FINAL REPORT
FOR THE
PHASE 2 REMEDIAL INVESTIGATION AT THE TONAWANDA LANDFILL FUSRAP VICINITY PROPERTY
IN TONAWANDA, NEW YORK

Contract No. **W912P4-07-D-0009, D.O. 0003**

Prepared for:

U.S. ARMY ENGINEER DISTRICT, BUFFALO

Buffalo, New York

Formerly Utilized Sites Remedial Action Program

Prepared by:

American Remediation Services and Environmental Corporation

2609 North River Road

Port Allen, LA 70767

March 2011

Appendix I. ARSEC Soil Core Survey Forms

Table of Contents for Appendices I, J and Q

Borehole	Date Drilled	Appendix I - Soil Survey Forms	Appendix J - Geologist Engineering Forms	Appendix Q HP Field Logbooks	Appendix Q Geologist Field Logbooks
IA1-1	3/8/2010	I-8	J-8	Q-55	Q-314
IA1-2	3/8/2010	I-12	J-12	Q-56	Q-315
IA1-3	3/15/2010	I-16	J-16	Q-181	Q-434
IA1-4	3/12/2010	I-20	J-20	Q-69	Q-430
IA1-5	3/16/2010	I-24	J-24	Q-183	Q-436
IA1-6	3/16-17/2010	I-28	J-28	Q-184-185	Q-437-438
IA1-7	3/9/2010	I-32	J-32	Q-57	Q-316
IA1-8	3/10/2010	I-36	J-36	Q-66	Q-426
IA1-9	3/11/2010	I-40	J-40	Q-68	Q-429
IA1-10	3/15/2010	I-44	J-45	Q-180	Q-433
IA1-11	3/12/2010	I-48	J-49	Q-178	Q-431
IA1-12	3/16/2010	I-52	J-52	Q-182	Q-435
IA1-13	3/10/2010	I-56	J-55	Q-62	Q-422
IA1-14	3/9/2010	I-59	J-58	Q-58	Q-317
IA1-15	3/11/2010	I-62	J-61	Q-67	Q-427-428
IA1-16	3/12/2010	I-67	J-65	Q-179	Q-432
IA1-17	3/10/2010	I-71	J-680	Q-63	Q-423
IA1-18	3/9/2010	I-74	J-70	Q-60	Q-420
IA1-19	3/9/2010	I-77	J-72	Q-59	Q-318
IA1-20	3/10/2010	I-80	J-74	Q-65	Q-425
IA1-21	3/10/2010	I-83	J-76	Q-64	Q-424
IA1-22	3/9/2010	I-86	J-78	Q-61	Q-421
IA1-DOE-B01	3/18/2010	I-89	J-80	Q-188	Q-441
IA1-DOE-B02	3/17/2010	I-92	J-83	Q-186	Q-439
IA1-DOE-B03	3/18/2010	I-95	J-86	Q-187	Q-440
IA1-B1	3/26/2010	I-98	J-89	Q-207	Q-461
IA1-B2	3/29/2010	I-102	J-92	Q-239	Q-493
IA1-B3	3/30/2010	I-110	J-96	Q-242	Q-496
IA1-B4	3/29/2010	I-114	J-100	Q-212	Q-466
IA1-B5	3/26/2010	I-118	J-104	Q-235	Q-490
IA1-B6	3/26/2010	I-122	J-108	Q-236-237	Q-491
IA1-B7	3/29/2010	I-126	J-113	Q-210	Q-464
IA1-B8	3/26/2010	I-130	J-117	Q-208	Q-462
IA1-B9	3/26/2010	I-134	J-121	Q-209	Q-463
IA1-B10	3/29/2010	I-138	J-125	Q-211	Q-465
IA1-B11	3/26/2010	I-142	J-129	Q-238	Q-492
IA1-B12	3/30/2010	I-142	J-134	Q-243	Q-497
IA1-B13	3/29/2010	I-146	J-138	Q-241	Q-495
IA1-B14	3/30/2010	I-150	J-142	Q-214-215	Q-467
IA1-B15	3/29/2010	I-154	J-147	Q-240	Q-494
IA1-B16	3/30/2010	I-158	J-151	Q-217	Q-470
IA1-B17	3/30/2010	I-162	J-155	Q-244	Q-498
IA2-1	3/18-19/2010	I-167	J-160	Q-189-190	Q-442-443
IA2-2	3/24/2010	I-170	J-163	Q-200	Q-454
IA2-3	3/23/2010	I-174	J-166	Q-231	Q-486
IA2-4	3/19+24/2010	I-178	J-171	Q-191 + Q-199	Q-444 + Q-453
IA2-5	3/24/2010	I-181	J-174	Q-198	Q-452
IA2-6	3/19/2010	I-184	J-177	Q-165	Q-482
IA2-7	3/22/2010	I-188	J-182	Q-166	Q-446

Table of Contents for Appendices I, J and Q

Borehole	Date Drilled	Appendix I - Soil Survey Forms	Appendix J - Geologist Engineering Forms	Appendix Q HP Field Logbooks	Appendix Q Geologist Field Logbooks
IA2-8	3/22/2010	I-192	J-186	Q-193	Q-447
IA2-9	3/22/2010	I-195	J-189	Q-194	Q-448
IA2-10	3/23/2010	I-198	J-191	Q-195	Q-449
IA2-11	3/23/2010	I-201	J-193	Q-197	Q-451
IA2-12	3/19/2010	I-204	J-195	Q-192	Q-445
IA2-13	3/22/2010	I-208	J-199	Q-228	Q-473
IA2-14	3/24/2010	I-212	J-202	Q-201	Q-455
IA2-15	3/24/2010	I-215	J-205	Q-202	Q-456
IA2-16	3/24/2010	I-218	J-207	Q-203	Q-457
IA2-17	3/25/2010	I-221	J-209	Q-232	Q-487
IA2-18	3/25/2010	I-224	J-211	Q-205	Q-459
IA2-19	3/25/2010	I-227	J-213	Q-204	Q-458
IA2-20	3/25/2010	I-230	J-215	Q-234	Q-489
IA2-21	3/25/2010	I-233	J-217	Q-206	Q-460
IA2-22	3/25/2010	I-236	J-219	Q-233	Q-488
IA2-DOE-B1	3/23/2010	I-239	J-221	Q-196	Q-450
IA2-DOE-B2	3/22/2010	I-242	J-223	Q-229	Q-484
IA2-DOE-B3	3/22/2010	I-245	J-226	Q-230	Q-485
IA3-1	2/15/2010	I-249	J-230	Q-12	Q-261
IA3-2	2/11/2010	I-252	J-233	Q-248	Q-257
IA3-3	2/12/2010	I-256	J-236	Q-11	Q-260
IA3-4	2/11/2010	I-259	J-239	Q-249	Q-255
IA3-5	2/15/2010	I-262	J-242	Q-13	Q-262
IA3-6	2/12/2010	I-265	J-245	Q-9	Q-258
IA3-7	2/15/2010	I-268	J-248	Q-16	Q-263
IA3-8	2/12/2010	I-271	J-251	Q-10	Q-259
IA3-9	2/15/2010	I-274	J-254	Q-17	Q-264
IA3-10	2/11/2010	I-277	J-257	Q-250	Q-256
IA3-11	2/16/2010	I-280	J-260	Q-19	Q-268
IA3-12	2/16/2010	I-283	J-263	Q-14	Q-265
IA3-13	2/16/2010	I-286	J-267	Q-15	Q-266
IA3-14	2/16/2010	I-289	J-270	Q-18	Q-267
IA3-15	2/17/2010	I-292	J-273	Q-23	Q-269
IA3-16	2/17/2010	I-295	J-276	Q-20	Q-270
IA3-17	2/17/2010	I-298	J-279	Q-72	Q-321
IA3-18	2/17/2010	I-301	J-281	Q-73	Q-322
IA3-19	2/18/2010	I-304	J-283	Q-24	Q-273
IA3-20	2/17/2010	I-307	J-286	Q-21	Q-271
IA3-21	2/17/2010	I-310	J-289	Q-74	Q-323
IA3-22	2/17/2010	I-313	J-291	Q-22	Q-272
IA3-B01	3/11/2010	I-316	J-294	Q-121-122	Q-369
IA3-B02	3/11/2010	I-319	J-297	Q-123	Q-370
IA3-B03	3/11/2010	I-322	J-300	Q-124	Q-371
IA3-B04	3/11/2010	I-225	J-303	Q-138	Q-395
IA3-B05	3/11/2010	I-328	J-306	Q-139	Q-396
IA3FL-0	3/4/2010	I-369	J-347	Q-104	Q-356
IA3FL-1	3/5/2010	I-372	J-350	Q-105	Q-357
IA3FL-2	3/4/2010	I-375	J-353	Q-51	Q-310
IA3FL-3	3/4/2010	I-378	J-356	Q-103	Q-355

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Borehole	Date Drilled	Appendix I - Soil Survey Forms	Appendix J - Geologist Engineering Forms	Appendix Q HP Field Logbooks	Appendix Q Geologist Field Logbooks
IA3FL-4	3/4/2010	I-381	J-359	Q-50	Q-309
IA3FL-5	3/4/2010	I-384	J-362	Q-49	Q-308
IA3FL-6	3/4/2010	I-387	J-365	Q-102	Q-354
IA3FL-7	3/5/2010	I-390	J-368	Q-52	Q-311
IA3FL-8	3/5/2010	I-393	J-371	Q-107	Q-359
IA3FL-9	3/5/2010	I-396	J-374	Q-54	Q-313
IA3FL-10	3/5/2010	I-399	J-377	Q-106	Q-358
IA3FL-11	3/5/2010	I-402	J-380	Q-53	Q-312
IA3-D1	3/16/2010	I-332	J-305	Q-175	Q-402
IA3-D2	3/15/2010	I-335	J-313	Q-143	Q-401
IA3-D3	3/15/2010	I-338	J-316	Q-148	Q-379
IA3-D4	3/15/2010	I-341	J-319	Q-147	Q-378
IA3-D5	3/15/2010	I-344	J-322	Q-146	Q-377
IA3-D6	3/15/2010	I-347	J-325	Q-145	Q-376
IA3-D7	3/15/2010	I-350	J-328	Q-144	Q-375
IA3-D8	3/12/2010	I-353	J-331	Q-173	Q-374
IA3-D9	3/14/2010	I-356	J-334	Q-142	Q-373
IA3-D10	3/12/2010	I-359	J-337	Q-141	Q-372
IA3-D11	3/11/2010	I-362	J-340	Q-172	Q-398
IA3-D12	3/11/2010	I-365	J-343	Q-140	Q-397
IA4-1	3/3/2010	I-406	J-384	Q-100	Q-351
IA4-2	3/3/2010	I-409	J-387	Q-99	Q-350
IA4-3	3/3/2010	I-413	J-390	Q-99	Q-348-349
IA4-4	3/2/2010	I-416	J-393	Q-43	Q-298-299
IA4-5	3/3/2010	I-420	J-397	Q-48	Q-306-307
IA4-6	3/3/2010	I-424	J-400	Q-101	Q-352-353
IA4-7	3/1/2010	I-428	J-403	Q-40	Q-293-294
IA4-8	3/1/2010	I-433	J-408	Q-93-94	Q-342-343
IA4-9	3/3/2010	I-438	J-413	Q-47	Q-303-305
IA4-10	3/3/2010	I-442	J-417	Q-46	Q-301-302
IA4-11	2/26/2010	I-446	J-421	Q-39	Q-292
IA4-12	not drilled	I-450	J-425	N/A	N/A
IA4-13	3/30/2010	I-451	J-426	Q-216	Q-468-469
IA4-14	3/2/2010	I-455	J-429	Q-97-98	Q-346-347
IA4-15	3/1/2010	I-458	J-432	Q-41-42	Q-295-296
IA4-16	2/26/2010	I-462	J-435	Q-91-92	Q-340-341
IA4-17	2/26/2010	I-467	J-440	Q-38	Q-290-291
IA4-18	3/2/2010	I-472	J-446	Q-45	Q-300
IA4-19	3/1/2010	I-478	J-454	Q-43	Q-297
IA4-20	3/2/2010	I-482	J-458	Q-95-96	Q-344-345
IA4-21	2/18/2010	I-487	J-463	Q-251	Q-325
IA4-22	2/18/2010	I-490	J-466	Q-75	Q-324
IA4-B01	3/9/2010	I-493	J-468	Q-111-112	Q-360-361
IA4-B02	3/9/2010	I-498	J-475	Q-113-114	Q-362
IA4-B03	3/9/2010	I-503	J-481	Q-136	Q-389-390
IA4-B04	3/9/2010	I-508	J-486	Q-137	Q-391
IA4-B05	3/10/2010	I-513	J-492	Q-119-120	Q-367-368
IA5-1	2/24-25/2010	I-518	J-496	Q-87-88	Q-337-338
IA5-2	2/24/2010	I-521	J-498	Q-84-86	Q-335-336

Table of Contents for Appendices I, J and Q

Borehole	Date Drilled	Appendix I - Soil Survey Forms	Appendix J - Geologist Engineering Forms	Appendix Q HP Field Logbooks	Appendix Q Geologist Field Logbooks
IA5-3	2/24/2010	I-527	J-505	Q-82-83	Q-333-334
IA5-4	2/23/2010	I-530	J-506	Q-81	Q-332
IA5-5	2/23/2010	I-536	J-513	Q-80	Q-330-331
IA5-6	2/23/2010	I-541	J-518	Q-32	Q-282
IA5-7	2/23/2010	I-546	J-524	Q-31	Q-281
IA5-8	2/22/2010	I-551	J-528	Q-78-79	Q-328-329
IA5-9	2/25/2010	I-556	J-534	Q-89-90	Q-339
IA5-10	2/25/2010	I-563	J-543	Q-36	Q-288
IA5-11	2/25/2010	I-567	J-546	Q-35	Q-286-287
IA5-12	2/24/2010	I-571	J-549	Q-34	Q-284-285
IA5-13	2/23/2010	I-576	J-556	Q-30	Q-280
IA5-14	2/24/2010	I-580	J-560	Q-33	Q-283
IA5-15	2/22/2010	I-584	J-564	Q-28	Q-277
IA5-16	2/25/2010	I-589	J-569	Q-37	Q-289
IA5-17	2/22/2010	I-595	J-576	Q-29	Q-278-279
IA5-18	2/19/2010	I-600	J-582	Q-27	Q-276
IA5-19	2/18/2010	I-605	J-586	Q-26	Q-275
IA5-20	2/19/2010	I-608	J-589	Q-76	Q-326
IA5-21	2/18/2010	I-613	J-594	Q-25	Q-274
IA5-22	2/22/2010	I-616	J-598	Q-77	Q-327
IA5-B01	3/10/2010	I-620	J-602	Q-117-118	Q-365-366
IA5-B02	3/10/2010	I-624	J-605	Q-115-116	Q-363-364
IA5-B03	3/10/2010	I-627	J-608	Q-170-171	Q-393-394
IA6-1	3/19/2010	I-633	J-616	Q-227	Q-481
IA6-2	3/19/2010	I-636	J-618	Q-226	Q-480
IA6-3	3/19/2010	I-639	J-622	Q-163-164	Q-416-417
IA6-4	3/19/2010	I-642	J-625	Q-161-162	Q-415
IA6-5	3/18/2010	I-645	J-626	Q-159-160	Q-413-414
IA6-6	3/18/2010	I-649	J-630	Q-157-158	Q-411-412
IA6-7	3/18/2010	I-653	J-633	Q-155-156	Q-409-410
IA6-8	3/18/2010	I-657	J-634	Q-153-154	Q-407-408
IA6-9	3/18/2010	I-661	J-635	Q-152	Q-406
IA6-10	3/17/2010	I-665	J-638	Q-151	Q-405
IA6-11	3/16/2010	I-669	J-644	Q-150	Q-404
IA6-12	3/16/2010	I-673	J-647	Q-149	Q-403
IA6-13	3/16/2010	I-677	J-650	Q-125-126	Q-380-381
IA6-14	3/16-17/2010	I-681	J-654	Q-127-128	Q-473
IA6-15	3/8/2010	I-685	J-658	Q-110	Q-388
IA6-16	3/8/2010	I-689	J-661	Q-109	Q-387
IA6-17	3/8/2010	I-692	J-664	Q-108	Q-384
IA6-18	3/17/2010	I-696	J-668	Q-129	Q-474
IA6-19	3/18/2010	I-700	J-672	Q-130	Q-475
IA6-20	3/18/2010	I-704	J-675	Q-131-132	Q-476-477
IA6-21	3/18/2010	I-708	J-679	Q-133	Q-478
IA6-22	3/18/2010	I-711	J-682	Q-225	Q-479
IA6-B01	3/10/2010	I-715	J-685	Q-169	Q-392

Table of Contents for Appendices I, J and Q

Borehole	Date Drilled	Appendix I - Soil Survey Forms	Appendix J - Geologist Engineering Forms	Appendix Q HP Field Logbooks	Appendix Q Geologist Field Logbooks
Temporary Well Points					
TWP-1	4/1/2010			Q-222	Q-505
TWP-2	4/1/2010			Q-221	Q-506
TWP-3	3/31/2010			Q-219	Q-501
TWP-4	4/1/2010			Q-220	Q-502
TWP-5	4/1/2010			Q-220	Q-502
TWP-6	3/31/2010			Q-218	Q-500
TWP-7	3/31/2010			Q-218	Q-500
TWP-8	4/1/2010			Q-221	Q-503
TWP-9	4/2/2010			Q-246	Q-507
TWP-10	4/1/2010			Q-222	Q-506
TWP-11	4/2/2010			Q-246	Q-508
TWP-12	4/2/2010			Q-247	Q-509
TWP-13	3/31/2010			Q-245	Q-499
TWP-14	4/2/2015			Q-247	Q-510

Soil and Core Survey Forms
Investigative Area 1

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA1-1

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-8-10	
Time of Activity	09:15	
Surveyor Name	Zach Hill	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093062.69	1065749.26
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187758	Ludlum 12 / 180411
Detector Model and Serial No.	Ludlum 44-10 / PR156393	Ludlum 44-9 / PR113654
Calibration Due Date	10-19-10	2-23-11
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 3708 cpm

Notes and Comments:

Backgrounds: Gamma: 4124 cpm (Ludlum Model 2221)

Beta: 66 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.8 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-8-10
Signature (Surveyor) Date

[redacted] 3-8-10
Signature (Sampler) Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 0.8	
0.5	4898	60	Standard	0.8 – 1.3	4566	60	0	TLS-SS-IA1-1(0.8-1.3)030810	1
1.0	5075	80					0		
2.0	4692	60					0		
3.0	4899	120					0		
4.0							0	No recovery 4.0 – 5.4	
5.0	5143	100					0		
6.0	5846	160					0		
7.0	5704	100					0		
8.0							0	No recovery 8.0 – 14.6	
9.0							0	↓	
10.0							0	↓	
11.0							0	↓	
12.0							0	↓	
13.0							0	↓	
14.0							0	↓	
15.0	5400	80					0		

Core I.D. Number	IA1-1

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0							0	No recovery 16.0 – 18.1	
17.0							0	↓	
18.0	5456	120					0		
19.0	5803	160	Standard	19.1 – 20.1	7330	82	0	TLS-SB-IA1-1(19.1-20.1)030810	5
20.0							0	No recovery 20.0 – 21.5	
21.0							0	↓	
22.0	11109	600	Standard	21.8 - 22.8	9285	702	0	TLS-SB-IA1-1(21.8-22.8)030810	2
23.0	10642	200	Standard	22.8 – 23.8	6232	116	0	TLS-SB-IA1-1(22.8-23.8)030810	4
24.0	8349	100	Standard	23.8 – 24.8	5092	79	0	TLS-SB-IA1-1(23.8-24.8)030810	3
25.0	5960	120	Standard	24.8 – 25.8	5222	73	0	TLS-SB-IA1-1(24.8-25.8)030810 (Chemical)	
26.0	6220	80					0		
27.0	5861	80					0		
28.0				N					
29.0									
30.0									
31.0					A				
32.0									

Core I.D. Number	IA1-1

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA1-2

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-08-10	
Time of Activity	13:30	
Surveyor Name	Zach Hill	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093062.69	1065749.26
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187758	Ludlum 12 / 180411
Detector Model and Serial No.	Ludlum 44-10 / PR156393	Ludlum 44-9 / PR113654
Calibration Due Date	10-19-10	2-23-11
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 4980 cpm

Notes and Comments:

Backgrounds: Gamma: 5689 cpm (Ludlum Model 2221)

Beta: 49 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 21.6 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-8-10
Signature (Surveyor) Date

[redacted] 3-8-10
Signature (Sampler) Date

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 0.5	
0.5	5590	60	Standard	0.5 -1.0	5683	69	0	TLS-SS-IA1-2(0.5-1.0)030810	1
1.0	5861	80					0		
2.0	6073	100					0		
3.0	6086	80					0		
4.0	6798	80					0	No recovery 4.0 – 4.3	
5.0	6124	100					0		
6.0	6267	100					0		
7.0	6628	120					0		
8.0							0	No recovery 8.0 – 18.3	
9.0							0	↓	
10.0							0	↓	
11.0							0	↓	
12.0							0	↓	
13.0							0	↓	
14.0							0	↓	
15.0							0	↓	

Core I.D. Number	IA1-2

ARSEC
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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0							0	No recovery 8.0 – 18.3	
17.0							0	↓	
18.0	7166	200	Standard	18.3 – 19.3	6871	154	0	TLS-SB-IA1-2(18.3-19.3)030810	5
19.0	6652	180					0		
20.0							0	No recovery 20.0 – 21.7	
21.0							0	↓	
22.0	6805	140	Standard	21.7 – 22.7	6375	98	0	TLS-SB-IA1-2(21.7-22.7)030810	2
23.0	8101	450	Standard	22.7 – 23.7	8244	637	0	TLS-SB-IA1-2(22.7-23.7)030810	4
24.0	7010	200	Standard	23.7 – 24.7	7268	156	0	TLS-SB-IA1-2(23.7-24.7)030810(Chemical)	
25.0	5607	80	Standard	25.0 – 26.0	5488	57	0	TLS-SB-IA1-2(25.0-26.0)030810	3
26.0							0		
27.0				N			0		
28.0									
29.0					A				
30.0									
31.0									
32.0									

Core I.D. Number	IA1-2

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA1-3

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-15-10	
Time of Activity	13:55	
Surveyor Name	Dave Warren	
Sampler Name	Mike Carlin	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093016.46	1065880.57
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187758	Ludlum 12 / 180411
Detector Model and Serial No.	Ludlum 44-10 / PR156393	Ludlum 44-9 / PR113654
Calibration Due Date	10-19-10	2-23-11
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 5853 cpm

Notes and Comments:

Backgrounds: Gamma: 4966 cpm (Ludlum Model 2221)

Beta: 38 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted]

Signature (Surveyor) 3-15-10 Date

[redacted]

Signature (Sampler) 3-15-10 Date

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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 1.2	
0.5							0	↓	
1.0	5087	70	Standard	1.2 – 1.7	5449	74	0	TLS-SS-IA1-3(1.2-1.7)031510	1
2.0	5022	80					0		
3.0	5271	60					0		
4.0							0	No recovery 4.0 – 6.6	
5.0							0	↓	
6.0							0	↓	
7.0	5768	100					0		
8.0							0	No recovery 8.0 – 11.4	
9.0							0	↓	
10.0							0	↓	
11.0	5328	60					0		
12.0							0	No recovery 12.0 – 14.0	
13.0							0	↓	
14.0							0	↓	
15.0	5665	80					0		

Core I.D. Number	IA1-3

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0	5160	60	Standard	15.5 – 16.0/17.6 – 18.1	17312	892	0	TLS-SB-IA1-3(15.5-16.0/17.6-18.1)031510(Chemical)	
17.0							0	No recovery 16.0 – 17.6	
18.0	21179	1200	Standard	18.1 -19.1	27250	1179	0	TLS-SB-IA1-3(18.1-19.1)031510	2
19.0	10528	500	Standard	19.1 – 20.0/24.0 – 24.1	14719	719	0	TLS-SB-IA1-3(19.1-20.0/24.1)031510	5
20.0							0	No recovery 20.0 – 24.0	
21.0							0	↓	
22.0							0	↓	
23.0							0	↓	
24.0	6672	80	Standard	24.1 – 25.1	6198	89	0	TLS-SB-IA1-3(24.0-25.0)031510	3
25.0	7510	100					0		
26.0	8094	100	Standard	26.0 – 27.0	7880	64	0	TLS-SB-IA1-3(26.0-27.0)031510	4
27.0	6126	120							
28.0				N					
					A				

Core I.D. Number	IA1-3

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA1-4

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-12-10	
Time of Activity	08:56	
Surveyor Name	Zach Hill	
Sampler Name	Mike Carlin	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093106.46	1065836.8
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187758	Ludlum 12 / 180411
Detector Model and Serial No.	Ludlum 44-10 / PR156393	Ludlum 44-9 / PR113654
Calibration Due Date	10-19-10	2-23-11
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 4935 cpm

Notes and Comments:

Backgrounds: Gamma: 6169 cpm (Ludlum Model 2221)

Beta: 40 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-12-10
Signature (Surveyor) Date

[redacted] 3-12-10
Signature (Sampler) Date

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 1.1	
0.5							0	↓	
1.0	6287	80	Standard	1.1 – 1.6	6196	62	0	TLS-SS-IA1-4(1.1-1.6)031210	1
1.5	6451	60					0		
2.6	6831	100					0		
4.0							0	No recovery 4.0 – 6.7	
5.0							0	↓	
6.0								↓	
7.0	7537	140	Standard	6.7 – 7.7	6714	76	0	TLS-SB-IA1-4(6.7- 7.7)031210(Chemical)	
8.0							0	No recovery 8.0 – 10.8	
9.0							0	↓	
10.0							0	↓	
11.0	7537	100	Standard	10.8 – 11.8	6642	71	0	TLS-SB-IA1-4(10.8-11.8)031210	4
12.0							0	No recovery 12.0 – 17.8	
13.0							0	↓	
14.0							0	↓	
15.0							0	↓	

Core I.D. Number	IA1-4

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0							0	No recovery 12.0 – 17.8	
17.0							0	↓	
18.0	7113	120					0		
19.0	7013	300	Standard	19.0 – 20.0	6642	71	0	TLS-SB-IA1-4(19.0-20.0)031210	5
20.0	6567	220					0	No recovery 20.0 – 20.3	
21.0	6628	80	Standard	21.3 – 22.3	6433	67	0	TLS-SB-IA1-4(21.3-22.3)031210	2
22.0	6192	60	Standard	22.8 – 23.8	6571	77	0	TLS-SB-IA1-4(22.8-23.8)031210	3
23.0	6382	80					0		
24.0									

Core I.D. Number	IA1-4

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

Soil Core I.D. Number: IA1-5

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-16-10	
Time of Activity	10:40	
Surveyor Name	Zach Hill	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093106.46	1065793.03
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187758	Ludlum 12 / 180411
Detector Model and Serial No.	Ludlum 44-10 / PR156393	Ludlum 44-9 / PR113654
Calibration Due Date	10-19-10	2-23-11
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 4845 cpm

Notes and Comments:

Backgrounds: Gamma: 6059 cpm (Ludlum Model 2221)

Beta: 50 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-16-10
Signature (Surveyor) Date

[redacted] 3-16-10
Signature (Sampler) Date

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 1.5	
0.5							0	↓	
1.0	9531	80	Standard	1.0 – 1.5	8179	74	0	TLS-SS-IA1-5(1.0-1.5)031610	1
2.0	22105	200					0		
3.0	168780	10600	Standard	3.0 – 4.0	284073	16334	0	TLS-SB-IA1-5(3.0-4.0)031610	4
4.0							0	No recovery 4.0 – 5.1	
5.0	11804	600					0		
6.0	22657	450					0		
7.0	57467	1000	Standard	7.0 – 8.0	1558	66819	0	TLS-SB-IA1-5(7.0-8.0)031610	5
8.0							0		
9.0							0	↓	
10.0	13558	200					0		
11.0	14815	250					0		
12.0							0	No recovery 12.0 – 14.6	
13.0							0	↓	
14.0							0	↓	
15.0	12449	180	Standard	14.6 – 15.6	16671	384	0	TLS-SB-IA1-5(14.6-15.6)031610	2

Core I.D. Number	IA1-5

ARSEC
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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0							0	No recovery 16.0 – 19.2	
17.0							0	↓	
18.0							0	↓	
19.0	13085	450					0		
20.0							0	No recovery 20.0 – 23.0	
21.0							0	↓	
22.0							0	↓	
23.0	10745	900					0		
24.0	7404	180	Standard	24.0 – 25.0	6187	89	0	TLS-SB-IA1-5(24.0-25.0)031610	3
25.0	7319	80					0		
26.0	7466	60					0		
27.0	7906	80					0		
28.0			N				0		
					A				

Core I.D. Number	IA1-5

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

Soil Core I.D. Number: IA1-6

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-17-10	
Time of Activity	09:00	
Surveyor Name	Zach Hill	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093106.46	1065749.26
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187758	Ludlum 12 / 180431
Detector Model and Serial No.	Ludlum 44-10 / PR156393	Ludlum 44-9 / 193567
Calibration Due Date	10-19-10	10-19-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 5552 cpm

Notes and Comments:

Backgrounds: Gamma: 3962 cpm (Ludlum Model 2221)

Beta: 41 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-17-10
Signature (Surveyor) Date

[redacted] 3-17-10
Signature (Sampler) Date

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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Statie Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 1.2	
0.5							0	↓	
1.0	5800	80	Standard	1.2 – 1.7	6178	41	0	TLS-SS-IA1-6(1.2-1.6)031710	1
2.0	6255	100					0		
3.0	6973	420	Standard	3.0 – 4.0	8112	387	0	TLS-SB-IA1-6(3.0-4.0)031710	5
4.0							0	No recovery 4.0 – 5.4	
5.0	7886	160	Standard	5.4 – 6.4	9094	120	0	TLS-SB-IA1-6(5.4-6.4)031710	4
6.0	7815	160	Standard	6.4 – 7.4	7853	85	0	TLS-SB-IA1-6(6.4-7.4)031710(Chemical)	
7.0	7132	220					0		
8.0							0	No recovery 8.0 – 13.0	
9.0							0	↓	
10.0							0	↓	
11.0							0	↓	
12.0							0	↓	
13.0	7128	120					0		
14.0	7451	120					0		
15.0	7426	140					0		

Core I.D. Number	IA1-6

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0	4717	80					0	No recovery 16.0 – 17.3	
17.0	7108	120					0		
18.0	7135	140					0		
19.0	6839	100					0		
20.0							0	No recovery 20.1 – 22.5	
21.0							0	↓	
22.0	7421	320		22.5 – 24.0			0		
23.0				↓			0		
24.0							0	No recovery 24.0 – 25.8	
25.0							0	↓	
26.0	7143	60	Standard	25.8 – 26.8	6314	58	0	TLS-SB-IA1-6(25.8-26.8)031710	2
27.0	7084	80	Standard	26.8 – 27.8	6798	44	0	TLS-SB-IA1-6(26.8-27.8)031710	3
28.0				N			0		
					A				

Core I.D. Number	IA1-6

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

Soil Core I.D. Number: IA1-7

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-9-10	
Time of Activity	08:40	
Surveyor Name	Zach Hill	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093054.43	1066517.48
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187758	Ludlum 12 / 180411
Detector Model and Serial No.	Ludlum 44-10 / PR156393	Ludlum 44-9 / PR113654
Calibration Due Date	10-19-10	2-23-11
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 2503 cpm

Notes and Comments:

Backgrounds: Gamma: 4798 cpm (Ludlum Model 2221)

Beta: 52 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Surface static count low due to thick sheet ice at bore location.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-9-10
Signature (Surveyor) Date

[redacted] 3-9-10
Sig[redacted]mpler) Date

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 1.0	
0.5							0	↓	
1.0	5579	60	Standard	1.0 – 1.5	5250	28	0	TLS-SS-IA1-7(1.0-1.5)030910	1
1.5	5075	80					0		
2.5	5598	90					0		
3.5	5472	80					0		
4.0							0	No recovery 4.0 – 5.0	
5.0	5600	80	Standard	5.0 – 6.0	5455	64	0	TLS-SB-IA1-7(5.0–6.0)030910	5a
6.0	5497	100					0		
7.0	5607	70					0		
8.0							0	No recovery 8.0 – 17.6	
9.0							0	↓	
10.0							0	↓	
11.0							0	↓	
12.0							0	↓	
13.0							0	↓	
14.0							0	↓	

Core I.D. Number	IA1-7

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
15.0							0	No recovery 8.0 – 17.6	
16.0							0	↓	
17.6	5636	120	Standard	17.6 – 18.6	5625	52	0	TLS-SB-IA1-7(17.6-18.6)030910	4
18.6	5362	120	Standard	18.6 – 19.6	5577	70	0	TLS-SB-IA1-7(18.6-19.6)030910	5
20.0							0	No recovery 20.0 – 20.5	
20.5	5057	100					0		
21.5	5329	80	Standard	21.5 – 22.5	5396	57	0	TLS-SB-IA1-7(21.5–22.5)030910	3
22.5	5380	80					0		
23.5	5373	60					0		
24.0							0	No recovery 24.0 – 28.0	
25.0							0	↓	
26.0							0	↓	
27.0							0	↓	
28.0							0	↓	

Core I.D. Number	IA1-7

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA1-8

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-10-10	
Time of Activity	15:10	
Surveyor Name	Zach Hill	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093150.24	1065968.11
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187758	Ludlum 12 / 180411
Detector Model and Serial No.	Ludlum 44-10 / PR156393	Ludlum 44-9 / PR113654
Calibration Due Date	10-19-10	2-23-11
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 5321 cpm

Notes and Comments:

Backgrounds: Gamma: 6053 cpm (Ludlum Model 2221)

Beta: 41 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: 0 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-10-10
Signature (Surveyor) Date

[redacted] 3-10-10
Signature (Sampler) Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 1.5	
0.5							0	↓	
1.0	7464	80	Standard	1.5 – 2.0	7163	53	0	TLS-SS-IA1-8(1.1-1.6)031010	1
2.0	7249	80					0		
3.0	7199	140	Standard	3.0 – 4.0	7180	64	0	TLS-SB-IA1-8 (3.0-4.0)031010	5
4.0							0	No recovery 4.0 – 4.7	
5.0	7358	100	Standard	4.7 – 5.7	7084	75	0	TLS-SB-IA1-8(4.7-5.7)031010	5a
6.0	7841	80	Standard	5.7 – 6.7	7340	66	0	TLS-SB-IA1-8(5.7-6.7)031010	4
7.0	7566	120	Standard	6.7 – 7.7	7094	67	0	TLS-SB-IA1-8(6.7-7.7)031010(Chemical)	
8.0							0	No recovery 8.0 – 24.0	
9.0							0	↓	
10.0							0	↓	
11.0							0	↓	
12.0							0	↓	
13.0							0	↓	
14.0							0	↓	
15.0							0	↓	

Core I.D. Number	IA1-8

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0							0	No recovery 8.0 – 24.0	
17.0							0	↓	
18.0							0	↓	
19.0							0	↓	
20.0							0	↓	
21.0							0	↓	
22.0							0	↓	
23.0							0	↓	
24.0	6973	60	Standard	24.8 – 25.8	7345	79	0	TLS-SB-IA1-8(24.8-25.8)031010	3
25.0	7170	60					0		
26.0	7167	80					0		
27.0	6943	60					0		
28.0									
29.0									
30.0									
31.0									
32.0									

Core I.D. Number	IA1-8

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA1-9

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-11-10	
Time of Activity	13:45	
Surveyor Name	Zach Hill	
Sampler Name	Zach Hill	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093150.24	1065924.34
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187758	Ludlum 12 / 180431
Detector Model and Serial No.	Ludlum 44-10 / PR156393	Ludlum 44-9 / PR193567
Calibration Due Date	10-19-10	10-19-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 5568 cpm

Notes and Comments:

Backgrounds: Gamma: 6307 cpm (Ludlum Model 2221)

Beta: 45 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 21.3 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-11-10
Signature (Surveyor) Date

[redacted] 3-11-10
Signature (Sampler) Date

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2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 2.0	
0.5							0	↓	
1.0							0	↓	
2.0	6714	100	Standard	2.0 – 2.5	6445	52	0	TLS-SS-IA1-9(2.0-2.5)031110	1
2.6	6625	90					0		
4.0							0	No recovery 4.0 – 5.7	
5.0							0	↓	
6.0	7314	100	Standard	5.7 – 6.7	6960	79	0	TLS-SB-IA1-9(5.7-6.7)031110	5
7.0	7643	80	Standard	6.7 – 7.7	7176	50	0	TLS-SB-IA1-9(6.7-7.7)031010	4
8.0							0	No recovery 8.0 – 19.0	
9.0							0	↓	
10.0							0	↓	
11.0							0	↓	
12.0							0	↓	
13.0							0	↓	
14.0							0	↓	
15.0							0	↓	

Core I.D. Number	IA1-9

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0							0	No recovery 8.0 – 19.0	
17.0							0	↓	
18.0							0	↓	
19.0	7112	80					0		
20.0							0	No recovery 20.0 – 21.0	
21.0	6978	120	Standard	21.1 – 22.1	6448	58	0	TLS-SB-IA1-9(21.1-22.1)031110	2
22.0	7086	100	Standard	22.8 – 23.8	6795	52	0	TLS-SB-IA1-9(22.8-23.8)031110	3
23.0	6828	90					0		
24.0							0	No recovery 24.0 – 28.3	
25.0							0	↓	
26.0							0	↓	
27.0							0	↓	
28.0	6221	60					0		
29.0	6512	60					0		
30.0	6357	80					0		
31.0									
32.0									

Core I.D. Number	IA1-9

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA1-10

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-15-10	
Time of Activity	09:35	
Surveyor Name	Dave Warren	
Sampler Name	Mike Carlin	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093150.24	1065880.57
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187758	Ludlum 12 / 180411
Detector Model and Serial No.	Ludlum 44-10 / PR156393	Ludlum 44-9 / PR113654
Calibration Due Date	10-19-10	2-23-11
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 4538 cpm

Notes and Comments:

Backgrounds: Gamma: 4993 cpm (Ludlum Model 2221)

Beta: 74 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-15-10
Signature (Surveyor) Date

[redacted] 3-15-10
Signature (Sampler) Date

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 1.2	
0.5							0	↓	
1.2	5376	100	Standard	1.2 – 1.7	5020	59	0	TLS-SS-IA1-10(1.2-1.7)031510	1
1.7	5295	80					0		
3.0	4766	100					0		
4.0							0	No recovery 4.0 – 10.5	
5.0							0	↓	
6.0							0	↓	
7.0							0	↓	
8.0							0	↓	
9.0							0	↓	
10.0	6198	120	Standard	10.5 – 11.5	5530	91	0	TLS-SB-IA1-10(10.5-11.5)031510	4
11.0	5859	150	Standard	11.5 – 12.0/13.9 – 14.4	5016	57	0	TLS-SB-IA1-10(11.5-12.0/13.9-14.4)031510	5
12.0							0	No recovery 12.0 – 13.9	
13.0							0	↓	
14.0	5353	80					0		
15.0	5865	60					0		

Core I.D. Number	IA1-10

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree
16.0							0	No recovery 16.0 – 17.8	
17.0							0		
18.0	5636	80	Standard	17.8 – 18.8	5393	67	0	TLS-SB-IA1-10(17.8-18.8)031510	2
19.0	5148	80					0		
20.0	5846	100	Standard	20.0 – 21.0	5094	45	0	TLS-SB-IA1-10(20.0-21.0)031510	3
21.0	5278	120							
22.0	5251	60							
23.0	4850	80							
24.0									

Core I.D. Number	IA1-10

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

Soil Core I.D. Number: IA1-11

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-12-10	
Time of Activity	11:02	
Surveyor Name	Zach Hill	
Sampler Name	Mike Carlin	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093156.72	1066517.48
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187758	Ludlum 12 / 180411
Detector Model and Serial No.	Ludlum 44-10 / PR156393	Ludlum 44-9 / PR113654
Calibration Due Date	10-19-10	2-23-11
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 5621 cpm

Notes and Comments:

Backgrounds: Gamma: 5888 cpm (Ludlum Model 2221)

Beta: 65 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Area scan after coring <8K cpm. LAWs of equipment and work area <100 cpm.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-12-10
Signature (Surveyor) Date

[redacted] 3-12-10
Signature (Sampler) Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 1.8	
0.5							0	↓	
1.0							0	↓	
2.0	6572	120	Standard	1.8 – 2.3	7092	74	0	TLS-SS-IA1-11(1.8-2.3)031210	1
2.3	6391	90					0		
3.0	6757	140					0		
4.0							0	No recovery 4.0 – 7.2	
5.0							0	↓	
6.0							0	↓	
7.0	6687	120					0		
8.0							0	No recovery	
9.0							0	↓	
10.0	10143	800					0		
11.0	9203	1100	Standard	11.0 – 12.0	11667	814	0	TLS-SB-IA1-11(11.0-12.0)031210	5
12.0							0	No recovery 12.0 – 13.4	
13.0	9218	300	Standard	13.4 – 14.4	9167	249	0	TLS-SB-IA1-11(13.4-14.4)031210	2
14.0	9733	800	Standard	14.4 – 15.4	8129	272	0	TLS-SB-IA1-4(14.4-15.4)031210	4

Core I.D. Number	IA1-11

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
15.0	8663	200					0		
16.0							0	No recovery 16.0 – 16.6	
16.6	6791	100	Standard	16.8 – 17.8	6976	67	0	TLS-SB-IA1-11(16.8-17.8)031210	3
18.0	7588	200	Standard	18.0 – 19.0	7403	92	0	TLS-SB-IA1-11(18.0-19.0)031210(Chemical)	
19.0	7317	80					0		
20.0									

Core I.D. Number	IA1-11

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

Soil Core I.D. Number: IA1-12

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-16-10	
Time of Activity	09:20	
Surveyor Name	Zach Hill	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093156.72	1066517.48
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187758	Ludlum 12 / 180411
Detector Model and Serial No.	Ludlum 44-10 / PR156393	Ludlum 44-9 / PR113654
Calibration Due Date	10-19-10	2-23-11
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 5940 cpm

Notes and Comments:

Backgrounds: Gamma: 6075 cpm (Ludlum Model 2221)

Beta: 45 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-16-10
Signature (Surveyor) Date

[redacted] 3-16-10
Signature (Sampler) Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 2.0	
0.5							0	↓	
1.0							0	↓	
2.0	7010	80	Standard	2.0 – 2.5	6231	59	0	TLS-SS-IA1-12(2.0-2.5)031610	1
3.0	9452	120	Standard	2.5 – 3.5	8208	141	0	TLS-SB-IA1-12(2.5-3.5)031610	5a
4.0							0	No recovery 4.0 – 6.5	
5.0							0		
6.0							0		
7.0	11940	800	Standard	6.5 – 7.5	9609	943	0	TLS-SB-IA1-12(6.5-7.5)031610	4
8.0							0	No recovery 8.0 – 11.3	
9.0							0	↓	
10.0							0	↓	
11.0	8287	140	Standard	11.3 – 12.0	7611	74	0	TLS-SB-IA1-12(11.3-12.0)031610	5
12.0							0	No recovery 12.0 – 16.3	
13.0							0	↓	
14.0							0	↓	
15.0							0	↓	

Core I.D. Number	IA1-12

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0	6108	100	Standard	16.3 – 17.3	5978	34	0	TLS-SB-IA1-12(16.3-17.3)031610	3
17.0	6289	100					0		
18.0	6868	80					0		
19.0	6985	60					0		
20.0							0		

Core I.D. Number	IA1-12

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

Soil Core I.D. Number: IA1-13

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-10-10	
Time of Activity	08:50	
Surveyor Name	Zach Hill	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093150.24	1065749.26
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187758	Ludlum 12 / 180411
Detector Model and Serial No.	Ludlum 44-10 / PR156393	Ludlum 44-9 / PR113654
Calibration Due Date	10-19-10	2-23-11
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 2989 cpm

Notes and Comments:

Backgrounds: Gamma: 6805 cpm (Ludlum Model 2221)

Beta: 48 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: 0 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Static count at bore location low due to thick sheet ice.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-10-10
Signature (Surveyor) Date

[redacted] 3-10-10
Signature (Sampler) Date

ARSEC
909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 1.2	
0.5							0	↓	
1.2	7350	60	Standard	1.2 – 1.7	6886	59	0	TLS-SS-IA1-13(1.2-1.7)031010	1
1.7	7415	60	Standard	1.7 – 2.7	7153	62	0	TLS-SB-IA1-13(1.7-2.7)031010	5a
2.7	7639	90	Duplicate	3.0 – 4.0	7496	60	0	TLS-SB-IA1-13(3.0-4.0)031010	4
4.0							0	No recovery 4.0 – 6.0	
5.0							0	↓	
6.0	7242	80	Standard	6.0 – 7.0	7151	60	0	TLS-SB-IA1-13(6.0-7.0)031010(Chemical)	
7.0	7385	100	Standard	7.0 – 8.0	7013	44	0	TLS-SB-IA1-13(7.0-8.0)031010	5
8.0							0	No recovery 8.0 – 8.9	
9.0	7147	80	Standard	8.9 – 9.9	7044	70	0	TLS-SB-IA1-13(8.9-9.9)031010	3
10.0	7292	80					0		
11.0	7230	70					0		
12.0	7012	60					0		
13.0	7004	80					0		
14.0									
15.0									

Core I.D. Number	IA1-13

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA1-14

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-9-10	
Time of Activity	10:50	
Surveyor Name	Zach Hill	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093156.72	1066210.59
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187758	Ludlum 12 / 180411
Detector Model and Serial No.	Ludlum 44-10 / PR156393	Ludlum 44-9 / PR113654
Calibration Due Date	10-19-10	2-23-11
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 3063 cpm

Notes and Comments:

Backgrounds: Gamma: 6080 cpm (Ludlum Model 2221)

Beta: 57 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Surface static count at this bore location low due to thick ice sheet covering ground.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-9-10
Signature (Surveyor) Date

[redacted] 3-9-10
Signature (Sampler) Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 1.6	
0.5							0	↓	
1.0	5777	60	Standard	1.6 – 2.1	6069	53	0	TLS-SS-IA1-14(1.6-2.1)030910	1
2.0	5857	80	Standard	2.1 – 3.1	5797	67	0	TLS-SB-IA1-14(2.1-3.1)030910	5c
3.0	6338	80	Standard	3.1 – 4.0	5796	61	0	TLS-SB-IA1-14(3.1-4.0)030910	5
4.0	6876	100					0		
5.0	6523	70	Standard	5.0 – 6.0	6003	62	0	TLS-SB-IA1-14(5.0-6.0)030910	3
6.0	5966	80					0		
7.0	5937	80					0		
8.0	6685	100	Standard	6.0 – 7.0	5982	70	0	TLS-SB-IA1-14(6.0-7.0)030910	4
9.0	6189	80					0		
10.0							0	Refusal @ 10.5'	
11.0				N					
12.0									
13.0					A				
14.0									
15.0									

Core I.D. Number	IA1-14

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA1-15

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-11-10	
Time of Activity	08:45	
Surveyor Name	Zach Hill	
Sampler Name	Zach Hill	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093150.24	1065968.11
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187758	Ludlum 12 / 180431
Detector Model and Serial No.	Ludlum 44-10 / PR156393	Ludlum 44-9 / PR193567
Calibration Due Date	10-19-10	10-19-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 6446 cpm

Notes and Comments:

Backgrounds: Gamma: 6182 cpm (Ludlum Model 2221)

Beta: 37 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-11-10
Date

[redacted] 3-11-10
Signature (Sampler) Date

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 1.2	
0.5							0	↓	
1.0	6383	60	Standard	1.2 – 1.8	6471	41	0	TLS-SS-IA1-15(1.2-1.8)031110	1
2.0	6585	80					0		
3.0	6254	80					0		
4.0							0	No recovery 4.0 – 6.0	
5.0							0	↓	
6.0	7169	90					0		
7.0	7314	120					0		
8.0							0	No recovery 8.0 -- 9.5	
9.5	7138	120					0		
10.5	7348	100	Standard	10.5 – 12.0	6840	48	0	TLS-SB-IA1-15(10.5-12.0)031110	5c
12.0							0	No recovery 12.0 – 13.6	
13.0							0	↓	
13.6	7009	110					0		
14.6	6933	200	Standard	14.6 – 15.6	7050	144	0	TLS-SB-IA1-15(14.6-15.6)031010	5
15.6							0	↓	

Core I.D. Number	IA1-15

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree
0.0							0	No recovery 0.0 – 1.2	
0.5							0	↓	
1.0	6383	60	Standard	1.2 – 1.8	6471	41	0	TLS-SS-IA1-15(1.2-1.8)031110	1
2.0	6585	80					0		
3.0	6254	80					0		
4.0							0	No recovery 4.0 – 6.0	
5.0							0	↓	
6.0	7169	90					0		
7.0	7314	120					0		
8.0							0	No recovery 8.0 – 9.5	
9.5	7138	120					0		
10.5	7348	100	Standard	10.5 – 12.0	6840	48	0	TLS-SB-IA1-15(10.5-12.0)031110	5c
12.0							0	No recovery 12.0 – 13.6	
13.0							0	↓	
13.6	7009	110					0		
14.6	6933	200	Standard	14.6 – 15.6	7050	144	0	TLS-SB-IA1-15(14.6-15.6)031010	5
15.6							0	↓	

Core I.D. Number	IA1-15

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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0							0	No recovery 16.0 – 17.0	
17.0	6820	140	Standard	17.0 – 18.0	6760	64	0	TLS-SB-IA1-15(17.0-18.0)031110	2
18.0	7183	150					0		
19.0	11,215	420	Standard	19.0 – 20.0	10,190	687	0	TLS-SB-IA1-15(19.0-20.0)031110	4
20.0							0	No recovery 20.0 – 21.0	
21.0	8127	180	Standard	21.0 – 22.0	6918	59	0	TLS-SB-IA1-15(21.0-22.0)031110(Chemical)	
22.0							0	Refusal @ 22.0'	
23.0									
24.0									
25.0									
26.0									
27.0									
28.0									
29.0									
30.0									
31.0									
32.0									

Core I.D. Number	IA1-15

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA1-16

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-12-10	
Time of Activity	14:00	
Surveyor Name	Zach Hill	
Sampler Name	Mike Carlin	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093194.01	1065880.57
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187758	Ludlum 12 / 180411
Detector Model and Serial No.	Ludlum 44-10 / PR156393	Ludlum 44-9 / PR113654
Calibration Due Date	10-19-10	2-23-11
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 4555 cpm

Notes and Comments:

Backgrounds: Gamma: 6934 cpm (Ludlum Model 2221)

Beta: 63 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-12-10
Signature (Surveyor) Date

[redacted] 3-12-10
Signature (Sampler) Date

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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0: 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 0.6	
0.5	6276	60	Standard	0.6 – 1.1	6760	73	0	TLS-SS-IA1-16(0.6-1.1)031210	1
1.0	7857	100					0		
2.0	9131	140					0		
3.0	8694	160					0		
4.0							0	No recovery 4.0 – 6.2	
5.0							0	↓	
6.0	8763	180	Standard	6.2 – 7.2	9228	111	0	TLS-SB-IA1-16(6.2-7.2)031210	5
7.0	10123	180	Standard	7.2 – 8.0/9.1 9.3	9873	193	0	TLS-SB-IA1-16(7.2-8.0/9.1-9.3)031210	5a
8.0							0	No recovery 8.0 – 9.1	
9.0	7970	100					0		
10.0	8215	100					0		
11.0	9199	140					0		
12.0							0	No recovery 12.0 – 13.2	
13.0	10503	260	Standard	13.2 – 14.2	10333	302	0	TLS-SB-IA1-16(13.2-14.2)031210	4
14.0	8153	180	Standard	14.2 – 15.2	7548	104	0	TLS-SB-IA11-6(14.2-15.2)031210(Chemical)	
15.0	8275	100					0		

Core I.D. Number	IA1-16

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0							0	No recovery 16.0 – 19.0	
17.0							0	↓	
18.0							0	↓	
19.0	7759	100	Standard	19.0 – 20.0	7292	61	0	TLS-SB-IA1-16(19.0-20.0)031210	3
20.0							0		

Core I.D. Number	IA1-16

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA1-17

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-10-10	
Time of Activity	10:05	
Surveyor Name	Zach Hill	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093194.01	1065836.8
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187758	Ludlum 12 / 180411
Detector Model and Serial No.	Ludlum 44-10 / PR156393	Ludlum 44-9 / PR113654
Calibration Due Date	10-19-10	2-23-11
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 5132 cpm

Notes and Comments:

Backgrounds: Gamma: 6230 cpm (Ludlum Model 2221)

Beta: 63 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: 0 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-10-10
Signature (Surveyor) Date

[redacted] 3-10-10
Signature (Sampler) Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 1.6	
0.5							0	↓	
1.6	6204	120	Standard	1.6 – 2.1	6197	57	0	TLS-SS-IA1-17(1.6-2.1)031010	1
2.1	6320	90	Standard	2.1 – 3.1	6391	73	0	TLS-SB-IA1-17(2.1-3.1)031010	5a
3.1	6500	80	Standard	3.1 – 4.0	6410	70	0	TLS-SB-IA1-17(3.1-4.0)031010	4
4.0							0	No recovery 4.0 – 5.0	
5.0	6233	100	Standard	5.0 – 6.0	6511	65	0	TLS-SB-IA1-17(5.0-6.0)031010	5
6.0	6268	100	Standard	6.0 – 7.0	6440	64	0	TLS-SB-IA1-17(6.0-7.0)031010	3
7.0	6259	100					0		
8.0	6225	70					0		
9.0	6196	80					0		
10.0				N			0		
11.0							0		
12.0							0		
13.0					A		0		
14.0							0		
15.0							0		

Core I.D. Number	IA1-17

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA1-18

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-9-10	
Time of Activity	14:40	
Surveyor Name	Zach Hill	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093259.22	1066223.5
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187758	Ludlum 12 / 180411
Detector Model and Serial No.	Ludlum 44-10 / PR156393	Ludlum 44-9 / PR113654
Calibration Due Date	10-19-10	2-23-11
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 6649 cpm

Notes and Comments:

Backgrounds: Gamma: 6933 cpm (Ludlum Model 2221)

Beta: 32 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-9-10
Signature (Surveyor) Date

[redacted] 3-9-10
Signature (Sampler) Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree
0.0							0	No recovery 0.0 – 1.0	
0.5							0	↓	
1.0	6930	80	Standard	1.0 – 1.5	6566	62	0	TLS-SS-IA1-18(1.0-1.5)030910	1
1.5	6800	120	Standard	1.5 – 2.5	6772	63	0	TLS-SB-IA1-18(1.5-2.5)030910	5
2.5	6686	100					0		
3.5	6889	80	Standard	3.5 – 4.5	6858	71	0	TLS-SB-IA1-18(3.5-4.5)030910	5a
4.5	6975	90	Standard	4.5 – 5.5	6733	68	0	TLS-SB-IA1-18(5.3-6.3)030910	3
5.5	6915	80	Standard	5.5 – 6.5	6323	75	0	TLS-SB-IA1-18(7.3-8.0)030910	4
6.5									
7.0				N					
8.0									
10.0									
11.0					A				
12.0									
13.0									
14.0									
15.0									

Core I.D. Number	IA1-18

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA1-19

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-9-10	
Time of Activity	13:45	
Surveyor Name	Zach Hill	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093194.01	1065749.26
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187758	Ludlum 12 / 180411
Detector Model and Serial No.	Ludlum 44-10 / PR156393	Ludlum 44-9 / PR113654
Calibration Due Date	10-19-10	2-23-11
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 7079 cpm

Notes and Comments:

Backgrounds: Gamma: 7254 cpm (Ludlum Model 2221)

Beta: 35 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-9-10
Signature (Surveyor) Date

[redacted] 3-9-10
Signature (Sampler) Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 0.4	
0.5	6850	80	Standard	0.4 – 0.9	7119	58	0	TLS-SS-1A1-19(0.4-0.9)030910	1
1.0	7096	90	Standard	0.9 – 1.9	7093	89	0	TLS-SB-1A1-19(0.9-1.9)030910	5
2.0	7325	80	Standard	1.9 – 2.9	6914	91	0	TLS-SB-1A1-19(1.9-2.9)030910	5a
3.0	7156	60	Standard	3.0 – 4.0	6967	70	0	TLS-SB-1A1-19(3.0-4.0)030910	3
4.0	7185	60					0		
5.0	7172	40					0		
6.0	7384	40	Standard	6.0 – 7.0	6842	79	0	TLS-SB-1A1-19(6.0-7.0)030910	4
7.0	7222	60					0		
8.0									
9.0				N					
10.0									
11.0									
12.0					A				
13.0									
14.0									
15.0									

Core I.D. Number	1A1-19

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA1-20

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-10-10	
Time of Activity	14:00	
Surveyor Name	Zach Hill	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093237.78	1065924.34
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187758	Ludlum 12 / 180411
Detector Model and Serial No.	Ludlum 44-10 / PR156393	Ludlum 44-9 / PR113654
Calibration Due Date	10-19-10	2-23-11
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 6256 cpm

Notes and Comments:

Backgrounds: Gamma: 7273 cpm (Ludlum Model 2221)

Beta: 58 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: 0 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-10-10
Signature (Surveyor) Date

[redacted] 3-10-10
Signature (Sampler) Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree
0.0							0	No recovery 0.0 – 1.1	
0.5							0	↓	
1.0	7282	120	Standard	1.1 – 1.6	7290	80	0	TLS-SS-IA1-20(1.1-1.6)031010	1
1.6	7347	190	Standard	1.6 – 2.6	7291	78	0	TLS-SB-IA1-20 (1.6-2.6)031010	5
2.6	7364	180	Standard	3.3 – 4.3	7053	62	0	TLS-SB-IA1-20(3.3-4.3)031010	3
4.0							0	No recovery 4.3 – 4.8	
5.0	7544	100	Duplicate	4.8 – 5.8	6940	54	0	TLS-SB-IA1-20(4.8-5.8)031010	4
6.0	7502	80	Standard	5.8 – 6.8	6922	74	0	TLS-SB-IA1-20(5.8-6.8)031010(Chemical)	
7.0	7153	60	Standard	6.8 – 7.8	7002	68	0	TLS-SB-IA1-20(6.8-~~7.8~~ 8.0)031010	5
8.0									
9.0				N					
10.0									
11.0									
12.0					A				
13.0									
14.0									
15.0									

Core I.D. Number	IA1-20

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

Soil Core I.D. Number: IA1-21

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-10-10	
Time of Activity	11:10	
Surveyor Name	Zach Hill	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093237.78	1065880.57
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187758	Ludlum 12 / 180411
Detector Model and Serial No.	Ludlum 44-10 / PR156393	Ludlum 44-9 / PR113654
Calibration Due Date	10-19-10	2-23-11
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 5427 cpm

Notes and Comments:

Backgrounds: Gamma: 7068 cpm (Ludlum Model 2221)

Beta: 32 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: 0 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-10-10
Signature (Surveyor) Date

[redacted] 3-10-10
Signature (Sampler) Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0: 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 0.4	
0.5	6926	80	Standard	0.4 – 0.9	6755	67	0	TLS-SS-IA1-21(0.4-0.9)031010	1
1.0	7155	100	Standard	0.9 – 1.9	6916	53	0	TLS-SB-IA1-21 (0.9-1.9)031010	5
2.0	7262	80	Standard	1.9 – 2.9	6861	54	0	TLS-SB-IA1-21(1.9-2.9)031010	4
3.0	6961	80	Standard	3.6 – 4.6	7028	85	0	TLS-SB-IA1-21(3.6-4.6)031010	3
4.0							0	No recovery 4.0 – 4.5	
4.5	7095	60	Standard				0		
5.5	7118	80					0		
6.5	7212	90	Standard	6.5 – 7.0	7045	62	0	TLS-SB-IA1-21(6.5-7.0)031010	5a
7.0									
9.0									
10.0				N					
11.0									
12.0					A				
13.0									
14.0									
15.0									

Page 2 of 3

Core I.D. Number	IA1-21

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

Soil Core I.D. Number: IA1-22

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-9-10	
Time of Activity	15:15	
Surveyor Name	Zach Hill	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093237.78	1065836.8
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187758	Ludlum 12 / 180411
Detector Model and Serial No.	Ludlum 44-10 / PR156393	Ludlum 44-9 / PR113654
Calibration Due Date	10-19-10	2-23-11
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 4809 cpm

Notes and Comments:

Backgrounds: Gamma: 6459 cpm (Ludlum Model 2221)

Beta: 44 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-9-10
Signature (Surveyor) Date

[redacted] 3-9-10
Signature (Sampler) Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 2.3	
0.5							0	↓	
1.0							0	↓	
2.0	6631	60	Standard	2.3 – 2.8	6443	73	0	TLS-SS-IA1-22(2.3-2.8)030910	1
3.0	6580	120	Standard	2.8 – 3.8	6582	77	0	TLS-SB-IA1-22(2.8-3.8)030910	4
4.0							0	No recovery 4.0 – 4.3	
4.3	6406	80	Standard	4.3 – 5.3	6157	66	0	TLS-SB-IA1-22(4.3-5.3)030910	3
5.3	6436	100	Standard	5.3 – 6.3	6281	76	0	TLS-SB-IA1-22(5.3-6.3)030910	5
6.3	6225	90	Standard	6.3 – 7.3	6369	73	0	TLS-SB-IA1-22(6.3-7.3)030910(Chemical)	
7.3	6461	60	Standard	7.3 – 8.0	6402	75	0	TLS-SB-IA1-22(7.3-8.0)030910	5c
8.0									
10.0				N					
11.0									
12.0					A				
13.0									
14.0									
15.0									

Core I.D. Number	1A1-22

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA1-DOE-B1

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-18-10	
Time of Activity	10:05	
Surveyor Name	Zach Hill	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093150.85	1065811.99
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187758	Ludlum 12 / 180431
Detector Model and Serial No.	Ludlum 44-10 / PR156393	Ludlum 44-9 / PR193567
Calibration Due Date	10-19-10	10-19-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 6483 cpm

Notes and Comments:

Backgrounds: Gamma: 6464 cpm (Ludlum Model 2221)

Beta: 36 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-18-10
Signature (Surveyor) Date

[redacted] 3-18-10
Signature (Sampler) Date

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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 0.4	
0.5	6636	60	Standard	0.4 – 0.9	6349	42	0	TLS-SS-IA1-DOE-B1(0.4-0.9)031810	1
1.0	7340	100					0		
2.0	6872	120					0		
3.0	7693	100					0		
4.0							0	No recovery 4.0 – 6.0	
5.0							0	↓	
6.0	8254	200	Duplicate	6.0 – 7.0	7986	292	0	TLS-SB-IA1-DOE-B1(6.0-7.0)031810	4
7.0	8180	200	Standard	7.0 – 8.0	7159	110	0	TLS-SB-IA1-DOE-B1(7.0-8.0)031810	5
8.0							0	No recovery 8.0 – 10.4	
9.0							0	↓	
10.0	7469	100					0		
11.0	7294	120					0		
12.0							0	No recovery 12.0 – 13.0	
13.0	6436	160	Standard	13.0 – 14.0	6518	73	0	TLS-SB-IA1-DOE-B1(13.0-14.0)031810	2
14.0	6766	80	Standard	14.2 – 15.2	6660	57	0	TLS-SB-IA1-DOE-B1(14.2-15.2)031810	3
15.0	6968	80					0		

Core I.D. Number	IA1-DOE-B1

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA1-DOE-B2

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-17-10	
Time of Activity	13:30	
Surveyor Name	Zach Hill	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093176.59	1065818.4
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187758	Ludlum 12 / 180431
Detector Model and Serial No.	Ludlum 44-10 / PR156393	Ludlum 44-9 / 193567
Calibration Due Date	10-19-10	10-19-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 6291 cpm

Notes and Comments:

Backgrounds: Gamma: 7472 cpm (Ludlum Model 2221)

Beta: 41 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-17-10
Signature (Surveyor) Date

[redacted] 3-17-10
Signature (Sampler) Date

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2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 0.5	
0.5	6490	60	Standard	0.5 – 1.0	6986	46	0	TLS-SS-IA1-DOE-B2(.5-1.0)031710	1
1.0	7821	40	Standard	1.0 – 2.0	7153	47	0	TLS-SB-IA1-DOE-B2(1.0-2.0)031710	5c
2.0	7346	100					0		
3.0	7916	120	Standard	3.0 – 4.0	7675	59	0	TLS-SB-IA1-DOE-B2(3.0-4.0)031710	4
4.0							0	No recovery 4.0 – 5.4	
5.0	7099	120	Standard	5.4 – 6.4	6856	58	0	TLS-SB-IA1-DOE-B2(5.4-6.4)031710(Chemical)	
6.0	7592	100	Standard	6.4 – 7.4	7278	56	0	TLS-SB-IA1-DOE-B2(6.4-7.4)031710	5
7.0	7776	100	Standard	7.6 – 8.6	7256	56	0	TLS-SB-IA1-DOE-B2(7.6-8.6)031710	3
8.0	7116	60					0		
9.0	7100	90					0		
10.0	6527	80					0		
11.0				N			0		
					A				

Core I.D. Number	IA1-DOE-B2

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA1-DOE-B3

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-18-10	
Time of Activity	08:45	
Surveyor Name	Zach Hill	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093160.85	1065833.94
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187758	Ludlum 12 / 180431
Detector Model and Serial No.	Ludlum 44-10 / PR156393	Ludlum 44-9 / 193567
Calibration Due Date	10-19-10	10-19-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 8490 cpm

Notes and Comments:

Backgrounds: Gamma: 6468 cpm (Ludlum Model 2221)

Beta: 32 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-18-10
Signature (Surveyor) Date

[redacted] 3-18-10
Signature (Sampler) Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 1.0	
0.5							0		
1.0	7684	100	Standard	1.0 – 1.5	7379	65	0	TLS-SS-IA1-DOE-B3(1.0-1.5)031810	1
2.0	9009	80					0		
3.0	8051	180	Standard	2.5 – 3.5	7112	258	0	TLS-SB-IA1-DOE-B3(2.5-3.5)031810	5
4.0							0	No recovery 4.0 – 5.3	
5.0	16590	1600	Duplicate	5.3 – 6.3	17776	3538	0	TLS-SB-IA1-DOE-B3(5.3-6.3)031810	4
6.0	8570	160	Standard	6.3 – 7.3	6838	70	0	TLS-SB-IA1-DOE-B3(6.3-7.3)031810	2
7.0	7109	100					0		
8.0	7525	80	Standard	8.2 – 9.2	6626	51	0	TLS-SB-IA1-DOE-B3(8.2-9.2)031810	3
9.0	7683	80					0		
10.0	7281	60					0		
11.0	6359	160					0		
				N					
					A				

Core I.D. Number	IA1-DOE-B3

I-96

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA1-B1

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-26-10	
Time of Activity	09:45	
Surveyor Name	Dennis Whitlock	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093158.01	1065821.931
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190191	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR240366	Ludlum 44-9 / PR153297
Calibration Due Date	2-23-11	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 8800 cpm

Notes and Comments:

Backgrounds: Gamma: 6076 cpm (Ludlum Model 2221)

Beta: 43 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Backgrounds for IA1-B1 the same as IA1-B8 & B9 because sample table was not moved.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-26-10
Date

[redacted] 3-26-10
Signature (Sampler) Date

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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 0.7	
0.5	6433	60	Standard	0.5 – 1.2	6057	57	0	TLS-SS-IA1-B1(0.7-1.2)032610	1
1.0	6766	60	Standard	1.2 – 2.2	5660	53	0	TLS-SB-IA1-B1(1.2-2.2)032610	4
2.0	6400	80					0		
3.0	6755	120					0		
4.0							0	No recovery 4.0 – 6.8	
5.0							0	↓	
6.0							0	↓	
7.0	7222	140	Standard	7.0 – 8.0	6492	70	0	TLS-SB-IA1-B1(7.0-8.0)032610	2
8.0							0	No recovery 8.0 – 14.0	
9.0							0	↓	
10.0							0	↓	
11.0							0	↓	
12.0							0	↓	
13.0							0	↓	
14.0	7019	300	Standard	14.0 – 15.0	6994	178	0	TLS-SB-IA1-B1(14.0-15.0)032610	5

Core I.D. Number	IA1-B1

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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
15.0	6046	80					0		
16.0	7057	100	Standard	16.3 – 17.3	5959	59	0	TLS-SB-IA1-B1(16.3-17.3)032610	3
17.0							0		
18.0									
19.0									
20.0									
21.0									
22.0									
23.0									
24.0									
25.0									
26.0									
27.0									
28.0									
29.0									
30.0									
31.0									
32.0									

Core I.D. Number	IA1-B1

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA1-B2

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-29-10	
Time of Activity	08:25	
Surveyor Name	Dennis Whitlock	
Sampler Name	Mike Carlin	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093084.731	1065727.232
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 229306
Detector Model and Serial No.	Ludlum 44-10 / PR242823	Ludlum 44-9 / PR191714
Calibration Due Date	10/19/10	10-28-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 4895 cpm

Notes and Comments:

Backgrounds: Gamma: 5919 cpm (Ludlum Model 2221)

Beta: 38 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-29-10
Signature (Surveyor) Date

[redacted] 3-29-10
Signature (Sampler) Date

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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 0.6	
0.5	6301	80	Standard	0.6 – 1.1	6065	60	0	TLS-SS-IA1-B2(0.6-1.1)032910	1
1.0	6218	60					0		
2.0	6292	80					0		
3.0	6017	60					0		
4.0							0	No recovery 4.0 – 4.5	
4.5	6391	40	Standard	4.5 – 5.5	6446	58	0	TLS-SB-IA1-B2(4.5-5.5)032910	2
5.0	6273	40					0		
6.0	6392	80					0		
7.0	6369	100					0		
8.0							0	No recovery 8.0 – 8.4	
8.4	6167	100					0		
9.0	6227	80					0		
10.0	6542	40	Standard	10.0 – 11.0	7115	178	0	TLS-SB-IA1-B2(10.0-11.0)032910(Chemical)	
11.0	6947	160	Standard	11.0 – 12.0	6957	74	0	TLS-SB-IA1-B2(11.0-12.0)032910	4
12.0							0	No recovery 12.0 – 15.0	

Core I.D. Number	IA1-B2

ARSEC
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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
13.0							0	No recovery 12.0 – 15.0	
14.0							0	↓	
15.0	6113	120					0		
16.0							0	No recovery 16.0 – 20.0	
17.0							0	↓	
18.0							0	↓	
19.0							0	↓	
20.0	6071	100					0		
21.0	6126	120					0		
22.0	6568	120					0		
23.0	6924	140					0		
24.0	6426	180	Standard	24.0 – 25.0	6304	115	0	TLS-SB-IA1-B2(24.0-25.0)032910	5
25.0	6416	60	Standard	25.0 – 26.0	6481	65	0	TLS-SB-IA1-B2(25.0-26.0)032910	3
26.0	6503	100							
27.0	6758	140							
28.0				N					
29.0									
30.0					A				

Core I.D. Number	IA1-B2

I-104

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

Soil Core I.D. Number: IA1-B3

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-30-10	
Time of Activity	08:00	
Surveyor Name	Dennis Whitlock	
Sampler Name	Mike Carlin	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093042.642	1065728.735
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 229306
Detector Model and Serial No.	Ludlum 44-10 / PR242823	Ludlum 44-9 / PR191714
Calibration Due Date	10/19/10	10-28-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 6803 cpm

Notes and Comments:

Backgrounds: Gamma: 6484 cpm (Ludlum Model 2221)

Beta: 30 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-30-10
Signature (Surveyor) Date

[redacted] 3-30-10
Signature (Sampler) Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 1.2	
0.5							0	↓	
1.0	6209	120	Standard	1.2 – 1.7	6194	64	0	TLS-SS-IA1-B3(1.2-1.7)033010	1
2.0	6496	60					0		
3.0	6416	80					0		
4.0							0	No recovery 4.0 – 4.4	
4.4	6662	40	Standard	4.4 – 5.4	6161	32	0	TLS-SB-IA1-B3(4.4-5.4)033010	2
5.0	6710	60					0		
6.0	6788	100					0		
7.0	6673	160	Standard	7.0 – 8.0	6677	71	0	TLS-SB-IA1-B3(7.0-8.0)033010	5
8.0							0	No recovery 8.0 – 13.5	
9.0							0	↓	
10.0							0	↓	
11.0							0	↓	
12.0							0	↓	
13.0							0	↓	

Core I.D. Number	IA1-B3

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree
14.0	7025	120	Standard	13.5 – 14.5	7247	106	0	TLS-SB-IA1-B3(13.5-14.5)033010	4
15.0	6695	80					0		
16.0							0	No recovery 16.0 – 16.6	
17.0	6897	80					0		
18.0	6984	40					0		
19.0	6728	80					0		
20.0							0	No recovery 20.0 – 25.3	
21.0							0	↓	
22.0							0	↓	
23.0							0	↓	
24.0							0	↓	
25.0	6637	80					0		
26.0	6668	100	Standard	25.9 – 26.9	6516	57	0	TLS-SB-IA1-B3(25.9-26.9)033010	3
27.0	6654	60							
28.0				N					
					A				

Core I.D. Number	IA1-B3

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

Soil Core I.D. Number: IA1-B4

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-29-10	
Time of Activity	13:40	
Surveyor Name	Zach Hill	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093046.024	1065764.059
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190191	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR240366	Ludlum 44-9 / PR153297
Calibration Due Date	2-23-11	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 4238 cpm

Notes and Comments:

Backgrounds: Gamma: 4986 cpm (Ludlum Model 2221)

Beta: 39 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-29-10
Signature (Surveyor) Date

[redacted] 3-29-10
Signature (Sampler) Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 1.7	
0.5							0	↓	
1.0	4938	50	Standard	1.7 – 2.2	5519	36	0	TLS-SS-IA1-B4(1.7-2.2)032910	1
2.0	5057	60					0		
3.0	5025	40					0		
4.0	5177	100	Standard	4.0 – 5.0	5193	50	0	TLS-SB-IA1-B4(4.0-5.0)032910	2
5.0	5116	160					0		
6.0	5171	100					0		
7.0	5255	100					0		
8.0							0	No recovery 8.0 – 9.0	
9.0	6274	80	Standard	9.0 – 10.0	5925	48	0	TLS-SB-IA1-B4(9.0-10.0)032910	4
10.0	5469	120	Standard	10.0 – 11.0	6100	66	0	TLS-SB-IA1-B4(10.0-11.0)032910(Chemical)	
11.0	5675	260	Standard	11.0 – 12.0	6075	394	0	TLS-SB-IA1-B4(11.0-12.0)032910	5
12.0							0	No recovery 12.0 – 12.8	
13.0	5161	100					0		
14.0	5858	120					0		

Core I.D. Number	IA1-B4

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
15.0	5307	100					0		
16.0							0	No recovery 16.0 – 17.0	
17.0	5241	80					0		
18.0	5620	120					0		
19.0	5907	160					0		
20.0							0	No recovery 20.0 – 22.3	
21.0							0	↓	
22.0	5382	80					0		
23.0	5497	80					0		
24.0	4950	80					0		
25.0	5057	60	Standard	25.2 – 26.2	5439	44	0	TLS-SB-IA1-B4(25.2-26.2)032910	3
26.0	5180	60					0		
27.0	5290	40					0		
28.0				N					
29.0									
30.0									
31.0					A				
32.0									

Core I.D. Number	IA1-B4

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

Soil Core I.D. Number: IA1-B5

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-26-10	
Time of Activity	09:30	
Surveyor Name	Dave Warren	
Sampler Name	Mike Carlin	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093084.731	1065815.918
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 229306
Detector Model and Serial No.	Ludlum 44-10 / PR242823	Ludlum 44-9 / PR191714
Calibration Due Date	10-19-10	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 4166 cpm

Notes and Comments:

Backgrounds: Gamma: 5188 cpm (Ludlum Model 2221)

Beta: 39 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-26-10
Signature (Surveyor) Date

[redacted] 3-26-10
Signature (Sampler) Date

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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 1.3	
0.5							0	↓	
1.0	5040	100	Standard	1.3 – 1.8	4771	51	0	TLS-SS-IA1-B5(1.3-1.8)032610	1
2.0	5142	60					0		
3.0	5250	110					0		
4.0							0	No recovery 4.0 – 5.0	
5.0	5047	90	Standard	6.0 – 7.0	5034	45	0	TLS-SB-IA1-B5(6.0-7.0)032610	2
6.0	5351	70					0		
7.0	5709	100					0		
8.0							0	No recovery 8.0 – 13.0	
9.0							0	↓	
10.0							0	↓	
11.0							0	↓	
12.0							0	↓	
13.0							0	↓	
14.0	5640	60	Standard	14.0 – 15.0	5879	71	0	TLS-SB-IA1-B5(14.0-15.0)032610(Chemical)	

Core I.D. Number	IA1-B5

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number
15.0	5760	100	Standard	15.0 – 16.0	5954	88	0	TLS-SB-IA1-B5(15.0-16.0)032610
16.0							0	No recovery 16.0 – 19.5
17.0							0	↓
18.0							0	↓
19.0	5203	60					0	
20.0							0	No recovery 20.0 – 24.0
21.0							0	↓
22.0							0	↓
23.0							0	↓
24.0	5359	80	Standard	24.0 – 25.0	5063	56	0	TLS-SB-IA1-B5(24.0-25.0)032610
25.0	5430	110	Standard	25.0 – 26.0	5096	46	0	TLS-SB-IA1-B5(25.0-26.0)032610
26.0	5339	50					0	
27.0	5442	90					0	
28.0								
29.0								
30.0								
31.0								
32.0								

Core I.D. Number	IA1-B5

these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

Soil Core I.D. Number: IA1-B6

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-26-10	
Time of Activity	13:00	
Surveyor Name	Dave Warren	
Sampler Name	Mike Carlin	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093084.731	1065859.51
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	(No)

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 229306
Detector Model and Serial No.	Ludlum 44-10 / PR242823	Ludlum 44-9 / PR191714
Calibration Due Date	10-19-10	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 6409 cpm

Notes and Comments:

Backgrounds: Gamma: 5111 cpm (Ludlum Model 2221)

Beta: 36 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-26-10
Signature (Surveyor) Date

[redacted] 3-26-10
Signature (Sampler) Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 1.1	
0.5							0	↓	
1.0	5032	80	Standard	1.3 – 1.8	4997	45	0	TLS-SS-IA1-B6(1.3-1.8)032610	1
2.0	5181	60					0		
3.0	5220	70					0		
4.0							0	No recovery 4.0 – 5.0	
5.0	5360	90					0		2
6.0	5170	60	Standard	6.1 – 7.1	5549	39	0	TLS-SB-IA1-B6(6.1-7.1)032610	
7.0	5530	90					0		
8.0							0	No recovery 8.0 – 8.7	
9.0	5285	80					0		
10.0	5585	100					0		
11.0	5764	110					0		
12.0							0	No recovery 12.0 – 13.4	
13.0	5315	60					0		
14.0	5597	90					0		

Core I.D. Number	IA1-B6

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
15.0	5696	100	Standard	15.0 – 16.0	5141	86	0	TLS-SB-IA1-B6(15.0-16.0)032610	4
16.0							0	No recovery 16.0 – 16.8	
17.0	5355	70					0		
18.0	5577	60					0		
19.0	5405	80					0		
20.0							0	No recovery 20.0 – 22.0	
21.0							0	↓	
22.0	5320	100					0		
23.0	5498	80					0		
24.0							0	No recovery 24.0 – 25.7	
25.0							0	↓	
26.0	5403	90					0		
27.0	5568	120	Standard	27.0 – 28.0	5587	60	0	TLS-SB-IA1-B6(27.0-28.0)032610	5
28.0	5047	70					0		
29.0	5201	110	Standard	29.0 – 30.0	5148	58	0	TLS-SB-IA1-B6(29.0-30.0)032610	3
30.0	5348	80					0		
31.0	5426	100							
32.0									

Core I.D. Number	IA1-B6

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

Soil Core I.D. Number: IA1-B7

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-29-10	
Time of Activity	08:20	
Surveyor Name	Zach Hill	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093090.095	1065900.095
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190191	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR240366	Ludlum 44-9 / PR153297
Calibration Due Date	2-23-11	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 6326 cpm

Notes and Comments:

Backgrounds: Gamma: 6643 cpm (Ludlum Model 2221)

Beta: 26 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-29-10
Signature (Surveyor) Date

[redacted] 3-29-10
Signature (Sampler) Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 0.8	
0.5							0	↓	
1.0	7209	80	Standard	0.8 – 1.3	6441	58	0	TLS-SS-IA1-B7(0.8-1.3)032910	1
2.0	7254	80					0		
3.0	7607	100					0		
4.0	7115	100					0	No recovery 4.0 – 4.3	
5.0	7428	50					0		
6.0	7167	120	Standard	6.0 – 7.0	7080	72	0	TLS-SB-IA1-B7(6.0-7.0)032910	5
7.0	8110	100	Standard	7.0 – 8.0	6914	61	0	TLS-SB-IA1-B7(7.0-8.0)032910	4
8.0							0	No recovery 8.0 – 10.0	
9.0							0	↓	
10.0	7183	100	Standard	10.0 – 11.0	7116	47	0	TLS-SB-IA1-B7(10.0-11.0)032910(Chemical)	
11.0	7521	100					0		
12.0							0	No recovery 12.0 – 13.6	
13.0							0	↓	
14.0	7101	80	Standard	13.6 – 14.6	7071	51	0	TLS-SB-IA1-B7(13.6-14.6)032910	2

Core I.D. Number	IA1-B7

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
14.6	7456	90					0		
16.0							0	No recovery 16.0 – 22.7	
17.0							0	↓	
18.0							0	↓	
19.0							0	↓	
20.0							0	↓	
21.0							0	↓	
22.0							0	↓	
23.0	7677	100					0		
24.0							0	No recovery 24.0 – 26.2	
25.0							0	↓	
26.0	7157	80	Standard	26.5 – 27.5	6978	82	0	TLS-SB-IA1-B7(26.5-27.5)032910	3
27.0	6815	80					0		
28.0				N					
29.0									
30.0									
31.0					A				
32.0									

Core I.D. Number	IA1-B7

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA1-B8

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-26-10	
Time of Activity	10:55	
Surveyor Name	Dennis Whitlock	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093175.195	1065944.995
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190191	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR240366	Ludlum 44-9 / PR153297
Calibration Due Date	2-23-11	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 6459 cpm

Notes and Comments:

Backgrounds: Gamma: 6076 cpm (Ludlum Model 2221)

Beta: 43 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Backgrounds for IA1-B8 the same as IA1-B1 & B9 because sample table was not moved.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-26-10
Signature (Surveyor) [redacted] Date

[redacted] 3-26-10
Signature (Sampler) Date

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2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 1.5	
0.5							0	↓	
1.0	6435	40	Standard	1.5 – 2.0	6087	43	0	TLS-SS-IA1-B8(1.5-2.0)032610	1
2.0	6077	40					0		
3.0	6129	60	Standard	3.0 – 4.0	5938	51	0	TLS-SB-IA1-B8(3.0-4.0)032610	5
4.0							0	No recovery 4.0 – 6.3	
5.0							0	↓	
6.0							0	↓	
7.0	6717	100	Standard	7.0 – 8.0	6432	57	0	TLS-SB-IA1-B8(7.0-8.0)032610	2
8.0							0	No recovery 8.0 – 24.0	
9.0							0	↓	
10.0							0	↓	
11.0							0	↓	
12.0							0	↓	
13.0							0	↓	
14.0							0	↓	

Core I.D. Number	IA1-B8

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
15.0							0	No recovery 8.0 – 24.0	
16.0							0	↓	
17.0							0	↓	
18.0							0	↓	
19.0							0	↓	
20.0							0	↓	
21.0							0	↓	
22.0							0	↓	
23.0							0	↓	
24.0	6308	100	Standard	24.0 – 25.0	5971	53	0	TLS-SB-IA1-B8(24.0-25.0)032610	3
25.0	6172	60					0		
26.0	6355	40					0		
27.0	6793	40	Standard	27.0 – 28.0	5963	48	0	TLS-SB-IA1-B8(16.3-17.3)032610	4
28.0									
29.0									
30.0									
31.0									
32.0									

Core I.D. Number	IA1-B8

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA1-B9

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-26-10	
Time of Activity	14:05	
Surveyor Name	Dennis Whitlock	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093217.966	1065946.135
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190191	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR240366	Ludlum 44-9 / PR153297
Calibration Due Date	2-23-11	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 5954 cpm

Notes and Comments:

Backgrounds: Gamma: 6076 cpm (Ludlum Model 2221)

Beta: 43 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Backgrounds for IA1-B8 the same as IA1-B1 & B8 because sample table was not moved.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-26-10
Signature (Surveyor [redacted] Date

[redacted] 3-26-10
Signature (Sampler) Date

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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 1.2	
0.5							0	↓	
1.0	6603	40	Standard	1.2 – 1.7	6253	53	0	TLS-SS-IA1-B9(1.2-1.7)032610	1
2.0	6661	100	Standard	1.7 – 2.7	6372	50	0	TLS-SB-IA1-B9(1.7-2.7)032610	5
3.0	6958	60					0		
4.0							0	No recovery 4.0 – 5.4	
5.0	6506	100	Standard	6.0 – 7.0	6932	65	0	TLS-SB-IA1-B9(6.0-7.0)032610	2
6.0	7157	80					0		
7.0	6653	60					0		
8.0							0	No recovery 8.0 – 9.0	
9.0	6710	60					0		
10.0	7003	40					0		
11.0	7118	80					0		
12.0							0	No recovery 12.0 – 14.2	
13.0							0	↓	
14.0	6989	120					0		

Core I.D. Number	IA1-B9

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
15.0	6610	40					0		
16.0							0	No recovery 16.0 – 17.6	
17.0	7503	120	Standard	17.6 – 18.6	6543	75	0	TLS-SB-IA1-B9(17.6-18.6)032610	4
18.0							0	↓	
19.0	7418	80	Standard	19.0 – 20.0	6527	60	0	TLS-SB-IA1-B9(19.0-20.0)032610(Chemical)	
20.0	6930	60					0		
21.0	6431	80	Standard	21.0 – 22.0	5979	58	0	TLS-SB-IA1-B9(16.3-17.3)032610	3
22.0	7042	100					0		
23.0	6757	60					0		
24.0									
25.0									
26.0									
27.0									
28.0									
29.0									
30.0									
31.0									
32.0									

Core I.D. Number	IA1-B9

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA1-B10

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-29-10	
Time of Activity	10:15	
Surveyor Name	Zach Hill	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093129.826	1065772.702
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190191	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR240366	Ludlum 44-9 / PR153297
Calibration Due Date	2-23-11	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 5554 cpm

Notes and Comments:

Backgrounds: Gamma: 5634 cpm (Ludlum Model 2221)

Beta: 56 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-29-10
Signature (Surveyor) Date

[redacted] 3-29-10
Signature (Sampler) Date

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2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 1.0	
0.5							0	↓	
1.0	5975	70	Standard	1.0 – 1.5	5463	35	0	TLS-SS-IA1-B10(1.0-1.5)032910	1
2.0	5452	60					0		
3.0	6167	180	Standard	3.0 – 4.0	6434	85	0	TLS-SB-IA1-B10(3.0-4.0)032910	5
4.0							0	No recovery 4.0 – 5.2	
5.0	6656	100					0		
6.0	6973	240	Standard	6.6 – 7.6	6445	105	0	TLS-SB-IA1-B10(6.6-7.6)032910	2
7.0	6656	160					0		
8.0							0	No recovery 8.0 – 12.0	
9.0							0	↓	
10.0							0	↓	
11.0							0	↓	
12.0	6097	140					0		
13.0	6359	120					0	↓	
14.0	6879	120					0		

Core I.D. Number	IA1-B10

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
15.0	7301	180	Standard	15.0 – 16.0	6452	60	0	TLS-SB-IA1-B10(15.0-16.0)032910	4
16.0							0	No recovery 16.0 – 23.0	
17.0							0	↓	
18.0							0	↓	
19.0							0	↓	
20.0							0	↓	
21.0							0	↓	
22.0							0	↓	
23.0	6738	160					0		
24.0	6053	120					0		
25.0	5918	100	Standard	25.1 – 26.1	6028	51	0	TLS-SB-IA1-B10(25.1-26.1)032910	3
26.0	5929	80					0		
27.0	6107	60					0		
28.0				N					
29.0									
30.0									
31.0					A				
32.0									

Core I.D. Number	IA1-B10

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

Soil Core I.D. Number: IA1-B11

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-26-10	
Time of Activity	14:50	
Surveyor Name	Dave Warren	
Sampler Name	Mike Carlin	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093085.106	1065770.823
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 229306
Detector Model and Serial No.	Ludlum 44-10 / PR242823	Ludlum 44-9 / PR191714
Calibration Due Date	10-19-10	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 4951 cpm

Notes and Comments:

Backgrounds: Gamma: 5182 cpm (Ludlum Model 2221)

Beta: 34 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-26-10
Signature (Surveyor) Date

[redacted] 3-26-10
Signature (Sampler) Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 1.8	
0.5							0	↓	
1.0							0	↓	
2.0	5215	90	Standard	1.8 – 2.3	5134	38	0	TLS-SS-IA1-B11(1.8 2.3)032610	1
3.0	5311	70					0		
4.0							0	No recovery 4.0 – 5.5	
5.0	5292	70	Standard	5.5 – 6.5	5798	61	0	TLS-SB-IA1-B11(5.5-6.5)032610	2
6.0	5788	80					0		
7.0	5902	70					0		
8.0							0	No recovery 8.0 – 20.6	
9.0							0	↓	
10.0							0	↓	
11.0							0	↓	
12.0							0	↓	
13.0							0	↓	
14.0							0	↓	

Core I.D. Number	IA1-B11

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
15.0							0	No recovery 8.0 – 20.6	
16.0							0	↓	
17.0							0	↓	
18.0							0	↓	
19.0							0	↓	
20.0							0	↓	
21.0	5761	90					0		
22.0	5960	80	Standard	22.0 – 23.0	5546	76	0	TLS-SB-IA1-B11(22.0-23.0)032610(Chemical)	
23.0	6264	80	Standard	23.0 – 24.0	6675	139	0	TLS-SB-IA1-B11(23.0-24.0)032610	4
24.0							0	No recovery 24.0 – 28.0	
25.0							0	↓	
26.0							0	↓	
27.0							0	↓	
28.0	5287	60					0		
29.0	5464	110	Standard	29.1 – 30.1	5221	53	0	TLS-SB-IA1-B11(29.1-30.1)032610	3
30.0	5518	90	Standard	30.1 – 31.1	5236	43	0	TLS-SB-IA1-B11(30.1-31.1)032610	5
31.0	5395	50							
32.0									

Core I.D. Number	IA1-B11

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

Soil Core I.D. Number: IA1-B12

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-30-10	
Time of Activity	09:50	
Surveyor Name	Dennis Whitlock	
Sampler Name	Mike Carlin	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093018.021	1065704.624
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	(No)

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 229306
Detector Model and Serial No.	Ludlum 44-10 / PR242823	Ludlum 44-9 / PR191714
Calibration Due Date	10/19/10	10-28-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 7207 cpm

Notes and Comments:

Backgrounds: Gamma: 6438 cpm (Ludlum Model 2221)

Beta: 34 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-30-10
Signature (Surveyor) Date

[redacted] 3-30-10
Signature (Sampler) Date

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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 1.2	
0.5							0	↓	
1.0	6534	60	Standard	1.2 – 1.7	6957	69	0	TLS-SS-IA1-B12(1.2-1.7)033010	1
2.0	6390	80					0		
3.0	6480	40					0		
4.0							0	No recovery 4.0 – 7.0	
5.0							0	↓	
6.0							0	↓	
7.0	6552	70	Standard	7.0 – 8.0	6322	50	0	TLS-SB-IA1-B12(7.0-8.0)033010	2
8.0							0		
9.0							0	No recovery 8.0 - 12.6	
10.0							0	↓	
11.0							0	↓	
12.0							0	↓	
13.0	6577	100					0		
14.0	6771	80					0		

Core I.D. Number	IA1-B12

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
15.0	6809	100					0		
16.0							0	No recovery 16.0 – 17.0	
17.0	6767	80					0		
18.0	6921	100					0		
19.0	7173	60	Standard	19.0 – 20.0	7158	80	0	TLS-SB-IA1-B12(19.0-20.0)033010	4
20.0							0	No recovery 20.0 – 21.7	
21.0							0	↓	
22.0	6905	40					0		
23.0	7112	80					0	↓	
24.0	6603	40					0	↓	
25.0	6906	60	Standard	25.6 – 26.6	6543	60	0	TLS-SB-IA1-B12(25.6-26.6)033010	3
26.0	6951	80					0		
27.0	6795	160	Standard	27.0 – 28.0	6672	54	0	TLS-SB-IA1-B12(27.0-28.0)033010	5
28.0									
				N					
					A				

Core I.D. Number	IA1-B12

144

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA1-B13

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-29-10	
Time of Activity	13:45	
Surveyor Name	Dennis Whitlock	
Sampler Name	Mike Carlin	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093047.903	1065683.64
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	(No)

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 229306
Detector Model and Serial No.	Ludlum 44-10 / PR242823	Ludlum 44-9 / PR191714
Calibration Due Date	10/19/10	10-28-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 5638 cpm

Notes and Comments:

Backgrounds: Gamma: 5981 cpm (Ludlum Model 2221)

Beta: 40 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-29-10
Signature (Surveyor) Date

[redacted] 3-29-10
Signature (Sampler) Date

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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 0.5	
0.5	6202	100	Standard	0.5 – 1.0	5738	54	0	TLS-SS-IA1-B13(0.5-1.0)032910	1
1.0	6188	80					0		
2.0	6247	60					0		
3.0	6586	80					0		
4.0							0	No recovery 4.0 – 4.7	
5.0	6426	120	Standard	5.3 – 6.3	6378	55	0	TLS-SB-IA1-B13(5.3-6.3)032910	2
6.0	6744	140					0		
7.0	7035	120					0		
8.0							0	No recovery 8.0 – 9.5	
9.0							0	↓	
10.0	7350	140					0		
11.0	6814	100					0		
12.0							0	No recovery 12.0 – 13.3	
13.0	7349	120					0		
14.0	7592	320	Standard	14.0 – 15.0	6983	182	0	TLS-SB-IA1-B13(14.0–15.0)032910	5
15.0	6979	100					0		

Core I.D. Number	1A1-B13

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0							0	No recovery 16.0 – 18.0	
17.0							0	↓	
18.0	7490	200	Standard	18.0 – 19.0	7405	209	0	TLS-SB-IA1-B13(18.0–19.0)032910	4
19.0	7489	180	Standard	19.0 – 20.0	7083	119	0	TLS-SB-IA1-B13(19.0–20.0)032910(Chemical	
20.0							0	No recovery 20.0 – 24.0	
21.0							0	↓	
22.0							0	↓	
23.0							0	↓	
24.0	6843	140					0		
25.0	6886	160	Standard	25.0 – 26.0	5944	53	0	TLS-SB-IA1-B13(25.0–26.0)032910	3
26.0	6924	120					0		
27.0	7099	100					0		
28.0				N			0		
					A				

Core I.D. Number	IA1-B13

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA1-B14

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-30-10	
Time of Activity	08:40	
Surveyor Name	Zach Hill	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093036.629	1065660.717
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190191	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR240366	Ludlum 44-9 / PR153297
Calibration Due Date	2-23-11	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 6765 cpm

Notes and Comments:

Backgrounds: Gamma: 6234 cpm (Ludlum Model 2221)

Beta: 22 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-30-10
Signature (Surveyor) Date

[redacted] 3-30-10
Signature (Sampler) Date

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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree
0.0	6426	60	Standard	0.0 – 0.5	6240	77	0	TLS-SS-IA1-B14(0.0-0.5)033010	1
0.5	6894	100					0		
1.0	6819	120					0		
2.0	7155	120					0		
3.0	6958	100					0		
4.0							0	No recovery 4.0 – 6.5	
5.0							0	↓	
6.0							0	↓	
7.0	7338	100	Standard	6.5 – 7.5	6659	79	0	TLS-SB-1A1-B14(6.5-7.5)033010	4
8.0							0	No recovery 8.0 – 9.0	
9.0	7195	120					0		
10.0	7035	160					0		
11.0	7014	140					0		
12.0							0	No recovery 12.0 – 16.0	
13.0							0	↓	
14.0							0	↓	
15.0							0	↓	

Core I.D. Number	IA1-B14

ARSEC
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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0	7177	100	Standard	16.0 – 17.0	6339	69	0	TLS-SB-IA1-B14(16.0–17.0)033010	2
17.0	6698	120					0		
18.0	7054	120					0		
19.0	7047	140					0		
20.0							0	No recovery 20.0 – 21.6	
21.0							0	↓	
22.0	7165	120	Standard	22.6 – 23.6	6633	83	0	TLS-SB-IA1-B14(22.6-23.6)033010	5
23.0							0	↓	
24.0							0	No recovery 24.0 – 26.3	
25.0							0	↓	
26.0	6909	120					0		
27.0	6800	120					0		
28.0	6397	100	Standard	28.6 – 29.6	6378	54	0	TLS-SB-IA1-B14(28.6-29.6)033010	3
29.0	6243	80					0		
30.0	6028	80					0		
31.0	6280	60					0		
32.0									

Core I.D. Number	IA1-B14

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA1-B15

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-29-10	
Time of Activity	10:20	
Surveyor Name	Dennis Whitlock	
Sampler Name	Mike Carlin	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093194.01	1065924.34
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 229306
Detector Model and Serial No.	Ludlum 44-10 / PR242823	Ludlum 44-9 / PR191714
Calibration Due Date	10/19/10	10-28-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 6518 cpm

Notes and Comments:

Backgrounds: Gamma: 6300 cpm (Ludlum Model 2221)

Beta: 29 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-29-10
Signature (Surveyor) Date

[redacted] 3-29-10
Signature (Sampler) Date

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 1.0	
0.5							0	↓	
1.0	6169	100	Standard	1.0 – 1.5	6078	51	0	TLS-SS-IA1-B15(1.0-1.5)032910	1
2.0	7100	120					0		
3.0	6825	160					0		
4.0							0	No recovery 4.0 – 6.7	
5.0							0	↓	
6.0							0	↓	
7.0	6987	80	Standard	6.7 – 7.7	6282	52	0	TLS-SB-IA1-B15(6.7-7.7)032910	2
8.0							0	No recovery 8.0 – 9.6	
9.0	6647	100					0		
10.0	6901	160	Standard	10.0 – 11.0	6718	77	0	TLS-SB-IA1-B15(10.0-11.0)032910	5
11.0	7133	80					0		
12.0	6142	120					0		
13.0	6447	100					0		
14.0	6989	80	Standard	14.0 – 15.0	6521	61	0	TLS-SB-IA1-B15(14.0–15.0)032910(Chemical	
15.0	7249	100	Standard	15.0 – 16.0	6893	69	0	TLS-SB-IA1-B15(15.0–16.0)032910	4

Core I.D. Number	IA1-B15

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0							0	No recovery 16.0 – 21.6	
17.0							0	↓	
18.0							0	↓	
19.0							0	↓	
20.0							0	↓	
21.0							0	↓	
22.0	6995	100					0		
23.0	6614	60					0		
24.0	7146	120					0		
25.0	6972	100					0		
26.0	6915	140					0		
27.0	7097	100	Standard	27.0 – 28.0	6191	52	0	TLS-SB-IA1-B15(27.0–28.0)032910	3
28.0				N			0		
					A				

Core I.D. Number	IA1-B15

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA1-B16

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-30-10	
Time of Activity	14:10	
Surveyor Name	Zach Hill	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093007.841	1065746.454
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190191	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR240366	Ludlum 44-9 / PR153297
Calibration Due Date	2-23-11	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 5664 cpm

Notes and Comments:

Backgrounds: Gamma: 5301 cpm (Ludlum Model 2221)

Beta: 60 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-30-10
Signature (Surveyor) [redacted] Date

[redacted] 3-30-10
Signature (Sampler) Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 1.0	
0.5							0	↓	
1.0	5499	80	Standard	1.0 – 1.5	5121	47	0	TLS-SS-IA1-B16(1.0-1.5)033010	1
2.0	5393	140					0		
3.0	5744	120					0		
4.0	5856	120					0	No recovery 4.0 – 9.0	
5.0							0	↓	
6.0							0	↓	
7.0							0	↓	
8.0							0	↓	
9.0	5762	100	Standard	9.0 – 10.0	5145	33	0	TLS-SB-IA1-B16(9.0-10.0)033010	2
10.0	5882	100					0		
11.0	6621	80	Standard	11.0 – 12.0	6002	62	0	TLS-SB-IA1-B16(11.0-12.0)033010	4
12.0							0	No recovery 12.0 – 14.0	
13.0							0	↓	
14.0	5579	100	Standard	14.0 – 15.0	5574	62	0	TLS-SB-IA1-B16(14.0-15.0)033010(Chemical)	
15.0	5674	80					0		

Core I.D. Number	IA1-B16

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0							0	No recovery 16.0 – 17.0	
17.0							0	↓	
18.0	5738	120					0		
19.0	6086	180					0		
20.0							0	No recovery 20.0 – 21.4	
21.0	6422	80					0		
22.0	6176	110					0		
23.0	5795	100					0		
24.0	6531	200	Standard	24.0 – 25.0	5973	93	0	TLS-SB-IA1-B14(24.0-25.0)033010	5
25.0	6066	120	Standard	25.4 – 26.4	5632	66	0	TLS-SB-IA1-B14(25.4-26.4)033010	3
26.0	5698	80					0		
27.0	5675	80					0		
28.0				N					
29.0									
30.0									
31.0					A				
32.0									

Core I.D. Number	IA1-B16

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA1-B17

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-30-10	
Time of Activity	14:55	
Surveyor Name	Dennis Whitlock	
Sampler Name	Mike Carlin	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093035.277	1065815.045
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	(No)

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 229306
Detector Model and Serial No.	Ludlum 44-10 / PR242823	Ludlum 44-9 / PR191714
Calibration Due Date	10/19/10	10-28-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 6257 cpm

Notes and Comments:

Backgrounds: Gamma: 6328 cpm (Ludlum Model 2221)

Beta: 42 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-30-10
Signature (Surveyor) Date

[redacted] 3-30-10
Signature (Sampler) Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 1.2	
0.5							0	↓	
1.0	6508	120	Standard	1.2 – 1.7	7066	52	0	TLS-SS-IA1-B17(1.2-1.7)033010	1
2.0	6325	60					0		
3.0	6274	40					0		
4.0							0	No recovery 4.0 – 6.4	
5.0							0	↓	
6.0							0	↓	
7.0	6295	60	Standard	6.4 – 7.4	8372	45	0	TLS-SB-IA1-B17(6.4-7.4)033010	2
8.0							0	No recovery 8.0 – 9.0	
9.0	7251	140					0		
10.0	8176	160					0		
11.0	8019	100					0		
12.0							0	No recovery 12.0 – 12.7	
13.0	8838	180					0		
14.0	9608	140	Standard	14.0 – 15.0	11,656	322	0	TLS-SB-IA1-B17(14.0-15.0)033010(Chemical)	

Core I.D. Number	IA1-B17

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
15.0	21989	500	Standard	15.0 – 16.0	571	23968	0	TLS-SB-IA1-B17(14.0-15.0)033010	4
16.0							0	No recovery 16.0 – 18.5	
17.0							0	↓	
18.0							0	↓	
19.0	9589	220	Standard	18.5 – 19.5	11656	125	0	TLS-SB-IA1-B17(18.5-19.5)033010	5
20.0							0	No recovery 20.0 – 23.0	
21.0							0	↓	
22.0							0	↓	
23.0	8710	120					0		
24.0							0	No recovery 24.0 – 25.0	
25.0	7465	240	Standard	25.6 – 26.6	7653	84	0	TLS-SB-IA1-B17(25.6-26.6)033010	3
26.0	7795	60					0		
27.0	7823	120					0		
28.0				N					
					A				

Core I.D. Number	IA1-B17

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

Soil and Core Survey Forms
Investigative Area 2

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA2-1

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-19-10	
Time of Activity	08:45	
Surveyor Name	Zach Hill	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092861.27	1065219.71
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	(No)

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187758	Ludlum 12 / 180431
Detector Model and Serial No.	Ludlum 44-10 / PR156393	Ludlum 44-9 / PR193567
Calibration Due Date	10-19-10	10-19-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 7695 cpm

Notes and Comments:

Backgrounds: Gamma: 7839 cpm (Ludlum Model 2221)

Beta: 28 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: >10 % NOTE: LEL allowed to dissipate to < 10% prior to collection of samples.

O_2: 20.9 % H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-19-10
Signature (Surveyor) Date

[redacted] 3-19-10
Signature (Sampler) Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 0.8	
0.5	8271	60	Standard	0.8 – 1.3	7566	63	0	TLS-SS-IA2-1(0.8-1.3)031910	1
1.0	8395	80					0		
2.0	8250	100					0		
3.0	8265	120					0		
4.0	8378	100					0	No recovery 4.0 – 4.2	
5.0	7729	80					0		
6.0	8431	80					0		
7.0	8014	100					0		
8.0	7634	80	Standard	8.0 – 9.0	7498	52	0	TLS-SB-IA2-1(8.0-9.0)031910(Chemical)	
9.0	8524	120	Duplicate	9.0 – 10.0	7666	51	0	TLS-SB-IA2-1(9.0-10.0)031910	4
10.0	7957	120	Standard	10.0 -11.0	7427	61	0	TLS-SB-IA2-1(10.0-11.0)031910	5
11.0							0	No recovery 11.0 – 15.0	
12.0							0	↓	
13.0							0	↓	
14.0							0	↓	
15.0							0	↓	

Core I.D. Number	IA2-1

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA2-2

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-24-10	
Time of Activity	10:30	
Surveyor Name	Zach Hill	
Sampler Name	John Holmes	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092899.03	1065295.23
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190191	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR240366	Ludlum 44-9 / PR153297
Calibration Due Date	2-23-11	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 7378 cpm

Notes and Comments:

Backgrounds: Gamma: 6975 cpm (Ludlum Model 2221)

Beta: 49 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10% % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-24-10
Signature (Surveyor) Date

[redacted] 3-24-10
Signature (Sampler) Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree
0.0							0	No recovery 0.0 – 0.5	
0.5	7871	60	Standard	0.5 – 1.0	6748	53	0	TLS-SS-IA2-2(0.5-1.0)032410	1
1.0	8085	60					0		
2.0	7506	60					0		
3.0	7553	120					0		
4.0	7793	80					0		
5.0	7304	100					0		
6.0	7104	120					0		
7.0	8199	60	Standard	7.0 – 8.0	6788	72	0	TLS-SB-IA2-2(7.0-8.0)032410	4
8.0	7057	80					0		
9.0	7909	100					0		
10.0							0	No recovery 10.0 – 11.2	
11.0	7231	140	Standard	11.2 – 12.2	7366	42	0	TLS-SB-IA2-2(11.2-12.2)032410	5
12.0	8003	40					0		
13.0	7815	100					0		
14.0	7486	140	Standard	14.7 – 15.7	7619	122	0	TLS-SB-IA2-2(14.7-15.7)032410	2
15.0	7585	120	Standard	15.7 – 16.7	6943	69	0	TLS-SB-IA2-2(15.7-16.7)032410	3

Core I.D. Number	IA2-2

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0	7885	80					0		
17.0	8197	140					0		
18.0							0		
				N					
					A				

Core I.D. Number	IA2-2

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

Soil Core I.D. Number: IA2-3

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-23-10	
Time of Activity	08:45	
Surveyor Name	Dave Warren	
Sampler Name	Mike Carlin	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092974.55	1065370.75
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	(No)

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190191	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR240366	Ludlum 44-9 / PR153297
Calibration Due Date	2-23-11	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 7233 cpm

Notes and Comments:

Backgrounds: Gamma: 7175 cpm (Ludlum Model 2221)

Beta: 46 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-23-10
Sig[redacted] Date

[redacted] 3-23-10
Signature (Sampler) Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 0.5	
0.5	7441	60	Standard	0.5 – 1.0	7468	75	0	TLS-SS-IA2-3(0.5-1.0)032310	1
1.0	7961	90					0		
2.0	7397	80					0		
3.0	8087	60					0		
4.0	7412	100					0		
5.0	7619	110	Standard	5.0 – 6.0	7157	74	0	TLS-SB-IA2-3(5.0-6.0)032310	5
6.0	7380	60					0		
7.0	7786	90					0		
8.0							0	No recovery 8.0 – 9.5	
9.0	7672	60					0	↓	
10.0	8151	120	Standard	10.0 – 11.0	7045	71	0	TLS-SB-IA2-3(10.0-11.0)032310	4
11.0	7617	80					0		
12.0							0	No recovery 12.0 – 13.5	
13.0	7119	60	Standard	13.5 – 14.5	7384	51	0	TLS-SB-IA2-13(13.5-14.5)032210	2
14.0	7823	70					0		

Core I.D. Number	IA2-3

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
15.0	8059	90					0		
16.0							0	No recovery 16.0 – 28.0	
17.0							0	↓	
18.0							0	↓	
19.0							0	↓	
20.0							0	↓	
21.0							0	↓	
22.0							0	↓	
23.0							0	↓	
24.0							0	↓	
25.0							0	↓	
26.0							0	↓	
27.0							0	↓	
28.0	7984	60	Standard	28.0 – 29.0	7770	72	0	TLS-SB-IA2-3(28.0-29.0)032310	3
29.0	7880	100					0		
30.0	7445	110					0		
31.0	7558	90					0		
32.0									→

Core I.D. Number	IA2-3

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA2-4

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-24-10	
Time of Activity	09:50	
Surveyor Name	Zach Hill	
Sampler Name	Dennis Whitlock	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092899.03	1065219.71
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190191	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR240366	Ludlum 44-9 / PR153297
Calibration Due Date	2-23-11	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 6546 cpm

Notes and Comments:

Backgrounds: Gamma: 6397 cpm (Ludlum Model 2221)

Beta: 53 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-24-10
Signature (Surveyor) Date

[redacted] 3-24-10
Signature (Sampler) Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 0.6	
0.5	7134	120	Standard	0.6 – 1.1	6748	67	0	TLS-SS-IA2-4(0.6-1.1)032410	1
1.0	6556	100	Standard	1.1 – 2.1	6556	59	0	TLS-SB-IA2-4(1.1-2.1)032410	5
2.0	6847	60					0		
3.0	6255	60					0		
4.0	7116	60					0	No recovery 4.0 – 4.4	
5.0	7049	40					0		
6.0	7377	100	Standard	6.4 – 7.4	6716	63	0	TLS-SB-IA2-4(6.4-7.4)032410	4
7.0							0	↓	
8.0							0	No recovery 8.0 – 12.0	
9.0							0	↓	
10.0							0	↓	
11.0							0	↓	
12.0	6990	80	Standard	12.0 – 13.0	6650	61	0	TLS-SB-IA2-4(12.0-13.0)032410	2
13.0	6987	80	Standard	13.6 – 14.6	6920	63	0	TLS-SB-IA2-4(13.6-14.6)032410	3
14.0	7138	60					0		
15.0	7144	80					0		
16.0									

Core I.D. Number	IA2-4

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA2-5

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-24-10	
Time of Activity	08:35	
Surveyor Name	Zach Hill	
Sampler Name	Dennis Whitlock	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092899.03	1065181.95
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	(No)

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190191	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR240366	Ludlum 44-9 / PR153297
Calibration Due Date	2-23-11	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 6654 cpm

Notes and Comments:

Backgrounds: Gamma: 4567 cpm (Ludlum Model 2221)

Beta: 45 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-24-10
Signature (Surveyor) Date

[redacted] 3-24-10
Signature (Sampler) Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 0.6	
0.5	7138	100	Standard	0.6 – 1.1	6398	61	0	TLS-SS-IA2-5(0.6-1.1)032410	1
1.0	6973	60					0		
2.0	7302	60	Standard	2.1 – 3.1	6622	63	0	TLS-SB-IA2-5(2.1-3.1)032410	4
3.0	6942	80	Duplicate	3.1 – 4.0	6521	64	0	TLS-SB-IA2-5(3.1-4.0)032410(Chemical)	
4.0							0	No recovery 4.0 – 4.5	
5.0	7120	80					0		
6.0	7152	120	Standard	5.5 – 6.5	6653	68	0	TLS-SB-IA2-5(5.5-6.5)032410	5
7.0	7099	100					0		
8.0							0	No recovery 8.0 – 9.1	
9.0	7172	100	Standard	9.5 – 10.5	6581	58	0	TLS-SB-IA2-5(9.5-10.5)032410	3
10.0	7289	80	Standard	10.5-11.5	6847	70	0	TLS-SB-IA2-5(10.5-11.5)032210	5a
11.0	6708	60					0		
12.0				N					
13.0									
14.0					A				

Core I.D. Number	IA2-5

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA2-6

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-19-10	
Time of Activity	13:30	
Surveyor Name	Dennis Whitlock	
Sampler Name	John Holmes	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092936.79	1065370.75
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190191	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR240366	Ludlum 44-9 / PR153297
Calibration Due Date	2-23-11	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 7696 cpm

Notes and Comments:

Backgrounds: Gamma: 7204 cpm (Ludlum Model 2221)

Beta: 41 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-19-10
Signature (Surveyor) Date

[redacted] 3-19-10
Signature (Sampler) Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 0.6	
0.5	6482	50	Standard	0.6 – 1.1	7305	72	0	TLS-SS-IA2-6(0.6-1.1)031910	1
1.0	7225	70					0		
2.0	8175	50	Standard	2.0 – 3.0	7323	56	0	TLS-SB-IA2-6(2.0-3.0)031910	4
3.0	7646	40	Standard	3.0 – 4.0	7506	77	0	TLS-SB-IA2-6(3.0-4.0)031910(Chemical)	
4.0	7960	80					0		
5.0	7392	110					0		
6.0	8015	100					0		
7.0	7518	70					0		
8.0							0	No recovery 8.0 – 9.8	
9.0							0	↓	
10.0	7642	80	Standard	9.8 – 10.8	7758	51	0	TLS-SB-IA2-6(9.8-10.8)031910	2
11.0	7934	70					0		
12.0							0	No recovery 12.0 – 15.5	
13.0							0	↓	
14.0							0	↓	

Core I.D. Number	IA2-6

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
15.0	7805	80					0		
16.0							0	No recovery 16.0 – 19.8	
17.0							0	↓	
19.0							0	↓	
19.8	8056	40					0		
20.0							0	No recovery 20.0 – 22.9	
21.0							0	↓	
22.0							0	↓	
23.0	8088	110	Standard	22.9 – 23.9	7492	60	0	TLS-SB-IA2-6(22.9-23.9)031910	5
24.0							0	No recovery 24.0 – 26.7	
25.0							0	↓	
26.0	8041	50					0		
27.0	7382	100					0		
28.0	6654	70					0		
29.0	7341	50	Standard	29.0 – 30.0	7024	60	0	TLS-SB-IA2-6(29.0-39.0)031910	3
30.0	7544	90					0		
31.0	7862	60					0		
32.0									

Core I.D. Number	IA2-6

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA2-7

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-22-10	
Time of Activity	08:50	
Surveyor Name	Zach Hill	
Sampler Name	Dennis Whitlock	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092936.79	1065370.75
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187758	Ludlum 12 / 180431
Detector Model and Serial No.	Ludlum 44-10 / PR156393	Ludlum 44-9 / PR193567
Calibration Due Date	10-19-10	10-19-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 7266 cpm

Notes and Comments:

Backgrounds: Gamma: 7790 cpm (Ludlum Model 2221)

Beta: 33 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-22-10
Signature (Surveyor) Date

[redacted] 3-22-10
Signature (Sampler) Date

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 0.4	
0.5	8752	80	Standard	0.4 – 0.9	7811	58	0	TLS-SS-IA2-7(0.4-0.9)032210	1
1.0	8121	110					0		
2.0	8461	100					0		
3.0	8165	60					0		
4.0	8495	140	Standard	4.0 – 5.0	8176	65	0	TLS-SB-IA2-7(4.0-5.0)032210	5
5.0	8383	80					0		
6.0	8070	40					0		
7.0	8217	120					0		
8.0	9072	20					0	No recovery 8.0 – 8.3	
9.0	8953	100					0		
10.0	8615	80	Standard	10.5 – 11.5	8282	61	0	TLS-SB-IA2-7(10.5-11.5)032210	2
11.0							0	No recovery 11.5 – 13.0	
12.0							0	↓	
13.0	10805	100	Duplicate	13.0 – 14.0	8952	55	0	TLS-SB-IA2-7(13.0-14.0)032210	4
14.0	9163	100					0		
15.0	9017	80					0		

Core I.D. Number	IA2-7

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0							0	No recovery 16.0 – 23.0	
17.0							0	↓	
18.0							0	↓	
19.0							0	↓	
20.0							0	↓	
21.0							0	↓	
22.0							0	↓	
23.0	8444	100	Standard	23.0 – 24.0	8061	57	0	TLS-SB-IA2-7(23.0-24.0)032210	3
24.0	9105	100					0		
25.0							0		
				N					
					A				

Core I.D. Number	IA2-7

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA2-8

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-22-10	
Time of Activity	13:00	
Surveyor Name	Zach Hill	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092936.79	1065295.23
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187758	Ludlum 12 / 180431
Detector Model and Serial No.	Ludlum 44-10 / PR156393	Ludlum 44-9 / PR193567
Calibration Due Date	10-19-10	10-19-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 6988 cpm

Notes and Comments:

Backgrounds: Gamma: 7978 cpm (Ludlum Model 2221)

Beta: 48 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-22-10
Signature (Surveyor) Date

[redacted] 3-22-10
Signature (Sampler) Date

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2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 0.3	
0.5	7840	60	Standard	0.3 – 0.8	7826	69	0	TLS-SS-IA2-8(0.3-0.8)032210	1
1.0	8441	80					0		
2.0	8396	100					0		
3.0	8339	40					0		
4.0							0	No recovery 4.0 – 4.8	
5.0		80	Standard	5.0 – 6.0	7871	70	0	TLS-SB-IA2-8(5.0-6.0)032210	2
6.0	9112	100	Standard	6.0 – 7.0	8371	78	0	TLS-SB-IA2-8(6.0-7.0)032210	4
7.0	8860	120	Standard	7.0 – 8.0	7922	108	0	TLS-SB-IA2-8(7.0-8.0)032210(Chemical)	
8.0	8587	120	Standard	8.0 -9.0	8026	63	0	TLS-SB-IA2-8(8.0-9.0)032210	3
9.0	8494	160	Standard	9.0 – 10.0	8204	79	0	TLS-SB-IA2-8(9.0-10.0)032210	5
10.0	8327	140					0		
11.0	8351	160					0		
12.0	8768	140					0		
13.0	8892	100					0		
14.0									
15.0									

Core I.D. Number	IA2-8

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

Soil Core I.D. Number: IA2-9

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-22-10	
Time of Activity	14:40	
Surveyor Name	Zach Hill	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092936.79	1065257.47
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	(No)

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187758	Ludlum 12 / 180431
Detector Model and Serial No.	Ludlum 44-10 / PR156393	Ludlum 44-9 / PR193567
Calibration Due Date	10-19-10	10-19-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 9126 cpm

Notes and Comments:

Backgrounds: Gamma: 8577 cpm (Ludlum Model 2221)

Beta: 43 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-22-10
Signature (Surveyor) Date

[redacted] 3-22-10
Signature (Sampler) Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 0.3	
0.5	8518	80	Standard	0.4 – 0.9	7904	62	0	TLS-SS-IA2-9(0.4-0.9)032210	1
1.0	8073	100					0		
2.0	8222	220	Standard	2.0 – 3.0	7842	81	0	TLS-SB-IA2-9(2.0-3.0)032210	5
3.0	8275	60	Standard	3.0 – 4.0	7911	68	0	TLS-SB-IA2-9(3.0-4.0)032210	3
4.0	8374	120	Standard	4.1 – 5.1	8193	63	0	TLS-SB-IA2-9(4.1-5.1)032210	5a
5.0	8321	100					0		
6.0	8515	120	Duplicate	6.0 – 7.0	8132	77	0	TLS-SB-IA2-9(8.0-9.0)032210	4
7.0	5226	120					0		
8.0							0		
9.0				N					
10.0									
11.0									
12.0					A				
13.0									
14.0									
15.0									

Core I.D. Number	IA2-9

Note 1

IA-1 through 1A-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA2-10

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-23-10	
Time of Activity	08:40	
Surveyor Name	Zach Hill	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092936.79	1065219.71
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	(No)

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187758	Ludlum 12 / 180431
Detector Model and Serial No.	Ludlum 44-10 / PR156393	Ludlum 44-9 / PR193567
Calibration Due Date	10-19-10	10-19-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 7295 cpm

Notes and Comments:

Backgrounds: Gamma: 8045 cpm (Ludlum Model 2221)

Beta: 47 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-23-10
Signature (Surveyor) Date

[redacted] 3-23-10
Signature (Sampler) [redacted] Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Connt (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 0.4	
0.5	8825	60	Standard	0.4-0.9	7591	73	0	TLS-SS-IA2-10(0.4-0.9)032310	1
1.0	8278	100					0		
2.0	8582	80					0		
3.0	9036	100	Standard	3.0-4.0	7827	68	0	TLS-SB-IA2-10(3.0-4.0)032310	4
4.0							0	No recovery 4.0-4.7	
5.0	8610	140	Standard	4.7-5.7	7742	68	0	TLS-SB-IA2-10(4.7-5.7)032310	3
6.0	8627	80	Standard	6.0-7.0	7758	72	0	TLS-SB-IA2-10(6.0-7.0)032310	5a
7.0	8420	80					0		5
8.0	8471	120	Standard	8.0-9.0	7899	71	0	TLS-SB-IA2-10(8.0-9.0)032310	
9.0	8495	60					0		
10.0									
11.0									
12.0					N				
13.0						A			
14.0									
15.0									

Core I.D. Number	IA2-10

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA2-11

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-23-10	
Time of Activity	10:45	
Surveyor Name	Zach Hill	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092936.79	1065181.95
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187758	Ludlum 12 / 229306
Detector Model and Serial No.	Ludlum 44-10 / PR156393	Ludlum 44-9 / PR191714
Calibration Due Date	10-19-10	10-19-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 6970 cpm

Notes and Comments:

Backgrounds: Gamma: 7555 cpm (Ludlum Model 2221)

Beta: 55 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-23-10
Signature (Surveyor) [redacted] Date

[redacted] 3-23-10
Signature (Sample [redacted] Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0	7925	100	Standard	0.0-0.6	7285	59	0	TLS-SS-IA2-11(0.0-0.6)032310	1
0.5	8045	80	Standard	0.6-1.6	7252	68	0	TLS-SB-IA2-11(0.6-1.6)032310	5a
1.5	8071	80	Standard	1.6-2.6	7222	80	0	TLS-SB-IA2-11(1.6-2.6)032310	4
2.5	8016	180	Standard	2.6-3.6	7742	108	0	TLS-SB-IA2-11(2.6-3.6)032310 Chemical	
3.5	8016	180	Standard	3.8-4.8	7678	73	0	TLS-SB-IA2-11(3.8-4.8)032310	3
4.0	7822	80					0		
5.0	7839	120					0		
6.0	7920	140	Standard	6.0-7.0	7521	96	0	TLS-SB-IA2-11(6.0-7.0)032310	5
7.0	7876	60					0		
8.0	7498	80					0		
9.0	7931	60					0		
10.0									
11.0					N				
12.0					A				
13.0									
14.0									
15.0									

Core I.D. Number	IA2-11

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

Soil Core I.D. Number: IA2-12

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-19-10	
Time of Activity	08:56	
Surveyor Name	Zach Hill	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092974.55	1065408.52
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	(No)

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187758	Ludlum 12 / 180431
Detector Model and Serial No.	Ludlum 44-10 / PR156393	Ludlum 44-9 / PR193567
Calibration Due Date	10-19-10	10-19-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 7147 cpm

Notes and Comments:

Backgrounds: Gamma: 8067 cpm (Ludlum Model 2221)

Beta: 40 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: >10 @ 4.0' % NOTE: LEL allowed to dissipate to < 10% prior to collection of samples.

O_2: 20.9 % H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-19-10
Signature (Surveyor) Date

[redacted] 3-19-10
Signature (Sampler) Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 0.5	
0.5	8084	80	Standard	0.5 – 1.0	8287	86	0	TLS-SS-IA2-12(0.5-1.0)031910	1
1.0	8461	120					0		
2.0	8687	100					0		
3.0	8702	100					0		
4.0	8534	80					0	No recovery 4.0 – 4.4	
5.0	9065	80	Standard	5.4 – 6.4	8303	60	0	TLS-SB-IA2-12(5.4-6.4)031910	4
6.0	8265	100							
7.0	8644	100					0		
8.0							0	No recovery 8.0 – 8.3	
8.3	9191	120	Standard	8.3 – 9.3	8458	82	0	TLS-SB-IA2-12(8.3-9.3)031910	2
9.3	8642	100					0		
10.3	8469	140	Standard	10.3 – 11.3	8534	67	0	TLS-SB-IA2-12(10.3-11.3)031910	5
12.0							0	No recovery 12.0 – 13.4	
13.0	8744	120					0		
14.0	8723	100					0		
15.0	8771	100					0		

Core I.D. Number	IA2-12

ARSEC
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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0							0	No recovery 16.0 – 24.0	
17.0							0	↓	
18.0							0	↓	
19.0							0	↓	
20.0							0	↓	
21.0							0	↓	
22.0							0	↓	
23.0							0	↓	
24.0	8087	61	Standard	24.0 – 25.0	8567	80	0	TLS-SB-IA2-12(24.0-25.0)031910	3
25.0	8278	60					0		
26.0	7249	60					0		
27.0	7998	80					0		
28.0							0		

Core I.D. Number	IA2-12

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA2-13

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-22-10	
Time of Activity	09:05	
Surveyor Name	Dave Warren	
Sampler Name	John Holmes	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092974.55	1065370.75
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	(No)

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190191	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR240366	Ludlum 44-9 / PR153297
Calibration Due Date	2-23-11	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 7233 cpm

Notes and Comments:

Backgrounds: Gamma: 7175 cpm (Ludlum Model 2221)

Beta: 46 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-22-10
Signature (Surveyor) Date

[redacted] 3-22-10
Signature (Sampler) [redacted] Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0		
0.5	7639	80	Standard	0.0 – 0.5	6971	47	0	TLS-SS-IA2-13(0.0-0.5)032210	1
1.0	7436	100					0		
2.0	7116	100					0		
3.0	7307	110	Standard	3.0 – 4.0	7049	82	0	TLS-SB-IA2-13(3.0-4.0)032210	5
4.0							0	No recovery 4.0 – 5.0	
5.0	7318	50	Standard	5.0 – 6.0	7173	66	0	TLS-SB-IA2-13(5.0-6.0)032210	2
6.0	7637	70					0		
7.0	7428	60					0		
8.0							0	No recovery 8.0 – 12.2	
9.0							0	↓	
10.0							0	↓	
11.0							0	↓	
12.0	7845	90	Standard	12.2 – 13.2	7374	57	0	TLS-SB-IA2-13(12.2-13.2)032210	3
13.0	7478	60					0		
14.0	7752	80	Standard	14.0 – 15.0	7448	47	0	TLS-SB-IA2-13(14.0-15.0)032210	4

Core I.D. Number	IA2-13

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
15.0	7452	50					0		
16.0	7559	80					0		
17.0	7681	90					0		
18.0							0		
				N					
					A				

Core I.D. Number	IA2-13

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA2-14

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-24-10	
Time of Activity	13:10	
Surveyor Name	Zach Hill	
Sampler Name	Dennis Whitlock	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092974.55	1065332.99
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	(No)

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190191	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR240366	Ludlum 44-9 / PR153297
Calibration Due Date	2-23-11	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 5368 cpm

Notes and Comments:

Backgrounds: Gamma: 6993 cpm (Ludlum Model 2221)

Beta: 50 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-24-10
Signature (Surveyor) Date

[redacted] 3-24-10
Signature (Sampler) Date

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2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 1.2	
0.5							0	↓	
1.0	7013	60	Standard	1.2 – 1.7	6486	61	0	TLS-SS-IA2-14(1.2-1.7)032410	1
2.0	7653	60	Standard	2.0 – 3.0	6264	59	0	TLS-SB-IA2-14(2.0-3.0)032410	4
3.0	7348	60					0		
4.0							0	No recovery 4.0 – 6.6	
5.0							0	↓	
6.6	7384	80	Standard	6.6 – 6.8	6495	47	0	TLS-SB-IA2-14(6.6-6.8)032410	2
6.8	7384	80	Standard	6.8 – 7.8	6818	61	0	TLS-SB-IA2-14(6.8-7.8)032410	3
8.0							0	No recovery 8.0 – 8.9	
9.0	7104	100	Standard	8.9 – 9.9	6787	68	0	TLS-SB-IA2-14(8.9-9.9)032410	5
10.0	7346	60					0		
11.0	7292	80					0		
12.0				N					
13.0									
14.0					A				

Core I.D. Number	IA2-14

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA2-15

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-24-10	
Time of Activity	14:10	
Surveyor Name	Zach Hill	
Sampler Name	John Holmes	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092974.55	1065295.23
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190191	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR240366	Ludlum 44-9 / PR153297
Calibration Due Date	2-23-11	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 7547 cpm

Notes and Comments:

Backgrounds: Gamma: 6993 cpm (Ludlum Model 2221)

Beta: 50 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Backgrounds the same as IA2-14 & 16 because sample table was not moved.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-24-10
Signature (Surveyor) Date

[redacted] 3-24-10
Signature (Sampler) Date

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2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 0.2	
0.5	7134	100	Standard	0.2 – 0.7	6676	52	0	TLS-SS-IA2-15(0.2-0.7)032410	1
1.0	8029	120	Duplicate	1.0 – 2.0	6790	67	0	TLS-SB-IA2-15(1.0-2.0)032410	4
2.0	7469	80	Standard	2.0 – 3.0	6428	45	0	TLS-SB-IA2-15(2.0-3.0)032410(Chemical)	
3.0	7975	100	Standard	3.0 – 4.0	6782	56	0	TLS-SB-IA2-15(3.0-4.0)032410	5a
4.0							0	No recovery 4.0 – 4.2	
5.0	7147	60	Standard	4.2 – 5.2	6847	76	0	TLS-SB-IA2-15(4.2-5.2)032410	3
6.0	7382	120	Standard	6.2 – 7.2	6437	68	0	TLS-SB-IA2-15(6.2-7.2)032410	5
7.0	6976	80					0		
8.0									
9.0									
10.0									
11.0									
12.0									
13.0									
14.0									

Core I.D. Number	IA2-15

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA2-16

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-24-10	
Time of Activity	14:50	
Surveyor Name	Zach Hill	
Sampler Name	Dennis Whitlock	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092974.55	1065257.47
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190191	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR240366	Ludlum 44-9 / PR153297
Calibration Due Date	2-23-11	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 6696 cpm

Notes and Comments:

Backgrounds: Gamma: 6993 cpm (Ludlum Model 2221)

Beta: 50 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Backgrounds the same as IA2-14 & 15 because sample table was not moved.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-24-10
Signature (Surveyor) Date

[redacted] 3-24-10
Signature (Sampler) Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree
0.0	6926	60	Standard	0.0 – 0.5	6350	63	0	TLS-SS-IA2-16(0.0-0.5)032410	1
0.5							0	↓	
1.0	7147	40					0		
2.0	7392	160	Standard	1.5 – 2.5	6651	52	0	TLS-SB-IA2-16(1.0-2.0)032410	5
3.0	7064	80	Standard	3.0 – 4.0	6445	64	0	TLS-SB-IA2-16(3.0-4.0)032410	3
4.0							0	No recovery 4.0 – 4.9	
5.0	7599	40	Standard	4.9 – 5.9	6782	61	0	TLS-SB-IA2-16(4.9-5.9)032410	5a
6.0	7680	60	Standard	6.0 – 7.0	6668	58	0	TLS-SB-IA2-16(6.0-7.0)032410(Chemical)	
7.0	7922	60	Standard	7.0 – 8.0	6452	58	0	TLS-SB-IA2-16(7.0-8.0)032410	4
8.0									
9.0				N					
10.0									
11.0									
12.0					A				
13.0									
14.0									

Core I.D. Number	IA2-16

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA2-17

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-25-10	
Time of Activity	08:34	
Surveyor Name	Dave Warren	
Sampler Name	Mike Carlin	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092974.55	1065219.71
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 229306
Detector Model and Serial No.	Ludlum 44-10 / PR242823	Ludlum 44-9 / PR191714
Calibration Due Date	10-19-10	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 6318 cpm

Notes and Comments:

Backgrounds: Gamma: 6942 cpm (Ludlum Model 2221)

Beta: 50 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-25-10
Date

[redacted] 3-25-10
Signature (Sampler) Date

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2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 0.2	
0.5	6946	120	Standard	0.2 – 0.7	6681	46	0	TLS-SS-IA2-17(0.2-0.7)032510	1
1.0	7136	120	Standard	1.0 – 2.0	6746	57	0	TLS-SB-IA2-17(1.0-2.0)032510	5
2.0	7016	100					0		
3.0	6889	140	Standard	2.8 – 3.8	6824	70	0	TLS-SB-IA2-17 (2.8-3.8)032510	3
4.0	6870	50					0	No recovery 4.0 – 4.5	
5.0	7014	70					0		
6.0	7235	100	Standard	6.0 – 7.0	6793	55	0	TLS-SB-IA2-17(6.0-7.0)032510	4
7.0	7053	90	Standard	7.0 – 8.0	6703	48	0	TLS-SB-IA2-17(7.0-8.0)032510	5a
8.0									
9.0				N					
10.0									
11.0									
12.0					A				
13.0									
14.0									

Core I.D. Number	IA2-17

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA2-18

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-25-10	
Time of Activity	09:15	
Surveyor Name	Zach Hill	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093012.32	1065370.75
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190191	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR240366	Ludlum 44-9 / PR153297
Calibration Due Date	2-23-11	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 7960 cpm

Notes and Comments:

Backgrounds: Gamma: 6863 cpm (Ludlum Model 2221)

Beta: 41 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Backgrounds the same as IA2-19 & 21 because sample table was not moved.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-25-10
Signature (Surveyor) Date

[redacted] 3-25-10
Signature (Sampler) Date

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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0	7282	120	Standard	0.0 – 0.5	6653	64	0	TLS-SS-IA2-18(0.0-0.5)032510	1
0.5	7624	100	Standard	0.5 – 1.5	6743	48	0	TLS-SB-IA2-18(0.5-1.5)032510	4
1.0	7187	100	Standard	1.5 – 2.5	6695	67	0	TLS-SB-IA2-18(1.5-2.5)032510(Chemical)	
2.0	6942	120	Standard	2.6 – 3.6	6795	79	0	TLS-SB-IA2-18(2.6-3.6)032510	3
3.0							0	↓	
4.0							0	No recovery 4.0 – 4.6	
5.0	7026	60	Standard	4.6 – 5.6	6450	57	0	TLS-SB-IA2-18(4.6-5.6)032510	5a
6.0	6987	80	Standard	5.6 – 6.6	6600	55	0	TLS-SB-IA2-18(5.6-6.6)032510	5
7.0									
8.0				N					
9.0									
10.0									
11.0					A				
12.0									
13.0									
14.0									

Core I.D. Number	IA2-18

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA2-19

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-25-10	
Time of Activity	08:30	
Surveyor Name	Zach Hill	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093012.32	1065332.99
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190191	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR240366	Ludlum 44-9 / PR153297
Calibration Due Date	2-23-11	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 7529 cpm

Notes and Comments:

Backgrounds: Gamma: 6863 cpm (Ludlum Model 2221)

Beta: 41 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Backgrounds the same as IA2-18 & 21 because sample table was not moved.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-25-10
Signature (Surveyor) Date

[redacted] 3-25-10
Signature (Sampler) Date

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2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0	7416	60	Standard	0.0 – 0.5	6358	34	0	TLS-SS-IA2-19(0.0-0.5)032510	1
0.5							0	↓	
1.0	7114	80	Standard	0.5 – 1.5	6778	60	0	TLS-SB-IA2-19(0.5-1.5)032510	5a
2.0	6844	120	Standard	2.3 – 3.3	6778	82	0	TLS-SB-IA2-19(2.3-3.3)032510	3
3.0	7347	160	Standard	3.3 – 4.0	6778	58	0	TLS-SB-IA2-19(3.3-4.0)032510	5
4.0							0	No recovery 4.0 – 4.7	
5.0	7488	60	Standard	4.7 – 5.7	7047	82	0	TLS-SB-IA2-19(4.7-5.7)032510	4
6.0	6859	80					0		
7.0									
8.0				N					
9.0									
10.0									
11.0					A				
12.0									
13.0									
14.0									

Core I.D. Number	IA2-19

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA2-20

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-25-10	
Time of Activity	10:25	
Surveyor Name	Dave Warren	
Sampler Name	Mike Carlin	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093012.32	1065295.23
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	(No)

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 229306
Detector Model and Serial No.	Ludlum 44-10 / PR242823	Ludlum 44-9 / PR191714
Calibration Due Date	10-19-10	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 6071 cpm

Notes and Comments:

Backgrounds: Gamma: 7103 cpm (Ludlum Model 2221)

Beta: 40 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted]
Signature (Surveyor) 3-25-10 Date

[redacted]
Signature (Sampler) 3-25-10 Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0	6648	100	Standard	0.0 – 0.5	6820	47	0	TLS-SS-IA2-20(0.0-0.5)032510	1
0.5	6866	70					0		
1.0	7130	90	Standard	1.0 – 2.0	6816	69	0	TLS-SB-IA2-20(1.0-2.07)032510	3
2.0	7099	80					0		
3.0	6942	110	Standard	3.0 – 4.0	6874	75	0	TLS-SB-IA2-20(3.0-4.0)032510	5
4.0							0	No recovery 4.0 – 4.8	
5.0	6886	110	Standard	4.8 – 5.8	6723	55	0	TLS-SB-IA2-20(4.8-5.8)032510(Chemical)	
6.0	7433	70	Standard	6.0 – 7.0	6926	82	0	TLS-SB-IA2-20(6.0-7.0)032510	4
7.0									
8.0				N					
9.0									
10.0									
11.0					A				
12.0									
13.0									
14.0									

Core I.D. Number	IA2-20

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA2-21

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-25-10	
Time of Activity	09:40	
Surveyor Name	Zach Hill	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093050.08	1065370.75
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190191	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR240366	Ludlum 44-9 / PR153297
Calibration Due Date	2-23-11	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 7587 cpm

Notes and Comments:

Backgrounds: Gamma: 6863 cpm (Ludlum Model 2221)

Beta: 41 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Backgrounds the same as IA2-18 & 19 because sample table was not moved.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-25-10
Signature (Surveyor) Date

[redacted] 3-25-10
Signature (Sampler) Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0	7491	80	Standard	0.0 – 0.5	6497	58	0	TLS-SS-IA2-21(0.0-0.5)032510	1
0.5	7900	80	Standard	0.5 – 1.5	6784	59	0	TLS-SB-IA2-21(0.5-1.5)032510	4
1.0	7549	60	Standard	1.5 – 2.5	6627	66	0	TLS-SB-IA2-21(1.5-2.5)032510	5a
2.0	7380	80	Standard	2.6 – 3.6	6831	57	0	TLS-SB-IA2-21(2.6-3.6)032510	3
3.0							0	↓	
4.0							0	No recovery 4.0 – 4.7	
5.0	7153	80					0		
6.0	6863	140	Standard	5.7 – 7.0	6753	56	0	TLS-SB-IA2-21(5.7-7.0)032510	5
7.0									
8.0				N					
9.0									
10.0									
11.0					A				
12.0									
13.0									
14.0									

Core I.D. Number	IA2-21

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA2-22

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-25-10	
Time of Activity	09:27	
Surveyor Name	Dave Warren	
Sampler Name	Mike Carlin	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092970.84	1065181.39
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 229306
Detector Model and Serial No.	Ludlum 44-10 / PR242823	Ludlum 44-9 / PR191714
Calibration Due Date	10-19-10	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 6800 cpm

Notes and Comments:

Backgrounds: Gamma: 7186 cpm (Ludlum Model 2221)

Beta: 40 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-25-10
Date

[redacted] 3-25-10
Signature (Sampler) Date

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2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0	7005	100	Standard	0.0 – 0.5	6752	70	0	TLS-SS-IA2-22(0.0-0.5)032510	1
0.5	6670	70					0		
1.0	6832	80	Standard	1.7 – 2.7	7029	73	0	TLS-SB-IA2-22(1.7-2.7)032510	5
2.0	6973	60					0		
3.0	6886	110	Standard	3.0 – 4.0	6743	54	0	TLS-SB-IA2-22(3.0-4.0)032510	3
4.0	7087	70	Standard	4.0 – 5.0	6912	73	0	TLS-SB-IA2-22(5.0-6.0)032510(Chemical)	
5.0	7166	100	Standard	5.0 – 6.0	6798	53	0	TLS-SB-IA2-22(6.0-7.0)032510	4
6.0								Coring stopped @ 6.0' due to expanding clay	
7.0									
8.0				N					
9.0									
10.0									
11.0					A				
12.0									
13.0									
14.0									

Core I.D. Number	IA2-22

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA2-DOE-B1

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-23-10	
Time of Activity	09:50	
Surveyor Name	Zach Hill	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092936.73	1065207.78
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187758	Ludlum 12 / 180411
Detector Model and Serial No.	Ludlum 44-10 / PR156393	Ludlum 44-9 / PR113654
Calibration Due Date	10-19-10	2-23-11
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 6893 cpm

Notes and Comments:

Backgrounds: Gamma: 8405 cpm (Ludlum Model 2221)

Beta: 47 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-23-10
Signature (Surveyor) Date

[redacted] 3-23-10
Signature (Sampler) Date

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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 0.5	
0.5	7725	80	Standard	0.5 – 1.0	7590	72	0	TLS-SS-IA2-DOE-B1(0.5-1.0)032310	1
1.0	7821	120					0		
2.0	7725	140	Standard	2.8 – 3.8	7472	49	0	TLS-SB-IA2-DOE-B1(2.8-3.8)032310	5a
3.0	8066	130	Standard	3.8 – 4.8	7436	58	0	TLS-SB-IA2-DOE-B1(3.8-4.8)032310	3
4.0	8260	80	Standard	4.8 – 5.8	7670	64	0	TLS-SB-IA2-DOE-B1(4.8-5.8)032310	4
5.0	7841	160	Standard	5.8 – 6.8	7624	77	0	TLS-SB-IA2-DOE-B1(6.8-7.8)032310	5
6.0	8200	100					0		
7.0									
8.0									
9.0				N					
10.0									
11.0					A				
12.0									
13.0									
14.0									
15.0									

Core I.D. Number	IA2-DOE-B1

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA2-DOE-B2

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-22-10	
Time of Activity	11:10	
Surveyor Name	Dave Warren	
Sampler Name	John Holmes	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092976.71	1065358.26
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	(No)

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190191	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR240366	Ludlum 44-9 / PR153296
Calibration Due Date	2-23-11	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 7195 cpm

Notes and Comments:

Backgrounds: Gamma: 7353 cpm (Ludlum Model 2221)

Beta: 34 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-22-10
Signature (Surveyor) Date

[redacted] 3-22-10
Signature (Sampler) Date

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2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Miuute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 0.4	
0.5	7058	80	Standard	0.4 – 0.9	7091	63	0	TLS-SS-IA2-DOE-B2(0.4-0.9)032210	1
1.0	7624	50					0		
2.0	7787	40					0		
3.0	8395	50	Standard	3.0 – 4.0	7409	68	0	TLS-SB-IA2-DOE-B2(3.0-4.0)032210	4
4.0	8038	60	Standard	4.0 – 5.0	7823	53	0	TLS-SB-IA2-DOE-B2(4.0-5.0)032210	2
5.0	7493	80					0		
6.0	7577	80					0		
7.0	8089	100					0		
8.0	7482	40	Standard	8.0 – 9.0	7677	48	0	TLS-SB-IA2-DOE-B2(8.0-9.0)032210	3
9.0	8308	90					0		
10.0	7661	110	Standard	10.0 – 11.0	8149	50	0	TLS-SB-IA2-DOE-B2(10.0-11.0)032210	5
11.0	7917	80							
12.0				N					
13.0									
14.0					A				
15.0									

Core I.D. Number	IA2-DOE-B2

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA2-DOE-B3

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-22-10	
Time of Activity	08:50	
Surveyor Name	Dave Warren	
Sampler Name	John Holmes	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092966.57	1065360.41
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	(No)

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190191	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR240366	Ludlum 44-9 / PR153296
Calibration Due Date	2-23-11	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 6987 cpm

Notes and Comments:

Backgrounds: Gamma: 6963 cpm (Ludlum Model 2221)

Beta: 58 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-22-10
Signature (Surveyor [redacted] Date

[redacted] 3-22-10
Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (epm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0	7770	80	Standard	0.0 – 0.5	7884	66	0	TLS-SS-IA2-DOE-B3(0.0-0.5)032210	1
1.0	8155	60					0		
2.0	7575	50					0		
3.0	8595	100					0		
4.0	8701	60	Standard	4.0 – 5.0	7766	67	0	TLS-SB-IA2-DOE-B3(4.0-5.0)032210	4
5.0	8262	80					0		
6.0	8417	90	Standard	6.0 – 7.0	7652	64	0	TLS-SB-IA2-DOE-B3(6.0-7.0)032210	5a
7.0	7958	100					0		
8.0							0	No recovery 8.0 – 12.0	
9.0							0	↓	
10.0							0	↓	
11.0							0	↓	
12.0	8426	90	Standard	12.0 – 13.0	7364	55	0	TLS-SB-IA2-DOE-B3(12.0-13.0)032210	3
13.0	7822	70					0	↓	
14.0	7896	110	Standard	14.0 – 15.0	7504	72	0	TLS-SB-IA2-DOE-B3(14.0-15.0)032210	5
15.0	8645	80					0		
16.0									→

Core I.D. Number	IA2-DOE-B3

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample seleetion. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than rhe termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interfaee, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

Soil and Core Survey Forms
Investigative Area 3

Soil Core I.D. Number: IA3-1

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:** ARSEC-HPS-0003	**Federal 09-055-00003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	2/15/2010	
Time of Activity	09:05	
Surveyor Name	Mark Shaffer	
Sampler Name	Dave Warren	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092423.97	1063866.48
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 186760
Detector Model and Serial No.	Ludlum 44-10 / PR 242823	Ludlum 44-9 / PR193658
Calibration Due Date	10/19/2010	10/19/2010
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 5,354 cpm

Notes and Comments:

Backgrounds: Gamma: 6,459 cpm (Ludlum Model 2221)

Beta: 56 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 02/15/2010
Date

[redacted] 02/15/2010
Signature (Sampler) Date

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (epm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0	6791	40	Standard	0.0 – 0.5	6142	40	0	TLS-SS-IA3-1(0.0-0.5)021510	1
0.5	6125	20					0		
1.0	6981	50	Standard	1.5 – 2.5	6408	56	0	TLS-SB-IA3-1(1.5 – 2.5)021510	3
2.0	6833	80	Standard	2.5 – 3.5	6336	68	0	TLS-SB-IA3-1(2.5 – 3.5)021510	5a
3.0	6344	80					0		
4.0	6676	80					0		
5.0	6439	80					0		
6.0	6806	80					0		
7.0	6591	80					0		
8.0-8.4	6224	80					0		
8.4-9.0	6165	60					0		
9.0-10.0	6703	80					0		
10.0-11.0	7190	60	Standard	10.0 – 11.0	6425	70	0	TLS-SB-IA3-1(10.0 – 11.0)021510	4
11.0-12.0	6748	100	Standard	11.0 – 12.0	6276	69	0	TLS-SB-IA3-1(11.0 – 12.0)021510	5
12.0-13.0	7128	80	Standard	12.0 – 13.0	6329	63	0	TLS-SB-IA3-1(12.0 – 13.0)021510 (Chemical)	

Core I.D. Number	IA3-1

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

Soil Core I.D. Number: IA3-2

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:** ARSEC-HPS-0003	**Federal 09-055-00003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	2/11/2010	
Time of Activity	14:50	
Surveyor Name	Mark Shaffer	
Sampler Name	Dave Warren	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092179.83	1063419.79
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 186760
Detector Model and Serial No.	Ludlum 44-10 / PR 242823	Ludlum 44-9 / PR193658
Calibration Due Date	10/19/2010	10/19/2010
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 4,958 cpm

Notes and Comments:

Backgrounds: Gamma: 6,047 cpm (Ludlum Model 2221)

Beta: 50 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 02/11/2010
Signature (SOC surveyor) Date

[redacted] 02/11/2010
Signature (Sampler) Date

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0	4958	60	Standard	0.0 – 0.5	5455	43	0	TLS-SS-IA3-2(0.0-0.5)021110	1
0.5	5768	80					0		
1.0	5980	140	Standard	1.0 – 2.0	5837	68	0	TLS-SB-IA3-2(1.0 – 2.0)021110	5
2.0	6734	120	Standard	2.0 – 3.0	6302	47	0	TLS-SB-IA3-2(2.0 – 3.0)021110	4
3.0	6449	80					0		
4.0	6136	60					0		
5.0								No recovery from 5.0 – 6.0 feet	
6.0								No recovery from 6.0 – 7.0 feet	
7.0								No recovery from 7.0 – 8.0 feet	
8.0	6494	60					0		
9.0	6095	80					0		
10.0								No recovery from 10.0 – 11.5 feet	
11.0	6289	100					0	(11.5 – 12.0 Depth)	
12.0	6316	60					0		
13.0	6629	60					0		
14.0	6035	80					0		
15.0	6191	60					0	(15.7 – 16.0 Depth)	

Core I.D. Number	IA3-2

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0	6408	80	Standard	16.0 – 17.0	5545	51	0	TLS-SB-IA3-2(16.0 – 17.0)021110	2
17.0	6050	60	Standard	17.0 – 18.0	5729	41	0	TLS-SB-IA3-2(17.0 – 18.0)021110	3
18.0	6028	120					0		
19.0	6174	100					0		
20.0									
21.0									
22.0									
23.0									
24.0									
25.0						A			
26.0					N				
27.0									
28.0									
29.0									
30.0									
31.0									
32.0									

Core I.D. Number	IA3-2

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA3-3

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:** ARSEC-HPS-0003	**Federal 09-055-00003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	2/12/2010	
Time of Activity	14:30	
Surveyor Name	Mark Shaffer	
Sampler Name	Dave Warren	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092408.14	1064109.41
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 186760
Detector Model and Serial No.	Ludlum 44-10 / PR 242823	Ludlum 44-9 / PR193658
Calibration Due Date	10/19/2010	10/19/2010
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 7,180 cpm

Notes and Comments:

Backgrounds: Gamma: 6,642 cpm (Ludlum Model 2221)

Beta: 46 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 02/12/2010
Signature (Surveyor) Date

[redacted] 02/12/2010
Signature (Sampler) Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0	7081	120	Standard	0.0 – 0.5	6585	56	0	TLS-SS-IA3-3(0.0-0.5)021210	1
0.5	6798	80					0		
1.0	6689	100	Standard	1.0 – 2.0	6833	47	0	TLS-SB-IA3-3(1.0-2.0)021210	3
2.0	7303	100					0		
3.0	7395	120	Standard	3.0 – 4.0	6516	73	0	TLS-SB-IA3-3(3.0-4.0)021210	4
4.0	7219	80					0	(Depth from 4.0 – 4.4 feet)	
5.0	6637	140	Standard	4.4 – 5.4	6638	77	0	TLS-SB-IA3-3(4.4–5.4)021210	5
5.4	7163	60					0	(Depth from 5.4 – 6.0 feet)	
6.0	7165	120					0	(Depth from 6.0 – 6.7 feet)	
7.0	7459	100	Standard	6.7 – 7.7	6651	44	0	TLS-SB-IA3-3(6.7–7.7)021210	2
8.0	7369	120					0		
9.0	7317	60					0		
10.0	6694	80					0		
11.0	7126	120					0		
12.0	7329	100					0		
13.0	6707	80					0		
14.0					N/A				

Core I.D. Number	IA3-3

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest sean reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA3-4

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:** ARSEC-HPS-0003	**Federal 09-055-00003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	2/11/2010	
Time of Activity	09:45	
Surveyor Name	Mark Shaffer	
Sampler Name	Dave Warren	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092277.03	1063547.45
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 186760
Detector Model and Serial No.	Ludlum 44-10 / PR 242823	Ludlum 44-9 / PR193658
Calibration Due Date	10/19/2010	10/19/2010
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 2,420 cpm

Notes and Comments:

Backgrounds: Gamma: 2,357 cpm (Ludlum Model 2221)

Beta: 70 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 02/11/2010
Signature (Supervisor) Date

[redacted] 02/11/2010
Signature (Sampler) Date

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2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0	5506	40	Standard	0.0 – 0.5	4923	37	0	TLS-SS-IA3-4(0.0-0.5)021110	1
0.5	5427	60					0		
1.0	5306	70	Standard	1.0 – 2.0	5193	49	0	TLS-SB-IA3-4(1.0-2.0)021110	4
2.0	5722	60	Standard	2.0 – 3.0	5225	54	0	TLS-SB-IA3-4(2.0-3.0)021110	5
3.0	5285	40					0		
4.0	5700	40					0		
5.0								No recovery from 5.0 – 6.0 feet	
6.0								No recovery from 6.0 – 7.0 feet	
7.0								No recovery from 7.0 – 8.0 feet	
8.0	5683	40					0		
9.0	5665	40					0		
10.0								No recovery from 10.0 – 11.0 feet	
11.0								No recovery from 11.0 – 12.2 feet	
12.0	5280	100	Standard	12.2 – 13.0 ft.	5010	72	0	TLS-SB-IA3-4(12.2-13.0)021110	2
13.0	5480	60	Standard	13.0 – 14.0 ft.	4683	38	0	TLS-SB-IA3-4(13.0-14.0)021110	3
14.0	5569	80					0		
15.0									

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

Soil Core I.D. Number: IA3-5

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:** ARSEC-HPS-0003	**Federal 09-055-00003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	2/15/2010	
Time of Activity	11:00	
Surveyor Name	Mark Shaffer	
Sampler Name	Dave Warren	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092505.96	1064309.05
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	(No)

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 186760
Detector Model and Serial No.	Ludlum 44-10 / PR 242823	Ludlum 44-9 / PR193658
Calibration Due Date	10/19/2010	10/19/2010
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 6,673 cpm

Notes and Comments:

Backgrounds: Gamma: 7,069 cpm (Ludlum Model 2221)

Beta: 34 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 02/15/2010
Date

[redacted] 02/15/2010
Signature (Sampler) Date

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta Oue Miuute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0	7434	60	Standard	0.0 – 0.5	7019	50	0	TLS-SS-IA3-5(0.0-0.5)021510	1
0.5	7600	100					0		
1.0	7776	60	Standard	0.8 – 1.8	7084	55	0	TLS-SB-IA3-5(0.8 – 1.8)021510	3
2.0	7735	60	Standard	2.2 – 3.2	7002	69	0	TLS-SB-IA3-5(2.2 – 3.2)021510	2
3.0	7467	80	Standard	3.0 – 4.0	6760	38	0	TLS-SB-IA3-5(3.0 – 4.0)021510(Chemical)	
4.0	7559	100	Standard	4.0 – 5.0	6782	59	0	TLS-SB-IA3-5(4.0 – 5.0)021510	4
5.0	7540	60					0		
6.0	7435	80					0		
7.0	7540	60					0		
8.0	6823	100					0		
9.0	7611	60					0		
10.0	7057	80					0		
11.0	7083	100					0		
12.0	7341	100					0		
13.0	7456	80					0		
14.0	7546	60					0		
15.0	7378	100	Standard	14.0 – 15.0	6864	71	0	TLS-SB-IA3-5(14.0 – 15.0)021510	5

Core I.D. Number	IA3-5

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interfaee, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA3-6

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:** ARSEC-HPS-0003	**Federal 09-055-00003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	2/12/2010	
Time of Activity	09:00	
Surveyor Name	Mark Shaffer	
Sampler Name	Dave Warren	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092397.72	1063774.23
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	(No)

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 186760
Detector Model and Serial No.	Ludlum 44-10 / PR 242823	Ludlum 44-9 / PR193658
Calibration Due Date	10/19/2010	10/19/2010
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 6,015 cpm

Notes and Comments:

Backgrounds: Gamma: 6,005 cpm (Ludlum Model 2221)

Beta: 29 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 02/12/2010
Date

[redacted] 02/12/2010
Signature (Sampler) Date

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2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0	6312	60	Standard	0.0 – 0.5	5870	46	0	TLS-SS-IA3-6(0.0-0.5)021210	1
0.5	6657	60					0		
1.0	6711	100					0		
2.0	6636	120					0		
3.0	6639	80	Standard	3.1 – 4.1	6278	59	0	TLS-SB-IA3-6(3.1-4.1)021210	3
4.0	6280	80					0		
5.0	6517	120	Standard	5.0 – 6.0	6090	65	0	TLS-SB-IA3-6(5.0 – 6.0)021210	5
6.0	6960	80	Standard	6.0 – 7.0	6062	47	0	TLS-SB-IA3-6(6.0 – 7.0)021210	5a
7.0	6747	80					0		
8.0	6526	120					0		
9.0	6330	100					0		
10.0	6892	60					0		
11.0	7187	100	Standard	11.0 – 12.0	6095	45	0	TLS-SB-IA3-6(11.0 – 12.0)021210	4
12.0	6451	80					0		
13.0					A				
14.0				N					
15.0									

Core I.D. Number	IA3-6

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA3-7

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:** ARSEC-HPS-0003	**Federal 09-055-00003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	2/15/2010	
Time of Activity	13:50	
Surveyor Name	Mark Shaffer	
Sampler Name	Dave Warren	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092608.88	1064478.05
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	(No)

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 186760
Detector Model and Serial No.	Ludlum 44-10 / PR 242823	Ludlum 44-9 / PR193658
Calibration Due Date	10/19/2010	10/19/2010
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 4,348 cpm

Notes and Comments:

Backgrounds: Gamma: 5,708 cpm (Ludlum Model 2221)

Beta: 26 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 02/15/2010
Date

[redacted] 02/15/2010
Signature (Sampler) Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0	5977	80	Standard	0.0 – 0.5	5679	57	0	TLS-SS-IA3-7(0.0-0.5)021510	1
0.5	5850	80					0		
1.0	6210	80	Standard	1.0 – 2.0	5719	41	0	TLS-SB-IA3-7(1.0-2.0)021510	2
2.0	6129	120	Standard	2.1 – 3.1	5723	42	0	TLS-SB-IA3-7(2.1-3.1)021510	3
3.0	6395	60	Standard, Duplicate	3.3 – 4.3	5736	60	0	TLS-SB-IA3-7(3.3-4.3)021510	4
4.0	6616	100	Standard	4.3 – 5.3	5989	54	0	TLS-SB-IA3-7(4.3-5.3)021510	5
4.3-5.0	6030	140	Standard	5.3 – 6.3	5886	75	0	TLS-SB-IA3-7(5.3-6.3)021510(Chemical)	
5.0-6.0	6014	60					0		
6.0	6194	100					0		
7.0	6279	80					0		
8.0	6138	80					0		
9.0	6543	60					0		
10.0	6107	60					0		
11.0	5739	100					0		
						A			
				N					

Core I.D. Number	IA3-7

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA3-8

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:** ARSEC-HPS-0003	**Federal 09-055-00003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	2/12/2010	
Time of Activity	10:35	
Surveyor Name	Mark Shaffer	
Sampler Name	Dave Warren	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092516.824	1063991.314
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 186760
Detector Model and Serial No.	Ludlum 44-10 / PR 242823	Ludlum 44-9 / PR193658
Calibration Due Date	10/19/2010	10/19/2010
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 5,586 cpm

Notes and Comments:

Backgrounds: Gamma: 6,473 cpm (Ludlum Model 2221)

Beta: 33 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 02/12/2010
Signature (Surveyor) Date

[redacted] 02/12/2010
Signature (Sampler) Date

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2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0	6739	140	Standard	0.0 – 0.5	6472	72	0	TLS-SS-IA3-8(0.0-0.5)021210	1
0.5	6202	120	Standard	0.5 – 1.5	6338	42	0	TLS-SB-IA3-8(0.5-1.5)021210	3
1.0	6617	100					0		
2.0	6653	60					0		
3.0	6607	100					0		
4.0	6724	100					0		
5.0	6714	100					0		
6.0	6626	120	Standard	6.0 – 7.0	6355	63	0	TLS-SB-IA3-8(6.0 – 7.0)021210	5
7.0	6911	100	Standard	7.0 – 8.0	6354	56	0	TLS-SB-IA3-8(7.0 – 8.0)021210	5a
8.0	7299	80	Standard	8.0 – 9.0	6432	62	0	TLS-SB-IA3-8(8.0 – 9.0)021210	4
9.0	6361	100					0	(No recovery from 9.5 – 10.5)	
10.0	7128	80	Duplicate	11.0 – 12.0	6202	62	0	TLS-SB-IA3-8(10.5 – 11.4)021210	
11.0							0	(No recovery from 11.4 – 12.2)	
12.0	6614	120					0		
13.0	6621	80					0		
14.0					A				
15.0				N					

Core I.D. Number	IA3-8

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA3-9

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:** ARSEC-HPS-0003	**Federal 09-055-00003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	2/15/2010	
Time of Activity	15:00	
Surveyor Name	Mark Shaffer	
Sampler Name	Dave Warren	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092721.78	1064703.86
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	(No)

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 186760
Detector Model and Serial No.	Ludlum 44-10 / PR 242823	Ludlum 44-9 / PR193658
Calibration Due Date	10/19/2010	10/19/2010
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 6,400 cpm

Notes and Comments:

Backgrounds: Gamma: 7,056 cpm (Ludlum Model 2221)

Beta: 46 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 02/15/2010
Date

[redacted] 02/15/2010
Date

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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0	7290	80	Standard	0.0 – 0.5	7071	48	0	TLS-SS-IA3-9(0.0-0.5)021510	1
0.5	6970	60	Standard	0.5 – 1.5	7076	59	0	TLS-SB-IA3-9(0.5-1.5)021510	3
1.0	7137	80					0		
2.0	7682	80					0		
3.0	7558	100	Standard	3.2 - 4.2	7230	47	0	TLS-SB-IA3-9(3.2-4.2)021510	2
4.0-4.7	7495	80					0		
4.7-5.7	7721	60					0		
5.7-6.7	7222	60					0		
6.7-7.7	7227	60					0		
7.7-8.7	7676	40					0		
8.7-9.7	7833	80	Standard, QA Split	8.7 – 9.7	7374	60	0	TLS-SB-IA3-9(8.7-9.7)021510	4
9.7-10.7	7293	140	Standard	9.7 – 10.7	7083	57	0	TLS-SB-IA3-9(9.7-10.7)021510	5
10.7-11.7	7228	60	Standard	10.7 – 11.7	7205	61	0	TLS-SB-IA3-9(10.7-11.7)021510(Chemical)	
11.7-12.7	7571	60					0		
12.7-13.7	7403	120					0		
						A			
				N					

Core I.D. Number	IA3-9

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be colleeted per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA3-10

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:** ARSEC-HPS-0003	**Federal 09-055-00003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	2/11/2010	
Time of Activity	12:50	
Surveyor Name	Mark Shaffer	
Sampler Name	Dave Warren	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092234.31	1063696.22
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 186760
Detector Model and Serial No.	Ludlum 44-10 / PR 242823	Ludlum 44-9 / PR193658
Calibration Due Date	10/19/2010	10/19/2010
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 4,448 cpm

Notes and Comments:

Backgrounds: Gamma: 5,650 cpm (Ludlum Model 2221)

Beta: 32 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 02/11/2010
Signature (Supervisor) Date

[redacted] 02/11/2010
Signature (Sampler) Date

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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0	6434	100	Standard	0.0 – 0.5	5702	44	0	TLS-SS-IA3-10(0.0-0.5)021110	1
0.5	6218	80					0		
1.0	6157	60					0		
2.0	7072	100	Standard	2.0 – 3.0	5697	73	0	TLS-SB-IA3-10(2.0-3.0)021110	4
3.0	6112	120	Standard	3.2 – 4.2	6017	75	0	TLS-SB-IA3-10(3.2-4.2)021110	3
4.0	5928	120					0	(4.2 – 5.0 Depth)	
5.0								No recovery from 5.0 – 6.5 feet	
6.0	6255	140	Standard	6.5 – 7.5	5739	73	0	TLS-SB-IA3-10(6.5 - 7.5)021110	5
7.0	6524	100					0	(7.5 – 8.0 Depth)	
8.0	6465	80					0		
9.0	6400	80					0		
10.0								No recovery from 10.0 – 11.2 feet	
11.0	6145	80					0	(11.2 – 12.0 Depth)	
12.0	6157	80					0		
13.0	6460	80					0		
14.0	6452	60	Standard	14.0 – 15.0	5938	57	0	TLS-SB-IA3-10(14.0 - 15.0)021110	5a
15.0									

Core I.D. Number	IA3-10

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be seleeted at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta seintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA3-11

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:** ARSEC-HPS-0003	**Federal 09-055-00003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	2/16/2010	
Time of Activity	15:30	
Surveyor Name	Mark Shaffer	
Sampler Name	Dave Warren	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	Moved 1 meter North	1064929.66
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 186760
Detector Model and Serial No.	Ludlum 44-10 / PR 242823	Ludlum 44-9 / PR193658
Calibration Due Date	10/19/2010	10/19/2010
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 4,140 cpm

Notes and Comments:

Backgrounds: Gamma: 6,942 cpm (Ludlum Model 2221)

Beta: 42 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 02/16/2010
Signature (Surveyor) Date

[redacted] 02/16/2010
Signature (Sampler) Date

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2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0								No recovery from 0.0 – 0.5 feet	
0.5								No recovery from 0.5 – 1.0 feet	
1.0	6971	60	Standard	1.0-1.5	6540	51	0	TLS-SS-IA3-11(1.0-1.5)021610	1
2.0	6857	40	Standard	2.2 – 3.2	6379	68	0	TLS-SB-IA3-11(2.2-3.2)021610	2
3.0	6652	60					0		
4.0	7237	60	Standard, Duplicate	4.0 – 5.0	5979	53	0	TLS-SB-IA3-11(4.0-5.0)021610	4
5.0								No recovery from 5-0 – 6.0 feet	
6.0	6675	60					0		
7.0	6822	40	Standard	7.0 – 8.0	6290	69	0	TLS-SB-IA3-11(7.0-8.0)021610	3
8.0	6712	60	Standard	8.0 – 9.0	5779	57	0	TLS-SB-IA3-11(8.0-9.0)021610	5
9.0	6364	60					0		
						A			
				N					

Core I.D. Number	IA3-11

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA3-12

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:** ARSEC-HPS-0003	**Federal 09-055-00003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	2/16/2010	
Time of Activity	09:10	
Surveyor Name	Mark Shaffer	
Sampler Name	Dave Warren	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092831.17	1065033.11
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 186760
Detector Model and Serial No.	Ludlum 44-10 / PR 242823	Ludlum 44-9 / PR193658
Calibration Due Date	10/19/2010	10/19/2010
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 4,635 cpm

Notes and Comments:

Backgrounds: Gamma: 4,610 cpm (Ludlum Model 2221)

Beta: 39 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 02/16/2010
Date

[redacted] 02/16/2010
Date

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2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0	5301	60	Standard	0.0 – 0.5	5018	60	0	TLS-SS-IA3-12(0.0-0.5)021610	1
0.5	5304	100	Standard	0.5 – 1.5	5152	40	0	TLS-SB-IA3-12(0.5-1.5)021610	5
1.0	5021	80					0		
2.0	4981	70					0		
3.0	5096	60					0		
4.0-4.4	5319	50					0		
4.4-8.4								No recovery from 4.4 – 8.4 feet	
8.4-9.4	5451	60	Standard	8.4 – 9.4	5070	38	0	TLS-SB-IA3-12(8.4-9.4)021610	2
10.0	5291	60					0	No recovery from 9.4 – 10.0 feet	
11.0	5986	60	Standard	11.0 – 12.0	5314	62	0	TLS-SB-IA3-12(11.0-12.0)021610	4
12.0	5807	60	Standard	12.0 – 13.0	5099	60	0	TLS-SB-IA3-12(12.0-13.0)021610	3
13.0	5692	80	Standard	13.0 – 14.0	5114	64	0	TLS-SB-IA3-12(13.0-14.0)021610(Chemical)	
14.0	5168	80					0		
15.0-16.0	5830	60					0		
17.0	5086	80					0		
18.0	5028	60					0		
19.0	5690	60					0		

Core I.D. Number	1A3-12

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA3-13

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:** ARSEC-HPS-0003	**Federal 09-055-00003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	2/16/2010	
Time of Activity	10:55	
Surveyor Name	Mark Shaffer	
Sampler Name	Dave Warren	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. I)	1092910.72	1065151.65
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 186760
Detector Model and Serial No.	Ludlum 44-10 / PR 242823	Ludlum 44-9 / PR193658
Calibration Due Date	10/19/2010	10/19/2010
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 6,250 cpm

Notes and Comments:

Backgrounds: Gamma: 6,193 cpm (Ludlum Model 2221)

Beta: 51 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.50 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 02/16/2010
Date

[redacted] 02/16/2010
Signature (Sampler) Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Couut (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0	6023	110	Standard	0.0 – 0.5	5842	59	0	TLS-SS-IA3-13(0.0-0.5)021610	1
0.5	6310	70					0		
1.0	6449	60					0		
2.0	6795	110					0		
3.0	6391	110	Standard	3.6 – 4.6	6237	75	0	TLS-SB-IA3-13(3.6-4.6)021610	3
4.0	6741	70					0		
5.0	6873	140	Standard	5.0 – 6.0	6275	53	0	TLS-SB-IA3-13(5.0-6.0)021610	5
6.0	6817	100					0		
7.0	7401	60	Standard	7.0 – 8.0	6372	62	0	TLS-SB-IA3-13(7.0-8.0)021610	4
8.0-9.2	6874	80					0		
9.2-10.0	6644	140	Standard	9.2 – 10.2	6045	65	0	TLS-SB-IA3-13(9.2-10.2)021610(Chemical)	
10.0	6841	120					0		
11.0	6420	100					0		
12.0	6836	80	Standard	12.0 – 13.0	5851	83	0	TLS-SB-IA3-13(12.0-13.0)021610	2
13.0-13.5	6967	80					0		

Core I.D. Number	IA3-13

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

Soil Core I.D. Number: IA3-14

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:** ARSEC-HPS-0003	**Federal 09-055-00003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	2/16/2010	
Time of Activity	14:35	
Surveyor Name	Mark Shaffer	
Sampler Name	Dave Warren	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092910.72	1065038.75
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 186760
Detector Model and Serial No.	Ludlum 44-10 / PR 242823	Ludlum 44-9 / PR193658
Calibration Due Date	10/19/2010	10/19/2010
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 6,697 cpm

Notes and Comments:

Backgrounds: Gamma: 6,137 cpm (Ludlum Model 2221)

Beta: 44 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 02/16/2010
Signature (Tech) Date

[redacted] 02/16/2010
Signature (Sampler) Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0	6351	70	Standard	0.0 – 0.5	5663	64	0	TLS-SS-IA3-14(0.0-0.5)021610	1
0.5	6378	70	Standard	0.5 – 1.5	5802	51	0	TLS-SB-IA3-14(0.5-1.5)021610	3
1.0	6300	60	Standard	1.5 – 2.5	5898	49	0	TLS-SB-IA3-14(1.5-2.5)021610	2
2.0	6516	40					0		
3.0	6255	70					0		
4.0	5827	100					0		
5.0	5880	40					0		
6.0	6201	50					0		
7.0	6025	40	Standard	6.5 – 7.5	5929	46	0	TLS-SB-IA3-14(6.5-7.5)021610(Chemical)	
8.0	5878	100	Standard	7.5 – 8.5	5699	42	0	TLS-SB-IA3-14(7.5-8.5)021610	5
9.0	6453	120	Standard	8.5 – 9.5	5640	47	0	TLS-SB-IA3-14(8.5-9.5)021610	4
9.0-9.5	6648	50					0		
						A			
				N					

Core I.D. Number	IA3-14

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA3-15

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:** ARSEC-HPS-0003	**Federal 09-055-00003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	2/17/2010	
Time of Activity	09:30	
Surveyor Name	David Warren	
Sampler Name	Mark Shaffer	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093023.62	1065264.56
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 186760
Detector Model and Serial No.	Ludlum 44-10 / PR 242823	Ludlum 44-9 / PR193658
Calibration Due Date	10/19/2010	10/19/2010
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 5,283 cpm

Notes and Comments:

Backgrounds: Gamma: 6,012 cpm (Ludlum Model 2221)

Beta: 51 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 02/17/2010
Signature (Surveyor) Date

[redacted] 02/17/2010
Signature (Sampler) Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0		
0.5	6048	40	Standard	0.0 – 0.5	5547	49	0	TLS-SS-IA3-15(0.0-0.5)021710	1
1.0	5498	60	Standard	0.9 – 1.9	5784	70	0	TLS-SB-IA3-15(0.9-1.9)021710	3
2.0	6162	70	Standard	2.0 – 3.0	5463	50	0	TLS-SB-IA3-15(2.0-3.0)021710	2
3.0	6454	60					0		
4.0	5690	40					0		
4.4	6091	60					0		
5.0	6057	40	Standard	4.0 – 5.0	5487	57	0	TLS-SB-IA3-15(4.0-5.0)021710	4
6.0	6069	60	Standard	5.0 – 6.0	5840	69	0	TLS-SB-IA3-15(5.0-6.0)021710(Chemical)	
7.0	5314	70					0		
8.0	6045	70	Duplicate	7.0 – 8.0	5435	60	0	TLS-SB-IA3-15(7.0-8.0)021710	5
9.0	6021	50					0		
9.0-9.6	5790	40					0		
						A			
				N					

Core I.D. Number	IA3-15

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA3-16

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:** ARSEC-HPS-0003	**Federal 09-055-00003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	2/17/2010	
Time of Activity	11:00	
Surveyor Name	Joe Craig	
Sampler Name	Dave Warren	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)		
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 186760
Detector Model and Serial No.	Ludlum 44-10 / PR 242823	Ludlum 44-9 / PR193658
Calibration Due Date	10/19/2010	10/19/2010
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 6,202 cpm

Notes and Comments:

Backgrounds: Gamma: 5,746 cpm (Ludlum Model 2221)

Beta: 34 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 02/17/2010
Signature (Surveyor) Date

[redacted] 02/17/2010
Signature (Sampler) Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0	6230	60	Standard	0.0 – 0.5	5720	47	0	TLS-SS-IA3-16(0.0-0.5)021710	1
0.5	6076	40					0		
1.0	6148	40					0		
2.0	6201	120	Standard	1.6 – 2.6	5774	65	0	TLS-SB-IA3-16(1.6-2.6)021710	2
3.0	6328	100	Standard	2.7 – 3.7	5810	59	0	TLS-SB-IA3-16(2.7-3.7)021710	3
4.0-4.8	6148	60					0		
4.8-5.8	6208	100					0		
5.8-6.8	6166	60					0		
6.8-7.8	6113	140	Standard	6.8 - 7.8	5729	54	0	TLS-SB-IA3-16(6.8-7.8)021710	5
7.8-8.8	6313	90	Standard, Duplicate	7.8 - 8.8	5780	54	0	TLS-SB-IA3-16(7.8-8.8)021710	4
8.8-9.8	6162	130	Standard	8.8 - 9.8	5891	62	0	TLS-SB-IA3-16(8.8-9.8)021710(Chemical)	
							0		
						A			
				N					

Core I.D. Number	IA3-16

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be seleeted at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be reeorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA3-17

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal 09-055-00003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	2/17/2010	
Time of Activity	09:35	[redacted]
Surveyor Name	Mike Carlin	
Sampler Name	John Holmes	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093119.03	1065494.71
Was the bore hole re-located due to refusal? (Circle either Yeas or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187758	Ludlum 12 / 229306
Detector Model and Serial No.	Ludlum 44-10 / PR156393	Ludlum 44-9 / PR191214
Calibration Due Date	10/19/2010	10/28/2010
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 7,019 cpm

Notes and Comments:

Backgrounds: Gamma: 6,977 cpm (Ludlum Model 2221)

Beta: 48 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: <19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 02/17/2010
Signature (Surveyor) Date

[redacted] 02/17/2010
Signature (Sampler) Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Statie Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0								No recovery from 0.0-0.5 feet.	
0.5	7009	40	Standard	0.5 – 1.0	6858	42	0	TLS-SS-IA3-17(0.5-1.0)021710	1
1.0	7835	80					0		
2.0	7122	110	Standard	1.9 – 2.9	6858	74	0	TLS-SB-IA3-17(1.9-2.9)021710	3
3.0	7178	70	Standard	3.0 – 4.0	6578	61	0	TLS-SB-IA3-17(3.0-4.0)021710	5
4.0	7297	40					0		
5.0	7803	80	Standard	5.3 – 6.3	6959	50	0	TLS-SB-IA3-17(5.3-6.3)021710	2
6.0	7573	70					0		
7.0	7307	50					0		
8.0	7110	60	Standard	8.0 – 9.0	6623	59	0	TLS-SB-IA3-17(8.0-9.0)021710(Chemical)	
9.0	7623	50	Standard, Duplicate	9.0 – 10.0	6732	50	0	TLS-SB-IA3-17(9.0-10.0)021710	4
						A			
				N					

Core I.D. Number	IA3-17

Note 1

1A-1 through 1A-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

1A-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA3-18

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal 09-055-00003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	2/17/2010	
Time of Activity	14:00	[redacted]
Surveyor Name	Mike Carlin	
Sampler Name	John Holmes	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)		
Was the bore hole re-located due to refusal? (Circle either Yeas or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187758	Ludlum 12 / 229306
Detector Model and Serial No.	Ludlum 44-10 / PR156393	Ludlum 44-9 / PR191214
Calibration Due Date	10/19/2010	10/28/2010
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 5,648 cpm

Notes and Comments:

Backgrounds: Gamma: 5,581 cpm (Ludlum Model 2221)

Beta: 64 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 02/17/2010
Signature (Surveyor) Date

[redacted] 02/17/2010
[redacted]ignature (Sampler) Date

I-297

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0	6314	30	Standard	0.0 0.5	5711	41	0	TLS-SS-IA3-18(0.0-0.5)021710	1
0.5	6054	50					0		
1.0	6425	90	Standard	1.3 – 2.3	5711	42	0	TLS-SB-IA3-18(1.3-2.3)021710	2
2.0	6587	40	Standard	2.3 3.3	5967	66	0	TLS-SB-IA3-18(2.3-3.3)021710	3
3.0	5864	120					0		
4.0	6368	20					0		
5.0	6633	80					0		
6.0	6301	120	Standard	6.0 – 7.0	6038	60	0	TLS-SB-IA3-18(6.0-7.0)021710	5
7.0	6013	60	Standard	7.0 – 8.0	6092	73	0	TLS-SB-IA3-18(7.0-8.0)021710(Chemical)	
8.0	6957	60	Standard	8.0 – 9.0	5952	52	0	TLS-SB-IA3-18(8.0-9.0)021710	4

A

N

Core I.D. Number	IA3-18

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA3-19

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:** ARSEC-HPS-0003	**Federal 09-055-00003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	2/18/2010	
Time of Activity	09:30	
Surveyor Name	Dave Warren	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093369.83	1066160.28
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 186760
Detector Model and Serial No.	Ludlum 44-10 / PR 242823	Ludlum 44-9 / PR PR193658
Calibration Due Date	10/19/2010	10/19/2010
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 6,948 cpm

Notes and Comments:

Backgrounds: Gamma: 5,453 cpm (Ludlum Model 2221)

Beta: 29 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 02/18/2010
Signatu[redacted]urveyor) Date

[redacted] 02/18/2010
[redacted] Signature (Sampler) Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0	6719	60					0		
0.5	6920	60	Standard	0.0 – 0.5	6487	39	0	TLS-SS-IA3-19(0.0-0.5)021810	1
1.0	7018	120	Standard	1.0 – 2.0	6598	48	0	TLS-SB-IA3-19(1.0-2.0)021810	2
2.0	6970	140					0		
2.7							0	No recovery 2.7-5.0	
5.0	6836	40	Standard	5.0 – 6.0	6618	52	0	TLS-SB-IA3-19(5.0-6.0)021810	3
6.0	7157	50	Standard	6.0 – 7.0	6847	48	0	TLS-SB-IA3-19(6.0-7.0)021810	4
7.0	7133	80		7.0 – 8.0	6694	60	0	TLS-SB-IA3-19(7.0-8.0)021610(Chemical)	
8.0	6756	140	Duplicate	8.0 – 9.0	6582	47	0	TLS-SB-IA3-19(8.0-9.0)021610	5
9.0	6704	60					0		
						A			
				N					

Core I.D. Number	1A3-19

1-306

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

Soil Core I.D. Number: IA3-20

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal 09-055-00003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	2/17/2010	
Time of Activity	11:00	
Surveyor Name	Joe Craig	
Sampler Name	Dave Warren	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)		
Was the bore hole re-located due to refusal? (Circle either Yeas or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 186760
Detector Model and Serial No.	Ludlum 44-10 / PR 242823	Ludlum 44-9 / PR193658
Calibration Due Date	10/19/2010	10/19/2010
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 6,196 cpm

Notes and Comments:

Backgrounds: Gamma: 5,866 cpm (Ludlum Model 2221)

Beta: 44 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 02/17/2010
[redacted]gnature (Surveyor) Date

[redacted] 02/17/2010
Signature ([redacted] Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (epm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree
0.0	6287	60	Standard	0.0 – 0.5	5941	51	0	TLS-SS-IA3-20(0.0-0.5)021710	1
0.5	6312	80	Standard	0.5 – 1.5	6061	72	0	TLS-SB-IA3-20(0.5-1.5)021710	4
1.0	5987	80	Standard	1.5 – 2.5	6127	53	0	TLS-SB-IA3-20(1.5-2.5)021710(Chemical)	
2.0	6006	60	Standard	2.5 – 3.5	6168	65	0	TLS-SB-IA3-20(2.5-3.5)021710	3
3.0-4.2	6012	120	Standard	3.5 – 4.5	6062	51	0	TLS-SB-IA3-20(3.5-4.5)021710	2
4.2-5.2	5938	100					0		
5.2-6.2	6096	120					0		
6.2-7.2	6067	140	Standard	6.2 – 7.2	5782	56	0	TLS-SB-IA3-20(6.2-7.2)021710	5
7.2-8.2	5905	60					0		
8.2-9.1	5739	60					0		
						A			
				N					

Core I.D. Number	IA3-20

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the seeond highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

Soil Core I.D. Number: IA3-21

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal 09-055-00003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	2/17/2010	
Time of Activity	15:35	[redacted]
Surveyor Name	Mike Carlin	
Sampler Name	John Holmes	
	Northing [redacted]	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)		
Was the bore hole re-located due to refusal? (Circle either Yeas or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187758	Ludlum 12 / 229306
Detector Model and Serial No.	Ludlum 44-10 / PR156393	Ludlum 44-9 / PR191214
Calibration Due Date	10/19/2010	10/28/2010
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 6,173 cpm

Notes and Comments:

Backgrounds: Gamma: 6,558 cpm (Ludlum Model 2221)

Beta: 23 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 02/17/2010
Signature (Surveyor) Date

[redacted] 02/17/2010
Signature (Sampler) Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0	7525	40	Standard	0.0 – 0.5	6444	67	0	TLS-SS-IA3-21(0.0-0.5)021710	1
0.5	6411	80					0		
1.0	7044	70	Standard	1.0 – 2.0	6524	60	0	TLS-SB-IA3-21(1.0-2.0)021710	2
2.0	7029	80					0		
3.0	7311	120	Standard	3.0 – 4.0	6256	64	0	TLS-SB-IA3-21(3.0-4.0)021710	4
4.0	6885	80	Standard	4.0 – 5.0	6461	53	0	TLS-SB-IA3-21(4.0-5.0)021710(Chemical)	
5.0	6757	110	Standard	5.0 – 6.0	6383	61	0	TLS-SB-IA3-21(5.0-6.0)021710	3
6.0	7018	120	Standard	6.0 – 7.0	6288	63	0	TLS-SB-IA3-21(6.0-7.0)021710	5
7.0	6906	105					0		
8.0-8.2	6340	70					0		
						A			
				N					

Core I.D. Number	IA3-21

I-371

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA3-22

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal 09-055-00003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	2/17/2010	
Time of Activity	15:05	
Surveyor Name	Joe Craig	
Sampler Name	Dave Warren	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)		
Was the bore hole re-located due to refusal? (Circle either Yeas or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 186760
Detector Model and Serial No.	Ludlum 44-10 / PR 242823	Ludlum 44-9 / PR193658
Calibration Due Date	10/19/2010	10/19/2010
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 3,917 cpm

Notes and Comments:

Backgrounds: Gamma: 5,781 cpm (Ludlum Model 2221)

Beta: 42 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 02/17/2010
Date

[redacted] 02/17/2010
Signature ([redacted]ler) Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0	5865	60	Standard	0.0 – 0.5	5887	17	0	TLS-SS-IA3-22(0.0-0.5)021710	1
0.5	6110	60					0		
1.0	6135	100					0		
2.0	5923	100	Standard	2.3 – 3.3	5981	24	0	TLS-SB-IA3-22(2.3-3.3)021710	3
3.0-3.6	5964	40					0		
3.6-4.6	6077	100	Standard	3.6 – 4.6	5800	23	0	TLS-SB-IA3-22(3.6-4.6)021710	2
4.6-5.6	6312	80	Standard, Duplicate	4.6 – 5.6	5740	24	0	TLS-SB-IA3-22(4.6-5.6)021710	4
5.6-6.6	5792	150	Standard	5.6 – 6.6	5710	23	0	TLS-SB-IA3-22(5.6-6.6)021710(Chemical)	
6.6-7.6	5945	60					0		
7.6-8.6	6029	100	Standard	7.6 – 8.6	5757	27	0	TLS-SB-IA3-22(7.6-8.6)021710	5
						A			
				N					

Core I.D. Number	IA3-22

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

Soil Core I.D. Number: IA3-B01

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-11-10	
Time of Activity	09:00	
Surveyor Name	John Holmes	
Sampler Name	Mike Carlin	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093455.78	1066298.57
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 229306
Detector Model and Serial No.	Ludlum 44-10 / PR242823	Ludlum 44-9 / PR191714
Calibration Due Date	10-19-10	10-28-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 8254 cpm

Notes and Comments:

Backgrounds: Gamma: 6851 cpm (Ludlum Model 2221)

Beta: 38 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: 0 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface

NOTE: Coring stopped by Zebra @ 12.5' due expanding clay with geologist concurrence.

[redacted] 3-11-10
Signature (Surveyor) Date

[redacted] 3-11-10
Signature (Sampler) Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 1.8	
0.5							0	↓	
1.8	6619	80	Standard	1.8 – 2.3	6497	55	0	TLS-SS-IA3-B01(1.8-2.3)031110	1
2.0	6499	50					0		
3.0	6708	110	Standard	3.0 – 4.0	6349	55	0	TLS-SB-IA3-B01(3.0-4.0)031110	5
4.0	6408	70					0		
5.0	6394	80	Standard	5.0 – 6.0	6373	64	0	TLS-SB-IA3-B01(5.0-6.0)031110	3
6.0	6346	70					0		
7.0	6581	90					0		
8.0	6439	100					0		
9.0	6654	100	Standard	9.0 – 10.0	6338	65	0	TLS-SB-IA3-B01(9.0-10)031110	2
10.0							0	No recovery 10.0 – 11.0	
11.0	6627	110	Standard	11.5 – 12.5	6257	61	0	TLS-SB-IA3-B01(11.5-12.5)031110	4
12.0	6778	90					0		
13.0									
14.0									
15.0									

Core I.D. Number	IA3-B01

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

Soil Core I.D. Number: IA3-B02

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-11-10	
Time of Activity	10:25	
Surveyor Name	John Holmes	
Sampler Name	Mike Carlin	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093448.87	1066263.76
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 229306
Detector Model and Serial No.	Ludlum 44-10 / PR242823	Ludlum 44-9 / PR191714
Calibration Due Date	10-19-10	10-28-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 5139 cpm

Notes and Comments:

Backgrounds: Gamma: 5601 cpm (Ludlum Model 2221)

Beta: 38 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: 0 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface

[redacted] 3-11-10
Signature (Surveyor) [redacted] Date

[redacted] 3-11-10
Signature (Sampler) [redacted] Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree
0.0							0	No recovery 0.0 – 2.3	
0.5							0	↓	
2.3	7319	90	Standard	2.3 – 2.8	6430	68	0	TLS-SS-IA3-B02(2.3-2.8)031110	1
3.0	7047	90	Standard	3.0 – 4.0	6459	53	0	TLS-SB-IA3-B02(3.0-4.0)031110	4
4.0	6786	70					0		
5.0	6490	80	Standard	5.0 – 6.0	6427	67	0	TLS-SB-IA3-B02(5.0-6.0)031110	3
6.0	6708	70					0		
7.0	6850	90	Standard	7.0 – 8.0	6427	51	0	TLS-SB-IA3-B02(7.0-8.0)031110	2
8.0	6746	100					0		
9.0	6802	110	Standard	9.0 – 10.0	6746	47	0	TLS-SB-IA3-B02(9.0-10.0)031110	5
10.0							0	No recovery 10.0 – 11.0	
11.0	6647	70					0		
12.0	6674	110					0		
13.0									

Core I.D. Number	IA3-B02

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

Soil Core I.D. Number: IA3-B03

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-11-10	
Time of Activity	15:00	
Surveyor Name	John Holmes	
Sampler Name	Mike Carlin	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093413.67	1066190.61
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 229306
Detector Model and Serial No.	Ludlum 44-10 / PR242823	Ludlum 44-9 / PR191714
Calibration Due Date	10-19-10	10-28-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 6443 cpm

Notes and Comments:

Backgrounds: Gamma: 6809 cpm (Ludlum Model 2221)

Beta: 44 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: 0 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface

[redacted] 3-11-10
Signature (Surveyor) [redacted] Date

[redacted] 3-11-10
Signature (Sampler) [redacted] Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 1.2	
0.5							0	↓	
1.2	7281	70	Standard	1.2 – 1.7	6713	58	0	TLS-SS-IA3-B03(1.2-1.7)031110	1
2.0	7091	110	Standard	2.0 – 3.0	6734	52	0	TLS-SB-IA3-B03(2.0-3.0)031110	5
3.0	7124	100					0		
4.0	6782	110					0		
5.0	7425	80	Standard	5.0 – 6.0	7052	59	0	TLS-SB-IA3-B03(5.0-6.0)031110	3
6.0	7360	110	Standard	6.0 – 7.0	6945	61	0	TLS-SB-IA3-B03(6.0-7.0)031110	4
7.0	7024	100					0		
8.0	7128	80	Standard	8.0 – 9.0	6945	40	0	TLS-SB-IA3-B03(8.0-9.0)031110	2
9.0	7118	100					0		
10.0							0	No recovery 10.0 – 11.0	
11.0	6751	80					0		
12.0	6636	100					0		
13.0									

Core I.D. Number	IA3-B03

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA3-B04

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-11-10	
Time of Activity	08:50	
Surveyor Name	Dennis Whitlock	
Sampler Name	Matt Walton	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. I)	1093293.81	1066001.25
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190191	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR240366	Ludlum 44-9 / 153297
Calibration Due Date	2-23-11	10-8-10
Detector Window Open or Closed	Open	10-28-10

Surface static gross gamma counts (one minute count), before bore hole drilling: 7880 cpm

Notes and Comments:

Backgrounds: Gamma: 7084 cpm (Ludlum Model 2221)

Beta: 31 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: 0 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface

NOTE: Coring stopped by Zebra @ 12.5' due expanding clay with geologist concurrence.

[redacted] 3-11-10
Signature (Surveyor) [redacted] Date

[redacted] 3-11-10
Signature (Sampler) [redacted] Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 0.8	
0.5							0	↓	
1.0	7291	80	Standard	0.8 – 1.3	6805	64	0	TLS-SS-IA3-B04(0.8-1.3)031110	1
2.0	7241	140	Standard	2.0 – 3.0	7235	51	0	TLS-SB-IA3-B04(2.0-3.0)031110	5
3.0	7119	80					0		
4.0	7279	60					0		
5.0							0	No recovery 5.0 – 6.0	
6.0	7595	70	Standard	6.0 – 7.0	6968	53	0	TLS-SB-IA3-B04(6.0-7.0)031110	4
7.0	7338	80	Standard	7.0 – 8.0			0	TLS-SB-IA3-B04(7.0-8.0)031110	2
8.0	7273	100					0		
9.0	6908	80					0		
10.0	6797	90	Standard	10.0 – 11.0	6787	47	0	TLS-SB-IA3-B04(10.0-11.0)031110	3
11.0	6611	100					0		
12.0	6975	130					0		
13.0	7126	80					0		
14.0	7107	60					0		
15.0									

Core I.D. Number	IA3-B04

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

Soil Core I.D. Number: IA3-B05

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-11-10	
Time of Activity	09:50	
Surveyor Name	Dennis Whitlock	
Sampler Name	Matt Walton	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093126.91	1065621.19
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190191	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR240366	Ludlum 44-9 / 153297
Calibration Due Date	2-23-11	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 5956 cpm

Notes and Comments:

Backgrounds: Gamma: 6887 cpm (Ludlum Model 2221)

Beta: 37 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: 0 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface

NOTE: Coring stopped by Zebra @ 12.5' due expanding clay with geologist concurrence.

[redacted] 3-11-10

Signature (Surveyor) [redacted] Date

[redacted] 3-11-10

Signature (Sampler) [redacted] Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 1.1	
0.5							0	↓	
1.0	6362	90	Standard	1.1 – 1.6	6304	45	0	TLS-SS-IA3-B05(1.1-1.6)031110	1
2.0	6461	120					0		
3.0	6738	100	Standard	3.0 – 4.0	6592	49	0	TLS-SB-IA3-B05(2.0-3.0)031110	2
4.0	6757	100	Standard	4.0 – 5.0	6192	59	0	TLS-SB-IA3-B05(4.0-5.0)031110	4
5.0							0	No recovery 5.0 – 6.3	
6.0	6181	60					0		
7.0	6351	90					0		
8.0	6661	100					0		
9.0	6217	100					0		
10.0	6177	120					0		
11.0	6283	80					0		
12.0	6405	120					0		
13.0	6361	130	Standard	13.0 – 14.0	6280	52	0	TLS-SB-IA3-B05(13.0-14.0)031110	5
14.0	6335	110	Standard	14.0 – 15.0	6586	45	0	TLS-SB-IA3-B05(14.0-15.0)031110	3
15.0									→

Core I.D. Number	IA3-B05

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

Soil and Core Survey Forms
Investigative Area 3 DL

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA3-D01

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-16-10	
Time of Activity	09:45	
Surveyor Name	Dennis Whitlock	
Sampler Name	Matt Walton	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092228.48	1063540.12
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190191	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR240366	Ludlum 44-9 / 153297
Calibration Due Date	2-23-11	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 7132 cpm

Notes and Comments:

Backgrounds: Gamma: 4950 cpm (Ludlum Model 2221)

Beta: 34 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: 0 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface

[redacted] 3-16-10
Signature (Surveyor) Date

[redacted] 3-16-10
Signature (Sampler) Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 2.1	
0.5							0	↓	
1.0							0	↓	
2.0	5342	80	Standard	2.1 – 2.6	5310	59	0	TLS-SS-IA3-D01(2.1-2.6)031610	1
3.0	5341	40	Standard	3.0 – 4.0	5233	42	0	TLS-SB-IA3-D01(3.0-4.0)031610(Chemical)	
4.0	5906	20	Standard	4.0 – 5.0	5542	59	0	TLS-SB-IA3-D01(4.0-5.0)031610	4
5.0							0	No recovery 5.0 – 7.0	
6.0							0	↓	
7.0	5287	100					0		
8.0	5457	80	Standard	8.0 – 9.0	5427	45	0	TLS-SB-IA3-D01(8.0-9.0)031610	3
9.0	5770	120	Standard	9.0 – 10.0	5391	64	0	TLS-SB-IA3-D01(9.0-10.0)031610	5
10.0							0	No recovery 10.0 – 10.4	
11.0	5678	40	Standard	10.4 – 11.4	5079	46	0	TLS-SB-IA3-D01(10.4-11.4)031610	5a
12.0	5501	60							
13.0	5085	100							
14.0	5563	120							
15.0									

Core I.D. Number	IA3-D01

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA3-D02

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-16-10	
Time of Activity	08:45	
Surveyor Name	Dennis Whitlock	
Sampler Name	Matt Walton	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092350.75	1063732.42
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190191	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR240366	Ludlum 44-9 / 153297
Calibration Due Date	2-23-11	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 6504 cpm

Notes and Comments:

Backgrounds: Gamma: 6800 cpm (Ludlum Model 2221)

Beta: 38 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: 0 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface

[redacted] 3-16-10
Signature (Surveyor) Date

[redacted] 3-16-10
Signature (Sampler) [redacted] Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (epm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree
0.0							0	No recovery 0.0 – 0.2	
0.5	6095	80	Standard	0.2 – 0.7	5767	48	0	TLS-SS-IA3-D02(0.2-0.7)031610	1
1.0	5717	60	Standard	1.7 – 2.7	5785	49	0	TLS-SB-IA3-D02(1.7-2.7)031610	3
2.0	6012	100	Standard	2.7 – 3.7	6041	61	0	TLS-SB-IA3-D02(2.7-3.7)031610	5
3.0	5772	80					0		
4.0	5844	70					0		
5.0							0	No recovery 5.0 – 6.0	
6.0	6014	40					0		
7.0	6239	60					0		
8.0	6037	40					0		
9.0	6054	30					0		
10.0	6690	70	Standard	10.0 – 11.0	5737	44	0	TLS-SB-IA3-D02(10.0-11.0)031610	4
11.0	6292	90	Standard	11.0 – 12.0	5909	46	0	TLS-SB-IA3-D02(11.0-12.0)031610	5a
12.0				N					
13.0									
14.0					A				
15.0									

Core I.D. Number	IA3-D02

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA3-D03

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-15-10	
Time of Activity	15:05	
Surveyor Name	Dennis Whitlock	
Sampler Name	Matt Walton	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092436.89	1063921.93
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	(No)

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190191	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR240366	Ludlum 44-9 / 153297
Calibration Due Date	2-23-11	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 5968 cpm

Notes and Comments:

Backgrounds: Gamma: 6634 cpm (Ludlum Model 2221)

Beta: 43 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: 0 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface

[redacted] 3-15-10
Signature (Surveyor) Date

[redacted] 3-15-10
Signature (Sampler) [redacted]ate

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Statie Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 0.2	
0.5	7106	150	Standard	0.2 – 0.7	6681	64	0	TLS-SS-IA3-D03(0.2-0.7)031510	1
1.0	8000	80	Standard	0.7 – 1.7	6788	69	0	TLS-SB-IA3-D03(0.7-1.7)031510	3
2.0	7296	110					0		
3.0	6907	120					0		
4.0	6614	120					0		
5.0							0	No recovery 5.0 – 6.1	
6.0	7470	80	Standard	6.1 – 7.1	6929	50	0	TLS-SB-IA3-D03(6.1-7.1)031510	5a
7.0	7230	100					0		
8.0	7102	60					0		
9.0	7453	60					0		
10.0	7597	100	Standard	10.0 – 11.0	7063	72	0	TLS-SB-IA3-D03(10.0-11.0)031510	4
11.0	7427	140	Standard	11.0 – 12.0	6729	64	0	TLS-SB-IA3-D03(11.0-12.0)031510	5
12.0				N					
13.0									
14.0					A				
15.0									

Core I.D. Number	IA3-D03

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest sean reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA3-D04

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-15-10	
Time of Activity	13:50	
Surveyor Name	Dennis Whitlock	
Sampler Name	Matt Walton	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092497.47	1064149.24
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	(No)

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190191	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR240366	Ludlum 44-9 / 153297
Calibration Due Date	2-23-11	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 7993 cpm

Notes and Comments:

Backgrounds: Gamma: 6142 cpm (Ludlum Model 2221)

Beta: 43 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: 0 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface

[redacted] 3-15-10
Signature (Surveyor) Date

[redacted] 3-15-10
Signature (Sampler) [redacted] Date

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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 0.3	
0.5	6487	80	Standard	0.3 – 0.8	6068	69	0	TLS-SS-IA3-D04(0.3-0.8)031510	1
1.0	6840	80	Standard	1.4 – 2.4	6102	47	0	TLS-SB-IA3-D04(1.4-2.4)031510	3
2.0	6435	120	Standard	2.4 – 3.4	6360	59	0	TLS-SB-IA3-D04(2.4-3.4)031510	5
3.0	6812	80	Standard	3.4 – 4.4	6253	52	0	TLS-SB-IA3-D04(3.4-4.4)031510	4
4.0	6374	80	Standard	1.4 – 5.0/6.2 – 6.6	6137	57	0	TLS-SB-IA3-D04(4.4-5.0/6.2-6.6)031510(Chemical)	
5.0							0	No recovery 5.0 – 6.2	
6.0	5820	90					0		
7.0	6381	80					0		
8.0	6251	70					0		
9.0	6553	80					0		
10.0	6790	60	Standard	10.0 – 11.0	6080	58	0	TLS-SB-IA3-D04(10.0-11.0)031510	5a
11.0							0		
12.0				N					
13.0									
14.0					A				
15.0									

Core I.D. Number	IA3-D04

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA3-D05

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-15-10	
Time of Activity	11:10	
Surveyor Name	John Holmes	
Sampler Name	Matt Walton	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092537.01	1064370.54
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	(No)

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190191	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR240366	Ludlum 44-9 / 153297
Calibration Due Date	2-23-11	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 5904 cpm

Notes and Comments:

Backgrounds: Gamma: 6319 cpm (Ludlum Model 2221)

Beta: 51 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: 0 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface

[redacted] 3-15-10
Signature (Surveyor) Date

[redacted] 3-15-10
Signature (Sampler) Date

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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 0.6	
0.5	6347	40	Standard	0.6 – 1.1	6311	50	0	TLS-SS-IA3-D05(0.6-1.1)031510	1
1.0	6467	80	Standard	1.5 – 2.5	6527	67	0	TLS-SB-IA3-D05(1.5-2.5)031510	3
2.0	6884	80					0		
3.0	6859	120					0		
4.0	7072	80	Standard	4.0 – 5.0	6176	51	0	TLS-SB-IA3-D05(4.0-5.0)031510	4
5.0							0	No recovery 5.0 – 6.0	
6.0	6925	30					0		
7.0	6480	80					0		
8.0	6661	130	Standard	8.4 – 9.4	6236	77	0	TLS-SB-IA3-D05(8.4-9.4)031510	5
9.0	115	6935					0		
10.0	7038	70	Standard	10.0 – 11.0	6251	57	0	TLS-SB-IA3-D05(10.0-11.0)031510	5a
11.0							0		
12.0				N					
13.0									
14.0					A				
15.0									

Core I.D. Number	IA3-D5

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA3-D06

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-15-10	
Time of Activity	10:15	
Surveyor Name	John Holmes	
Sampler Name	Matt Walton	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092661.76	1064592.99
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190191	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR240366	Ludlum 44-9 / 153297
Calibration Due Date	2-23-11	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 6256 cpm

Notes and Comments:

Backgrounds: Gamma: 6253 cpm (Ludlum Model 2221)

Beta: 50 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: 0 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface

[redacted] 3-15-10
Signature (Surveyor) Date

[redacted] 3-15-10
Signature (Sampler) [redacted] Date

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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 0.4	
0.5	5867	90	Standard	0.4 – 0.9	6386	63	0	TLS-SS-IA3-D06(0.4-0.9)031510	1
1.0	6468	80	Standard	0.9 – 1.9	6155	57	0	TLS-SB-IA3-D06(2.6-3.6)031510	3
2.0	6511	50					0		
3.0	7318	70	Standard	3.0 – 4.0	6480	77	0	TLS-SB-IA3-D06(3.0-4.0)031510(Chemical)	
4.0	7953	100	Standard	4.0 – 5.0	6571	58	0	TLS-SB-IA3-D06(4.0-5.0)031510	4
5.0							0	No recovery 5.0 – 6.4	
6.0	6474	100	Standard	6.4 – 7.4	6515	57	0	TLS-SB-IA3-D06(6.4-7.4)031510	5
7.0	7049	100					0		
8.0	6545	80					0		
9.0	6943	40					0		
10.0	6960	80					0		
11.0	7437	90	Standard	11.0 – 12.0	6338	51	0	TLS-SB-IA3-D06(11.0-12.0)031510	5a
12.0				N					
13.0									
14.0					A				
15.0									

Core I.D. Number	IA3-D6

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA3-D07

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-15-10	
Time of Activity	08:55	
Surveyor Name	John Holmes	
Sampler Name	Matt Walton	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092753.36	1064812.82
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	(No)

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190191	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR240366	Ludlum 44-9 / 153297
Calibration Due Date	2-23-11	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 6918 cpm

Notes and Comments:

Backgrounds: Gamma: 5124 cpm (Ludlum Model 2221)

Beta: 44 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: 0 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface

[redacted] 3-15-10
Signature (Surveyor) Date

[redacted] 3-15-10
Signature (Sampler) [redacted] Date

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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 1.1	
0.5							0	↓	
1.0	6667	100	Standard	1.1 – 1.6	6373	57	0	TLS-SS-IA3-D07(1.1-1.6)031510	1
2.0	7180	70	Standard	2.6 – 3.6	6355	48	0	TLS-SB-IA3-D07(2.6-3.6)031510	3
3.0	6820	60					0		
4.0	6568	60					0		
5.0	6945	40	Standard	5.2 – 6.2	6414	54	0	TLS-SB-IA3-D07(5.2-6.2)031510	5a
6.0	6072	60					0		
7.0	6688	90					0		
8.0	6510	70	Standard	8.6 – 9.6	6485	53	0	TLS-SB-IA3-D07(8.6-9.6)031510(Chemical)	
9.0	7353	40	Standard	9.6 – 10.6	6401	54	0	TLS-SB-IA3-D07(9.6-10.6)031510	4
10.0	6751	80					0		
11.0	6705	100	Standard	11.0 – 12.0	6302	53	0	TLS-SB-IA3-D07(11.0-12.0)031510	5
12.0				N					
13.0									
14.0					A				
15.0									

Core I.D. Number	IA3-D7

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA3-D08

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-12-10	
Time of Activity	14:15	
Surveyor Name	John Holmes	
Sampler Name	Matt Walton	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092915.61	1065084.12
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	(No)

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190191	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR240366	Ludlum 44-9 / 153297
Calibration Due Date	2-23-11	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 6623 cpm

Notes and Comments:

Backgrounds: Gamma: 6290 cpm (Ludlum Model 2221)

Beta: 45 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: 0 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface

[redacted] 3-12-10
Signature (Surveyor) Date

[redacted] 3-12-10
Signature (Sampler) Date

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2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree
0.0							0	No recovery 0.0 – 0.6	
0.5	6575	60	Standard	0.6 – 1.1	6256	62	0	TLS-SS-IA3-D08(0.6-1.1)031210	1
1.0	6845	90	Standard	1.8 – 2.8	6449	45	0	TLS-SB-IA3-D08(1.8-2.8)031210	3
2.0	7116	100					0		
3.0	7281	100	Standard	3.0 – 4.0	6433	61	0	TLS-SB-IA3-D08(3.0-4.0)031210	5
4.0	7027	90					0		
5.0							0	No recovery 5.0 – 6.0	
6.0	7426	70	Standard	6.0 – 7.0	6360	59	0	TLS-SB-IA3-D08(6.0-7.0)031210	4
7.0	7267	60					0		
8.0	6996	80					0		
9.0	6980	50					0		
10.0	7348	100	Standard	10.0 – 11.0	6438	70	0	TLS-SB-IA3-D08(10.0-11.0)031210	5a
11.0	6820	60					0		
12.0				N					
13.0									
14.0					A				
15.0									

Core I.D. Number	IA3-D8

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA3-D09

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-12-10	
Time of Activity	10:30	
Surveyor Name	Dennis Whitlock	
Sampler Name	Matt Walton	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092995.87	1065291.74
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	(No)

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190191	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR240366	Ludlum 44-9 / 153297
Calibration Due Date	2-23-11	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 5516 cpm

Notes and Comments:

Backgrounds: Gamma: 7051 cpm (Ludlum Model 2221)

Beta: 40 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: 0 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface

[redacted] 3-12-10
Signature (Surveyor) Date

[redacted] 3-12-10
Signature (Sampler) [redacted] Date

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 0.4	
0.5	6494	50	Standard	0.4 – 0.9	6984	57	0	TLS-SS-IA3-D09(0.4-0.9)031210	1
1.0	6566	110	Standard	1.0 – 2.0	6815	54	0	TLS-SB-IA3-D09(1.0-2.0)031210	3
2.0	7614	80					0		
3.0	7683	100	Standard	3.0 – 4.0	6800	55	0	TLS-SB-IA3-D09(3.0-4.0)031210	4
4.0	7045	120					0		
5.0							0	No recovery 5.0 – 6.6	
6.0	6887	80					0		
7.0	7423	130	Standard	7.0 – 8.0	6925	63	0	TLS-SB-IA3-D09(7.0-8.0)031210	5
8.0	7622	80					0		
9.0	7353	60					0		
10.0	7634	70	Standard	10.0 – 11.0	6658	58	0	TLS-SB-IA3-D09(10.0-11.0)031210	5a
11.0	7548	80					0		
12.0				N					
13.0									
14.0					A				
15.0									

Core I.D. Number	IA3-D09

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA3-D10

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-12-10	
Time of Activity	08:50	
Surveyor Name	Dennis Whitlock	
Sampler Name	Matt Walton	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093090.08	1065481.04
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190191	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR240366	Ludlum 44-9 / 153297
Calibration Due Date	2-23-11	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 7536 cpm

Notes and Comments:

Backgrounds: Gamma: 7352 cpm (Ludlum Model 2221)

Beta: 43 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: 0 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface

[redacted] 3-12-10
Signature (Surveyor) Date

[redacted] 3-12-10
Signature (Sampler) Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 0.6	
0.5	7575	40	Standard	0.6 – 1.1	7153	61	0	TLS-SS-IA3-D10(0.6-1.1)031210	1
1.0	7372	50	Standard	1.3 – 2.3	7193	72	0	TLS-SB-IA3-D10(1.3-2.3)031210	3
2.0	7666	80	Standard	2.0 – 3.0	7417	62	0	TLS-SB-IA3-D10(2.3-3.3)031210	5a
3.0	7813	110	Standard	3.0 – 4.0	7484	71	0	TLS-SB-IA3-D10(3.3-4.3)031210	4
4.0	7638	100	Standard	4.0 – 5.0	7249	71	0	TLS-SB-IA3-D10(4.0-5.0)031210(Chemical)	
5.0							0	No recovery 5.0 – 6.2	
6.0	7447	130					0		
7.0	7349	60					0		
8.0	7379	140	Standard	8.0 – 9.0	7258	63	0	TLS-SB-IA3-D10(8.0-9.0)031210	5
9.0	7353	60					0		
10.0	7104	90					0		
11.0	7503	90					0		
12.0				N					
13.0									
14.0					A				
15.0									

Core I.D. Number	IA3-D10

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA3-D11

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-11-10	
Time of Activity	14:45	
Surveyor Name	Dennis Whitlock	
Sampler Name	Matt Walton	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093076.13	1065525.97
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	(No)

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190191	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR240366	Ludlum 44-9 / 153297
Calibration Due Date	2-23-11	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 6288 cpm

Notes and Comments:

Backgrounds: Gamma: 7189 cpm (Ludlum Model 2221)

Beta: 43 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: 0 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface

NOTE: Coring stopped by Zebra @ 12.5' due expanding clay with geologist concurrence.

[redacted] 3-11-10
Signature (Surveyor) Date

[redacted] 3-11-10
Signature (Sampler) Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 0.2	
0.5	7717	120	Standard	0.2 – 0.7	7092	56	0	TLS-SS-IA3-D11(0.2-0.7)031110	1
1.0	7314	60					0		
2.0	7382	80					0		
3.0	7313	120					0		
4.0	7484	89	Standard	4.0 – 5.0	6987	63	0	TLS-SB-IA3-D11(4.0-5.0)031110	2
5.0							0	No recovery 5.0 – 6.4	
6.0	7414	100					0		
7.0	7284	80					0		
8.0	7203	110	Standard	8.0 – 9.0	7135	66	0	TLS-SB-IA3-D11(8.0-9.0)031110	3
9.0	7499	90	Standard	9.0 – 10.0	7149	51	0	TLS-SB-IA3-D11(9.0-10.0)031110	4
10.0	7013	160	Standard	10.0 – 11.0	7035	66	0	TLS-SB-IA3-D11(10.0-11.0)031110	5
11.0	7387	110					0		
12.0									
13.0									
14.0									
15.0									

Core I.D. Number	1A3-D11

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

Soil Core I.D. Number: IA3-D12

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-11-10	
Time of Activity	10:55	
Surveyor Name	Dennis Whitlock	
Sampler Name	Matt Walton	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093128.17	1065698.34
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	(No)

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190191	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR240366	Ludlum 44-9 / 153297
Calibration Due Date	2-23-11	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 5956 cpm

Notes and Comments:

Backgrounds: Gamma: 6887 cpm (Ludlum Model 2221)

Beta: 37 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: 0 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface

NOTE: Coring stopped by Zebra @ 12.5' due expanding clay with geologist concurrence.

[redacted] 3-11-10
Signature (Surveyor) Date

[redacted] 3-11-10
Signature (Sampler) Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 1.4	
0.5							0	↓	
1.0	6584	60	Standard	1.4 – 1.9	6788	52	0	TLS-SS-IA3-D12(1.4-1.9)031110	1
2.0	7083	80	Standard	2.0 – 3.0	6921	61	0	TLS-SB-IA3-D12(2.0-3.0)031110	4
3.0	7064	90					0		
4.0	7086	150	Standard	4.0 – 5.0	7174	69	0	TLS-SB-IA3-D12(4.0-5.0)031110	2
5.0	7077	100					0	No recovery 5.0 – 5.5	
6.0	7086	150	Standard	6.0 – 7.0	6912	59	0	TLS-SB-IA3-D12(6.0-7.0)031110	5
7.0	6842	140	Standard	7.0 – 8.0	6747	60	0	TLS-SB-IA3-D12(7.0-8.0)031110	3
8.0	6923	80					0		
9.0	6645	120					0		
10.0							0	No recovery 10.0 – 11.1	
11.0	7019	130					0		
12.0	6879	120					0		
13.0	6937	90					0		
14.0	6954	60					0		
15.0									

Core I.D. Number	IA3-D12

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

Soil and Core Survey Forms
Investigative Area 3 FL

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA3-FL0

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-4-10	
Time of Activity	15:05	
Surveyor Name	John Holmes	
Sampler Name	Mike Carlin	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093657.27	1066577.74
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	(No)

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 229306
Detector Model and Serial No.	Ludlum 44-10 / PR242823	Ludlum 44-9 / PR191714
Calibration Due Date	10-19-10	10-28-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 5725 cpm

Notes and Comments:

Backgrounds: Gamma: 5041 cpm (Ludlum Model 2221)

Beta: 34 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-4-10
Signature (Surveyor) Date

[redacted] 3-4-10
Signature (Sampler) Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 1.3	
0.5							0	↓	
1.0	4437	40	Standard	1.3 – 1.8	4957	43	0	TLS-SS-IA3-FL0(1.3-1.8)030410	1
2.0	4559	60					0		
3.0	5228	100	Standard	2.9 – 3.9	4872	46	0	TLS-SB-IA3-FL0(2.9-3.9)030410	3
4.0	5774	90	Standard	4.0 – 5.0	4836	63	0	TLS-SB-IA3-FL0(4.0-5.0)030410	4
5.0	4735	90	Standard	5.0 – 6.0	4814	57	0	TLS-SB-IA3-FL0(5.0-6.0)030410(Chemical)	
6.0	4941	70					0		
7.0	5454	90					0		
8.0	5116	80					0		
9.0	4986	90					0		
10.0	5052	90	Standard	10.6 – 11.6	4672	52	0	TLS-SB-IA3-FL0(10.6-11.6)030410	2
11.0	5329	110	Standard	11.6 – 12.6	4683	48	0	TLS-SB-IA3-FL0(11.6-12.6)030410	5
12.0	5484	80					0		
13.0									
14.0									
15.0									

Core I.D. Number	IA-3-FL0

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

Soil Core I.D. Number: IA3-FL1

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-5-10	
Time of Activity	09:00	
Surveyor Name	John Holmes	
Sampler Name	Mike Carlin	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093568.96	1066399.81
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	(No)

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 229306
Detector Model and Serial No.	Ludlum 44-10 / PR242823	Ludlum 44-9 / PR191714
Calibration Due Date	10-19-10	10-28-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 4784 cpm

Notes and Comments:

Backgrounds: Gamma: 5032 cpm (Ludlum Model 2221)

Beta: 47 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-5-10
Date

[redacted] 3-5-10
Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading epm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 2.3	
0.5							0	↓	
1.0							0	↓	
2.0	4987	60	Standard	2.3 – 2.8	4831	60	0	TLS-SS-IA3-FL1(2.3-2.8)030510	1
3.0	4322	40	Standard	3.0 – 4.0	4850	52	0	TLS-SB-IA3-FL1(3.0-4.0)030510	3
4.0	5075	40					0		
5.0	5366	80	Standard	5.0 – 6.0	5090	61	0	TLS-SB-IA3-FL1(5.0-6.0)030510	4
6.0	5221	100	Standard	6.0 – 7.0	5012	49	0	TLS-SB-IA3-FL1(6.0-7.0)030510	5a
7.0	4975	60					0		
8.0	4859	50					0		
9.0	4457	70					0		
10.0	4784	60					0		
11.0	4960	40					0		
12.0	4972	100	Standard	12.0 – 13.0	4860	57	0	TLS-SB-IA3-FL1(12.0-13.0)030510	5
13.0	5125	90					0		
14.0									
15.0									

Core I.D. Number	IA-3-FL1

Note 1

1A-1 through 1A-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

1A-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA3-FL2

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-4-10	
Time of Activity	14:40	
Surveyor Name	Zach Hill	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093482.02	1066220.54
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187758	Ludlum 12 / 180411
Detector Model and Serial No.	Ludlum 44-10 / PR156393	Ludlum 44-9 / PR113654
Calibration Due Date	10-19-10	2-23-11
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 5628 cpm

Notes and Comments:

Backgrounds: Gamma: 3483 cpm (Ludlum Model 2221)

Beta: 34 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-4-10
Signature (Surveyor) Date

[redacted] 3-4-10
Signature (Sampler) Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 0.5	
0.5	5043	100	Standard	0.5 – 1.0	5151	43	0	TLS-SS-IA3-FL2(0.5-1.0)030410	1
1.0	5251	80					0		
2.0	5309	60					0		
3.0	5422	120	Standard	3.0 – 4.0	5162	37	0	TLS-SB-IA3-FL2(3.0-4.0)030410	5
4.0	5491	80	Standard	4.0 – 5.0	5064	49	0	TLS-SB-IA3-FL2(4.0-5.0)030410	3
5.0							0	No recovery 5.0 – 5.9	
6.0	5822	80	Standard	5.9 – 6.9	5252	42	0	TLS-SB-IA3-FL2(5.9-6.9)030410	4
7.0	5708	60	Standard	6.9 – 7.9	5005	54	0	TLS-SB-IA3-FL2(6.9-7.9)030410(Chemical)	
8.0	5408	100	Standard	7.9 – 8.9	5227	50	0	TLS-SB-IA3-FL2(7.9-8.9)030410	5c
9.0	5699	40					0		
10.0	5780	60					0		
11.0	5380	60					0		
12.0	5575	70					0		
13.0	5338	60					0		
14.0	5409	120					0		
15.0				N A					

Core I.D. Number	IA3-FL2

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the seeond highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

Soil Core I.D. Number: IA3-FL3

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-4-10	
Time of Activity	13:20	
Surveyor Name	John Holmes	
Sampler Name	Mike Carlin	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093395.09	1066038.03
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	(No)

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 229306
Detector Model and Serial No.	Ludlum 44-10 / PR242823	Ludlum 44-9 / PR191714
Calibration Due Date	10-19-10	10-28-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 4453 cpm

Notes and Comments:

Backgrounds: Gamma: 4841 cpm (Ludlum Model 2221)

Beta: 25 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-4-10
Signature (Surveyor[redacted] Date

[redacted] 3-4-10
Signature (Sampler) Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 1.0	
0.5	4751	70	Standard	1.0 – 1.5	4999	63	0	TLS-SS-IA3-FL3(1.0-1.5)030410	1
1.0	4908	90		↓			0		
2.0	5166	70					0		
3.0	4867	120	Standard	3.0 – 4.0	4878	73	0	TLS-SB-IA3-FL3(3.0-4.0)030410(Chemical)	
4.0	5985	80	Standard	4.0 – 5.0	4873	54	0	TLS-SB-IA3-FL3(4.0-5.0)030410	4
5.0	4676	60	Standard	5.0 – 6.0	4796	44	0	TLS-SB-IA3-FL3(5.0-6.0)030410	3
6.0	4747	90					0		
7.0	5508	50					0		
8.0	4441	100					0		
9.0	4971	120	Standard	9.0 – 10.0	4936	58	0	TLS-SB-IA3-FL3(8.4-9.4)030410	5
10.0	5134	40	Standard	10.8 – 11.8	4860	62	0	TLS-SB-IA3-FL3(10.8-11.8)030410	2
11.0	4929	90					0		
12.0	5366	80					0		
13.0	4543	90					0		
14.0	4543	60					0		
15.0									

Core I.D. Number	IA-3-FL3

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA3-FL4

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-4-10	
Time of Activity	13:25	
Surveyor Name	Zach Hill	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093291.91	1065817.93
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187758	Ludlum 12 / 180411
Detector Model and Serial No.	Ludlum 44-10 / PR156393	Ludlum 44-9 / PR113654
Calibration Due Date	10-19-10	2-23-11
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 6696 cpm

Notes and Comments:

Backgrounds: Gamma: 4759 cpm (Ludlum Model 2221)

Beta: 34 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-4-10
Signature (Surveyor) Date

[redacted] 3-4-10
Signature (Sampler) Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 1.1	
0.5							0	↓	
1.0	5080	100	Standard	1.1 – 1.6	4568	34	0	TLS-SS-IA3-FL4(1.1-1.6)030410	1
2.0	5202	100	Standard	1.6 – 2.6	4672	55	0	TLS-SB-IA3-FL4(1.6-2.6)030410	5
3.0	4822	80					0		
4.0	5001	120	Standard	4.5 – 5.5	4717	48	0	TLS-SB-IA3-FL4(4.5-5.5)030410	3
5.0							0	No recovery 5.0 – 6.0	
6.0	5118	80					0		
7.0	5303	100					0		
8.0	5469	80	Standard	8.0 – 9.0	4788	46	0	TLS-SB-IA3-FL4(8.0-9.0)030410	4
9.0	4885	80	Standard	9.0 – 10.0	4445	52	0	TLS-SB-IA3-FL4(9.0-10.0)030410(Chemical)	
10.0	4691	100	Standard	10.0 – 11.0	4646	54	0	TLS-SB-IA3-FL4(10.0-11.0)030410	5c
11.0	4711	90					0		
12.0	5261	80					0		
13.0	4929	100					0		
14.0	4841	80					0		
15.0				N	A				

Core I.D. Number	IA3-FL4

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA3-FL5

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-4-10	
Time of Activity	10:15	
Surveyor Name	Zach Hill	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093246.5	1065724.36
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187758	Ludlum 12 / 180411
Detector Model and Serial No.	Ludlum 44-10 / PR156393	Ludlum 44-9 / PR113654
Calibration Due Date	10-19-10	2-23-11
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 4003 cpm

Notes and Comments:

Backgrounds: Gamma: 5768 cpm (Ludlum Model 2221)

Beta: 26 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-4-10
Signature (Surveyor) Date

[redacted] 3-4-10
Signature (Sampler) Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 1.5	
0.5							0	↓	
1.0	5345	80	Standard	1.5 – 2.0	5467	45	0	TLS-SS-IA3-FL5(1.5-2.0)030410	1
2.0	5951	60	Standard	2.0 – 3.0	5801	62	0	TLS-SB-IA3-FL5(2.0-3.0)030410	2
3.0	5786	100					0		
4.0	6035	100	Standard	4.0 – 5.0	5780	54	0	TLS-SB-IA3-FL5(4.0-5.0)030410	3
5.0	5612	100					0		
6.0	5695	100	Standard	6.0 – 7.0	5506	35	0	TLS-SB-IA3-FL5(5.0-6.0)030410	5
7.0	5824	60					0		
8.0	5822	60					0		
9.0	5836	80					0		
10.0	6440	120	Standard	10.0 – 11.0	5422	51	0	TLS-SB-IA3-FL5(10.0-11.0)030410	4
11.0	5827	80	Standard	11.0 – 12.0	5396	51	0	TLS-SB-IA3-FL5(11.0-12.0)030410(Chemical)	
12.0	5425	80					0		
13.0	5869	80					0		
14.0	5728	60					0		
15.0				N A					

Core I.D. Number	1A3-FL5

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA3-FL6

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-4-10	
Time of Activity	10:32	
Surveyor Name	John Holmes	
Sampler Name	Mike Carlin	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093204.46	1065634.60
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	(No)

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 229306
Detector Model and Serial No.	Ludlum 44-10 / PR242823	Ludlum 44-9 / PR191714
Calibration Due Date	10-19-10	10-28-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 5031 cpm

Notes and Comments:

Backgrounds: Gamma: 4870 cpm (Ludlum Model 2221)

Beta: 40 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-4-10
Signature (Surveyor) Date

[redacted] 3-4-10
Signature (Sampler) Date

ARSEC
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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, ete.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 0.6	
0.5	5168	60	Standard	0.6 – 1.1	4843	59	0	TLS-SS-IA3-FL6(0.6-1.1)030410	1
1.0	4542	70	Standard	1.4 – 2.4	4876	69	0	TLS-SB-IA3-FL6(1.4-2.4)030410	3
2.0	5013	70					0		
3.0	5177	100					0		
4.0	4822	80					0		
5.0	5046	80					0		
6.0	4914	110	Standard	6.0 – 7.0	4955	59	0	TLS-SB-IA3-FL6(6.0-7.0)030410	5
7.0	5312	90					0		
8.0	4947	70	Standard	8.4 – 9.4	4945	46	0	TLS-SB-IA3-FL6(8.4-9.4)030410	2
9.0	5145	60					0		
10.0	5047	80					0		
11.0	5386	60					0		
12.0	5322	100					0		
13.0	6226	90	Standard	13.0 – 14.0	4820	50	0	TLS-SB-IA3-FL6(13.0-14.0)030410	4
14.0	4607	100					0		
15.0									

Core I.D. Number	IA-3-FL6

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA3-FL7

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-5-10	
Time of Activity	08:50	
Surveyor Name	Zach Hill	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093167.18	1065553.82
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187756	Ludlum 12 / 180431
Detector Model and Serial No.	Ludlum 44-10 / PR242539	Ludlum 44-9 / PR193567
Calibration Due Date	10-19-10	10-19-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 5257 cpm

Notes and Comments:

Backgrounds: Gamma: 3829 cpm (Ludlum Model 2221)

Beta: 25 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-5-10
Signature (Surveyor) Date

[redacted] 3-5-10
Signature (Sampler) Date

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 1.0	
0.5							0	↓	
1.0	5246	60	Standard	1.0 - 1.5	4682	44	0	TLS-SS-IA3-FL7(1.0-1.5)030510	1
2.0	4639	80	Standard	1.5 – 2.5	4693	52	0	TLS-SB-IA3-FL7(1.5-2.5)030510	5
3.0	4961	70	Standard	3.2-4.2	4857	46	0	TLS-SB-IA3-FL7(3.2-4.2)030510	3
4.0	4650	60					0		
5.0							0	No recovery 5.0 – 5.5	
6.0	4808	60	Standard	5.5 – 6.5	4729	59	0	TLS-SB-IA3-FL7(5.5-6.5)030510	5c
7.0	5457	80	Standard	6.5 – 7.5	4672	55	0	TLS-SB-IA3-FL7(6.5-7.5)030510	4
8.0	5153	80					0		
9.0	5125	70					0		
10.0	5547	90					0		
11.0				N			0		
12.0							0		
13.0							0		
14.0					A		0		
15.0									

Core I.D. Number	IA3-FL7

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: 1A3-FL08

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-5-10	
Time of Activity	11:10	
Surveyor Name	John Holmes	
Sampler Name	Mike Carlin	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. I)	1093050.89	1065307.77
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	(No)

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 229306
Detector Model and Serial No.	Ludlum 44-10 / PR242823	Ludlum 44-9 / PR191714
Calibration Due Date	10-19-10	10-28-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 4056 cpm

Notes and Comments:

Backgrounds: Gamma: 5134 cpm (Ludlum Model 2221)

Beta: 25 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-5-10
Signature (Surveyor) Date

[redacted] 3-5-10
Signature (Sampler) Date

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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 1.0	
0.5							0	↓	
1.0	6748	40	Standard	1.0 – 1.5	5274	53	0	TLS-SS-IA3-FL8(1.0-1.5)030510	1
1.5	5967	50	Standard	1.5 – 2.5	5307	64	0	TLS-SB-IA3-FL8(1.5-2.5)030510	3
2.0	5484	90					0		
3.0	5633	70	Standard	3.0 – 4.0	5183	50	0	TLS-SB-IA3-FL8(3.0-4.0)030510	5a
4.0	5720	50	Standard	4.0 – 5.0	5203	66	0	TLS-SB-IA3-FL8(4.0-5.0)030510	4
5.0	5059	90					0		
6.0	5039	100	Standard	6.0 – 7.0	5195	40	0	TLS-SB-IA3-FL8(6.0-7.0)030510	5
7.0	5209	70					0		
8.0	5417	40					0		
9.0	5427	40					0		
10.0	5367	70					0		
11.0	5216	40					0		
12.0	5393	40					0		
13.0									
14.0									

Core I.D. Number	IA-3-FL8

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA3-FL9

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-5-10	
Time of Activity	11:15	
Surveyor Name	Zach Hill	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092726.74	1064626.62
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187756	Ludlum 12 / 180431
Detector Model and Serial No.	Ludlum 44-10 / PR242539	Ludlum 44-9 / PR193567
Calibration Due Date	10-19-10	10-19-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 4351 cpm

Notes and Comments:

Backgrounds: Gamma: 5297 cpm (Ludlum Model 2221)

Beta: 39 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-5-10
Signature (Surveyor) Date

[redacted] 3-5-10
Signature (Sampler) [redacted] Date

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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 1.0	
0.5							0	↓	
1.0	5549	80	Standard	1.0 – 1.5	5349	45	0	TLS-SS-IA3-FL9(1.0-1.5)030510	1
2.0	5187	60	Standard	2.0 – 3.0	5164	46	0	TLS-SB-IA3-FL9(2.0-3.0)030510	3
3.0	5299	90	Standard	3.0 – 4.0	5254	54	0	TLS-SB-IA3-FL9(3.0-4.0)030510	5c
4.0	5636	80					0		
5.0							0	No recovery 5.0 – 6.3	
6.0	5633	60					0		
7.0	5377	70					0		
8.0	5391	100	Standard	8.3 – 9.3	5180	61	0	TLS-SB-IA3-FL9(8.3-9.3)030510	5
9.0	5655	90					0		
10.0	5679	60	Standard	10.0 – 11.0	5089	52	0	TLS-SB-IA3-FL9(10.0-11.0)030510	4
11.0	5243	80					0		
12.0				N					
13.0									
14.0					A				
15.0									

Core I.D. Number	IA3-FL9

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Soil Core I.D. Number: IA3-FL10

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-5-10	
Time of Activity	10:00	
Surveyor Name	John Holmes	
Sampler Name	Mike Carlin	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092639.08	1064447.78
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	(No)

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 229306
Detector Model and Serial No.	Ludlum 44-10 / PR242823	Ludlum 44-9 / PR191714
Calibration Due Date	10-19-10	10-28-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 4468 cpm

Notes and Comments:

Backgrounds: Gamma: 5136 cpm (Ludlum Model 2221)

Beta: 37 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-5-10
Signature (Surveyor) Date

[redacted] 3-5-10
Signature (Sampler) Date

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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 1.5	
0.5							0	↓	
1.0	4652	110	Standard	1.5 – 2.0	4965	63	0	TLS-SS-IA3-FL10(1.5-2.0)030510	1
2.0	5131	60	Standard	2.0 – 3.0	5001	60	0	TLS-SB-IA3-FL10(2.0-3.0)030510	3
3.0	5417	80	Standard	3.0 – 4.0	4900	53	0	TLS-SB-IA3-FL10(3.0-4.0)030510	2
4.0	5845	100					0		
5.0	5001	80					0		
6.0	5259	100					0		
7.0	5345	110	Standard	7.0-8.0	5198	44	0	TLS-SB-IA3-FL10(7.0-8.0)030510	5
8.0	5076	90					0	↓	
9.0	5685	70					0	↓	
10.0	5659	70					0		
11.0	5073	100					0		
12.0	5619	90					0		
13.0	5809	110	Standard	13.0 – 14.0	5104	55	0	TLS-SB-IA3-FL10(13.0-14.0)030510	4
14.0	5451	80							
15.0									

Core I.D. Number	IA-3-FL10

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

Soil Core I.D. Number: IA3-FL11

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-5-10	
Time of Activity	10:00	
Surveyor Name	Zach Hill	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092556.81	1064267.1
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187756	Ludlum 12 / 180431
Detector Model and Serial No.	Ludlum 44-10 / PR242539	Ludlum 44-9 / PR193567
Calibration Due Date	10-19-10	10-19-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 4923 cpm

Notes and Comments:

Backgrounds: Gamma: 3308 cpm (Ludlum Model 2221)

Beta: 21 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-5-10
Signature (Surveyor) Date

[redacted] 3-5-10
Signature (Sampler) Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 0.5	
0.5	5455	90	Standard	0.5 – 1.0	5147	43	0	TLS-SS-IA3-FL11(0.5-1.0)030510	1
1.0	5509	80	Standard	1.5 – 2.5	5145	47	0	TLS-SB-IA3-FL11(1.5-2.5)030510	3
2.0	5784	90							
3.0	5283	120	Standard	3.0 – 4.0	5194	54	0	TLS-SB-IA3-FL11(3.0-4.0)030510	5
4.0	5610	60					0		
5.0							0	No recovery 5.0 – 6.0	
6.0	5120	100	Standard	6.0 – 7.0	5047	52	0	TLS-SB-IA3-FL11(6.0-7.0)030510	5c
7.0	6134	120	Standard	7.0 – 8.0	5330	46	0	TLS-SB-IA3-FL11(7.0-8.0)030510	4
8.0	5821	80					0		
9.0	5909	100					0		
10.0	5155	80					0		
11.0				N			0		
12.0							0		
13.0							0		
14.0					A		0		
15.0									

Core I.D. Number	IA3-FL11

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

Soil and Core Survey Forms
Investigative Area 4

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA4-1

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-3-10	
Time of Activity	13:50	
Surveyor Name	John Holmes	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092858.14	1066312.89
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 229306
Detector Model and Serial No.	Ludlum 44-10 / PR242823	Ludlum 44-9 / PR191714
Calibration Due Date	10-19-10	10-28-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 5240 cpm

Notes and Comments:

Backgrounds: Gamma: 4680 cpm (Ludlum Model 2221)

Beta: 26 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-3-10
Signature (Surveyor) Date

[redacted] 3-3-10
Signature (Sampler) Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 1.2	
0.5							0	↓	
1.0	5152	70	Standard	1.2 – 1.7	5001	50	0	TLS-SS-IA4-1(1.2-1.7)030310	1
2.0	5256	40					0		
3.0	5492	80	Standard	3.0 – 4.0	4864	43	0	TLS-SB-IA4-1(3.0-4.0)030310	4
4.0	4726	100	Standard	4.0 – 5.0	4930	78	0	TLS-SB-IA4-1(4.0-5.0)030310(Chemical)	
5.0							0	No recovery 5.0 – 7.0	
6.0							0	↓	
7.0	5085	90					0		
8.0	4837	100	Standard	8.0 – 9.0	4969	61	0	TLS-SB-IA4-1(8.0-9.0)030310	5
9.0	5335	70	Standard	9.0 – 10.0	5209	73	0	TLS-SB-IA4-1(9.0-10.0)030310	5a
10.0	4969	80					0		
11.0	5014	60					0		
12.0							0	Refusal @ 12.0'	
13.0				N					
14.0									
15.0					A				

Core I.D. Number	IA4-1

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA4-2

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-3-10	
Time of Activity	10:50	
Surveyor Name	Dave Warren	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092858.14	1066210.59
Was the bore hole re-located due to refusal? (Circle either Yeas or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187758	Ludlum 12 / 180411
Detector Model and Serial No.	Ludlum 44-10 / PR156393	Ludlum 44-9 / PR113654
Calibration Due Date	10-19-10	2-23-11
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 5099 cpm

Notes and Comments:

Backgrounds: Gamma: 5034 cpm (Ludlum Model 2221)

Beta: 38 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-3-10
Signature (Surveyor) Date

[redacted] 3-3-10
Signature (Sampler) Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 1.5	
0.5							0	↓	
1.0	5743	90	Standard	1.5 – 2.0	4909	60	0	TLS-SS-IA4-2(1.5-2.0)030310	1
2.0	4495	110	Standard	2.0 – 3.0	5104	43	0	TLS-SB-IA4-2(2.0-3.0)030310	5
3.0	5201	80					0		
4.0	5128	100					0		
5.0							0	No recovery 5.0 – 6.4	
6.0	4842	100					0		
7.0	5144	70					0		
8.0	4568	60					0		
9.0	5251	80					0		
10.0							0	No recovery 10.0 – 11.2	
11.0	5636	80					0		
12.0	6148	110	Standard	12.0 – 13.0	5056	41	0	TLS-SB-IA4-2(12.0-13.0)030310	4
13.0	5730	90	Standard	13.0 – 14.0	5183	51	0	TLS-SB-IA4-2(13.0-14.0)030210	5a
14.0	5275	60					0		
15.0	5043	90					0		

Core I.D. Number	IA4-2

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0								Refusal @ 16.3'	
17.0									
18.0									
19.0									
20.0									
21.0				N					
22.0									
23.0									
24.0					A				
25.0									
26.0									
27.0									
28.0									
29.0									
30.0									
31.0									
32.0									

Core I.D. Number	1A4-2

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA4-3

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-3-10	
Time of Activity	09:10	
Surveyor Name	Dave Warren	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092952.13	1066517.48
Was the bore hole re-located due to refusal? (Circle either Yeas or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187758	Ludlum 12 / 180411
Detector Model and Serial No.	Ludlum 44-10 / PR156393	Ludlum 44-9 / PR113654
Calibration Due Date	10-19-10	2-23-11
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 5379 cpm

Notes and Comments:

Backgrounds: Gamma: 6006 cpm (Ludlum Model 2221)

Beta: 42 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-3-10
Signature (Surveyo[redacted] Date

[redacted] 3-3-10
Signature (Sampler) Date

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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 0.5	
0.5	6472	30	Standard	0.5 – 1.0	6030	79	0	TLS-SS-IA4-3(0.5-1.0)030310	1
1.0	5761	80					0		
2.0	5832	70					0		
3.0	6259	90					0		
4.0	5643	100					0		
5.0	6474	80					0	No recovery 5.0 – 5.5	
6.0	6811	110	Standard	6.0 – 7.0	6034	52	0	TLS-SB-IA4-3(6.0-7.0)030310	5a
7.0	6222	120	Standard	7.0 – 8.0	6061	81	0	TLS-SB-IA4-3(7.0-8.0)030310	5
8.0	6727	90					0		
9.0	6129	110	Standard	9.0 – 10.0	6291	78	0	TLS-SB-IA4-3(9.0-10.0)030310(Chemical)	
10.0	6940	80	Duplicate	10.0 – 11.0	6059	64	0	TLS-SB-IA4-3(10.0-11.0)030310	4
11.0	6593	110					0	Refusal @ 11.8'	
12.0				N					
13.0									
14.0									
15.0					A				

Core I.D. Number	IA4-3

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA4-4

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-2-10	
Time of Activity	08:39	
Surveyor Name	Dave Warren	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092952.13	1066415.19
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187758	Ludlum 12 / 180431
Detector Model and Serial No.	Ludlum 44-10 / PR156393	Ludlum 44-9 / PR193567
Calibration Due Date	10-19-10	10-19-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 5847 cpm

Notes and Comments:

Backgrounds: Gamma: 6378 cpm (Ludlum Model 2221)

Beta: 33 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-2-10
Signature (Survey[redacted] Date

[redacted] 3-2-10
Signature (Sampler) Date

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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 1.0	
0.5							0	↓	
1.0	5333	60	Standard	1.0 – 1.5	5436	46	0	TLS-SS-IA4-4(1.0-1.5)030210	1
2.0	6165	80	Standard	1.5 – 2.5	5632	36	0	TLS-SB-IA4-4(1.5-2.5)030210	5c
3.0	5846	100	Standard	2.5 – 3.5	5604	41	0	TLS-SB-IA4-4(2.5-3.5)030210	5c
4.0	6013	140					0		
5.0							0	No recovery 5.0 – 5.7	
6.0	5564	120					0		
7.0	5850	80					0		
8.0	6493	100					0		
9.0	5596	120					0		
10.0							0	No recovery 10.0 – 11.2	
11.0	6322	80					0		
12.0	6386	100					0		
13.0	6788	90	Standard	13.0 – 14.0	5520	54	0	TLS-SB-IA4-4(13.0-14.0)030210	4
14.0	6114	110	Duplicate	14.0 – 15.0	5246	44	0	TLS-SB-IA4-4(14.0-15.0)030210(Chemical)	
15.0							0	No recovery 15.0 – 18.0	

Core I.D. Number	IA4-4

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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0							0	No recovery 15.0 – 18.0	
17.0							0	↓	
18.0	6053	100					0		
19.0	6155	140	Standard	19.0 – 20.0	5593	53	0	TLS-SB-IA4-4(19.0-20.0)030210	5
20.0	5503	80					0		
21.0	5966	120					0		
22.0	5696	80					0		
23.0	6242	80					0		
24.0	6401	120					0		
25.0	6325	100					0		
26.0							0	Refusal @ 26.0'	
27.0				N					
28.0									
29.0									
30.0					A				
31.0									
32.0									

Core I.D. Number	IA4-4

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA4-5

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-3-10	
Time of Activity	14:00	
Surveyor Name	Zach Hill	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092952.13	1066312.89
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	~~No~~

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187758	Ludlum 12 / 180431
Detector Model and Serial No.	Ludlum 44-10 / PR156393	Ludlum 44-9 / PR193567
Calibration Due Date	10-19-10	10-19-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 4933 cpm

Notes and Comments:

Backgrounds: Gamma: 5355 cpm (Ludlum Model 2221)

Beta: 26 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-3-10
Signature (Surveyor) Date

[redacted] 3-3-10
Signature (Sampler) Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 0.7	
0.5	5801	80	Standard	0.7 – 1.2	5430	38	0	TLS-SS-IA4-5(0.7-1.2)030310	1
1.0	6415	100	Standard	1.2 – 2.2	5480	52	0	TLS-SB-IA4-5(1.2-2.2)030310	4
2.0	5520	80					0		
3.0	5563	110					0		
4.0	5033	160	Standard	4.0 – 5.0	5355	58	0	TLS-SB-IA4-5(4.0-5.0)030310	5
5.0	5688	80					0		
6.0	5725	120					0		
7.0	5929	80					0		
8.0	5425	100	Standard	8.0 – 9.0	5384	67	0	TLS-SB-IA4-5(8.0-9.0)030310	5c
9.0	6027	80	Standard	9.0 – 10.0	5800	54	0	TLS-SB-IA4-5(9.0-10.0)030310	5c
10.0							0	No recovery 10.0 – 11.7	
11.0							0	↓	
12.0	6264	130					0		
13.0	6289	80					0		
14.0	5947	100					0		
15.0							0	No recovery 15.0 – 16.1	

Core I.D. Number	IA4-5

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0	5824	80					0		
17.0	6290	100					0		
18.0	5528	60					0		
19.0	6297	80					0		
20.0							0	Refusal @ 20.0'	
21.0									
22.0									
23.0				N					
24.0									
25.0									
26.0									
27.0					A				
28.0									
29.0									
30.0									
31.0									
32.0									

Core I.D. Number	IA4-5

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

Soil Core I.D. Number: IA4-6

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-4-10	
Time of Activity	08:40	
Surveyor Name	John Holmes	
Sampler Name	Mike Carlin	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092952.13	1066210.59
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 229306
Detector Model and Serial No.	Ludlum 44-10 / PR242823	Ludlum 44-9 / PR191714
Calibration Due Date	10-19-10	10-28-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 4699 cpm

Notes and Comments:

Backgrounds: Gamma: 4775 cpm (Ludlum Model 2221)

Beta: 30 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5% %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-4-10
Signature (Surveyor) Date

[redacted] 3-4-10
Signature (Sampler) Date

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Statie Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0	5138	40	Standard	0.0 – 0.5	4937	53	0	TLS-SS-1A4-6(0.0-0.5)030410	1
0.5	5503	80					0		
1.0	5305	70					0		
2.0	4652	100					0		
3.0	5325	70					0		
4.0	5045	80					0		
5.0							0	No recovery 5.0 – 6.9	
6.0							0	↓	
7.0	4659	90					0		
8.0	5609	60	Standard	8.0 – 9.0	5111	79	0	TLS-SB-1A4-6(8.0-9.0)030410	5a
9.0	4798	100					0		
10.0							0	No recovery 10.0 – 12.7	
11.0							0	↓	
12.0	4543	70					0		
13.0	5010	60					0		
14.0	5048	50					0		
15.0	6523	40	Standard	15.0 – 16.0	4842	76	0	TLS-SB-IA4-6(15.0-16.0)030410	4

Core I.D. Number	

ARSEC
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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0	6013	80	Standard	16.0 – 17.0	4848	79	0	TLS-SB-IA4-6(16.0-17.0)030410(Chemical)	
17.0	6537	110	Standard	17.0 – 18.0	4834	45	0	TLS-SB-IA4-6(17.0-18.0)030410	5
18.0								Refusal @ 18.0'	
19.0									
20.0									
21.0									
22.0				N					
23.0									
24.0									
25.0									
26.0					A				
27.0									
28.0									
29.0									
30.0									
31.0									
32.0									

Core I.D. Number	IA4-6

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

Soil Core I.D. Number: IA4-7

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-1-10	
Time of Activity	09:45	
Surveyor Name	Dave Warren	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093054.43	1066517.48
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187758	Ludlum 12 / 180411
Detector Model and Serial No.	Ludlum 44-10 / PR156393	Ludlum 44-9 / PR113654
Calibration Due Date	10-19-10	2-23-11
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 7264 cpm

Notes and Comments:

Backgrounds: Gamma: 6907 cpm (Ludlum Model 2221)

Beta: 91 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted]

Signature (Surveyor) 3-1-10 Date

[redacted]

Signature (Sampler) 3-1-10 Date

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree
0.0							0	No recovery 0.0 – 0.8	
0.5	7200	120	Standard	0.8 – 1.3	6818	78	0	TLS-SS-IA4-7(0.8-1.3)030110	1
1.0	7167	140	Standard	1.3 – 2.3	6753	79	0	TLS-SB-IA4-7(1.3-2.3)030110	5
2.0	7398	80	Standard	2.3 – 3.3	6787	65	0	TLS-SB-IA4-7(2.3-3.3)030110	5c
3.0	7645	60	Standard	3.3 – 4.3	6718	71	0	TLS-SB-IA4-7(3.3-4.3)030110	5c
4.0							0	↓	
5.0							0	No recovery 5.0 – 5.7	
6.0	7577	80					0		
7.0	7736	60					0		
8.0	7247	80					0		
9.0	7740	80					0		
10.0							0	No recovery 10.0 – 11.0	
11.0	8011	100					0		
12.0	7650	120					0		
13.0	7849	100					0		
14.0	8272	140					0		
15.0	7212	60					0	No recovery 15.0 – 15.3	

Core I.D. Number	IA4-7

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0	7463	80					0		
17.0	7003	120					0		
18.0	7687	120					0		
19.0	7442	80					0		
20.0	7688	60					0	No recovery 20.0 – 20.6	
21.0	7256	100					0		
22.0	6870	80					0		
23.0							0		
24.0	8395	100	Duplicate	24.0 – 25.0	6834	65	0	TLS-SB-IA4-7(24.0-25.0)030110	4
25.0							0	No recovery 25.0 – 27.4	
26.0							0	↓	
27.0	7097	100					0		
28.0	7238	100					0		
29.0							0		
30.0							0	No recovery 30.0 – 34.0	
31.0							0	↓	
32.0							0	↓	

Core I.D. Number	IA4-7

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
33.0							0	No recovery 30.0 – 34.0	
34.0							0	Refusal @ 34.0	
35.0									
36.0									
37.0									
38.0				N					
39.0									
40.0									
41.0									
42.0					A				
43.0									
44.0									
45.0									
46.0									
47.0									
48.0									
49.0									

Core I.D. Number	1A4-7

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA4-8

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-1-10	
Time of Activity	08:35	
Surveyor Name	John Holmes	
Sampler Name	Mike Carlin	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093054.43	1066415.19
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 229306
Detector Model and Serial No.	Ludlum 44-10 / PR242823	Ludlum 44-9 / PR191714
Calibration Due Date	10-19-10	10-28-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 5805 cpm

Notes and Comments:

Backgrounds: Gamma: 5559 cpm (Ludlum Model 2221)

Beta: 50 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-1-10
Signature (Surveyor) Date

[redacted] 3-1-10
Signature (Sampler) Date

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 1.3	
0.5							0	↓	
1.0	5642	40	Standard	1.3 – 1.8	5443	63	0	TLS-SS-IA4-8(1.3-1.8)030110	1
2.0	5857	90					0		
3.0	5623	80	Standard	3.0 – 4.0	5707	77	0	TLS-SB-IA4-8(3.0-4.0)030110)Chemical	
4.0	6525	105	Standard	4.0 – 5.0	5552	71	0	TLS-SB-IA4-8(4.0-5.0)030110	4
5.0							0	No recovery 5.0 – 7.2	
6.0							0	↓	
7.0	5797	60					0		
8.0	5579	100					0		
9.0	5540	90					0		
10.0							0	No recovery 10.0 – 11.3	
11.0	5795	70					0		
12.0	5895	50					0		
13.0	5625	90					0		
14.0	5922	40					0		
15.0	5760	50					0	No recovery 5.0 – 5.3	

Core I.D. Number	IA4-8

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0	5619	90					0		
17.0	5835	40					0		
18.0	5496	70					0		
19.0	5704	60					0		
20.0							0	No recovery 20.0 – 20.9	
21.0	6005	90					0		
22.0	6291	110					0		
23.0	6355	80					0		
24.0	6022	50					0		
25.0	5961	70					0		
26.0	5895	100	Standard	26.2 – 27.2	5783	72	0	TLS-SB-IA4-8(26.2-27.2)030110	2
27.0	5632	90					0		
28.0							0		
29.0	5677	70	Standard	29.60 – 30.6	5613	59	0	TLS-SB-IA4-8(29.6-30.6)030110	3
30.0	5944	60					0		
31.0	5909	110					0		
32.0	5882	120	Standard	32.0 – 33.0	5585	63	0	TLS-SB-IA4-8(32.0-33.0)030110	5

Core I.D. Number	IA4-8

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
33.0	5784	90							
34.0	5445	60							
35.0	5665	100							
36.0	5821	50						Refusal @ 36.6	
37.0									
38.0									
39.0									
40.0				N					
41.0									
42.0									
43.0					A				
44.0									
45.0									
46.0									
47.0									
48.0									
49.0									

Core I.D. Number	IA4-8

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA4-9

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-3-10	
Time of Activity	11:00	
Surveyor Name	John Holmes	
Sampler Name	Mike Carlin	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093054.43	1066312.89
Was the bore hole re-located due to refusal? (Circle either Yeas or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 229306
Detector Model and Serial No.	Ludlum 44-10 / PR242823	Ludlum 44-9 / PR191714
Calibration Due Date	10-19-10	10-28-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 6112 cpm

Notes aud Comments:

Backgrounds: Gamma: 7333 cpm (Ludlum Model 2221)

Beta: 41 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted]
Signature (Surveyor) 3-3-10 Date

[redacted]
Signature (Sampler) 3-3-10 Date

ARSEC
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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 0.2	
0.5	7756	60	Standard	0.2 – 0.8	6983	41	0	TLS-SS-IA4-9(0.2-0.8)030310	1
1.0	7395	60					0		
2.0	7830	80	Standard	1.8 – 2.8	7220	63	0	TLS-SB-IA4-9(1.8-2.8)030310	5c
3.0	7938	80	Standard	2.8 – 3.8	7197	88	0	TLS-SB-IA4-9 (2.8-3.8)030310	5c
4.0	7770	120					0		
5.0							0	No recovery 5.5 – 6.5	
6.0							0	↓	
7.0	7917	120					0		
8.0	8010	120					0		
9.0	8130	110	Duplicate	9.0 – 10.0	7175	71	0	TLS-SB-IA4-9 (9.0-10.0)030310	4
10.0							0	No recovery 10.0 – 10.3	
11.0	8072	100					0		
12.0	7837	80					0		
13.0	7695	80					0		
14.0	7172	60					0		
15.0							0	No recovery 15.0 – 15.3	

Core I.D. Number	IA4-9

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0	7672	120					0		
17.0	7600	140	Standard	17.3 – 18.3	7183	60	0	TLS-SB-IA4-9(17.3-18.3)030310	5
18.0	7462	100							
19.0	7468	80							
20.0								No recovery 20.0 – 22.7	
21.0								↓	
22.0								↓	
23.0	8103	100							
24.0	7864	100							
25.0								Refusal @ 25.0'	
26.0									
27.0				N					
28.0									
29.0					A				
30.0									
31.0									
32.0									

Core I.D. Number	IA4-9

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA4-10

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-3-10	
Time of Activity	09:00	
Surveyor Name	John Holmes	
Sampler Name	Mike Carlin	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093054.43	1066210.59
Was the bore hole re-located due to refusal? (Circle either Yeas or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 229306
Detector Model and Serial No.	Ludlum 44-10 / PR242823	Ludlum 44-9 / PR191714
Calibration Due Date	10-19-10	10-28-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 5486 cpm

Notes and Comments:

Backgrounds: Gamma: 6118 cpm (Ludlum Model 2221)

Beta: 34 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-3-10
Signature (Surveyor) Date

[redacted] 3-3-10
Signature (Sampler) Date

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 0.6	
0.5	6343	120	Standard	0.6 – 1.1	5994	53	0	TLS-SS-IA4-10(0.6-1.1)030310	1
1.0	6520	60					0		
2.0	6575	140	Standard	2.0 - 3.0	6090	58	0	TLS-SB-IA4-10(2.0-3.0)030310	5
3.0	6112	100	Standard	3.0 – 4.0	6235	75	0	TLS-SB-IA4-10(3.0-4.0)030310	5c
4.0	6478	100	Standard	4.0 – 5.0	5995	82	0	TLS-SB-IA4-10(4.0-5.0)030310	5c
5.0							0	No recovery 5.0 – 7.8	
6.0							0	↓	
7.0							0	↓	
8.0	7218	90	Standard	7.8 – 8.8	6377	56	0	TLS-SB-IA4-10(7.8-8.8)030310	4
9.0	6549	60	Standard	8.8 – 9.8	6096	60	0	TLS-SB-IA4-10(8.8-9.8)030310(Chemical)	
10.0								No recovery 10.0 – 12.2	
11.0	6343	140						↓	
12.0	6305	110							
13.0	6609	120							
14.0								No recovery 14.0 – 19.1	
15.0								↓	

Core I.D. Number	IA4-10

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0								No recovery 14.0 – 19.1	
17.0								↓	
18.0								↓	
19.0	6405	80							
20.0	6548	120							
21.0								Refusal @ 21.0'	
22.0									
23.0									
24.0				N					
25.0									
26.0									
27.0					A				
28.0									
29.0									
30.0									
31.0									
32.0									

Core I.D. Number	IA4-10

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

Soil Core I.D. Number: IA4-11

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	2-26-10	
Time of Activity	14:30	
Surveyor Name	Dave Warren	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093156.72	1066517.48
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187758	Ludlum 12 / 180411
Detector Model and Serial No.	Ludlum 44-10 / PR156393	Ludlum 44-9 / PR113654
Calibration Due Date	10-19-10	2-23-11
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 7105 cpm

Notes and Comments:

Backgrounds: Gamma: 6643 cpm (Ludlum Model 2221)

Beta: 46 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted]

Signature (Surveyor) [redacted] 2-26-10
Date

[redacted]

Signa[redacted]ampler) 2-26-10
Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 0.8	
0.5							0	↓	
1.0							0	↓	
2.0	6652	100	Standard	0.8 – 1.3	5951	66	0	TLS-SS-IA4-11(0.8-1.3)022610	1
3.0	6389	80					0		
4.0	6397	60					0		
5.0	6384	80					0		
6.0	6433	100					0	No recovery 5.0 -5.5	
7.0	6456	60					0		
8.0	6307	60					0		
9.0	6095	80					0		
10.0							0	No recovery 10.0 – 11.2	
11.0	6472	80					0		
12.0	6580	100	Standard	12.2 – 13.2	6043	68	0	TLS-SB-IA4-11(12.2-13.2)022610	4
13.0	6481	100	Standard	13.2 – 14.2	6238	60	0	TLS-SB-IA4-11(13.2-14.2)022610(Chemical)	
14.0	6216	80							
15.0								No recovery 15.0 – 16.0	

Core I.D. Number	IA4-11

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0	6079	80					0		
17.0	6428	60					0		
18.0	6563	100					0		
19.0	6250	100					0		
20.0							0	No recovery 20.0 – 24.0	
21.0							0	↓	
22.0							0	↓	
23.0							0	↓	
24.0	6156	80					0		
25.0	5965	80					0		
26.0	6999	60	Standard	26.0 – 27.0	6351	62	0	TLS-SB-IA4-11(26.0-27.0)022610	3
27.0	6311	100	Standard	27.0 – 28.0	6122	60	0	TLS-SB-IA4-11(27.0-28.0)022610	5c
28.0	6291	100					0		
29.0	6330	120	Standard	29.0 – 30.0	5960	72	0	TLS-SB-IA4-11(29.0-30.0)022610	5
30.0				N					
					A				

Core I.D. Number	IA4-11

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

Soil Core I.D. Number: IA4-12

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	N/A	
Time of Activity	N/A	
Surveyor Name	N/A	
Sampler Name	N/A	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093156.72	1066517.48
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Notes and Comments:

Corehole IA4-12 was omitted due to the town's current contractor placing a large pile of fresh soil at this location. With the USACE's concurrence, the hole was not drilled.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA4-13

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-30-10	
Time of Activity	10:35	
Surveyor Name	Zach Hill	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093156.72	1066210.59
Was the bore hole re-located due to refusal? (Circle either Yes or No)	(Yes)	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190191	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR240366	Ludlum 44-9 / PR153297
Calibration Due Date	2-23-11	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 9866 cpm

Notes and Comments:

Backgrounds: Gamma: 8208 cpm (Ludlum Model 2221)

Beta: 43 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Walk over scan after coring < 8K cpm. LAWs of equipment/sample area <100 cpm.
NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-30-10
Signature (Surveyor) [redacted] Date

[redacted] 3-30-10
Signature (Sampler) [redacted] Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 0.7	
0.5	8125	100	Standard	0.7 – 1.2	7805	66	0	TLS-SS-IA4-13(0.7-1.2)033010	
1.0	8311	100					0		1
2.0	7815	80					0		
3.0	8272	80					0		
4.0	8600	100					0		
5.0							0	No recovery 5.0 – 6.4	
6.0	8423	140	Standard	6.4 – 7.4	7953	55	0	TLS-SB-IA4-13(6.4-7.4)033010	5
7.0	8658	140	Standard	7.4 – 8.4	7903	83	0	TLS-SB-IA4-13(7.4-8.4)033010	5a
8.0	8327	120					0		
9.0	8801	100	Standard	9.0 – 10.0	7892	69	0	TLS-SB-IA4-13(9.0-10.0)033010	4
10.0							0	No recovery 10.0 – 12.5	
11.0							0	↓	
12.0							0	↓	
13.0	8417	100					0		
14.0	8340	120	Standard	14.0 – 15.0	8229	50	0	TLS-SB-IA4-13(14.0-15.0)033010	5b
15.0	7690	80					0		

Core I.D. Number	IA4-13

ARSEC
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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0							0	Refusal @ 16.8'	
17.0									
18.0									
19.0									
20.0									
21.0				N					
22.0									
23.0									
24.0									
25.0					A				
26.0									
27.0									
28.0									
29.0									
30.0									
31.0									
32.0									

Core I.D. Number	IA4-13

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA4-14

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-2-10	
Time of Activity	15:30	
Surveyor Name	John Holmes	
Sampler Name	Mike Carlin	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093156.72	1066210.59
Was the bore hole re-located due to refusal? (Circle either Yeas or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 229306
Detector Model and Serial No.	Ludlum 44-10 / PR242823	Ludlum 44-9 / PR191714
Calibration Due Date	10-19-10	10-28-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 5309 cpm

Notes and Comments:

Backgrounds: Gamma: 5480 cpm (Ludlum Model 2221)

Beta: 58 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-2-10
Signature (Surveyor) Date

[redacted] 3-2-10
Signature (Sampler) Date

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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 1.0	
0.5							0	↓	
1.0	5271	50	Standard	1.0 – 1.5	4922	63	0	TLS-SS-IA4-14(1.0-1.5)030210	1
2.0	4512	70					0		
3.0	5014	40					0		
4.0	5898	80	Standard	4.0 – 5.0	5129	53	0	TLS-SB-IA4-14(4.0-5.0)030210	5
5.0							0	No recovery 5.0 – 7.5	
6.0							0	↓	
7.0	5156	60	Standard	7.5 – 8.5	5177	57	0	TLS-SB-IA4-14 (7.5-8.5)030210(Chemical)	
8.0	5704	40					0		
9.0	5602	70					0		
10.0							0	No recovery 10.0 – 12.0	
11.0							0	↓	
12.0	5193	60					0		
13.0	6220	90	Standard	12.0 – 13.0	5100	40	0	TLS-SB-IA4-14(13.0-14.0)030210	4
14.0	5205	50					0	Refusal @ 15.0'	
15.0									

Core I.D. Number	1A4-14

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA4-15

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-1-10	
Time of Activity	14:30	
Surveyor Name	Dave Warren	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093259.02	1066517.48
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187758	Ludlum 12 / 180411
Detector Model and Serial No.	Ludlum 44-10 / PR156393	Ludlum 44-9 / 113654
Calibration Due Date	10-19-10	2-23-11
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 5010 cpm

Notes and Comments:

Backgrounds: Gamma: 5519 cpm (Ludlum Model 2221)

Beta: 28 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-1-10
Signature (Surveyor) Date

[redacted] 3-1-10
Sig[redacted] (Sampler) Date

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 0.7	
0.5	5623	60	Standard	0.7 – 1.2	4934	54	0	TLS-SS-IA4-15(0.7-1.2)030110	1
1.0	6108	100	Standard	1.2 – 2.2	5165	59	0	TLS-SB-IA4-15(1.2-2.2)030110	5
2.0	6399	80	Standard	2.2 – 3.2	5471	62	0	TLS-SB-IA4-15(2.2-3.2)030110	4
3.0	6237	60	Duplicate	3.2 – 4.2	5437	73	0	TLS-SB-IA4-15(3.2-4.2)030110(Chemical)	
4.0	5396	100					0		
5.0							0	No recovery 5.0 – 9.1	
6.0							0	↓	
7.0							0	↓	
8.0							0	↓	
9.0	6106	60					0		
10.0							0	No recovery 10.0 – 13.0	
11.0							0	↓	
12.0							0	↓	
13.0	5613	100	Chemical Duplicate	13.0 – 14.0	5218	55	0	TLS-SB-IA4-15(13.0-14.0)030110	5b
14.0							0		
15.0							0		

Core I.D. Number	IA4-15

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Sean Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Statie Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0								Refusal @ 16.0'	
17.0									
18.0									
19.0									
20.0									
21.0				N					
22.0									
23.0									
24.0					A				
25.0									
26.0									
27.0									
28.0									
29.0									
30.0									
31.0									
32.0									

Core I.D. Number	IA4-15

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

Soil Core I.D. Number: 1A4-16

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	2-26-10	
Time of Activity	10:50	
Surveyor Name	John Holmes	
Sampler Name	Mike Carlin	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093259.02	1066415
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 229306
Detector Model and Serial No.	Ludlum 44-10 / PR242823	Ludlum 44-9 / PR191714
Calibration Due Date	10-19-10	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 7750 cpm

Notes and Comments:

Backgrounds: Gamma: 8051 cpm (Ludlum Model 2221)

Beta: 38 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 2-26-10

Signature (Surveyor) Date

[redacted] 2-26-10

Signature (Sampler) [redacted] Date

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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 0.2	
0.5	8253	40	Standard	0.2 -0.7	7639	77	0	TLS-SS-IA4-16(0.2-0.7)022610	1
1.0	8338	60					0		
2.0	7880	100					0		
3.0	8265	90					0		
4.0	8324	110	Standard	4.0 – 5.0	7763	65	0	TLS-SB-IA4-16(4.0-5.0)022610	5
5.0							0	No recovery 5.0 – 6.3	
6.0	7580	60					0		
7.0	8740	70	Standard	7.0 – 8.0	7919	75	0	TLS-SB-IA4-16(7.0-8.0)022610	5a
8.0	8400	40					0		
9.0	7785	90					0		
10.0							0	No recovery 10.0 – 11.0	
11.0	7830	80					0		
12.0	8093	70					0		
13.0	8915	80	Standard	13.0 – 14.0	7826	72	0	TLS-SB-IA4-16(13.0-14.0)022610	4
14.0	8092	90	Standard	14.0 – 15.0	8004	76	0	TLS-SB-IA4-16(14.0-15.0)022610)Chemical	
15.0							0	No recovery 15.0 -25.0	

Core I.D. Number	IA4-16

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree
16.0							0	No recovery 15.0 -25.0	
17.0							0	↓	
18.0							0	↓	
19.0							0	↓	
20.0							0	↓	
21.0							0	↓	
22.0							0	↓	
23.0							0	↓	
24.0							0	↓	
25.0	7770	50	Standard	25.0 – 26.0	7921	72	0	TLS-SB-IA4-16(25.0-26.0)022610	3
26.0	7525	40					0		
27.0	8350	90					0		
28.0	8025	100					0		
29.0	8175	60					0		
30.0							0	No recovery 30.0 – 33.6	
31.0							0	↓	
32.0							0	↓	

Core I.D. Number	IA4-16

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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree
33.0	7750	60							
34.0	8360	80							
35.0								Refusal @ 36'	
36.0									
37.0									
38.0									
39.0				N					
40.0									
41.0									
42.0					A				
43.0									
44.0									
45.0									
46.0									
47.0									
48.0									
49.0									

Core I.D. Number	1A4-16

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA4-17

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	2-26-10	
Time of Activity	09:05	
Surveyor Name	Dave Warren	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093259.02	1066312.89
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187758	Ludlum 12 / 180411
Detector Model and Serial No.	Ludlum 44-10 / PR156393	Ludlum 44-9 / PR113654
Calibration Due Date	2-23-11	10-19-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 3122 cpm

Notes and Comments:

Backgrounds: Gamma: 5607 cpm (Ludlum Model 2221)

Beta: 33 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 2-26-10
Signature (Surveyor) Date

[redacted] 2-26-10
Signature (Sampler) Date

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2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0								No recovery 0.0 – 0.5	
0.5	6279	60	Standard	0.5 – 10.	6306	65	0	TLS-SS-IA4-17(0.5-1.0)022610	1
1.0	6145	80					0		
2.0	6514	60					0		
3.0	6495	100					0		
4.0	6458	80					0		
5.0							0	No recovery 5.0 – 5.9	
6.0	6307	80					0		
7.0	6767	160	Duplicate	6.9 – 7.9	7439	84	0	TLS-SB-IA4-17(6.9-7.9)022610	4
8.0	6454	140	Standard	7.9 – 8.9	6432	77	0	TLS-SB-IA4-17(7.9-8.9)022610	5
9.0	6226	62	Standard	8.9 – 9.9	6245	140	0	TLS-SB-IA4-17(8.9-9.9)022610	5c
10.0	6513	80					0		
11.0	6623	60					0		
12.0	6624	60					0		
13.0	6507	140					0		
14.0	6365	100					0		
15.0							0	No recovery 15.0 – 16.4	

Core I.D. Number	IA4-17

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0	6364	80					0		
17.0	6497	120					0		
18.0	6540	100					0	From 18.4 – 20.0	
19.0							0		
20.0							0	No recovery 20.0 – 23.0	
21.0							0	↓	
22.0							0	↓	
23.0	6406	100					0		
24.0	6463	80					0		
25.0							0	No recovery 25.0 – 34.5	
26.0							0	↓	
27.0							0	↓	
28.0							0	↓	
29.0							0	↓	
30.0							0	↓	
31.0							0	↓	
32.0							0	↓	

Core I.D. Number	IA4-17

ARSEC
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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
33.0							0	No recovery 25.0 – 34.5	
34.0	5960	80					0		
35.0							0	No recovery 35.0 – 39.4	
36.0							0	↓	
37.0							0	↓	
38.0							0	↓	
39.0	5866	100					0		
40.0							0	No recovery 40.0 – 44.2	
41.0							0	↓	
42.0							0	↓	
43.0							0	↓	
44.0	5980	100					0		
45.0							0	No recovery 45.0 – 47.5	
46.0							0	↓	
47.0							0	↓	
48.0	6201	160	Standard	48.0 – 49.0	6314	62	0	TLS-SB-IA4-17(48.0-49.0)022610	3
49.0									

Core I.D. Number	IA4-17

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

Soil Core I.D. Number: IA4-18

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-2-10	
Time of Activity	14:05	
Surveyor Name	Dave Warren	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093361.31	1066517.48
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	(No)

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187758	Ludlum 12 / 180431
Detector Model and Serial No.	Ludlum 44-10 / PR156393	Ludlum 44-9 / PR193567
Calibration Due Date	10-19-10	10-19-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 8032 cpm

Notes and Comments:

Backgrounds: Gamma: 7180 cpm (Ludlum Model 2221)

Beta: 50 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted]

Signature (Surveyor) 3-2-10 Date

[redacted]

Signature (Sampler) 3-2-10 Date

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree
0.0							0	No recovery 0.0 – 2.0	
0.5							0	↓	
1.0							0	↓	
2.0	6840	40	Standard	2.0 – 2.5	7295	51	0	TLS-SS-IA4-18(2.0-2.5)030210	1
3.0	7770	60					0		
4.0	7742	80					0		
5.0	7767	60					0	No recovery 5.0 – 8.4	
6.0							0	↓	
7.0							0	↓	
8.0	7630	80					0		
9.0	7809	100	Standard	9.0 – 10.0	7100	43	0	TLS-SB-IA4-18(9.0-10.0)030210	4
10.0	7597	60	Standard	10.0 – 11.0	6922	61	0	TLS-SB-IA4-18(10.0-11.0)030210(Chemical)	
11.0	7681	60					0		
12.0	6958	120	Standard	12.0 – 13.0	7101	65	0	TLS-SB-IA4-18(12.0-13.0)030210	5
13.0	7014	80					0		
14.0	7587	80					0		
15.0							0	No recovery 15.0 – 16.6	

Core I.D. Number	IA4-18

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0							0	No recovery 15.0 – 16.6	
17.0	7382	80					0		
18.0	7539	60					0		
19.0	7706	100					0		
20.0							0	No recovery 20.0 – 23.6	
21.0							0	↓	
22.0							0	↓	
23.0							0	↓	
24.0	7392	80	Standard	24.0 – 25.0	7141	60	0	TLS-SB-IA4-18(24.0-25.0)030210	2
25.0							0	No recovery 25.0 – 44.0	
26.0							0	↓	
27.0							0	↓	
28.0							0	↓	
29.0							0	↓	
30.0							0	↓	
31.0							0	↓	
32.0							0	↓	

Core I.D. Number	IA4-18

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
33.0							0	No recovery 25.0 – 44.0	
34.0							0	↓	
35.0							0	↓	
36.0							0	↓	
37.0							0	↓	
38.0							0	↓	
39.0							0	↓	
40.0							0	↓	
41.0							0	↓	
42.0							0	↓	
43.0							0	↓	
44.0	7386	80	Standard	44.0 – 45.0	7210	45	0	TLS-SB-IA4-4(44.0-45.0)030210	3
45.0								No recovery 45.0 – 64.0	
46.0								↓	
47.0								↓	
48.0								↓	
49.0								↓	

Core I.D. Number	IA4-18

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
50.0								No recovery 45.0 – 64.0	
51.0								↓	
52.0								↓	
53.0								↓	
54.0								↓	
55.0								↓	
56.0								↓	
57.0								↓	
58.0								↓	
59.0								↓	
60.0								↓	
61.0								↓	
62.0								↓	
63.0								↓	
64.0								Refusal @ 64.0'	
65.0									
66.0									

Core I.D. Number	1A4-18

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA4-19

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-1-10	
Time of Activity	15:30	
Surveyor Name	Dave Warren	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093361.31	1066517.48
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	~~No~~

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187758	Ludlum 12 / 180411
Detector Model and Serial No.	Ludlum 44-10 / PR156393	Ludlum 44-9 / PR113654
Calibration Due Date	10-19-10	2-23-11
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 5857 cpm

Notes and Comments:

Backgrounds: Gamma: 6787 cpm (Ludlum Model 2221)

Beta: 48 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted]

Signature (Surveyor) 3-1-10 Date

[redacted]

Sig[redacted] (Sampler) 3-1-10 Date

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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0								No recovery 0.0 – 0.5	
0.5	6691	100	Standard	0.5 – 1.0	6356	70	0	TLS-SS-IA4-19(0.5-1.0)030110	1
1.0	6798	60	Standard	1.0 – 2.0	6580	53	0	TLS-SB-IA4-19(1.0-2.0)030110	4
2.0	6425	60					0		
3.0	6682	100					0		
4.0	6672	80					0		
5.0							0	No recovery 5.0 – 7.4	
6.0							0	↓	
7.0	6770	60					0		
8.0	6772	60					0		
9.0	6641	80					0		
10.0							0	No recovery 10.0 – 12.3	
11.0							0	↓	
12.0	6748	80					0		
13.0	6547	100					0		
14.0	6705	80					0		
15.0							0	No recovery 15.0 – 16.7	

Core I.D. Number	IA4-19

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0							0	No recovery 15.0 – 16.7	
17.0							0	↓	
18.0	6781	60					0		
19.0	6770	110					0		
20.0							0	No recovery 20.0 – 21.8	
21.0	6680	100	Standard	21.8 – 22.8	6289	50	0	TLS-SB-IA4-19(21.8-22.8)030110	2
22.0							0	↓	
23.0	6720	70					0		
24.0	6413	60					0		
25.0	6590	90					0		
26.0	6749	100					0		
27.0	7173	90	Standard	27.0 – 28.0	6425	41	0	TLS-SB-IA4-19(27.0-28.0)030110	3
28.0	6539	120	Standard	28.0 – 29.0	6453	67	0	TLS-SB-IA4-19(28.0-29.0)030110	5
29.0	6649	100					0		
30.0				N			0		
31.0									
32.0					A				

Core I.D. Number	IA4-19

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA4-20

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-2-10	
Time of Activity	12:50	
Surveyor Name	John Holmes	
Sampler Name	Mike Carlin	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093327.97	1066413.45
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 229306
Detector Model and Serial No.	Ludlum 44-10 / PR242823	Ludlum 44-9 / PR191714
Calibration Due Date	10-19-10	10-28-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 5388 cpm

Notes and Comments:

Backgrounds: Gamma: 5536 cpm (Ludlum Model 2221)

Beta: 50 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-2-10
Signature (Surveyor) Date

[redacted] 3-2-10
Signature (Sampler) Date

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 -1.5	
0.5							0	↓	
1.0	5572	50	Standard	1.5 – 2.0	5187	67	0	TLS-SS-IA4-20(1.5-2.0)030210	1
2.0	5897	100					0		
3.0	5572	110	Standard	3.0 – 4.0	5444	48	0	TLS-SB-IA4-20(3.0-4.0)030210	5
4.0	5840	90					0		
5.0							0	No recovery 5.0 – 6.5	
6.0	5788	60					0		
7.0	5756	40					0		
8.0	5980	100	Standard	8.0 – 9.0	5594	76	0	TLS-SB-IA4-20 (8.0-9.0)030210(Chemical)	
9.0	6044	60	Standard	9.0 – 10.0	5656	52	0	TLS-SB-IA4-20(9.0-10.0)030210	4
10.0	5836	30					0	No recovery 10.0 – 10.8	
11.0	5919	60					0		
12.0	5833	70					0		
13.0	5777	80					0		
14.0	5905	100					0		
15.0							0	No recovery 15.0 – 16.0	

Core I.D. Number	IA4-20

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scau Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0	5823	80					0		
17.0	5882	70					0		
18.0	5963	80					0		
19.0	5981	90					0		
20.0							0	No recovery 20.0 – 21.9	
21.0							0	↓	
22.0	5601	50	Standard	21.9 – 22.9	5669	60	0	TLS-SB-IA4-20(21.9-22.9)030210	2
23.0	5632	80					0		
24.0	5890	90					0		
25.0							0	No recovery 25.0 – 28.5	
26.0							0	↓	
27.0							0	↓	
28.0	5610	40					0		
29.0	5927	70					0		
30.0	5816	90	Standard	30.0 – 31.0	5648	73	0	TLS-SB-IA4-20(30.0-31.0)030210	3
31.0	5713	70					0		
32.0	5886	100					0		

Core I.D. Number	IA4-20

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ort Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
33.0	5694	60							
34.0	5847	90							
35.0									
36.0									
37.0									
38.0				N					
39.0									
40.0									
41.0									
42.0					A				
43.0									
44.0									
45.0									
46.0									
47.0									
48.0									
49.0									

Core I.D. Number	IA4-20

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

Soil Core I.D. Number: TA4-21

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:** ARSEC-HPS-0003	**Federal 09-055-00003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	2/18/2010	
Time of Activity	13:42	
Surveyor Name	John Holmes	
Sampler Name	Mike Carlin	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092841.06	1064969.68
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187758	Ludlum 12 / 229306
Detector Model and Serial No.	Ludlum 44-10 / PR156393	Ludlum 44-9 / PR191214
Calibration Due Date	10/19/2010	10/28/2010
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 6,594 cpm

Notes and Comments:

Backgrounds: Gamma: 6,009 cpm (Ludlum Model 2221)

Beta: 36 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 2-18-10

Signature (Su[redacted]or) Date

[redacted] 2-18-10

Signature (Sampler) Date

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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0	6870	80	Standard	0.0 – 0.5	5988	44	0	TLS-SS-IA4-21(0.0-0.5)021810	1
0.5	6757	40	Standard	0.5 – 1.5	6021	60	0	TLS-SB-IA4-21(0.5-1.5)021810	4
1.0	6017	50	Standard	1.5 – 2.5	5844	47	0	TLS-SB-IA4-21(1.5-2.5)021810(Chemical)	
2.0	5624	60					0		
3.0	6529	60					0		
4.0	6724	80					0		
5.0	6101	110					0		
6.0	6842	120	Standard	5.5 – 6.5	6195	76	0	TLS-SB-IA4-21(5.5-6.5)021810	5
7.0	6570	50	Standard	6.7 – 7.7	5929	46	0	TLS-SB-IA4-21(6.7-7.7)021810	3
8.0	6325	40					0		
9.0	6402	50	Standard	8.5 – 9.5	5640	47	0	TLS-SB-IA4-21(9.5-10.5)021810	2
10.0	6388	60					0		
11.0	6632	80					0		
						A			
				N					

Core I.D. Number	IA3-14

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

Soil Core I.D. Number: IA4-22

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:** ARSEC-HPS-0003	**Federal 09-055-00003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	2/18/2010	
Time of Activity	10:20	
Surveyor Name	John Holmes	
Sampler Name	Mike Carlin	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093452.24	1066514.47
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187758	Ludlum 12 / 229306
Detector Model and Serial No.	Ludlum 44-10 / PR 156393	Ludlum 44-9 / PR 191214
Calibration Due Date	10/19/2010	10/28/2010
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 5,280 cpm

Notes and Comments: The bore hole off-set due to interferences.

Backgrounds: Gamma: 6,195 cpm (Ludlum Model 2221)

Beta: 41 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted]
Signature (Surveyor) [redacted] 2-18-10 Date

[redacted]
Signature (Sampler) 2-18-10 Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree
0.0	6250	30	Standard	0.0 – 0.5	6285	31	0	TLS-SS-IA4-22(0.0-0.5)021810	1
0.5	6186	80	Standard	0.5 – 1.5	6298	43	0	TLS-SB-IA4-22(0.5-1.5)021810	3
1.0	5915	100	Standard	1.5 – 2.5	6147	40	0	TLS-SB-IA4-22(1.5-2.5)021810	5
2.0	6966	90	Standard	2.5 – 3.5	6119	55	0	TLS-SB-IA4-22(2.5-3.5)021810	5a
3.0	6250	60					0		
4.0	6912	40					0		
5.0	6925	75					0		
6.0	6228	60					0		
7.0	7081	80	Standard	7.0 – 8.0	6110	55	0	TLS-SB-IA4-22(7.0-8.0)021810	4
8.0	6207	60	Standard	8.0 – 9.0	5993	47	0	TLS-SB-IA4-22(8.0-9.0)021810(Chemical)	
9.0	6242	100					0		
				N					
					A				

Core I.D. Number	IA4-22

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA4-B01

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-9-10	
Time of Activity	09:05	
Surveyor Name	Mike Carlin	
Sampler Name	Matt Walton	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093278.46	1066230.54
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR242823	Ludlum 44-9 / 153297
Calibration Due Date	10-19-10	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 7582 cpm

Notes and Comments:

Backgrounds: Gamma: 7616 cpm (Ludlum Model 2221)

Beta: 54 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 21.4 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-9-10
Signature (Surveyor) Date

[redacted] 3-9-10
Signature (Sampler) Date

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0							0	No recovery 15.0 – 18.2	
17.0							0	↓	
18.0	7786	44	Standard	18.2 – 19.2	7512	43	0	TLS-SB-IA4-B01(18.2-19.2)030910	2
19.0	7619	60					0		
20.0							0	No recovery 20.0 – 24.6	
21.0							0	↓	
22.0							0	↓	
23.0							0	↓	
24.0	7944	55					0		
25.0							0	No recovery 25.0 – 29.1	
26.0							0	↓	
27.0							0	↓	
28.0							0	↓	
29.0	7933	62					0		
30.0							0	No recovery 30.0 – 38.1	
31.0							0	↓	
32.0							0	↓	

Core I.D. Number	IA4-B01

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
33.0							0	No recovery 30.0 – 38.1	
34.0							0	↓	
35.0							0	↓	
36.0							0	↓	
37.0							0	↓	
38.0	8010	62	Standard	38.1 – 39.1	7276	59	0	TLS-SB-IA4-B01(38.1-39.1)030910	3
39.0	8215	75					0		
40.0							0	No recovery 40.0 – 44.5	
41.0							0	↓	
42.0							0	↓	
43.0							0	↓	
44.0	7566	55					0	↓	
45.0							0	No recovery 45.0 – 47.7	
46.0							0	↓	
47.0	7285	50					0	↓	
48.0	7611	50					0		
49.0	7945	80	Standard	49.0 – 50.0	7338	65	0	TLS-SB-IA4-B01(49.0-50.0)030910	5

Core I.D. Number	IA4-B01

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
50.0								No recovery 50.0 – 55.0	
51.0								↓	
52.0								↓	
53.0								↓	
54.0								↓	
55.0									
56.0									
57.0				N					
58.0									
59.0									
60.0									
61.0					A				
62.0									
63.0									
64.0									
65.0									
66.0									

Core I.D. Number	IA4-B01

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-9-10	
Time of Activity	13:47	
Surveyor Name	John Holmes	
Sampler Name	Mike Carlin	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093261.86	1066193.70
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	(No)

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR242823	Ludlum 44-9 / 153297
Calibration Due Date	10-19-10	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 7074 cpm

Notes and Comments:

Backgrounds: Gamma: 8075 cpm (Ludlum Model 2221)

Beta: 44 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: 0 % O_2: 21.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-9-10

Signature (Surveyor) Date

[redacted] 3-9-10

Signature (Sampler) Date

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ort Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 2.0	
0.5							0	↓	
1.0							0	↓	
2.0	8109	40	Standard	2.0 – 2.5	7815	35	0	TLS-SS-IA4-B02(2.0-2.5)030910	1
2.5 – 3.0	8446	70					0		
3.0	8561	60					0		
4.0	7588	70					0		
5.0							0	No recovery 5.0 – 7.6	
6.0							0	↓	
7.6	8431	70					0		
8.0	8591	80					0		
9.0	8702	90					0		
10.0	8026	90					0		
11.0	7995	60					0		
12.0	8948	100	MS/MSD	12.0 – 13.0	8043	71	0	TLS-SB-IA4-B02(12.0-13.0)030910	
13.0	9378	60	Standard	13.0 – 14.0	7774	57	0	TLS-SB-IA4-B02(13.0-14.0)030910	4
14.0	8232	110	Duplicate	14.0 – 15.0	7689	65	0	TLS-SB-IA4-B02(14.0-15.0)030910(Chemical)	

Core I.D. Number	IA4-B02

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
15.0							0	No recovery 15.0 – 16.8	
17.0	8174	60	Standard	16.8 – 17.8	8160	73	0	TLS-SB-IA4-B02(16.8-17.8)030910	2
18.0	9211	70					0		
19.0	8497	110					0		
20.0							0	No recovery 20.0 – 23.8	
21.0							0	↓	
22.0							0	↓	
23.0	8101	100					0	↓	
24.0	8395	90					0		
25.0							0	No recovery 25.0 – 28.9	
26.0							0	↓	
27.0							0	↓	
28.0							0	↓	
29.0	8610	50					0		
30.0							0	No recovery 30.0 – 33.8	
31.0							0	↓	
32.0							0	↓	

Core I.D. Number	IA4-B02

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

pth et)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
.0	7764	70					0	No recovery 30.0 – 33.8	
.0	8179	50					0		
.0							0	No recovery 35.0 – 46.4	
.0							0	↓	
.0							0	↓	
.0							0	↓	
.0							0	↓	
.0							0	↓	
.0							0	↓	
.0							0	↓	
.0							0	↓	
.0							0	↓	
.0							0	↓	
.0							0	↓	
.0	7516	70	Standard	46.4 – 47.4	7477	72	0	TLS-SB-IA4-B02(46.4-47.4)030910	3
.0	8241	100					0		
.0	8373	110					0		
.0	7829	110	Standard	49.0 – 50.0	7750	55	0	TLS-SB-IA4-B02(49.0-50.0)030910	5

Core I.D. Number	IA4-B02

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample eollected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

Soil Core I.D. Number: IA4-B03

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-11-10	
Time of Activity	09:50	
Surveyor Name	Dennis Whitlock	
Sampler Name	Matt Walton	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093211.20	1066144.82
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190191	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR240366	Ludlum 44-9 / 153297
Calibration Due Date	2-23-11	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 7627 cpm

Notes and Comments:

Backgrounds: Gamma: 8149 cpm (Ludlum Model 2221)

Beta: 24 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-9-10
Signature (Surveyor) Date

[redacted] 3-9-10
Signature (Sampler) Date

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2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 2.8	
0.5							0	↓	
1.0							0	↓	
2.0	7965	30	Standard	2.8 – 3.3	7767	25	0	TLS-SS-IA4-B03(2.8-3.3)030910	1
3.0	8055	40					0		
4.0	8045	80					0		
5.0							0	No recovery 5.0 – 8.2	
6.0							0	↓	
7.0							0	↓	
8.0	8142	80					0		
9.0	8107	100					0		
10.0	8198	40					0		
11.0	8034	70					0		
12.0	7833	90					0		
13.0	7924	100					0		
14.0	8247	110	Standard	14.0 – 15.0	8048	42	0	TLS-SB-IA4-B03(14.0-15.0)030910	5
15.0							0	No recovery 15.0 – 17.6	

Core I.D. Number	IA4-B03

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0							0	No recovery 15.0 – 17.6	
17.0	8132	40	Standard	17.6 – 18.6	7965	33	0	TLS-SB-IA4-B03(17.6-18.6)030910	2
18.0	8139	80					0		
19.0	8275	70					0		
20.0							0	No recovery 20.0 – 28.6	
21.0							0	↓	
22.0							0	↓	
23.0							0	↓	
24.0							0	↓	
25.0							0	↓	
26.0							0	↓	
27.0							0	↓	
28.0	8538	60	Standard	28.6 – 29.6	7959	57	0	TLS-SB-IA4-B03(28.6-29.6)030910	4
29.0	8472	80					0		
30.0							0	No recovery 30.0 – 33.8	
31.0							0	↓	
32.0							0	↓	

Core I.D. Number	IA4-B01

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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
33.0							0	No recovery 30.0 – 33.8	
34.0							0	↓	
35.0	8366	40	Standard	33.8 – 34.8	7683	52	0	TLS-SB-IA4-B03(38.1-39.1)030910	3
36.0	7823	90					0		
37.0									
38.0									
39.0									
40.0									
41.0									
42.0									
43.0									
44.0									
45.0									
46.0									
47.0									
48.0									
49.0									

Core I.D. Number	IA4-B03

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

Soil Core I.D. Number: IA4-B04

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-9-10	
Time of Activity	13:35	
Surveyor Name	Dennis Whitlock	
Sampler Name	Matt Walton	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093211.20	1066161.28
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190191	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR240366	Ludlum 44-9 / 153297
Calibration Due Date	2-23-11	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 7440 cpm

Notes and Comments:

Backgrounds: Gamma: 8301 cpm (Ludlum Model 2221)

Beta: 43 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-9-10
Signature (Surveyor) Date

[redacted] 3-9-10
Signature (Sampler) [redacted] Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 2.3	
0.5							0	↓	
1.0							0	↓	
2.0	8605	80	Standard	2.3 – 2.8	8112	55	0	TLS-SS-1A4-B04(2.3-2.8)030910	1
3.0	8254	80					0		
4.0	8430	100					0		
5.0							0	No recovery 5.0 – 7.5	
6.0							0	↓	
7.0	8542	90					0	↓	
8.0	8600	80					0		
9.0	8508	80					0		
10.0	8458	115					0		
11.0	8015	140					0		
12.0	8376	100					0		
13.0	8595	115					0		
14.0	8595	80					0		
15.0							0	No recovery 15.0 – 17.0	

Core I.D. Number	1A4-B04

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading epm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0							0	No recovery 15.0 – 17.0	
17.0	8728	80	Standard	17.0 – 18.0	8373	49	0	TLS-SB-IA4-B04(17.0-18.0)030910	4
18.0	8831	80					0		
19.0	8783	80					0		
20.0							0	No recovery 20.0 – 28.0	
21.0							0	↓	
22.0							0	↓	
23.0							0	↓	
24.0							0	↓	
25.0							0	↓	
26.0							0	↓	
27.0							0	↓	
28.0	8376	90	Standard	28.0 – 29.0	8496	67	0	TLS-SB-IA4-B04(28.0-29.0)030910	2
29.0	8343	80					0		
30.0							0	No recovery 30.0 – 33.1	
31.0							0	↓	
32.0							0	↓	

Core I.D. Number	IA4-B04

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree
33.0	8522	150	Standard	33.1 – 34.1	8461	55	0	TLS-SB-IA4-B04(33.1-34.1)030910	5
34.0	8500	50					0		
35.0							0	No recovery 35.0 – 38.8	3
36.0							0	↓	
37.0							0	↓	
38.0	8735	100					0	↓	
39.0	8760	100	Standard	39.0 – 40.0	8060	55	0	TLS-SB-IA4-B04(39.0-40.0)030910	3
40.0							0	No recovery 40.0 – 42.3	
41.0							0	↓	
42.0	8573	100					0		
43.0	8312	90					0		
44.0	8218	90					0		
45.0				N					
46.0									
47.0					A				
48.0									
49.0									

Core I.D. Number	IA4-B04

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA4-B05

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Coutract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-10-10	
Time of Activity	15:00	
Surveyor Name	John Holmes	
Sampler Name	Mike Carlin	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092841.77	1066596.21
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR242823	Ludlum 44-9 / 153297
Calibration Due Date	10-19-10	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 5703 cpm

Notes and Comments:

Backgrounds: Gamma: 6318 cpm (Ludlum Model 2221)

Beta: 51 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: 0 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-10-10
Signature (Surveyor) Date

[redacted] 3-10-10
Signature (Sampler) Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 0.3	
0.5	6347	80	Standard	0.3 – 0.8	6071	55	0	TLS-SS-IA4-B05(0.3-0.8)031010	1
1.0	6238	120	Standard	1.0 – 2.0	5922	58	0	TLS-SB-IA4-B05(1.0-2.0)031010	5
2.0	6296	90					0		
3.0	6453	70	Standard	3.0 – 4.0	6004	45	0	TLS-SB-IA4-B05(3.0-4.0)031010	5a
4.0	6303	80					0		
5.0							0	No recovery 5.0 – 5.9	
6.0	6484	105	Standard	5.9 – 6.9	5775	56	0	TLS-SB-IA4-B05(5.9-6.9)031010	4
7.0	6456	90					0		
8.0	6322	110					0		
9.0	5944	80					0		
10.0							0	No recovery 10.0 – 12.8	
11.0							0	↓	
12.0	6385	70					0		
13.0	6158	80					0		
14.0	6045	80					0		
15.0							0	No recovery 15.0 – 18.5	

Core I.D. Number	IA4-B05

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0							0	No recovery 15.0 – 18.5	
17.0								↓	
18.0	6329	90							
19.0									
20.0									
21.0									
22.0				N					
23.0									
24.0									
25.0					A				
26.0									
27.0									
28.0									
29.0									
30.0									
31.0									
32.0									

Core I.D. Number	1A4-B05

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

Soil and Core Survey Forms
Investigative Area 5

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA5-1

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	2-25-10	
Time of Activity	08:20	
Surveyor Name	John Holmes	
Sampler Name	Mike Carlin	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092867.41	1066091.9
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187758	Ludlum 12 /229806
Detector Model and Serial No.	Ludlum 44-10 / PR156393	Ludlum 44-9 /PR191714
Calibration Due Date	10/19/2010	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 5275 cpm

Notes and Comments:

Backgrounds: Gamma: 5956 cpm (Ludlum Model 2221)

Beta: 37 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 2-25-10
[redacted]nature (Surveyor) Date

[redacted] 2-25-10
Signature (Sampler) Date

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 1.8	
0.5							0	↓	
1.0	5741	30	Standard	1.8 – 2.4	5839	54	0	TLS-SS-IA5-1(1.8-2.4)022510	1
2.0	5928	50					0		
3.0	5791	40	Standard	3.0 – 4.0	6054	40	0	TLS-SB-IA5-13(3.0-4.0)022510 (Chemical)	
4.0	5955	40	Standard	4.0 – 5.0	5773	59	0	TLS-SB-IA5-13(4.0-5.0)022510	4
5.0							0	No recovery 5.0 – 9.0	
6.0							0	↓	
7.0							0	↓	
8.0							0	↓	
9.0	5635	70	Standard	9.0 – 10.0	5638	57	0	TLS-SB-IA5-13(9.0-10.0)022510	5
10.0								Refusal @ 10.0	

Core I.D. Number	IA5-1

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA5-2

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	2-24-10	
Time of Activity	1120	
Surveyor Name	Dave Warren	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092867.41	1065989.69
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 186760
Detector Model and Serial No.	Ludlum 44-10 / PR242823	Ludlum 44-9 / PR193658
Calibration Due Date	10/19/2010	10/19/2010
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 5637 cpm

Notes and Comments:

Backgrounds: Gamma: 3928 cpm (Ludlum Model 2221)

Beta: 44 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted]
Signature (Surveyor) 2-24-10
Date

[redacted]
Sig[redacted]e (Sampler) [redacted] 2-24-10
Date

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 0.4	
0.5	5103	80	Standard	0.4 – 0.6	4591	53	0	TLS-SS-IA5-2(0.4-0.6)022410	1
1.0	5025	70					0		
2.0	5049	100					0		
3.0	5143	90					0		
4.0	5050	80					0		
5.0							0	No recovery 5.0 – 5.5	
6.0	5009	40					0		
7.0	5156	70					0		
8.0	4804	80					0		
9.0	5071	70					0		
10.0							0	No recovery 10.0 – 12.3	
11.0							0	↓	
12.0	4714	80					0		
13.0	5080	100					0		
14.0	5187	110	Standard	14.0 – 15.0	5061	34	0	TLS-SB-IA5-2(14.0-15.0)022410	5
15.0							0	No recovery 15.0 – 19.3	

Core I.D. Number	IA5-2

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0							0	No recovery 15.0 – 19.3	
17.0							0	↓	
18.0							0	↓	
19.0	4905	110	Standard	19.3 – 20.0/22.4 -22.7	5084	42	0	TLS-SB-IA5-2(19.3-20.0/22.4-22.7)022410	2
20.0							0	No recovery 20.0 – 22.4	
21.0							0	↓	
22.4	5140	40					0		
23.0	4778	80					0		
24.0	5034	90					0		
25.0							0	No recovery 25.0 – 53.5	
26.0							0	↓	
27.0							0	↓	
28.0							0	↓	
29.0							0	↓	
30.0							0	↓	
31.0							0	↓	
32.0							0	↓	

Core I.D. Number	IA5-2

ARSEC
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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
33.0							0	No recovery 25.0 – 53.5	
34.0							0	↓	
35.0							0	↓	
36.0							0	↓	
37.0							0	↓	
38.0							0	↓	
39.0							0	↓	
40.0							0	↓	
41.0							0	↓	
42.0							0	↓	
43.0							0	↓	
44.0							0	↓	
45.0							0	↓	
46.0							0	↓	
47.0							0	↓	
48.0							0	↓	
49.0							0	↓	

Core I.D. Number	IA5-2

ARSEC
2909 North River Road
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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
50.0							0	No recovery 25.0 – 53.5	
51.0							0	↓	
52.0							0	↓	
53.0	4845	70	Standard	53.5 – 54.5	4843	59	0	TLS-SB-IA5-2(53.5-54.5)022410	3
54.0	4990	70					0		
55.0							0	No recovery 55.0 – 58.0	
56.0							0	↓	
57.0							0	↓	
58.0	5214	60	Standard	58.0 – 59.0	4885	76	0	TLS-SB-IA5-2(58.0-59.0)022410(Chemical)	
59.0	5248	70	Standard	59.0 – 60.0	4945	68	0	TLS-SB-IA5-2(59.0-60.0)022410	4
60.0									
61.0									
62.0			N			A			
63.0									
64.0									
65.0									
66.0									

Core I.D. Number	IA5-2

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: 1A5-3

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	2-24-10	
Time of Activity	1120	
Surveyor Name	Dave Warren	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092867.41	1065887.47
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.		Ludlum 12 / 186760
Detector Model and Serial No.		Ludlum 44-9 / PR193658
Calibration Due Date		10/19/10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 5363 cpm

Notes and Comments:

Backgrounds: Gamma: 6949 cpm (Ludlum Model 2221)

Beta: 46 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

Note: First refusal @ 7.0 ft (results below). Moved rig 1 meter south. Second refusal @ 4.0 ft with no recovery. No samples taken this corehole.

Signature (Surveyor) 2-24-10 Date

Signature (Sampler) 2-24-10 Date

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0								No recovery 0.0-1.6 ft	
1.6	6611	30							
2.0	6434	50							
3.0	6710	60							
4.0	6614	50							
5.0								No recovery 5.0-7.0 ft	
6.0									
7.0								Refusal @ 7 ft	
8.0									
9.0									
10.0									
11.0									
12.0									
13.0									
14.0									
15.0									

Core I.D. Number	1A5-3

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA5-4

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	2-23-10	
Time of Activity	14:07	
Surveyor Name	John Holmes	
Sampler Name	Mike Carlin	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092867.41	1065887.47
Was the bore hole re-located due to refusal? (Circle either Yes or No)	~~Yes~~	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187758	Ludlum 12 / 229306
Detector Model and Serial No.	Ludlum 44-10 / PR156393	Ludlum 44-9 / PR191214
Calibration Due Date	10-19-10	10-28-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 5653 cpm

Notes and Comments:

Backgrounds: Gamma: 5985 cpm (Ludlum Model 2221)

Beta: 47 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 2-23-10
[redacted]ignature (Surveyor) Date

[redacted] 2-23-10
Signature (Sampler) Date

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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 1.5	
0.5							0	↓	
1.0	5897	30	Standard	1.5 – 2.0	5823	57	0	TLS-SS-IA5-4(1.5-2.0)022310	1
2.0	6057	70					0		
3.0	6013	50					0		
4.0	5998	90					0		
5.0							0	No recovery	
6.0	6116	60					0		
7.0	6215	50	Standard	7.0 – 8.0	5958	62	0	TLS-SB-IA5-4(7.0-8.0)022310	2
8.0	5920	30					0		
9.0	5812	80					0		
10.0							0	No recovery 10.0 – 11.0	
11.0	6007	60		12.0-13.0 [redacted] 13-10			0		
12.0	6422	100	Standard	~~11.0 – 12.0~~	5951	57	0	TLS-SB-IA5-4(~~11.0-12.0~~ 12.0-13.0 PB 13-10)022310	5
13.0	6092	50	Standard	13.0 – 14.0	5751	42	0	TLS-SB-IA5-4(13.0-14.0)022310(Chemical)	
14.0	6436	70	Standard	14.0 – 15.0	5912	57	0	TLS-SB-IA5-4(14.0-15.0)022310	4
15.0							0	No recovery 15.0 – 18.2	

Core I.D. Number	IA5-4

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0							0	No recovery 15.0 – 18.2↓	
17.0							0	↓	
18.0	5668	40					0		
19.0	5874	60					0		
20.0							0	No recovery 20.0 – 57.4	
21.0							0	↓	
22.0							0	↓	
23.0							0	↓	
24.0							0	↓	
25.0							0	↓	
26.0							0	↓	
27.0							0	↓	
28.0							0	↓	
29.0							0	↓	
30.0							0	↓	
31.0							0	↓	
32.0							0	↓	

Core I.D. Number	IA5-4

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
33.0								No recovery 20.0 – 57.4	
34.0								↓	
35.0								↓	
36.0								↓	
37.0								↓	
38.0								↓	
39.0								↓	
40.0								↓	
41.0								↓	
42.0								↓	
43.0								↓	
44.0								↓	
45.0								↓	
46.0								↓	
47.0								↓	
48.0								↓	
49.0								↓	

Core I.D. Number	IA5-4

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
50.0							0	No recovery 20.0 – 57.4	
51.0							0	↓	
52.0							0	↓	
53.0							0	↓	
54.0							0	↓	
55.0							0	↓	
56.0							0	↓	
57.0	5954	40	Standard	57.4 – 58.4	5828	81	0	TLS-SB-IA5-4(57.4-58.4)022310	3
58.0									
59.0									
60.0									
61.0									
62.0									
63.0									
64.0									
65.0									
66.0									

Core I.D. Number	IA5-4

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA5-5

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	2-23-10	
Time of Activity	10:30	
Surveyor Name	John Holmes	
Sampler Name	Mike Carlin	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092867.41	1065683.04
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187758	Ludlum 12 / 229306
Detector Model and Serial No.	Ludlum 44-10 / PR 156393	Ludlum 44-9 / PR191214
Calibration Due Date	10-19-10	10-28-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 6354 cpm

Notes and Comments:

Backgrounds: Gamma: 7374 cpm (Ludlum Model 2221)

Beta: 36 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 2-23-10
Signature (Surveyor) Date

[redacted] 2-23-10
Signature (Sampler) Date

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 1.1	
0.5							0	↓	
1.0	7481	90	Standard	1.1 – 1.6	6714	57	0	TLS-SS-IA5-5(1.1-1.6)022310	1
2.0	7047	60					0		
3.0	6977	120	Standard	3.0 – 4.0	6768	66	0	TLS-SB-IA5-5(3.0-4.0)022310	5
4.0	7301	110					0		
5.0							0	No recovery 5.0 – 7.3↓	
6.0							0	↓	
7.0	6803	90					0		
8.0	6979	70					0		
9.0	7143	100					0		
10.0							0	No recovery 10.0 – 11.0	
11.0	7040	80					0		
12.0	6855	90					0		
13.0	7025	40					0		
14.0	7424	90					0		
15.0							0	No recovery 15.0 – 17.0	

Core I.D. Number	IA5-5

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0							0	No recovery 15.0 – 17.0	
17.0	7108	60					0		
18.0	7048	40	Standard	18.0 – 19.0	6707	61	0	TLS-SB-IA5-5(18.0-19.0)022310	2
19.0	7250	90					0		
20.0							0	No recovery 20.0 – 33.5	
21.0							0	↓	
22.0							0	↓	
23.0							0	↓	
24.0							0	↓	
25.0							0	↓	
26.0							0	↓	
27.0							0	↓	
28.0							0	↓	
29.0							0	↓	
30.0							0	↓	
31.0							0	↓	
32.0							0	↓	

Core I.D. Number	IA5-5

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
33.0							0	No recovery 20.0 – 33.5	
34.0	7369	50	Standard	34.0 – 35.0	6654	69	0	TLS-SB-IA5-5(34.0-35.0)022310	3
35.0							0	No recovery 35.0 – 37.2	
36.0							0	↓	
37.0	7408	70	Standard	37.2 – 38.2	6614	59	0	TLS-SB-IA5-5(37.2-38.2)022310	4
38.0	7165	50					0		
39.0	7254	70	Standard	38.3 -39.3	6751	55	0	TLS-SB-IA3-5(38.2-39.2)022310(Chemical)	
40.0							0		
41.0									
42.0									
43.0									
44.0									
45.0									
46.0									
47.0									
48.0									
49.0									

Core I.D. Number	IA5-5

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA5-6

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	2-23-10	
Time of Activity	14:20	
Surveyor Name	Dave Warren	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092867.41	1065580.83
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 180431
Detector Model and Serial No.	Ludlum 44-10 / PR242823	Ludlum 44-9 / PR193567
Calibration Due Date	10-19-10	10-19-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 6224 cpm

Notes and Comments:

Backgrounds: Gamma: 4235 cpm (Ludlum Model 2221)

Beta: 32 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 2-23-10
Signature (Surveyor) Date

[redacted] 2-23-10
Sig[redacted]re (Sampler) Date

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Form HPM-3-6-I
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0								No recovery 0.0 – 0.4	
0.5	6116	100	Standard	0.4 – 0.9	5804	35	0	TLS-SS-IA5-6(0.4-0.9)022310	1
1.0	5993	100					0		
2.0	5971	60					0		
3.0	6237	120					0		
4.0	6067	100					0		
5.0	6195	80					0	No recovery 5.0 – 5.3	
6.0	6108	120					0		
7.0	6177	60					0		
8.0	6189	60					0		
9.0	6284	80	Duplicate	9.0 – 10.0	5674	54	0	TLS-SB-IA5-6(9.0-10.0)022310	4
10.0	6250	100	Standard	10.6 – 11.6	5823	62	0	TLS-SB-IA5-6(10.6-11.6)022310 (Chemical)	
11.6	6167	80					0		
12.6	6053	100					0		
13.6	5998	120					0		
14.0							0		
15.0							0	No recovery 15.0 – 17.2	

Core I.D. Number	IA5-6

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0							0	No recovery 15.0 – 17.2	
17.0	6203	120	Standard	17.2 – 18.2	5681	38	0	TLS-SB-IA5-6(17.2-18.2)022310	2
18.2	5977	100					0		
19.2	6085	140	Standard	19.0 – 20.0	5782	55	0	TLS-SB-IA5-6(19.0-20.0)022310	5
20.0							0	No recovery 20.0 – 24.6↓	
21.0							0	↓	
22.0							0	↓	
23.0							0	↓	
24.0	6228	100					0		
25.0							0	No recovery 25.0 – 39.6	
26.0							0	↓	
27.0							0	↓	
28.0							0	↓	
29.0							0	↓	
30.0							0	↓	
31.0							0	↓	
32.0							0	↓	

Core I.D. Number	IA5-6

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
33.0							0	No recovery 25.0 – 39.6	
34.0							0	↓	
35.0							0	↓	
36.0							0	↓	
37.0							0	↓	
38.0							0	↓	
39.0	6022	60					0		
40.0							0	No recovery 40.0 – 47.1	
41.0							0	↓	
42.0							0	↓	
43.0							0	↓	
44.0							0	↓	
45.0							0	↓	
46.0							0	↓	
47.0	6171	60	Standard	47.1 – 48.1	5915	65	0	TLS-SB-IA5-6(47.1-48.1)022310	3
48.0	5981	50					0		
49.0	5872	120					0		

Core I.D. Number	IA5-6

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA5-7

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	2-23-10	
Time of Activity	10:40	
Surveyor Name	Dave Warren	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092867.41	1065478.61
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR242843	Ludlum 44-9 / 153297
Calibration Due Date	10-19-10	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 5,671 cpm

Notes and Comments:

Backgrounds: Gamma: 5,914 cpm (Ludlum Model 2221)

Beta: 30 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted]

Signature (Surveyor) 2-23-10 Date

[redacted]

Signature (Sampler) 2-23-10 Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0	6692	80	Standard	0.0 – 0.5	6251	76	0	TLS-SS-IA5-7(0.0-0.5)022310	1
0.5	6972	100	Duplicate	0.5 – 1.5	6234	56	0	TLS-SB-IA5-7(0.5-1.5)022310	4
1.0	6590	100					0		
2.0	6419	120	Standard	2.0 – 3.0	6138	69	0	TLS-SB-IA5-7(2.0-3.0)022310	5
3.0	6200	100	Standard	3.0 – 4.0	6011	60	0	TLS-SB-IA5-7(3.0-4.0)022310(Chemical)	
4.0	6347	80					0		
5.0							0	No recovery 5.0 – 8.3	
6.0							0	↓	
7.0							0	↓	
8.0							0	↓	
9.0	6188	100	Standard	9.0 – 10.0	5752	35	0	TLS-SB-IA5-7(9.0-10.0)022310	2
10.0							0	No recovery 10.0 – 33.7	
11.0							0	↓	
12.0							0	↓	
13.0							0	↓	
14.0							0	↓	
15.0							0	↓	

Core I.D. Number	IA5-7

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0							0	No recovery 10.0 – 33.7	
17.0							0	↓	
18.0							0	↓	
19.0							0	↓	
20.0							0	↓	
21.0							0	↓	
22.0							0	↓	
23.0							0	↓	
24.0							0	↓	
25.0							0	↓	
26.0							0	↓	
27.0							0	↓	
28.0							0	↓	
29.0							0	↓	
30.0							0	↓	
31.0							0	↓	
32.0							0	↓	

Core I.D. Number	IA5-7

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
33.0							0	No recovery 10.0 – 33.7	
34.0	5876	110	Standard	33.7 – 35.0	5810	43	0	TLS-SB-IA5-7(33.7-35.0)022310	3
35.0									
36.0									
37.0									
38.0									
39.0									
40.0									
41.0									
42.0									
43.0									
44.0									
45.0									
46.0									
47.0									
48.0									
49.0									

Core I.D. Number	IA5-7

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA5-8

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	2-22-10	
Time of Activity	09:05	
Surveyor Name	John Holmes	
Sampler Name	Mike Carlin	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092867.41	1065376.4
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187758	Ludlum 12 /229306
Detector Model and Serial No.	Ludlum 44-10 / PR156393	Ludlum 44-9 /PR191714
Calibration Due Date	10/19/2010	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 6,102 cpm

Notes and Comments:

Backgrounds: Gamma: 5,697 cpm (Ludlum Model 2221)

Beta: 50 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.
NOTE: No native sample per Sample Coordinator

[redacted]
Signature (Surveyor) 2-22-10 Date

[redacted]
Signature (Sampler) 2-22-10 Date

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No Recovery 0.0 – 1.5	
0.5							0	↓	
1.0							0	↓	
1.5	6644	40	Standard	1.5 – 2.0	5878	63	0	TLS-SS-IA5-8(1.5-2.0)022210	1
2.0	6752	60					0		
3.0	6637	80					0		
4.0	6947	110	Standard	4.0 – 5.0	5854	71	0	TLS-SB-IA5-8(4.0-5.0)022210	5
5.0							0	No recovery 5.0 – 6.8	
6.0							0	↓	
7.0	6934	80	Standard	6.8 – 7.8	6250	82	0	TLS-SB-IA5-8(6.8-7.8)022210	4
8.0	6316	70					0		
9.0	6846	90					0		
10.0	6633	80					0		
11.0							0		
12.0							0		
13.0	6152	40	Standard	13.0 – 14.0	6045	54	0	TLS-SB-IA5-8(13.0-14.0)022210	2
14.0	6427	70					0		

Core I.D. Number	IA5-8

ARSEC
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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
15.0							0	No recovery 15.0 – 50.0	
↓							0	↓	
↓							0	↓	
↓							0	↓	
50.0							0	↓	
									3

Core I.D. Number	1A5-8

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
							0	No recovery 10.0 – 20.8	
							0	↓	
							0	↓	
							0	↓	
							0	↓	
							0		
				Standard			0	TLS-SB-IA5-22(21.4-22.4)022210	3
							0		
							0		
							0		
							0		

Core I.D. Number	IA5-8

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA5-9

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	09:00	
Time of Activity	2-25-10	
Surveyor Name	John Holmes	
Sampler Name	Mike Carlin	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092969.63	1066091.9
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR242823	Ludlum 44-9 / 153297
Calibration Due Date	10-19-10	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 6321 cpm

Notes and Comments:

Backgrounds: Gamma: 6868 cpm (Ludlum Model 2221)

Beta: 42 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 2-25-10
Signature (Surveyor) Date

[redacted] 2-25-10
Signature (Sampler) Date

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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 0.7	
0.5	6868	30	Standard	0.7 – 1.3	6313	81	0	TLS-SS-IA5-9(0.7-1.3)022510	1
1.0	6742	60					0		
2.0	6955	40					0		
3.0	6653	70					0		
4.0	6747	90					0		
5.0							0	No recovery 5.0 – 6.6	
6.0	6402	60					0		
7.0	5643	100					0		
8.0	6454	90					0		
9.0	6660	70					0		
10.0							0	No recovery 10.0 – 12.0	
11.0							0	↓	
12.0	5875	90	Standard	12.0 – 13.0	6539	77	5	TLS-SB-IA5-9(12.0-13.0)022510(Chemical)	
13.0	6467	110	Standard	13.0 – 14.0	6593	83	0	TLS-SB-IA5-13(13.0-14.0)022510	5
14.0	6691	100					0		
15.0							0	No recovery 15.0 – 16.4	

Core I.D. Number	IA5-9

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0	6701	50					0		
17.0	6743	70					0		
18.0	6915	90					0		
19.0	6940	60					0		
20.0							0	No recovery 20.0 – 23.5↓	
21.0							0	↓	
22.0							0	↓	
23.0	7075	40	Standard	23.5 – 24.5	6512	74	0	TLS-SB-IA5-9(23.5-24.5)022510	4
24.0	6628	60							
25.0								No recovery 25.0 – 29.0	
26.0								↓	
27.0								↓	
28.0								↓	
29.0	7108	80	Standard	29.0 – 30.0	6757	54	0	TLS-SB-IA5-9(29.0-30.0)022510	2
30.0							0	No recovery 30.0 – 63.9	
31.0							0		
32.0							0		

Core I.D. Number	IA5-9

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
33.0							0	No recovery 30.0 – 63.9	
34.0							0	↓	
35.0							0	↓	
36.0							0	↓	
37.0							0	↓	
38.0							0	↓	
39.0							0	↓	
40.0							0	↓	
41.0							0	↓	
42.0							0	↓	
43.0							0	↓	
44.0							0	↓	
45.0							0	↓	
46.0							0	↓	
47.0							0	↓	
48.0							0	↓	
49.0							0	↓	

Core I.D. Number	IA5-9

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
50.0							0	No recovery 30.0 – 63.9	
51.0							0	↓	
52.0							0	↓	
53.0							0	↓	
54.0							0	↓	
55.0							0	↓	
56.0							0	↓	
57.0							0	↓	
58.0							0	↓	
59.0							0	↓	
60.0							0	↓	
61.0							0	↓	
62.0							0	↓	
63.0							0	↓	
64.0	6626	110	Standard	63.9 – 64.9	6414	66	0	TLS-SB-IA5-9(63.9-64.9)022310	3
65.0							0	No recovery 65.0 – 75.0	
66.0							0	↓	

Core I.D. Number	

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
67.0							0	No recovery 65.0 – 75.0	
68.0							0	↓	
69.0							0	↓	
70.0							0	↓	
71.0							0	↓	
72.0							0	↓	
73.0							0	↓	
74.0							0	↓	
75.0	6581	60					0		
76.0	6755	40					0		
77.0	6678	90					0		
78.0	6675	100					0		
79.0	6597	100					0		
							0		

Core I.D. Number	IA5-9

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA5-10

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	2-25-10	
Time of Activity	10:45	
Surveyor Name	Dave Warren	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092969.63	1065989.69
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187758	Ludlum 12 / 180431
Detector Model and Serial No.	Ludlum 44-10 / PR156393	Ludlum 44-9 / 193567
Calibration Due Date	10-19-10	10-19-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 6015 cpm

Notes and Comments:

Backgrounds: Gamma: 6812 cpm (Ludlum Model 2221)

Beta: 48 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 2-25-10
Signature (Surveyo[redacted] Date

[redacted] 2-25-10
Sign[redacted] (Sampler) Date

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 0.8	
0.5	6976	100	Standard	0.8 – 1.3	6622	56	0	TLS-SS-IA5-10(0.8-1.3)022510	1
1.0	7191	90					0		
2.0	7223	100					0		
3.0	7210	150	Standard	3.3 – 4.3	7393	53	0	TLS-SB-IA5-10(3.3-4.3)022510	5
4.0	7114	130					0		
5.0							0	No recovery 5.0 – 7.1	
6.0							0	↓	
7.0	7142	100	Standard	7.1 – 8.1	7011	66	0	TLS-SB-IA5-10(7.1-8.1)022510	3
8.0	7084	100	Standard	8.1 – 9.1	6963	67	0	TLS-SB-IA5-10(8.1-9.1)022510	2
9.0	7186	60					0	↓	
10.0							0	No recovery 10.0 – 12.3	
11.0							0		
12.0	7061	100					0		
13.0	7199	140					0		
14.0	7291	140	Standard	14.0 – 15.0	6878	59	0	TLS-SB-IA5-10(14.0-15.0)022510	4
15.0							0	No recovery 15.0 – 19.0	

Core I.D. Number	IA5-10

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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0							0	No recovery 15.0 – 19.0	
17.0							0	↓	
18.0							0	↓	2
19.0	7057	60	Standard	19.0 – 20.0	6386	57	0	TLS-SB-IA5-10(19.0-20.0)022510 (Chemical)	
20.0									

Core I.D. Number	IA5-10

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA5-11

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	2-25-10	
Time of Activity	08:30	
Surveyor Name	Dave Warren	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092969.63	1065887.47
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187758	Ludlum 12 / 180431
Detector Model and Serial No.	Ludlum 44-10 / PR156393	Ludlum 44-9 / 193567
Calibration Due Date	10-19-10	10-19-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 5987 cpm

Notes and Comments:

Backgrounds: Gamma: 6712 cpm (Ludlum Model 2221)

Beta: 43 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 2-25-10
Signature (Surveyor) Date

[redacted] 2-25-10
Signature (Sampler) Date

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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 2.0	
0.5							0	↓	
1.0							0	↓	
2.0	6830	80	Standard	2.0 – 2.5	6736	41	0	TLS-SS-IA5-11(2.0-2.5)022510	1
3.0	6513	80					0		
4.0			Standard	3.5 – 5.0	6507	56	0	TLS-SB-IA5-11(3.5-5.0)022510	5
5.0							0	No recovery 5.0 – 7.4	
6.0							0		
7.0	6618	60					0		
8.0	6752	100					0		
9.0	6595	80					0		
10.0							0	No recovery 10.0 – 10.7	
11.0	6651	60	Standard	10.7 – 11.7	6452	47	0	TLS-SB-IA5-11(10.7-11.7)022510(Chemical)	
12.0	6894	60	Standard	11.7 – 12.7	6453	50	0	TLS-SB-IA5-11(11.7-12.7)022510	4
13.0	6704	80	Standard	13.0 – 14.0	6573	33	0	TLS-SB-IA5-11(13.0-14.0)022510	2
14.0	6719	100	Standard	14.0 – 15.0	6384	50	0	TLS-SB-IA5-11(14.0-15.0)022510	3
15.0							0	Refusal @ 15.0	

Core I.D. Number	IA5-11

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA5-12

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	2-24-10	
Time of Activity	10:35	
Surveyor Name	Dave Warren	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092969.63	1065785.26
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187758	Ludlum 12 /180431
Detector Model and Serial No.	Ludlum 44-10 / PR156393	Ludlum 44-9 /PR193567
Calibration Due Date	10-19-10	10-19-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 6025 cpm

Notes and Comments:

Backgrounds: Gamma: 6019 cpm (Ludlum Model 2221)

Beta: 48 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted]
Signature (Surveyor)

2-24-10
Date

[redacted]
Signature (Sampler)

2-24-10
Date

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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0								No recovery 0.0-2.2	
0.5									
1.0									
2.0	5971	60	Standard	2.2-2.7	5806	38	0	TLS-SS-IA5-12(2.2-2.7)022410	1
3.0	6180	80	Stamdard	3.3-4.3	5804	41	0	TLS-SB-IA5-12(3.3-4.3)022410	4
4.0	5893	100							
5.0								No recovery 5.0-6.1	
6.0	6095	100		5596	49			TLS-SB-IA5-12(6.1-7.1)022410 Chemical	
7.0	5988	80							
8.0	6093	100							
9.0	5996	60							
10.0								No recovery 10.0-11.0	
11.0	5781	40							
12.0	5621	60							
13.0	5707	120	Standard	13.0-14.0	5567	45		TLS-SB-IA5-12(13.0-14.0)022410	5
14.0	5907	60							
15.0								No recovery 15.0-17.8	

Core I.D. Number	IA5-12

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0								↓	
17.0								↓	
18.0	5847	60						↓	
19.0	5754	80						↓	
20.0								No recovery 20.0-22.8	
21.0								↓	
22.0								↓	
23.0	5790	60	Standard	23.0-24.0	5449	47	0	TLS-SB-IA5-12(23.0-24.0)022410	2
24.0	5767	40						↓	
25.0								No recovery 25.0-49.0	
26.0								↓	
27.0								↓	
28.0								↓	
29.0								↓	
30.0								↓	
31.0								↓	
32.0								↓	

Core I.D. Number	IA5-12

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
33.0								↓	
34.0								↓	
18.0								↓	
35.0								↓	
36.0								↓	
37.0								↓	
38.0								↓	
39.0								↓	
40.0								↓	
41.0								↓	
42.0								↓	
43.0								↓	
44.0								↓	
45.0								↓	
46.0								↓	
47.0								↓	
48.0								↓	

Core I.D. Number	IA5-12

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
49.0	5518	60						Recovery 49.0-49.5	
50.0								No Recovery 49.5-58.0	
51.0								↓	
52.0								↓	
53.0								↓	
54.0								↓	
55.0								↓	
56.0								↓	
57.0								↓	
58.0	6238	80	Standard	58.0-59.0	5583	42	0	TLS-SB-IA5-12(58.0-59.0)022410	2
59.0	6091	120							
					N				
						A			

Core I.D. Number	IA5-12

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA5-13

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	2-23-10	
Time of Activity	08:55	
Surveyor Name	Dave Warren	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092969.63	1065683.04
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR242823	Ludlum 44-9 / 153297
Calibration Due Date	10-19-10	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 4,759 cpm

Notes and Comments:

Backgrounds: Gamma: 5130 cpm (Ludlum Model 2221)

Beta: 46 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted]
Signature (Surveyor[redacted] 2-23-10
Date

[redacted]
Signa[redacted] (Sampler) 2-23-10
Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 1.7	
0.5							0	↓	
1.0							0	↓	
2.0	6016	80	Standard	1.7 – 2.3	5138	38	0	TLS-SS-IA5-13(1.7-2.3)022310	1
3.0	5388	80					0		
4.0	5061	60					0		
5.0							0	No recovery 5.0 – 8.0	
6.0							0	↓	
7.0							0	↓	
8.0	5185	60					0		
9.0	5116	80					0		
10.0							0	No recovery 10.0 – 13.2	
11.0							0		
12.0					pD 4-13-10		0		
13.0	6087	120	Duplicate	13.2 – 14.2	5410	73	0	TLS-SB-IA5-13(13.2-14.2)022310	4
14.0							0		
15.0							0	No recovery 15.0 – 18.2	

Core I.D. Number	IA5-13

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0							0	No recovery 15.0 – 18.2↓	
17.0							0	↓	
18.0	5831	80	Standard	18.2 – 19.2	5531	57	0	TLS-SB-IA5-13(18.2-19.2)022310	2
19.0	5733	60					0		
20.0							0	No recovery 20.0 – 23.8	
21.0							0	↓	
22.0							0	↓	
23.0	5830	160	Standard	23.5 – 25.0	5272	129	0	TLS-SB-IA5-13(23.5-25.0)022310	5
24.0							0	↓	
25.0	6143	80	Standard	25.8 - 26.8	5238	57	0	TLS-SB-IA5-13(25.8-26.8)022310	3
26.0	6289	100					0		
27.0	5685	60	Standard	27.0 - 28.0	5250	63	0	TLS-SB-IA5-13(27.0-28.0)022310 (Chemical)	
28.0	5492	120					0		
29.0	5445	100					0		
30.0									
31.0									
32.0									

Core I.D. Number	IA5-13

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA5-14

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	2-24-10	
Time of Activity	09:00	
Surveyor Name	Dave Warren	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092969.63	1065478.61
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187758	Ludlum 12 / 180431
Detector Model and Serial No.	Ludlum 44-10 / PR156393	Ludlum 44-9 / 193567
Calibration Due Date	10-19-10	10-19-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 5,715 cpm

Notes and Comments:

Backgrounds: Gamma: 6289 cpm (Ludlum Model 2221)

Beta: 38 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 2-24-10
Signature (Surveyor) Date

[redacted] 2-24-10
Signature (Sampler) Date

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recover 0.0 – 2.0	
0.5							0	↓	
1.0							0	↓	
2.0	6411	100	Standard	2.0 – 2.5	6319	44	0	TLS-SS-IA5-14(2.0-2.5)022410	1
2.5	6300	60					0		
3.0	6246	60					0		
4.0	6416	80	Duplicate	4.0 – 5.0	6056 ~~6499~~ [redacted] 4-13-10	34 ~~60~~	0	TLS-SB-IA5-14(4.0-5.0)022410	4
5.0							0	No recovery 5.0 – 8.7	
6.0							0	↓	
7.0							0	↓	
8.0				[redacted] 1340			0	↓	
8.7	6348	100	Standard	9.0 – 10.0	6499	60	0	TLS-SB-IA5-14(9.0-10.0) 022410	2
10.0							0	No recovery 10.0 – 12.6	
11.0							0	↓	
12.0	6212	40	Standard	12.6 – 13.6	6450	44	0	TLS-SB-IA5-14(12.6-13.6)022410 (Chemical)	
14.0	6231	140	Standard	14.0 – 15.0	6518	67	0	TLS-SB-IA5-14 (14.0-15.0) 022410	5
15.0							0	No recovery 15.0 – 18.2	

Core I.D. Number	IA5-14

ARSEC
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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0							0	No recovery 15.0 – 18.2	
17.0							0	↓	
18.0	6309	80					0		
19.0	6357	120					0		
20.0							0	No recovery 20.0 – 27.7	
21.0							0	↓	
22.0							0	↓	
23.0							0	↓	
24.0							0	↓	
25.0							0	↓	
26.0							0	↓	
27.0							0	↓	
28.0	6164	120	Standard	28.0 – 29.0	6401	48	0	TLS-SB-IA5-14(28.0-29.0) 022410	3
29.0	6266	120			[redacted] 4-13-10		0		
30.0									

Core I.D. Number	IA5-14

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA5-15

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	2-22-10	
Time of Activity	09:14	
Surveyor Name	Dave Warren	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092969.63	1065478.61
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR242843	Ludlum 44-9 / PR153297
Calibration Due Date	10-19-10	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 6,650 cpm

Notes and Comments:

Backgrounds: Gamma: 6745 cpm (Ludlum Model 2221)

Beta: 32 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 2-22-10
Signature (Surveyo[redacted] Date

[redacted] 2-22-10
Signa[redacted] (Sampler) Date

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0		
0.5	7107	40	Standard	0.5 – 1.0	6973	24	0	TLS-SS-IA5-15(0.5-1..0)022210	1
1.0	7625	60					0		
2.0	8002	60	Duplicate	2.0 – 3.0	7265	74	0	TLS-SB-IA5-15(2.0-3.0)022210	4
3.0	7643	60					0		
4.0	7038	40					0		
5.0							0	No recovery 5.0 – 6.6	
6.6	7938	40					0		
7.0	7786	40	Standard	7.6 – 8.6	7195	47	0	TLS-SB-IA5-15(7.6-8.6)022210	2
8.0	7429	40					0		
9.0							0	No recovery 9.6 – 10.5	
10.0							0	↓	
11.0	7108	40					0		
12.0	7209	60					0		
13.0	6650	40					0		
14.0	7189	40					0		
15.0							0	No recovery 15.0 – 19.0	

Core I.D. Number	IA5-15

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0							0	No recovery 15.0 – 19.0	
17.0							0	↓	
18.0							0	↓	
19.0	7140	60					0		
20.0							0	No Recovery 20.0 – 24.0	
21.0							0	↓	
22.0							0	↓	
23.0							0	↓	
24.0	6870	40					0		
25.0							0	No recovery 25.0 – 34.4	
26.0							0	↓	
27.0							0	↓	
28.0							0	↓	
29.0							0	↓	
30.0							0	↓	
31.0							0	↓	
32.0							0	↓	

Core I.D. Number	IA5-15

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
33.0							0	No recovery 25.0 – 34.4	
34.0	6929	40					0		
35.0	7436	80	Standard	35.0 – 36.0	6941	55	0	TLS-SB-IA5-15(35.0-36.0)022210	3
36.0	7001	80	Standard	36.0 – 37.0	6737	55	0	TLS-SB-IA5-15(36.0-37.0)022210 (Chemical)	
37.0	7027	100	Standard	37.0 – 38.0	6592	49	0	TLS-SB-IA5-15(37.0-38.0)022210	5
38.0	7147	60					0		
39.0	7170	60					0		
40.0									
41.0									
42.0									
43.0									
44.0									
45.0									
46.0									
47.0									
48.0									
49.0									

Core I.D. Number	IA5-15

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

Soil Core I.D. Number: IA5-16

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	2-25-10	
Time of Activity	13:45	
Surveyor Name	Dave Warren	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093071	1066091.9
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 197170	Ludlum 12 / 1180431
Detector Model and Serial No.	Ludlum 44-10 / PR242823	Ludlum 44-9 / PR193567
Calibration Due Date	10-19-10	10-19-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 5959 cpm

Notes and Comments:

Backgrounds: Gamma: 5326 cpm (Ludlum Model 2221)

Beta: 42 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 2-25-10
Signature (Surveyor[redacted] Date

[redacted] 2-25-10
Si[redacted]ture (Sampler) Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree
0.0							0	No recovery 0.0 – 1.8	
0.5							0	↓	
1.0	6374	60	Standard	1.8 – 2.3	6410	65	0	TLS-SS-IA5-16(1.8-2.3)022510	1
2.0	6422	120			[redacted]		0		
3.0	6473	120					0		
4.0	6690	60					0		
5.0							0	No recovery 5.0 – 8.4	
6.0							0	↓	
7.0							0	↓	
8.0							0	↓	
9.0	6539	100					0		
10.0							0	No recovery 10.0 – 11.4	
11.0	6543	100					0		
12.0	6668	140	Standard	12.4 – 13.4	6035	53	0	TLS-SB-IA5-16(12.4-13.4)022510	5
13.0	6691	120					0		
14.0	6734	80					0		
15.0							0	No recovery 15.0 – 17.7	

Core I.D. Number	IA5-16

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0							0	No recovery 15.0 – 17.7	
17.0							0	↓	
18.0	6577	80					0		
19.0	6753	80	Standard	19.0 – 20.0	6207	66	0	TLS-SB-IA5-16(19.0-20.0)022510	4
20.0							0	No recovery 20.0 – 23.3	
21.0							0	↓	
22.0							0	↓	
23.0							0	↓	
24.0	6642	120	Standard	24.0 – 25.0	5858	66	0	TLS-SB-IA5-16(24.0-25.0)022510(Chemical)	
25.0							0	No recovery 25.0 – 28.8	
26.0							0	↓	
27.0							0	↓	
28.0							0	↓	
29.0	6520	140	Standard	29.0 – 30.0	6563	61	0	TLS-SB-IA5-16(29.0-30.0)022510	2
30.0							0	No recovery 30.0 – 49.0	
31.0							0	↓	
32.0							0	↓	

Core I.D. Number	

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
33.0							0	No recovery 30.0 – 49.0	
34.0							0	↓	
35.0							0	↓	
36.0							0	↓	
37.0							0	↓	
38.0							0	↓	
39.0							0	↓	
40.0							0	↓	
41.0							0	↓	
42.0							0	↓	
43.0							0	↓	
44.0							0	↓	
45.0							0	↓	
46.0							0	↓	
47.0							0	↓	
48.0							0	↓	
49.0	6368	140	Standard	49.0 – 50.0	6204	53	0	TLS-SB-IA5-16(49.0-50.0)022510	3

Core I.D. Number	IA5-16

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
50.0							0	No recovery 50.0 – 53.5	
51.0							0	↓	
52.0							0	↓	
53.0							0	↓	
54.0	6461	60					0		
55.0							0		

Core I.D. Number	IA5-16

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA5-17

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	2-22-10	
Time of Activity	17:15	
Surveyor Name	Dave Warren	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093071.84	1065989.69
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR242843	Ludlum 44-9 / 153297
Calibration Due Date	10-19-10	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 7,483 cpm

Notes and Comments:

Backgrounds: Gamma: 6,752 cpm (Ludlum Model 2221)

Beta: 88 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.
NOTE: First core bore met refusal @ 33.0'

[redacted]

Signature (Supervisor) 2-22-10 Date

[redacted]

Signature (Sampler) 2-22-10 Date

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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0								No recovery 0.0 – 1.8	
0.5								↓	
1.0	7125	40	Standard	1.8 – 2.3	7574	60	0	TLS-SS-IA5-17(1.8-2.3)022210	1
2.0	7299	100					0		
3.0	6833	120	Standard	3.3 – 4.3	7167	66	0	TLS-SB-IA5-17(2.0-3.0)022210	5
4.0	7059	80					0		
5.0							0	No recovery 5.0 – 6.4	
6.0								↓	
7.0	7073	60					0		
8.0	7377	80	Standard	7.4 – 8.4	7525	95	0	TLS-SB-IA5-17(7.4-8.4)022210	4
9.0	6925	80			[redacted] 9-13-10		0		
10.0							0	No recovery 10.0 – 12.7	
11.0							0	↓	
12.0							0	↓	
13.0	7166	60					0		
14.0	7017	60					0		
15.0							0		

Core I.D. Number	IA5-17

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0							0	No Recovery 15.0 -18.2	
17.0							0	↓	
18.0	7420	120	Standard	18.2 – 19.2	7616	87	0	TLS-SB-IA5-17(18.2-19.2)022210	2
19.0							0	↓	
20.0							0	No recovery 20.0 – 24.0	
21.0							0	↓	
22.0							0	↓	
23.0							0	↓	
24.0	7327	100					0		
25.0							0	No recovery 25.0 – 43.9	
26.0							0	↓	
27.0							0	↓	
28.0							0	↓	
29.0							0	↓	
30.0							0	↓	
31.0							0	↓	
32.0							0	↓	

Core I.D. Number	IA5-17

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
33.0							0	No recovery 25.0 – 43.9	
34.0							0	↓	
35.0							0	↓	
36.0							0	↓	
37.0							0	↓	
38.0							0	↓	
39.0							0	↓	
40.0							0	↓	
41.0							0	↓	
42.0							0	↓	
43.0							0	↓	
44.0							0	Second refusal	

Core I.D. Number	IA5-17

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA5-18

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	2-19-10	
Time of Activity	13:22	
Surveyor Name	Dave Warren	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093071.84	1065887.47
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 186760
Detector Model and Serial No.	Ludlum 44-10 / PR 242823	Ludlum 44-9 / PR193658
Calibration Due Date	10/19/2010	10/19/2010
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 5,376 cpm

Notes and Comments:

Backgrounds: Gamma: 5,059 cpm (Ludlum Model 2221)

Beta: 31 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: <19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted]

Signatur[redacted]rveyor) 2-19-10 Date

[redacted] Signature (Sampler) 2-19-10 Date

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 0.8	
0.5	5598	80	Standard	0.8 – 1.3	5361	47	0	TLS-SS-IA5-18(0.8-1.3)021910	1
1.0	5758	120	Standard	1.3 – 2.3	5452	45	0	TLS-SB-IA5-18(1.3-2.3)021910	5
2.0	6184	80					0		7 CB 4-13-10
3.0	5817	60					0		
4.0	6279	100	Standard	4.0 – 5.0	5622	49	0	TLS-SB-IA5-18(4.0-5.0)021910	4
5.0							0	No recovery 5.0 - 8.6↓	
6.0							0	↓	
7.0							0	↓	
8.0							0	↓	
9.0	5744	100					0		
10.0							0	No recovery 10.0 – 13.9	
11.0							0	↓	
12.0							0	↓	
13.0							0	↓	
14.0	5774	100					0		
15.0							0	No recovery 15.0 – 18.0	

Core I.D. Number	IA5-18

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0							0	No recovery 15.0 – 18.0	
17.0							0	↓	
18.0	5795	60	Standard	18.0 – 19.0	5643	69	0	TLS-SB-IA5-18(18.0-19.0)021910	2
19.0	5668	80	Standard	19.0 – 20.0	5469	58	0	TLS-SB-IA5-18(19.0-20.0)021910	3
20.0									
21.0									
22.0									
23.0									
24.0									
25.0									
26.0									
27.0									
28.0									
29.0									
30.0									
31.0									
32.0									

Core I.D. Number	IA5-18

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

AP'SEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA5-19

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:** ARSEC-HPS-0003	**Federal 09-055-00003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	2/17/2010	
Time of Activity	14:35	
Surveyor Name	Dave Warren	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093178.84	1066083.46
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	(No)

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 186760
Detector Model and Serial No.	Ludlum 44-10 / PR242823	Ludlum 44-9 / PR193658
Calibration Due Date	10/19/2010	10/19/2010
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 4,432 cpm

Notes and Comments:

Backgrounds: Gamma: 6,953 cpm (Ludlum Model 2221)

Beta: 29 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 02/17/2010
Signat[redacted] (Surveyor) Date

[redacted] 02/17/2010
[redacted] Signature (Sampler) Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0	6632	80	Standard	0.0 – 0.5	6239	52	0	TLS-SS-IA5-19(0.0-0.5)021710	1
0.5	6643	80					0		
1.0	6547	120	Standard	1.0 – 2.0	5981	46	0	TLS-SB-IA5-19(1.0-2.0)021710	5
2.0	6602	60					0		
3.0	6714	40					0		
4.0	6735	60					0		
5.0	7000	80	Standard	4.5 – 5.5	6575	53	0	TLS-SB-IA5-19(4.5-5.5)021710	4
6.0	6670	60	Standard	5.5 – 6.5	6389	45	0	TLS-SB-IA5-19(5.5-6.5)021710	2
7.0	6802	80					0		
8.0	6562	60					0		
9.0	6879	80					0		
10.0	6950	80	Standard	10.5 – 11.5	6151	56	0	TLS-SB-IA5-19(10.5-11.5)021710	3
11.0	6650	40							
12.0	6396	40							
						A			
				N					

Core I.D. Number	IA5-19

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA5-20

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	2-19-10	
Time of Activity	13:20	
Surveyor Name	John Holmes	
Sampler Name	Mike Carlin	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093174.06	1065989.69
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187758	Ludlum 12 / 229306
Detector Model and Serial No.	Ludlum 44-10 / PR156393	Ludlum 44-9 / PR191214
Calibration Due Date	10-19-10	10-28-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 5,008 cpm

Notes and Comments:

Backgrounds: Gamma: 5,810 cpm (Ludlum Model 2221)

Beta: 42 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted]
Signature (Surveyor) Date

[redacted]
Signature (Sampler) Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0								No recovery 0.0 – 1.4	
0.5								↓	
1.4-1.9	5722	40	Standard	1.4 – 1.9	4995	44		TLS-SS-IA5-20(1.4 – 1.9)021910	1
2.0	5700	60							
3.0	5631	40							
4.0	5413	50							
5.0								No recovery 5.0 – 8.1	
6.0								↓	
7.0								↓	
8.1	5820	30						↓	
9.0	5520	30	Standard	9.0 – 10.0	5513	49		TLS-SB-IA5-20(9.0 – 10.0)021910	2
10.0								No recovery 10.0 – 27.2	
11.0								↓	
12.0								↓	
13.0								↓	
14.0								↓	
15.0								↓	

Core I.D. Number	IA5-20

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0								No recovery 10.0 – 27.2	
17.0								↓	
18.0								↓	
19.0								↓	
20.0								↓	
21.0								↓	
22.0								↓	
23.0								↓	
24.0								↓	
25.0							0.2	↓	
26.0								↓	
27.2-28.2	5444	30	Standard	27.2 28.2	5297	46		TLS-SB-IA5-20(27.2-28.2)021910	3
28.3	5733	50							
29.0	5519	90							
30.0	5603	80							
31.0	5809	70	Standard	31.0 – 32.0	5564	40		TLS-SB-IA5-20(31.0-32.0)021910	4
32.0	5745	110	Standard	32.0 – 33.0	5414	70		TLS-SB-IA5-20(32.0-33.0)021910	5

Core I.D. Number IA5-20

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number
33.0	5644	100						
34.0	5404	100						
35.0								
36.0								
37.0								
38.0								
39.0								
40.0			N		A			
41.0								
42.0								
43.0								
44.0								
45.0								
46.0								
47.0								
48.0								
49.0								

Core I.D. Number	IA5-20

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA5-21

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:** ARSEC-HPS-0003	**Federal 09-055-00003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	2/18/2010	
Time of Activity	11:22	
Surveyor Name	Dave Warren	
Sampler Name	Joe Craig	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093276.27	1066091.9
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 186760
Detector Model and Serial No.	Ludlum 44-10 / PR242823	Ludlum 44-9 / PR193658
Calibration Due Date	10/19/2010	10/19/2010
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 6.906 cpm

Notes and Comments:

Backgrounds: Gamma: 6,385 cpm (Ludlum Model 2221)

Beta: 52 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: >19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 02/18/2010
Signatu[redacted]urveyor) Date

[redacted] 02/18/2010
[redacted] Signature (Sa[redacted]pler) Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0-0.5	
0.5	7166	100	Standard	0.8 – 1.3	6959	56	0	TLS-SS-IA5-21(0.8-1.3)021810	1
1.0	7246	100					0		
2.0	7320	60					0		
3.0	7549	40	Standard	3.8– 4.8	7205	41	0	TLS-SB-IA5-21(3.8-4.8)021810	4
4.0							0	No recovery 4.8 – 17.2	
17.0	7155	80	Standard	17.2 – 18.2	7145	57	0	TLS-SB-IA5-21(17.2-18.2)021810	2
18.0	7223	80	Standard	18.2 – 19.2	7280	73	0	TLS-SB-IA5-21(18.2-19.2)021810	3
19.0							0	No recovery 19.2-22.7	
22.0	7122	120	Standard	22.7 – 24.0	6887	61	0	TLS-SB-IA5-21(22.7-24.0)021810	5
						A			
					N				

Core I.D. Number	IA5-21

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

Soil Core I.D. Number: IA5-22

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	2-22-10	
Time of Activity	09:05	
Surveyor Name	John Holmes	
Sampler Name	Mike Carlin	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093051.77	1065580.79
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 187758	Ludlum 12 / 229306
Detector Model and Serial No.	Ludlum 44-10 / PR156393	Ludlum 44-9 / PR191214
Calibration Due Date	10-19-10	10-28-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 5,295 cpm

Notes and Comments:

Backgrounds: Gamma: 5,638 cpm (Ludlum Model 2221)

Beta: 46 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: <19.5 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] Signature (Surveyor) 2-22-10 Date

[redacted] Signature (Sampler) 2-22-10 Date

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No Recovery 0.0 – 2.4	
0.5							0	↓	
1.0							0	↓	
2.0	5595	40	Standard	2.4 – 2.9	5463	40	0	TLS-SS-IA5-22(2.4-3.0)022210	1
3.0	6071	50	Standard	3.0 – 4.0	5570	52	0	TLS-SB-IA5-22(3.0-4.0)022210 (Chemical)	
4.0	6831	50	Standard	4.0 – 5.0	6026	63	0	TLS-SB-IA5-22(4.0-5.0)022210	4
5.0							0	No Recovery 5.0 – 7.0	
6.0							0	↓	
7.0	5629	70	Standard	7.5 – 8.5	5729	49	0	TLS-SB-IA5-22(7.5-8.5)022210	2
8.0	6012	40			[redacted]		0		
9.0	6229	110			6159	55	0	TLS-SB-IA5-22(9.0-10.0)022210	5
10.0							0	No Recovery 10.0 -20.8	
11.0							0	↓	
12.0							0	↓	
13.0							0	↓	
14.0							0	↓	
15.0							0	↓	

Core I.D. Number	IA5-22

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0							0	No recovery 10.0 – 20.8	
17.0							0	↓	
18.0							0	↓	
19.0							0	↓	
20.0							0	↓	
20.8	5889	30					0		
21.0	6035	60		Standard	5382	51	0	TLS-SB-IA5-22(21.4-22.4)022210	3
22.0	6018	40			[redacted] 9-13-10		0		
23.0	6122	100					0		
24.0	6442	60					0		
25.0							0		

Core I.D. Number	IA5-22

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

Soil Core I.D. Number: IA5-B01

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-10-10	
Time of Activity	13:49	
Surveyor Name	John Holmes	
Sampler Name	Mike Carlin	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092873.96	1066043.66
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR242823	Ludlum 44-9 / 153297
Calibration Due Date	10-19-10	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 4821 cpm

Notes and Comments:

Backgrounds: Gamma: 4799 cpm (Ludlum Model 2221)

Beta: 32 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: 0 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-10-10
Signature (Surveyor) Date

[redacted] 3-10-10
Signature (Sampler) Date

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 0.8	
0.5	4920	50	Standard	0.8 – 1.3	5000	42	0	TLS-SS-IA5-B01(0.8-1.3)031010	1
1.0	5020	90					0		
2.0	5295	80	Standard	2.0 – 3.0	4877	65	0	TLS-SB-IA5-B01(2.0-3.0)031010	4
3.0	5034	110	Standard	3.0 – 4.0	4993	51	0	TLS-SB-IA5-B01(3.0-4.0)031010	5
4.0	5272	80	Standard	4.0 – 5.0	4895	51	0	TLS-SB-IA5-B01(4.0-5.0)031010	2
5.0							0	No recovery 5.0 – 8.0	
6.0							0	↓	
7.0							0	↓	
8.0	5069	50					0		
9.0	4946	70					0		
10.0							0	No recovery 10.0 – 12.7	
11.0							0	↓	
12.0	5035	40					0		
13.0	4897	60					0		
14.0	5113	50					0		
15.0							0	No recovery 15.0 – 17.0	

Core I.D. Number	IA5-B01

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0							0	No recovery 15.0 – 17.0	
17.0									
18.0									
19.0									
20.0									
21.0									
22.0									
23.0				N		A			
24.0									
25.0									
26.0									
27.0									
28.0									
29.0									
30.0									
31.0									
32.0									

Core I.D. Number	IA5-B01

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Soil Core I.D. Number: IA5-B02

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-10-10	
Time of Activity	15:00	
Surveyor Name	John Holmes	
Sampler Name	Mike Carlin	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092841.77	1066596.21
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR242823	Ludlum 44-9 / 153297
Calibration Due Date	10-19-10	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 5703 cpm

Notes and Comments:

Backgrounds: Gamma: 6318 cpm (Ludlum Model 2221)

Beta: 51 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: 0 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

Signature (Surveyor) 3-10-10 Date

Signature (Sampler) 3-10-10 Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 0.5	
0.5	4477	80	Standard	0.5 – 1.0	4830	65	0	TLS-SS-IA5-B02(0.5-1.0)031010	1
1.0	5194	70					0		
2.0	5156	90					0		
3.0	5632	105	Standard	3.0 – 4.0	5241	63	0	TLS-SB-IA5-B02(3.0-4.0)031010	5
4.0	5312	70					0		
5.0							0	No recovery 5.0 – 6.5	
6.0	4969	80		6.5 – 7.0			0		
7.0	5538	50	Standard	7.0 – 8.0	5116	45	0	TLS-SB-IA5-B02(7.0-8.0)031010	2
8.0	5969	90	Standard	8.0 – 9.0	5027	43	0	TLS-SB-IA5-B02(3.0-4.0)031010	4
9.0	4983	50					0		
10.0							0	No recovery 10.0 – 12.4	
11.0							0	↓	
12.0	5218	80		12.4 – 13.0			0		
13.0	5203	100					0		
14.0									
15.0									

Core I.D. Number	IA5-B02

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

Soil Core I.D. Number: IA5-B03

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-10-10	
Time of Activity	13:50	
Surveyor Name	Dennis Whitlock	
Sampler Name	Matt Walton	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092843.18	1066031.87
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190191	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR240366	Ludlum 44-9 / PR153296
Calibration Due Date	2-23-11	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 8697 cpm

Notes and Comments:

Backgrounds: Gamma: 8577 cpm (Ludlum Model 2221)

Beta: 44 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

Signature (Surveyor) 3-10-10 Date

Signature (Sampler) 3-10-10 Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 0.7	
0.5	8609	60	Standard	0.7 – 1.2	8362	63	0	TLS-SS-IA5-B03(0.7-1.2)031010	1
1.0	8638	60					0		
2.0	8615	40					0		
3.0	8827	80	Standard	3.0 – 4.0	8349	66	0	TLS-SB-IA5-B03(3.0-4.0)031010	2
4.0	8560	140	Standard	4.0 – 5.0	8368	58	0	TLS-SB-IA5-B03(4.0-5.0)031010	5
5.0							0	No recovery 5.0 – 6.5	
6.0	8704	120		6.5 – 7.0			0		
7.0	8750	100					0		
8.0	8443	40					0		
9.0	8418	40					0		
10.0							0	No recovery 10.0 – 13.5	
11.0							0	↓	
12.0							0	↓	
13.0	8976	80	Standard	13.5 – 14.5	8154	73	0	TLS-SB-IA5-B03(13.5-14.5)031010	
14.0	8513	60					0		
15.0							0	No recovery 4.3 – 4.8	

Core I.D. Number	IA5-B03

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0							0	No recovery 4.3 – 4.8	
17.0							0	↓	
18.0							0	↓	
19.0							0	↓	
20.0							0	↓	
21.0							0	↓	
22.0							0	↓	
23.0							0	↓	
24.0							0	↓	
25.0							0	↓	
26.0							0	↓	
27.0							0	↓	
28.0							0	↓	
29.0							0	↓	
30.0							0	↓	
31.0							0	↓	
32.0							0	↓	

Core I.D. Number	IA5-B03

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
33.0							0	No recovery 4.3 – 4.8	
34.0							0	↓	
35.0							0	↓	
36.0							0	↓	
37.0							0	↓	
38.0							0	↓	
39.0							0	↓	
40.0							0	↓	
41.0							0	↓	
42.0							0	↓	
43.0							0	↓	
44.0							0	↓	
45.0							0	↓	
46.0							0	↓	
47.0							0	↓	
48.0							0	↓	
49.0							0	Refusal @ 49.0’	

Core I.D. Number	IA5-B03

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

Soil and Core Survey Forms
Investigative Area 6

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA6-1

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-19-10	
Time of Activity	10:10	
Surveyor Name	Dave Warren	
Sampler Name	John Holmes	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092583.92	1066413.02
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 229306
Detector Model and Serial No.	Ludlum 44-10 / PR242823	Ludlum 44-9 / 191714
Calibration Due Date	10-19-10	10-28-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 7735 cpm

Notes and Comments:

Backgrounds: Gamma: 7220 cpm (Ludlum Model 2221)

Beta: 41 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-19-10
Signature (Surveyor) Date

[redacted] 3-19-10
Signature (Sampler) Date

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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 3.0	
1.0							0	↓	
2.0							0	↓	
3.0	7380	40	Standard	3.0 – 3.5	7326	46	0	TLS-SS-IA6-1(3.0-3.5)031910	1
4.0	7113	60	Standard	4.0 5.0	7004	46	0	TLS-SB-IA6-1(4.0-5.0)031910	4
5.0							0	No recovery 5.0 – 6.0	
6.0	7160	60	Standard	6.0 – 7.0	6803	52	0	TLS-SB-IA6-1(6.0-7.0)031910	3
7.0							0		

Core I.D. Number	IA6-1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

Soil Core I.D. Number: 1A6-2

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-19-10	
Time of Activity	08:50	
Surveyor Name	Dave Warren	
Sampler Name	John Holmes	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092583.92	1066250.59
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 229306
Detector Model and Serial No.	Ludlum 44-10 / PR242823	Ludlum 44-9 / 191714
Calibration Due Date	10-19-10	10-28-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 5245 cpm

Notes and Comments:

Backgrounds: Gamma: 7243 cpm (Ludlum Model 2221)

Beta: 49 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-19-10

Signature (Surveyor) [redacted] Date

[redacted] 3-19-10

Signature (Sampler) [redacted] Date

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 3.7	
1.0							0	↓	
2.0							0	↓	
3.0							0	↓	
4.0	7276	90	Standard	3.7 -4.2	7087	49	0	TLS-SS-IA6-2(3.7-4.2)031910	1
5.0							0	No recovery 5.0 – 9.2	
6.0							0	↓	
7.0							0	↓	
8.0							0	↓	
9.0	6970	80	Standard	9.2 – 10.2	7124	63	0	TLS-SB-IA6-2(9.2-10.2)031910	2
10.0							0	No recovery 10.2 – 14.0	
11.0							0	↓	
12.0							0	↓	
13.0							0	↓	
14.0	7350	80	Standard	14.0 – 15.0	6920	67	0	TLS-SB-IA6-3(14.0-15.0)031910	3
15.0							0		

Core I.D. Number	IA6-2

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

Soil Core I.D. Number: IA6-3

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-19-10	
Time of Activity	09:25	
Surveyor Name	Dennis Whitlock	
Sampler Name	Matt Walton	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092583.92	1066088.15
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190191	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR240366	Ludlum 44-9 / 153297
Calibration Due Date	2-23-11	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 7304 cpm

Notes and Comments:

Backgrounds: Gamma: 7895 cpm (Ludlum Model 2221)

Beta: 33 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-19-10

Signature (Surveyor) Date

[redacted] 3-19-10

Signature (Sampler) Date

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 2.4	
1.0							0	↓	
2.0	9016	40	Standard	2.4 – 2.9	7487	53	0	TLS-SS-IA6-3(2.4-2.9)031910	1
3.0	7551	120	Standard	3.0 – 4.0	7470	54	0	TLS-SB-IA6-3(3.0-4.0)031910	4
4.0	7628	110	Standard	4.0 – 5.0	7642	49	0	TLS-SB-IA6-3(4.0-5.0)031910	4a
5.0							0	No recovery 5.0 – 7.5	
6.0							0	↓	
7.0	7729	80					0		
8.0	8469	120	Standard	8.0 – 9.0	7457	57	0	TLS-SB-IA6-3(8.0-9.0)031910	3
9.0	7622	70					0		
10.0							0	No recovery 10.0 – 13.0	
11.0							0	↓	
12.0							0	↓	
13.0							0	2nd Refusal @ 13.0'	

Core I.D. Number	IA6-3

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA6-4

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-19-10	
Time of Activity	08:50	
Surveyor Name	Dennis Whitlock	
Sampler Name	Matt Walton	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092583.92	1065925.72
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190191	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR240366	Ludlum 44-9 / 153297
Calibration Due Date	2-23-11	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 8365 cpm

Notes and Comments:

Backgrounds: Gamma: 7656 cpm (Ludlum Model 2221)

Beta: 49 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-19-10
Signature (Surveyor) Date

[redacted] 3-19-10
Signature (Sampler) Date

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2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 2.8	
1.0							0	↓	
2.0							0	↓	
3.0	7903	70	Standard	2.8 – 3.3	7121	61	0	TLS-SS-IA6-4(2.8-3.3)031910	1
4.0	8221	50	Standard	4.0 – 5.0	7580	66	0	TLS-SB-IA6-3(3.0-4.0)031910	3
5.0								Refusal @ 5.0'	
6.0									
7.0									
8.0									
9.0									
10.0									
11.0									
12.0									
13.0									

Core I.D. Number	IA6-4

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA6-5

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-18-10	
Time of Activity	15:20	
Surveyor Name	Dennis Whitlock	
Sampler Name	Matt Walton	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092583.92	1065763.28
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190191	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR240366	Ludlum 44-9 / 153297
Calibration Due Date	2-23-11	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 7841 cpm

Notes and Comments:

Backgrounds: Gamma: 8056 cpm (Ludlum Model 2221)

Beta: 40 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-18-10
Signature (Surveyor) [redacted] Date

[redacted] 3-18-10
Signature (Sampler) [redacted] Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 1.8	
0.5							0	↓	
1.0							0	↓	
2.0	7821	60					0		
3.0	8381	60					0		
4.0	8853	90					0		
5.0							0	No recovery 5.0 – 6.7	
6.0	8192	40					0		
7.0	7687	20					0		
8.0	8018	50					0		
9.0	8326	80					0		
10.0							0	No recovery 10.0 – 12.3	
11.0							0	↓	
12.0	8141	60	Standard	12.3 – 12.8	7750	59	0	TLS-SS-IA6-5(12.3-12.8)031810	1
13.0	8528	70					0		
14.0	8270	60					0		
15.0	8045	60					0	No recovery 15.0 – 16.5	

Core I.D. Number	IA6-5

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0	7948	90	Standard	16.0 – 17.0	7674	67	0	TLS-SB-IA6-5(16.0-17.0)031810	4
17.0	7620	80					0		
18.0	8634	40	Standard	18.0 – 19.0	7813	55	0	TLS-SB-IA6-5(18.0-19.0)031810	2
19.0	8430	90					0		
20.0	8302	40					0		
21.0	7798	80					0		
22.0	8010	90					0		
23.0	8736	70	Standard	23.0 – 24.0	7811	60	0	TLS-SB-IA6-5(23.0-24.0)031810	3
24.0	8393	110	Standard	24.0 – 25.0	7775	67	0	TLS-SB-IA6-5(24.0-25.0)031810 (Chemical)	
25.0									
				N					
					A				

Core I.D. Number	IA6-5

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following loeations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

Soil Core I.D. Number: IA6-6

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-18-10	
Time of Activity	13:50	
Surveyor Name	Dennis Whitlock	
Sampler Name	Matt Walton	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092583.92	1065600.85
Was the bore hole re-located due to refusal? (Circle either Yes or No)	(Yes)	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190191	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR240366	Ludlum 44-9 / 153297
Calibration Due Date	2-23-11	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 7099 cpm

Notes and Comments:

Backgrounds: Gamma: 7322 cpm (Ludlum Model 2221)

Beta: 40 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-18-10
Signature (Surveyor) [redacted] Date

[redacted] 3-18-10
Signature (Sampler) [redacted] Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 0.5	
0.5	8251	30					0		
1.0	7019	40					0		
2.0	7106	40					0		
3.0	7670	70					0		
4.0	7778	60	Standard	4.5 – 5.0	9077	53	0	TLS-SS-IA6-6(4.5-5.0)031810	1
5.0							0	No recovery 5.0 – 6.6	
6.0	7842	80					0		
7.0	7539	70					0		
8.0	7634	100	Standard	8.0 – 9.0	6693	62	0	TLS-SB-IA6-6(8.0-9.0)031810	4
9.0	8105	80					0		
10.0							0	No recovery 10.0 – 13.7	
11.0							0	↓	
12.0							0	↓	
13.0	7438	50					0		
14.0	8072	130	Standard	14.0 – 15.0	6775	43	0	TLS-SB-IA6-6(14.0-15.0)031810	2
15.0							0	No recovery 15.0 – 16.5	

Core I.D. Number	IA6-6

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0	7143	30					0		
17.0	7671	50	Standard	17.0 – 18.0	7185	39	0	TLS-SB-IA6-6(17.0-18.0)031810 (Chemical)	
18.0	8411	30	Standard	18.0 – 19.0	7165	36	0	TLS-SB-IA6-6(18.0-19.0)031810	3
19.0	7841	30					0		
20.0							0		
				N					
					A				

Core I.D. Number	IA6-6

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA6-7

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-18-10	
Time of Activity	1045	
Surveyor Name	Dennis Whitlock	
Sampler Name	John Holmes	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092583.92	1065438.41
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190191	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR240366	Ludlum 44-9 / 153297
Calibration Due Date	2-23-11	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 4295 cpm

Notes and Comments:

Backgrounds: Gamma: 4847 cpm (Ludlum Model 2221)

Beta: 40 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

First refusal at 6.0 ft bgs. Moved rig 3 ft west. No samples collected this corehole.

Signature (Surveyor) Date 3-18-10

Signature (Sampler) Date 3-18-10

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 0.4	
0.4	5301	60					0		
1.0	5462	50					0		
2.0	5016	80					0		
3.0	5301	60					0		
4.0	5612	90					0		
5.0							0	No recovery 5.0 – 9.0	
6.0							0		
7.0							0		
8.0							0		
9.0	4710	40					0		
10.0							0	No recovery 10.0 – 15.0	
11.0									
12.0									
13.0									
14.0									
15.0								No recovery 15.0-20.0	

Core I.D. Number	1A6-7

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0							0		
17.0							0		
18.0							0		
19.0							0		
20.0							0		
							0	Second refusal at 20.0	
				N					
					A				

Core I.D. Number	1A6-7

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 - 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading.
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 - 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: 1A6-8

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal--HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-18-10	
Time of Activity	1010	
Surveyor Name	Dennis Whitlock	
Sampler Name	John Holmes	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092583.92	1065275.97
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190191	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR240366	Ludlum 44-9 / 153297
Calibration Due Date	2-23-11	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 5061 cpm

Notes and Comments:

Backgrounds: Gamma: 5440 cpm (Ludlum Model 2221)

Beta: 34 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

First refusal at 25.0 ft bgs. Moved rig 3 ft west. No samples collected this corehole.

Signature (Surveyor) 3-18-10 Date

Signature (Sampler) 3-18-10 Date

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2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 1.1	
1.1	6019	140					0		
2.0	5453	60					0		
3.0	6613	70					0		
4.0	6422	120					0		
5.0							0	No recovery 5.0-8.4	
6.0							0		
7.0							0		
8.4	5729	60					0		
9.0	6015	90					0		
10.0							0	No recovery 10.0-14.5	
11.0							0		
12.0							0		
13.0							0		
14.5	5496	100					0		
15.0							0	No recovery 15.0-20.0	

Core I.D. Number	IA6-8

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0							0		
17.0							0		
18.0							0		
19.0							0		
20.0							0		
							0	Second refusal at 20.0	
				N					
					A				

Core I.D. Number	IA6-8

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading.
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading.
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA6-9

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-18-10	
Time of Activity	08:25	
Surveyor Name	Dennis Whitlock	
Sampler Name	Matt Walton	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092583.92	1065113.54
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	(No)

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190191	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR240366	Ludlum 44-9 / 153297
Calibration Due Date	2-23-11	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 6174 cpm

Notes and Comments:

Backgrounds: Gamma: 4797 cpm (Ludlum Model 2221)

Beta: 30 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-18-10
Signature (Surveyor) Date

[redacted] 3-18-10
Signature (Sampler) Date

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0	5627	50					0		
1.0	5651	100					0		
2.0	5586	100					0		
3.0	5696	120	Standard	3.5 – 4.0	4822	72	0	TLS-SS-IA6-9(3.5-4.0)031810	1
4.0	5447	130	Standard	4.0 – 5.0	5380	46	0	TLS-SB-IA6-9(4.0-5.0)031810	4
5.0							0	No recovery 5.0 – 7.4	
6.0							0	↓	
7.0							0	↓	
8.0	5902	110	Standard	7.4 – 8.4	5181	43	0	TLS-SB-IA6-9(7.4-8.4)031810	3
9.0	5784	60	Standard	8.4 – 9.4	5048	74	0	TLS-SB-IA6-9(8.4-9.4)031810 (Chemical)	
10.0	5612	100					0		
11.0							0	No recovery 10.0 – 13.2	
12.0							0	↓	
13.0	5536	60					0		
14.0	5615	80	Standard	14.0 – 15.0	4893	41	0	TLS-SB-IA6-9(14.0-15.0)031810	2
15.0							0	No recovery 15.0 – 20.0	

Core I.D. Number	IA6-9

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0							0	No recovery 15.0 – 20.0	
17.0							0	↓	
18.0							0	↓	
19.0							0	↓	
20.0							0	↓	
				N					
					A				

Core I.D. Number	1A6-9

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA6-10

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-17-10	
Time of Activity	08:40	
Surveyor Name	Dennis Whitlock	
Sampler Name	Matt Walton	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092583.92	1064951.1
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	(No)

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR242823	Ludlum 44-9 / 153297
Calibration Due Date	10-19-10	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 4610 cpm

Notes and Comments:

Backgrounds: Gamma: 5137 cpm (Ludlum Model 2221)

Beta: 26 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.
NOTE: Hydraulic line failure @ 45.0'.

[redacted] 3-17-10
Signature (Surveyor) Date

[redacted] 3-17-10
Signature (Sampler) Date

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 0.4	
0.5	5387	90					0		
1.0	5747	90					0		
2.0	6273	40					0		
3.0	5600	80					0		
4.0	5208	70					0		
5.0							0	No recovery 5.0 – 6.8	
6.0							0	↓	
7.0	5791	110					0		
8.0							0	No recovery 8.0 – 9.1	
9.0	4813	70	Standard	9.1 – 9.6	5503	55	0	TLS-SS-IA6-10(9.1-9.6)031710	1
10.0	5464	70					0		
11.0	5699	60					0		
12.0	6152	90	Standard	12.0 – 13.0	5743	60	0	TLS-SB-IA6-10(12.0-13.0)031710	3
13.0							0	No recovery 13.0 – 15.6	
14.0							0	↓	
15.0	5311	90	Standard	15.6 – 16.6	5431	51	0	TLS-SB-IA6-10(15.6-16.6)031710	4

Core I.D. Number	IA6-10

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0	4717	80					0		
17.0	5806	60	Standard	17.0 – 18.0	5455	46	0	TLS-SB-IA6-10(17.0-18.0)031710	4a
18.0							0	No recovery 18.0 – 45.0	
							0	↓	
							0	↓	
							0	↓	
							0	↓	
							0	↓	
							0	↓	
							0	↓	
							0	↓	
							0	↓	
							0	↓	
							0	↓	
							0	↓	
							0	↓	
45.0							0	↓	

Core I.D. Number	IA6-10

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA6-11

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-16-10	
Time of Activity	10:45	
Surveyor Name	Dennis Whitlock	
Sampler Name	Matt Walton	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092583.92	1064788.67
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	(No)

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR242823	Ludlum 44-9 / 153297
Calibration Due Date	10-19-10	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 8814 cpm

Notes and Comments:

Backgrounds: Gamma: 7426 cpm (Ludlum Model 2221)

Beta: 36 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-16-10
Signature (Surveyor [redacted] Date

[redacted] 3-16-10
Signature (Sampler) [redacted] Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 0.8	
0.5							0	↓	
1.0	7090	110					0		
2.0	7429	70					0		
3.0	7276	80					0		
4.0	7021	140					0		
5.0	7695	100					0		
6.0	7928	90					0		
7.0	7731	110					0		
8.0	8078	60					0		
9.0	7572	60					0		
10.0							0	No recovery 10.0 – 12.0	
11.0							0	↓	
12.0	8083	60	Standard	12.0 – 13.0	7110	25	0	TLS-SS-IA6-11(12.0-12.5)031610	1
13.0	7888	70	Standard	12.5 – 13.0/13.5 – 14.0	7210	50	0	TLS-SB-IA6-11(12.5-13.0/13.5-14.0)031610 No recovery 13.0 – 13.5	4
14.0	8082	80	Standard	14.0 – 15.0	7249	58	0	TLS-SB-IA6-11(14.0-15.0)031610	4a
15.0	7995	80	Standard	15.0 – 16.0	7187	71	0	TLS-SB-IA6-11(15.0-16.0)031610 (Chemical)	

Core I.D. Number	IA6-11

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0	8456	80	Standard	16.0 – 17.0	7099	55	0	TLS-SB-IA6-11(16.0-17.0)031610	3
17.0									
				N					
					A				

Core I.D. Number	IA6-11

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA6-12

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-16-10	
Time of Activity	10:45	
Surveyor Name	Dennis Whitlock	
Sampler Name	Mike Carlin	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. I)	1092583.92	1064626.23
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR242823	Ludlum 44-9 / 153297
Calibration Due Date	10-19-10	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 6111 cpm

Notes and Comments:

Backgrounds: Gamma: 7426 cpm (Ludlum Model 2221)

Beta: 36 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-16-10
Signature (Surveyor) [redacted] Date

[redacted] 3-16-10
Signature (Sampler) [redacted] Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 1.0	
0.5							0	↓	
1.0	7569	90	Standard	1.0 – 1.5	7204	60	0	TLS-SS-IA6-12(1.0-1.5)031610	1
2.0	7222	50					0		
3.0	7531	80					0		
4.0	7626	105					0		
5.0	7875	80	Standard	5.0 – 6.0	7168	44	0	TLS-SB-IA6-12(5.0-6.0)031610 (Chemical)	
6.0	7850	110	Standard	6.0 – 7.0	7228	50	0	TLS-SB-IA6-12(2.0-3.0)031610	4
7.0	7700	70					0		
8.0	7472	100					0		
9.0	7316	90					0		
10.0							0	No recovery 10.0 – 11.7	
11.0	7497	80					0		
12.0	7729	60					0		
13.0	7560	80	Standard	13.0 – 14.0	7397	59	0	TLS-SB-IA6-12(13.0-14.0)031610 Native soil	4c
14.0	7459	100					0		
15.0	7570	70					0	No recovery 15.0 – 15.6	

Core I.D. Number	IA6-12

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0	7883	50	Standard	16.0 – 17.0	7697	56	0	TLS-SB-IA6-12(17.0-18.0)031610	4a
17.0	8478	50	Standard	17.0 – 18.0	7180	60	0	TLS-SB-IA6-12(18.0-19.0)031610	3
18.0									
				N					
					A				

Core I.D. Number	IA6-12

Note 1

1A-1 through 1A-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

1A-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA6-13

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-16-10	
Time of Activity	09:45	
Surveyor Name	Dave Warren	
Sampler Name	Mike Carlin	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1093746.35	1066413.02
Was the bore hole re-located due to refusal? (Circle either Yes or No)	(Yes)	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR242823	Ludlum 44-9 / 153297
Calibration Due Date	10-19-10	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 6111 cpm

Notes and Comments:

Backgrounds: Gamma: 6406 cpm (Ludlum Model 2221)

Beta: 53 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-16-10
Signature (Surveyor) Date

[redacted] 3-16-10
Signature (Sampler) Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree
0.0							0	No recovery 0.0 – 1.3	
0.5							0	↓	
1.0	6790	100					0		
2.0	6507	80					0		
3.0	6402	120					0		
4.0	6670	60					0		
5.0							0	No Recovery 5.0-5.5	
6.0	6714	80					0		
7.0	6947	80					0		
8.0	6973	120					0		
9.0	6791	80					0		
10.0							0	No recovery 10.0 – 11.1	
11.0	6955	60					0		
12.0	6791	80	Standard	12.0-12.5	6862	61	0	TLS-SS-IA6-13(12.0-12.5)031610	1
13.0	6714	80					0		
14.0	66803	100					0		
15.0							0	No recovery 15.0 – 16.4	

Core I.D. Number	IA6-13

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0							0		
17.0	6743	120					0		
18.0	6691	120					0		
19.0	6580	120					0		
20.0							0	No recovery 20.0-21.6	
21.0	6711	60	Standard	21.6-22.6	6765	45	0	TLS-SB-IA6-13(21.6-22.6)031610	2
22.0	6517	120					0		
23.0	7001	140	Standard	23.0-24.0	6702	63	0	TLS-SB-IA6-13(23.0-24.0)031610	3
24.0	6762	60			6666	66	0	TLS-SB-IA6-13(24.0-25.0)031610 Chemical	
25.0	6916	140	Standard	25.0-26.0	6971	56	0	TLS-SB-IA6-13(25.0-26.0)031610	4
26.0	6775	100					0		
27.0	6777	80					0		
					N				
						A			

Core I.D. Number	IA6-13

Note 1

IA-I through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA6-14

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-17-10	
Time of Activity	09:00	
Surveyor Name	Dave Warren	
Sampler Name	Mike Carlin	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092746.35	1066250.59
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 229306
Detector Model and Serial No.	Ludlum 44-10 / PR242823	Ludlum 44-9 / 191714
Calibration Due Date	10-19-10	10-28-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 5673 cpm

Notes and Comments:

Backgrounds: Gamma: 6231 cpm (Ludlum Model 2221)

Beta: 43 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-17-10
Signature (Surveyor) Date

[redacted] 3-17-10
Signature (Sampler) Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Dnplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 1.5	
0.5							0	↓	
1.0	6461	60					0		
2.0	6065	120					0		
3.0	6091	100					0		
4.0	6208	120					0		
5.0							0	No recovery 5.0 – 7.2	
6.0							0	↓	
7.0							0	↓	
8.0	6125	60					0		
9.0	6345	100					0		
10.0							0	No recovery 10.0 – 11.7	
11.0							0	↓	
12.0	6268	140	Standard	12.0 – 12.5	6100	62	0	TLS-SS-IA6-14(12.0-12.5)031710	1
13.0	6236	100	Standard	13.0 – 14.0	5889	62	0	TLS-SB-IA6-14(13.0-14.0)031710	3
14.0	6227	60	Standard	14.0 – 15.0	6046	50	0	TLS-SB-IA6-14(14.0-15.0)031710(Chemical)	
15.0							0	No recovery 15.0 – 16.4	

Core I.D. Number	IA6-14

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0	6021	80	Standard	16.4 – 17.4	6035	50	0	TLS-SB-IA6-14(16.4-17.4)031710	4
17.0	6114	80	Standard	17.4 – 18.4	5962	44	0	TLS-SB-IA6-14(17.4-18.4)031710	4a
18.0	6104	60					0		
19.0	6001	60					0		
20.0							0	No recovery 20.0 – 24.5	
21.0							0	↓	
22.0							0	↓	
23.0							0	↓	
24.0							0	↓	
25.0								2nd refusal @ 24.5'	
				N					
					A				

Core I.D. Number	IA6-14

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA6-15

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-08-10	
Time of Activity	13:25	
Surveyor Name	John Holmes	
Sampler Name	Mike Carlin	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092746.35	1066088.15
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR242823	Ludlum 44-9 / 153297
Calibration Due Date	10-19-10	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 5643 cpm

Notes and Comments:

Backgrounds: Gamma: 5559 cpm (Ludlum Model 2221)

Beta: 39 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted]
Signature (Surveyor) [redacted] 3-8-10
Date

[redacted]
Signature (Sampler) [redacted] 3-8-10
Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 1.0	
0.5							0	↓	
1.0	5355	40	Standard	1.0 – 1.5	5228	46	0	TLS-SS-IA6-15(1.0-1.5)030810	1
1.5	4835	60					0		
2.0	6455	50	Standard	2.0 – 3.0	5244	43	0	TLS-SB-IA6-15(2.0-3.0)030810	3
3.0	5499	40					0		
4.0	5595	50					0		
5.0							0	No recovery 5.0 – 5.5	
5.5	5153	70					0		
6.0	5136	100	Standard	6.0 – 7.0	5654	49	0	TLS-SB-IA6-15(6.0-7.0)030810	4
7.0	5432	70					0		
8.0	5542	90					0		
9.0	5690	90					0		
10.0							0	No recovery 10.0 – 14.3	
11.0							0	↓	
12.0							0	↓	
13.0							0	↓	

Core I.D. Number	IA6-15

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
14.3	6123	110	Standard	9.7-10.0/14.3-15.0	5654/5320	59/43	0	TLS-SB-IA6-15(9.7-10.0/14.3-15.0)030810	2
15.0							0	No recovery 16.0 – 18.1	
				N					
					A				

Core I.D. Number	IA6-15

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA6-16

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-08-10	
Time of Activity	10:50	
Surveyor Name	John Holmes	
Sampler Name	Mike Carlin	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092746.35	1065925.72
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR242823	Ludlum 44-9 / 153297
Calibration Due Date	10-19-10	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 4754 cpm

Notes and Comments:

Backgrounds: Gamma: 5102 cpm (Ludlum Model 2221)

Beta: 39 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-8-10
Signature (Surveyor) Date

[redacted] 3-8-10
Signature (Sampler) Date

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2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 1.3	
0.5							0	↓	
1.0	4898	60					0		
1.3	5306	70					0		
2.0	4466	90					0		
3.0	5082	60	Standard	3.0 – 3.5	4902	43	0	TLS-SS-IA6-16(3.0-3.5)030810	1
4.0	5104	100	Standard	4.0 – 5.0	4965	61	0	TLS-SB-IA6-16(4.0-5.0)030810	4
5.0							0	No recovery 5.0 – 6.4	
6.0	3338	50					0		
7.0	5396	40	Standard	7.0 – 8.0	4807	62	0	TLS-SB-IA6-16(7.0-8.0)030810	3
8.0	4715	100	Standard	8.0 – 9.0	4759	44	0	TLS-SB-IA6-16(8.0-9.0)030810(Chemical)	
9.0	5133	70					0		
10.0							0	No recovery 10.0 – 12.2	
11.0							0	↓	
12.0	5111	100					0		
13.0	4388	40					0		
14.0	4905	50	Standard	14.0 – 15.0	4490	47	0	TLS-SB-IA6-16(14.0-15.0)030810	2

Core I.D. Number	IA6-16

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA6-17

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-08-10	
Time of Activity	09:25	
Surveyor Name	John Holmes	
Sampler Name	Mike Carlin	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092746.35	1065763.28
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR242823	Ludlum 44-9 / 153297
Calibration Due Date	10-19-10	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 4265 cpm

Notes and Comments:

Backgrounds: Gamma: 5245 cpm (Ludlum Model 2221)

Beta: 47 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-8-10
Signature (Surveyor) Date

[redacted] 3-8-10
Signature (Sampler) Date

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 2.0	
0.5							0	↓	
1.0							0	↓	
2.0	5487	30	Standard	2.0 – 2.5	5275	40	0	TLS-SS-IA6-17(2.0-2.5)030810	1
2.5	4839	50					0		
3.0	5817	70	Standard	3.0 – 4.0	5250	53	0	TLS-SB-IA6-17(3.0-4.0)030810	3
4.0	5460	60					0		
5.0							0	No recovery 5.0 – 6.5	
6.0	5203	60					0		
7.0	5807	90	Standard	7.0 – 8.0	5348	51	0	TLS-SB-IA6-17(7.0-8.07)030810	4
8.0	5709	70					0		
9.0	5404	50	Standard	9.0 – 10.0	5090	62	0	TLS-SB-IA6-17(9.0-10.0)030810	2
10.0							0	No recovery 10.0 – 20.0	
11.0							0	↓	
12.0							0	↓	
13.0							0	↓	
14.0							0	↓	

Core I.D. Number	IA6-17

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
15.0							0	No recovery 10.0 – 20.0	
16.0							0	↓	
17.0							0	↓	
18.0							0	↓	
19.0							0	↓	
20.0									
21.0									
22.0				N					
24.0									
25.0									
26.0									
27.0					A				
28.0									
29.0									
30.0									
31.0									
32.0									

Core I.D. Number	1A6-17

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA6-18

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-17-10	
Time of Activity	10:23	
Surveyor Name	Dave Warren	
Sampler Name	Mike Carlin	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092746.35	1065600.85
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	(No)

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 229306
Detector Model and Serial No.	Ludlum 44-10 / PR242823	Ludlum 44-9 / 191714
Calibration Due Date	10-19-10	10-28-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 5517 cpm

Notes and Comments:

Backgrounds: Gamma: 6515 cpm (Ludlum Model 2221)

Beta: 35 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-17-10
Signature (Surveyor) Date

[redacted] 3-17-10
Signature (Sampler) Date

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree
0.0							0	No recovery 0.0 – 1.3	
0.5							0	↓	
1.0	6619	80					0		
2.0	6733	60					0		
3.0	6864	60					0		
4.0	6609	80	Standard	4.0 – 4.5	6384	43	0	TLS-SS-IA6-18(4.0-5.0)031710	1
5.0							0	No recovery 5.0 – 8.9	
6.0							0	↓	
7.0							0	↓	
8.0							0	↓	
9.0	6847	50	Standard	8.9 – 9.9	6333	60	0	TLS-SB-IA6-18(8.9-9.9)031710	4
10.0							0	No recovery 10.0 – 20.0	
11.0							0	↓	
12.0							0	↓	
13.0							0	↓	
14.0							0	↓	
15.0							0	↓	

Core I.D. Number	IA6-18

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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0							0	No recovery 10.0 – 20.0	
17.0							0	↓	
18.0							0	↓	
19.0							0	↓	
20.0	6826	100					0		
21.0	6595	60					0		
22.0	6627	120	Standard	22.0 – 23.0	6600	54	0	TLS-SB-IA6-18(22.0-23.0)031710	3
23.0	6491	60	Standard	23.0 – 24.0	6531	58	0	TLS-SB-IA6-18(23.24.0)031710(Chemical)	
24.0	6504	80					0		
25.0	6569	80	Standard	25.0 – 26.0	6488	50	0	TLS-SB-IA6-18(25.26.0)031710	4c
26.0								Refusal @ 26.0'	
				N					
					A				

Core I.D. Number	IA6-18

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA6-19

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-18-10	
Time of Activity	08:32	
Surveyor Name	Dave Warren	
Sampler Name	Mike Carlin	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092746.35	1065438.41
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	(No)

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 229306
Detector Model and Serial No.	Ludlum 44-10 / PR242823	Ludlum 44-9 / 191714
Calibration Due Date	10-19-10	10-28-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 6018 cpm

Notes and Comments:

Backgrounds: Gamma: 6987 cpm (Ludlum Model 2221)

Beta: 50 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-18-10
Signature (Surveyor) Date

[redacted] 3-18-10
Signature (Sampler) Date

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 1.1	
0.5							0	↓	
1.0	6656	120	Standard	1.1 – 1.6	6755	71	0	TLS-SS-IA6-19(1.1-1.6)031810	1
2.0	6781	120					0		
3.0	6883	100					0		
4.0	7234	80	Standard	4.0 – 5.0	6707	62	0	TLS-SB-IA6-19(4.0-5.0)031810	3
5.0							0	No recovery 5.0 – 7.2	
6.0							0	↓	
7.0	6386	100	Standard	7.2 – 8.2	6749	51	0	TLS-SB-IA6-19(7.2-8.2)031810	2
8.0	6624	80	Standard	8.2 – 9.2	6706	49	0	TLS-SB-IA6-19(8.2-9.2)031810	4
9.0	6452	60					0		
10.0							0	No recovery 10.0 – 20.0	
11.0							0	↓	
12.0							0	↓	
13.0							0	↓	
14.0							0	↓	
15.0							0	↓	

Core I.D. Number	IA6-19

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0							0	No recovery 10.0 – 20.0	
17.0							0	↓	
18.0							0	↓	
19.0							0	↓	
20.0							0	↓	
				N					
					A				

Core I.D. Number	IA6-19

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA6-20

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-18-10	
Time of Activity	10:00	
Surveyor Name	Dave Warren	
Sampler Name	Mike Carlin	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092746.35	1065275.97
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 229306
Detector Model and Serial No.	Ludlum 44-10 / PR242823	Ludlum 44-9 / 191714
Calibration Due Date	10-19-10	10-28-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 5436 cpm

Notes and Comments:

Backgrounds: Gamma: 7109 cpm (Ludlum Model 2221)

Beta: 40 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-18-10
Signature (Surveyor) Date

[redacted] 3-18-10
Signature (Sampler) Date

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree
0.0							0	No recovery 0.0 – 1.5	
0.5							0	↓	
1.0	7080	60	Standard	1.5 – 2.0	7105	63	0	TLS-SS-IA6-20(1.5-2.0)031810	1
2.0	7226	60					0		
3.0	7361	80	Standard	3.0 – 4.0	6908	54	0	TLS-SB-IA6-20(3.0-4.0)031810(Chemical)	
4.0	7399	60	Standard	4.0 – 5.0	7071	78	0	TLS-SB-IA6-20(4.0-5.0)031810	3
5.0							0	No recovery 5.0 – 6.6	
6.0							0	↓	
7.0	7362	80	Standard	6.6 – 7.6	7193	61	0	TLS-SB-IA6-20(6.6-7.6)031810	4
8.0	7242	80					0		
9.0	7328	120	Standard	9.0 – 10.0	7017	54	0	TLS-SB-IA6-20(9.0-10.0)031810	2
10.0							0	No recovery 10.0 – 25.0	
11.0							0	↓	
12.0							0	↓	
13.0							0	↓	
14.0							0	↓	
15.0							0	↓	

Core I.D. Number	IA6-20

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Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0							0	No recovery 10.0 – 25.0	
17.0							0	↓	
18.0							0	↓	
19.0							0	↓	
20.0							0	↓	
21.0							0	↓	
22.0							0	↓	
23.0							0	↓	
24.0							0	↓	
25.0							0	↓	
				N					
					A				

Core I.D. Number	IA6-20

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA6-21

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-18-10	
Time of Activity	13:35	
Surveyor Name	Dave Warren	
Sampler Name	Mike Carlin	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092746.35	1065113.54
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 229306
Detector Model and Serial No.	Ludlum 44-10 / PR242823	Ludlum 44-9 / 191714
Calibration Due Date	10-19-10	10-28-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 6121 cpm

Notes and Comments:

Backgrounds: Gamma: 6777 cpm (Ludlum Model 2221)

Beta: 60 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-18-10
Signature (Surveyor) [redacted] Date

[redacted] 3-18-10
Signature (Sampler) [redacted] Date

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2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 1.7	
0.5							0	↓	
1.0							0	↓	
2.0	6644	80	Standard	1.7 – 2.2	6553	51	0	TLS-SS-IA6-21(1.7-2.2)031810	1
3.0	6844	120	Standard	2.5 – 3.5	6200	66	0	TLS-SB-IA6-21(3.0-4.0)031810	3
4.0	6518	80	Standard	3.5 – 4.5	6306	59	0	TLS-SB-IA6-21(4.0-5.0)031810	4
5.0							0	No recovery 5.0 – 8.7	
6.0							0	↓	
7.0							0	↓	
8.0							0	↓	
9.0	6511	60	Standard	9.0 – 10.0	6458	49	0	TLS-SB-IA6-21(9.0-10.0)031810	4c
10.0							0	No recovery 10.0 – 15.0	
11.0							0	↓	
12.0							0	↓	
13.0							0	↓	
14.0							0	↓	
15.0							0	↓	

Core I.D. Number	IA6-21

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample eentered around the eore area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA6-22

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-18-10	
Time of Activity	14:50	
Surveyor Name	Dave Warren	
Sampler Name	Mike Carlin	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092579.52	1064727.85
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190170	Ludlum 12 / 229306
Detector Model and Serial No.	Ludlum 44-10 / PR242823	Ludlum 44-9 / 191714
Calibration Due Date	10-19-10	10-28-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 5684 cpm

Notes and Comments:

Backgrounds: Gamma: 6475 cpm (Ludlum Model 2221)

Beta: 47 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-18-10
Signature (Surveyor) [redacted] Date

[redacted] 3-18-10
Signature (Sampler) [redacted] Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 1.5	
0.5							0	↓	
1.0	6142	40	Standard	1.5 – 2.0	6326	64	0	TLS-SS-IA6-22(1.5-2.0)031810	1
2.0	6602	40					0		
3.0	6749	50	Standard	3.0 – 4.0	6426	75	0	TLS-SB-IA6-22(3.0-4.0)031810	3
4.0	6585	60	Standard	4.0 – 5.0	6420	56	0	TLS-SB-IA6-22(4.0-5.0)031810(Chemical)	
5.0							0	No recovery 5.0 – 8.7	
6.0							0	↓	
7.0							0		
8.0							0		
9.0	6483	100	Standard	8.7 – 9.7	6020	60	0	TLS-SB-IA6-22(8.7-9.7)031810	4
10.0							0	No recovery 10.0 – 18.3	
11.0							0	↓	
12.0							0	↓	
13.0							0	↓	
14.0							0	↓	
15.0							0	↓	

Core I.D. Number	IA6-22

ARSEC
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Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
16.0							0	No recovery 10.0 – 18.3	
17.0							0	↓	
18.0	6453	80	Standard	18.3 – 19.3	6453	71	0	TLS-SB-IA6-22(18.3-19.3)031810	2
19.0	6427	80					0	↓	
20.0									

Core I.D. Number	IA6-22

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Soil Core I.D. Number: IA6-B01

SOIL CORE SURVEY FORM

Project Name:	**Tonawanda FUSRAP Landfill Site Operable Unit Remedial Investigation**	**Task Description:**	**Soil Core Gamma Survey**
Contract No:	**W912P4-07-D-0009**	**ARSEC Job Number:**	**Federal –HP-0003**
Delivery Order:	**0003**		

Site Name	**Tonawanda FUSRAP Landfill Site**	
Date of Activity	3-10-10	
Time of Activity	13:50	
Surveyor Name	Dennis Whitlock	
Sampler Name	Matt Walton	
	Northing	**Easting**
Bore Hole Location (As listed in the SAP, Vol. 1)	1092843.18	1066031.87
Was the bore hole re-located due to refusal? (Circle either Yes or No)	Yes	No

Survey Instrumentation

	Instrument 1	**Instrument 2**
Meter Model and Serial No.	Ludlum 2221 / 190191	Ludlum 12 / 186707
Detector Model and Serial No.	Ludlum 44-10 / PR240366	Ludlum 44-9 / PR153296
Calibration Due Date	2-23-11	10-8-10
Detector Window Open or Closed	Open	NA

Surface static gross gamma counts (one minute count), before bore hole drilling: 8697 cpm

Notes and Comments:

Backgrounds: Gamma: 8577 cpm (Ludlum Model 2221)

Beta: 44 cpm (Ludlum Model 12)

4-Gas Monitoring while core is removed from the bore hole (record highest readings).

LEL: <10 % O_2: 20.9 %

H_2S: 0 ppm CO: 0 ppm

NOTE: Core depth on this form begins at the soil surface and ends at the fill/native soil interface.

[redacted] 3-10-10
Signature (Surveyor) [redacted] Date

[redacted] 3-10-10
Signature (Sampler) [redacted] Date

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
0.0							0	No recovery 0.0 – 0.4	
0.5	8961	60	Standard	0.4 – 0.9	8400	70	0	TLS-SS-IA6-B01(0.4-0.9)031010	1
1.0	8927	80					0		
2.0	8784	120	Standard	2.0 – 3.0	7957	54	0	TLS-SB-IA6-B01(2.0-3.0)031010	4
3.0	8526	100					0		
4.0	8919	60					0		
5.2	8932	50					0	No recovery 5.0 – 5.2	
5.7							0	No recovery 5.7 – 6.7	
6.7	8727	50					0		
7.0	8869	80					0		
8.0	8434	80					0		
9.0	8600	110					0		
10.0							0	No recovery 10.0 – 13.3	
11.0							0	↓	
12.0							0	↓	
13.0	8947	60	Standard	13.3 – 14.3	8640	50	0	TLS-SB-IA6-B01(13.3-14.3)031010	3
14.0	8541	60					0		

Core I.D. Number	IA6-B01

ARSEC
2909 North River Road
Port Allen, LA 70767

Form HPM-3-6-1
SOIL CORE GAMMA SURVEY FORM

Depth (Feet)	Core Scan Gamma Reading (cpm)	Core Scan Beta Reading cpm	Sample Description (Standard, Field Duplicate, MS/MSD, QA Split)	Depth Interval of Sample, e.g., 1.0-2.0; 3.5-4.5, etc.	Static Gamma One Minute Count (cpm)	Static Beta One Minute Count (cpm)	PID Reading	Sample I.D. Number	Sample Collection Decision Tree Number (Note 1)
15.0							0	No recovery 15.0 – 16.9	
16.0							0	↓	
17.0	8664	40	Standard	16.9 – 17.9	8568	43	0	TLS-SB-IA6-B01(16.9-17.9)031010	2
18.0	8886	120					0		
19.0	8820	80					0		
20.0	8779	40					0	No recovery 20.0 – 20.4	
21.0	8677	100	Standard	21.0 – 22.0	8687	62	0	TLS-SB-IA6-B01(21.0-22.0)031010	4c
22.0	8488	60					0		
23.0	8578	100					0		
24.0	8618	80					0		
25.0									
				N					
					A				

Core I.D. Number	IA6-B01

Note 1

IA-1 through IA-5 Sampling Protocol

Soil borings will extend through the landfill waste to native soil. Five samples will be collected per soil boring location. In these borings, each sample collected will include a one foot segment of the boring (except for the cores surface, which will include approximately the top 6-inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]
2. A soil sample from the first foot just inside the saturated zone
3. A sample from the first foot of native soil below the landfill waste
4. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil) then the fourth sample interval should be selected at the second highest gamma reading, or by other professional judgment.
5. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above four fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the first foot of native soil, or in the area of the highest gamma instrument reading) then the fifth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

IA-6 Sampling Protocol

Soil borings will extend through the structural fill placed by the Town of Tonawanda to a depth of 12 feet beneath the structural fill. The entire length of the soil cores, including those in the structural fill, will be scanned and considered for potential sample selection. Greater depths will only be obtained if a positive result is obtained in the bottom interval of the soil core during core scanning. Four samples will be collected per soil boring location and will consist of a one foot segment of the boring (except for the cores surface, which will include approximately the top 6 inches of the boring) at the following locations:

1. The core surface [i.e., the top 6 inches of the current landfill surface (0.0 – 0.5 feet bgs)]. If the boring location is on the access road, then the sample will be from the first 6 inches of soil beneath the current road bed material [i.e., below any pavement and gravel base]. The depth of the interface between the road and the soil like materials will be recorded on USACE ENG Form 5056-R or Form 5056A-R. Sample depth will be recorded on the ARSEC Soil Core Survey Form.
2. A soil sample from the first foot just inside the saturated zone. If the saturated zone is not reached in the boring (i.e., it is deeper than the termination depth of the boring), then the sample will be from the bottom one foot of the boring.
3. A one foot sample centered around the core area where the gamma instrument registered the highest reading. If the highest gamma instrument reading interval is the same as any of the above two fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface) then the third sample interval should be selected at the second highest gamma reading, or by other professional judgment.
4. A one foot sample centered around the core area where the beta instrument (i.e., beta scintillator) registered the highest beta reading. If the highest beta reading interval is the same as any of the above three fixed intervals (i.e., the highest scan reading is in either the top 6 inches, or at the saturated zone interface, or in the area of the highest gamma instrument reading) then the fourth sample interval should be selected using the following decision tree:
   a. A one foot sample centered around the core area with the second highest gamma reading,
   b. A one foot sample centered around the core area with the second highest beta reading, or
   c. A one foot core sample using other professional judgment.

Appendix J. USACE ENG Forms 5056-R and 5056A-R

Table of Contents for Appendices I, J and Q

Borehole	Date Drilled	Appendix I - Soil Survey Forms	Appendix J - Geologist Engineering Forms	Appendix Q HP Field Logbooks	Appendix Q Geologist Field Logbooks
IA1-1	3/8/2010	I-8	J-8	Q-55	Q-314
IA1-2	3/8/2010	I-12	J-12	Q-56	Q-315
IA1-3	3/15/2010	I-16	J-16	Q-181	Q-434
IA1-4	3/12/2010	I-20	J-20	Q-69	Q-430
IA1-5	3/16/2010	I-24	J-24	Q-183	Q-436
IA1-6	3/16-17/2010	I-28	J-28	Q-184-185	Q-437-438
IA1-7	3/9/2010	I-32	J-32	Q-57	Q-316
IA1-8	3/10/2010	I-36	J-36	Q-66	Q-426
IA1-9	3/11/2010	I-40	J-40	Q-68	Q-429
IA1-10	3/15/2010	I-44	J-45	Q-180	Q-433
IA1-11	3/12/2010	I-48	J-49	Q-178	Q-431
IA1-12	3/16/2010	I-52	J-52	Q-182	Q-435
IA1-13	3/10/2010	I-56	J-55	Q-62	Q-422
IA1-14	3/9/2010	I-59	J-58	Q-58	Q-317
IA1-15	3/11/2010	I-62	J-61	Q-67	Q-427-428
IA1-16	3/12/2010	I-67	J-65	Q-179	Q-432
IA1-17	3/10/2010	I-71	J-680	Q-63	Q-423
IA1-18	3/9/2010	I-74	J-70	Q-60	Q-420
IA1-19	3/9/2010	I-77	J-72	Q-59	Q-318
IA1-20	3/10/2010	I-80	J-74	Q-65	Q-425
IA1-21	3/10/2010	I-83	J-76	Q-64	Q-424
IA1-22	3/9/2010	I-86	J-78	Q-61	Q-421
IA1-DOE-B01	3/18/2010	I-89	J-80	Q-188	Q-441
IA1-DOE-B02	3/17/2010	I-92	J-83	Q-186	Q-439
IA1-DOE-B03	3/18/2010	I-95	J-86	Q-187	Q-440
IA1-B1	3/26/2010	I-98	J-89	Q-207	Q-461
IA1-B2	3/29/2010	I-102	J-92	Q-239	Q-493
IA1-B3	3/30/2010	I-110	J-96	Q-242	Q-496
IA1-B4	3/29/2010	I-114	J-100	Q-212	Q-466
IA1-B5	3/26/2010	I-118	J-104	Q-235	Q-490
IA1-B6	3/26/2010	I-122	J-108	Q-236-237	Q-491
IA1-B7	3/29/2010	I-126	J-113	Q-210	Q-464
IA1-B8	3/26/2010	I-130	J-117	Q-208	Q-462
IA1-B9	3/26/2010	I-134	J-121	Q-209	Q-463
IA1-B10	3/29/2010	I-138	J-125	Q-211	Q-465
IA1-B11	3/26/2010	I-142	J-129	Q-238	Q-492
IA1-B12	3/30/2010	I-142	J-134	Q-243	Q-497
IA1-B13	3/29/2010	I-146	J-138	Q-241	Q-495
IA1-B14	3/30/2010	I-150	J-142	Q-214-215	Q-467
IA1-B15	3/29/2010	I-154	J-147	Q-240	Q-494
IA1-B16	3/30/2010	I-158	J-151	Q-217	Q-470
IA1-B17	3/30/2010	I-162	J-155	Q-244	Q-498
IA2-1	3/18-19/2010	I-167	J-160	Q-189-190	Q-442-443
IA2-2	3/24/2010	I-170	J-163	Q-200	Q-454
IA2-3	3/23/2010	I-174	J-166	Q-231	Q-486
IA2-4	3/19+24/2010	I-178	J-171	Q-191 + Q-199	Q-444 + Q-453
IA2-5	3/24/2010	I-181	J-174	Q-198	Q-452
IA2-6	3/19/2010	I-184	J-177	Q-165	Q-482
IA2-7	3/22/2010	I-188	J-182	Q-166	Q-446

Table of Contents for Appendices I, J and Q

Borehole	Date Drilled	Appendix I - Soil Survey Forms	Appendix J - Geologist Engineering Forms	Appendix Q HP Field Logbooks	Appendix Q Geologist Field Logbooks
IA2-8	3/22/2010	I-192	J-186	Q-193	Q-447
IA2-9	3/22/2010	I-195	J-189	Q-194	Q-448
IA2-10	3/23/2010	I-198	J-191	Q-195	Q-449
IA2-11	3/23/2010	I-201	J-193	Q-197	Q-451
IA2-12	3/19/2010	I-204	J-195	Q-192	Q-445
IA2-13	3/22/2010	I-208	J-199	Q-228	Q-473
IA2-14	3/24/2010	I-212	J-202	Q-201	Q-455
IA2-15	3/24/2010	I-215	J-205	Q-202	Q-456
IA2-16	3/24/2010	I-218	J-207	Q-203	Q-457
IA2-17	3/25/2010	I-221	J-209	Q-232	Q-487
IA2-18	3/25/2010	I-224	J-211	Q-205	Q-459
IA2-19	3/25/2010	I-227	J-213	Q-204	Q-458
IA2-20	3/25/2010	I-230	J-215	Q-234	Q-489
IA2-21	3/25/2010	I-233	J-217	Q-206	Q-460
IA2-22	3/25/2010	I-236	J-219	Q-233	Q-488
IA2-DOE-B1	3/23/2010	I-239	J-221	Q-196	Q-450
IA2-DOE-B2	3/22/2010	I-242	J-223	Q-229	Q-484
IA2-DOE-B3	3/22/2010	I-245	J-226	Q-230	Q-485
IA3-1	2/15/2010	I-249	J-230	Q-12	Q-261
IA3-2	2/11/2010	I-252	J-233	Q-248	Q-257
IA3-3	2/12/2010	I-256	J-236	Q-11	Q-260
IA3-4	2/11/2010	I-259	J-239	Q-249	Q-255
IA3-5	2/15/2010	I-262	J-242	Q-13	Q-262
IA3-6	2/12/2010	I-265	J-245	Q-9	Q-258
IA3-7	2/15/2010	I-268	J-248	Q-16	Q-263
IA3-8	2/12/2010	I-271	J-251	Q-10	Q-259
IA3-9	2/15/2010	I-274	J-254	Q-17	Q-264
IA3-10	2/11/2010	I-277	J-257	Q-250	Q-256
IA3-11	2/16/2010	I-280	J-260	Q-19	Q-268
IA3-12	2/16/2010	I-283	J-263	Q-14	Q-265
IA3-13	2/16/2010	I-286	J-267	Q-15	Q-266
IA3-14	2/16/2010	I-289	J-270	Q-18	Q-267
IA3-15	2/17/2010	I-292	J-273	Q-23	Q-269
IA3-16	2/17/2010	I-295	J-276	Q-20	Q-270
IA3-17	2/17/2010	I-298	J-279	Q-72	Q-321
IA3-18	2/17/2010	I-301	J-281	Q-73	Q-322
IA3-19	2/18/2010	I-304	J-283	Q-24	Q-273
IA3-20	2/17/2010	I-307	J-286	Q-21	Q-271
IA3-21	2/17/2010	I-310	J-289	Q-74	Q-323
IA3-22	2/17/2010	I-313	J-291	Q-22	Q-272
IA3-B01	3/11/2010	I-316	J-294	Q-121-122	Q-369
IA3-B02	3/11/2010	I-319	J-297	Q-123	Q-370
IA3-B03	3/11/2010	I-322	J-300	Q-124	Q-371
IA3-B04	3/11/2010	I-225	J-303	Q-138	Q-395
IA3-B05	3/11/2010	I-328	J-306	Q-139	Q-396
IA3FL-0	3/4/2010	I-369	J-347	Q-104	Q-356
IA3FL-1	3/5/2010	I-372	J-350	Q-105	Q-357
IA3FL-2	3/4/2010	I-375	J-353	Q-51	Q-310
IA3FL-3	3/4/2010	I-378	J-356	Q-103	Q-355

Table of Contents for Appendices I, J and Q

Borehole	Date Drilled	Appendix I - Soil Survey Forms	Appendix J - Geologist Engineering Forms	Appendix Q HP Field Logbooks	Appendix Q Geologist Field Logbooks
IA3FL-4	3/4/2010	I-381	J-359	Q-50	Q-309
IA3FL-5	3/4/2010	I-384	J-362	Q-49	Q-308
IA3FL-6	3/4/2010	I-387	J-365	Q-102	Q-354
IA3FL-7	3/5/2010	I-390	J-368	Q-52	Q-311
IA3FL-8	3/5/2010	I-393	J-371	Q-107	Q-359
IA3FL-9	3/5/2010	I-396	J-374	Q-54	Q-313
IA3FL-10	3/5/2010	I-399	J-377	Q-106	Q-358
IA3FL-11	3/5/2010	I-402	J-380	Q-53	Q-312
IA3-D1	3/16/2010	I-332	J-305	Q-175	Q-402
IA3-D2	3/15/2010	I-335	J-313	Q-143	Q-401
IA3-D3	3/15/2010	I-338	J-316	Q-148	Q-379
IA3-D4	3/15/2010	I-341	J-319	Q-147	Q-378
IA3-D5	3/15/2010	I-344	J-322	Q-146	Q-377
IA3-D6	3/15/2010	I-347	J-325	Q-145	Q-376
IA3-D7	3/15/2010	I-350	J-328	Q-144	Q-375
IA3-D8	3/12/2010	I-353	J-331	Q-173	Q-374
IA3-D9	3/14/2010	I-356	J-334	Q-142	Q-373
IA3-D10	3/12/2010	I-359	J-337	Q-141	Q-372
IA3-D11	3/11/2010	I-362	J-340	Q-172	Q-398
IA3-D12	3/11/2010	I-365	J-343	Q-140	Q-397
IA4-1	3/3/2010	I-406	J-384	Q-100	Q-351
IA4-2	3/3/2010	I-409	J-387	Q-99	Q-350
IA4-3	3/3/2010	I-413	J-390	Q-99	Q-348-349
IA4-4	3/2/2010	I-416	J-393	Q-43	Q-298-299
IA4-5	3/3/2010	I-420	J-397	Q-48	Q-306-307
IA4-6	3/3/2010	I-424	J-400	Q-101	Q-352-353
IA4-7	3/1/2010	I-428	J-403	Q-40	Q-293-294
IA4-8	3/1/2010	I-433	J-408	Q-93-94	Q-342-343
IA4-9	3/3/2010	I-438	J-413	Q-47	Q-303-305
IA4-10	3/3/2010	I-442	J-417	Q-46	Q-301-302
IA4-11	2/26/2010	I-446	J-421	Q-39	Q-292
IA4-12	not drilled	I-450	J-425	N/A	N/A
IA4-13	3/30/2010	I-451	J-426	Q-216	Q-468-469
IA4-14	3/2/2010	I-455	J-429	Q-97-98	Q-346-347
IA4-15	3/1/2010	I-458	J-432	Q-41-42	Q-295-296
IA4-16	2/26/2010	I-462	J-435	Q-91-92	Q-340-341
IA4-17	2/26/2010	I-467	J-440	Q-38	Q-290-291
IA4-18	3/2/2010	I-472	J-446	Q-45	Q-300
IA4-19	3/1/2010	I-478	J-454	Q-43	Q-297
IA4-20	3/2/2010	I-482	J-458	Q-95-96	Q-344-345
IA4-21	2/18/2010	I-487	J-463	Q-251	Q-325
IA4-22	2/18/2010	I-490	J-466	Q-75	Q-324
IA4-B01	3/9/2010	I-493	J-468	Q-111-112	Q-360-361
IA4-B02	3/9/2010	I-498	J-475	Q-113-114	Q-362
IA4-B03	3/9/2010	I-503	J-481	Q-136	Q-389-390
IA4-B04	3/9/2010	I-508	J-486	Q-137	Q-391
IA4-B05	3/10/2010	I-513	J-492	Q-119-120	Q-367-368
IA5-1	2/24-25/2010	I-518	J-496	Q-87-88	Q-337-338
IA5-2	2/24/2010	I-521	J-498	Q-84-86	Q-335-336

Table of Contents for Appendices I, J and Q

Borehole	Date Drilled	Appendix I - Soil Survey Forms	Appendix J - Geologist Engineering Forms	Appendix Q HP Field Logbooks	Appendix Q Geologist Field Logbooks
IA5-3	2/24/2010	I-527	J-505	Q-82-83	Q-333-334
IA5-4	2/23/2010	I-530	J-506	Q-81	Q-332
IA5-5	2/23/2010	I-536	J-513	Q-80	Q-330-331
IA5-6	2/23/2010	I-541	J-518	Q-32	Q-282
IA5-7	2/23/2010	I-546	J-524	Q-31	Q-281
IA5-8	2/22/2010	I-551	J-528	Q-78-79	Q-328-329
IA5-9	2/25/2010	I-556	J-534	Q-89-90	Q-339
IA5-10	2/25/2010	I-563	J-543	Q-36	Q-288
IA5-11	2/25/2010	I-567	J-546	Q-35	Q-286-287
IA5-12	2/24/2010	I-571	J-549	Q-34	Q-284-285
IA5-13	2/23/2010	I-576	J-556	Q-30	Q-280
IA5-14	2/24/2010	I-580	J-560	Q-33	Q-283
IA5-15	2/22/2010	I-584	J-564	Q-28	Q-277
IA5-16	2/25/2010	I-589	J-569	Q-37	Q-289
IA5-17	2/22/2010	I-595	J-576	Q-29	Q-278-279
IA5-18	2/19/2010	I-600	J-582	Q-27	Q-276
IA5-19	2/18/2010	I-605	J-586	Q-26	Q-275
IA5-20	2/19/2010	I-608	J-589	Q-76	Q-326
IA5-21	2/18/2010	I-613	J-594	Q-25	Q-274
IA5-22	2/22/2010	I-616	J-598	Q-77	Q-327
IA5-B01	3/10/2010	I-620	J-602	Q-117-118	Q-365-366
IA5-B02	3/10/2010	I-624	J-605	Q-115-116	Q-363-364
IA5-B03	3/10/2010	I-627	J-608	Q-170-171	Q-393-394
IA6-1	3/19/2010	I-633	J-616	Q-227	Q-481
IA6-2	3/19/2010	I-636	J-618	Q-226	Q-480
IA6-3	3/19/2010	I-639	J-622	Q-163-164	Q-416-417
IA6-4	3/19/2010	I-642	J-625	Q-161-162	Q-415
IA6-5	3/18/2010	I-645	J-626	Q-159-160	Q-413-414
IA6-6	3/18/2010	I-649	J-630	Q-157-158	Q-411-412
IA6-7	3/18/2010	I-653	J-633	Q-155-156	Q-409-410
IA6-8	3/18/2010	I-657	J-634	Q-153-154	Q-407-408
IA6-9	3/18/2010	I-661	J-635	Q-152	Q-406
IA6-10	3/17/2010	I-665	J-638	Q-151	Q-405
IA6-11	3/16/2010	I-669	J-644	Q-150	Q-404
IA6-12	3/16/2010	I-673	J-647	Q-149	Q-403
IA6-13	3/16/2010	I-677	J-650	Q-125-126	Q-380-381
IA6-14	3/16-17/2010	I-681	J-654	Q-127-128	Q-473
IA6-15	3/8/2010	I-685	J-658	Q-110	Q-388
IA6-16	3/8/2010	I-689	J-661	Q-109	Q-387
IA6-17	3/8/2010	I-692	J-664	Q-108	Q-384
IA6-18	3/17/2010	I-696	J-668	Q-129	Q-474
IA6-19	3/18/2010	I-700	J-672	Q-130	Q-475
IA6-20	3/18/2010	I-704	J-675	Q-131-132	Q-476-477
IA6-21	3/18/2010	I-708	J-679	Q-133	Q-478
IA6-22	3/18/2010	I-711	J-682	Q-225	Q-479
IA6-B01	3/10/2010	I-715	J-685	Q-169	Q-392

Table of Contents for Appendices I, J and Q

Borehole	Date Drilled	Appendix I - Soil Survey Forms	Appendix J - Geologist Engineering Forms	Appendix Q HP Field Logbooks	Appendix Q Geologist Field Logbooks
Temporary Well Points					
TWP-1	4/1/2010			Q-222	Q-505
TWP-2	4/1/2010			Q-221	Q-506
TWP-3	3/31/2010			Q-219	Q-501
TWP-4	4/1/2010			Q-220	Q-502
TWP-5	4/1/2010			Q-220	Q-502
TWP-6	3/31/2010			Q-218	Q-500
TWP-7	3/31/2010			Q-218	Q-500
TWP-8	4/1/2010			Q-221	Q-503
TWP-9	4/2/2010			Q-246	Q-507
TWP-10	4/1/2010			Q-222	Q-506
TWP-11	4/2/2010			Q-246	Q-508
TWP-12	4/2/2010			Q-247	Q-509
TWP-13	3/31/2010			Q-245	Q-499
TWP-14	4/2/2015			Q-247	Q-510

USACE ENG HTRW Forms
Investigative Area 1

HTRW DRILLING LOG

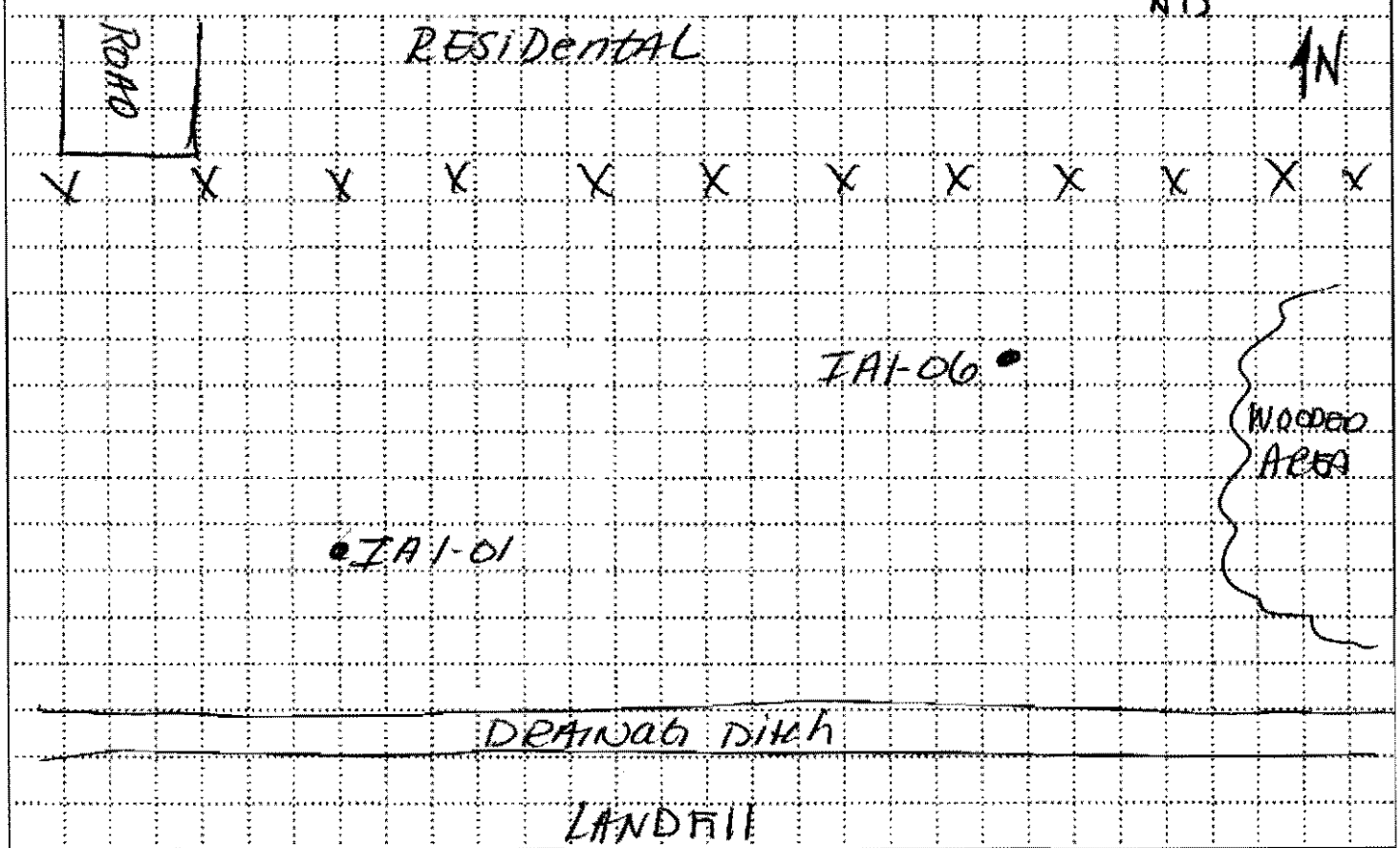
DISTRICT: Buffalo		HOLE NUMBER: IA1-D1
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 4 SHEETS
3. PROJECT: TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: [redacted]	6. MANUFACTURER'S DESIGNATION OF DRILL: Geoprobe 6620DT	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: ~~3 1/4" CASING~~ 3" CORE w/ ~~3/4" PLASTIC SLEEVE~~ MACRO CORE	8. HOLE LOCATION: N 1093062.69 E 1065749.26	
	9. SURFACE ELEVATION:	
	10. DATE STARTED: 3/8/10 9:15am	11. DATE COMPLETED: 3/8/10 11:05am
12. OVERBURDEN THICKNESS: 23.8'	15. DEPTH GROUNDWATER ENCOUNTERED: 21.8'	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 28.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP TOTAL	TCLP TOTAL	SVOC TCLP	Pest TOTAL	PCB TOTAL	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
CUTTINGS DRUMMED	—	—	—	[redacted]

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT	HOLE NO
TON LF - Buffalo DISTRICT FUSRAP PROJECT	IA1-D1

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER IA1-01

SHEET 2 OF 4

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e) J	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B/J 1mm static count
	0	NO RECOVERY	NO RECOVERY		SEE NOTES		
	1	Fill: Dark brown clay, gravel (<1"), brick, waste (ash, glass), course sand, some sand, loose-stiff, moist	60	4898			Top 6" 60/4566 (0.8-1.3')
	2		80	5075			
	3		60	4692			
Recovery 40"	4		120	4899			
	5	NO RECOVERY	NO RECOVERY				
	6	Fill: gravel (<½"), course sand, trace brown clay, waste (ash, glass), brick, stiff, moist	100	5143			
	7		160	5846			
Recovery 31"	8		100	5704			
	9	NO RECOVERY	NO RECOVERY				
	10						

PROJECT

HOLE NO. IA1-01

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: JA1-01

PROJECT:

INSPECTOR: [redacted]

SHEET 3 OF 4

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) PB	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h) Bb immunoassay
	10				SEE NOTES		
		NO RECOVERY	NO RECOVERY				
	11						
Recovery 0"	12						
	13						
	14						
	15	FILL: COURSE SAND, GRAVEL (<1"), WASTE (ASH, GLASS), brick, loose, moist	80	5480			
Recovery 24"	16						
	17	NO RECOVERY	NO RECOVERY				
	18						
	19	FILL: COURSE + fine SAND, WASTE (ASH, GLASS, metal, plastic), brick, very loose, moist	120	5456			
Recovery 24"	20		160	5803			High B 82/7330 (JA-20')

PROJECT: TON. LF BUFFALO DISTRICT FUSRAP PROJECT

HOLE NO. JA1-01

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR K Hoelscher

HOLE NUMBER IA1-01

SHEET 4 OF 4

ELEV. (e)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e) γ	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B/γ 1 min static count
	20	No Recovery	No Recovery		SEE NOTES		
	21						
	22	FILL: waste (ASH, glass), wood, coarse sand, wet, loose	600	11,109			Saturated 702/9285 (21.8-22.8')
	23						High B 116/6232 (22.8-23.8')
							Native 79/5092 (23.8-24.8')
Recovery 30"	24	Reddish-brown silt, clay, coarse + fine sand, trace sand, soft, moist (CL)	200	10,642			Chemical 73/5222 (24.8-25.8')
	25		100	5349			
	26		120	5960			
	27		80	6220			
Recovery 48"	28		80	5861			
	29	Bottom of Boring @ 26.0' Notes: weather sunny @ 32°F; PID Reading: 0 ppm; Gamma Reading: 10 ppm	Sample ID (Lab Analysis) TLS-SS-IA1-01 (0.8-1.3') 030810; TLS-SB IA1-01 (21.8-22.8') 030810; TLS-SB IA1-01 (23.8-24.8') 030810; TLS-SB IA1-01 (22.8-23.8') 030810; TLS-SB IA1-01 (19-20') 030810; TLS-SB IA1-01 (24.8-25.8') 030810				Top 6" Saturated; Native; High γ; High B; Chemical
	30						

PROJECT

HOLE NO. IA1-01

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

DISTRICT: Buffalo	HOLE NUMBER: IA1-02	
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 4 SHEETS
3. PROJECT: TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: DAN FERBEL	6. MANUFACTURER'S DESIGNATION OF DRILL: Geoprobe 6620DT	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: ~~3 1/4" CASING 3" CORE w/ 4" PLASTIC SLEEVE~~ 3" MACRO CORE w/ 4" Plastic Sleeve	8. HOLE LOCATION: N 1093062.169 E 1065705.49	
	9. SURFACE ELEVATION:	
	10. DATE STARTED: 3/8/10 1:33pm	11. DATE COMPLETED: 3/8/10 3:15pm
12. OVERBURDEN THICKNESS: 24.8'	15. DEPTH GROUNDWATER ENCOUNTERED: 22.0'	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 28.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

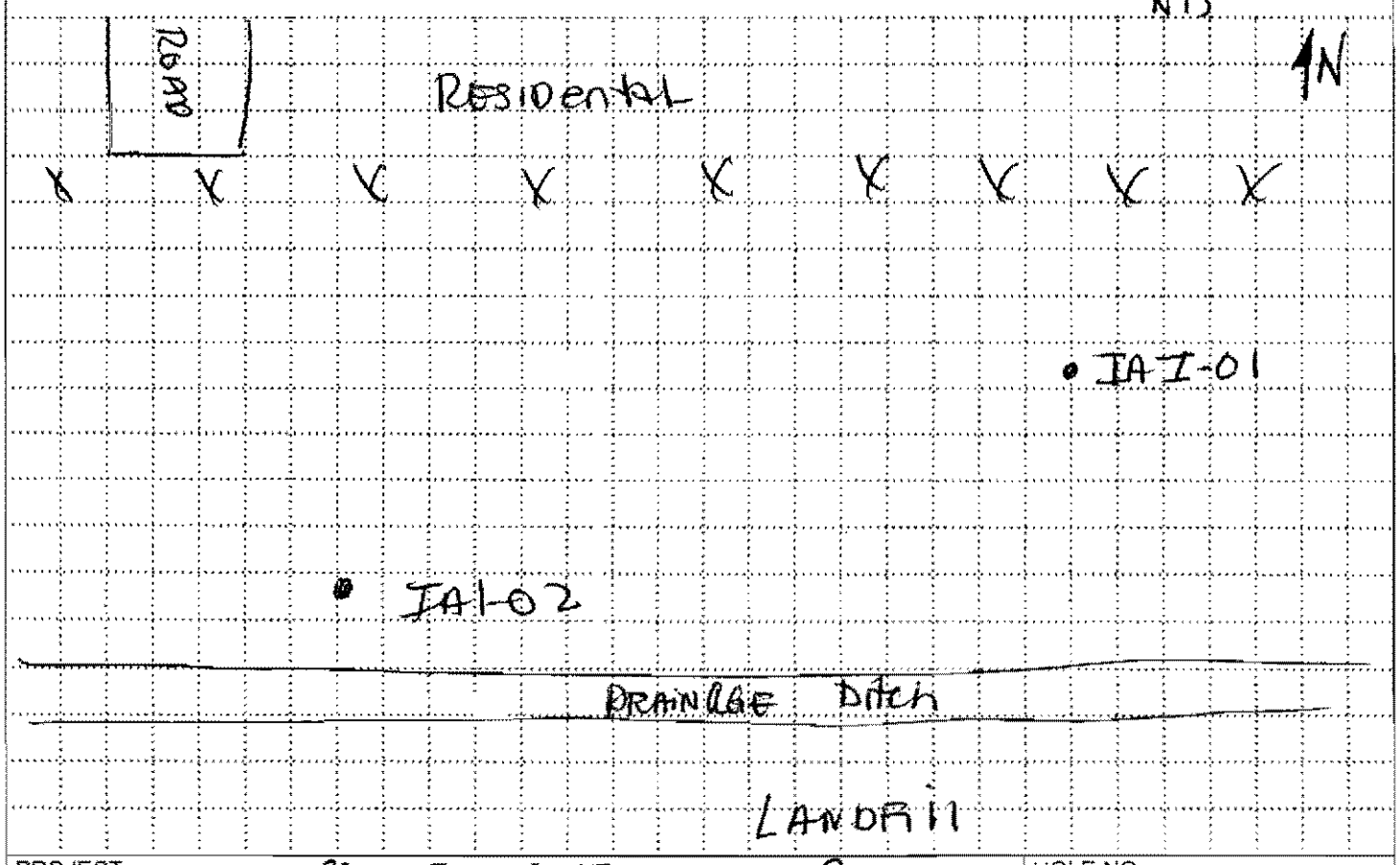
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP TOTAL	TCLP TOTAL	SVOC TCLP	PESTICIDE TOTAL	PCB TOTAL	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
CUTTINGS DRUMMED	—	—	—	[redacted]

LOCATION SKETCH/COMMENTS

SCALE: NTS



PROJECT: TON LF - Buffalo DISTRICT FUSRAP PROJECT

HOLE NO: IA1-02

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: IA1-02

PROJECT:

INSPECTOR: K Hoelscher

SHEET 2 OF 4

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS 5(.) (Lab Sample Count)
	0	No Recovery	No Recovery		See Notes		
		Fill: Reddish brown Top Soil, organic matter, Rootlets, Soft, moist					Top 6" 69/5683 (.4-1.0')
	1	Fill: WASTE (ASH, glass), Course SAND, fine SAND, loose, moist	100	5590			
	2		80	5861			
	3		100	6073			
Recovery 43"	4	Fill: WASTE (ASH), gravel (<2"), Soft, moist	80	6086			
		No Recovery	No Recovery				
	5	Fill: WASTE (ASH, glass), gravel (<2"), Course SAND, loose, moist	80	6798			
	6		100	6124			
	7		100	6267			
Recovery 44"	8		120	6628			
	9	No Recovery	No Recovery				
	10						

PROJECT: TCU of Buffalo District Cleanup Project

HOLE NO. IA1-02

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: IA1-02

PROJECT:

INSPECTOR: K Hoelscher

SHEET 3 OF 4

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h) B1
	10				SEE NOTES		
	11	NO RECOVERY	NO RECOVERY				
Recovery 0"	12						
	13						
	14						
	15						
Recovery 0"	16						
	17						
	18						
	19	Fill) WASTE (ASH, GLASS, plastic), COURSE + fine SAND, brick, gravel (<1"), loose, moist	200	7166			High B 154/6871 (18.3-19.3')
Recovery 22"	20		180	6652			

PROJECT: TOWN OF BUFFALO DISTRICT FUSTIPP Project

HOLE NO: IA1-02

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: JA1-02

PROJECT:

INSPECTOR: Kirkeeper

SHEET 4 OF 4

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e) J	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B/J
	20				SEE NOTES		
		NO RECOVERY	NO RECOVERY				
	21						
	22	FILL (WASTE (ASH, GLASS), WOOD, COURSE + FINE SAND, GRAVEL (<1"), LOOSE, MOIST - WET	140	6805			High J 637/6871 (22.7-23.7')
	23		450	8101			SATURATED 98/6875 (22-22.7')
RECOVERY 30"	24		200	7010			Chemical 156/7268 (23.7-24.7')
		NO RECOVERY	NO RECOVERY				
	25	REDDISH BROWN CLAY, COURSE + FINE SAND, SOFT, MOIST (CL)	80	5607			NATIVE 57/5488 (24.8-25.8')
	26		100	5748			
	27						
RECOVERY 40"	28		60	6807			
		Bottom of Boring @ 28.0'					
		NOTES Weather: sunny, 32°F PID Reading: 0 ppm Gamma Reading: count/min	Sample ID (RAD ANALYSIS) TLS SS-JA1-02 (0.4-1.0') 030810 TLS-SB JA1-02 (22.7-23.7) 030810 TLS-SB JA1-02 (18.3-19.3) 030810 TLS-SB JA1-02 (22-22.7) 030810 TLS-SB JA1-02 (23.7-24.7) 030810 TLS-SB JA1-02 (24.8-25.8) 030810				TOP 6" High J High B Saturated Chemical NATIVE
	29						
	30						

PROJECT: TLF Burrow Disposal Area RI/FS Project

HOLE NO. JA1-02

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

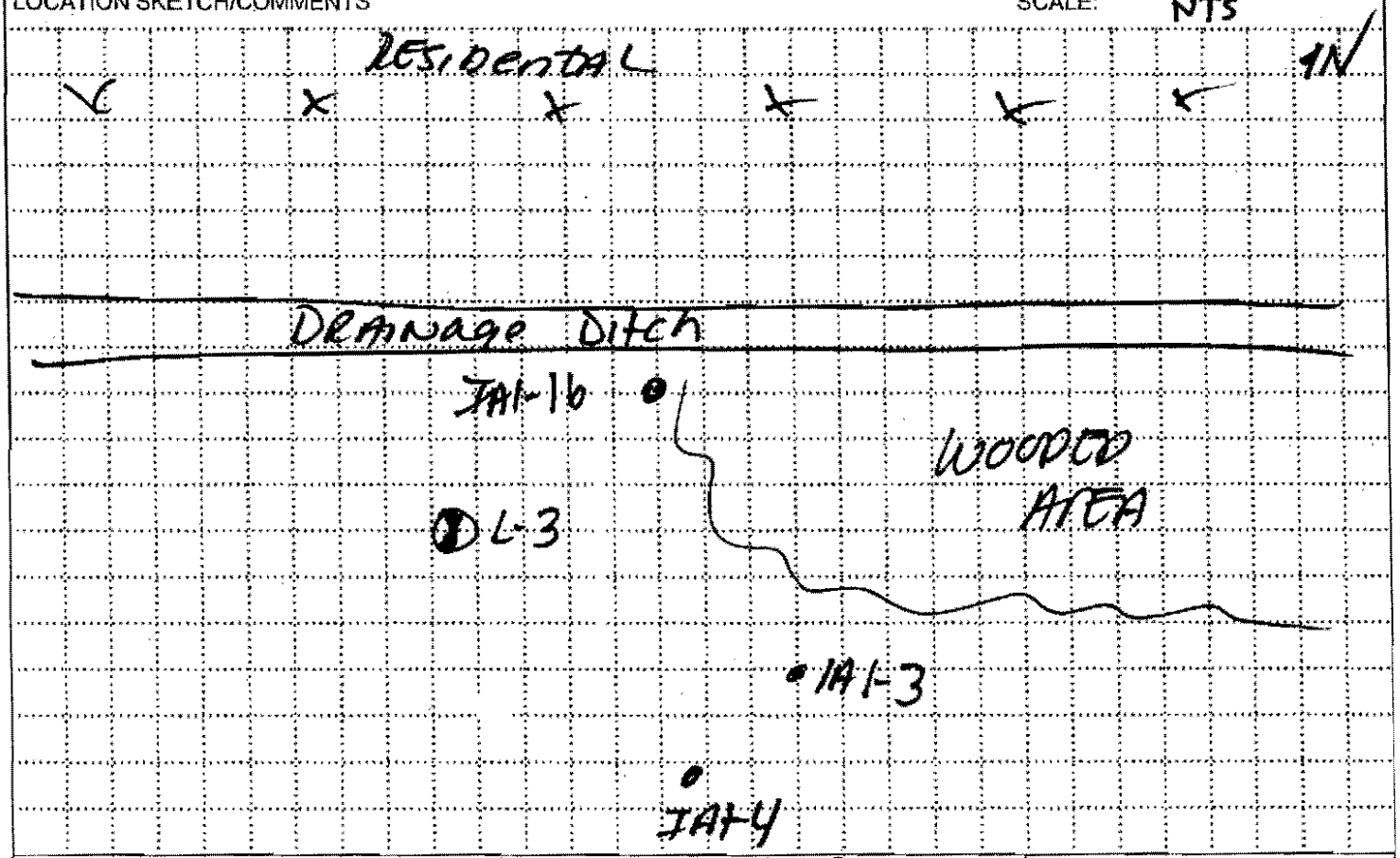
DISTRICT: Buffalo		HOLE NUMBER: JA1-3
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 4
3. PROJECT: TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: [redacted]	6. MANUFACTURER'S DESIGNATION OF DRILL: 6620 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 2" MACRO CORE w/ 4" PLASTIC SLEEVE	8. HOLE LOCATION: N= 1093106.46 E= 1005880.57	
	9. SURFACE ELEVATION: N/A	
	10. DATE STARTED: 3/15/10 1355	11. DATE COMPLETED: 3/15/10 4:30
12. OVERBURDEN THICKNESS: 24.1'	15. DEPTH GROUNDWATER ENCOUNTERED: 18.1'	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 28.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP / TOTALS	TCLP / TOTALS	SVOC-TCLP / TOTALS	PEST-TCLP / TOTALS	PCB-TOTALS	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	2[redacted]
CUTTINGS DRUMMED	-	-	-	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON LF- Buffalo DISTRICT FUSRAP PROJECT — HOLE NO: JA1-3

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER JA1-3

SHEET 2 OF 4

REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	SAMPLE OR CORE BOX NO. (e) B	CONDITIONAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h)
	0	NO RECOVERY	NO RECOVERY		SEE NOTE		
	1						
		Fill: Brown clay, silt, gravel (1/2"), rootlets, moist, stiff	70	5087			Top 6" 74 (0.2-1.5) 5449
	2						
	3	Fill: Course + fine sand, waste (glass, ash), brick, loose, moist	80	5022			
33"	4	Fill: white + black ash, wood, soft, moist	60	5271			
	5	NO RECOVERY	NO RECOVERY				
	6						
	7	Fill: Course + fine sand, gravel (1/2"), waste (white ash), soft, moist	100	5768			
15"	8						
	9	NO RECOVERY	NO RECOVERY				
	10						

PROJECT

HOLE NO. JA1-3

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER JA1-3

SHEET 3 OF 4

REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC REMARKS COUNTS (h)
	10	NO Recovery	No Recovery		See NOTES		
	11						
16"	12	Fill: Course + fine sand, gravel (1/4"), wood (ash), loose, moist	60	5328			
	13	NO Recovery	No Recovery				
	14						
	15	Fill: Black clay, sand, gravel (1/2"), wood, waste (ash, glass), slag, loose, moist	80	5665			
24"	16		60	5760			Chemical 892/17,312 (15.5-16'/17.6-18.1')
	17	NO Recovery	No Recovery				
	18	Fill: Course + fine sand, waste (ash, metal, glass), gravel (1/4"), loose, wet	1200	21,179			SATURATED 1179/27,250 (18.1-18.1')
30"	19		500	10528			High B - 719/14719 (18.1-20/24-24.1)
	20						

PROJECT

HOLE NO. JA1-3

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER JA1-3

SHEET 4 OF 4

RECID ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) 8	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	20	NO RECOVERY	NO RECOVERY		SEE NOTES		
	21					3ppm	
	22						
	23						
6"	24						
	25	REDISH-brown silt, trace sand, fine sand, gravel (4"), strong odor, (LL)	80	6672			Nature 89 (24.1-25.1) 6198
	26		100	7510			
	27		100	8094			High γ 64 (26-27') 7880
48"	28		120	6126			
	29	Bottom of Boring @ 28.0' NOTES: weather; cloudy 35°F PID reading: 3ppm (20-24)					
	30	Gamma: cant/min.					

Sample ID (Lab. Analysis)
TCS-SS-JA1-3(1.2-1.7')031510 TOP 6"
TCS-SB JA1-3(26-27') 031510 High γ & duplicate
TCS-SB JA1-3(18.1-20/24-24.1) 031510 High B
TCS-SB JA1-3(24.1-25.1) 031510 Nature
TCS-SB JA1-3(18.1-18.1) 031510 Saturated
TCS-SB JA1-3(15.3-16.1/16-18.1) 031510 chemical

PROJECT

HOLE NO. JA1-3

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

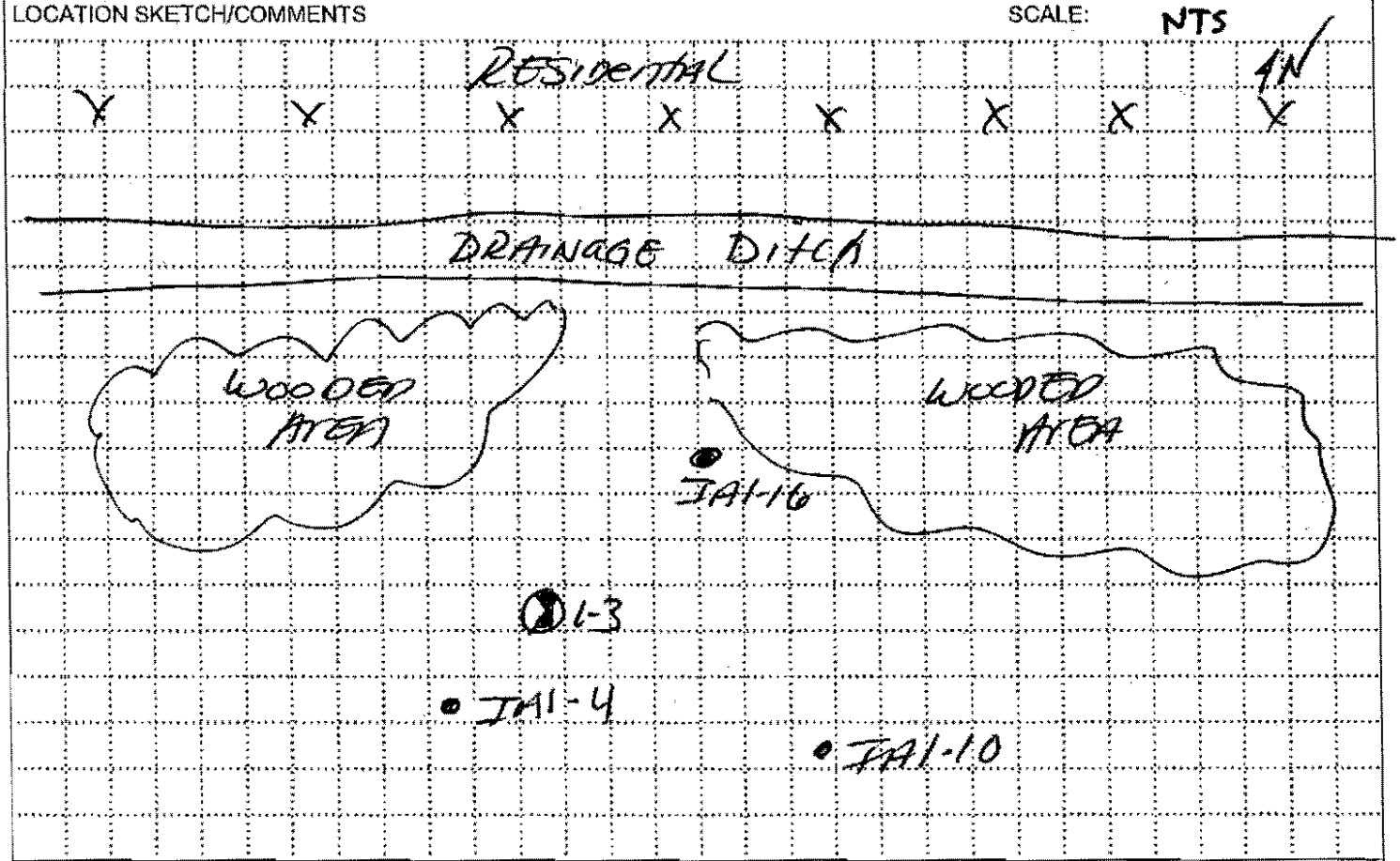
DISTRICT: Buffalo	HOLE NUMBER: IA1-4	
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 4
3. PROJECT: TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: DAN FERREL	6. MANUFACTURER'S DESIGNATION OF DRILL: 6620 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: ~~3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE~~ 3" MACRO CORE w/ 4' plastic sleeve	8. HOLE LOCATION: N=1093106.46 E=1065836.8	
	9. SURFACE ELEVATION: N/A	
	10. DATE STARTED: 3/12/10 855am	11. DATE COMPLETED: 3/12/10 1052am
12. OVERBURDEN THICKNESS: 22.8'	15. DEPTH GROUNDWATER ENCOUNTERED: 21.3'	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 24.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP / TOTALS	TCLP / TOTALS	SVOC-TCLP / TOTALS	PEST-TCLP / TOTALS	PCB-TOTALS	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIG[redacted]
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT	HOLE NO
TON LF - Buffalo DISTRICT FUSRAP PROJECT	IA1-4

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR K Hoelscher

HOLE NUMBER IA1-4

SHEET 2 OF 4

RECID (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS REMARKS (h)
	0	NO RECOVERY	NO RECOVERY		SEE LOGS		
	1	Fill: organic matter, rootlets, soft, loose	80	6287			Top 64 (1.1-1.6') 62/6192
	2	Fill: Brownish-red sand, course + fine sand, waste (ash, glass), slag, gravel (<1") loose, moist	40	6451			
	3		100	6831			
36"	4						
	5	NO RECOVERY	NO RECOVERY				
	6						
	7	Fill: course sand, gravel (<1"), waste (ash, glass), loose, moist	140	7328			Chemical (6.7-7.7') 62/6714
16"	8						
	9	NO RECOVERY	NO RECOVERY				
	10						

PROJECT

HOLE NO. IA-4

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER IA1-4

SHEET 3 OF 4

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC REMARKS COUNTS (h)
	10	NO RECOVERY	NO RECOVERY		SEE NOTES		
	11	FILL: COURSE + FINE SAND, gravel (<1"), waste ash, glass), brick, loose, moist	100	7537			High γ 71/6642 (10.8-11.8')
15"	12						
	13	NO RECOVERY	NO RECOVERY				
	14						
	15						
0	16						
	17						
	18	FILL: COURSE + fine SAND, gravel (<1"), brick, waste (ash, glass), slag, loose, soft					
	19		120	7113			
28"	20		300	7013			High B 122/6775 (19-20)

PROJECT

HOLE NO. IA1-4

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR K Hoelscher

HOLE NUMBER JA1-4

SHEET 4 OF 4

RECIO ~~CHEM~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) 8	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	20	FILL: NO RECOVERY	NO RECOVERY		See NOTES		
	21	FILL: WOOD, COARSE SAND, WASTE (ASH), BRICK, LOOSE MOIST	220	6560			
	22	FILL: brown clay, COARSE SAND, waste (GLASS, ASH), WOOD, med. STIFF, moist	80	6628			
			60	6192			SATURATED 67 (21.3-22.3') 6433
	23	REDISH brown clay, SOME SAND, trace silt, COARSE + fine SAND, SOFT, moist (ML)	80	6382			NATIVE 77 (22.8-23.8') 6571
4.5"	24	Bottom of Boring @ 24.0'					
	25	NOTES					
	26	-weather: RAIN, 58°F -PID reading: 0ppm -Gamma Reading: COUNT/MIN					
	27	SAMPLE ID (RAD. ANALYSIS) TCS-SS-JA1-4 (11-11.6') 031210 Fill TCS-SB-JA1-4 (22.3-23.8') 031210 Native					
	28	TCS-SB-JA1-4 (21.3-22.3') 031210 SATURATED TCS-SB-JA1-4 (19-20') 031210 HighB TCS-SB-JA1-4 (10.8-11.8') 031210 HighB TCS-SB-JA1-4 (6.7-7.7') 031210 CHEMICAL					
	29						
	30						

PROJECT

HOLE NO. JA1-4

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

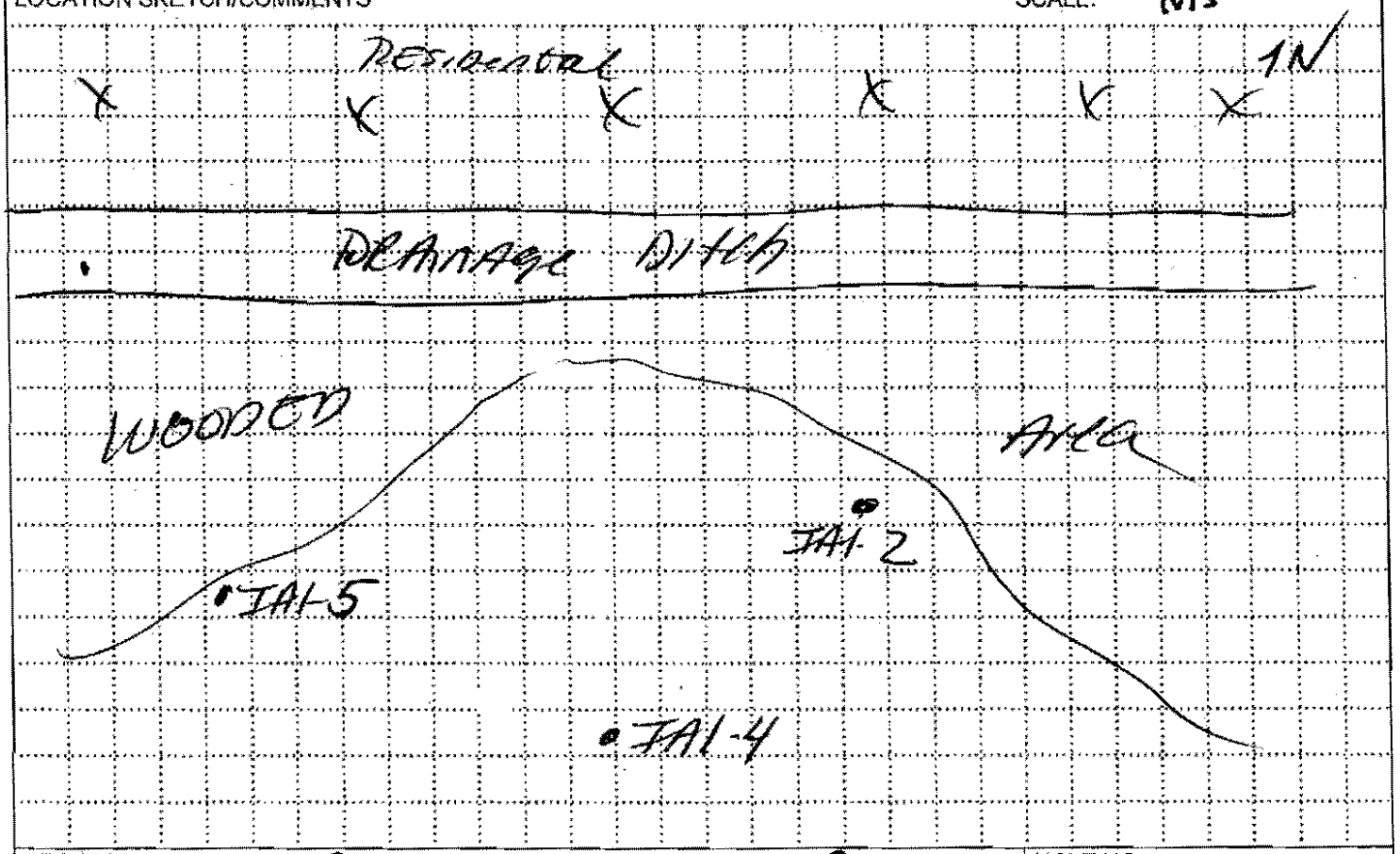
DISTRICT: Buffalo		HOLE NUMBER: IA1-5
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 4 SHEETS
3. PROJECT: TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: Dan FERRON	6. MANUFACTURER'S DESIGNATION OF DRILL: 1620 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: ~~3¼" CASING, 2" CORE w/ 5' PLASTIC SLEEVE~~ 3" MacroCore w/ 4" plastic Sleeve	8. HOLE LOCATION: N= 1093106.46 E= 1065793.03	
	9. SURFACE ELEVATION: N/A	
	10. DATE STARTED: 3/16/10 1032hr	11. DATE COMPLETED: 3/16/10 1150hr
12. OVERBURDEN THICKNESS: 24.0'	15. DEPTH GROUNDWATER ENCOUNTERED: 14.6'	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 28.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	–	–	–	–	–	N/A

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIG[redacted]
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON LF- Buffalo DISTRICT FUSRAP PROJECT — HOLE NO. IA1-5

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER JAI-5

SHEET 2 OF 4

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC READINGS COUNTS (h)
	0	NO Recovery	NO Recovery		SEE NOTE		
	1	FILL: Dark brown topsoil, organic matter, rootlets, moist, loose	80	9531			Top 6" 74 / 8179 (1-1-F)
	2	FILL: black-gray coarse sand, gravel (1½"), brick, rootlets, organic matter, loose, moist	200	22,105			
36"	4		10,000	168,780			High γ 16,334 / 284,073
	5	NO Recovery	NO Recovery				
	6	FILL: gray coarse & fine sand, gravel (1½"), waste (ash, brick), loose, moist	600	11804			
	7		450	22657			
36"	8		1000	57467			High B - 1558 / 66819
	9	NO Recovery	NO Recovery				
	10						

PROJECT

HOLE NO. JAI-5

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER JA1-5

SHEET 3 OF 4

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) 8	DEPTH/SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC READING COUNTS (h)
	10	FILL: gray coarse + fine sand, brick, slag, waste (ash), concrete, reddish-orange cake like material, sand, loose, moist			See NOTES		
	11		200	13558			
24"	12		250	14815			
	13	NO Recovery	NO Recovery				
	14						
	15	FILL: coarse + fine sand brick, slag, reddish-orange cake like material sand, waste (gray ash, glass), loose moist-wet	180	12449			SATURATED 384 (11.6-15.6) 16471
17"	16						
	17	NO Recovery	NO Recovery				
	18						
	19	FILL: Black coarse + fine sand, sand, gravel (1 1/2"), slag, waste (ash, glass), brick, loose, moist	450	13,085			
22"	20						

PROJECT

HOLE NO JA1-5

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER TAI-5

SHEET 4 OF 4

RECID ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) 8	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	20	NO Recovery	NO Recovery		SEE NOTES		
	21						
	22						
	23						
12"	24	Fill coarse & fine sand (Black), slag, waste (ash, glass rose, moist	900	10745			
	25	Reddish brown silt, clay, submanded gravel, some sand, fine gravel, moist stiff (CL)	180	7404			Native 89 (24-25') 6787
	26		80	7319			
	27		60	7466			
26'	28		80	7906			
	29	Bottom of Boring @ 28.0' NOTES: Weather sunny 60°F PID Reading open Gamma Reading count/min	SAMPLE ID (RAD ANALYSIS) TLS-SS-TAI-5 (1-1.5') 031610 Top 6" TLS-SB TAI-5 (3-4') 031610 High TLS-SB TAI-5 (7-8') 031610 High TLS-SB TAI-5 (14.6-15.6') 031610 Saturated TLS-SB TAI-5 (24-25') 031610 Native				
	30						

PROJECT

HOLE NO. TAI-5

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

DISTRICT	Buffalo
HOLE NUMBER	IA1-6
1. COMPANY NAME	ENSOL, INC.
2. DRILLING CONTRACTOR	ZEBRA ENVIRONMENTAL CORP.
SHEET / SHEETS	1 OF 4
3. PROJECT	TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT
4. LOCATION	TONAWANDA LF, TONAWANDA, NY
5. NAME OF DRILLER	Dan Ferrel
6. MANUFACTURER'S DESIGNATION OF DRILL	U620DT GEOPROBE
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	3" MACRO CORE w/ 4" PLASTIC SLEEVE
8. HOLE LOCATION	N= 1093106.46 E= 1065749.26
9. SURFACE ELEVATION	
10. DATE STARTED	3/17/10 9:00AM
11. DATE COMPLETED	3/17/10 1105AM
12. OVERBURDEN THICKNESS	26.8'
15. DEPTH GROUNDWATER ENCOUNTERED	25.8'
13. DEPTH DRILLED INTO ROCK	N/A
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	N/A
14. TOTAL DEPTH OF HOLE	28.0'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	N/A

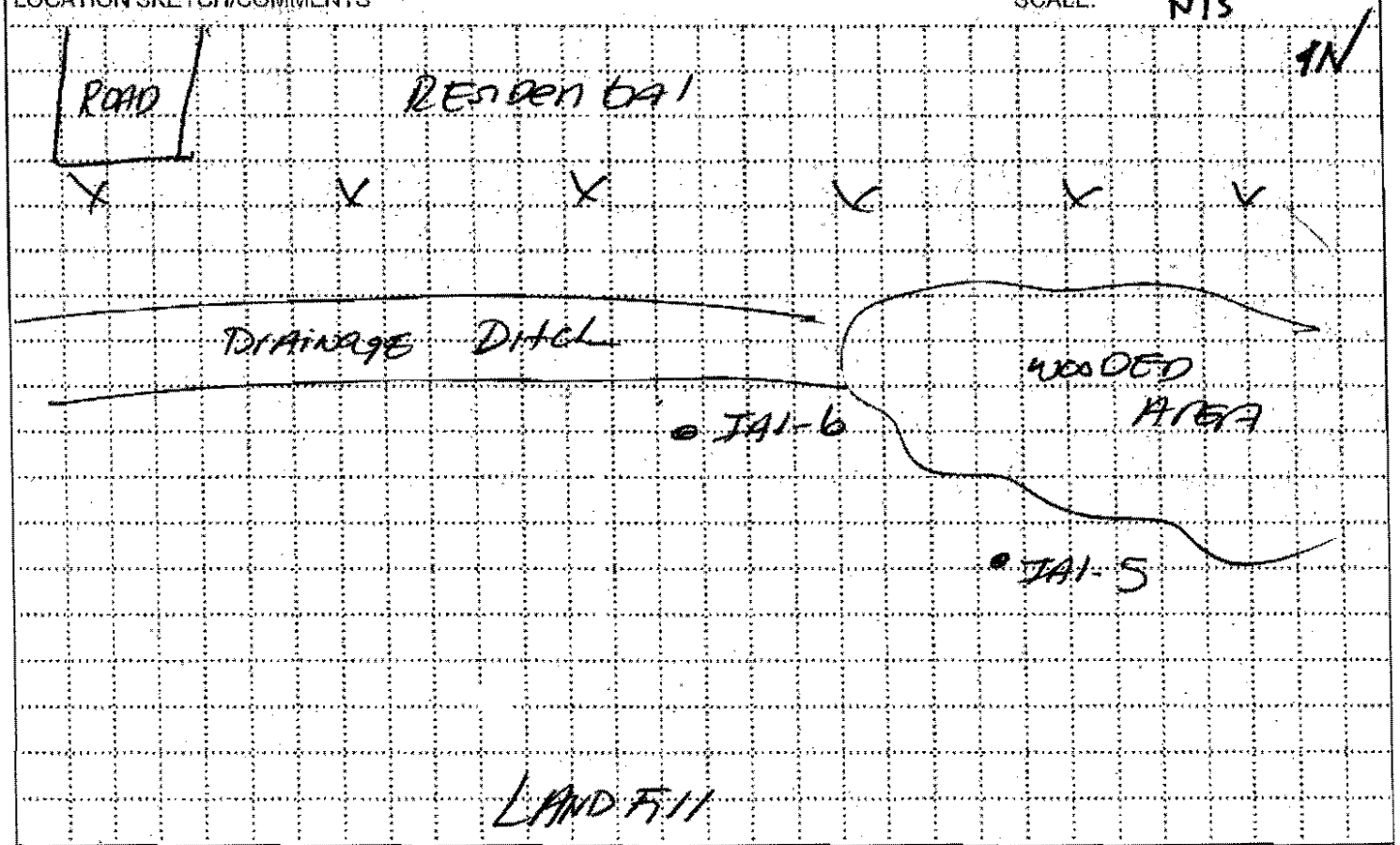
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP / TOTALS	TCLP / TOTALS	SVOC-TCLP / TOTALS	PCB-TCLP / TOTALS	PCB-TOTALS	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	2[redacted]
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS

SCALE: NTS



PROJECT	HOLE NO
TON LF- Buffalo DISTRICT FUSRAP PROJECT	IA1-6

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR K Hoelscher

HOLE NUMBER IA1-6

SHEET 2 OF 4

REC'D ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) 8	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS ~~REMARKS~~ (h)
	0	NO Recovery	NO Recovery		SEE NOTE		
	1						
		Fill: DARK brown topsoil organic matter rootlets gravel (<1/4"), loose, moist	80	5500			Top 6" 41 (22-1.7) 6178
	2						
		Fill: course + fine sand, gravel (<1"), brick, waste (ash, glass), wood loose, moist	100	6255			
	3						
			420	6973			Hole B 387/8112 (6.4-7.4)
	4						
		NO Recovery	NO Recovery				Channel 85/7853
	5						
		Fill: course & fine sand, gravel (<1 1/2"), brick, waste (ash, glass), loose, moist	160	7886			
	6						
			160	7815			
	7						
			200	7132			
	8						
		NO Recovery	NO Recovery				
	9						
	10						

PROJECT

HOLE NO. IA1-6

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER JA1-6

SHEET 3 OF 4

~~ELEV~~ REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COMMENTS (h)
	10	NO Recovery	No Recovery		See NOTES		
	11						
0"	12						
	13						
	14	Fill: coarse + fine sand, sand, slag, gravel (<1½"), brick, base, moist	120	7128			
	15		120	7451			
34"	16		140	7027			
	17	NO Recovery	No Recovery				
	18	Fill: coarse + fine sand, sand, brick, waste (ash, glass), slag, loose, moist	120	7108			
	19		140	7135			
33"	20		100	6839			

PROJECT

HOLE NO JA1-6

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT | INSPECTOR [redacted] | HOLE NUMBER JA1-6 | SHEET 4 OF 4

RECID (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h)
	20	No Recovery	No Recovery		SEE NOTES		
	21						
	22						
	23	Fill: coarse + fine sand, slag, wood, gravel (<1/2"), glass, brick, loose, moist	320	7421			
23''	24						
	25	No Recovery	No Recovery				
	26	Fill: Reddish brown silt, sand, clay, waste (glass), gravel (<1"), soft, wet	60	7143			Saturated 58 (25.8-26.8') 6314
	27	Reddish brown clay, silt, trace sand, fine sand, moist stiff	80	7084			Native 44 (26.8-27.8') 6798
27''	28	Bottom of Boring @ 28.0					
	29	NOTES: Weather: sunny; Gamma = count/min; PID Reading: 0 ppm					
	30						

Sample ID (RAD ANALYSIS)

TCS-SS	JA1-6 (1.2-1.7') 031710	Tuff
TCS-SB	JA1-6 (3-4') 031710	High γ
TCS-SB	JA1-6 (6.4-7.4') 031710	High γ
TCS-SB	JA1-6 (25.8-26.8') 031710	Saturated
TCS-SB	JA1-6 (26.8-27.8') 031710	Native
TCS-SB	JA1-6 (6.4-7.4') 031810	Chemical

PROJECT | HOLE NO JA1-6

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

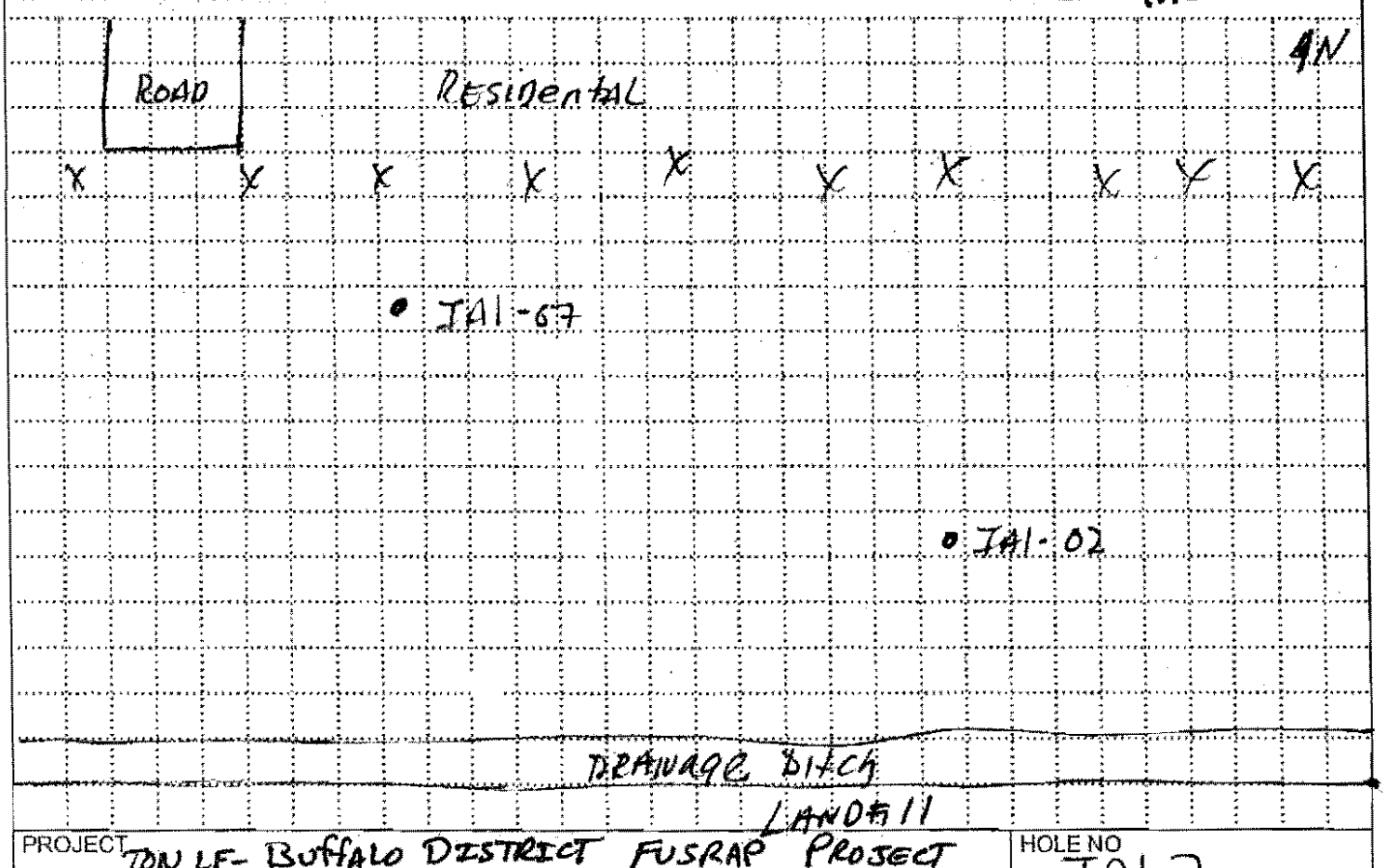
DISTRICT: Buffalo		HOLE NUMBER: IA1-7
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF SHEETS
3. PROJECT: TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: DAN FERREL	6. MANUFACTURER'S DESIGNATION OF DRILL: 6620 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: ~~3 1/4" CASING 2" CORE w/ 5' 4" PLASTIC SLEEVE~~ 2 5/8" CORE in a 3 1/4" CASING w/ 4' plastic sleeve	8. HOLE LOCATION: N= 1093106.46 E= 1065705.49	
	9. SURFACE ELEVATION:	
	10. DATE STARTED: 3/9/10 8:40 am	11. DATE COMPLETED: 3/9/10 10:40 am
12. OVERBURDEN THICKNESS: 21.6'	15. DEPTH GROUNDWATER ENCOUNTERED: Not encountered	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 28.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	-	-	-	-	-	N/A

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23 [redacted]
CUTTINGS DRUMMED	-	-	-	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON LF - Buffalo DISTRICT FUSRAP PROJECT — HOLE NO: IA1-7

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR K Hoelscher

HOLE NUMBER JA1-7

SHEET 2 OF 4

~~ELEV.~~ REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) 8	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	0	NO RECOVERY	NO RECOVERY		SEE NOTES		
	1	Fill: DARK-brown topsoil, ROOTLETS, SOFT, MOIST	60	5579			Top 6" (1-1.5') 28/5250
	2	Fill: reddish brown clay, silt, trace SAND, gravel (coal) COURSE SAND, waste (ASH, GLASS), brick, loose, moist	80	5075			
	3		90	5598			
96"	4		80	5472			
		NO RECOVERY	NO RECOVERY				
	5	Fill: waste (ASH, GLASS), gravel (coal), COURSE SAND, fine SAND, brick, loose - moist - WET	80	5600			SATURATED SUB. (5-6') 64/5455
	6		100	5497			
	7		70	5607			
	8	NO RECOVERY	NO RECOVERY				
36"	9						
	10						

PROJECT

HOLE NO JA1-7

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPEC[redacted]

HOLE NUMBER IA1-7

SHEET 3 OF 4

~~ELEV~~ REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) ~~X~~	GEOTECH SAMPLE OR CORE BOX NO. (e) ~~X~~ B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	10				See Notes		
	11	No Recovery	No Recovery				
0"	12						
	13						
	14						
	15						
0"	16						
	17						
	18	Fill: coarse + fine sand, brick, wood, waste (ash, glass, metal, plastic), loose, wet	120	5636			Hight 52 (17.6-18.6') 5625
	19						HighB 70/ (18.6-19.6') 5577
30"	20		120	5362			

PROJECT

HOLE NO IA1-7

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPEC[redacted]

HOLE NUMBER JA1-7

SHEET 4 OF 4

REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) 8	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h)
	20	NO RECOVERY	NO RECOVERY		See NOTES		
	21	FILL (ASH) CONSE SAND, Clay, waste SOFT, MOIST	100	5057			
	22	REDDISH-BROWN clay, trace SAND, silt, fine SAND, SOFT, MOIST (CL)	80	5329			Native 57 (21.6-22.6') 5396
	23		80	5380			
29''	24		60	5373			
	25	NO RECOVERY	NO RECOVERY				
	26						
	27						
0''	28						
	29	Bottom of Boring @ 28.0' NOTES: -weather: sunny, 32°F -GAMMA Reading: count MIN. -PID Reading: 0ppm	SAMPLE I.D. (RAD. ANALYSIS) TLS-SS-JA1-7(16-1.5')030910 Top 6'' TLS SB JA1-7(16.6-19.6)030910 High B TLS-SB JA1-7(17.6-18.6')030910 High J TLS-SB JA1-7 (21.6-22.6')030910 Native TLS-SB JA1-7(5.0-6.0')030910 Saturated Sub. DILUTED by HP				
	30						

PROJECT

HOLE NO JA1-7

ENG FORM 5058A-R, AUG 94

HTRW DRILLING LOG

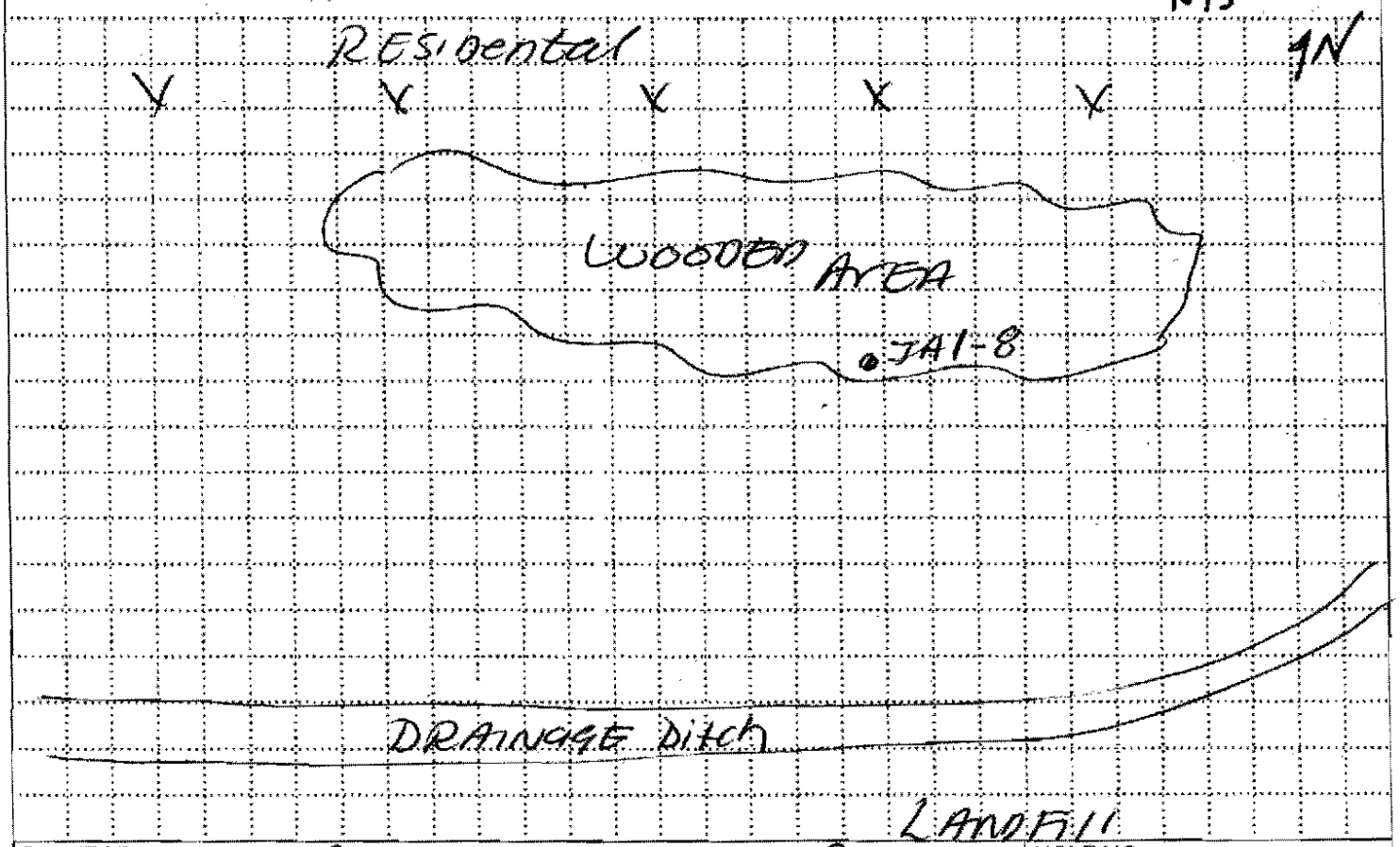
DISTRICT: Buffalo	HOLE NUMBER: JA1-08	
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 4
3. PROJECT: TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: DAN FERREL	6. MANUFACTURER'S DESIGNATION OF DRILL: U620 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: ~~3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE~~ 3" MACRO CORE w/ 4" plastic sleeve	8. HOLE LOCATION: N= 1093150.24 E= 1065968.11	
	9. SURFACE ELEVATION: N/A	
	10. DATE STARTED: 3/10/10 3:10 pm	11. DATE COMPLETED: 3/10/10 4:30pm
12. OVERBURDEN THICKNESS: 24.8'	15. DEPTH GROUNDWATER ENCOUNTERED: NOT encountered	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 28.0	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP / TOTALS	TCLP / TOTALS	SVOC-TCLP / TOTALS	PEST-TCLP / TOTALS	PCB-TOTALS	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON LF - Buffalo DISTRICT FUSRAP PROJECT — HOLE NO: JA1-08

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR K Hoelscher

HOLE NUMBER TA1-8

SHEET 2 OF 4

REC'D ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) 8	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS REMARKS (h)
	0	NO Recovery	NO Recovery		See notes		
	1						
	2	Fill: Dark brown topsoil, rootlets, soft, moist	80	7464			Top 6" 53 (1.5-2') / 7163
	3	Fill: sand, trace reddish-brown clay, waste (ash, glass, plastic), loose, moist	80	7249			High B 64 (3-4') / 7180
	4		140	7199			
		NO Recovery	No Recovery				
	5	Fill: gravel (2½"), waste (ash, glass, metal, plastic), brick, coarse sand, fine sand, loose, moist	100	7358			Saturated sub. 75 (4.7-5.7') 7084
	6		80	7841			High δ 66 (5.7-6.7') / 7340
	7		120	7566			Chemical 67 (6.7-7.7') / 7094
	8						
		NO Recovery	No Recovery				
	9						
	10						

PROJECT

HOLE NO. TA1-8

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER IA1-08

SHEET 3 OF 4

REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h)
	10	No Recovery	No Recovery		See notes		
	11						
	12						
	13						
	14						
	15						
	16						
	17						
	18						
	19						
	20						

PROJECT

HOLE NO. IA1-08

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR K Hoelscher

HOLE NUMBER JAI-8

SHEET 4 OF 4

RECD ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) 8	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	20				See Notes		
	21	NO RECOVERY	NO RECOVERY				
	22						
	23						
	24						
	25	REDISH brown clay, SOME SAND, TRACE SILT, COURSE & fine SAND, SOFT, moist (CL)	60	6973			Native 79 (24.8-25.8) 7345
	26		60	7170			
	27		80	7167			
	28	Bottom of boring	60	6943			
	29	NOTES: -Weather: sunny, 35°F -PID Reading: 0 ppm -Gamma Reading: 10 cpm/min	Sample TOLIAD Analysis TLS-SS-JAI-8(1.5-2.0') 031010 Top 6" TLS SB JAI-8(3-4') 031010 High B TLS SB JAI-8 (4.7-5.7') 031010 SATURATED SUB picked up HP TLS SB JAI-8 (5.7-6.7') 031010 High J TLS SB JAI-8 (6.7-7.7') 031010 Chemical TLS SB JAI-8 (24.8-25.8) 031010 Native				
	30						

PROJECT

HOLE NO. JAI-8

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

DISTRICT: Buffalo		HOLE NUMBER: IA1-9
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF SHEETS
3. PROJECT: TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: DAN FERREL	6. MANUFACTURER'S DESIGNATION OF DRILL: 6620 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: ~~2 1/4" CASING 2" CORE w/5' PLASTIC SLEEVE~~ 3" macrocore w/ 4" plastic sleeve	8. HOLE LOCATION: N= 1093150.24 E= 1065924.34	
	9. SURFACE ELEVATION: N/A	
	10. DATE STARTED: 3/10/10 1:45 pm	11. DATE COMPLETED: 3/11/10 4:00 pm
12. OVERBURDEN THICKNESS: 22.8'	15. DEPTH GROUNDWATER ENCOUNTERED: 21.1	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 31.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

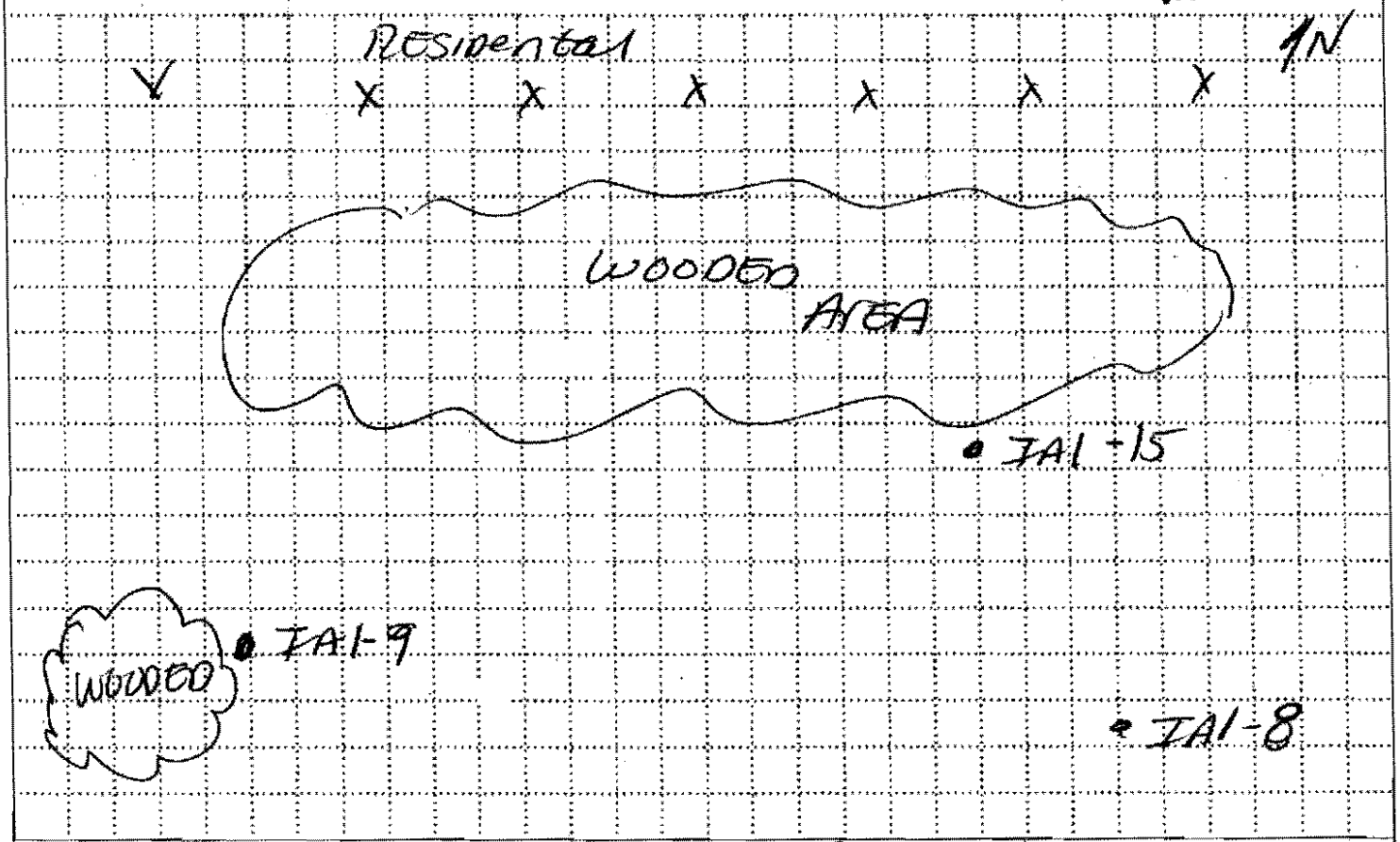
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	–	–	–	–	–	N/A

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)
CUTTINGS DRUMMED	–	–	–

[redacted]

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON LF - Buffalo DISTRICT FUSRAP PROJECT — HOLE NO: IA1-9

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT | INSPECTOR [redacted] | HOLE NUMBER IA1-9 | SHEET 2 OF SHEET

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) 8	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	0–2	NO Recovery	No Recovery		See Notes		
	3	Fill: organic matter, rootlets, waste (ash, glass, concrete), brick, loose sand, loose, moist	100	6714			Top 6" 62/6445 (2.2.6')
24"	4	Fill: concrete, brick, sand, glass, loose, moist	100	6625			
	5	No Recovery	No Recovery				
	6–7	Fill: course & fine sand, sand, waste (ash, glass, metal), loose, moist	100	7314			High B 79/6960 (5.7.6.7')
25"	8		80	7643			High J+D plate (6.7.7.7') 50/7176
	9–10	NO Recovery	NO Recovery				

PROJECT | HOLE NO IA1-9

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER IA1-9

SHEET 3 OF SHEET

REC'D ~~BLOW~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	10	NO Recovery	No Recovery		See notes		
	11						
8"	12						
	13						
	14						
	15						
0"	16						
	17						
	18						
	19						
8"	20	FILL: course + fine sand, brick, glass, loose, moist	80	7112			

PROJECT

HOLE NO. IA1-9

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR K Hoelscher

HOLE NUMBER IAL-9

SHEET 4 OF

RECO ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) 8	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	20	NO Recovery	NO Recovery		See Notes		
	21						
	22	Fill black-brown clay waste (glass, metal, ash), gravel (1/2"), soft, wet	120	6978			Saturation: 58 (21.1-22.1') 6418
	23		100	7086			Natives: 52 (22.8-23.8') 6795
30"	24	reddish-brown clay, sub-rounded gravel (2"), fine sand, some silt, trace sand, soft, moist (CL)	90	6828			
	25	No Recovery	No Recovery				
	26						
	27						
45"	28						
	29	Reddish brown clay, silt, trace sand, sub-rounded gravel (4"), soft, moist (CL)	60	6221			
	30		60	6572			

PROJECT

HOLE NO. IAL-9

ENG FORM 5056A-R, AUG 94

NOTE

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER JA1-9

SHEET 5 OF 5

REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	OR CORE BOX NO. (e)	SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h)
	30	Continue from previous page	See previous page		See Notes		
36"	31		80	6357			
		Bottom of Boring @ 31.0'					
		NOTES:					
	32	Weather - Sunny, 67°F					
		- PID Reading: 0 ppm					
		Gamma Reading: cont/min					
	33	Sample ID (Lab Analysis)					
		TLS-SS JA1-9 (2-2.6') 031110	Top 6"				
		TLSSB JA1-9 (22.8-23.8) 031110	Native				
	34	TLS-SB-JA1-9 (21.1-22.1') 031110	Saturated				
		TLS-SB-JA1-9 (6.7-7.7') 031110	High δ-Duplicate				
		TLS-SB-JA1-9 (5.7-6.7') 031110	High B				
	35						
	36						
	37						
	38						
	39						
	40						

PROJECT

HOLE NO. JA1-9

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

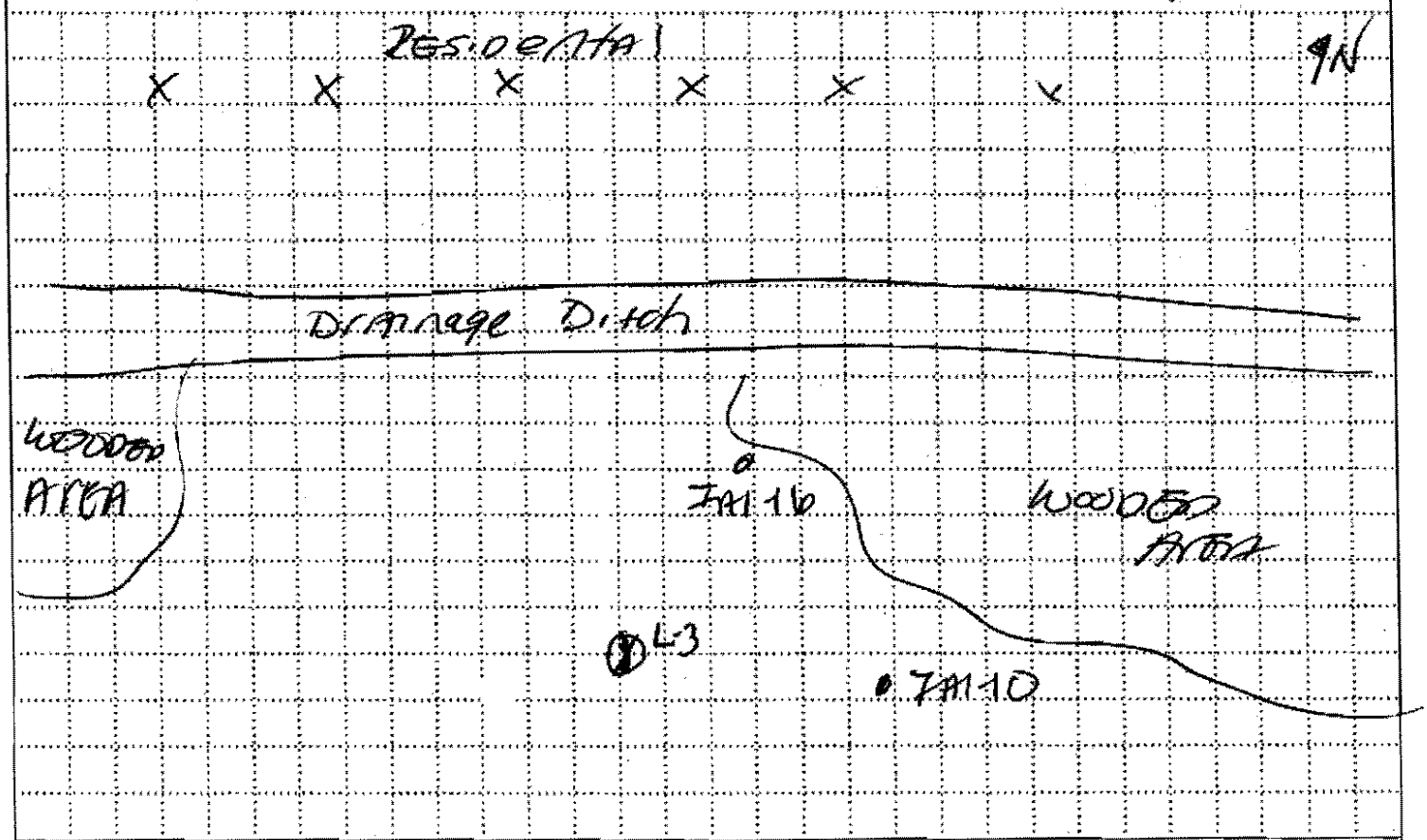
DISTRICT: Buffalo		HOLE NUMBER: TA1-10
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 4
3. PROJECT: TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: DAN Ferrel	6. MANUFACTURER'S DESIGNATION OF DRILL: 6620 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: ~~3 1/4" CASING 2" CORE W/ 5' PLASTIC SLEEVE~~ 2" Macro Core w/4' plastic sleeve	8. HOLE LOCATION: N= 1093130.24 E= 1605880.57	
	9. SURFACE ELEVATION: N/A	
	10. DATE STARTED: 3/15/10 935 Am	11. DATE COMPLETED: 3/15/10 113 Am
12. OVERBURDEN THICKNESS: 20.0	15. DEPTH GROUNDWATER ENCOUNTERED: 17.8'	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 24.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	–	–	–	–	–	N/A

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	[redacted]
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON LF- Buffalo DISTRICT FUSRAP PROJECT — HOLE NO. TA1-10

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER IA 1-10

SHEET 2 OF 4

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	0	NO Recovery	NO Recovery		See NOTE		Top 6" 59/5020 (1-2-1-7")
	1	FILL DARK brown topsoil, organic matter, coal (ST), soft moist	100	5376			
	2	FILL: DARK-brown sand (coarse sand, gravel (1/2"), wood, waste (ash, glass), loose, moist	80	5295			
34"	4		100	4666			
	5	NO RECOVERY	NO Recovery				
	6						
	7						
6"	8						
	9						
	10						

PROJECT

HOLE NO IA1-10

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTO[redacted]

HOLE NUMBER JA1-10

SHEET 3 OF SHEET

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC REMARKS COUNTS (h)
	10	NO Recovery	NO Recovery		See notes		
	11	Fill: gravel (2"), course + fine sand, waste (ash, glass), slag, reddish-orange coke like material, loose, moist	120	6198			High X 91/5530 (10.5-11.5')
	12		150	5859			High B 57/5016 (11.5-12.0, 13.9-14.4)
	13	NO Recovery	NO Recovery				
	14	Fill: sand, fine sand, loose, moist					
	15		80	5553			
	16	Fill: course + fine sand, brick, waste (ash, glass), loose, moist	60	5865			
	17	NO Recovery	NO Recovery				
	18	Fill: black course + fine sand, waste (ash, glass), loose, moist					Saturated 45/5094 (17.8-18.8')
	19	Fill: Black oily course sand, wood, loose, moist	80	3636			
			80	5148			
	20						

PROJECT

HOLE NO JA1-10

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER JAI-10

SHEET 4 OF 4

RECID (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) 8	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h)
	20	Reddish-brown clay, sand, trace silt, fine sand, grass (1'11"), moist, soft (CL)					Native 67 (20-21') 5393
	21		120	5278			
	22		60	5251			
48"	23		80	4850			
		Bottom of Boring @ 24.0'					
	24	- Weather: Cloudy, 35°F - DID reading from Gamma Count/min					
	25	Sample ID (Rad. Analysis) TCS-SS JAI-10 (1.2-1.7') 031510 Top 6"					
	26	TCS-SB JAI-10 (11.5-12'/13.9-14.4') 031510 High/Med TCS-SB-JAI-10 (10.5-11.5') 031510 High L TCS-SB JAI-10 (17.8-18.8') 031510 Saturated					
	27	TCS-SB JAI-10 (20-21') 031510 Native					
	28						
	29						
	30						

PROJECT

HOLE NO JAI-10

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

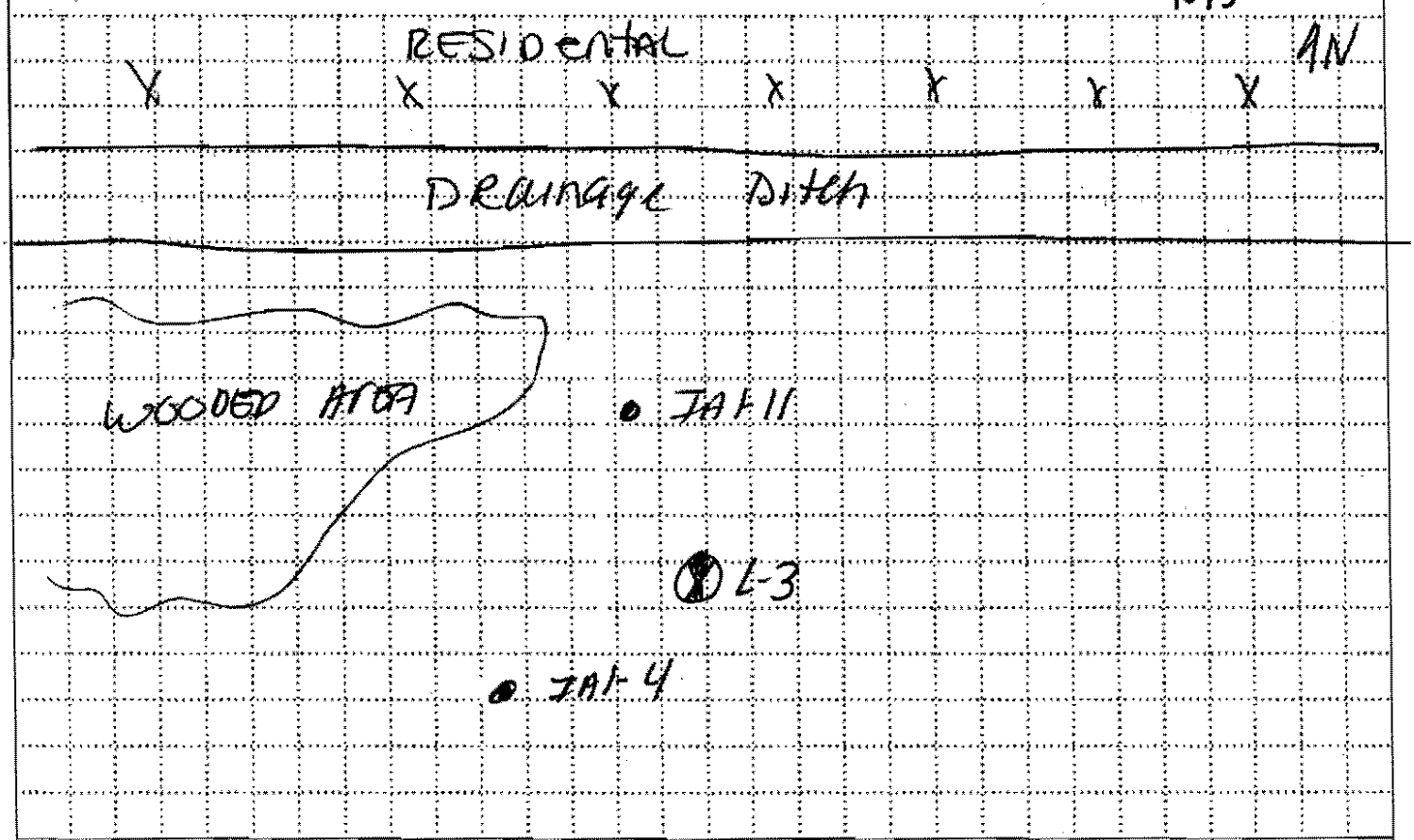
DISTRICT: Buffalo	HOLE NUMBER: JA1-11	
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 3
3. PROJECT: TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: DAN FERREL	6. MANUFACTURER'S DESIGNATION OF DRILL: 6620 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: ~~3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE~~ 3" MACROCORE w/ 4" plastic sleeve	8. HOLE LOCATION: N= 1093150.24 E= 1665836.8	
	9. SURFACE ELEVATION: N/A	
	10. DATE STARTED: 3/12/10 1102 am	11. DATE COMPLETED: 3/12/10 1215 pm
12. OVERBURDEN THICKNESS: 16.8'	15. DEPTH GROUNDWATER ENCOUNTERED: 13.4'	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 20.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP / TOTALS	TCLP / TOTALS	SVOC-TCLP / TOTALS	PEST-TCLP / TOTALS	PCB-TOTALS	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGN
CUTTINGS DRUMMED	–	–	–	[redacted]

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON LF- Buffalo DISTRICT FUSRAP PROJECT — HOLE NO: JA1-11

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR K Hoelscher

HOLE NUMBER JA1-11

SHEET 2 OF 3

~~ELEV.~~ REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) 8	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	0	NO RECOVERY	NO RECOVERY		See notes		
	1						
	2	Fill: ~~Dark brown organic matter contents, soft, clayey~~					
		Fill: CONCRETE, loose, Dry	120	6572			BD 6" 74/ (1.8-2.3') /7092
	3		70	6391			
26"	4	Fill: SILT, SAND, trace clay, waste (ash, glass, fabric, metal), loose, moist	140	6757			
	5	NO RECOVERY	NO RECOVERY				
	6						
	7						
10"	8	Fill: coarse & fine sand gravel (1/4-1/2"), brick, loose, moist	120	6687			
		NO RECOVERY	NO RECOVERY				
	9						
	10						

PROJECT

HOLE NO. JA1-11

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR K Hoelscher

HOLE NUMBER JAI-11

SHEET 3 OF 3

REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC REMARKS COUNTS (h)
	10	FILL: COURSE + FINE SAND, GRAVEL (2"-½"), BRICK, WASTE (ASH, GLASS), LOOSE, MOIST	800	10,143	SEE NOTES		
	11		1,160	9203			HighB (11-12) 814/11,067
24"	12	NO RECOVERY	NO RECOVERY				
	13						
	14	FILL: COURSE & FINE SAND, TRACE CLAY, ORANGE CAKE LIKE MATERIAL, BRICK, WASTE (ASH, METAL), SAND, LOOSE, MOIST	300	9218			Saturated (13.4-14.4) 249/9167
	15		800	9733			High B (14.4-15.4') 272/8129
34"	16		200	8663			
		NO RECOVERY	NO RECOVERY				
	17	REDDISH-BROWN CLAY, TRACE SAND, SILT, SUB-ROUNDED GRAVEL, COURSE + FINE SAND, MOIST, SOFT (CL)	100	6791			Native (16.8-17.8') 67/6976
	18						
	19		200	7588			Chemical (18-19') 92/7403
42"	20		80	7317			

PROJECT

HOLE NO. JAI-11

ENG FORM 5056A-R, AUG 94

NOTES:
- weather: Drizzel, 45°F
- PID reading 0ppm
- Gamma Reading: 10mR/hr

Sample I.D. (RAD ANALYSIS)
TCS-SS-JAI-11 (1.8-2.3') 031210 Top 6"
TCS-SB-JAI-11 (13.4-14.4) 031210 Saturated
TCS-SB-JAI-11 (14.4-15.4') 031210 High B
TCS-SB JAI-11 (11-12') 031210 High B
TCS-SB JAI-11 (16.8-17.8') 031210 Native
TCS-SB JAI-11 (18-19') 031210 Chemical

HTRW DRILLING LOG

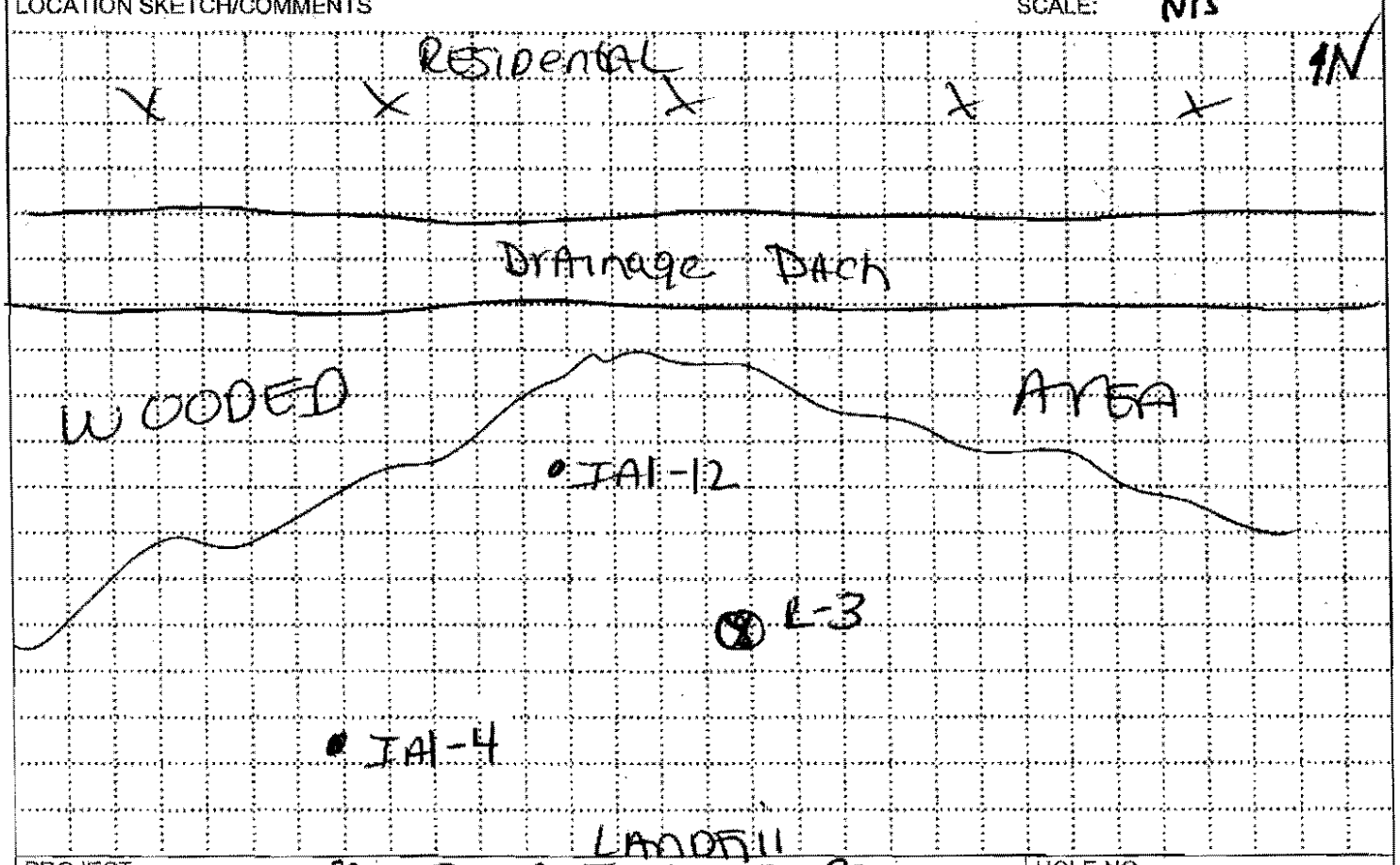
DISTRICT	Buffalo
HOLE NUMBER	JA1-12
1. COMPANY NAME	ENSOL, INC.
2. DRILLING CONTRACTOR	ZEBRA ENVIRONMENTAL CORP.
SHEET / SHEETS	1 OF 3
3. PROJECT	TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT
4. LOCATION	TONAWANDA LF, TONAWANDA, NY
5. NAME OF DRILLER	DAN FERREL
6. MANUFACTURER'S DESIGNATION OF DRILL	6670DT GEOPROBE
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	3" MACRO CORE W/ ? 4' PLASTIC SLEEVE
8. HOLE LOCATION	N= 1093150.24 E= 1065793.03
9. SURFACE ELEVATION	N/A
10. DATE STARTED	3/16/10 0120 hrs
11. DATE COMPLETED	3/16/10 1030
12. OVERBURDEN THICKNESS	16.3'
15. DEPTH GROUNDWATER ENCOUNTERED	NOT ENCOUNTERED
13. DEPTH DRILLED INTO ROCK	N/A
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	N/A
14. TOTAL DEPTH OF HOLE	20.0
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	N/A

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	-	-	-	-	-	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
CUTTINGS DRUMMED	-	-	-	[redacted]

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT TON LF- Buffalo DISTRICT FUSRAP PROJECT HOLE NO. JA1-12

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER JA1-12

SHEET 2 OF 3

REC'D ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) 8	SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS REMARKS (h)
	0	NO Recovery	NO Recovery		SEE NOTE		
	1						
	2						
		Fill: Dark brown topsoil organic matter, gravel (<1½"), waste (ash, glass), soft, moist	80	7010			Top 6" 59/6231 (2-2.5')
	3		120	9452			2nd Highest 8 141/8228 (2.5-3.5')
24"	4						
	5	NO Recovery	NO Recovery				
	6						
	7	Fill: coarse sand, sand gravel (<1"), waste (ash, glass, metal), loose, moist	800	11,940			Duplicate High 8 943/9609 (6.5-7.5')
18"	8						
	9	NO Recovery	NO Recovery				
	10						

PROJECT

HOLE NO. JA1-12

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER JAI-12

SHEET 3 OF 3

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC REMARKS COUNTS (h)
	10	Continue from previous page			See NOTES		
	11						
16"	12	Fill: coarse + fine sand, sand, brick, moist, loose	140	8287			High B 74/7611 (11.3-12.3')
	13	NO RECOVERY	NO RECOVERY				
	14						
	15						
0"	16						
	17	Reddish-brown silt, clay, fine sand, gravel (<1½"), stiff, moist (CL)	100	6108			Native 54/5978 (16.3-17.3')
	18		80	6289			
	19		80	6868			
45"	20		60	6986			

PROJECT Bottom of Boring @ 20.0'

HOLE NO JAI-12

ENG FORM 5056A-R, AUG 94

Notes
- Weather, Sunny, 42°F
- Gamma Reading: 0 mR/hr
- PID Reading: 0 ppm

Sample ID (RAM Analysis)
TLS SS-JAI-12 (2-2.5') 031610 700611
TLS SB-JAI-12 (6.5-7.5') 031610 High B Duplicate
TLS SB-JAI-12 (11.3-12.3') 031610 High B
TLS SB-JAI-12 (2.5-3.5') 031610 2nd Highest B
TLS SB-JAI-12 (16.3-17.3') 031610 Native

HTRW DRILLING LOG

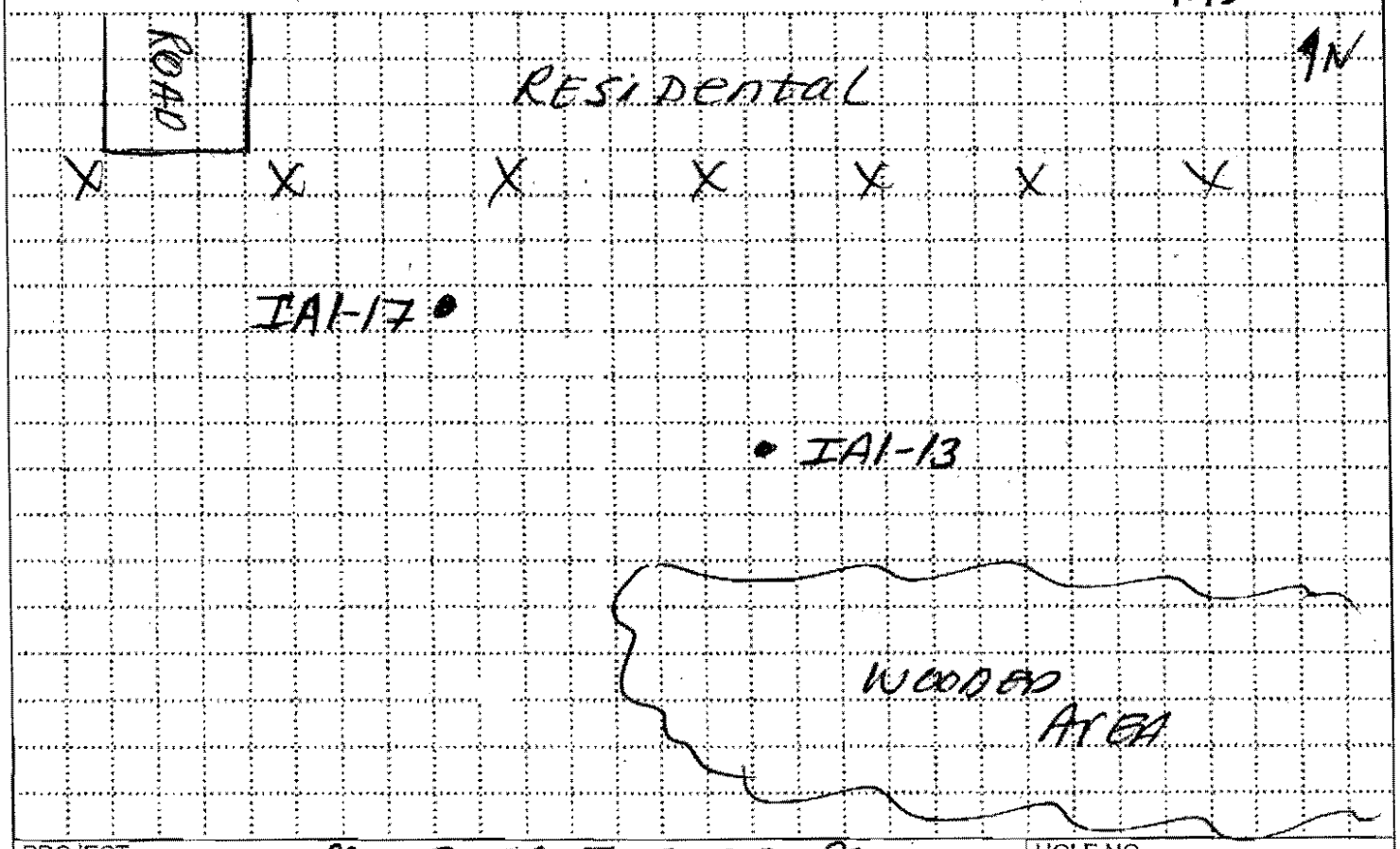
DISTRICT: Buffalo		HOLE NUMBER: IA1-13
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 3 SHEETS
3. PROJECT: TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: DAN FERREL	6. MANUFACTURER'S DESIGNATION OF DRILL: DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: ~~3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE~~	8. HOLE LOCATION: N= 1093150.24 E= 1065749.26	
	9. SURFACE ELEVATION: N/A	
	10. DATE STARTED: 3/10/10 8:50 AM	11. DATE COMPLETED: 3/10/10 10:00 AM
12. OVERBURDEN THICKNESS: 8.9'	15. DEPTH GROUNDWATER ENCOUNTERED:	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 14.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP / TOTALS	TCLP / TOTALS	SVAC-TCLP / TOTALS	PEST-TCLP / TOTALS	PCB-TOTALS	N/A

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	[redacted]
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON LF- Buffalo DISTRICT FUSRAP PROJECT — HOLE NO: IA1-13

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER JA1-13

SHEET 2 OF 3

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	SEQUENTIAL SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	0	NO RECOVERY	NO RECOVERY		SEE NOTES		
	1						
	2	FILL: BROWN TOPSOIL, ORGANIC MATTER, ROOTLETS, TRACE of clay, SOFT, MOIST	60	7350			Top 6" 59/6886 (1.2-1.7')
			60	7414			SATURATED SUB 62/7153 (1.7-2.7')
	3	FILL: gravel (<1"), COURSE & FINE SAND, WASTE (ASH, glass), TRACE of clay					High J 60/7496 Duplicate (3-4.0')
33"	4		90	7639			
	5	NO RECOVERY	NO RECOVERY				
	6						
	7	FILL: gravel (<1"), WASTE (ASH, glass, metal), brick, MOIST, LOOSE	80	7242			Chemical 60/7151 (6-7')
26'	8		100	7385			High B 44/7013 (7-8')
		NO RECOVERY	NO RECOVERY				
	9	REDDISH-BROWN CLAY, SOME SAND, TRACE SILT, COURSE SAND, SHALE, MOIST (CL)	80	7147			Native 70/7074 (8.4-9.9')
	10						

PROJECT

HOLE NO. JA1-13

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR: Y Hoelscher

HOLE NUMBER: IA1-13

SHEET 3 OF 3

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS ~~(d)~~	GEOTECH SAMPLE OR CORE BOX NO. ~~(e)~~	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC REMARKS COUNTS (h)
	10	Continue from previous page			See Notes		
	11		80	7292			
38"	12		70	7230			
	13	REDISH BROWN Clay, some SAND, TRACE SILT, Subrounded GRAVEL (<2"), COARSE SAND, FINE SAND, STIFF, MOIST (CL)	60	7012			
24"	14		80	7074			
		Bottom of BORING @ 14.01					
	15	Notes:					
		- Weather: OVERCAST, 33°F					
		- Chemical Count/min					
	16	- PID Reading: 0 ppm					
		Sample I.D. (RAD ANALYSIS)					
		TLS SS-IA1-13 (1.2-1.7') 031010 TCP60					
	17	TLS SB IA1-13 (1.7-2.7') 031010 SATURATED SUB PICKED by HP					
		TLS SB IA1-13 (3-4') 031010 High & Duplicate					
		TLS SB IA1-13 (6-7') 031010 Chemical					
	18	TLS SB IA1-13 (7-8') 031010 High B					
		TLS SB IA1-13 (8.9-9.9') 03100 Native					
	19						
	20						

PROJECT

HOLE NO. IA1-13

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

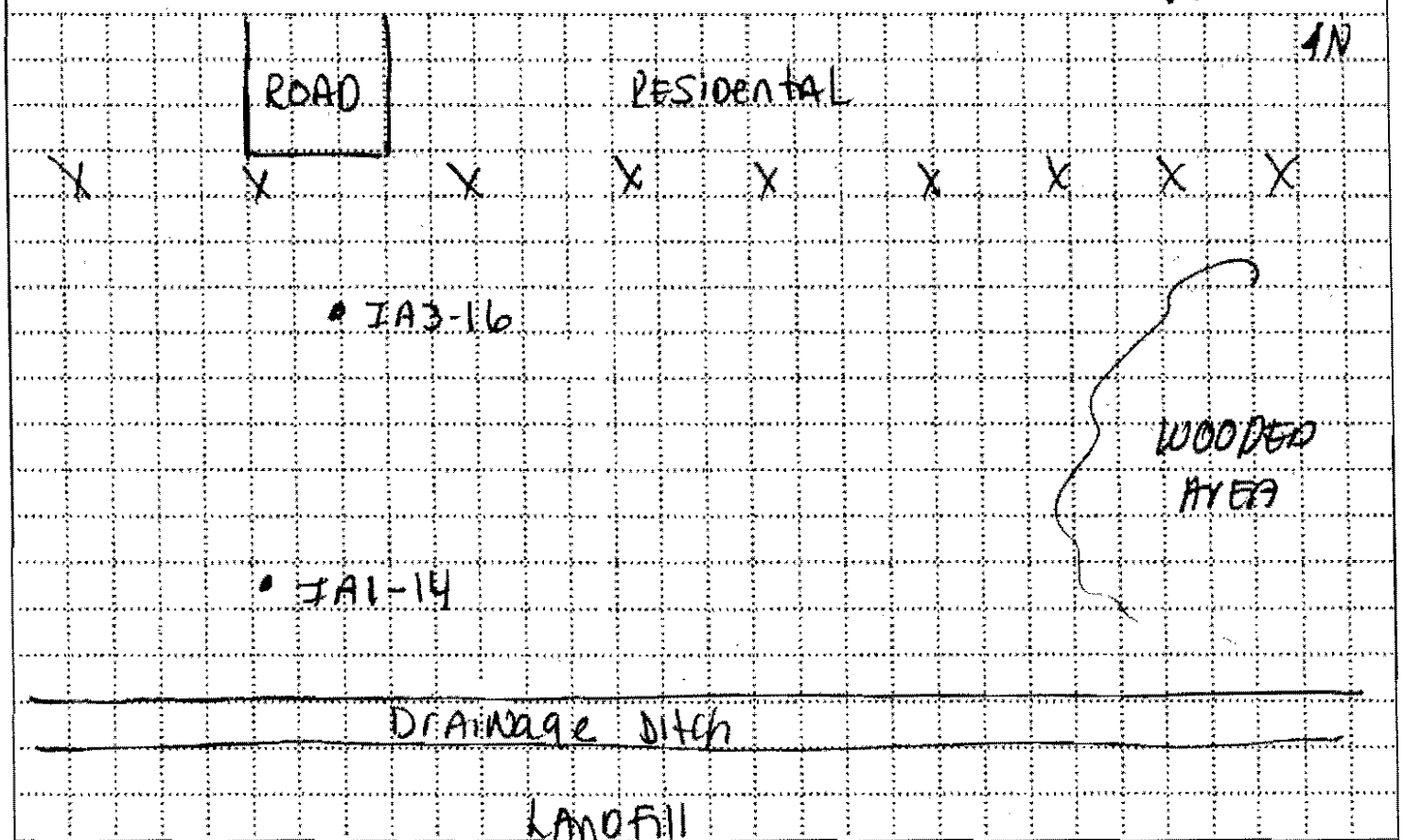
DISTRICT: Buffalo		HOLE NUMBER: JA1-14
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 3 SHEETS
3. PROJECT: TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: DAN Ferrel	6. MANUFACTURER'S DESIGNATION OF DRILL: 6620 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: ~~3¼" CASING 2" CORE w/ 5' PLASTIC SLEEVE~~ 3¼" CASING, 2510" CORE w/ 4' plastic sleeve	8. HOLE LOCATION: N= 1093180.24 E= 1065705.49	
	9. SURFACE ELEVATION:	
	10. DATE STARTED: 3/9/10 10:50am	11. DATE COMPLETED: 3/9/10 11:50am
12. OVERBURDEN THICKNESS: 5.0'	15. DEPTH GROUNDWATER ENCOUNTERED: NOT encountered	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 10.5'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	–	–	–	–	–	N/A

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)
CUTTINGS DRUMMED	–	–	–

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON LF- Buffalo DISTRICT FUSRAP PROJECT — HOLE NO: JA1-14

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR K Hoelscher

HOLE NUMBER JA1-14

SHEET 2 OF 3

RECID ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) 8	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	0	NO RECOVERY	NO RECOVERY		See NOTES		
	1						
	2	FILL: DARK-BROWN TOPSOIL, WOOD, NOTHETS, FINE SAND, LOOSE, MOIST	60	5777			Top 6" 53/6069 (1.6-2.1')
	3	FILL: WASTE (TIRE CHIP, PLASTER), BRICK, WOOD, COURSE SAND, STIFF, MOIST	80	5857			Saturated Sub. 67 (2.1-3.1') 5797
31"	4		80	6338			High B 61/5796 (3.1-4')
	5		100	6876			
	6	REDISH-BROWN CLAY, SOME SILT, GRAVEL (<1"), COURSE & FINE SAND, TRACE SAND, DESICCATION CRACKS W/GRAY INFILLING, GRAY MOTTING, STIFF, MOIST (CL)	70	6523			Native 62/6003 (5-6')
	7		80	5966			
48"	8		80	5937			
	9	REDISH-BROWN CLAY, SOME SAND, TRACE SILT, COURSE & FINE SAND, GRAVEL (<2"), DESICCATION CRACKS W/GRAY INFILLING TO 8.5' STIFF, MOIST (CL)	100	6685			
	10		80	6189			

PROJECT

HOLE NO JA1-14

ENG FORM 5056A-R, AUG 94

TITRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR: K Heelscher

HOLE NUMBER: JA1-14

SHEET 3 OF 3

REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h)
	10	Continue from previous page →			See NOTES		
		Bottom of boring @ 10.5'					
	11	NOTES:					
		- Weather: sunny, 32°F					
30"	12	- PID reading: 0ppm					
		- Gamma reading: count/min					
	13	- Refusal met @ 10.5' - native @ 5.0'					
		SAMPLE ID (CLP ANALYSIS)					
		TLS-SS-JA1-14 (1.6-2.1') 030910 Top 6"					
	14	TLS-SB-JA1-14 (5-6') 030910 Native					
		TLS-SB-JA1-14 (3.1-4') 030910 High B					
		TLS-SB-JA1-14 (8-9') 030910 High B					
	15	TLS-SB JA1-14 (2.1-3.1') 030910 Saturated sub picked by HP					
	16						
	17						
	18						
	19						
	20						

PROJECT

HOLE NO: JA1-14

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

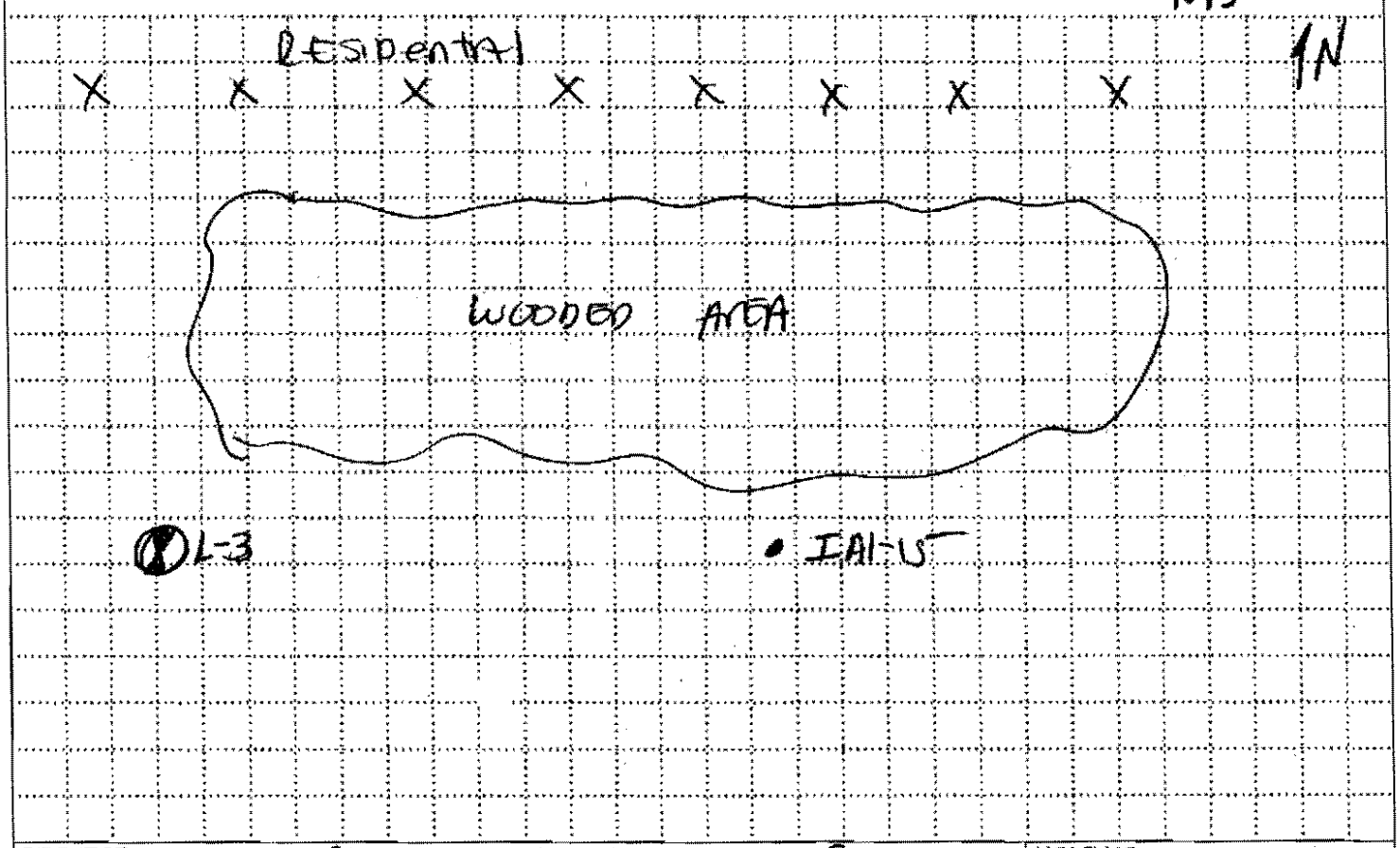
DISTRICT: Buffalo	HOLE NUMBER: JA1-15	
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 4 SHEETS
3. PROJECT: TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER	6. MANUFACTURER'S DESIGNATION OF DRILL: DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: ~~3 1/4" CASING 2" CORE W/ 5' PLASTIC SLEEVE~~ 3" macro core w/4' plastic sleeve	8. HOLE LOCATION: N= E=	
	9. SURFACE ELEVATION: N/A	
	10. DATE STARTED: 3/11/10	11. DATE COMPLETED: 3/11/10
12. OVERBURDEN THICKNESS: NOT ENCOUNTERED	15. DEPTH GROUNDWATER ENCOUNTERED: NOT ENCOUNTERED	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 22.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP / TOTALS	TCLP / TOTALS	SVOC-TCLP / TOTALS	PEST-TCLP / TOTALS	PCB- TOTALS	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT	HOLE NO
TON LF- Buffalo DISTRICT FUSRAP PROJECT	JA1-15

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSF [redacted]

HOLE NUMBER: IA1-15

SHEET 2 OF 4

~~ELEV.~~ REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS REMARKS (h)
	0	NO Recovery	NO Recovery		See Notes		
	1						
		Fill: Dark brown topsoil, organic matter, modLETS, loose, moist	60	6383			Tc@64 41 / (1.2-1.8') / 6471
	2						
		Fill: Course + fine sand gravel (<2"), waste ash, shingles), loose, moist	80	6585			
	3						
35"	4		80	6254			
		NO Recovery	NO Recovery				
	5						
	6						
		Fill: Course + fine sand, waste ash, glass slag), gravel (<2"), loose, moist	90	7169			
	7						
30"	8		120	7314			
		NO Recovery	NO Recovery				
	9						
		Fill: Course sand, waste ash, brick, glass, glass, slag), gravel (<2"), loose, moist	120	7138			
	10						

PROJECT

HOLE NO. IA1-15

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR K Hoelscher

HOLE NUMBER JA1-15

SHEET 3 OF 4

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	10	continue from previous page	continue from previous page		See notes		
	11	Fill: course & fine sand, waste (ash, plaster, glass), brick, loose, moist	100	7348			Active 48 / Sub. (10.5-12') / 6840
30"	12						
	13	No Recovery	No Recovery				
	14	Fill: sand, fine sand course sand, waste (ash), waste (glass, slag, metal), brick, loose, moist	110	7009			
	15						High B 144 / (14.6-15.6') / 7050
30"	16		200	6933			
	17	No Recovery	No Recovery				
	18	Fill: course & fine sand, gravel (1/4"), waste (ash, glass, slag), loose, moist-wet	140	6820			Saturated Sub. 64 (17.5-18.5') 6760
	19		150	7183			
36"	20	Fill: ash, wood, paper, plastic, loose, moist	420	11,215			High J 687 (19-20') 10,190

PROJECT

HOLE NO JA1-15

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT | INSPECTOR [redacted] | HOLE NUMBER JA1-15 | SHEET 1 OF 1

REC'D ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD ~~TEST~~ RESULTS (d) 8	~~SAMPLE~~ OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	~~REMARKS~~ 1 MIN. STATIC COUNTS (h)
	20	NO Recovery	No Recovery		see notes		
	21						
24"	22	Fill: course & fine sand, trace clay, waste (ash) above moist Fill: Brown brown clay, course sand, waste (glass), street, moist	180	827			Chemical 59 (21-22') 6918
		Bottom of Boring @ 22.0' Refusal @ 22.0')					
	23	NOTES: - weather: Sunny, 66°F - PID reading: 0ppm					
	24	- Gamma Count = min					
	25	Sample ID (Ram. analysis) TCS-SS-JA1-01 (1.2-1.8') 031110 Top 6" TCS SB JA1-15 (17.5-18.5') 031110 saturated sub. pulled by HPD					
	26	TCS SB JA1-15 (10.5-12') 031110 Native Sub " "					
		TCS SB JA1-15 (14.6-15.6') 031110 High B					
	27	TCS SB JA1-15 (19-20') 031110 High B TCS SB JA1-15 (21-22') 031110 Chemical / Duplicate					
	28						
	29						
	30						

PROJECT | HOLE NO. JA1-15

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

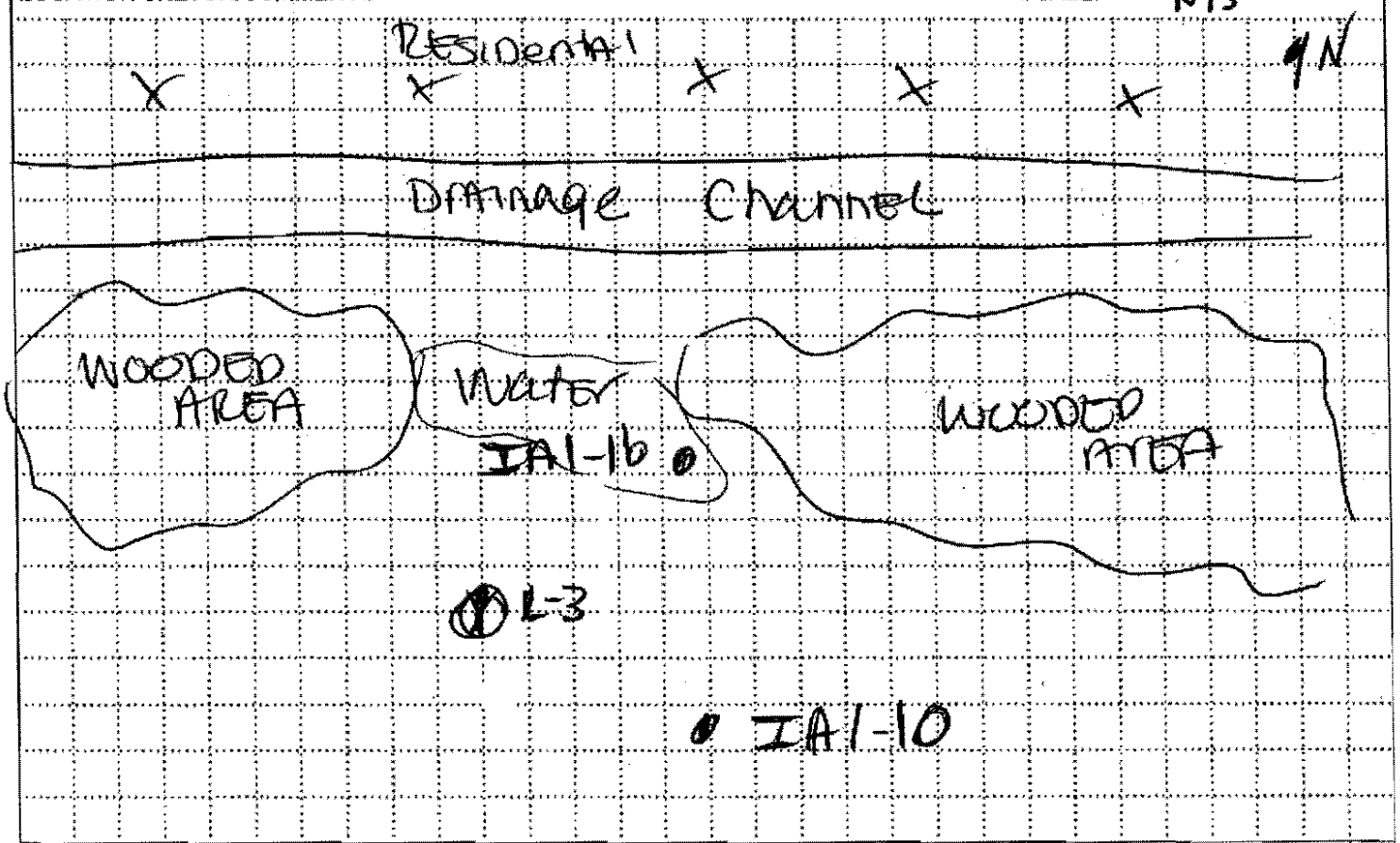
DISTRICT: Buffalo		HOLE NUMBER: IA1-16
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 3 SHEETS
3. PROJECT: TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: Dan Ferrel	6. MANUFACTURER'S DESIGNATION OF DRILL: 6620 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: ~~3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE~~ 3" MACRO CORE w/ 4' plastic sleeve	8. HOLE LOCATION: N= 093194.01 E= 1065880.57	
	9. SURFACE ELEVATION: N/A	
	10. DATE STARTED: 3/12/10 200pm	11. DATE COMPLETED: 3/12/10 400pm
12. OVERBURDEN THICKNESS: 19.0	15. DEPTH GROUNDWATER ENCOUNTERED: NOT ENCOUNTERED	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 20.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP / TOTALS	TCLP / TOTALS	SVOC-TCLP / TOTALS	PEST-TCLP / TOTALS	PCB- TOTALS	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. S[redacted]
CUTTINGS DRUMMED	-	-	-	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON LF- Buffalo DISTRICT FUSRAP PROJECT — HOLE NO. IA1-16

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR: K Hoelscher

HOLE NUMBER: FA1-16

SHEET 2 OF 3 SHEET

REC'D ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) 8	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. ~~READING~~ STATIC COUNTS (h)
	0	NO RECOVERY	NO RECOVERY		SEE NOTES		
	1	FILL: DARK brown topsoil, organic matter, loose, moist	60	6276			Top 6" 193/6760 (.6-1.1')
	2		100	7857			
	3	FILL: COURSE SAND fine SAND, gravel (c/u), waste (ASH, glass), loose, moist	140	9131			
	4		160	8694			
	5	NO RECOVERY	NO RECOVERY				
	6						
	7	FILL: COURSE & fine SAND, waste (glass & ASH), slag, concrete, gravel (c/u), loose, moist	180	8763			Hand 111/9228 (6.2-7.2')
	8		180	10,123			Next Hand 8 193 (7.2-8'/4.1-93) 9873
	9	NO RECOVERY	NO RECOVERY				
	10	FILL COURSE & fine SAND SAND, gravel (c/u), waste, (ASH, glass, metal), concrete, slag, loose, moist	100	7970			

PROJECT

HOLE NO. FA1-16

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR: L Hoelscher

HOLE NUMBER: JA1-16

SHEET 3 OF 3

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	10	Continue from previous page	Continue from previous page		See notes		
	11						
	12						
		NO RECOVERY	NO RECOVERY				
	13						
	14	Fill: REDISH-ORANGE SAND, COURSE + FINE SAND, WASTE (GLASS, PLASTER, ASH), BONE, LOOSE, MOIST	260	10,503			High γ + Duplicate (13.2-14.2') 302 / 10,333
	15		180	8,153			Chemical 104 / 7548 (14.2-15.2')
	16		100	8,275			
	17	NO RECOVERY	NO RECOVERY				
	18						
	19						
	20	REDISH-BROWN CLAY, SOME SAND, TRACE SILT, COURSE + FINE SAND, SOFT, MOIST (CL)	100	7759			Native 101 / 7292 (19-20')

PROJECT: Bottom of Boring @ 20.0'

HOLE NO: JA1-16

ENG FORM 5056A-R, AUG 94

NOTES:
- Weather: RAIN, 40°F
- PID Reading: 0ppm
- Gamma Reading Count/min

SAMPLE ID (RAD. ANALYSIS)
TLJ-SS-JA1-16 (0.0-1.1) TOP 6"
TLJ-SB-JA1-16 (6.2-7.2) High B
TLJ-SB-JA1-16 (13.2-14.2) High γ - Duplicate
TLJ-SB-JA1-16 (7.2-8.2/9.1-9.3) 031210 Not High γ
TLJ-SB-JA1-16 (14-20) 031210 Native
TLJ-SB-JA1-16 (14.2-15.2) 031210 Chemical

HTRW DRILLING LOG

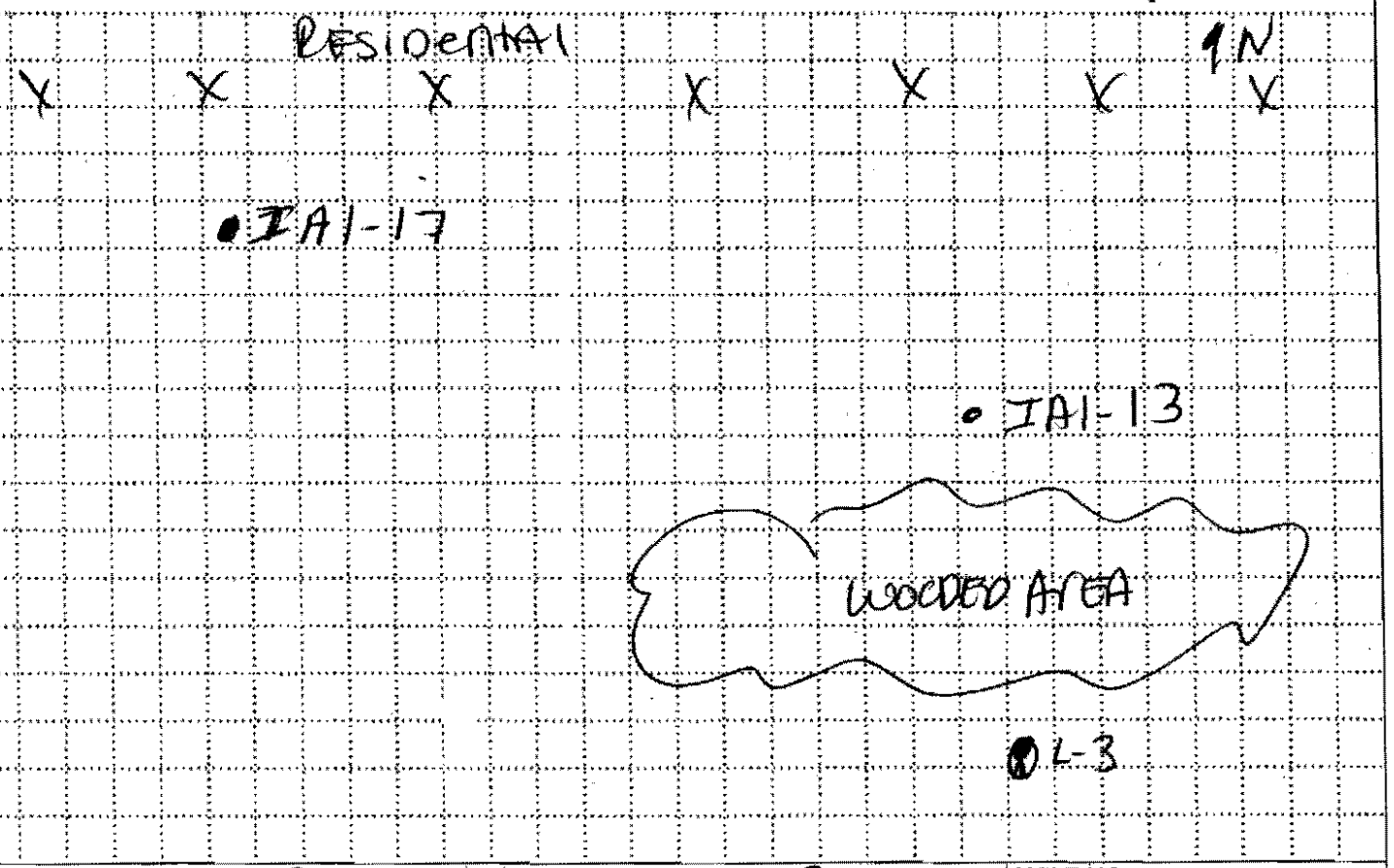
DISTRICT	Buffalo
HOLE NUMBER	IA1-17
1. COMPANY NAME	ENSOL, INC.
2. DRILLING CONTRACTOR	ZEBRA ENVIRONMENTAL CORP.
SHEET / SHEETS	1 OF 2
3. PROJECT	TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT
4. LOCATION	TONAWANDA LF, TONAWANDA, NY
5. NAME OF DRILLER	DAN FERREL
6. MANUFACTURER'S DESIGNATION OF DRILL	6620 DT GEOPROBE
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	~~3 1/4" CASING 2" CORE W/ 5' PLASTIC SLEEVE~~ 3" MACRO CORE W/ 4' plastic sleeve
8. HOLE LOCATION	N=1093194.01 E=1065836.8
9. SURFACE ELEVATION	N/A
10. DATE STARTED	3/10/10 1005 am
11. DATE COMPLETED	3/10/10 11:05AM
12. OVERBURDEN THICKNESS	6.7'
15. DEPTH GROUNDWATER ENCOUNTERED	NOT Encountered
13. DEPTH DRILLED INTO ROCK	N/A
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	N/A
14. TOTAL DEPTH OF HOLE	10.0'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	N/A

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	-	-	-	-	-	N/A

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
CUTTINGS DRUMMED	-	-	-	

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT TON LF- Buffalo DISTRICT FUSRAP PROJECT HOLE NO. IA1-17

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER JA1-17

SHEET 2 OF SHEET

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. ~~STATIC~~ ~~READING~~ COUNTS (h)
	0	NO RECOVERY	NO RECOVERY		SPR NOTES		
	1						
	2	FILL: Reddish-brown clay, silt, gravel (<1"), rootlets, soft, moist	120	6204			Top 6" (1.6-2.1') 57/6197
	3		90	6320			Saturated sub (2.1-3.1') 73/6391
	4	FILL: Sand, trace silt, waste (ash, glass, metal, wood), loose, moist	80	6500			High β (5-6') 70/6410
	5	NO RECOVERY	NO RECOVERY				
	6	FILL: Reddish brown clay, waste (ash, glass, slag), wood, stiff moist	100	6233			High γ (3.1-4') 65/6511
	7		100	6268			Native (6.7-7.7') 64/6440
	8	Reddish-brown silt, clay, gray mottling, trace sub-rounded gravel (<1"), trace coarse sand, stiff, moist (CL)	100	6259			
	9		70	6225			
	10	Reddish-brown clay, some sand, trace silt, trace sub-rounded gravel (<1"), pulverized stone, stiff, moist (CL)	80	6196			

PROJECT

HOLE NO JA1-17

ENG FORM 5056A-R, AUG 94

NOTES:
- Weather: Sunny, 35°F
- PID Reading: 0ppm
- Gamma Reading: count/min

Sample ID (Rad. Analysis)
TLS SS JA1-17 (1.6-2.1') 031010 Top 6"
TLS SB JA1-17 (2.1-3.1') 031010 Saturated sub. picked by HP
TLS SB JA1-17 (3.1-4.0') 031010 High γ
TLS SB JA1-17 (5-6.0') 031010 High β
TLS SB JA1-17 (6.7-7.7') 031010 Native

HTRW DRILLING LOG

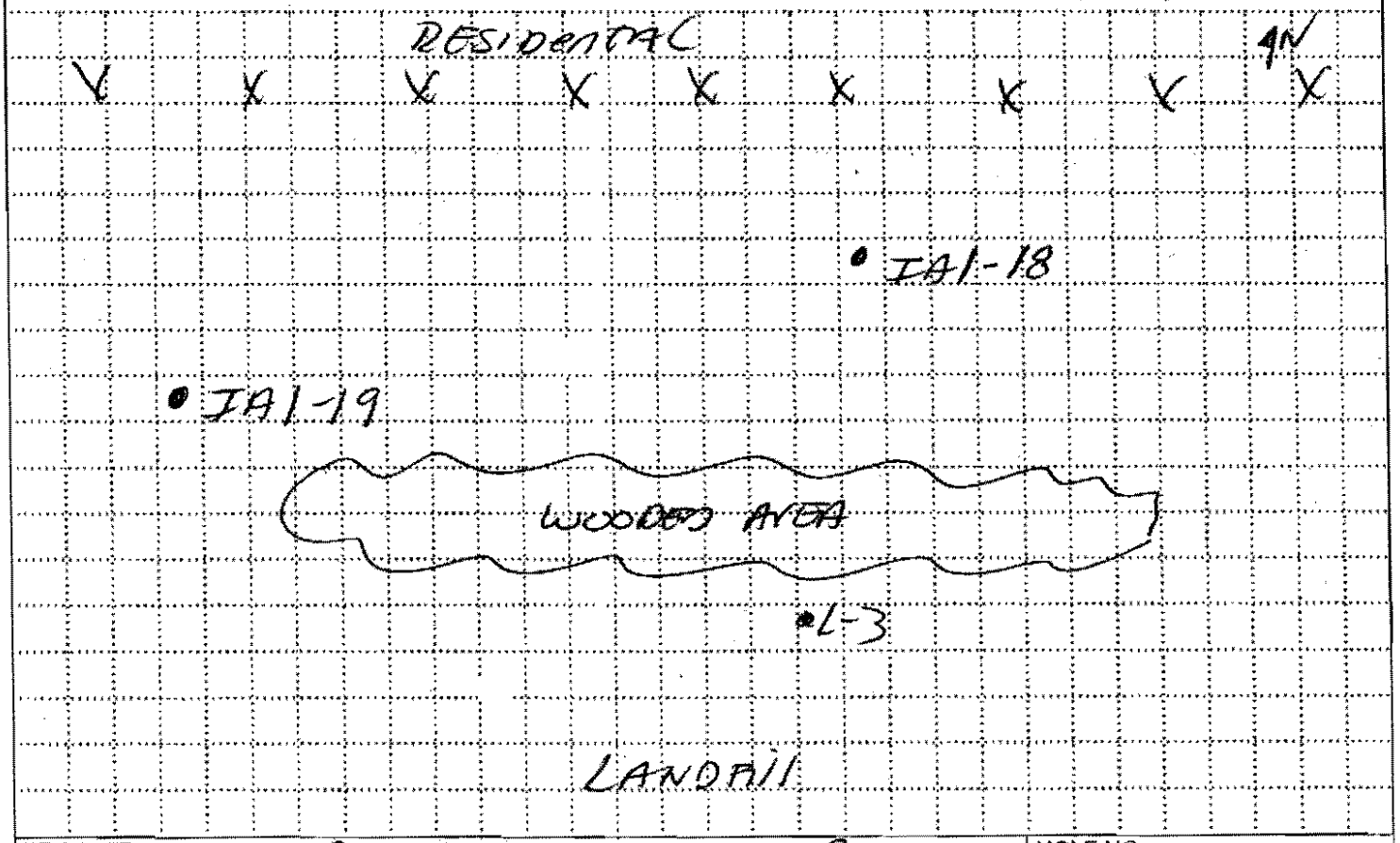
DISTRICT	Buffalo
HOLE NUMBER	IA1-18
1. COMPANY NAME	ENSOL, INC.
2. DRILLING CONTRACTOR	ZEBRA ENVIRONMENTAL CORP.
SHEET / SHEETS	1 OF 3
3. PROJECT	TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT
4. LOCATION	TONAWANDA LF, TONAWANDA, NY
5. NAME OF DRILLER	DAN Ferrel
6. MANUFACTURER'S DESIGNATION OF DRILL	U620 DT GEOPROBE
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	~~3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE~~ 3 1/4 casing 2 5/8 core w/ 4' plastic sleeve
8. HOLE LOCATION	N= 1093194.01 E= 1065793.03
9. SURFACE ELEVATION	N/A
10. DATE STARTED	3/9/10 2:40 pm
11. DATE COMPLETED	3/9/10 3:05 pm
12. OVERBURDEN THICKNESS	4.8'
13. DEPTH DRILLED INTO ROCK	N/A
14. TOTAL DEPTH OF HOLE	8.0'
15. DEPTH GROUNDWATER ENCOUNTERED	NOT ENCOUNTERED
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	N/A
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	N/A

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	–	–	–	–	–	N/A

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23.
CUTTINGS DRUMMED	–	–	–	[redacted]

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT	HOLE NO.
TON LF- Buffalo DISTRICT FUSRAP PROJECT	IA1-18

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR R HOELSCHER

HOLE NUMBER JA1-18

SHEET 2 OF 2

REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) 8	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC REMARKS COUNTS (h)
	0	NO RECOVERY	NO RECOVERY		See Notes		
	1	FILL: Dark-brown topsoil, organic matter, rootlets, coarse sand, moist, soft	80	6930			Top 6" 62/6566 (1-1.5')
	2	FILL: brown clay, coarse + fine sand, gravel (<1"), some silt, stiff, moist	120	6800			High B 63/6772 (1.5-2.5')
	3		100	6686			
36"	4		80	6089			Saturated sub. 71/6858 (3.5-4.0')
		NO RECOVERY	NO RECOVERY				
		FILL: SAME AS ABOVE					
	5	Reddish brown clay, some sand, trace silt, coarse sand, desiccation cracks w/ gray infilling, stiff, moist-dry (CL)	90	6975			Native 68/6733 (4.8-5.8')
	6		80	6915			High δ 75/6323 (5.8-6.8')
	7	Reddish brown clay, some silt, trace sand, fine sand, gray mottling, stiff moist (CL)	100	6883			
42"	8	Bottom of Boring @ 8.0'					
	9	NOTES -weather: Sunny, 33°F -Gamma Reading: count/min -PID Reading: 0ppm	Sample I.D. (CAD. ANALYSIS) TLS-SS-JA1-18 (1-1.5') 030910 Top 6" TLS-SB-JA1-18 (1.5-2.5') 030910 High B TLS-SB-JA1-18 (3.5-4.0') 030910 SATURATED SUB [illegible] TLS-SB-JA1-18 (4.8-5.8') 030910 Native TLS-SB-JA1-18 (5.8-6.8') 030910 High δ				
	10						

PROJECT

HOLE NO JA1-18

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

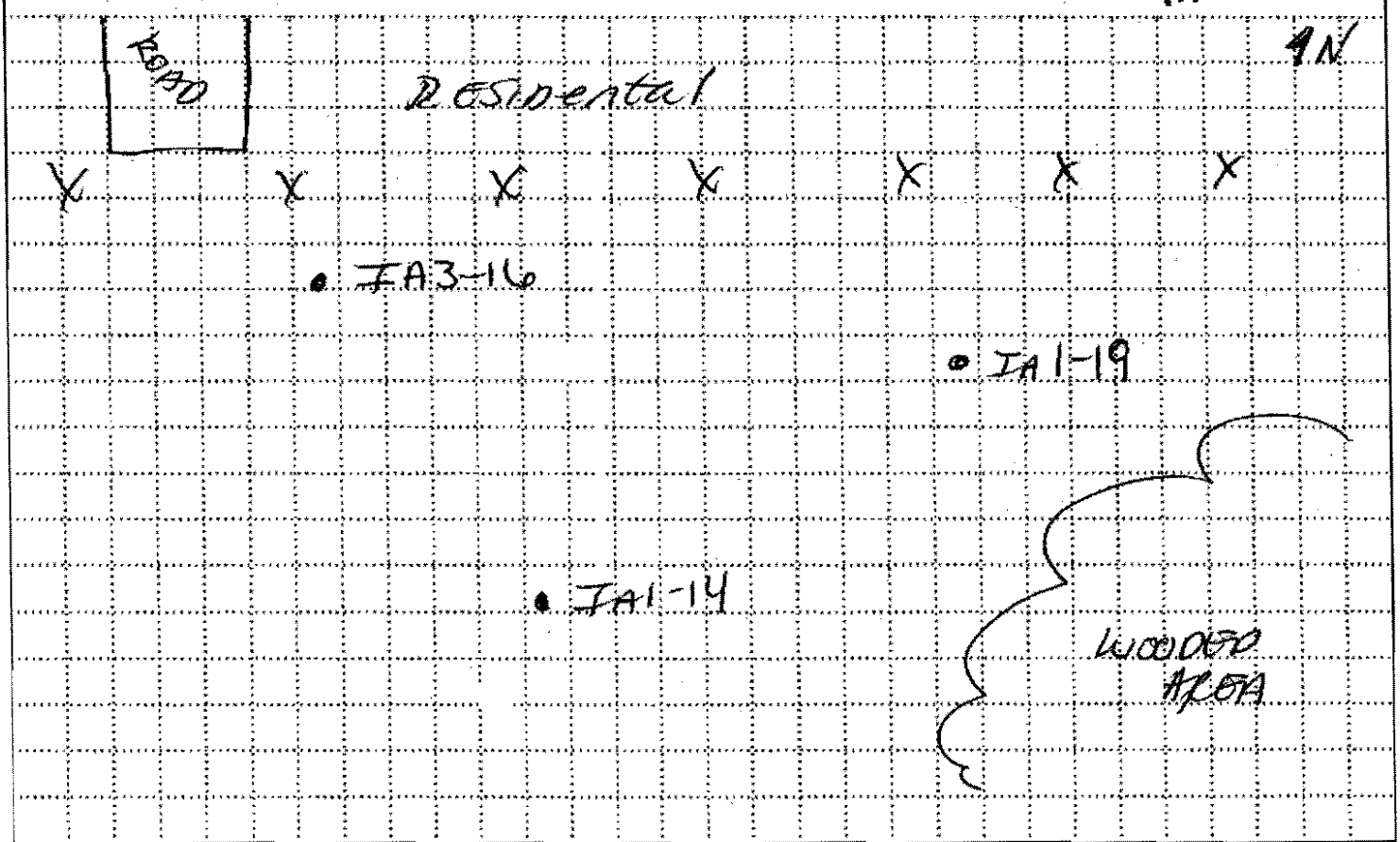
DISTRICT	Buffalo
HOLE NUMBER	JA1-19
1. COMPANY NAME	ENSOL, INC.
2. DRILLING CONTRACTOR	ZEBRA ENVIRONMENTAL CORP.
SHEET / SHEETS	1 OF 2
3. PROJECT	TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT
4. LOCATION	TONAWANDA LF, TONAWANDA, NY
5. NAME OF DRILLER	DAN Ferrel
6. MANUFACTURER'S DESIGNATION OF DRILL	DT GEOPROBE
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	~~3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE~~ 3" MACRO CORE w/ 4" plastic sleeve
8. HOLE LOCATION	N= 1093194.01 E= 1065749.26
9. SURFACE ELEVATION	N/A
10. DATE STARTED	3/9/10 1:45 pm
11. DATE COMPLETED	3/9/10 2:30 pm
12. OVERBURDEN THICKNESS	3.0'
15. DEPTH GROUNDWATER ENCOUNTERED	NOT ENCOUNTERED
13. DEPTH DRILLED INTO ROCK	N/A
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	N/A
14. TOTAL DEPTH OF HOLE	8.0'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	N/A

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	–	–	–	–	–	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIG[redacted]
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON LF- Buffalo DISTRICT FUSRAP PROJECT — HOLE NO: JA1-19

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER IA1-19

SHEET 2 OF 2

~~ELEV.~~ REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) ~~X~~	GEOTECH SAMPLE OR CORE BOX NO. (e) ~~X~~ B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	0	NO RECOVERY	NO RECOVERY		see notes		
	1	Fill: DARK-brown topsoil, organic matter, rootlets, gravel (1/4"), soft, moist	90	6850			TopB (.4-.9') 58/7119
	2	Fill: waste (ash, glass), coarse sand, gravel (1/2"), brick, loose, moist	90	7096			HighB (1.9-1.9') 89/7093 Saturated sub. (1.9-2.9') 91/6914
	3		80	7325			
48"	4	Reddish-brown clay, some silt, trace sand, coarse sand, fine sand, Desiccation cracks w/ gray infilling, moist-stiff (CL)	60	7156			Native (3-4') 70/6967
	5		60	7185			
	6	Reddish-brown clay, some sand, trace silt, gravel (1/2"), coarse sand, gray mottling, moist-dry, stiff (CL)	40	7172			
	7		40	7384			High~~B~~ (6-7') /
48"	8		60	7222			
	9	Bottom of Boring @ 8.0' NOTES: Weather, sunny, 32°F - PID Reading: 0 ppm - Gamma Reading: count/min	Sample I.D. (Lead Analysis) TLS SB IA1-19 (.4-.9) 030910 TopB(.4 TLS SB IA1-19 (3-4') 030910 Native TLS SB IA1-19 (1.9-2.9) 030910 Saturated sub. pulled by HP TLS SB IA1-19 (.9-1.9') 030910 HighB TLS SB IA1-19 (6-7') 030910 High B				
	10						

PROJECT

HOLE NO. IA1-19

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

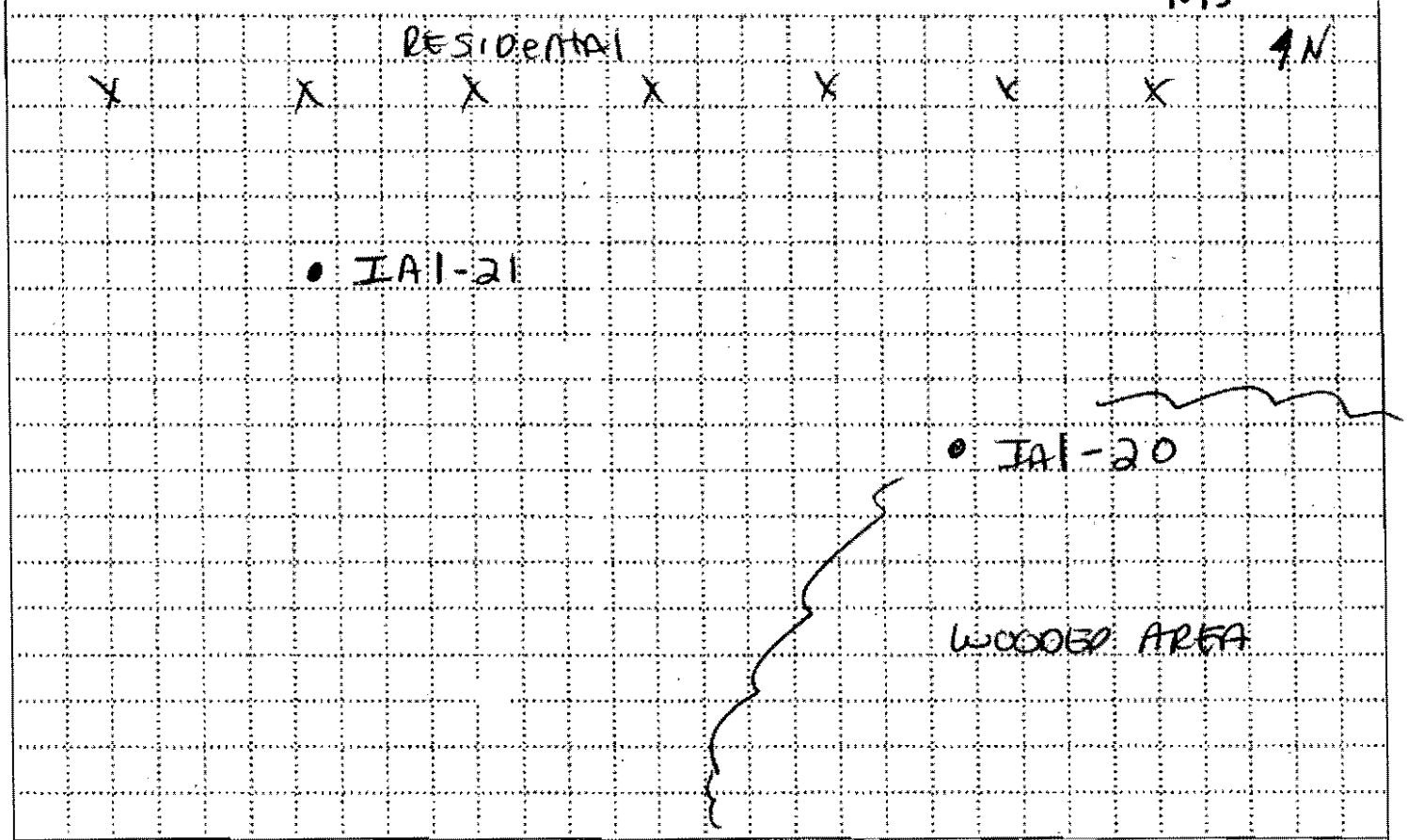
DISTRICT: Buffalo		HOLE NUMBER: IA1-20
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 2 SHEETS
3. PROJECT: TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: Dan Ferrel	6. MANUFACTURER'S DESIGNATION OF DRILL: 6620 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: ~~3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE~~ 3" MACRO core w/ 4' plastic sleeve	8. HOLE LOCATION: N= 1093237.78 E= 1065924.34	
	9. SURFACE ELEVATION: N/A	
	10. DATE STARTED: 3/10/10 14:00	11. DATE COMPLETED: 3/10/10 15:05
12. OVERBURDEN THICKNESS: 3.3'	15. DEPTH GROUNDWATER ENCOUNTERED: NOT ENCOUNTERED	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 8.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP / TOTALS	TCLP / TOTALS	SVOC-TCLP / TOTALS	PEST-TCLP / TOTALS	PCB-TOTALS	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. [redacted]
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON LF- Buffalo DISTRICT FUSRAP PROJECT — HOLE NO. IA1-20

ENG FORM 5056-R, AUG 94

INSPECTOR [redacted]

SHEET 2 OF 2

REC'D ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) 8	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS REMARKS (h)
	0	NO RECOVERY	NO RECOVERY		See NOTES		
	1						
		Fill: COURSE SAND, WASTE (ASH, GLASS) GRAVEL (1/2"), TRACE WOOD, LOOSE, MOIST	120	7282			Top 6" 80/7290 (1.1-1.6')
	2		140	7347			High B 78/7291 (1.6-2.0')
	3						Native 62/7053 (3.3-4.0')
36"	4	Reddish-brown clay, some silt trace sand, gray mottling, stiff, moist (CL)	180	7364			
		NO RECOVERY	NO RECOVERY				
	5	Reddish brown clay, silt, sand, fine sand, trace sub-rounded gravel (1/2"), gray mottling, stiff, moist (CL),	100	7544			High J 54/6940 (4.5-5.8')
	6	Reddish brown clay, some silt, trace sand, fine gravel, stiff, moist, (CL).	80	7502			Chemical 72/6922 (5.8-6.8')
40"	8		60	7153			Saturated sub. 68/7002 (6.8-8.0')
	9	NOTES: Bottom of Boring @ 8.0' Weather: sunny 35°F PID Reading 0ppm Gamma Reading 0ppm					
	10						

SAMPLE ID (RAD. ANALYSIS)
TCLSS IAI-20 (1.1-1.6') 031010 Top 6"
TCLSB IAI-20 (6.8-8') 031010 Saturated sub. PID 0, HP
TCLSB IAI-20 (3.3-4.0) 031010 Native
TCLSB IAI-20 (1.6-2.0') 031010 High B
TCLSB IAI-20 (4.5-5.8') 031010 High J
TCLSB IAI-20 (5.8-6.8') 031010 Chemical

PROJECT

HOLE NO. IAI-20

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

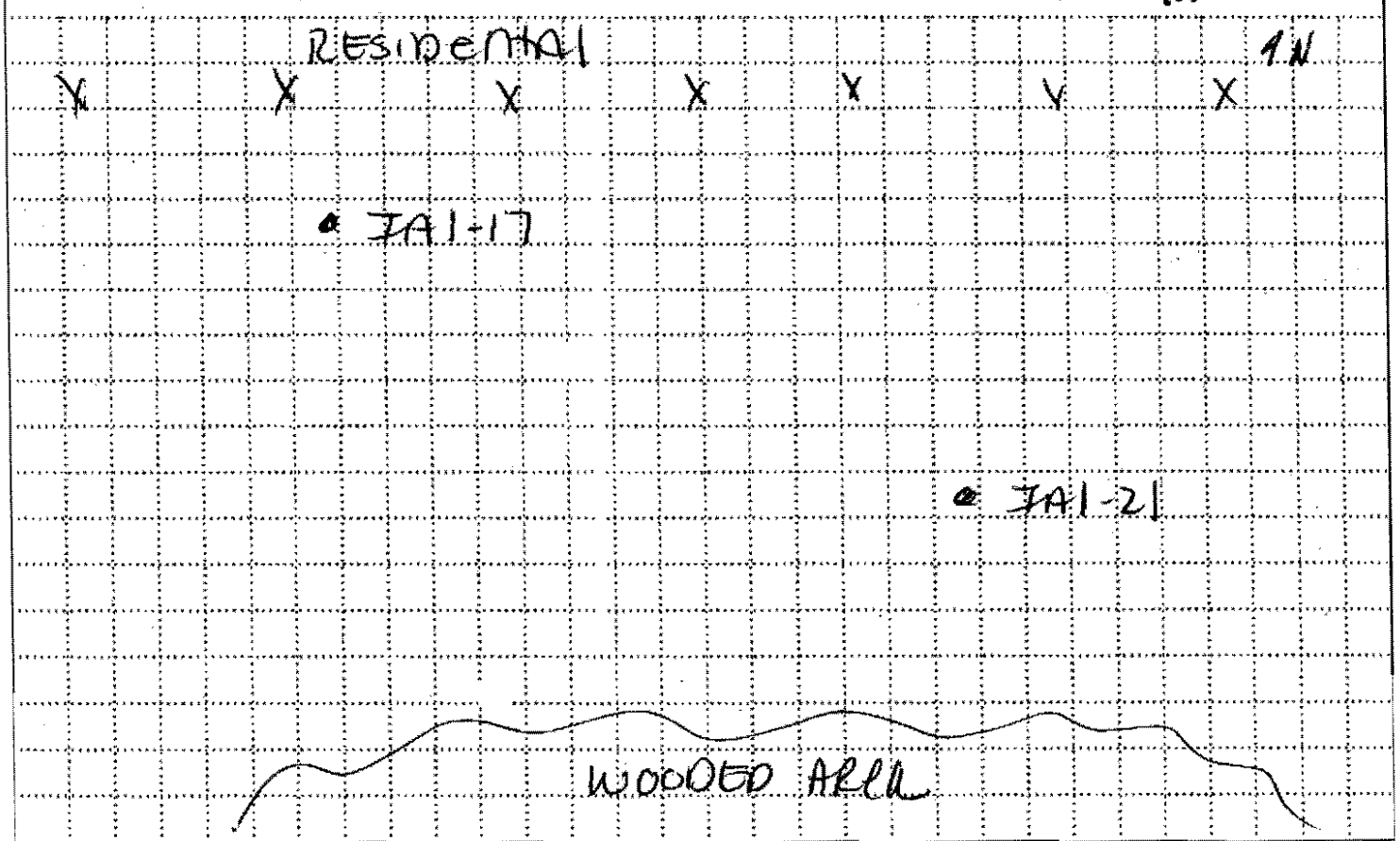
DISTRICT	Buffalo
HOLE NUMBER	JA1-21
1. COMPANY NAME	ENSOL, INC.
2. DRILLING CONTRACTOR	ZEBRA ENVIRONMENTAL CORP.
SHEET / SHEETS	1 OF 2
3. PROJECT	TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT
4. LOCATION	TONAWANDA LF, TONAWANDA, NY
5. NAME OF DRILLER	DAN Ferrel
6. MANUFACTURER'S DESIGNATION OF DRILL	6620 DT GEOPROBE
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	~~3¼" CASING 2" CORE w/ 5' PLASTIC SLEEVE~~ 9" MACRO CORE 4" plastic sleeve
8. HOLE LOCATION	N= 1093237.78 E= 1065880.57
9. SURFACE ELEVATION	
10. DATE STARTED	3/10/10 11:10am
11. DATE COMPLETED	3/10/10 1200pm
12. OVERBURDEN THICKNESS	3.6'
15. DEPTH GROUNDWATER ENCOUNTERED	NOT encountered
13. DEPTH DRILLED INTO ROCK	N/A
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	N/A
14. TOTAL DEPTH OF HOLE	7.0'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	N/A

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	-	-	-	-	-	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
CUTTINGS DRUMMED	-	-	-	

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT TON LF- Buffalo DISTRICT FUSRAP PROJECT HOLE NO. JA1-21

ENG FORM 5056-R, AUG 94

THRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR K Hoelscher

HOLE NUMBER JA1-21

SHEET 2 OF SHEET

REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h)
	0	NO RECOVERY	NO RECOVERY		See NOTES		
		Fill: DARK-brown topsoil, organic matter, rootlets, soft, moist	80	6926			Top 6" (1.4-.9) 67/6755
	1	Fill: Fine SAND, WASTE (ASH, GLASS), loose, moist	100	7155			High B (.9-1.9') 53/6916
	2						High γ (1.9-2.9') 54/6861
	3	Fill: REDDISH brown clay, gravel (<1"), WASTE (GLASS), stiff, moist	80	7262			Native (3.6-4.6') 85/7028
44"	4	REDDISH brown clay, some sand, trace silt, gravel (<1"), stiff, moist (CL)	80	6961			
		NO RECOVERY	NO RECOVERY				
	5	REDDISH-brown clay, sub rounded gravel (<1"), SOME SAND, COURSE SAND, fine SAND, trace gray mottling, stiff, moist (CL)	60	7095			
	6		80	7118			
48"	7		90	7212			Native (6.5-7.0') 62/7045
		Bottom of Boring @ 7.0'					
	8	NOTES: - WEATHER: OVERCAST - PID reading: 0 ppm - Gamma reading: count/min					
	9	Sample ID (lab analysis) TLS-SS-JA1-21(.4-.9)031010 TLS-SB JA1-21(.9-1.9)031010 TLS-SB JA1-2(1.9-2.9)031010 TLS SB JA1-2(3.6-4.6)031010 TLS SB JA1-2 (6.5-7.0)031010	Top 6" High B High γ Native				
	10		saturated sub, picked by HP				

PROJECT

HOLE NO. JA1-21

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

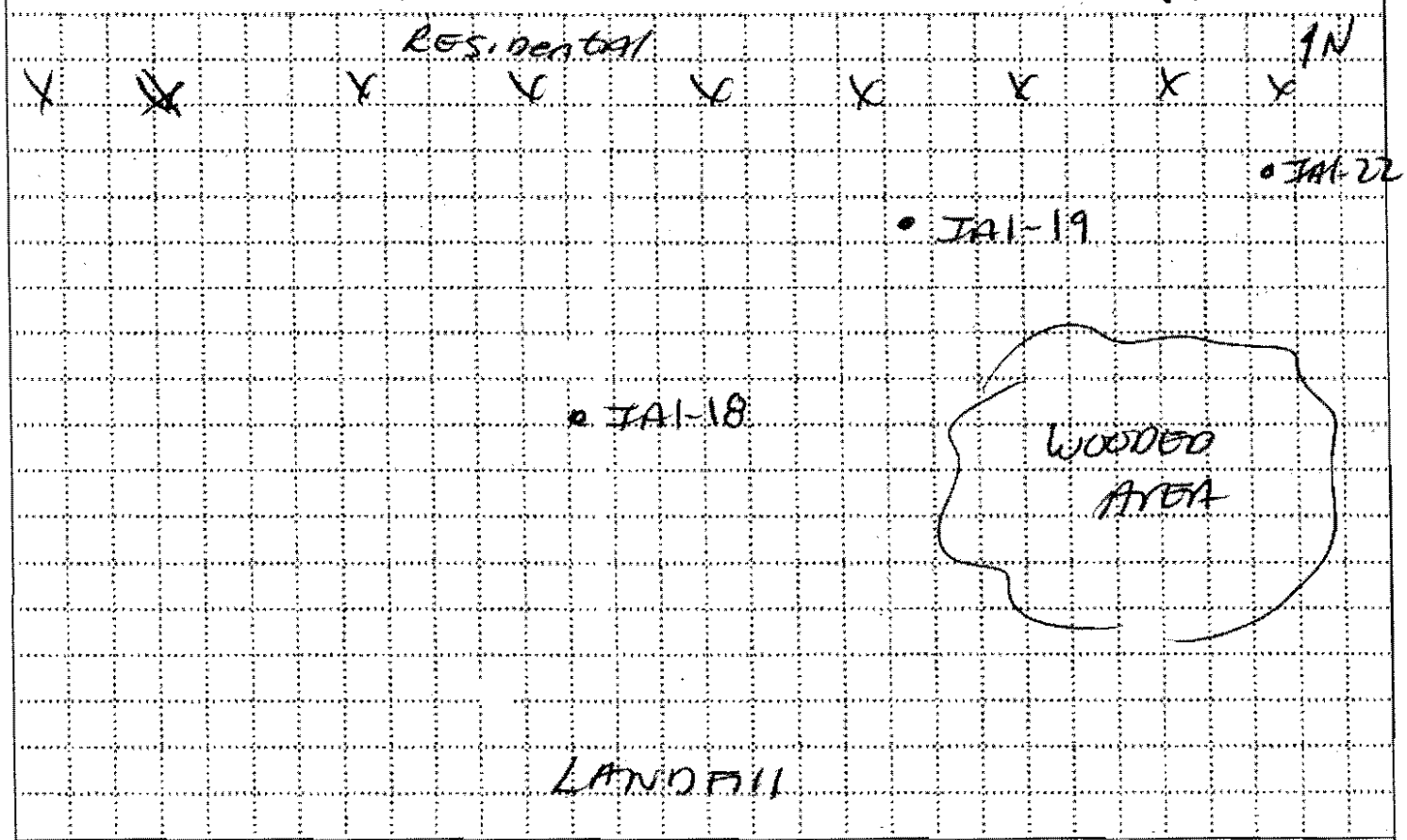
DISTRICT: Buffalo		HOLE NUMBER: JA1-22
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 2 SHEETS
3. PROJECT: TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: DAN Ferrel	6. MANUFACTURER'S DESIGNATION OF DRILL: 6620 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: ~~3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE~~	8. HOLE LOCATION: N= 1093237.78 E= 1065836.8	
	9. SURFACE ELEVATION: N/A	
	10. DATE STARTED: 3/9/10 3:26pm	11. DATE COMPLETED: 3/9/10 4:00pm
12. OVERBURDEN THICKNESS: 4.3'	15. DEPTH GROUNDWATER ENCOUNTERED: NOT ENCOUNTERED	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 8.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	-	-	-	-	-	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INVESTIGATOR
CUTTINGS DRUMMED	-	-	-	[redacted]

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON LF- Buffalo DISTRICT FUSRAP PROJECT — HOLE NO: JA1-22

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR K Hoelscher

HOLE NUMBER JA1-22

SHEET 2 OF 2

REC ID (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h)
	0	NO Recovery	NO Recovery			See notes	
	1						
	2						
	3	Fill: Dark-brown topsoil, organic matter, rootlets, soft, moist	60	6631			Top 6011 (2.3-2.8') 73/6443
	4	Fill: sand, course sand, gravel (1 1/2"), waste (ash, glass), brick, loose, moist	120	6580			High γ (2.8-3.8') 77/6582
		No Recovery	No Recovery				
	5	Reddish-brown clay, some silt, trace sand, course sand, gray mottling, stiff, moist (CL)	80	6406			Native (4.3-5.3') 66/6157
	6		100	6436			High B (5.3-6.3') 76/6281
	7		96	6225			Chemical (6.3-7.3') 73/6369
	8		60	6461			Saturated sub (7.3-8.0') 75/6462
		Bottom of Boring @ 8.0'					
	9	NOTES - Weather: Sunny, 32°F - Gamma Reading: count/min - PID Reading: 0ppm	Sample ID (Rad Analysis) TCS-SS-JA1-22(2.3-2.8')030910 TCS-SB JA1-22(2.8-3.8')030910 TCS-SB JA1-22(4.3-5.3')030910 TCS-SB JA1-22(5.3-6.3')030910 TCS-SB JA1-22(6.3-7.3')030910 TCS-SB JA1-22(7.3-8.0')030910				Top 6" High γ Native High B Saturated sub-by HP Chemical
	10						

PROJECT

HOLE NO JA1-22

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

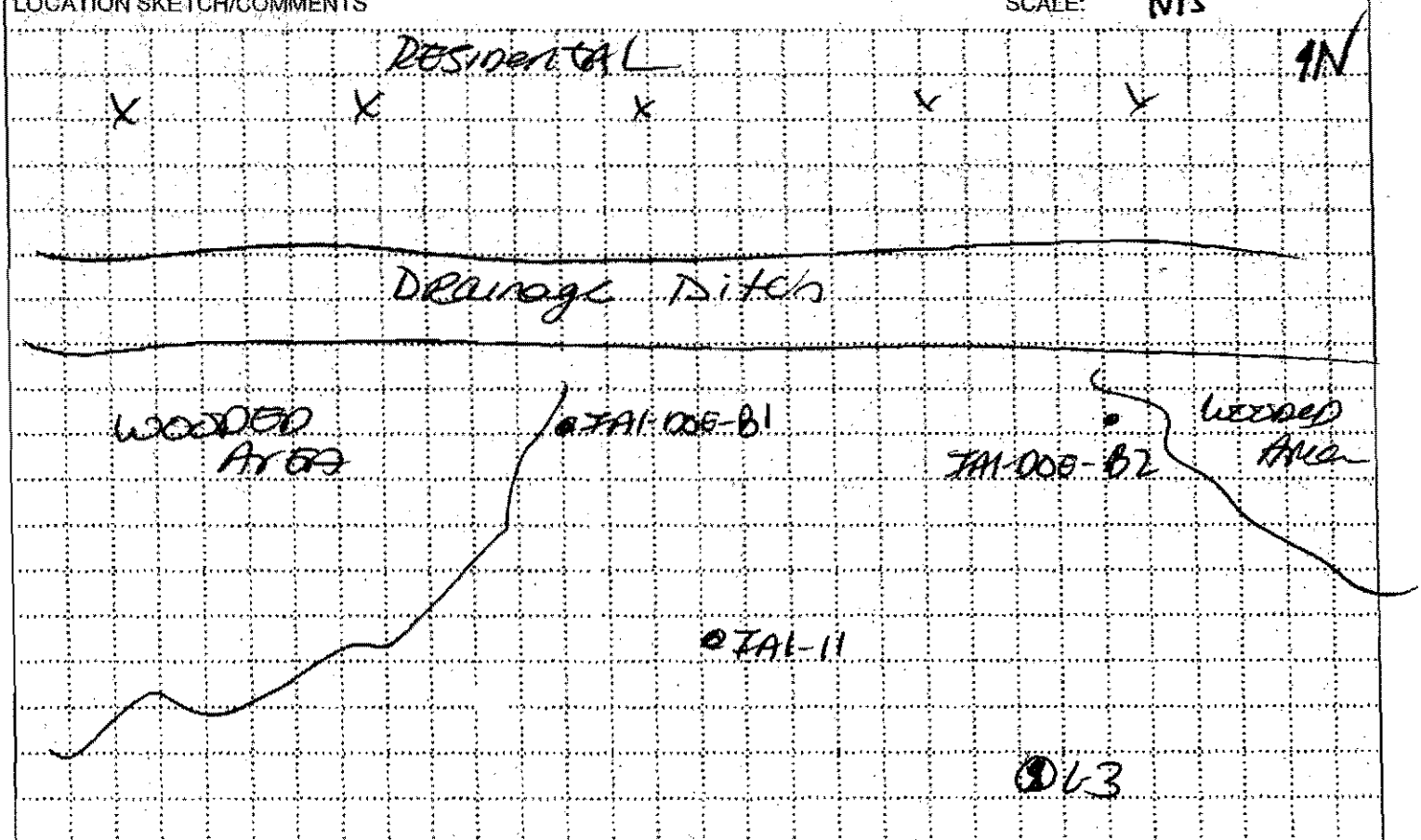
DISTRICT	Buffalo
HOLE NUMBER	TAI-006-B1
1. COMPANY NAME	ENSOL, INC.
2. DRILLING CONTRACTOR	ZEBRA ENVIRONMENTAL CORP.
SHEET / SHEETS	1 OF 3
3. PROJECT	TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT
4. LOCATION	TONAWANDA LF, TONAWANDA, NY
5. NAME OF DRILLER	Dan Ferrel
6. MANUFACTURER'S DESIGNATION OF DRILL	6620 DT GEOPROBE
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	2" MACRO CORE W/ 5' PLASTIC SLEEVE
8. HOLE LOCATION	N= 1093150.858 E= 1065811.999
9. SURFACE ELEVATION	N/A
10. DATE STARTED	3/18/10 1005
11. DATE COMPLETED	3/18/10 1020
12. OVERBURDEN THICKNESS	14.2'
13. DEPTH DRILLED INTO ROCK	N/A
14. TOTAL DEPTH OF HOLE	16.0'
15. DEPTH GROUNDWATER ENCOUNTERED	13.0'
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	N/A
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	N/A

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	–	–	–	–	–	N/A

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. S[redacted]
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT TON LF- Buffalo DISTRICT FUSRAP PROJECT HOLE NO TAI 006 B1

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER IA1-DOEB1

SHEET 2 OF 3

REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	OR CORE BOX NO. (e) B	SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h)
	0	NO Recovery	NO Recovery		SEE NOTE		
	1	Fill: DARK brown topsoil organic matter, roots, gravel (1/2"), waste (glass), loose, moist	60	6636			Top 6" 42/6349 (.4-.9')
	2		100	7340			
	3	Fill: gray ash, course & fine sand, sand, waste (glass), loose, moist	120	6872			
	4		100	7693			
	5	NO Recovery	NO Recovery				
	6						
	7	Fill: Black course & fine sand, slag, waste (ash), wood, loose, moist	200	8254			High A 242/7986 (6-7)
	8		200	8180			High B 110/7159 (7-8')
	9	NO Recovery	NO Recovery				
	10						

PROJECT

HOLE NO IA1-DOE-B1

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER TAI-DOE-B1

SHEET 3 OF 3

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC REMARKS COUNTS (h)
	10	Continued from previous page			See NOTES		
	11	FILL: coarse & fine sand, sand, brick, waste (glass, ash), loose, moist	160	7469			
	12		120	7294			
		No Recovery	No Recovery				
	13						
	14	FILL: Reddish brown clay, coarse & fine sand, gravel (1/2"), brick, waste (ash, glass), stiff, wet	160	6436			Saturated 73 (13-14') 6578
	15	Reddish brown clay, some sand, trace silt, fine sand, trace sub-rounded gravel (1/2"), stiff, moist (CL)	80	6766			Native 57/6660 (14.2-15.2')
	16		80	6968			
		Bottom of Boring @ 16.0'					
	17	NOTES Weather: sunny; 42°F PID reading: 0 ppm Gamma reading: count/min					
	18	Sample ID (Field Analysis) TLS-SS-TAI-DOE-B1(.4-.9') 031810	Top 6"				
		TLS-SB-TAI-DOE-B1(6-7') 031810	High				
	19	TLS-SB TAI-DOE-B1(7-8') 031910 TLS-SB TAI-DOE-B1(13-14') 031810	High B Saturated				
		TLS SB TAI-DOE-B1(14.2-15.2') 031810	Native				
	20						

PROJECT

HOLE NO. TAI-DOE-B1

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

DISTRICT: Buffalo	HOLE NUMBER: TAI-DOE-B2	
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 3 SHEETS
3. PROJECT: TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: [redacted]	6. MANUFACTURER'S DESIGNATION OF DRILL: Geoprobe 6620DT	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE W/ 5' PLASTIC SLEEVE	8. HOLE LOCATION:	
	9. SURFACE ELEVATION: N/A	
	10. DATE STARTED: 3/17/10 1:30	11. DATE COMPLETED: 3/17/10
12. OVERBURDEN THICKNESS: 7.6'	15. DEPTH GROUNDWATER ENCOUNTERED: NOT ENCOUNTERED	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 11.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

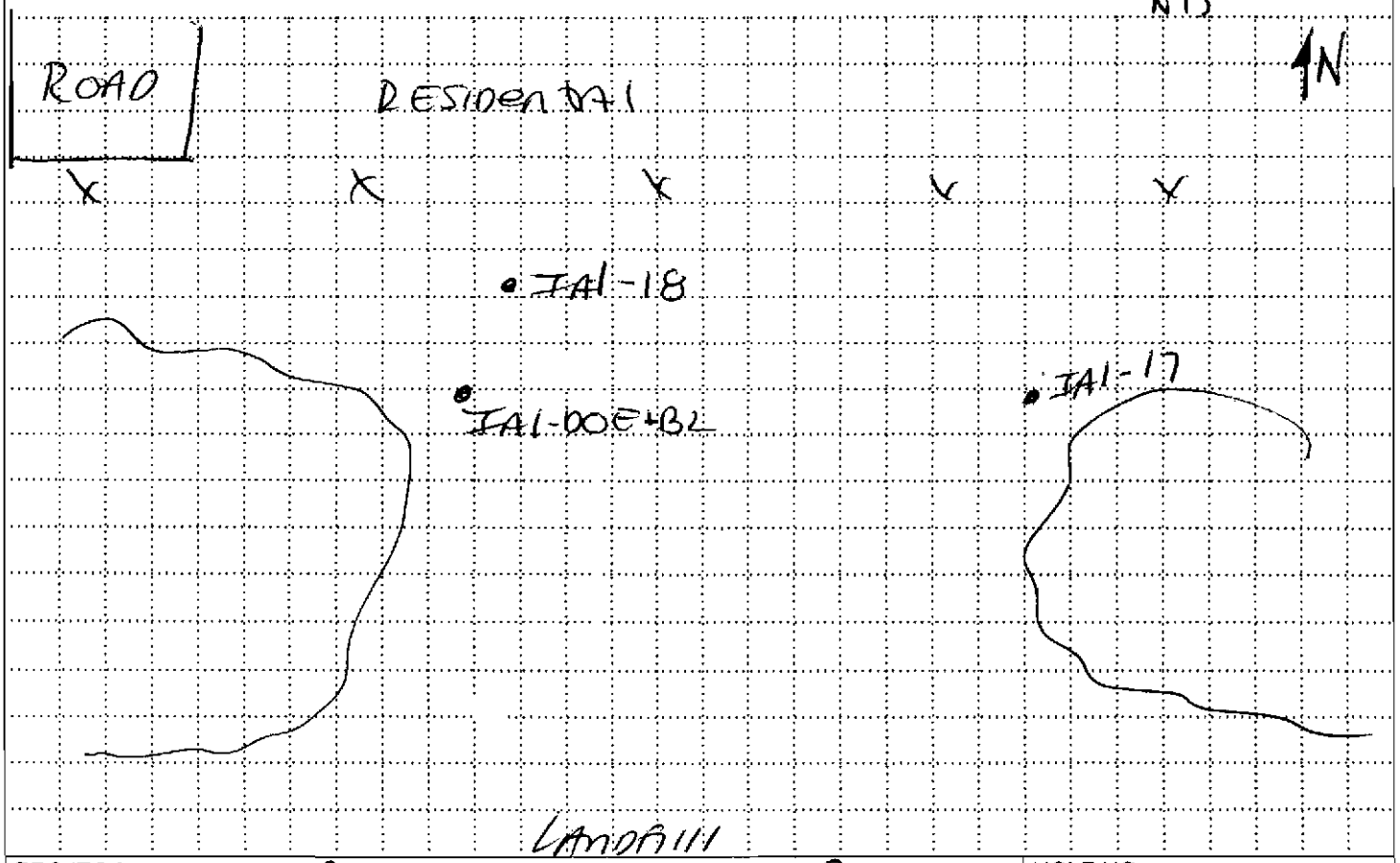
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP TOTAL	TCLP TOTAL	SVOC TCLP	PCB TOTAL	PCB TOTAL	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
CUTTINGS DRUMMED	–	–	–	[redacted]

LOCATION SKETCH/COMMENTS

SCALE: NTS



PROJECT	HOLE NO
TON LF- Buffalo DISTRICT FUSRAP PROJECT	TAI-DOE-B2

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER JAI-06E-B2

SHEET 2 OF 3

REC ID (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCR RESULTS (d) X	OR CORE BOX NO. (e) B	SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h)
	0	NO RECOVERY	NO RECOVERY		SEE NOTE		
	1	FILL: REDDISH BROWN SILT, CLAY, ORGANIC MATTER, PLASTICS, GRAVEL (1/2") STIFF, MOIST	60	6490			Top 6" 46/6986 (1.5-1')
	2	FILL: COARSE + FINE SAND, SAND, WASTE (ASH, GLASS, PLASTIC, PAPER), GRAVEL (1 1/2"), LOOSE, MOIST	40	7821			2nd Highest 47/7153 (1-2')
	3		100	7346			
45"	4		120	7916			Duplicate High 59/7675 (3-4')
	5	NO RECOVERY	NO RECOVERY				
	6	FILL: COARSE SAND, GRAVEL (1 1/2"), WASTE (ASH, GLASS, METAL), BRICK, LOOSE, MOIST	120	7099			Chemical 58/6856 (5.4-6.4')
	7		100	7592			High B 56/7278 (6.4-7.4')
32'	8	REDDISH BROWN SILT, CLAY, SOME SAND, TRACE SUB ROUNDED GRAVEL (1 1/2") FINE GRAVEL, STIFF-MOIST (CL)	100	7776			Native 56/7256 (7.6-8.6')
	9		60	7116			
	10		90	7100			

PROJECT

HOLE NO JAI-06E-B2

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER TA1-DOE-B2

SHEET 3 OF 3

REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h)
	10	Continue from previous page	80	6527	See NOTES		
	11	Bottom of Boring @ 11.0'					
36"	12	Notes					
		-weather: Sunny 55°F					
		-PID Reading: 0ppm					
	13	-Gamma Reading: Count/min					
		Sample ID (RADANALYSIS)					
	14	TLS-SS-TA1-DOE-B2(.5-1)	031710	Top 6"			
		TLS-SB-TA1-DOE-B2(1-2)	031710				
		TLS-SB-TA1-DOE-B2(3-4)	031710	High γ			
	15	TLS-SB-TA1-DOE-B2(7)	031710	High B			
		TLS-SB-TA1-DOE-B2(7.6-8.6)	031710	Nodule			
	16						
	17						
	18						
	19						
	20						

PROJECT

HOLE NO TA1-DOE-B2

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

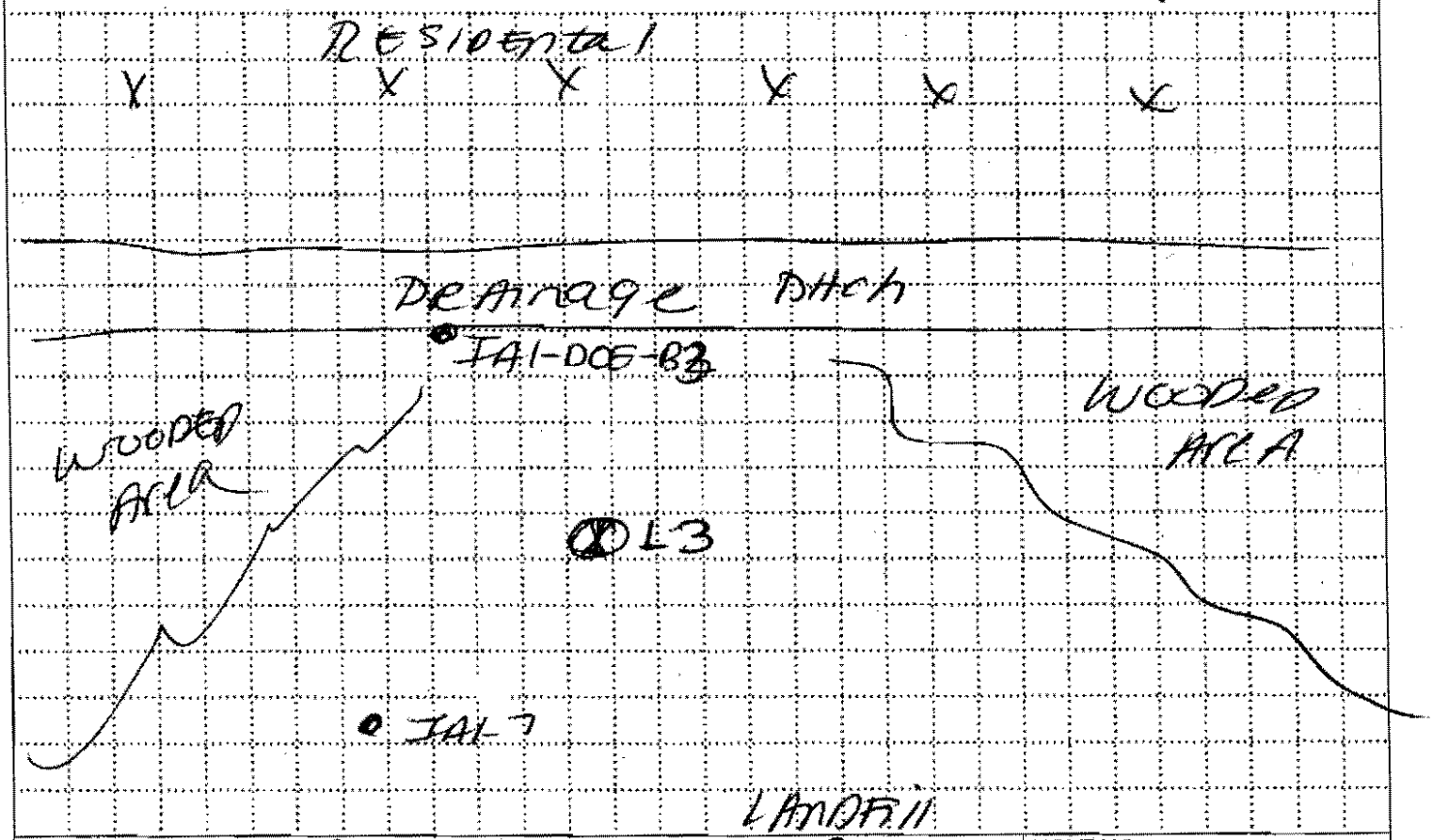
DISTRICT: Buffalo		HOLE NUMBER: JAI-DOE-33
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 3 SHEETS
3. PROJECT: TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: Dan Ferrel	6. MANUFACTURER'S DESIGNATION OF DRILL: 6620 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: ~~2 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE~~ 3" macrocore w/ 4' plastic sleeve	8. HOLE LOCATION: N= 1093160.859 E= 1065833.947	
	9. SURFACE ELEVATION: N/A	
	10. DATE STARTED: 3/18/10 8:45	11. DATE COMPLETED: 3/18/10 10:00
12. OVERBURDEN THICKNESS: 8.2'	15. DEPTH GROUNDWATER ENCOUNTERED: 7.1'	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 12.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	-	-	-	-	-	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIG[redacted]
CUTTINGS DRUMMED	-	-	-	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON LF - Buffalo DISTRICT FUSRAP PROJECT — HOLE NO: JAI-DOE-B3

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER JAI-DOE B3

SHEET 2 OF 3

REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	OR CORE BOX NO. (e) B	SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h)
	0	NO RECOVERY	NO RECOVERY		SEE NOTES		
	1						
		FILL: DARK brown topsoil, clay, organic matter, gravel (<1½"), loose, moist	100	7684			Top UH 65/7379 (1-1.5')
	2		80	9009			
	3	FILL: Blackish ASH, gravel (<½"), sand, waste (glass), loose, moist	180	8051			High B 258/7112 (2.5-3.5')
36"	4						
		NO RECOVERY	NO RECOVERY				
	5						
		FILL: waste (ASH, glass) fine & course sand, gravel (<1½"), sand, loose, moist	1,600	16590			Duplicate + High J 3538/17776 (5.3-6.3')
	6						
	7		160	8,571			
							Saturated 70/6838 (7.1-8.1')
33"	8		100	7109			
		Reddish brown silt, clay, some sand, gray mottling, fine sand, stiff, moist (CL)	80	7525			Native 51/6626 (8.2-9.2')
	9		80	7683			
	10						

PROJECT

HOLE NO JAI-DOE-B3

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER TA1-DOE-B3

SHEET 3 OF 3

REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	SAMPLE OR CORE BOX NO. (e) B	INDIVIDUAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h)
	10	Reddish-brown clay, some sand, trace silt, fine sand, sub-rounded gravel (2½"), stiff, moist (U)	60	7281	See NOTES		
	11		60	6359			
48"	12	Bottom of Boring 12.0'					
	13	NOTES					
		-Weather: sunny, 40°F					
		-PID Reading: 0 ppm					
	14	-Gamma Reading: 100 nR/hr					
		-SATURATED (7.1-8.1') - DIESEL ODOR					
		SAMPLE ID (RAD. ANALYSIS)					
	15	TLS-SS-TA1-DOE-B3 (1-1.5') 031810		Type 6'			
		TLS-SB-TA1-DOE-B3 (2.5-3.5') 031810		High B			
		TLS-SB-TA1-DOE-B3 (5.3-6.3') 031810		High 8 / Duplicate			
	16	TLS-SB-TA1-DOE-B3 (7.1-8.1') 031810		SATURATED			
		TLS-SB-TA1-DOE-B3 (8.2-9.2') 031810		Inactive			
	17						
	18						
	19						
	20						

PROJECT

HOLE NO TA1-DOE-B3

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

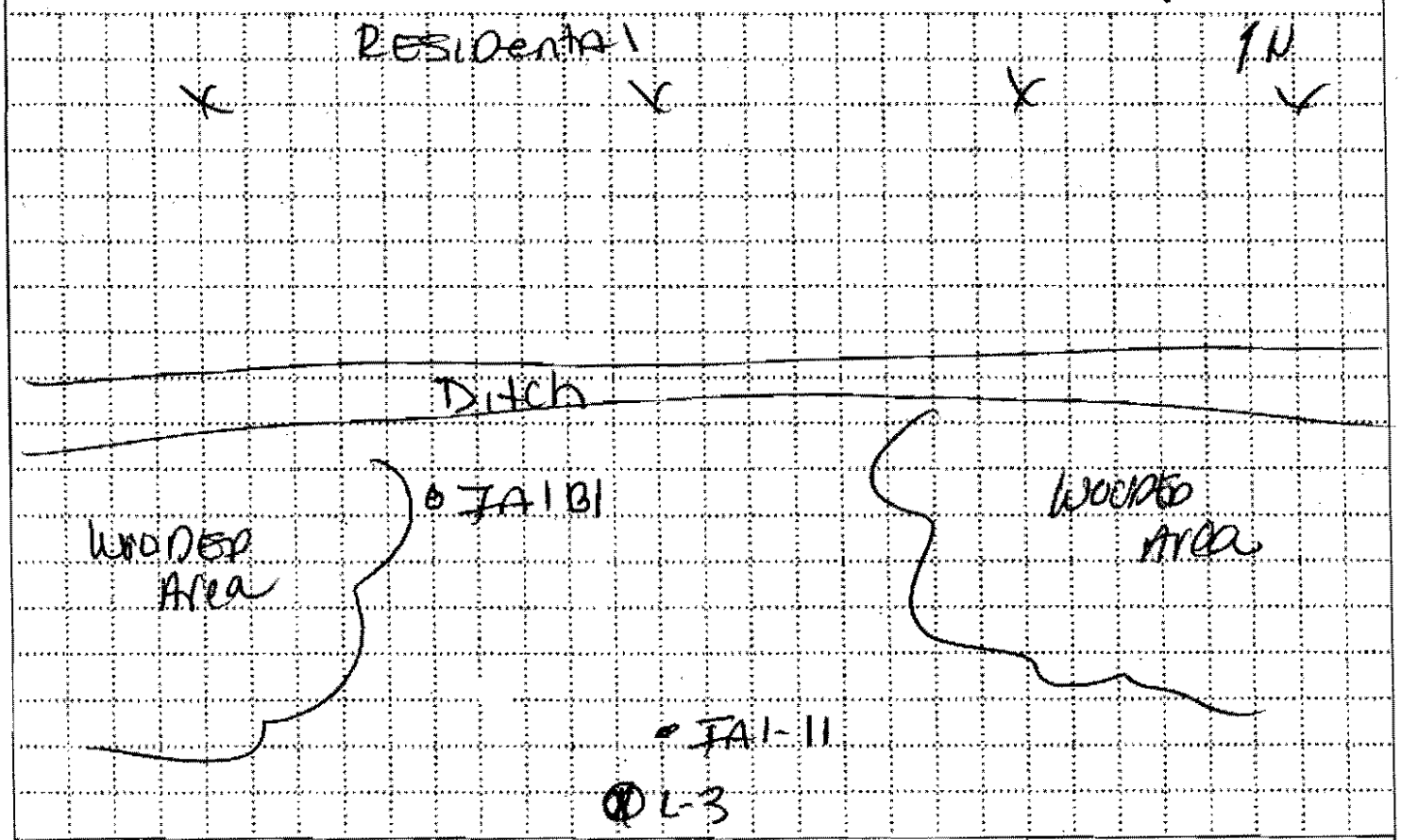
DISTRICT	Buffalo
HOLE NUMBER	JA1-B1
1. COMPANY NAME	ENSOL, INC.
2. DRILLING CONTRACTOR	ZEBRA ENVIRONMENTAL CORP.
SHEET / SHEETS	1 OF 3
3. PROJECT	TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT
4. LOCATION	TONAWANDA LF, TONAWANDA, NY
5. NAME OF DRILLER	Phil Crosi
6. MANUFACTURER'S DESIGNATION OF DRILL	7720 DT GEOPROBE
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	~~3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE~~ 3" macro core w/ 4' plastic sleeve
8. HOLE LOCATION	N= 1093158.01 E= 1065821.931
9. SURFACE ELEVATION	N/A
10. DATE STARTED	3/26/10 945
11. DATE COMPLETED	3/26/10 1050
12. OVERBURDEN THICKNESS	16.3'
15. DEPTH GROUNDWATER ENCOUNTERED	7.0'
13. DEPTH DRILLED INTO ROCK	N/A
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	N/A
14. TOTAL DEPTH OF HOLE	18.0'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	N/A

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	-	-	-	-	-	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE
CUTTINGS DRUMMED	-	-	-	[redacted]

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT TON LF- Buffalo DISTRICT FUSRAP PROJECT HOLE NO JA1B1

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER FAI-B1

SHEET 2 OF 3

REC'D ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) 8	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS ~~REMARKS~~ (h)
	0	NO RECOVERY	NO RECOVERY		SEE NOTES		
	1	FILL: WASTE (ASH, GLASS), WOOD, GRAVEL (CIII), COARSE GRAVEL, CONCRETE, LOOSE, MOIST	60	6433			Top 57 (1-1.2') 6057
	2		60	6766			Hand 53 (1.2-1.7') 56660
	3		80	6400			
41"	4		120	6755			
	5	NO RECOVERY	NO RECOVERY				
	6						
	7	FILL: WASTE (ASH, GLASS), GRAVEL (CIII), CONCRETE, WOOD, LOOSE, MOIST-WET	140	7222			Saturated 70 (7-8') 6492
14"	8						
	9	NO RECOVERY	NO RECOVERY				
	10						

PROJECT

HOLE NO. FAI-B1

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER FA1-B1

SHEET 3 OF 3

RECO (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	OR CORE BOX NO. (e) B	GEOTECHNICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC REMARKS COUNTS (h)
	10	NO Recovery	No Recovery		See NOTES		
	11						
011	12						
	13						
011	14	Fill, course sand, waste (ash, glass), loose, moist	300	7019			Hanb 178/6994 (14-15')
	15						
	16	Reddish brown clay, silt, fine sand, fine sub rounded gravel, moist, stiff (CL)	80	6046			Native 59/589 (16.3-17.3')
	17		100	7057			
1811	18		60	6393			
	19	Bottom of Boring @ 18.0' NOTES -weather: Sunny, 38°F -Gamma Reading: 0 ppm -PID Reading: 0 ppm	Sample ID (Lab Analysis) TLSS FA1-B1 (.7-1.2) 032610 Topsoil; TLSS FA1-B1 (1.2-1.7') 032610 Hand; TLSS FA1-B1 (7-8') 032610 Scheduled; TLSS FA1-B1 (14-15') 032610 Hand B; TLSS FA1-B1 (16.3-17.3) 032610 Native				
	20						

PROJECT

HOLE NO. FA1-B1

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

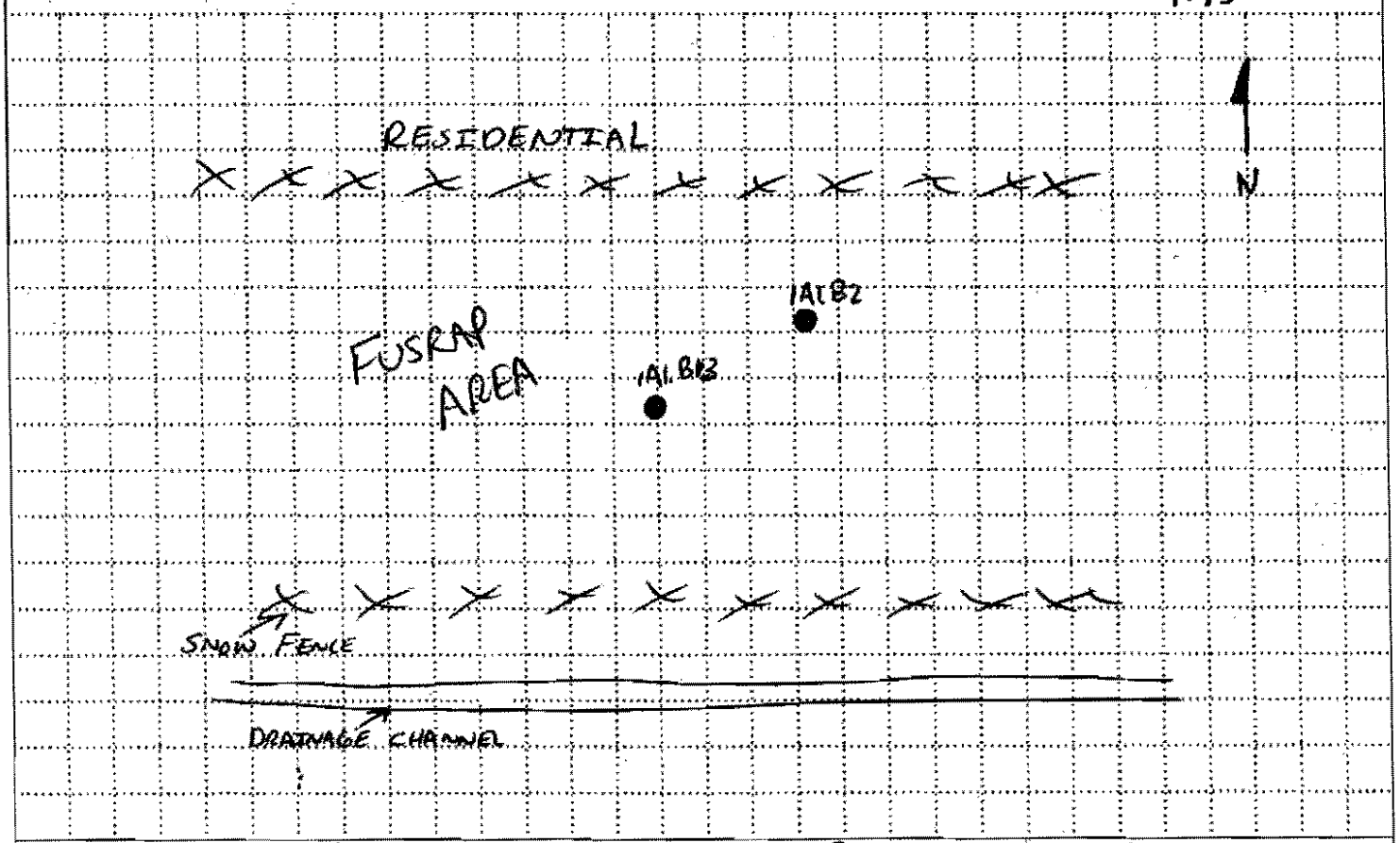
DISTRICT: Buffalo		HOLE NUMBER: 1A1.B2
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 4 SHEETS
3. PROJECT: TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: MIKE LANIEWSKI	6. MANUFACTURER'S DESIGNATION OF DRILL: 6620 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING, 2" CORE w/ 4' PLASTIC SLEEVE	8. HOLE LOCATION: N= 1093084.731 E= 1065727.232	
	9. SURFACE ELEVATION:	
	10. DATE STARTED: 3/29/10 0825	11. DATE COMPLETED: 3/29/10 1015
12. OVERBURDEN THICKNESS: 25.0'	15. DEPTH GROUNDWATER ENCOUNTERED: 4.5' bgs	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 28.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC		METALS		OTHER (SPECIFY)		OTHER (SPECIFY)		OTHER (SPECIFY)		21. TOTAL CORE RECOVERY
5	TCLP	TOTALS	TCLP	TOTALS	SVOC-TCLP	TOTALS	PEST-TCLP	TOTALS	PCB-TOTALS		N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)
CUTTINGS DRUMMED	–	–	–

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT: TON LF- Buffalo DISTRICT FUSRAP PROJECT HOLE NO: 1A1.B2

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A1.B2

SHEET 2 OF 4

REC'D ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~READING~~ COUNTS (h)
	0	NO RECOVERY →					→
	1	FILL: DARK-BROWN CLAY, GRAVEL, BRICK, WOOD, WASTE (GLASS, ASH), MED. STIFF, MOIST.	6301	80		TOP 6"	I 6065 B 60
	2		6218	60	SEE NOTES		
	3		6292	80			
41"	4		6017	60			
		NO RECOVERY →					→
	5	FILL: WASTE (GLASS, ASH), LOOSE, WET.	6391	40		SAT.	6446 58
	6		6273	40			
	7		6392	80			
44"	8		6369	100			
		NO RECOVERY →					→
	9	FILL: WASTE (GLASS, ASH), LOOSE, WET.	6167	100			
	10		6227	80			

PROJECT

HOLE NO 1A1.B2

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: 1A1.B2

PROJECT:

INSPECTOR: D. Popp

SHEET 3 OF 4

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC REMAINING COUNTS (h) γ	B
	10	CONTINUED FROM PAGE 3	6542	40	SEE	CHEM	7115	178
	11		6497	160	NOTES	HEIGH γ	6957	74
43"	12							
	13	NO RECOVERY →						
	14							
	15	FILL: WASTE (GLASS, ASH), LOOSE, WET.	6113	120				
12"	16							
	17							
	18	NO RECOVERY →						
	19							
0"	20							

PROJECT

HOLE NO 1A1.B2

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A1.B2

SHEET 4 OF 4

RECD ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~READING~~ COUNTS (h)	
	20	FILL: WASTE (GLASS, ASH), LOOSE, WET.						
	21		6071	100				
	22		6126	120				
	23		6568	120	SEE			
48"	24		6924	140	NOTES			
	25		6426	180		HIGH B	X 6304	B 115
	26	REDDISH-BROWN SILT AND CLAY, TRACE COURSE SAND AND FINE SUB-ROUND GRAVEL (<1/4"), SOFT, V. MOIST. (CL)	6416	60		NATIVE	6481	65
	27		6503	100				
48"	28		6758	140				
	29	BOTTOM of BORING AT 28.0'						
	30	NOTES: - OVERCAST, 42°F - SAMPLE I.D. TLS-SS-1A1.B2(0.6-1.1)032910 TLS-SB-1A1.B2(4.5-5.5)032910 TLS-SB-1A1.B2(10.0-11.0)032910 TLS-SB-1A1.B2(11.0-12.0)032910 TLS-SB-1A1.B2(24.0-25.0)032910 TLS-SB-1A1.B2(25.0-26.0)032910 - PID READINGS = 0 ppm (VOC's)						

PROJECT

HOLE NO 1A1.B2

ENG FORM 5056A-R, AUG 94

- SOIL READINGS ARE COUNTS/MIN.

HTRW DRILLING LOG

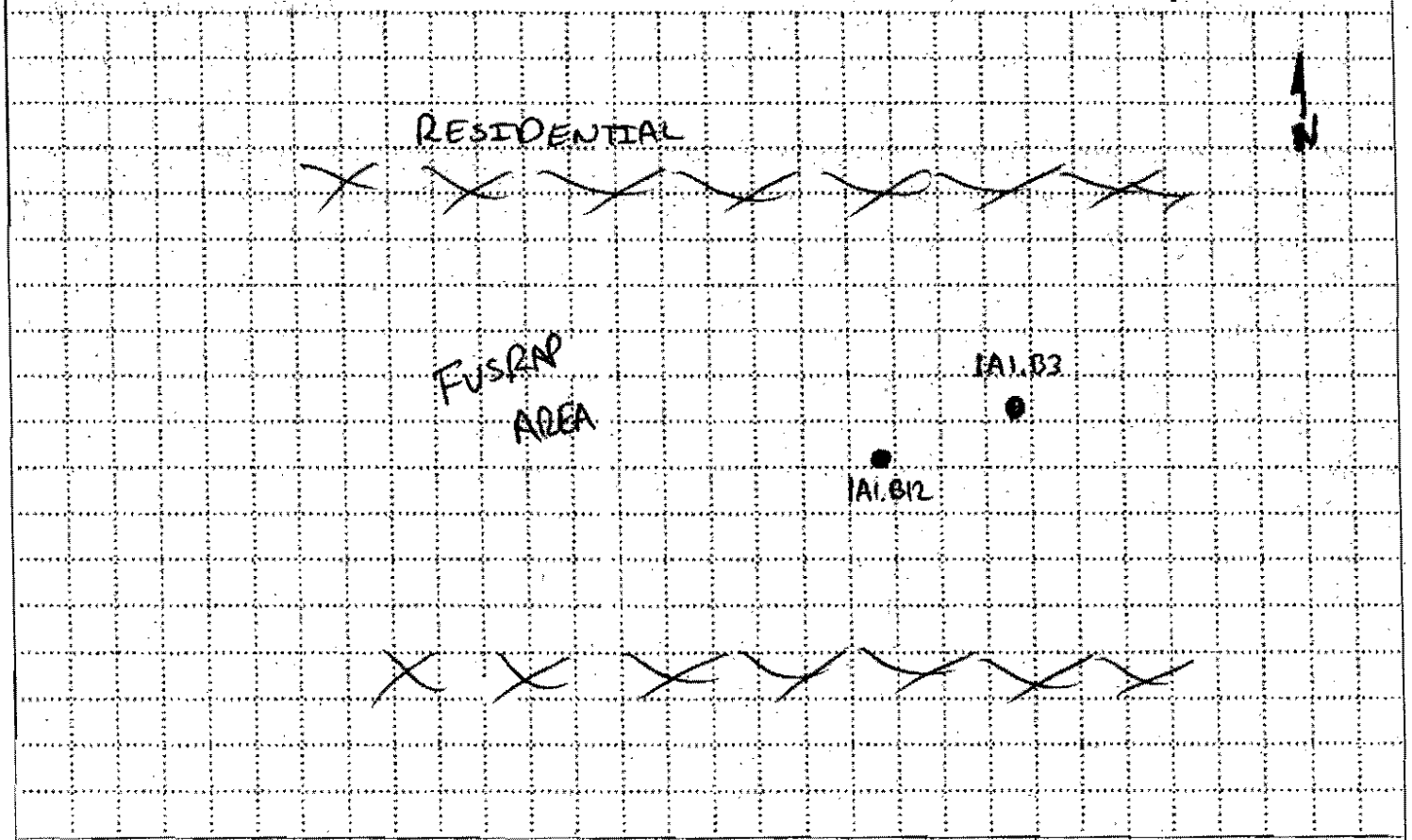
DISTRICT	Buffalo
HOLE NUMBER	IA1.B3
1. COMPANY NAME	ENSOL, INC.
2. DRILLING CONTRACTOR	ZEBRA ENVIRONMENTAL CORP.
SHEET / SHEETS	1 OF 4
3. PROJECT	TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT
4. LOCATION	TONAWANDA LF, TONAWANDA, NY
5. NAME OF DRILLER	PHIL ORSI
6. MANUFACTURER'S DESIGNATION OF DRILL	7720 DT GEOPROBE
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	3 1/4" CASING 2" CORE w/ 4' PLASTIC SLEEVE
8. HOLE LOCATION	N= 1093042.642 E= 1065728.735
9. SURFACE ELEVATION	
10. DATE STARTED	3/30/10 0830
11. DATE COMPLETED	3/30/10 0945
12. OVERBURDEN THICKNESS	25.9'
15. DEPTH GROUNDWATER ENCOUNTERED	4.4' bgs
13. DEPTH DRILLED INTO ROCK	N/A
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	N/A
14. TOTAL DEPTH OF HOLE	28.0'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	N/A

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	–	–	–	–	–	N/A %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
CUTTINGS DRUMMED	–	–	–	[redacted]

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT TON LF- Buffalo DISTRICT FUSRAP PROJECT HOLE NO IA1.B3

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A1. B3

SHEET 2 OF 4

RECID ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS REMARKS (h)
	0	NO RECOVERY →					
	1						
	2	FILL: REDDISH-BROWN CLAY, GRASS, GRAVEL, WASTE (ASH, GLASS), MED. STIFF, MOIST.	6209	120	SEE NOTES	TOP 6"	X 6194 B 64
	3		6496	60			
34"	4		6416	80			
		NO RECOVERY →					
	5	FILL: WOOD, WASTE (ASH, GLASS), LOOSE, WET.	6662	40		SAT.	6161 32
	6		6710	60			
	7		6788	100			
44"	8		6673	160		HIGH B	6677 71
	9	NO RECOVERY →					
	10						

PROJECT

HOLE NO 1A1. B3

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A1.B3

SHEET 3 OF 4

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS REMARKS (h)	
	10							
	11							
0"	12	NO RECOVERY →						
	13							
	14	FILL: WASTE (ASH, GLASS), LOOSE, WET.	7025	120	SEE NOTE	HH64 6	X 7247	B 106
	15							
30"	16		6695	80				
		NO RECOVERY →						
	17	FILL: WASTE (ASH, GLASS), LOOSE, WET.	6897	80				
	18							
	19		6984	40				
42"	20		6728	80				

PROJECT

HOLE NO 1A1.B3

ENG FORM 5056A-R, AUG 94

PROJECT

INSPECTOR D. Popp

1A1.B3

SHEET 4 OF 4

RECID ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) ~~X~~	GEOTECH SAMPLE OR CORE BOX NO. (e) ~~B~~	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	20						
	21						
	22	NO RECOVERY →					
	23						
0"	24						
	25						
	26	FILL: WASTE (ASH, GLASS), LOOSE, WET	6637	80			
	27	REDDISH-BROWN SILT AND CLAY, TRACE COURSE SAND AND FINE SUB-ROUND GRAVEL (< 3/4"), SOFT, V. MOIST. (CL)	6668	100	SEE NOTES	NATIVE	X 6516 B 57
31"	28		6654	60			
	29	BOTTOM of BORING AT 28.0'					
	30						

NOTES:
- CLEAR, 34°F
- SAMPLE I.D.

TLS-SS-1A1.B3(1.2-1.7)033010
TLS-SB-1A1.B3(4.4-5.4)033010
TLS-SB-1A1.B3(7.0-8.0)033010
TLS-SB-1A1.B3(13.5-14.5)033010
TLS-SB-1A1.B3(25.9-26.9)033010

- PID READINGS = 0 ppm (VOC's)
- SOIL READINGS ARE COUNTS/MIN.

PROJECT

HOLE NO 1A1.B3

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

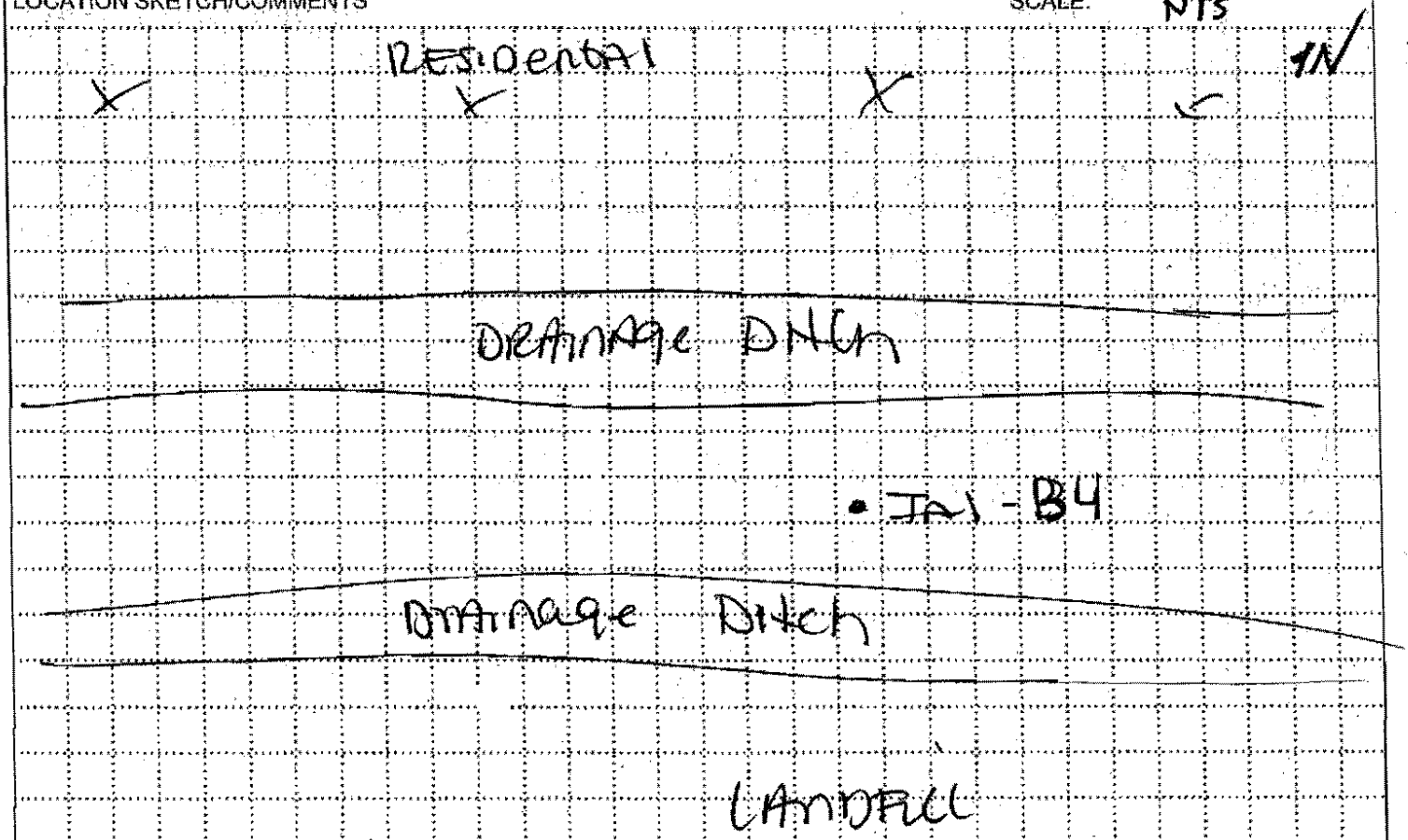
DISTRICT: Buffalo	HOLE NUMBER: JA1 B4	
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 4 SHEETS
3. PROJECT: TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: [redacted]	6. MANUFACTURER'S DESIGNATION OF DRILL: 770 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 2" IMPACT CORE W/4ft PLASTIC SLEEVE	8. HOLE LOCATION: N= 1093046.024 E= 1065764.059	
	9. SURFACE ELEVATION: N/A	
	10. DATE STARTED: 3/29/10 1340pm	11. DATE COMPLETED: 3/29/10 310
12. OVERBURDEN THICKNESS: 25.2'	15. DEPTH GROUNDWATER ENCOUNTERED: 4.0'	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 28.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP / TOTALS	TCLP / TOTALS	SVOC-TCLP / TOTALS	PEST-TCLP / TOTALS	PCB-TOTALS	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23
CUTTINGS DRUMMED	–	–	–	[redacted]

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON LF- Buffalo DISTRICT FUSRAP PROJECT — HOLE NO: JA1-B4

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER TA1-B4

SHEET 2 OF

REC'D ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) 8	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	0	No Recovery	No Recovery		SEE NOTE		
	1						
	2	Fill waste (ash, glass, paper, plastic), wood, loose, moist	50	4938			Tcpb 11 36 (1.72.3') 5519
	3		60	5057			
28"	4		40	5028			
	5	Fill waste (ash, glass, paper, plastic), wood, wet, loose	100	5177			Saturated 50 (4-5')
	6		160	5116			
	7		100	5171			
48"	8		100	5255			
	9	No Recovery	No Recovery				
	10	Fill waste (ash, glass, paper, plastic), wood, moist-wet, loose	80	6274			Hum & 48 (9-10') 5925

PROJECT

HOLE NO. TA1-B4

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER JA1-04

SHEET 3 OF

REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h)
	10	Continue from previous page	120	5469	See NOTES		Chemical 66 (10-11') 6100
36"	11		260	5675			HgNB 394 (11-12') 6075
	12	NO Recovery	NO RECOVERY				
	13	Fill: WASTE (ASH, GLASS, PAPER), GRAVEL (1 1/2"), WOOD, LOOSE, WET-MOIST	100	5161			
	14		120	5858			
40"	15		100	6307			
	16	NO Recovery	NO RECOVERY				
	17	Fill: SAME AS 12.8-16'	80	5241			
	18		120	5620			
36"	19		160	5907			
	20						

PROJECT

HOLE NO. JA1-04

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER FA1-B4

SHEET 4 SHEET

RECID ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) 8	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h) 1 MIN. STATIC COUNTS
	20	NO RECOVERY	NO RECOVERY		SEE NOTES		
	21						
	22						
	23	FILL: SAME AS 17-20'	80	5382			
22"	24		80	5497			Lecture 44 (24-25') 5439
	25		80	4950			
	26	REDDISH brown silt, clay, trace SAND, trace fine SAND, fine sub-rounded gravel (1/2"), trace gray mottling, STIFF, MOIST (CL)	40	5057			
	27		60	5180			
48"	28		40	5270			
	29	Bottom of Barry @ 28.6' NOTES Weather cloudy 40 PID reading 40 ppm Gamma count/1min					
	30						

SAMPLE ID (RAD ANALYSIS)
TLS SS FA1 B4 (1.7-2.3') Topsoil
TLS SB FA1-B4 (4-5) Saturated
TLS SB FA1-B4 (9-10) Hum B
TLS SB FA1 B4 (11-12) Hum B
TLS SB FA1-B4 (10-11) 032910 Chemical FA1-B4
TLS SB FA1-B4 (25.2-26.2) 032910 Lecture

PROJECT

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

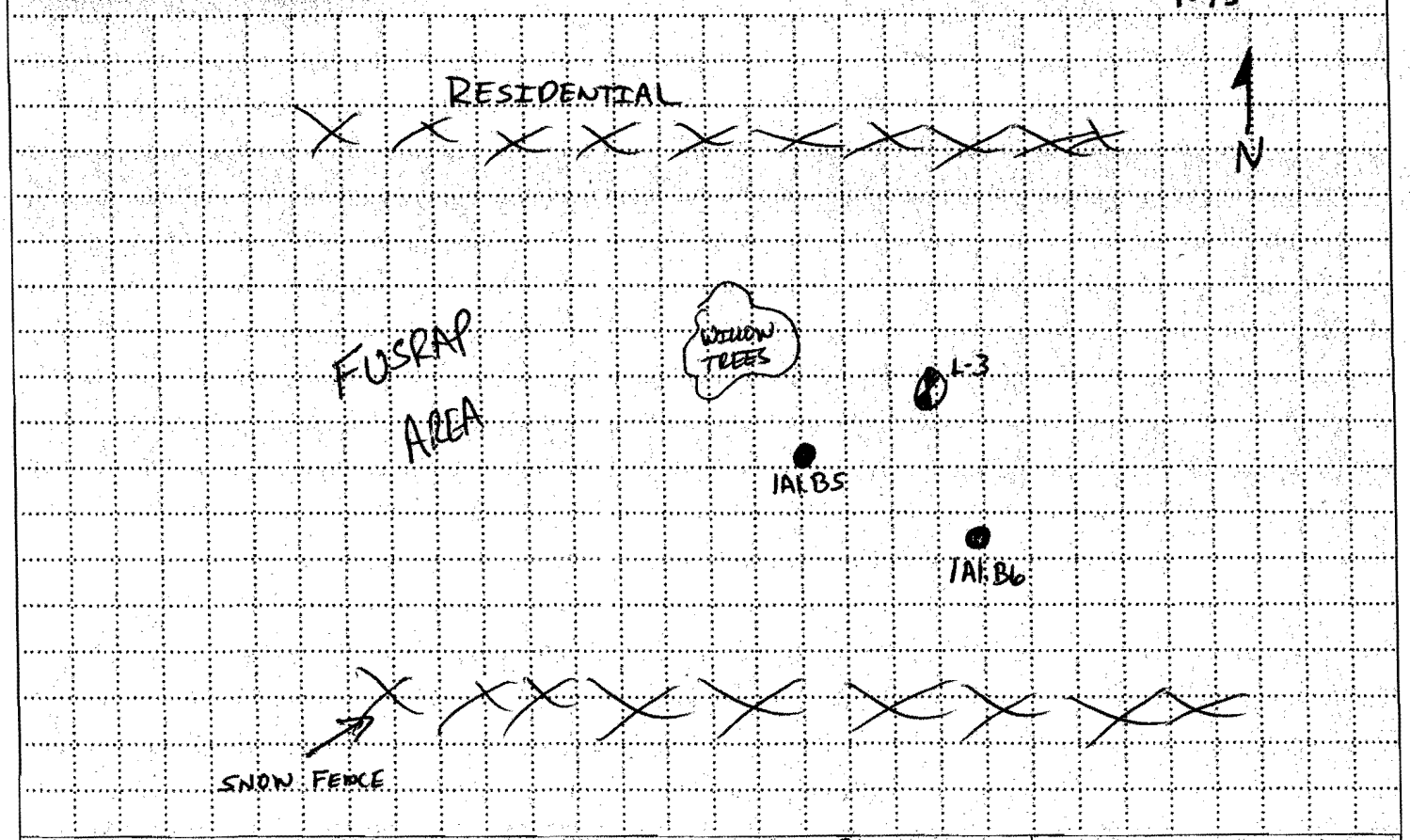
DISTRICT: Buffalo	HOLE NUMBER: IAL.B5	
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 4 SHEETS
3. PROJECT: TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: JEFF SNYDER	6. MANUFACTURER'S DESIGNATION OF DRILL: 6620 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE W/ 4' PLASTIC SLEEVE	8. HOLE LOCATION: N=1093084.731 E=1065815.918	
	9. SURFACE ELEVATION:	
	10. DATE STARTED: 3/26/10 0945	11. DATE COMPLETED: 3/26/10 1200
12. OVERBURDEN THICKNESS: 24.0'	15. DEPTH GROUNDWATER ENCOUNTERED: 5.0' bgs	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 28.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP / TOTALS	TCLP / TOTALS	SVOC-TCLP / TOTALS	PEST-TCLP / TOTALS	PCB-TOTALS	N/A

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
CUTTINGS DRUMMED	–	–	–	[redacted]

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT	HOLE NO
TON LF - Buffalo DISTRICT FUSRAP PROJECT	IAL.B5

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A1.B5

SHEET 2 OF 4

~~ELEV.~~ RECID (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h) 1 MIN. STATIC COUNTS γ / B
	0	NO RECOVERY →					
	1						
		FILL: DARK-BROWN CLAY, ROOTS, WASTE (ASH), SOFT, V. MOIST.					
	2		5040	100		TOP 6"	4771 51
	3		5142	60			
33"	4		5250	110			
		NO RECOVERY →					
	5						
		FILL: WASTE (ASH, GLASS), REDDISH-BROWN CLAY, LOOSE, WET.					
	6		5047	90		SAT.	5034 45
	7		5351	70			
36"	8		5709	100			
	9	NO RECOVERY →					
	10						

PROJECT

HOLE NO 1A1.B5

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A1.B5

SHEET 3 OF 4

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	10						
	11						
0"	12	NO RECOVERY →					
	13						
	14	FILL: WASTE (ASH, GLASS), LOOSE, WET.	5505	90			
	15		5640	60		CHEM.	γ 5879 B 71
34"	16		5760	100		HIGH γ	5954 88
	17						
	18	NO RECOVERY →					
	19						
6"	20	FILL: WASTE (ASH, GLASS), LOOSE, WET.	5203	60			

PROJECT

HOLE NO 1A1.B5

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. PoPP

HOLE NUMBER 1A1.B5

SHEET 4 OF 4

RECID ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) 8	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS ~~REMARKS~~ (h)
	20						
	21						
	22	NO RECOVERY →					
	23						
0"	24						
	25	REDDISH-BROWN SILT AND CLAY, TRACE COURSE SAND AND FINE SUB-ROUND GRAVEL (<½"), STIFF, MOIST. (CL)	5359	80		NATIVE	8: 5063 B: 56
	26		5430	110		HIGH B	5096 46
	27		5339	50			
48"	28		5442	90			
	29	BOTTOM of BORING AT 28.0' NOTES: - CLEAR, 28°F - SAMPLE I.D. TLS-SS-1A1.B5(1.3-1.8)032610 TLS-SB-1A1.B5(5.0-6.0)032610 TLS-SB-1A1.B5(14.0-15.0)032610					
	30	TLS-SB-1A1.B5(24.0-25.0)032610 TLS-SB-1A1.B5(25.0-26.0)032610					

PROJECT

HOLE NO 1A1.B5

ENG FORM 5056A-R, AUG 94

- PID READINGS = 0ppm (VOC's)
- SOIL READINGS ARE COUNTS/MIN.

HTRW DRILLING LOG

DISTRICT: Buffalo	HOLE NUMBER: 1A1.B6	
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 5 SHEETS
3. PROJECT: TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: Jeff SNYDER	6. MANUFACTURER'S DESIGNATION OF DRILL: 6620 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE w/ 4' PLASTIC SLEEVE	8. HOLE LOCATION: N= 1093084.731 E= 1065859.51	
	9. SURFACE ELEVATION:	
	10. DATE STARTED: 3/26/10 1315	11. DATE COMPLETED: 3/26/10 1430
12. OVERBURDEN THICKNESS: 29.0'	15. DEPTH GROUNDWATER ENCOUNTERED: 6.1' bgs	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 32.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

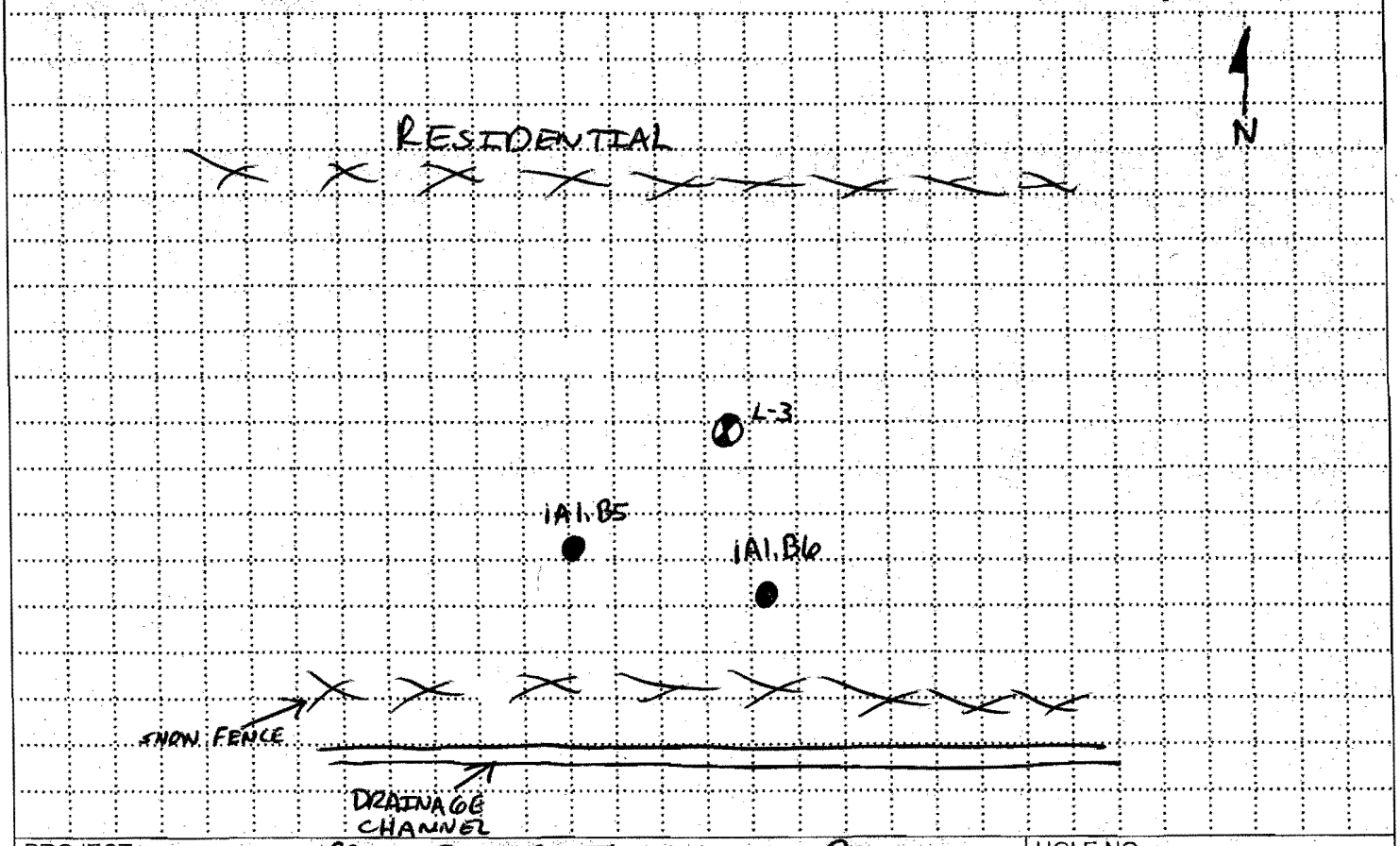
18. GEOTECHNICAL SAMPLES	DISTRUBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	–	–	–	–	–	N/A %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
CUTTINGS DRUMMED	–	–	–	[redacted]

LOCATION SKETCH/COMMENTS

SCALE: NTS



PROJECT: TON LF- Buffalo DISTRICT FUSRAP PROJECT | HOLE NO: 1A1.B6

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR: D. Popp

HOLE NUMBER: IA1.B6

SHEET 2 OF 5

RECID ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS ~~REMARKS~~ (h)
	0	NO RECOVERY →					→
	1						
	2	FILL: REDDISH-BROWN CLAY, WASTE (GLASS, PLASTIC), BRICK, GRAVEL, STIFF, MOIST.	5032	80	SEE NOTES	TOP 6"	X 4997 B 45
	3		5181	60			
35"	4		5220	70			
	5	NO RECOVERY →					→
	6	FILL: REDDISH-BROWN CLAY, WASTE (ASH, GLASS, METAL), LOOSE, WET.	5360	90			
	7		5170	60		SAT.	5549 39
33"	8		5530	90			
		NO RECOVERY →					→
	9	FILL: WASTE (ASH, GLASS), LOOSE, WET.	5285	80			
	10						

PROJECT

HOLE NO IA1.B6

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: 1A1.B6

PROJECT:

INSPECTOR: D. Poff

SHEET 3 OF 5

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	10	CONTINUED FROM PAGE 2	5585	100			
	11		5764	110			
37"	12						
	13	NO RECOVERY →					
	14	FILL: WASTE (ASH, GLASS), LOOSE, WET.	5315	60	SEE NOTES		
	15		5597	90			
30"	16		5696	100		HIGH γ	γ 5141 B 86
		NO RECOVERY →					
	17	FILL: WASTE (ASH, GLASS), LOOSE, WET.	5355	70			
	18						
	19		5577	60			
37"	20		5405	80			

PROJECT

HOLE NO 1A1.B6

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR: D. Popp

HOLE NUMBER: 1A1.B6

SHEET 4 OF 5

REC'D ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	20						
	21	NO RECOVERY →					→
	22						
		FILL: WASTE (ASH, GLASS), LOOSE, WET.	5320	100	SEE NOTES		
	23		5498	80			
24"	24						
	25	NO RECOVERY →					→
	26	FILL: WASTE (ASH, GLASS), LOOSE, WET.	5403	90			
	27						
							γ B
29"	28		5568	120		HIGH B	5587 60
			5047	70			
	29						
		REDDISH-BROWN SILT AND CLAY, TRACE COURSE SAND AND FINE SUB-ROUND GRAVEL (<1/4"), SOFT, MOIST. (CL)	5201	110		NATIVE	5148 58
	30						

PROJECT

HOLE NO 1A1.B6

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A1.B6

SHEET 5 OF 5

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	30	CONTINUED FROM PAGE 4					
			5348	80			
	31						
			5426	100			
	32						
		BOTTOM of BORING AT 32.0'					
		NOTES:					
	33	- CLEAR, 30°F					
		- SAMPLE I.D.					
		TLS-SS-1A1.B6(1.1-1.6)032610					
	34	TLS-SB-1A1.B6(6.1-7.1)032610					
		TLS-SB-1A1.B6(15.0-16.0)032610					
	35	TLS-SB-1A1.B6(27.0-28.0)032610					
		TLS-SB-1A1.B6(29.0-30.0)032610					
		- PID READINGS = 0 ppm (VOC's)					
	36	- SOIL READINGS ARE					
		COUNTS/MIN.					
	37						
	38						
	39						
	40						

PROJECT

HOLE NO 1A1.B6

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

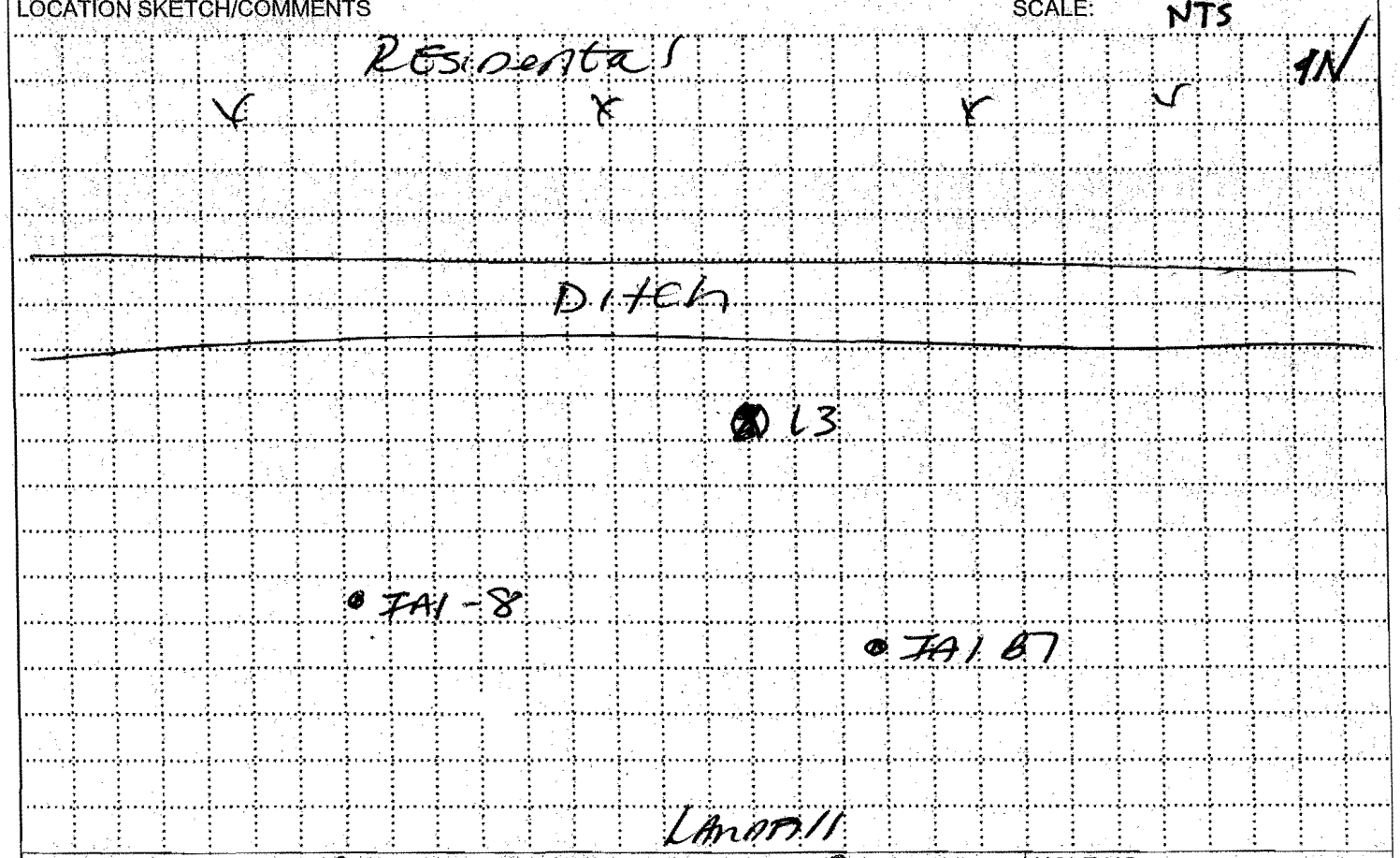
DISTRICT: Buffalo		HOLE NUMBER: JA1-B7
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 4 SHEETS
3. PROJECT: TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: Phil Olsi	6. MANUFACTURER'S DESIGNATION OF DRILL: 7720 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 2" MACRO CORE W/ 4' PLASTIC SLEEVE	8. HOLE LOCATION: N= 1093090.095 E= 1065900.095	
	9. SURFACE ELEVATION: NA	
	10. DATE STARTED: 3/29/10 800 AM	11. DATE COMPLETED: 3/29/10 1010 AM
12. OVERBURDEN THICKNESS: 26.5'	15. DEPTH GROUNDWATER ENCOUNTERED: 13.6'	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 26.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP / TOTALS	TCLP / TOTALS	SVOC-TCLP / TOTALS	PEST-TCLP / TOTALS	PCB- TOTALS	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23 [redacted]
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT: TON LF- Buffalo DISTRICT FUSRAP PROJECT HOLE NO: JA1 B7

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER JA1-B7

SHEET 2 OF

~~ELEV.~~ RECID (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) 8	SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h) 1 MIN. STATIC COUNTS
	0	NO Recovery	NO Recovery		SEE NOTE		
	1	Fill: Reddish brown silt, clay, waste (ash, paper, glass), sand, stiff, moist	80	7209			Typ (1-1.3') 58 / 6441
	2		80	7254			
	3		100	7607			
	4	NO Recovery	NO Recovery				
	5	Fill: waste (ash, glass, metal, paper, plastic), loose, moist	100	7115			
	6		80	7428			
	7		120	7167			Hgnb (6.8-7.8') 72 / 7086
	8		100	8110			Hgnb (7-8') 101 / 6914
	9	NO Recovery	NO Recovery				
	10						

PROJECT

HOLE NO JA1-B7

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER JA1 B7

SHEET 3 OF SHEE

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	10	Fill: waste (ash, glass, paper, metal), sand, loose, wet-moist	100	7813	See Notes		Chemical (10-11') 47/7116
	11						
	12		100	7521			
	13	NO Recovery	No Recovery				
	14	Fill: waste (ash, paper, glass, metal), loose, wet	80	7101			Saturated (13.6-14.6) 51/7071
	15		90	7456			
	16						
	17	NO Recovery	No Recovery				
	18						
	19						
	20						

PROJECT

HOLE NO. JA1 B7

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER FA1 B7

SHEET 4 OF 4

RECID ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) 8	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h) 1 MIN. STATIC COUNTS
	20	NO RECOVERY	NO RECOVERY		SEE NOTES		
	21						
	22						
	23	Fill: black oily waste (ash, glass, plaster, paper), loose, moist	100	7677			
	24						
	25	NO RECOVERY	NO RECOVERY				
	26	Fill: ~~black oily waste~~ waste (ash, glass, plaster, paper), loose, moist					
	27	Redish brown silty clay, fine subrounded gravel (1/2"), fine sand, soft, moist (CL)	80	7157			Native 82 (26.5-27.5) 6978
	28		80	6815			
		Bottom of Boring @ 28.0' NOTES -weather: cloudy, rain -PID Ready on gamma Count/min	45				
	30						

Sample ID (Lab Analysis)
TLS-SS-FA1-B7 (.8-1.3) 032910 Top 6"
TLS-SB FA1-B7 (6-7') 032910 High B
TLS-SB FA1-B7 (7-8') 032910 High B
TLS-SB FA1-B7 (0-1') 032910 Chemical
TLS-SB FA1-B7 (13.6-14.6) 032910 Saturated
TLS-SB FA1-B7 (26.5-27.5) 032910 Native

PROJECT

HOLE NO. FA1-B7

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

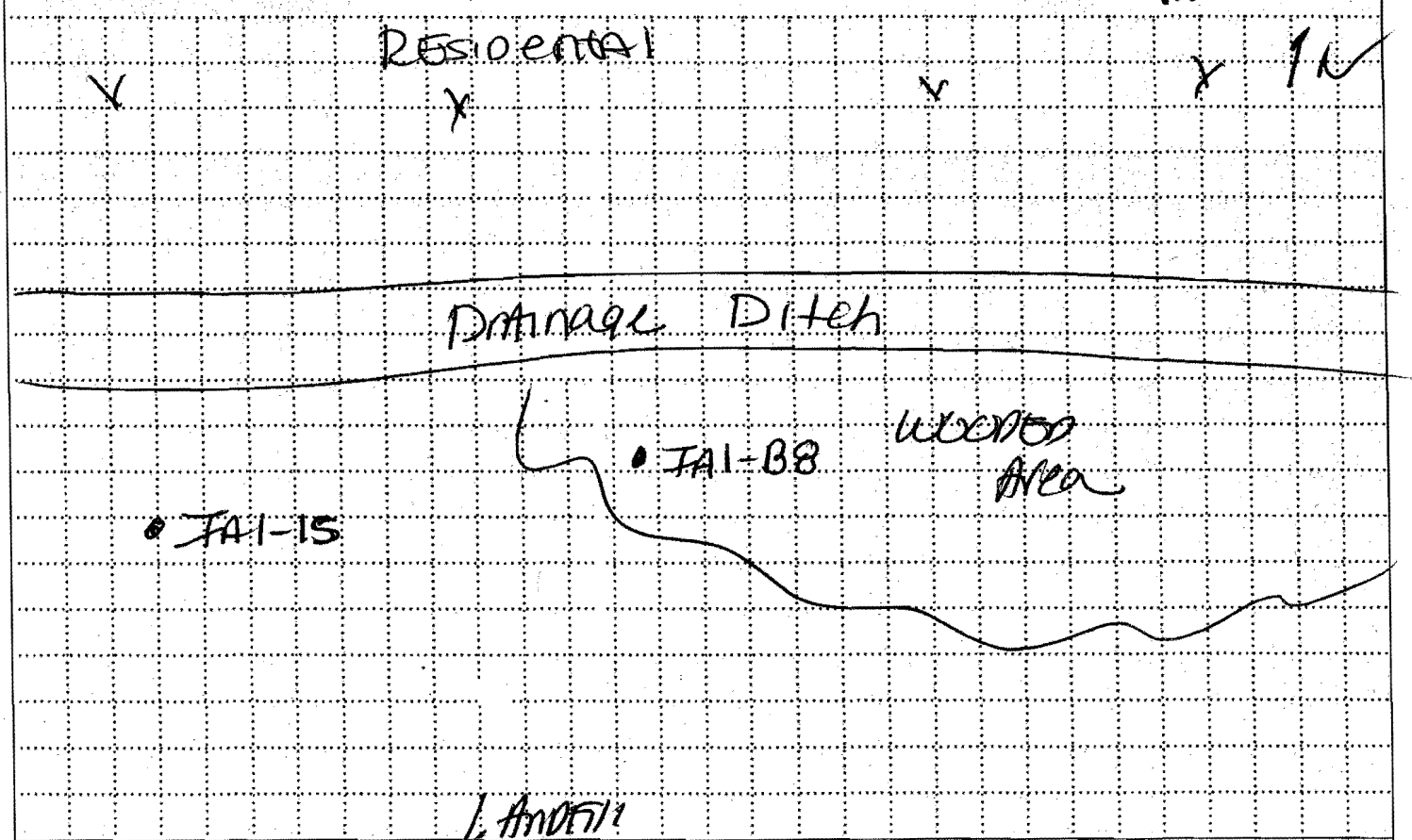
DISTRICT: Buffalo		HOLE NUMBER: JA1-B8
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 4 SHEETS
3. PROJECT: TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: Phil Orsi	6. MANUFACTURER'S DESIGNATION OF DRILL: 7720DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: ~~3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE~~ 3" MACRO CORE W/ 4' plastic sleeves	8. HOLE LOCATION: N=1093175.195 E=1065944.995	
	9. SURFACE ELEVATION: N/A	
	10. DATE STARTED: 3/26/10 1055	11. DATE COMPLETED: 3/26/10 1245
12. OVERBURDEN THICKNESS: 24.0'	15. DEPTH GROUNDWATER ENCOUNTERED: 7.0'	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 28.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	–	–	–	–	–	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATU[redacted]
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON LF- Buffalo DISTRICT FUSRAP PROJECT — HOLE NO: JA1-B8

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER JA1-B8

SHEET 2 OF 4

RECID ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) 8	OR CORE BOX NO. (e) B	SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	0	NO Recovery	NO Recovery		SEE NOTE		
	1						
	2	Fill: waste (ash, glass, slag), brick, metal, loose, moist	40	4435			Top 6" 43/6087 (1.52')
	3		40	6077			
29"	4		60	6129			HAnB 51/5938 (3-4')
	5	NO Recovery	NO Recovery				
	6						
	7	Fill: waste (ash, glass, metal), brick, loose, moist-wet	100	6717			
21"	8		60	7127			Saturated 57/6432 (7-8')
	9	NO Recovery	NO Recovery				
	10						

PROJECT

HOLE NO JA1-B8

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER JA1-B8

SHEET 3 OF 4

~~ELEV.~~ REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	10	NO RECOVERY			See NOTES		
	11						
0"	12						
	13						
	14						
	15						
0"	16						
	17						
	18						
	19						
0"	20						

PROJECT

HOLE NO. JA1 B8

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT | INSPECTOR [redacted] | HOLE NUMBER JAI-B8 | SHEET 4 OF

RECO ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) 8	GEOTECH. SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS ~~REMARKS~~ (h)
	20				SEE NOTES		
	21	NO Recovery	No Recovery				
	22						
	23						
0"	24						
	25	Redish brown silt, clay, fine subrounded gravel (<1/2"), trace gravel (<1")	100	6308			Nature 53 (24-25) 5971
	26	fine sand, trace sand, soft, moist (CL)	60	6172			
	27		40	6355			
48"	28		46	6793			Hgnb 46 (27-28) 5937
	29	Bottom of Boring @ 28' Notes: weather: sunny, 35°C PID Reading: 0ppm Gamma Reading: count/min		SAMPLE ID (RADIOANALYSIS) TLS-SS-JAI-B8 (1.5-2') 032610 Tpb U TLS-SB-JAI-B8 (3-4') 032610 Hgnb TLS-SB-JAI-B8 (7-8') 032610 Sr Am Cs TLS-SB-JAI-B8 (27-28') 032610 Hgnb TLS-SB-JAI-B8 (24-25') 032610 Nature			
	30						

PROJECT | HOLE NO JAI-B8

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

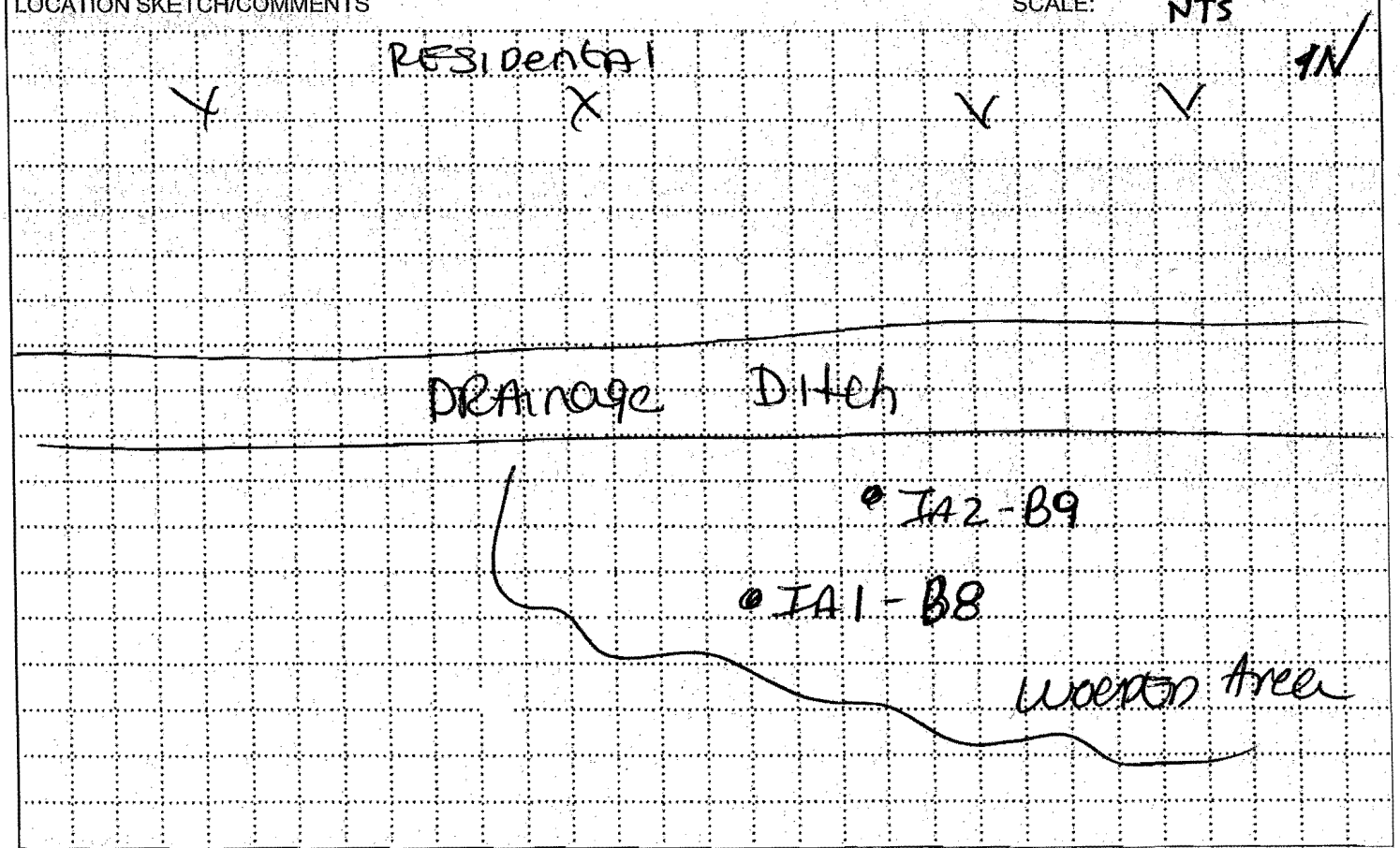
DISTRICT: Buffalo		HOLE NUMBER: IA1-B9
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 4 SHEETS
3. PROJECT: TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: Phil OPSi	6. MANUFACTURER'S DESIGNATION OF DRILL: 7720DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 2" MACRO CORE W/ 4" PLASTIC SLEEVE	8. HOLE LOCATION: N= 1093217.966 E= 1065946.135	
	9. SURFACE ELEVATION: N/A	
	10. DATE STARTED: 3/26/10 205 pm	11. DATE COMPLETED: 3/26/10 335pm
12. OVERBURDEN THICKNESS: 21.0'	15. DEPTH GROUNDWATER ENCOUNTERED: 6.0'	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 29.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP / TOTALS	TCLP / TOTALS	SVOC-TCLP / TOTALS	PES-TCLP / TOTALS	PCB-TOTALS	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. [redacted]
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON LF- Buffalo DISTRICT FUSRAP PROJECT — HOLE NO: IA1-B9

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER JA1-B9

SHEET 2 OF 4

RECID ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) 8	OR CORE BOX NO. (e) B	SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	0	NO RECOVERY	NO RECOVERY		SEE NOTE		
	1						
		FILL: DARK brown SAND, WASTE (ASH, GLASS), SLAG, LOOSE, MOIST	40	6603			Equil (1.2-1.7) 53/6253
	2		100	6661			Hydr (1.7-2.7) 50/6372
	3						
32"	4		60	6958			
	5	NO RECOVERY	NO RECOVERY				
	6	FILL: SAND, COARSE gravel, WASTE (ASH, GLASS), BRICK, LOOSE, MOIST-WET	100	6506			
	7		80	7157			Saturator (6.4-7.4) 65/6932
32"	8		60	6653			
	9	NO RECOVERY	NO RECOVERY				
	10	FILL: COARSE & fine SAND, BRICK, WASTE (ASH, GLASS), LOOSE, MOIST	60	6710			

PROJECT

HOLE NO JA1-B9

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER JA1B9

SHEET 3 OF 4

~~REC'D ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	10	continue from previous page			See NOTES		
	11		40	7003			
36''	12		80	7118			
	13	NO Recovery	No Recovery				
	14						
	15	Fill: Coarse & fine sand & gravel (C2'), waste (ash, glass), loose, moist	120	6989			
22''	16		40	6610			
	17	NO Recovery	No Recovery				
	18	Fill: Coarse & fine sand, brick, waste (ash, glass), loose, moist	120	7503			High γ 75/6543 (16-18')
	19						
27''	20	Fill: Reddish brown silty clay, brick, sand, moist, soft	80	7418			Chemical 60/6527 (18.6-20')

PROJECT

HOLE NO. JA1B9

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT | INSPECTOR [redacted] | HOLE NUMBER TA1-B9 | SHEET 4 OF

RECID ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	20	Continue from previous page			SEE NOTES		
	21		60	6930			
	22	Redish brown silt, clay, fine subrounded gravel (<1/2"), fine sand, trace sand soft-med stiff, moist (CL)	80	6431			Active 58 (21.22') 5979
	23		100	7042			
L/γ'	24		60	6575			
	25	Bottom of Borry @ 24.0' NOTES Weather Sunny 40 PID Reading 0ppm					
	26	Gamma Reading count/min Sample ID (RAD ANALYSIS)					
	27	TLS-SS-TA1-B9 (1.2-1.7')	032610	Top 6"			
		TLS-SB TA1-B9 (1.7-2.7')	032610	High B			
		TLS-SB-TA1-B9 (6.4-7.4')	032610	SATURATED			
	28	TLS SB-TA1-B9 (17.6-18.6')	032610	High γ			
		TLS-SB-TA1-B9 (18.6-20')	032610	Chemical			
		TLS-SB-TA1-B9 (21-22)	032610	Active			
	29						
	30						

PROJECT | HOLE NO TA1-B9

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

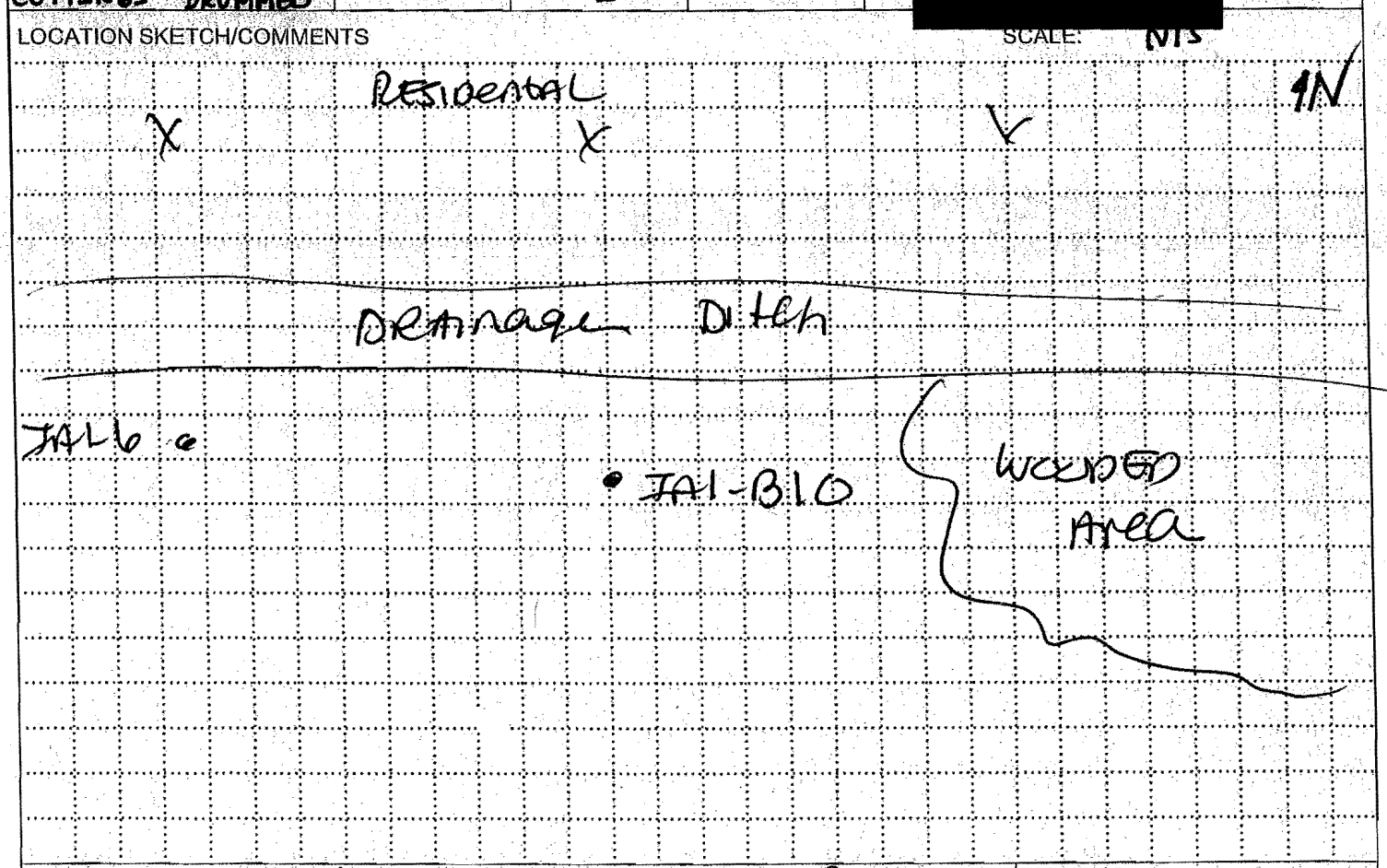
DISTRICT: Buffalo	HOLE NUMBER: JA1-B10	
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 4 SHEETS
3. PROJECT: TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: Phil Ocsi	6. MANUFACTURER'S DESIGNATION OF DRILL: 7720 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 2" MACRO CORE W/ 4' PLASTIC SLEEVE	8. HOLE LOCATION: N= 1093129.826 E= 1065772.702	
	9. SURFACE ELEVATION: N/A	
	10. DATE STARTED: 3/29/10 1015am	11. DATE COMPLETED: 3/29/10 1140
12. OVERBURDEN THICKNESS: 25.1'	15. DEPTH GROUNDWATER ENCOUNTERED: 6.6'	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 28.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	-	-	-	-	-	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SI[redacted]
CUTTINGS DRUMMED	-	-	-	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON LF- Buffalo DISTRICT FUSRAP PROJECT — HOLE NO: JA1-B10

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER JA1B10

SHEET 2 OF 4

RECID ~~REV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	SUBTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h) 1 MIN. STATIC COUNTS
	0	NO RECOVERY	NO RECOVERY		SEE NOTE		
	1	Fill WASTE (ASH, GLASS, metal), gravel (1/2"), loose, moist	70	5975			Tap 6" 35 (1-1.5') 5463
	2		60	5452			
	3						High B 85 (3-4') 6434
36"	4		180	6167			
	5	NO RECOVERY	NO RECOVERY				
	6	Fill WASTE (ASH, GLASS, metal), gravel (1/2"), loose, wet	100	6656			
	▼ 7		240	6973			Saturated 105 (6.6-7.6') 6445
34	8		160	6566			
	9	NO RECOVERY	NO RECOVERY				
	10						

PROJECT

HOLE NO JA1 B10

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER IA1-B10

SHEET 3 OF 4

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	10	NO RECOVERY	NO RECOVERY		See NOTES		
	11						
0"	12						
	13	FILL: COURSE SAND, fine SAND, WASTE (ASH, GLASS, METAL), LOOSE, MOIST, WET	140	6097			
	14		120	6359			
	15		120	6879			
48"	16		180	7301			Hg/18 60/6452
	17	NO RECOVERY	NO RECOVERY				
	18						
	19						
0"	20						

PROJECT

HOLE NO. IA1-B10

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER JA1 B10

SHEET 1 OF

RECID (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECHNICAL SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h)
6"	20				SEE NOTES		
	21	NO Recovery	NO Recovery				
	22						
	23						
12"	24	Fill: waste (ash, glass, metal), sand, loose, moist	160	6738			
	25	Fill: waste (ash, glass), brick, fine sand, loose, moist	120	6053			
	26	Reddish brown silt, clay fine subrounded gravel, fine sand, trace sand, stiff- moist (CL)	100	5913			Native 51 (25.1-26.1') 6028
	27		80	5929			
48"	28		60	6107			
	29	Bottom of Boring @ 28.01					
	30						

NOTES
weather: cloudy 40°F
Gamma Count/min
PID Ready 4pm

SAMPLE ID (PAH Analysis)
TLS-SS-JA1-B10 (1-1.5') 032410 Topsoil
TLS-SB JA1-B10 (3-4') 032410 High B
TLS-SB JA1-B10 (6.6-7.6') 032410 saturated
TLS-SB JA1-B10 (15-16') 032410 High
TLS-SB JA1-B10 (25.1-26.1') 032410 Native

PROJECT

HOLE NO JA1 B10

ENG FORM 5056A-R, AUG 94

BUFFALO

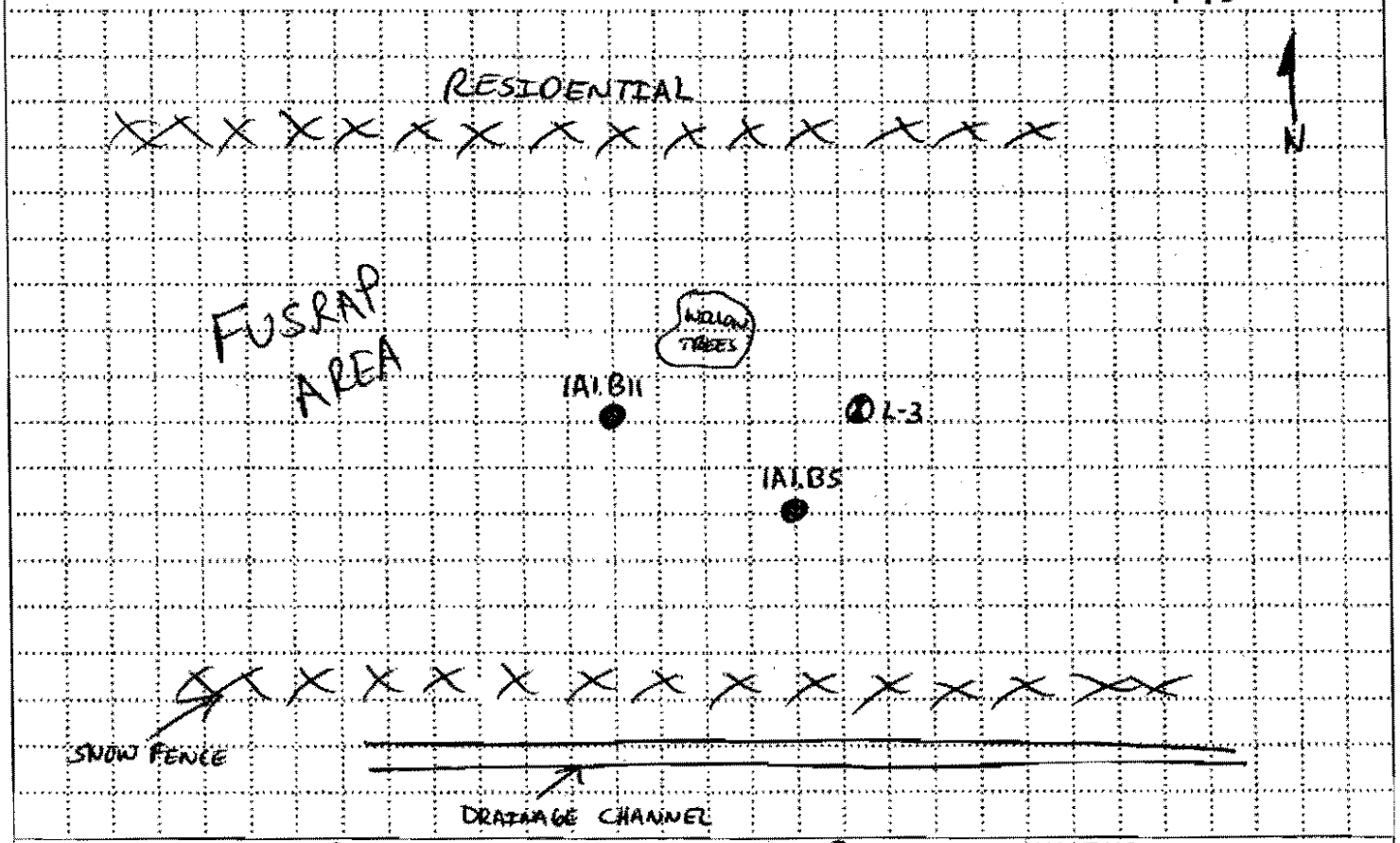
IA1.B11

1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF SHEETS
3. PROJECT: TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: Jeff SNYDER	6. MANUFACTURER'S DESIGNATION OF DRILL: 6620 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING, 2" CORE w/ 4' PLASTIC SLEEVE	8. HOLE LOCATION: N=1093085.106 E=1065770.823	
	9. SURFACE ELEVATION:	
	10. DATE STARTED: 3/26/10 1435	11. DATE COMPLETED: 3/26/10 1600
12. OVERBURDEN THICKNESS: 29.1'	15. DEPTH GROUNDWATER ENCOUNTERED: 5.5' bgs	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 32.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP / TOTALS	TCLP / TOTALS	SVAC-TCLP / TOTALS	PEST-TCLP / TOTALS	PCB- TOTALS	N/A%
22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	[redacted]		
CUTTINGS DRUMMED	–	–	–			

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT: TON LF- Buffalo DISTRICT FUSRAP PROJECT HOLE NO: IA1.B11

ENG FORM 5056-R, AUG 94

THRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A1.B11

SHEET 2 OF 5

REC'D ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS REMARKS (h)
	0						
	1	NO RECOVERY →					→
	2	FILL: WASTE (ASH, METAL, PLASTIC, WIRE), GRAVEL, LOOSE, MOIST.				TOP 6"	X 5134 B 38
	3		5215	90	SEE NOTES		
			5311	70			
25"	4						
	5	NO RECOVERY →					→
	6	FILL: WASTE (ASH, GLASS), LOOSE, WET.	5292	70		SAT.	5798 61
	7		5788	80			
30"	8		5902	70			
	9	NO RECOVERY →					→
	10						

PROJECT

HOLE NO 1A1.B11

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A1.B11

SHEET 3 OF 5

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	10						
	11						
0"	12						
	13						
	14						
	15	NO RECOVERY →					
0"	16						
	17						
	18						
	19						
0"	20						

PROJECT

HOLE NO 1A1.B11

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A1.B11

SHEET 4 OF 5

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)	
	20	NO RECOVERY →						
	21	FILL: WASTE (ASH, GLASS, PLASTIC), LOOSE, WET.	5761	90	SEE NOTES			
	22							
							γ	B
	23		5960	80		CHEM.	5546	76
			6264	140		HIGH γ	6675	139
40"	24							
	25							
	26	NO RECOVERY →						
	27							
0"	28							
		FILL: WASTE (ASH, GLASS, PLASTIC), LOOSE, WET.	5287	60				
	29							
		REDDISH-BROWN SILT AND CLAY, TRACE COURSE SAND, SOFT, MOIST. (CL)	5464	110		NATIVE	5221	53
	30							

PROJECT

HOLE NO 1A1.B11

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A1.B11

SHEET 5 OF 5

REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h) γ	B
	30	CONTINUED FROM PAGE 4						
	31		5518	90	SEE	HIGH B	5236	43
			5395	50	NOTES			
48"	32							
		BOTTOM of BORING AT 32.0'						
		NOTES:						
	33	- CLEAR, 38°F						
		- SAMPLE I.D.						
		TLS-SS-1A1.B11(1.8-2.3)032610						
	34	TLS-SB-1A1.B11(5.5-6.5)032610						
		TLS-SB-1A1.B11(22.0-23.0)032610						
	35	TLS-SB-1A1.B11(23.0-24.0)032610						
		TLS-SB-1A1.B11(29.1-30.1)032610						
		TLS-SB-1A1.B11(30.1-31.1)032610						
	36	- PID READINGS = 0ppm (VOCs)						
		- SOIL READINGS ARE						
	37	COUNTS/MIN.						
		- COLLECTED RAD. DUPLICATE.						
	38							
	39							
	40							

PROJECT

HOLE NO 1A1.B11

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

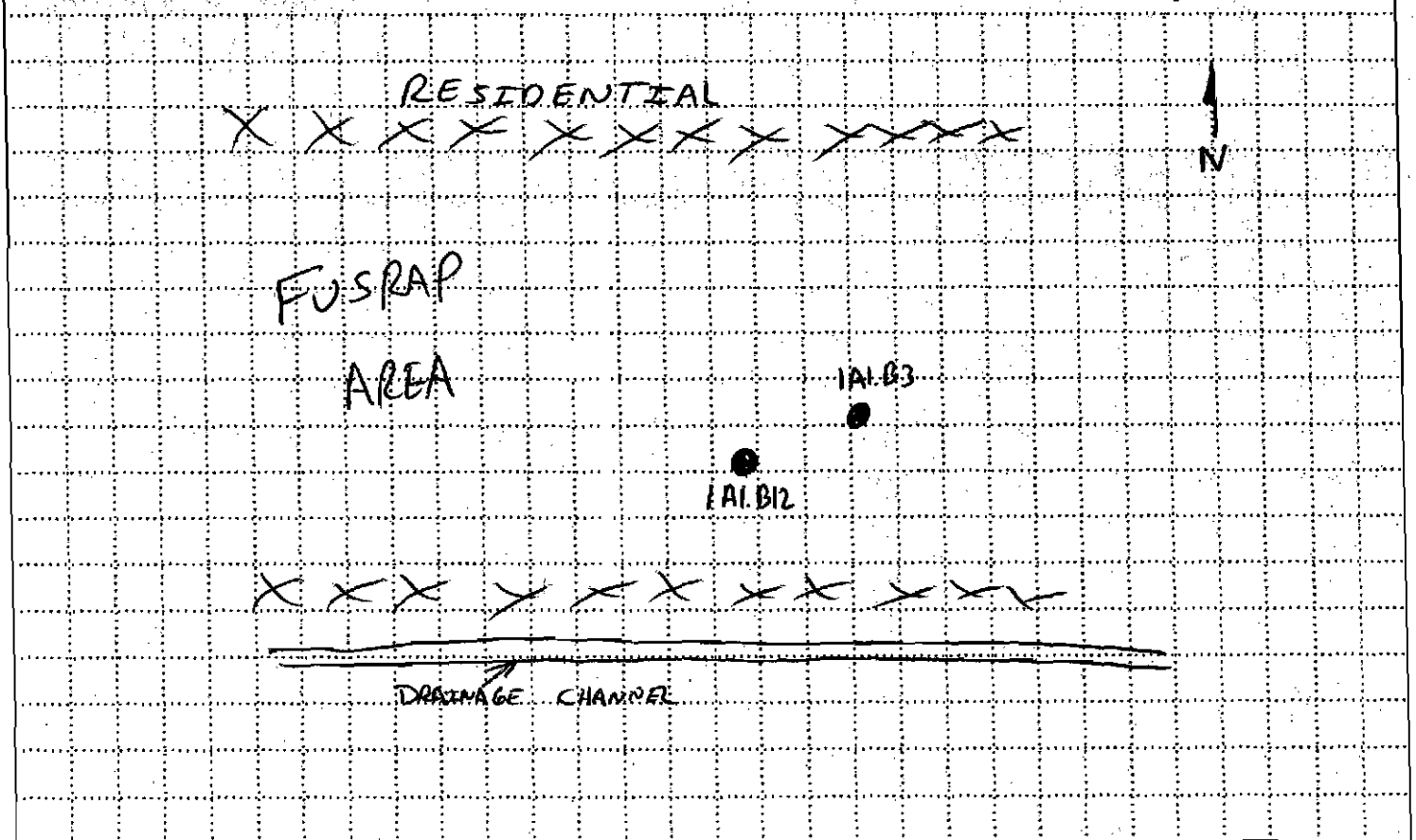
DISTRICT: Buffalo	HOLE NUMBER: 1A1.B12	
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 4 SHEETS
3. PROJECT: TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: PHIL ORSI	6. MANUFACTURER'S DESIGNATION OF DRILL: 7720 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE w/ 4' PLASTIC SLEEVE	8. HOLE LOCATION: N= 1093018.021 E= 1065704.624	
	9. SURFACE ELEVATION:	
	10. DATE STARTED: 3/30/10 0950	11. DATE COMPLETED: 3/30/10 1100
12. OVERBURDEN THICKNESS: 25.6'	15. DEPTH GROUNDWATER ENCOUNTERED: 7.0' bgs	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 28.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	–	–	–	–	–	N/A

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	[redacted]
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT	HOLE NO
TON LF - Buffalo DISTRICT FUSRAP PROJECT	1A1.B12

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A1.B12

SHEET 2 OF 4

~~ELEV.~~ REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	0–1	NO RECOVERY →					
	1–4	FILL: REDDISH-BROWN CLAY, ROOTS, GRAVEL, BRICK, WASTE (ASH, PLASTIC, GLASS), MED. STIFF, MOIST.	6534	60	SEE NOTES	TOP 6"	X 6597 B 69
			6390	80			
34"	4		6480	40			
	5–7	NO RECOVERY →					
12"	7–8	FILL: WASTE (GLASS, ASH), LOOSE, WET.	6552	70		SAT.	6322 50
	9–10	NO RECOVERY →					

PROJECT

HOLE NO. 1A1.B12

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: 1A1.B12

PROJECT:

INSPECTOR: D. Popp

SHEET 3 OF 4

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS ~~(d)~~ γ	GEOTECH SAMPLE OR CORE BOX NO. ~~(e)~~ B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	10						
	11	NO RECOVERY →					
0"	12						
	13	FILL: WASTE (ASH, GLASS), LOOSE, WET.	6577	100	SEE NOTES		
	14		6771	80			
	15		6809	100			
40"	16	NO RECOVERY →					
	17	FILL: WASTE (ASH, GLASS), LOOSE, WET.	6767	80			
	18		6921	100			
	19		7173	60		HIGH γ	γ 7158 B 80
36"	20						

PROJECT:

HOLE NO. 1A1.B12

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A1.B12

SHEET 4 OF 4

RECID ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS ~~REMARKS~~ (h)	
	20							
	21	NO RECOVERY →						
	22	FILL: WASTE (ASH, GLASS), LOOSE, WET.	6905	40				
	23							
28"	24		7112	80	SEE			
	25		6603	40	NOTES			
	26	REDDISH-BROWN SILT AND CLAY, TRACE COURSE SAND AND FINE SUB-ROUND GRAVEL (< ½"), SOFT, V. MOIST. (CL)	6906	60				
	27		6951	80		NATIVE	X 6543	B 60
48"	28		6795	160		HIGH B	6672	54
	29	BOTTOM OF BORING AT 28.0'						
	30	NOTES: - CLEAR, 37°F - SAMPLE I.D. TLS-SS-1A1.B12(1.2-1.7)033010 TLS-SB-1A1.B12(7.0-8.0)033010 TLS-SB-1A1.B12(19.0-20.0)033010						

PROJECT

TLS-SB-1A1.B12(25.6-26.6)033010

HOLE NO 1A1.B12

ENG FORM 5056A-R, AUG 94

TLS-SB-1A1.B12(27.0-28.0)033010

- PID READINGS = 0 ppm (VOC's)

- SOIL READINGS ARE COUNTS/MIN.

HTRW DRILLING LOG

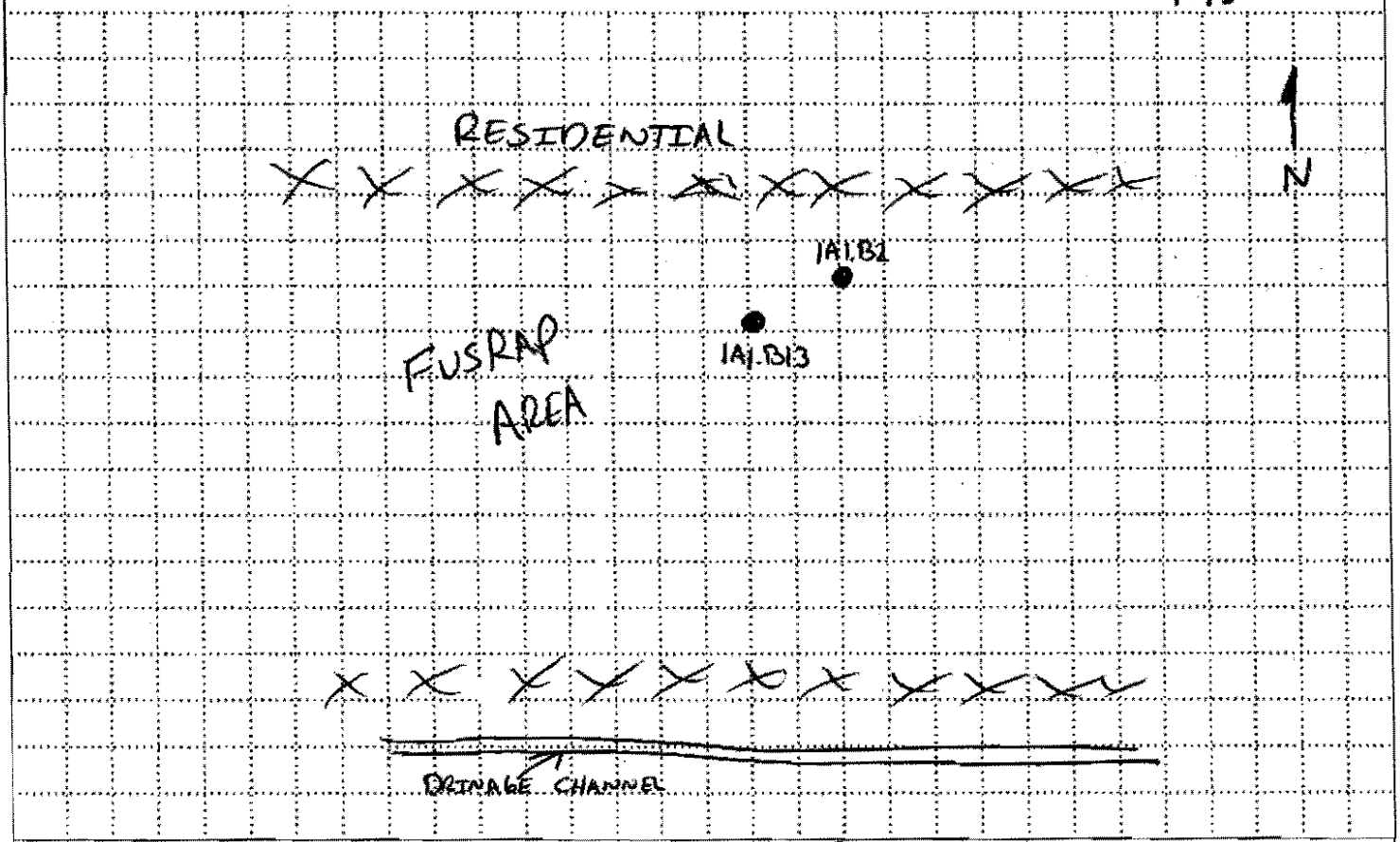
DISTRICT	Buffalo
HOLE NUMBER	1A1.B13
1. COMPANY NAME	ENSOL, INC.
2. DRILLING CONTRACTOR	ZEBRA ENVIRONMENTAL CORP.
SHEET / SHEETS	1 OF 4
3. PROJECT	TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT
4. LOCATION	TONAWANDA LF, TONAWANDA, NY
5. NAME OF DRILLER	MIKE LANIENSKI
6. MANUFACTURER'S DESIGNATION OF DRILL	6620 DT GEOPROBE
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	3 1/4" CASING 2" CORE W/ 4' PLASTIC SLEEVE
8. HOLE LOCATION	N= 1093047.903 E= 1065683.64
9. SURFACE ELEVATION	
10. DATE STARTED	3/29/10 1345
11. DATE COMPLETED	3/29/10 1515
12. OVERBURDEN THICKNESS	25.0'
15. DEPTH GROUNDWATER ENCOUNTERED	5.3' bgs
13. DEPTH DRILLED INTO ROCK	N/A
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	N/A
14. TOTAL DEPTH OF HOLE	28.0'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	N/A

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP / TOTALS	TCLP / TOTALS	SVOC-TCLP / TOTALS	PES-TCLP / TOTALS	PCB-TOTALS	N/A %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. [redacted]
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT	HOLE NO
TON LF- Buffalo DISTRICT FUSRAP PROJECT	1A1.B13

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A1.B13

SHEET 2 OF 4

REC'D ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h) 1 MIN. STATIC COUNTS
	0	NO RECOVERY →					→
	1	FILL: DARK-BROWN CLAY, GRAVEL, GRASS, BRICK, WASTE (GLASS, ASH), CONCRETE, MED. STIFF, MOIST.	6206	100		TOP 6"	X 5738 B 54
	2		6188	80	SEE NOTES		
	3		6247	60			
43"	4		6586	80			
		NO RECOVERY →					→
	5	FILL: WASTE (ASH, GLASS), LOOSE, WET.	6426	120			
	6					SAT.	6378 55
	7		6744	140			
41"	8		7035	120			
	9	NO RECOVERY →					→
	10	FILL: WASTE (ASH, GLASS), LOOSE, WET.	(9.5-11.0') 7350	140			

PROJECT

HOLE NO 1A1.B13

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A1.B13

SHEET 3 OF 4

RECO ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN STATIC ~~READING~~ COUNTS (h)	
	10	CONTINUED FROM PAGE 2						
	11							
30"	12		6814	100	SEE NOTES			
	13	NO RECOVERY →						
	14	FILL: WASTE (ASH, GLASS), LOOSE, WET.	7349	120				
	15		7592	320		HIGH B	γ 6983	B 182
34"	16		6979	100				
	17	NO RECOVERY →						
	18							
	19	FILL: WASTE (ASH, GLASS), LOOSE, WET.	7490	200		HIGH γ	7405	209
24"	20		7489	180		CHEM.	7083	119

PROJECT

HOLE NO 1A1.B13

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Poff

HOLE NUMBER IA1 B13

SHEET 4 OF 4

RECO (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h)	
	20							
	21							
	22	NO RECOVERY →						
	23							
0"	24							
		FILL: WASTE (ASH, GLASS), LOOSE, WET.	6843	140	SEE			
	25							
		REDDISH-BROWN SILT AND CLAY, TRACE COARSE SAND AND FINE SUB-ROUND GRAVEL (<1/4"), SOFT, MOIST. (CL)	6886	160	NOTES	NATIVE	X 5944	B 53
	26							
	27		6924	120				
48"	28		7099	100				
		BOTTOM of BORING AT 28.0'						
		NOTES:						
		- CLOUDY, 45°F						
	29	- SAMPLE I.D.						
		TLS-SS-IA1B13(0.5-1.0) 032910						
		TLS-SB-IA1B13(5.3-6.3) 032910						
		TLS-SB-IA1B13(14.0-15.0) 032910						
	30							
		TLS-SB-IA1B13(18.0-19.0) 032910						
		TLS-SB-IA1B13(19.0-20.0) 032910						
		TLS-SB-IA1B13(25.0-26.0) 032910						

PROJECT

HOLE NO IA1.B13

ENG FORM 5056A-R, AUG 94

- PID READINGS = 0ppm (VOC's)
- SOIL READINGS ARE COUNTS/MIN.

HTRW DRILLING LOG

DISTRICT: Buffalo	HOLE NUMBER: FA1-B14	
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 3 SHEETS
3. PROJECT: TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: Joe Hutchison	6. MANUFACTURER'S DESIGNATION OF DRILL: 6620DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: ~~3 1/4" CASING, 2" CORE w/ 5' PLASTIC SLEEVE~~ 3" macro core w/4' plastic sleeve	8. HOLE LOCATION: N= 1093036.629 E= 1065660.717	
	9. SURFACE ELEVATION: N/A	
	10. DATE STARTED: 3/30/10 840AM	11. DATE COMPLETED: 3/30/10 1050AM
12. OVERBURDEN THICKNESS: 28.6'	15. DEPTH GROUNDWATER ENCOUNTERED: 16.0'	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 32.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

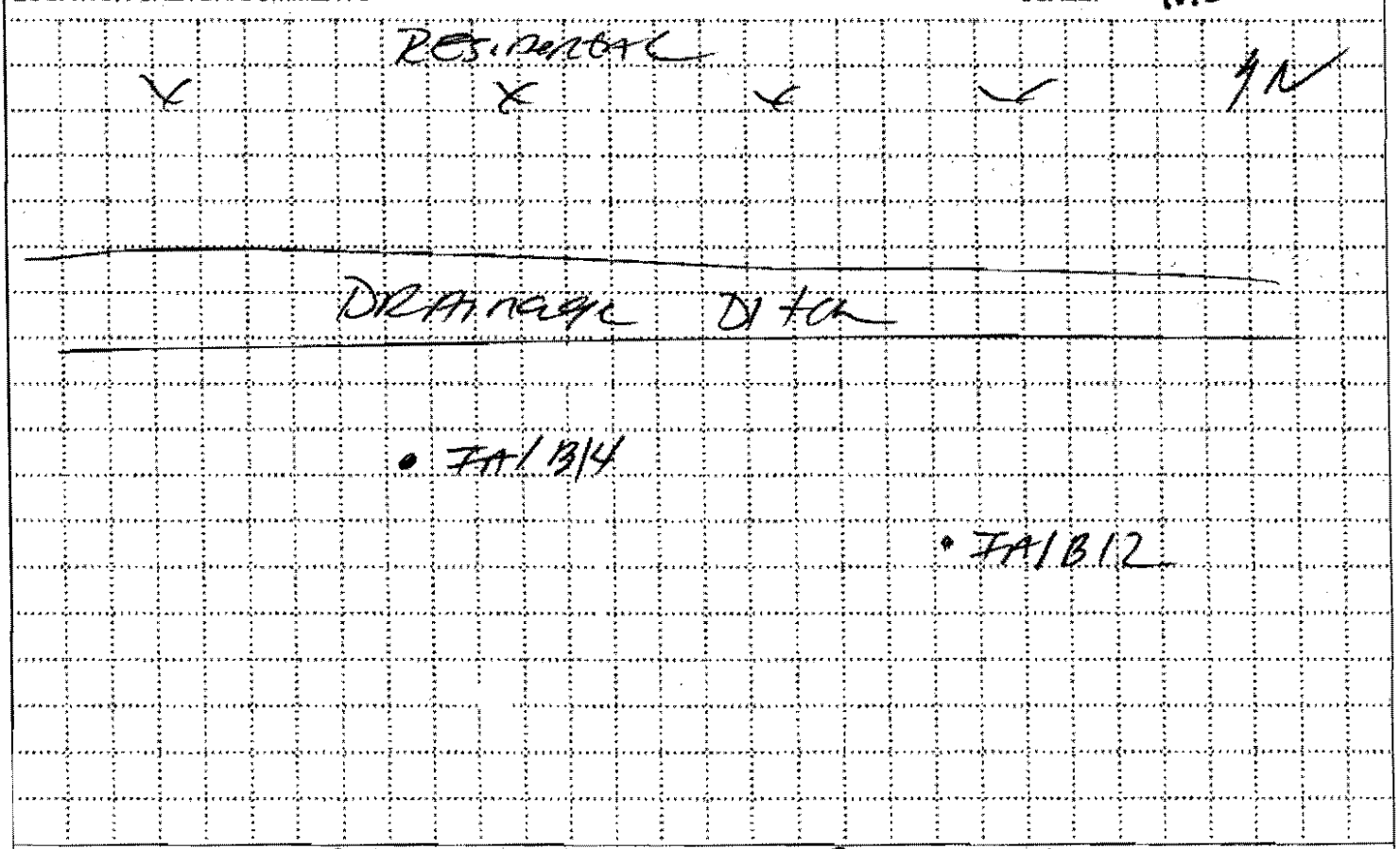
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	–	–	–	–	–	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)
CUTTINGS DRUMMED	–	–	–

[redacted]

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON LF- Buffalo DISTRICT FUSRAP PROJECT — HOLE NO. FA1-B14

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER FA1-B14

SHEET 2 OF 5

REC'D ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	OR CORE BOX NO. (e) B	SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS REMARKS (h)
	0	FILL: Reddish brown silt, clay, organic matter, rootlets, moist, soft	60	6426	See note		Top 6" (0-.5) 71/6240
	1		100	6894			
	2		120	6819			
	3	FILL: waste (ash, glass, plastic), course sand, loose, moist	120	7155			
48"	4		100	6958			
	5	NO Recovery	NO Recovery				
	6						
	7	FILL: course & fine sand, brick, waste (ash, glass), loose, moist	100	7338			High γ (6.5-7.5') 79/6659
24"	8						
	9	NO Recovery	No Recovery				
	10	FILL: course & fine sand, waste (ash, metal, glass), brick, loose, moist	120	7195			

PROJECT

HOLE NO. FA1-B14

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER TAI B14

SHEET 3 OF 5

REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h)
	10						
		Continue from previous page	160	7035			
	11						
36"	12		140	7014			
	13	NO Recovery	NO Recovery				
	14						
	15						
6"	16						
		Fill same as 9-12'	100	7177			Saturated 69 (16-17') 6339
	17						
			120	6698			
	18						
			120	7054			
	19						
48"			140	7047			
	20						

PROJECT

HOLE NO. TAI-B 14

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER JA1 B14

SHEET 4 OF 5

RECID (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	OR CORE BOX NO. (e) B	SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h)
	20						
		NO Recovery	NO Recovery				
	21						
	22	Fill: Same as 16-20'	120	7165			
	23						
			180	6753			Hgm B 83 (22.6-23.6) 6633
33"	24						
	25	NO Recovery	No Recovery				
	26						
		Fill: Same as 21.6-24'					
	27		120	6909			
24"	28		120	6800			
			100	6387			Native 54 (28.6-29.6) 6338
	29	Reddish brown silt, clay, trace sand, trace subrounded gravel (c/f), trace sand soft, moist (c)	80	6243			
	30						

PROJECT

HOLE NO. JA1-B14

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER FAI-B14

SHEET 5 OF 5

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) 8	SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	30	continue from previous page	80	6028			
	31		60	6280			
48"	32	Bottom of Boring @ 32.0'					
	33	NOTES:					
		- weather sunny 40°F					
		- PID Reading 0ppm					
	34	Gamma cart/min					
		Sample ID (see analysis)					
	35	TLS-SS-FAI-B14(0-5) 033010 Type 6"					
		TLS-SB FAI-B14(6.5-7.5) 033010 High V					
		TLS SB FAI-B14(16-17) 033010 Saturated					
	36	TLS-SB FAI-B14(22.6-23.6) 033010 High B					
		TLS-SB FAI-B14(28.6-29.6) 033010 Native					
	37						
	38						
	39						
	40						

PROJECT

HOLE NO FAI-B14

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

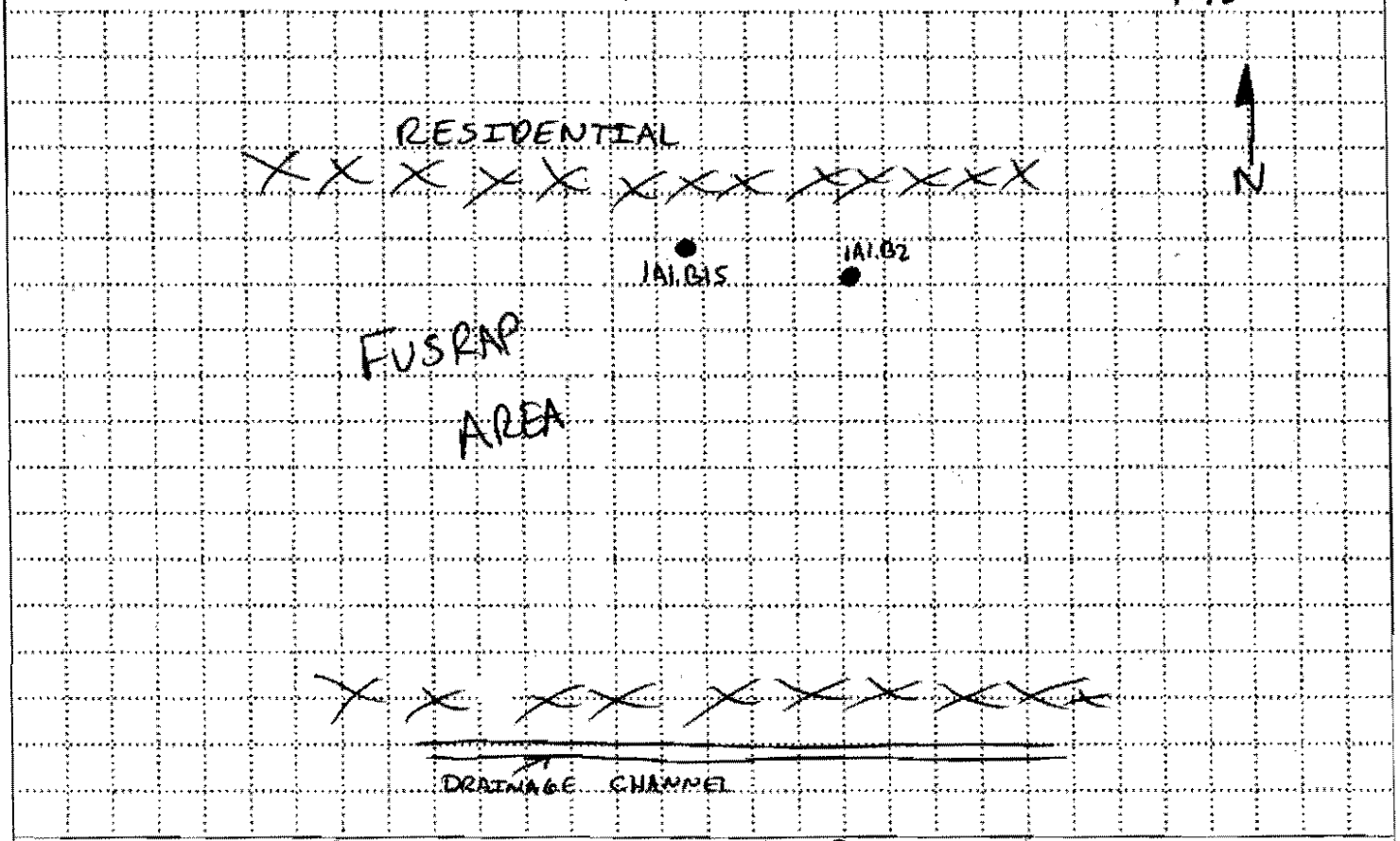
DISTRICT: Buffalo		HOLE NUMBER: 1A1.B15
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 4 SHEETS
3. PROJECT: TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: MIKE LANIEWSKI	6. MANUFACTURER'S DESIGNATION OF DRILL: 6620 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE w/ 4' PLASTIC SLEEVE	8. HOLE LOCATION: N= 1093082.239 E= 1065671.83	
	9. SURFACE ELEVATION:	
	10. DATE STARTED: 3/29/10 1020	11. DATE COMPLETED: 3/29/10 1200
12. OVERBURDEN THICKNESS: 27.0'	15. DEPTH GROUNDWATER ENCOUNTERED: 6.7' bgs	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 28.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP / TOTALS	TCLP / TOTALS	SVOC-TCLP / TOTALS	PCB-TCLP / TOTALS	PCB-TOTALS	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	2[redacted]
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON LF- Buffalo DISTRICT FUSRAP PROJECT — HOLE NO: 1A1.B15

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A1.B15

SHEET 2 OF 4

RECID (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS REMARKS (h)
	0–1	NO RECOVERY →					→
	1–2	FILL: DARK-BROWN CLAY, ROOTS, GRAVEL, WASTE (ASH, METAL, GLASS), BRICK, WOOD, MED. STIFF, MOIST.	6169	100		TOP 6"	X 6078 B 51
	2–3		7100	120	SEE NOTES		
36"	3–4		6825	160			
	4–5	NO RECOVERY →					→
	5–6						
	6–7	FILL: WASTE (ASH, GLASS), LOOSE, WET.	6987	80		SAT.	6282 52
15"	7–8						
	8–9	NO RECOVERY →					→
	9–10	FILL: WASTE (ASH, GLASS), LOOSE, WET.	6647	100			

PROJECT

HOLE NO 1A1.B15

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A1.B15

SHEET 3 OF 4

REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h) γ	B
	10	CONTINUED FROM PAGE 2						
			6901	160		HIGH B	6718	77
	11				SEE			
			7133	80	NOTE			
28"	12							
		NO RECOVERY →						
		FILL: WASTE (ASH, GLASS), LOOSE, WET.						
	13		6142	120				
	14		6447	100				
	15		6989	80		CHEM.	6521	61
			7249	100		HIGH γ	6893	69
43"	16							
	17							
	18	NO RECOVERY →						
	19							
0"	20							

PROJECT

HOLE NO 1A1.B15

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A1.B15

SHEET 4 OF 4

RECO ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS ~~(d)~~ X	GEOTECH SAMPLE OR CORE BOX NO. ~~(e)~~ B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~DYNAMIC~~ COUNTS (h)
	20						
	21	NO RECOVERY →					→
	22	FILL: WASTE (ASH, GLASS), LOOSE, WET.	6995	100			
	23						
29"	24		6614	60	SEE NOTES		
	25		7146	120			
	26		6972	100			
	27		6915	140			
48"	28	REDDISH-BROWN SILT AND CLAY, TRACE COURSE SAND AND FINE SUB-ROUND GRAVEL (<1/4"), SOFT, WET.	7097	100		NATIVE	X 6191 B 52
	29	BOTTOM OF BORING AT 28.0'					
	30						

NOTES:
- RAIN, 42°F
- SAMPLE I.D.
TLS-SS-1A1.B15(1.0-1.5) 032910
TLS-SB-1A1.B15(6.7-7.7) 032910
TLS-SB-1A1.B15(10.0-11.0) 032910
TLS-SB-1A1.B15(14.0-15.0) 032910
TLS-SB-1A1.B15(15.0-16.0) 032910
TLS-SB-1A1.B15(27.0-28.0) 032910

PROJECT

HOLE NO 1A1.B15

ENG FORM 5056A-R, AUG 94

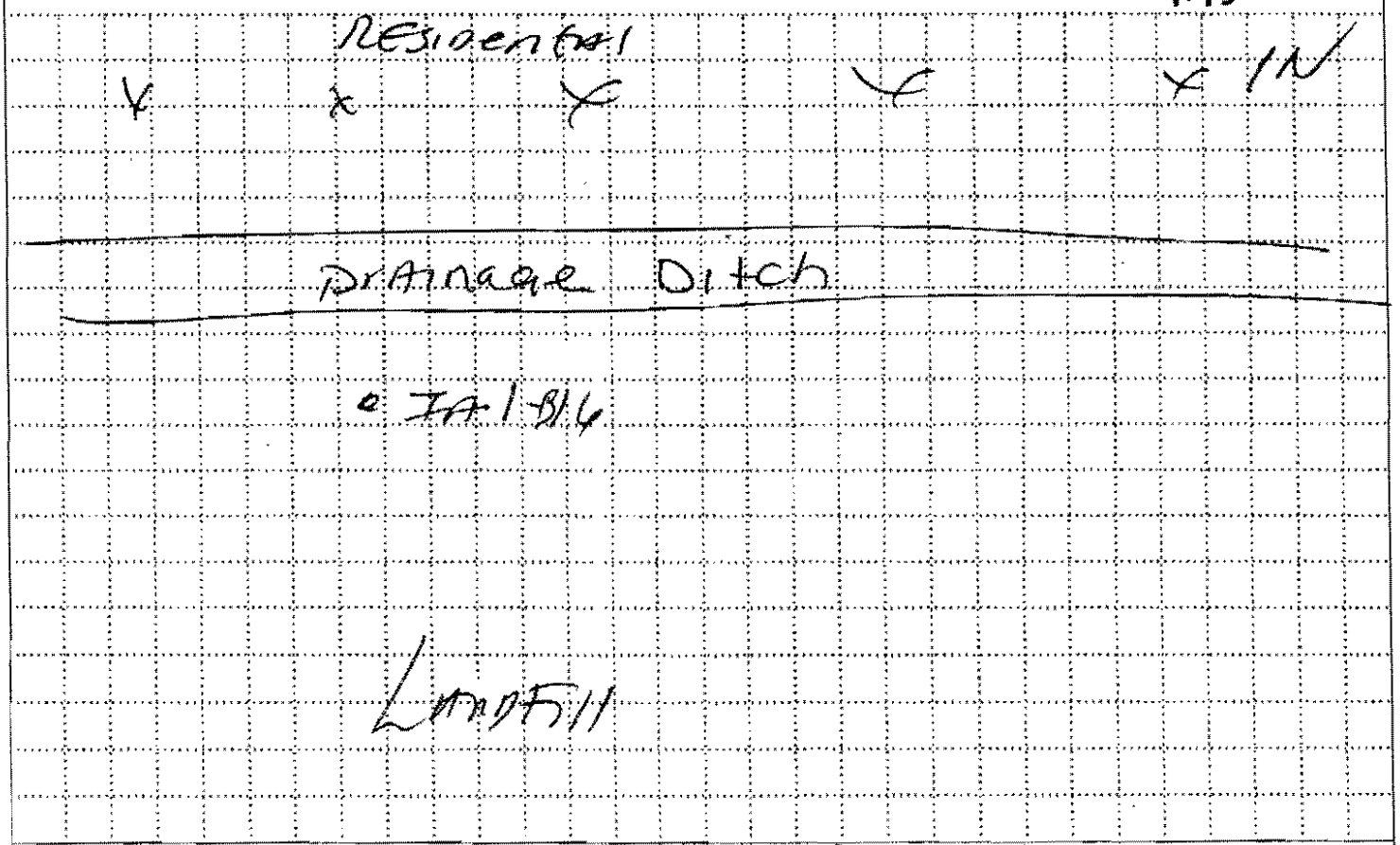
- PID READINGS = 0ppm (VOC'S)
- SOIL READINGS ARE COUNTS/MIN.
- COLLECTED RAD. DUPLICATE.

HTRW DRILLING LOG

DISTRICT	Buffalo
HOLE NUMBER	7A1-B/6
1. COMPANY NAME	ENSOL, INC.
2. DRILLING CONTRACTOR	ZEBRA ENVIRONMENTAL CORP.
SHEET / OF / SHEETS	1
3. PROJECT	TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT
4. LOCATION	TONAWANDA LF, TONAWANDA, NY
5. NAME OF DRILLER	JDE / Hutchison
6. MANUFACTURER'S DESIGNATION OF DRILL	6620 DT GEOPROBE
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	~~3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE~~ 3" Macrocore w/ 4' plastic sleeve
8. HOLE LOCATION	N=1093194.01 E=1065880.57
9. SURFACE ELEVATION	N/A
10. DATE STARTED	3/30/10 2:30pm
11. DATE COMPLETED	3/30/10 3:30pm
12. OVERBURDEN THICKNESS	25.4
15. DEPTH GROUNDWATER ENCOUNTERED	9.0'
13. DEPTH DRILLED INTO ROCK	N/A
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	N/A
14. TOTAL DEPTH OF HOLE	28.0'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	N/A
18. GEOTECHNICAL SAMPLES	N/A
DISTURBED	–
UNDISTURBED	–
19. TOTAL NUMBER OF CORE BOXES	N/A
20. SAMPLES FOR CHEMICAL ANALYSIS	5
VOC	TCLP / TOTALS
METALS	TCLP / TOTALS
OTHER (SPECIFY)	SVOC-TCLP / TOTALS
OTHER (SPECIFY)	PEST-TCLP / TOTALS
OTHER (SPECIFY)	PCB-TOTALS
21. TOTAL CORE RECOVERY	N/A%
22. DISPOSITION OF HOLE	CUTTINGS DRUMMED
BACKFILLED	–
MONITORING WELL	–
OTHER (SPECIFY)	–
23. SIG	[redacted]

LOCATION SKETCH/COMMENTS

SCALE: NTS



PROJECT TON LF- Buffalo DISTRICT FUSRAP PROJECT

HOLE NO. 7A1-B/6

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER IA1-B16

SHEET 2 OF

REC'D ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD ~~SAMPLE~~ RESULTS (d) 8	~~SLOT/CUT SAMPLE~~ OR CORE BOX NO. (e) 8	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. ~~READING~~ STATIC COUNTS (h)
	0	NO Recovery	NO Recovery				
	1						
		Fill: Redish brown clay, waste (ash, glass, metal), stiff, moist	80	5499			Top 6" (1-1.5') 47/5121
	2		140	5393			
	3		120	5744			
	4		120	5856			
	5						
	6	NO Recovery	NO Recovery				
	7						
	8						
	9						
	10	Fill: coarse & fine sand, waste (ash, glass, metal) gravel, loose, wet	100	5762			Saturated (9-10') 33/5143

PROJECT

HOLE NO. IA1-B16 [redacted] 4-7-10

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

[redacted]

1A1-B16

HOLE NUMBER 1A1-B16

SHEET 3 OF SHEET

PROJECT

INSPECTOR

REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC REMAINING COUNTS (h)
	10	Continue from previous page					
	11		160	5882			
	12		80	6621			Hanr 62 (11-12') 6002
	13	No Recovery	No Recovery				
	14						
	15	Fill same as 9-12'	100	5579			Chemical 62 (14-15') 5574
	16		80	5674			
	17	No Recovery	No Recovery				
	18						
	19	Fill same as 14-16'	120	5738			
	20		180	6086			

PROJECT

HOLE NO. 1A1-B16

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

1A1-B16PB

PROJECT

INSPECTOR [redacted]

HOLE NUMBER 7A1-16

SHEET 4 OF 8

RECO'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) 8	OR CORE BOX NO. (e) 8	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h)
	20	No Recovery	No Recovery				
	21						
	22	Fill: Course + fine sand, waste cash, glass, metal, loose, moist-wet	80	6422			
	23		100	6176			
	24		100	5745			
	25		200	6531			High B 93/5973 (24-25')
	26	Reddish brown silt, clay, fine subrounded gravel (<1/2"), trace sand, trace fine sand, stiff, moist (CL)	120	6066			Native 44/5632 (25-26')
	27		80	5698			
	28		80	5675			
	29	Bottom of Boring @ 28.0' NOTES: Weather: sunny 40°F PID Reading: 0ppm Gamma cnt/min					
	30						

Sample ID (LAB ANALYSIS)
TCJ 87A1-16(1-15') 033010 Topsoil
TCJ 87A1-16(9-10) 033010 Saturated
TCJ 87A1-16(11-12) 033010 High
TCJ 87A1-16(14-15) 033010 Chemical
TCJ 87A1-16(24-25) 033010 High B

PROJECT

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

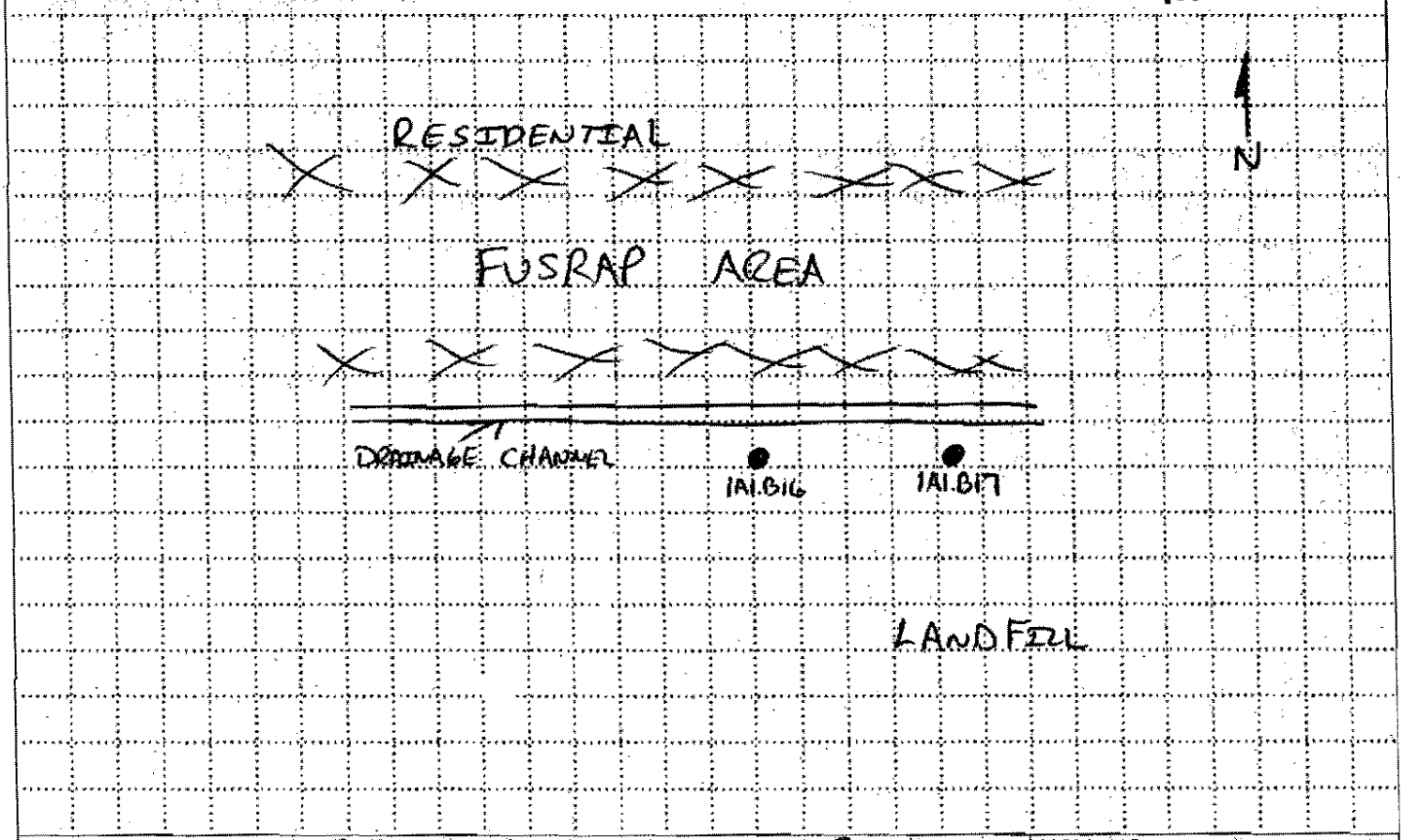
DISTRICT: Buffalo		HOLE NUMBER: 1A1.B17
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 4 SHEETS
3. PROJECT: TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: PHIL ORSI	6. MANUFACTURER'S DESIGNATION OF DRILL: 7720 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE w/ 4' PLASTIC SLEEVE	8. HOLE LOCATION: N= E=	
	9. SURFACE ELEVATION:	
	10. DATE STARTED: 3/30/10 1400	11. DATE COMPLETED: 3/30/10 1530
12. OVERBURDEN THICKNESS: 25.6'	15. DEPTH GROUNDWATER ENCOUNTERED: 6.4' bgs	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 28.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	–	–	–	–	–	N/A

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)
CUTTINGS DRUMMED	–	–	–

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT: TON LF- Buffalo DISTRICT FUSRAP PROJECT HOLE NO: 1A1.B17

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: 1A1.B17

PROJECT:

INSPECTOR: D. Popp

SHEET 2 OF 4

REC'D ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h)
	0–1	NO RECOVERY →					→
	1–4	FILL: WASTE (ASH, GLASS, SLAG), REDDISH-BROWN CLAY, CONCRETE, STIFF, MOIST.	6508	120		TOP 6"	X 7066 B 62
			6325	60	SEE NOTES		
33"			6274	40			
	4–6	NO RECOVERY →					→
	6–8	FILL: WASTE (GLASS, ASH, RUBBER), REDDISH-BROWN CLAY, LOOSE, WET.	6295	60		SAT.	8272 45
22"	8–9	NO RECOVERY →					→
	9–10	FILL: WASTE (ASH, GLASS, METAL), LOOSE, WET.	7251	140			

PROJECT:

HOLE NO: 1A1.B17

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A1, B17

SHEET 3 OF 4

REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h)	
	10	CONTINUED FROM PAGE 2						
			8176	160	SEE			
	11							
			8019	100	NOTES			
36"	12							
		NO RECOVERY →						
	13	FILL: WASTE (ASH, GLASS), LOOSE, WET	8838	180				
	14							
							X	B
	15		9608	140		CHEM.	11656	322
			21989	500		HIGH X	23968	571
39"	16							
	17	NO RECOVERY →						
	18							
	19	FILL: WASTE (ASH, GLASS), LOOSE, WET.	9589	220		HIGH B	10736	125
18"	20							

PROJECT

HOLE NO 1A1.B17

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A1.B17

SHEET 4 OF 4

RECID ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) 8	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	20						
	21	NO RECOVERY →					
	22						
	23	FILL: WASTE (ASH, GLASS), LOOSE, WET.	8710	120			
12"	24	NO RECOVERY →					
	25	FILL: WASTE (ASH, GLASS), LOOSE, WET.	7465	240	SEE NOTES		
	26	REDDISH-BROWN SILT AND CLAY, TRACE COURSE SAND AND FINE SUB-ROUND GRAVEL (< 3/4"), MED. STIFF, MOIST. (CL)	7795	60		NATIVE	X 7653 B 84
	27		7823	120			
36"	28	BOTTOM of BORING AT 28.0'					
	29	NOTES: - CLEAR, 45°F - SAMPLE I.D. TLS-SS-1A1.B17(1.2-1.7)033010 TLS-SB-1A1.B17(6.4-7.4)033010					
	30	TLS-SB-1A1.B17(14.0-15.0)033010 TLS-SB-1A1.B17(15.0-16.0)033010					

PROJECT

HOLE NO 1A1.B17

ENG FORM 5056A-R, AUG 94

TLS-SB-1A1.B17(18.5-19.5)033010

TLS-SB-1A1.B17(25.6-26.6)033010

- COLLECTED RAD. DUPLICATE AND FIELD AND EQUIPMENT BLANKS.

- PID READINGS = 0ppm (VOC's)

- SOIL READINGS ARE COUNTS/MIN.

USACE ENG HTRW Forms
Investigative Area 2

HTRW DRILLING LOG

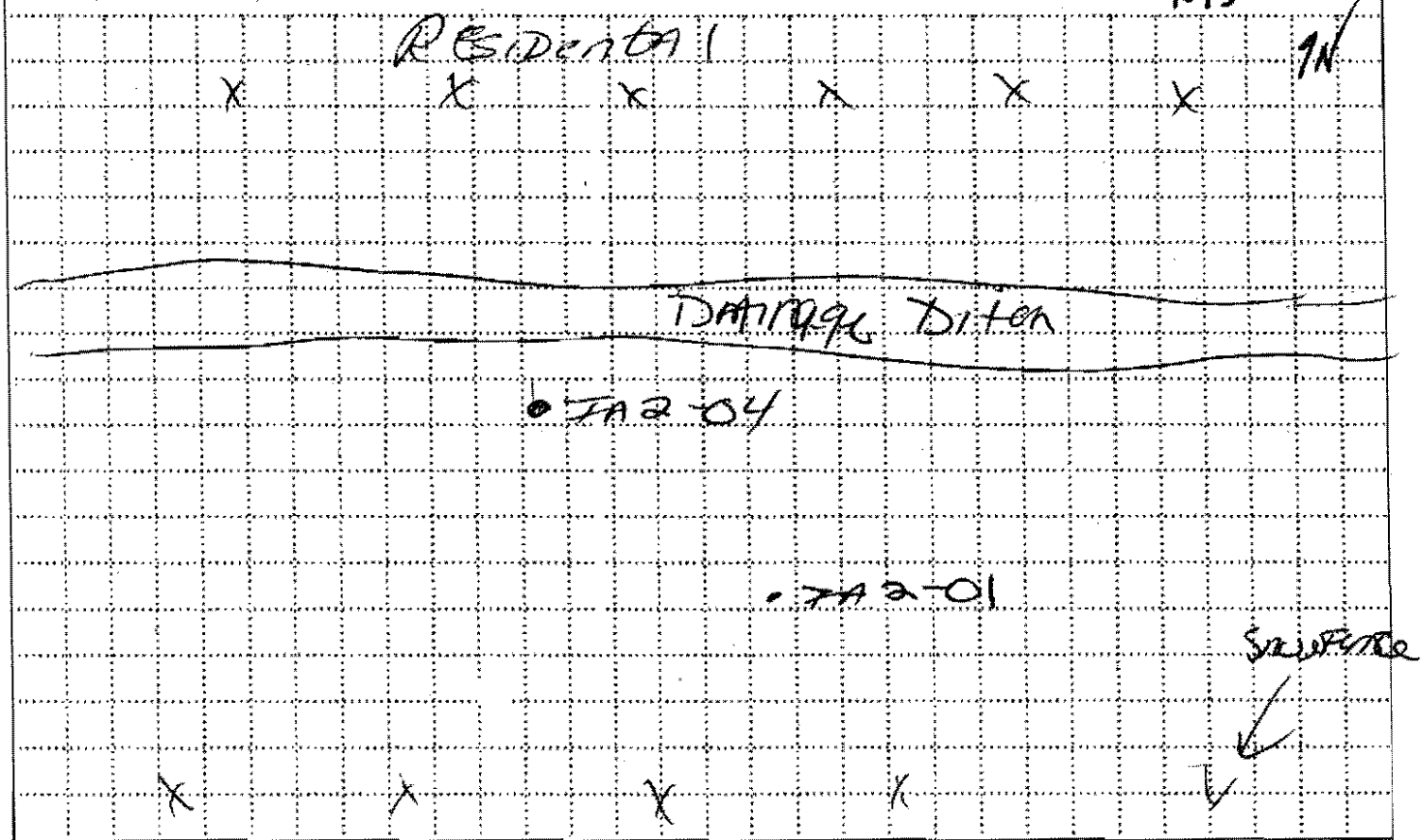
DISTRICT: Buffalo	HOLE NUMBER: TA2-01	
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 3 SHEETS
3. PROJECT: TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: DAN FERRISI	6. MANUFACTURER'S DESIGNATION OF DRILL: 6620DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: ~~3 1/4" CASING 2" CORE W/5' PLASTIC SLEEVE~~ 2" MACROCORE 1/4/4' PLASTIC SLEEVE	8. HOLE LOCATION: N= 1092861.27 E= 1065219.71	
	9. SURFACE ELEVATION: N/A	
	10. DATE STARTED: 3/19/10 845	11. DATE COMPLETED: 3/19/10 1015
12. OVERBURDEN THICKNESS: NOT ENCOUNTERED	15. DEPTH GROUNDWATER ENCOUNTERED: NOT ENCOUNTERED	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 11.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP / TOTALS	TCLP / TOTALS	SVOC-TCLP / TOTALS	PEST-TCLP / TOTALS	PCB-TOTALS	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
CUTTINGS DRUMMED	-	-	-	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT	HOLE NO.
TON LF- Buffalo DISTRICT FUSRAP PROJECT	TA2-01

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER TA 2-01

SHEET 2 OF 3

REC'D ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) 8	OR CORE BOX NO. (e) B	SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS ~~REMARKS~~ (h)
	0	NO Recovery	NO Recovery		SEE NOTE		
	1	FILL: Reddish brown silt, clay, gravel (<1"), trace waste (glass), stiff, moist	60	8271			Dp 6" 63 (.8-1.3') 65566
	2		80	8395			
	3		100	8250			
	4	NO Recovery	120	8265			
			NO Recovery				
	5	FILL: Continue from above	100	8378			
	6		80	7729			
	7		80	8431			
	8		100	8014			
	9	FILL: Cinder & fine sand, waste (glass, ash, paper), wood, gravel (<1"), rocks, moist	80	7634			Chemical 52/7498 (8-9')
	10		120	8524			Hydro & 51/7666 Duplicate (9-10')

PROJECT

HOLE NO TA 2-01

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER IA2-01

SHEET 3 OF 3

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	10	Continue from previous page	120	7957	See NOTES		High B w/ (10-11') /7427
	11	NO Recovery					
	12						
	13						
	14						
	15	Bottom of Boring @ 15.0'					
	16	- Stopped @ 15.0' due to High LEL levels. NOTES					
	17	- PID reading: 0ppm - Gamma Reading: 10mR/hr					
	18	- Weather: Sunny 45°F Sample ID (Rad Analysis) 7LJ-SS-IA2-01(-8-13')031910 7LJ-SB-IA2-01(8-9')031910		Top 6" Chemical			
	19	7LJ-B-IA2-01(9-10')031910 7LJ-B-IA2-01(10-11')031910		High & Duplicate High B			
	20	- Data is second attempt @ IA2-01, stopped @ 1st attempt due to LEL.					

PROJECT

HOLE NO IA2-01

ENG FORM 5056A-R, AUG 94

TRW DRILLING LOG

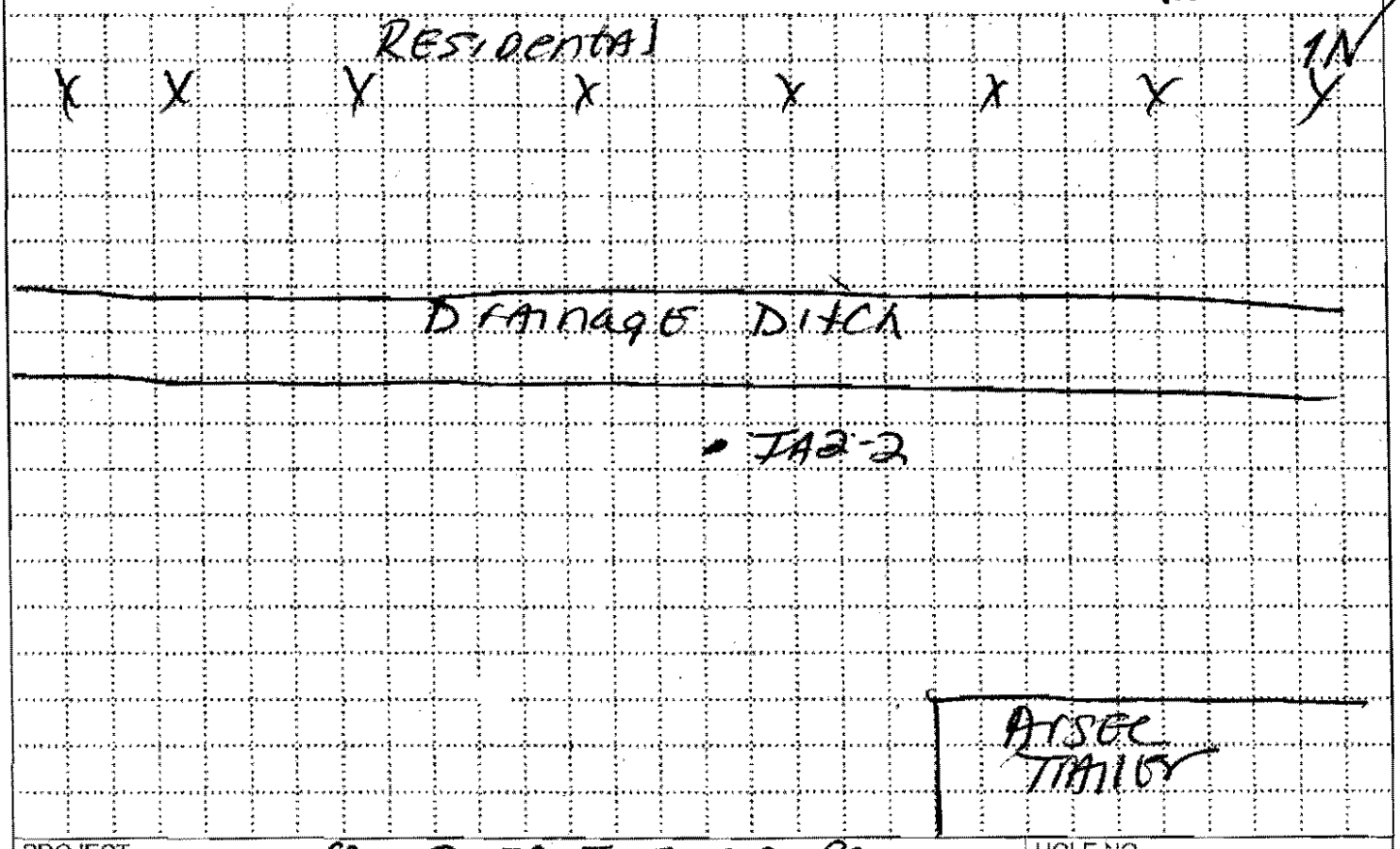
DISTRICT: Buffalo		HOLE NUMBER: TA2-2
COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF SHEETS
3. PROJECT: TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: Dave ORS	6. MANUFACTURER'S DESIGNATION OF DRILL: 7720 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: ~~3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE~~ 3" MACRO CORE W/ 4' PLASTIC SLEEVE	8. HOLE LOCATION: N= 1092899.03 E= 1065295.23	
	9. SURFACE ELEVATION: N/A	
	10. DATE STARTED: 3/24/10 1030am	11. DATE COMPLETED: 3/24/10 11:35am
12. OVERBURDEN THICKNESS: 15.7	15. DEPTH GROUNDWATER ENCOUNTERED: 14.7'	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 18.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	–	–	–	–	–	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. [redacted]
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON LF - Buffalo DISTRICT FUSRAP PROJECT — HOLE NO. TA2-2

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER TA2-2

SHEET 2 OF 3

REC'D ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) 8	SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	0	NO Recovery	NO Recovery		SEE NOTE		
	1	Fill: Reddish brown clay, silt, gravel (1/4"), trace waste (GLASS), trace brick, SOFT-STIFF MOIST	60	7871			Top 6" 53 (1.5-1.1) 6743
	2		60	8085			
	3		60	7506			
43"	4		120	7553			
	5		80	7793			
	6		100	7304			
	7		120	7104			
48"	8		60	8199			High 72 (7-8') 6788
	9		80	7057			
24"	10	Fill: waste (ash, glass, plastic, metal), gravel (1/4"), loose, moist	100	7909			

PROJECT

HOLE NO. TA2-2

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER FA2-2

SHEET 3 OF 3

RECOVERY (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN STATIC REMARKS COUNTS (h)
	10	NO RECOVERY	NO RECOVERY		See NOTES		
	11						
	12	FILL WASTE (ASH, GLASS, PAPER, METAL, PLASTIC), SAND, GRAVEL (1/2"), LOOSE, MOIST	140	7231			High B 42 (11.2-12.2) 7366
	13		40	8003			
34"	14		100	7815			
	15	FILL WASTE (ASH, GLASS, PLASTIC), GRAVEL (2"), LOOSE, MOIST	140	7486			Saturated 122 (14.2-15.7) 7619
	16	Reddish brown SILT, CLAY, FINE SAND, FINE SUBROUNDED GRAVEL (1/2") TRACE DESICATION CRACKS, W/GRAY MOTTLING, WET-MOIST, SOFT	120	7585			
	17		80	7885			
48"	18		140	8197			
	19	Bottom of Boring @ 18.0' NOTES Weather Sunny 40°F PID Reading 0 ppm Gamma Reading count/min					
	20						

SAMPLE ID (ANALYSIS)
TLS-SS-FA2-2(5-1.0') 032410 Top 6"
TLS-SB FA2-2(7-8') 032410 High B
TLS-SB FA2-2(11.2-12.2') 032410 High B
TLS-SB FA2-2(14.2-15.7) 032410 Saturated
TLS-SB FA2-2(15.7-16.7) 032410 Water

PROJECT

HOLE NO. FA2-2

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

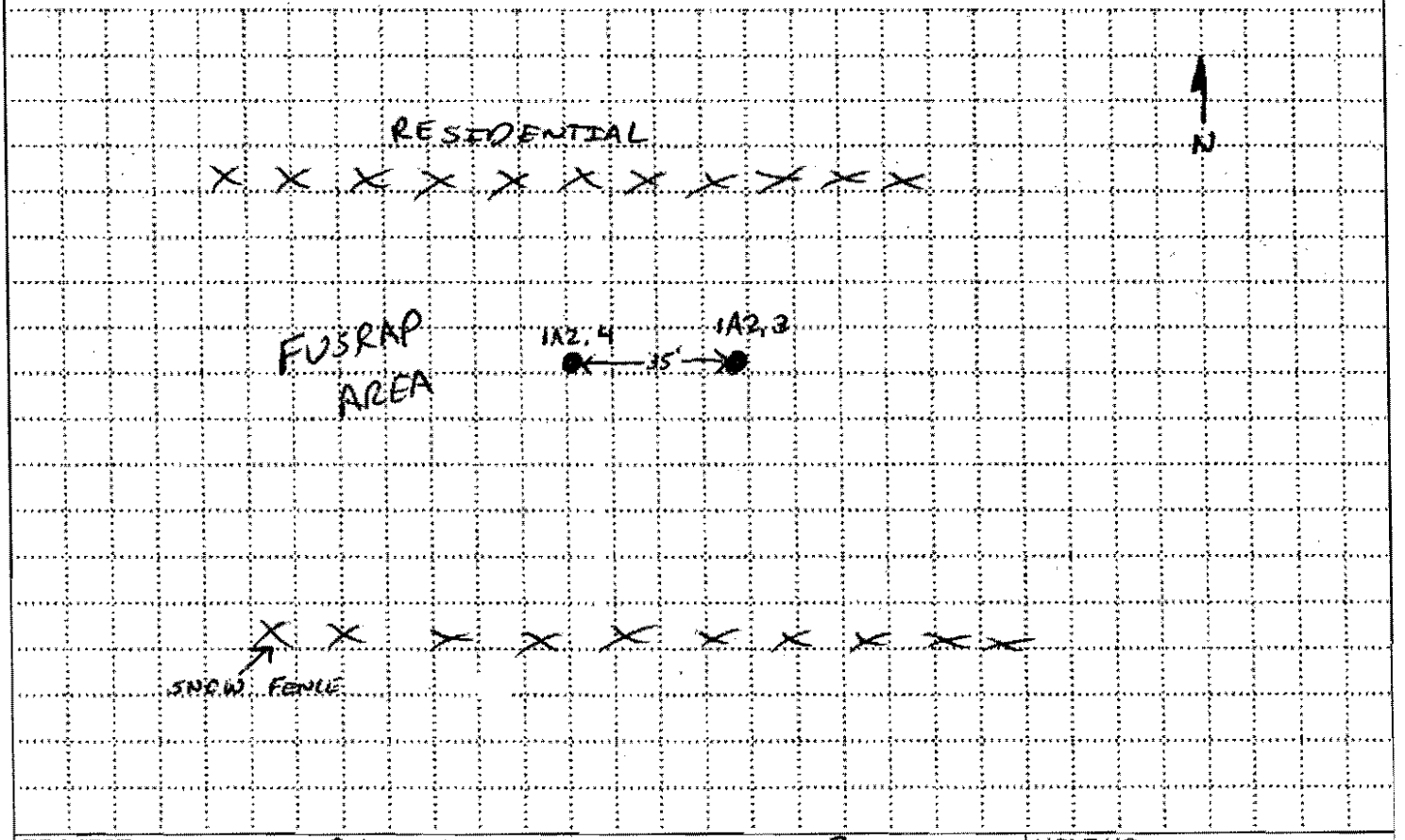
DISTRICT	Buffalo
HOLE NUMBER	1A2, 3
1. COMPANY NAME	ENSOL, INC.
2. DRILLING CONTRACTOR	ZEBRA ENVIRONMENTAL CORP.
SHEET / SHEETS	1 OF 5
3. PROJECT	TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT
4. LOCATION	TONAWANDA LF, TONAWANDA, NY
5. NAME OF DRILLER	Jeff SNYDER
6. MANUFACTURER'S DESIGNATION OF DRILL	6620 DT GEOPROBE
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE
8. HOLE LOCATION	N= 1092899.03 E= 1065257.47
9. SURFACE ELEVATION	621.272
10. DATE STARTED	3/23/10 0845
11. DATE COMPLETED	3/23/10 1130
12. OVERBURDEN THICKNESS	28.0'
15. DEPTH GROUNDWATER ENCOUNTERED	13.5' bgs
13. DEPTH DRILLED INTO ROCK	N/A
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	N/A
14. TOTAL DEPTH OF HOLE	32.0'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	N/A

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	–	–	–	–	–	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23 [redacted]
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT	HOLE NO
TON LF - Buffalo DISTRICT FUSRAP PROJECT	1A2, 3

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A2.3

SHEET 2 OF 5

REC'D ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) ~~X~~	GEOTECH SAMPLE OR CORE BOX NO. (e) ~~X~~ B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS REMARKS (h)
	0	NO RECOVERY →					
	1	FILL: REDDISH-BROWN CLAY, GRAVEL (<2"), ROOTLETS, STIFF, MOIST.	7441	60		TOP 6"	X 7478 B 75
	2		7961	90			
	3		7397	80	SEE NOTES		
44"	4		8087	60			
	5	FILL: REDDISH-BROWN CLAY, GRAVEL, BRICK, WASTE (PLASTIC, GLASS, ASH, PAPER), MED. STIFF, MOIST.	7442	100			
	6		7619	110		HIGH B	7157 74
	7		7380	60			
48"	8		7786	90			
	9	NO RECOVERY →					
	10	FILL: WASTE (ASH, GLASS, PLASTIC), GRAVEL, LOOSE, MOIST.	7672	60			

PROJECT

HOLE NO 1A2.3

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A2.3

SHEET 3 OF 5

REC'D ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h) X	B
	10	CONTINUED FROM PAGE 2						
			8151	120		AIGHX	7045	71
	11				SEE			
			7617	80	NOTES			
30"	12							
	13	NO RECOVERY →						
	14	FILL: WASTE (ASH, GLASS), LOOSE, WET.	7119	60		SAT.	7384	51
			7823	70				
	15							
			8059	90				
33"	16							
	17							
	18	NO RECOVERY →						
	19							
0"	20							

PROJECT

HOLE NO 1A2.3

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR: D. Popp

HOLE NUMBER: 1A2.3

SHEET 4 OF 5

RECO ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)	
	20							
	21							
	22							
	23							
0"	24	NO RECOVERY →						
	25							
	26							
	27							
0"	28							
	29	REDDISH-BROWN SILT AND CLAY, TRACE COURSE SAND AND FINE SUB-ROUND GRAVEL (<1"), MED. STIFF, MOIST. (CL)	7984	60	SEE NOTES	NATIVE	γ 7770	β 72
	30		7880	100				

PROJECT

HOLE NO 1A2.3

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR O. Poff

HOLE NUMBER 1A2.3

SHEET 5 OF 5

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	30	CONTINUED FROM PAGE 4					
	31		7445	110			
			7558	90			
48"	32						
		BOTTOM of BORING AT 32.0'					
		NOTES:					
	33	- RAIN, 40°F					
		- SAMPLE I.D.					
	34	TLS-SS-1A2.3(0.5-1.0)032310					
		TLS-SB-1A2.3(5.0-6.0)032310					
		TLS-SB-1A2.3(10.0-11.0)032310					
	35	TLS-SB-1A2.3(13.5-14.5)032310					
		TLS-SB-1A2.3(28.0-29.0)032310					
	36	- PID READINGS = 0ppm (VOC's)					
		- SOIL READINGS ARE COUNTS/MIN.					
	37	- COLLECTED RAD. DUPLICATE.					
	38						
	39						
	40						

PROJECT

HOLE NO 1A2.3

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

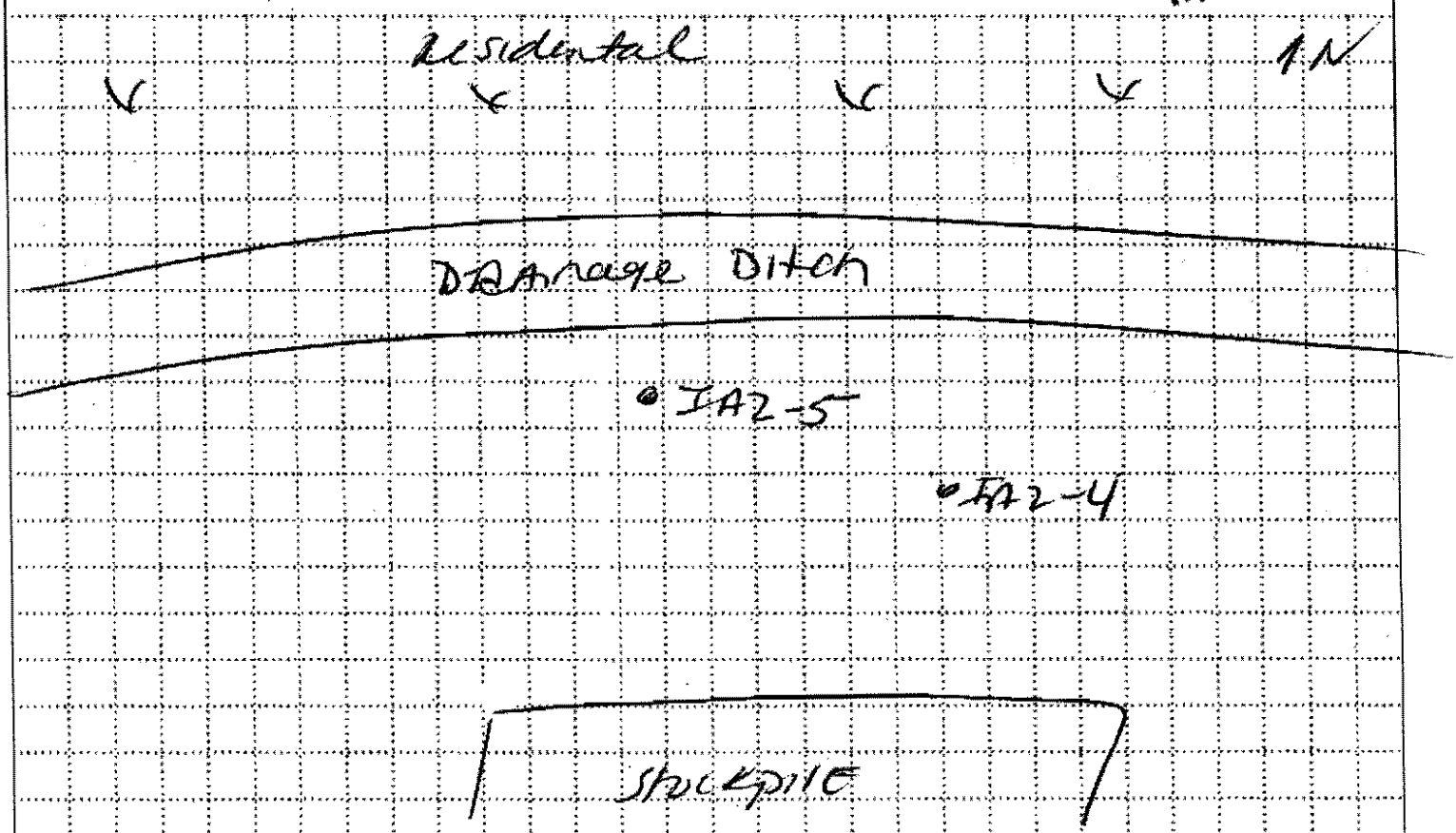
DISTRICT	Buffalo
HOLE NUMBER	TA2-4
1. COMPANY NAME	ENSOL, INC.
2. DRILLING CONTRACTOR	ZEBRA ENVIRONMENTAL CORP.
SHEET / SHEETS	1 OF 3
3. PROJECT	TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT
4. LOCATION	TONAWANDA LF, TONAWANDA, NY
5. NAME OF DRILLER	Dan Ferrel
6. MANUFACTURER'S DESIGNATION OF DRILL	7720 DT GEOPROBE
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	~~3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE~~ 3" macro core w/ 4' plastic sleeve
8. HOLE LOCATION	N= 1092899.03 E= 1065[illegible]
9. SURFACE ELEVATION	N/A
10. DATE STARTED	3/24/10 950 am
11. DATE COMPLETED	3/24/10 1025 am
12. OVERBURDEN THICKNESS	13.6'
15. DEPTH GROUNDWATER ENCOUNTERED	12.0'
13. DEPTH DRILLED INTO ROCK	N/A
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	N/A
14. TOTAL DEPTH OF HOLE	16.0'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	N/A

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	–	–	–	–	–	N/A

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIG[redacted]
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT TON LF- Buffalo DISTRICT FUSRAP PROJECT HOLE NO. TA2-4

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER JA2-4

SHEET 2 OF

REC'D ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	OR CORE BOX NO. (e) B	SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS REMARKS (h)
	0	No Recovery	No Recovery		SEE NOTE		
	1	Fill: Dark brown topsoil, organic matter, rootlets, soft, moist	120	7134			Zp 6" 67 (.6-1.1) 6748
	2	Fill: Reddish brown silty clay, concrete, trace waste (glass), stiff, moist	100	6810			HgHB 59 (1.1-2.1) 6556
	3		60	6847			
42"	4		60	6255			
		No Recovery	No Recovery				
	5	Fill: Reddish brown silt, clay, wood, concrete, stiff, moist	60	7116			
	6		40	7049			
	7	Fill: Black waste/ash, glass, plastic, paper, brick, gravel (<1"), loose moist	100	7377			HgHγ 63 (6.4-7.4) 6716
44"	8						
	9	No Recovery	No Recovery				
	10						

PROJECT

HOLE NO. JA2-4

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER JA2-4

SHEET 3 OF 3

REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC READING COUNTS (h)
	10	NO Recovery	NO Recovery		See NOTES		
	11						
6"	12						
	13	Fill: Dark brown clay, waste (ash, glass), brick, gravel (1/2"), soft, moist	80	6990			Saturated 61 (12-13') 6650
			60	6987			Native 63 (13.6-14.6') 6920
	14	Reddish-brown clay, some silt, trace sand, fine sub-rounded gravel (1/2"), trace gray mottling, soft moist (CL)	60	7138			
48"	15		80	7144			
	16	Bottom of Boring @ 16.0'					
	17	NOTES: - Weather: Sunny 40°F - PID Reading 0 ppm - Gamma Reading 10 mR/hr					
	18	SAMPLE ID (RAD. MAX 4 PM) TLS-SS-JA2-4(0.6-1.1')032410	Top 6"				
		TLS-SB-JA2-4(1.1-2.1')032410	High B				
	19	TLS-SB-JA2-4(6.4-7.4')032410	High 8				
		TLS-SB-JA2-4(12-13')032410	Saturated				
		TLS-SB-JA2-4(13.6-14.6')032410	Native				
	20						

PROJECT

HOLE NO JA2-4

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

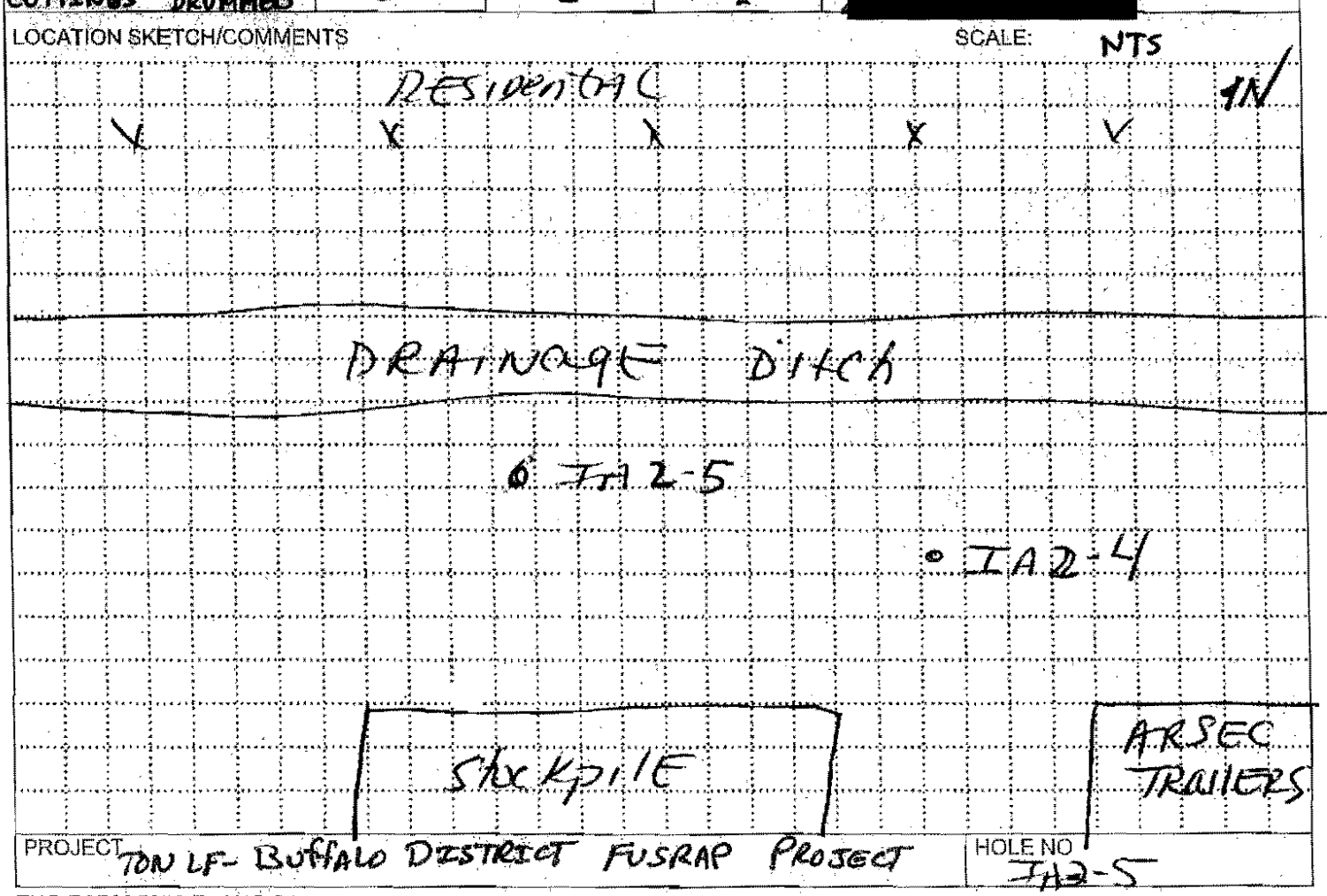
DISTRICT: Buffalo		HOLE NUMBER: IA2-5
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 3
3. PROJECT: TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: DILLORSI	6. MANUFACTURER'S DESIGNATION OF DRILL: 7720 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3" MACRO CORE w/ 4" PLASTIC SLEEVE	8. HOLE LOCATION: N=109299.03 E=1065181.95	
	9. SURFACE ELEVATION: N/A	
	10. DATE STARTED: 3/24/10 835 am	11. DATE COMPLETED: 3/24/10 945 am
12. OVERBURDEN THICKNESS: 9.5'	15. DEPTH GROUNDWATER ENCOUNTERED: NOT ENCOUNTERED	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 12.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP / TOTALS	TCLP / TOTALS	SVOC-TCLP / TOTALS	PST-TCLP / TOTALS	PCB-TOTALS	N/A

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23 [redacted]
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON LF - Buffalo DISTRICT FUSRAP PROJECT — HOLE NO: IA2-5

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER TA2-5

SHEET 2 OF 3

RECID ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) 8	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS REMARKS (h)
	0	NO RECOVERY	NO RECOVERY		SEE NOTE		
	1	FILL: brown clay, sand, gravel (<1"), brick, concrete, stiff, moist	100	7138			Top bit 61 (0.6-1.1) 6398
	2		60	6973			
	3		60	7302			High γ 63 (2.1-3.1) 6622
44"	4		80	6942			Minimal 64 (3.1-4.0) 6521
		NO RECOVERY	NO RECOVERY				
	5	FILL: brown clay, sand, gravel (<1"), coarse sand, cinders, stiff, moist	80	7120			
	6	FILL: Dark brown waste (glass, ash), brick, wire, moist	120	7152			High B 68 (5.5-6.5') 6653
	7		100	7099			
43"	8						
		NO RECOVERY	NO RECOVERY				
	9						
		FILL: Ash brown clay, concrete, waste (ash, glass), stiff, moist	100	7172			Wire 58 (9.5-10.5') 6581
	10	Reddish brown clay, silt, trace sand & wood pieces	80	7289			2nd High γ 76 (10.5-11.5') 6847

PROJECT

HOLE NO. TA2-5

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER TA2-5

SHEET 3 OF 3

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	DISTURBED SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	10	Gray mottling, fine Sub rounded gravel, stiff, moist (CL)	SEE previous page		See NOTES		
	11						
			60	6708			
36'	12	Bottom of Boring @ 12.0'					
	13	NOTES					
		-weather sunny 40°F					
		-PID Reading: 0ppm					
	14	-Gamma Count: min					
	15	Sample ID (RAD Analysis)					
		TLS-SS-TA2-5(0.6-1.1') 032410		Top 6"			
	16	TLS-SB-TA2-5(2.1-3.1') 032410		High B			
		TLS-SB-TA2-5(3.1-4.0') 032410		Chemical			
		TLS-SB-TA2-5(5.5-6.5') 032410		High B			
	17	TLS-SB-TA2-5(9.5-10.5') 032410		Native			
		TLS-SB-TA2-5(10.5-11.5') 032410		2nd Highest			
	18						
	19						
	20						

PROJECT

HOLE NO TA2-5

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

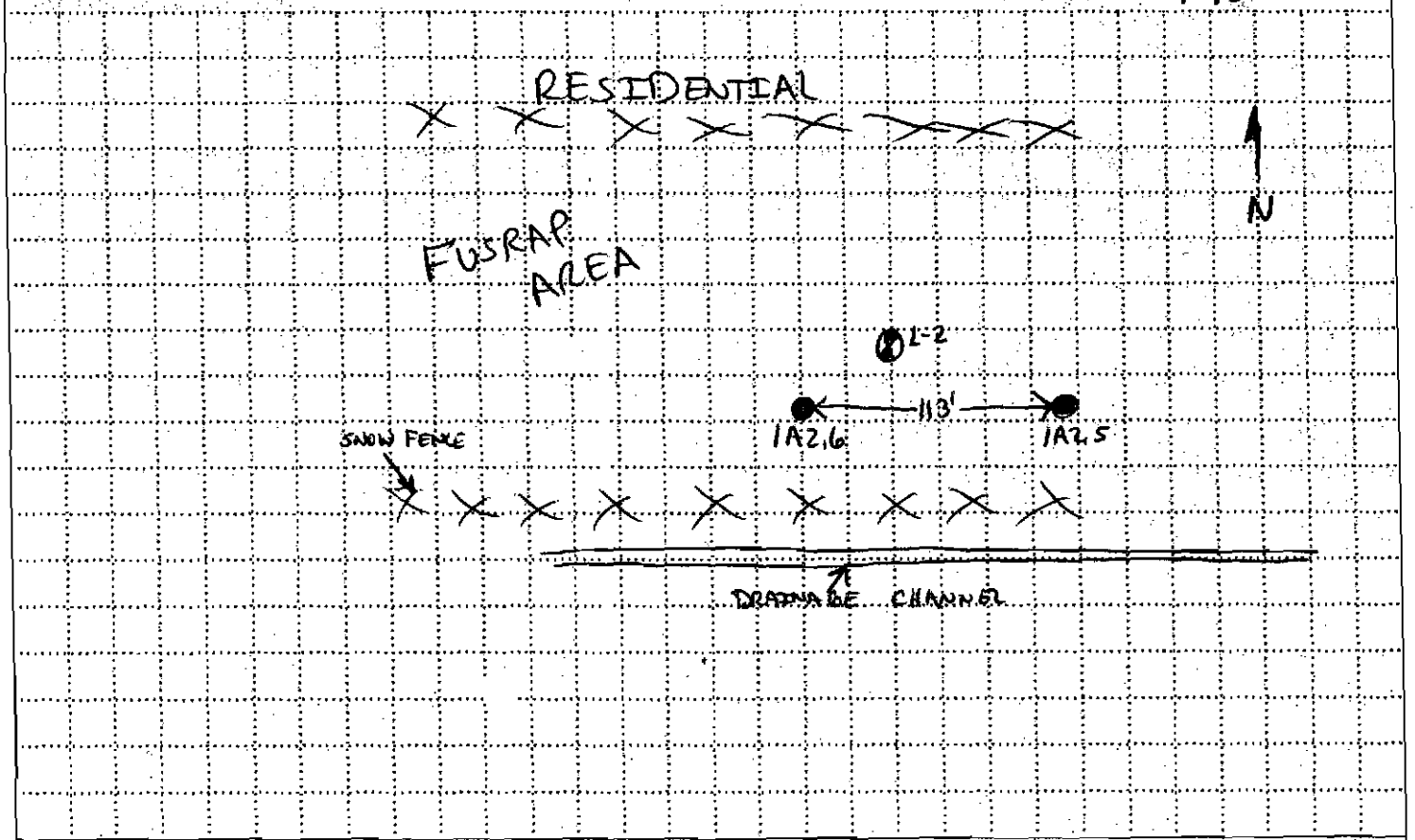
DISTRICT: Buffalo		HOLE NUMBER: 1A2.6
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 5 SHEETS
3. PROJECT: TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: PHIL ORSI	6. MANUFACTURER'S DESIGNATION OF DRILL: 7720 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE W/ 4' PLASTIC SLEEVE	8. HOLE LOCATION: N= 1092936.79 E=1065370.75	
	9. SURFACE ELEVATION: 622.423	
	10. DATE STARTED: 3/19/10 1330	11. DATE COMPLETED: 3/19/10 1615
12. OVERBURDEN THICKNESS: 29.0'	15. DEPTH GROUNDWATER ENCOUNTERED: 9.8' bgs	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 32.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP / TOTALS	TCLP / TOTALS	SVOC-TCLP / TOTALS	PCB-TCLP / TOTALS	PCB-TOTALS	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23
CUTTINGS DRUMMED	–	–	–	[redacted]

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT	HOLE NO
TON LF- Buffalo DISTRICT FUSRAP PROJECT	1A2.6

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A2.6

SHEET 2 OF 5

RECID ~~RECV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS REMARKS (h)
	0	NO RECOVERY →					→
	1	FILL: REDDISH-BROWN CLAY, ROOTLETS, GRAVEL, WASTE (GLASS), STIFF, MOIST.	6482	50		TOP 6"	X 7305 B 72
	2		7225	70			
	3		8175	50	SEE	HIGH X	7323 56
43"	4		7646	40	NOTES	CHEM.	7506 77
	5	FILL: REDDISH-BROWN CLAY, GRAVEL, WOOD, WASTE (PLASTIC, GLASS), BRICK, STIFF, MOIST.	7960	80			
	6		7392	110			
	7		8015	100			
48"	8		7518	70			
	9	NO RECOVERY →					→
	10	SEE PAGE 3 of 5					

PROJECT

HOLE NO 1A2.6

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER 1A2.6

PROJECT

INSPECTOR D. Popp

SHEET 3 OF 5

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STRIPE COUNTS (h) X	B
	10	FILL: GRAVEL, WOOD, WASTE (GLASS, PAPER, ASH), LOOSE, WET.	7642	80	SEE NOTES	SAT. (9.8'-10.8')	7758	51
	11		7934	70				
25"	12							
	13	NO RECOVERY →						
	14							
	15							
6"	16	FILL: WASTE (ASH, GLASS), LOOSE, WET	7805	80				
	17	NO RECOVERY →						
	18							
	19							
2"	20	SAME AS 15.5'-16.0'	8056	40				

PROJECT

HOLE NO 1A2.6

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A2.6

SHEET 4 OF 5

RECD (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h)
	20						
	21	NO RECOVERY →					
	22						
	23						
14"	24	SAME AS 19.8'-20.0	8088	110	SEE NOTES	HIGH B	X 9492 B 60
	25						
	26	NO RECOVERY →					
	27		8041	50			
15"	28	SAME AS 22.9'-24.0'	7382	100			
	29		6654	70			
	30	REDDISH-BROWN SILT AND CLAY, TRACE COURSE SAND AND FINE SUB-ROUND GRAVEL (<1/4"), SOFT, MOIST. (CL)	7341	50		NATIVE	7024 45

PROJECT

HOLE NO 1A2.6

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A2.6

SHEET 5 OF 5

REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h)
	30	CONTINUED FROM PAGE 4					
	31		7544	90			
			7862	60			
48"	32						
		BOTTOM of BORING AT 32.0'					
		NOTES:					
	33	- CLEAR, 50°F					
		- SAMPLE I.D.					
		TLS-SS-1A2.6(0.6-1.1)031910					
	34	TLS-SB-1A2.6(2.0-3.0)031910					
		TLS-SB-1A2.6(3.0-4.0)031910					
		TLS-SB-1A2.6(9.8-10.8)031910					
	35	TLS-SB-1A2.6(22.9-23.9)031910					
		TLS-SB-1A2.6(29.0-30.0)031910					
		- PID READINGS = 0ppm (VOC's)					
	36	- SOIL READINGS ARE COUNTS/MIN.					
	37						
	38						
	39						
	40						

PROJECT

HOLE NO 1A2.6

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

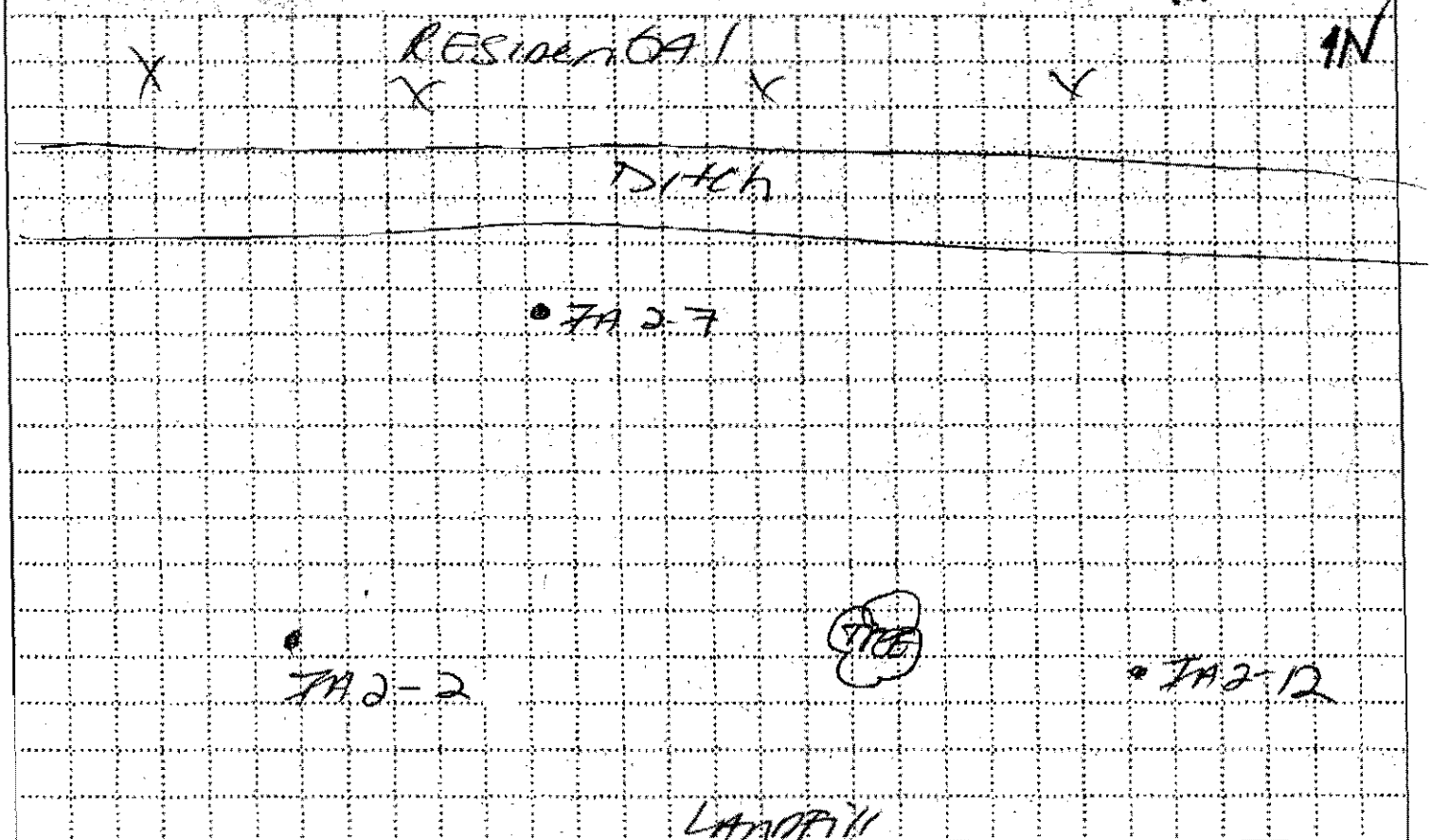
DISTRICT: Buffalo		HOLE NUMBER: JA2-7
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 4
3. PROJECT: TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: DAN FERREL	6. MANUFACTURER'S DESIGNATION OF DRILL: 7720 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 2" MACRO CORE W/ 4' PLASTIC SLEEVE	8. HOLE LOCATION: N= 1092936.79 E= 1065370.75	
	9. SURFACE ELEVATION: N/A	
	10. DATE STARTED: 3/22/10 850	11. DATE COMPLETED: 3/22/10 1110
12. OVERBURDEN THICKNESS: 23.0'	15. DEPTH GROUNDWATER ENCOUNTERED: 10.5'	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 25.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	-	-	-	-	-	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SI[redacted]
CUTTINGS DRUMMED	-	-	-	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON LF- Buffalo DISTRICT FUSRAP PROJECT	HOLE NO: JA2-7

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER FA2-7

SHEET 2 OF 4

REC'D ~~REEN.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) 8	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS ~~REMARKS~~ (h)
	0	NO Recovery	No Recovery		SEE NOTE		
	1	FILL: Reddish brown clay, sand, rootlets, trace concrete, stiff, moist	80	8572			Top 6" 58 (4-1') Fill
	2		110	8121			
	3		100	8461			
	4		60	8165			
	5	FILL: Reddish brown clay, sand, gravel (<1"), stiff, moist	140	8495			Hand 65 (4-5') 8776
	6		80	8383			
	7	FILL: Blackish gray waste (ash, glass, metal), brick, loose, moist	40	8070			
	8		120	8217			
	9	FILL: gray coarse + fine sand, waste (ash, glass) brick, loose, moist	20	9072			
	10		100	8933			

PROJECT

HOLE NO FA2-7

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER MA2-7

SHEET 3 OF 4 SHEET

RECV'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. ~~REMARKS~~ COUNTS (h)
	10	Continue from previous page	80	8213	See notes		Sample 6 (10.5-11.5') 8282
	11						
	12	No Recovery	No Recovery				
	13						
	14	Fill: gray coarse sand, waste (ash, glass), brick, loose, moist	100	10805			High 55 Duplicate 8432 (13-14')
	15		100	9163			
	16		80	9017			
	17	No Recovery	No Recovery				
	18						
	19						
	20						

PROJECT

HOLE NO MA2-7

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER JA27

SHEET 4 OF 4

RECD (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
	20				SEE NOTES		1 MIN. STATIC COUNTS
		continue from previous page					
	21						
	22						
	23						
	24	Reddish brown clay, silt, fine sand, soft, moist (CL)	100	8444			Active 59 (23-24) 8061
			100	9105			
	25						
	26	Bottom of Boring @ 25.0'					
		NOTES					
		- Weather: rain, 38°F					
		- PID reading: 0ppm					
	27	- Gamma reading: count/min					
		Sample ID (lab analysis)					
	28	TLS-SS-JA2-12 (0-4') 032210		Top 6"			
		TLS-SB-JA2-12 (4-5') 032210		High B			
		TLS-SB-JA2-12 (13-14') 032210		High B + Duplicate			
	29	TLS-SB-JA2-12 (10.5-11.5') 032210		Saturated			
		TLS-SB JA2-12 (23-24') 032210		Active			
	30						

PROJECT

HOLE NO JA27

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

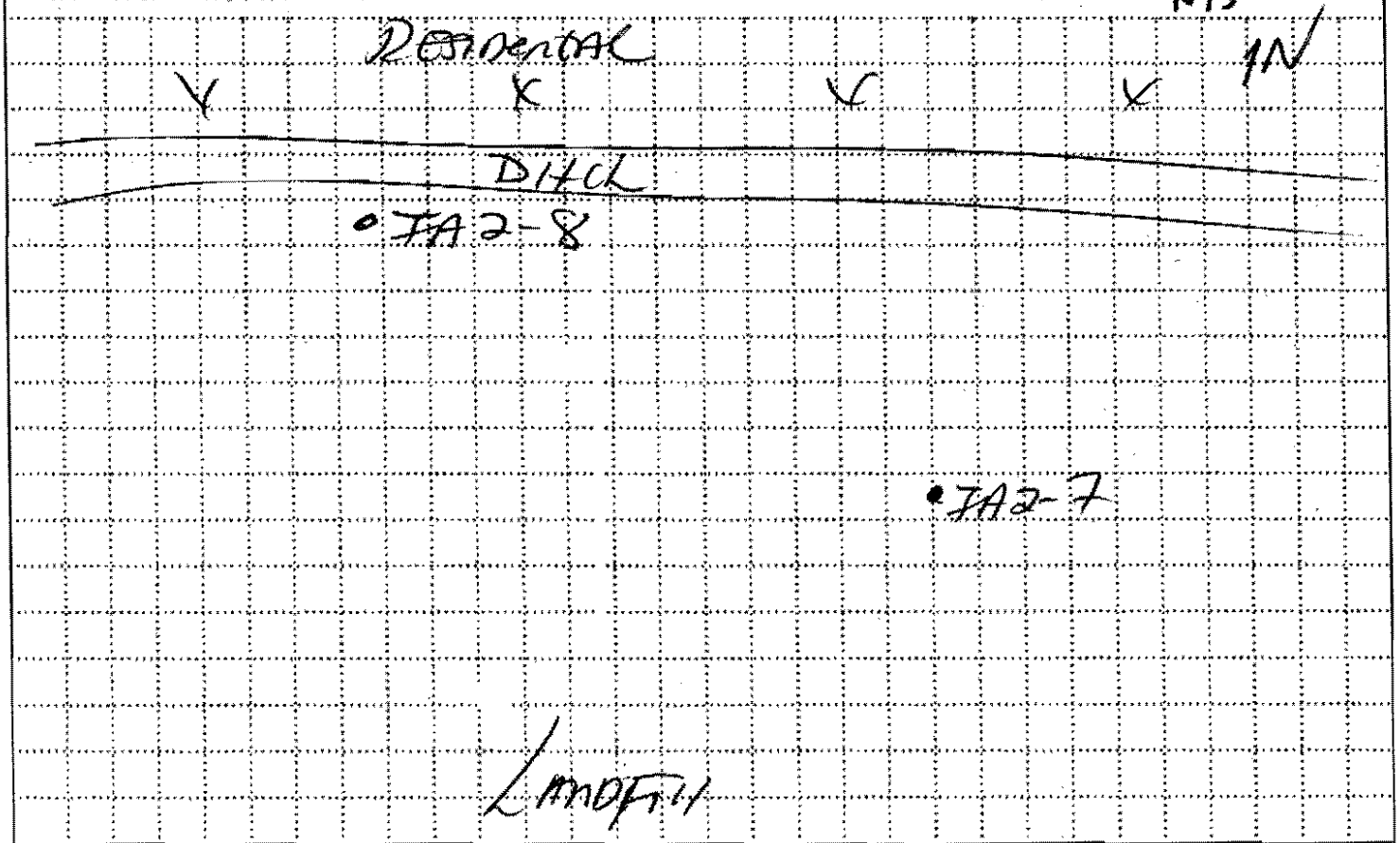
DISTRICT: Buffalo		HOLE NUMBER: JA2-8
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 3 SHEETS
3. PROJECT: TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: Phil ORSI	6. MANUFACTURER'S DESIGNATION OF DRILL: 7720 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: ~~3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE~~ 3" CASING w/ 4' plastic sleeve	8. HOLE LOCATION: N= 1092936.79 E= 1065295.23	
	9. SURFACE ELEVATION: N/A	
	10. DATE STARTED: 3/22/10 1730	11. DATE COMPLETED: 3/22/10 210
12. OVERBURDEN THICKNESS: 8.0'	15. DEPTH GROUNDWATER ENCOUNTERED: 5.0'	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 14.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP / TOTALS	TCLP / TOTALS	SVOC-TCLP / TOTALS	PEST-TCLP / TOTALS	PCB- TOTALS	N/A

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. [redacted]
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON LF- Buffalo DISTRICT FUSRAP PROJECT — HOLE NO. JA2-8

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER JA28

SHEET 2 OF 3

RECID (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD RESULTS (d) X	OR CORE BOX NO. (e) B	ADDITIONAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS REMARKS (h)
	0	NO RECOVERY	NO RECOVERY		SEE NOTES		
	1	FILL: Reddish brown clay, organic matter, rootlets, stiff, moist	60	7840			Top 6" (1.3-1') 64 / 7826
	2		80	8441			
	3		100	8396			
42	4		40	8339			
		NO RECOVERY	NO RECOVERY				
	5	FILL: Dark Black waste (ash, glass, plastic), wood, gravel (<1"), loose, moist	80	8406			Sphenon (5-6') 70 / 7871
	6		100	9112			
40	7		120	8860			Hydrocarbon (6-7') 78 / 8871
	8	Reddish brown silt, clay, gray mottling, gravel (<1"), stiff, moist (<1')	120	8587			Chemical (7-8') 108 / 7922
	9		160	8494			Nathan (8-9') 63 / 8026
	10						

PROJECT

HOLE NO. JA2-8

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT | INSPECTOR [redacted] | HOLE NUMBER TA2-8 | SHEET 3 OF 3

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) 8	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC REMAINING COUNTS (h)
	10						
		continue from previous page			See NOTES		HighB 79 (9-10') 8024
	11		140	8327			
			160	8351			
	12						
			140	8768			
	13						
			100	8892			
24	14						
		Bottom of Boring @ 14.0'					
	15	NOTES:					
		-weather: cloudy 35°F					
		-PID Reading: 0 ppm					
	16	-Gamma Reading ~~counts~~ cpm					
	17	Sample IDs (Lab analysis)					
		TCS-SS-TA2-8(3-1')032210					Top 6"
		TCS-SB-TA2-8(5-6')032210					Saturated
	18	TCS-SB-TA2-8(8-9')032210					Native
		TCS-SB-TA2-8(9-10')032210					High B
		TCS-SB-TA2-8(6-7')032210					High B
	19	TCS-SD-TA2-8(7-8')032210					Chemical
	20						

PROJECT | HOLE NO. TA2-8

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

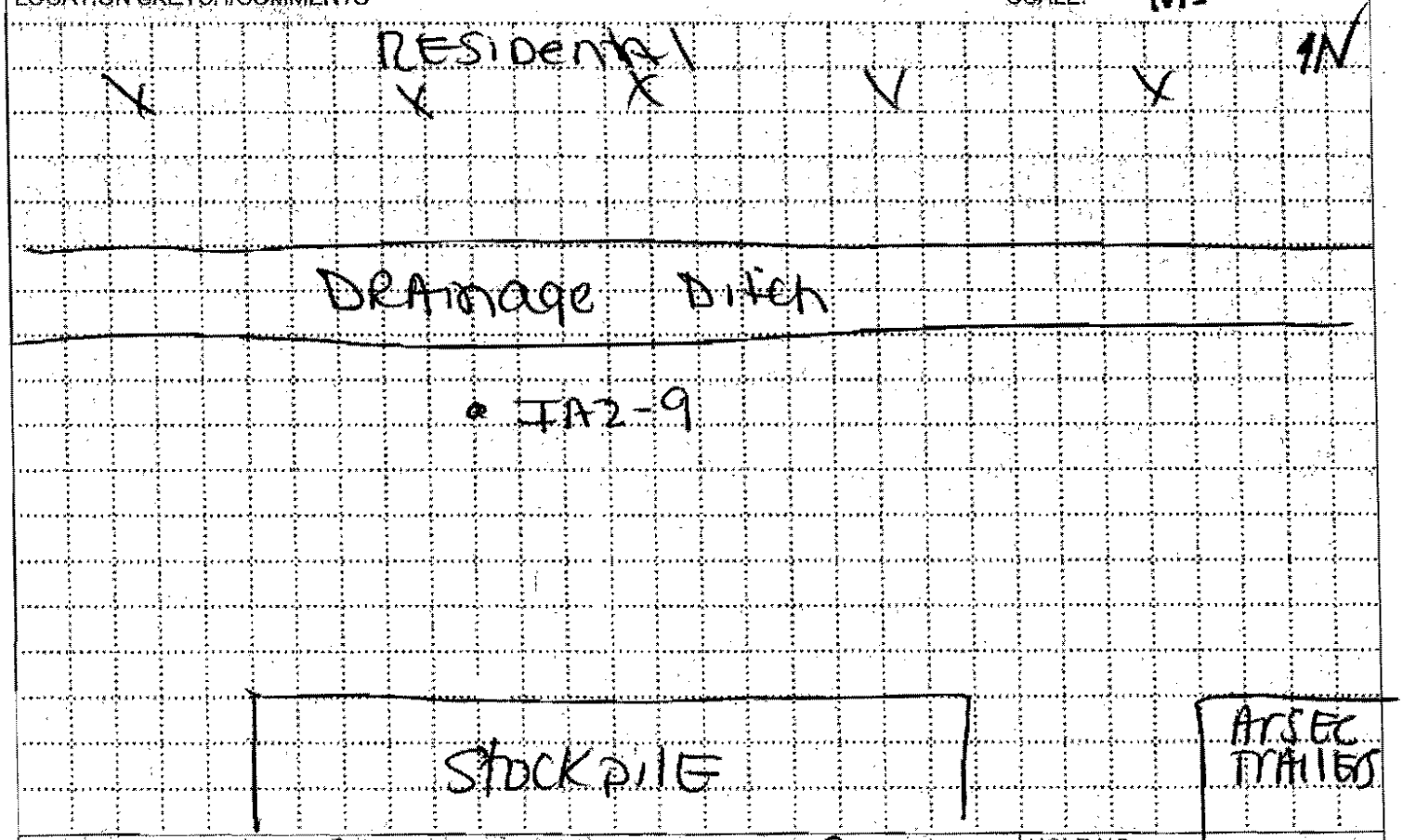
DISTRICT: Buffalo	HOLE NUMBER: JA 2-9	
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 2 SHEETS
3. PROJECT: TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: DAN FERRET	6. MANUFACTURER'S DESIGNATION OF DRILL: 7720 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3" MACRO CORE W/ 4' PLASTIC SLEEVE	8. HOLE LOCATION: N= 1092936.77 E= 1065257.47	
	9. SURFACE ELEVATION: N/A	
	10. DATE STARTED: 3/22/10 2:40 pm	11. DATE COMPLETED: 3/22/10 3:40 pm
12. OVERBURDEN THICKNESS: 3.1'	15. DEPTH GROUNDWATER ENCOUNTERED: NOT encountered	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 8.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	–	–	–	–	–	N/A

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIG[redacted]
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON LF - Buffalo DISTRICT FUSRAP PROJECT — HOLE NO: JA2-9

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER IA2-9

SHEET 2 OF 2

REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) 8	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h)
	0	NO RECOVERY	NO RECOVERY		See NOTES		
	1	Fill: DARK brown topsoil, organic matter, mottles, soft, moist	80	8518			Top 6" (0.4-1') 42/7904
	2	Fill: DARK brown clay, silt, waste (glass, ash, plastic), gravel (1/4"), loose, moist	100	8073			
	3		220	8222			High B (2-3') 81/7842
44"	4	REDISH brown silt, clay, trace fine sand, gray mottling, gravel (1/2"), trace sand, stiff, moist (CL)	60	8275			Native (3-4') 68/7911
	5		120	8374			2nd highest B (4-5') 63/8193
	6		100	8321			
	7		120	8515			High B Duplicate (6-7') 77/8132
48"	8		120	8226			
	9	Bottom of Boring @ 8.0' NOTES - Weather: Rain 35°F - PID Reading 0 ppm - Gamma Reading count/min	SAMPLE ID (PID ANALYSIS) TLJ-SS-IA2-9 (0.4-1') 032210 Top 6" TLJ-SB-IA2-9 (2-3') 032210 High B TLJ-SB-IA2-9 (3-4') 032210 Native TLJ-SB-IA2-9 (4-5') 032210 2nd highest B TLJ-SB-IA2-9 (6-7') 032210 High B Duplicate				
	10						

PROJECT

HOLE NO IA2-9

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

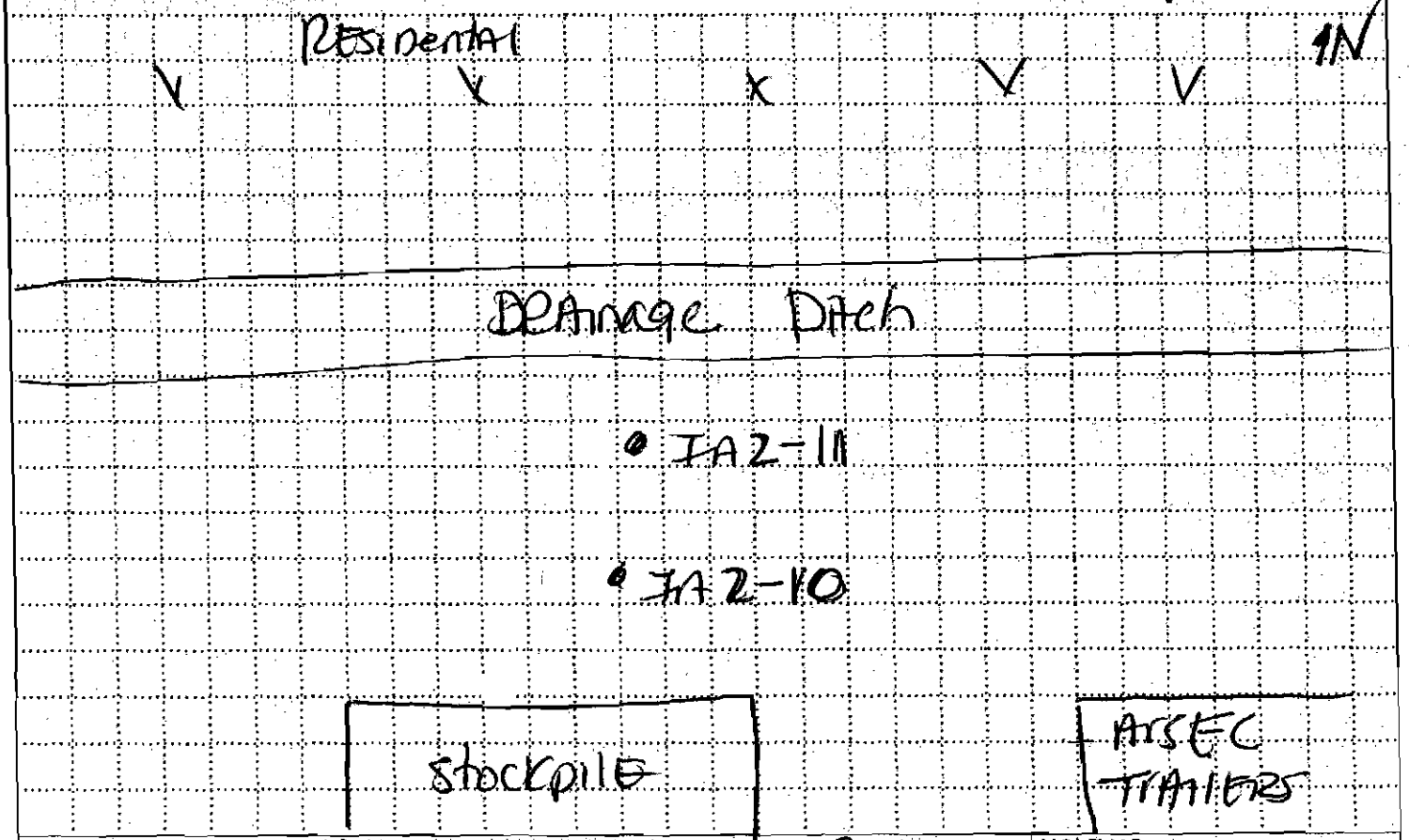
DISTRICT	Buffalo
HOLE NUMBER	JA2-10
1. COMPANY NAME	ENSOL, INC.
2. DRILLING CONTRACTOR	ZEBRA ENVIRONMENTAL CORP.
SHEET / SHEETS	1 OF 2
3. PROJECT	TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT
4. LOCATION	TONAWANDA LF, TONAWANDA, NY
5. NAME OF DRILLER	Phil Orsi
6. MANUFACTURER'S DESIGNATION OF DRILL	7720 DT GEOPROBE
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	2" MACRO CORE W/ 4' PLASTIC SLEEVE
8. HOLE LOCATION	N=1092936.79 E=1065219.71
9. SURFACE ELEVATION	N/A
10. DATE STARTED	3/23/10 840
11. DATE COMPLETED	3/23/10 940
12. OVERBURDEN THICKNESS	4.7'
15. DEPTH GROUNDWATER ENCOUNTERED	NOT ENCOUNTERED
13. DEPTH DRILLED INTO ROCK	N/A
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	N/A
14. TOTAL DEPTH OF HOLE	10.0'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	N/A

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	-	-	-	-	-	N/A

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. S[redacted]
CUTTINGS DRUMMED	-	-	-	

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT TON LF- Buffalo DISTRICT FUSRAP PROJECT HOLE NO. JA2-10

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT | INSPECTOR [redacted] | HOLE NUMBER IA2-10 | SHEET 2 OF 2

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	OR CORE BOX NO. (e)	SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h)
	0	NO RECOVERY	NO RECOVERY		SEE NOTE		
	1	FILL: DARK brown clay, organic matter, rootlets, course + fine SAND, waste (ASH, GLASS), STIFF, moist	60	8825			Top 6" 73/7591 (.4-1')
	2		100	8278			
	3		80	8582			
44"	4		100	9036			High β 68/7827 (3-4')
	5	NO RECOVERY	NO RECOVERY				
	6	REDDISH brown clay, fine SAND, trace SILT some SAND STIFF, moist (CL)	140	8610			Native 68 (4.75-7') 7742
29"	7		80	8627			Second Highest β 72/7758 (6-7')
	8	REDDISH brown clay, fine SAND, gray mottling, fine sub-rounded gravel (<1/2"), STIFF, moist (CL)	80	8420			
	9		120	8471			High β 71/7899 (8-9')
36"	10		60	8495			

Bottom of Boring @ 10.0'

PROJECT | HOLE NO. IA2-10

ENG FORM 5056A-R, AUG 94

Notes:
- Weather: Rain 35°F
- PID Reading: 0 ppm
- Gamma Reading: count/min

Sample ID (RAD. ANALYSIS)
TLS-SS-IA2-10(3-4')032310 ~~Top 6"~~ High β
TLS-SB-IA2-10(4.7-5.7')032310 NOCTIVE
TLS-SB-IA2-10(.4-1')032310 Top 6"
TLS-SB-IA2-10(6-7')032310 2nd Highest β
TLS-SB-IA2-10(8-9')032310 High β

HTRW DRILLING LOG

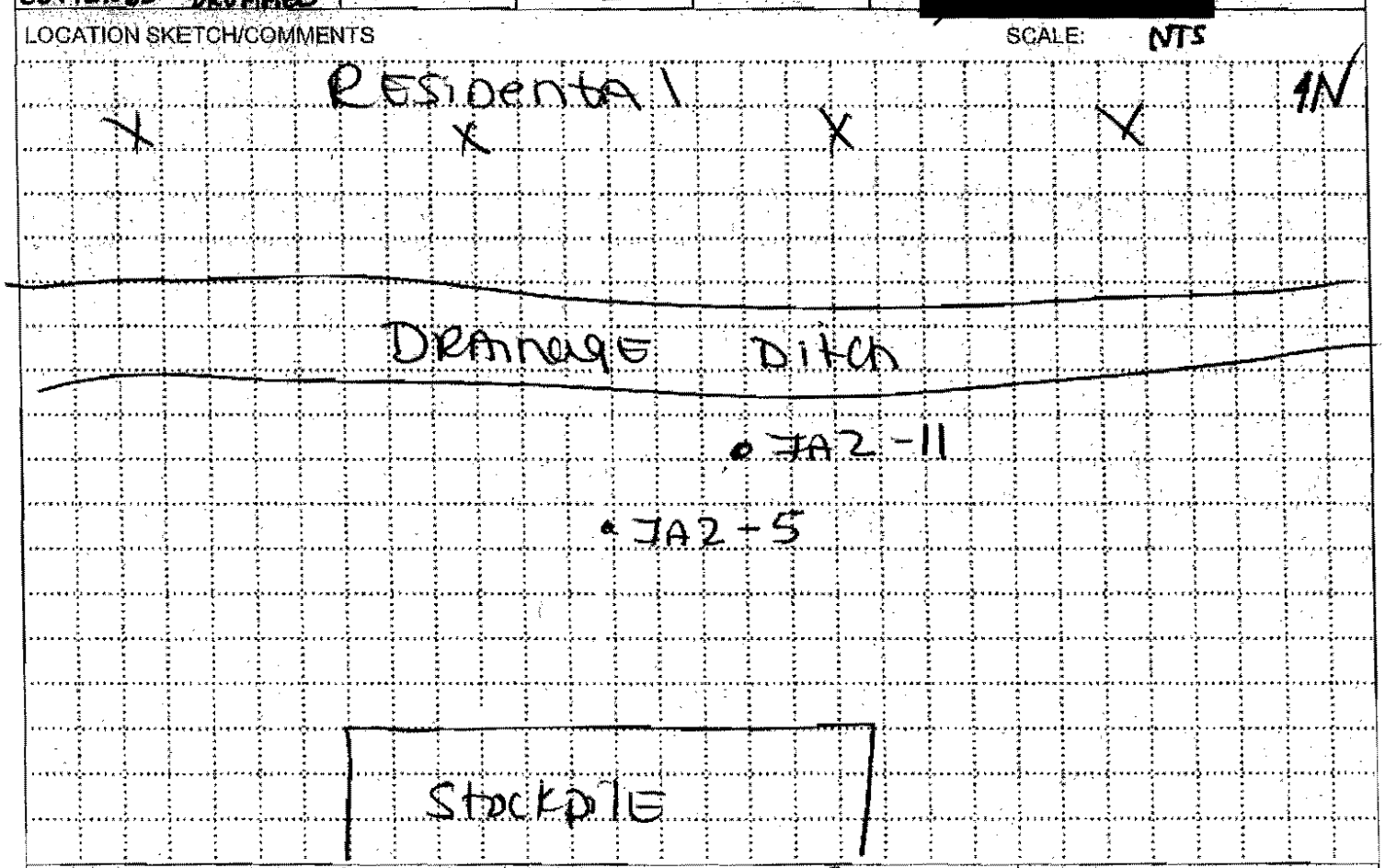
DISTRICT: Buffalo		HOLE NUMBER: JA2-11
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 2 SHEETS
3. PROJECT: TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: Phil Orsi	6. MANUFACTURER'S DESIGNATION OF DRILL: 7720 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3" MACRO CORE W/ 4' PLASTIC SLEEVE	8. HOLE LOCATION: N= 1092936.79 E= 1065181.95	
	9. SURFACE ELEVATION: N/A	
	10. DATE STARTED: 3/23/10 10:45 AM	11. DATE COMPLETED: 3/23/10 1115 AM
12. OVERBURDEN THICKNESS: 3.8'	15. DEPTH GROUNDWATER ENCOUNTERED: NOT encountered	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 10.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
~~N/A~~ 5	TCLP 1ea	TCLP 1ea/5	SVOC TCLP	PEST TCLP	PES 1ea/1	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SI[redacted]
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON LF- Buffalo DISTRICT FUSRAP PROJECT — HOLE NO: JA2-11

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER FA2-11

SHEET 2 OF 2

~~ELEV.~~ RECID (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h)
	0	Fill: DARK-brown TOPSOIL, organic matter, rootlets, SOFT, moist	100	7925	SEE NOTE		Top 6" (0-.6') 59/7285
	1	Fill: DARK brown WASTE (ASH, GLASS) GRAVEL (1/4"), brick, loose, moist	80	8045			2nd Highest (.6-1') 68/7252
	2		80	8071			High (1.6-2.6') 80/7222
	3						Chemical (2.6-3.6') 108/7742
	4	Reddish brown silt, clay, some sand, fine sand, gray mottling, stiff, moist (CL)	180	8016			
	5		80	7822			Native (3.8-4.8') 73/7678
	6		120	7839			
	7		140	7920			High B (6-7') 96/7521
	8	Reddish-brown silt, clay, trace sand, trace gray mottling, fine sand, fine sub-rounded gravel (1/2"), stiff, moist (CL)	60	7876			
	9		80	7498			
	10		60	7931			

PROJECT

Bottom of Boring @ 10.0'

HOLE NO FA2-11

ENG FORM 5056A-R, AUG 94

Notes:

- weather: Rain 34°F
- PID Reading 4ppm
- Gamma Reading count/min
- Refusal encountered @ 2.0' on 1st attempt, see notes above for 2nd attempt

Sample ID (Rad. Analysis)

TLS-SS-FA2-11 (0-.6') 032310 Top 6"
TLS-SB FA2-11 (6-7') 032310 High B
TLS-SB FA2-11 (1.6-2.6') 032310 High
TLS-SB FA2-11 (.6-1') 032310 2nd High
TLS-SB FA2-11 (3.8-4.8') 032310 Native
TLS-SB FA2-11 (2.6-3.6') 032310 Chemical

HTRW DRILLING LOG

DISTRICT	Buffalo
HOLE NUMBER	JA2-12
1. COMPANY NAME	ENSOL, INC.
2. DRILLING CONTRACTOR	ZEBRA ENVIRONMENTAL CORP.
SHEET / SHEETS	1 OF 4
3. PROJECT	TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT
4. LOCATION	TONAWANDA LF, TONAWANDA, NY
5. NAME OF DRILLER	[redacted]
6. MANUFACTURER'S DESIGNATION OF DRILL	6620 DT GEOPROBE
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	3" MACRO CORE W/ 4' PLASTIC SLEEVE
8. HOLE LOCATION	N= 1092899.03 E= 1065295.23
9. SURFACE ELEVATION	N/A
10. DATE STARTED	3/19/10 1340
11. DATE COMPLETED	3/19/10 1530
12. OVERBURDEN THICKNESS	24.0'
13. DEPTH DRILLED INTO ROCK	N/A
14. TOTAL DEPTH OF HOLE	28.0'
15. DEPTH GROUNDWATER ENCOUNTERED	8.7'
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	N/A
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	N/A

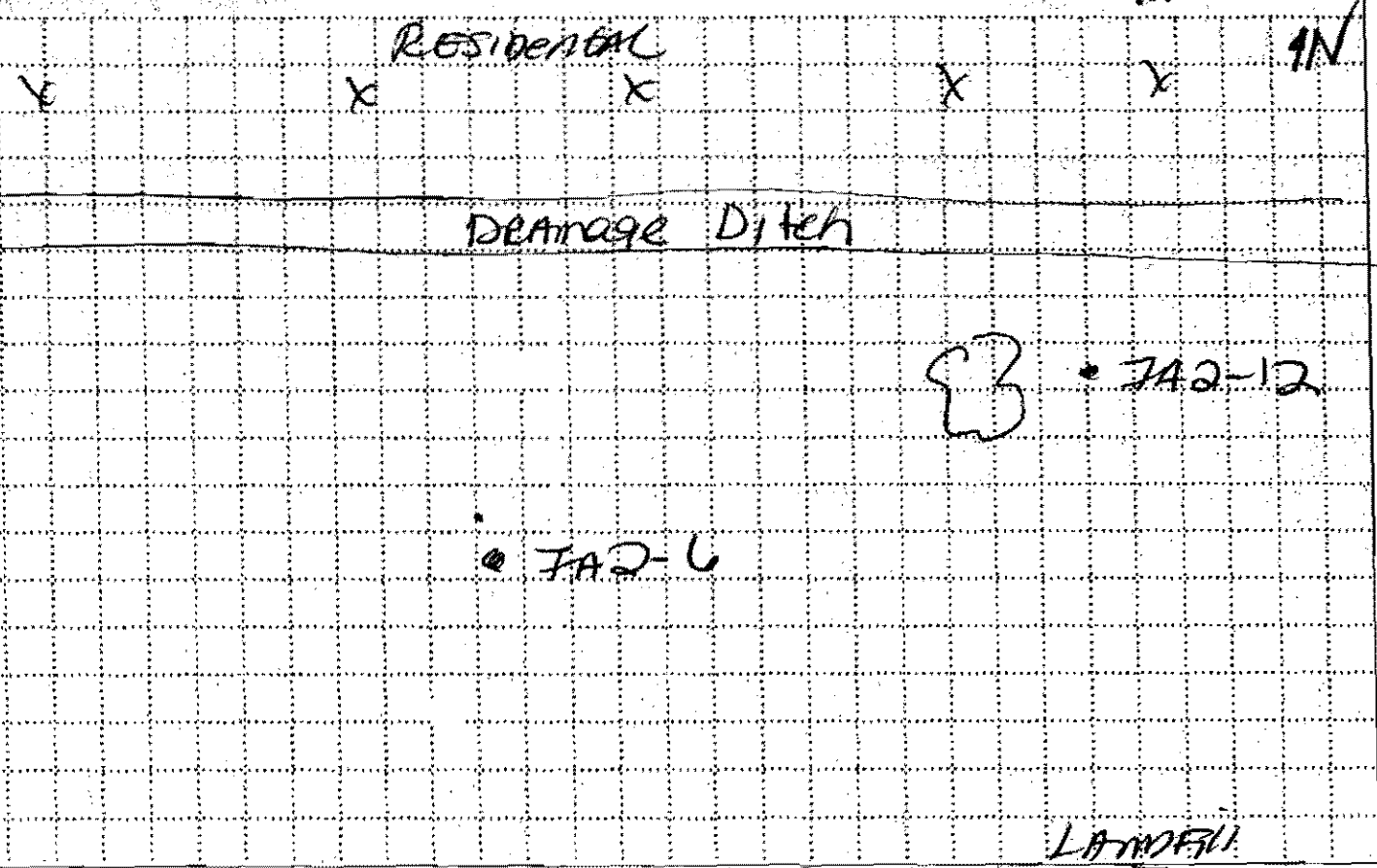
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	–	–	–	–	–	N/A

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIG[redacted]
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS

SCALE: NTS



PROJECT	TON LF- Buffalo DISTRICT FUSRAP PROJECT
HOLE NO	JA2-12

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT | INSPECTOR [redacted] | HOLE NUMBER TA2-12 | SHEET 2 OF 4

REC'D ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) 8	SUBSAMPLE NO. OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS REMARKS (h)
	0	NO RECOVERY	NO RECOVERY		SEE NOTE		
	1	FILL: Redish brown silt, clay, some sand, trace waste (glass), stiff, moist	80	8084			Top 64 86/8287 (2.5-4')
	2		120	8461			
	3		100	8687			
	4	FILL: Black coarse sand, waste (ash, glass, plastic, metal), loose, moist	100	8702			
		NO RECOVERY	NO RECOVERY				
	5	FILL: Black/brown gray course & fine sand waste (ash, glass, slag) brick, loose, moist	80	8534			
	6		80	9065			Hydro 60/8303 (5.4-6.4')
	7		120	8265			
	8		100	8640			
		NO RECOVERY	NO RECOVERY				
	9	FILL: Dark gray sand gravel (coal), waste (ash, glass), brick, loose, moist	120	9191			Saturation 52/8458 (8.7-9.7')
	10		100	8642			

PROJECT | HOLE NO TA2-12

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER JA2-12

SHEET 3 OF 4

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) 8	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC REMARKS COUNTS (h)
	10	Fill continue from previous page	continue	from page	See NOTES		
	11		140	8469			High 8 67 (103113) 8534
	12	No Recovery	No Recovery				
	13						
	14	Fill: Black fine sand, waste (ash, glass, paper, plastic), loose, moist	120	8744			
	15		100	8723			
	16		100	8771			
	17	No Recovery	No Recovery				
	18						
	19						
	20						

PROJECT

HOLE NO JA2-12

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER JA2-12

SHEET 4 OF 4

RECID ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h) 1 MIN. STATIC COUNTS
	20	NO Recovery	NO Recovery		SEE NOTES		
	21						
	22						
	23						
	24						
	25	Reddish brown silt, clay, some sand, fine sub-rounded gravel (1/2"), soft, moist (CL)	80	8567			Notice CL/ (24-25') 8087
	26		60	8238			
	27		60	7249			
	28		80	7998			
	29	Bottom of Boring @ 28.0' NOTES: - weather: clear, 52°F - Gamma Reading: cont/min - PID Reading: 0 ppm		Sample ID (Lab Analysis) TCS-SS-JA2-12 (0.5-1') 031910 Topsoil TCS-SB JA2-12 (10.3-11.8') 031910 High B TCS-SB JA2-12 (5.4-6.4') 031910 High B TCS-SB JA2-12 (8.7-9.7') 031910 Saturated TCS-SB JA2-12 (24-25') 031910 Notice			
	30						

PROJECT

HOLE NO JA2-12

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

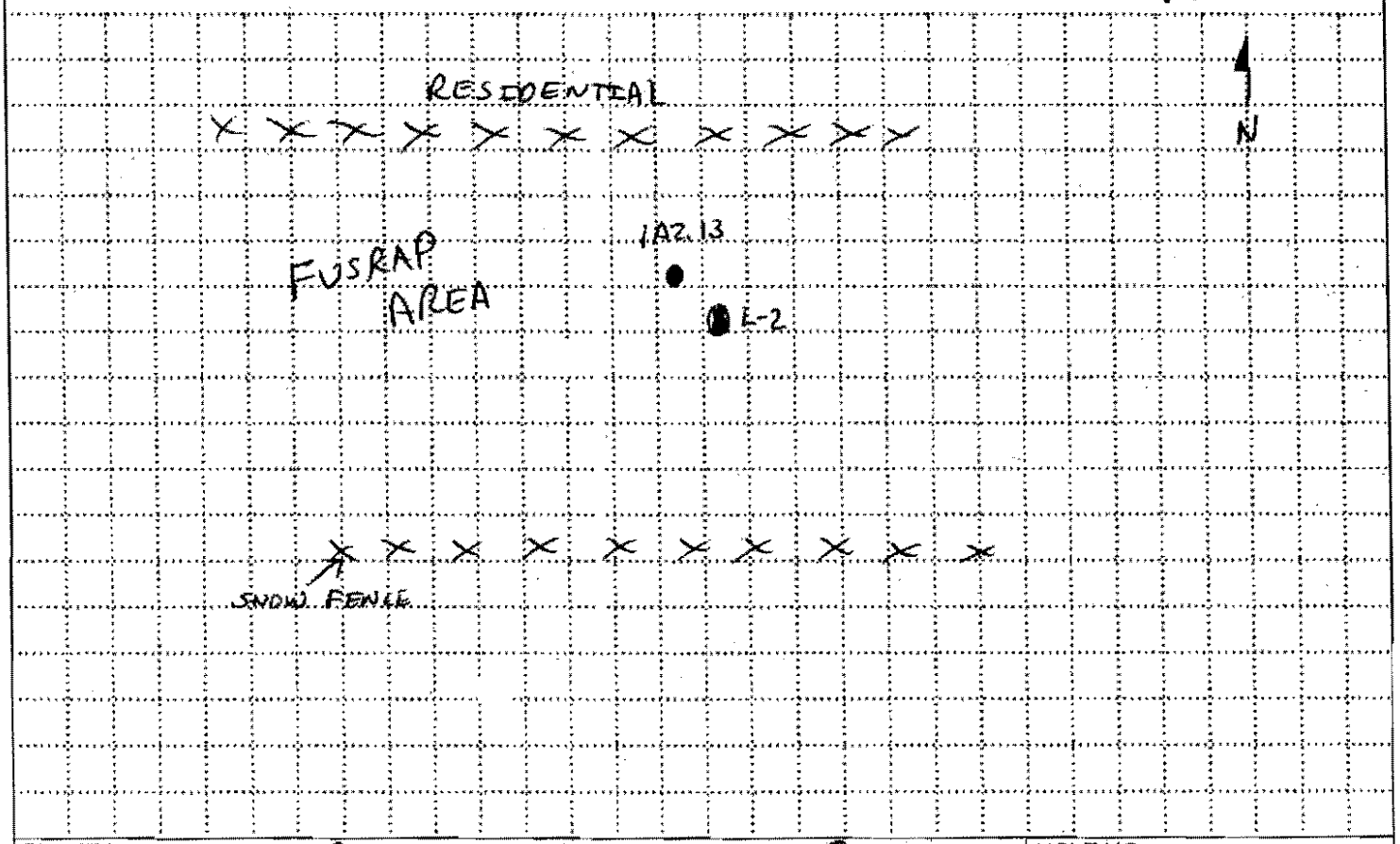
DISTRICT: Buffalo		HOLE NUMBER: 1A2.13
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 3 SHEETS
3. PROJECT: TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: Jeff SNYDER	6. MANUFACTURER'S DESIGNATION OF DRILL: 6620 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE w/ 4' PLASTIC SLEEVE	8. HOLE LOCATION: N= 1092974.55 E= 1065370.75	
	9. SURFACE ELEVATION: 618.114	
	10. DATE STARTED: 3/22/10 0900	11. DATE COMPLETED: 3/22/10 1100
12. OVERBURDEN THICKNESS: 12.2'	15. DEPTH GROUNDWATER ENCOUNTERED: 5.0' bgs	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 18.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	-	-	-	-	-	N/A

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. [redacted]
CUTTINGS DRUMMED	-	-	-	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON LF - Buffalo DISTRICT FUSRAP PROJECT — HOLE NO: 1A2.13

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: 1A2.13

PROJECT:

INSPECTOR: D. Popp

SHEET 2 OF 3

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~READING~~ COUNTS (h) X	(h) B
	0	FILL: REDDISH-BROWN CLAY, GRAVEL, WASTE (GRAVEL), BRICK, STIFF, MOIST.	7639	80		TOP 6"	6971	47
	1		7436	100	SEE NOTES			
	2		7116	100				
	3		7307	110		HIGH B	7049	82
48"	4	NO RECOVERY →						
	5	FILL: GRAVEL, SAND, REDDISH-BROWN CLAY, WASTE (GLASS, ASH, METAL), BRICK, LOOSE, WET.	7318	50		SAT.	7113	66
	6		7637	70				
	7		7428	60				
36"	8	NO RECOVERY →						
	9							
	10							

PROJECT:

HOLE NO: 1A2.13

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A2.13

SHEET 3 OF 3

REC'D ~~REV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC REMARKING COUNTS (h) γ	B
	10							
	11	NO RECOVERY →						
0"	12							
	13	REDDISH-BROWN SILT AND CLAY, TRACE COURSE SAND AND FINE SUB-ROUND GRAVEL (<1"), STIFF, MOIST (CL)	7845	90	SEE	NATIVE	7374	57
	14		7478	60	NOTE			
34"	15		7752	80		HIGH γ	7448	47
	16		7452	50				
	17		7559	80				
36"	18		7681	90				
	19	BOTTOM of BORING AT 18.0'						
	20							

NOTES:
- RAIN, 40°F
- SAMPLE I.D.
TLS-SS-1A2.13(0.0-0.5)032210
TLS-SB-1A2.13(3.0-4.0)032210
TLS-SB-1A2.13(5.0-6.0)032210
TLS-SB-1A2.13(12.2-13.2)032210
TLS-SB-1A2.13(14.0-15.0)032210

PROJECT

HOLE NO 1A2.13

ENG FORM 5056A-R, AUG 94

- PID READINGS = 0 ppm (VOC's)
- SOIL READINGS ARE COUNTS/MIN

HTRW DRILLING LOG

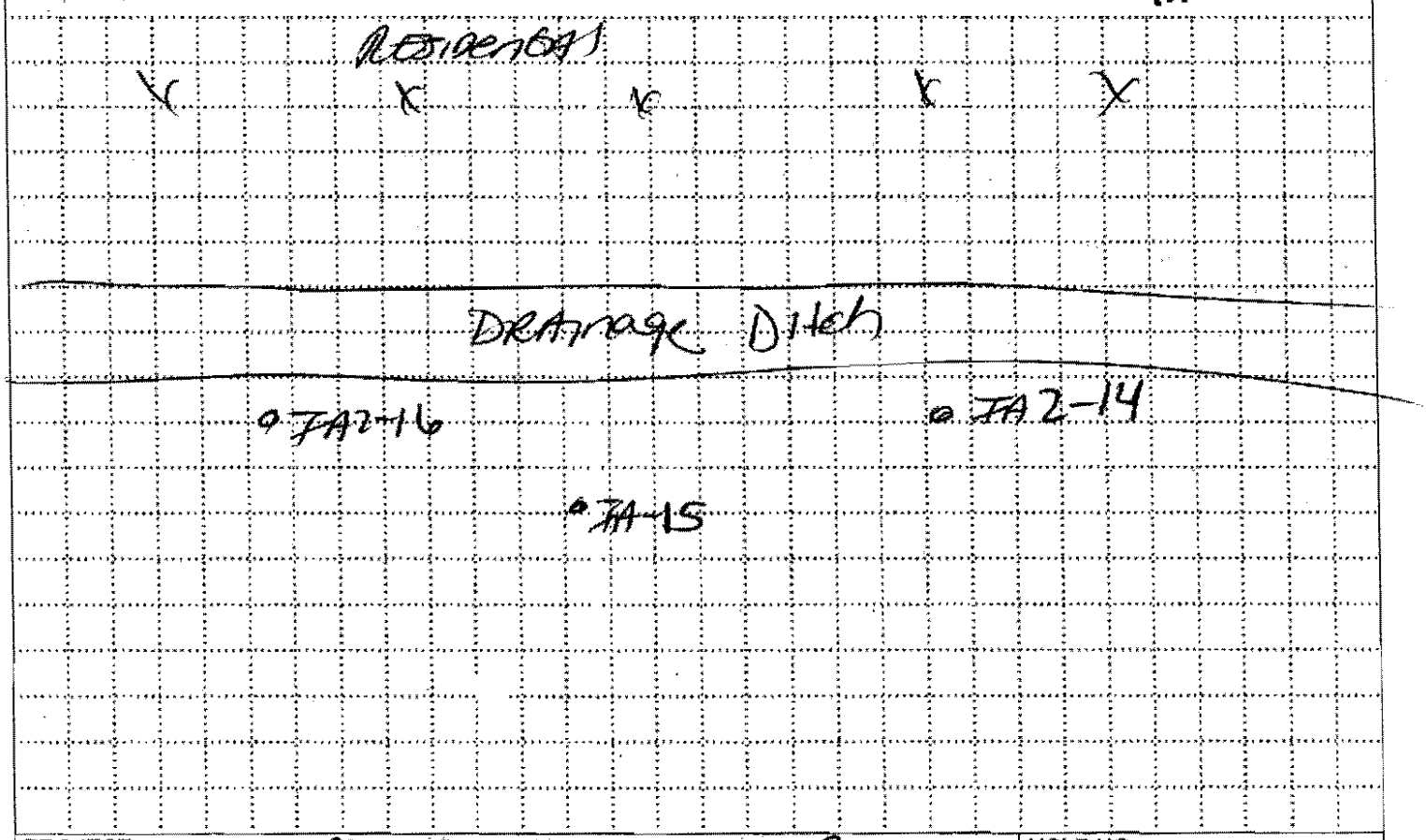
DISTRICT: Buffalo	HOLE NUMBER: TA2-14	
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 3 SHEETS
3. PROJECT: TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER:	6. MANUFACTURER'S DESIGNATION OF DRILL: DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: ~~3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE~~ 3" Macro core w/ 4' plastic sleeve	8. HOLE LOCATION: N= 1092974.55 E= 1065332.99	
	9. SURFACE ELEVATION: N/A	
	10. DATE STARTED: 3/24/10 1310	11. DATE COMPLETED: 3/24/10 1405
12. OVERBURDEN THICKNESS: 6.0'	15. DEPTH GROUNDWATER ENCOUNTERED: 6.6'	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 12.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	-	-	-	-	-	N/A

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
CUTTINGS DRUMMED	-	-	-	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON LF- Buffalo DISTRICT FUSRAP PROJECT — HOLE NO: TA2-14

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER JA214

SHEET 2 OF 3

RECID ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	SAMPLE OR CORE BOX NO. (e)	ADDITIONAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	0	NO Recovery	NO Recovery		SEE NOTE		
	1						
		FILL: DARK brown topsoil, organic matter, roots, soft, moist	60	7093			Top 6" (0.2-1.2') 61 / 6486
	2						
		FILL: waste (ash, glass, metal), concrete, brick, loose, moist	60	7653			High 57 (2-3') / 6264
	3						
24"	4		60	7348			Estimated 47 (4.6-6.8') / 6495
		NO Recovery	NO Recovery				
	5						
	6						
		FILL: continue from above					
	7						
18"		Reddish brown silt, clay, trace sand, trace gray mottling, fine sand, stiff, moist (CL)	80	7084			Native 61 (6.8-7.8') / 6818
	8						
		NO Recovery	NO Recovery				
	9						
		Reddish brown clay, silt, trace sand, gray mottling, fine sub-rounded gravel (1/4), stiff, moist (CL)	100	7104			
	10						

PROJECT

HOLE NO. JA2-14

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER IA2-14

SHEET 3 OF 3

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	10	continue from Drawdx page	60	7346	See NOTES		HighB 68 (5.9-9.9') 6787
	11		80	7292			
	12	Bottom of Boring @ 12.0'					
	13	NOTES -weather: sunny 45°F -PID Reading: open					
	14	-Gamma Reading 60 cpm/min					
	15	Sample In (Radanalysis) TLS SS IA2-14 (1.2-1.7') 032410		Rob''			
		TLS SB-IA2-14 (8.9-9.9') 032410		HighB			
	16	TLS SB-IA2-14 (6.6-6.8') 032410		Subnatant			
		TLS-SB-IA2-14 (6.8-7.5') 032410		Nothing			
	17	TLS-SB-IA2-14 (2-3') 032410		High δ			
	18						
	19						
	20						

PROJECT

HOLE NO IA2-14

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

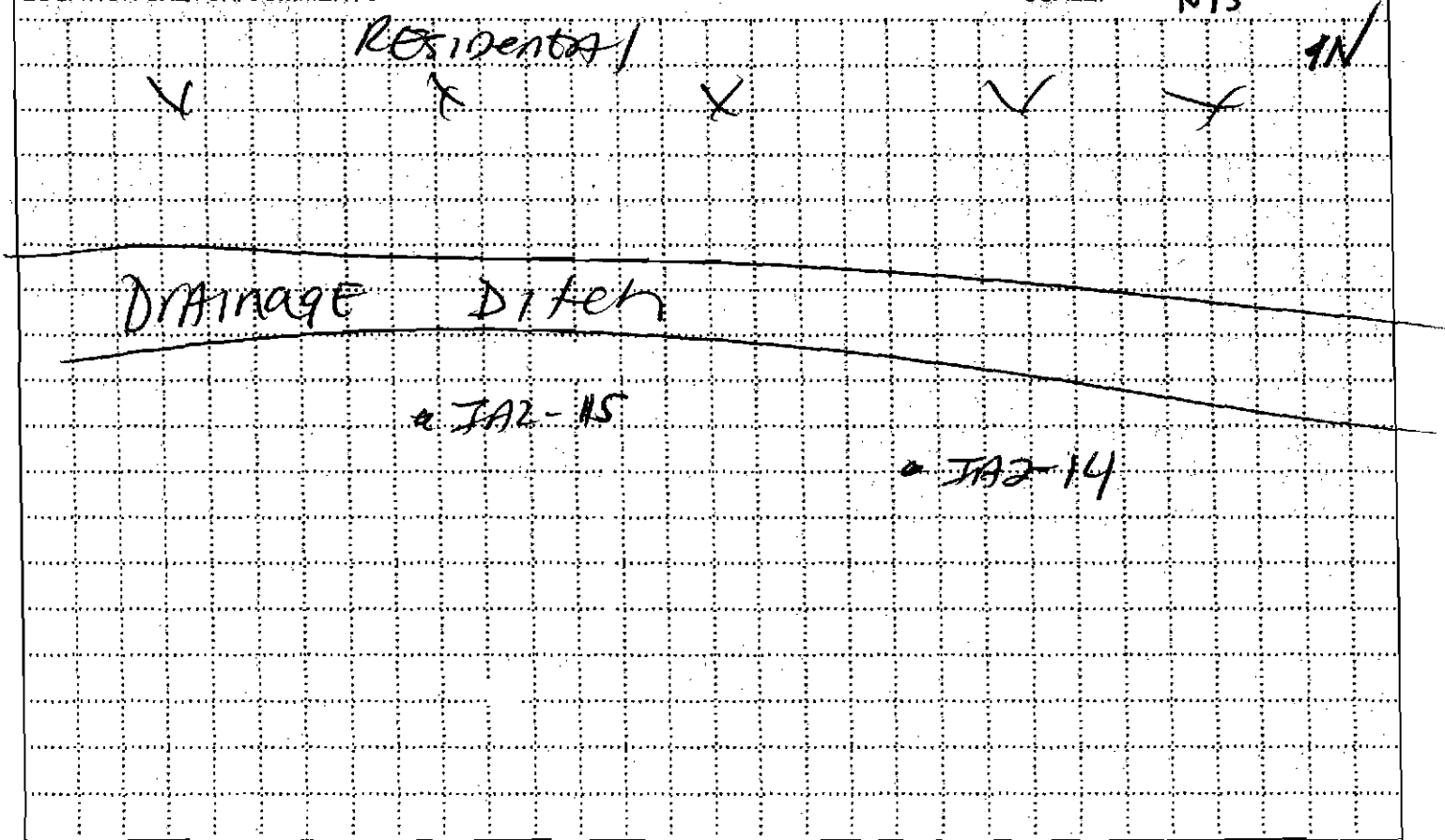
DISTRICT	Buffalo
HOLE NUMBER	JA2-15
1. COMPANY NAME	ENSOL, INC.
2. DRILLING CONTRACTOR	ZEBRA ENVIRONMENTAL CORP.
SHEET / SHEETS	1 OF 2
3. PROJECT	TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT
4. LOCATION	TONAWANDA LF, TONAWANDA, NY
5. NAME OF DRILLER	Phil ORSi
6. MANUFACTURER'S DESIGNATION OF DRILL	7720DT GEOPROBE
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	2" MACRO CORE W/ 4ft PLASTIC SLEEVE
8. HOLE LOCATION	N= 1092974.55 E= 1065295.23
9. SURFACE ELEVATION	
10. DATE STARTED	3/24/10 1410 pm
11. DATE COMPLETED	3/24/10 1425 pm
12. OVERBURDEN THICKNESS	4.2'
15. DEPTH GROUNDWATER ENCOUNTERED	NOT encountered
13. DEPTH DRILLED INTO ROCK	N/A
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	N/A
14. TOTAL DEPTH OF HOLE	8.0'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	N/A

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP / TOTALS	TCLP / TOTALS	SVOC-TCLP / TOTALS	PEST-TCLP / TOTALS	PCB-TOTALS	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23
CUTTINGS DRUMMED	–	–	–	[redacted]

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT	TON LF- Buffalo DISTRICT FUSRAP PROJECT
HOLE NO	JA2-15

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER FA2-15

SHEET 2 OF

REC'D ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	OR CORE BOX NO. (e) B	SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	0	NO Recovery	NO Recovery		SEE NOTE		
		Fill: topsoil, organic matter, roots, soft, moist	160	7134			Top 6" 52 (.2-.7') 6676
	1						
	2	Fill: dark brown clay, concrete, waste (ash, glass, plastic), stiff, moist	120	8029			High X 47 Duplicate 6790
	3		80	7469			Chemical 45 (2-3') 6428
48"	4		100	7975			2nd Highest X 56 (3-4') 6847
		NO Recovery	NO Recovery				
	5	Reddish brown clay, silt, trace sand, fine subrounded gravel (<1/2"), gray mottling, stiff, moist (CL)	60	7147			Native 76 (4.2-5.2') 6847
	6		100	7487			
	7		120	7382			High B 68 (6.2-7.2') 6437
48"	8		80	6976			
	9	NOTES Bottom of Boring @ 8.0' Weather Sunny 40° PID Reading 0ppm Gamma count/min	Sample ID (LAB ANALYSIS) TCLP SS-FA2-15 (.2-.7') 032410; TCLP SB FA2-15 (1-2') 032410; TCLP SB-FA2-15 (2-3') 032410; TCLP SB-FA2-B (4.2-5.2') 032410; TCLP SB FA2-15 (6.2-7.2') 032410; TCLP SB FA2-15 (3-4') 03240				Top 6" High X Dup. Chemical Native High B 2nd Highest X
	10						

PROJECT

HOLE NO. FA2-15

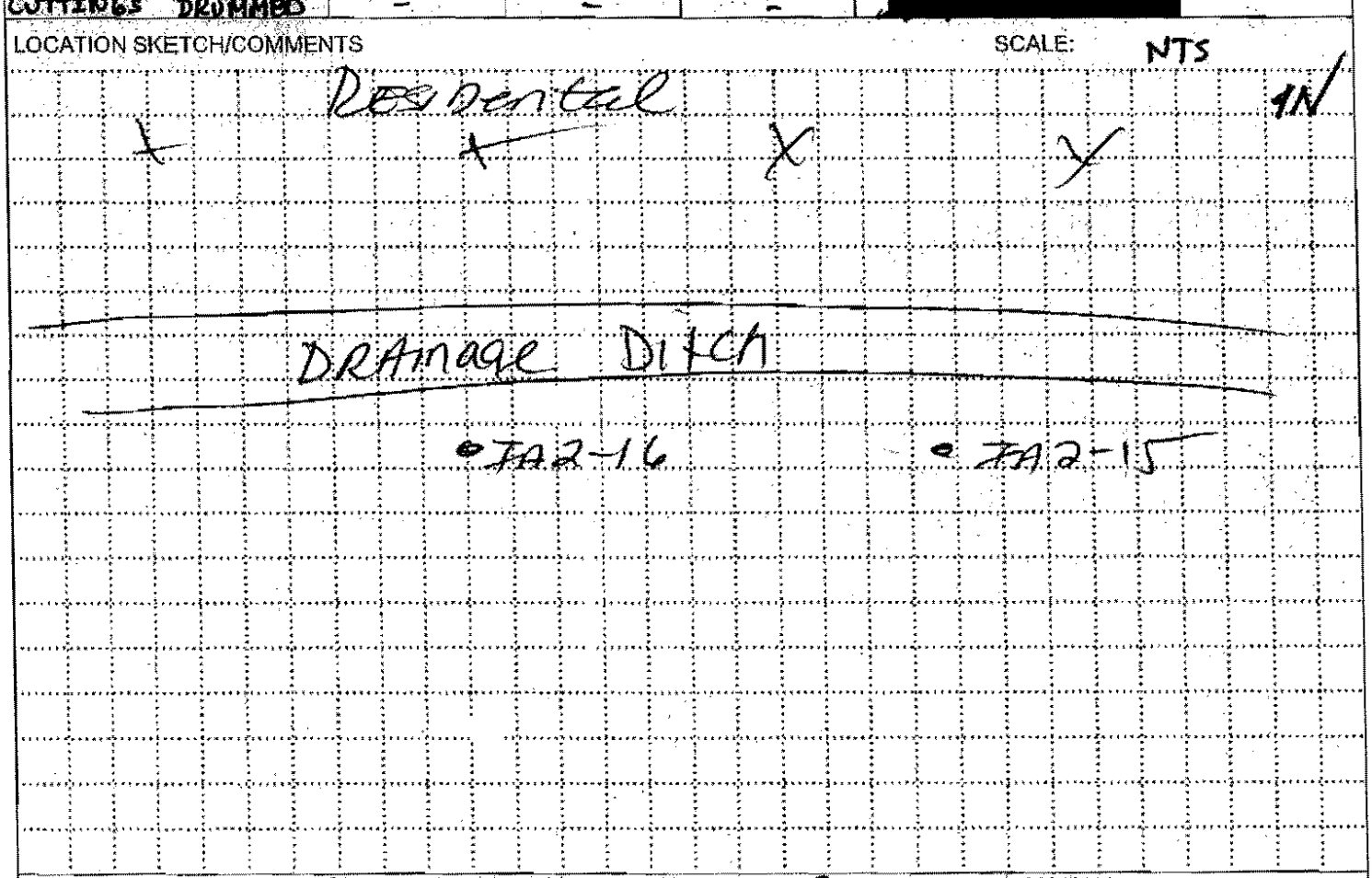
ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

DISTRICT	Buffalo
HOLE NUMBER	TA2-16
1. COMPANY NAME	ENSOL, INC.
2. DRILLING CONTRACTOR	ZEBRA ENVIRONMENTAL CORP.
SHEET / SHEETS	1 OF 2
3. PROJECT	TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT
4. LOCATION	TONAWANDA LF, TONAWANDA, NY
5. NAME OF DRILLER	[redacted]
6. MANUFACTURER'S DESIGNATION OF DRILL	7720 DT GEOPROBE
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	3" MACRO CORE w/ 4" PLASTIC SLEEVE
8. HOLE LOCATION	N= 1092974.55 E= 1065257.47
9. SURFACE ELEVATION	N/A
10. DATE STARTED	3/24/10 2:50 pm
11. DATE COMPLETED	3/24/10 3:35 pm
12. OVERBURDEN THICKNESS	3.0'
13. DEPTH DRILLED INTO ROCK	N/A
14. TOTAL DEPTH OF HOLE	6.0'
15. DEPTH GROUNDWATER ENCOUNTERED	NOT ENCOUNTERED
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	N/A
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	N/A
18. GEOTECHNICAL SAMPLES	N/A
DISTURBED	–
UNDISTURBED	–
19. TOTAL NUMBER OF CORE BOXES	N/A
20. SAMPLES FOR CHEMICAL ANALYSIS	5
VOC	TCLP / TOTALS
METALS	TCLP / TOTALS
OTHER (SPECIFY)	SVOC-TCLP / TOTALS
OTHER (SPECIFY)	PEST-TCLP / TOTALS
OTHER (SPECIFY)	PCB-TOTALS
21. TOTAL CORE RECOVERY	N/A%
22. DISPOSITION OF HOLE	CUTTINGS DRUMMED
BACKFILLED	–
MONITORING WELL	–
OTHER (SPECIFY)	–
23.	[redacted]

LOCATION SKETCH/COMMENTS

SCALE: NTS



PROJECT TON LF- Buffalo DISTRICT FUSRAP PROJECT

HOLE NO. TA2-16

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT | INSPECTOR [redacted] | HOLE NUMBER JA2-16 | SHEET 2 OF

REC ID ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. ~~DRILLING~~ STATIC COUNTS (h)
	0	Fill. Dark brown topsoil organic matter, pebbles, soft, moist	60	6926	SEE NOTE		Top 6' (0-5') 63/6350
	1	Fill: Brown clay, concrete, gravel (1/1"), waste (ash, glass, metal), stiff, moist	40	7147			
	2		160	7392			High B (0.5-2.5') 52/6657
	3	Reddish brown silt, clay gray mottling, fine sand, fine sub-rounded gravel (1/2"), stiff, moist (CL)	80	7064			Native (3-4') 64/6445
43''	4						
		No Recovery	No Recovery				
	5						
	6	Reddish brown clay, silt, gravel (1/2"), fine sand, fine submitted gravel, trace gray mottling, stiff, moist (CL)	40	7599			2nd Highest 61 (4.5-5.5') 6788
	7		60	7680			Chemical 58 (6-7') 6668
40''	8		60	7922			High δ 58 (7-8') 6452
	9	Bottom of Boring @ 8.0' Weather sunny 40°F Gamma Reading: count/min PID Reading: ppm					
	10						

Sample Tolerance Analysis
TLS-SS-JA2-16 (0-2') 032410 Top 6"
TLS SB-JA2-16 (0.5-2.5') 032410 High B
TLS SB-JA2-16 (7-8') 032410 High δ
TLS SB-JA2-16 (3-4) 032410 Native
TLS SB-JA2-16 (6-7') 032410 Chemical
TLS SB-JA2-16 (4.5-5.5') 032410 2nd Highest δ

PROJECT | HOLE NO. JA2-16

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

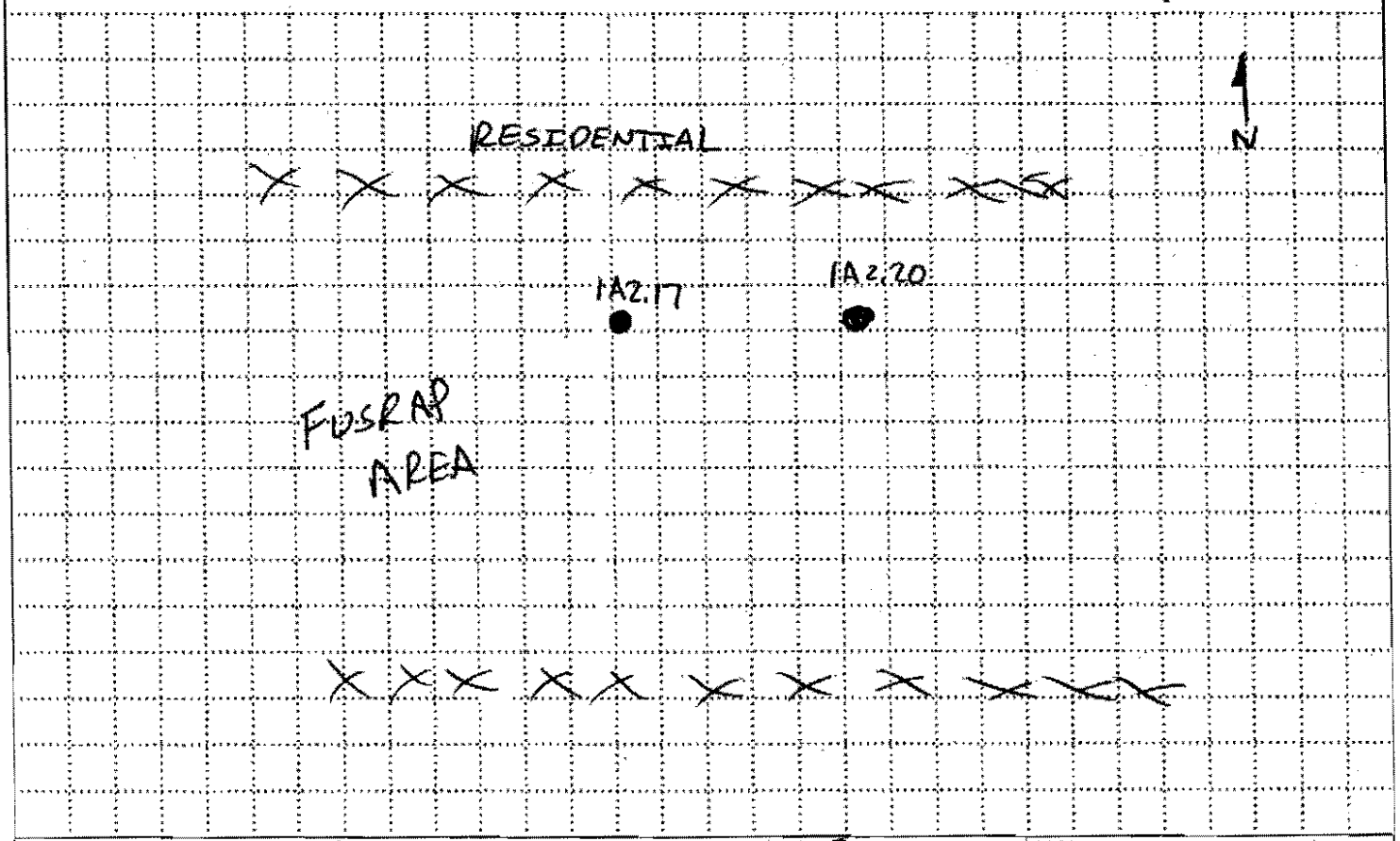
DISTRICT	Buffalo
HOLE NUMBER	1A2.17
1. COMPANY NAME	ENSOL, INC.
2. DRILLING CONTRACTOR	ZEBRA ENVIRONMENTAL CORP.
SHEET / SHEETS	1 OF 2
3. PROJECT	TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT
4. LOCATION	TONAWANDA LF, TONAWANDA, NY
5. NAME OF DRILLER	Jeff SNYDER
6. MANUFACTURER'S DESIGNATION OF DRILL	6620 DT GEOPROBE
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	3 1/4" CASING 2" CORE w/ 4' PLASTIC SLEEVE
8. HOLE LOCATION	N= 1092974.55 E= 1065219.71
9. SURFACE ELEVATION	612.827
10. DATE STARTED	3/25/10 0835
11. DATE COMPLETED	3/25/10 0920
12. OVERBURDEN THICKNESS	2.8'
15. DEPTH GROUNDWATER ENCOUNTERED	NOT ENCOUNTERED
13. DEPTH DRILLED INTO ROCK	N/A
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	N/A
14. TOTAL DEPTH OF HOLE	8.0'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	N/A

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	-	-	-	-	-	N/A

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)
CUTTINGS DRUMMED	-	-	-

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT TON LF- Buffalo DISTRICT FUSRAP PROJECT HOLE NO 1A2.17

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: 1A2.17

PROJECT:

INSPECTOR: D. Popp

SHEET 2 OF 2

REC. ID (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h)
	0	NO RECOVERY →					→
	1	DARK-BROWN CLAYEY TOPSOIL, ROOTLETS, GRAVEL, GRASS, BRICK, GRAY MOTTLING, SOFT, WET	6946	120		TOP 6"	X 6681 B 46
	2		7136	120		HIGH B	6746 57
	3		7016	100			
46"	4	REDDISH-BROWN SILT AND CLAY, SOME FINE SAND, GRAY MOTTLING STIFF, MOIST (CL)	6889	140		NATIVE	6824 70
		NO RECOVERY →					→
	5	REDDISH-BROWN SILT AND CLAY, TRACE COURSE SAND AND FINE SUB-ROUND GRAVEL (<½"), GRAY MOTTLING TO 6.4', STIFF, MOIST (CL)	6870	50			
	6		7014	70			
	7		7235	100		HIGH γ	6793 55
44"	8		7053	90		2ND HIGH γ	6703 48
		BOTTOM of BORING AT 8.0'					
	9	NOTES: - CLOUDY, 39°F					
	10	- SAMPLE I.D. TLS-SS-1A2.17(0.2-0.7)032510 TLS-SB-1A2.17(1.0-2.0)032510 TLS-SB-1A2.17(2.8-3.8)032510					

PROJECT

HOLE NO. 1A2.17

ENG FORM 5056A-R, AUG 94

TLS-SB-1A2.17(6.0-7.0)032510

TLS-SB-1A2.17(7.0-8.0)032510

- COLLECTED RAD, DUPLICATE

- PID READINGS = 0 ppm (VOC'S)

- SOIL READINGS ARE COUNTS/MIN.

HTRW DRILLING LOG

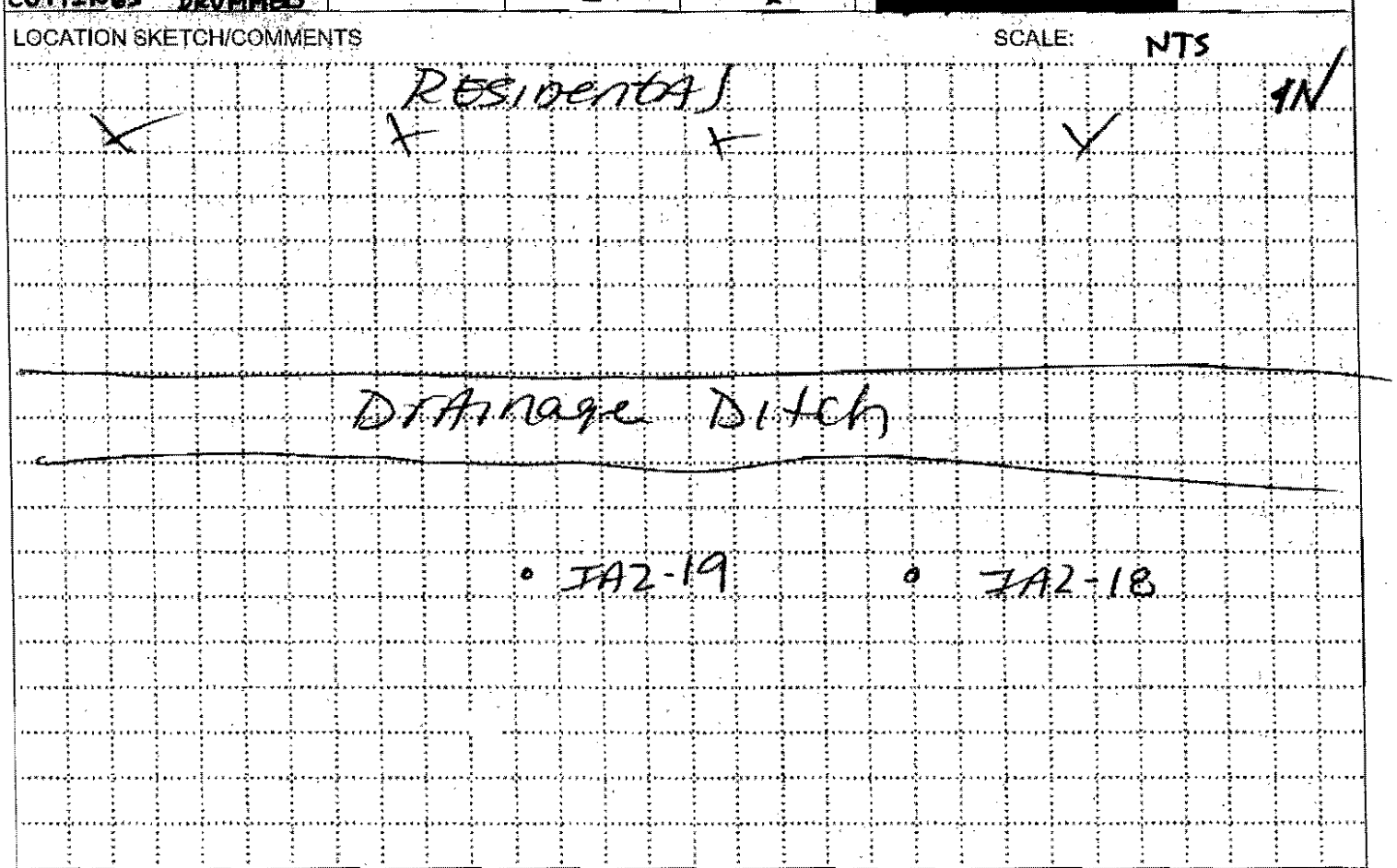
DISTRICT	Buffalo
HOLE NUMBER	IA2-18
SHEET / SHEETS	1 OF 2
1. COMPANY NAME	ENSOL, INC.
2. DRILLING CONTRACTOR	ZEBRA ENVIRONMENTAL CORP.
3. PROJECT	TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT
4. LOCATION	TONAWANDA LF, TONAWANDA, NY
5. NAME OF DRILLER	
6. MANUFACTURER'S DESIGNATION OF DRILL	DT GEOPROBE
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	3" MACRO CORE W/ 4" PLASTIC SLEEVE
8. HOLE LOCATION	N=1093012.32 E=1065370.75
9. SURFACE ELEVATION	N/A
10. DATE STARTED	3/25/10 915
11. DATE COMPLETED	3/25/10 935
12. OVERBURDEN THICKNESS	2.0
15. DEPTH GROUNDWATER ENCOUNTERED	NOT encountered
13. DEPTH DRILLED INTO ROCK	N/A
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	N/A
14. TOTAL DEPTH OF HOLE	7.0'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	N/A

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP / TOTALS	TCLP / TOTALS	SVOC-TCLP / TOTALS	PEST-TCLP / TOTALS	PCB-TOTALS	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. [redacted]
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT	HOLE NO.
TON LF- Buffalo DISTRICT FUSRAP PROJECT	IA2-18

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER JA 2-18

SHEET 2 OF 2

REC'D ~~RECOV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) 8	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~SCREENING~~ COUNTS (h)
	0	Fill: Dark brown topsoil, organic matter, rootlets, soft, moist	120	9282	SEE NOTE		Top 6" (0-.5') 60/6453
	1		100	7624			High 8 48/6743 (.5-1.5')
	2	Reddish brown silt, clay, trace sand, fine sand, gray mottling, stiff, moist (CL)	100	7187			Chemical 67/6645 (1.5-2.5')
	3		120	6942			Above 79/6558 (2.6-3.6')
48"	4	No Recovery	No Recovery				
	5	Reddish brown silt, clay, some sand, trace gray mottling, desiccation cracks w/gray infilling, trace fine subrounded gravel, stiff, moist (CL)	60	7024			2nd High 8 57/6450 (5.6-6.6')
	6		80	6987			High 8 55/6600 (4.6-5.6')
	7						
25"	8						
	9	Bottom of Boring @ 8.0' NOTES: Weather: Cloudy 43°F PID Reading: 0 ppm Gamma Reading: Count/min	Sample ID (Lab Analysis) TCS-SS-JA2-18 (0-.5') 032510 Top 6" TCS-SB-JA2-18 (.5-1.5') 032510 High 8 TCS-SB-JA2-18 (1.5-2.5') 032510 Chemical TCS-SB-JA2-18 (2.6-3.6') 032510 Above TCS-SB-JA2-18 (5.6-6.6') 032510 Hand TCS-SB-JA2-18 (4.6-5.6') 032510 2nd High 8				
	10						

PROJECT

HOLE NO. JA2-18

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

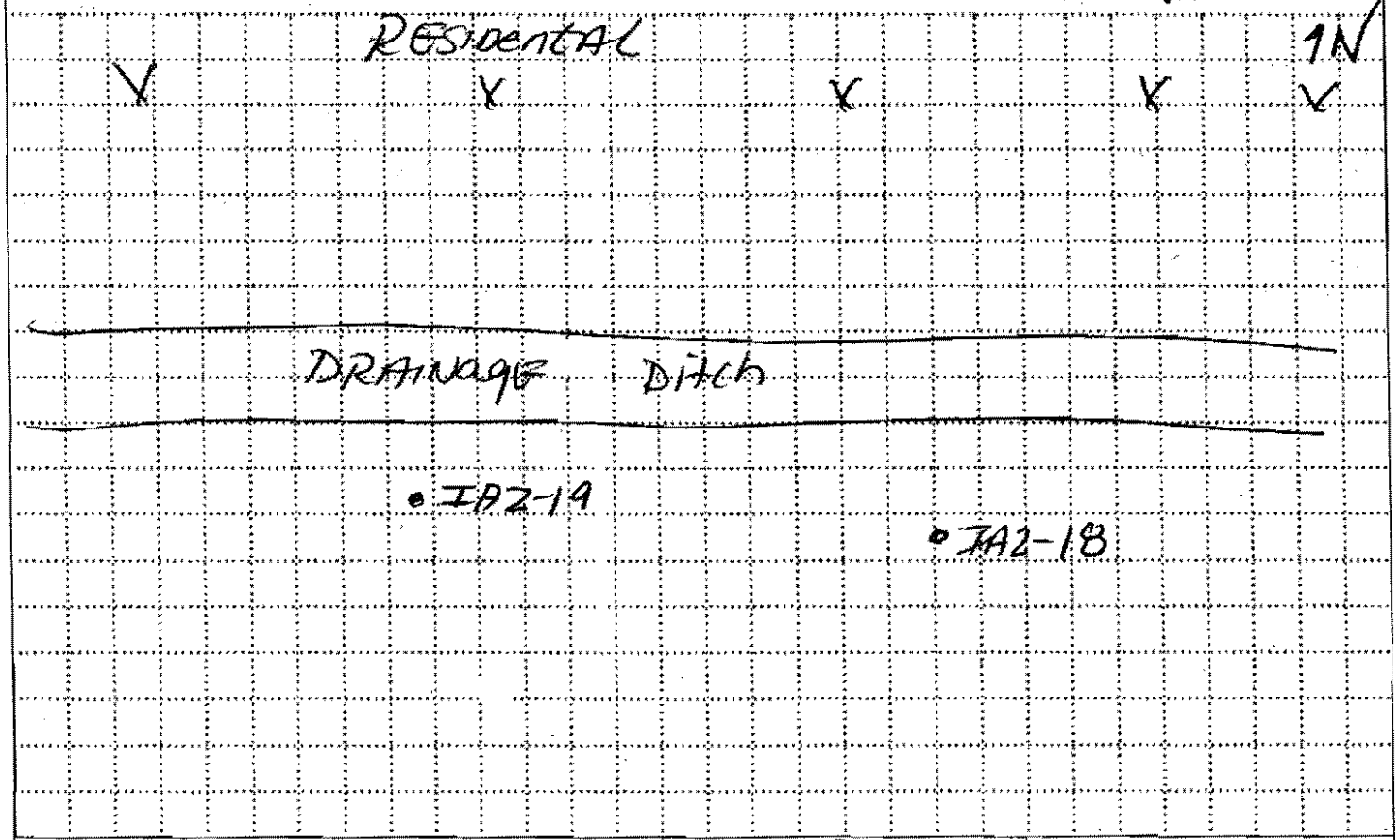
DISTRICT: Buffalo	HOLE NUMBER: TA2-19	
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 2 SHEETS
3. PROJECT: TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: Dhl ORS	6. MANUFACTURER'S DESIGNATION OF DRILL: 7720 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: ~~3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE~~ 3" PREN CORE w/ 4' PLASTIC SLEEVE	8. HOLE LOCATION: N= 109301232 E= 1065332.99	
	9. SURFACE ELEVATION: N/A	
	10. DATE STARTED: 3/25/10 830	11. DATE COMPLETED: 3/25/10 910
12. OVERBURDEN THICKNESS: 2.3'	15. DEPTH GROUNDWATER ENCOUNTERED: NOT ENCOUNTERED	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 7.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	–	–	–	–	–	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. [redacted]
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON LF- Buffalo DISTRICT FUSRAP PROJECT — HOLE NO: TA2-19

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER TA2-19

SHEET 2 OF 2

REC'D ~~BLOW~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) 8	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS ~~REMARKS~~ (h)
	0				SEE NOTES		Top 6" 54/6358
	1	FILL: Reddish brown clay (waste cash, glass), gravel (1/2"), rootlets, stiff, moist	60				2nd HgN 60/6778 (.5-1.5')
	2		80				Native 52/6778 (2.3-3.3')
	3	Reddish brown clay, silt, trace sand, fine sub-rounded gravel (1/2"), gray mottling, stiff, moist (CL)	160	7343			HgNB 58/6778 (3.3-4')
48"	4	NO Recovery	NO Recovery				
	5	Reddish brown clay, sand, trace silt, fine sand, gray mottling trace fine subrounded gravel (1/2"), stiff, moist (CL)	60	7488			HgN γ 82/7047 (4.75-5.7')
	6		80	6859			
	7	Bottom of Boring @ 7.0'					
25'	8	NOTES -Weather: cloudy 40F -PID Reading: 0ppm -Gamma Reading: count/min	SAMPLE ID (RADANALYSIS TLS-SS-TA2-19(0-.5) 32510 Top 6" TLS-SB-TA2-19(.5-1.5) 32510 2nd HgN γ TLS SB-TA2-19(2.3-3.3') 32510 Native TLS SB TA2-19 (3.3-4') 32510 HgNB TLS SB TA2-19(4.75-5.7') 32510 HgN γ				
	9						
	10						

PROJECT

HOLE NO. TA2-19

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

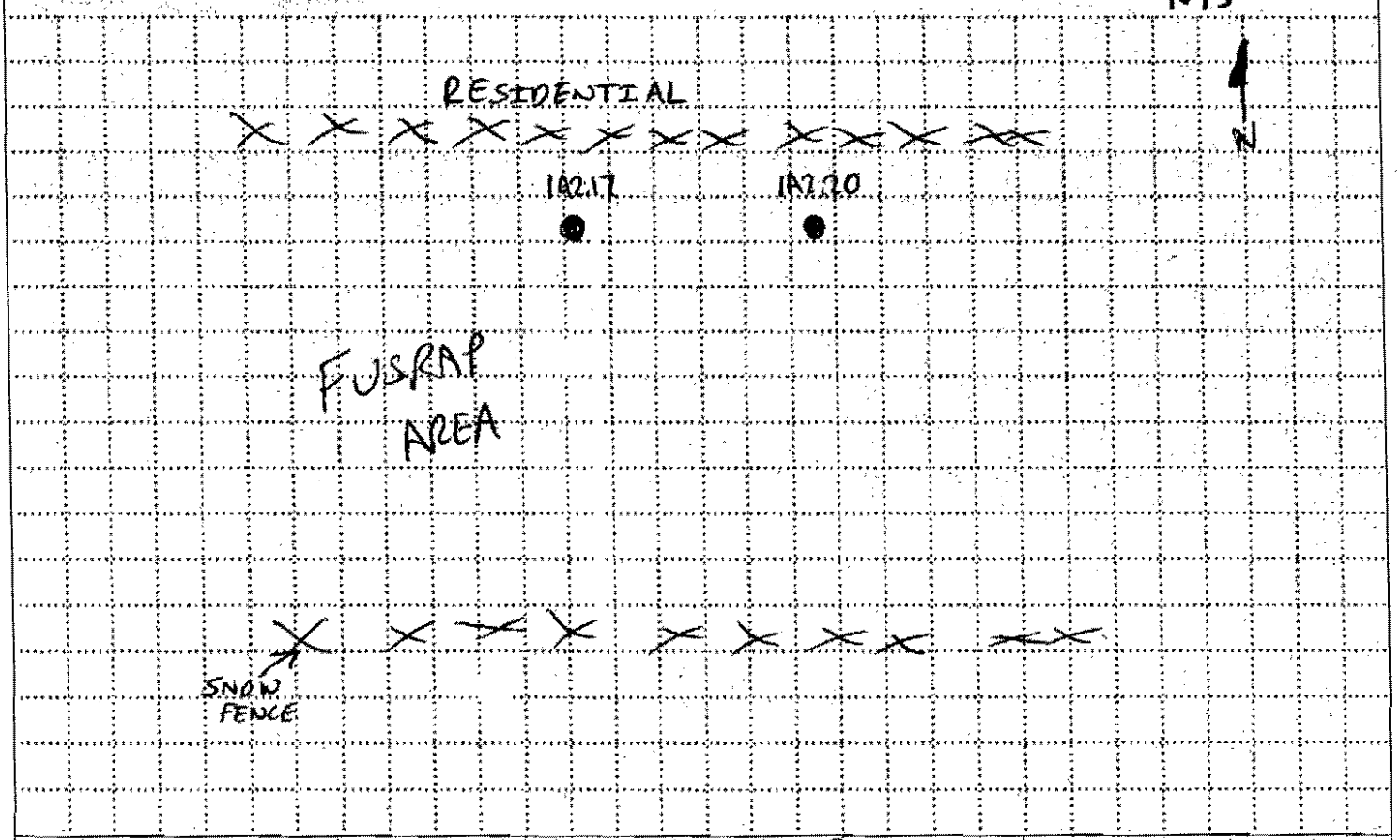
DISTRICT: Buffalo		HOLE NUMBER: 1A2.20
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 2 SHEETS
3. PROJECT: TOWN of TONAWANDA LP OPERABLE UNIT-Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: JEFF SNYDER	6. MANUFACTURER'S DESIGNATION OF DRILL: 6620DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE w/ 4' PLASTIC SLEEVE	8. HOLE LOCATION: N= 1093012.32 E= 1065295.23	
	9. SURFACE ELEVATION: 614.406	
	10. DATE STARTED: 3/25/10 1010	11. DATE COMPLETED: 3/25/10 1055
12. OVERBURDEN THICKNESS: 1.0'	15. DEPTH GROUNDWATER ENCOUNTERED: NOT ENCOUNTERED	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 7.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP / TOTALS	TCLP / TOTALS	SVOC-TCLP / TOTALS	PEST-TCLP / TOTALS	PCB- TOTALS	N/A

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. [redacted]
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON LF- Buffalo DISTRICT FUSRAP PROJECT — HOLE NO: 1A2.20

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: 1A2.20

PROJECT:

INSPECTOR: D. Popp

SHEET 2 OF 2

REC'D ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) ~~γ~~	GEOTECH SAMPLE OR CORE BOX NO. (e) ~~γ~~ B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. ~~READING~~ STATIC COUNTS (h) γ	(h) B
	0	DARK-BROWN CLAYEY TOPSOIL, GRASS, ROOTLETS, SOFT, WET.	6648	100		TOP 6"	6820	47
	1		6866	70				
	2	REDDISH-BROWN SILT AND CLAY, SOME SAND, ROOTLETS, MED. STIFF, MOIST. (CL)	7130	90		NATIVE	6816	69
	3	REDDISH-BROWN SILT AND CLAY, TRACE COURSE SAND AND FINE SUB-ROUND GRAVEL (<1/2"), GRAY MOTTLING, STIFF, MOIST. (CL)	7099	80				
48"	4		6942	110		HIGH B	6874	75
		NO RECOVERY →						
	5	SAME AS 2.2'-4.0'	6886	110		CHEM.	6723	55
	6		7433	70		HIGH γ	6926	82
29"	7	BOTTOM of BORING AT 7.0'						
	8	NOTES: - CLOUDY, 40°F - SAMPLE I.D. TLS-SS-1A2.20(0.0-0.5)032510 TLS-SB-1A2.20(1.0-2.0)032510 TLS-SB-1A2.20(3.0-4.0)032510						
	9	TLS-SB-1A2.20(4.8-5.8)032510 TLS-SB-1A2.20(6.0-7.0)032510 - PID READINGS = 0 ppm (VOC's) - SOIL READINGS ARE COUNTS/MIN.						
	10							

PROJECT:

HOLE NO: 1A2.20

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

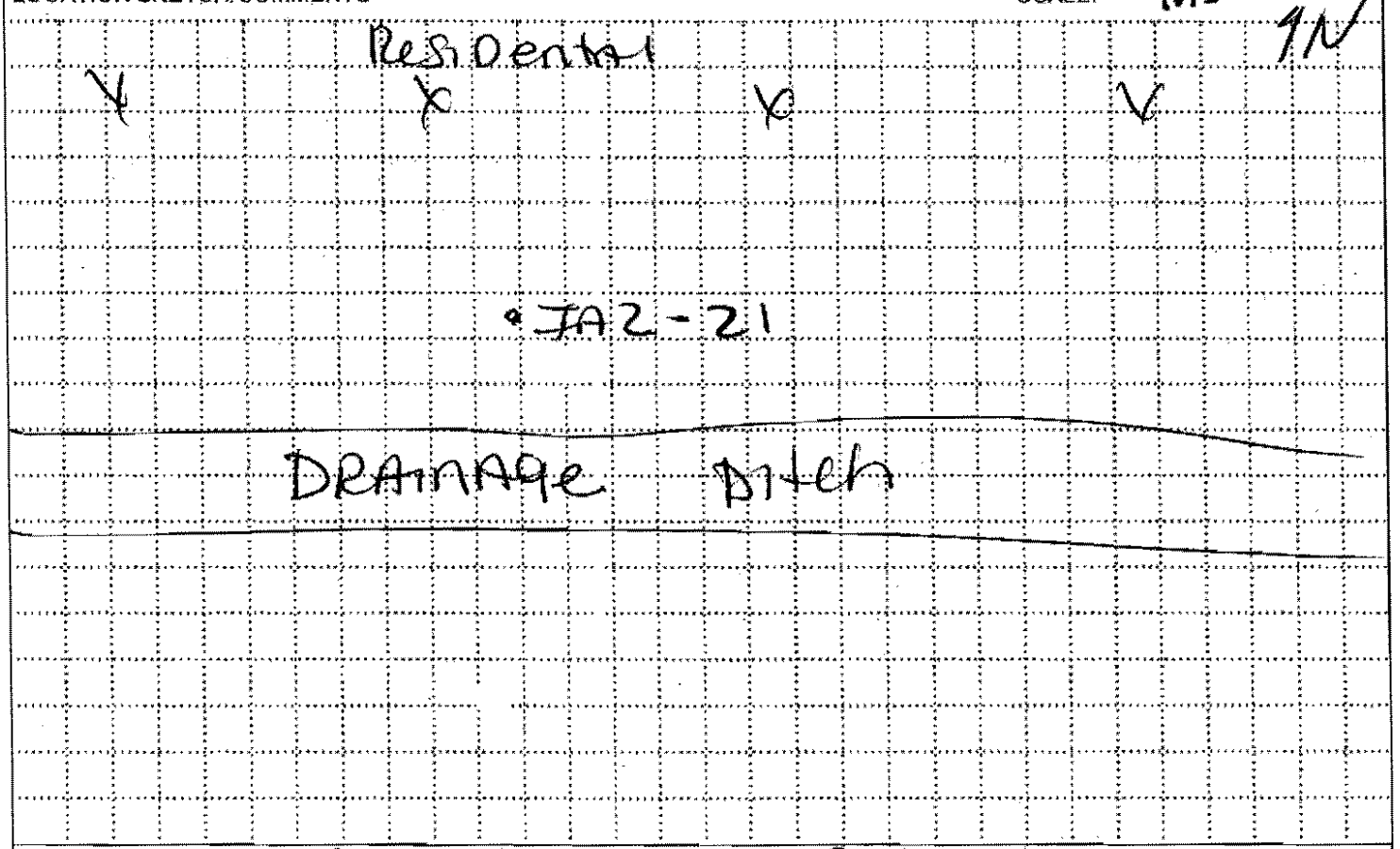
DISTRICT: Buffalo		HOLE NUMBER: JA2-21
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 2 SHEETS
3. PROJECT: TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: Phil Orsi	6. MANUFACTURER'S DESIGNATION OF DRILL: 7720 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: ~~3 1/4" CASSDOL 2" CORE w/ 5' PLASTIC SLEEVE~~ 3" MACRO CORE w/ 4' plastic sleeve	8. HOLE LOCATION: N=1093050.08 E=1065370.75	
	9. SURFACE ELEVATION: N/A	
	10. DATE STARTED: 3/25/10 945	11. DATE COMPLETED: 3/25/10 1005
12. OVERBURDEN THICKNESS: 2.6'	15. DEPTH GROUNDWATER ENCOUNTERED: NOT encountered	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 7.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	-	-	-	-	-	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATU[redacted]
CUTTINGS DRUMMED	-	-	-	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT	HOLE NO
TON LF- Buffalo DISTRICT FUSRAP PROJECT	JA2-21

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER JA2-21

SHEET 2 OF

REC'D ~~FLEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC REMARKS COUNTS (h)
	0	Fill: Dark brown topsoil, organic matter, rootlets, soft, moist.	80	7491	SEE NOTE		Typ 6" (0-5') 58/6497
	1	Fill: Waste (ash, plastic, glass), gravel (<1"), silt, loose, moist	80	7900			High γ (5-1.5') 59/6784
	2		60	7549			2nd High γ (1.5-2.5') 64/6427
	3	Reddish brown silt, clay, trace sand, trace gray mottling, fine sand, stiff, moist (CL)	80	7380			Native (2.6-3.6') 57/6831
	4	NO RECOVERY	NO RECOVERY				
	5	Reddish brown silt, clay, gray mottling, fine subrounded gravel (<1/2"), stiff, moist (CL)	80	7153			
	6		140	6863			High β (5.7-7') 56/6753
	7	Bottom of Boring @ 7.0'					
	8	Notes: Weather - Cloudy 42°F; PID Reading 0 ppm; Gamma Count/min					
	9						
	10						

Sample ID (Lab Analysis)

TLJ SS-JA2-21 (0-5') 032510 Typ γ
TLJ SB-JA2-21 (0.5-1.5') 032510 High γ
TLJ SB-JA2-21 (1.5-2.5') 032510 2nd High γ
TLJ SB-JA2-21 (2.6-3.6') 032510 Native
TLJ SB-JA2-21 (5.7-7.0') 032510 High β

PROJECT

HOLE NO. JA2-21

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

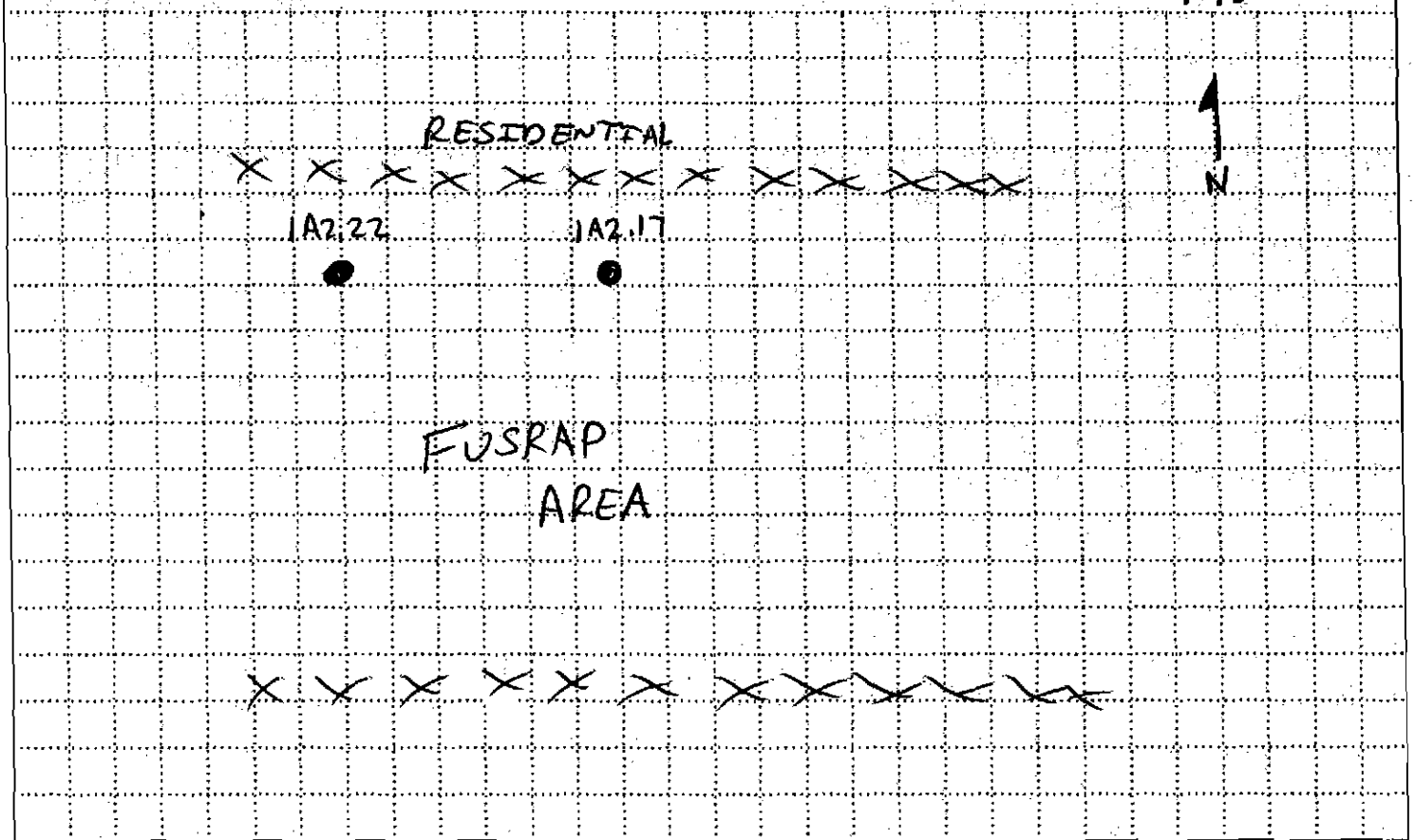
DISTRICT: Buffalo		HOLE NUMBER: 1A2.22
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 2 SHEETS
3. PROJECT: TOWN of TONAWANDA LF OPERABLE UNIT-Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: JEFF SNYDER	6. MANUFACTURER'S DESIGNATION OF DRILL: 6620 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE w/ 4' PLASTIC SLEEVE	8. HOLE LOCATION: N= 1092970.84 E= 1065181.39	
	9. SURFACE ELEVATION: 613.124	
	10. DATE STARTED: 3/25/10 0900	11. DATE COMPLETED: 3/25/10 1000
12. OVERBURDEN THICKNESS: 1.7'	15. DEPTH GROUNDWATER ENCOUNTERED: NOT ENCOUNTERED	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 6.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP / TOTALS	TCLP / TOTALS	SVOC-TCLP / TOTALS	PEST-TCLP / TOTALS	PCB- TOTALS	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. [redacted]
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON LF- Buffalo DISTRICT FUSRAP PROJECT — HOLE NO: 1A2.22

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A2.22

SHEET 2 OF 2

~~ELEV~~ REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h) γ	B
	0	DARK-BROWN CLAYEY TOPSOIL, ROOTLETS, GRASS, GRAVEL, SOFT, WET.	7005	100		TOP 6"	6752	70
	1		6670	70				
			6832	80				
	2	REDDISH-BROWN SILT AND CLAY, SOME FINE SAND, GRAY MOTTLING, STIFF, MOIST. (CL)				NATIVE	7029	73
	3		6973	60				
48"	4		6886	110		HIGH B	6743	54
	5	REDDISH-BROWN SILT AND CLAY, TRACE COURSE SAND AND FINE SUB-ROUND GRAVEL (< 1/2"), GRAY MOTTLING, STIFF, MOIST. (CL)	7087	70		CHEM	6912	73
24"	6		7166	100		HIGH γ	6798	53
	7	BOTTOM OF BORING AT 6.0'						
	8	NOTES: - CLOUDY, 39°F - SAMPLE I.D. TLS-SS-1A2.22(0.0-0.5)032510 TLS-SB-1A2.22(1.7-2.7)032510 TLS-SB-1A2.22(3.0-4.0)032510 TLS-SB-1A2.22(4.0-5.0)032510 TLS-SB-1A222(5.0-6.0)032510						
	9	- PID READINGS = 0ppm (VOCs) - SOIL READING ARE COUNTS/MIN. - COLLECTED RAD. DUPLICATE.						
	10							

PROJECT

HOLE NO. 1A2.22

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

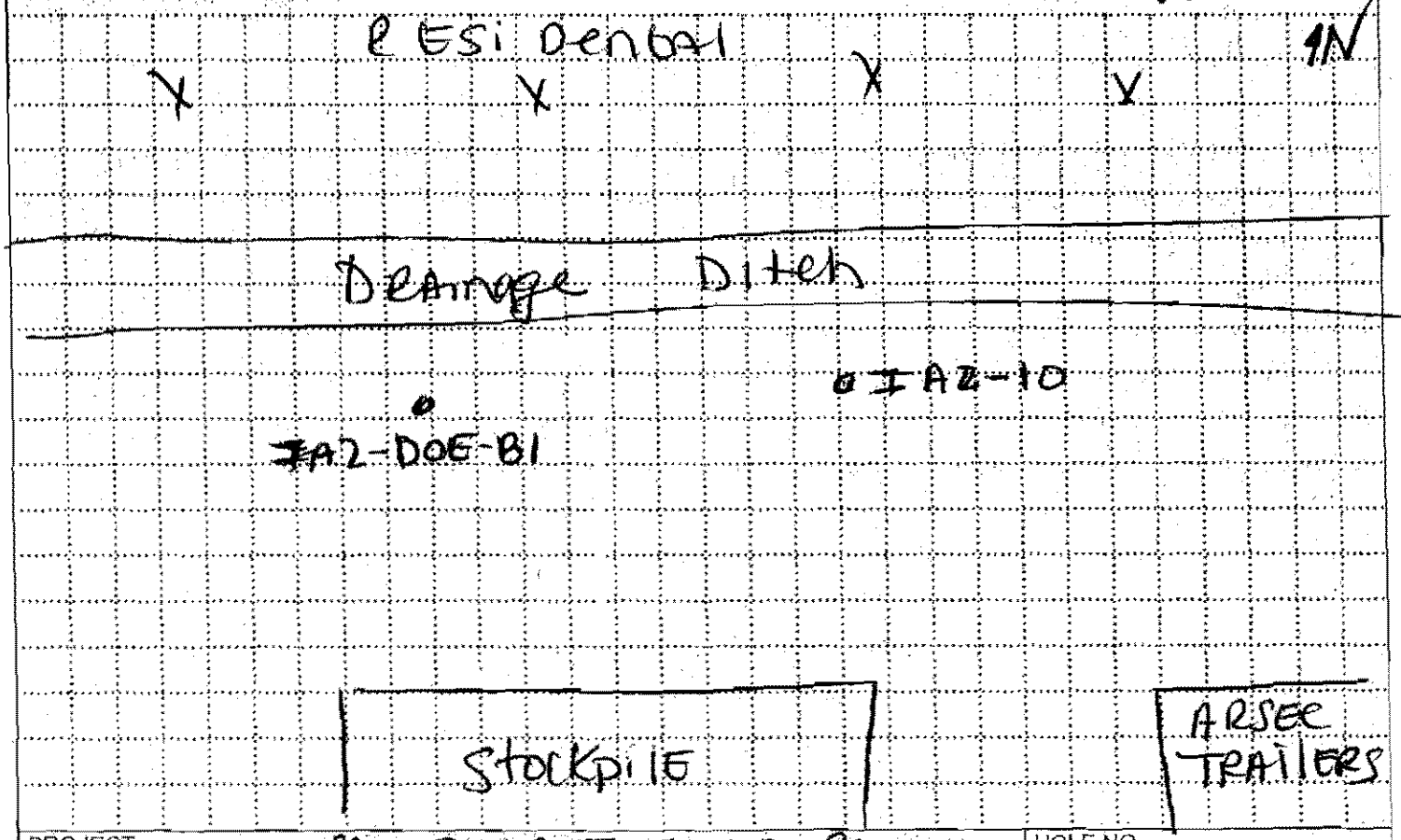
DISTRICT	Buffalo
HOLE NUMBER	JA2 DOE B1
1. COMPANY NAME	ENSOL, INC.
2. DRILLING CONTRACTOR	ZEBRA ENVIRONMENTAL CORP.
SHEET / SHEETS	1 OF 2
3. PROJECT	TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT
4. LOCATION	TONAWANDA LF, TONAWANDA, NY
5. NAME OF DRILLER	Phil ORSI
6. MANUFACTURER'S DESIGNATION OF DRILL	7720DT GEOPROBE
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	2" MACRO CORE W/ 4' PLASTIC SLEEVE
8. HOLE LOCATION	N= E=
9. SURFACE ELEVATION	N/A
10. DATE STARTED	3/23/10 950am
11. DATE COMPLETED	3/23/10 10:30am
12. OVERBURDEN THICKNESS	3.8'
15. DEPTH GROUNDWATER ENCOUNTERED	NOT ENCOUNTERED
13. DEPTH DRILLED INTO ROCK	N/A
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	N/A
14. TOTAL DEPTH OF HOLE	7.0'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	N/A

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	–	–	–	–	–	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIG[redacted]
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT	TON LF- Buffalo DISTRICT FUSRAP PROJECT
HOLE NO.	JA2 DOE B1

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER JA2-DOE-B1

SHEET 2 OF SHEET

RECID ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS REMARKS (h)
	0	NO RECOVERY	NO RECOVERY		SEE NOTE		
	1	FILL: DARK-brown clay, WASTE (ASH, GLASS), gravel (<1½"), loose-med. stiff, moist	80	7725			Top 6" (.5-1.) 72/7590
	2		120	7827			2nd Highest β (3.8-5.8) 49/7472
	3		140	7725			High B (5.8-6.8) 77/7624
	4		130	8066			
	5	REDISH brown silt clay, fine sub-rounded gravel (<1½") TRACE gray mottling, fine sand, stiff, moist (CL)	80	8260			Native (3.8-4.8') 58/7436
	6	REDISH brown clay, fine sand, some gray mottling, fine sand, gravel (<1"), stiff moist (CL)	160	7841			High γ (4.8-5.8') 64/7670
	7		100	8200			~~High B~~
	8	Bottom of Boring @ 7.0' NOTES -weather: Rain 35°F -PID Reading 0ppm -Gamma Reading (COUNT/min	SAMPLE TO (LEAD ANALYSIS)				
	9		TLS-SS-JA2-DOE-B1(.5-1') 032310 Top 6"				
			TLS SB JA2-DOE-B1(5.8-6.8') 032310 High B				
			TLS SB JA2 DOE-B1(4.8-5.8') 032310 High γ				
			TLS SB JA2 DOE B1(4.8-5.8') 032310 2nd High γ				
	10		TLS SB JA2 DOE B1(3.8-4.8') 032310 Native				

PROJECT

HOLE NO JA2-DOE-B1

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

DISTRICT	Buffalo
HOLE NUMBER	1A2.DOE.B02
1. COMPANY NAME	ENSOL, INC.
2. DRILLING CONTRACTOR	ZEBRA ENVIRONMENTAL CORP.
SHEET / SHEETS	1 OF 3
3. PROJECT	TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT
4. LOCATION	TONAWANDA LF, TONAWANDA, NY
5. NAME OF DRILLER	Jeff SNYDER
6. MANUFACTURER'S DESIGNATION OF DRILL	6620 DT GEOPROBE
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	3 1/4" CASING 2" CORE W/ 4" PLASTIC SLEEVE
8. HOLE LOCATION	N= E=
9. SURFACE ELEVATION	
10. DATE STARTED	3/22/10 1105
11. DATE COMPLETED	3/22/10 1400
12. OVERBURDEN THICKNESS	8.0'
15. DEPTH GROUNDWATER ENCOUNTERED	4.5' bgs
13. DEPTH DRILLED INTO ROCK	N/A
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	N/A
14. TOTAL DEPTH OF HOLE	16.0'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	N/A

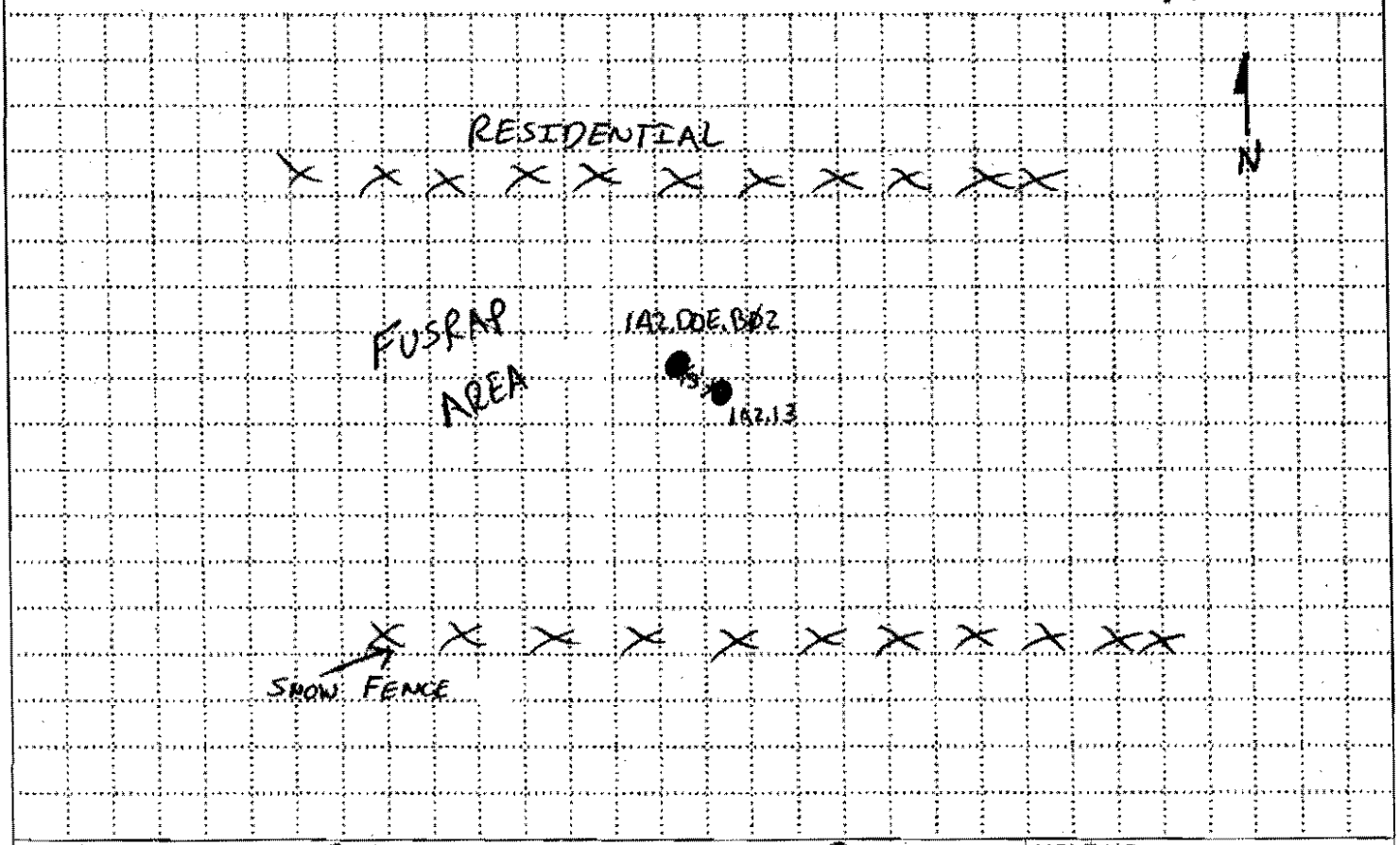
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	-	-	-	-	-	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)
CUTTINGS DRUMMED	-	-	-

[redacted]

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT TON LF- Buffalo DISTRICT FUSRAP PROJECT HOLE NO 1A2.DOE.B02

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A2.DOE.B02

SHEET 2 OF 3

REC'D ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS ~~(d)~~ X	GEOTECH SAMPLE OR CORE BOX NO. ~~(e)~~ B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	0	NO RECOVERY →					→
	1	FILL: REDDISH-BROWN CLAY, GRAVEL, WASTE (ASH), CONCRETE, STIFF, MOIST.	7058	80	SEE NOTES	TOP 6"	X 7091 B 63
	2		7624	50			
	3		7787	40			
44"	4		8395	50		HIGH X	7409 68
	5	FILL: DARK-BROWN CLAY, WASTE (ASH), LOOSE, WET.	8038	60		SAT.	7823 58
	6		7493	80			
	7		7577	80			
48"	8		8089	100			
	9	REDDISH-BROWN SILT AND CLAY, TRACE COURSE SAND AND FINE SUB-ROUND GRAVEL (<1"), GRAY MOTTLING TO 9.7', STIFF, MOIST. (CL)	7482	40		NATIVE	7679 48
	10		8308	90			

PROJECT

HOLE NO. 1A2.DOE.B02

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A2.DOEBØ2

SHEET 3 OF 3

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC REMARKS COUNTS (h) X	B
	10	CONTINUED FROM PAGE 2						
			7661	110		HIGH B	8149	50
	11							
48"	12		7917	80				
	13		7337	80	SEE NOTES			
	14		7677	100				
	15		7714	60				
48"	16		7483	80				
		BOTTOM of BORING AT 16.0'						
		NOTES:						
	17	- RAIN, 40°F						
		- SAMPLE I.D.						
		TLS-SS-1A2.DOE.BØ2(0.4-0.9)032210						
	18	TLS-SB-1A2.DOE.BØ2(3.0-4.0)032210						
		TLS-SB-1A2.DOE.BØ2(4.0-5.0)032210						
		TLS-SB-1A2.DOE.BØ2(8.0-9.0)032210						
		TLS-SB-1A2.DOE.BØ2(10.0-11.0)032210						
	19	- PID READINGS = 0ppm (VOCs)						
		- SOIL READINGS ARE COUNTS/MIN.						
	20							

PROJECT

HOLE NO. 1A2.DOE.BØ2

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

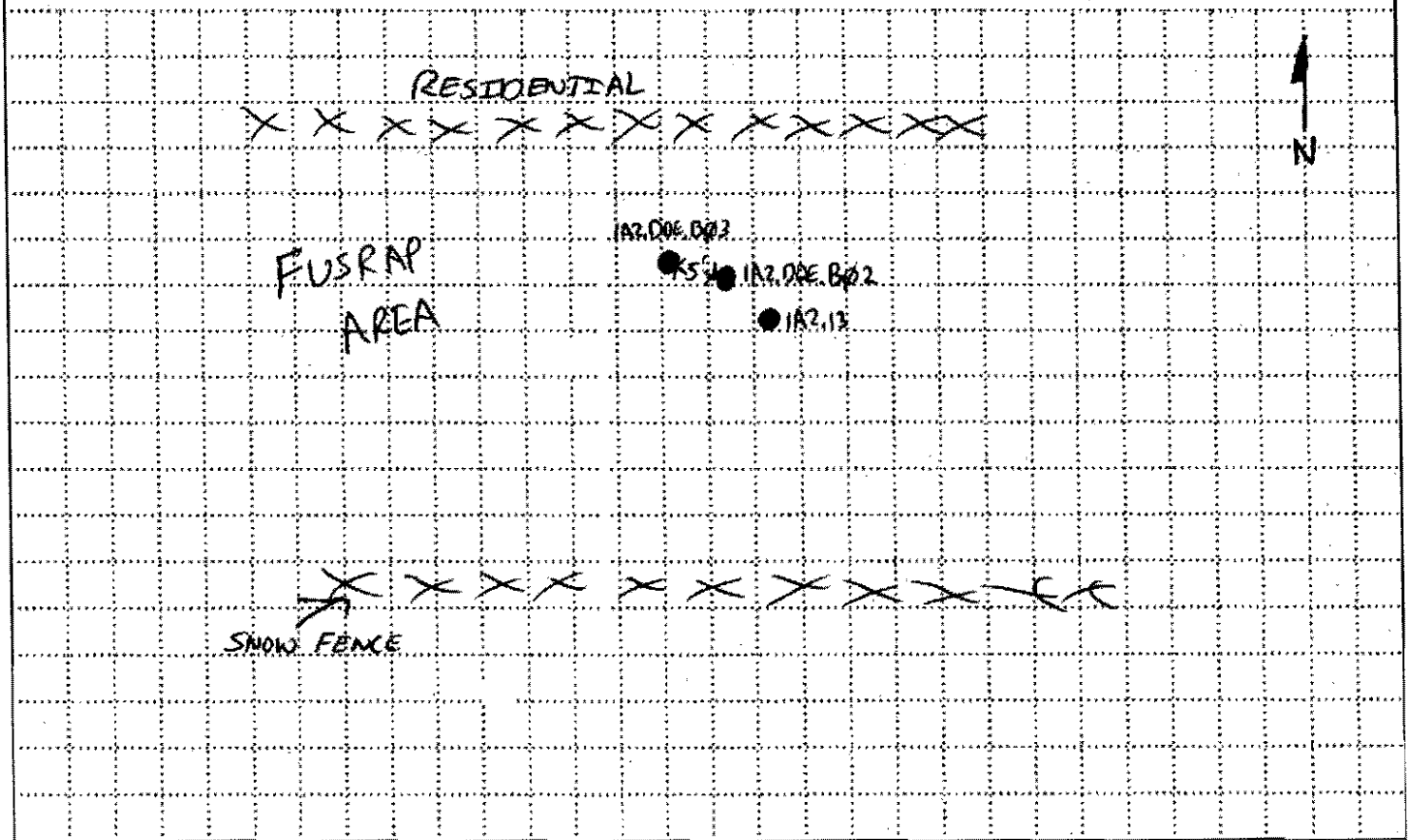
DISTRICT: Buffalo	HOLE NUMBER: 1A2.DOE.B03	
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 3 SHEETS
3. PROJECT: TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: JEFF SNYDER	6. MANUFACTURER'S DESIGNATION OF DRILL: 6620 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE w/ 4' PLASTIC SLEEVE	8. HOLE LOCATION: N= E=	
	9. SURFACE ELEVATION	
	10. DATE STARTED: 3/22/10 1425	11. DATE COMPLETED: 3/22/10 1540
12. OVERBURDEN THICKNESS: 12.0'	15. DEPTH GROUNDWATER ENCOUNTERED: 6.7' bgs	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 16.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	-	-	-	-	-	N/A

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
CUTTINGS DRUMMED	-	-	-	[redacted]

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON LF - Buffalo DISTRICT FUSRAP PROJECT — HOLE NO: 1A2.DOE.B03

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. POPP

HOLE NUMBER 1A2.DOE.B03

SHEET 2 OF 3

REC'D ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS REMARKS (h)
	0	FILL: REDDISH-BROWN CLAY, GRAVEL, WASTE (ASH, GLASS, METAL), MED. STIFF, MOIST.	7770	80		TOP 6"	X 7884 B 66
	1		8155	60			
	2		7595	50			
	3		8595	100	SEE NOTES		
48"	4	FILL: WASTE (ASH, GLASS), LOOSE, WET.	8707	60		HIGH X	7364 55
	5		8262	80			
	6		8417	90		SAT.	7652 64
	7		7958	100			
48"	8						
	9	NO RECOVERY →					
	10						

PROJECT

HOLE NO. 1A2.DOE.B03

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Poff

HOLE NUMBER 1A2.DOE.B03

SHEET 3 OF 3

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING ~~RESULTS~~ (d) X	GEOTECH SAMPLE OR ~~CORE BOX~~ NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	10						
	11	NO RECOVERY →					→
0"	12						
	13	REDDISH-BROWN SILT AND CLAY, TRACE COURSE SAND AND FINE SUB-ROUND GRAVEL (<1"), STIFF, MOIST. (CL)	8426	90	SEE NOTES	NATIVE	X 7504 B 72
	14		7822	70			
	15		7896	110		HIGH B	7766 67
48"	16		8645	80			
	17	BOTTOM of BORING AT 16.0'					
	18	NOTES: - RAIN, 39°F - SAMPLE I.D. TLS-SS-1A2.DOE.B03(0.0-0.5) 032210 TLS-SB-1A2.DOE.B03(4.0-5.0) 032210 TLS-SB-1A2.DOE.B03(6.0-7.0) 032210 TLS-SB-1A2.DOE.B03(12.0-13.0) 032210					
	19	TLS-SB-1A2.DOE.B03(14.0-15.0) 032210 - PID READINGS = 0ppm (VOC's) - SOIL READINGS ARE COUNTS/MIN					
	20						

PROJECT

HOLE NO 1A2.DOE.B03

ENG FORM 5056A-R, AUG 94

USACE ENG HTRW Forms
Investigative Area 3

HTRW DRILLING LOG

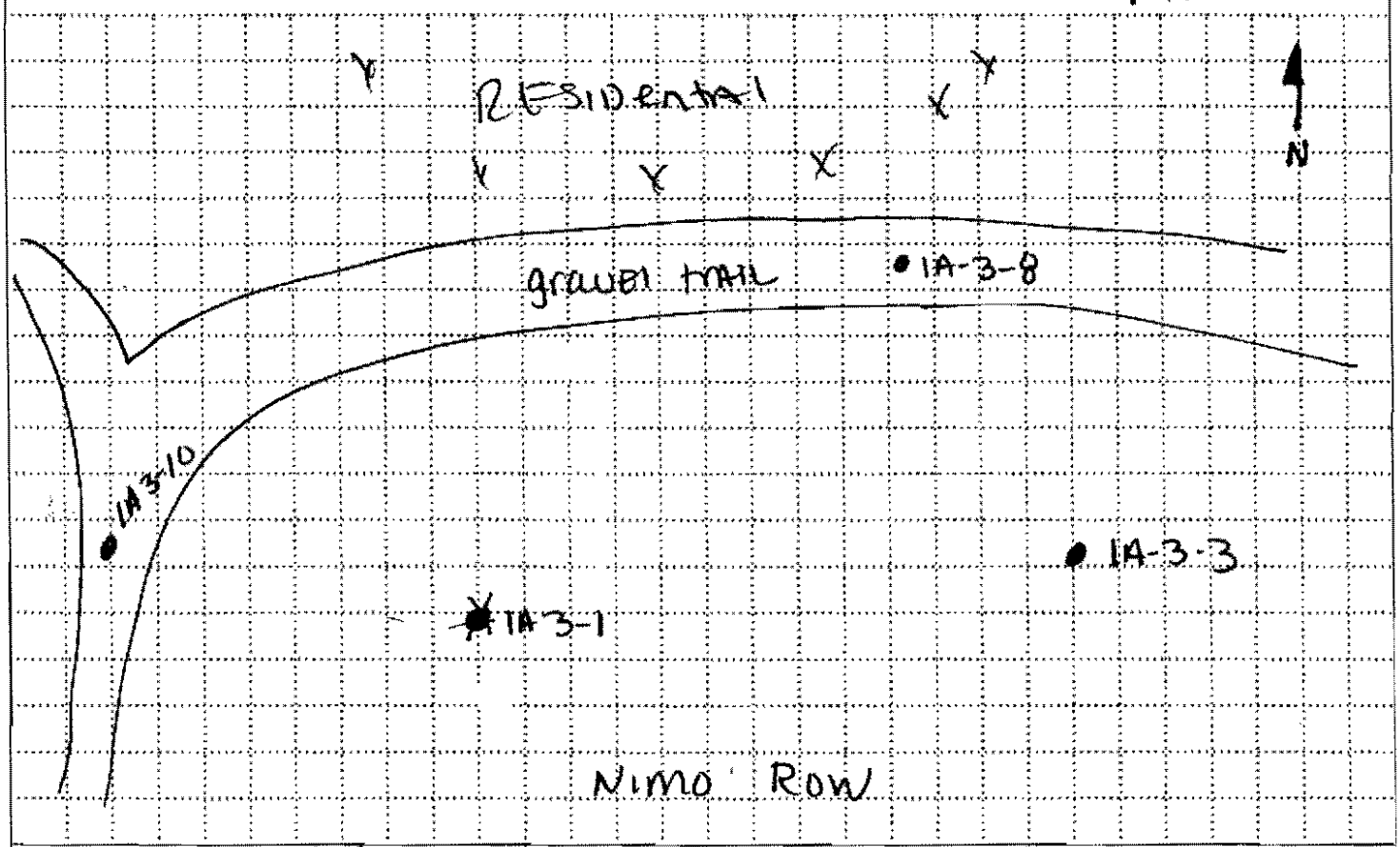
DISTRICT: BUFFALO	HOLE NUMBER: 1A-3-1	
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 3 SHEETS
3. PROJECT: TOWN OF TONAWANDA LF OPERABLE UNIT - BUFFALO DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: DOMONIC PINO	6. MANUFACTURER'S DESIGNATION OF DRILL: Geoprobe 7720DT	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CORE W/ PLASTIC SLEEVES (4')	8. HOLE LOCATION: N 1092294 E 415565.4	
	9. SURFACE ELEVATION: 601.388	
	10. DATE STARTED: 2-15-10 9:05 am	11. DATE COMPLETED: 2-15-10 10:40 am
12. OVERBURDEN THICKNESS: 1.6'	15. DEPTH GROUNDWATER ENCOUNTERED: NOT ENCOUNTERED	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 13.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
6	TCLP / TOTAL	TCLP / TOTAL	SVOC-TCLP / TOTAL	PEST-TCLP / TOTAL	PCB-TOTAL	N/A %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
CUTTINGS DRUMMED	-	-	-	[redacted]

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT: TON. LF - BUFFALO DISTRICT FUSRAP PROJECT | HOLE NO: 1A-3-1

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPE[redacted]

HOLE NUMBER 1A-3-1

SHEET 2 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B-	GEOTECH SAMPLE OR CORE BOX NO. (e) γ	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B-/γ 1-Min. Static count
	0	Fill: Gravel, course + fine sand, Asphalt, frozen, stiff	40	6791	See NOTES		Top 6" 40/6142
	1		20	6125			
			40	6981			Native 56/6408
	2	Reddish-brown silt, clay w/ fine and course sand, Desiccation cracks w/ gray silt infilling, stiff, moist (CL)	80	6636			Saturated 60/6336 (See note)
	3						
			80	6344			
	4						
			80	6676			
	5						-Recovery 60"
			80	6439			
	6						
			80	6806			
	7						
			80	6591			
	8						
			80	6224			
			60	6165			
	9						
			80	6703			
	10						Recovery 42"

PROJECT

HOLE NO 1A3-1

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPE[redacted]

HOLE NUMBER 1A-3-1

SHEET 3 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B-	GEOTECH SAMPLE OR CORE BOX NO. (e) γ	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h) γ/B 1min. static count
	10	Continued from previous page	60	7190	SEE NOTES		High γ 70/6425
	11		100	6748			High B- 69/6276
	12		80	7128			Chemical 63/6329
	13	Bottom of Boring @ 13.0'					
	14	NOTES					
		Weather: Overcast, 23°F					
		Sample ID. (QAO, Analysis)					
	15	TLS-SS-1A 3-1 (12-13') 021510	Chemical				- Recovery 60"
		TLS SB 1A-3-1 (0.0-0.5) 021510	Rod 6"				
		TLS-SB 1A-3-1 (1.5-2.5') 021510	Native				
	16	TLS-SB 1A-3-1 (2.5-3.5') 021510	Saturated				
		TLS-SB 1A-3-1 (10-11') 021510	High γ				
		TLS-SB 1A-3-1 (11-12') 021510	High B-				
	17	-PID readings = 0 ppm					
		-Gamma readings - cnt/min					
	18	-Saturated sample selected by HP					
	19						
	20						

PROJECT

HOLE NO 1A3-1

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

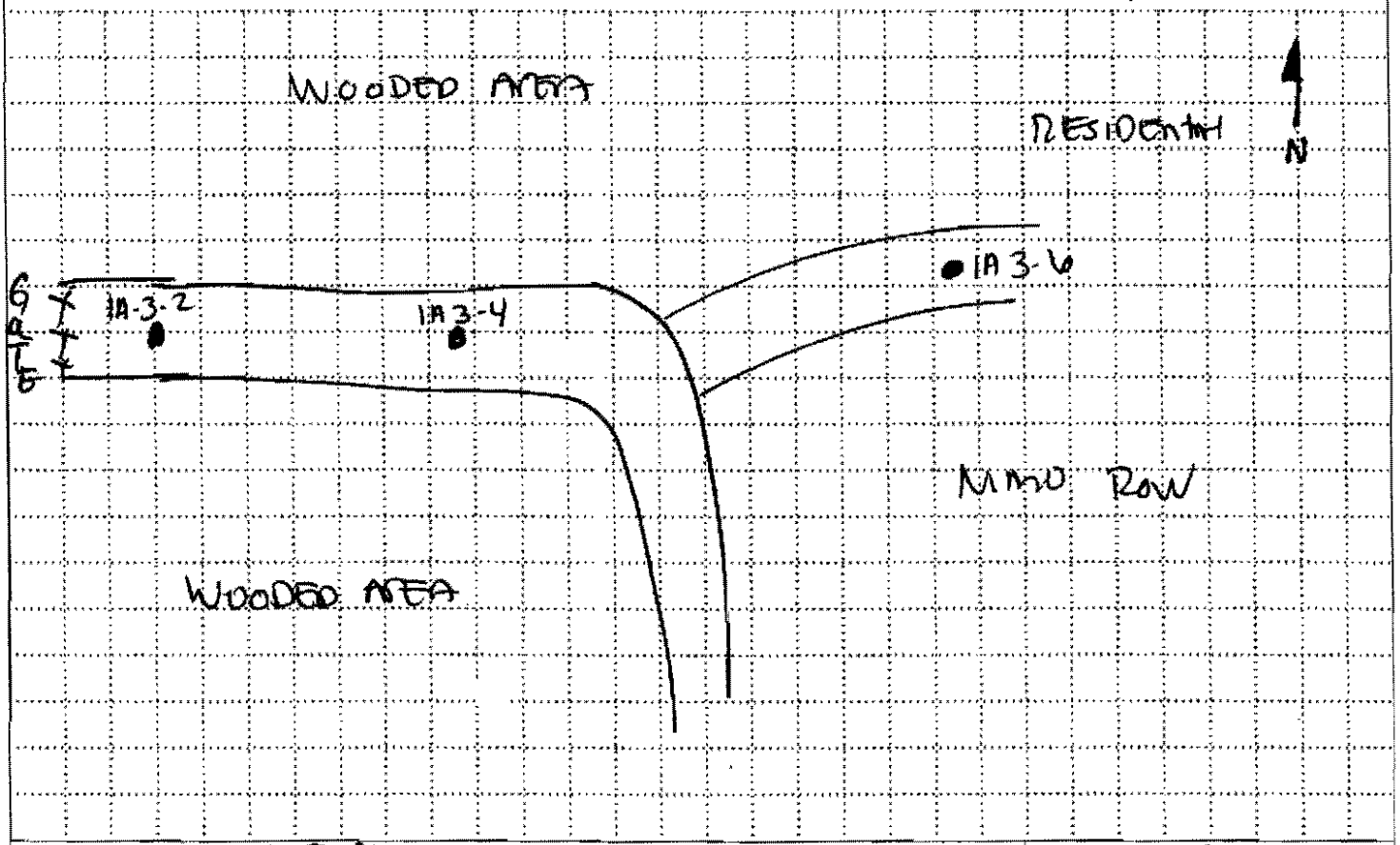
DISTRICT	BUFFALO
HOLE NUMBER	1A.3-2
SHEET / SHEETS	1 OF 3
1. COMPANY NAME	ENSOL, INC.
2. DRILLING CONTRACTOR	ZEBRA ENVIRONMENTAL CORP.
3. PROJECT	TOWN OF TONAWANDA LF OPERABLE UNIT - BUFFALO DISTRICT FUSRAP PROJECT
4. LOCATION	TONAWANDA LF, TONAWANDA, NY
5. NAME OF DRILLER	Domonic DINO
6. MANUFACTURER'S DESIGNATION OF DRILL	Geoprobe 7720DT
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	3 1/4" CORE W/ PLASTIC SLEEVES (5')
8. HOLE LOCATION	N 1092149 E 415061.2
9. SURFACE ELEVATION	588.788
10. DATE STARTED	2-11-10 245pm
11. DATE COMPLETED	2-11-10 345 pm
12. OVERBURDEN THICKNESS	17.1'
15. DEPTH GROUNDWATER ENCOUNTERED	16.3' bgs
13. DEPTH DRILLED INTO ROCK	N/A
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	N/A
14. TOTAL DEPTH OF HOLE	20.0'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	N/A

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
-	-	-	-	-	-	N/A %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)
CUTTINGS DRUMMED	-	-	-

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT TON. LF - BUFFALO DISTRICT FUSRAP PROJECT HOLE NO. 1A3.2

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPE[redacted]

HOLE NUMBER 1A3-2

SHEET 2 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e) γ	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B/γ 1-MIN. static count
	0	Asphalt gravel paving, loose, FROZEN	80	5768	SEE NOTES		Top 6" 43/5455
	1	NO RECOVERY	NO RECOVERY				
	2	Fill: REDISH SAND, fine gravel, Ash, WOOD, very loose, moist	140	5980			high B 68/5837
	3		120	6734			high γ 47/6302
	4		80	6449			
	5		60	6136			
	6	NO RECOVERY (N/R)	N/R				-Recovery 60"
	7		N/R				
	8		N/R				
	9	Fill: DARK-red, orange silt SAND, w/gravel, Ash, WOOD, moist, loose	60	6494			
	10		80	6095			

PROJECT

HOLE NO. 1A 3-2

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPEC [redacted]

HOLE NUMBER 1A-3-2

SHEET 3 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B-	GEOTECH SAMPLE OR CORE BOX NO. (e) γ	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B-/γ 1-min. static count
	10	NO RECOVERY	NO RECOVERY				-Recovery 47"
	11						
	12	Fill: Black sand, silt w/ some gravel (<1"), loose, moist	100	6289			
	13		60	6316			
	14		60	6629			
	15		80	6035			
		NO RECOVERY	NO RECOVERY				-Recovery 47.5"
	16	Dark-brown clay, silt, sand w/ gravel (<1"), moist, stiff (CL)	60	6191			Saturated: 51/5545
	17		80	6408			Native: 41/5729
	18		60	6056			
	19		120	6028			
	20	Bottom of Boring 20'	100	6174			-Recovery 52"

PROJECT

HOLE NO. 1A-3-2

ENG FORM 5056A-R, AUG 94

NOTE: OVERCAST, 23°F
- Gamma Reading count/min
- PID reading = 0 ppm

SAMPLE I.D. (RAD. ANALYSIS)
TLS-SS-1A3-2 (0.0-0.6') 021110 = Top 6"
TLS-SB 1A3-2 (2-3') 021110 = high γ
TLS-SB 1A3-2 (1-2') 021110 = high B-
TLS-SB 1A3-2 (16-17') 021110 = saturated
TLS-SB 1A3-2 (17-18') 021110 = native

HTRW DRILLING LOG

DISTRICT: Buffalo	HOLE NUMBER: 1A-3-3	
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 3 SHEETS
3. PROJECT: TOWN OF TONAWANDA LF OPERABLE UNIT - BUFFALO DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: Domonic Pino	6. MANUFACTURER'S DESIGNATION OF DRILL: Geoprobe 7720DT	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CORE - W/ PLASTIC SLEEVES (5')	8. HOLE LOCATION: N 1092402 E 415773	
	9. SURFACE ELEVATION: 604.127	
	10. DATE STARTED: 2-12-10 2:15pm	11. DATE COMPLETED: 02-12-10 3:30pm
12. OVERBURDEN THICKNESS: 9'	15. DEPTH GROUNDWATER ENCOUNTERED: 7.1' bgs	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 14.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

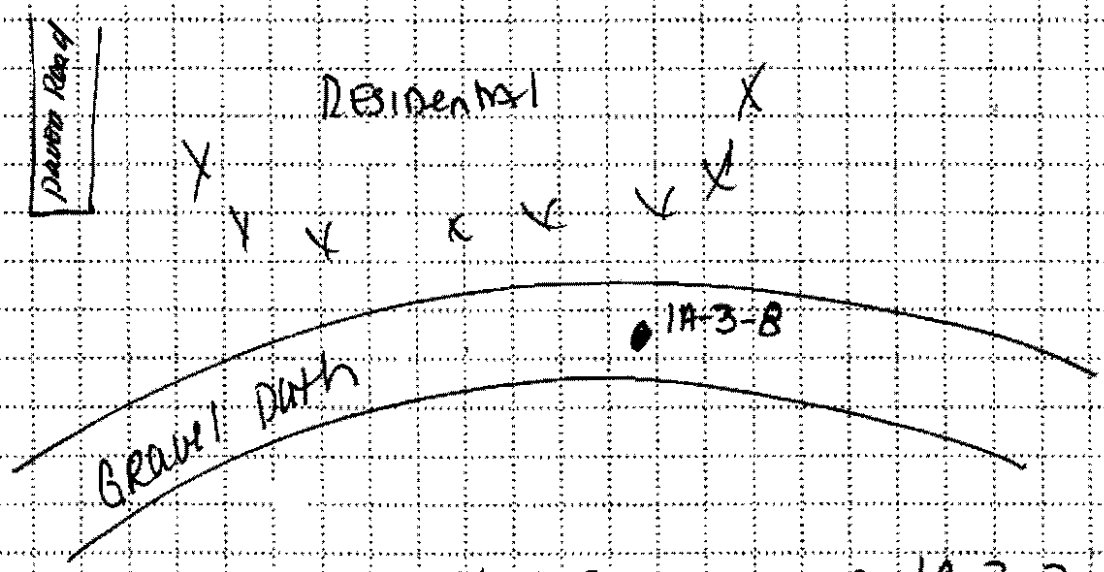
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
-	-	-	-	-	-	N/A %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)
CUTTINGS DRUMMED	-	-	- [redacted]

LOCATION SKETCH/COMMENTS — SCALE: NTS

* Hole 1A-3-3 Relocated, due to NIMO R.O.W
New GPS location
N: 1092408.145
E 1064109.413



PROJECT: TON. LF - BUFFALO DISTRICT FUSRAP PROJECT — HOLE NO: 1A-3-3

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR: K Hoelscher

HOLE NUMBER: 1A-3-3

SHEET 2 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS ~~NB~~	GEOTECH SAMPLE OR CORE BOX NO. ~~γ~~	ANALYTICAL SAMPLE NO. ~~γ~~	BLOW COUNT (g)	REMARKS ~~B/γ~~ 1 min. static count
	0	Topsoil, rootlets, gravel (<1"), wood, stiff, frozen	120	7081	see notes		Top 6" 56/6585
	1		80	6798			
		Reddish-brown silt, clay course and fine sand, desiccation cracks w/ gray infilling, stiff, moist (CL)	100	6689			Native 47/6833
	2		100	7303			
	3		120	7395			High γ 73/6516
	4		80	7219			
	5		140	6637			High B 77/6638 - recovery 56.2"
	6		60	7163			
			120	7165			Saturated 44/6651
	7	▼					
	8		100	7459			
	9		120	7369			
	10		60	7317			Recovery 56"

PROJECT

HOLE NO. 1A-3-3

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR K Hoelscher

HOLE NUMBER 1A-3-3

SHEET 3 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B-	GEOTECH SAMPLE OR CORE BOX NO. (e) γ	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h) B/γ 1min. static count
	10	Continued from previous page	80	6694			
	11		120	7126			
	12		100	7329			
	13		80	6707			
	14	Bottom of Boring @ 14.0'					
	15	Note: Sunny, 25°F					- recovery 59"
		- Sample I.D. (RAD. Analysis)					
	16	TLS-SS-1A3-3 (0.0-0.5) 021210	Top 6"				
		TLS-SB 1A3-3 (1'-2') 021210	Native				
		TLS-SB 1A3-3 (6.7'-7.7') 021210	Saturated				
		TLS-SB 1A 3-3 (4.4-5.4') 021210	high B-				
	17	TLS-SB 1A3-3 (3-4') 021210	high γ				
	18						
	19						
	20						

PROJECT

HOLE NO 1A-3-3

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

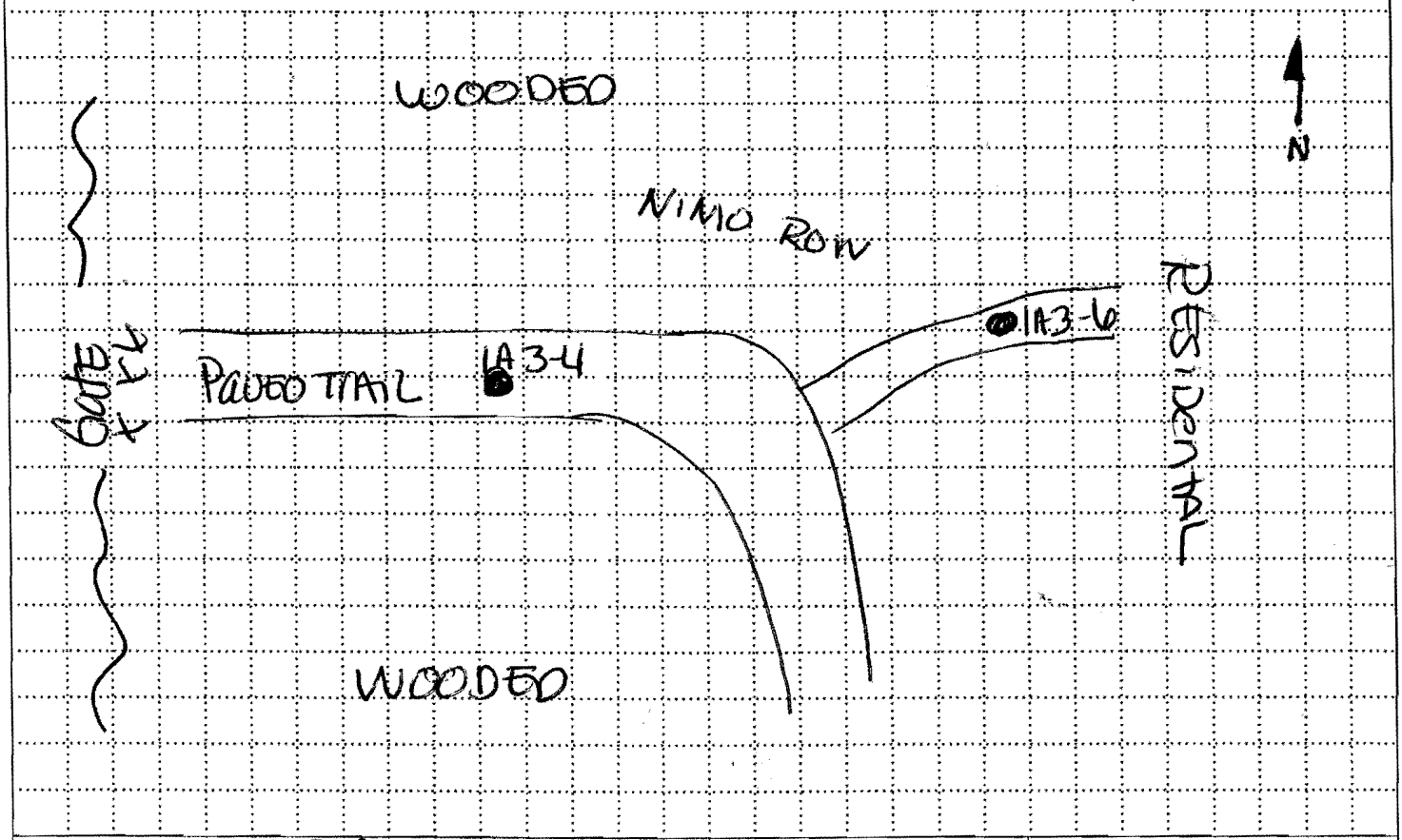
DISTRICT	Buffalo
HOLE NUMBER	1A-3-4
1. COMPANY NAME	ENSOL, INC.
2. DRILLING CONTRACTOR	ZEBRA ENVIRONMENTAL CORP.
SHEET	1 OF 3 SHEETS
3. PROJECT	TOWN OF TONAWANDA LF OPERABLE UNIT - BUFFALO DISTRICT FUSRAP PROJECT
4. LOCATION	TONAWANDA LF, TONAWANDA, NY
5. NAME OF DRILLER	Dominic Pino
6. MANUFACTURER'S DESIGNATION OF DRILL	Geoprobe 7720DT
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	3 1/4 CASING W/ PLASTIC SLEEVES (5')
8. HOLE LOCATION	N 1092242 E 415188.4
9. SURFACE ELEVATION	589.88
10. DATE STARTED	2-11-10 9:45
11. DATE COMPLETED	2-11-10 11:45 AM
12. OVERBURDEN THICKNESS	13.2'
15. DEPTH GROUNDWATER ENCOUNTERED	13.2' bgs
13. DEPTH DRILLED INTO ROCK	N/A
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	N/A
14. TOTAL DEPTH OF HOLE	15.0'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	N/A

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
0	-	-	-	-	-	N/A %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
CUTTINGS DRUMMED	-	-	-	

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT TON. LF - Buffalo DISTRICT FUSRAP PROJECT

HOLE NO 1A-3-4

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT TLF Operable Unit - Buffalo District Fusemp Project

INSPECTOR K Hoeischer

HOLE NUMBER MA3-4

SHEET 2 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e) γ	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B/γ
	0	Asphalt, paving, stiff, frozen	225	5306	See notes		1-minute sonic count Top 6" 37/4923
	1	Fill: yellowish-brown clay, slag, gravel (<1"), loose, moist	250	5306			
	2	Fill: Reddish-brown clay, slag, ash, wood, gravel, stiff, moist	340	5722			High γ 54/5205 High B 54/5225
	3						
	4		280	5285			
	5		260	5100			Recovery = 60"
	6	NO RECOVERY	NO RECOVERY				
	7		NO RECOVERY				
	8		NO RECOVERY				
	9		260	5683			
	10		240	5665			Recovery = 24"

PROJECT

HOLE NO. MA3-4

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER 1A-3-4

PROJECT Tonawanda LF operable unit - Buffalo District FUSRAP Project

INSPECTOR K Hoelscher

SHEET 3 OF SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS 1-minute static count
	10	NO RECOVERY	NO RECOVERY				
	11		NO RECOVERY				
	12	Fill: Continued from previous page	100	5280			Saturated: 38/41683
	13	Reddish-brown silt, clay, trace gravel + sand (cobble), vertical desiccation cracks w/ gray silt infilling, stiff, moist. (CL)	60	5480			Native: 72/5010
	14		80	5569			
	15	Bottom of Boring @ 15.0'					- Recovery 36"
	16	NOTE: OVERCAST, 23°F					
		- Sample ID (RAD Analysis)					
		TLS-SS-1A34 (0.0-0.5)021110 =	Top 6"				
	17	TLS-SB-1A3-4 (2.0-3.0)021110 =	High B				
		TLS-SB-1A3-4 (2.0-3.0)021110	High J				
		TLS-SB-1A3-4 (12.2-13.0)021110	Saturated				
	18	TLS-SB-1A3-4 (13.0-14.0)021110	Native				
		- Gamma readings are counts/min.					
	19	- PID readings are 0ppm					
	20						

PROJECT

HOLE NO. 1A-3-4

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

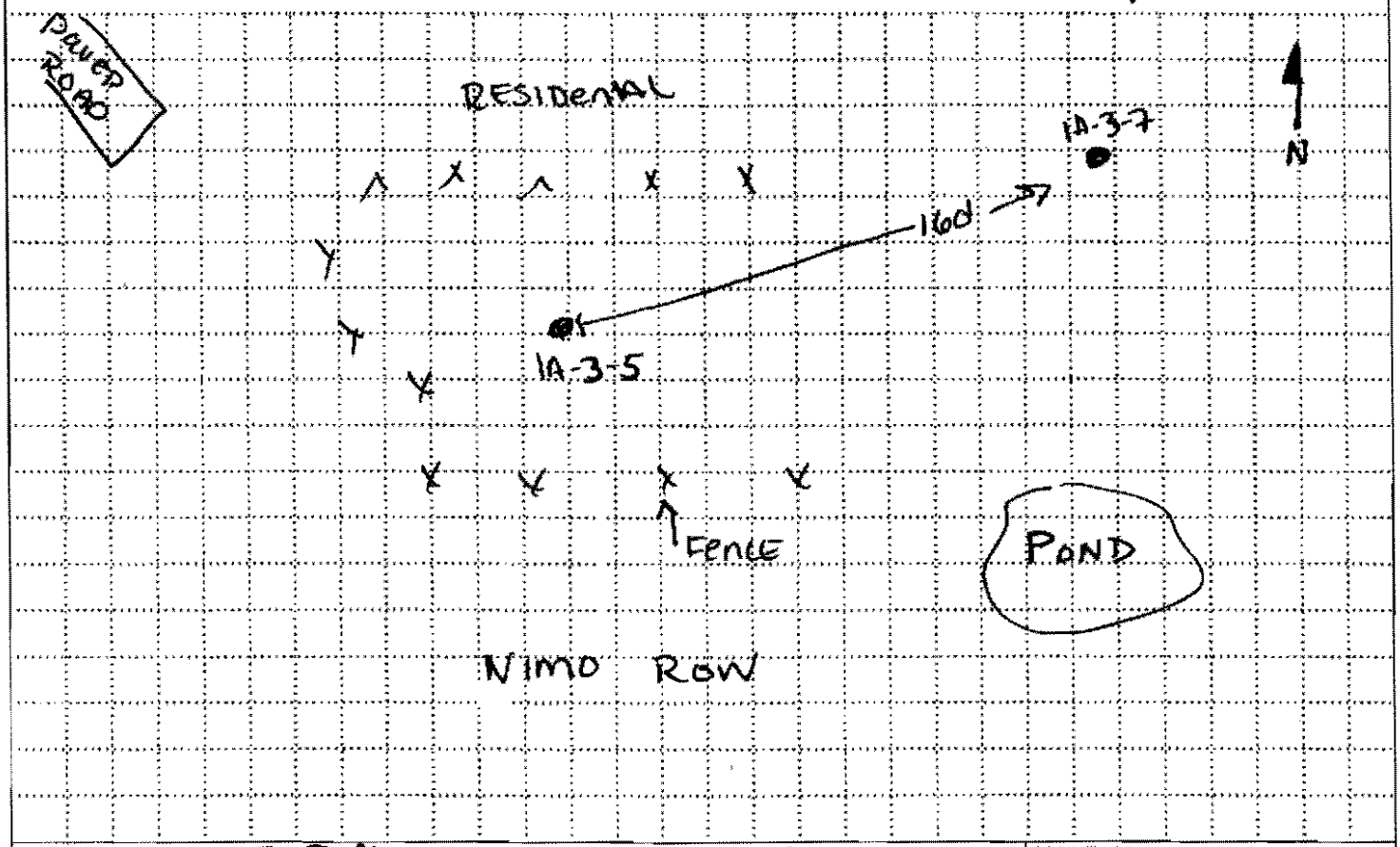
DISTRICT	Buffalo
HOLE NUMBER	1A-3-5
1. COMPANY NAME	ENSOL, INC.
2. DRILLING CONTRACTOR	ZEBRA ENVIRONMENTAL CORP.
SHEET / SHEETS	1 OF 3
3. PROJECT	TOWN OF TONAWANDA LF OPERABLE UNIT - BUFFALO DISTRICT FUSRAP PROJECT
4. LOCATION	TONAWANDA LF, TONAWANDA, NY
5. NAME OF DRILLER	DOMONIC PINO
6. MANUFACTURER'S DESIGNATION OF DRILL	GEOPROBE 7720DT
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	3 1/4" CORE W/ PLASTIC SLEEVES (4')
8. HOLE LOCATION	N 1092474 E 415949.6
9. SURFACE ELEVATION	606.477
10. DATE STARTED	2-15-10 11:00am
11. DATE COMPLETED	2-15-10 12:18pm
12. OVERBURDEN THICKNESS	1.4'
15. DEPTH GROUNDWATER ENCOUNTERED	2.2'
13. DEPTH DRILLED INTO ROCK	N/A
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	N/A
14. TOTAL DEPTH OF HOLE	15.0'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	N/A

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP/TOTAL	TCLP/TOTAL	SVOC-TCLP/TOTAL	PCB-TCLP/TOTAL	PCB-TOTAL	N/A %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
CUTTINGS DRUMMED	-	-	-	

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT TON. LF - BUFFALO DISTRICT FUSRAP PROJECT HOLE NO. 1A-3-5

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: WA-3-5

PROJECT:

INSPECTOR: K Hoelscher

SHEET 2 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B-	GEOTECH SAMPLE OR CORE BOX NO. (e) γ	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h) B-/γ 1-min static count
	0	DARK brown clayey Topsoil w/organic matter and rootlets, stiff, frozen	60	7434	See Notes		Top 6" 50/7019
	1		100	7600			
		Reddish-brown silt, clay, trace of organic material, coarse sand, fine sand, desiccation cracks w/ gray silt infilling to 8.2' soft, moist-very wet (CL)	60	7776			Native: 55/7084
	2						
	3		60	7735			Saturated 69/7002
	4		80	7467			Chemical 38/6760
	5		100	7559			High γ 59/6782
	6		60	7540			
	7		80	7435			
	8		60	7540			
	9		100	6823			
			60	7611			
	10		80	7057			

PROJECT

HOLE NO. WA-3-5

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER 1A 3-5

PROJECT

INSPECTOR

SHEET 3 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e) γ	ANALYTICAL SAMPLE NO. (f)	SLOW COUNT (g)	REMARKS B+/γ 1 min static count
	10	CONTINUED FROM PREVIOUS PAGE	100	7083	SEE NOTES		
	11		100	7341			
	12		80	7456			
	13		60	7546			
	14		100	7378			High B⁻ 71/6864
	15	BOTTOM OF BORING @ 15.0'					
	16	NOTE: Weather, overcast 23°F					
	17	Sample I.D. (RAD ANALYSIS) TLS-SS-1A3-5 (0.0-0.5') 021510	TOP 6" Native				
		TLS-SB-1A3-5 (.8-1.8') 021510	Saturated				
		TLS-SB-1A3-5 (2.2-3.2') 021510					
		TLS-SB-1A3-5 (14-15') 021510					
	18	TLS-SB-1A3-5 (4-5') 021510	High B⁻				
		TLS-SB-1A3-5 (3-4') 021510	High γ				
			Chemical				
		Gamma Counts/min.					
	19	PID Readings = 0 ppm					
	20						

PROJECT

HOLE NO. 1A-3-5

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

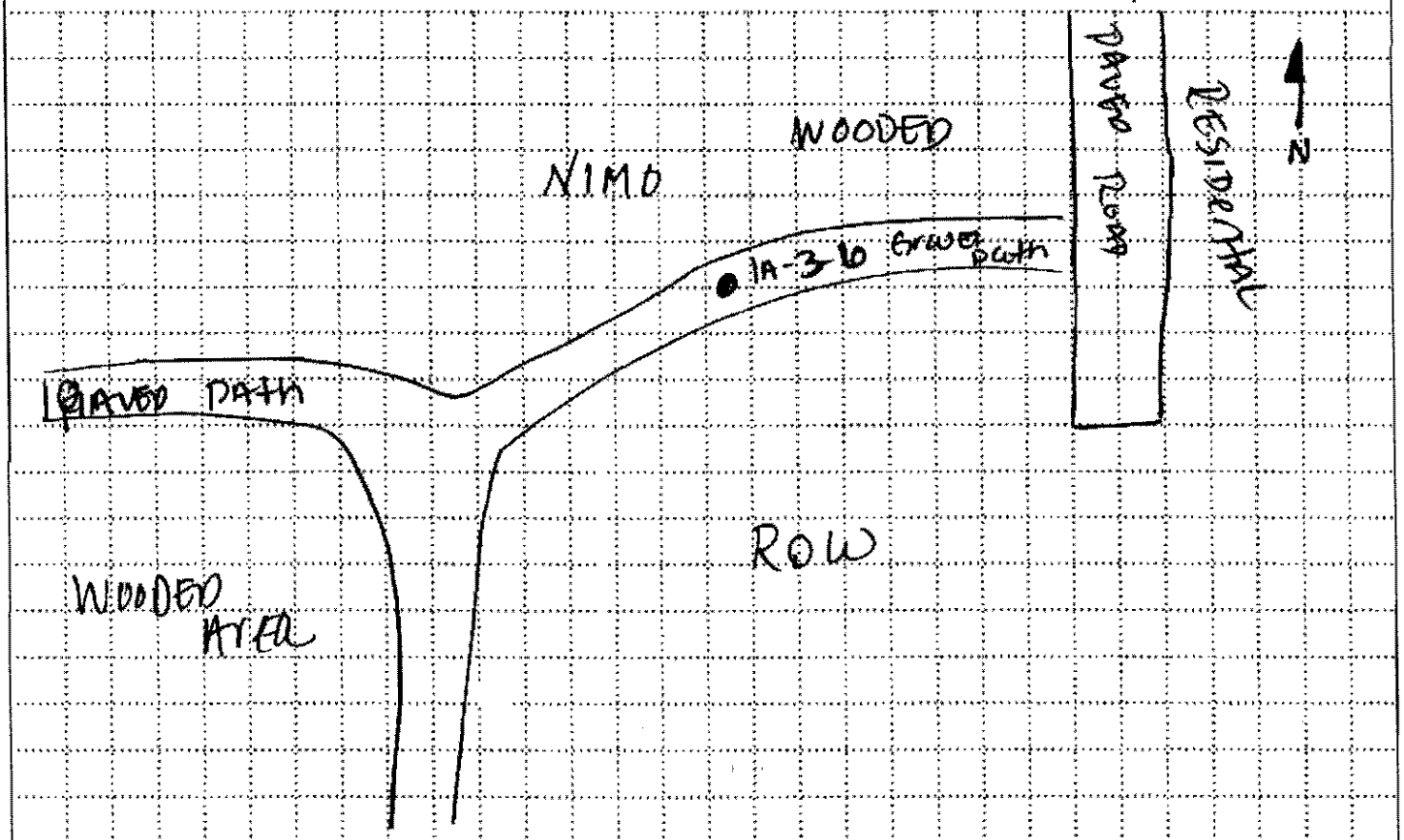
DISTRICT: Buffalo	HOLE NUMBER: 1A-3-6	
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 3 SHEETS
3. PROJECT: TOWN OF TONAWANDA LF OPERABLE UNIT - BUFFALO DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: Domonic Pino	6. MANUFACTURER'S DESIGNATION OF DRILL: Geoprobe 7720DT	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/2 Core w/ plastic sleeves (4')	8. HOLE LOCATION: N 1092356 E 415417.6	
	9. SURFACE ELEVATION: 598.047	
	10. DATE STARTED: 2/12/10 900am	11. DATE COMPLETED: 2/12/10 1010am
12. OVERBURDEN THICKNESS: 1.8'	15. DEPTH GROUNDWATER ENCOUNTERED: NOT Encountered	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 13.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
-	-	-	-	-	-	N/A %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23
CUTTINGS DRUMMED	-	-	-	[redacted]

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON. LF - Buffalo DISTRICT FUSRAP PROJECT — HOLE NO. 1A-3-6

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR K Hoelscher

HOLE NUMBER 1A-3-6

SHEET 2 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B-	GEOTECH SAMPLE OR CORE BOX NO. (e) J	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B-/J 1-Min. static count
	0	CRUSHED STONE, Asphalt, loose, FROZEN	60	6312	SEE NOTES		TopL" 46/5670
	1		60	6657			
			100	6711			
	2	Reddish-Brown silt + Clay w/trace course SAND & FINE gravel (<2"), gray mottling + ver. DESICCATION CRACKS w/ silt INFILLING, MED. STIFF, moist (CL)	120	6636			
	3		80	6639			NATIVE 59/6278
	4		80	6280			
	5		120	6517			High B- 65/6090
	6		80	6960			Saturated: 47/6062 Subsitnk.
	7		80	6747			
	8		120	6526			
	9		100	6330			
	10						

PROJECT

HOLE NO 1A-3-6

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

IN[redacted]

HOLE NUMBER 1A-3-6

SHEET 3 OF 3

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e) γ	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B-/γ 1-Min. Static count
	10	CONTINUED FROM PREVIOUS PAGE	60	6892	See NOTES		
	11		100	7187			High γ 45/6095
	12		80	6451			
	13	Bottom of Boring 13.0'					
	14	NOTE: Sunny, 25°F					
		Sample ID (Rad. Analysis)					
	15	TLJ-SS-1A3-6(0.0-0.5)021210 =	Rep 64				
		TLJ-SB-1A3-6(3.1-4.1)021210	Native				
		TLJ-SB-1A3-6(5'-6') 021210	High B-				
		TLJ-SB-1A3-6(6'-7') 021210	Saturated	Sub. (see NOTES)			
	16	TLJ-SB-1A3-6(11'-12') 021210	High γ				
		Gamma readings count/min.					
	17	PID readings: 0ppm					
		*Saturated zone was selected by HP					
	18						
	19						
	20						

PROJECT

HOLE NO. 1A-3-6

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

DISTRICT	Buffalo
HOLE NUMBER	1A3-7
1. COMPANY NAME	ENSOL, INC.
2. DRILLING CONTRACTOR	ZEBRA ENVIRONMENTAL CORP.
SHEET / SHEETS	1 OF 3
3. PROJECT	TOWN OF TONAWANDA LF OPERABLE UNIT - BUFFALO DISTRICT FUSRAP PROJECT
4. LOCATION	TONAWANDA LF, TONAWANDA, NY
5. NAME OF DRILLER	DEMONIC DINO
6. MANUFACTURER'S DESIGNATION OF DRILL	GEOPROBE 7720DT
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	3 3/4" CORE W/ PLASTIC SLEEVES (4')
8. HOLE LOCATION	N 1092577 E 41161081
9. SURFACE ELEVATION	606.392
10. DATE STARTED	2-15-10 1:50 pm
11. DATE COMPLETED	2-15-10 3:20 pm
12. OVERBURDEN THICKNESS	2.6'
15. DEPTH GROUNDWATER ENCOUNTERED	1.5'
13. DEPTH DRILLED INTO ROCK	N/A
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	N/A
14. TOTAL DEPTH OF HOLE	12.0'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	N/A

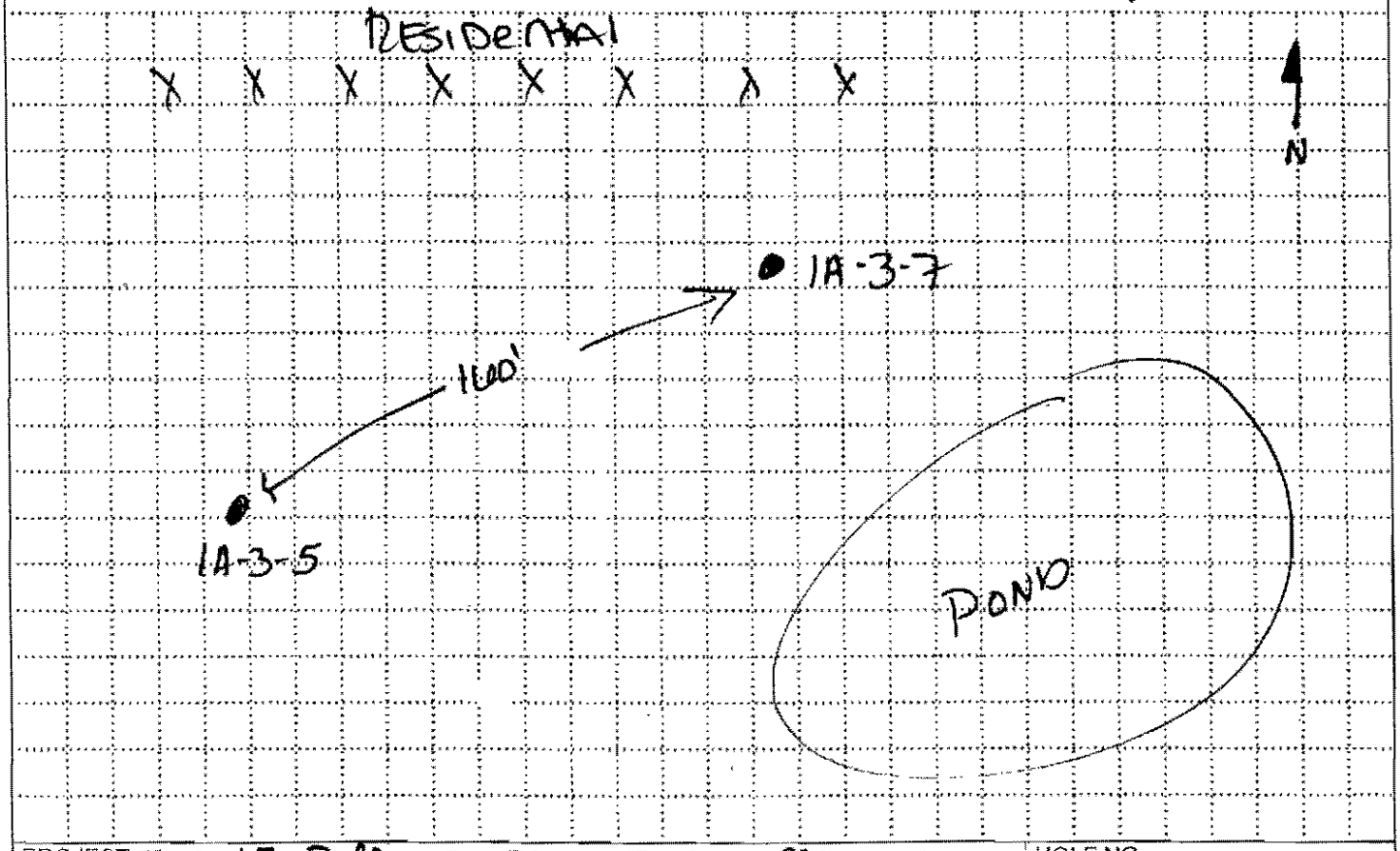
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP / TOTAL	TCLP / TOTAL	SVOC TCLP / TOTAL	PESTICIDE TCLP / TOTAL	PCB - TOTAL	N/A %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)
CUTTINGS DRUMMED	-	-	-

[redacted]

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT TON. LF - BUFFALO DISTRICT FUSRAP PROJECT HOLE NO. 1A-3-7

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR Kitoelscher

HOLE NUMBER 1A-3-7

SHEET 2 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) PS	GEOTECH SAMPLE OR CORE BOX NO. (e) γ	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS PS/γ 1min static count
	0	TOPSOIL, DARK-BROWN ORGANIC MATERIAL, ROOTLETS, SAND, FROZEN SHEE-WET	80	5977	SEE NOTES		57/5679 = TOP 6"
	1		80	5850			
		▼					Saturated: 41/5719
	2		80	6210			
							Native 42/5923
	3	REDISH-BROWN SILT, CLAY, COURSE SAND, DESICCATION CRACKS W/ GRAY INFILLING, WET, SOFT (CL)	120	6129			
	4		60	6395			High γ 60/5736
			100	6616			
	5		140	6030			High B⁻ 54/5989 -Recovery 51"
	6		60	6014			Chemical 75/5886
	7		100	6194			
	8		80	6279			
	9		80	6138			
	10		60	6543			-Recovery 53"

PROJECT

HOLE NO 1A-3-7

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR: K Hoelscher

HOLE NUMBER: 1A3-7

SHEET 3 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) β⁻	GEOTECH SAMPLE OR CORE BOX NO. (e) γ	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h) β⁻/γ
	10	Continue from previous page			See Notes		1-Min static count
	11		60	6107			
			100	5739			
	12	Bottom of Boring @ 12.0'					
	13	NOTES:					
		Weather: Overcast, 24°F					
		Sample I.D. (Rad. Analysis)					
	14	TLS-SS-1A3-7 (0.0-0.5') 021510	6"				
		TLS-SB-1A3-7 (2.1-3.1') 021510	Native				
	15	TLS-SB-1A3-7 (1.2') 021570	Saturated				
		TLS-SB-1A3-7 (4.3-5.3') 021570	High β⁻				— Recovery 30"
		TLS-SB-1A3-7 (3.3-4.3') 021570	High γ (Duplicate)				
	16	TLS-SB-1A3-7 (5-6') 021570	Chemical				
		Gamma Reading = Counts/Min.					
	17						
		PID Reading = 0ppm					
	18						
	19						
	20						

PROJECT

HOLE NO. 1A-3-7

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

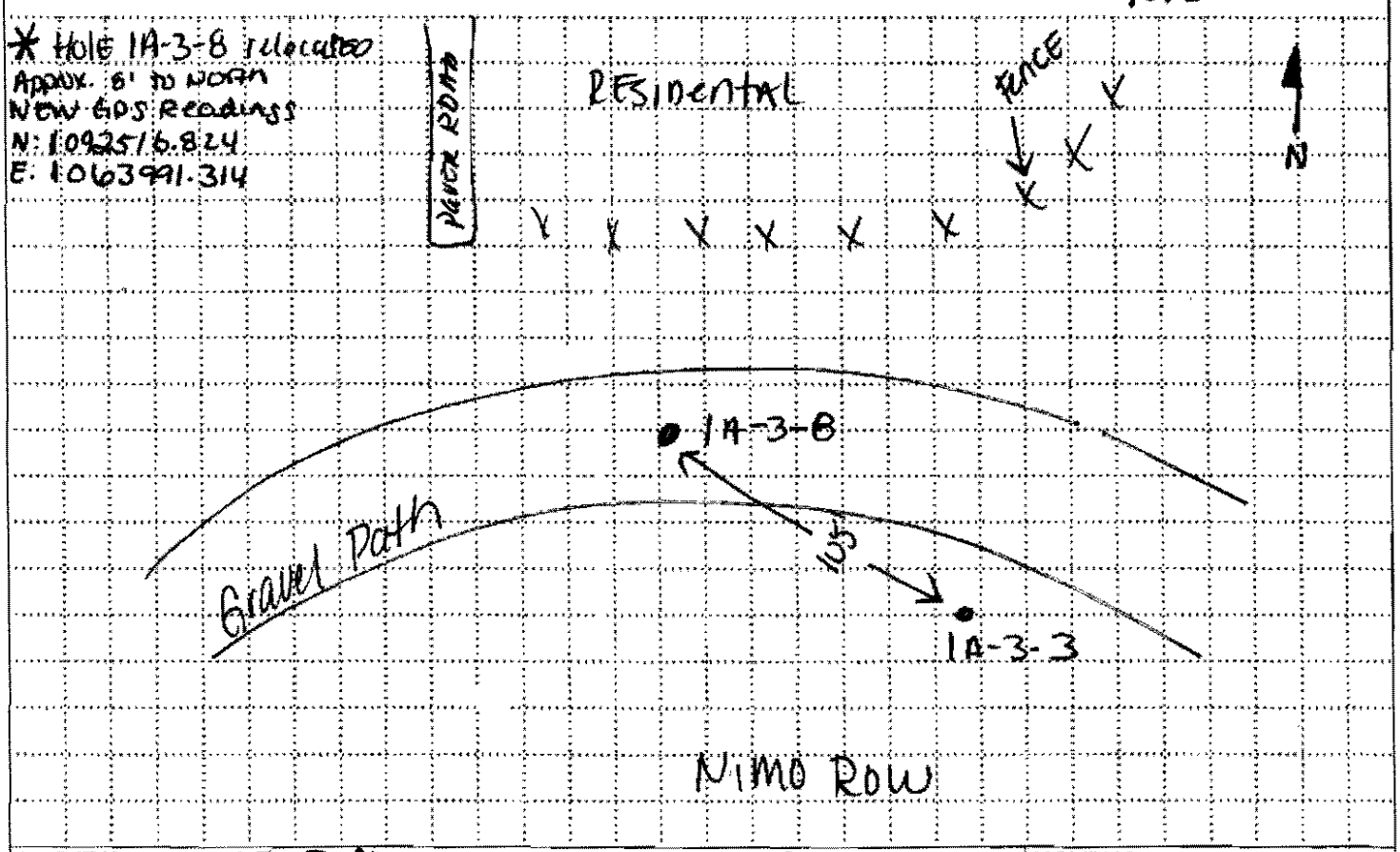
DISTRICT: BUFFALO		HOLE NUMBER: 1A-3-8
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 3 SHEETS
3. PROJECT: TOWN OF TONAWANDA LF OPERABLE UNIT - BUFFALO DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: DOMONIC PINO	6. MANUFACTURER'S DESIGNATION OF DRILL: GEOPROBE 7720DT	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CORE W/ PLASTIC SLEEVES (5')	8. HOLE LOCATION: N 1092459 E 4156376	
	9. SURFACE ELEVATION: 602.374	
	10. DATE STARTED: 2-12-10 10:35am	11. DATE COMPLETED: 2-12-10 11:56am
12. OVERBURDEN THICKNESS: 0.8'	15. DEPTH GROUNDWATER ENCOUNTERED: NOT ENCOUNTERED	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 14.2'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
—	—	—	—	—	—	[redacted]

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	[redacted]
CUTTINGS DRUMMED	-	-	-	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON. LF - BUFFALO DISTRICT FUSRAP PROJECT — HOLE NO. 1A-3-8

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR K Hoelscher

HOLE NUMBER 1A-3-8

SHEET 2 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS B⁻	GEOTECH SAMPLE OR CORE BOX NO. γ	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B⁻/γ 1-Min. Static Count
	0	Fill: gravel, course/fine sand, topsoil, stiff, frozen	140	6739	See Notes		Top 6" 72/6472
	1	Reddish-brown silt clay, course sand, gravel (<1"), vertical desiccation cracks w/ gray infilling, stiff, moist (CL)	120	6202			Notice 42/6338
	2		100	6617			
	3		60	6653			
	4		100	6607			
	5		100	6724			-Recovery 60"
	6		100	6714			
	7		120	6626			High B⁻ 63/6355
	8		100	6911			Saturated Subs. tok 56/6354
	9		80	7299			High γ 62/6432
	10	No Recovery	100	6361			-Recovery 52.9"

PROJECT

HOLE NO 1A-3-8

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR

HOLE NUMBER 1A-3-8

SHEET 3 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS ~~β~~ B⁻	GEOTECH SAMPLE OR CORE BOX NO. ~~α~~ γ	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B'/γ 1MIN Static count
	10	NO RECOVERY	NO RECOVERY		SEE NOTES		
	11	Continued from previous page	80	7128			Duplicate 62/6202
	12	NO RECOVERY	NO RECOVERY				
	13	Continued from above	120	6614			
	14		80	6621			
	15	Bottom of Boring @ 14.2' Note: Sunny, 230F -Sample I.D. (RAD. Analysis)					-Recovery 36.8"
	16	TLS-SS-1A-3-8 (0.0-0.5') 021210 TLS-SB-1A-3-8 (6.5-11.5) 021210 TLS-SB-1A 3-8 (7'-8') 021210 TLS-SB 1A 3-8 (6'-7') 021210	Top 6" Native saturation	(see note)			
	17	TLS-SB 1A 3-8 (8-9') 021210 TLS-SB 1A 3-8 (10.5-11.5') 021210	High B⁻ High γ Duplicate				
	18	-Gamma reading count/min -PID reading = 0 ppm -Duplicate taken					
	19	-Saturated zone selected by HP					
	20						

PROJECT

HOLE NO. 1A-3-8

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

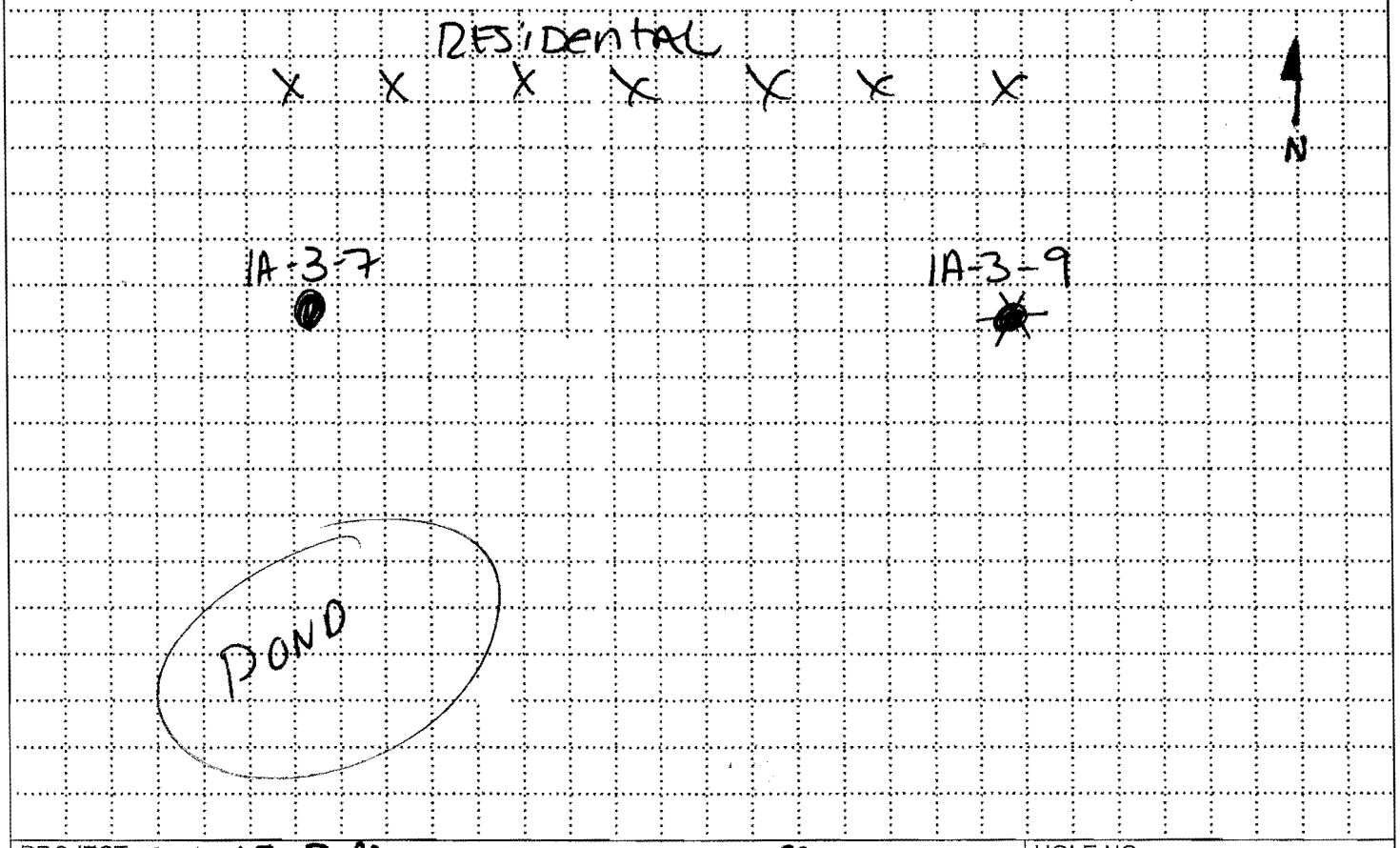
DISTRICT: Buffalo	HOLE NUMBER: 1A-3-9	
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 3 SHEETS
3. PROJECT: TOWN OF TONAWANDA LF OPERABLE UNIT - BUFFALO DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: Dominic Pino	6. MANUFACTURER'S DESIGNATION OF DRILL: Geoprobe 7720DT	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 INCH CORE W/ PLASTIC SLEEVES (4')	8. HOLE LOCATION: N 1092685 E 416345.5	
	9. SURFACE ELEVATION: 610.15'	
	10. DATE STARTED: 2-15-10 3:25pm	11. DATE COMPLETED: 2-15-10 4:30pm
12. OVERBURDEN THICKNESS: 9'	15. DEPTH GROUNDWATER ENCOUNTERED: 3.8'	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 13.7'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP/TOTAL	TCLP/TOTAL	SVOC TCLP/TOTAL	PEST TCLP/T	PCB/TOTAL	N/A %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23 [redacted]
CUTTINGS DRUMMED	-	-	-	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT	HOLE NO
TON. LF - BUFFALO DISTRICT FUSRAP PROJECT	1A-3-9

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER 1A-3-9

PROJECT

INSPECTOR K Hoelscher

SHEET 2 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B-	GEOTECH SAMPLE OR CORE BOX NO. (e) J	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B/J 1-Min. Static Count
	0	DARK-brown clayey topsoil, w/ organic material, rootlets, stiff, frozen	80	7290	SEE NOTES		TOD 6" 48/7071
	1		60	6970			Native 59/7076
	2	REDISH-BROWN SILT, clay, TRACE course sand, gravel, Desiccation cracks w/ gray silt infilling, STIFF, MOIST (CL)	80	7137			
	3		80	7682			
	4	▼	100	7558			Saturated 47/7230
			80	7495			
	5		60	7721			-Recovery 55.5"
	6		60	7222			
	7		60	7227			
	8		40	7676			
	9		80	7833			High J 60/7374
	10		See next page				-Recovery 59"

PROJECT

HOLE NO 1A-3-9

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER 1A-3-9

SHEET 3 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B-	GEOTECH SAMPLE OR CORE BOX NO. (e) γ	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B-/γ 1-min static count
	10	Continued from previous page	140	7293	SEE NOTES		High B- 57/7083
	11		60	7228			Chemical 61/7205
	12		60	7571			
	13		120	7403			
	14	Bottom of Boring @ 13.7'					-Recovery 48"
	15	Notes: Weather: Overcast, 25°F Sample I.D. (Rad. Analysis) TLS					
	16	TLS TLS TLS					
	17	TLS TLS					
	18	Gamma Readings: Counts/min. -PID Readings=0ppm					
	19						
	20						

PROJECT

HOLE NO. 1A-3-9

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

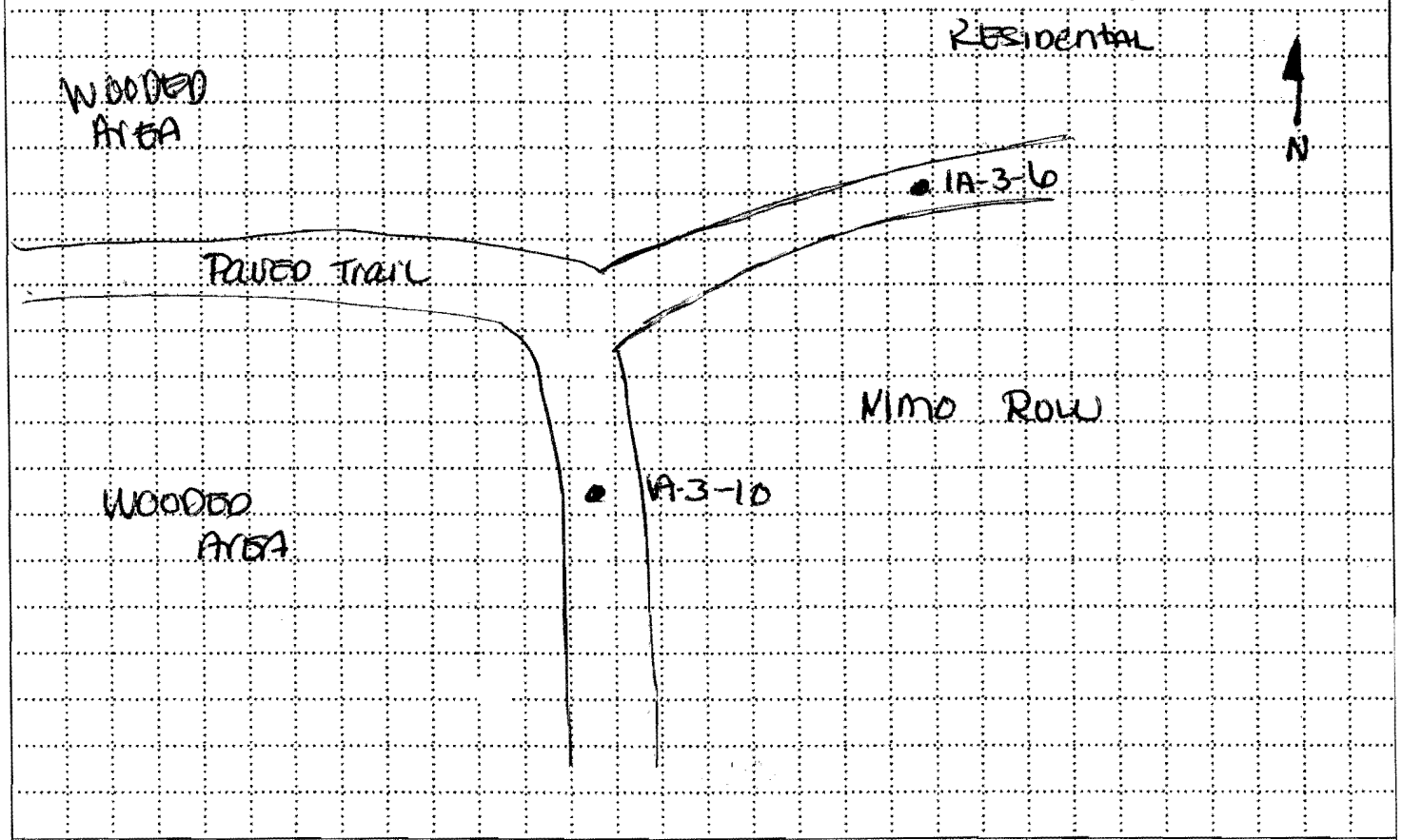
DISTRICT: Buffalo		HOLE NUMBER: 1A-3-10
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF SHEETS
3. PROJECT: TOWN OF TONAWANDA LF OPERABLE UNIT - BUFFALO DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: Dominic Pino	6. MANUFACTURER'S DESIGNATION OF DRILL: Geoprobe 7720 DT	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 2 1/4 CORING W/ PLASTIC SLEEVES (5')	8. HOLE LOCATION: N 1092195 E 415338.7	
	9. SURFACE ELEVATION: 599.53	
	10. DATE STARTED: 2-11-10 1:30pm	11. DATE COMPLETED: 2-11-10 2:30pm
12. OVERBURDEN THICKNESS: 1.9'	15. DEPTH GROUNDWATER ENCOUNTERED: NOT ENCOUNTERED	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 15.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
—	—	—	—	—	—	N/A %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	[redacted]
CUTTINGS DRUMMED	-	-	-	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON. LF - Buffalo DISTRICT FUSRAP PROJECT — HOLE NO: 1A-3-10

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: IA 3-10

PROJECT: TLF Operable Unit Buffalo District Fusepup Project

INSPECTOR: [redacted]

SHEET 2 OF 3

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B-	GEOTECH SAMPLE OR CORE BOX NO. (e) J	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
	0	Asphalt paving, stiff, frozen			See notes		Top 6" 41/5728
		gravel base, stiff, frozen	100	6434			
	1		60	6157			
	2	Reddish-brown clay + silt, trace course sand + fine gravel w/ desiccation cracks + gray infilling, stiff, moist (CL)	120	7072			high J 13/5697
	3		100	6112			Native 75/6017
	4		120	5928			
	5						-Recovery 60"
	6	No Recovery	No Recovery				
	7		140	6255			High B- 73/5739
	8		100	6524			
	9		80	6465			
	10		80	6400			-Recovery 42"

PROJECT

HOLE NO. IA 3-10

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER 1A-3-10

PROJECT TLF Operable Unit- Buffalo District FUSRAP Project

INSPECTOR [redacted]

SHEET 3 OF SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B-	GEOTECH SAMPLE OR CORE BOX NO. γ	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
	10	NO RECOVERY	NO RECOVERY				
	11						
	12	REDISH- brown clay, silt, trace course sand + fine gravel w/ desiccation cracks + gray infilling, stiff soft (CL)	80	6145			
			80	6157			
	13		80	6460			
	14		60	6452			Saturated: 57/5938 (see notes)
	15	Bottom of Boring @ 15.0'					-Recovery 47"
	16	NOTES: OVERCAST, 23°F					
		-Sample I.D (Rad. Analysis)					
		TLS-SS-1A3-10(0.0-0.6)021110	Top 6"				
	17	TLS-SB-1A3-10(2.0-3.0)021110	High γ				
		TLS-SB-1A3-10(6.5-7.5)021110	High B-				
		TLS-SB-1A3-10(13.2-14.2)021110	Native				
		TLS-SB-1A3-6(14.0-15.0)0210	Saturated	zone-selected by HP			
	18	-Gamma readings are counts/min.					
	19	- Saturated zone sample selected by HP.					
		- PID readings - 0ppm					
	20						

PROJECT

HOLE NO. 1A-3-10

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

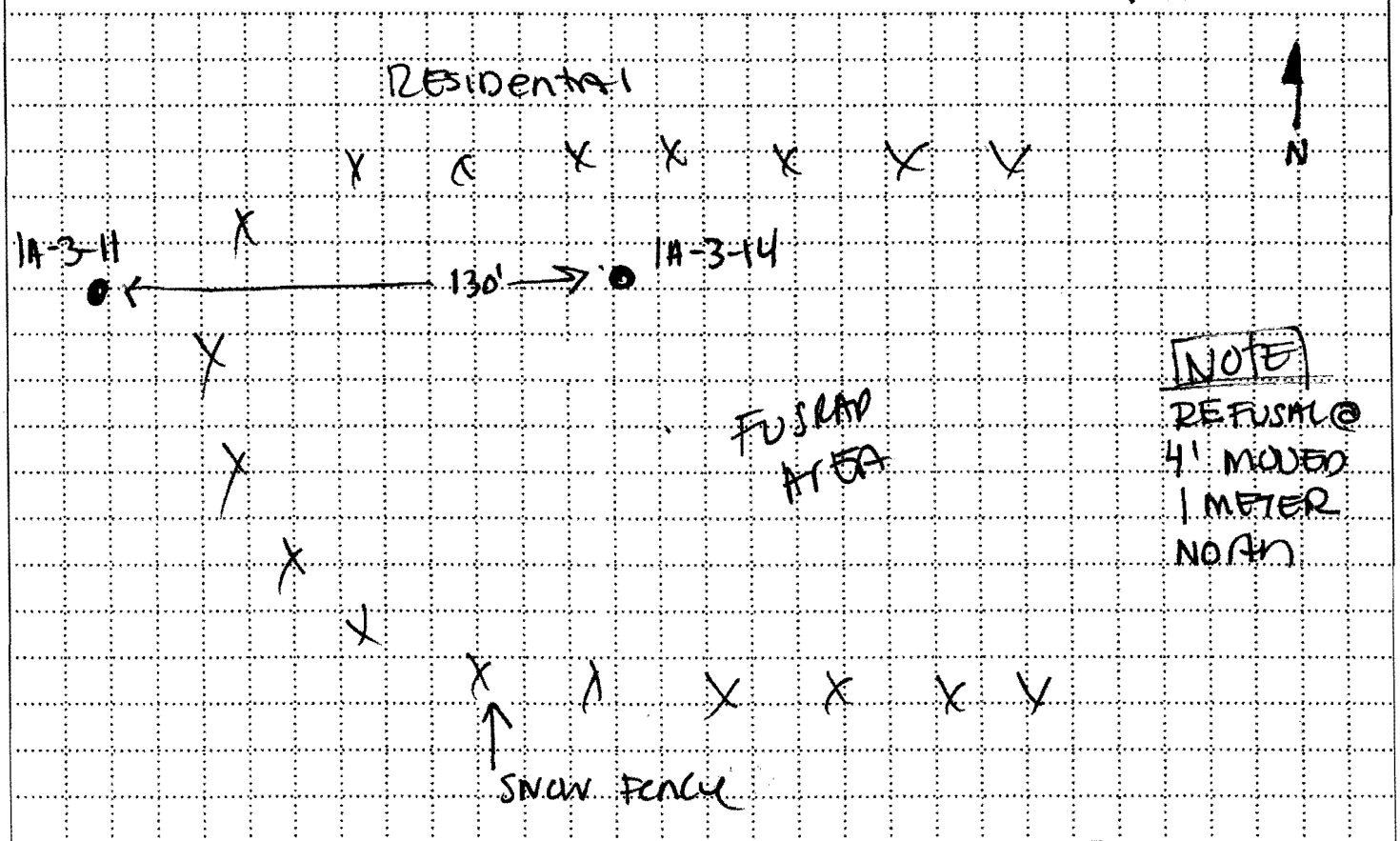
DISTRICT: Buffalo	HOLE NUMBER: 1A3-11	
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 3 SHEETS
3. PROJECT: TOWN OF TONAWANDA LF OPERABLE UNIT - BUFFALO DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: Dominic Dino	6. MANUFACTURER'S DESIGNATION OF DRILL: Geoprobe 7720DT	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: ~~2" MACRO CORE~~ 3'/4" CORE W/ PLASTIC SLEEVES (5')	8. HOLE LOCATION: N 1092798 E 416572	
	9. SURFACE ELEVATION: 611.605	
	10. DATE STARTED: 2-16-10 340pm	11. DATE COMPLETED: 02-16-10 450pm
12. OVERBURDEN THICKNESS: 7.5'	15. DEPTH GROUNDWATER ENCOUNTERED: 3.2'	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 10.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
—	—	—	—	—	—	N/A %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
CUTTINGS DRUMMED	-	-	-	[redacted]

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON. LF - BUFFALO DISTRICT FUSRAP PROJECT — HOLE NO: 1A-3-11

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: 1A 3-11

PROJECT

INSPECTOR [redacted]

SHEET 2 OF 2 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e) γ	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B-1 γ
	0	NO RECOVERY	NO RECOVERY		See NOTES		1mw. Static count
	1						
	2	Fill: Reddish-brown clay, glass, gravel, wood, loose, moist-wet	60	6971			Top 6" 51/6540
	3		40	6857			Saturated 68/6379
	4		60	6652			
	5		60	7237			High γ 53/6379 Recovery 48"
	6	NO RECOVERY	NO RECOVERY				
	7	Fill: gravel, glass, wood, loose, moist	60	6675			
	8	Reddish-brown silt + clay, some gray mottling, some sub-round course sand, soft-med. stiff moist (CL)	40	6822			Native 69/6290
	9		60	6712			
	10		60	6364			High B 57/5779 Recovery 45"

PROJECT

HOLE NO. 1A 3-11

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECT [redacted]

HOLE NUMBER 1A-3-11

SHEET 3 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) PB-	GEOTECH SAMPLE OR CORE BOX NO. (e) X	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h) B1 J 1mrstate count
	10	NOTE!					
		Weather: OVERCAST, 22°C					
	11	Sample I.D (Rad. Analysis)					
		TLS-SS-1A-3-11(1.0-1.5')021610	Top 6"				
	12	TLS-SB-1A-3-11(2.2-3.2)021610	Saturated				
		TLS-SB-1A-3-11 (4.0-5.0') 021610	High X				
		TLS-SB-1A-3-11 (7-8')021610	Native				
	13	TLS-SD-1A-3-11 (8-9')021610	High B				
		PID Reading: 0 ppm					
	14	Gamma Reading: counts/min					
		* REFUSAL @ 4'					
	15	MOVED 1 METER NORTH					
	16						
	17						
	18						
	19						
	20						

PROJECT

HOLE NO. 1A3-11

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

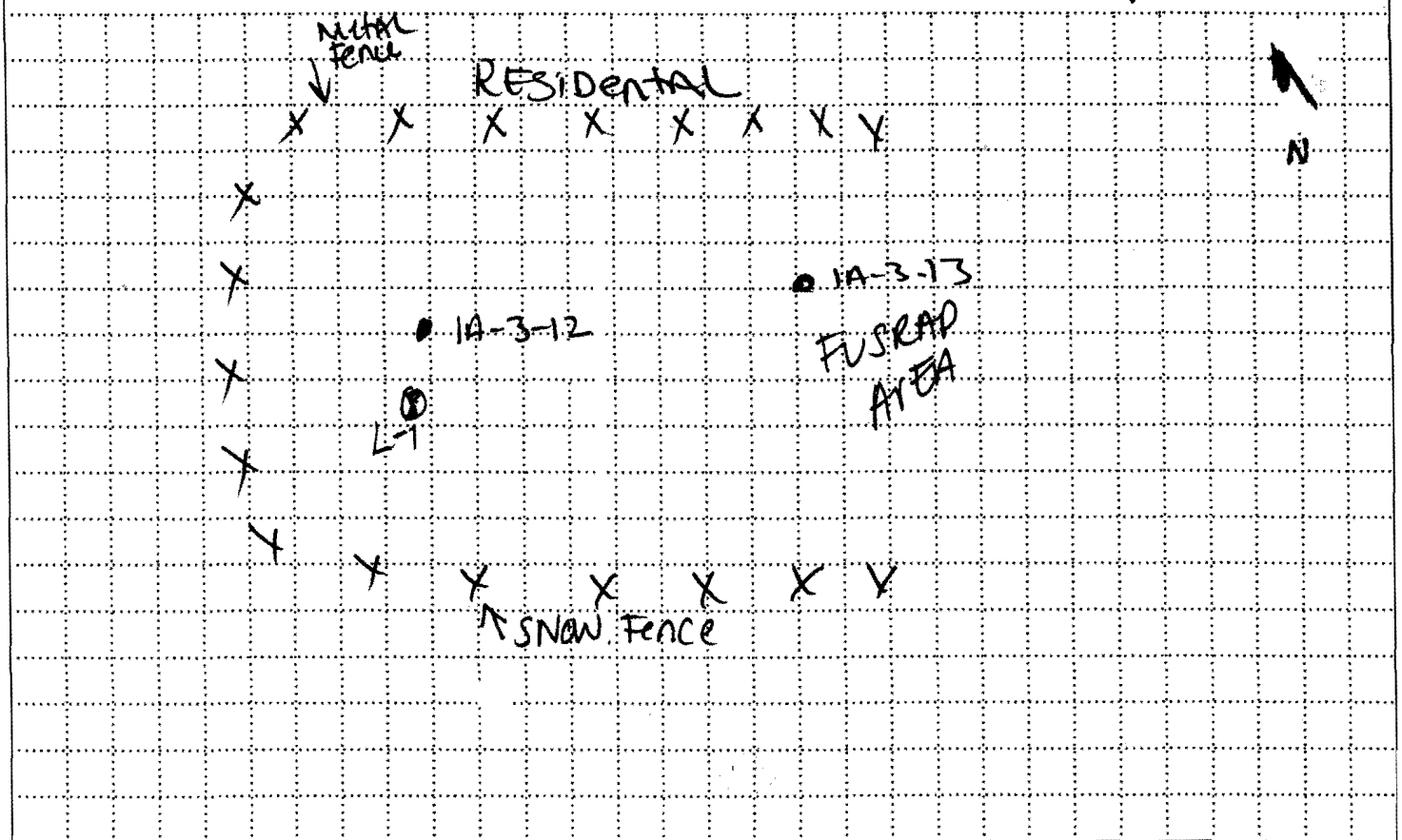
DISTRICT: Buffalo		HOLE NUMBER: 1A-3-12
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 1 SHEETS
3. PROJECT: TOWN OF TONAWANDA LF OPERABLE UNIT - BUFFALO DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: Domonic Dino	6. MANUFACTURER'S DESIGNATION OF DRILL: Geoprobe 7720 DT	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CORE W/ PLASTIC SLEEVES (5')	8. HOLE LOCATION: N 1092796 E 416674.9	
	9. SURFACE ELEVATION: 613.561	
	10. DATE STARTED: 2-16-10 9:10 am	11. DATE COMPLETED: 2-16-10 10:30 am
12. OVERBURDEN THICKNESS: 12.0'	15. DEPTH GROUNDWATER ENCOUNTERED: 9.0'	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 20.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP total	TCLP total	SVOC TCLP/total	Pest. TCLP	PCB total	N/A %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	[redacted]
CUTTINGS DRUMMED	-	-	-	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON. LF - Buffalo DISTRICT FUSRAP PROJECT — HOLE NO: 1A-3-12

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER 1A3-12

PROJECT

INSPECTOR K Hoelscher

SHEET 2 OF 4 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) PB	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B-1
	0	Fill: REDISH-brown clay, gravel, organic matter, glass, waste, loose, moist	60	5301	SEE NOTES		1min static count Top 6" 60/5018
	1		100	5304			High B 40/5152
	2		80	5201			
	3		70	4981			
	4		60	5096			
			50	5319			
	5						Recovery 52"
	6	NO RECOVERY	NO RECOVERY				
	7						
	8						
	9	Fill: REDISH-brown clay, gravel, organic matter, glass, waste loose, ~~moist - v. wet~~	60	5451			Saturated 38/5070
	10	NO RECOVERY	NO RECOVERY				Recovery 12"

PROJECT

HOLE NO. 1A3-12

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER 1A-3-12

PROJECT

INSPECTOR L Hoelscher

SHEET 3 OF 4

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e) γ	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h) B-1 γ 1-Min. static count
	10	Fill: Redish-brown clay, gravel, organic matter, glass, waste, loose moist-v.wet	60	5291	See Notes		
	11		60	5986			High γ 62/5314
	12	Redish-brown silt + clay, trace of course sand, gravel (<1"), stiff, moist-wet (CL)	60	5807			Native 60/5099
	13		80	5692			Chemical 64/5114
	14		80	5168			
	15		80	5441			-Recovery 57"
	16		60	5830			
	17		80	5086			
	18		60	5028			
	19		60	5690			
	20	Bottom of Boring @ 20'					Recovery 60"

PROJECT

HOLE NO. 1A-3-12

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: 1A-3-12

PROJECT:

INSPECTOR: K Hoelscher

SHEET 4 OF 4 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
	20	NOTE:					
		Weather: Overcast, 25°F					
	21	Sample I.D. (RAD ANALYSIS)					
		TLS-SS-1A-3-12 (0.0-0.5') 021610	Top 6"				
		TLS-SB 1A-3-12 (8.4-9.4') 021610	Saturation				
	22	TLS-SB 1A-3-12 (12-13') 021610	Native				
		TLS-SB 1A-3-12 (.5-1.5') 021610	High β-				
		TLS-SB 1A-3-12 (11-12') 021610	High γ				
	23	TLS-SB 1A-3-12 (13-14') 021610	Chemical				
		- PID reading = 0ppm					
	24	- Gamma Reading = counts/min					
	25						
	26						
	27						
	28						
	29						
	30						

PROJECT

HOLE NO. 1A-3-12

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

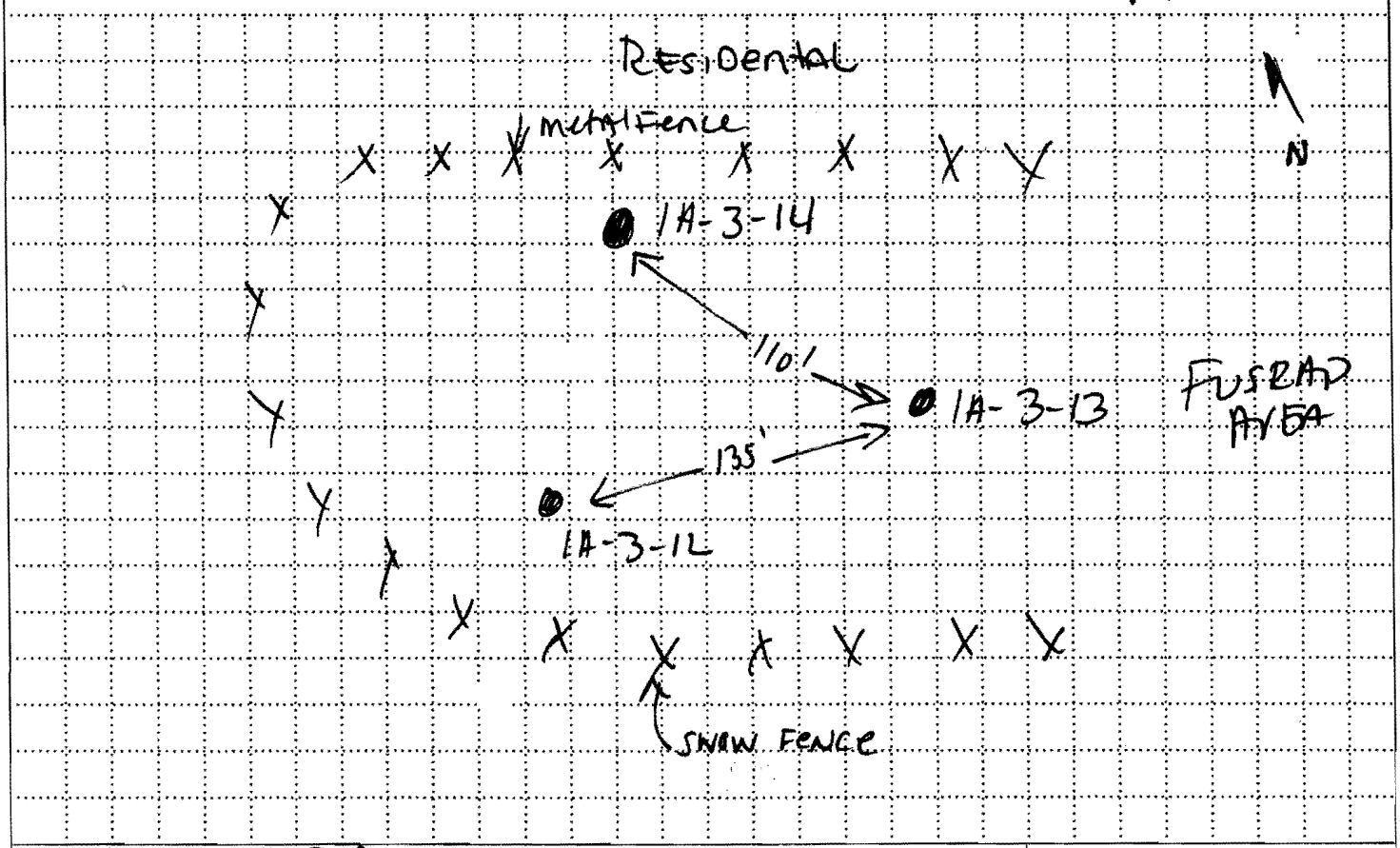
DISTRICT: Buffalo		HOLE NUMBER: 1A-3-13
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 3 SHEETS
3. PROJECT: TOWN OF TONAWANDA LF OPERABLE UNIT - BUFFALO DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: Domonic Dino	6. MANUFACTURER'S DESIGNATION OF DRILL: 7720 DT	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CORE W/ PLASTIC SLEEVES (5')	8. HOLE LOCATION: N 1092877 E 4167975	
	9. SURFACE ELEVATION: 614.901	
	10. DATE STARTED: 2-16-10 10:52 pm	11. DATE COMPLETED: 2-16-10 12:05 pm
12. OVERBURDEN THICKNESS: 4.2'	15. DEPTH GROUNDWATER ENCOUNTERED: 12.4'	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 13.5'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP/TOTAL	TCLP/TOTAL	SVOC TCLP TOTAL	PEST. TOTAL	PCB TOTAL	N/A %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	[redacted]
CUTTINGS DRUMMED	-	-	-	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON. LF - Buffalo DISTRICT FUSRAP PROJECT — HOLE NO: 1A 3-13

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR K Hoelscher

HOLE NUMBER 1A-3-13

SHEET 2 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B-	GEOTECH SAMPLE OR CORE BOX NO. (e) γ	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B-/γ 1-min spatic count
	0	Fill: Redish brown clayey Topsoil w/organic matter, glass, medium, stiff	110	6023	SEE NOTES		Top 6" 59/5842
	1		70	6310			
	2		60	6449			
	3		110	6795			
	4		110	6891			
	5	Redish-brown silt + Clay w/course sand, Desication cracks w/gray infilling, stiff moist (CL)	70	6741			Native 75/6237 Recovery 60"
	6		140	6873			High B 53/6275
	7		100	6817			
	8		60	7401			High γ 62/6372
	9		80	6874			
	10		140	6644			Chemical 65/6045 Recovery 57"

PROJECT

HOLE NO. 1A-3-13

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR Khloe Ischer

HOLE NUMBER 1A-3-13

SHEET 3 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) PB	GEOTECH SAMPLE OR CORE BOX NO. (e) γ	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h) B1/γ
	10	Continue from previous page			See Note		1-Min. static count
	11		120	6841			
	12		100	6420			
							Saturated 83/5857
	13		80	6836			
			80	6967			
	14	Bottom of Borehole @ 14.0'					-recovery 48"
		Note:					
		Weather: overcast, 25°F					
	15	Sample I.D. (Rad. Analysis)					
		TLS-SB-1A3-13(0.0-0.5)021610	Top 6"				
		TLS-SB 1A3-13(12-13')021610	saturated				
	16	TLS-SB-1A3-13 (3.6-4.6')021610	Native				
		TLS-SB-1A3-13(5-6')021610	High B-				
	17	TLS-SB-1A3-13(7-8')021610	High γ				
		TLS-SB-1A3-13(9.2-10.2)021610	Chemical				
		PID Readings = 0 ppm					
	18	Gamma Reading = count/Min					
	19						
	20						

PROJECT

HOLE NO. 1A-3-13

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

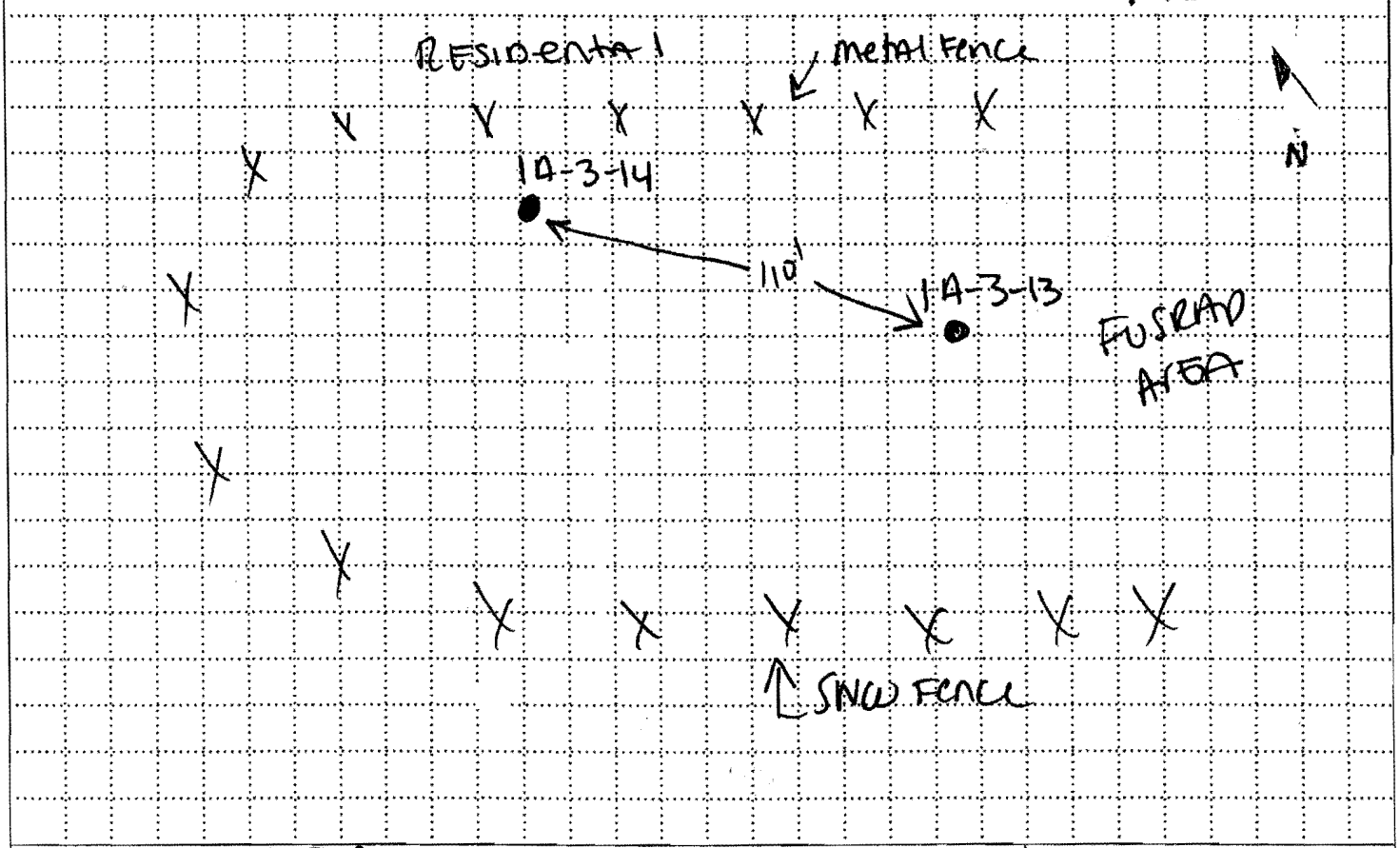
DISTRICT: Buffalo		HOLE NUMBER: 1A-3-14
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 3 SHEETS
3. PROJECT: TOWN OF TONAWANDA LF OPERABLE UNIT - BUFFALO DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: Domonic Dino	6. MANUFACTURER'S DESIGNATION OF DRILL: Geoprobe 7720DT	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" ROPE W/ PLASTIC SLEEVES (5')	8. HOLE LOCATION: N 1092875 E 416680.9	
	9. SURFACE ELEVATION: 613.356	
	10. DATE STARTED: 2-16-10 2:35 pm	11. DATE COMPLETED: 2-16-10 3:40pm
12. OVERBURDEN THICKNESS: 1.3'	15. DEPTH GROUNDWATER ENCOUNTERED: 1.7'	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 9.5'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP TOTAL	TCLP TOTAL	SVOC TCLP TOTAL	Pest. Total	PCB total	N/A %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. [redacted]
CUTTINGS DRUMMED	-	-	-	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON. LF - Buffalo DISTRICT FUSRAP PROJECT | HOLE NO. 1A-3-14

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER 1A3-14

SHEET 2 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX NO.	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS 1min static count
	0	DARK-brown topsoil w/organics, FINE SAND, ROOTLETS, STIFF, moist	70	6351	SEE NOTE		TCD 6" 64/5663
	1	REDISH-brown silt, clay w/ TRACE FINE SAND, ROOTLETS, STIFF, MOIST	70	6378			Native 51/5802
	2	▼ REDISH-brown silt + clay w/ trace fine + course sand, med, gravel, stiff, moist (CL)	60	6300			Saturated: 49/5898
	3		40	6516			
	4		70	6255			
			100	5827			
	5		40	5880			
	6		50	6201			
	7		40	6025			
	8		100	5878			Chemical 46/5929
	9		120	6453			HighB- 42/5699
			50	6640			High J 47/5640
	10	Bottom of Boring @ 9.5'					

PROJECT

HOLE NO 1A3-14

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: 1A 3-14

PROJECT:

INSPECTOR: K Hoelscher

SHEET 3 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
	10	NOTE:					
		WEATHER: OVERCAST, 28°F					
	11	Sample I.D. (RAD ANALYSIS)					
		TLS-SS-1A-3-14 (0.0-0.5') 021610	Top 6"				
	12	TLS-SB-1A-3-14 (.5-1.5') 021610	Native				
		TLS-SB-1A-3-14 (1.5-2.5') 021610	Saturated				
		TLS-SB-1A-3-14 (6.7-7.5') 021610	Chemical				
	13	TLS-SB-1A-3-14 (7.5-8.5') 021610	High γ				
		TLS-SB-1A-3-14 (8.5-9.5') 021610	High β⁻				
	14	PID READINGS: 0ppm					
		Gamma=60/min					
	15						
	16						
	17						
	18						
	19						
	20						

PROJECT

HOLE NO. 1A 3-14

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

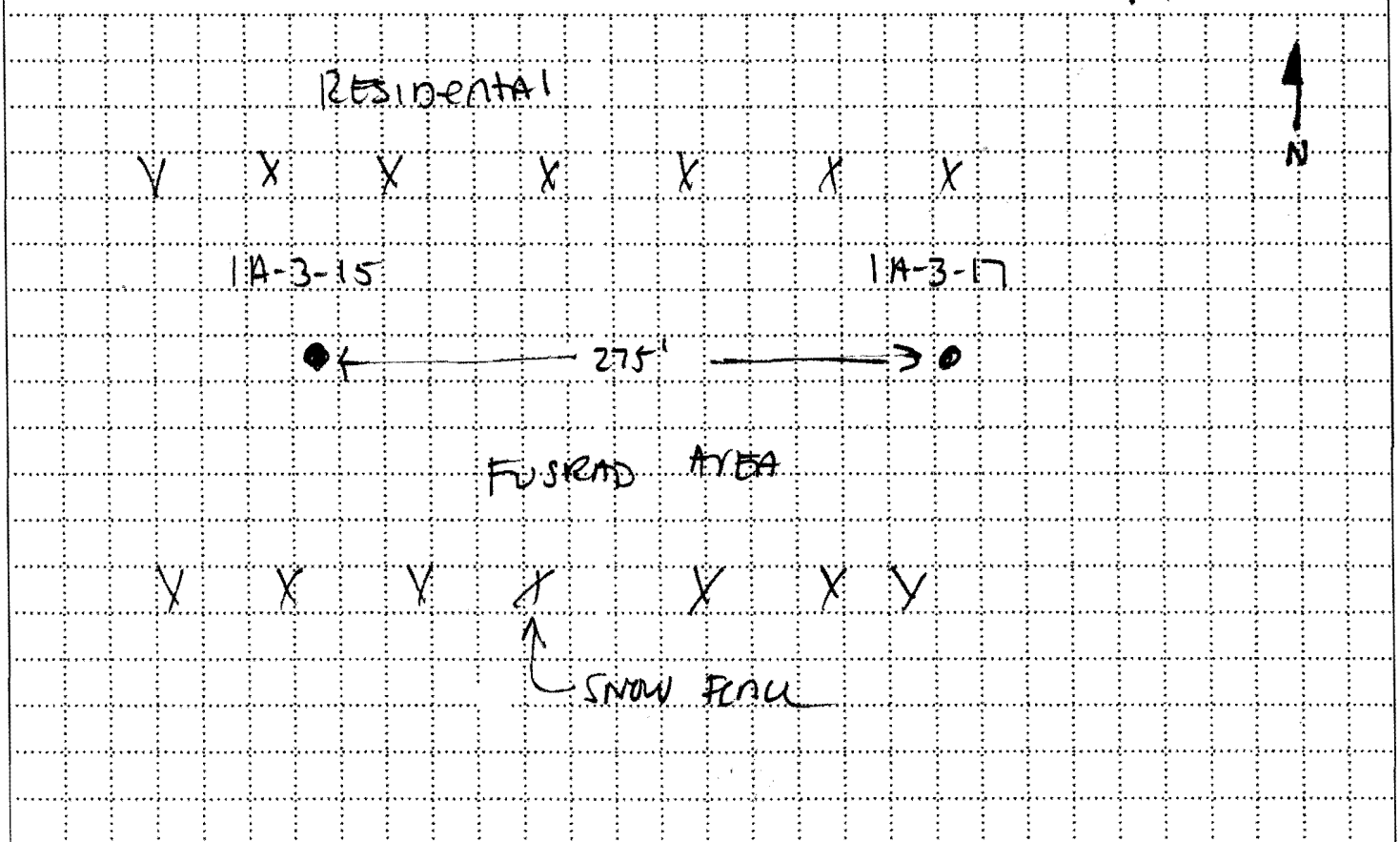
DISTRICT	Buffalo
HOLE NUMBER	1A-3-15
1. COMPANY NAME	ENSOL, INC.
2. DRILLING CONTRACTOR	ZEBRA ENVIRONMENTAL CORP.
SHEET / SHEETS	1 OF 3
3. PROJECT	TOWN OF TONAWANDA LF OPERABLE UNIT - BUFFALO DISTRICT FUSRAP PROJECT
4. LOCATION	TONAWANDA LF, TONAWANDA, NY
5. NAME OF DRILLER	Domonic Pino
6. MANUFACTURER'S DESIGNATION OF DRILL	Geoprobe 7720DT
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	3 1/4" CORE W/ PLASTIC SLEEVES (5')
8. HOLE LOCATION	N 1092987 E 416906.3
9. SURFACE ELEVATION	614.497
10. DATE STARTED	2-17-10 9:30AM
11. DATE COMPLETED	2-17-10 10:30AM
12. OVERBURDEN THICKNESS	1.2'
15. DEPTH GROUNDWATER ENCOUNTERED	1.8'
13. DEPTH DRILLED INTO ROCK	N/A
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	N/A
14. TOTAL DEPTH OF HOLE	10.6'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	N/A

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP/TOTAL	TCLP/TOTAL	SVOC TCLP/TOTAL	PEST. TOTAL	PCB TOTAL	N/A %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
CUTTINGS DRUMMED	-	-	-	[redacted]

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT TON. LF - BUFFALO DISTRICT FUSRAP PROJECT HOLE NO. 1A-3-15

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT | INSPEC[redacted] | HOLE NUMBER 1A-3-15 | SHEET 2 OF SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B7/J 1 min static count
	0	DARK-BROWN clayey topsoil w/organic material, ROOTLETS, STIFF, FROZEN	40	6084	SEE NOTES		TOP 6" 49/5547
	1		60	5498			Native 70/5784
	2	REDISH brown silt + clay, fine & course SAND, some rootlets to 3.8', DESICCATION cracks w/ gray infilling, STIFF, MOIST (CL)	70	6162			
	3		60	6454			SATURATED 50/5463
	4		40	5690			
			60	6091			
	5		40	6057			High J = 51/5487 - Recovery 60"
	6		60	6069			Chemical 69/5840
	7		70	5314			
	8	REDISH-brown silt, clay w/ FINE + course SAND (<1"), MOIST, STIFF (CL)	70	6045			High B7 Duplicate 60/5435
	9		50	6021			
			40	5790			
	10	NORMINERAL Bottom of BORING @ 10.0'					Recovery 56"

PROJECT | HOLE NO. 1A-3-15

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER 1A-3-15

PROJECT

INSPECTOR

SHEET 3 OF 3

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
	10	NOTES!					
		weather: OVERCAST 22 °F					
	11	Sample I.D. (RAD. ANALYSIS)					
		TLS-SS-1A-3-15(0.0-0.5')021710	Top 6"				
		TLS-SB-1A3-15(.9-1.9)021710	Native				
	12	TLS-SB-1A3-15(2-3')021710	saturated				
		TLS-SB-1A3-15(7-8')021710	High B				
	13	TLS-SB-1A3-15(4-5')021710	High δ-	Duplicate			
		TLS-SB-1A3-15(5-6)021710	Chemical				
	14	- PID READING - 0ppm					
		Gamma Reading count/MIN.					
	15						
	16						
	17						
	18						
	19						
	20						

PROJECT

HOLE NO. 1A-3-15

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

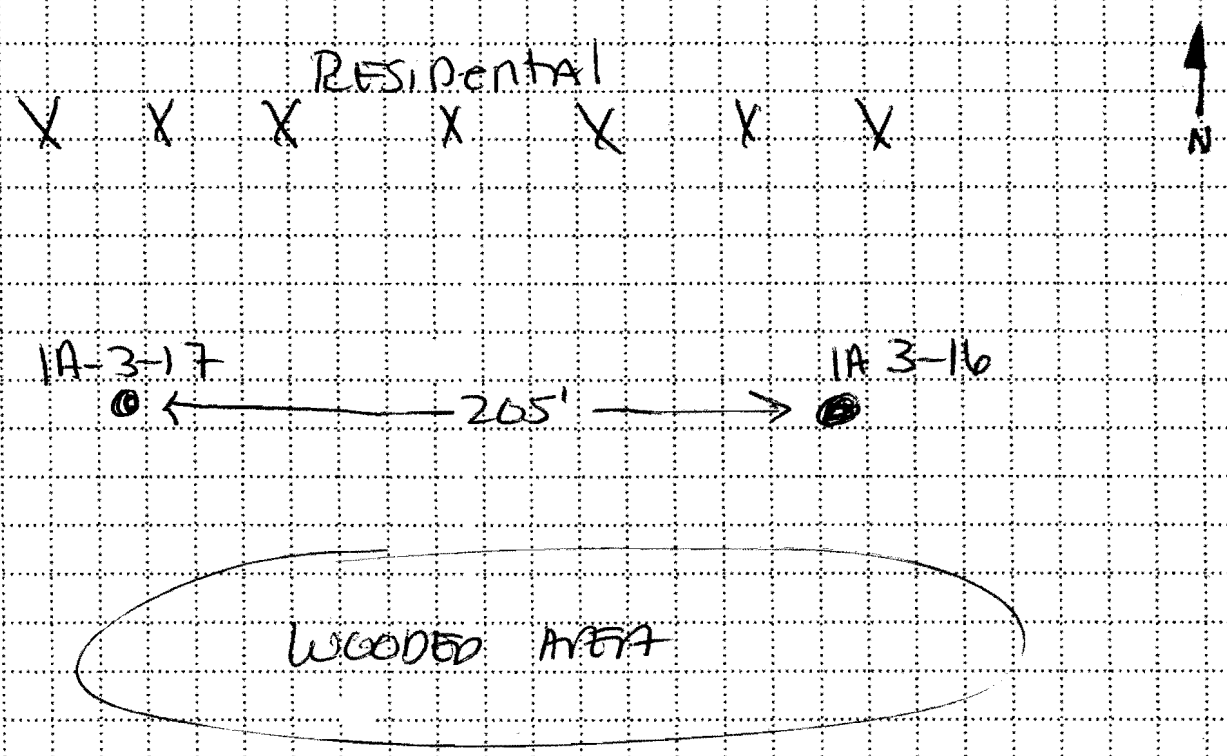
DISTRICT: Buffalo		HOLE NUMBER: 1A-3-16
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 3 SHEETS
3. PROJECT: TOWN OF TONAWANDA LF OPERABLE UNIT - BUFFALO DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: Domonic Pino	6. MANUFACTURER'S DESIGNATION OF DRILL: Geoprobe 7720DT	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CAVE W/ PLASTIC SLEEVES (5')	8. HOLE LOCATION: N 1093168 E 417323	
	9. SURFACE ELEVATION: 618.923	
	10. DATE STARTED: 2-17-10 1040 Am	11. DATE COMPLETED: 2-17-10 1155Am
12. OVERBURDEN THICKNESS: 2.7'	15. DEPTH GROUNDWATER ENCOUNTERED: 2.2'	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 9.8	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP TOTAL	TCLP TOTAL	TCLP SVOC TOTAL	Dieh TOTAL	PCB TOTAL	N/A %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23 [redacted]
CUTTINGS DRUMMED	-	-	-	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON. LF - BUFFALO DISTRICT FUSRAP PROJECT — HOLE NO: 1A 3-16

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER 1A-3-16

SHEET 2 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B-	GEOTECH SAMPLE OR CORE BOX NO. (e) γ	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS 8/8 1 min. Static count
	0	Dark-reddish brown clay and silt, organic matter, gravel, glass, waste, rootlets, soft, moist	66	6230	SEE NOTES		Top 6" 47/5720
	1		40	6076			
		Black clayey topsoil, organic, soft, moist					
	2	▼	40	6148			Saturated 65/5774
	3	Reddish-brown silt + clay, fine sand + course sand, gravel (<2"), desiccation cracks w/ gray infilling, gray mottling, stiff, moist (CL)	120	6201			Native: 59/5810
	4		100	6328			
			60	6148			
	5						Recovery 58"
			100	6208			
	6						High B- 54/5729
			60	6166			
	7						High γ 54/5780
			140	6113			
	8						
		Reddish-brown clay + silt, trace course sand + fine sub-round gravel (<2"), stiff, moist (CL)	90	6313			Chemical 62/5891
	9		130	6162			
	10	Bottom of Boring 10'					Recovery 60"

PROJECT

HOLE NO. 1A-3-16

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECT [redacted]

HOLE NUMBER 1A-3-16

SHEET 3 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
	10	NOTES:					
		WEATHER: OVERCAST, 22°F					
	11	SAMPLE ID (RAD. ANALYSIS)					
		TLS-SS-1A3-16(0.0-0.5') 021710	Top 6"				
	12	TLS-SB 1A3-16(2.7-3.1') 021710	Native				
		TLS-SB 1A3-16(1.6-2.6') 021710	Saturated				
		TLS-SB 1A3-16 (7.8-8.8') 021710	High γ				
	13	TLS-SB-1A3-16(6.8-7.8') 021710	High B-				
		TLS-SB-1A3-16(8.8-9.8') 021710	Chemical				
	14	PID Readings: 0 ppm					
		Gamma Readings: count/min					
	15						
	16						
	17						
	18						
	19						
	20						

PROJECT

HOLE NO 1A-3-16

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

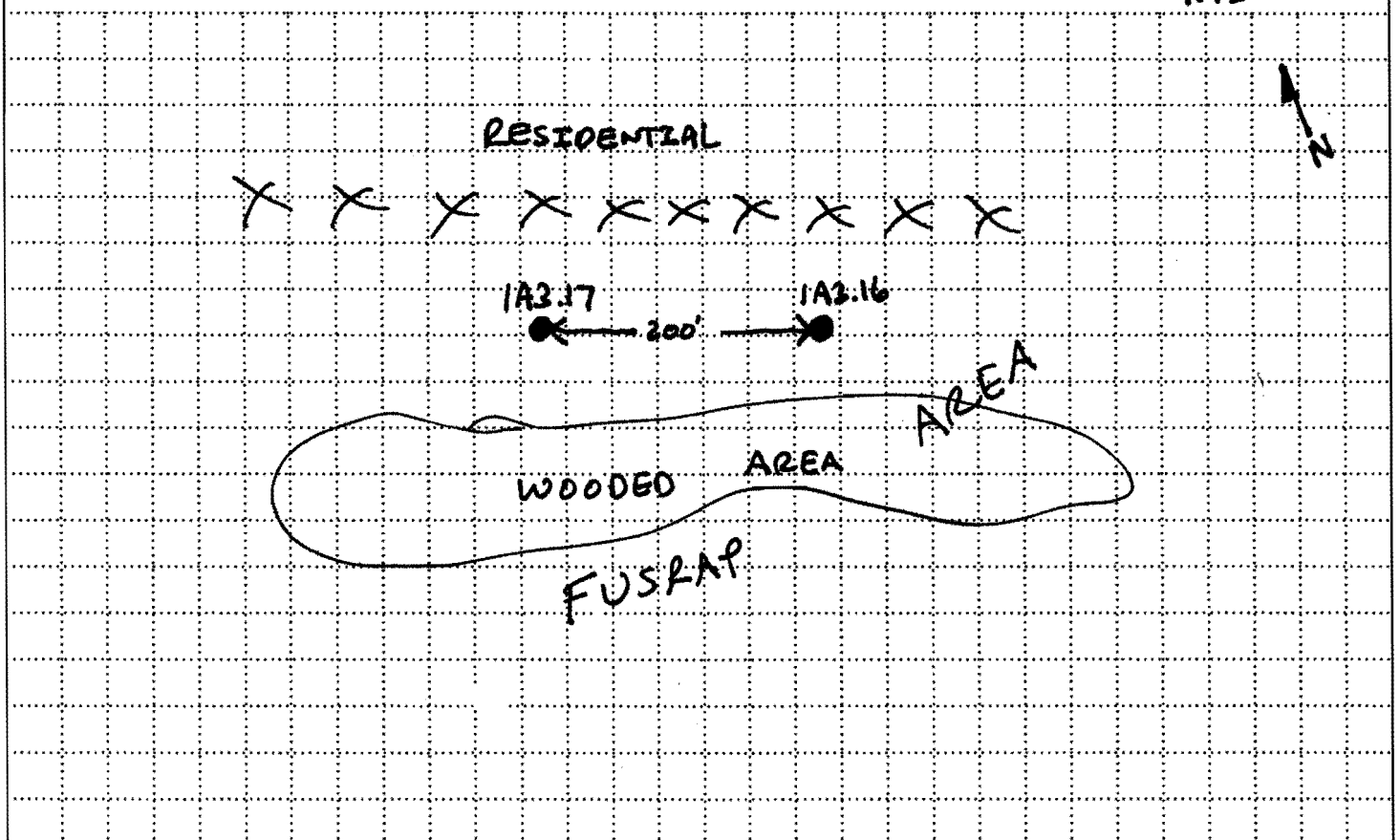
DISTRICT	Buffalo
HOLE NUMBER	1A3.17
1. COMPANY NAME	ENSOL, INC.
2. DRILLING CONTRACTOR	ZEBRA ENVIRONMENTAL CORP.
SHEET / SHEETS	1 OF 2
3. PROJECT	TOWN of TONAWANDA LP OPERABLE UNIT-Buffalo DISTRICT FUSRAP PROJECT
4. LOCATION	TONAWANDA LF, TONAWANDA, NY
5. NAME OF DRILLER	JEff SNYDER
6. MANUFACTURER'S DESIGNATION OF DRILL	6620 DT GEOPROBE
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE
8. HOLE LOCATION	N: 1093080 E: 417136.7
9. SURFACE ELEVATION	616.897
10. DATE STARTED	2/17/10 0934
11. DATE COMPLETED	2/17/10 1150
12. OVERBURDEN THICKNESS	1.4'
15. DEPTH GROUNDWATER ENCOUNTERED	5.3' bgs
13. DEPTH DRILLED INTO ROCK	N/A
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	N/A
14. TOTAL DEPTH OF HOLE	10.0'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	N/A

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP / TOTALS	TCLP / TOTALS	SVOC-TCLP / TOTALS	PEST-TCLP / TOTALS	PCB-TOTALS	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)
CUTTINGS DRUMMED	–	–	–

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT TON LF- Buffalo DISTRICT FUSRAP PROJECT HOLE NO 1A3.17

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: 1A3.17

PROJECT:

INSPECTOR: D. Popp

SHEET 2 OF 2

~~ELEV~~ RECID (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	~~FIELD SCREENING RESULTS~~ (d) X	~~GEOTECH SAMPLE OR CORE BOX NO.~~ (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MINUTE ~~REMARKS~~ STATIC (h) COUNTS X	B
	0	NO RECOVERY →			SEE NOTES			
	1	DARK-BROWN CLAYEY TOPSOIL W/ ROOTLETS, SOME WASTE (GLASS), SOFT, MOIST	7009	40		TOP 6"	6858	42
			7835	80				
	2	REDDISH-BROWN CLAY AND SILT, SOME COURSE SAND AND FINE GRAVEL (<1"), POCKETS of GRAY MOTTLING, SOFT-STIFF, MOIST. (CL)	7122	110		NATIVE 1.9'-2.9'	6858	74
	3							
	4		7178	70		HIGH B	6578	61
			7297	40				
55"	5	▼						
			7803	80		SATURATED 5.3'-6.3'	6959	50
	6		7573	70				
	7		7307	50				
	8		7110	60		CHEMICAL SAMPLE	6623	59
	9		7623	50		HIGH X	6732	50
60"	10	BOTTOM of BORING AT 10.0'						

PROJECT: BOTTOM of BORING AT 10.0'

HOLE NO: 1A3.17

ENG FORM 5056A-R, AUG 94

NOTES:
- SNOW, 30°F
- SAMPLE I.D.
  - TLS-SS-1A3.17 (0.5-1.0) 021710
  - TLS-SB-1A3.17 (1.9-2.9) 021710
  - TLS-SB-1A3.17 (3.0-4.0) 021710
  - TLS-SB-1A3.17 (5.3-6.3) 021710
  - TLS-SB-1A3.17 (8.0-8.0) 021710
  - TLS-SB-1A3.17 (9.0-10.0) 021710
- GAMMA READINGS ARE COUNTS/MIN.
- PID READINGS = 0 ppm (VOC's)

HTRW DRILLING LOG

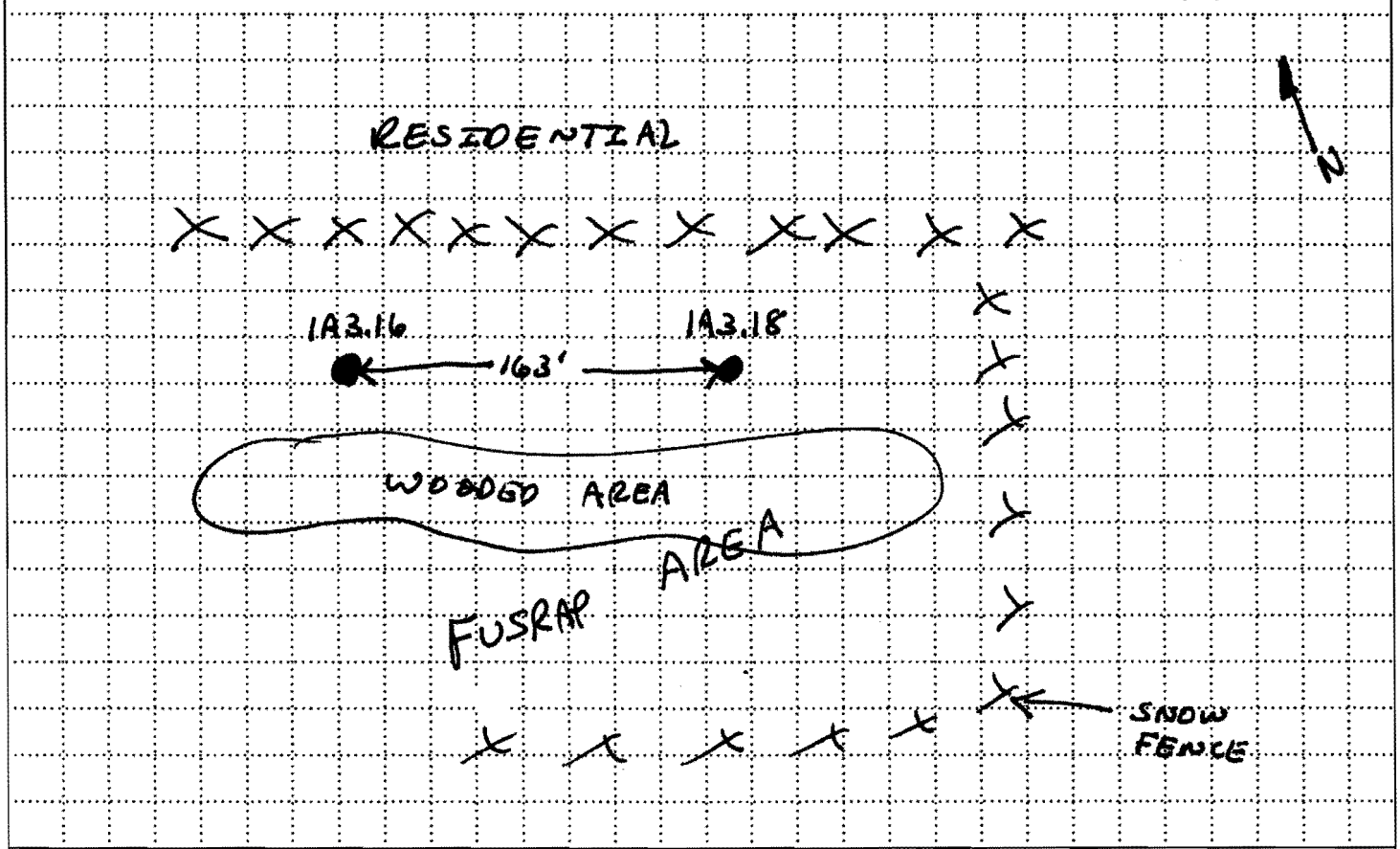
DISTRICT: Buffalo		HOLE NUMBER: 1A3.18
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 2 SHEETS
3. PROJECT: TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: JEFF SNYDER	6. MANUFACTURER'S DESIGNATION OF DRILL: 6620 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE	8. HOLE LOCATION: N = 1093241 E = 417479.3	
	9. SURFACE ELEVATION: 619.468	
	10. DATE STARTED: 2/17/10 1355	11. DATE COMPLETED: 2/17/10 1535
12. OVERBURDEN THICKNESS: 2.9'	15. DEPTH GROUNDWATER ENCOUNTERED: 2.3' bgs	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 10.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP / TOTALS	TCLP / TOTALS	SVOC-TCLP / TOTALS	PEST-TCLP / TOTALS	PCB-TOTALS	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. [redacted]
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT	HOLE NO
TON LF - Buffalo DISTRICT FUSRAP PROJECT	1A3.18

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT	INSPECTOR	HOLE NUMBER	SHEET	SHEETS
	D. Popp	1A3.18	2 OF	2

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h) γ	(h) B
	0	NO RECOVERY →				→		
	1	DARK-BROWN CLAYEY TOPSOIL W/ ROOTLETS, FROZEN	6314	30	SEE NOTES	TOP 6"	5711	41
		CONCRETE PIECES						
	2	FILL: CLAY, SAND, GRAVEL, GLASS, BRICK, SOFT, WET	6054	50				
	3		6425	90		SAT.	5711	42
	4	REDDISH-BROWN SILT AND CLAY W/ TRACE COURSE SAND AND SUB-ROUND ~~COURSE~~ OR FINE GRAVEL (<1"), GRAY MOTTLING, MED. STIFF, MOIST. (CL)	6587	40		NATIVE	5967	66
46"	5		5864	120				
	6		6368	20				
	7		6633	80				
	8		6301	120		HIGH B	6038	60
	9		6013	60		CHEM.	6092	73
60"	10		6957	60		HIGH γ	5952	52

PROJECT BOTTOM of BORING AT 10.0' HOLE NO 1A 3.18

ENG FORM 5056A-R, AUG 94

NOTES:
- SNOW, 30°F
- SAMPLE I.D.
  TLS-SS-1A3.18(0.0-0.5)021710
  TLS-SB-1A3.18(1.3-2.3)021710
  TLS-SB-1A3.18(2.3-3.3)021710
  TLS-SB-1A3.18(6.0-7.0)021710
  TLS-SB-1A3.18(7.0-8.0)021710
  TLS-SB-1A3.18(8.0-9.0)021710
- GAMMA READINGS ARE COUNTS/MIN.
- PID READINGS = 0 ppm (VOC's)

HTRW DRILLING LOG

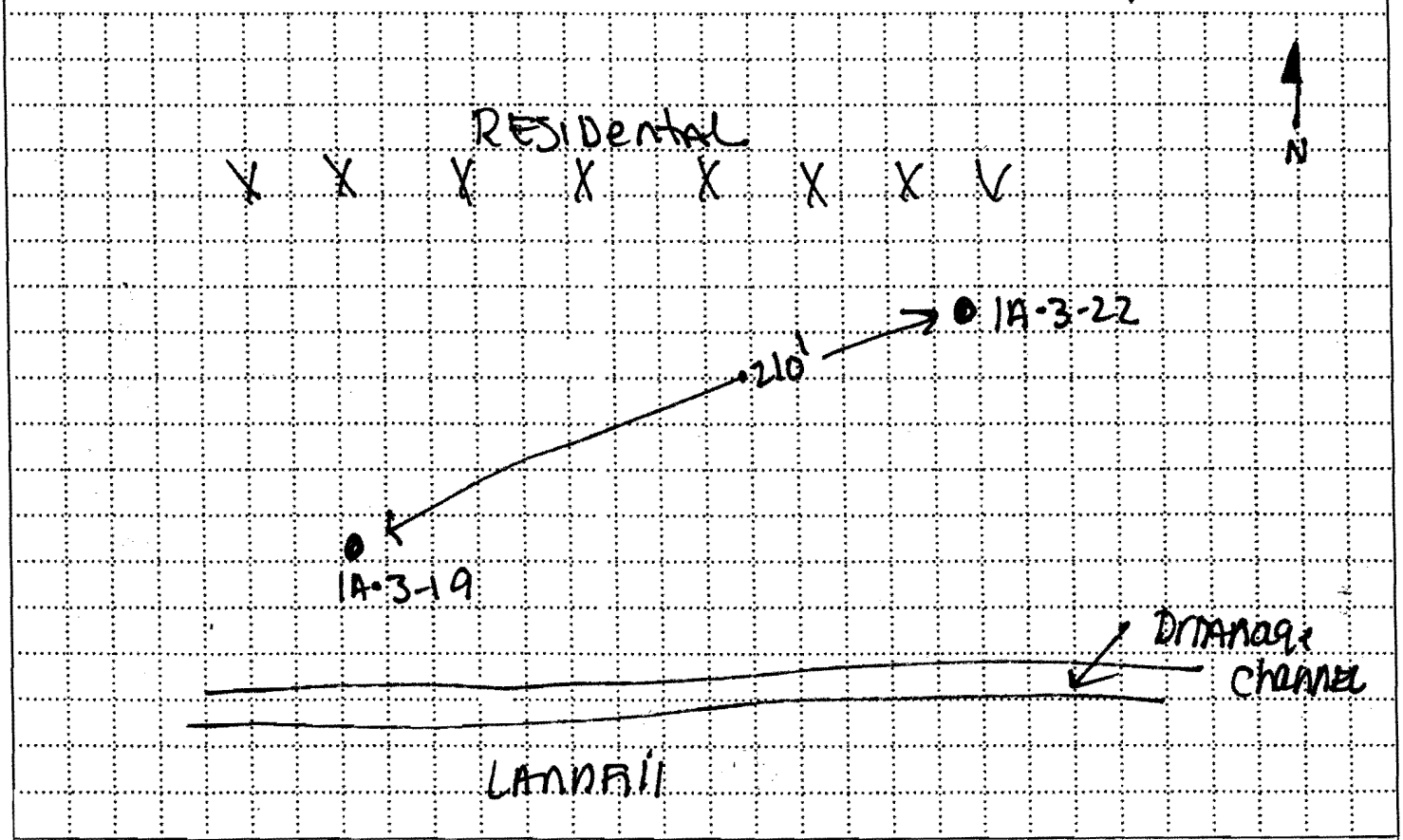
DISTRICT: Buffalo		HOLE NUMBER: 1A-3-19
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 3 SHEETS
3. PROJECT: TOWN OF TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: DOMONIC PINO	6. MANUFACTURER'S DESIGNATION OF DRILL: Geoprobe 6620DT	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CORE W/ PLASTIC SLEEVES (5')	8. HOLE LOCATION: N 1093332 E 417801.6	
	9. SURFACE ELEVATION: 622.823	
	10. DATE STARTED: 02/18/10 930am	11. DATE COMPLETED: 2-18-10 1110AM
12. OVERBURDEN THICKNESS: 5.0'	15. DEPTH GROUNDWATER ENCOUNTERED: 1.7'	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 10.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP TOTAL	TCLP TOTAL	VOC TCLP	PEST TOTAL	PCB TOTAL	N/A %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
CUTTINGS DRUMMED	-	-	-	[redacted]

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON. LF - Buffalo DISTRICT FUSRAP PROJECT | HOLE NO: 1A-3-19

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER 1A-3-19

SHEET 2 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e) γ	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B/γ 1-min Static Count
	0	Fill - Reddish brown clay, organic matter, gravel, stiff, frozen	60	6719	SEE NOTES		Top 6" 39/6487
	1		60	6920			
	2	Fill: Ash, gravel, gravel, glass, reddish-brown clay, loose, wet - v. wet	120	7018			Saturated: 48/6598
			140	6970			
	3						
	4	NO RECOVERY	NO RECOVERY				
	5						
	6	Reddish-brown silt + clay, trace course sand, desiccation cracks w/ gray infilling & gray molting, stiff, moist (CL)	40	6836			Recovery 32" Native 52/6618
	7		80	7157			High γ 48/6847
	8		80	7133			Chemical 60/6694
	9		140	6756			High B 47/6528
	10	Bottom of Boring @ 10.0'	60	6704			Recovery 60"

PROJECT

HOLE NO. 1A-3-19

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER 1A-3-19

SHEET 3 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
	10	NOTE:					
		Weather: OVERCAST, 28°F					
	11	SAMPLE I.D. (RAD. ANALYSIS)					
		TLS-SS-1A3-19 (0.0-0.5') 021810	Top 6"				
	12	TLS SB-1A3-19 (5-6') 021810	Active				
		TLS-SB-1A3-19 (1-2') 021810	Saturated				
		TLS-SB 1A3-19 (6-7') 021810	High B				
	13	TLS-SB-1A3-19 (8-9') 021810	High γ				
		TLS-SB-1A3-19 (7-8') 021810	Chemical				
		- DIO READING: 0 ppm					
	14	Gamma Reading: count/min					
	15						
	16						
	17						
	18						
	19						
	20						

PROJECT

HOLE NO. 1A-3-19

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

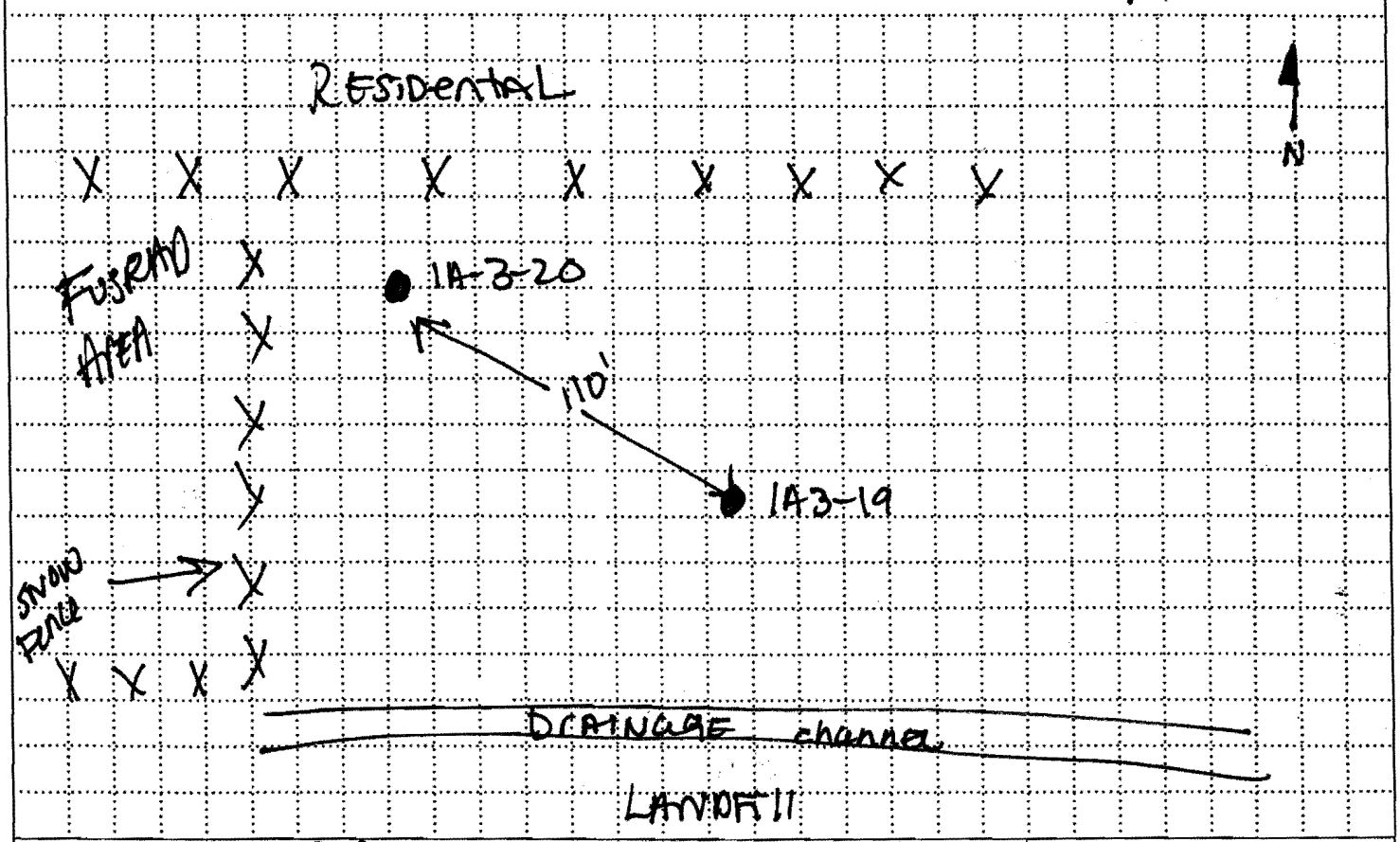
DISTRICT: Buffalo	HOLE NUMBER: 1A-3-20	
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 3 SHEETS
3. PROJECT: TOWN OF TONAWANDA LF OPERABLE UNIT - BUFFALO DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: DOMINIC PINO	6. MANUFACTURER'S DESIGNATION OF DRILL: Geoprobe 7720DT	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CORE W/ PLASTIC SLEEVES (5')	8. HOLE LOCATION: N 1093332 E 417687.5	
	9. SURFACE ELEVATION: 620.763	
	10. DATE STARTED: 2-17-10 1:50pm	11. DATE COMPLETED: 2-17-10 2:35pm
12. OVERBURDEN THICKNESS: 2.5'	15. DEPTH GROUNDWATER ENCOUNTERED: 1.6'	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 9.1'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
						N/A %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON. LF - BUFFALO DISTRICT FUSRAP PROJECT — HOLE NO: 1A-3-20

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER 1A-3-20

SHEET 2 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B⁻	GEOTECH SAMPLE OR CORE BOX NO. (e) γ	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B/γ (MIN. Static Count)
	0	DARK-brown clay, course SAND, ROOTLETS, SOFT, MOIST	60	6287	SEE NOTES		Top 6" 51/5941
	1		80	6312			High γ 72/6061
	2	Fill: Ash, glass, gravel, loose, V. WET	80	5987			Chemical 53/6127
	3	Reddish-brown silt + clay, Fine sub-round gravel (<1") and Trace course sand, Desiccation cracks w/ grey silt infilling to 6.7', STIFF, moist (CL)	60	6006			Native 65/6168
	4		120	6012			Saturated 51/6062
	5		100	5939			Recovery 56"
	6		120	6069			
	7		140	6067			High B⁻ 56/5782
	8		60	5905			
	9		60	5739			
	10	Bottom of Boring @ 9.1'					Recovery 56"

PROJECT

HOLE NO 1A-3-20

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR

HOLE NUMBER 1A-3-20

SHEET 3 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
	10	NOTES!					
		Weather: OVERCAST, 28°F					
	11	Sample I.D. (RAD Analysis)					
		TLS-SS-1A3-20(0.0-0.5)021710	TYP				
	12	TLS-SB 1A2-20(.5-1.5')021710	High γ				
		TLS-SB 1A3-2α(1.5-2.5)021710	Chemical				
		TLS-SB 1A-3-20(2.5-3.5)021710	Native				
	13	TLS-SB-1A-3-20(3.5-4.5)021710	Saturated				
		PID READINGS: 0ppm					
	14	GAMMA READING: count/MIN.					
	15						
	16						
	17						
	18						
	19						
	20						

PROJECT

HOLE NO. 1A-3-20

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

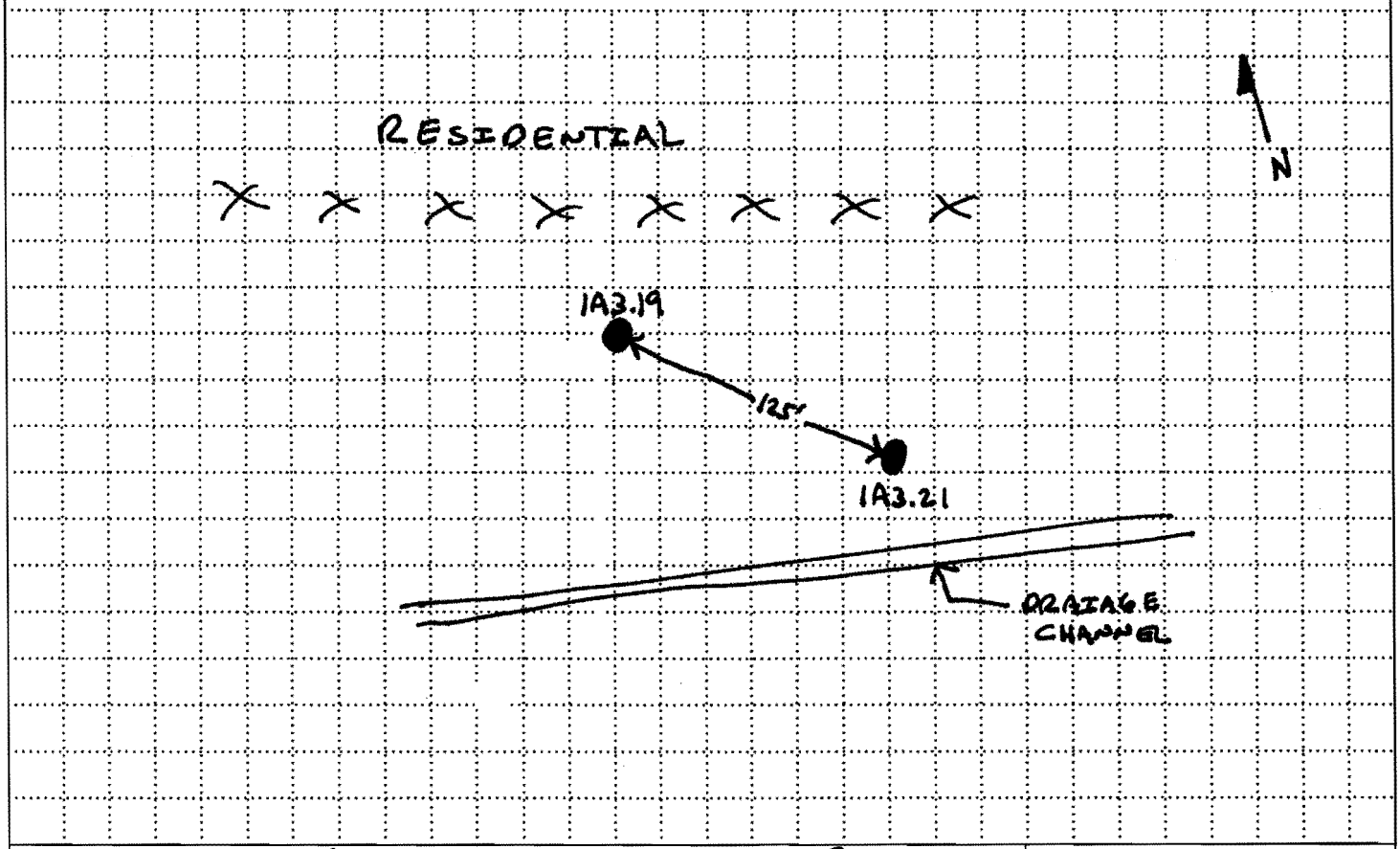
DISTRICT: BUFFALO		HOLE NUMBER: 1A3.21
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 2 SHEETS
3. PROJECT: TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: Jeff SNYDER	6. MANUFACTURER'S DESIGNATION OF DRILL: 6620 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE	8. HOLE LOCATION: N = 1093464 E = 41870	
	9. SURFACE ELEVATION: 624.581	
	10. DATE STARTED: 2/17/10 1540	11. DATE COMPLETED: 2/17/10 1730
12. OVERBURDEN THICKNESS: 4.3'	15. DEPTH GROUNDWATER ENCOUNTERED: NOT ENCOUNTERED	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 9.2'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP / TOTALS	TCLP / TOTALS	SVOC - TCLP / TOTALS	PEST - TCLP / TOTALS	PCB - TOTALS	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. S[redacted]
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT: TON LF - Buffalo DISTRICT FUSRAP PROJECT HOLE NO: 1A3.21

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: 1A3.21

PROJECT:

INSPECTOR: D. Popp

SHEET 2 OF 2 SHEETS

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. ~~STATIC~~ REMOVING COUNTS (h) γ	(h) B
	0	NO RECOVERY →				→		
	1	FILL: REDDISH-BROWN CLAY, WOOD CHIPS, GRAVEL, MED. STIFF, MOIST.	7525	40		TOP 6"	6444	67
			6411	80	SEE NOTES			
	2							
			7044	70				
	3							
			7029	80				
	4							
		FILL: CLAY, WASTE (ASH, GLASS), WOOD, LOOSE, MOIST.	7311	120		HIGH γ	6256	64
48"	5							
		NO RECOVERY →				→		
		REDDISH-BROWN SILT AND CLAY W/ TRACE COURSE SAND AND SUB-ROUND FINE GRAVEL (<1½"), VERT./HORZ DESSICCATION CRACKS W/ GRAY INFILLING, SOME GRAY MOTTLING, STIFF, MOIST. (CL)	6885	80		CHEM.	6461	53
	6							
			6757	110		NATIVE ~~NATIVE~~ OP	6383	61
	7							
			7018	120		HIGH B	6288	62
	8							
			6906	105				
	9							
			6340	70				
		BOTTOM OF BORING AT 9.2'						
56"	10							

PROJECT: HOLE NO: 1A3.21

ENG FORM 5056A-R, AUG 94

NOTES:
- SNOW, 30° F
- SAMPLE I.D.
  TLS-SB-1A3.21 (0.0-0.5) 021710
  TLS-SB-1A3.21 (3.0-4.0) 021710
  TLS-SB-1A3.21 (4.0-5.0) 021710
  TLS-SB-1A3.21 (5.0-6.0) 021710
  TLS-SB-1A3.21 (6.0-7.0) 021710
- GAMMA READINGS ARE COUNTS / MIN.
- PID READINGS = 0 ppm (VOC's)

HTRW DRILLING LOG

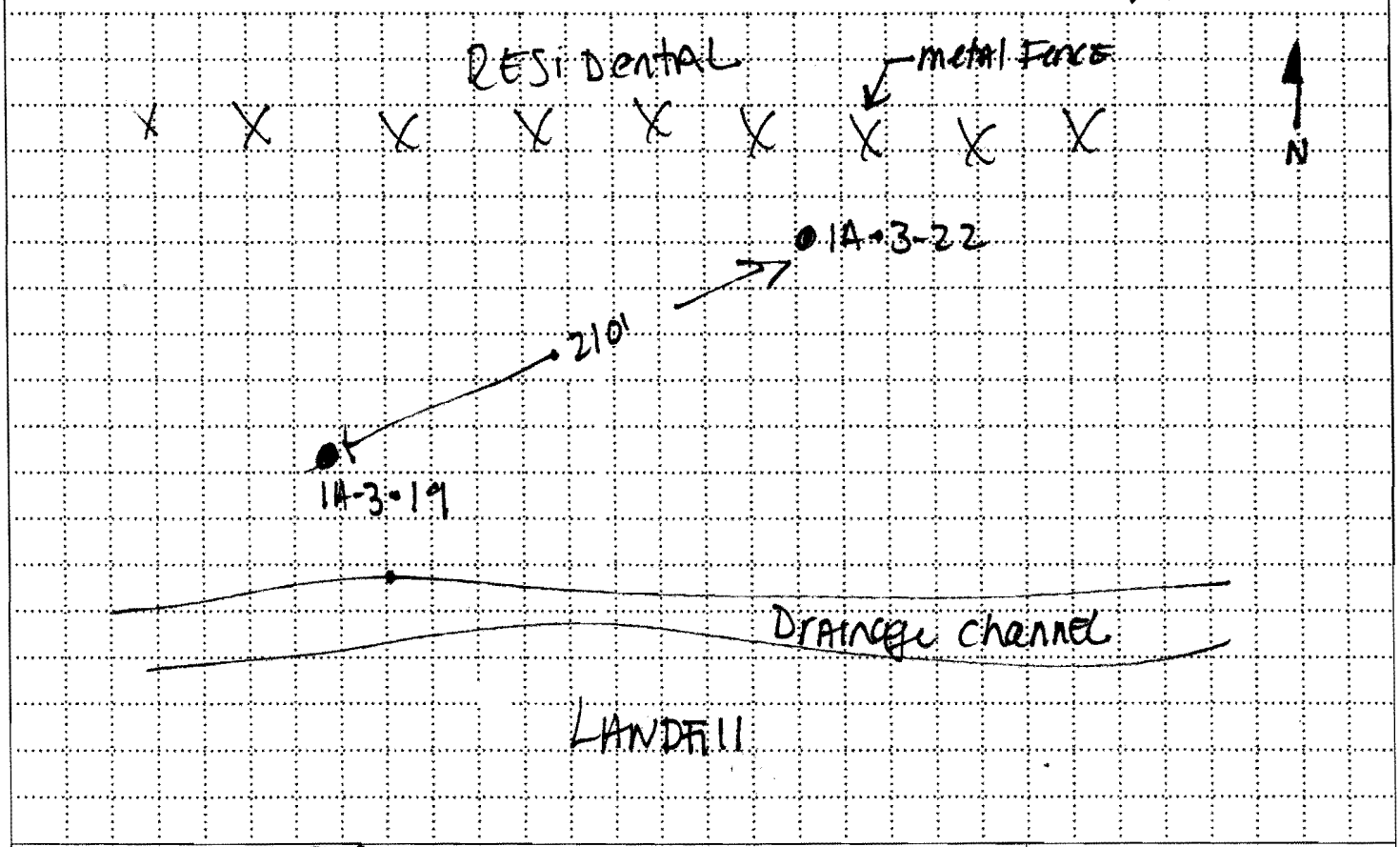
DISTRICT: Buffalo		HOLE NUMBER: 1A-3-22
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 3 SHEETS
3. PROJECT: TOWN OF TONAWANDA LF OPERABLE UNIT - BUFFALO DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: DOMONIC DING	6. MANUFACTURER'S DESIGNATION OF DRILL: 7720DT	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CORE W/ PLASTIC SLEEVES (4')	8. HOLE LOCATION: N 1093457 E 417957.7	
	9. SURFACE ELEVATION: 621.497	
	10. DATE STARTED: 2-17-10 3:05 pm	11. DATE COMPLETED: 2-17-10 4:20pm
12. OVERBURDEN THICKNESS: 2.3'	15. DEPTH GROUNDWATER ENCOUNTERED: 4.4'	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 10.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP Total	TCLP Total	SVOC TCLP/Total	Dest. Total	PCB Total	N/A %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. [redacted]
CUTTINGS DRUMMED	-	-	-	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON. LF - BUFFALO DISTRICT FUSRAP PROJECT — HOLE NO: 1A-3-22

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPEC[redacted]

HOLE NUMBER 1A-3-22

SHEET 2 OF SHEETS 3

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS ~~(d)~~ B	GEOTECH SAMPLE OR CORE BOX NO. ~~(e)~~ γ	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B/γ 1min Static count
	0	DARK-brown clayey topsoil w/ rootlets, soft, moist	60	5865	SEE NOTES		Top 6" 17/5884
	1	Fill: DARK-brown-reddish clay, silt, waste, glass, ash, brick, loose, moist	60	6110			Native 24/5981
	2		100	6135			
	3	Reddish-brown silt + clay w/ desiccation cracks w/ gray silt infilling, trace course + fine sand, stiff, moist-v. wet	100	5923			
			40	5964			
	4						Saturated: 23/5800
			100	6077			
	5						-Recovery 48"
			80	6312			High γ: 24/5740 Duplicate:
	6		150	5792			Chemical 23/5710
	7		60	5945			
	8		100	6029			High B- 27/5757
	9						
	10	Bottom of boring @ 16'					Recovery 60"

PROJECT

HOLE NO 1A-3-22

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR K Hoelscher

HOLE NUMBER 1A-3-22

SHEET 3 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
	10	NOTES:					
		Weather: SNOW, 20°F					
	11	Sample ID. (RHA ANALYSIS)					
		TLS-SS-1A3-22(0.0-0.5')021710	Top 6"				
	12	TLS-SB-1A3-22(2.3-3.3')021710	Native				
		TLS-SB-1A3-22(3.6-4.6')021710	Saturated				
		TLS-SB-1A3-22(7.6-8.6')021710	High β^-				
	13	TLS-SB-1A3-22(4.6-5.6)021710	High γ				
		TLS-SB-1A-3-22(5.6-6.6)021710	Chemical				
	14						
	15						
	16						
	17						
	18						
	19						
	20						

PROJECT

HOLE NO. 1A-3-22

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

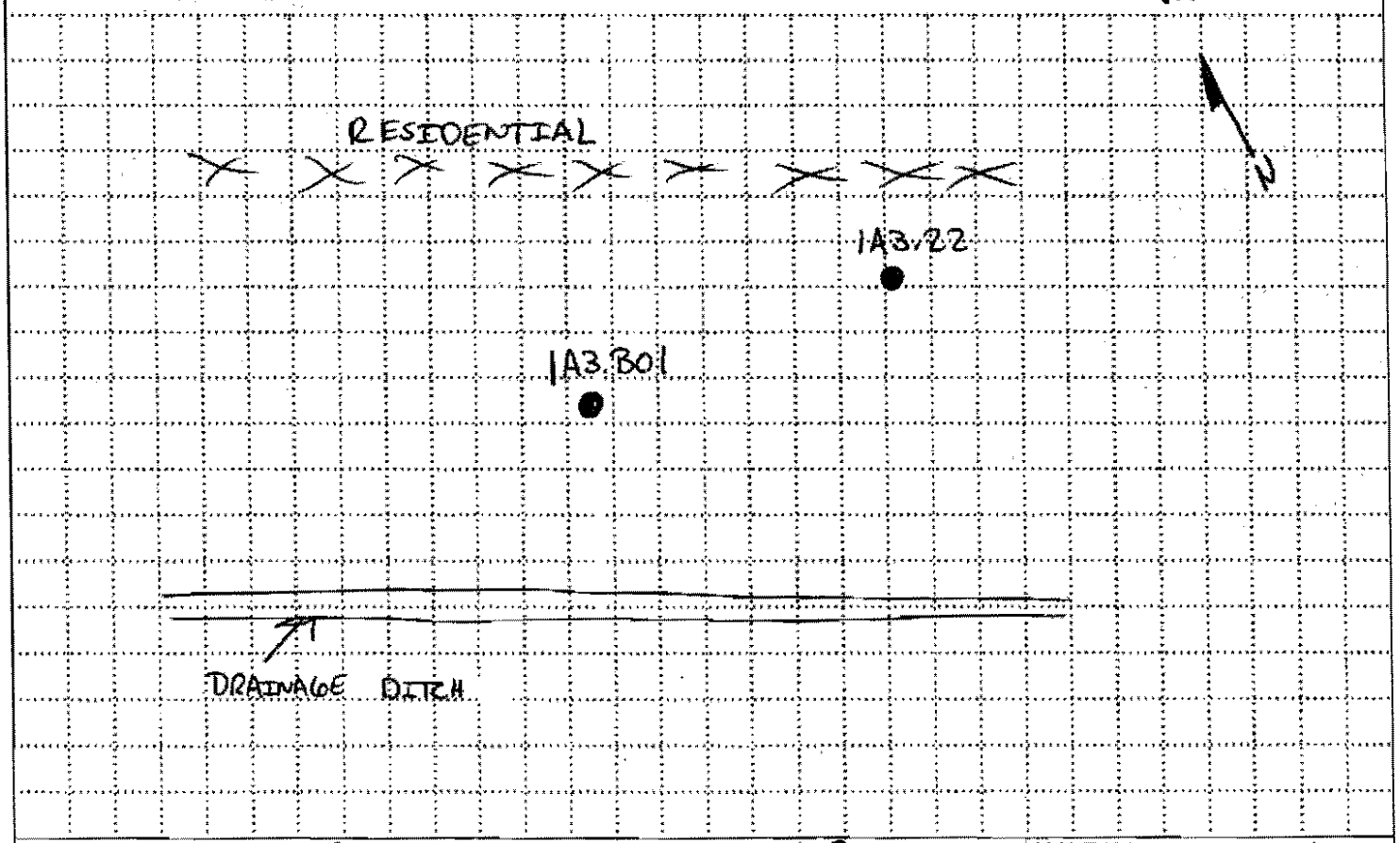
DISTRICT: Buffalo		HOLE NUMBER: 1A3.B01
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 3 SHEETS
3. PROJECT: TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: JEFF SNYDER	6. MANUFACTURER'S DESIGNATION OF DRILL: 6620 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE W/ 5' PLASTIC SLEEVE	8. HOLE LOCATION: N= 1093455.78 E= 1066298.57	
	9. SURFACE ELEVATION:	
	10. DATE STARTED: 3/11/10 0900	11. DATE COMPLETED: 3/11/10 1010
12. OVERBURDEN THICKNESS: 10.0'	15. DEPTH GROUNDWATER ENCOUNTERED: NOT ENCOUNTERED	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 12.5'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	-	-	-	-	-	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23 [redacted]
CUTTINGS DRUMMED	-	-	-	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT	HOLE NO
TON LF- Buffalo DISTRICT FUSRAP PROJECT	1A3.B01

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: 1A3, B01

PROJECT:

INSPECTOR: D. Popp

SHEET 2 OF 3

REC'D ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING ~~RESULTS~~ (d) X	GEOTECH SAMPLE OR ~~CORE BOX~~ NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. ~~RESULTS~~ STATIC COUNTS (h)	
	0							
	1	NO RECOVERY →						
	2	DARK-BROWN CLAYEY TOPSOIL, GRASS, ROOTLETS, SOFT, WET	6616	80		TOP 6"	X 6497	B 55
	3	FILL: REDDISH-BROWN CLAY, GRAVEL, ASPHALT, MED. STIFF, MOIST.	6499	50				
	4		6708	110	SEE NOTES	HIGH B	6349	55
			6408	70				
36"	5	REDDISH-BROWN SILT AND CLAY, TRACE of COURSE SAND AND FINE SUB-ROUND GRAVEL (<1"), GRAY MOTTLING TO 9.4', STIFF, MOIST. (CL)	6394	80		NATIVE	6373	64
	6							
	7		6347	70				
	8		6581	90				
	9		6439	100				
60"	10		6654	100		SAT. (2ND HIGH X)	6338	65

PROJECT

HOLE NO 1A3, B01

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A3, B01

SHEET 3 OF 3

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	10	NO RECOVERY →					→
	11						
	12	SAME AS 5.0'-10.0'	6627	110	SEE		X B
18"			6778	90	NOTES	HIGH X	6257 61
	13	BOTTOM of BORING AT 12.5'					
	14	NOTES:					
		- CLEAR, 40°F					
		- SAMPLE I.D.					
	15	TLS-SS-1A3.B01(1.8-2.3)031110					
		TLS-SB-1A3, B01(3.0-4.0)031110					
		TLS-SB-1A3, B01(5.0-6.0)031110					
		TLS-SB-1A3, B01(9.0-10.0)031110					
	16	TLS-SB-1A3,B01(11.5-12.5)031110					
		- PID READINGS = 0ppm (VOC's)					
	17	- SOIL READINGS ARE COUNTS/MIN.					
		- DRILLER TERMINATED BORING AT 12.5' DUE TO EXPANSIVE CLAYS.					
	18						
	19						
	20						

PROJECT

HOLE NO 1A3, B01

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

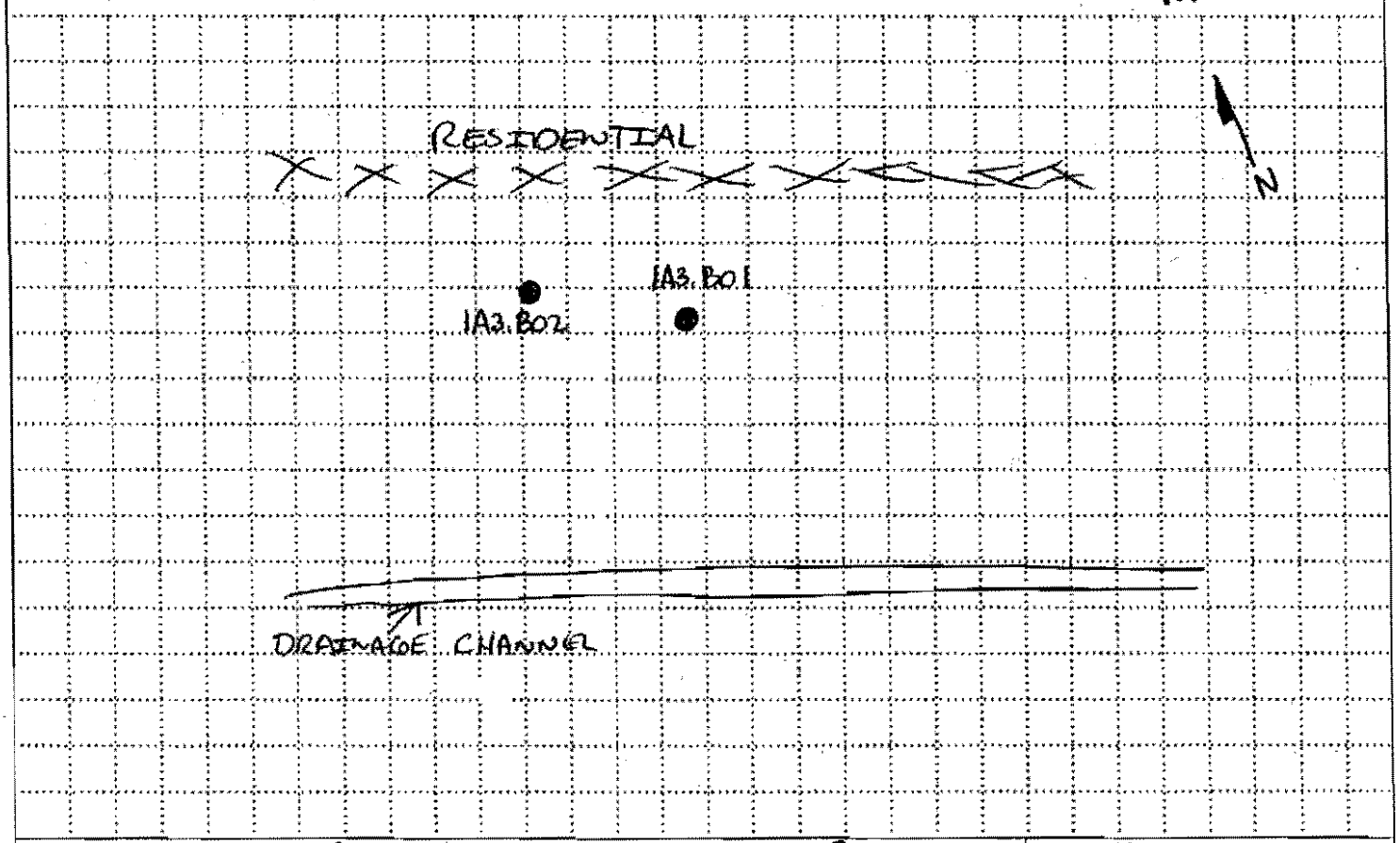
DISTRICT: Buffalo		HOLE NUMBER: 1A3.B02
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 3 SHEETS
3. PROJECT: TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: Jeff SNYDER	6. MANUFACTURER'S DESIGNATION OF DRILL: 6620 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE W/ 5' PLASTIC SLEEVE	8. HOLE LOCATION: N= 1093448.87 E= 1066263.76	
	9. SURFACE ELEVATION:	
	10. DATE STARTED: 3/11/10 1015	11. DATE COMPLETED: 3/11/10 1140
12. OVERBURDEN THICKNESS: 5.0'	15. DEPTH GROUNDWATER ENCOUNTERED: NOT ENCOUNTERED	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 12.5'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	-	-	-	-	-	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. [redacted]
CUTTINGS DRUMMED	-	-	-	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT	HOLE NO
TON LF - Buffalo DISTRICT FUSRAP PROJECT	1A3.B02

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR: D. Popp

HOLE NUMBER: 1A3.B02

SHEET 2 OF 3

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) ~~X~~	GEOTECH SAMPLE OR CORE BOX NO. (e) ~~X~~ B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h) X	B
	0–2	NO RECOVERY →						
	3	DARK-BROWN CLAYEY TOPSOIL, GRASS, ROOTLETS, SOFT, WET.	7319	90		TOP 6"	6430	68
	4	FILL: REDDISH-BROWN CLAY, GRAVEL, WASTE (ASH), MED. STIFF, MOIST.	7047	90	SEE NOTES	HIGH X	6459	53
30"	5		6786	70				
	6	REDDISH-BROWN SILT AND CLAY, TRACE COURSE SAND AND FINE SUB-ROUND GRAVEL (<1"), GRAY MOTTLING TO 7.2', STIFF, MOIST. (CL)	6490	80		NATIVE	6427	67
	7		6708	70				
	8		6850	90		SAT. (2ND HIGH X)	6427	51
	9		6746	100				
60"	10		6802	110		HIGH B	6746	47

PROJECT

HOLE NO 1A3.B02

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR: D. POPP

HOLE NUMBER: 1A3, B02

SHEET 3 OF 3

RECO ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	10	NO RECOVERY →					
	11	REDDISH-BROWN SILT AND SAND, TRACE COURSE SAND, SOFT, MOIST. (SM)	6647	70			
	12		6674	110			
18"		BOTTOM OF BORING AT 12.5'					
	13	NOTES:					
		- CLEAR, 46° F					
	14	- SAMPLE I.D.					
		TLS-SS-1A3.B02(2.3-2.8)031110					
		TLS-SB-1A3.B02(3.0-4.0)031110					
	15	TLS-SB-1A3.B02(5.0-6.0)031110					
		TLS-SB-1A3.B02(7.0-8.0)031110					
		TLS-SB-1A3.B02(9.0-10.0)031110					
	16	- PID READINGS = 0 PPM (VOCS)					
		- SOIL READINGS ARE COUNTS/MIN.					
	17	- DRILLER TERMINATED BORING AT 12.5' DUE TO EXPANSIVE CLAYS.					
	18						
	19						
	20						

PROJECT

HOLE NO 1A3, B02

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

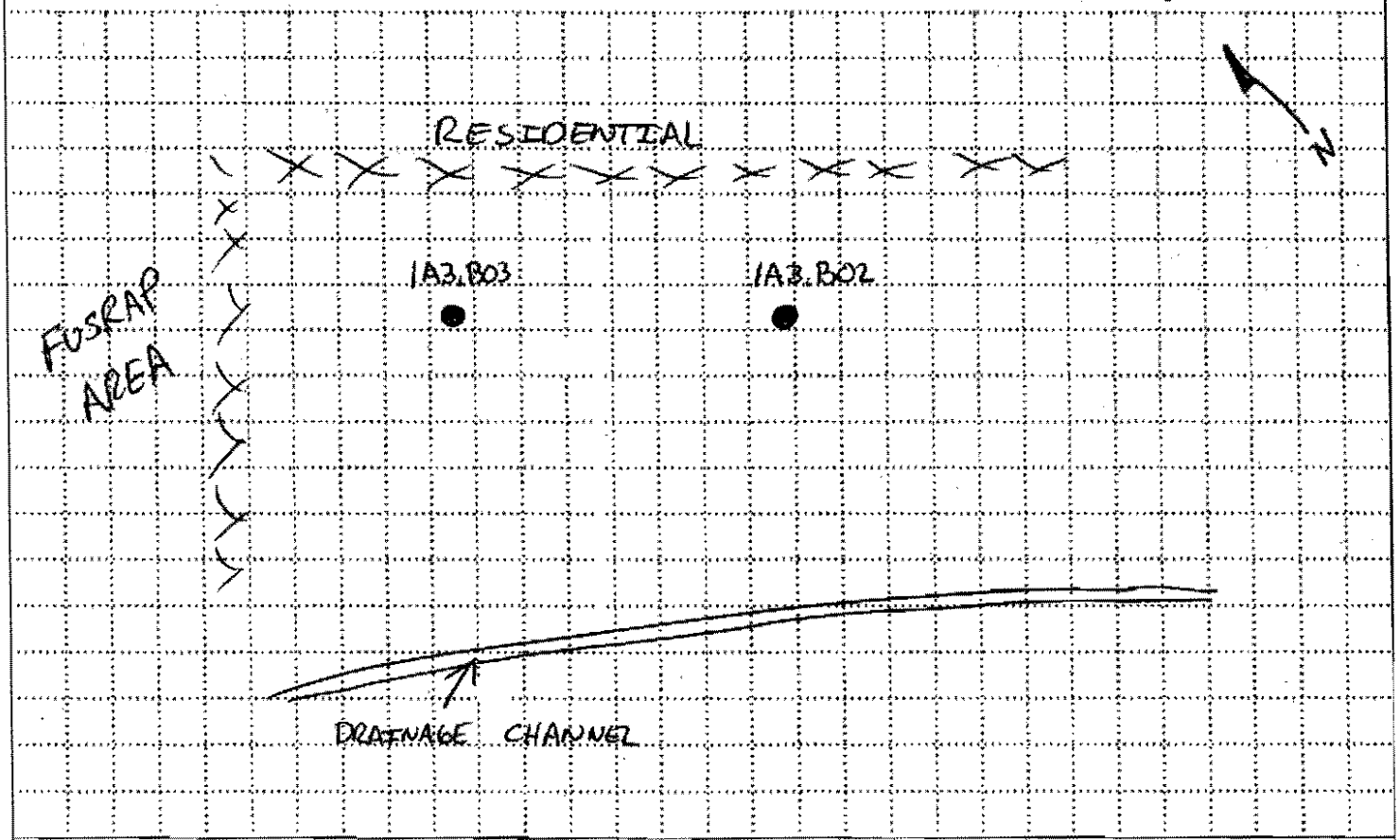
DISTRICT: Buffalo		HOLE NUMBER: 1A3.B03
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 3 SHEETS
3. PROJECT: TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: Jeff SNYDER	6. MANUFACTURER'S DESIGNATION OF DRILL: 6620 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE	8. HOLE LOCATION: N= 1093413.675 E= 1066190.61	
	9. SURFACE ELEVATION:	
	10. DATE STARTED: 3/11/10 1450	11. DATE COMPLETED: 3/11/10 1615
12. OVERBURDEN THICKNESS: 5.0'	15. DEPTH GROUNDWATER ENCOUNTERED: NOT ENCOUNTERED	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 12.5'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	–	–	–	–	–	N/A

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23 [redacted]
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT: TON LF- Buffalo DISTRICT FUSRAP PROJECT HOLE NO: 1A3.B03

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A3,B03

SHEET 2 OF 3

~~ELEV.~~ RECID (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	~~FIELD SCREENING RESULTS~~ (d) X	~~GEOTECH SAMPLE OR CORE BOX NO.~~ (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. ~~BLOWING~~ STATIC COUNTS (h)	
	0	NO RECOVERY →					→	
	1							
	2	REDDISH-BROWN CLAYEY TOPSOIL, GRASS, ROOTLETS, SOFT, WET.	7281	70		TOP 6"	X 6713	B 58
	3	FILL: REDDISH-BROWN CLAY, GRAVEL, WASTE (ASH), STIFF, MOIST.	7091	110	SEE NOTES	HIGH B	6734	52
	4		7124	100				
	5		6782	110				
	6	REDDISH-BROWN SILT AND CLAY, TRACE COURSE SAND AND FINE SUB-ROUND GRAVEL (<1"), GRAY MOTTLING TO 8.4', STIFF, MOIST. (CL)	7425	80		NATIVE	7052	59
	7		7360	110		HIGH X	6945	61
	8		7024	100				
	9		7128	80		SAT. (2ND HIGH X)	6945	40
	10		7118	100				

PROJECT

HOLE NO 1A3,B03

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A3, B03

SHEET 3 OF 3

~~ELEV~~ REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) ~~X~~	GEOTECH SAMPLE OR CORE BOX NO. (e) ~~X~~ B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h) 1 MIN. STATIC COUNTS
	10	NO RECOVERY →					
	11						
	12	SAME AS 5.0'-10.0' (NO GRAY MOTTLING)	6751	80			
18"			6636	100			
	13	BOTTOM OF BORING AT 12.5'					
	14	NOTES:					
		- CLEAR, 60°F					
		- SAMPLE I.D.					
		TLS-SS-1A3, B03(1.2-1.7)031110					
		TLS-SB-1A3, B03(2.0-3.0)031110					
	15	TLS-SB-1A3, B03(5.0-6.0)031110					
		TLS-SB-1A3, B03(6.0-7.0)031110					
		TLS-SB-1A3, B03(8.0-9.0) 031110					
	16	- PID READINGS = 0ppm (VOC's)					
		- SOIL READINGS ARE COUNTS/MIN.					
	17						
		- DRILLER TERMINATED BORING AT 12.5' DUE TO EXPANSIVE CLAYS.					
	18						
	19						
	20						

PROJECT

HOLE NO 1A3, B03

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

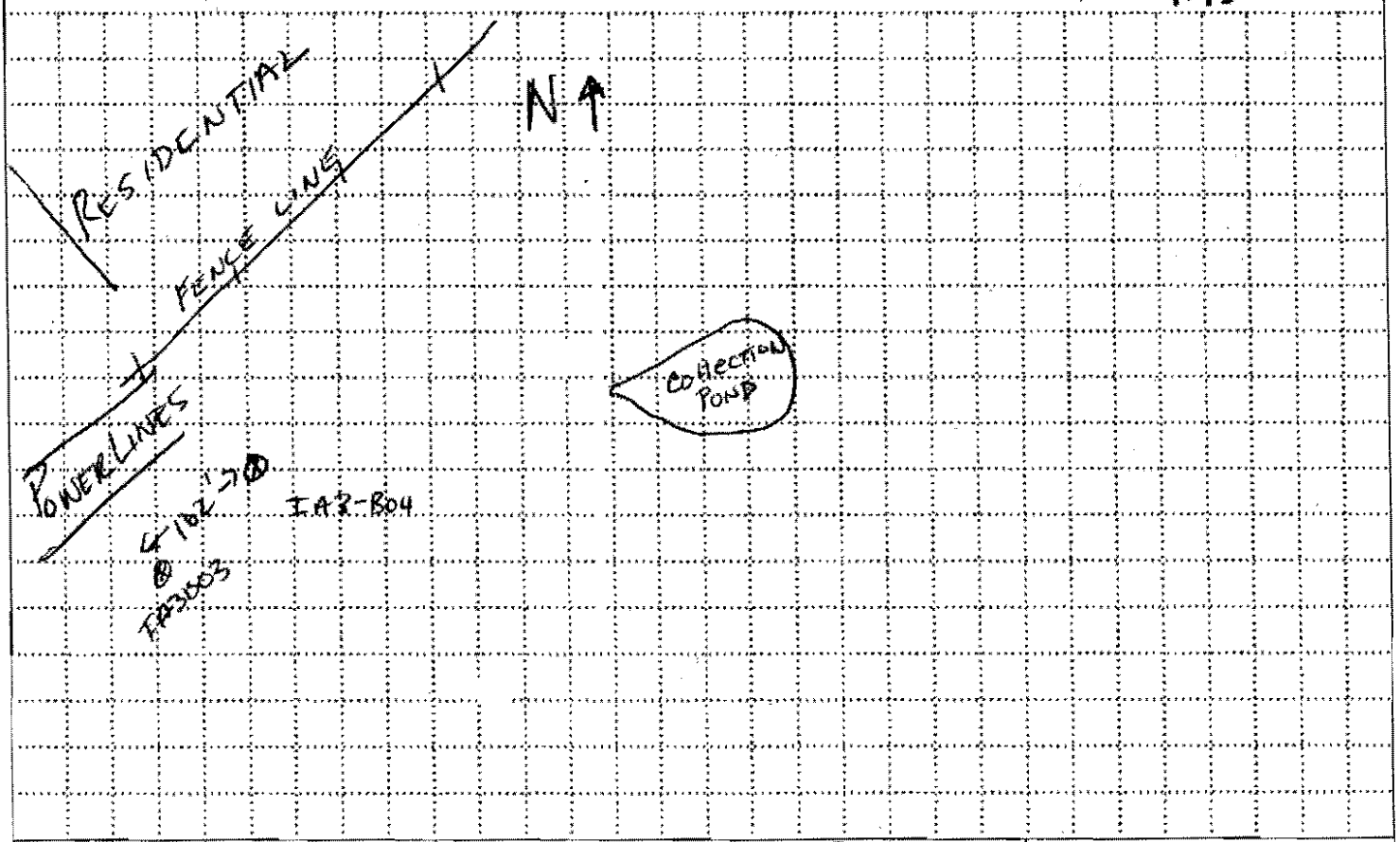
DISTRICT: Buffalo		HOLE NUMBER: IA3B04
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 3 SHEETS
3. PROJECT: TOWN of TONAWANDA LP OPERABLE UNIT-Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: PHIL ORSI / DOM PINO	6. MANUFACTURER'S DESIGNATION OF DRILL: 7720 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE W/ 5' PLASTIC SLEEVE	8. HOLE LOCATION: N= 1092277.03 E= 1063547.45	
	9. SURFACE ELEVATION	
	10. DATE STARTED: 3-11-10	11. DATE COMPLETED: 3-11-10
12. OVERBURDEN THICKNESS	15. DEPTH GROUNDWATER ENCOUNTERED: NOT ENCOUNTERED	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 15'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP / TOTALS	TCLP / TOTALS	SVK-TCLP / TOTALS	PEST-TCLP / TOTALS	PCB-TOTALS	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. [redacted]
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT	HOLE NO.
TON LF- Buffalo DISTRICT FUSRAP PROJECT	IA3-B04

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR

HOLE NUMBER IA3B04

SHEET 2 OF 3

RECID ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) 8	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)	
	0	NO RECOVERY						
	1	FILL: GRAVEL <1/4", ashphalt organic material (WOOD ROOTS) REDDISH BROWN CLAY, FIRM, MOIST.	7291	80		Top 6" (.8-1.3)	8 6805	b 64
	2							
			7241	140		Hi beta	7235	51
	3							
			7119	80				
	4							
			7279	60				
52"	5	NO RECOVERY						
	6							
		FILL: REDDISH BROWN, CLAY, grey inside, TRACE STONE, FIRM, MOIST.	7595	70		Hi 8	6968	53
	7							
			7338	80		SAT	7096	43
	8							
			7273	100				
	9							
			6908	80				
48"	10							

PROJECT

HOLE NO IA3 B04

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPE[redacted]

HOLE NUMBER IA3 B04

SHEET 3 OF 3

REC'D ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) 8	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC REMAINING COUNTS (h)	
	10						8	6
			6797	90		NAT.	6787	47
	11	FILL: REDDISH BROWN, SILTY CLAY, TRACE COARSE SAND, VERY FIRM, SEMI-DRY. (CL)						
			6611	100				
	12							
			6975	130				
	13							
			7126	80				
	14							
			7107	60				
60"	15							
		END OF BORING @ 15'						
	16	NOTES:						
		SAMPLE ID #S						
	17	TLS-SS IA4-B03(.8-1.3) 031110 (TOY6")						
		TLS-SB IA4-B03(2.0-3.0) 031110 (H' beta)						
		TLS-SB IA4-B03(6.0-7.0) 031110 (H' Gamma)						
		TLS-SB IA4-B03(7.0-8.0) 031110 (SAT)						
	18	TLS-SB IA4-B03(10.0-11.0) 031110 (NATIVE)						
		NATIVE: @ 10'						
	19	GROUND WATER: NOT ENCOUNTERED						
		PID = 0 ppm (VOC'S)						
		TOTAL RECOVERY: 160"						
	20	WEATHER = SUNNY 55°						

PROJECT

HOLE NO. IA3B04

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

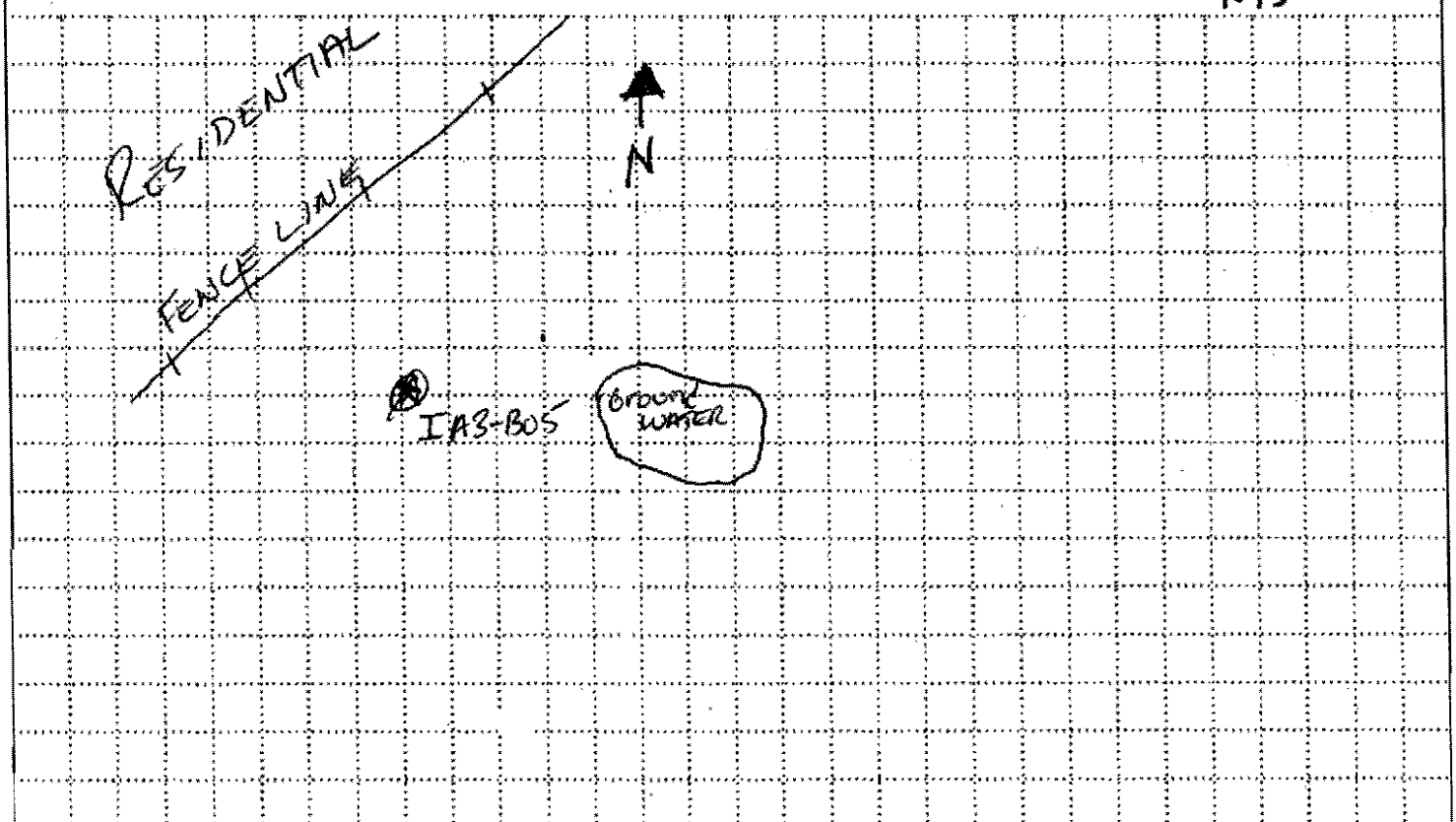
DISTRICT: Buffalo		HOLE NUMBER: IA3B05
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 3 SHEETS
3. PROJECT: TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: PHIL ORSI / DOM PINO	6. MANUFACTURER'S DESIGNATION OF DRILL: T720DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE W/ 5' PLASTIC SLEEVE	8. HOLE LOCATION: N= 1092505.96 E= 1064309.05	
	9. SURFACE ELEVATION:	
	10. DATE STARTED: 3/11/10	11. DATE COMPLETED: 3/11/10
12. OVERBURDEN THICKNESS:	15. DEPTH GROUNDWATER ENCOUNTERED: NOT ENCOUNTERED	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 15'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP / TOTALS	TCLP / TOTALS	SVOC-TCLP / TOTALS	PEST-TCLP / TOTALS	PCB-TOTALS	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. [redacted]
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT	HOLE NO.
TON LF- Buffalo DISTRICT FUSRAP PROJECT	IA3B05

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR S. PRYCE

HOLE NUMBER IA3-B05

SHEET 2 OF 3

RECID ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h) γ	b
	0	No Recovery						
	1							
	2	FILL: Organic material (wood, roots), cinder gravel <1/4", reddish brown clay, med. stiff, moist.	6362	90		Top 6"	6304	45
	3		6461	120				
	4		6738	100		SAT.	6592	49
47"	5		6757	100		Hi γ	6192	59
	6	No Recovery						
	7	FILL: Reddish brown clay stone <1/4" stiff, moist.	6181	60				
	8		6351	90				
	9		6661	100				
45"	10		6217	100				

PROJECT

HOLE NO. IA3-B05

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR S. PRYCE

HOLE NUMBER IA3B05

SHEET 3 OF 3

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) 8	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMAINING~~ COUNTS (h)	
	10						8	6
	11		6177	120				
	12	FILL: REDDISH BROWN CLAY, TRACE COARSE SAND, STIFF, MOIST.	6283	80				
	13		6405	120				
	14		6361	130		Hi beta	6280	52
60"	15		6335	110		NATIVE	6586	45
		BOTTOM OF BORING @ 15'						
	16	NOTES:						
		SAMPLE ID #S						
		TLS-SS-IA3B05(1.1-1.6)031110(TOP 6")						
	17	TLS-SB-IA3B05(3.0-4.0)031110 (SAT)						
		TLS-SB-IA3B05(4.0-5.0)031110 (Hi 8)						
		TLS-SB-IA3B05(13.0-14.0)031110 (Hi 6)						
		TLS-SB-IA3B05(14.0-15.0)031110 (NATIVE)						
	18	PID = 0 ppm (VOC'S)						
		GROUNDWATER: NOT ENCOUNTERED						
		NATIVE : 14'						
	19	TOTAL RECOVERY: 152"						
	20	WEATHER: SUNNY 60°						

PROJECT

HOLE NO. IA3B05

ENG FORM 5056A-R, AUG 94

USACE ENG HTRW Forms
Investigative Area 3 DL

IA3D-01

HTRW DRILLING LOG

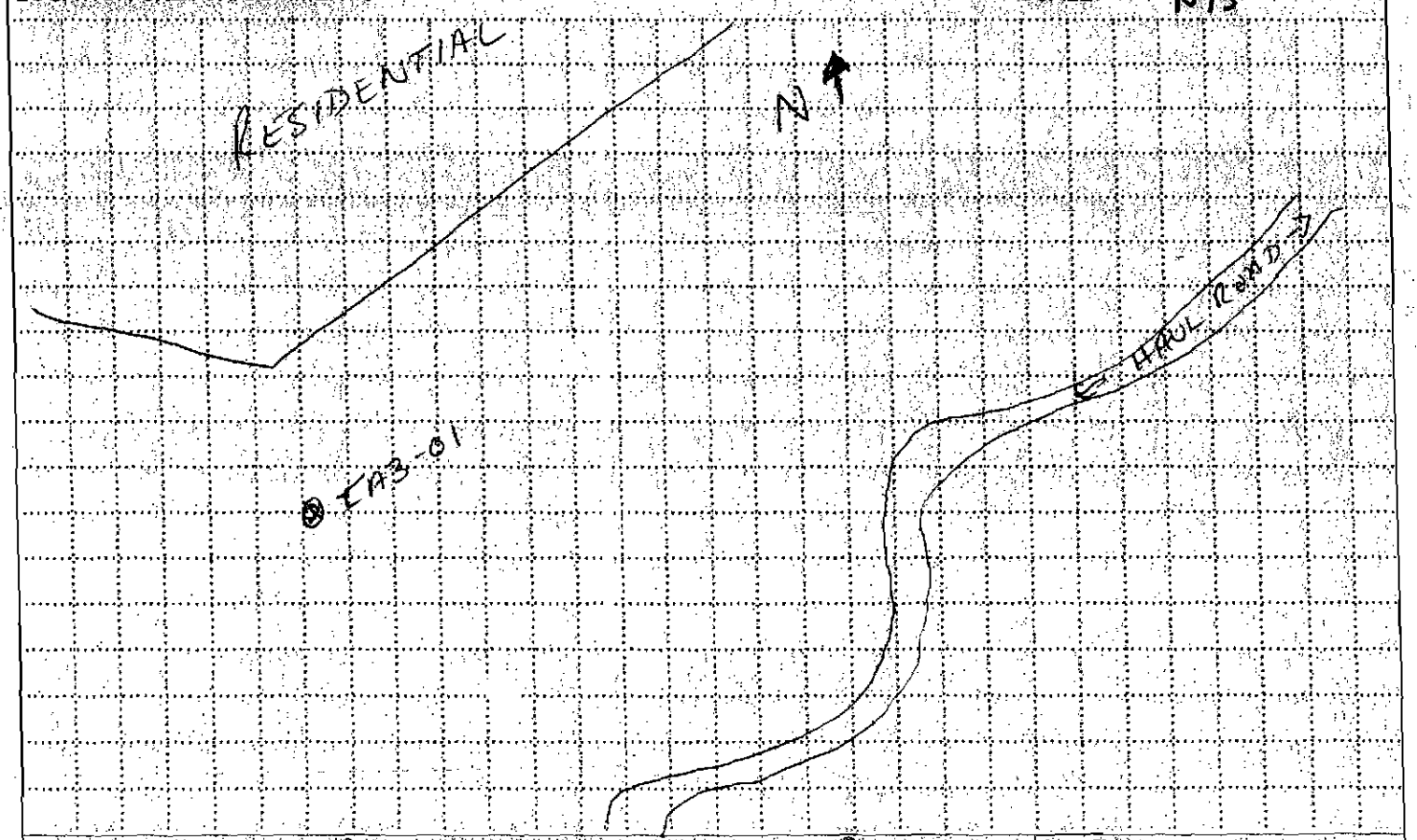
DISTRICT: Buffalo		HOLE NUMBER: ~~IA3-01~~
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 3
3. PROJECT: TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: PHIL ORSI / DOM PINO	6. MANUFACTURER'S DESIGNATION OF DRILL: DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/2" CASING 2" CORE w/ 5' PLASTIC SLEEVE	8. HOLE LOCATION: N= 1092331.1 E= 1063923.95	
	9. SURFACE ELEVATION:	
	10. DATE STARTED: 3/16/10	11. DATE COMPLETED: 3/16/10
12. OVERBURDEN THICKNESS: N/A	15. DEPTH GROUNDWATER ENCOUNTERED: NOT ENCOUNTERED	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 14'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP / TOTALS	TCLP / TOTALS	SVOC-TCLP / TOTALS	PCB-TCLP / TOTALS	PCB-TOTALS	N/A

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. [redacted]
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON LF - Buffalo DISTRICT FUSRAP PROJECT — HOLE NO: IA3-01

ENG FORM 5056-R, AUG 94

1A3D-01

HTRW DRILLING LOG (CONTINUATION SHEET)

[redacted] 3-5-10

HOLE NUMBER ~~IA3-01~~

PROJECT

INSPECTOR STUART PRYCE

SHEET 2 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	~~FIELD SCREENING RESULTS~~ (d) γ	~~GEOTECH SAMPLE OR CORE BOX~~ NO. (e) B	~~ANALYTICAL SAMPLE NO.~~ (f)	~~BLOW COUNT~~ (g)	1 MIN. STATIC ~~REMARKS~~ COUNT (h) γ	B
	0–2	NO RECOVERY →						
	3	FILL: ORGANIC MATERIAL: ROOTS, STONE, CINDER, ASH, CEMENT, LOOSE, WET.	5342	80		TOP 6"	5310	59
	4		5341	40		CHEM	5233	42
			5906	20		Hi γ	5542	59
35"	5							
	6–7	NO RECOVERY →						
	8	FILL: REDDISH BROWN CLAY, COARSE SAND + STONE, VERY WET, LOOSE (7-8') (8-10' STIFF, MOIST. NATIVE @ 8'	5287	100				
	9		5457	80		NATIVE	5427	45
			5770	120		Hi Beta	5391	64
36"	10							

PROJECT

HOLE NO. IA3-01

ENG FORM 5056A-R, AUG 94

IA3D-01

HTRW DRILLING LOG (CONTINUATION SHEET)

[redacted] 65th

HOLE NUMBER ~~IA3-01~~

PROJECT

INSPECTO[redacted]

SHEET 3 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNT (h) γ	REMARKS B
		NO RECOVERY						
	11'	Fill: Reddish Brown Clay, coarse sand + stone, very stiff, moist.	5678	40		2ND H' γ	5079	46
	12'		5501	60				
	13'		5085	100				
42'/	14'		5563	120				
	15'	END OF BORING 14' STOPPED DUE TO EXPANSIVE CLAY.						

NOTES:

SAMPLE ID #S

TLS-SS-IA3-01 (2.1-2.6)	031610	TOP 6"
TLS-SB-IA3-01 (3.0-4.0)	031610	CHEM
TLS-SB-IA3-01 (4.0-5.0)	031610	H γ
TLS-SB-IA3-01 (8.0-9.0)	031610	NATIVE
TLS-SB-IA3-01 (9.0-10.0)	031610	24' BETA
TLS-SB-IA3-01 (10.4-11.4)	031610	2ND H' γ

PID = 0 ppm VOC'S

NATIVE @ 8'

GROUNDWATER - N/E

CHEM DUPE SAMPLE TAKEN.

RECOVERY = 115"

WEATHER = SUNNY 50°

PROJECT

HOLE NO. IA3-01

ENG FORM 5056A-R, AUG 94

1A3D-02

HTRW DRILLING LOG

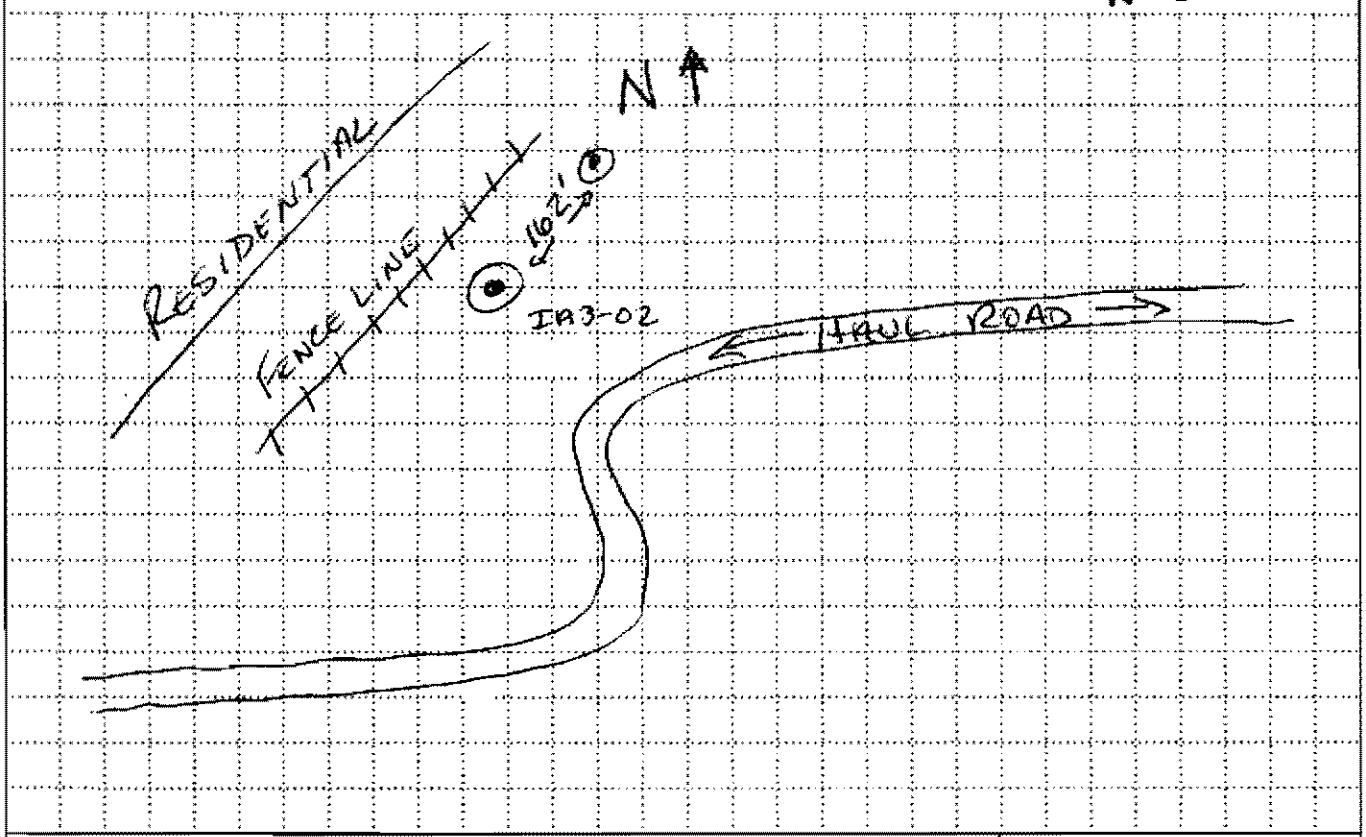
DISTRICT: BUFFALO [redacted] 5-10		HOLE NUMBER: ~~IA3-02~~
1. COMPANY NAME: ENSOL INC.	2. DRILLING CONTRACTOR: ZEBRA	SHEET 1 OF 3 SHEETS
3. PROJECT: TOWN OF TONAWANDA LP OPERABLE BUFFALO DISTRICT FUSRAP SITE	4. LOCATION: TONAWANDA LANDFILL, TONAWANDA NY	
5. NAME OF DRILLER: PHILORSI / DOM PINO	6. MANUFACTURER'S DESIGNATION OF DRILL: 7720 DT GEO-PROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASTING 2" CORE W/5' PLASTIC SLEEVE	8. HOLE LOCATION: N = 1092179.83 E = 1063419.79	
	9. SURFACE ELEVATION	
	10. DATE STARTED: 3/16/10	11. DATE COMPLETED: 3/16/10
12. OVERBURDEN THICKNESS: N/A	15. DEPTH GROUNDWATER ENCOUNTERED: NOT ENCOUNTERED	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 12'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	—	—	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	—	—	—	—	—	N/A %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. S[redacted]
CUTTINGS DRUMMED	—	—	—	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TONAWANDA LANDFILL – BUFFALO DISTRICT FUSRAP — HOLE NO. IA3-02

ENG FORM 5056-R, AUG 94

IA3D-02

HTRW DRILLING LOG (CONTINUATION SHEET)

[redacted] 5'10"

HOLE NUMBER ~~IA3-02~~

PROJECT: TONAWANDA LANDFILL, BUFFALO

INSPECTOR: STUART PRYCE

SHEET 2 OF 3 SHEETS

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING ~~RESULTS~~ (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOWCOUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h) X	B
	0	NO RECOVERY						
		Fill: Organic Material, grass, roots, wood, cement to 18", Reddish Brown Clay, stiff, moist.	6095	80		(.2-.8) Top 6"	5767	48
	1		5717	60		(1.7-2.7) NATIVE	5785	49
	2		6012	100		(2.7-3.7) Hi beta	6049	61
	3		5772	80				
	4		5844	70				
58"	5	NO RECOVERY						
	6							
	7	Fill: Reddish Brown Clay, trace coarse sand + stone very stiff, moist. Expansive	6014	40				
	8		6239	60				
	9	Fill: Reddish Brown Clay, trace coarse sand, stone, stiff, moist	6054 (SP) 37	40				
48"	10		6054	30				

PROJECT

HOLE NO. IA3-02

ENG FORM 5056A-R, AUG 94

1A3D-02

HTRW DRILLING LOG (CONTINUATION SHEET)

[redacted]

HOLE NUMBER: ~~IA3-02~~

PROJECT: TONAWANDA LANDFILL, BUFFALO FUSRAP

INSPECTOR: [redacted]

SHEET 2 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	~~HNU SCREENING RESULTS~~ (d) γ	~~GEOTECH SAMPLE OR CORE BOX NO.~~ (e) B	~~ANALYTICAL SAMPLE NO.~~ (f)	~~BLOWCOUNT~~ (g)	~~REMARKS~~ 1 MIN. STATIC COUNTS (h) γ	B
		FILL: CONT. FROM PAGE #2	6690	70		Hi γ (10.0-11.0)	5737	49
	11		6292	80		2ND Hi γ (11.0-12.0)	5909	46
24"	12	END OF BORING – STOPPED @ 12' DUE TO EXPANSIVE CLAY						

NOTES:

SAMPLE ID #S

TLS-SS-IA3-02(.2-.8)031610 – TOP 6"
TLS-SB-IA3-02(1.7-2.7)031610 – NATIVE
TLS-SB-IA3-02(2.7-3.7)031610 – Hi beta
TLS-SB-IA3-02(10.0-11.0)031610 – Hi γ
TLS-SB-IA3-02(11.0-12.0)031610 – 2ND Hi γ

(PID = 0 ppm VOC's)

NATIVE @ 19"

GROUND WATER = NOT ENCOUNTERED.

TOTAL RECOVERY = 130"

WEATHER = SUNNY 50°

PROJECT

HOLE NO. IA3-02

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

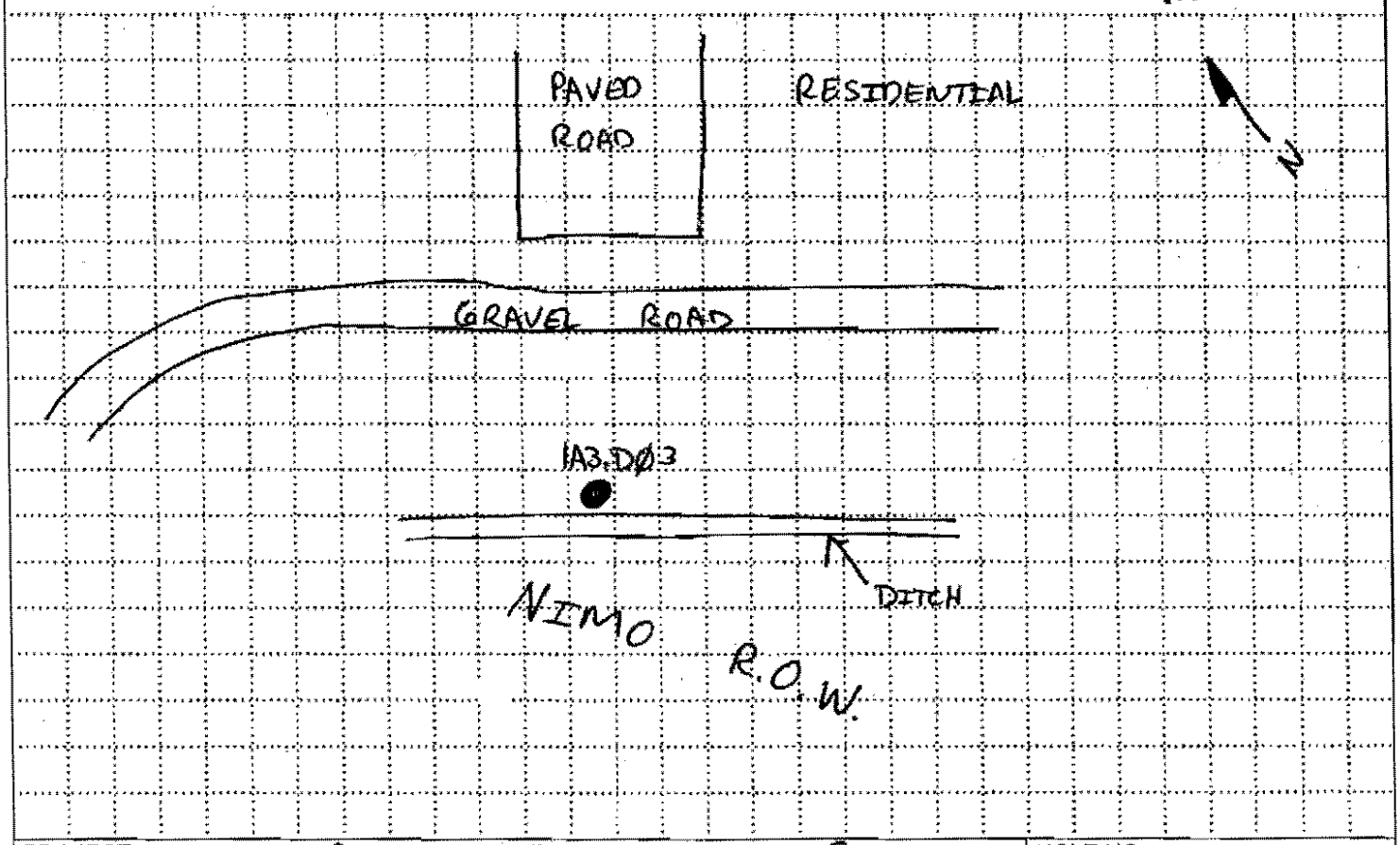
DISTRICT: Buffalo		HOLE NUMBER: 1A3.DØ3
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 3 SHEETS
3. PROJECT: TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: PHIL ORSI	6. MANUFACTURER'S DESIGNATION OF DRILL: 6620 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE	8. HOLE LOCATION: N= 1092436.899 E= 1063921.938	
	9. SURFACE ELEVATION:	
	10. DATE STARTED: 3/15/10 1510	11. DATE COMPLETED: 3/15/10 1600
12. OVERBURDEN THICKNESS: 0.7'	15. DEPTH GROUNDWATER ENCOUNTERED:	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 12.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	–	–	–	–	–	N/A

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. [redacted]
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT	HOLE NO
TON LF- Buffalo DISTRICT FUSRAP PROJECT	1A3.DØ3

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A3DØ3

SHEET 2 OF 3

REC'D ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS ~~REMARKS~~ (h)
	0	NO RECOVERY →					
		DARK-BROWN CLAYEY TOPSOIL, GRASS, GRAVEL, SOFT, WET	7106	150		TOP 6"	γ 6681 B 64
	1	REDDISH-BROWN SILT AND CLAY, TRACE COURSE SAND AND FINE SUB-ROUND GRAVEL (<1/4"), GRAY MOTTLING, STIFF, MOIST. (CL)	8000	80	SEE NOTES	NATIVE	6788 69
	2						
	3		7296	110			
	4		6907	120			
57"	5		6614	120			
	6	NO RECOVERY →					
	7	SAME AS 0.7'-5.0 (NO MOTTLING)	7470	80		2ND HIGH γ	6929 50
22" (5.0'-8.0')	8		7230	100			
	9		7102	60			
	10		7453	60			

PROJECT

HOLE NO 1A3,DØ3

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A3.DØ3

SHEET 3 OF 3

REC'D ~~FLEW~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~READING~~ COUNTS (h) X	B
	10	CONTINUED FROM PAGE 2						
			7597	100	SEE	HIGH X	7063	72
	11				NOTES			
			7427	140		HIGH B	6729	64
48" (8.0'-12.0')	12	BOTTOM of BORING AT 12.0'						
	13	NOTES:						
		- CLOUDY, 45°F						
		- SAMPLE I.D.						
	14	TLS-SS-1A3.DØ3(0.2-0.7)031510						
		TLS-SB-1A3.DØ3(0.7-1.7) 031510						
	15	TLS-SB-1A3.DØ3(6.1-7.1)031510						
		TLS-SB-1A3.DØ3(10.0-11.0)031510						
		TLS-SB-1A3.DØ3(11.0-12.0)031510						
	16	- PID READINGS = 0ppm (VOC'S)						
		- SOIL READINGS ARE						
	17	COUNTS/MIN.						
		- DRILLER TERMINATED						
	18	BORING AT 12.0' DUE						
		TO EXPANSIVE CLAYS.						
	19							
	20							

PROJECT

HOLE NO 1A3.DØ3

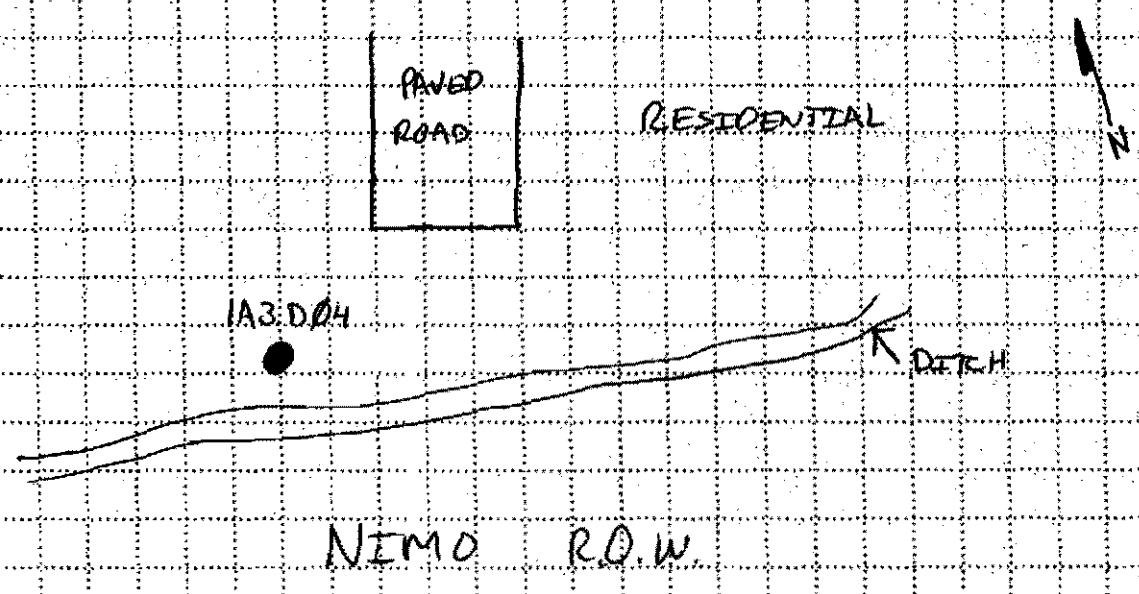
ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

DISTRICT	Buffalo
HOLE NUMBER	1A3.D04
1. COMPANY NAME	ENSOL, INC.
2. DRILLING CONTRACTOR	ZEBRA ENVIRONMENTAL CORP.
SHEET / SHEETS	1 OF 3
3. PROJECT	TOWN of TONAWANDA LP OPERABLE UNIT-Buffalo DISTRICT FUSRAP PROJECT
4. LOCATION	TONAWANDA LF, TONAWANDA, NY
5. NAME OF DRILLER	PHIL ORSI
6. MANUFACTURER'S DESIGNATION OF DRILL	6620 DT GEOPROBE
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	3 1/4" CASING 2" CORE W/ 5' PLASTIC SLEEVE
8. HOLE LOCATION	N= 1092497.478 E=1064149.247
9. SURFACE ELEVATION	
10. DATE STARTED	3/15/10 1350
11. DATE COMPLETED	3/15/10 1500
12. OVERBURDEN THICKNESS	1.4'
15. DEPTH GROUNDWATER ENCOUNTERED	NOT ENCOUNTERED
13. DEPTH DRILLED INTO ROCK	N/A
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	N/A
14. TOTAL DEPTH OF HOLE	12.0'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	N/A
18. GEOTECHNICAL SAMPLES	N/A
DISTURBED	–
UNDISTURBED	–
19. TOTAL NUMBER OF CORE BOXES	N/A
20. SAMPLES FOR CHEMICAL ANALYSIS	5
VOC	TCLP / TOTALS
METALS	TCLP / TOTALS
OTHER (SPECIFY)	ZNC-TCLP / TOTALS
OTHER (SPECIFY)	PBS-TCLP / TOTALS
OTHER (SPECIFY)	PCB-TOTALS
21. TOTAL CORE RECOVERY	N/A%
22. DISPOSITION OF HOLE	CUTTINGS DRUMMED
BACKFILLED	–
MONITORING WELL	–
OTHER (SPECIFY)	–
23. [redacted]	

LOCATION SKETCH/COMMENTS

SCALE: NTS



PROJECT	TON LF- Buffalo DISTRICT FUSRAP PROJECT
HOLE NO	1A3.D04

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: 1A3D04

PROJECT:

INSPECTOR: D Popp

SHEET 2 OF 3

REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h) γ	B
	0	NO RECOVERY →						
	1	DARK-REDDISH-BROWN CLAYEY TOPSOIL, ROOTLETS, GRAVEL, MED. STIFF, MOIST.	6487	80		TOP 6"	6068	69
	2	REDDISH-BROWN SILT AND CLAY, GRAY AND ORANGE MOTTLING, STIFF, MOIST. (CL)	6840	80		NATIVE	6102	47
	3		6435	120	SEE NOTES	HIGH B	6360	59
	4	REDDISH-BROWN SILT AND CLAY, TRACE COURSE SAND AND FINE SUB-ROUND GRAVEL (<3/4"), GRAY MOTTLING, STIFF, MOIST. (CL)	6812	80		HIGH γ	6253	52
56"	5		6374	80		CHEM. (4.4'-5.0')	6137	57
	6	NO RECOVERY →						
	7	REDDISH-BROWN SILT AND CLAY, TRACE COURSE SAND AND FINE SUB-ROUND GRAVEL (<1/4"), GRAY MOTTLING TO 8.0', STIFF, MOIST. (CL)	5820	90		CHEM. (6.2'-6.6')		
45" (5.0-8.0')	8		6381	80				
	9		6251	70				
	10		6553	80				

PROJECT

HOLE NO 1A3D04

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A3.DØ4

SHEET 3 OF 3

~~ELEV.~~ REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS REMARKS (h) γ	B
	10	CONTINUED FROM PAGE 2						
			6790	60	SEE NOTES	2ND HIGH γ	6080	58
	11							
			6734	70				
48" (8.0'-12.0')	12	BOTTOM of BORING AT 12.0'						
		NOTES:						
	13	- CLOUDY, 45°F						
		- SAMPLE I.D.						
	14	TLS-SS-1A3.DØ4(0.3-0.8)031510						
		TLS-SB-1A3.DØ4(1.4-2.4)031510						
		TLS-SB-1A3.DØ4(2.4-3.4)031510						
	15	TLS-SB-1A3.DØ4(3.4-4.4)031510						
		TLS-SB-1A3.DØ4(4.4-5.0/6.2-6.0)031510						
		TLS-SB-1A3.DØ4(10.0-11.0)031510						
	16	- COLLECTED CHEMICAL DUP.						
		- PID READINGS = 0ppm (VOCs)						
	17	- SOIL READINGS ARE COUNTS/MIN.						
	18	- DRILLER TERMINATED BORING AT 12.0' DUE TO EXPANSIVE CLAYS.						
	19							
	20							

PROJECT

HOLE NO 1A3.DØ4

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

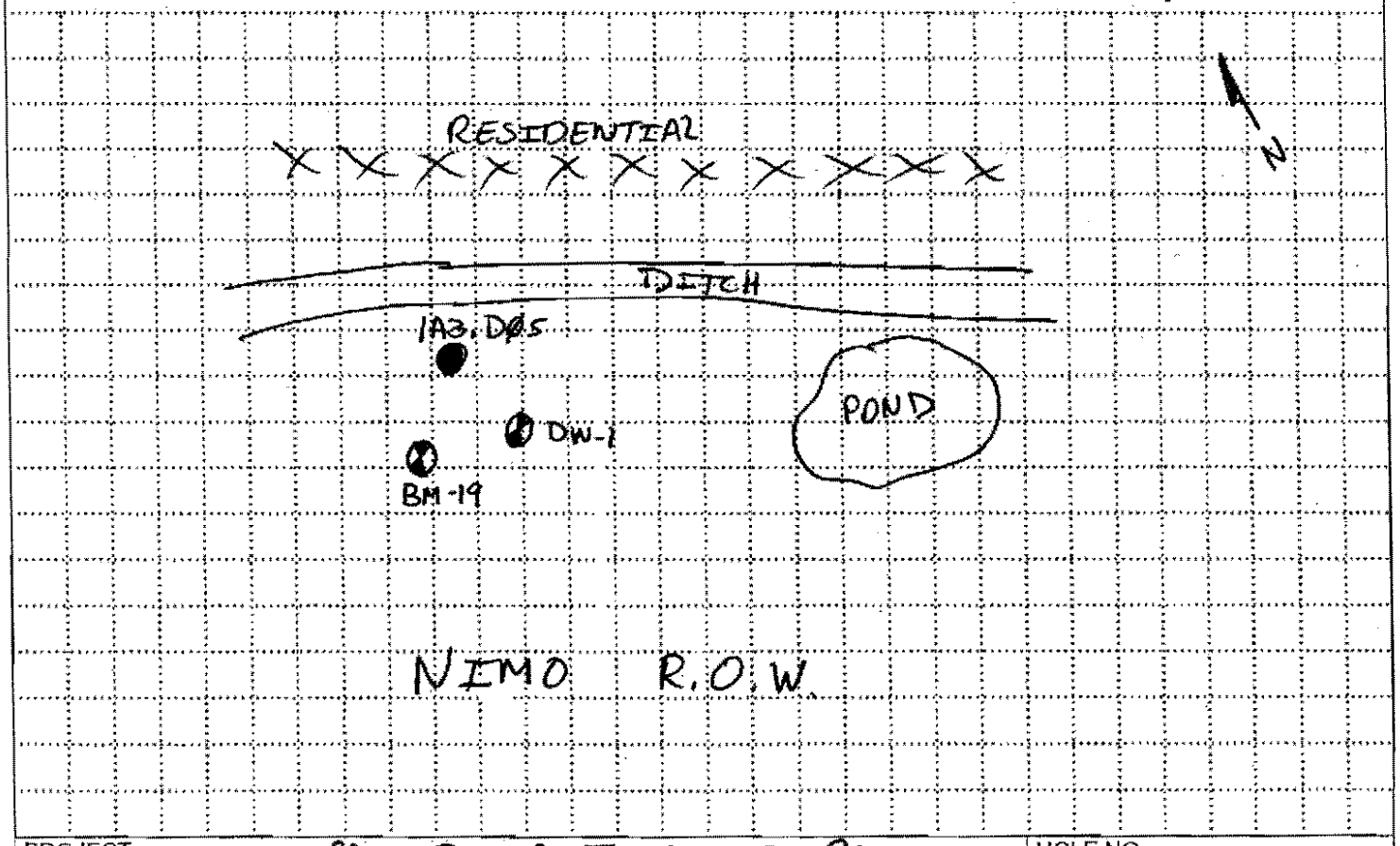
DISTRICT: Buffalo	HOLE NUMBER: 1A3.D05	
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 3 SHEETS
3. PROJECT: TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: PHIL ORSI	6. MANUFACTURER'S DESIGNATION OF DRILL: 6620 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE	8. HOLE LOCATION: N=1092537.018 E=1064370.545	
	9. SURFACE ELEVATION:	
	10. DATE STARTED: 3/15/10 1120	11. DATE COMPLETED: 3/15/10 1215
12. OVERBURDEN THICKNESS: 1.5'	15. DEPTH GROUNDWATER ENCOUNTERED: NOT ENCOUNTERED	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 12.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	-	-	-	-	-	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. S[redacted]
CUTTINGS DRUMMED	-	-	-	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON LF - Buffalo DISTRICT FUSRAP PROJECT — HOLE NO: 1A3.D05

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER 1A3,DØ5

PROJECT

INSPECTOR D. Poff

SHEET 2 OF 3

REC'D ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~SCREENING~~ COUNTS (h)
	0	NO RECOVERY →					→
	1	DARK-BROWN AND GRAY CLAYEY TOPSOIL, GRASS, ROOTLETS, CONCRETE, SOFT, WET.	6347	40		TOP 6"	X 6311 B 50
	2	REDDISH-BROWN SILT AND CLAY, TRACE COURSE SAND AND FINE SUB-ROUND GRAVEL (< 1/4"), GRAY MOTTLING, STIFF, MOIST. (CL)	6467	80	SEE NOTES	NATIVE	6527 67
	3		6884	80			
	4		6859	120			
51"	5		7072	80		HIGH X	6176 51
	6	NO RECOVERY →					→
	7	REDDISH-BROWN SILT AND CLAY, TRACE COURSE SAND AND FINE SUB-ROUND GRAVEL (< 1/4"), GRAY MOTTLING TO 6.9', STIFF, MOIST. (CL)	6925	30			
			6480	80			
24" (5.0'-8.0')	8	NO RECOVERY →					→
	9	SAME AS 6.0'-8.0'	6661	130		HIGH B	6236 77
	10		6935	115			

PROJECT

HOLE NO 1A3,DØ5

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. PoPP

HOLE NUMBER 1A3,DØ5

SHEET 3 OF 3

~~REC'D ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h) γ	B
	10	CONTINUED FROM PAGE 2						
	11		7038	70	SEE	2ND HIGH γ	6251	57
			6811	100	NOTES			
44" (8.0-12.0)	12	BOTTOM of BORING AT 12.0'						
	13	NOTES:						
		- CLOUDY, 42°F						
		- SAMPLE I.D.						
	14	TLS-SS-1A3,DØ5(0.6-1.1)031510						
		TLS-SB-1A3,DØ5(1.5-2.5)031510						
	15	TLS-SB-1A3,DØ5(4.0-5.0)031510						
		TLS-SB-1A3,DØ5(8.4-9.4)031510						
		TLS-SB-1A3,DØ5(10.0-11.0)031510						
	16	- PID READINGS = 0ppm (VOCs)						
		- SOIL READINGS ARE						
	17	COUNTS/MIN.						
		- DRILLER TERMINATED						
	18	BORING AT 12.0' DUE TO						
		EXPANSIVE CLAYS.						
	19							
	20							

PROJECT

HOLE NO 1A3,DØ5

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

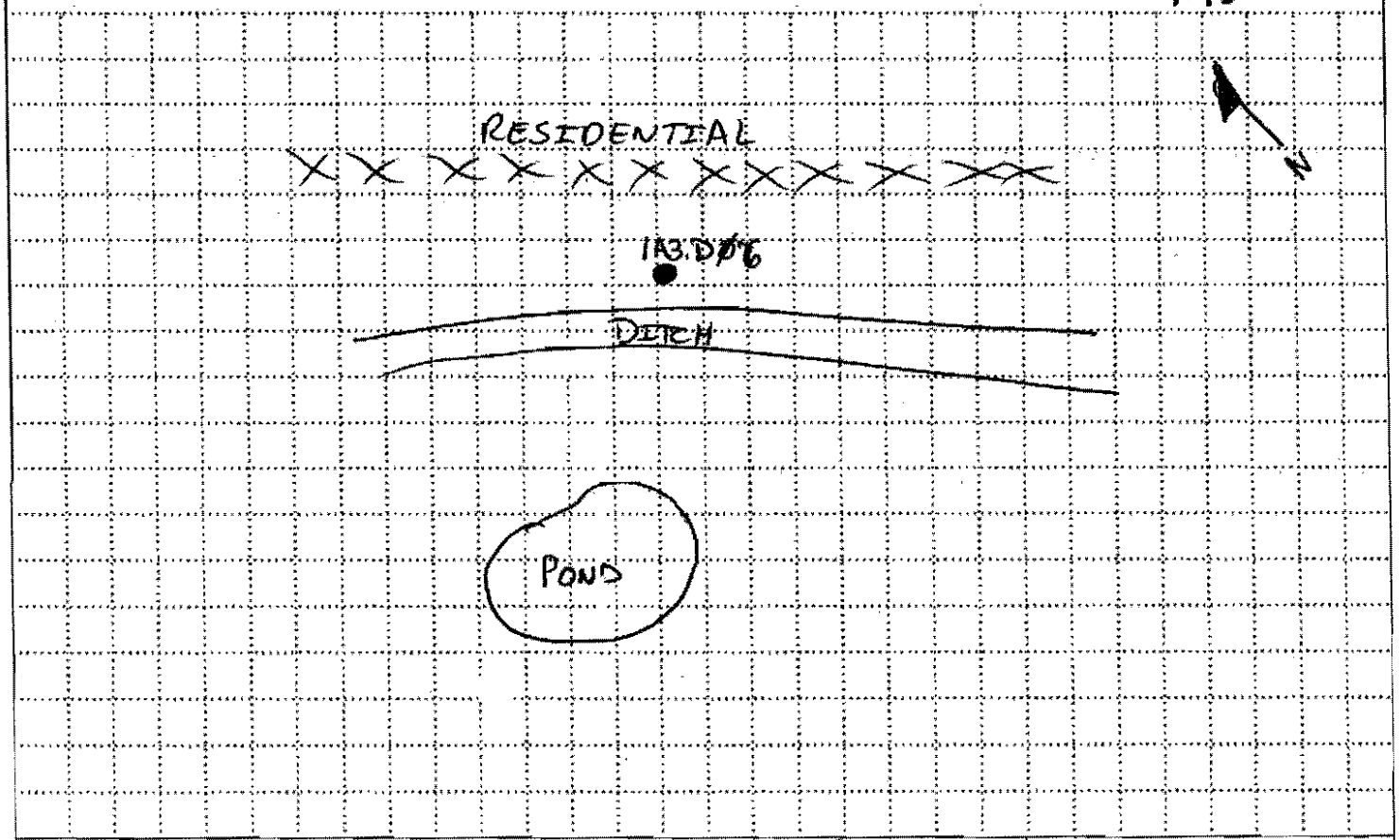
DISTRICT	Buffalo
HOLE NUMBER	1A3.D06
1. COMPANY NAME	ENSOL, INC.
2. DRILLING CONTRACTOR	ZEBRA ENVIRONMENTAL CORP.
SHEET / SHEETS	1 OF 3
3. PROJECT	TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT
4. LOCATION	TONAWANDA LF, TONAWANDA, NY
5. NAME OF DRILLER	PHIL ORSI
6. MANUFACTURER'S DESIGNATION OF DRILL	6620 DT GEOPROBE
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	3 1/4" CASING 2" CORE W/ 5' PLASTIC SLEEVE
8. HOLE LOCATION	N= 1092661.764 E= 1064592.994
9. SURFACE ELEVATION	
10. DATE STARTED	3/15/10 1020
11. DATE COMPLETED	3/15/10 1105
12. OVERBURDEN THICKNESS	0.9'
15. DEPTH GROUNDWATER ENCOUNTERED	NOT ENCOUNTERED
13. DEPTH DRILLED INTO ROCK	N/A
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	N/A
14. TOTAL DEPTH OF HOLE	12.0'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	N/A

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP / TOTALS	TCLP / TOTALS	SVOC-TCLP / TOTALS	PEST-TCLP / TOTALS	PCB-TOTALS	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. [redacted]
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT	TON LF - Buffalo DISTRICT FUSRAP PROJECT
HOLE NO	1A3.D06

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: 1A3,D06

PROJECT:

INSPECTOR: D. Poff

SHEET 2 OF 3

REC'D ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC REMARKS COUNTS (h)
	0	NO RECOVERY →					→
	1	DARK-BROWN CLAYEY TOPSOIL, ROOTLETS, GRASS, MED. STIFF, WET	5867	90		TOP 6"	X 6386 / B 63
			6468	80		NATIVE	6155 57
	2	REDDISH-BROWN SILT AND CLAY, BLACK/GRAY/ORANGE MOTTLING, TRACE COURSE SAND, MED. STIFF, MOIST (CL)	6511	50	SEE NOTES		
	3						
			7318	70		CHEM.	6480 77
	4						
			7953	100		HIGH X	6571 58
54"	5						
		NO RECOVERY →					→
	6						
	7	REDDISH-BROWN SILT AND CLAY, TRACE COURSE SAND AND FINE SUB-ROUND GRAVEL (<1/4"), GRAY MOTTLING TO 8.7', STIFF, MOIST. (CL)	6474	100		HIGH B	6515 57
21" (5.0'-8.0')	8		7049	100			
	9		6545	80			
			6943	40			
	10						

PROJECT:

HOLE NO: 1A3,D06

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. PoPP

HOLE NUMBER 1A3.DØ6

SHEET 3 OF 3

~~ELEV~~ REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMAINING~~ COUNTS (h)
	10	CONTINUED FROM PAGE 2	6960	80	SEE NOTES		
	11		7437	90		2ND HIGH γ	γ B 6338 51
48" (8.0'-12.0')	12	BOTTOM of BORING AT 12.0'					
	13	NOTES: - CLOUDY, 42° F - SAMPLE I.D.					
	14	TLS-SS-1A3.DØ6(0.4-0.9)031510 TLS-SB-1A3.DØ6(0.9-1.9)031510 TLS-SB-1A3.DØ6(3.0-4.0)031510					
	15	TLS-SB-1A3.DØ6(4.0-5.0)031510 TLS-SB-1A3.DØ6(6.4-7.4)031510 TLS-SB-1A3.DØ6(11.0-12.0)031510					
	16	- PID READINGS = 0ppm (VOC's) - SOIL READINGS ARE COUNTS/MIN.					
	17	- DRILLER TERMINATED BORING AT 12.0' DUE TO EXPANSIVE CLAYS.					
	18						
	19						
	20						

PROJECT

HOLE NO 1A3.DØ6

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

DISTRICT	Buffalo
HOLE NUMBER	1A3.D07
1. COMPANY NAME	ENSOL, INC.
2. DRILLING CONTRACTOR	ZEBRA ENVIRONMENTAL CORP.
SHEET / SHEETS	1 OF 3
3. PROJECT	TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT
4. LOCATION	TONAWANDA LF, TONAWANDA, NY
5. NAME OF DRILLER	PHIL ORSI
6. MANUFACTURER'S DESIGNATION OF DRILL	6620 DT GEOPROBE
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE
8. HOLE LOCATION	N= 1092753.361 E= 1064812.826
9. SURFACE ELEVATION	
10. DATE STARTED	3/15/10 0900
11. DATE COMPLETED	3/15/10 1015
12. OVERBURDEN THICKNESS	2.6'
15. DEPTH GROUNDWATER ENCOUNTERED	NOT ENCOUNTERED
13. DEPTH DRILLED INTO ROCK	N/A
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	N/A
14. TOTAL DEPTH OF HOLE	12.0'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	N/A

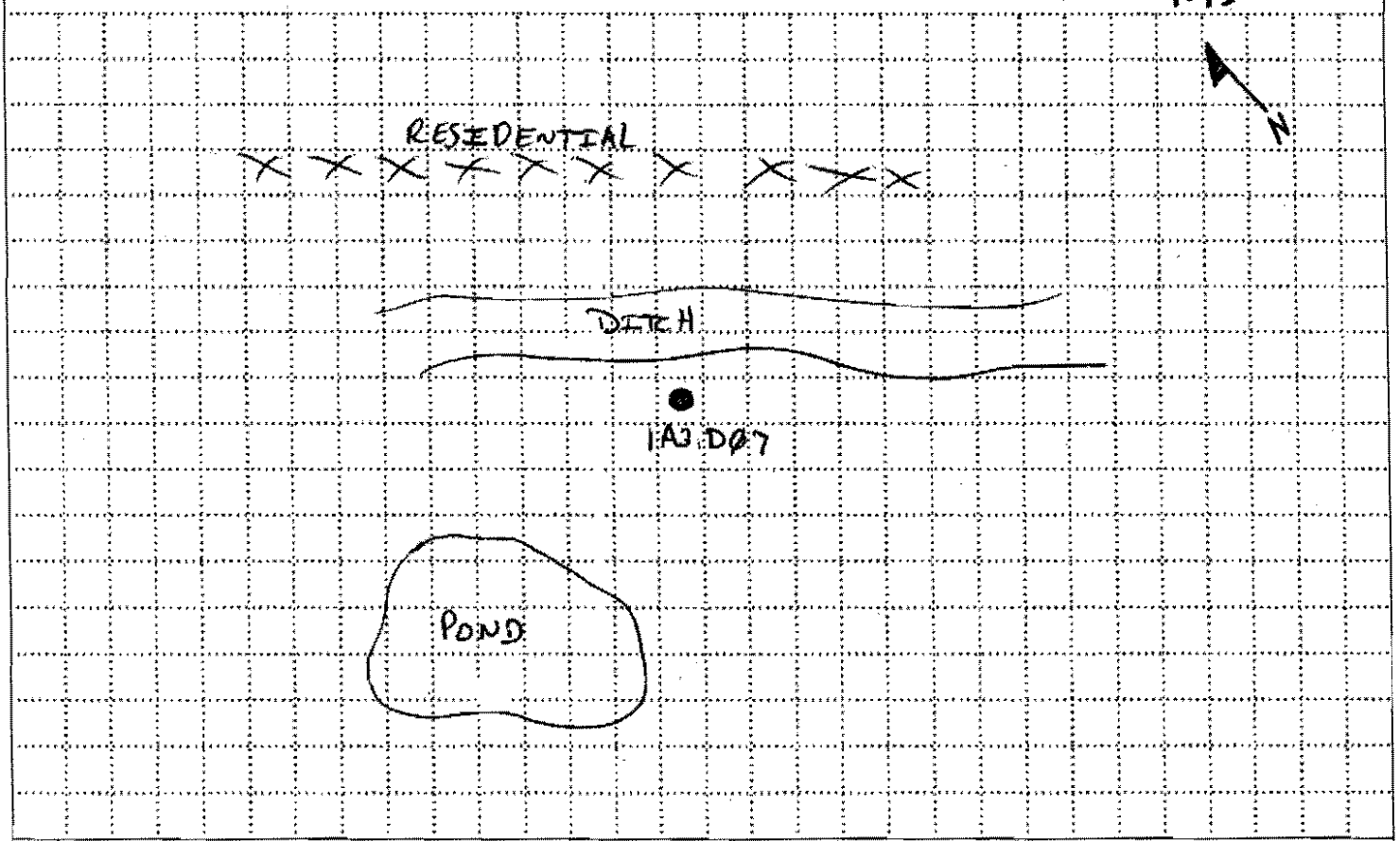
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP / TOTALS	TCLP / TOTALS	SVOC-TCLP / TOTALS	PEST-TCLP / TOTALS	PCB-TOTALS	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23.
CUTTINGS DRUMMED	–	–	–	[redacted]

LOCATION SKETCH/COMMENTS

SCALE: NTS



PROJECT	TON LF- Buffalo DISTRICT FUSRAP PROJECT
HOLE NO	1A3.D07

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A3,D07

SHEET 2 OF 3

RECID ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS ~~REMARKS~~ (h)
	0	NO RECOVERY →					→
	1						
		REDDISH-BROWN CLAYEY TOPSOIL, GRASS, ROOTS, SOFT, WET.	6667	100		TOP 6"	γ 6373 B 57
	2				SEE		
		DARK-BROWN SILT AND CLAY, ROOTLETS, BLACK AND ORANGE MOTTLING, MED. STIFF, MOIST. (CL)	7180	70	NOTES		
	3					NATIVE	6355 48
	4		6820	60			
	5		6568	60			
46"		NO RECOVERY →					→
	6	REDDISH-BROWN SILT AND CLAY, TRACE COURSE SAND AND FINE SUB-ROUND GRAVEL (<1/2"), GRAY MOTTLING TO 8.0', MED. STIFF, MOIST (CL)	6945	40		2ND HIGH γ	6414 54
	7		6072	60			
34" (5.0'-8.0')	8		6688	90			
	9		6510	70			
						CHEM.	6485 53
	10		7353	40		HIGH γ	6401 54

PROJECT

HOLE NO 1A3,D07

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. POPP

HOLE NUMBER 1A3.DØ7

SHEET 3 OF 3

REC'D ~~TLEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC REMARKS COUNTS (h)	
	10	CONTINUED FROM PAGE 2				HIGH X (CONT.)	X	B
	11		6751	80	SEE NOTES	HIGH B	6302	53
48" (8.0'-12.0')	12		6706	100				
		BOTTOM of BORING AT 12.0'						
	13	NOTES: - OVERCAST, 40°F - SAMPLE I.D.						
	14	TLS-SS-1A3.DØ7(1.1-1.6)031510 TLS-SB-1A3.DØ7(2.6-3.6)031510 TLS-SB-1A3.DØ7(5.2-6.2)031510						
	15	TLS-SB-1A3.DØ7(8.6-9.6)031510 TLS-SB-1A3.DØ7(9.6-10.6)031510 TLS-SB-1A3.DØ7(11.0-12.0)031510						
	16	- PID READINGS = 0 ppm (VOC's) - SOIL READINGS ARE COUNTS/MIN.						
	17	- COLLECTED RAD. DUPLICATE						
	18	- DRILLER TERMINATED BORING AT 12.0' DUE TO EXPANSIVE CLAYS.						
	19							
	20							

PROJECT

HOLE NO 1A3.BØ7

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

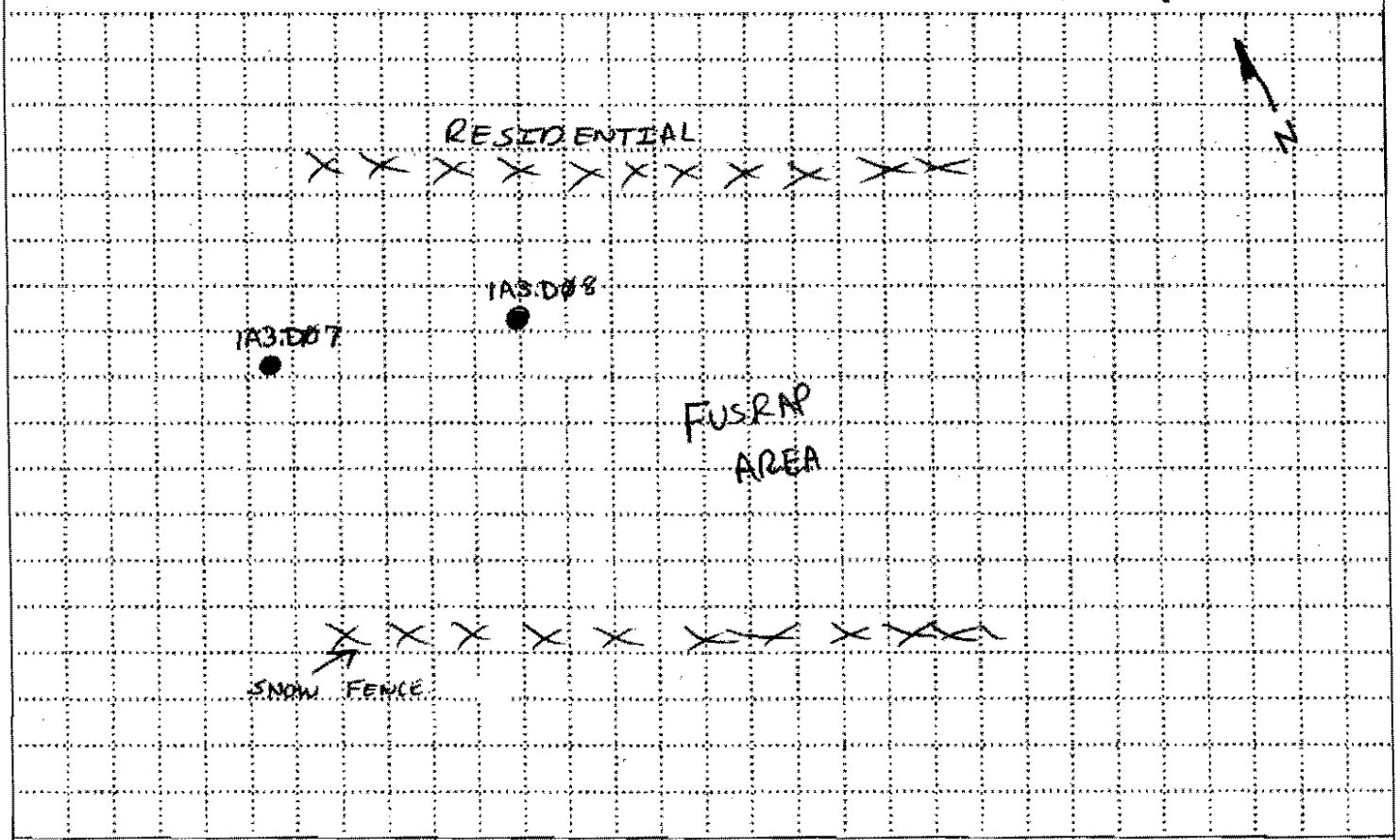
DISTRICT: Buffalo		HOLE NUMBER: 1A3.D08
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 3 SHEETS
3. PROJECT: TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: PHIL ORSI	6. MANUFACTURER'S DESIGNATION OF DRILL: DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE	8. HOLE LOCATION: N= 1092915.618 E= 1065084.127	
	9. SURFACE ELEVATION:	
	10. DATE STARTED: 3/12/10 1410	11. DATE COMPLETED: 3/12/10 1530
12. OVERBURDEN THICKNESS: 1.8'	15. DEPTH GROUNDWATER ENCOUNTERED: NOT ENCOUNTERED	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 12.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	–	–	–	–	–	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	2[redacted]
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT: TON LF- Buffalo DISTRICT FUSRAP PROJECT HOLE NO: 1A3.D08

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: 1A3,DØ8

PROJECT:

INSPECTOR: D. Popp

SHEET 2 OF 3

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING ~~RESULTS~~ (d) X	GEOTECH SAMPLE ~~OR CORE BOX NO.~~ (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. ~~READING~~ STATIC COUNTS (h)
	0	NO RECOVERY →					→
	1	DARK-BROWN CLAYEY TOPSOIL, GRASS, GRAVEL, SOFT, WET.	6575	60		TOP 6"	X 6256 B 65
			6845	90			
	2	REDDISH-BROWN SILT AND CLAY, BLACK AND ORANGE MOTTLING, TRACE COURSE SAND, MED. STIFF, MOIST. (CL)	7116	100	SEE NOTES	NATIVE	6449 45
	3	REDDISH-BROWN SILT AND CLAY, TRACE COURSE SAND AND FINE SUB-ROUND GRAVEL (<1"), GRAY MOTTLING, STIFF, MOIST. (CL)	7281	100		HIGH B	6433 61
51"	5		7027	90			
	6	NO RECOVERY →					→
	7	REDDISH-BROWN SILT AND CLAY, TRACE COURSE SAND AND FINE SUB-ROUND GRAVEL (<1"), GRAY MOTTLING TO 8.0', STIFF, MOIST. (CL)	7426	70		HIGH X	6360 59
36" (5.0'-8.0')	8		7267	60			
	9		6996	80			
	10		6980	50			

PROJECT:

HOLE NO: 1A3,DØ8

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. PoPP

HOLE NUMBER 1A3.DØ8

SHEET 3 OF 3

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMAINING~~ COUNTS (h) γ	B
	10	CONTINUED FROM PAGE 2						
			7348	100	SEE NOTES	2ND HIGH γ	6438	70
	11							
			6820	60				
48" (8.0-12.0')	12	BOTTOM of BORING AT 12.0'						
	13	NOTES:						
		- RAIN, 42° F						
		- SAMPLE I.D.						
	14	TLS-SS-1A3.DØ8(0.6-1.1)031210						
		TLS-SB-1A3.DØ8(1.8-2.8)031210						
		TLS-SB-1A3.DØ8(3.0-4.0)031210						
	15	TLS-SB-1A3.DØ8(6.0-7.0)031210						
		TLS-SB-1A3.DØ8(10.0-11.0)031210						
		- PID READINGS = 0ppm (VOCs)						
	16	- SOIL READINGS ARE COUNTS/MIN.						
		- DRILLER TERMINATED BORING AT 12.0' DUE TO EXPANSIVE CLAYS.						
	17							
	18							
	19							
	20							

PROJECT

HOLE NO 1A3.DØ8

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

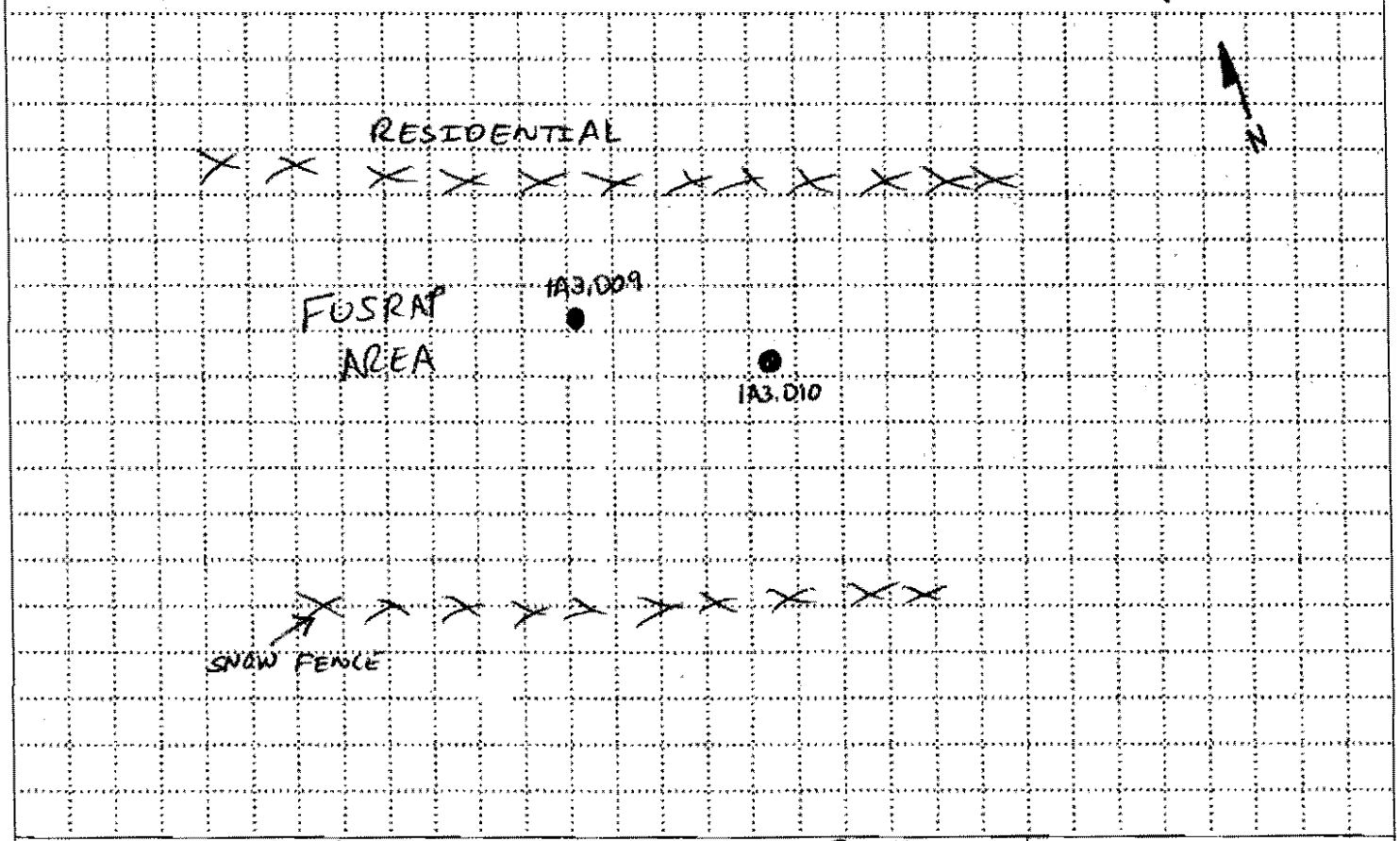
DISTRICT: Buffalo		HOLE NUMBER: 1A3.D09
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 3 SHEETS
3. PROJECT: TOWN of TONAWANDA LP OPERABLE UNIT-Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: PHIL ORSI	6. MANUFACTURER'S DESIGNATION OF DRILL: DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE W/ 5' PLASTIC SLEEVE	8. HOLE LOCATION: N= 1092995.874 E= 1065291.746	
	9. SURFACE ELEVATION:	
	10. DATE STARTED: 3/12/10 1030	11. DATE COMPLETED: 3/12/10 1140
12. OVERBURDEN THICKNESS: 1.0'	15. DEPTH GROUNDWATER ENCOUNTERED: NOT ENCOUNTERED	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 12.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	-	-	-	-	-	N/A

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	2[redacted]
CUTTINGS DRUMMED	-	-	-	

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT	HOLE NO
TON LF- Buffalo DISTRICT FUSRAP PROJECT	1A3.D09

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: 1A3.D09

PROJECT:

INSPECTOR: D. Popp

SHEET 2 OF 3

~~ELEV.~~ REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h)
	0	NO RECOVERY →					→
	1	DARK-BROWN CLAYEY TOPSOIL, ROOTLETS, SOFT, WET.	6494	50		TOP 6"	X 6984 / B 57
	2	REDDISH-BROWN SILT AND CLAY, TRACE COURSE SAND AND FINE SUB-ROUND GRAVEL (<½"), GRAY MOTTLING TO 3.7', STIFF, MOIST. (CL)	6566	110	SEE NOTES	NATIVE	6875 54
	3		7614	80			
	4		7683	100		HIGH X	6800 55
52"	5		7045	120			
	6	NO RECOVERY →					→
	7	REDDISH-BROWN SILT AND CLAY, TRACE COURSE SAND AND FINE SUB-ROUND GRAVEL (<½"), STIFF, MOIST. (CL)	6887	80			
20" (5.0'-8.0')	8		8423	130		HIGH B	6925 63
	9		7622	80			
	10		7353	60			

PROJECT

HOLE NO. 1A3.D09

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A3.D09

SHEET 3 OF 3 SHEET

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC REMARKS COUNTS (h) X	B
	10	CONTINUED FROM PAGE 2						
			7634	70	SEE	2ND HIGH X	6658	58
	11				NOTES			
			7548	80				
48" (8.0'-12.0')	12	BOTTOM of BORING AT 12.0'						
		NOTES:						
	13	- CLOUDY, 41°F						
		- SAMPLE I.D.						
		TLS-SS-1A3.D09(0.4-0.9)031210						
	14	TLS-SB-1A3.D09(1.0-2.0)031210						
		TLS-SB-1A3.D09(3.0-4.0) 031210						
		TLS-SB-1A3.D09(7.0-8.0)031210						
	15	TLS-SB-1A3.D09(10.0-11.0)031210						
		- PID READINGS = 0ppm (VOC's)						
	16	- SOIL READINGS ARE COUNTS/MIN.						
		- DRILLER TERMINATED BORING AT 12.0' DUE TO EXPANSIVE CLAYS.						
	17							
	18							
	19							
	20							

PROJECT

HOLE NO. 1A3.D09

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

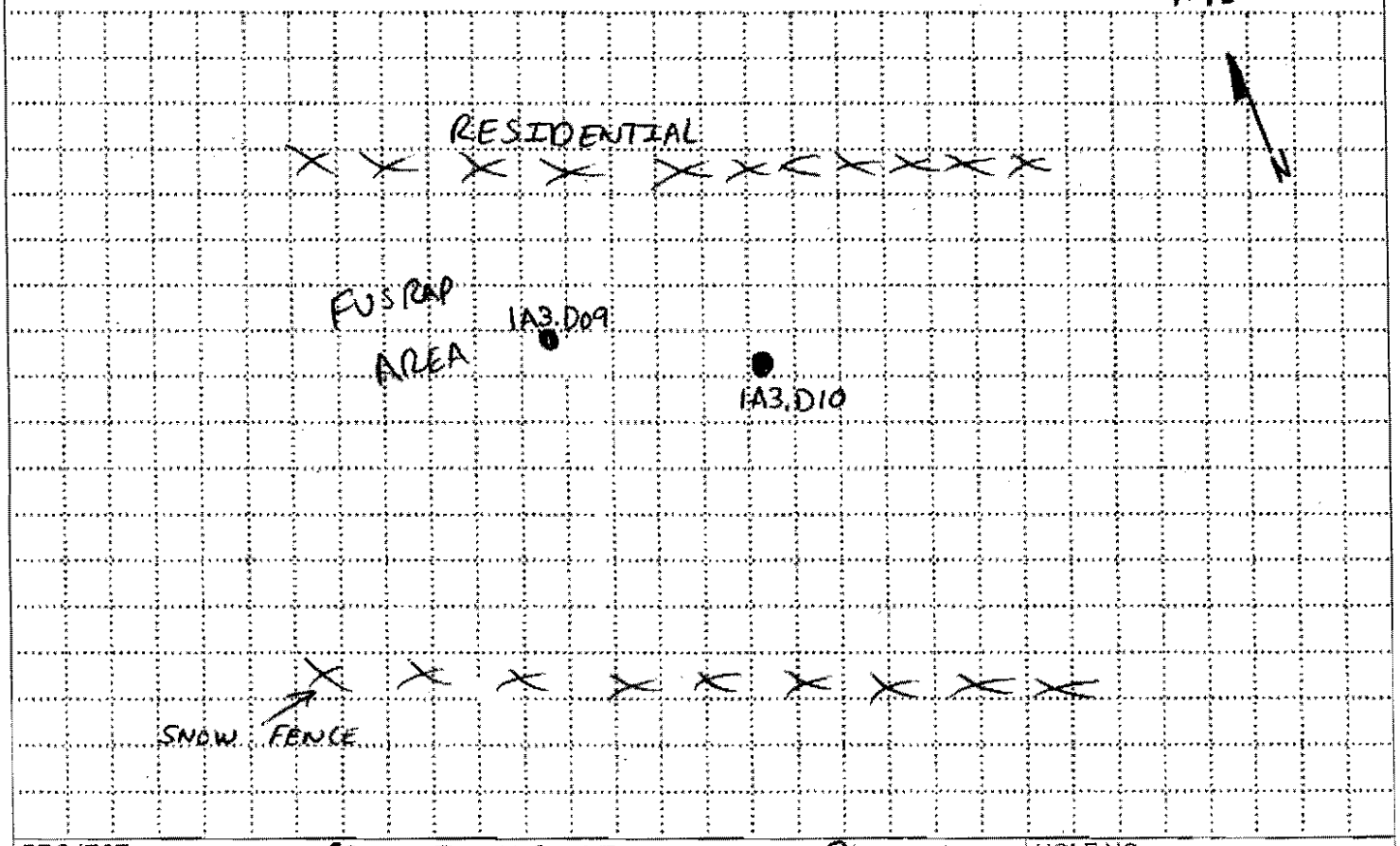
DISTRICT	Buffalo
HOLE NUMBER	1A3.D10
1. COMPANY NAME	ENSOL, INC.
2. DRILLING CONTRACTOR	ZEBRA ENVIRONMENTAL CORP.
SHEET / SHEETS	1 OF 3
3. PROJECT	TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT
4. LOCATION	TONAWANDA LF, TONAWANDA, NY
5. NAME OF DRILLER	PHIL ORSI
6. MANUFACTURER'S DESIGNATION OF DRILL	6620 DT GEOPROBE
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	3 1/4" CASING, 2" CORE w/ 5' PLASTIC SLEEVE
8. HOLE LOCATION	N= 1093090.088 E= 1065481.046
9. SURFACE ELEVATION	
10. DATE STARTED	3/12/10 0900
11. DATE COMPLETED	3/12/10 1015
12. OVERBURDEN THICKNESS	1.3'
15. DEPTH GROUNDWATER ENCOUNTERED	NOT ENCOUNTERED
13. DEPTH DRILLED INTO ROCK	N/A
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	N/A
14. TOTAL DEPTH OF HOLE	12.0'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	N/A

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP / TOTALS	TCLP / TOTALS	SVOC-TCLP / TOTALS	PEST-TCLP / TOTALS	PCB- TOTALS	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. [redacted]
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT	HOLE NO
TON LF- Buffalo DISTRICT FUSRAP PROJECT	1A3.D10

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A3, D10

SHEET 2 OF 3

REC'D ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS REMARKS (h)	
	0	NO RECOVERY →					→	
	1	FILL: DARK-BROWN CLAY, ROOTLETS, WASTE (ASH, GLASS), LOOSE, WET	7575	40		TOP 6"	X 7153	B 61
	2	REDDISH-BROWN SILT AND CLAY, TRACE COURSE SAND AND FINE SUB-ROUND GRAVEL (<3/4"), GRAY MOTTLING, STIFF, MOIST. (CL)	7372	50		NATIVE (1.3'-2.3')	7193	72
	3		7666	80	SEE	2ND HIGH X (2.0'-3.0')	7417	67
	4		7813	110	NOTES	HIGH X	7484	71
53"	5		7638	100		CHEM.	7249	71
	6	NO RECOVERY →					→	
	7		7447	130				
	8	SAME AS 1.3'-5.0'	7349	60				
	9		7379	140		HIGH B	7258	63
43"	10		7355	60				

PROJECT

HOLE NO 1A3, D10

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A3.D10

SHEET 3 OF 3

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	10	CONTINUED FROM PAGE 2					
			7109	90			
	11						
			7503	90			
24"	12						
		BOTTOM of BORING AT 12.0'					
	13	NOTES:					
		- LIGHT RAIN, 40°F					
		- SAMPLE I.D.					
	14	TLS-SS-1A3.D10 (0.6-1.1) 031210					
		TLS-SB-1A3.D10 (1.3-2.3) 031210					
		TLS-SB-1A3.D10 (2.0-3.0) 031210					
		TLS-SB-1A3.D10 (3.0-4.0) 031210					
	15	TLS-SB-1A3.D10 (4.0-5.0) 031210					
		TLS-SB-1A3.D10 (8.0-9.0) 031210					
	16	- PID READINGS = 0 ppm (VOCs)					
		- SOIL READINGS ARE COUNTS/MIN.					
	17	- COLLECTED RAD. DUPLICATE					
		- DRILLER TERMINATED BORING AT 12.0' DUE TO EXPANSIVE CLAYS.					
	18						
	19						
	20						

PROJECT

HOLE NO 1A3.D10

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

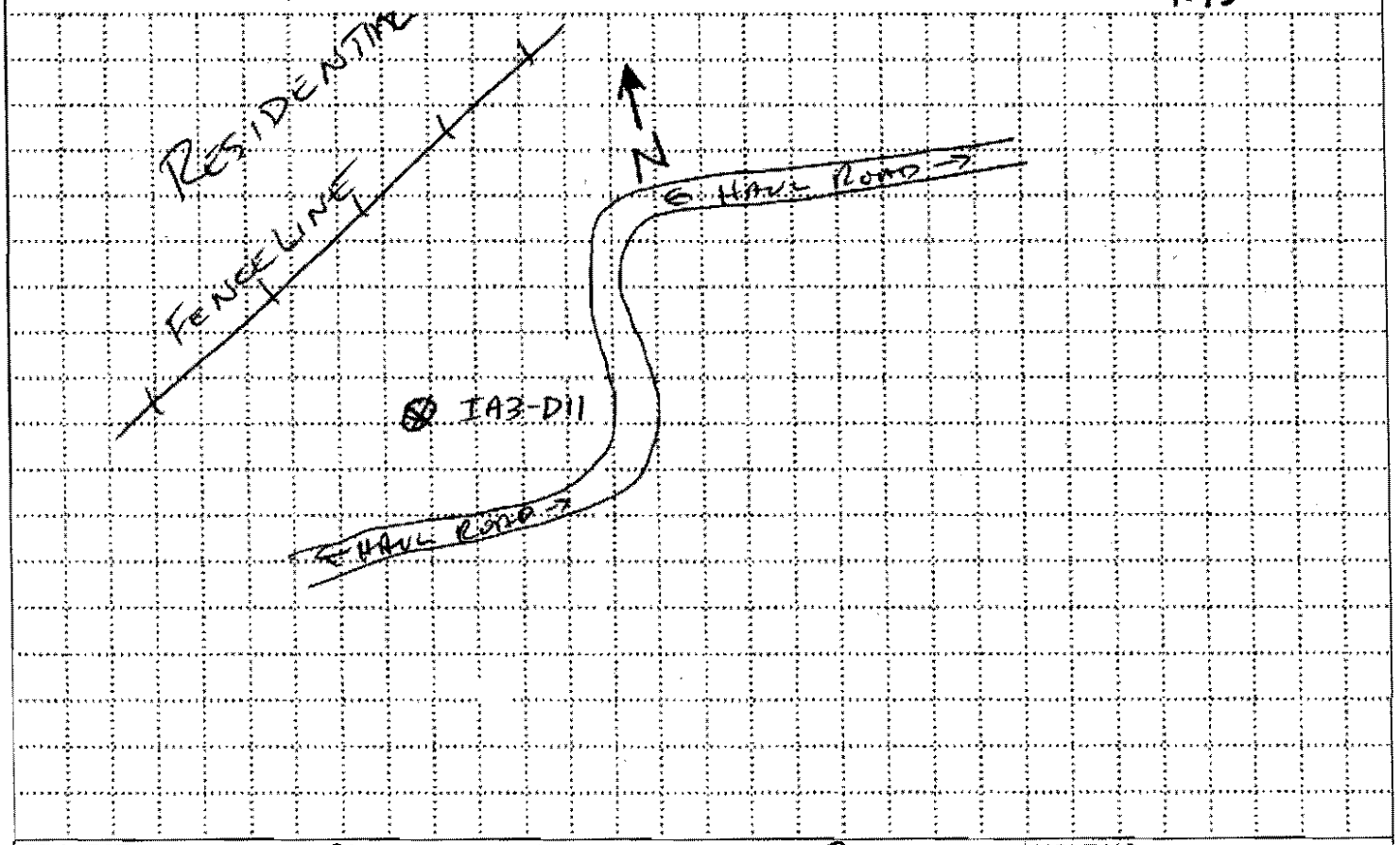
DISTRICT	Buffalo
HOLE NUMBER	IA3-D11
1. COMPANY NAME	ENSOL, INC.
2. DRILLING CONTRACTOR	ZEBRA ENVIRONMENTAL CORP.
SHEET / SHEETS	1 OF 3
3. PROJECT	TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT
4. LOCATION	TONAWANDA LF, TONAWANDA, NY
5. NAME OF DRILLER	PHIL ORSI / DOM PINO
6. MANUFACTURER'S DESIGNATION OF DRILL	7720 DT GEOPROBE
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	3 1/4" CASING 2" CORE W/ 5' PLASTIC SLEEVE
8. HOLE LOCATION	N= 1092831.17 E= 1065033.11
9. SURFACE ELEVATION	
10. DATE STARTED	3/11/10
11. DATE COMPLETED	3/11/10
12. OVERBURDEN THICKNESS	
15. DEPTH GROUNDWATER ENCOUNTERED	NOT ENCOUNTERED
13. DEPTH DRILLED INTO ROCK	N/A
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	N/A
14. TOTAL DEPTH OF HOLE	12'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	N/A

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP / TOTALS	TCLP / TOTALS	SVOC-TCLP / TOTALS	PEST-TCLP / TOTALS	PCB-TOTALS	N/A %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)
CUTTINGS DRUMMED	-	-	-

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT TON LF- Buffalo DISTRICT FUSRAP PROJECT HOLE NO IA3-D11

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: IA3-D11

PROJECT:

INSPECTOR: STUART PRYCE

SHEET 2 OF 3

RECID ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) 8	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~READING~~ COUNTS (h)	
	0	NO RECOVERY						
						0.2-0.7	8	b
			7177	120		TOP 6"	7092	56
	1							
		Fill: ORGANIC MATERIAL: (ROOTS, WOOD) WASTE: (PLASTIC, COATS) BRICK, REDDISH BROWN CLAY, FIRM, MOIST.	7314	60				
	2							
			7382	80				
	3							
			7313	120				
	4							
			7484	80		SAT	6987	63
58"	5							
		NO RECOVERY						
	6							
			7417	100				
	7							
		Fill: REDDISH BROWN CLAY, COARSE SAND, SMALL STONE, FIRM, MOIST	7284	80				
	8							
			7203	110		NATIVE	7133	66
	9							
			7499	90		HiY	7149	51
44"	10							

PROJECT:

HOLE NO. IA3-D11

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPE[redacted]

HOLE NUMBER IA3-D11

SHEET 3 OF 3

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC REMAINING COUNTS (h)	
	10						γ	b
	11	Fill: Reddish Brown Clay, coarse sand, very firm, moist.	7013	160		Hi beta	7035	66
24"	12		7381	110				
	13	END OF BORING @ 12' * STOPPED @ 12' DUE TO EXPANSIVE CLAY.						
	14	NOTES:						
		SAMPLE ID #'s						
	15	TLS-SS-IA3-D11(0.2-0.7)0311 10 (TOP 6")						
		TLS-SB-IA3-D11(4.0-5.0)0311 10 (SAT.)						
		TLS-SB-IA3-D11(8.0-9.0)0311 10 (NATIVE)						
		TLS-SB-IA3-D11(9.0-10.0)0311 10 (Hi γ)						
	16	TLS-SB-IA3-D11(10.0-11.0)0311 10 (Hi beta)						
	17							
	18	PID = 0 ppm (VOC's) NATIVE @ 8' GROUNDWATER = NOT ENCOUNTERED.						
	19	TOTAL RECOVERY: 126"						
	20	WEATHER: SUNNY 62°						

PROJECT

HOLE NO IA3-D11

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

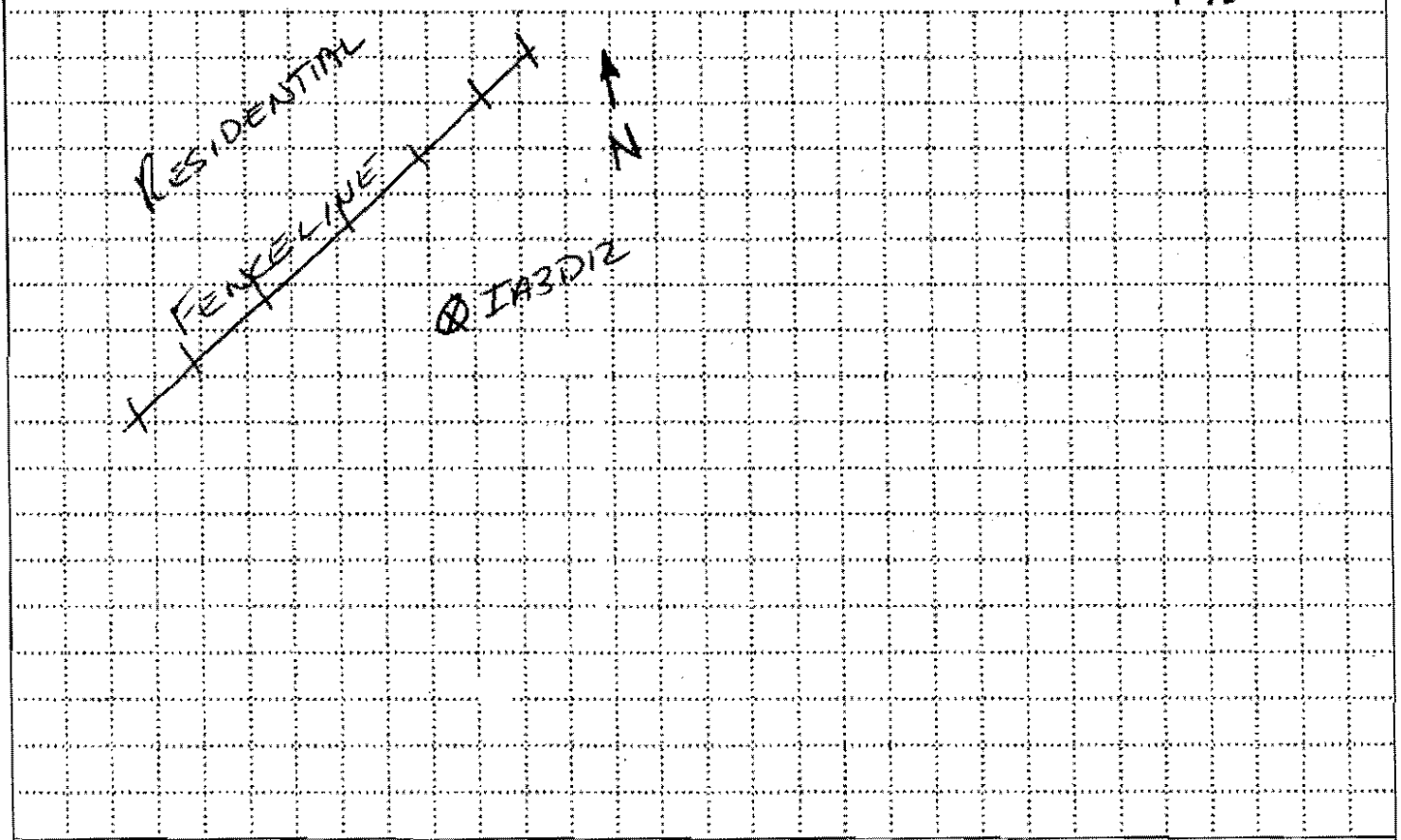
DISTRICT: Buffalo		HOLE NUMBER: IA3D12
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 3 SHEETS
3. PROJECT: TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: PHIL ORSI / DOM PINO	6. MANUFACTURER'S DESIGNATION OF DRILL: 7720 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE	8. HOLE LOCATION: N= 1092831.17 E= 1065033.11	
	9. SURFACE ELEVATION	
	10. DATE STARTED: 3/11/10	11. DATE COMPLETED: 3/11/10
12. OVERBURDEN THICKNESS	15. DEPTH GROUNDWATER ENCOUNTERED: NOT ENCOUNTERED	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 15'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP / TOTALS	TCLP / TOTALS	SVOC-TCLP / TOTALS	PEST-TCLP / TOTALS	PCB- TOTALS	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. [redacted]
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON LF- Buffalo DISTRICT FUSRAP PROJECT — HOLE NO: IA3D12

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: IA3D12

PROJECT

IN [redacted]

SHEET 2 OF 3

REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS REMARKS (h)	
	0	No Recovery						
	1						γ	b
	2		6584	60		Top 6"	6788	52
		Fill: ORGANIC MATERIAL, (WOOD, ROOTS, REDDISH BROWN CLAY, FIRM WET.	7083	80		Hi γ	6921	61
	3		7064	90				
	4		7075	90		SAT.	7174	69
44"	5	No Recovery						
	6		7077	100				
		Fill: CINDERS, SMALL GRAVEL <1/4", REDDISH BROWN CLAY, COARSE SAND, TRACE STONE, MOIST, FIRM.	7086	150		Hi beta	6912	59
	7		6842	140		NATIVE	6747	60
	8		6923	80				
	9		6645	120				
54"	10							

PROJECT

HOLE NO. IA3-D12

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER IA3-D12

SHEET 3 OF 3

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC REMARKS COUNTS (h)
	10	No Recovery					
	11						
	12	FILL: Reddish Brown Clay, trace coarse sand, gravel, very firm, moist.	7109	130			
	13		6879	120			
	14		6937	90			
47"	15		6954	60			
		END OF BORING @ 15'					
	16	NOTES:					
		SAMPLE ID #'s					
	17	TLS-SB-IA3-D12(1.4-1.9)031110 (Top 6")					
		TLS-SB-IA3-D12(2.0-3.0)031110 (Hi γ)					
		TLS-SB-IA3-D12(4.0-5.0)031110 (SAT)					
		TLS-SB-IA3-D12(6.0-7.0)031110 (Hi beta)					
	18	TLS-SB-IA3-D12(7.0-8.0)031110 (NATIVE)					
		PID = 0 ppm (VOC's)					
	19	GROUNDWATER: NOT ENCOUNTERED.					
		NATIVE : 7'					
		TOTAL RECOVERY: 145"					
	20	WEATHER — SUNNY 60°					

PROJECT

HOLE NO. IA3 D12

ENG FORM 5056A-R, AUG 94

USACE ENG HTRW Forms
Investigative Area 3 FL

HTRW DRILLING LOG

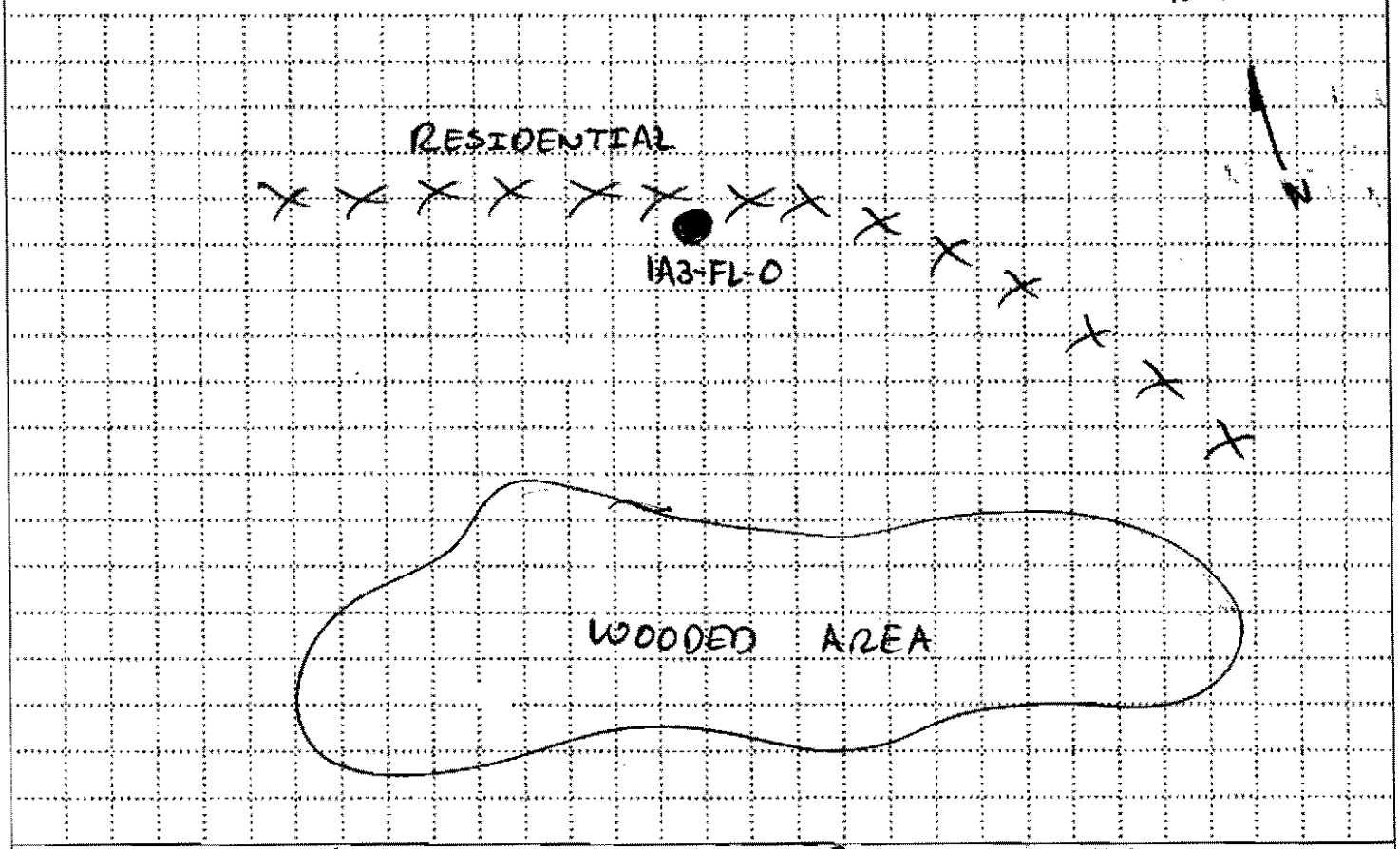
DISTRICT	Buffalo
HOLE NUMBER	1A3-FL-0
1. COMPANY NAME	ENSOL, INC.
2. DRILLING CONTRACTOR	ZEBRA ENVIRONMENTAL CORP.
SHEET / SHEETS	1 OF 3
3. PROJECT	TOWN of TONAWANDA LP OPERABLE UNIT-Buffalo DISTRICT FUSRAP PROJECT
4. LOCATION	TONAWANDA LF, TONAWANDA, NY
5. NAME OF DRILLER	JEFF SNYDER
6. MANUFACTURER'S DESIGNATION OF DRILL	6620 DT GEOPROBE
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE
8. HOLE LOCATION	N = 1093657.27 E = 1066577.74
9. SURFACE ELEVATION	
10. DATE STARTED	3/4/10 1445
11. DATE COMPLETED	3/4/10 1600
12. OVERBURDEN THICKNESS	2.9'
15. DEPTH GROUNDWATER ENCOUNTERED	10.6' bgs
13. DEPTH DRILLED INTO ROCK	N/A
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	N/A
14. TOTAL DEPTH OF HOLE	13.0'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	N/A

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP / TOTALS	TCLP / TOTALS	SVOC-TCLP / TOTALS	PEST-TCLP / TOTALS	PCB-TOTALS	N/A

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. [redacted]
CUTTINGS DRUMMED	-	-	-	

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT	HOLE NO
TON LF- Buffalo DISTRICT FUSRAP PROJECT	1A3-FL-0

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A3-FL-0

SHEET 2 OF 3 SHEETS

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)	
	0	NO RECOVERY →					→	
	1							
	2	DARK-BROWN CLAYEY TOPSOIL, W/ ROOTLETS, GRAVEL, SOFT, WET.	4437	40		TOP 6"	X 4957	B 43
	3		4659	60				
	4	REDDISH-BROWN SILT AND CLAY, TRACE COURSE SAND AND FINE SUB-ROUND GRAVEL (<1 1/2"), DESSICCATION CRACKS W/ GRAY INFILLING TO 5.8', MED. STIFF, MOIST (CL)	5228	100	SEE NOTES	NATIVE	4872	46
44"	5		5774	90		~~HIGH~~ X	4856	63
	6		4735	90		CHEM	4814	57
	7		4941	70				
	8		5454	90				
	9		5116	80				
60"	10		4986	50				

PROJECT

HOLE NO 1A3-FL-0

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A3-FL-0

SHEET 3 OF 3 SHEETS

RECID ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. ~~REMARKS~~ COUNTS (h)	STATIC
	10	CONTINUED FROM PAGE 2	5052	90				
	11	REDDISH-BROWN SILT AND SAND, TRACE COURSE SAND, SOFT, WET (SM)	5329	110	SEE NOTES	SAT.	X 4672	B 52
	12					HIGH B	4683	48
			5484	80				
	13	BOTTOM of BORING AT 13.0'						
	14	NOTES:						
		- CLEAR, 35°F						
		- SAMPLE I.D.						
	15	TLS-SS-1A3-FL-0(1.3-1.8) 030410						
		TLS-SB-1A3-FL-0(2.9-3.9) 030410						
		TLS-SB-1A3-FL-0(4.0-5.0) 030410						
	16	TLS-SB-1A3-FL-0(5.0-6.0) 030410						
		TLS-SB-1A3-FL-0(10.6-11.6) 030410						
		TLS-SB-1A3-FL-0(11.6-12.6) 030410						
	17	- COLLECTED CHEM. DUPLICATE						
		- PID READINGS = 0ppm (VOC'S)						
	18	- SOIL READINGS ARE COUNTS/MIN.						
	19							
	20							

PROJECT

HOLE NO 1A3-FL-0

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

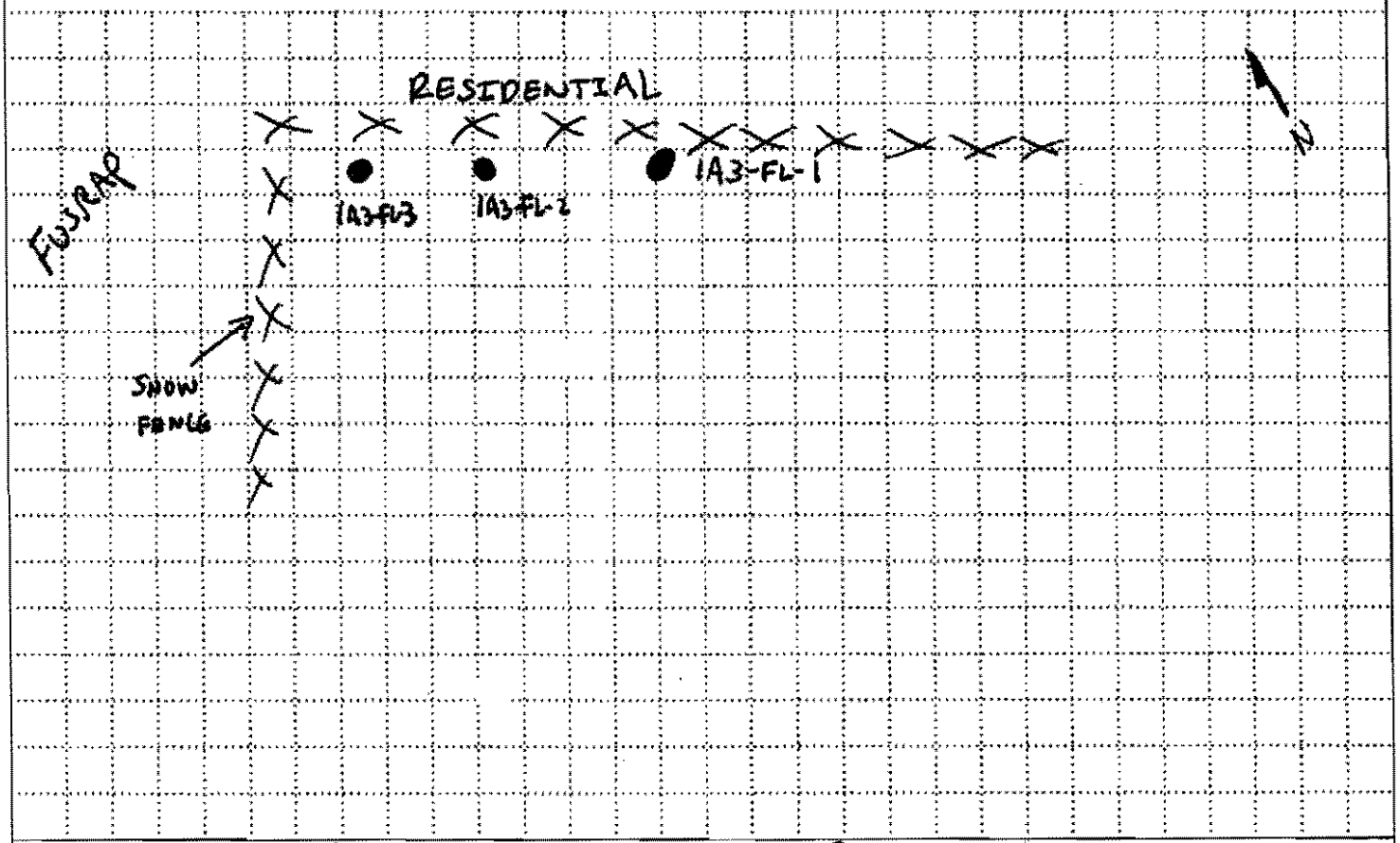
DISTRICT: Buffalo		HOLE NUMBER: 1A3-FL-1
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 3
3. PROJECT: TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: Jeff SNYDER	6. MANUFACTURER'S DESIGNATION OF DRILL: 6620 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE	8. HOLE LOCATION: N= 1093568.96 E= 1066399.81	
	9. SURFACE ELEVATION:	
	10. DATE STARTED: 3/5/10 0900	11. DATE COMPLETED: 3/5/10 1000
12. OVERBURDEN THICKNESS: 3.4'	15. DEPTH GROUNDWATER ENCOUNTERED: NOT ENCOUNTERED	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 14.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
NTM	-	-	-	-	-	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23 [redacted]
CUTTINGS DRUMMED	-	-	-	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON LF- Buffalo DISTRICT FUSRAP PROJECT — HOLE NO: 1A3-FL-1

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR: D. Popp

HOLE NUMBER: IA3-FL-1

SHEET 2 OF 3

REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) ~~X~~	GEOTECH SAMPLE OR CORE BOX NO. (e) ~~B~~	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h) X	(h) B
	0							
	1	NO RECOVERY →						
	2							
		DARK-BROWN CLAYEY TOPSOIL, GRAVEL, ROOTLETS, SOFT, WET						
	3	FILL: WASTE (ASH, CERAMIC), BRICK, STIFF, MOIST	4987	60		TOP 6"	4831	60
		REDDISH-BROWN CLAY AND SILT, TRACE COURSE SAND AND FINE SUB-ROUND GRAVEL (<1/2"), STIFF, DRY-MOIST. (CL)						
	4		4322	40		NATIVE	4850	52
32"	5		5075	40	SEE NOTES			
	6		5366	80		HIGH X	5090	61
	7		5221	100		SAT. (2ND HIGH X)	5012	49
	8		4975	60				
	9		4859	50				
60"	10		4457	70				

PROJECT

HOLE NO. IA3-FL-1

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A3-FL-1

SHEET 3 OF 3 SHEETS

REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN STATIC COUNTS (h) X	B
	10	CONTINUED FROM PAGE 2	4784	60				
	11		4960	40	SEE NOTES			
	12		4972	100		HIGH B	4860	57
	13		5125	90				
48"	14	BOTTOM of BORING AT 14.0'						
	15	NOTES: - CLEAR, 25°F						
	16	- SAMPLE I.D. TLS-SS-1A3-FL-1 (2.3-2.8) 030510						
		TLS-SB-1A3-FL-1 (3.4-4.4) 030510						
		TLS-SB-1A3-FL-1 (5.0-6.0) 030510						
	17	TLS-SB-1A3-FL-1 (6.0-7.0) 030510						
		TLS-SB-1A3-FL-1 (12.0-13.0) 030510						
		- COLLECTED RAD. DUPLICATE						
	18	- PID READINGS = 0 ppm (VOC's)						
		- SOIL READINGS ARE COUNTS/MIN.						
	19							
	20							

PROJECT

HOLE NO 1A3-FL-1

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

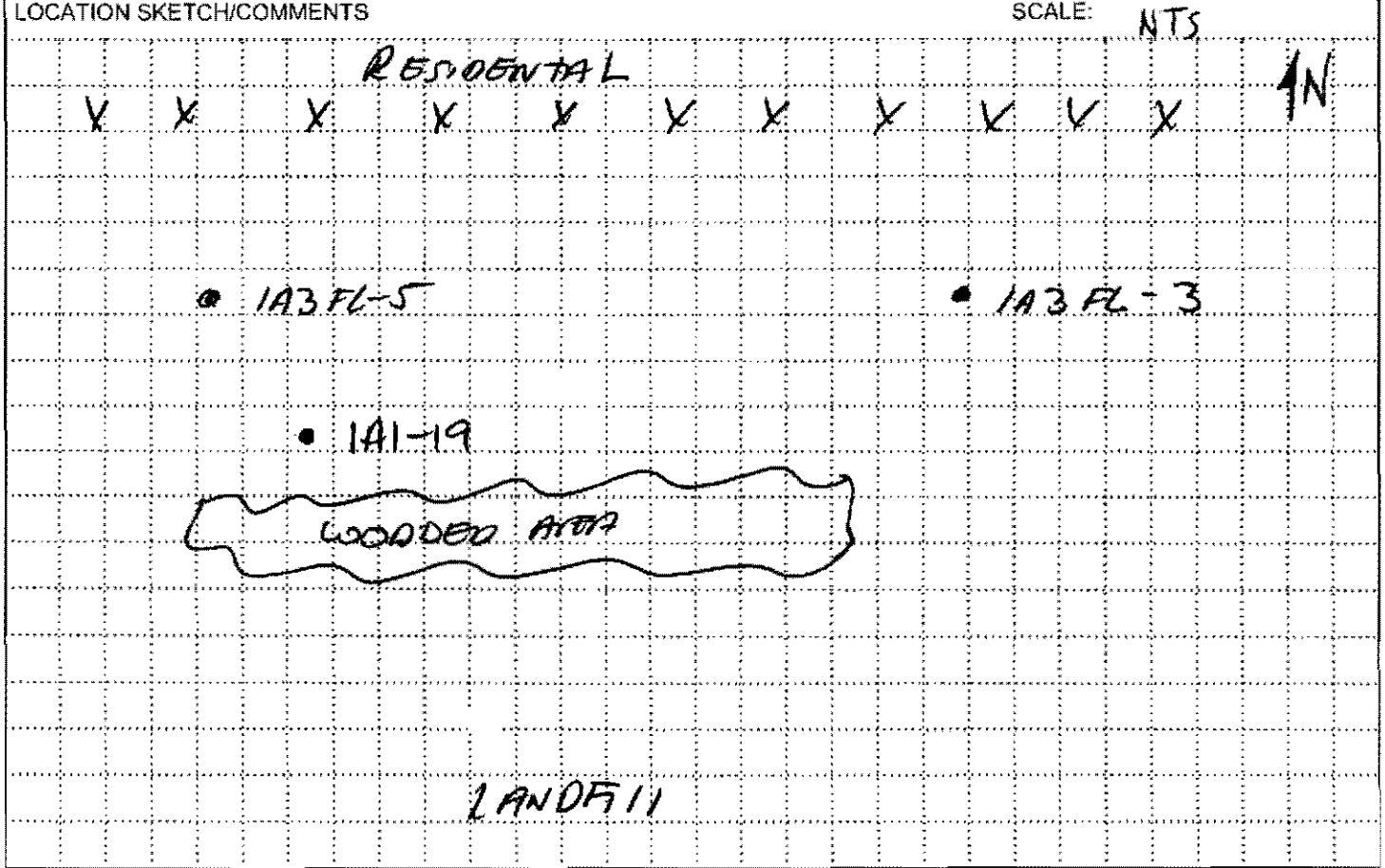
DISTRICT	Buffalo
HOLE NUMBER	1A3FL-2
SHEET / SHEETS	1 OF 3
1. COMPANY NAME	ENSOL, INC.
2. DRILLING CONTRACTOR	ZEBRA ENVIRONMENTAL CORP.
3. PROJECT	TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT
4. LOCATION	TONAWANDA LF, TONAWANDA, NY
5. NAME OF DRILLER	Phil ORSI
6. MANUFACTURER'S DESIGNATION OF DRILL	Geoprobe 77200T
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE
8. HOLE LOCATION	N 1093482.02 E 1066220.54
9. SURFACE ELEVATION	N/A
10. DATE STARTED	3/4/10 2:40pm
11. DATE COMPLETED	3/4/10 3:40pm
12. OVERBURDEN THICKNESS	4.0'
15. DEPTH GROUNDWATER ENCOUNTERED	NOT ENCOUNTERED
13. DEPTH DRILLED INTO ROCK	N/A
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	N/A
14. TOTAL DEPTH OF HOLE	15.0'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	N/A
18. GEOTECHNICAL SAMPLES	N/A
DISTURBED	–
UNDISTURBED	–
19. TOTAL NUMBER OF CORE BOXES	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP TOTAL	TCLP TOTAL	SVOC TCLP	PEST. TOTAL	PCB TOTAL	N/A

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)
CUTTINGS DRUMMED	—	—	—

[redacted]

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT	TON LF- Buffalo DISTRICT FUSRAP PROJECT
HOLE NO.	1A3FL-2

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER 1A3FL 2

SHEET 2 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e) J	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B/J 1min state count
	0	NO RECOVERY	NO RECOVERY		See notes		
	1	Fill: Topsoil, organic matter, rootlets, soft, moist	100	5043			Top 6" 43/5157 (.5-1.0')
	2	Fill: Reddish-brown clay, silt, wood, sub-rounded gravel (2"), soft, moist	80	5251			
	3	Fill: Dark-brown clay, gravel (2"), waste (ash), wood, moist, stiff	60	5309			
	4		120	5422			High B 37/5162 (3-4')
	5	Reddish-brown silt, clay, gray mottling, some sand, sub-rounded gravel (2"), stiff, moist (CL)	80	5497			Native 49/5064 (4.5')
	6	NO RECOVERY	NO RECOVERY				
	7	Reddish-brown clay, some sand, trace silt, trace of sub-rounded gravel (1½"), trace course sand, gray mottling, dolomitized stone, stiff, moist-dry (CL)	80	5822			High J 42/5052 (5.4-6.4')
	8		60	5708			Chemical 54/5005 (6.4-7.4')
	9		100	5408			Saturated Sub (7.4-8.4') 50/5227
	10		40	5099			

PROJECT

HOLE NO. 1A3-FL-2

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: 1A3FL-2

PROJECT:

INSPECTOR: K Hoelscher

SHEET 3 OF 3

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e) γ	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS: B γ (min static cone)
	10	Continue from previous page			SEE NOTES		
	11		60	5780			
	12	Reddish-brown clay, some silt, trace sand, trace sub-rounded gravel (1/2"), trace of course sand, fine sand, stiff, moist	60	5380			
	13		70	5575			
	14	Reddish-brown clay, some sand, trace silt, course sand, stiff, moist (CL)	60	5338			
	15		120	5409			
		Bottom of Boring @ 15.0'					
	16	NOTES:					
		- weather: sunny, 35°F					
		- Gamma Reading: 100ct/min					
		PID Readings: 0ppm					
	17	Sample I.D. (Rad Analysis)					
		TLS-SS-1A3FL2 (0.5-1.0') 030410	Top 6"				
	18	TLS-SB 1A3FL2 (4-5') 030410	Native				
		TLS-SB 1A3FL2 (7.9-8.9') 030410	Saturated Sub.				
		TLS-SB 1A3FL2 (3-4') 030410	High B				
	19	TLS-SB 1A3FL2 (5.9-6.9') 030410	High γ				
		TLS-SB 1A3FL2 (6.9-7.9') 030410	Chemical				
	20						

PROJECT: TCN of Florida Disposal Facility

HOLE NO: 1A3FL-2

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

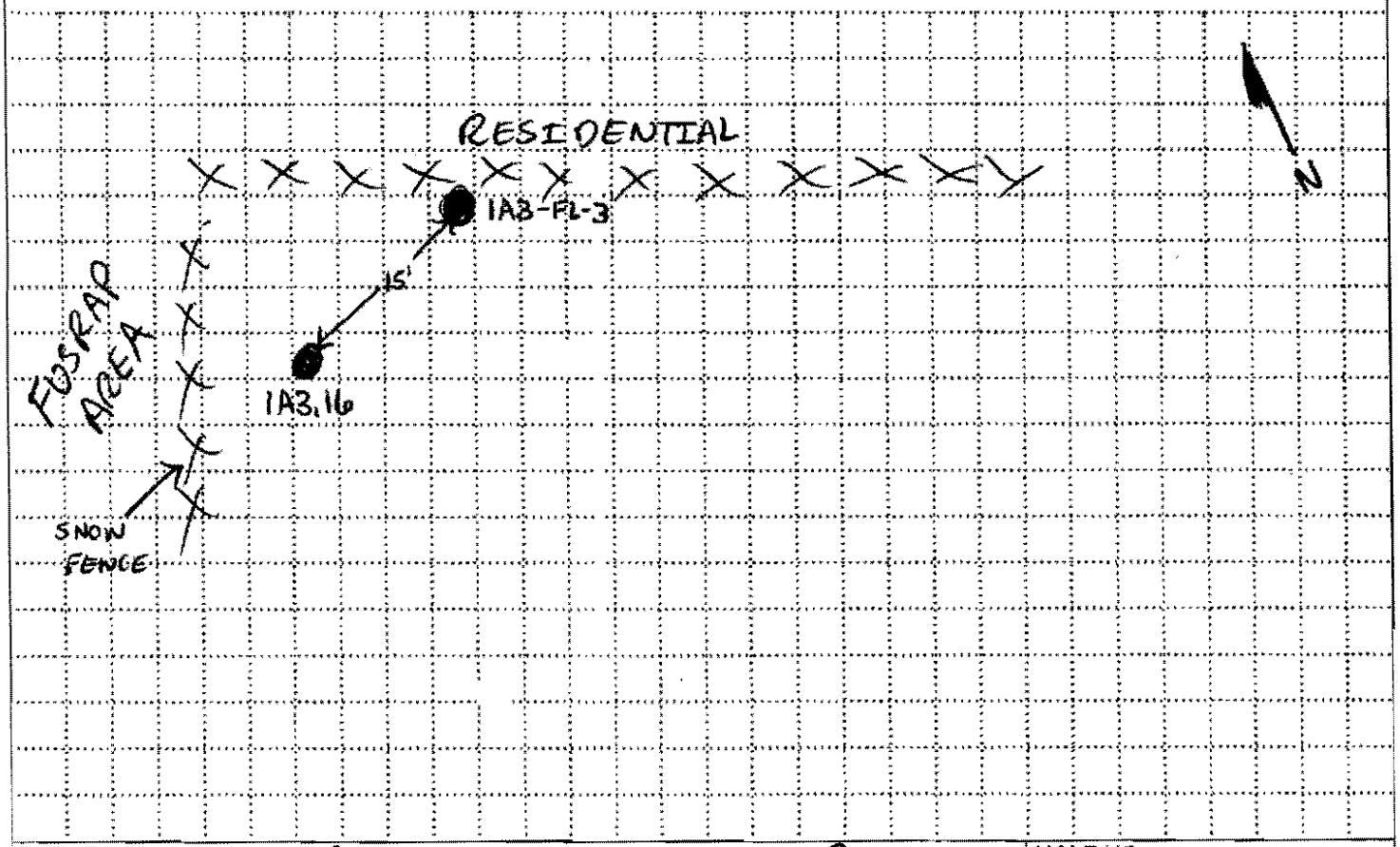
DISTRICT: Buffalo		HOLE NUMBER: 1A3-FL-3
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 3 SHEETS
3. PROJECT: TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: JEFF SNYDER	6. MANUFACTURER'S DESIGNATION OF DRILL: 6620 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE	8. HOLE LOCATION: N= 1093395.09 E= 1066038.03	
	9. SURFACE ELEVATION:	
	10. DATE STARTED: 3/4/10 1315	11. DATE COMPLETED: 3/4/10 1430
12. OVERBURDEN THICKNESS: 5.0'	15. DEPTH GROUNDWATER ENCOUNTERED: 10.8' bgs	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 15.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP / TOTALS	TCLP / TOTALS	SVOC-TCLP / TOTALS	PEST-TCLP / TOTALS	PCB- TOTALS	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. [redacted]
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT	HOLE NO
TON LF- Buffalo DISTRICT FUSRAP PROJECT	1A3-FL-3

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. PoPP

HOLE NUMBER 1A3-FL-3

SHEET 2 OF 3

REC'O (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h)	
	0	NO RECOVERY →						
	1	DARK-BROWN CLAY BY TOPSOIL W/ ROOTLETS, MED. STIFF, FROZEN	4751	70		TOP 6"	γ 4999	B 63
	2	FILL: REDDISH-BROWN CLAY, GRAVEL, ROOTLETS, MED. STIFF, MOIST.	4908	90				
	3	FILL: REDDISH-BROWN CLAY, COURSE SAND, ROOTLETS, WASTE (ASH, GLASS), MED. STIFF, MOIST.	5166	70	SEE NOTES			
	4		4867	120		CHEM	4878	73
48"	5		5985	80		HIGH γ	4873	54
	6	REDDISH-BROWN SILT AND CLAY, TRACE COURSE SAND AND SUB-ROUND FINE GRAVEL (<½"), STIFF, MOIST (CL)	4676	60		NATIVE	4796	44
	7		4747	90				
	8		5508	50				
	9		4441	100				
60"	10		4971	120		HIGH B	4936	58

PROJECT

HOLE NO 1A3-FL-3

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A3-FL-3

SHEET 3 OF 3 SHEETS

~~ELEV.~~ REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING ~~RESULTS~~ (d) X	GEOTECH. SAMPLE ~~OR CORE BOX NO.~~ (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. ~~REMARKS~~ STATIC COUNTS (h)	
	10	CONTINUED FROM PAGE 2						
			5134	40				
	11	REDDISH-BROWN SILT AND SAND, TRACE COURSE SAND, MED. STIFF, MOIST. (SM)					X	B
			4929	90	SEE NOTES	SAT.	4860	62
	12							
			5366	80				
	13	REDDISH-BROWN SILT AND CLAY, TRACE COURSE SAND AND FINE SUB-ROUND GRAVEL (<1/2"), STIFF, MOIST (CL)						
	14		4543	90				
			5068	60				
60"	15	BOTTOM OF BORING AT 15.0'						
	16	NOTES:						
		- CLEAR, 35°F						
		- SAMPLE I.D.						
	17	TLS-SS-1A3-FL-3(1.0-1.5) 030410						
		TLS-SB-1A3-FL-3(30-40) 030410						
		TLS-SB-1A3-FL-3(40-50) 030410						
	18	TLS-SB-1A3-FL-3(50-60) 030410						
		TLS-SB-1A3-FL-3(90-100) 030410						
		TLS-SB-1A3-FL-3(10.8-11.8) 030410						
	19	- COLLECTED CHEM. DUPLICATE (MS/MSD), FIELD BLANK, EQUIPMENT BLANK						
		- SOIL READINGS ARE COUNTS/MIN.						
	20	- PID READINGS = 0 ppm (VOC'S)						

PROJECT

HOLE NO 1A3-FL-3

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

DISTRICT	Buffalo
HOLE NUMBER	1A3-FL-4
1. COMPANY NAME	ENSOL, INC.
2. DRILLING CONTRACTOR	ZEBRA ENVIRONMENTAL CORP.
SHEET / SHEETS	1 OF 3
3. PROJECT	TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT
4. LOCATION	TONAWANDA LF, TONAWANDA, NY
5. NAME OF DRILLER	Phil OBSi
6. MANUFACTURER'S DESIGNATION OF DRILL	Geoprobe 7720DT
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE
8. HOLE LOCATION	N 1093291.91 E 1065817.93
9. SURFACE ELEVATION	N/A
10. DATE STARTED	3/4/10 1:25pm
11. DATE COMPLETED	3/4/10 2:30pm
12. OVERBURDEN THICKNESS	4.5'
15. DEPTH GROUNDWATER ENCOUNTERED	NOT ENCOUNTERED
13. DEPTH DRILLED INTO ROCK	N/A
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	N/A
14. TOTAL DEPTH OF HOLE	15.0'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	N/A

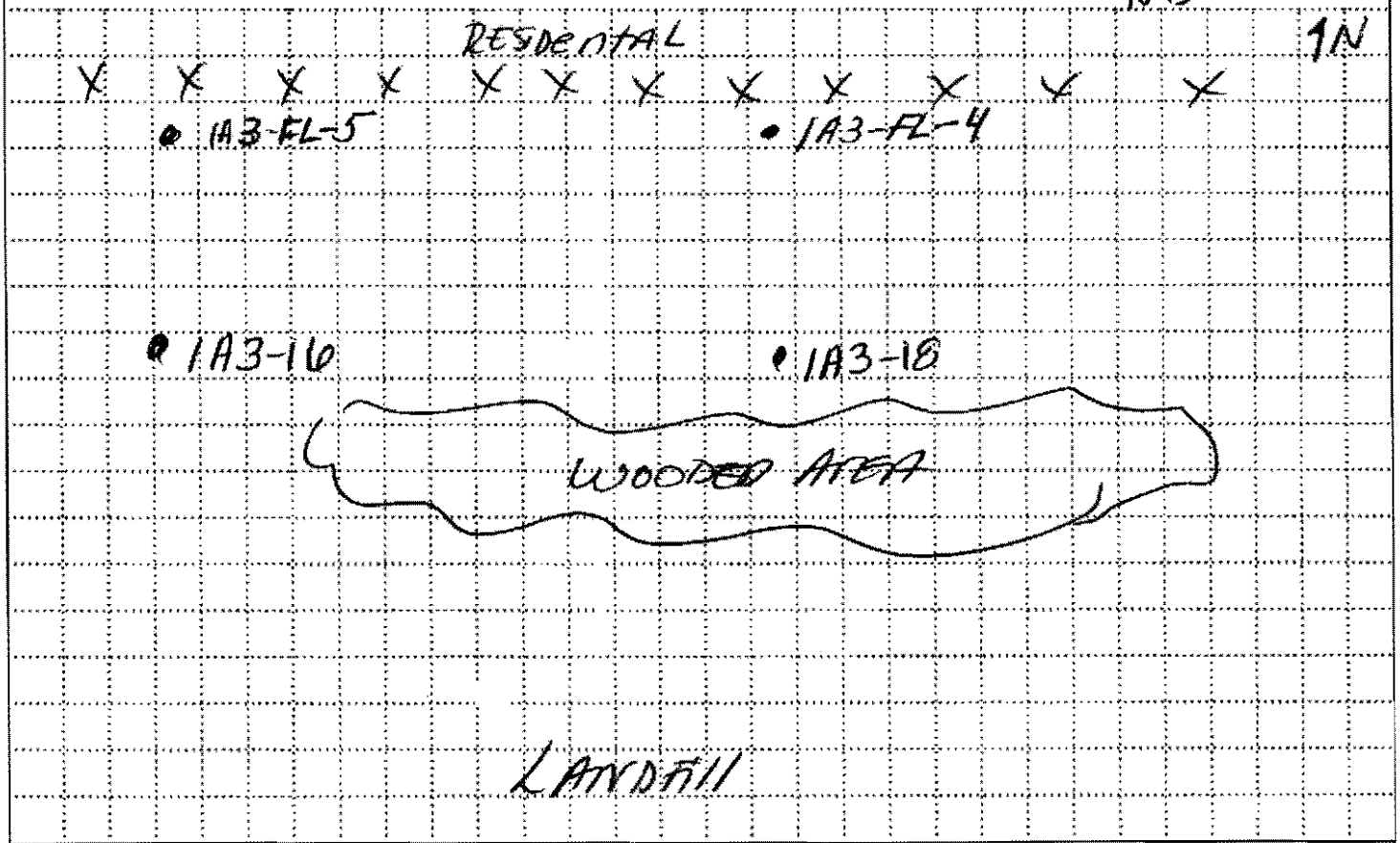
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP BAT	TCLP TOTAL	SVOC TCLP	PCB TOTAL	PEST TOTAL	N/A

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23.
CUTTINGS DRUMMED	—	—	—	[redacted]

LOCATION SKETCH/COMMENTS

SCALE: NTS



PROJECT	TON LF- Buffalo DISTRICT FUSRAP PROJECT
HOLE NO	1A3-FL-4

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: IA3-FL-4

PROJECT

INSPECTOR [redacted]

SHEET 2 OF 3

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) PID	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS 8/8 1 min static count
	0	NO RECOVERY	NO RECOVERY		SEE NOTES		
	1	Fill: Dark-brown topsoil, organic matter, silt, rootlets, soft, moist	100	5080			Top 6" 34/4568 (1.1-1.6')
	2	Fill: Dark brownish black clay, silt, wood, waste (ash, glass), soft-stiff, moist	100	5202			High B 55/4672
	3	Fill: Reddish brown clay, silt, rootlets, wood, stiff, moist	80	4822			
Recovery 58"	4–5	Reddish-brown silt, clay, gray mottling, sub-rounded gravel (<1/2"), trace sand, some silt, Desiccation cracks w/ gray infilling, stiff, moist (CL)	120	5001			Native 48/4717 (4.5-5.5')
	6	NO RECOVERY	NO RECOVERY				
	7	Reddish-brown silt, clay, gray mottling, pulverized stone, trace sand, stiff, moist (CL)	80	5118	1		
	8		100	5303			
	9	Reddish brown clay, silt, gray mottling, some sand, trace silt, Desiccation cracks w/ gray infilling, sub-rounded gravel (<1/2"), stiff, moist (CL)	80	5469			High γ 46/4788 (8-9')
	10		80	4885			Chemical 52/4445 (9-10')

PROJECT

HOLE NO

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPEC[redacted]

HOLE NUMBER 1A3-FL-4

SHEET 3 OF 3

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e) J	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS 1 min static count
Recovery 57"	10	REDISH-BROWN CLAY, COURSE + FINE SAND, SUB-ROUNDED GRAVEL (21"), SOME SILT, TRACE SAND, STIFF, MOIST (CL)			See NOTES		SATURATED SUB. 54 (10-11) 4646
	11		100	4691			
	12		90	4711			
	13	REDISH-BROWN CLAY, COURSE + FINE SAND, STIFF, MOIST (CL)	80	5261			
	14		100	4929			
Recovery 60"	15		80	4841			
		Bottom of Boring @ 15.0'					
	16	NOTES:					
		Weather: Sunny, 35°F					
		Gamma Reading: counts/min					
	17	PID Reading: 0 ppm					
		SAMPLE I.D. (RADANALYSIS)					
		TLS-SS-1A3-FL4 (1.1-1.6') 030410	Topsoil				
		TLS-SB-1A3-FL4 (1.6-2.6') 030410	High B				
	18	TLS-SB-1A3-FL4 (4.5-5.5') 030410	Native				
		TLS-SB-1A3-FL4 (8.0-9.0') 030410	High γ				
		TLS-SB-1A3-FL4 (9.0-10.0) 030410	Chemical				
	19	TLS-SB-1A3-FL4 (10.0-11.0') 030410	SATURATED	SUB.			
	20						

PROJECT

HOLE NO 1A3-FL-4

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

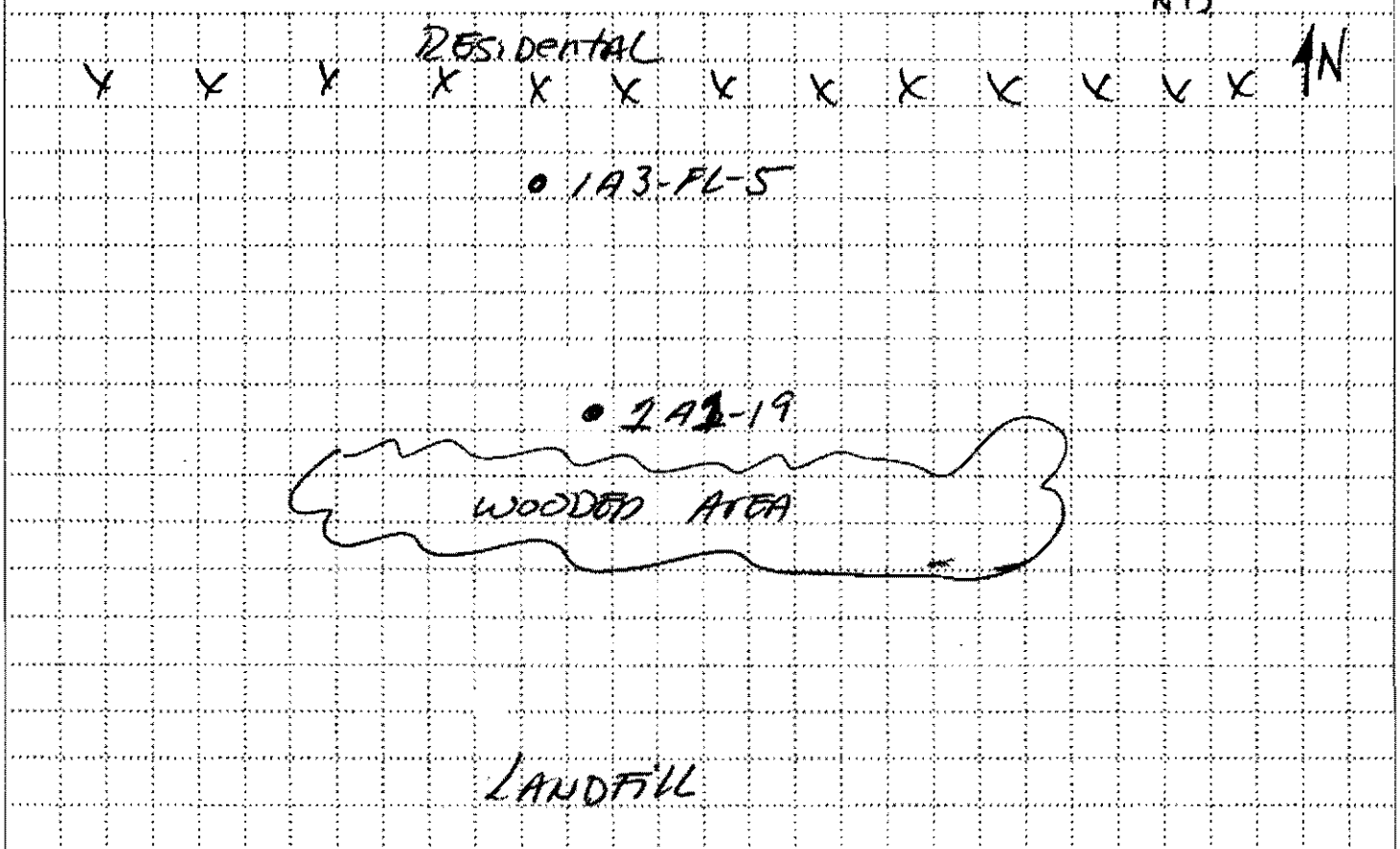
DISTRICT	Buffalo
HOLE NUMBER	1A3-FL-5
1. COMPANY NAME	ENSOL, INC.
2. DRILLING CONTRACTOR	ZEBRA ENVIRONMENTAL CORP.
SHEET / SHEETS	1 OF 3
3. PROJECT	TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT
4. LOCATION	TONAWANDA LF, TONAWANDA, NY
5. NAME OF DRILLER	Phil ORSI
6. MANUFACTURER'S DESIGNATION OF DRILL	Geoprobe 7720DT
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE
8. HOLE LOCATION	N 1093246.5 E = 1065724.31
9. SURFACE ELEVATION	N/A
10. DATE STARTED	3/4/10 10:25 AM
11. DATE COMPLETED	3/4/10 11:25 AM
12. OVERBURDEN THICKNESS	4.0'
15. DEPTH GROUNDWATER ENCOUNTERED	2.4'
13. DEPTH DRILLED INTO ROCK	N/A
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	N/A
14. TOTAL DEPTH OF HOLE	15.0'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	N/A

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP TOTAL	TCLP TOTAL	SVOC TCLP	PEST. TOTAL	PCB TOTAL	N/A %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23
CUTTINGS DRUMMED	—	—	—	[redacted]

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT TON LF- Buffalo DISTRICT FUSRAP PROJECT HOLE NO 1A3 FL-5

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: 1A3-FL-5

PROJECT

INSPECTOR [redacted]

SHEET 2 OF 3

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e) 8	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS 6/8 (1min static count)
	0	NO RECOVERY	NO RECOVERY		See notes		
	1						
	2	Fill: Topsoil, organic matter, rootlets, wood, waste(glass), stiff, moist	80	5345			Top 6" 45/5467 (1.5-2')
	3	Fill: Reddish-brown clay, wood, waste(ash), moist, soft	60	5951			Saturated 62/5801 (2.4-3.4')
	4		100	5786			
Recovery 43"	5	Reddish-brown silt, clay, trace of sub-rounded gravel, course sand, gray mottling, stiff, moist (CL)	100	6035			Native 54/5780 (4.5')
	6		100	5612			
	7		100	5695			High B 35/5506 (6-7')
	8		60	5824			
	9		60	5822			
Recovery 60"	10		80	5836			High 51/5422 (10-11')

PROJECT

HOLE NO. 1A3-FL-5

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER 1A3-FL-5

SHEET 3 OF 3

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e) γ	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B/γ 1min. static count
	10	REDISH-BROWN SILT, CLAY, TRACE SUB-ROUNDED GRAVEL (<1"), GRAY DESICCATION CRACKS W/ GRAY INFILLING, STIFF, MOIST (CL)			See NOTES		CHEMICAL (10-11') 51/539b
	11		120	6440			
	12		80	5827			
	13		80	5425			
	14		80	5869			
Recovery 60"	15		60	5728			
		Bottom of Boring @ 15.0'					
	16	NOTES: - Weather: Sunny, 35°F - Gamma Readings: count/min - PID Reading: 0ppm					
	17	- Refusal encountered @ 5' during 1st Attempt, second attempt data is above. Sample I.D. (Lab Analysis)					
	18	TLS-SS-1A3-FLS (1.5-2')030410	Top 6"				
		TLS-SB-1A3-FLS (4-5')030410	Active				
		TLS-SB-1A3-FLS (2.4-3.4')030410	Saturated				
		TLS-SB-1A3-FLS (6-7')030410	High B				
	19	TLS-SB-1A3-FLS (9-10')030410	High γ				
		TLS-SB-1A3-FLS (10-11')030410	Chemical				
	20						

PROJECT

HOLE NO. 1A3-FL-5

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

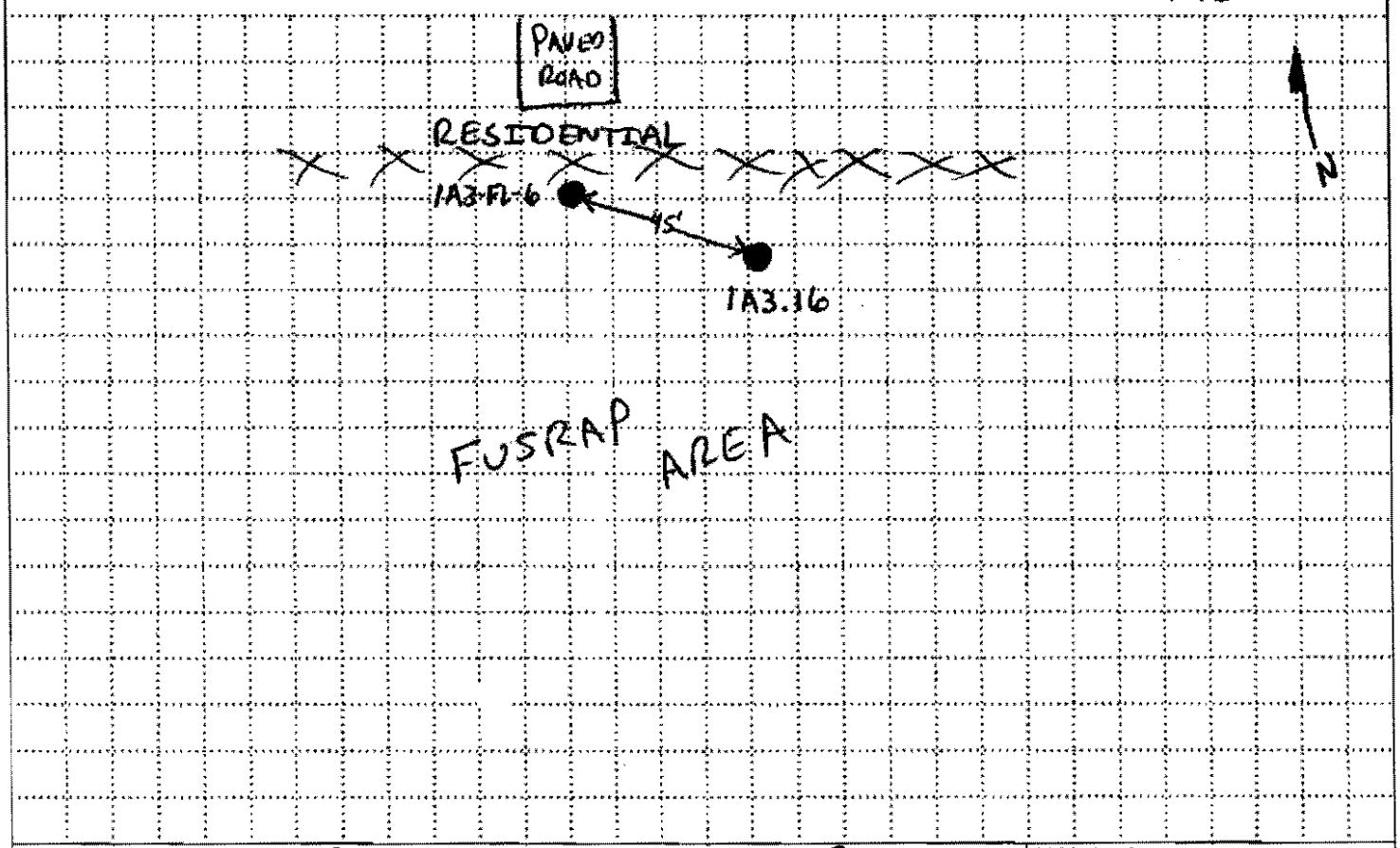
DISTRICT	Buffalo
HOLE NUMBER	1A3-FL-6
1. COMPANY NAME	ENSOL, INC.
2. DRILLING CONTRACTOR	ZEBRA ENVIRONMENTAL CORP.
SHEET / SHEETS	1 OF 3
3. PROJECT	TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT
4. LOCATION	TONAWANDA LF, TONAWANDA, NY
5. NAME OF DRILLER	JEFF SNYDER
6. MANUFACTURER'S DESIGNATION OF DRILL	6620 DT GEOPROBE
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE
8. HOLE LOCATION	N = 1093204.46 E = 1065634.60
9. SURFACE ELEVATION	
10. DATE STARTED	3/4/10 1025
11. DATE COMPLETED	3/4/10 1130
12. OVERBURDEN THICKNESS	1.4'
15. DEPTH GROUNDWATER ENCOUNTERED	8.4' bgs
13. DEPTH DRILLED INTO ROCK	N/A
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	N/A
14. TOTAL DEPTH OF HOLE	15.0'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	N/A

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	-	-	-	-	-	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. [redacted]
CUTTINGS DRUMMED	-	-	-	

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT TON LF- Buffalo DISTRICT FUSRAP PROJECT HOLE NO 1A3-FL-6

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER IA3-FL-6

SHEET 2 OF 3

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) ~~X~~	GEOTECH SAMPLE OR CORE BOX NO. (e) ~~B~~	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)	
	0	NO RECOVERY →						
	1	DARK-BROWN CLAYEY TOPSOIL W/ ROOTLETS, SOME GRAVEL, SOFT, WET	5168	60		~~AT~~ TOP 6"	X 4843	B 59
	2	REDDISH-BROWN SILT AND CLAY, TRACE COURSE SAND AND FINE SUB-ROUND GRAVEL (<1"), DESSICCATION CRACKS W/ GRAY INFILLING, GRAY MOTTLING, STIFF, MOIST (CL)	4542	70		NATIVE	4876	69
	3		5013	70	SEE NOTES			
	4		5177	100				
51"	5		4828	80				
	6		5046	90				
	7		4914	110		HIGH B	4955	59
	8		5312	90				
	9	REDDISH-BROWN, TRACE FINE AND COURSE SAND, SOFT, WET (CL)	4947	70		SAT.	4945	46
60"	10		5145	60				

PROJECT

HOLE NO IA3-FL-6

ENG FORM 5058A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR: D. Popp

HOLE NUMBER: 1A3-FL-6

SHEET 3 OF 3

RECID ~~CLEAR~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS ~~REMARKS~~ (h)
	10	REDDISH-BROWN SILT AND CLAY, SOME FINE AND COURSE SAND AND FINE SUB-ROUND GRAVEL (<1/2"), STIFF, MOIST. (CL)	5047	80			
	11		5386	60	SEE NOTES		
	12	REDDISH-BROWN SILT AND CLAY, TRACE COURSE SAND AND SUB-ROUND FINE GRAVEL (<1/2"), STIFF, MOIST. (CL)	5322	100			
	13		6226	90		HIGH X	X 4820 / B 50
	14		4607	100			
60"	15	BOTTOM OF BORING AT 15.0'					
	16	NOTES: - CLEAR, 30°F - SAMPLE I.D.					
	17	TLS-SS-1A3-FL-6(0.6-1.1)030410 TLS-SB-1A3-FL-6(1.4-2.4)030410 TLS-SB-1A3-FL-6(6.0-7.0)030410 TLS-SB-1A3-FL-6(8.4-9.4)030410					
	18	TLS-SB-1A3-FL-6(13.0-14.0)030410 - PID READINGS = 0ppm (VOC'S)					
	19	- SOIL READINGS ARE COUNTS/MIN.					
	20						

PROJECT

HOLE NO 1A3-FL-6

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

DISTRICT	Buffalo
HOLE NUMBER	1A3FL-7
1. COMPANY NAME	ENSOL, INC.
2. DRILLING CONTRACTOR	ZEBRA ENVIRONMENTAL CORP.
SHEET / SHEETS	1 OF 3
3. PROJECT	TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT
4. LOCATION	TONAWANDA LF, TONAWANDA, NY
5. NAME OF DRILLER	Phil ORSi
6. MANUFACTURER'S DESIGNATION OF DRILL	Geoprobe 7720DT
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	3 1/4" CASING 2" CORE W/ 5' PLASTIC SLEEVE
8. HOLE LOCATION	N 1093167.16 E 1065533.82
9. SURFACE ELEVATION	N/A
10. DATE STARTED	3/5/10 8:45 Am
11. DATE COMPLETED	3/5/10 9:45 Am
12. OVERBURDEN THICKNESS	3.2'
15. DEPTH GROUNDWATER ENCOUNTERED	NOT ENCOUNTERED
13. DEPTH DRILLED INTO ROCK	N/A
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	N/A
14. TOTAL DEPTH OF HOLE	11.0'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	N/A

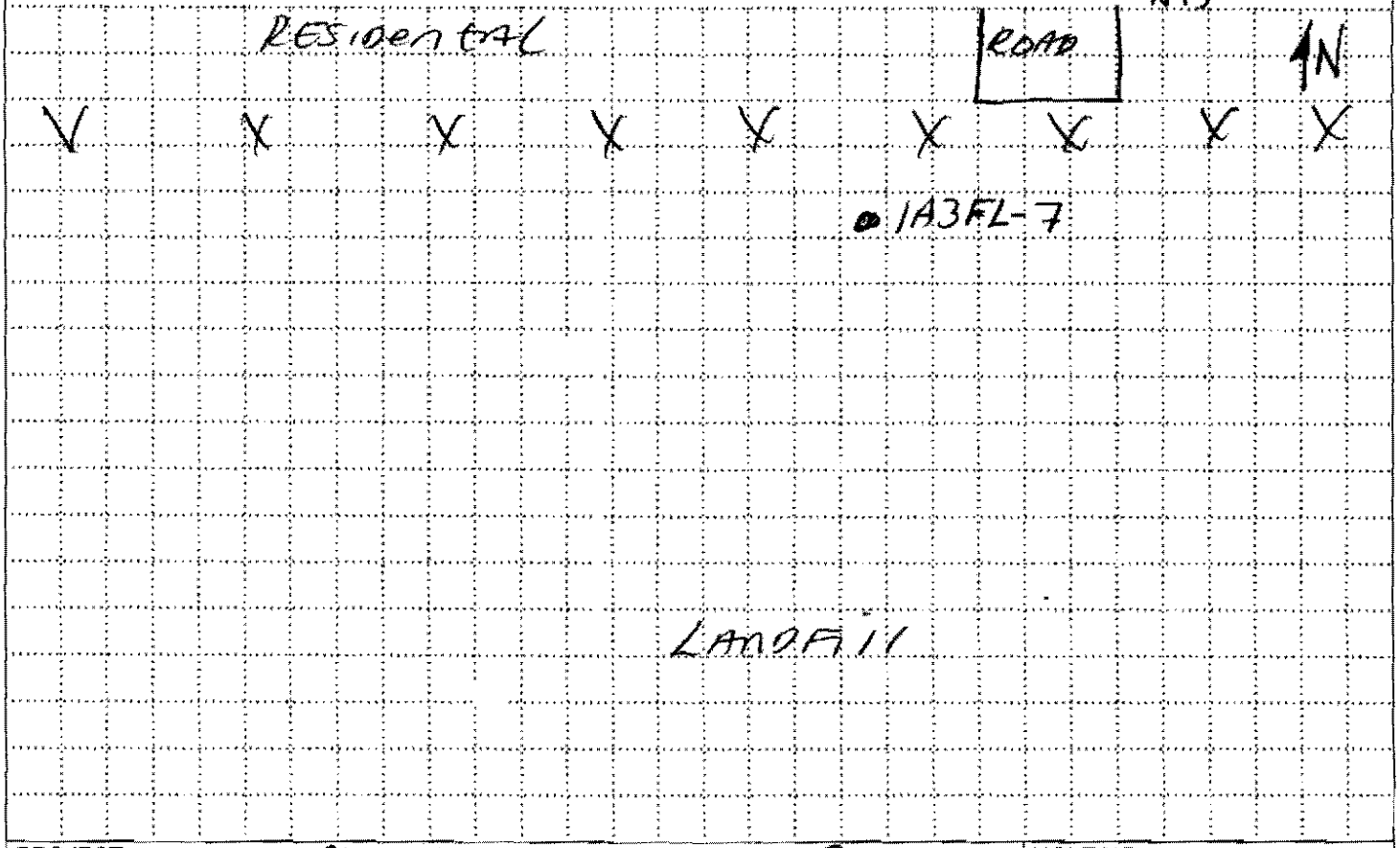
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	—	—	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
—	—	—	—	—	—	N/A %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)
CUTTINGS DRUMMED	—	—	—

LOCATION SKETCH/COMMENTS

SCALE: NTS



PROJECT	HOLE NO
TON LF- Buffalo DISTRICT FUSRAP PROJECT	1A3FL-7

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: 1A3PL-7

PROJECT:

INSPECTOR: [redacted]

SHEET 2 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	OR CORE BOX NO. (e)	SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B/J 1 mm static cone
	0	NO RECOVERY	NO RECOVERY		SEE NOTES		
	1	FILL: DARK brown, organic matter, rootlets, soft, stiff	60	5246			Top 6" 44/4682 (1-1.5')
	2	FILL: Reddish brown clay, trace sand, rootlets, soft, moist	80	4639			High B 52/4643 (1.5-2.5')
	3	FILL: wood, silt, waste (ash), loose, dry	70	4961			Method 46/4657 (2.5-3.5')
	4	Reddish-brown silt, clay, gray mottling, gravel (1/2"), some silt, trace sand, stiff, moist (CL)	60	4650			
Recovery 48"	5	NO RECOVERY	NO RECOVERY				
	6	Reddish brown silt, clay gravel (1/2"), some sand, gray mottling (CL)	60	4864			Saturated Sub. 59 (5.5-6.5') 4729
	7		80	5459			High J 55/4672 (6.5-7.5')
	8	Reddish brown silt, clay, trace sand, trace course sand, stiff, moist (CL)	80	5313			
	9	Reddish brown clay, some silt, trace course sand, stiff, moist (CL)	70	5725			
Recovery 48"	10						

PROJECT:

HOLE NO. 1A3PL-7

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: 1A3FL-7

PROJECT:

INSPECTOR: K Hoelscher

SHEET 3 OF 3

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e) J	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B4 (mm/stroke)
	10	continue from previous page	90	5547	SEE NOTES		
Recovery 12"	11	Bottom of Boring @ 11.0'					
	12	NOTES:					
		- Weather: Sunny, 35°F					
		- Gamma Reading: counts/min					
	13	- PID Readings: 0ppm					
		SAMPLE ID (LAB ANALYSIS)					
	14	TLS-SS-1A3FL-7 (1-1.5') 030570	Top 6"				
		TLS-SB-1A3FL-7 (1.5-2.5') 030570	High B				
		TLS-SB-1A3FL-7 (3.2-4.2') 030570	Native				
	15	TLS-SB-1A3FL-7 (6.5-7.5') 030570	High J				
		TLS-SB-1A3FL-7 (5.5-6.5') 030570	Laminated sub. picked by HP				
	16						
	17						
	18						
	19						
	20						

PROJECT: TON. LF Buffalo District Formerly Project

HOLE NO. 1A3FL-7

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

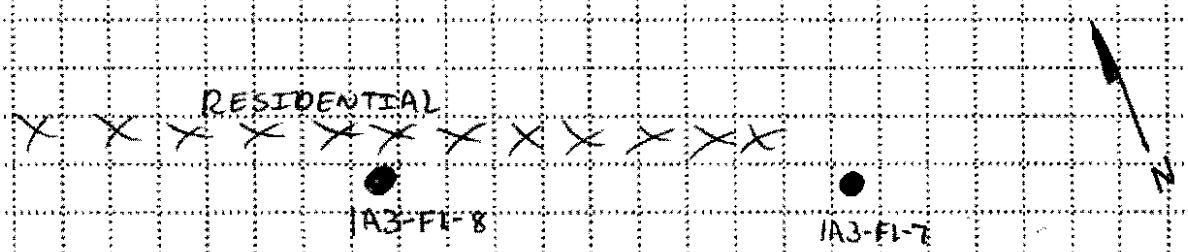
DISTRICT: Buffalo		HOLE NUMBER: 1A3-FL-8
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 3 SHEETS
3. PROJECT: TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: Jeff SNYDER	6. MANUFACTURER'S DESIGNATION OF DRILL: 6620 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE	8. HOLE LOCATION: N = 1093050.89 E = 1065307.77	
	9. SURFACE ELEVATION:	
	10. DATE STARTED: 3/5/10 1115	11. DATE COMPLETED: 3/5/10 1210
12. OVERBURDEN THICKNESS: 1.5'	15. DEPTH GROUNDWATER ENCOUNTERED: NOT ENCOUNTERED	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 13.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	-	-	-	-	-	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	2[redacted]
CUTTINGS DRUMMED	-	-	-	

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT: TON LF - Buffalo DISTRICT FUSRAP PROJECT HOLE NO: 1A3-FL-8

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. PoPP

HOLE NUMBER 1A3-FL-8

SHEET 2 OF 3 SHEETS

RECID ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h) γ	B
	0	NO RECOVERY →						
	1	DARK-BROWN CLAYEY TOPSOIL, ROOTLETS, GRASS, SOFT, WET	6748	40		TOP 6"	5274	53
	2	REDDISH-BROWN SILT AND CLAY, TRACE COURSE SAND AND FINE SUB-ROUND GRAVEL (< 1/2"), GRAY MOTTLING, STIFF, DRY-MOIST. (CL)	5967	50		NATIVE	5307	64
	3		5489	90	SEE			
	4		5633	70	NOTES	SAT. (2ND HIGH γ)	5183	50
48"	5		5720	50		HIGH γ	5203	66
	6		5059	90				
	7		5039	100		HIGH B	5195	40
	8		5209	70				
	9		5417	40				
60"	10		5227	40				

PROJECT

HOLE NO 1A3-FL-8

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR: D. Popp

HOLE NUMBER: 1A3-FL-8

SHEET 3 OF 3

RECID ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS ~~REMARKS~~ (h)
	10	CONTINUED FROM PAGE 2					
			5367	70			
	11						
			5216	40			
	12						
			5393	40			
36"	13						
		BOTTOM of BORING AT 13.0'					
		NOTES:					
	14	- CLEAR, 28°F					
		- SAMPLE I.D.					
		TLS-SS-1A3-FL-8(1.0-1.5) 030510					
	15	TLS-SB-1A3-FL-8(1.5-2.5) 030510					
		TLS-SB-1A3-FL-8(3.0-4.0) 030510					
		TLS-SB-1A3-FL-8(4.0-5.0) 030510					
	16	TLS-SB-1A3-FL-8(6.0-7.0) 030510					
		- PID READINGS = 0ppm (VOCs)					
	17	- SOIL READINGS ARE COUNTS/MIN.					
	18						
	19						
	20						

PROJECT

HOLE NO 1A3-FL-8

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

DISTRICT	Buffalo
HOLE NUMBER	1A3-FL-9
1. COMPANY NAME	ENSOL, INC.
2. DRILLING CONTRACTOR	ZEBRA ENVIRONMENTAL CORP.
SHEET / SHEETS	1 OF 3
3. PROJECT	TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT
4. LOCATION	TONAWANDA LF, TONAWANDA, NY
5. NAME OF DRILLER	Phil Orsi
6. MANUFACTURER'S DESIGNATION OF DRILL	Geoprobe 7720DT
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	3 1/4" CASING 2" CORE W/ 5' PLASTIC SLEEVE
8. HOLE LOCATION	N 1092726.74 E 1064626.62
9. SURFACE ELEVATION	N/A
10. DATE STARTED	3/5/10 11:05 am
11. DATE COMPLETED	3/5/10 1150 pm
12. OVERBURDEN THICKNESS	2.0'
15. DEPTH GROUNDWATER ENCOUNTERED	NOT ENCOUNTERED
13. DEPTH DRILLED INTO ROCK	N/A
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	N/A
14. TOTAL DEPTH OF HOLE	12.0'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	N/A

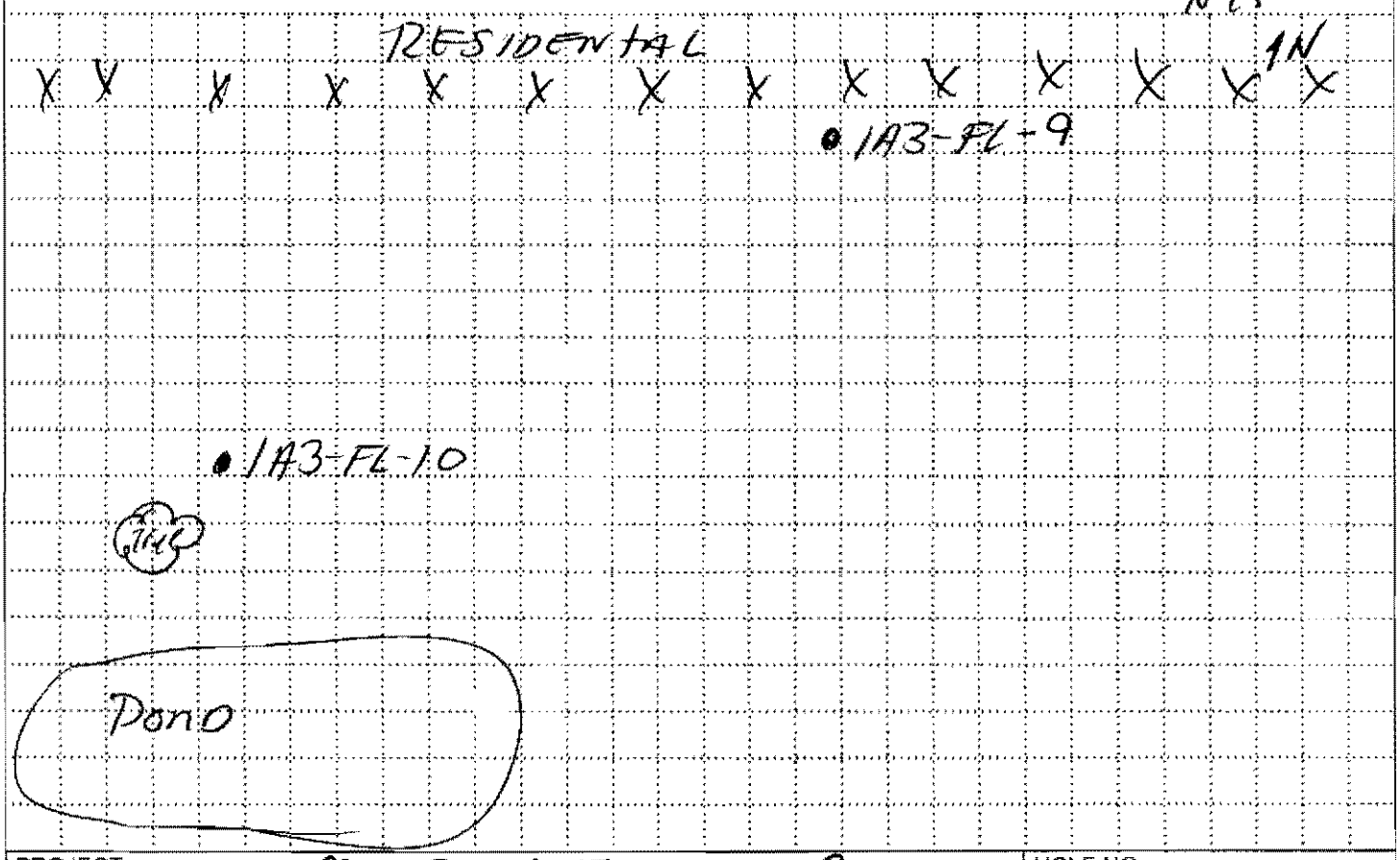
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	—	—	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
—	—	—	—	—	—	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)
CUTTINGS DRUMMED	—	—	—

LOCATION SKETCH/COMMENTS

SCALE: NTS



PROJECT	TON LF- Buffalo DISTRICT FUSRAP PROJECT
HOLE NO.	1A3-FL-9

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: 1A3-FL-9

PROJECT:

INSPECTOR: [redacted]

SHEET 2 OF 3

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) PID	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS 3(j) Initial Sample Number
	0	NO RECOVERY	NO RECOVERY		SEE NOTES		
	1	Fill: DARK brown topsoil, organic matter, rootlets, soft, wet	80	5549			Top Soil 46/5164 (0-1.5')
	2	Reddish-brown Clay, some silt, trace sand, trace sub-rounded gravel (2 1/2"), stiff, moist (CL)	60	5187			Native 46/5164 (2-3')
	3		90	5299			
	4						Saturated sub. 54/5254 (3-4')
Recovery 46"	5		80	5636			
	6	NO RECOVERY	NO RECOVERY				
	7	Reddish-brown clay, some sand, trace silt, gray mottling, course + fine sand, stiff, moist (CL)	60	5633			
	8		70	5377			
	9	Reddish-brown clay, some sand, trace silt, course sand, sub-rounded gravel (2 1/4"), stiff, moist (CL)	100	5391			High B 61/5188 (8.3-9.3')
Recovery 48"	10		90	5655			

PROJECT: Tow of Buffalo District Fuelling Project

HOLE NO: 1A3FL-9

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: 1A3FL-9

PROJECT:

INSPECTOR: K Hoelscher

SHEET 3 OF 3

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) PB	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h) BY INSTRUMENTATION
	10	Continue from previous page			SEE NOTES		High Y 52/5089 (10-11')
	11		60	5679			
Recovery 24"	12		80	5243			
		Bottom of Boring @ 12.0'					
	13	NOTES:					
		-Weather: Sunny, 35°F					
	14	-Gamma Readings: count/min					
		-PID Reading: 0ppm					
		Sample ID (Rad Analysis)					
	15	TLS-SS-1A3FL-9 (1-1.5') 030510	Tip 6''				
		TLS-SB 1A3FL-9 (2-3') 030510	Negative				
		TLS-SB 1A3FL-9 (3-4') 030510	Saturated	sub. picked by HD			
	16	TLS-SB 1A3FL-9 (6.3-9.3') 030510	High				
		TLS-SB 1A3FL-9 (10-11') 030510	High Y				
	17						
	18						
	19						
	20						

PROJECT: TON of Buffalo District Fusrap Project

HOLE NO: 1A3FL-9

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

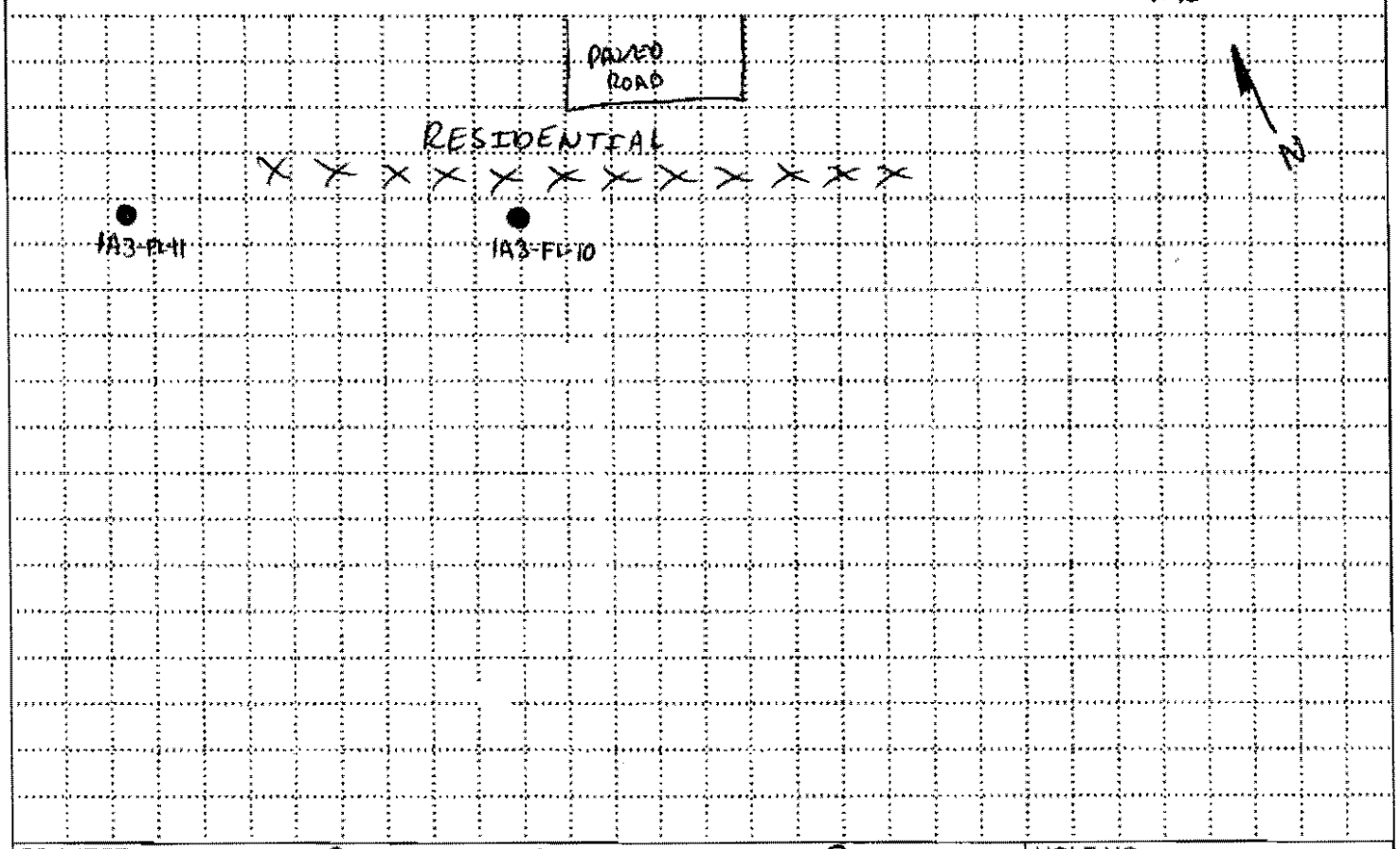
DISTRICT	Buffalo
HOLE NUMBER	1A3-FL-10
1. COMPANY NAME	ENSOL, INC.
2. DRILLING CONTRACTOR	ZEBRA ENVIRONMENTAL CORP.
SHEET / SHEETS	1 OF 3
3. PROJECT	TOWN of TONAWANDA LF OPERABLE UNIT-Buffalo DISTRICT FUSRAP PROJECT
4. LOCATION	TONAWANDA LF, TONAWANDA, NY
5. NAME OF DRILLER	Jeff SNYDER
6. MANUFACTURER'S DESIGNATION OF DRILL	6620 DT GEOPROBE
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE
8. HOLE LOCATION	N = 1092639.08 E = 1064447.78
9. SURFACE ELEVATION	
10. DATE STARTED	3/5/10 1015
11. DATE COMPLETED	3/5/10 1100
12. OVERBURDEN THICKNESS	2.0'
15. DEPTH GROUNDWATER ENCOUNTERED	3.0 bgs
13. DEPTH DRILLED INTO ROCK	N/A
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	N/A
14. TOTAL DEPTH OF HOLE	15.0'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	N/A

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	-	-	-	-	-	N/A

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23 [redacted]
CUTTINGS DRUMMED	-	-	-	

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT	HOLE NO
TON LF- Buffalo DISTRICT FUSRAP PROJECT	1A3-FL-10

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. POPP

HOLE NUMBER 1A3-FL-10

SHEET 2 OF 3 SHEETS

RECID ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING ~~RESULTS~~ (d) X	GEOTECH SAMPLE ~~OR CORE BOX NO.~~ (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)	
	0	NO RECOVERY						
	1							
	2	DARK-BROWN CLAYEY TOPSOIL, GRAVEL, ROOTLETS, STIFF, FROZEN	4652	110		TOP 6"	X 4965	B 63
	3	REDDISH-BROWN SILT AND CLAY, TRACE FINE AND COURSE SAND, FINE SUB-ROUND GRAVEL (<1/2"), MED. STIFF, MOIST. (CL)	5131	60		NATIVE	5001	60
	4	DARK-BROWN/BLACK SILT AND CLAY, SOFT, WET. (CL)	5417	80	SEE NOTES	SAT.	4900	53
42"	5	REDDISH-BROWN SILT AND CLAY, TRACE COURSE SAND AND FINE SUB-ROUND GRAVEL (<1/2"), STIFF, DRY-MOIST (CL)	5845	100				
	6		5001	80				
	7		5259	100				
	8		5345	110		HIGH B	5198	44
	9		5076	90				
60"	10		5686	70				

PROJECT

HOLE NO 1A3-FL-10

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR: D. Popp

HOLE NUMBER: 1A3-FL-10

SHEET 3 OF 3 SHEETS

RECIO ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) ~~%~~	GEOTECH SAMPLE OR CORE BOX NO. (e) ~~B~~	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)	
	10	CONTINUED FROM PAGE 2.						
			5659	70				
	11							
			5073	100	SEE			
	12							
			5619	90	NOTES			
	13	REDDISH-BROWN SILT AND CLAY, TRACE COURSE SAND, MED. STIFF, MOIST. (CL)					%	B
			5809	110		HIGH %	5104	55
	14							
			5451	80				
60"	15	BOTTOM OF BORING AT 15.0'						
		NOTES:						
	16	- CLEAR, 28°F						
		- SAMPLE I.D.						
		TLS-SS-1A3-FL-10(1.5-2.0)030510						
		TLS-SB-1A3-FL-10(2.0-3.0)030510						
	17	TLS-SB-1A3-FL-10(3.0-4.0)030510						
		TLS-SB-1A3-FL-10(7.0-8.0)030510						
		TLS-SB-1A3-FL-10(13.0-14.0)030510						
	18	- PID READINGS = 0 ppm (VOC'S)						
		- SOIL READINGS ARE COUNTS/MIN.						
	19							
	20							

PROJECT

HOLE NO 1A3-FL-10

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

DISTRICT	Buffalo
HOLE NUMBER	1A3FL-11
1. COMPANY NAME	ENSOL, INC.
2. DRILLING CONTRACTOR	ZEBRA ENVIRONMENTAL CORP.
SHEET / SHEETS	1 OF 3
3. PROJECT	TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT
4. LOCATION	TONAWANDA LF, TONAWANDA, NY
5. NAME OF DRILLER	Phil Orsi
6. MANUFACTURER'S DESIGNATION OF DRILL	Geoprobe 7720DT
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	3 1/4" CASING 2" CORE W/ 5' PLASTIC SLEEVE
8. HOLE LOCATION	N 1092556.81 E 1064267.10
9. SURFACE ELEVATION	N/A
10. DATE STARTED	3/5/10 10:00Am
11. DATE COMPLETED	3/5/10 10:50Am
12. OVERBURDEN THICKNESS	1.5'
15. DEPTH GROUNDWATER ENCOUNTERED	NOT ENCOUNTERED
13. DEPTH DRILLED INTO ROCK	N/A
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	N/A
14. TOTAL DEPTH OF HOLE	11.0'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	N/A

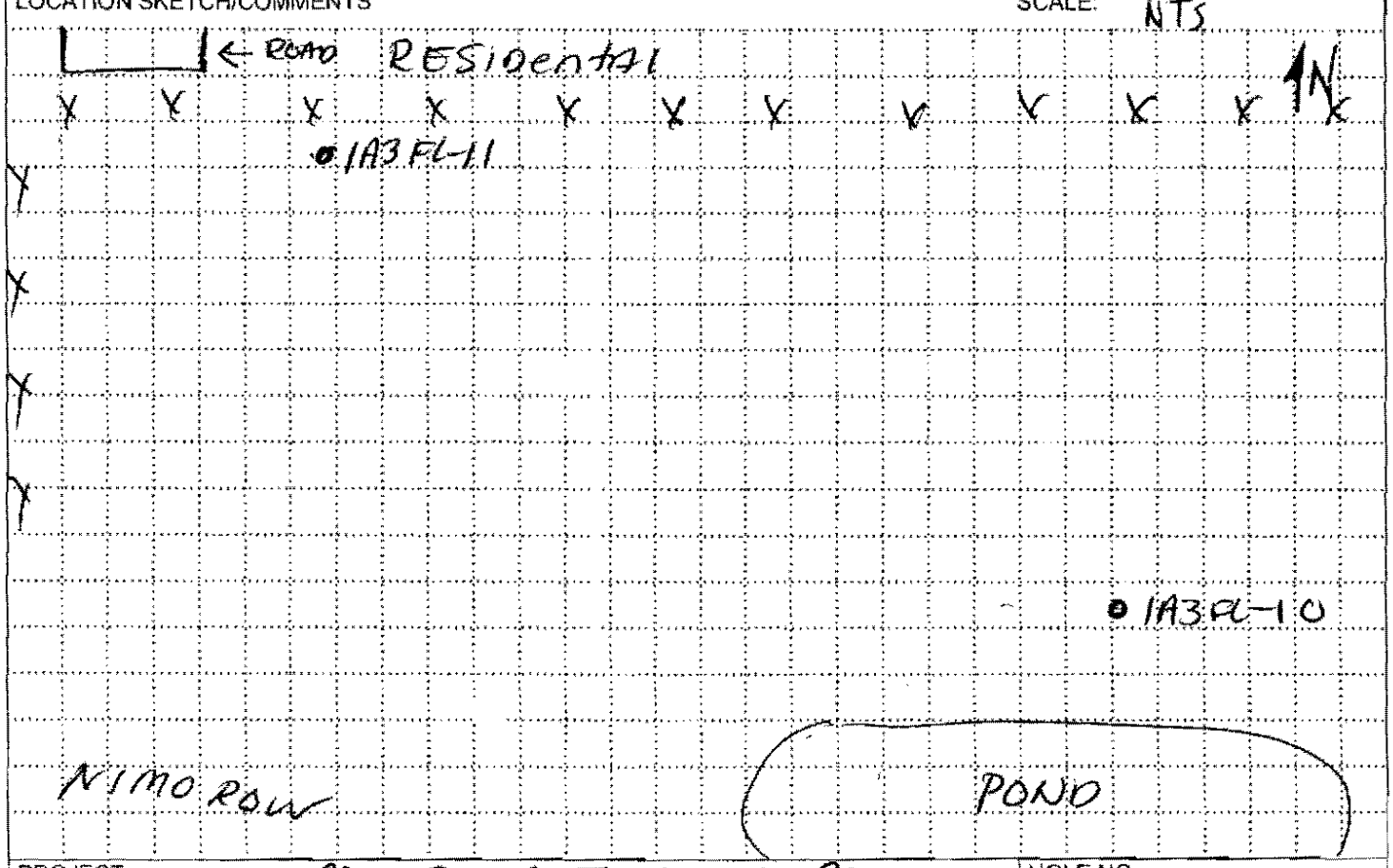
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	—	—	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
—	—	—	—	—	—	N/A

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	[redacted]
CUTTINGS DRUMMED	—	—	—	

LOCATION SKETCH/COMMENTS

SCALE: NTS



PROJECT	HOLE NO.
TON LF- Buffalo DISTRICT FUSRAP PROJECT	1A3-FL-11

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: 1A3FL-11

PROJECT:

INSPECTOR: [redacted]

SHEET 2 OF 3

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS
	0	NO RECOVERY	NO RECOVERY		See Notes		
	1	FILL: DARK brown TOPSOIL, organic matter, rootlets, soft, moist	90	5455			Top 6" 43/5147 (.5-1')
	2	Reddish-brown silt, clay, some sand, trace of course sand, gravel (<1"), desiccation cracks w/gray infilling, stiff, moist (CL)	80	5509			Native 47/5145 (1.5-2.5')
	3		90	5784			
	4		120	5283			High B 54/5194 (3-4')
	5		60	5610			
	6	NO RECOVERY	NO RECOVERY				
	7	Reddish brown clay, some silt, trace sand, trace course + fine sand, gravel-sub-rounded (<1"), stiff, moist (CL)	60	5720			Saturated sub 52/5047 (6-7')
	8		120	6134			High B 46/5330 (7-8')
	9	Reddish brown clay, some silt, trace sand, trace fine sand, gravel (<2"), stiff, moist (CL)	80	5821			
	10		100	5909			

PROJECT: TOW IF Buffalo District Fosdip Project

HOLE NO. 1A3-FL-11

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: 1A3FL-11

PROJECT:

INSPECTOR: K Hoelscher

SHEET 3 OF 3

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) PID	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS: By immersion
	10	Continue from previous page	80	5755	SEE NOTES		
Recovery 12"	11	Bottom of Boring @ 11.0'					
		NOTES:					
	12	- weather: Sunny, 35°F					
		- Gamma Reading: count/min					
		- PID Reading: 0 ppm					
	13	SAMPLE I.D. (LEAD ANALYSIS)					
		TLS-SS-1A3FL-11(.5-1')030570	Top 6"				
	14	TLS-SB-1A3FL-11(1.5-2.5')030570	Native				
		TLS-SB-1A3FL-11(3-4')030570	High B				
		TLS-SB-1A3FL-11(6-7')030570	[illegible] SLB. picked by HP				
	15	TLS-SB-1A3FL-11(7-8')030570	High J				
	16						
	17						
	18						
	19						
	20						

PROJECT: TON of Buffalo District FUSRAP Project

HOLE NO. 1A3-FL-11

ENG FORM 5056A-R, AUG 94

USACE ENG HTRW Forms
Investigative Area 4

HTRW DRILLING LOG

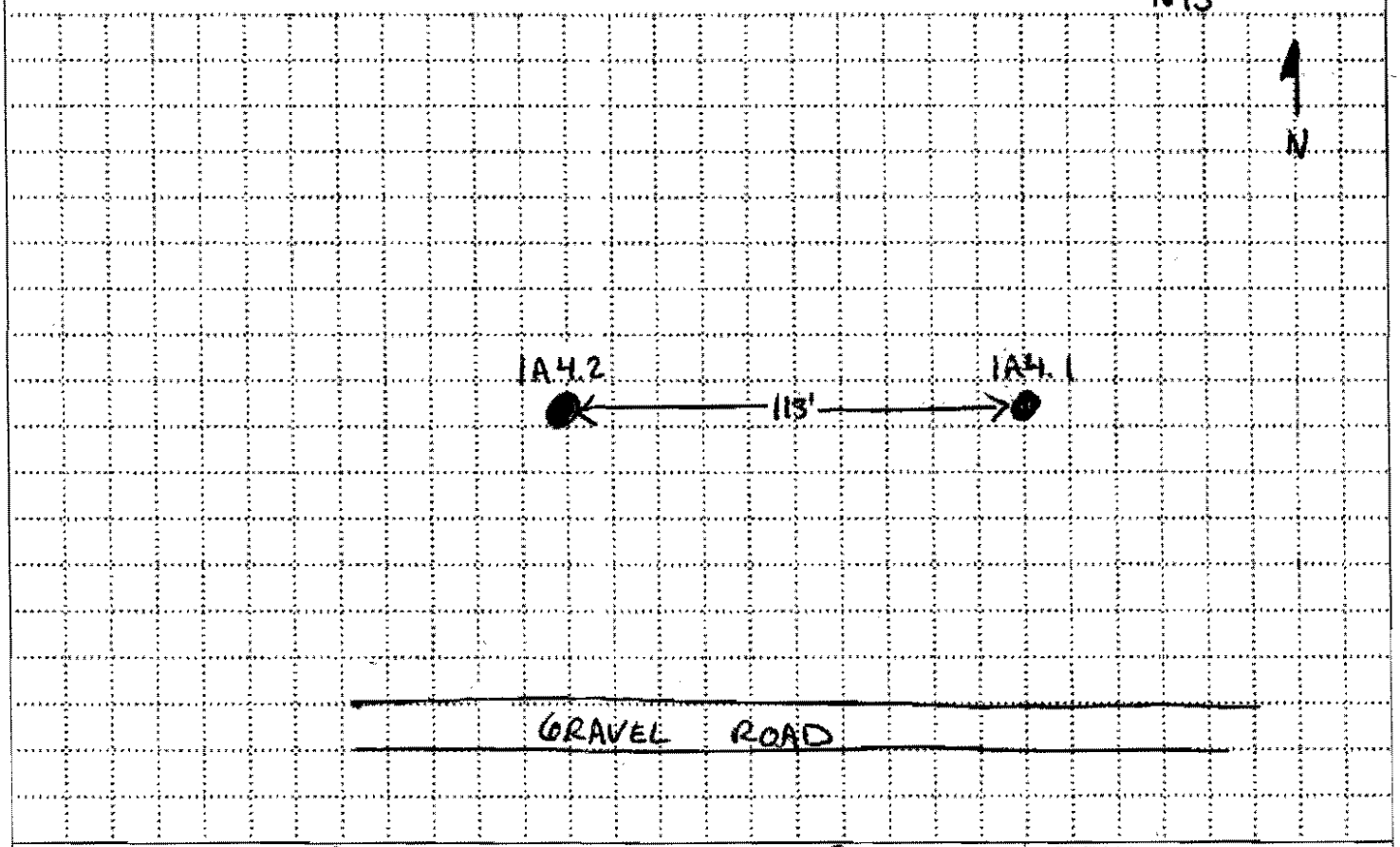
DISTRICT: Buffalo		HOLE NUMBER: 1A4.1
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 3 SHEETS
3. PROJECT: TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: JEFF SNYDER	6. MANUFACTURER'S DESIGNATION OF DRILL: 6620 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE W/ 5' PLASTIC SLEEVE	8. HOLE LOCATION: N= 1092822 E= 417954.2	
	9. SURFACE ELEVATION: 644.234	
	10. DATE STARTED: 3/3/10 1350	11. DATE COMPLETED: 3/3/10 1530
12. OVERBURDEN THICKNESS: NATIVE NOT ENCOUNTERED (REFUSAL AT 12.0')	15. DEPTH GROUNDWATER ENCOUNTERED: NOT ENCOUNTERED	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 12.0' (REFUSAL)	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP / TOTALS	TCLP / TOTALS	SVOC-TCLP / TOTALS	PEST-TCLP / TOTALS	PCB-TOTALS	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)
CUTTINGS DRUMMED	–	–	–

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT: TON LF- Buffalo DISTRICT FUSRAP PROJECT HOLE NO: 1A4.1

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. PoPP

HOLE NUMBER 1A4.1

SHEET 2 OF 3

REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h) γ	B
	0	NO RECOVERY →						
	1							
	2	FILL: REDDISH-BROWN CLAY, BRICK, GRAVEL, WOOD, MED. STIFF, MOIST.	5152	70		TOP 6"	5001	50
	3		5256	40				
	4		5492	80		HIGH γ	4864	43
45"	5		4726	100		CHEM	4930	78
	6	NO RECOVERY →						
	7	FILL: REDDISH-BROWN CLAY, ASPHALT, BRICK, SLAG, MED. STIFF, MOIST.	5085	90				
	8		4837	100		HIGH B	4969	61
	9		5335	70		SAT. (2ND HIGH γ)	5209	73
35"	10							

PROJECT

HOLE NO 1A4.1

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. BOPP

HOLE NUMBER 1A4.1

SHEET 3 OF 3

RECO (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN STATIC COUNTS (h)
	10	FILL: CONTINUED FROM PAGE 2	4969	80			
	11		5014	60			
24"	12	BOTTOM of BORING AT 12.0' (REFUSAL)					
	13	NOTES:					
		- CLEAR, 41°F					
		- SAMPLE I.D.					
	14	TLS-SS-1A4.1(1.2-1.7)030310					
		TLS-SB-1A4.1(3.0-4.0)030310					
		TLS-SB-1A4.1(4.0-5.0)030310					
	15	TLS-SB-1A4.1(8.0-9.0)030310					
		TLS-SB-1A4.1(9.0-10.0)030310					
		- MOVED 1m W of					
	16	ORIGINAL LOCATION (REFUSAL AT 12.0')					
		- PID READINGS = 0ppm (VOCs)					
	17	- COLLECTED RAD, DUPLICATE					
	18						
	19						
	20						

PROJECT

HOLE NO 1A4.1

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

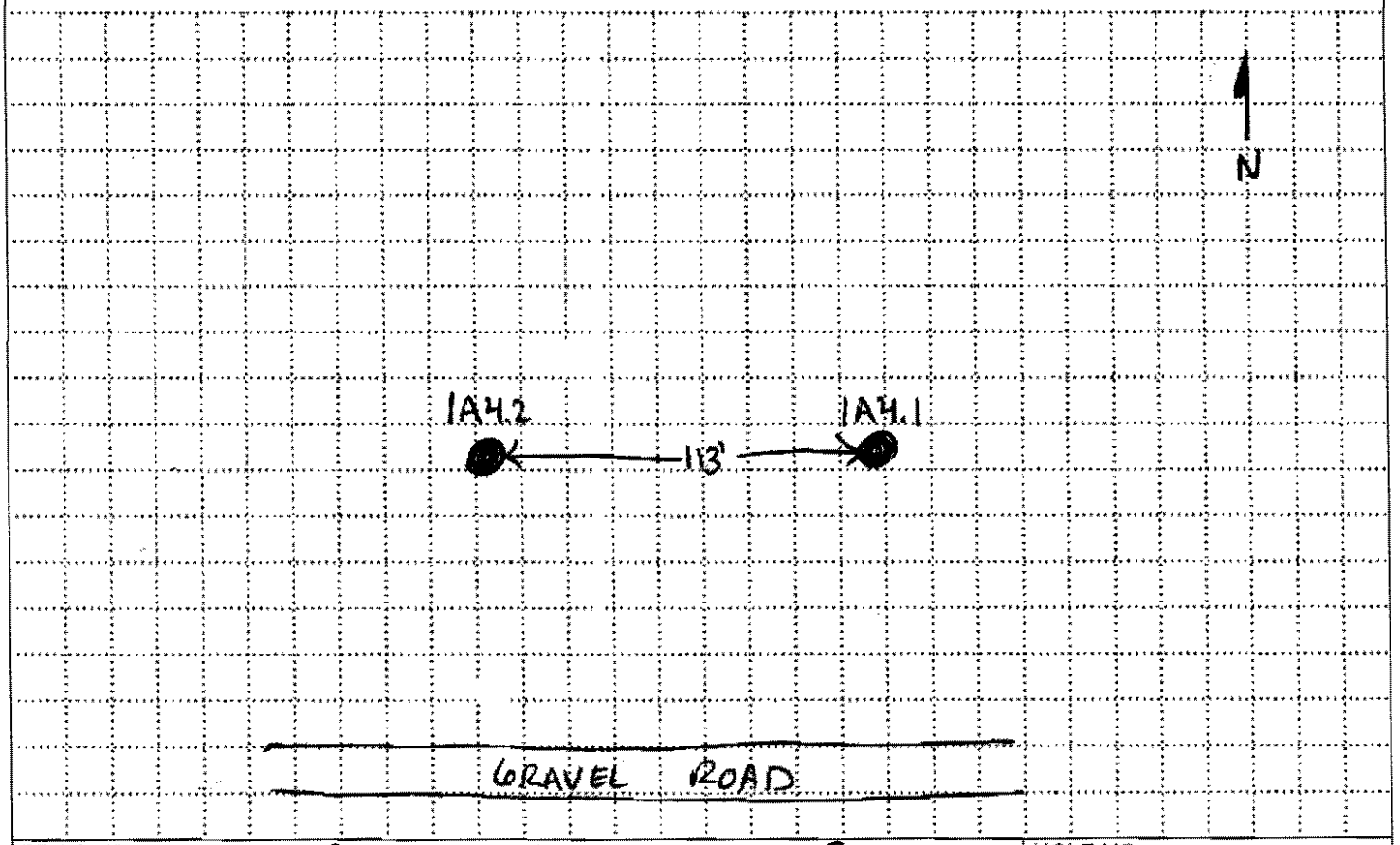
DISTRICT: Buffalo		HOLE NUMBER: 1A4.2
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 3 SHEETS
3. PROJECT: TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: Jeff SNYDER	6. MANUFACTURER'S DESIGNATION OF DRILL: 6620 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE	8. HOLE LOCATION: N= 1092822 E= 417852.4	
	9. SURFACE ELEVATION: 644.574	
	10. DATE STARTED: 3/3/10 1015	11. DATE COMPLETED: 3/3/10 1130
12. OVERBURDEN THICKNESS: NATIVE NOT ENCOUNTERED (REFUSAL AT 16.3')	15. DEPTH GROUNDWATER ENCOUNTERED: NOT ENCOUNTERED	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 16.3' (REFUSAL)	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	–	–	–	–	–	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)
CUTTINGS DRUMMED	–	–	–

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT: TON LF- Buffalo DISTRICT FUSRAP PROJECT HOLE NO: 1A4.2

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A4.2

SHEET 2 OF 3

RECID ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)	
	0							
	1	NO RECOVERY →					→	
	2	FILL: DARK-BROWN CLAY, BRICK, GRAVEL, ASPHALT, CONCRETE, STIFF, MOIST.	5743	90	SEE NOTES	TOP 6"	X/4909	B/60
	3		4495	110		HIGH B	5104	43
	4		5201	80				
40"	5		5128	100				
	6	NO RECOVERY →					→	
	7	FILL: DARK BROWN CLAY, BRICK, GRAVEL, CONCRETE, ASPHALT, STIFF, MOIST.	4842	100				
	8		5144	70				
	9		4568	60				
42"	10		5251	80				

PROJECT

HOLE NO 1A4.2

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A4.2

SHEET 3 OF 3 SHEETS

REC'O ~~REV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN ~~REMOVE~~ STATIC COUNTS (h) X	B
	10	NO RECOVERY →						
	11							
	12	FILL: DARK-BROWN CLAY, GRAVEL, SOFT, MOIST.	5636	80				
	13		6148	110	SEE NOTES	HIGH X	5056	41
	14		5730	90		SAT. (2ND HIGH X)	5183	51
43"	15		5275	60				
15"	16		5043	90				
	17	BOTTOM of BORING AT 16.3' (REFUSAL)						
	18	NOTES: - CLEAR, 38°F - SAMPLE I.D. TLS-SS-1A4.2(1.5-2.0)030310 TLS-SB-1A4.2(2.0-3.0)030310 TLS-SB-1A4.2(12.0-13.0)030310 TLS-SB-1A4.2(13.0-14.0)030310						
	19	- MOVED 1m E of ORIGINAL LOCATION (REFUSAL AT 17.8') - PID READINGS = 0ppm (VOCs)						
	20	- SOIL READINGS ARE COUNTS/MIN.						

PROJECT

HOLE NO 1A4.2

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

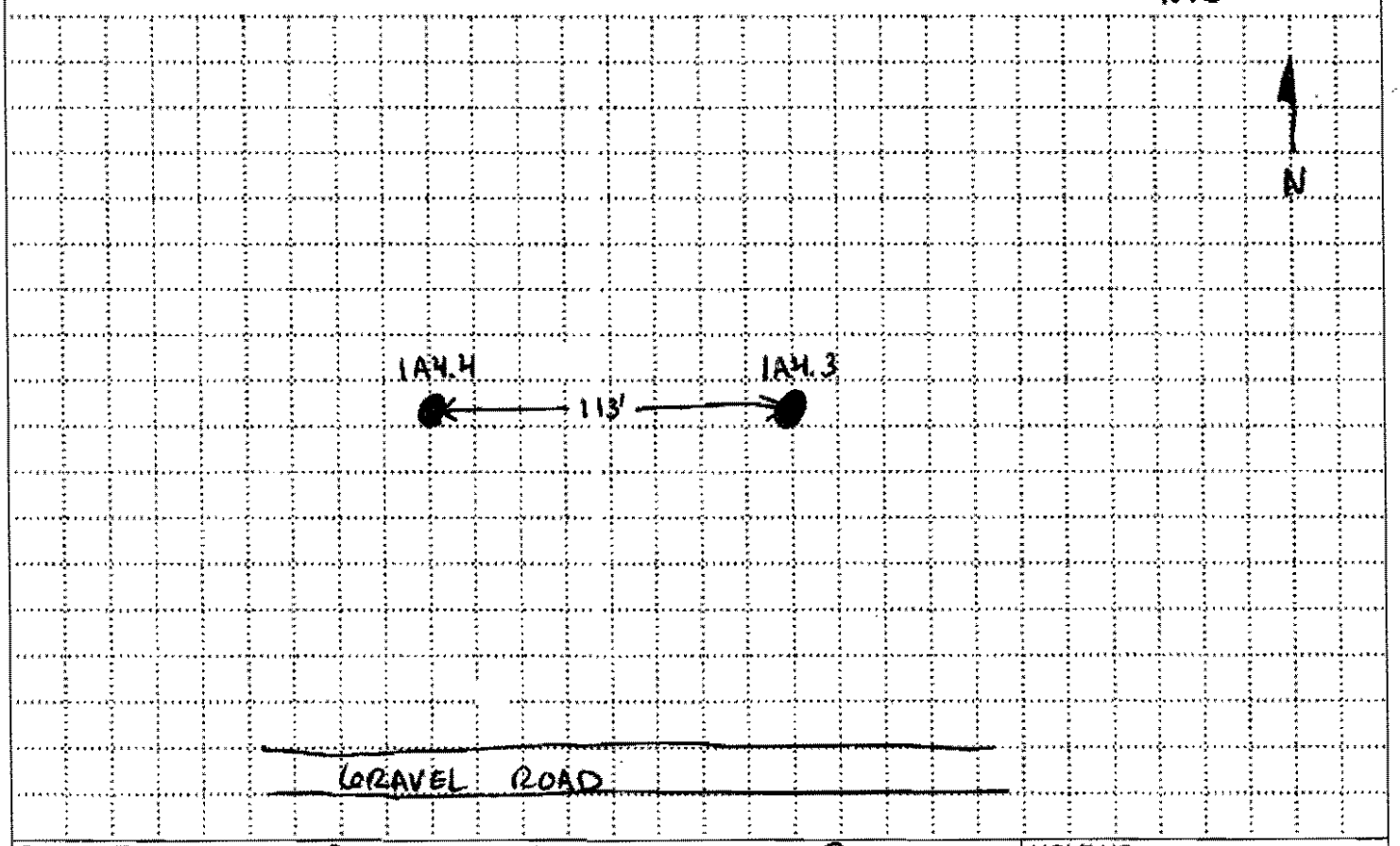
DISTRICT	Buffalo
HOLE NUMBER	1A4.3
1. COMPANY NAME	ENSOL, INC.
2. DRILLING CONTRACTOR	ZEBRA ENVIRONMENTAL CORP.
SHEET / SHEETS	1 OF 3
3. PROJECT	TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT
4. LOCATION	TONAWANDA LF, TONAWANDA, NY
5. NAME OF DRILLER	SEFF SNYDER
6. MANUFACTURER'S DESIGNATION OF DRILL	6620 DT GEOPROBE
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	3 1/4" CASING 2" CORE W/ 5' PLASTIC SLEEVE
8. HOLE LOCATION	N= 1092916 E= 418159.5
9. SURFACE ELEVATION	648.197
10. DATE STARTED	3/3/10 0840
11. DATE COMPLETED	3/3/10 0950
12. OVERBURDEN THICKNESS	NATIVE NOT ENCOUNTERED (REFUSAL AT 11.8')
15. DEPTH GROUNDWATER ENCOUNTERED	NOT ENCOUNTERED
13. DEPTH DRILLED INTO ROCK	N/A
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	N/A
14. TOTAL DEPTH OF HOLE	11.8' (REFUSAL)
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	N/A

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP / TOTALS	TCLP / TOTALS	SVOC - TCLP / TOTALS	PEST - TCLP / TOTALS	PCB - TOTALS	N/A

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)
CUTTINGS DRUMMED	-	-	-

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT TON LF- Buffalo DISTRICT FUSRAP PROJECT HOLE NO 1A4.3

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A4.3

SHEET 2 OF 3

REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h) X	B
	0	NO RECOVERY →						
	1	FILL: REDDISH-BROWN CLAY, BRICK, WOOD, WASTE, (PLASTIC), MED. STIFF, MOIST.	6472	30		TOP 6"	6030	79
	2		5761	80				
	3		5832	70	SEE NOTES			
	4		6259	90				
54"	5		5643	100				
		NO RECOVERY →						
	6	FILL: DARK-BROWN CLAY, SAND, GRAVEL, ASPHALT, MED. STIFF, MOIST.	6474	80				
	7		6811	110		SAT. (2ND X) HIGH	6034	52
	8		6222	120		HIGH B	6061	81
	9		6727	90				
53"	10		6129	110		CHEM.	6291	78

PROJECT

HOLE NO 1A4.3

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A4.3

SHEET 3 OF 3 SHEETS

REC'D ~~SEL~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. ~~REMARKS~~ STATIC COUNTS (h) X	B
	10	FILL: DARK-BROWN CLAY, GRAVEL, WOOD, MED. STIFF, MOIST.	6940	80	SEE NOTES	HIGH X	6059	64
	11		6593	110				
22"	12	BOTTOM of BORING AT 11.8' (REFUSAL)						
	13	NOTES: - CLOUDY, 35°F - SAMPLE I.D.						
	14	TLS-SS-1A4.3(0.5-1.0)030310 TLS-SB-1A4.3(6.0-7.0)030310 TLS-SB-1A4.3(7.0-8.0)030310						
	15	TLS-SB-1A4.3(9.0-10.0)030310 TLS-SB-1A4.3(10.0-11.0)030310						
	16	- COLLECTED RAD. DUPLICATE SAMPLE - PID READINGS = 0ppm (VOC's)						
	17	- MOVED 1m NORTH of ORIGINAL LOCATION (REFUSAL AT 11.6')						
	18	- SOIL READINGS ARE COUNTS / MIN.						
	19							
	20							

PROJECT

HOLE NO 1A4.3

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

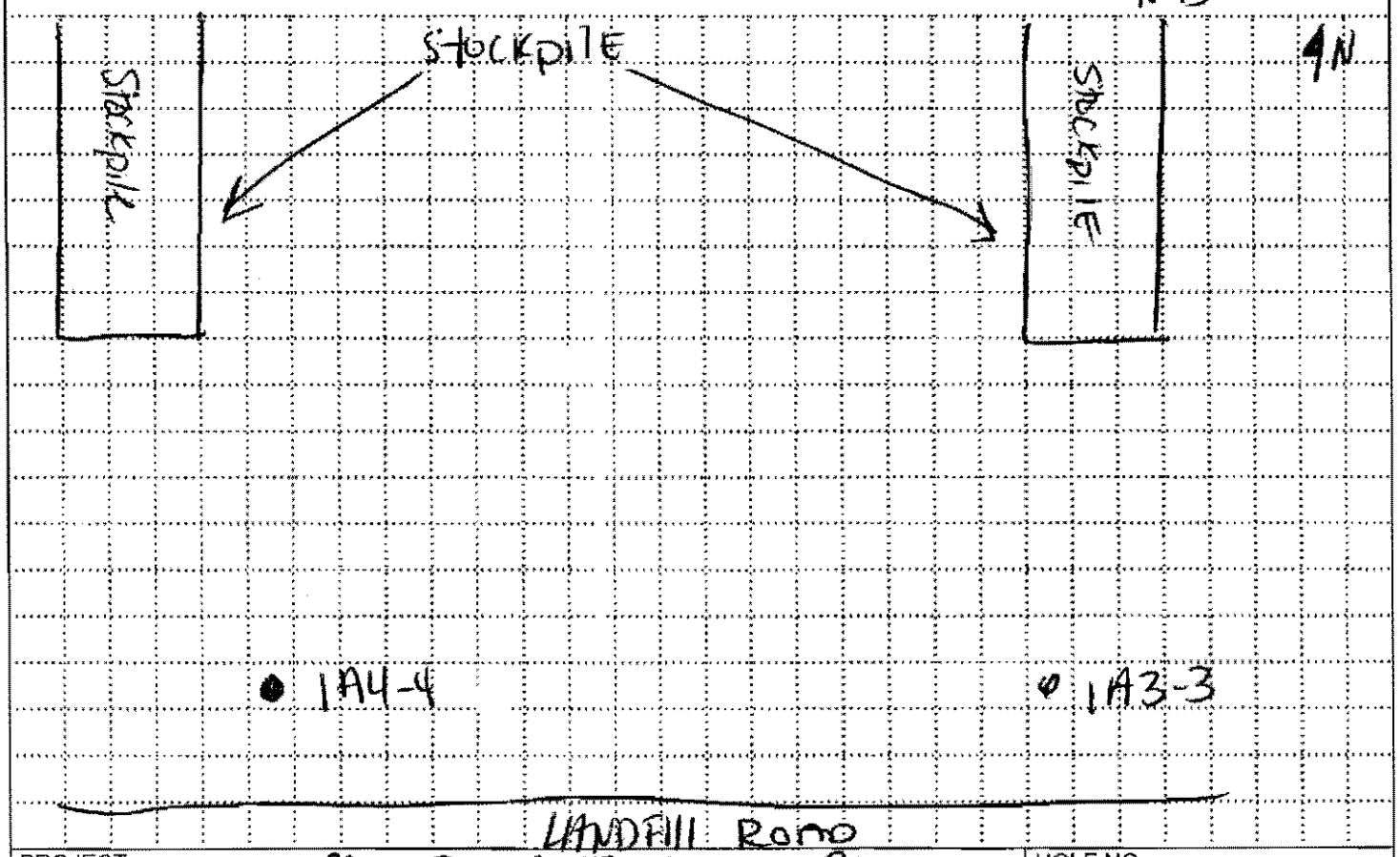
DISTRICT	Buffalo
HOLE NUMBER	1A4-4
1. COMPANY NAME	ENSOL, INC.
2. DRILLING CONTRACTOR	ZEBRA ENVIRONMENTAL CORP.
SHEET / SHEETS	1 OF 4
3. PROJECT	TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT
4. LOCATION	TONAWANDA LF, TONAWANDA, NY
5. NAME OF DRILLER	Phil Orsi
6. MANUFACTURER'S DESIGNATION OF DRILL	Geoprobe 7720DT
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE
8. HOLE LOCATION	N 1092916 E 418057.3
9. SURFACE ELEVATION	647.956
10. DATE STARTED	3/2/10 935 hrs
11. DATE COMPLETED	3/2/10 1055 hrs
12. OVERBURDEN THICKNESS	26.2'
15. DEPTH GROUNDWATER ENCOUNTERED	NOT ENCOUNTERED
13. DEPTH DRILLED INTO ROCK	N/A
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	N/A
14. TOTAL DEPTH OF HOLE	26.2'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	N/A

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP 1010M	TCLP 7470M	SVOC TCLP	PEST 1010M	PCB 1010M	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. [redacted]
CUTTINGS DRUMMED	—	—	—	

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT	HOLE NO.
TON LF - Buffalo DISTRICT FUSRAP PROJECT	1A4-4

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR K Hoelscher

HOLE NUMBER 1AU-4

SHEET 2 OF 4 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) PB	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B1 1min static count
	0	NO RECOVERY	NO RECOVERY		SEE NOTES		
	1	FILL: DARK brown clay, silt, CONCRETE, BRICK, GLASS, ASH, STIFF, MOIST	60	5333			Top 6" (1-1.5') 46/5436
	2		80	6165			Native SLUD (1.5-2.5') 56/5632
	3		100	5846			SATURATED SLUD (2.5-3.5') 41/5664
	4						
Recovery 48"	5		140	6013			
		NO RECOVERY	NO RECOVERY				
	6	FILL: continue from above w/ SAND, waste	120	5564			
	7		80	5850			
	8		100	6493			
	9						
Recovery 30"	10		120	5596			

PROJECT

HOLE NO. 1A-4-1

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER 1AL-4

SHEET 3 OF 4 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) HB	GEOTECH SAMPLE OR CORE BOX NO. (e) J	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B/J 1min spatic count
	10	NO RECOVERY	NO RECOVERY		SEE NOTES		
	11						
	12	Fill: continue from previous page	80	6322			
	13		100	6386			
	14		90	6788			High J 54/5520 (13-14')
Recovery 35"	15		110	6114			Chemical 44/5246 (14-15')
	16	NO RECOVERY	NO RECOVERY				
	17						
	18						
	19	Fill: Dark brown clay, silt, sand, concrete, waste (paper, plastic, plaster, and glass), stiff, moist	100	6053			
Recovery 24"	20		140	6155			High B 53/5593 (19-20')

PROJECT

HOLE NO. 1AL-4

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: 1A4-4

PROJECT:

INSPECTOR: K Hoelscher

SHEET 4 OF 4 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) PB	GEOTECH SAMPLE OR CORE BOX NO. (e) NB	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B/J 1 min. state count
	20	Fill: Reddish-brown silt, clay, waste (ash, paper), wood, stiff, moist			SEE NOTES		
	21		80	5303			
	22		120	5966			
	23		80	5696			
	24		80	6242			
	25		120	6401			
	26	Fill: silt, sand, waste (ash + glass), stiff, moist	80	5664			
	27	Refusal @ 26.2'					
	28	Notes: Weather: Overcast, 30°F; Gamma Readings: 0.0 cpm; PID Readings: 0 ppm; Sample ID (and analysis):					
	29	TLS-SS-1A4-4 (1-1.5) 030210; TLS-SB-1A4-4 (1.5-2.5) 030210; TLS-SB-1A4-4 (2.5-3.5) 030210; TLS-SB-1A4-4 (13-14') 030210; TLS-SB-1A4-4 (14-15') 030210; TLS-SB-1A4-4 (19-20') 030210	Tip 6" native soil; saturated soil than 8; chemical than 8		* Refusal met @ 26.0' on 1st attempt, moved one meter NE, Refusal met @ 26.2' on second attempt (see attached notes).		
	30						

PROJECT:

HOLE NO. 1A4-4

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

DISTRICT: Buffalo	HOLE NUMBER: 1A4-5	
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 3 SHEETS
3. PROJECT: TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: Phil Orsi	6. MANUFACTURER'S DESIGNATION OF DRILL: Geoprobe 7720DT	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE	8. HOLE LOCATION: N 1092916 E 417852.3	
	9. SURFACE ELEVATION: 643.468	
	10. DATE STARTED: 3/3/10 2:00pm	11. DATE COMPLETED: 3/3/10 4:10pm
12. OVERBURDEN THICKNESS: 20.0'	15. DEPTH GROUNDWATER ENCOUNTERED: NOT ENCOUNTERED	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 20.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

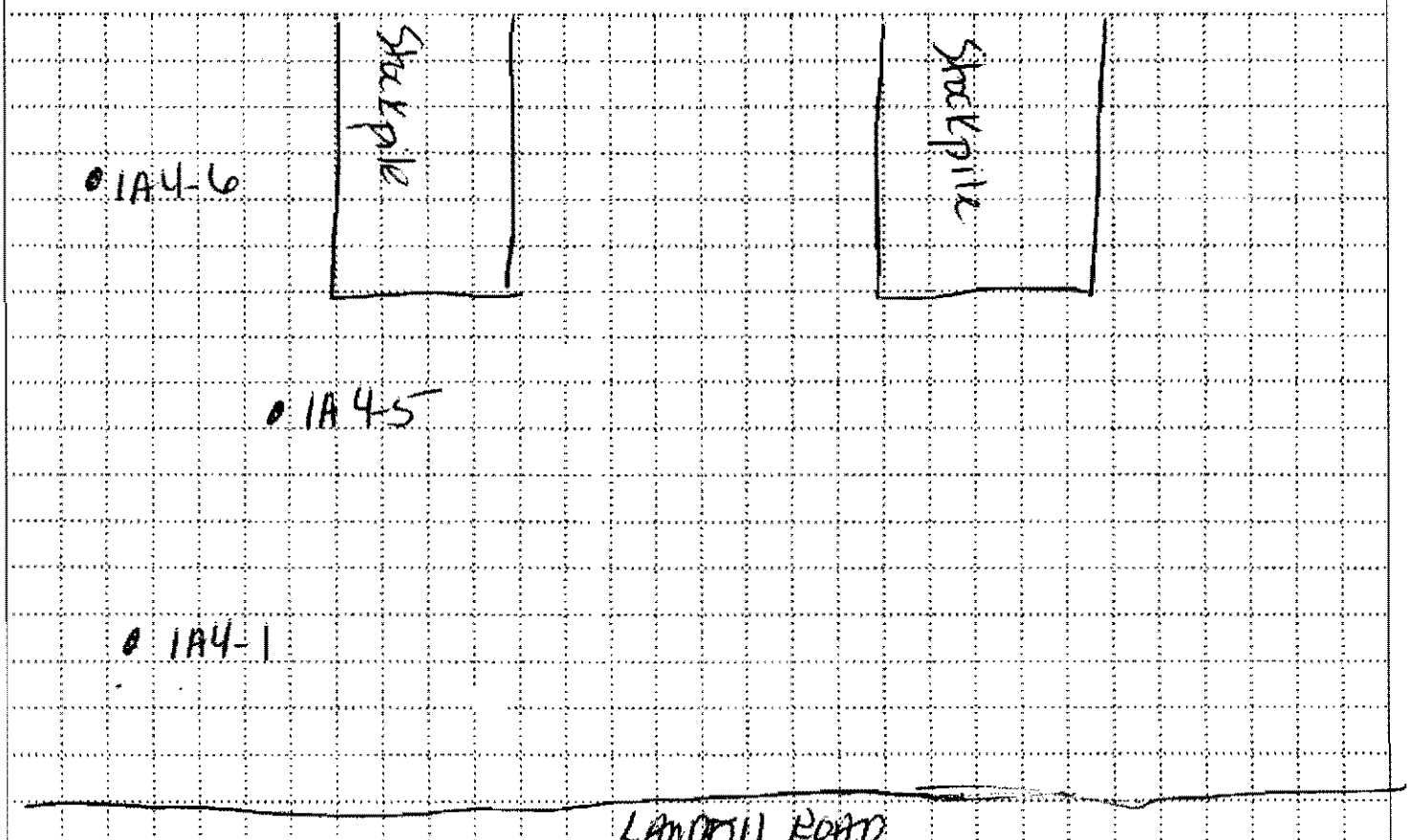
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
–	–	–	–	–	–	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIG[redacted]
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS

SCALE:



PROJECT	HOLE NO
TON LF - Buffalo DISTRICT FUSRAP PROJECT	1A4-5

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: IA4-5

PROJECT:

INSPECTOR: K Hoelscher

SHEET 2 OF 3

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e) J	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h) B/J 1min static count
	0	NO RECOVERY	NO RECOVERY		See NOTE		
	1	FILL: BLACKISH-brown clay, POCKETS OF TAN SILT, gravel (1/2"), CONCRETE, brick, WASTE(ASH), loose-stiff, moist	80	5801			TPOB" 38/5430 (.7-1.2')
	2		100	4415			HYAN J 52/5480 (1.2-2.2')
	3		80	5520			
	4		110	5563			
Recovery 51"	5		160	5033			HYAN B 58/5355 (4-5')
	6		80	5688			
	7		120	5725			
	8		80	5929			
	9		100	5425			Native Sub 67/5384 (8-9')
Recovery 60"	10		80	6027			Saturated Sub 54/5800 (9-10')

PROJECT: TON LANDFILL-BUFFALO DISTRICT FUSRAP Project

HOLE NO. IA4-5

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER 1A4-5

PROJECT

INSPECTOR K Hoelscher

SHEET 3 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
	10				SEE NOTES		
	11	NO Recovery	NO Recovery				
	12	Fill: Redish-brown clay, pockets of tan silt, gravel (<½"), waste (ash), wood, moist, soft	130	6262			
	13		80	6289			
	14						
	15		100	5947			
	16	NO Recovery	NO Recovery				
	17	Fill: Redish-brown clay, gravel (<1½"), wood, waste (glass + plastic), soft, moist	80	5824			
	18		100	6290			
	19		60	5528			
	20		80	6097			

PROJECT Refusal @ 20.0'

HOLE NO 1A4-5

ENG FORM 5056A-R, AUG 94

NOTES:
- weather - sunny, 33°F
- Gamma Readings: count/min
- PID reading: 0ppm
* Refusal met @ 1st Attempt @ 22.0'
Refusal encountered @ 20.0', see notes above.

Sample ID
TLS-SS-1A4-5 (1.7-2.2') 030310 Tube
TLS-SB-1A4-5 (1.2-2.2') 030310 High
TLS-SB-1A4-5 (4-5') 030310 High B
TLS-SB-1A4-5 (8-9') 030310 native substrate picked by HP
TLS-SB-1A4-5 (9-10') 030310 SATURATED substrate picked by HP

HTRW DRILLING LOG

DISTRICT	Buffalo
HOLE NUMBER	1A4.6
1. COMPANY NAME	ENSOL, INC.
2. DRILLING CONTRACTOR	ZEBRA ENVIRONMENTAL CORP.
SHEET / SHEETS	1 OF 3
3. PROJECT	TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT
4. LOCATION	TONAWANDA LF, TONAWANDA, NY
5. NAME OF DRILLER	Jeff SNYDER
6. MANUFACTURER'S DESIGNATION OF DRILL	6620 OT GEOPROBE
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE
8. HOLE LOCATION	N = 1092952.13 E = 1066210.59
9. SURFACE ELEVATION	643.468
10. DATE STARTED	3/4/10 0845
11. DATE COMPLETED	3/4/10 0940
12. OVERBURDEN THICKNESS	NATIVE NOT ENCOUNTERED (18.0' REFUSAL)
15. DEPTH GROUNDWATER ENCOUNTERED	NOT ENCOUNTERED
13. DEPTH DRILLED INTO ROCK	N/A
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	N/A
14. TOTAL DEPTH OF HOLE	18.0' (REFUSAL)
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	N/A

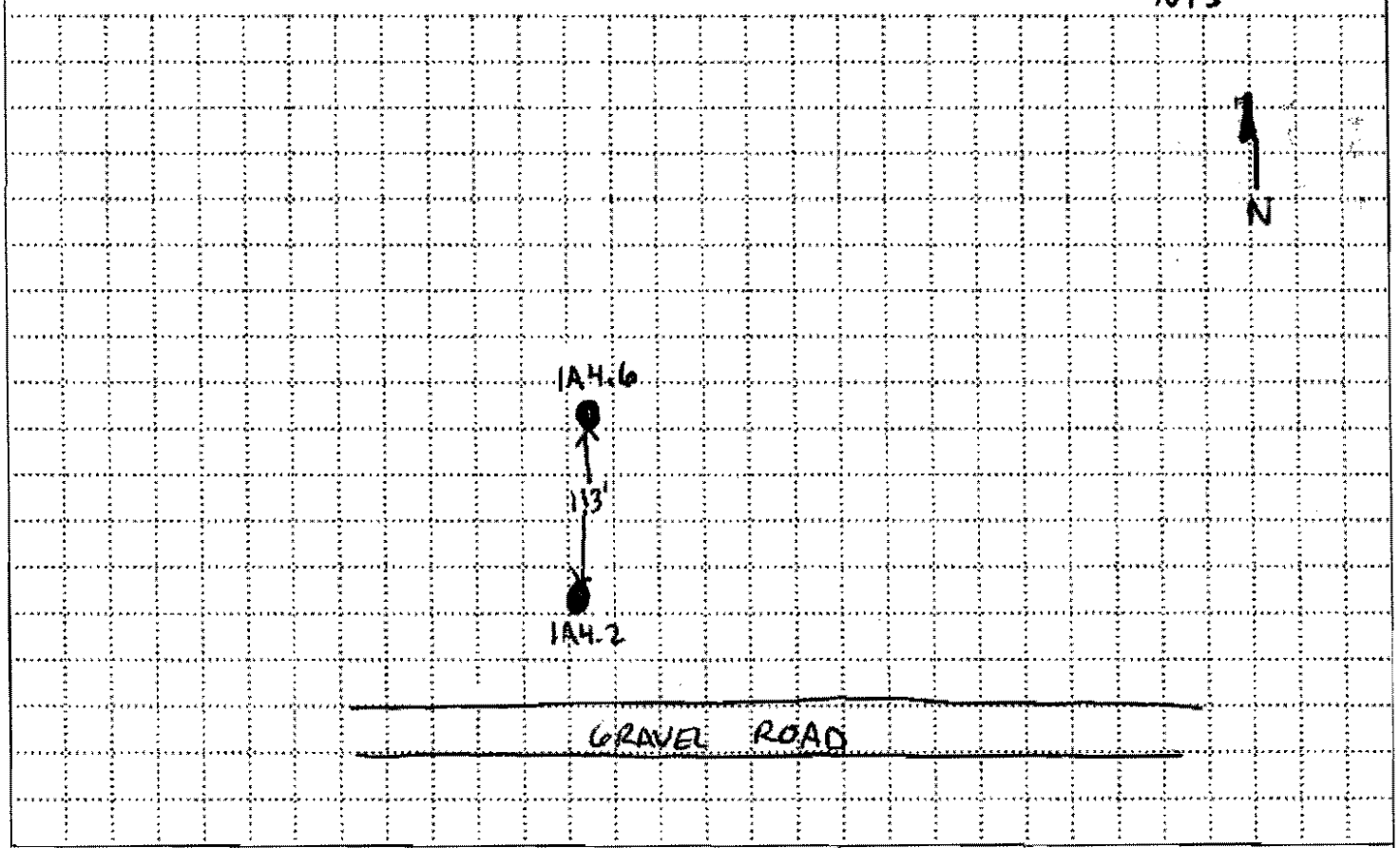
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP / TOTALS	TCLP / TOTALS	SVOC-TCLP / TOTALS	PEST-TCLP / TOTALS	PCB-TOTALS	N/A

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. [redacted]
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS

SCALE: NTS



PROJECT TON LF- Buffalo DISTRICT FUSRAP PROJECT

HOLE NO 1A4.6

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR: D. Poff

HOLE NUMBER: 1A4.6

SHEET 2 OF 3

RECO ~~PEN~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMAINING~~ COUNTS (h) X	B
	0	FILL: DARK-BROWN CLAY, GRAVEL, BRICK, WOOD, ASPHALT, STIFF, MOIST.	5138	40		TOP 6"	4937	53
	1		5503	80				
	2		5308	70	SEE NOTES			
	3		4652	100				
	4		5325	70				
60"	5		5045	80				
	6	NO RECOVERY						
	7	FILL: REDDISH-BROWN CLAY, GRAVEL, BRICK, WASTE (PLASTIC), MED. STIFF, MOIST.	4659	90				
	8							
	9		5609	60		SAT. (2nd HIGH X)	5111	79
35"	10		4798	100				

PROJECT

HOLE NO 1A4.6

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR: D. Popp

HOLE NUMBER: 1A4.6

SHEET 3 OF 3

RECO ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN STATIC ~~REMARKS~~ COUNTS (h)	
	10							
	11	NO RECOVERY →						
	12							
	13	FILL: REDDISH-BROWN CLAY, GRAVEL, MED. STIFF, MOIST.	X 4543	B 70				
	14		5010	60	SEE NOTES			
25"	15		5048	50				
	16	FILL: REDDISH-BROWN CLAY, GRAVEL, BRICK, WOOD, STIFF, MOIST.	6523	40		HIGH X	X 4842	B 76
	17		6013	80		CHEM.	4848	79
36"	18		6537	110		HIGH B	4834	45
	19	BOTTOM of BORING AT 18.0' (REFUSAL)						
	20							

NOTES:
- CLEAR, 30°F
- SAMPLE I.D.
  TLS-SS-1A4.6(0.0-0.5)030410
  TLS-SB-1A4.6(8.0-9.0)030410
  TLS-SB-1A4.6(15.0-16.0)030410
  TLS-SB-1A4.6(16.0-17.0)030410
  TLS-SB-1A4.6(17.0-18.0)030410
- MOVED 1 M W of ORIGINAL LOCATION
- PID READINGS = 0 ppm (VOC's)
- SOIL READINGS ARE COUNTS/MIN.

PROJECT

HOLE NO 1A4.6

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

DISTRICT	Buffalo
HOLE NUMBER	1A4-7
1. COMPANY NAME	ENSOL, INC.
2. DRILLING CONTRACTOR	ZEBRA ENVIRONMENTAL CORP.
SHEET / SHEETS	1 OF 5
3. PROJECT	TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT
4. LOCATION	TONAWANDA LF, TONAWANDA, NY
5. NAME OF DRILLER	Phil Orsi
6. MANUFACTURER'S DESIGNATION OF DRILL	Geoprobe 7720DT
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE
8. HOLE LOCATION	N 1093054.43 E 1066517.48
9. SURFACE ELEVATION	3
10. DATE STARTED	3-1-10 8:35am
11. DATE COMPLETED	3-1-10 11:40am
12. OVERBURDEN THICKNESS	34.0'
15. DEPTH GROUNDWATER ENCOUNTERED	NOT ENCOUNTERED
13. DEPTH DRILLED INTO ROCK	N/A
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	N/A
14. TOTAL DEPTH OF HOLE	34.0'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	N/A

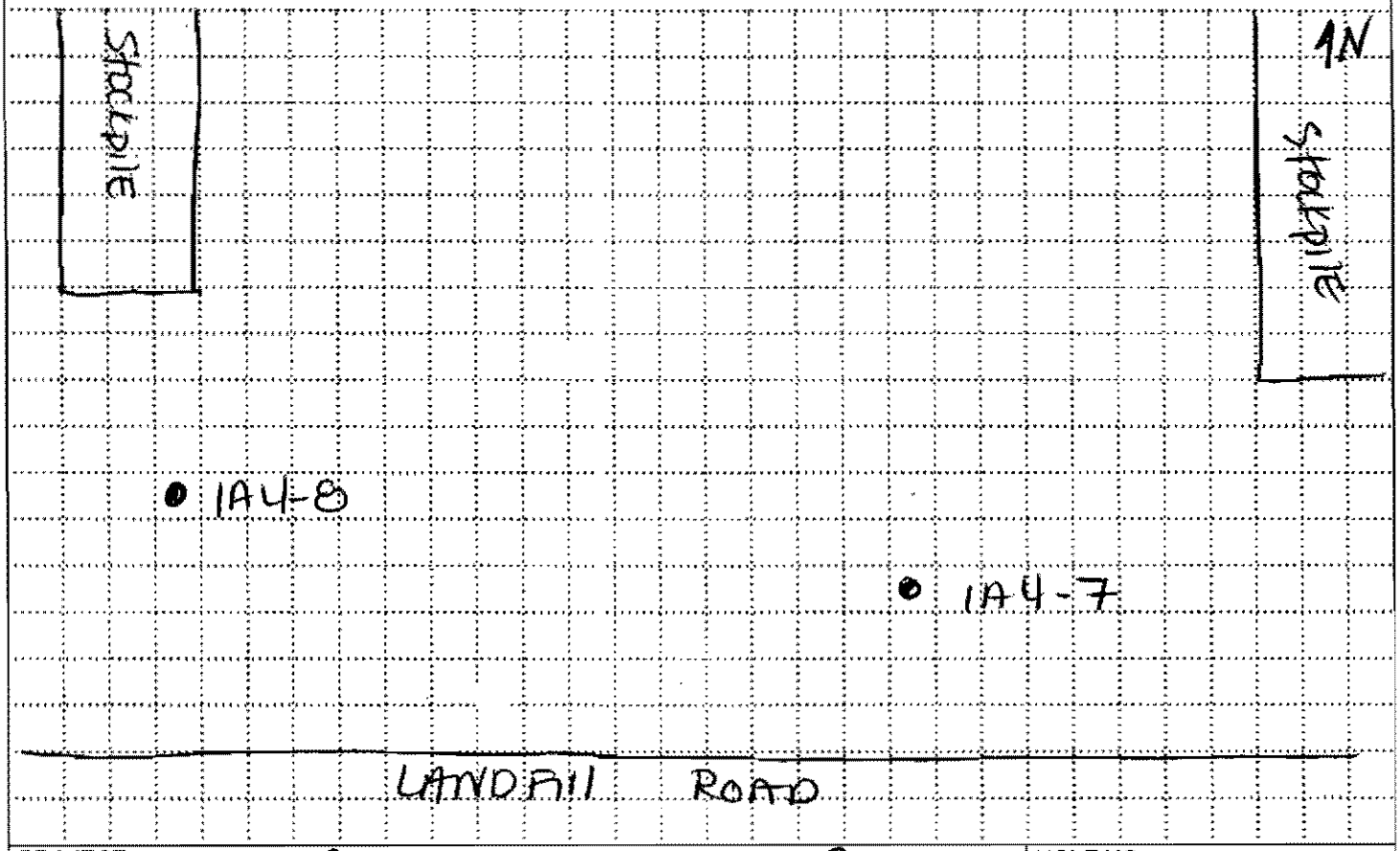
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
–	–	–	–	–	–	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)
CUTTINGS DRUMMED	–	–	–

LOCATION SKETCH/COMMENTS

SCALE:



PROJECT TON LF- Buffalo DISTRICT FUSRAP PROJECT

HOLE NO. 1A4-7

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR K Hoelscher

HOLE NUMBER IA4-7

SHEET 2 OF 5 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS B	GEOTECH SAMPLE OR CORE BOX NO.	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B/J 1 min static count
	0	NO RECOVERY	NO RECOVERY		SEE NOTES		
	1	FILL: Silt, sand, some clay, gravel (<1"), waste, wood, glass, stiff, moist	120	7200			Top 6" 78/6818
	2		140	7167			Hyn B 79/6753 (1.3-2.3')
							Native Sub (2.3-3.3') 65/6787
	3		80	7398			Saturated Sub (3.3-4.3') 71/6718
	4						
	5		60	7645			
		NO RECOVERY	NO RECOVERY				
	6	FILL: SAME AS ABOVE	80	7577			
	7		60	7736			
	8		80	7247			
	9		80	7740			
	10						

PROJECT

HOLE NO. IA4-7

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR K Hoelscher

HOLE NUMBER 1A4-7

SHEET 3 OF 5

REMARKS 8/8 1 min. static cont

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) 13	GEOTECH SAMPLE OR CORE BOX NO. (e) 8	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)
	10	NO RECOVERY	NO RECOVERY		SEE NOTES	
	11					
	12	Fill: Sand, silt, some glass, fine sand, loose, moist	100	8011		
	13		120	7650		
	14		100	7849		
	15		140	8272		
		NO RECOVERY	NO RECOVERY			
	16	Fill: SAME AS ABOVE	60	7262		
	17	Fill: Reddish-brown clay, silt, sand, waste, wood, some gravel (<1"), moist, stiff	80	7463		
	18		120	7005		
	19		120	7687		
	20		80	7442		

PROJECT

HOLE NO. 1A4-7

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR: Y Hoelscher

HOLE NUMBER: 1A4-7

SHEET 4 OF 5 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e) δ	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B/δ (min. static depth)
	20	NO RECOVERY	NO RECOVERY		SEE NOTES		
	21	Fill: continued from previous page	60	7688			
	22		160	7256			
	23		80	6870			
	24		100	8395			High δ 65 (24-25') / 6834
	25	NO RECOVERY	NO RECOVERY				
	26						
	27						
		Fill: SAME AS Above					
	28	Fill: SAND, gravel (4"), silt, sandy clay, waste (glass, wood, plastic + plaster), very loose, moist-dry	100	7097			
	29		100	7238			
	30						

PROJECT

HOLE NO. 1A4-7

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT	INSPECTOR	HOLE NUMBER	SHEET / SHEETS
	L Heelscher	1A4-7	5 OF 5

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B/g 1m N. static count
	30				SEE NOTES		
	31	NO RECOVERY	NO RECOVERY				
	32						
	33						
	34	REFUSAL @ 34.0'					
	35	NOTES:					
	36	WEATHER: OVERCAST, 30°F -GAMMA COUNTS/min -PID READINGS: 0ppm					
	37	SAMPLE I.D. (RAD. ANALYSIS) TLS-SS-1A4-7 (.5-1.3') 031010 TLS-SB-1A4-7 (1.3-2.3') 031010 TLS-SB-1A4-7 (2.3-3.3') 031010	Typical High B- NATIVE SUBSTRATE				
	38	TLS-SB-1A4-7 (3.3-4.3') 031010 TLS-SB-1A4-7 (24-25') 031010	SATURATED SUBSTRATE High B + DUPLICATE				
	39						
	40						

PROJECT	HOLE NO
	1A4-7

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

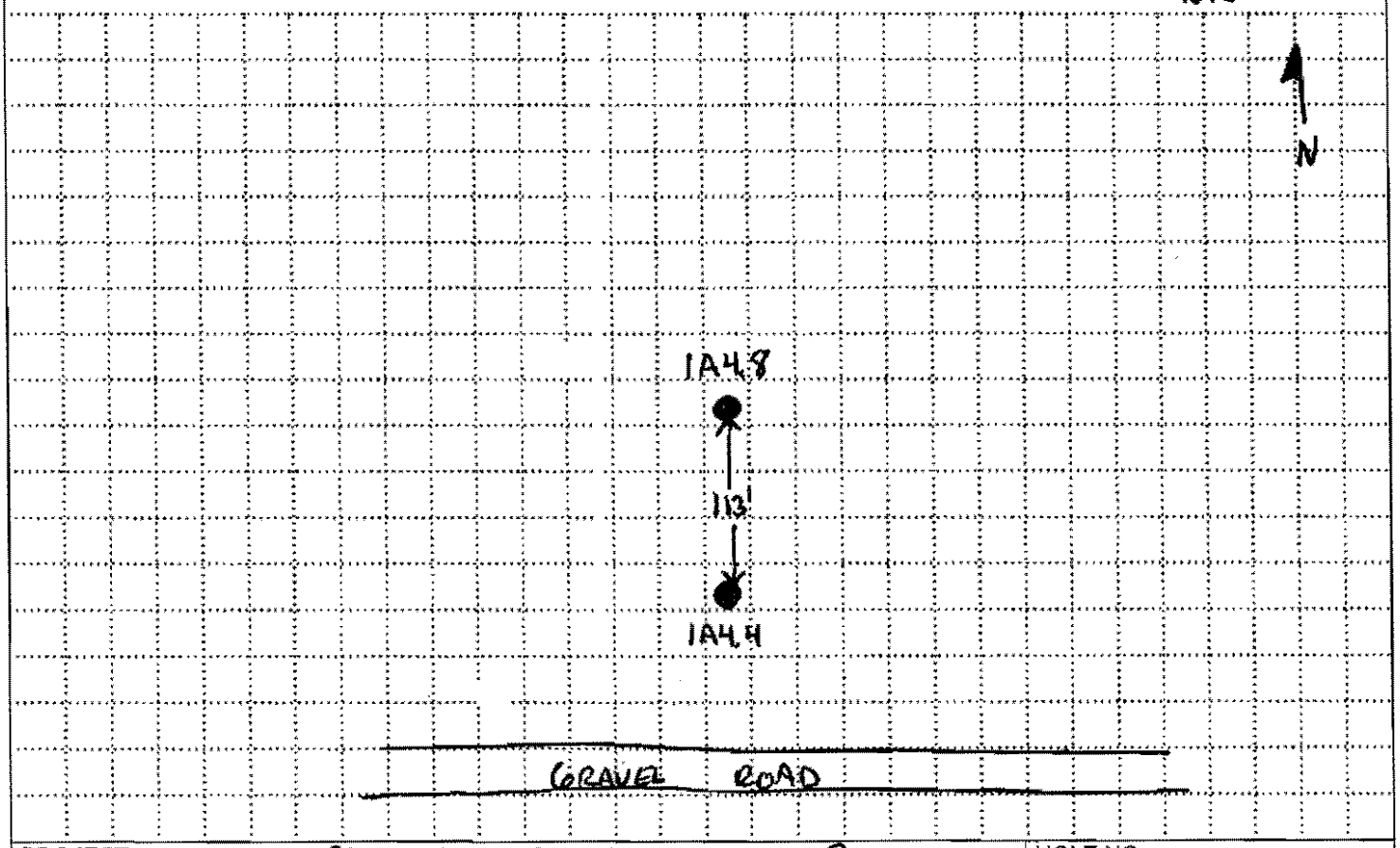
DISTRICT: Buffalo		HOLE NUMBER: 1A4.8
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 5 SHEETS
3. PROJECT: TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: JEFF SNYDER	6. MANUFACTURER'S DESIGNATION OF DRILL: 6620 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE	8. HOLE LOCATION: N= 1093017 E= 418056.5	
	9. SURFACE ELEVATION: 644.586	
	10. DATE STARTED: 3/1/10 0835	11. DATE COMPLETED: 3/1/10 1130
12. OVERBURDEN THICKNESS: 29.0'	15. DEPTH GROUNDWATER ENCOUNTERED: 26.2'	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 36.6' - REFUSAL	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP / TOTALS	TCLP / TOTALS	SVOC-TCLP / TOTALS	PEST-TCLP / TOTALS	PCB- TOTALS	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23 [redacted]
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT: TON LF- Buffalo DISTRICT FUSRAP PROJECT HOLE NO: 1A4.8

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A48

SHEET 2 OF 5

REC'O ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)	
	0	NO RECOVERY →						
	1							
	2	FILL: DARK-BROWN CLAY, GRAVEL, BRICK, CONCRETE, WASTE (PLASTIC), MED. STIFF, MOIST.	5462	40	SEE NOTES	TOP 6"	X 5443	B 63
	3		6857	90				
	4		5623	80		CHEM.	5707	77
43"	5		6525	105		HIGH X	5552	71
	6	NO RECOVERY →						
	7							
	8	FILL: DARK-BROWN CLAY, GRAVEL, SAND, BRICK, MED. STIFF, MOIST.	5797	60				
	9		5579	100				
32"	10		5540	90				

PROJECT

HOLE NO 1A4.8

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A4.8

SHEET 3 OF 5

RECIO ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING ~~RESULTS~~ (d) 8	GEOTECH SAMPLE ~~OR CORE BOX NO.~~ (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	10	NO RECOVERY →					→
	11						
	12	FILL: DARK BROWN CLAY, GRAVEL, SAND, MED. STIFF, MOIST.	5795	70			
	13		5895	50	SEE NOTES		
	14		5625	90			
44"	15		5922	40			
		NO RECOVERY →					→
	16	FILL: REDDISH-BROWN CLAY, GRAVEL, WASTE (GLASS, CLOTH, PLASTIC), MED. STIFF, MOIST.	5760	50			
	17		5619	90			
	18		5835	40			
	19		5496	70			
56"	20		5704	60			

PROJECT

HOLE NO 1A4.8

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A4.8

SHEET 4 OF 5

RECID (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN STATIC COUNTS (h) X	B
	20	NO RECOVERY →						
	21	FILL: REDDISH-BROWN CLAY, GRAVEL, WASTE (ASH), MED. STIFF, MOIST.	6005	90				
	22							
	23		6291	110				
	24		6355	80	SEE NOTES			
			6022	50				
49"	25							
	26	FILL: REDDISH-BROWN CLAY, COURSE SAND, ORGANIC MATTER (ROOTLETS), SOFT, WET.	5961	70				
	27		5895	110		SAT	5783	72
	28		5632	90				
			5677	70				
	29	REDDISH-BROWN SILT AND CLAY, TRACE COURSE SAND AND SUB-ROUND	5944	60				
60"	30					NATIVE	5613	59

PROJECT

HOLE NO 1A4.8

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. PoPP

HOLE NUMBER 1A4.8

SHEET 5 OF 5

REC'D ~~SEQ~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. ~~REMARKS~~ STATIC COUNTS (h)	
	30	FINE GRAVEL (<1½"), SOME GRAY MOTTLING AND DESSICCATION CRACKS W/ GRAY INFILLING, STIFF, MOIST. (CL)	5860	110	SEE NOTES	NATIVE (CONT.)		
	31		5909	60				
	32		5882	120		HIGH B	X 5585	B 63
	33		5784	90				
60"	34		5445	60				
	35		5665	100				
19"	36		5821	50				
	37	BOTTOM of BORING AT 36.6' (REFUSAL)						
	38	NOTES: - OVERCAST, 34°F - SAMPLE I.D. - TLS-SS-1A4.8(1.3-1.8)030110 TLS-SB-1A4.8(3.0-4.0)030110 TLS-SB-1A4.8(4.0-5.0)030110						
	39	TLS-SB-1A4.8(26.2-27.2)030110 TLS-SB-1A4.8(29.6-30.6)030110 TLS-SB-1A4.8(32.0-33.0)030110 - PID READINGS = 0ppm (VOC's)						
	40							

PROJECT - SOIL READINGS ARE COUNTS/MIN.

HOLE NO 1A4.8

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

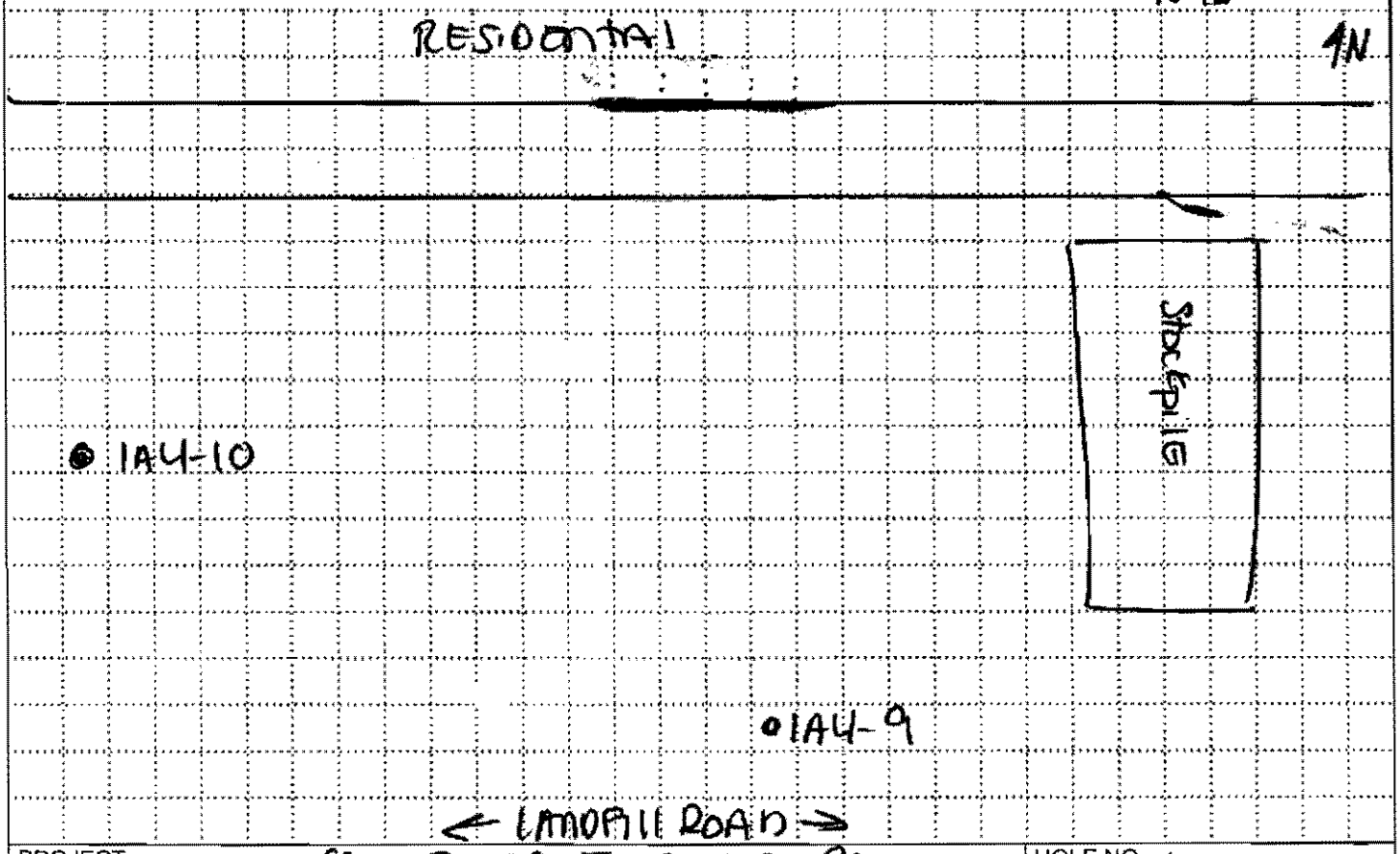
DISTRICT: Buffalo	HOLE NUMBER: 1A4-9	
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 4 SHEETS
3. PROJECT: TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: Phil Orsi	6. MANUFACTURER'S DESIGNATION OF DRILL: Geoprobe 7720DT	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE	8. HOLE LOCATION: N 1093018 E 417954.5	
	9. SURFACE ELEVATION: 641.847	
	10. DATE STARTED: 3/3/10 11:11am	11. DATE COMPLETED: 3/3/10 12:30pm
12. OVERBURDEN THICKNESS: 27.0'	15. DEPTH GROUNDWATER ENCOUNTERED: NOT ENCOUNTERED	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 27.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
–	–	–	–	–	–	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
CUTTINGS DRUMMED	–	–	–	[redacted]

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON LF - Buffalo DISTRICT FUSRAP PROJECT — HOLE NO. 1A4-9

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR K Hoelscher

HOLE NUMBER 1A4-9

SHEET 2 OF 4 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e) 12	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B/J
	0	NO RECOVERY	NO RECOVERY		See note		1 min static count
	1	Fill: DARK brown clay, brick, CONCRETE, gravel (<1"), WASTE (ASH), STIFF, MOIST	60	7756			Top 6" (.7-.8') 41/6983
			60	7395			
	2		80	7830			Native Sub. (1.8-2.8') 63/7220
	3		60	7938			Saturated Sub. (2.8-3.8') 84/7199
Recovery 58"	4		120	7770			
	5	NO RECOVERY	NO RECOVERY				
	6						
	7	Fill: Reddish-brown clay, CONCRETE, WASTE (ASH, ASPHALT), gravel (<1"), STIFF, MOIST	120	7917			
	8		100	8012			
	9		110	8130			High γ 71/7175 Duplicate (9-10')
Recovery 45"	10						

PROJECT

HOLE NO. 1A4-9

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER 1H4-9

PROJECT

INSPECTOR K Hoelscher

SHEET 3 OF 4

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h) 3b 1 min static count
	10	NO RECOVERY	NO RECOVERY		SEE NOTES		
	11	Fill: REDISH-brown clay, CONCRETE, WASTE (ASH), SOFT, MOIST	100	8072			
	12		100	7745			
	13		80	7837			
	14		80	7695			
	15		60	7172			
		NO RECOVERY	NO RECOVERY				
	16	Fill: DARK-brown clay, WOOD, WASTE (ASH, GLASS), gravel (2"), STIFF, MOIST	140	7539			
	17		120	7672			
	18		140	7608			HighB 60/7183 (17.3-18.3')
	19		100	7462			
	20		80	7468			

PROJECT

HOLE NO. 1H4-9

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: 1A49

PROJECT:

INSPECTOR: K Hoelscher

SHEET 4 OF 4 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e) J	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B J 1 min static count
	20	NO RECOVERY	NO RECOVERY			See NOTES	
	21						
	22						
	23	FILL: LOOSE, WASTE (ASH, GLASS + plastic), LOOSE, MOIST	100	8103			
	24						
	25		100	7864			
	26	NO RECOVERY	NO RECOVERY				
	27	REFUSAL @ 27.0'					
	28	NOTES -weather: OVERCAST, 32°F -GAMMA READING: 0 counts/min -PID READINGS 0 ppm Sample ID (RAD ANALYSIS)					
	29	TLJ-SS-1A49 (.2-.8') 030310 TLJ-SB 1A49 (9-10') 030310 TLJ-SB 1A49 (17.3-18.3') 030310 TLJ-SB 1A49 (1.8-2.8') 030310 TLJ-SB 1A49 (2.8-3.8') 030310	Topsoil High B - Duplicate High B Native Soil SATURATED SOIL				
	30	- REFUSAL encountered @ 22.0' @ 1st Attempt.					

PROJECT:

HOLE NO. 1A49

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

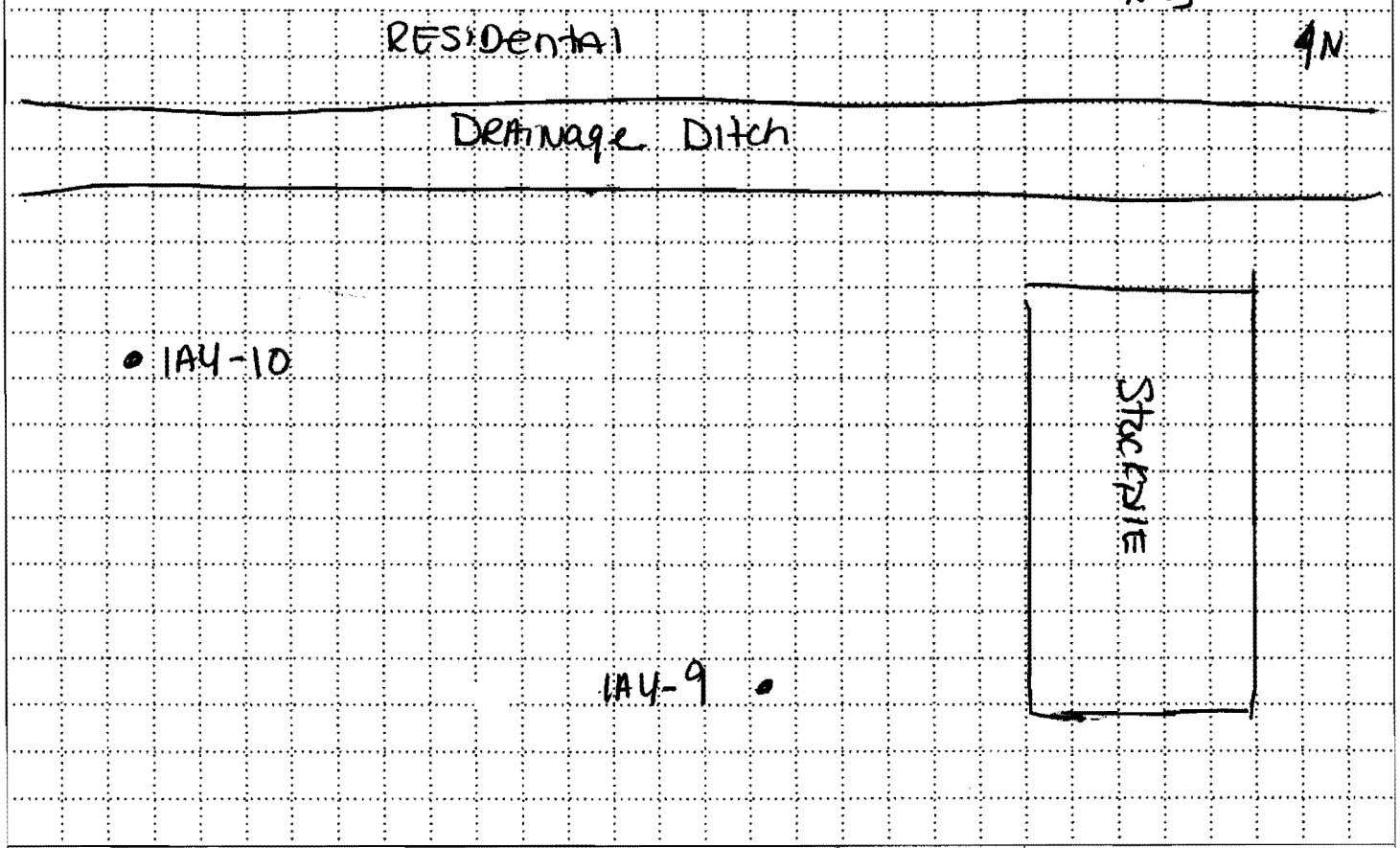
DISTRICT	Buffalo
HOLE NUMBER	1A4-10
1. COMPANY NAME	ENSOL, INC.
2. DRILLING CONTRACTOR	ZEBRA ENVIRONMENTAL CORP.
SHEET / SHEETS	1 OF 4
3. PROJECT	TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT
4. LOCATION	TONAWANDA LF, TONAWANDA, NY
5. NAME OF DRILLER	Phil Orsi
6. MANUFACTURER'S DESIGNATION OF DRILL	Geoprobe 7720DT
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE
8. HOLE LOCATION	N 1093018 E 4178517
9. SURFACE ELEVATION	639.6
10. DATE STARTED	3/3/10 855 Am
11. DATE COMPLETED	3/3/10 950 Am
12. OVERBURDEN THICKNESS	21.0'
15. DEPTH GROUNDWATER ENCOUNTERED	NOT ENCOUNTERED
13. DEPTH DRILLED INTO ROCK	N/A
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	N/A
14. TOTAL DEPTH OF HOLE	21.0'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	N/A

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP Total	TCLP Total	SVOC TCLP	PEST Total	PCB Total	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)
CUTTINGS DRUMMED	—	—	—

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT	TON LF- Buffalo DISTRICT FUSRAP PROJECT
HOLE NO	1A4-10

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: 1AU-10

PROJECT:

INSPECTOR: K Hoelscher

SHEET 2 OF 4

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) 1B	GEOTECH SAMPLE OR CORE BOX NO. (e) 2	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS 3/2 1min static count
	0	NO RECOVERY	NO RECOVERY		See Notes		
	1	Fill: brownish clay, SAND, gravel (<1"), brick, concrete, waste (ash), moist, firm	120	6343			Top 6" (.6-1.1') 53/5999
	2		60	6520			
	3		140	6575			High B (2-3') 58/6090
	4		100	6112			Native Sub. (3-4') 75/6235
Recovery 51"	5		100	6478			Saturated Sub. (4-5') 82/5995
	6	NO RECOVERY	NO RECOVERY				
	7						
	8	Fill: Brownish clay, gravel (<2"), SAND, waste (ash), wet, soft	90	7218			High J (7.5-8.5') 56/6377
	9		60	6549			Chemical (8.8-9.8') 60/6096
Recovery 25"	10						

PROJECT:

HOLE NO. 1AU10

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: 1A4-10

PROJECT:

INSPECTOR: K Hoelscher

SHEET 3 OF 4

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) 1B	GEOTECH SAMPLE OR CORE BOX NO. (e) 1J	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h) 3/J 1mm-static count
	10	NO RECOVERY	NO RECOVERY		SEE NOTES		
	11						
	12						
	13	FILL: DARK-brown clay gravel (<2"), brick, wood, WASTE (ASH), LOOT, SOFT	140	6343			
	14		110	6305			
Recovery 23"	15		120	5609			
	16	NO RECOVERY	NO RECOVERY				
	17						
	18						
	19						
Recovery 11"	20	FILL: Clay WASTE (ASH, ASPHALT), DRY, LOOSE	80	6405			

PROJECT: HOLE NO:

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: 1A4-10

PROJECT:

INSPECTOR: K Hoelscher

SHEET 4 OF 4

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e) γ	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h) B/γ 1 min. static count
Recovery 12"	20	Fill: Brown clay, WASTE (ASH, Asphalt), Dry, loose	120	6548	SEE NOTES		
	21	REFUSAL @ 21.0'					
	22	NOTES:					
		-weather: Sunny, 32°F					
		-Gamma Readings: count/min					
	23	-PID Readings: 0ppm					
		-Refusal encountered at 16.0' during 1st Attempt, Refusal encountered at 21.0' during 2nd attempt.					
	24	Sample I.D. (Rad. Analysis)					
		TLS-SS-1A4-10(.6-1.1')030310	Top 6"				
		TLS SB-1A4-10 (3-4')030310	Native Subsitute				
	25	TLS-SB-1A4-10 (4-5')030310	Saturated Sub.				
		TLS-SB-1A4-10 (2-3')030310	High B				
		TLS-SB-1A4-10 (7.5-8.5')030310	High γ				
		TLS-SB-1A4-10 (8.8-9.8')030310	Chemical				
	26						
	27						
	28						
	29						
	30						

PROJECT:

HOLE NO. 1A4-10

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

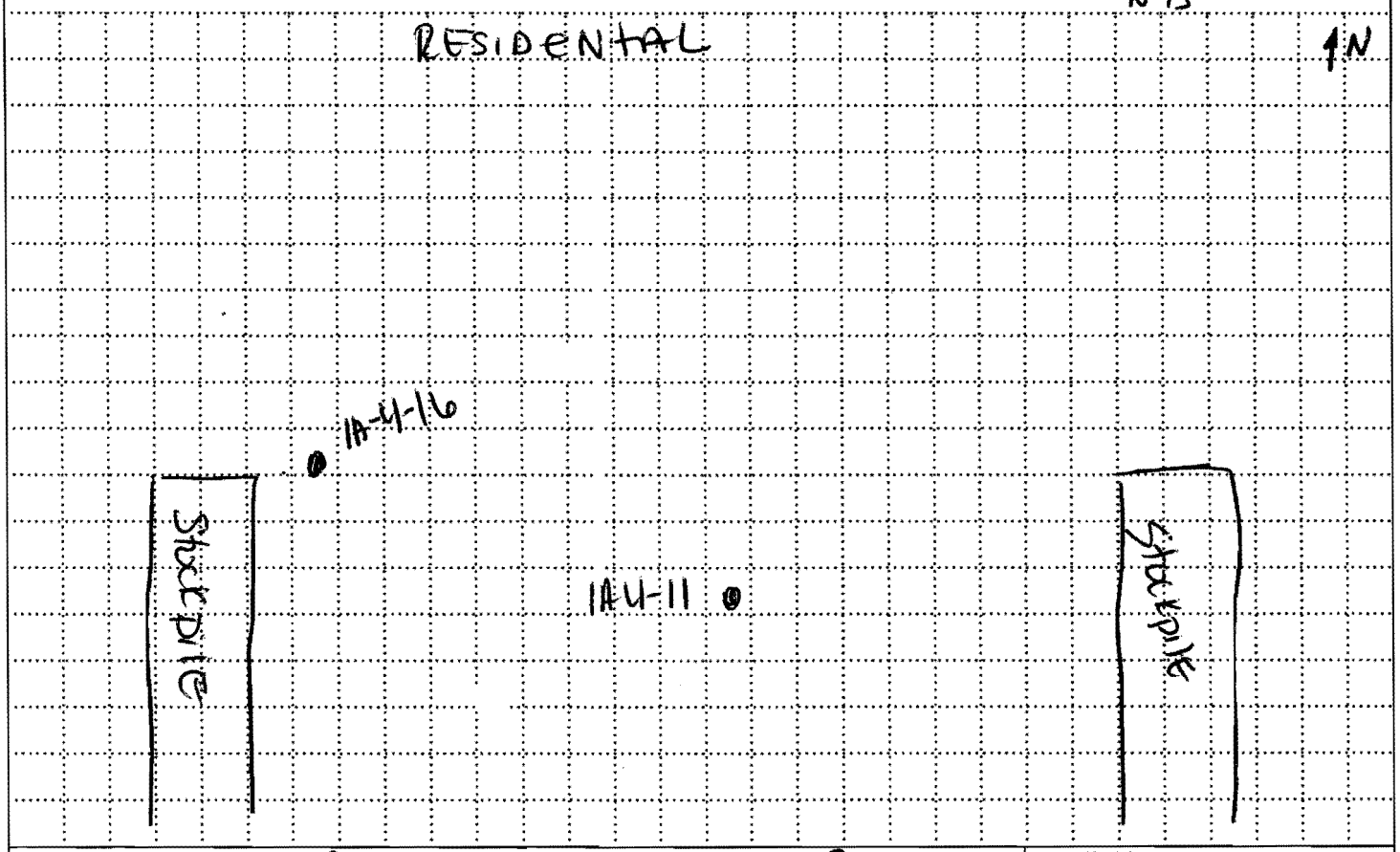
DISTRICT	Buffalo
HOLE NUMBER	1A-4-11
1. COMPANY NAME	ENSOL, INC.
2. DRILLING CONTRACTOR	ZEBRA ENVIRONMENTAL CORP.
SHEET / SHEETS	1 OF 4
3. PROJECT	TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT
4. LOCATION	TONAWANDA LF, TONAWANDA, NY
5. NAME OF DRILLER	Phil ORSi
6. MANUFACTURER'S DESIGNATION OF DRILL	Geoprobe 7720DT
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	3 1/4" CASING 2" CORE W/ 5' PLASTIC SLEEVE
8. HOLE LOCATION	N 1093120 E 418158.8
9. SURFACE ELEVATION	641.208
10. DATE STARTED	2-26-10 2:30pm
11. DATE COMPLETED	2-26-10 4:20pm
12. OVERBURDEN THICKNESS	26.0'
15. DEPTH GROUNDWATER ENCOUNTERED	NOT ENCOUNTERED
13. DEPTH DRILLED INTO ROCK	N/A
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	N/A
14. TOTAL DEPTH OF HOLE	30.0'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	N/A

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP TOTAL	TCLP TOTAL	SVOC TCLP TOTAL	PEST. TOTAL	PCB TOTAL	N/A

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23 [redacted]
CUTTINGS DRUMMED	—	—	—	

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT	HOLE NO.
TON LF- Buffalo DISTRICT FUSRAP PROJECT	1A4-11

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER 1A4-11

PROJECT

INSPECTOR K Hoelscher

SHEET 2 OF 4 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B/J 1 min static count
	0	NO RECOVERY	NO RECOVERY		SEE NOTES		
	1	Fill: sand, silt, some clay, sub-rounded gravel, brick, moist, stiff	100	6652			Top 6" 66/5951 (8-1-39)
	2		80	6389			
	3	Fill: concrete, loose, dry	60	6397			
	4	Fill: silt, sand, gravel, brick, loose, moist	80	6384			
	5	NO RECOVERY	NO RECOVERY				
	6	Fill: tan-gray silt, sand, gravel, brick, waste (plastic) some clay, moist, loose	100	6433			
	7		60	6456			
	8		60	6367			
	9		80	6095			
	10						

PROJECT

HOLE NO. 1A-4-11

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: 1A4-11

PROJECT:

INSPECTOR: K Hoelscher

SHEET 3 OF 4 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) PB	GEOTECH SAMPLE OR CORE BOX NO. (e) γ	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B/γ 1 min headspace count
	10	NO RECOVERY	NO RECOVERY		See NOTES		
	11						
	12	Fill: Continue from previous page w/wood	80	6472			
	13	Fill: DARK-brown clay, silt, sand, waste (plastic), wood, gravel (<2"), moist, stiff	100	6580			High γ 68/6043 (12.2-13.2')
	14		100	6481			chemical 60/6238 (13.2-14.2')
	15		80	6216			
	16	NO RECOVERY	NO RECOVERY				
	17	Fill: Same as above	80	6079			
	18		60	6428			
	19		100	6563			
	20		100	6250			

PROJECT

HOLE NO. 1A4-11

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: 1A4-11

PROJECT:

INSPECTOR: K Hoelscher

SHEET 4 OF 4 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e) γ	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B/γ 1min static count
	20				See NOTES		
	21	NO RECOVERY	NO RECOVERY				
	22						
	23						
	24						
	25	FILL: continue from previous page	80	6156			
	26	Reddish-brown Clay, silt, gray mottling, fine sand, moist, stiff (CL)	80	5965			
	27		60	5999			Native (26-27') 62/6351
	28		100	6311			Saturated Sub (27-28') 60/6122
	29		100	6291			
	30		120	6330			High B (29-30.0') 72/5960

PROJECT: Bottom of Boring @ 30.0'

HOLE NO: 1A4-11

ENG FORM 5056A-R, AUG 94

NOTES:
- Weather: Overcast, 25°F
- PID Reading: 0ppm
- Gamma Reading: count/min.

SAMPLE I.D. (RAD. ANALYSIS)
TLS-SS-1A4-11 (.8-1.3') 022610 Top6"
TLS-SB-1A4-11 (26.0-27.0') 022610 Native
TLS-SB-1A4-11 (12.2-13.2') 022610 High γ
TLS-SB-1A4-11 (27.0-28.0') 022610 Saturated Sub (picked by H.P)
TLS-SB-1A4-11 (29.0-30.0') 022610 High B
TLS-SB-1A4-11 (13.2-14.2') 022610 Chemical

Corehole IA4-12

Corehole IA4-12 was omitted due to the town's current contractor placing a large pile of fresh soil at this location. With the USACE's concurrence, the hole was not drilled.

HTRW DRILLING LOG

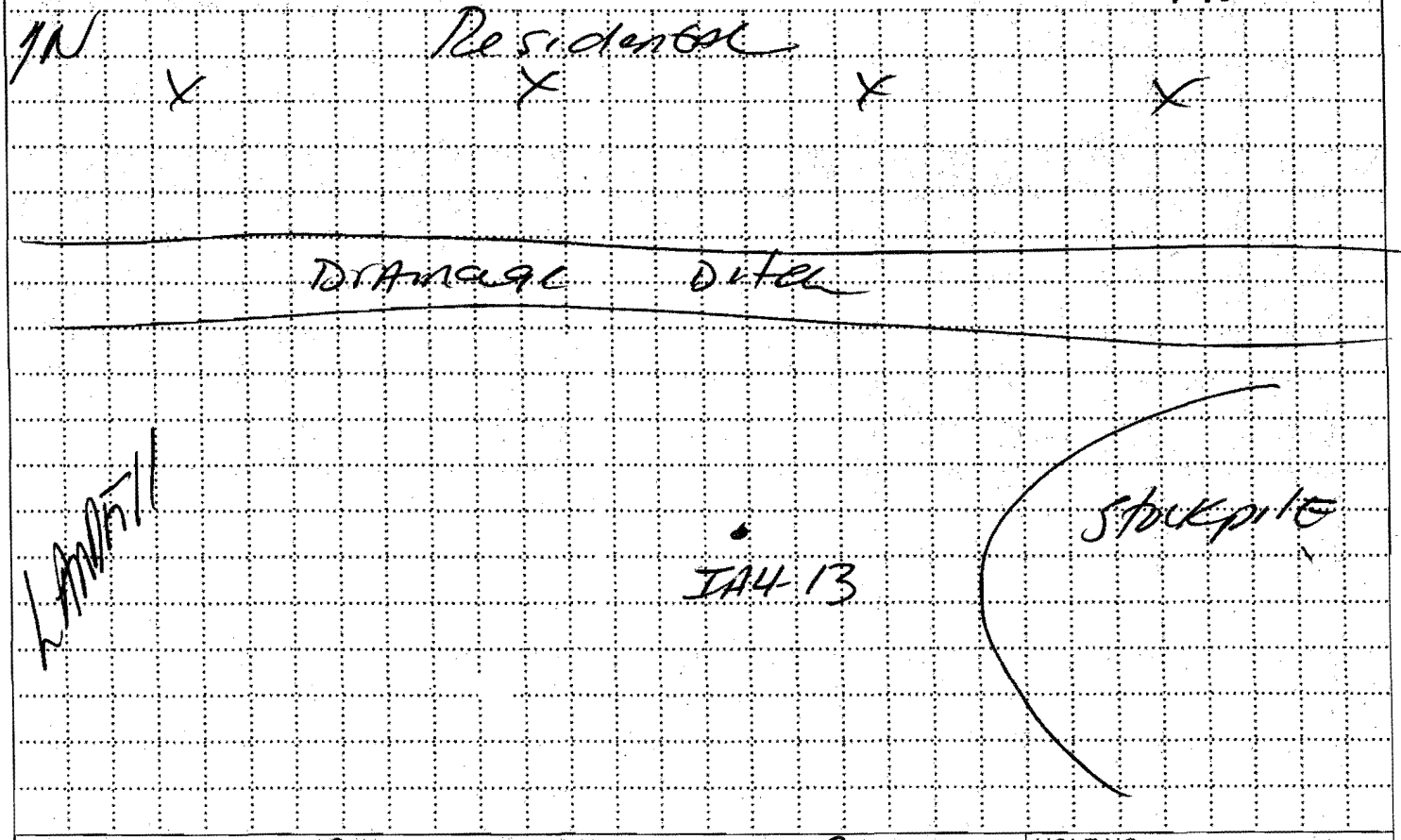
DISTRICT: Buffalo	HOLE NUMBER: IA4-13	
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF SHEETS
3. PROJECT: TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: Joe Hutchision	6. MANUFACTURER'S DESIGNATION OF DRILL: 6620 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE	8. HOLE LOCATION: N= 1093156.72 E= 1066312.89	
	9. SURFACE ELEVATION: N/A	
	10. DATE STARTED: 3/30/10 1120am	11. DATE COMPLETED: 3/30/10 120pm
12. OVERBURDEN THICKNESS: NOT ENCOUNTERED	15. DEPTH GROUNDWATER ENCOUNTERED: NOT ENCOUNTERED	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 16.8'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP / TOTALS	TCLP / TOTALS	SVOC-TCLP / TOTALS	PEST-TCLP / TOTALS	PCB- TOTALS	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	2[redacted]
CUTTINGS DRUMMED	-	-	-	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON LF- Buffalo DISTRICT FUSRAP PROJECT — HOLE NO: IA4-13

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER IA4-13

SHEET 2 OF

RECID ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) 8	OR CORE BOX NO. (e) B	SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h)
	0	NO Recovery	NO Recovery		SEE NOTE		
	1	Fill: Redish brown clay, CONCRETE, brick, Asphalt, SHFF, moist	100	8125			Typ 6'1 66 (7-13') 7805
	2		100	8311			
	3		80	7815			
	4		80	8272			
42"	5		100	8600			
	6	NO Recovery	NO Recovery				
	7	Fill: Redish brown clay, CONCRETE, brick, Asphalt, SHFF, moist	140	8423			High B 54 (6.4-7.4) 7953
	8		140	8658			2nd High 83 (7.4-8.4) 7892
	9		120	8327			
46"	10		100.	8801			High 69 (9-10) 7892

PROJECT

HOLE NO IA1-13

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER JA4-13

SHEET 3 OF 3

REC'D ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	10	NO Recovery	NO Recovery		See NOTES		
	11						
	12						
	13	Fill Redish brown clay, concrete, brick, stuff, moist	100	8417			
	14						2NI Hgnb 50/8229 (14.15')
30"	15		120	8540			
	16	Fill sand, silt, clay, brick, concrete, plastic, loose + mud stuff, moist	80	7690			
			90	8238			
	17	Refusal @ 16.8'					
	18	NOTES Refusal encountered @ 18.0' during 1st attempt, 16.8' @ second attempt, see notes above. Weather sunny 40F Gamma count/min DH reading ppm Sample ID (lead analysis) TLS-SS-JA4-13 (1.7-1.3') 033010 Tcp6 or TLS-SB-JA4-13 (7.4-8.4) 033010 2B Hgnb ~~TLS-SB-JA4-13 (6.4-7.4) 033010 Hgnb~~ TLS-SB-JA4-13 (9-10) 033010 Hgnb TLS-SB-JA4-13 (14-15) 033010 2NI Hgnb					
26"	20						

PROJECT

HOLE NO JA4-13

ENG FORM 5056A, 1 AUG 84

HTRW DRILLING LOG

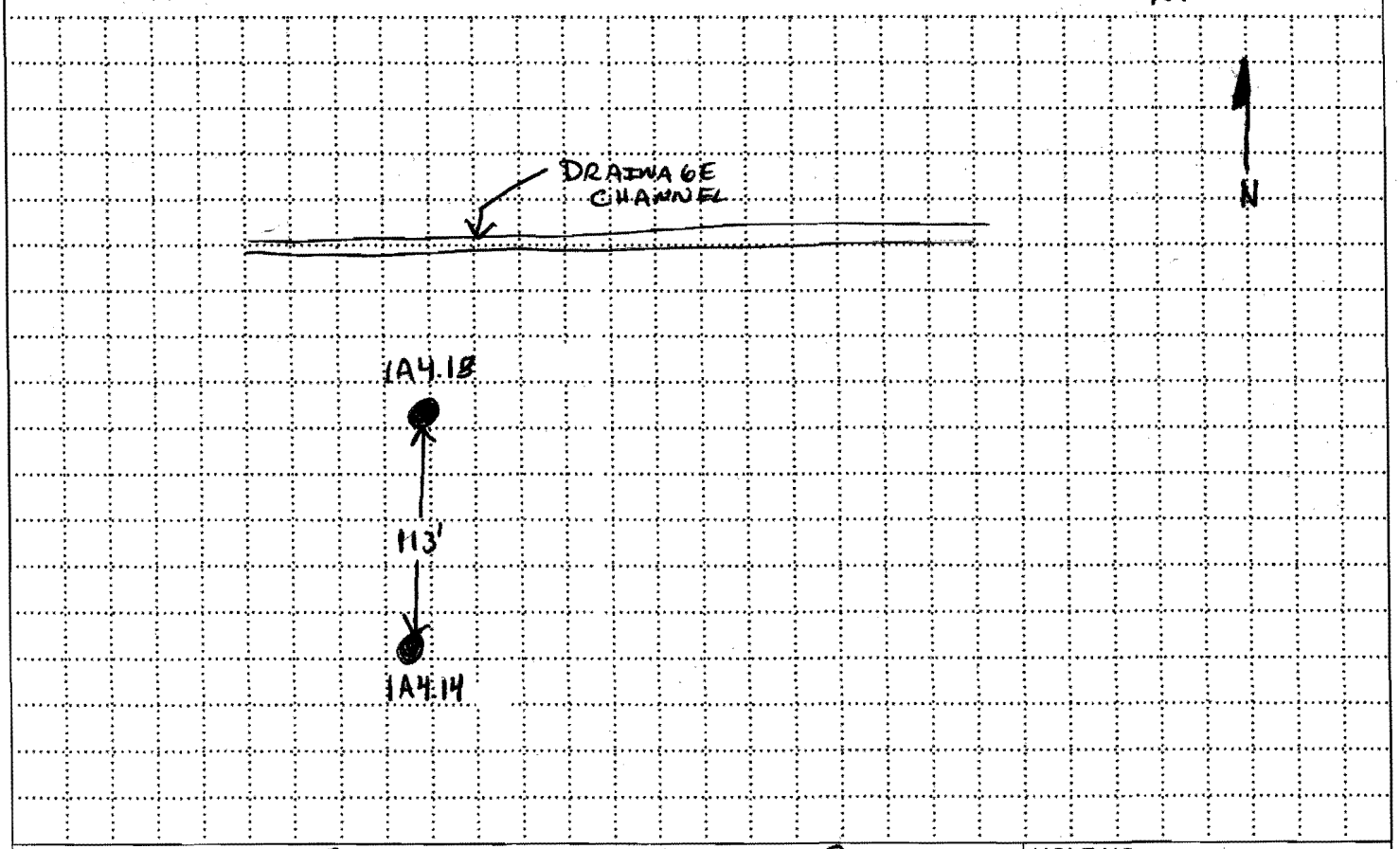
DISTRICT	Buffalo
HOLE NUMBER	1A4.14
1. COMPANY NAME	ENSOL, INC.
2. DRILLING CONTRACTOR	ZEBRA ENVIRONMENTAL CORP.
SHEET / SHEETS	1 OF 3
3. PROJECT	TOWN of TONAWANDA LP OPERABLE UNIT-Buffalo DISTRICT FUSRAP PROJECT
4. LOCATION	TONAWANDA LF, TONAWANDA, NY
5. NAME OF DRILLER	PHIL ORSI
6. MANUFACTURER'S DESIGNATION OF DRILL	7720 DT GEOPROBE
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	3 1/4" CASING 2" CORE W/ 5' PLASTIC SLEEVE
8. HOLE LOCATION	N= 1093223 E= 418057.2
9. SURFACE ELEVATION	636.562
10. DATE STARTED	3/2/10 1440
11. DATE COMPLETED	3/2/10 1630
12. OVERBURDEN THICKNESS	NATIVE NOT ENCOUNTERED - REFUSAL AT 15.0'
15. DEPTH GROUNDWATER ENCOUNTERED	NOT ENCOUNTERED
13. DEPTH DRILLED INTO ROCK	N/A
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	N/A
14. TOTAL DEPTH OF HOLE	15.0' - REFUSAL AT 15.0'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	N/A

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP/TOTALS	TCLP/TOTALS	SVOC-TCLP/TOTALS	PEST-TCLP/TOTALS	PCB-TOTALS	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)
CUTTINGS DRUMMED	-	-	-

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT TON LF- Buffalo DISTRICT FUSRAP PROJECT HOLE NO 1A4.~~16~~14

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. POPP

HOLE NUMBER 1A4.14

SHEET 2 OF 3 SHEETS

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) ~~1~~ γ	GEOTECH SAMPLE OR CORE BOX NO. (e) ~~2~~ B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)	
	0	NO RECOVERY →						
	1	FILL: DARK-BROWN CLAY, SAND, GRAVEL, ASPHALT, MED. STIFF, MOIST.	5271	50	SEE NOTES	TOP 6"	γ 4922	B 63
	2							
	3		4512	70				
	4		5014	40				
48"	5		5898	80		HIGH B	5129	53
	6	NO RECOVERY →						
	7							
PID= 7.8ppm. (PEAK)	8	FILL: DARK-BROWN CLAY AND SAND, SOFT, MOIST, STRONG HYDROCARBON ODOR	5156	60		CHEM.	γ 5177	B 57
	9	FILL: DARK-BROWN CLAY, WASTE (PLASTIC, WOOD, RUG), GRAVEL, MED. STIFF, MOIST.	5704	40				
29"	10		5602	70				

PROJECT

HOLE NO 1A4.14

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. POPP

HOLE NUMBER

SHEET 3 OF 3 SHEETS

RECIO ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)	
	10							
	11	NO RECOVERY →						
	12							
	13	FILL: REDDISH-BROWN CLAY, ROOTLETS, WASTE (GLASS, ASH), WOOD CHIPS, MED. STIFF, MOIST.	5193	60				
	14		6220	90	SEE NOTES	HIGH X	X 5100	B 40
	15		5205	50				
	16	BOTTOM of BORING AT 15.0' (REFUSAL)						
	17	NOTES:						
	18	- CLOUDY, 35°F						
	19	- SAMPLE I.D. TLS-SS-1A4.14(1.0-1.5)030210 TLS-SB-1A4.14(4.0-5.0)030210 TLS-SB-1A4.14(7.5-8.5)030210 TLS-SB-1A4.14(13.0-14.0)030210						
	20	- REFUSAL AT 34.0' AT ORIGINAL LOCATION, MOVED 1M WEST.						
		- PID READINGS = 0ppm (VOC's) EXCEPT SPIKE AT 7.5'-8.0' (7.8 ppm)						
		- SOIL READINGS ARE COUNTS/MIN.						

PROJECT

HOLE NO 1A4.14

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

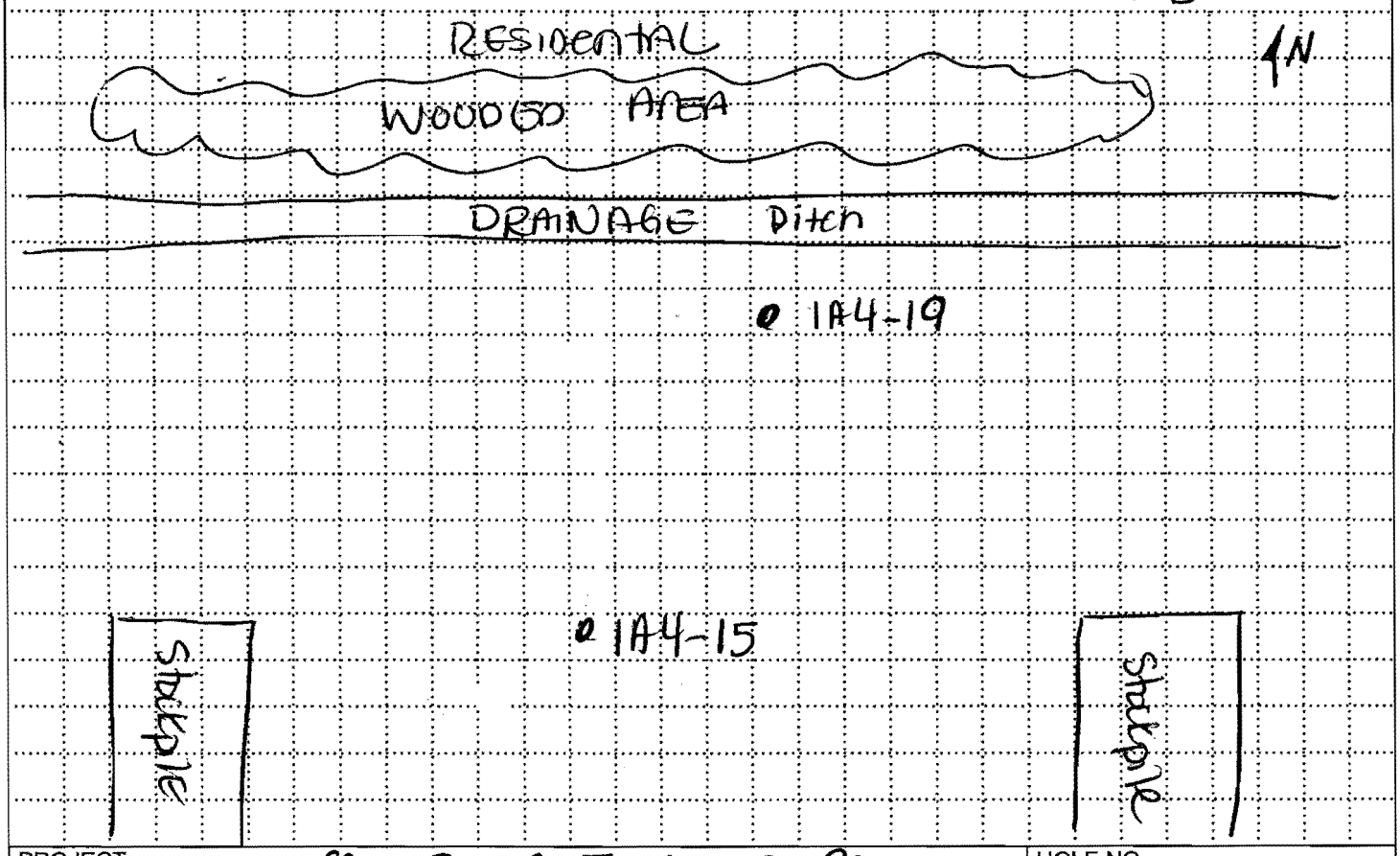
DISTRICT: Buffalo		HOLE NUMBER: 1A4-15
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 3 SHEETS
3. PROJECT: TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: Phil Orsi	6. MANUFACTURER'S DESIGNATION OF DRILL: Geoprobe 7720DT	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE	8. HOLE LOCATION: N1093259.02 E1066517.48	
	9. SURFACE ELEVATION	
	10. DATE STARTED: 3/1/10 2:30pm	11. DATE COMPLETED: 3/1/10 3:20pm
12. OVERBURDEN THICKNESS: 16.0'	15. DEPTH GROUNDWATER ENCOUNTERED: NOT ENCOUNTERED	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 16.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP TOTAL	TCLP TOTAL	SVOC TCLP TOTAL	PCB TOTAL	PEST. TOTAL	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23 [redacted]
CUTTINGS DRUMMED	—	—	—	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT	HOLE NO
TON LF- Buffalo DISTRICT FUSRAP PROJECT	1A4-15

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER 1A4-15

PROJECT

INSPECTOR K Hoelscher

SHEET 2 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e) γ	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B/γ 1 min. Shaken
	0	NO RECOVERY	NO RECOVERY		See NOTES		
	1	Fill: silt, sand, clay, WASTE, gravel (<2"), glass, plaster, stiff, moist	100	5623			Top 6" 54/4934 (1.7-1.2')
	2		100	6108			High B 59/5165 (1.2-2.2')
	3		80	6399			High γ 62/5471 Duplicate (2.2-3.2')
	4		60	6237			Chemical 73/5437 (3.2-4.2')
Recovery 32"	5		100	5396			
	6						
	7	NO RECOVERY	NO RECOVERY				
	8						
	9						
Recovery 50"	10	Fill: Same as Above	100	6106			

PROJECT

HOLE NO 1A4-15

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: 1A4-15

PROJECT:

INSPECTOR: K Hoelscher

SHEET 3 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e) γ	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B γ 1 min static count
	10				SEE NOTES		
	11	NO RECOVERY	NO RECOVERY				
	12						
	13						
		Fill: continue from previous page					MS/MSD 55/5218 (13-14')
	14		100	5613			
Recovery 24"	15		60	6113			
		NO RECOVERY	NO RECOVERY				
Recovery 0"	16						
		REFUSAL @ 16.0'					
	17	NOTES:					
		- Weather: Sunny, 32°F	* REFUSAL WAS ENCOUNTERED at 1st push @ 30.0'. Drillers moved 1 meter North.				
		- Gamma readings: counts/min					
		- PID Readings: 0 ppm					
	18	Sample I.D. (lead analysis)					
		TLS-SS-1A4-15(.7-1.2')030110	Top 6"				
		TLS-SB-1A4-15(1.2-2.2')030110	High B				
	19	TLS-SB-1A4-15(2.2-3.2')030110	High γ, Duplicate				
		TLS-SB-1A4-15(3.2-4.2')030110	Chemical				
		TLS-SB-1A4-15(13-14')030110	MS/MSD				
	20						

PROJECT:

HOLE NO: 1A4-15

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

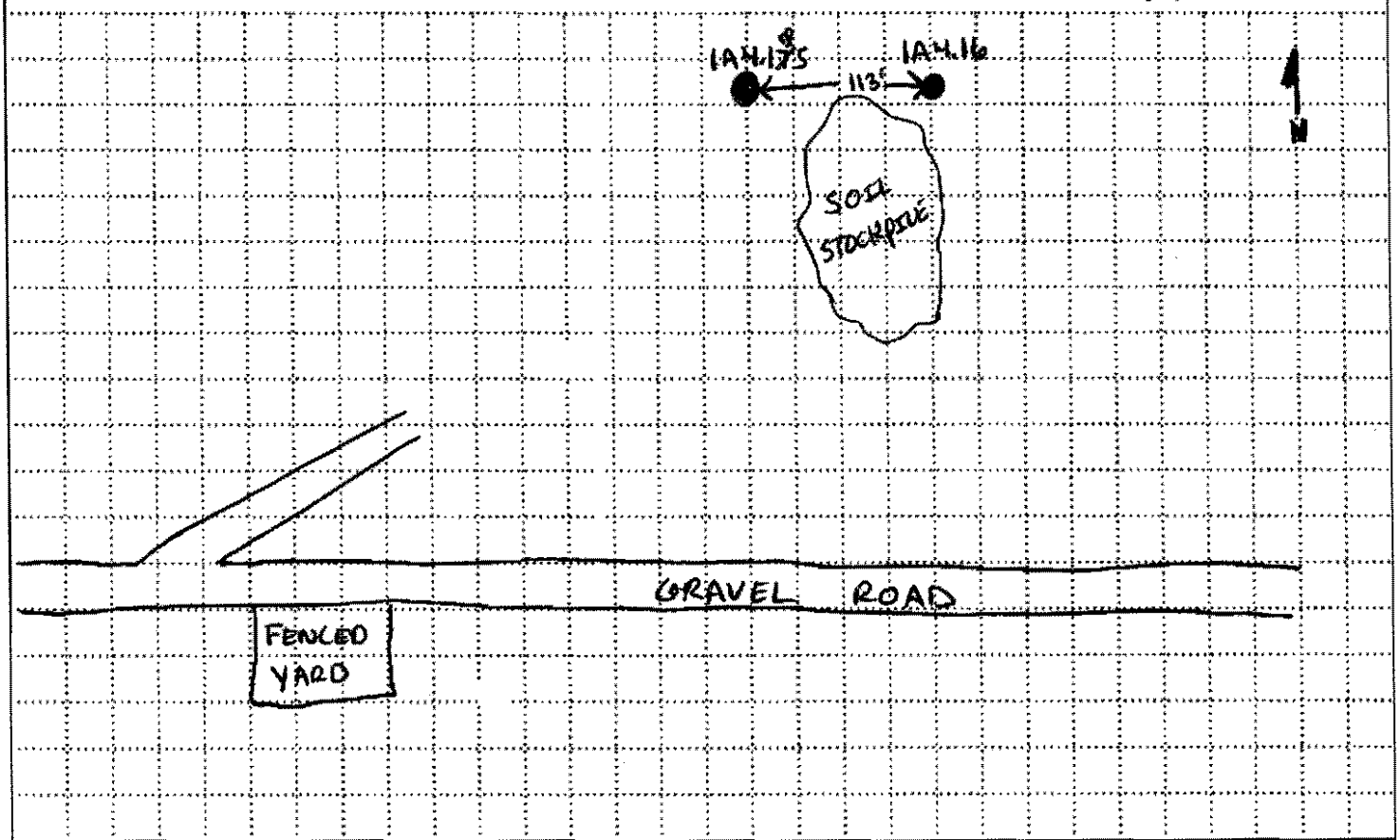
DISTRICT: Buffalo		HOLE NUMBER: 1A4.16
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 5 SHEETS
3. PROJECT: TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: JEFF SNYDER	6. MANUFACTURER'S DESIGNATION OF DRILL: 6620 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE	8. HOLE LOCATION: N= 1093259.02 E= 1066415.19	
	9. SURFACE ELEVATION: 636.562	
	10. DATE STARTED: 2/26/10 1045	11. DATE COMPLETED: 2/26/10 1130
12. OVERBURDEN THICKNESS: 25.0'	15. DEPTH GROUNDWATER ENCOUNTERED: NOT ENCOUNTERED	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 35.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP/TOTALS	TCLP/TOTALS	SVOC-TCLP/TOTALS	PEST-TCLP/TOTALS	PCB TOTALS	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	[redacted]	[redacted]
CUTTINGS DRUMMED	–	–	–		

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT: TON LF- Buffalo DISTRICT FUSRAP PROJECT HOLE NO: 1A4.16

ENG FORM 5056-R, AUG 94

PROJECT

INSPECTOR D. POPP

HOLE NO. IA4.16

SHEET 2 OF 5 SHEETS

REC'D ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING ~~RESULTS~~ (d) X	GEOTECH SAMPLE ~~OR CORE BOX NO.~~ (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h) X	B
	0	NO RECOVERY →					→	
	1	FILL: DARK-BROWN CLAY, BRICK, GRAVEL, WOOD, WASTE (GLASS), MED. STIFF, MOIST.	8253	40		TOP 6"	7639	77
	2		8338	60				
	3		7880	100	SEE NOTES			
	4		8265	90				
56"	5		8324	110		HIGH B	7763	65
	6	NO RECOVERY →					→	
	7	FILL: DARK-BROWN CLAY, BRICK, GRAVEL, CONCRETE, SAND, WASTE (GLASS, ASH), STIFF, MOIST.	7580	60				
	8		8740	70		SAT. (2ND HIGH X)	7919	75
	9		8400	40				
40"	10		7785	90				

PROJECT

HOLE NO IA4.16

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. PoPP

HOLE NUMBER 1A4.16

SHEET 3 OF 5 SHEETS

REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1MIN. STATIC COUNTS (h)	
	10	NO RECOVERY →						
	11	FILL: DARK-AND LIGHT-BROWN CLAY, SAND, GRAVEL, BRICK, MED. STIFF, MOIST.	7830	80				
	12		8093	70	SEE NOTES			
	13		8915	80		HIGH X	X 7826	B 72
	14		8092	90		CHEM.	8004	76
41"	15							
	16							
	17	NO RECOVERY →						
	18							
	19							
0"	20							

PROJECT

HOLE NO 1A4.16

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A4.16

SHEET 4 OF 5

REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h)	
	20							
	21							
	22	NO RECOVERY →						
	23							
	24							
0"	25							
	26	REDDISH-BROWN SILT AND SAND, SOME COURSE SAND AND SUB-ROUND FINE GRAVEL (< 1/2"), STIFF, MOIST. (SM)	7770	50		NATIVE	X 7921	B 72
	27		7525	40	SEE NOTES			
	28		8350	80				
	29		8025	100				
60"	30		8179	60				

PROJECT

HOLE NO 1A4.16

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A4.16

SHEET 5 OF 5

REC'D ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) ~~X~~	GEOTECH SAMPLE OR ~~CORE BOX~~ NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN, STATIC ~~REMARKS~~ COUNTS (h)
	30						
	31						
	32	NO RECOVERY →					
	33						
	34	REDDISH-BROWN SILT AND SAND, SOME COURSE SAND AND SUB-ROUND FINE GRAVEL (<½"), STIFF, MOIST. (SM)	7750	60			
16"	35		8360	80			
		BOTTOM OF BORING AT 35.0'					
	36	NOTES:					
		- SNOW, 27°F					
		- SAMPLE I.D.					
	37	TLS-SS-1A4.16(0.2-0.7)022610					
		TLS-SB-1A4.16(4.0-5.0)022610					
		TLS-SB-1A4.16(7.0-8.0)022610					
	38	TLS-SB-1A4.16(13.0-14.0)022610					
		TLS-SB-1A4.16(14.0-15.0)022610					
		TLS-SB-1A4.16(25.0-26.0)022610					
	39	- SOIL READINGS ARE COUNTS/MIN.					
		- PID READINGS = 0 ppm (VOC's)					
	40	- MOVED 1M NORTH OF ORIGINAL LOCATION					

PROJECT

HOLE NO 1A4.16

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

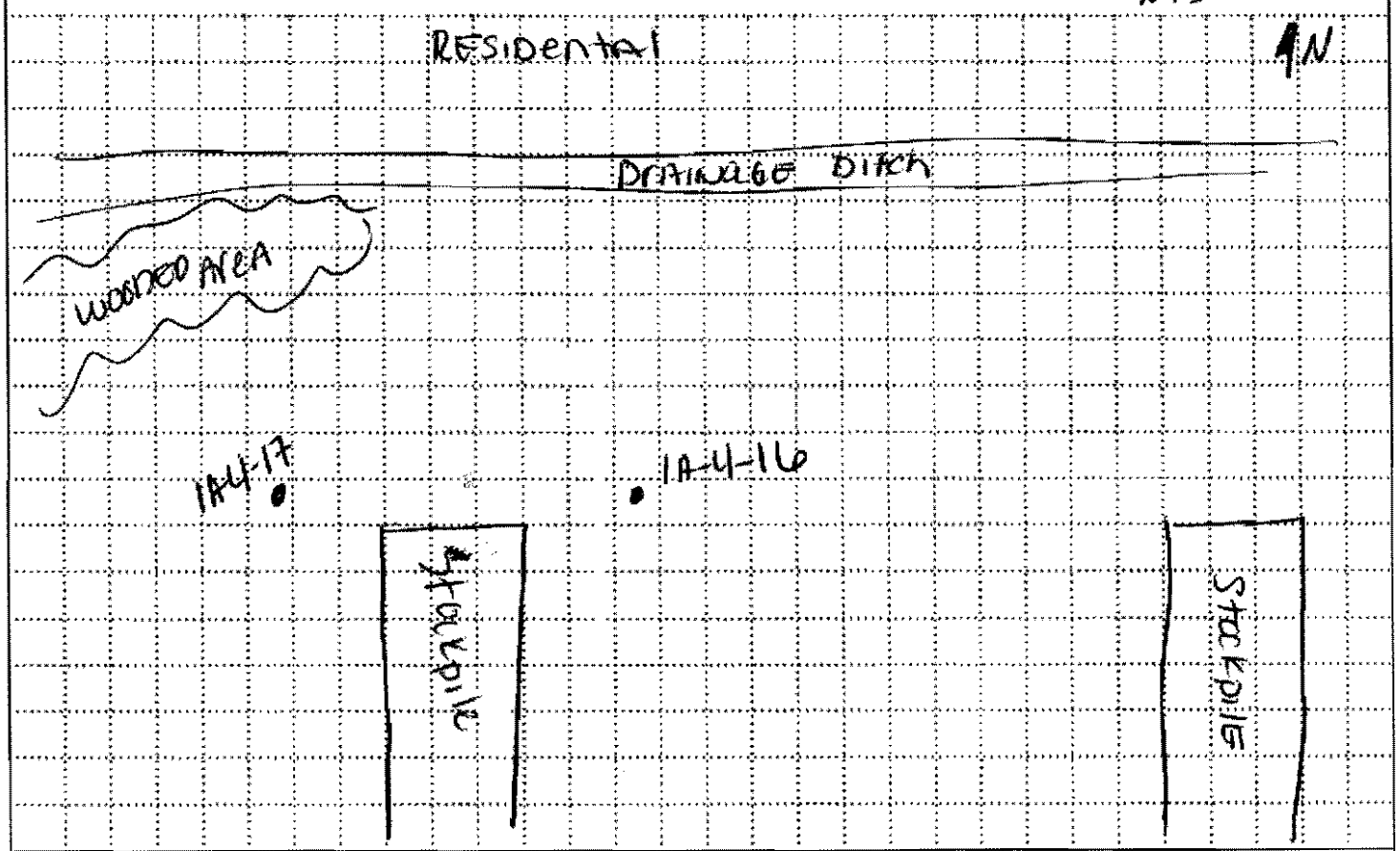
DISTRICT: Buffalo		HOLE NUMBER: 1A-4-17
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 6 SHEETS
3. PROJECT: TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: Phil Orsi	6. MANUFACTURER'S DESIGNATION OF DRILL: Geoprobe 7720DT	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE W/ 5' PLASTIC SLEEVE	8. HOLE LOCATION: N 1093222 E 417954.3	
	9. SURFACE ELEVATION: 635.206	
	10. DATE STARTED: 2-26-10	11. DATE COMPLETED: 2-26-10
12. OVERBURDEN THICKNESS: 48.0'	15. DEPTH GROUNDWATER ENCOUNTERED: NOT ENCOUNTERED	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 50.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
–	–	–	–	–	–	N/A

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	2[redacted]
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT	HOLE NO
TON LF - Buffalo DISTRICT FUSRAP PROJECT	1A-4-17

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR K Hoelscher

HOLE NUMBER 1A-4-17

SHEET 2 OF SHEETS 6

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e) J	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS 51 J 1 mm 3 mate count
	0	NO RECOVERY	NO RECOVERY		SEE NOTES		
	1	Fill: Silt, sand, Black-brown clay w/ gravel (<2"), Concrete, brick, shale, moist	60	6279			Top 6" 65/6306 (.5-1.0')
	2		80	6145			
	3		60	6514			
	4		100	6495			
Recovery 55"	5		80	6458			
		NO RECOVERY	NO RECOVERY				
	6						
		Fill: Same as above w/ wood + rootlets	80	6307			Hand J 84/7439 (6.9-7.9')
	7						
			160	6769			
	8						Hand B 77/6432 (7.9-8.9')
			140	6454			
	9						Saturated 102/6226 Sub. (8.9-9.9')
Recovery 57"			140	6245			
	10						

PROJECT

HOLE NO 1A-4-17

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR K Hoelscher

HOLE NUMBER 1A-4-17

SHEET 3 OF 6

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e) X	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B/X 1 min static count
	10	Fill: Continue from previous page			See Notes		
	11		80	6513			
	12		60	6223			
	13		60	6624			
	14		140	6507			
Recovery 60"	15		100	6365			
	16	NO Recovery	NO Recovery				
	17	Fill: SiH, sand, glass gravel (<1"), brown clay, some ash, stiff, moist	80	6364			
	18		120	6497			
	19						
Recovery 24"	20		100	6590			

PROJECT

HOLE NO. 1A-4-17

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR K Hoelscher

HOLE NUMBER 1A 4-17

SHEET 4 OF 6

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e) J	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B1 J 1 min. stick count
	20				SEE NOTES		
	21	NO RECOVERY	NO RECOVERY				
	22						
	23						
		Fill: gravel, ash, silt, sand, some clay, moist, loose					
	24		100	6406			
Recovery 0"	25		80	6463			
	26	NO RECOVERY	NO RECOVERY				
	27						
	28						
	29						
Recovery 0"	30						

PROJECT

HOLE NO. 1A4-17

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR K Hoelscher

HOLE NUMBER 1A4-17

SHEET 5 OF 6 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) PB	GEOTECH SAMPLE OR CORE BOX NO. (e) J	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B1 J 1 MIN. static cont
	30				SEE NOTES		
	31	NO RECOVERY	NO RECOVERY				
	32						
	33						
	34						
Recovery 5"	35	Fill: sand, ash, gravel (1/4"), some silt, glass, loose, moist	80	5960			
	36	NO RECOVERY	NO RECOVERY				
	37						
	38						
	39						
Recovery 6"	40	Fill: continue from above	100	5866			

PROJECT

HOLE NO. 1A4-17

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER 1AU17

PROJECT

INSPECTOR K Hoelscher

SHEET 6 OF 6 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e) γ	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B/γ 1 min. static count
	40				SEE NOTES		
	41	NO RECOVERY	NO RECOVERY				
	42						
	43						
	44						
		Fill: Black sand, course+fine gravel, loose, moist-wet					
Recovery 11"	45		100	5980			
	46	NO RECOVERY	NO RECOVERY				
	47						
		Fill: Same as above					
	48		160	6201			
	49	Redish-brown silt, clay, w/ fine gravel, soft, moist (CL)	160	6201			Native: 62/6314 (48.0-49.0')
Recovery 36"	50						

PROJECT Bottom of Boring @50.0'

HOLE NO. 1AU-17

ENG FORM 5056A-R, AUG 94

NOTES:
- Weather: Snow, 25°F
- Gamma Reading: Count/min
- PID Reading: 0 ppm

* Refusal was encountered at 17.0', Drillers moved 1 meter South for second attempt, Data is above.

Sample I.D (Lab Analysis)
TLS-SB-1AU-17(5-1.0')022610 Topl"
TLS-SB-1AU-17(48.0-49.0')022610 Native
TLS-SB-1AU-17(6.9-7.9')022610 High γ-Duplicate
TLS-SB-1AU-17(7.9-8.9')022610 High B
TLS-SB-1AU-17(8.9-9.9')022610 Saturated Sub. (picked by H.P)

HTRW DRILLING LOG

DISTRICT	Buffalo
HOLE NUMBER	1A4-18
1. COMPANY NAME	ENSOL, INC.
2. DRILLING CONTRACTOR	ZEBRA ENVIRONMENTAL CORP.
SHEET / SHEETS	1 OF
3. PROJECT	TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT
4. LOCATION	TONAWANDA LF, TONAWANDA, NY
5. NAME OF DRILLER	Jeff Snyder
6. MANUFACTURER'S DESIGNATION OF DRILL	Geoprobe 6620DT
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE
8. HOLE LOCATION	N1093222 E417852.1
9. SURFACE ELEVATION	631.774
10. DATE STARTED	3/2/10 2:05 pm
11. DATE COMPLETED	3/2/10 4:35pm
12. OVERBURDEN THICKNESS	44.0'
15. DEPTH GROUNDWATER ENCOUNTERED	24.0'
13. DEPTH DRILLED INTO ROCK	N/A
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	N/A
14. TOTAL DEPTH OF HOLE	64.0'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	N/A

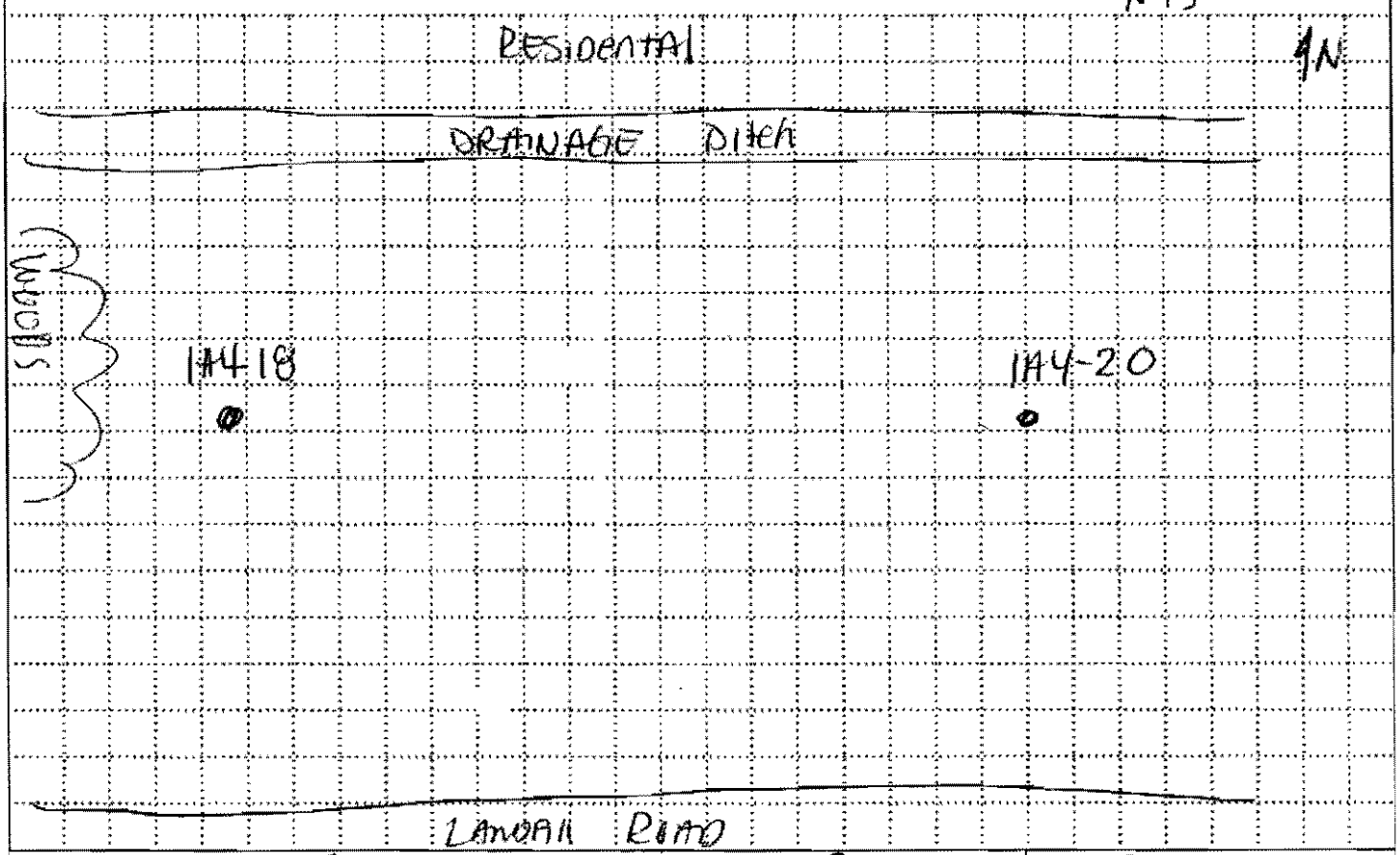
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	RCP TOTAL	TCLP TOTAL	SVOC TCLP	PCB TOTAL	PEST. TOTAL	N/A

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. [redacted]
CUTTINGS DRUMMED	—	—	—	

LOCATION SKETCH/COMMENTS

SCALE: NTS



PROJECT	HOLE NO
TON LF - Buffalo DISTRICT FUSRAP PROJECT	1A4-18

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR K Hoelscher

HOLE NUMBER 1A4-18

SHEET 2 OF SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e) J	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B/J Min Static Count
	0				SEE NOTES		
	1	NO RECOVERY	NO RECOVERY				
	2						
		FILL: Reddish brown clay, gravel, brick, waste (ash), moist, loose	40	6840			Top 6" (2-2.5') 51/7295
	3		60	7770			
	4		80	7742			
Recovery 36"	5		60	7767			
	6	NO RECOVERY	NO RECOVERY				
	7						
	8						
	9	FILL: Reddish-brown clay, gravel, brick, waste (ash), moist, stiff	80	7630			
Recovery 19"	10		100	7809			High J 61/6922 (9-10')

PROJECT

HOLE NO

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR K Hoelscher

HOLE NUMBER IAU-18

SHEET 3 OF SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) PID	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
	10	Fill: Reddish Clay, sand, gravel (1/2"), waste (ash), moist, med. stiff			See notes		1min static cone; Chemical 61/6922 (10-11')
	11		60	7597			
	12		60	7681			
	13		120	6958			High B 63/7101 (12-13')
	14		80	7014			
Recovery 60"	15		80	7583			
	16	No Recovery	No Recovery				
	17	Fill: Reddish-brown clay, brick, concrete, waste (ash, glass), wet, soft	80	7382			
	18		60	7539			
	19		100	7706			
Recovery 43"	20						

PROJECT

HOLE NO

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: 1AU-18

PROJECT:

INSPECTOR: K Hoelscher

SHEET 4 OF 8

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX NO.	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS
	20				See NOTES		1mm STATIC WATER
	21	NO RECOVERY	NO RECOVERY				
	22						
	23						
	24	FILL: WASTE (ASH, GLASS), GRAVEL (<1"), WET, LOOSE	80	7392			SATURATED 60/ (24-25') /7141
Recovery 16"	25						
	26	NO RECOVERY	NO RECOVERY				
	27						
	28						
	29						
Recovery 0"	30						

PROJECT:

HOLE NO: 1AU-18

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: 1A4-18

PROJECT:

INSPECTOR: K Hoelscher

SHEET 5 OF 8

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e) S	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS
	30				See notes		in ~~start~~ count
	31	NO RECOVERY	NO RECOVERY				
	32						
	33						
	34						
Recovery 0'	35						
	36						
	37						
	38						
	39						
Recovery 0'	40						

PROJECT

HOLE NO

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR R Hoelscher

HOLE NUMBER 1A4-18

SHEET 6 OF 8

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e) J	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B/J 1 min Static Count
	40				See Notes		
	41	NO RECOVERY	NO RECOVERY				
	42						
	43						
	44						
Recovery 12"	45	REDISH clay, SILT, SAND, MOIST, SOFT (CL)	80	7386			Native (44-45') 45/7210
	46	NO RECOVERY	NO RECOVERY				
	47						
	48						
	49						
Recovery 0"	50						

PROJECT

HOLE NO. 1A4-18

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER 1AH-18

PROJECT

INSPECTOR K Hoelscher

SHEET 7 OF 8

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e) J	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B J 1 min Strike count
	50				See Note		
	51	NO Recovery	No Recovery				
	52						
	53						
	54						
Recovery 0"	55						
	56						
	57						
	58						
	59						
Recovery 0"	60						

PROJECT

HOLE NO 1AH-18

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER 1A4-18

PROJECT

INSPECTOR K Hoelscher

SHEET 8 OF 8 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B/J 1mm Static count
	60	NO RECOVERY	NO RECOVERY		See NOTES		
	61						
	62						
	63						
Recovery 0"	64						
		REFUSAL @ 64.0'					
	65	NOTES:					
		Weather: OVERCAST, 30°F					
		GAMMA Readings count/min					
	66	- PID Reading: 0 ppm					
		Sample # 0 (RAD. ANALYSIS)					
		TCS-SS-1A4-18 (2-2.5') 030210	Top 6"				
	67	TCS-SB-1A4-18 (24-25') 030210	SATURATED				
		TCS-SB-1A4-18 (44-45') 030210	NATIVE				
		TCS-SB-1A4-18 (12-13') 030210	High B				
		TCS-SB-1A4-18 (9-10') 030210	High J				
	68	TCS-SB-1A4-18 (10-11') 030210	CHEMICAL				
		- Refusal met @ 64.0' - native met @ 44.0'					
	69						
	70						

PROJECT

HOLE NO. 1A4-18

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

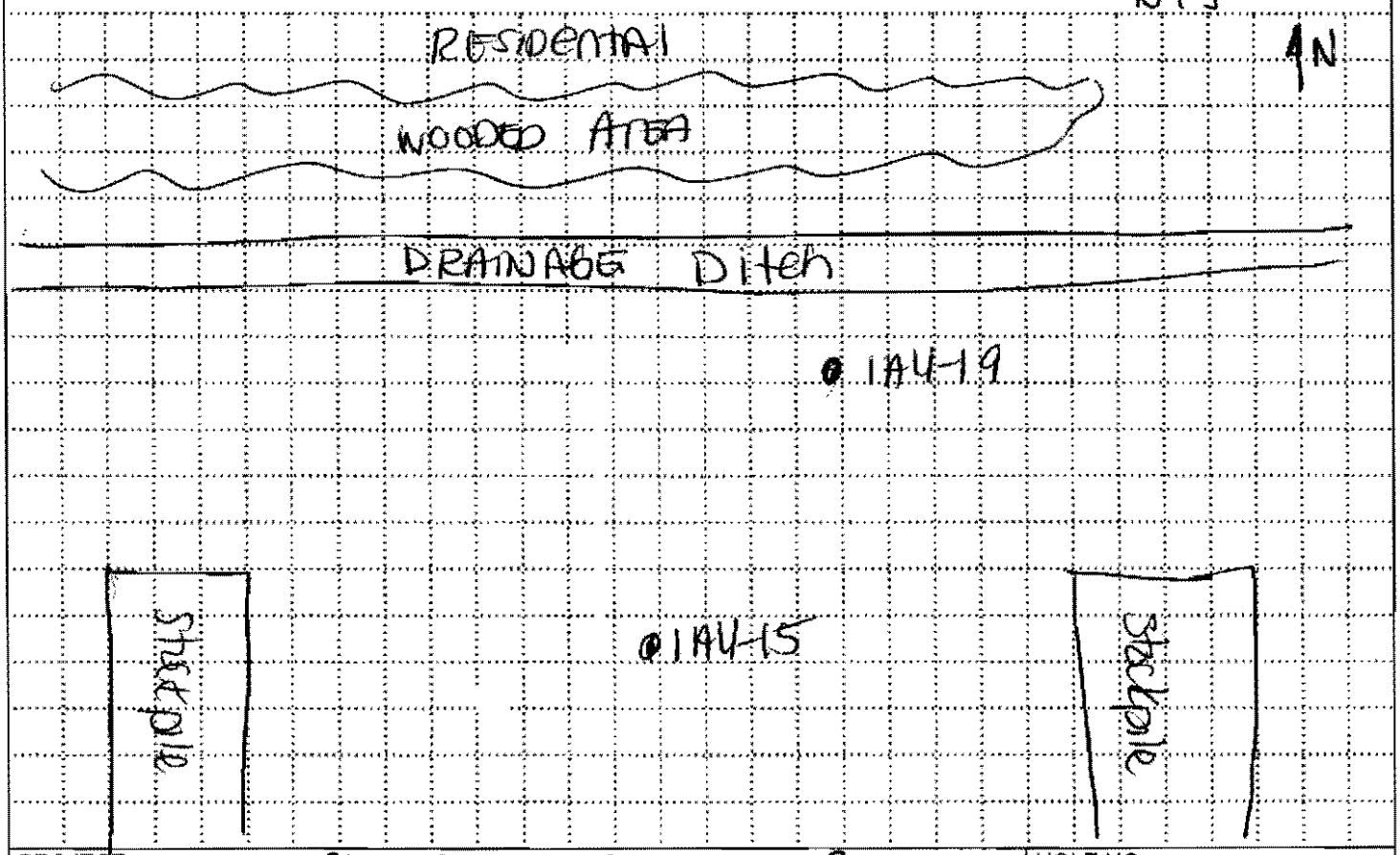
DISTRICT: Buffalo	HOLE NUMBER: 1A4-19	
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 4 SHEETS
3. PROJECT: TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: Phil Orsi	6. MANUFACTURER'S DESIGNATION OF DRILL: Geoprobe 7720DT	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE W/ 5' PLASTIC SLEEVE	8. HOLE LOCATION: N 1093361.31 E 1066517.48	
	9. SURFACE ELEVATION:	
	10. DATE STARTED: 3/1/10 3:30pm	11. DATE COMPLETED: 3/1/10 4:50pm
12. OVERBURDEN THICKNESS: 27.0'	15. DEPTH GROUNDWATER ENCOUNTERED: 22.6'	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 30.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
–	–	–	–	–	–	N/A %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. [redacted]
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON LF- Buffalo DISTRICT FUSRAP PROJECT — HOLE NO. 1A4-19

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: 1A4-19

PROJECT:

INSPECTOR: K Hoelscher

SHEET 2 OF 4 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e) δ	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B/δ 1min static count
	0	NO RECOVERY	NO RECOVERY		SEE NOTES		
	1	Fill: silt, sand, brownish clay, brick, wood, stiff, moist	100	6691			Top 6" 70/6356 (0.5-1')
	2		60	6798			High δ 53/6580 (1-2')
	3		60	6425			
	4		100	6682			
Recovery 54"	5		80	6672			
	6	NO RECOVERY	NO RECOVERY				
	7						
	8		60	6770			
	9	Fill: SAME AS ABOVE w/ gravel	60	6772			
Recovery 32"	10		80	6641			

PROJECT:

HOLE NO. 1A4-19

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR K Hoelscher

HOLE NUMBER IAY-19

SHEET 3 OF 4

REMARKS B/J 1 min. static count

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e) J	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)
	10				See notes	
	11	NO RECOVERY	NO RECOVERY			
	12					
	13	Fill: Blackish brown clay, course + fine sand, brick, wood, waste, stiff, moist	80	6748		
	14		100	6547		
Recovery 32"	15		80	6705		
	16	NO RECOVERY	NO RECOVERY			
	17	Fill: Brown clay w/silt, gravel (1/4"), concrete, brick, wood, stiff, moist	60	6781		
	18		110	6770		
	19		60	6685		
Recovery 30"	20					

PROJECT

HOLE NO. IAY-19

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR: K Hoelscher

HOLE NUMBER: 1A4-19

SHEET 4 OF 4

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
	20				SEE NOTES		1min static count
	21	NO RECOVERY	NO RECOVERY				
	22	Fill) Reddish-brown silt & clay, wood, waste, gravel (<1"), stiff, moist	100	6680			Saturated 65 (21.8-22.8') 6522
	23		70	6720			
Recovery 38'	24		60	6413			
	25		90	6590			
	26		100	6749			
	27	Reddish-brown silt + clay w/ course gravel, Desiccation cracks w/ gray silt infilling, stiff, moist (CL).	90	7173			Native 41/6425 (27-28')
	28		120	6539			High B 67/6453 (28-29')
Length 40'	29		100	6649			
	30						

PROJECT: Bottom of Boring @ 30.0'

HOLE NO. 1A4-19

ENG FORM 5056A-R, AUG 94

NOTES:

- Weather: Overcast, 32°F
- Gamma reading: count/min
- PID Reading: 0 ppm

SAMPLE I.D. (LAB ANALYSIS)

TCS-SS-1AH19 (.5-1') 030110 Top 6"
TCS-SB-1AH19 (1-2') 030110 High
TCS-SB-1AH19 (27-28') 030110 Native
TCS-SB-1AH19 (21.8-22.8') 030110 Saturated
TCS-SB-1AH19 (28-29') 030110 High B

HTRW DRILLING LOG

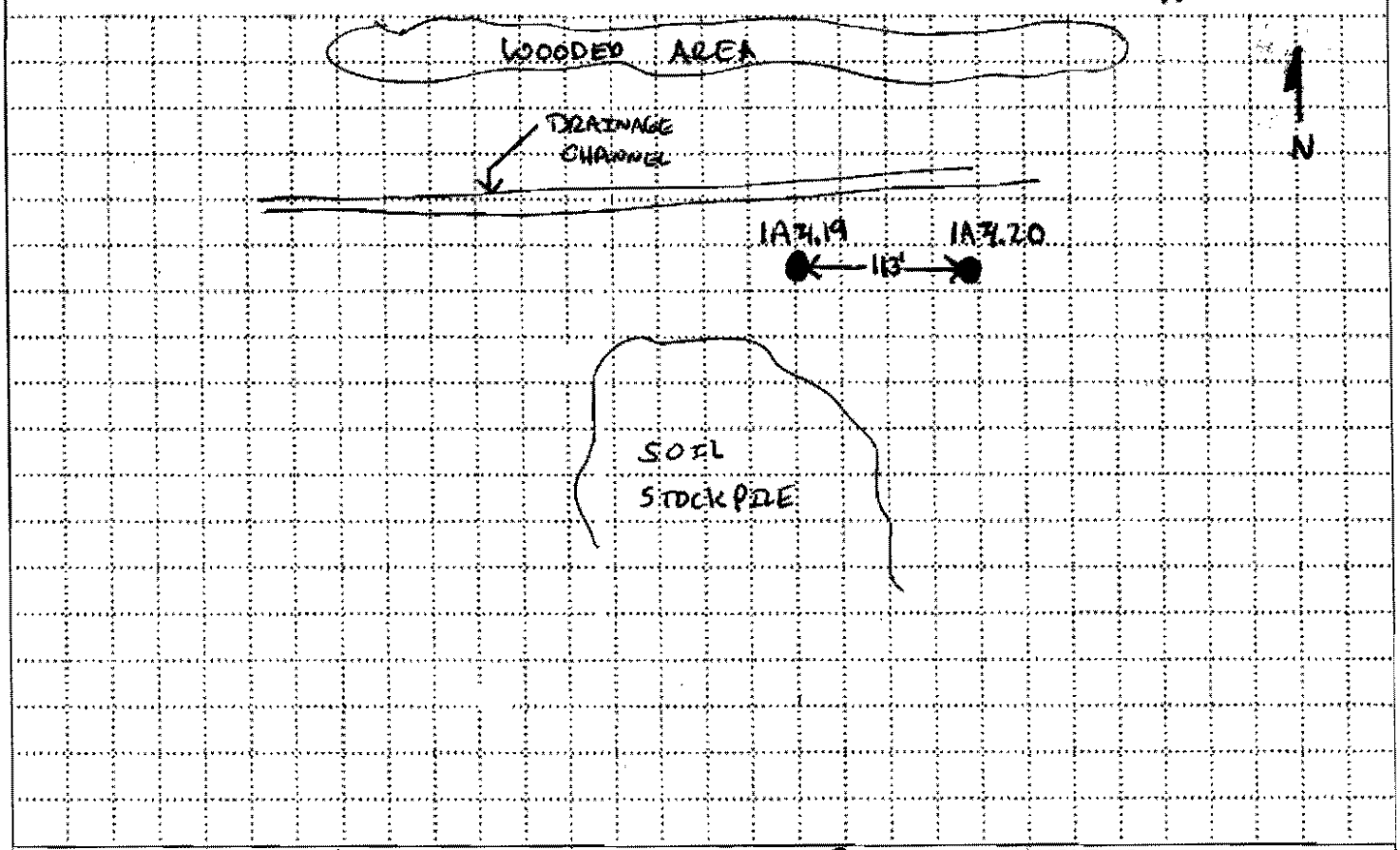
DISTRICT: Buffalo		HOLE NUMBER: 1A4.20
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 5 SHEETS
3. PROJECT: TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: PHIL ORSI	6. MANUFACTURER'S DESIGNATION OF DRILL: 7720 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE	8. HOLE LOCATION: N = 1093325 E = 418058.1	
	9. SURFACE ELEVATION: 627.738	
	10. DATE STARTED: 3/2/10 1250	11. DATE COMPLETED: 3/2/10 1430
12. OVERBURDEN THICKNESS: 30.0'	15. DEPTH GROUNDWATER ENCOUNTERED: 21.9' bgs	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 35.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP / TOTALS	TCLP / TOTALS	SVOC - TCLP / TOTALS	PEST - TCLP / TOTALS	PCB - TOTALS	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	[redacted]
CUTTINGS DRUMMED	-	-	-	

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT: TON LF - Buffalo DISTRICT FUSRAP PROJECT HOLE NO: 1A4.20

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A4.20

SHEET 2 OF 5 SHEETS

RECID ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)	
	0	NO RECOVERY →						
	1							
	2	FILL: DARK-BROWN CLAY, WOOD, BRICK, ASPHALT, STIFF, MOIST.	5572	50		TOP 6"	X 5187	B 67
	3		5897	100	SEE NOTES			
	4		5572	110		HIGH B	5444	48
41"	5		5840	90				
	6	NO RECOVERY →						
	7	FILL: DARK-BROWN CLAY, SAND, BRICK, GRAVEL, MED. STIFF, MOIST.	5788	60				
	8		5756	40				
	9		5980	100		CHEM.	5594	76
42"	10		6044	60		HIGH X	5656	52

PROJECT

HOLE NO 1A4.20

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER 1A4.20

PROJECT

INSPECTOR D. Popp

SHEET 3 OF 5 SHEETS

RECID ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING ~~RESULTS~~ (d) X	GEOTECH SAMPLE OR ~~CORE BOX~~ NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	10	NO RECOVERY →					
	11	FILL: DARK-BROWN CLAY, BRICK, GRAVEL, MED. STIFF, MOIST.	5836	30			
			5919	60			
	12	FILL: REDDISH-BROWN CLAY, STIFF, MOIST.	5333	70	SEE		
	13		5777	80	NOTES		
	14		5905	100			
49"	15	NO RECOVERY →					
	16	FILL: REDDISH-BROWN CLAY, WASTE (ASH, GLASS, RUBBER), STIFF, MOIST.	5823	80			
	17		5882	70			
	18		5963	80			
	19		5981	90			
45"	20						

PROJECT

HOLE NO 1A4.20

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. POPP

HOLE NUMBER 1A420

SHEET 4 OF 5

RECID ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)	
	20							
	21	NO RECOVERY →						
	22						X	B
		FILL: WASTE (ASH), LOOSE, WET.	5601	50		SAT.	5669	60
	23		5632	80	SEE NOTES			
	24		5390	90				
37"	25							
	26							
		NO RECOVERY →						
	27							
	28							
	29	FILL: WASTE (ASH, GLASS), LOOSE, WET.	5610	40				
17"	30		5927	70				

PROJECT

HOLE NO 1A4.20

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A4.20

SHEET 5 OF 5

~~ELEV.~~ REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h) X	B
	30	REDDISH-BROWN SILT AND CLAY, FINE TO COURSE SAND, FIRM, MOIST. (CL)	5816	90		NATIVE	5648	73
	31							
	32		5713	70				
	33		5886	100				
	34		5694	60				
60"	35		5847	90				
		BOTTOM of BORING AT 35.0'						
	36	NOTES: - OVERCAST, 40°F - SAMPLE I.D.						
	37	TLS-SS-1A4.20(1.5-2.0)030210 TLS-SB-1A4.20(3.0-4.0)030210 TLS-SB-1A4.20(8.0-9.0)030210 TLS-SB-1A4.20(9.0-10.0)030210						
	38	TLS-SB-1A4.20(21.9-22.9)030210 TLS-SB-1A4.20(30.0-31.0)030210						
	39	- CHEM. AND RAD. DUPLICATE COLLECTED - PID READINGS = 0ppm (VOC's) - SOIL READINGS ARE COUNTS/MIN.						
	40							

PROJECT

HOLE NO 1A4.20

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

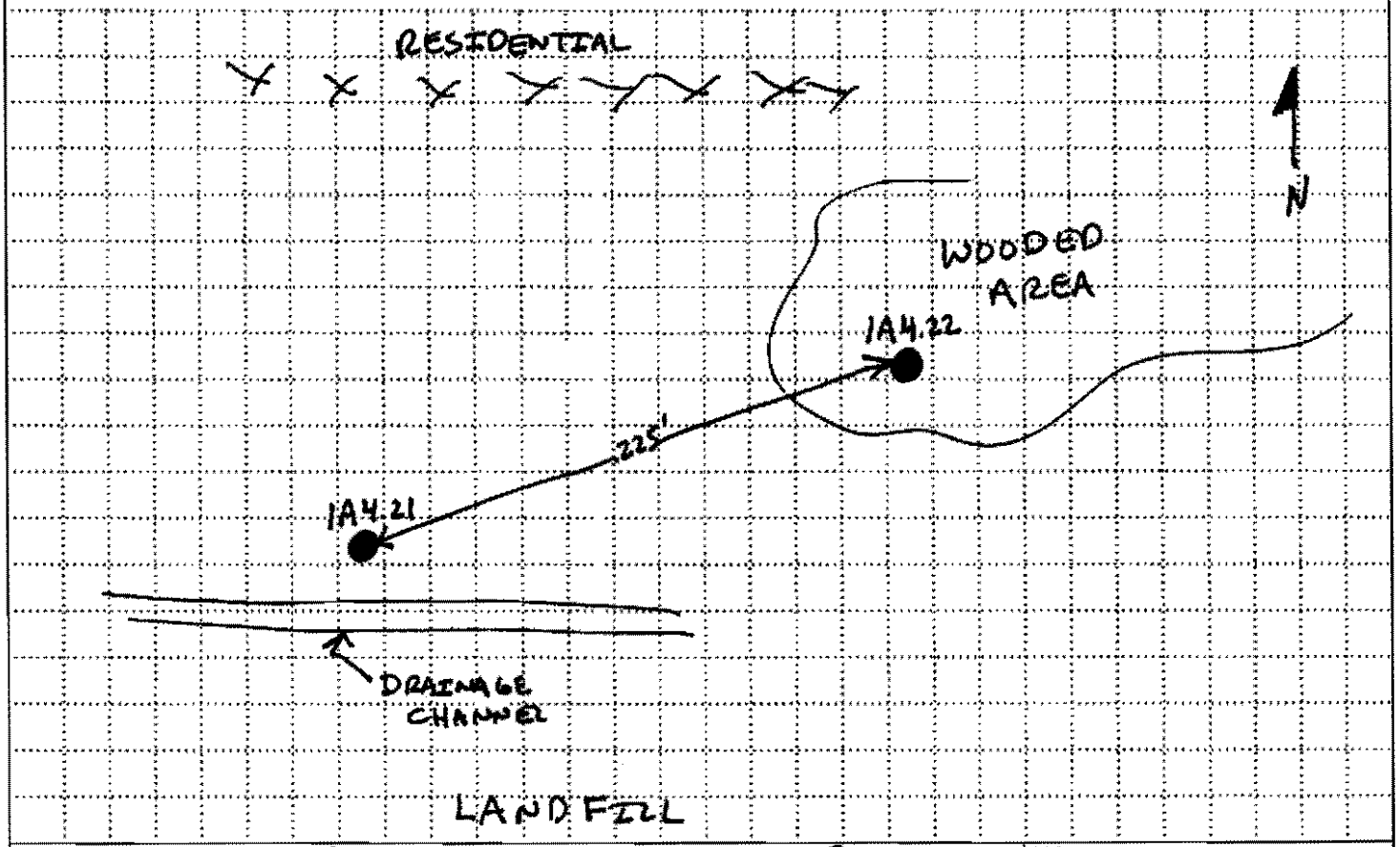
DISTRICT: Buffalo		HOLE NUMBER: 1A4.21
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 3 SHEETS
3. PROJECT: TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: DOM PINO	6. MANUFACTURER'S DESIGNATION OF DRILL: 7720 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE W/ 5' PLASTIC SLEEVE	8. HOLE LOCATION: N = 1093325 E 417951.8	
	9. SURFACE ELEVATION: 624.424	
	10. DATE STARTED: 2/18/10 1350	11. DATE COMPLETED: 2/18/10 1630
12. OVERBURDEN THICKNESS: 16.8'	15. DEPTH GROUNDWATER ENCOUNTERED: 18.0 bgs	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 19.5'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP / TOTALS	TCLP / TOTALS	SVOC - TCLP / TOTALS	PEST - TCLP / TOTALS	PCB - TOTALS	N/A

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. [redacted]
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT: TON LF - Buffalo DISTRICT FUSRAP PROJECT HOLE NO: 1A4.21

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. POPP

HOLE NUMBER IA4.21

SHEET 2 OF 3 SHEETS

REC'D ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h) X	B
	0							
	1	NO RECOVERY →						
	2							
		DARK-BROWN CLAYEY TOPSOIL W/ ROOTLETS, MED. STIFF, MOIST.	6870	80	SEE NOTES	TOP 6"	5988	44
	3		6757	40		HIGH X	6021	60
		FILL: DARK-BROWN CLAY W/ GRAVEL, SOME WASTE (GLASS), LOOSE, MOIST.	6017	50		CHEM.	5841	47
	4	FILL: CONCRETE PIECES, CLAY, GRAVEL, WASTE (GLASS), LOOSE, MOIST.	5624	60				
36"	5						/	
	6	NO RECOVERY →						
	7							
		FILL: WASTE (ASH, GLASS, WOOD CHIPS), CLAY, LOOSE, MOIST	6529	60				
	8							
	9		6724	80				
29"	10		6101	110				

PROJECT

HOLE NO IA4.21

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A4.21

SHEET 3 OF 3 SHEETS

REC'D ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS ~~REMARKS~~ (h)
	10						
	11	NO RECOVERY →					
	12						
	13	FILL: WASTE (ASH, GLASS, WOOD CHIPS), CLAY, LOOSE, MOIST.	6842	120		HIGH B	6195 76
	14		6570	50			
24"	15		6325	40			
	16	NO RECOVERY →					
	17	FILL: WASTE (ASH, GLASS, WOOD CHIPS), CLAY, LOOSE, MOIST.	6402	50			
	18	REDDISH-BRN SILT AND CLAY, TRACE COARSE SAND, MED. STIFF, MOIST-WET. (CL)	6388	60		NATIVE	6088 50
	19		6632	80		SAT.	6016 50
46"	20	BOTTOM of BORING AT 19.5'					

PROJECT

HOLE NO 1A4.21

ENG FORM 5056A-R, AUG 94

Notes:

- OVERCAST, 30°F
- SAMPLE I.D. (ARSEC I.D.)
  TLS-SS-1A4.21(0.0-0.5)021810
  TLS-SB-1A4.21(0.5-1.5)021810
  TLS-SB-1A4.21(1.5-2.5)021810
  TLS-SB-1A4.21(5.5-6.5)021810
  TLS-SB-1A4.21(6.7-7.7)021810
  TLS-SB-1A4.21(9.5-10.5)021810
- GAMMA READINGS ARE COUNTS/MIN.
- PID READINGS: 0 ppm (VOC's)
- BOREHOLE offset APPROX. 8' NORTH (CORE ON BANK).
- REFUSAL @ 3.5', MOVED 1m NORTH

HTRW DRILLING LOG

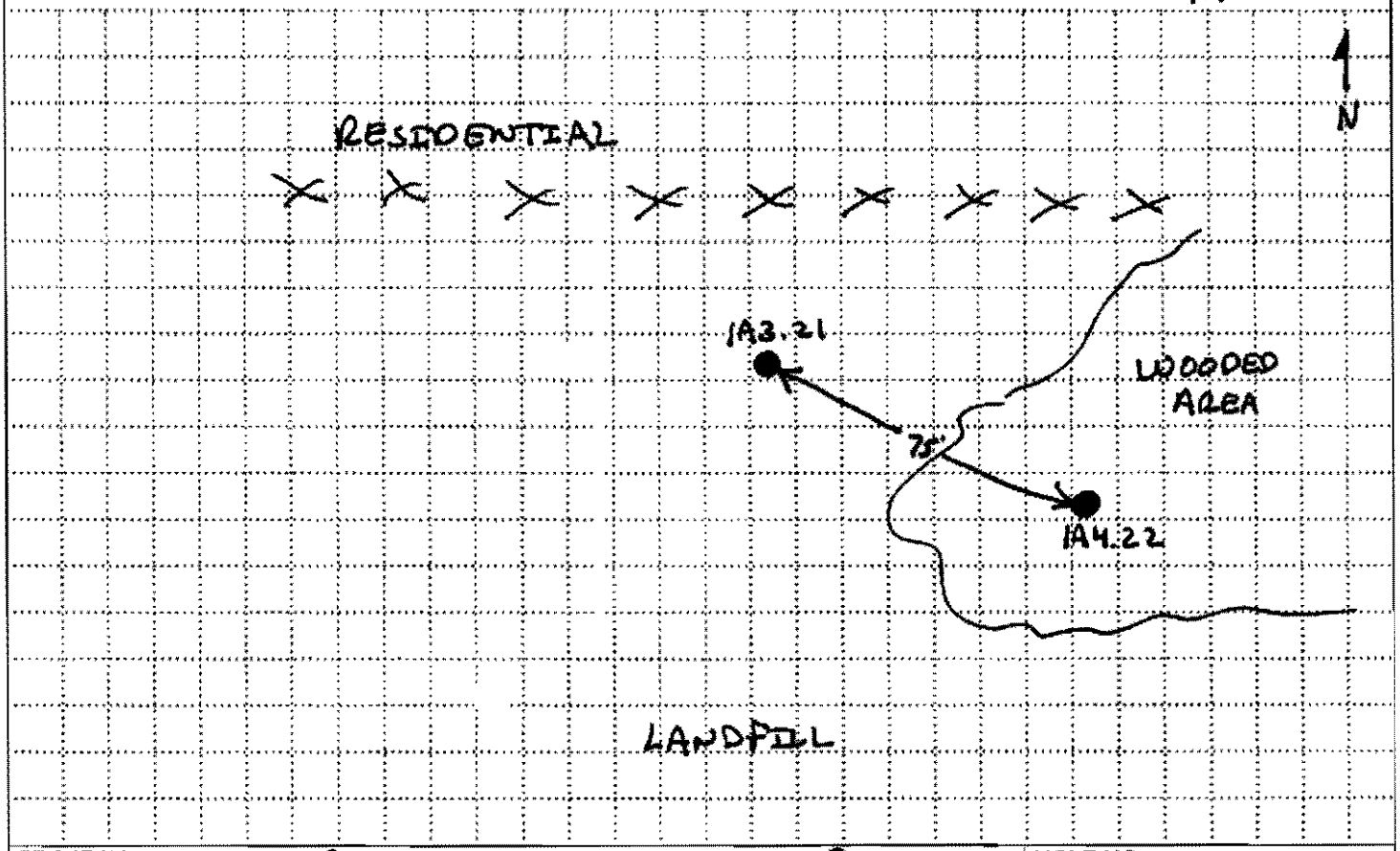
DISTRICT: Buffalo		HOLE NUMBER: 1A4.22
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 2 SHEETS
3. PROJECT: TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: DOM PINO	6. MANUFACTURER'S DESIGNATION OF DRILL: 7720 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE	8. HOLE LOCATION: N = 1093428 OP, E = 1066519.472 OP	
	9. SURFACE ELEVATION: 621.559	
	10. DATE STARTED: 2/18/10 1020	11. DATE COMPLETED: 2/18/10
12. OVERBURDEN THICKNESS: 1.0'	15. DEPTH GROUNDWATER ENCOUNTERED: NOT ENCOUNTERED	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 10.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP / TOTALS	TCLP / TOTALS	SVOC - TCLP / TOTALS	PEST - TCLP / TOTALS	PCB - TOTALS	N/A

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23.
CUTTINGS DRUMMED	-	-	-	[redacted]

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON LF - Buffalo DISTRICT FUSRAP PROJECT — HOLE NO: 1A4.22

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A 4.22

SHEET 2 OF 2 SHEETS

REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h) X	B
	0	DARK REDDISH-BROWN CLAYEY TOPSOIL W/ ROOTLETS, SOFT, MOIST.	6250	30		TOP 6"	6285	31
	1		6186	80		NATIVE	6298	43
		REDDISH-BROWN SILT AND CLAY, TRACE COURSE SAND, SOFT, MOIST. (CL)	5915	100		HIGH B	6147	40
	2							
		REDDISH-BROWN SILT AND CLAY, TRACE COURSE SAND, SOME FINE SUB-ROUND GRAVEL (<1"), GRAY MOTTLING TO 4.1', STIFF, MOIST. (CL)	6966	90		2ND HIGH X	6119	55
	3							
	4		6250	60				
60"	5		6912	40				
	6		6924	75				
	7		6228	60				
	8		7081	80		HIGH X	6610	54
	9		6207	60		CHEM.	5993	47
60"	10		6242	100				

PROJECT BOTTOM OF BORING AT 10.0'

HOLE NO 1A 4.22

ENG FORM 5056A-R, AUG 94

NOTES:

- OVERCAST, 31°F
- SAMPLE I.D.

TLS-SS-1A4.22(0.0-0.5)021810
TLS-SB-1A4.22(0.5-1.5)021810
TLS-SB-1A4.22(1.5-2.5)021810
TLS-SB-1A4.22(2.5-3.5)021810
TLS-SB-1A4.22(7.0-8.0)021810
TLS-SB-1A4.22(8.0-9.0)021810

- PID READINGS = 0 ppm (VOC's)
- MOVED BOREHOLE APPROX. 5' SOUTH DUE TO TREES
- GAMMA READINGS ARE COUNTS/MIN.

HTRW DRILLING LOG

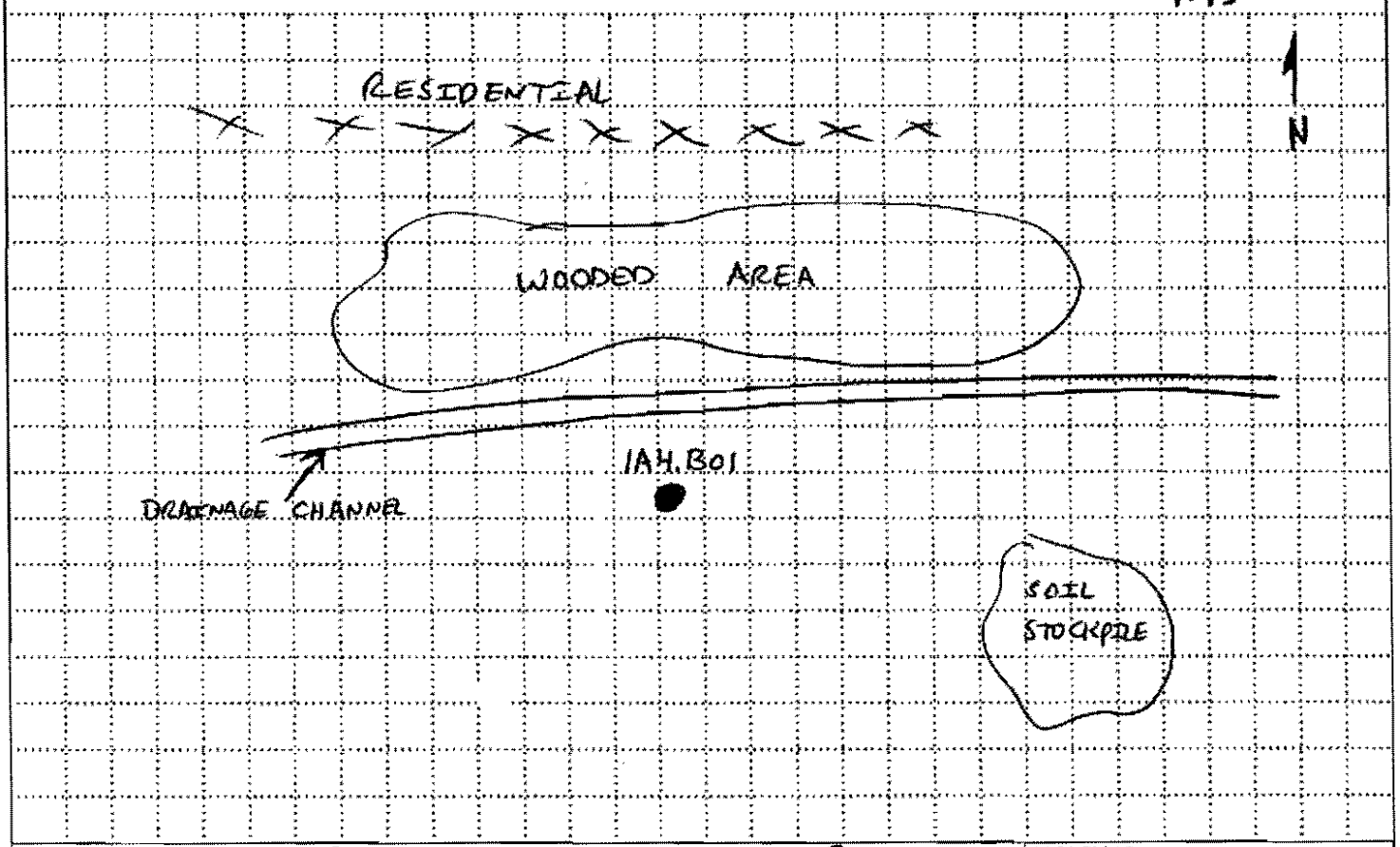
DISTRICT	Buffalo
HOLE NUMBER	1A4.B01
1. COMPANY NAME	ENSOL, INC.
2. DRILLING CONTRACTOR	ZEBRA ENVIRONMENTAL CORP.
SHEET / SHEETS	1 OF 7
3. PROJECT	TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT
4. LOCATION	TONAWANDA LF, TONAWANDA, NY
5. NAME OF DRILLER	PHIL ORSI
6. MANUFACTURER'S DESIGNATION OF DRILL	DT GEOPROBE
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE
8. HOLE LOCATION	N= 1093278.46 E= 1066230.54
9. SURFACE ELEVATION	
10. DATE STARTED	3/9/10 0905
11. DATE COMPLETED	3/9/10 1145
12. OVERBURDEN THICKNESS	38.1'
15. DEPTH GROUNDWATER ENCOUNTERED	18.2' bgs
13. DEPTH DRILLED INTO ROCK	N/A
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	N/A
14. TOTAL DEPTH OF HOLE	55.0'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	N/A

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP / TOTALS	TCLP / TOTALS	SVOC-TCLP / TOTALS	PEST-TCLP / TOTALS	PCB- TOTALS	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23
CUTTINGS DRUMMED	-	-	-	[redacted]

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT	HOLE NO
TON LF- Buffalo DISTRICT FUSRAP PROJECT	1A4.B01

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A4.B01

SHEET 2 OF 7

~~ELEV.~~ REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h)	
	0	NO RECOVERY →						
	1							
	2	FILL: DARK-BROWN CLAY, GRAVEL, WASTE (PLASTIC), MED. STIFF, MOIST.	7961	50		TOP 6"	γ 7410	B 76
	3		7044	55	SEE NOTES			
	4		7700	40		CHEM.	7330	58
42"	5		8413	50		HIGH γ	7300	51
	6	NO RECOVERY →						
	7							
	8	FILL: DARK-AND REDDISH-BROWN CLAY, GRAVEL, WASTE (METAL), SOFT, MOIST	7560	80				
	9		7513	60				
33"	10		7601	50				

PROJECT

HOLE NO 1A4.B01

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A4.B01

SHEET 3 OF 7 SHEETS

REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC REMARKS COUNTS (h)
	10	NO RECOVERY →					
	11	FILL: REDDISH-BROWN CLAY, GRAVEL, ASPHALT, WASTE (ASH), MED. STIFF, MOIST.	7401	40	SEE NOTES		
	12		7969	50			
	13		7737	60			
	14		8346	55			
54"	15		8206	60			
	16						
	17	NO RECOVERY →					
	18						
	19	FILL: WASTE (ASH, GLASS), LOOSE, WET	7786	44		SAT.	X 7512 B 43
20"	20		7619.	60			

PROJECT

HOLE NO 1A4.B01

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: 1A4.B01

PROJECT:

INSPECTOR: D. Popp

SHEET: OF

RECID ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING ~~RESULTS~~ (d) 8	GEOTECH SAMPLE ~~OR CORE BOX NO.~~ (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	20						
	21						
	22	NO RECOVERY →					
	23						
	24						
5"	25	FILL: WASTE (ASH, GLASS), LOOSE, WET	7944	55	SEE NOTE		
	26						
	27	NO RECOVERY →					
	28						
	29						
9"	30	FILL: WASTE (ASH, GLASS), LOOSE, WET.	7933	62			

PROJECT

HOLE NO 1A4.B01

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Poff

HOLE NUMBER 1A4.B01

SHEET 5 OF 7

REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h)	
	30							
	31							
	32							
	33							
	34	NO RECOVERY →						
0"	35							
	36							
	37							
	38							
	39	REDDISH-BROWN SILT AND CLAY, TRACE COURSE SAND AND FINE SUB-ROUND GRAVEL (<½"), SOFT, MOIST (CL)	8010	62	SEE NOTES	NATIVE	γ 7276	B 59
21"	40		8215	75				

PROJECT

HOLE NO 1A4.B01

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. PoPP

HOLE NUMBER 1A4.B01

SHEET 6 OF 7

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN ~~REMARKS~~ STATIC COUNTS (h)
	40						
	41						
	42	NO RECOVERY →					→
	43						
	44						
4"	45	REDDISH-BROWN SILT AND CLAY, TRACE COURSE SAND AND FINE SUB-ROUND GRAVEL (<1/2"), SOFT, MOIST (CL)	7566	55	SEE NOTES		
	46						
	47	NO RECOVERY →					→
	48	REDDISH-BROWN SILT AND CLAY, TRACE COURSE SAND AND FINE SUB-ROUND GRAVEL (<1/2"), SOFT, MOIST (CL)	X 7285	B 49			
	49		7611	50			
26"	50		7945	80		HIGH B	X 7338 B 65

PROJECT

HOLE NO 1A4.B01

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT	INSPECTOR	HOLE NUMBER	SHEET / SHEETS
	D. PoPP	1A4.B01	7 OF 7

RECID (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h)
	50						
	51						
	52	NO RECOVERY →					
	53						
	54						
0"	55						
		BOTTOM of BORING AT 55.0'					
		NOTES:					
	56	- CLEAR, 34°F					
		- SAMPLE I.D.					
		TLS-SS-1A4.B01(1.3-1.8)030910					
	57	TLS-SB-1A4.B01(3.0-4.0)030910					
		TLS-SB-1A4.B01(4.0-5.0)030910					
		TLS-SB-1A4.B01(18.2-19.2)030910					
		TLS-SB-1A4.B01(38.1-39.1)030910					
	58	TLS-SB-1A4.B01(49.0-50.0)030910					
		- PID READINGS = 0ppm (VOC's)					
		- COLLECTED RAD. & CHEM. DUPLICATE,					
	59	MS/MSD, EQUIPMENT AND FIELD BLANK					
		- SOIL READINGS ARE					
	60	COUNTS/MIN.					

PROJECT	HOLE NO
	1A4.B01

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

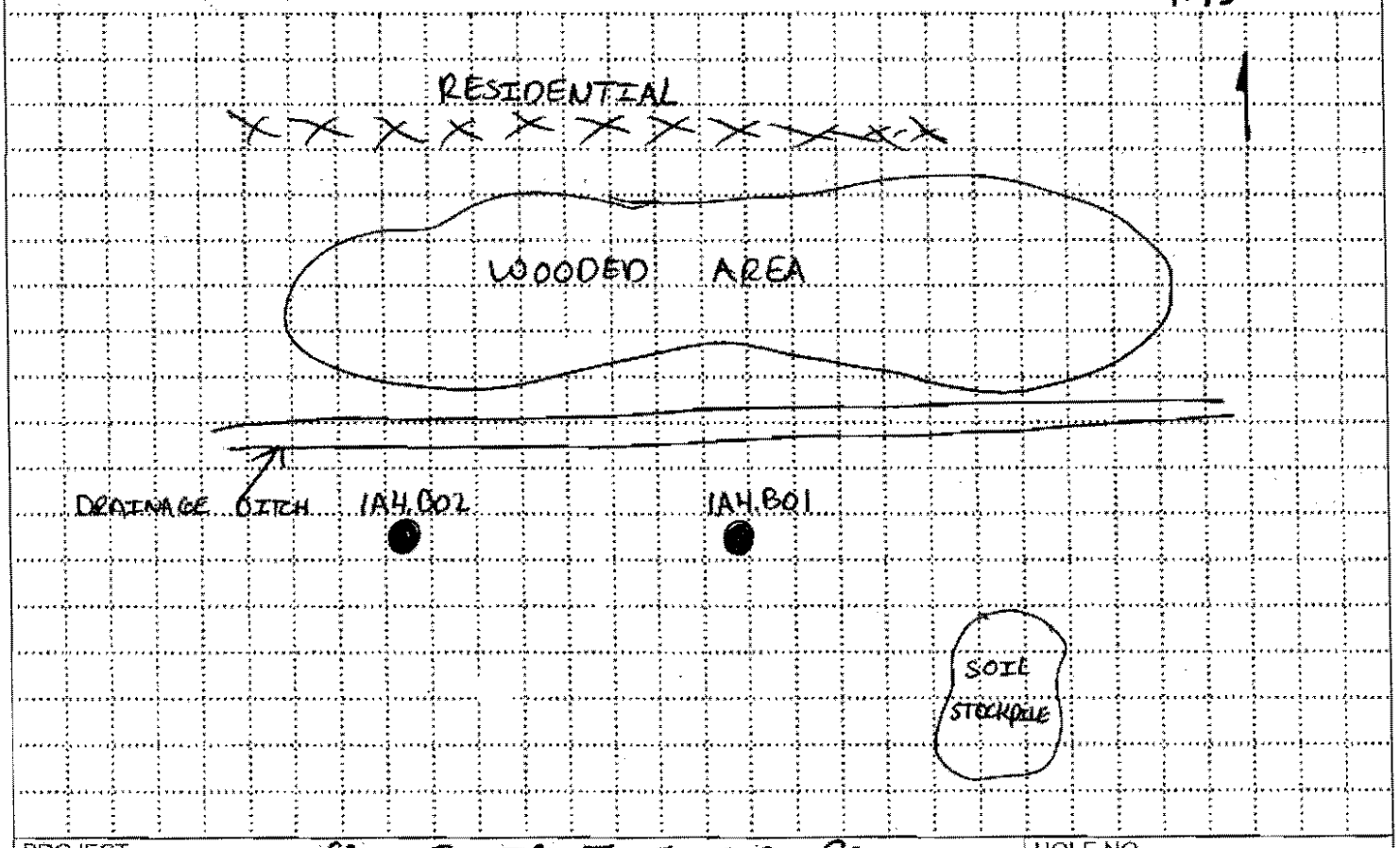
DISTRICT: Buffalo		HOLE NUMBER: 1A4.B02
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 6 SHEETS
3. PROJECT: TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: PHIL ORSI	6. MANUFACTURER'S DESIGNATION OF DRILL: 7720 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE	8. HOLE LOCATION: N= 1093261.86 E= 1066193.70	
	9. SURFACE ELEVATION:	
	10. DATE STARTED: 3/9/10 1345	11. DATE COMPLETED: 3/9/10 1600
12. OVERBURDEN THICKNESS: 46.4'	15. DEPTH GROUNDWATER ENCOUNTERED: 16.8 bgs	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 50.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP / TOTALS	TCLP / TOTALS	PAH-TCLP / TOTALS	PCB-TCLP / TOTALS	PCB-TOTALS	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23 [redacted]
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT	HOLE NO
TON LF - Buffalo DISTRICT FUSRAP PROJECT	1A4.B02

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. POPP

HOLE NUMBER 1A4.B02

SHEET 2 OF 6

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~RESULTS~~ COUNTS (h)
	0						
	1	NO RECOVERY →					
	2						
		FILL: DARK-BROWN CLAY, GRAVEL, SAND, STIFF, MOIST.	8109	40		TOP 6"	X 7815 / B 35
	3		8446	70			
					SEE		
	4		8561	60			
					NOTES		
			7588	70			
36"	5						
	6						
		NO RECOVERY →					
	7						
	8	FILL: DARK-BROWN/REDDISH-BROWN CLAY, GRAVEL, SAND, STIFF, MOIST.	8431	70			
	9		8597	80			
			8703	90			
30"	10						

PROJECT

HOLE NO 1A4.B02

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Poff

HOLE NUMBER 1A4.B02

SHEET 3 OF 6

REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (n)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h) X	B
	10	FILL: REDDISH-BROWN CLAY, GRAVEL, WASTE (ASH), STIFF, MOIST.	8026					
	11							
	12		7995		SEE NOTES			
	13		8948			MS/MSD	8043	71
	14		9378			HIGH X	7774	57
60"	15		8232			CHEM	7689	65
	16	NO RECOVERY →						
	17	FILL: WASTE (ASH), MED. STIFF, WET.	8174					
	18		8660			SAT.	8160	73
	19		9211					
36"	20		8497					

PROJECT

HOLE NO 1A4.B02

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. PoPP

HOLE NUMBER 1A4.B02

SHEET 4 OF 6

RECO ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) 8	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	20						
	21						
	22	NO RECOVERY →					→
	23						
	24	FILL: WASTE (ASH), MED. STIFF, WET	8101	100	SEE NOTES		
13"	25		8395	90			
	26						
	27	NO RECOVERY →					→
	28						
	29	FILL: WASTE (ASH), MED. STIFF, WET	8610	50			
12"	30						

PROJECT

HOLE NO 1A4.B02

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A4.B02

SHEET 5 OF 6

REC ID (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h)
	30						
	31						
	32	NO RECOVERY →					
	33						
	34	FILL: WASTE (ASH), MED. STIFF, WET	7764	70			
8"	35		8179	50	SEE NOTES		
	36						
	37						
	38	NO RECOVERY →					
	39						
0"	40						

PROJECT

HOLE NO 1A4.B02

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A4.B02

SHEET 6 OF 6

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	40						
	41						
	42						
	43	NO RECOVERY →					→
	44						
	45						
	46						
	47	REDDISH-BROWN SILT AND CLAY, TRACE COURSE SAND AND FINE SUB-ROUND GRAVEL (<1/2"), SOFT, MOIST. (CL)	7516	70	SEE NOTES	NATIVE	X 7477 B 72
	48		8241	100			
	49		8373	110			
	50		7829	110		HIGH B	7750 55

PROJECT BOTTOM of BORING AT 50.0'

HOLE NO 1A4.B02

ENG FORM 5056A-R, AUG 94

NOTES:
- CLEAR, 42°F
- SAMPLE I.D.
  TLS-SS-1A4.B02(2.0-2.5)030910
  TLS-SB-1A4.B02(12.0-13.0)030910
  TLS-SB-1A4.B02(13.0-14.0)030910
  TLS-SB-1A4.B02(14.0-15.0)030910
  TLS-SB-1A4.B02(16.8-17.8)030910
  TLS-SB-1A4.B02(46.4-47.4)030910
  TLS-SB-1A4.B02(49.0-50.0)030910
- COLLECTED CHEM DUPLICATE & MS/MSD.
- SOIL READINGS ARE COUNTS/MIN.
- PID READINGS = 0 ppm (VOC's)

HTRW DRILLING LOG

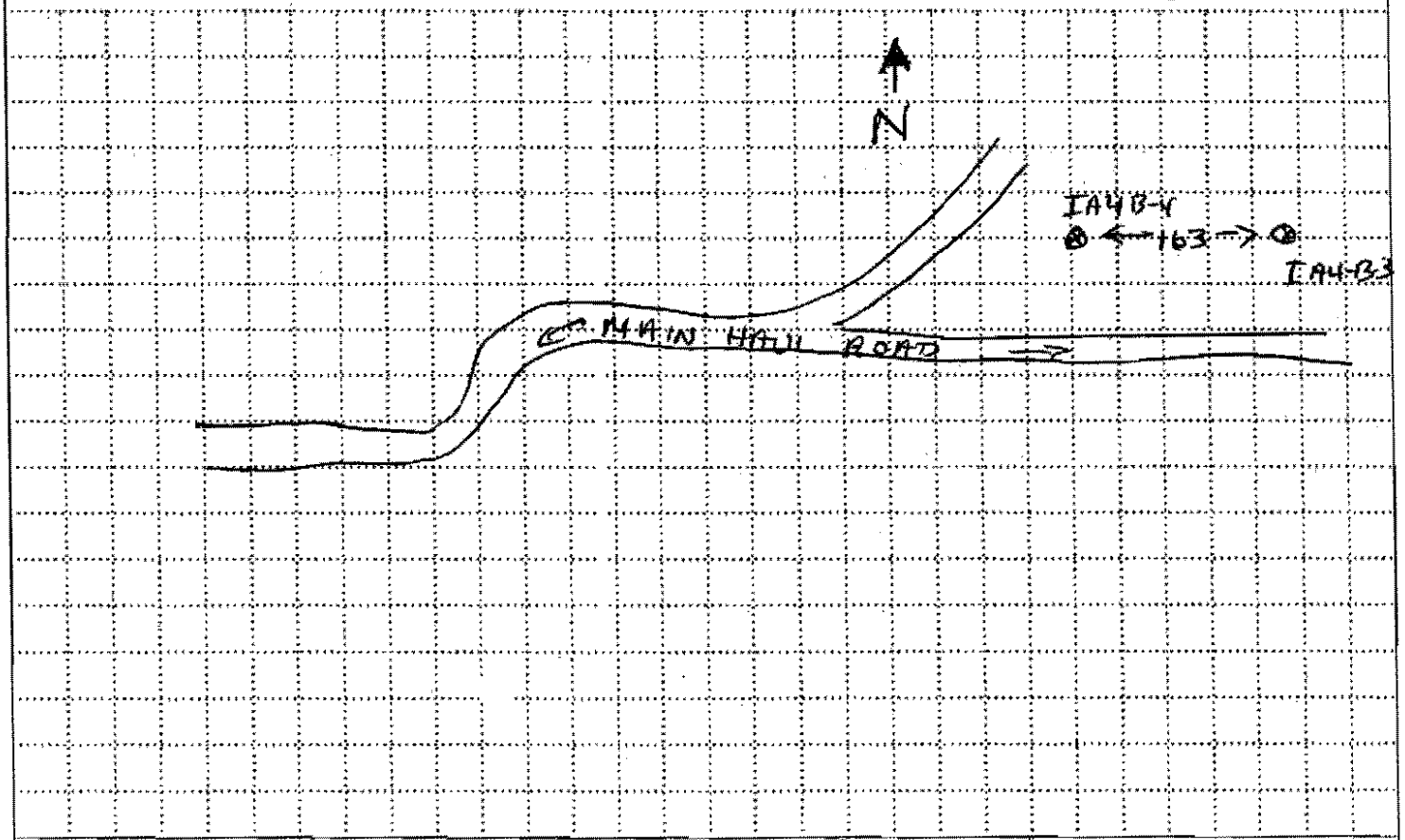
DISTRICT	Buffalo
HOLE NUMBER	IA4-B03
1. COMPANY NAME	ENSOL, INC.
2. DRILLING CONTRACTOR	ZEBRA ENVIRONMENTAL CORP.
SHEET / SHEETS	1 OF 5
3. PROJECT	TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT
4. LOCATION	TONAWANDA LF, TONAWANDA, NY
5. NAME OF DRILLER	JEFF SNYDER
6. MANUFACTURER'S DESIGNATION OF DRILL	6620 DT GEOPROBE
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE
8. HOLE LOCATION	N= 1092952.13 E= 1066517.48
9. SURFACE ELEVATION	
10. DATE STARTED	03-09-10
11. DATE COMPLETED	03-09-10
12. OVERBURDEN THICKNESS	
15. DEPTH GROUNDWATER ENCOUNTERED	17.6'
13. DEPTH DRILLED INTO ROCK	N/A
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	N/A
14. TOTAL DEPTH OF HOLE	35'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	N/A

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	-	-	-	-	-	N/A

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
CUTTINGS DRUMMED	-	-	-	[redacted]

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT TON LF- Buffalo DISTRICT FUSRAP PROJECT HOLE NO. IA4-B03

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

HOLE NUMBER IA4-B03

INSPECTOR J. CHIODO

SHEET 2 OF 5

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h) γ b
	0						
	1	No Recovery →					
	2						
	3		7965	30			
		Fill: Light Brown Clay, small stone, glass, brick, asphalt, dry, hard loose.	8055	40		Top 6"	(2.8-3.3) 7767 / 25
	4		8045	80			
26"	5						
	6	No Recovery →					
	7						
	8						
		Fill: Brown clay with small stones 1/8", concrete, brick, hard, moist.	8142	80			
	9		8107	100			
20"	10						

PROJECT

HOLE NO. IA4-B03

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR J. CHIODO

HOLE NUMBER IA4-B03

SHEET 3 OF 5

~~ELEV~~ REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h) γ b
	10						
			8198	40			
	11						
		FILL: BROWN CLAY, CONCRETE, WASTE (GLASS, ASH, ASHPART MOIST, MED. SOFT	8034	70			
	12						
			7833	90			
	13						
			7924	100			
	14						
			8247	110		H: beta	8048 /42
60"	15						
	16	NO RECOVERY →					
	17						
	18		8132	40		SAT	
		FILL: CLAY, GRAVEL, ½ WASTE (ASH, MILLINGS, GLASS BRICK, WOOD) WET LOOSE.	8139	80		176-186	7965 /33
	19						
			8275	70			
29"	20						

PROJECT

HOLE NO. IA4-B03

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR J. CHIUDO

HOLE NUMBER IA4-B03

SHEET 4 OF 5

RECID (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h)
	20						
	21						
	22	No Recovery →					
	23						
	24						
0"	25						
	26						
	27	No Recovery →					
	28						
	29	FILL: CLAY, GRAVEL, 1/3" GLASS, BRICK, WOOD, WASTE (ASH, MILLING) WET, LOOSE	8538	60		Hi X	
17"	30		8472	80		28.6 - 29.6	7959/57

PROJECT

HOLE NO. IA4-B03

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

HOLE NUMBER IA4-B03

INSPECTOR J. CHIODO

SHEET 5 OF 5

RECID ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	30						
	31						
		No Recovery →					→
	32						
	33						
	34		8266	40			
		Fill: Brown Clay, small Gravel 1/8", Fine Sand, Silt, Moist, Soft	7823	90		NATIVE	(33.8-34.8) 7683 / 52
1511	35	Native @ 33.8'					
		End of Boring @ 35'					
		* 2nd Attempt, Drill Malfunction; @ 30' Moved South 2' from Original IA4B03					
	36	Notes:					
		Sample ID #s					
	37	TLS-SS-IA4B02(2.8-3.3) 030910 (Top 6")					
		TLS-SB IA4B03 (14-15.0) 030910 (Hi beta)					
		TLS-SB IA4B03 (17.6-18.6) 030910 (Sat.)					
	38	TLS-SB IA4B03 (28.6-29.6) 030910 (Hi Gamma)					
		TLS-SB IA4B03 (33.8-39.8) 030910 (Native)					
		PID = 0 ppm (VOCs)					
	39	Groundwater: 17.6'					
		Native: 33.8'					
		Total Recovery: 167"					
	40	Weather - 40° Sunny.					

PROJECT

HOLE NO. IA4-B-03

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

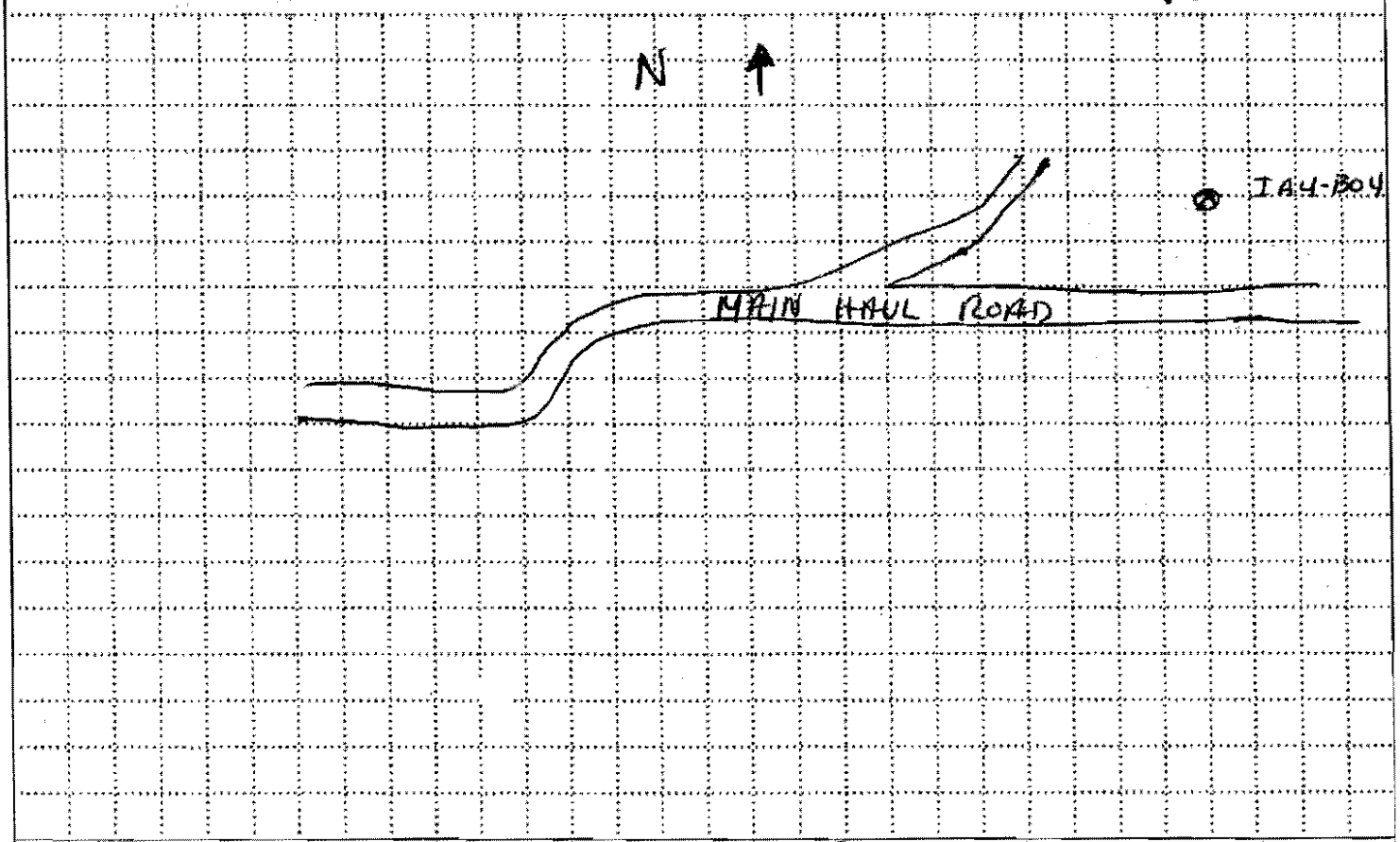
DISTRICT: Buffalo		HOLE NUMBER: IA4-B04
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 6 SHEETS
3. PROJECT: TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: JEFF SNYDER	6. MANUFACTURER'S DESIGNATION OF DRILL: 6620 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE	8. HOLE LOCATION: N= 1092952.13 E= 1066415.19	
	9. SURFACE ELEVATION	
	10. DATE STARTED: 3-09-10	11. DATE COMPLETED: 3-09-10
12. OVERBURDEN THICKNESS	15. DEPTH GROUNDWATER ENCOUNTERED: 28'	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 45'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	-	-	-	-	-	N/A

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SI[redacted]
CUTTINGS DRUMMED	-	-	-	

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT: TON LF- Buffalo DISTRICT FUSRAP PROJECT	HOLE NO. IA4-B04

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR J. PRYCE

HOLE NUMBER IA4-B04

SHEET 2 OF 6

~~ELEV.~~ REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) 8	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h)	REMARKS
	0							
	1	No Recovery →						
	2						8	b
	3	Fill: Dark Brown Clay, gravel, ash, dry, stiff,	8605	80		Top 6"	8112	65
	4		8254	80				
27"	5		8430	100				
	6	No Recovery →						
	7							
	8		8542	90				
	9		8600	80				
30"	10		8508	80				

PROJECT

HOLE NO. IA4-B04

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: IA4-B04

PROJECT:

INSPECTOR: S. PRYCE

SHEET 3 OF 6

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~INCREMENTAL~~ COUNTS (h)
	10						γ b
			8458	115			
	11						
		Fill: WASTE (GLASS, PLASTIC), DARK BROWN CLAY, STIFF, DRY.	8015	140			
	12						
			8376	100			
	13						
			8595	80			
	14						
			8596	80			
60"	15						
	16	No RECOVERY →					
	17						
			8728	80			
	18	Fill: GRAVEL, GREY ASH, CINDER, MOIST CRUMBY ASHPHALT.					
			8831	80		Hi γ	8373 / 49
	19						
			8783	80			
36"	20						

PROJECT:

HOLE NO. IA4-B04

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR S. PRYCE

HOLE NUMBER IA4-B04

SHEET 4 OF 6

RECID ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING ~~RESULTS~~ (d) γ	GEOTECH SAMPLE ~~OR CORE BOX NO.~~ (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h) γ b
	20						
	21						
	22	No Recovery					
	23						
	24						
0"	25						
	26						
	27	No Recovery					
	28						
	29	Fill: Gravel, stone, sandy clay, very moist	8376	90		SAT	8496 / 67
			8343	80			
24"	30						

PROJECT

HOLE NO. IA4-B04

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR S. PRYCE

HOLE NUMBER IA4-B04

SHEET 5 OF 6

RECV'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h) γ b
	30						
	31	No Recovery →					
	32						
	33						
	34	Fill: Grey + Black Ash, Cinders, Clay, Firm, Moist.	8522	150		Hi beta	8461 / 55
			8500	150			
23"	35						
	36	No Recovery →					
	37						
	38						
	39		8735	100			
		Fill: Reddish Brown, Silty Clay, trace coarse sand, Firm, Moist. (CL)	8760	100		NATIVE	8060 / 55
14"	40						

PROJECT

HOLE NO. IA4-B04

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR S. PRYCE

HOLE NUMBER IA4-B04

SHEET 6 OF 6

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN STATIC ~~REMARKS~~ COUNTS (h)
	40						
	41	No Recovery →					
	42						
	43	Fill:	8573	100			
			8312	90			
	44						
			8218	90			
27'	45						
		Bottom of Boring @ 45'					
	46	Notes:					
		Sample ID #s					
	47	TLS-SS-IA4-B04(2.3-2.8)030910 Top 6"					
		TLS-SB-IA4-B04(17.0-18.0)030910 Hi 8					
		TLS-SB-IA4-B04(28.0-29.0)030910 SAT					
		TLS-SB-IA4-B04(33.0-34.0)030910 Hi beta					
	48	TLS-SB-IA4-B04(39.0-40.0)030910 NATIVE					
		Total Recovery:					
	49	Groundwater @ 28'					
		Native @ 38.8'					
		PID - 0 ppm (VOC's)					
	50	Weather - Sunny 47°					

PROJECT

HOLE NO. IA4-B04

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

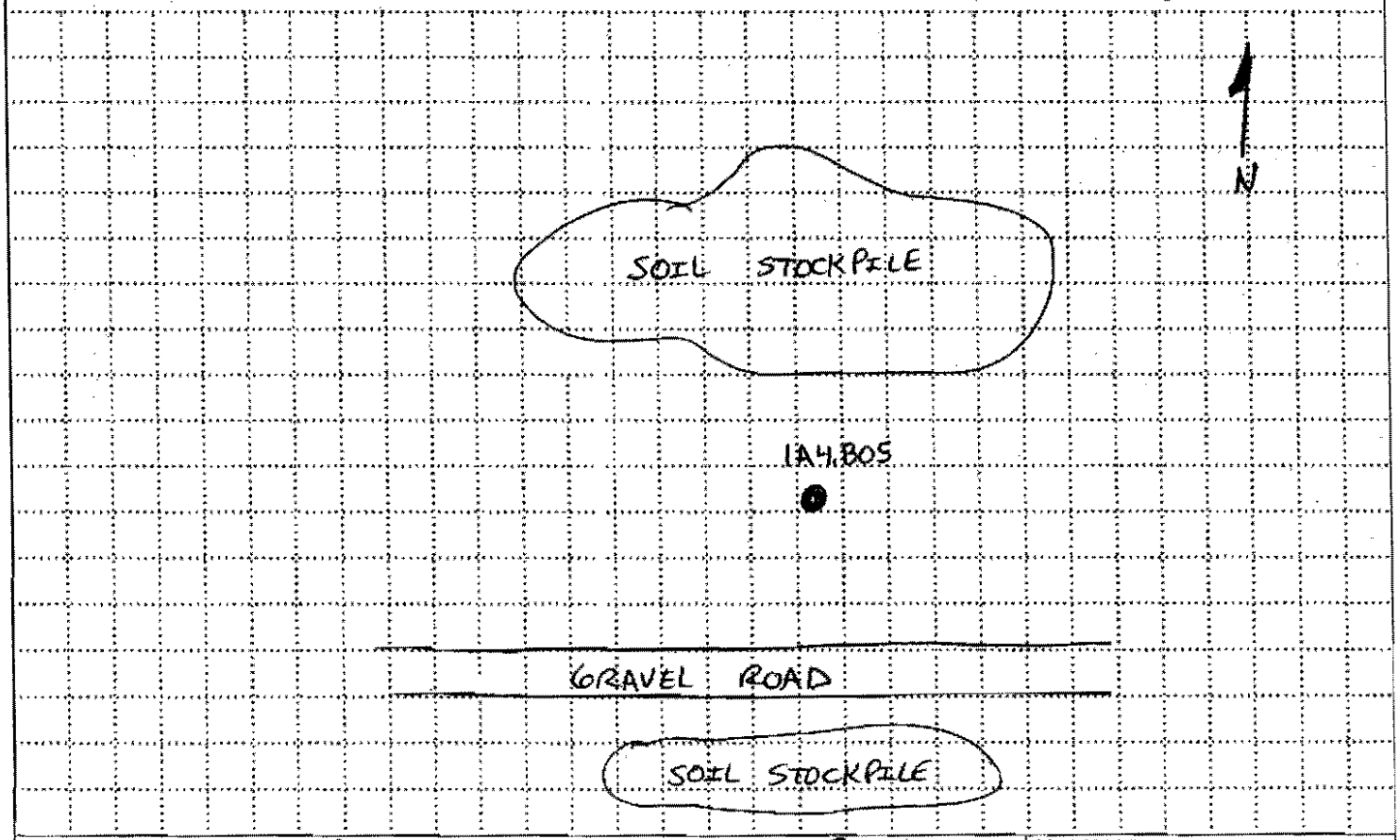
DISTRICT: Buffalo	HOLE NUMBER: 1A4.B05	SHEET 1 OF 3
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	
3. PROJECT: TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: PHIL ORSI	6. MANUFACTURER'S DESIGNATION OF DRILL: DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE	8. HOLE LOCATION: N= 1092841.77 E= 1066596.21	
	9. SURFACE ELEVATION:	
	10. DATE STARTED: 3/10/10 1540	11. DATE COMPLETED: 3/10/10 1635
12. OVERBURDEN THICKNESS: NATIVE NOT ENCOUNTERED (REFUSAL AT 19.0')	15. DEPTH GROUNDWATER ENCOUNTERED: NOT ENCOUNTERED	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 19.0' - REFUSAL	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	-	-	-	-	-	N/A

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23 [redacted]
CUTTINGS DRUMMED	-	-	-	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON LF - Buffalo DISTRICT FUSRAP PROJECT — HOLE NO: 1A4.B05

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. POPP

HOLE NUMBER 1A4.B05

SHEET 2 OF 3

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING ~~RESULTS~~ (d) X	GEOTECH SAMPLE ~~OR CORE BOX NO.~~ (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~READING~~ COUNTS (h) X	B
	0	NO RECOVERY →						
	1	DARK-REDDISH BROWN CLAYEY TOPSOIL, GRAVEL, ROOTLETS, GRASS, SOFT, WET	6347	80		TOP 6"	6071	55
	2	FILL: REDDISH-BROWN CLAY, GRAVEL, ASPHALT, BRICK, STIFF	6238	120		HIGH B	5922	58
	3		6296	90	SEE NOTES	SAT. (2ND HIGH X)	6004	45
	4		6453	70				
55"	5		6306	80				
	6	NO RECOVERY →						
	7	FILL: DARK-BROWN CLAY, GRAVEL, ASPHALT, MED. STIFF, MOIST.	6484	105		HIGH X	5775	56
	8		6456	90				
	9		6322	110				
48"	10		5944	80				

PROJECT

HOLE NO 1A4.B05

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A4.B05

SHEET 3 OF 3

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	10						
	11	NO RECOVERY →					
	12						
	13	FILL: DARK-BROWN CLAY, CONCRETE, BRICK, WASTE (PLASTIC), SOFT, MOIST.	6385	70			
	14		6158	80			
25"	15		6045	80			
	16						
	17	NO RECOVERY →					
	18						
6"	19	FILL: DARK-BROWN CLAY, WOOD, CONCRETE, SOFT, MOIST.	6329	90			
		BOTTOM of BORING AT 19.0'	(REFUSAL)				
		NOTES: - CLEAR, 52° F					
	20						

PROJECT

HOLE NO 1A4.B05

ENG FORM 5056A-R, AUG 94

- SAMPLE I.D.
TLS-SS-1A4.B05(0.3-0.8) 031010
TLS-SB-1A4.B05(1.0-2.0) 031010
TLS-SB-1A4.B05(3.0-4.0) 031010
TLS-SB-1A4.B05(5.9-6.9) 031010
- PID READINGS = 0 ppm (VOC'S)
- SOIL READINGS ARE COUNTS/MIN.
- MOVED 1m EAST of ORIGINAL LOCATION (REFUSAL AT 19.0')

USACE ENG HTRW Forms
Investigative Area 5

HTRW DRILLING LOG

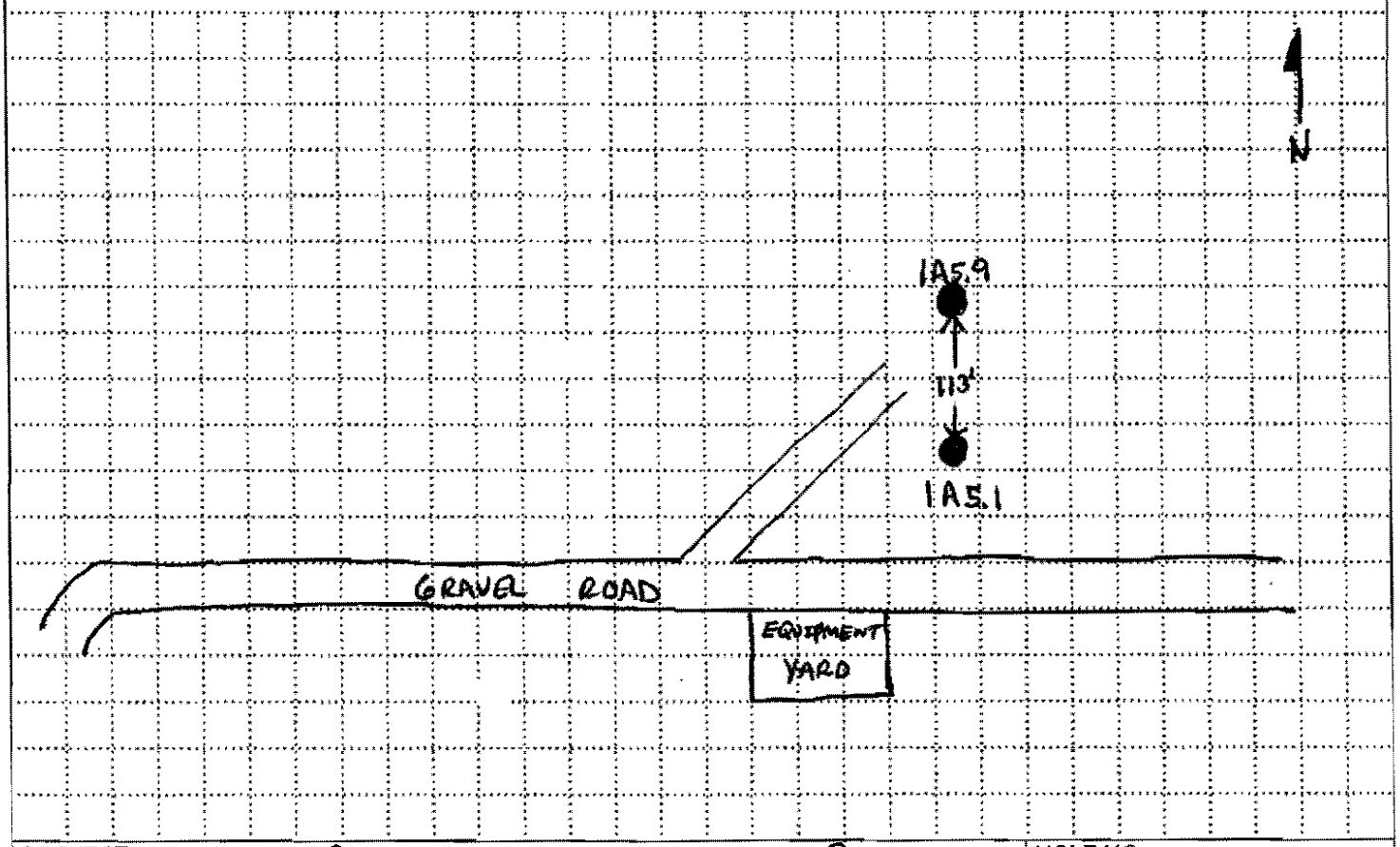
DISTRICT: Buffalo		HOLE NUMBER: 1A5.1
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 2 SHEETS
3. PROJECT: TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: JEFF SNYDER	6. MANUFACTURER'S DESIGNATION OF DRILL: 6620 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE	8. HOLE LOCATION: N= 1092867.41 E= 1066091.9	
	9. SURFACE ELEVATION	
	10. DATE STARTED: 2/25/10 0830	11. DATE COMPLETED: 2/25/10 0915
12. OVERBURDEN THICKNESS: 10.0' - REFUSAL AT 10.0'	15. DEPTH GROUNDWATER ENCOUNTERED: NOT ENCOUNTERED	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 10.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP / TOTALS	TCLP / TOTALS	SVOC-TCLP / TOTALS	PEST-TCLP / TOTALS	PCB-TOTALS	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23 [redacted]
CUTTINGS DRUMMED	-	-	-	

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT: TON LF- Buffalo DISTRICT FUSRAP PROJECT HOLE NO: 1A5.1

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR

HOLE NUMBER 1A5.1

SHEET 2 OF 2 SHEETS

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS ~~REMARKS~~ (h)	
	0							
	1	NO RECOVERY →						
	2	FILL: DARK-BROWN CLAY, GRAVEL, STIFF, MOIST.	5741	30			X	B
						TOP 6"	5839	54
			5928	50				
	3				SEE NOTES			
			5791	40		CHEM.	6054	40
	4							
			5955	40		HIGH X	5773	59
39"	5							
	6							
	7	NO RECOVERY →						
	8							
	9	FILL: DARK-BROWN CLAY, GRAVEL, STIFF, MOIST.	5635	70		HIGH B	5638	57
11"	10							

PROJECT BOTTOM of BORING AT 10.0' (REFUSAL) HOLE NO 1A5.1

ENG FORM 5056A-R, AUG 94

NOTES:

- SNOW, 29°F
- SAMPLE I.D.
  TLS-SS-1A5.1(1.8-2.4)022510
  TLS-SB-1A5.1(3.0-4.0)022510
  TLS-SB-1A5.1(4.0-5.0)022510
  TLS-SB-1A5.1(9.0-10.0)022510
- SOIL READINGS ARE COUNTS/MIN.
- PID READINGS = 0 ppm (VOC's)
- MOVED 1m WEST of ORIGINAL LOCATION

HTRW DRILLING LOG

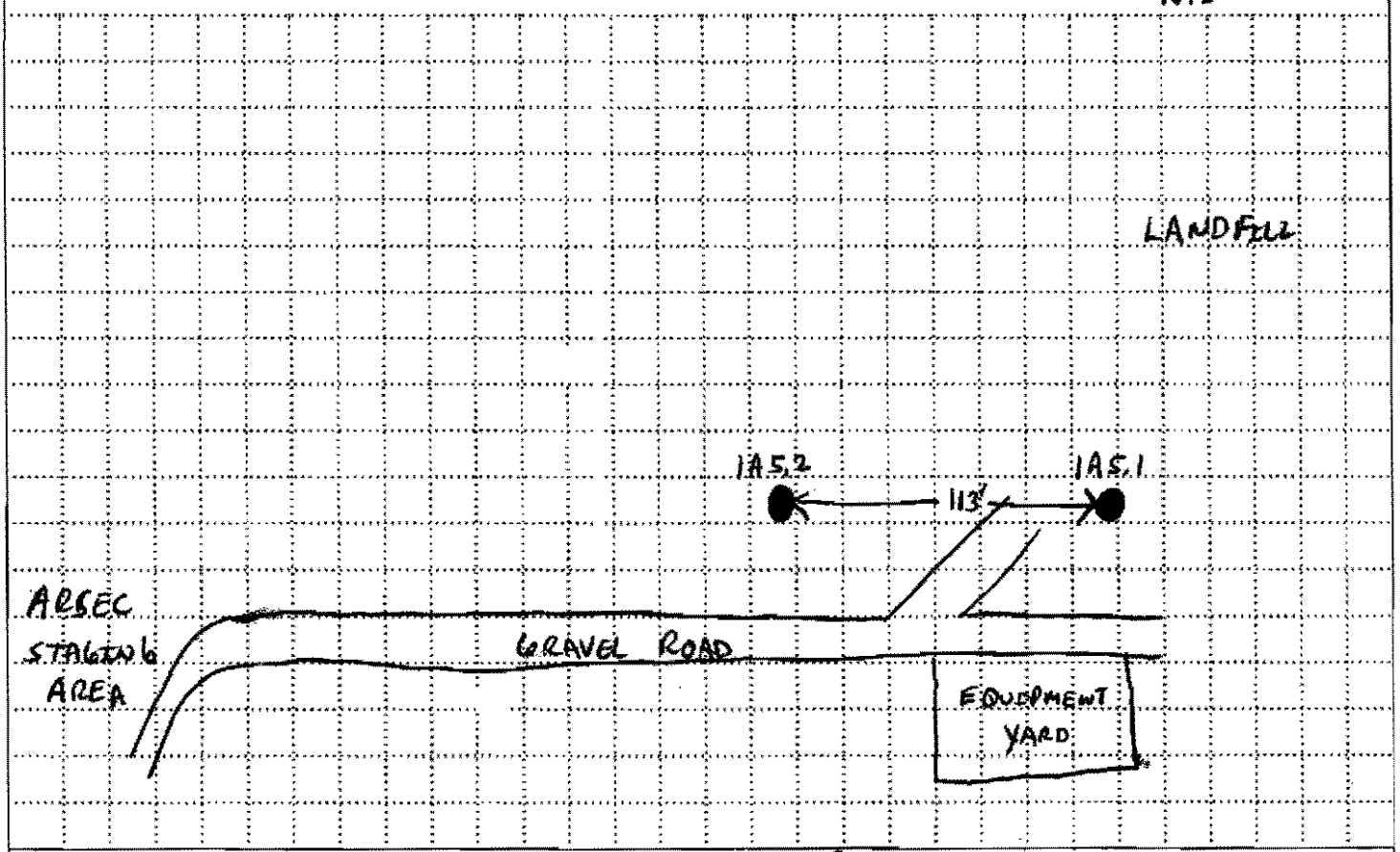
DISTRICT: Buffalo		HOLE NUMBER: 1A5.2
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 7 SHEETS
3. PROJECT: TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: JEFF SNYDER	6. MANUFACTURER'S DESIGNATION OF DRILL: 6620 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE	8. HOLE LOCATION: N= E=	
	9. SURFACE ELEVATION	
	10. DATE STARTED: ~~1/12~~ 2/24/10 1125	11. DATE COMPLETED: 2/24/10 1330
12. OVERBURDEN THICKNESS: 53.5'	15. DEPTH GROUNDWATER ENCOUNTERED: 19.5' bgs	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 60.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP / TOTALS	TCLP / TOTALS	SVOC - TCLP/TOTAL	PEST - TCLP/TOTAL	PCB - TOTALS	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. [redacted]
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT: TON LF - Buffalo DISTRICT FUSRAP PROJECT HOLE NO: 1A5.2

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: 1A5, 2

PROJECT:

INSPECTOR: D. Poff

SHEET 2 OF 7 SHEETS

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	0	NO RECOVERY →					→
	1	FILL: DARK-BROWN CLAY, SOME GRAVEL AND BRICK, STIFF, MOIST.	5103	80		TOP 6"	X 4591 / B 53
	2		5025	70		SEE NOTES	
	3		5049	100			
	4		5143	90			
55"	5		5050	80			
		NO RECOVERY →					→
	6	FILL: DARK-BROWN CLAY, BRICK, SAND, GRAVEL, WASTE (GLASS, METAL), MED. STIFF, MOIST.	5009	70			
	7		4941	40			
	8		5156	70			
	9		4804	80			
52"	10		5071	70			

PROJECT

HOLE NO 1A52

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR: D. Popp

HOLE NUMBER: 1A5.2

SHEET 3 OF 7 SHEETS

~~ELEV.~~ REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	~~REMARKS~~ 1 MIN. STATIC COUNTS (h)	
	10							
	11	NO RECOVERY →					→	
	12							
	13	FILL: DARK-BROWN CLAY, BRICK, SAND, GRAVEL, WASTE (GLASS), LOOSE, MOIST.	2714	80	SEE NOTES			
			5080	100				
	14						X	B
			5187	110		HIGH B	5061	34
30"	15							
	16							
	17	NO RECOVERY →					→	
	18							
	19							
8"	20	FILL: WASTE (GLASS, CLOTH), LOOSE, WET.	4905	110		SAT	X 5084	B 42

PROJECT

HOLE NO 1A5.2

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: 1A5.2

PROJECT

INSPECTOR

SHEET 4 OF 7 SHEETS

~~ELEV.~~ RECID (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. ~~RETAINED~~ STATIC COUNTS (h)
	20						
	21	NO RECOVERY →					→
	22						
	23	FILL: LIGHT BROWN BENTONITE-LIKE SUBSTANCE, SOFT, WET.			SEE NOTES		
	24						
28"	25						
	26						
	27						
	28	NO RECOVERY →					→
	29						
0"	30						

PROJECT

HOLE NO 1A5.2

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: 1A5.2

PROJECT:

INSPECTOR: D. Popp

SHEET 5 OF 7

RECO ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN ~~SEATING~~ STATIC COUNTS (h)
	30						
	31						
	32						
	33						
	34						
0"	35	NO RECOVERY →					
	36						
	37						
	38						
	39						
0"	40						

PROJECT:

HOLE NO: 1A5.2

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT	INSPECTOR	HOLE NUMBER	SHEET	SHEETS
	D. Popp	1A5, 2	6 OF	7

REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h) 1 MIN, STATIC COUNTS
	40						
	41						
	42						
	43						
	44						
0"	45	NO RECOVERY					
	46						
	47						
	48						
	49						
0"	50						

PROJECT	HOLE NO
	1A5, 2

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT	INSPECTOR	HOLE NUMBER	SHEET	SHEETS
	D. Popp	1A5.2	7	7

REC'D ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING ~~RESULTS~~ (d) X	GEOTECH SAMPLE ~~OR CORE BOX NO.~~ (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)	
	50							
	51	NO RECOVERY →						
	52							
	53							
	54	REDDISH-BROWN SILT AND CLAY W/ TRACE of COURSE SAND, SOFT, V. MOIST.	4845	60		NATIVE	X 4843	B 59
16"	55							
	56	NO RECOVERY →						
	57							
	58	REDDISH-BROWN SILT AND CLAY W/ TRACE of COURSE SAND, SOFT, V. MOIST	5214	60		CHEM.	X 4885	B 76
	59		5248	70		HIGH X	4945	68
22"	60							

PROJECT: BOTTOM of BORING AT 60.0'

HOLE NO: 1A5.2

ENG FORM 5056A-R, AUG 94

NOTES:
- CLEAR, 30°F
- SAMPLE I.D.
  TLS-SS-1A5.2(0.4-0.9)022410
  TLS-SB-1A5.2(14.0-15.0)022410
  TLS-SB-1A5.2(19.3-20.0/22.4-22.7)022410
  TLS-SB-1A5.2(53.5-54.5)022410
  TLS-SB-1A5.2(58.0-59.0)022410
  TLS-SB-1A5.2(59.0-60.0)022410
- PID READINGS = 0ppm (VOCs)
- COLLECTED HIGH & DUP.
- MOVED 1M SOUTH of ORIGINAL LOCATION

Corehole IA 5-3

Corehole IA5-3 met refusal at 7 ft and 4 ft. No geologic descriptions were made due to low soil recoveries. No samples were collected.

HTRW DRILLING LOG

DISTRICT	Buffalo
HOLE NUMBER	1A5.4
1. COMPANY NAME	ENSOL, INC.
2. DRILLING CONTRACTOR	ZEBRA ENVIRONMENTAL CORP.
SHEET / SHEETS	1 OF 7
3. PROJECT	TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT
4. LOCATION	TONAWANDA LF, TONAWANDA, NY
5. NAME OF DRILLER	JEff SNYDER
6. MANUFACTURER'S DESIGNATION OF DRILL	6620 DT GEOPROBE
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE
8. HOLE LOCATION	N = 1092832 E = 417427.8
9. SURFACE ELEVATION	634.384
10. DATE STARTED	2/23/10 1405
11. DATE COMPLETED	2/23/10 1630
12. OVERBURDEN THICKNESS	57.4'
15. DEPTH GROUNDWATER ENCOUNTERED	NOT ENCOUNTERED
13. DEPTH DRILLED INTO ROCK	N/A
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	N/A
14. TOTAL DEPTH OF HOLE	60.0'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	N/A

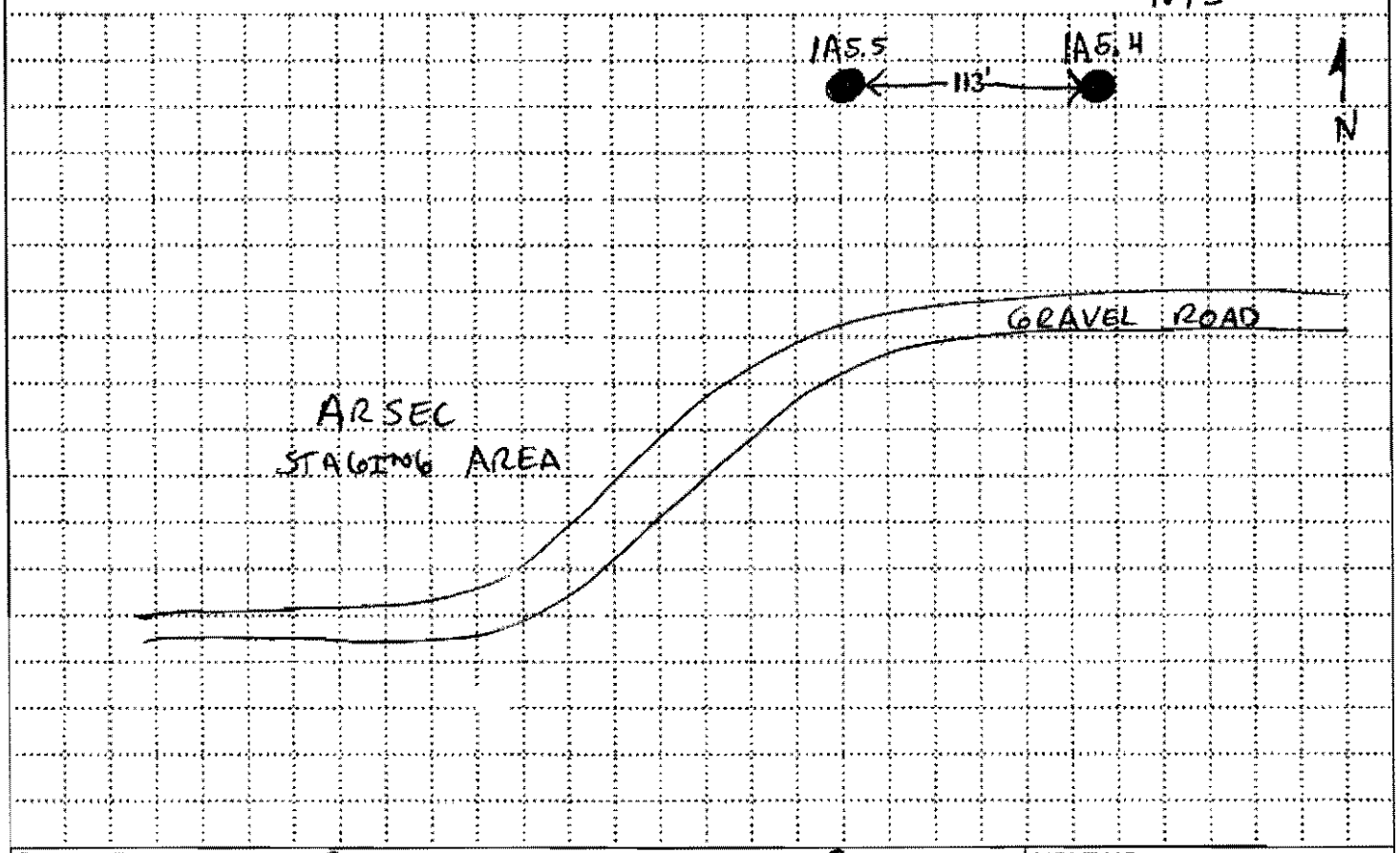
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP / TOTALS	TCLP / TOTALS	SVOC-TCLP / TOTALS	PEST-TCLP / TOTALS	PCB-TOTALS	N/A %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. S[redacted]
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS

SCALE: NTS



PROJECT	TON LF- Buffalo DISTRICT FUSRAP PROJECT
HOLE NO	1A5.4

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. PoPP

HOLE NUMBER 1A5.4

SHEET 2 OF 7

REC'D ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)	
	0–1	NO RECOVERY →					→	
	2	FILL: DARK-BROWN CLAY W/ GRAVEL, WASTE (BRICK, GLASS), MED. STIFF, MOIST	5897	30		TOP 6"	X 5823	B 57
	3		6057	70				
	4	FILL: CONCRETE PIECES	6013	50	SEE NOTES			
42"	5		5998	90				
	6	NO RECOVERY →					→	
	7	FILL: WASTE (CLAY, ASH, BRICK, SAND), LOOSE, MOIST.	6116	60				
	8		6215	50		2ND HIGH X (SAT.)	5958	62
	9		5920	30				
46"	10		5812	80				

PROJECT

HOLE NO 1A5.4

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A5,4

SHEET 3 OF 7 SHEETS

~~ELEV.~~ REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)	
	10	NO RECOVERY →						
	11	FILL: WASTE (CLAY, GRAVEL, SAND, GLASS, ASH), SOFT, MOIST.	6007	60				
	12		6422	100		HIGH B	X 5951	B 57
	13		6092	50	SEE NOTES	CHEM	5751	42
	14		6436	70		HIGH X	5912	57
48"	15	NO RECOVERY →						
	16							
	17							
	18							
	19	FILL: WASTE (CLAY, GRAVEL, SAND, GLASS, ASH), SOFT, MOIST.	5668	40				
21"	20		5874	60				

PROJECT

HOLE NO 1A5,4

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT	INSPECTOR	HOLE NUMBER	SHEET	SHEETS
	D. Popp	1A5,4	4 OF	7

RECID ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	20						
	21						
	22						
	23						
	24	NO RECOVERY →					
0'	25						
	26						
	27						
	28						
	29						
0'	30						

PROJECT	HOLE NO
	1A5,4

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. POPP

HOLE NUMBER 1A5, 4

SHEET 5 OF 7

REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h)
	30						
	31						
	32						
	33						
	34	NO RECOVERY →					
0"	35						
	36						
	37						
	38						
	39						
0"	40						

PROJECT

HOLE NO 1A5, 4

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER 1A5.4

PROJECT

INSPECTOR D. Popp

SHEET 6 OF 7 SHEETS

REC'D ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	40						
	41						
	42						
	43						
	44						
0"	45	NO RECOVERY					
	46						
	47						
	48						
	49						
0"	50						

PROJECT

HOLE NO 1A5.4

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT	INSPECTOR	HOLE NUMBER	SHEET / SHEETS
	D. Popp	1A5.4	7 OF 7

RECID ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)	
	50							
	51							
	52							
	53	NO RECOVERY →						
	54							
0"	55							
	56							
	57							
	58	REDDISH-BROWN SILT AND CLAY WITH TRACE OF COURSE SAND, SOFT, V. MOIST. (CL)	5954	40		NATIVE	X 5828	B 81
	59		6038	90				
30"	60		5743	60				

PROJECT: BOTTOM of BORING AT 60.0'

HOLE NO: 1A5.4

ENG FORM 5056A-R, AUG 94

NOTES:
- CLOUDY, 32°F
- SAMPLE I.D.
  TLS-SS-1A5.4(1.5-2.0)022310
  TLS-SB-1A5.4(7.0-8.0)022310
  TLS-SB-1A5.4(12.0-13.0)022310
  TLS-SB-1A5.4(13.0-14.0)022310
  TLS-SB-1A5.4(14.0-15.0)022310
  TLS-SB-1A5.4(57.4-58.4)022310
- PID READINGS = 0ppm (VOC)
- NO GROUNDWATER ENCOUNTERED SO SAMPLE COLLECTED FROM 2ND HIGHEST X

HTRW DRILLING LOG

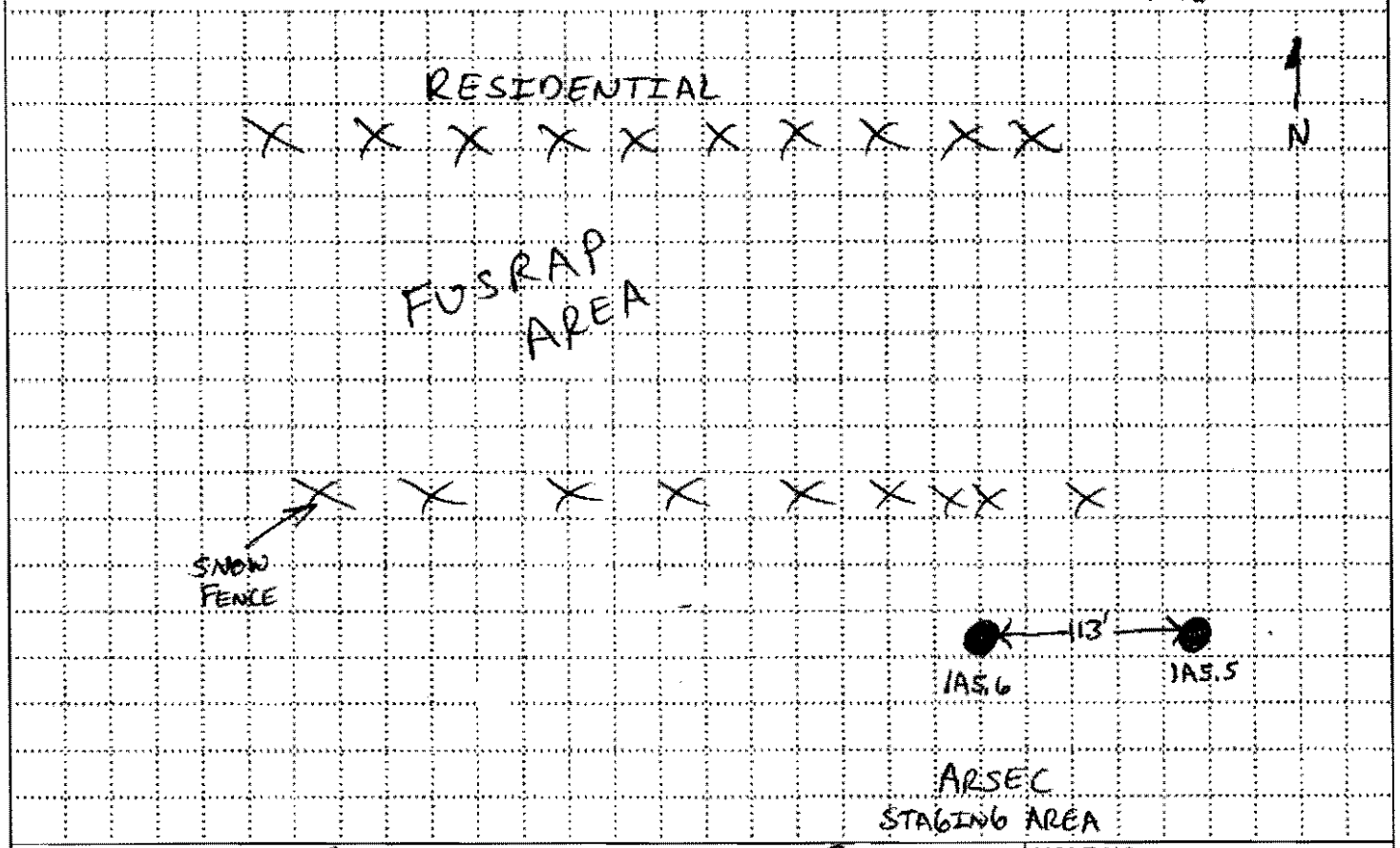
DISTRICT	Buffalo
HOLE NUMBER	1A5.5
1. COMPANY NAME	ENSOL, INC.
2. DRILLING CONTRACTOR	ZEBRA ENVIRONMENTAL CORP.
SHEET / SHEETS	1 OF 5
3. PROJECT	TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT
4. LOCATION	TONAWANDA LF, TONAWANDA, NY
5. NAME OF DRILLER	JEFF SNYDER
6. MANUFACTURER'S DESIGNATION OF DRILL	6620 DT GEOPROBE
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE
8. HOLE LOCATION	N = 1092832 E = 417324.5
9. SURFACE ELEVATION	631.137
10. DATE STARTED	2/23/10 1030
11. DATE COMPLETED	2/23/10 1210
12. OVERBURDEN THICKNESS	34.0'
15. DEPTH GROUNDWATER ENCOUNTERED	18.0' bgs
13. DEPTH DRILLED INTO ROCK	N/A
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	N/A
14. TOTAL DEPTH OF HOLE	40.0'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	N/A

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP / TOTALS	TCLP / TOTALS	SVOC-TCLP/TOTALS	PEST-TCLP/TOTALS	PCB-TOTALS	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23.
CUTTINGS DRUMMED	–	–	–	[redacted]

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT	HOLE NO
TON LF- Buffalo DISTRICT FUSRAP PROJECT	1A5.5

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT	INSPECTOR	HOLE NUMBER	SHEET	SHEETS
	D. Popp	1A5, 5	2 OF	5

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS ~~REMARKS~~ (h) X	B
	0–1	NO RECOVERY					→	
	1–2	FILL: DARK-BROWN CLAY, SOME WASTE (BRICK, CLOTH), MED. STIFF, MOIST.	7481	90		TOP 6"	6714	57
	2–3		7047	60	SEE NOTES			
	3–4		6977	120		HIGH B	6768	66
	4–5		7301	110				
44"	5–6	NO RECOVERY					→	
	6–7							
	7–8	FILL: DARK-BROWN CLAY, SOME WASTE (WOOD CHIPS, CONCRETE, ASH), MED. STIFF, MOIST.	6803	90				
	8–9		6979	70				
31"	9–10		7143	100				

PROJECT

HOLE NO 1A5, 5

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A5,5

SHEET 3 OF 5

RECID ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS ~~REMARKS~~ (h)
	10	NO RECOVERY					→
	11						
	12	FILL: REDDISH-BROWN CLAY, WASTE (ASH, WOOD CHIPS), LOOSE, MOIST.	7040	80	SEE NOTES		
	13		6855	90			
	14		7025	40			
48"	15		7424	90			
	16	NO RECOVERY					→
	17	FILL: DARK-BROWN CLAY, WASTE (WOOD, ASH), LOOSE, WET	7108	60			
	18						X B
	19		7048	40		SAT.	6707 61
35"	20		7250	90			

PROJECT

HOLE NO 1A5,5

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: 1A5, 5

PROJECT:

INSPECTOR: D. Popp

SHEET 4 OF 5 SHEETS

RECID ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS ~~REMARKS~~ (h)
	20						
	21						
	22						
	23						
	24						
0"	25	NO RECOVERY					
	26						
	27						
	28						
	29						
0"	30						

PROJECT:

HOLE NO: 1A5, 5

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. POPP

HOLE NUMBER 1A5.5

SHEET 5 OF 5 SHEETS

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS ~~REMARKS~~ (h)	
	30							
	31	NO RECOVERY →						
	32							
	33							
	34	FILL: WASTE (ASH, PLASTIC), LOOSE, WET.	7369	50				
18"	35	REDDISH-BROWN SILT AND CLAY, TRACE COURSE SAND, SOFT, MOIST (CL)	7316	40		NATIVE	X 6654	B 69
	36	NO RECOVERY →						
	37							
	38	REDDISH-BROWN SILT AND CLAY, TRACE COURSE SAND, SOFT, MOIST (CL)	7408	70		HIGH X	6614	59
	39		7165	50		CHEM.	6751	55
32"	40		7254	70				

PROJECT BOTTOM OF AT 40.0'

HOLE NO 1A5.5

ENG FORM 5056A-R, AUG 94

NOTES:
- CLOUDY, 33° F
- SAMPLE I.D.
  TLS-SS-1A5.5(1.1-1.6)022310
  TLS-SB-1A5.5(3.0-4.0)022310
  TLS-SB-1A5.5(18.0-19.0)022310
  TLS-SB-1A5.5(34.0-35.0)022310
  TLS-SB-1A5.5(37.2-38.2)022310
  TLS-SB-1A5.5(38.2-39.2)022310
- GAMMA COUNTS ARE COUNTS/MIN.
- COLLECTED RAD. & CHEM. DUPLICATES.
- PID READINGS = 0ppm (VOCS)
- REFUSAL AT ORIGINAL LOCATION AT 34.0', MOVED 1M NE.

HTRW DRILLING LOG

DISTRICT: Buffalo	HOLE NUMBER: 1A-5-6	
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 6 SHEETS
3. PROJECT: TOWN of TONAWANDA LF OPERABLE UNIT-Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: Phil Orsi	6. MANUFACTURER'S DESIGNATION OF DRILL: Geoprobe 7720DT	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING, 2" CORE w/ 5' PLASTIC SLEEVE	8. HOLE LOCATION: N 1092832 E 1172178	
	9. SURFACE ELEVATION: 627.573	
	10. DATE STARTED: 2-23-10 2:20pm	11. DATE COMPLETED: 2-23-10 4:45pm
12. OVERBURDEN THICKNESS: 47.1'	15. DEPTH GROUNDWATER ENCOUNTERED: 17.5'	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 50.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

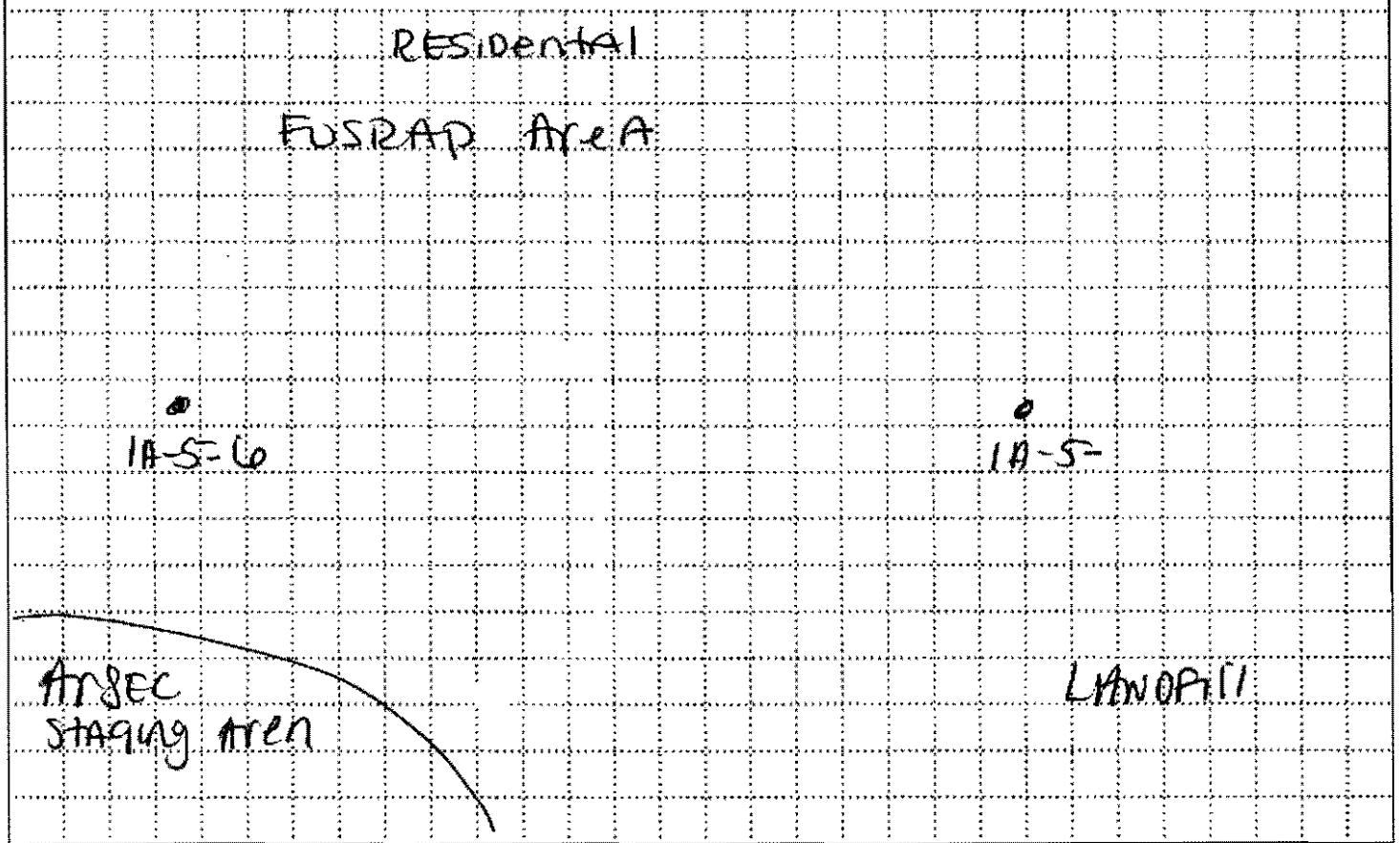
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
6	TCLP TOMM	TCLP TOMM	SVOC TCLP TOMM	DCB 8270M	PEST. TOMM	N/A

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	[redacted]
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS

SCALE:



PROJECT: TON LF- Buffalo DISTRICT FUSRAP PROJECT | HOLE NO. A-5-6

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR: KHOELSCHER

HOLE NUMBER: 1A-S-6

SHEET 2 OF 6

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B/J
	0	NO RECOVERY	NO RECOVERY		SEE NOTES		1min stretic count
	1	Fill: REDISH-brown, silt clay, gravel, w/ organic matter, rootlets, stiff, moist	100	6116			Top 6" 35/5804
			100	5993			
	2						
			60	5971			
	3						
			120	6237			
	4						
Recovery 56"	5		100	6076			
		NO RECOVERY	NO RECOVERY				
		Fill: SAME AS Above					
	6		80	6195			
	7		80	6108			
	8	Fill: ash, brick, concrete, DARK-brown clay, organic matter, loose, moist	80	6177			
	9		120	6189			
Recovery 57"	10		120	6284			High δ 54/5674 Duplicate

PROJECT

HOLE NO. 1A-S-6

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR K Hoelscher

HOLE NUMBER 1A-5-6

SHEET 3 OF 6

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e) γ	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B/γ 1min. Static counts
	10	NO RECOVERY	NO RECOVERY		SEE NOTES		
	11	FILL: SAND, ASH, gravel, silt glass, concrete, waste, redish-brown-orange-red clay, stiff, moist	100	6250			Chemical 62/5823
	12		80	6167			
	13		100	6053			
	14		120	5998			
RECOVERY 54"	15						
	16	NO RECOVERY	NO RECOVERY				
	17						
	18	FILL: SAME AS ABOVE, w/ COURSE SAND, WET-V.WET	120	6203			Saturated 38/5681
	19		100	5977			
RECOVERY 34"	20		140	6085			High B 55/5782

PROJECT

HOLE NO 1A-5-6

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR K Hoelscher

HOLE NUMBER 1A-5-6

SHEET 4 OF 6 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B/2 1min static count
	20				See Note		
	21						
	22	NO RECOVERY	NO RECOVERY				
	23						
	24						
Recovery 6"	25	Fill: continued from previous page	100	6228			
	26						
	27	NO RECOVERY	NO RECOVERY				
	28						
	29						
Recovery 0"	30						

PROJECT

HOLE NO 1A-5-6

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER 1A-5-6

PROJECT

INSPECTOR L Hoelscher

SHEET 5 OF 6 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) PB	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h) B1J 1mm Static count
	30				See Notes		
	31	NO RECOVERY	NO RECOVERY				
	32						
	33						
	34						
RECOVERY 0"	35						
	36						
	37						
	38						
	39						
RECOVERY 4"	40	REDDISH BROWN CLAY W/ COURSE SAND SOFT, STIFF	600	6022			

PROJECT

HOLE NO 1A-5-6

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR: K Hoetscher

HOLE NUMBER: 1A-5-6

SHEET 6 OF 6 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e) J	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B/J 1min Static count
	40						
	41	NO RECOVERY	NO RECOVERY				
	42						
	43						
	44						
Recovery 0"	45						
	46						
	47						
	48	REDISH-brown clay w/ COURSE SAND, SOFT, MOIST-WET	60	6171			Native 65/5915
	49		80	5891			
Recovery 40"	50		120	5872			

PROJECT

HOLE NO 1A-5-6

ENG FORM 5056A-R, AUG 94

Note: Weather: OVERCAST, 30°F
Gamma Reading: count/min
PID Reading: 0ppm

Sample I.D. (RAD ANALYSIS)
TLS-SB-1A-5-6(.4-.9)022310 Top 6"
TLS-SB-1A-5-6(17.2-18.2')022310 Saturated
TLS-SB-1A-5-6(47.1-48.1)022310 Native
TLS-SB-1A-5-6(19-20)022310 High B
TLS-SB-1A-5-6(9-10')022310 High J-Duplicate
TLS-SB-1A-5-6(10.6-11.6)022310 Chemical

HTRW DRILLING LOG

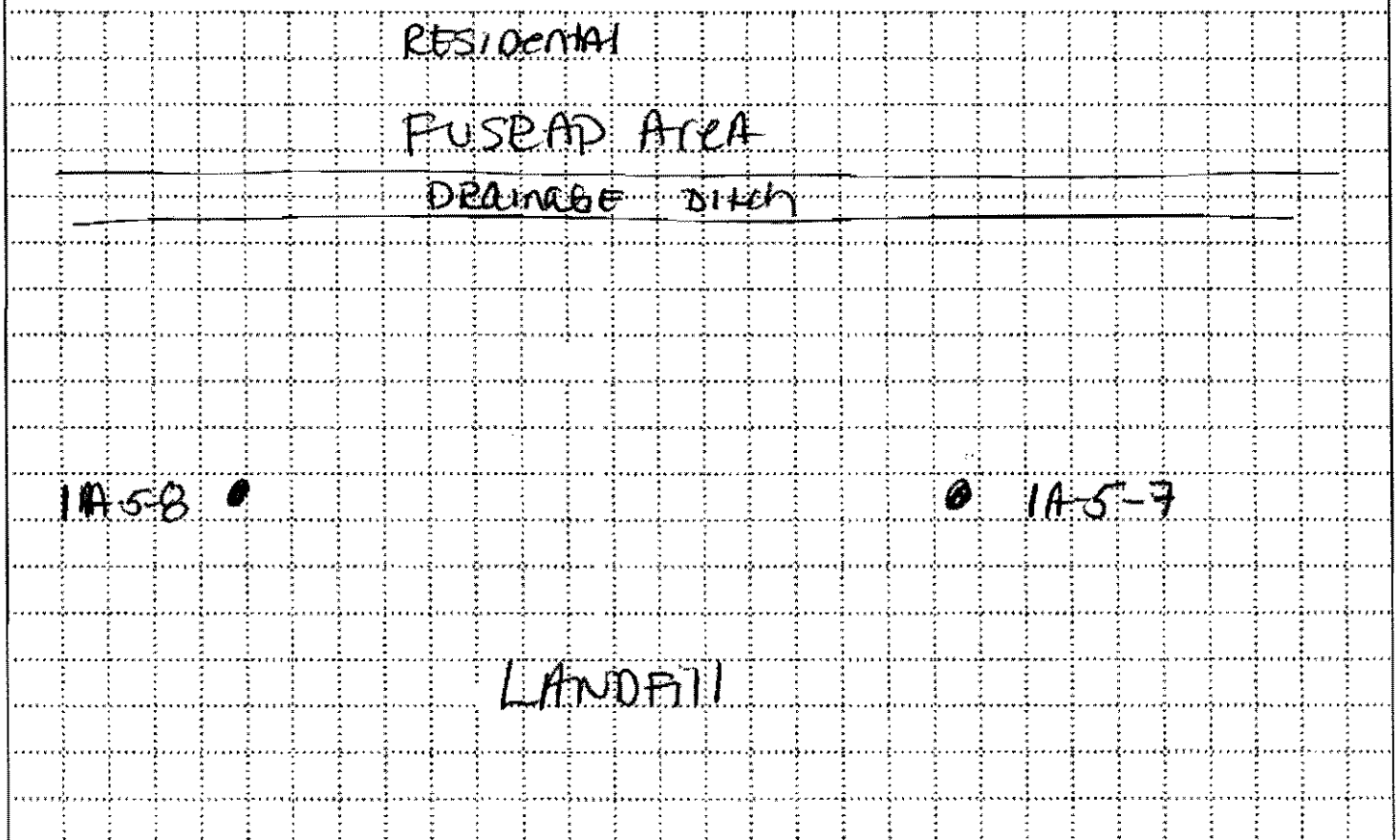
DISTRICT: Buffalo		HOLE NUMBER: 1A-5-7
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 5 SHEETS
3. PROJECT: TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: Phil Orsi	6. MANUFACTURER'S DESIGNATION OF DRILL: Geoprobe 7720DT	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE	8. HOLE LOCATION: N 1092832 E 417118.6	
	9. SURFACE ELEVATION: 622.196	
	10. DATE STARTED: 2-23-10 10:40 Am	11. DATE COMPLETED: 2-23-10 12:10 pm
12. OVERBURDEN THICKNESS: 33.7'	15. DEPTH GROUNDWATER ENCOUNTERED: 9.0'	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 35.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP Total	TCLP Total	SVOC TCLP Total	PCB Total	Pest Total	N/A

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. [redacted]
CUTTINGS DRUMMED				

LOCATION SKETCH/COMMENTS SCALE:



PROJECT: TON LF- Buffalo DISTRICT FUSRAP PROJECT	HOLE NO: 1A5-7

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR K Hoelscher

HOLE NUMBER 1A5-7

SHEET 2 OF 5 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e) J	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B/J 1min Stoppy count
	0	Fill: Reddish-brown clay, sand, waste, wood, ash, glass, gravel, stiff, moist	80	6692	SEE NOTES		Top 60" 7b/6281
	1		100	6972			High J 56/6234
	2		100	6590			
	3		120	6419			High B 64/6138
	4		100	6200			Chemical 60/6011
Recovery 60"	5		80	6347			
	6	NO RECOVERY	NO RECOVERY				
	7						
	8						
	9	▼					Saturated 35/5762
Recovery 19"	10		100	6188			

PROJECT

HOLE NO. 1A5-7

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: 1A-5-7

PROJECT:

INSPECTOR: K Hoelscher

SHEET 4 OF 5

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B 1/4 1mm-Stretecount
	20	NO RECOVERY	NO RECOVERY		See NOTES		
	21						
	22						
	23						
	24						
Recovery OK	25						
	26						
	27						
	28						
	29						
Recovery OK	30						

PROJECT

HOLE NO. 1A-5-7

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER 1A-5-7

PROJECT

INSPECTOR K Hoelscher

SHEET 5 OF 5 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) NB	GEOTECH SAMPLE OR CORE BOX NO. (e) J	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B/J 1 min static count
	30				See NOTES		
	31	NO RECOVERY	NO RECOVERY				
	32						
	33						
	34	REDISH-brown silt, clay w/course sand, gravel (4") moist-wet, soft (CL)	100	5876			Native 43/5810
Recovery 15"	35	Bottom of Boring @ 35.0'					
	36	NOTE: Weather: OVERCAST 30°F Sample I.D. (Lab. Analysis)					
	37	TLS-SS-1A-5-7 (0.0-0.5) 022310	Top 6"				
		TLS-SB-1A-5-7 (33.7-35.0) 022310	Native				
		TLS-SB-1A-5-7 (9.0-10.0') 022310	Saturated				
		TLS-SB-1A-5-7 (2.0-3.0') 022310	High B				
	38	TLS-SB-1A-5-7 (.5-1.5') 022310	High J				
		TLS-SB-1A-5-7 (3.0-4.0) 022310	Chemical				
		- Gamma Reading: Count/min.					
	39	- PID READING: 0 ppm					
	40						

PROJECT

HOLE NO 1A-5-7

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

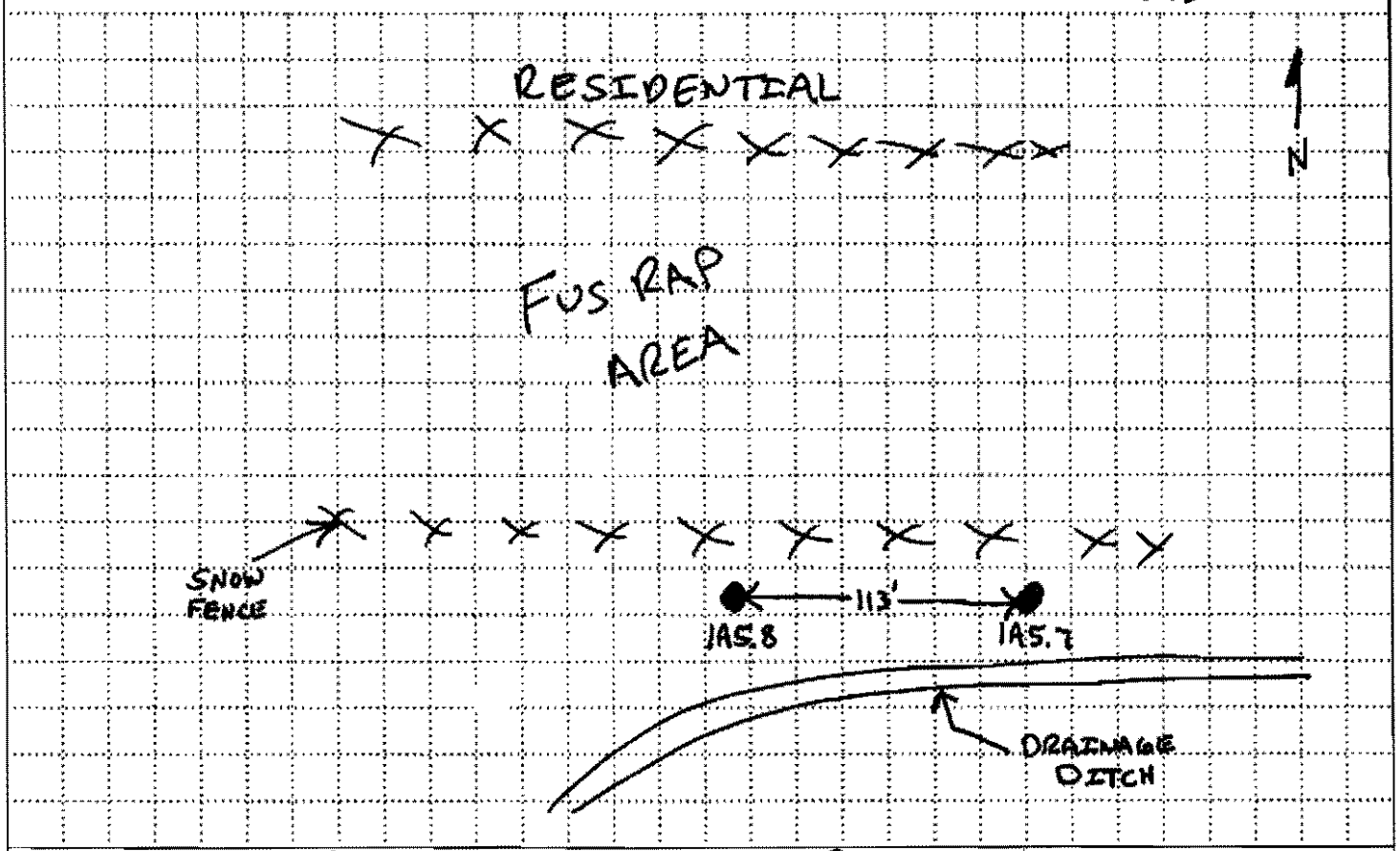
DISTRICT: Buffalo		HOLE NUMBER: 1A5.8
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 6 SHEETS
3. PROJECT: TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: Jeff SNYDER	6. MANUFACTURER'S DESIGNATION OF DRILL: 6620 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE	8. HOLE LOCATION: N = 1092831 E = 417020.5	
	9. SURFACE ELEVATION: 624.255	
	10. DATE STARTED: 2/22/10 1330	11. DATE COMPLETED: 2/22/10 1600
12. OVERBURDEN THICKNESS: 15.0' (NO RECOVERY 15.0'-50.0)	15. DEPTH GROUNDWATER ENCOUNTERED: 13.0 bgs	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 50.0' - BORING TERMINATED	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	–	–	–	–	–	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
CUTTINGS DRUMMED	–	–	–	[redacted]

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON LF - Buffalo DISTRICT FUSRAP PROJECT — HOLE NO: 1A5.8

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. POPP

HOLE NUMBER 1A5.8

SHEET 2 OF 6 SHEETS

RECO ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS REMARKS (h)	
	0	NO RECOVERY →						
	1							
	2	DARK-BROWN CLAY BY TOPSOIL W/ ROOTLETS, STIFF, FROZEN	6641	40		TOP 6"	X 5878	B 63
	3	FILL: REDDISH-BROWN CLAY W/ GRAVEL, MED. STIFF, MOIST.	5752	60	SEE NOTES			
	4		6637	80				
48"	5		6947	110		HIGH B	5854	71
	6	NO RECOVERY →						
	7	FILL: REDDISH-BROWN CLAY W/ GRAVEL, MED. STIFF, MOIST.	6934	80				
			6316 ~~6934~~ DP	~~80~~ DP 70		HIGH X	6250	82
	8		6846 ~~6316~~ DP	90				
	9		6633	80				
37"	10							

PROJECT

HOLE NO 1A5.8

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A5.8

SHEET 3 OF 6

RECOVERY (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h)	
	10							
	11	NO RECOVERY →					→	
	12							
	13	FILL: REDDISH-BROWN CLAY W/GRAVEL, WASTE (ASH, BRICK), LOOSE, WET.	6265	80	SEE NOTES			
			6152	40		SAT.	X 6045	B 54
	14							
			6427	70				
31"	15							
	16							
	17	NO RECOVERY →					→	
	18							
	19							
0"	20							

PROJECT

HOLE NO 1A5.8

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Poff

HOLE NUMBER 1A5,8

SHEET 4 OF 6 SHEETS

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING ~~RESULTS~~ (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	20						
	21						
	22						
	23						
	24	NO RECOVERY →					
0"	25						
	26						
	27						
	28						
	29						
0"	30						

PROJECT

HOLE NO 1A5,8

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A5,8

SHEET 5 OF 6

~~ELEV~~ REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	~~FIELD SCREENING RESULTS~~ (d) X	~~GEOTECH SAMPLE OR CORE BOX NO.~~ (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. ~~REMARKS~~ STATIC COUNTS (h)
	30						
	31						
	32						
	33						
	34						
0"	35	NO RECOVERY					
	36						
	37						
	38						
	39						
0"	40						

PROJECT

HOLE NO 1A5,8

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT	INSPECTOR	HOLE NUMBER	SHEET	SHEETS
	D. Popp	1A5,8	6 OF	6

RECD ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~READING~~ COUNTS (h)
	40						
	41						
	42						
	43						
	44						
0"	45	NO RECOVERY →					
	46						
	47						
	48						
	49						
0"	50						

PROJECT BORING TERMINATED AT 50' DUE TO OBSTRUCTION IN CORE SHOE

HOLE NO 1A5,8

ENG FORM 5056A-R, AUG 94

NOTES:

- FREEZING RAIN, 33°F
- SAMPLE I.D.
  TLS-SS-1A5.8 (1.5-2.0) 022210
  TLS-SB-1A5.8 (4.0-5.0) 022210
  TLS-SB-1A5.8 (6.8-7.8) 022210
  TLS-SB-1A5.8 (13.0-14.0) 022210
- GAMMA READINGS ARE COUNTS/MIN.
- NO CHEM OR DUPLICATE COLLECTED
- PID READINGS = 0 ppm (VOC's)
- REFUSAL AT 27.0' AT ORIGINAL LOCATION, MOVED 1 M EAST.

HTRW DRILLING LOG

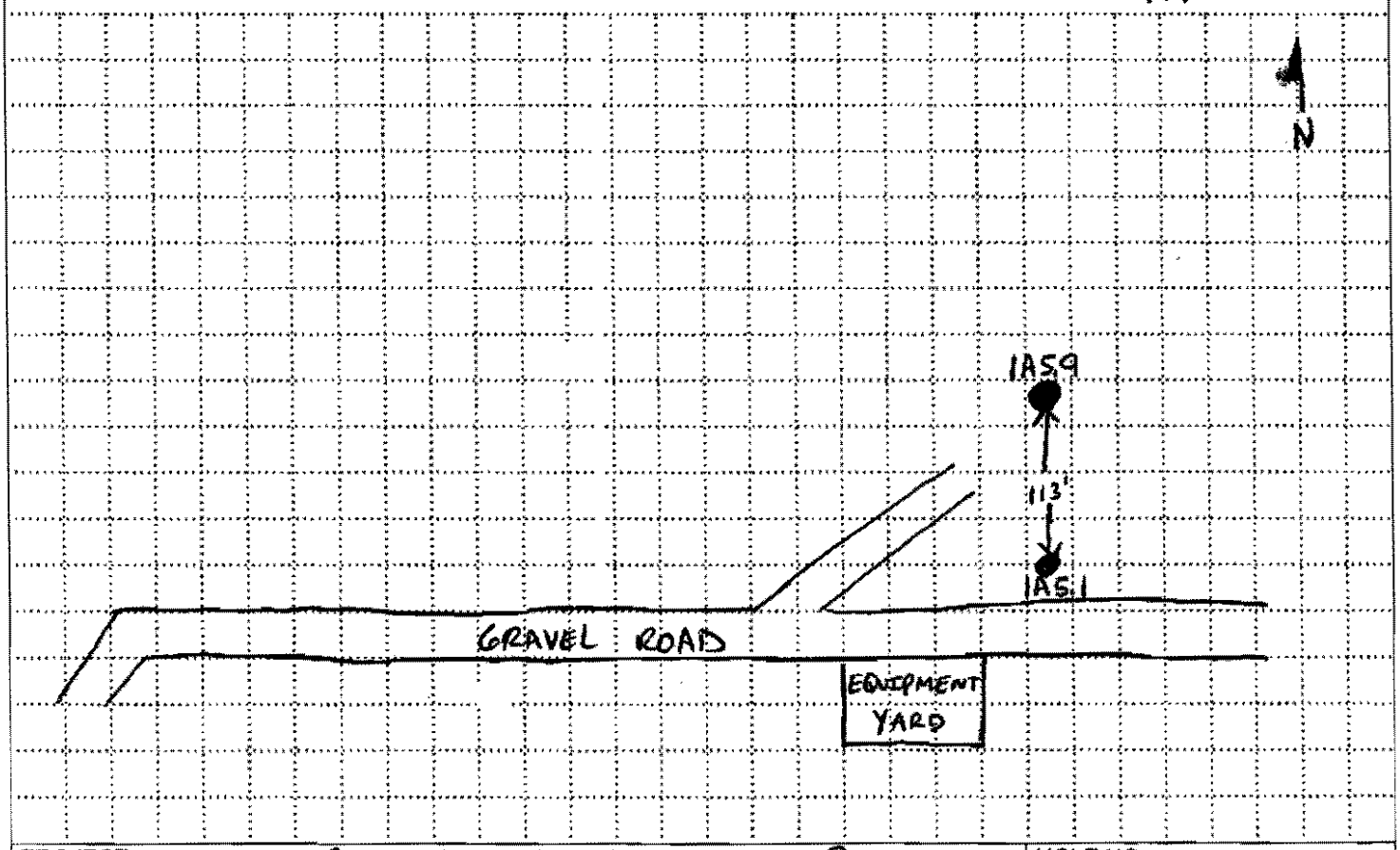
DISTRICT: Buffalo		HOLE NUMBER: 1A5.9
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF SHEETS 9
3. PROJECT: TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: JEFF SNYDER	6. MANUFACTURER'S DESIGNATION OF DRILL: 6620 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE	8. HOLE LOCATION: N = 1092969.63 E = 1066091.9	
	9. SURFACE ELEVATION:	
	10. DATE STARTED: 2/25/10 0930	11. DATE COMPLETED: 2/25/10 1600
12. OVERBURDEN THICKNESS: 63.9'	15. DEPTH GROUNDWATER ENCOUNTERED: 29.0' bgs	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 75.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP / TOTALS	TCLP / TOTALS	SVOC-TCLP / TOTALS	PEST-TCLP / TOTALS	PCB- TOTALS	N/A

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	[redacted]	[redacted]
CUTTINGS DRUMMED	-	-	-		

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT: TON LF- Buffalo DISTRICT FUSRAP PROJECT HOLE NO: 1A5.9

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A5.9

SHEET 2 OF 9

REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h)
	0	NO RECOVERY →					→
	1	FILL: DARK-BROWN CLAY, ORGANIC MATERIAL, BRICK, GRAVEL, WASTE (PLASTIC, GLASS), STIFF, MOIST.	6868	30		TOP 6"	X 6313 B 81
	2		6742	60			
	3		6955	40	SEE NOTES		
	4		6653	70			
49"	5		6747	90			
	6	NO RECOVERY →					→
	7	FILL: REDDISH-BROWN CLAY, GRAVEL, SAND, WASTE (PLASTIC), MED. STIFF, MOIST.	6402	60			
	8		6643	100			
	9		6454	90			
40"	10		6660	90			

PROJECT

HOLE NO 1A5.9

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. POPP

HOLE NUMBER 1A5.9

SHEET 3 OF 9

REC'D ~~BLOW~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)	
	10							
	11	NO RECOVERY →					→	
	12	FILL: SAND (STRONG HYDROCARBON ODOR), LOOSE, MOIST						
		FILL: WASTE (ROOFING MATERIAL), DARK-BROWN CLAY, MED. STIFF, MOIST.	6875	90		CHEM.	X 6539	B 77
	13		6467	110	SEE NOTES	HIGH B	6593	83
	14		6691	100				
36"	15							
	16	NO RECOVERY →					→	
	17	FILL: DARK-BROWN CLAY, WOOD CHIPS, WASTE (PLASTIC), MED. STIFF, MOIST.	6701	50				
	18		6743	70				
	19		6915	90				
42"	20		6940	60				

PROJECT

HOLE NO 1A5.9

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. POPP

HOLE NUMBER 1A5.9

SHEET 4 OF 9

RECO (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h)	
	20							
	21							
	22	NO RECOVERY →						
	23							
	24	FILL: WASTE (ASH, GLASS), LOOSE, MOIST	7075	40	SEE NOTES	HIGH X	X 6512	B 74
			6628	60				
14"	25							
	26	NO RECOVERY →						
	27							
	28							
	29							
		FILL: WASTE (ASH, METAL), LOOSE, WET.	7108	80		SAT.	X 6957	B 64
12"	30							

PROJECT

HOLE NO 1A5.9

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A5.9

SHEET 5 OF 9

RECID ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1MIN. STATIC ~~REMARKS~~ COUNTS (h)
	30						
	31						
	32						
	33						
	34						
0"	35	NO RECOVERY →					
	36						
	37						
	38						
	39						
0"	40						

PROJECT

HOLE NO 1A5.9

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A5,9

SHEET 6 OF 9

RECID ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	~~FIELD SCREENING RESULTS~~ (d) X	~~GEOTECH SAMPLE OR CORE BOX NO.~~ (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1MIN. STATIC ~~REMARKS~~ COUNTS (h)
	40						
	41						
	42						
	43						
	44						
0"	45	NO RECOVERY →					
	46						
	47						
	48						
	49						
0"	50						

PROJECT

HOLE NO 1A5,9

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT	INSPECTOR D. Popp	HOLE NUMBER 1A59
		SHEET 7 OF 9

REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1MIN STATIC COUNTS (h)
	50						
	51						
	52						
	53						
	54						
0"	55	NO RECOVERY →					
	56						
	57						
	58						
	59						
0"	60						

PROJECT	HOLE NO 1A5.9

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. PoPP

HOLE NUMBER 1A5.9

SHEET 8 OF 9 SHEETS

REC'O (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h)	
	60							
	61							
	62	NO RECOVERY →						
	63							
	64	REDDISH-BROWN SILTY AND SAND, SOME FINE GRAVEL (<1"), SOFT, MOIST. (SM)	66636	110	SEE NOTES	NATIVE	X 64114	B 66
13"	65							
	66							
	67							
	68	NO RECOVERY →						
	69							
0"	70							

PROJECT

HOLE NO 1A5.9

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. POPP

HOLE NUMBER 1A5.9

SHEET 9 OF 9 SHEETS

REC'D ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	70	REDDISH-BROWN SILT AND CLAY, SOFT, WET (CL)	6591	60			
	71		6755	40			
	72		6678	90			
	73		6675	100			
	74		6592	100			
	75	BOTTOM of BORING AT 75.0'					
	76	NOTES:					
		- SNOW, 30°F					
		- SAMPLE I.D.					
	77	TLS-SS-1A5.9(0.7-1.3)022510					
		TLS-SB-1A5.9(12.0-13.0)022510					
		TLS-SB-1A5.9(13.0-14.0)022510					
		TLS-SB-1A5.9(23.5-24.5)022510					
	78	TLS-SB-1A5.9(29.0-30.0)022510					
		TLS-SB-1A5.9(63.9-64.9)022510					
	79	- CHEM. DUPLICATE COLLECTED					
		- PID READINGS = 0 ppm (VOC's), EXCEPT 12.0'-12.3' (5.1 ppm)					
	80	- SOIL READINGS ARE COUNTS/MIN.					

PROJECT

HOLE NO 1A 5.9

ENG FORM 5056A-R, AUG 94

~~NO~~

HTRW DRILLING LOG

DISTRICT: Buffalo		HOLE NUMBER: 1A-5-10
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 3 SHEETS
3. PROJECT: TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: Phil Orsi	6. MANUFACTURER'S DESIGNATION OF DRILL: Geoprobe 7720DT	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE	8. HOLE LOCATION: N 109293.2 E 417631.2	
	9. SURFACE ELEVATION: 637.258	
	10. DATE STARTED: 2-25-10 10:15am	11. DATE COMPLETED: 2-25-10 11:30am
12. OVERBURDEN THICKNESS: 20.0'	15. DEPTH GROUNDWATER ENCOUNTERED: NOT encountered	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 20.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

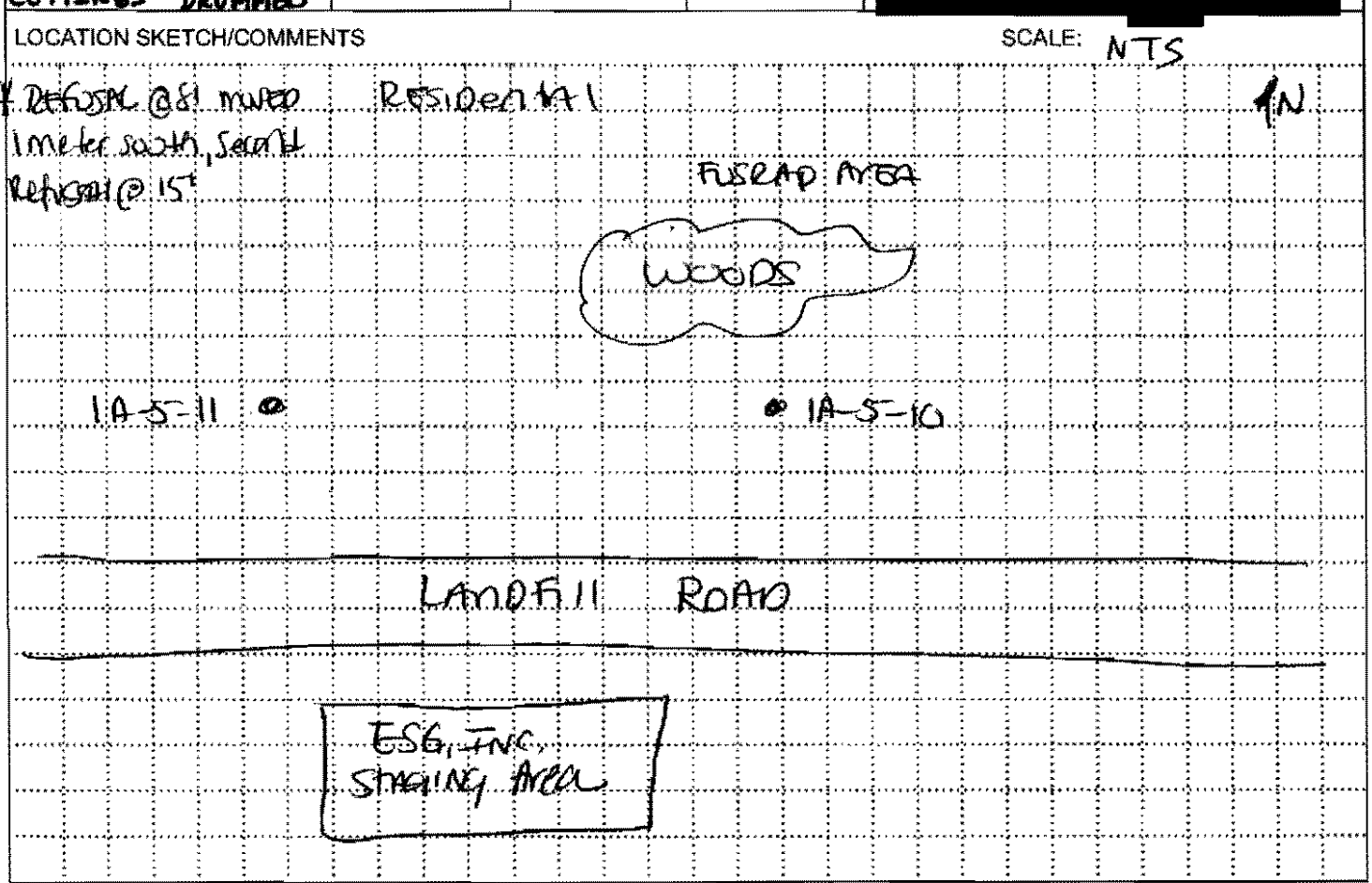
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP TOTAL	TCLP TOTAL	PCB TOTAL	Pest. TOTAL	SVOC TOTAL	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)
CUTTINGS DRUMMED	—	—	—

[redacted]

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON LF - Buffalo DISTRICT FUSRAP PROJECT — HOLE NO. 1A-5-10

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR: K Hoelscher

HOLE NUMBER: 1A-5-10

SHEET 2 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e) J	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B/J Imn stain count
	0	NO Recovery	NO Recovery		See Notes		
	1	Fill: Black clay, gravel, Brick, concrete, glass, stiff, moist	100	6976			Expl 56/6622
	2		90	7191			
	3		100	7223			
	4		150	7210			High B 53/7393
	5		130	7114			
	6	NO Recovery	NO Recovery				
	7						
	8	Fill: Silt, sand, clay, wood, gravel, some waste, some Rubber, stiff moist	100	7142			Native 66/7011 Sub.
	9		100	7084			Saturated 67/6963 Sub.
	10		60	7186			

PROJECT

HOLE NO. 1A5-10

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR K Hoelscher

HOLE NUMBER 1A5-10

SHEET 3 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) PB	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS 8/8 1min ~~state~~ count
	10						
		NO RECOVERY	NO RECOVERY				
	11						
	12						
		Fill continued from previous page, Reddish-brown clay, stiff moist					
	13		60	7061			
	14		140	7199			
	15		140	7291			High δ 59/6678 Duplicate
	16	NO RECOVERY	NO RECOVERY				
	17						
	18						
	19						
		Fill: same as above					
	20		60	7057			Chemical 57/6386

PROJECT Bottom of Boring @ 20.0' - REFUSAL @ 20.0'

HOLE NO 1A-5-10

ENG FORM 5056A-R, AUG 94

NOTES: Weather: Snow 25°F
- Gamma Readings: count/min
- PID reading = 0ppm
- Refusal encountered @ 8'

Sample ID (QA Analysis)
TLS-SB-1A5-10 (0.8-1.3) 022570 Top 6'
TLS-SB-1A5-10 (3.3-4.3) 022570 High B
TLS-SB-1A5-10 (14.0-15.0) 022570 High δ, Duplicate
TLS-SB-1A5-10 (14.0-20.0) 022570 Chemical
TLS-SB-1A5-10 (8.1-9.1) 022570 Saturated (H.P sub.)
TLS-SB-1A5-10 (7.1-8.1) 022570 Negative (H.P sub.)

Offset 10 meter south. Data in above. Second refusal @ 15.0'

J-545

HTRW DRILLING LOG

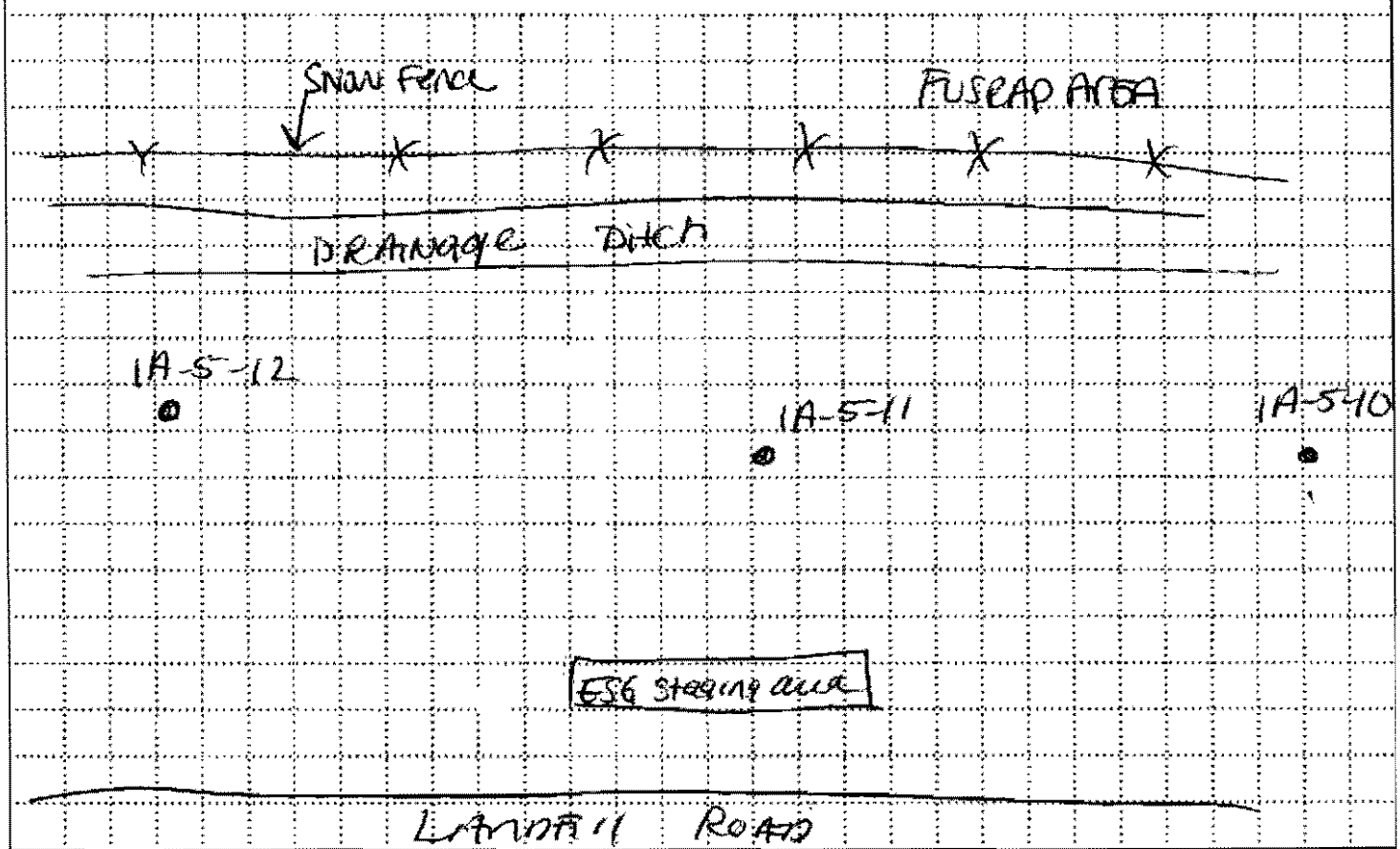
DISTRICT: Buffalo	HOLE NUMBER: 1A5-11	
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 3
3. PROJECT: TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: Phil Orsi	6. MANUFACTURER'S DESIGNATION OF DRILL: Geoprobe 7720DT	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE	8. HOLE LOCATION: N 1092926 E 417527.9	
	9. SURFACE ELEVATION: 633.965	
	10. DATE STARTED: 2-24-10 9:00AM	11. DATE COMPLETED: 2-24-10 10:15AM
12. OVERBURDEN THICKNESS: 15.0'	15. DEPTH GROUNDWATER ENCOUNTERED: NOT ENCOUNTERED	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 15.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP 10ml	TCLP 10ml	SVOC TCLP 10ml	PCB total	Oil 10ml	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
CUTTINGS DRUMMED	—	—	—	[redacted]

LOCATION SKETCH/COMMENTS — SCALE:



PROJECT	HOLE NO
TON LF- Buffalo DISTRICT FUSRAP PROJECT	1A5-11

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR K HOELSCHER

HOLE NUMBER 1A-S-11

SHEET 2 OF SHEETS 3

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) PID	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h) Bld Immunochem cont
	0				See Notes		
	1	NO RECOVERY	NO RECOVERY				
	2						
		Fill: WASTE, glass, gravel (<2"), black clay, silt, stiff, moist	80	6830			Top 6" 41/6736
	3		80	6513			
	4						High B 56/6736
	5		140	6524			
	6	NO RECOVERY	NO RECOVERY				
	7						
	8	Fill: Same as above, w/concrete, moist, stiff	60	6618			
	9		100	6752			
	10		80	6595			

PROJECT

HOLE NO. 1A-S-11

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR: Y Hoelscher

HOLE NUMBER: 1A-5-11

SHEET 3 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e) γ	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B/γ 1 min static count
	10	NO RECOVERY	NO RECOVERY		See Notes		
	11	Fill: Continue from previous page	60	6651			Chemical 47/6452
	12		60	6894			High γ 50/6453
	13		80	6704			Saturation (HP saturate) 33/6573
	14		100	6719			Native (HP saturate) 50/6384
	15	Bottom of Boring @ 15.0' Refusal @ 15.0'					
		NOTE:					
	16	Weather: overcast, 25°F					
		PID reading - 0ppm					
		Gamma reading = 100 cnt/min					
	17	Refusal @ 15' for 1st attempt, moved 1 meter south for second attempt Refusal met @ 15' - second attempt					
		Sample ID (end. Analysis)					
	18	TCS-SS-1A5-11 (2.0-2.5') 022510	Top 6"				
		TCS-SB 1A5-11 (11.7-12.7') 022510	High γ				
		TCS-SB 1A5-11 (10.7-11.7') 022510	Chemical				
		TCS-SB 1A5-11 (3.5-5.0') 022510	High B				
	19	TCS-SB 1A5-11 (13.0-14.0') 022510	Saturated - H.P. pick				
		TCS-SB 1A5-11 (14.0-15.0') 022510	Native - H.P. pick				
		- NO SATURATION or native material encountered					
	20						

PROJECT

HOLE NO. 1A-5-11

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

DISTRICT: Buffalo	HOLE NUMBER: 1A-5-12	
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 7 SHEETS
3. PROJECT: TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: Phil Orsi	6. MANUFACTURER'S DESIGNATION OF DRILL: Geoprobe 7720DT	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE	8. HOLE LOCATION: N 1092934 E 417557.5	
	9. SURFACE ELEVATION: 635.482	
	10. DATE STARTED: 2-24-10 10:35	11. DATE COMPLETED: 2-24-10
12. OVERBURDEN THICKNESS: 58.0'	15. DEPTH GROUNDWATER ENCOUNTERED: 23.0'	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 60.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

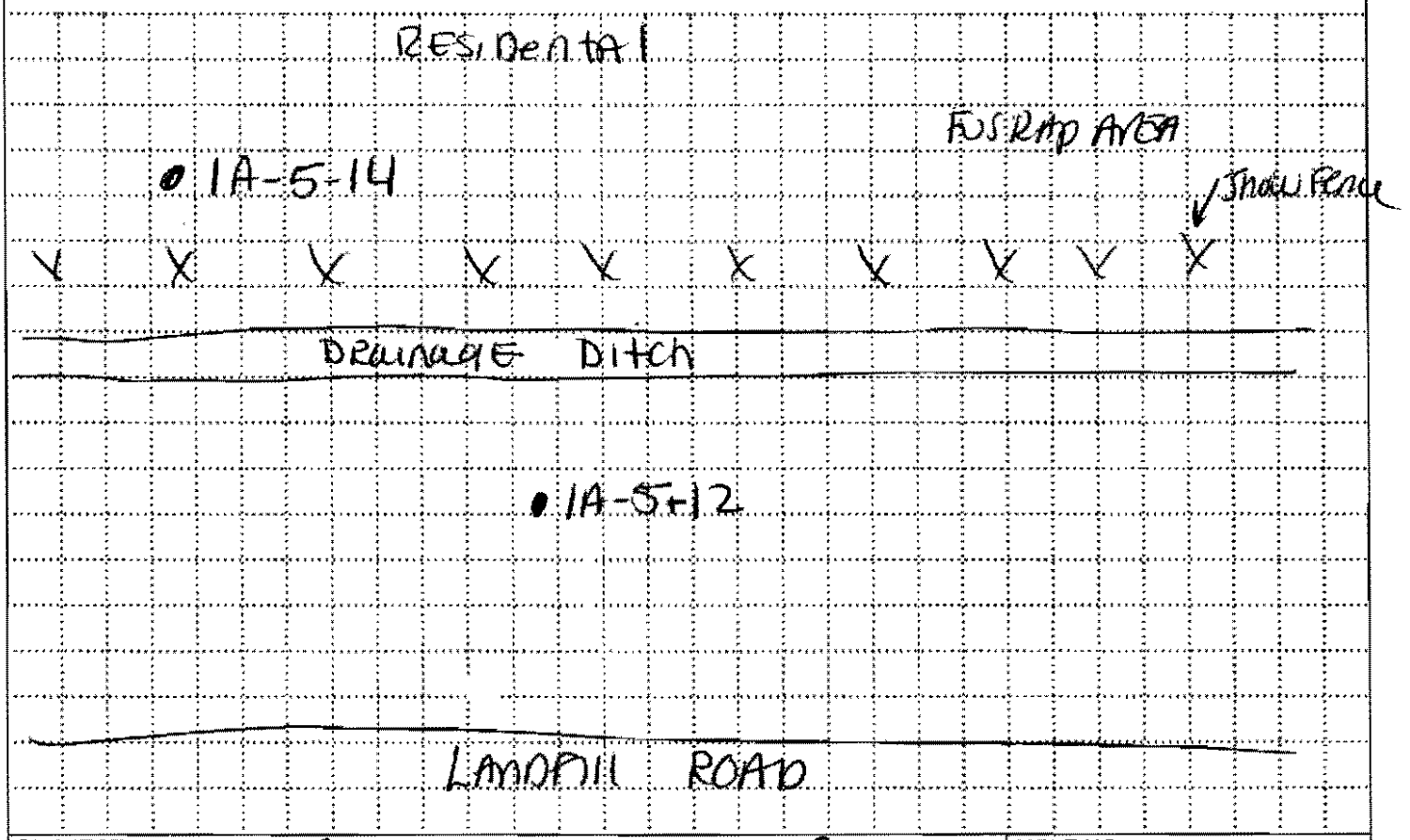
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP TOTAL	TCLP TOTAL	SVOC TCLP TOTAL	PCB TOTAL	PEST. TOTAL	N/A

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. S[redacted]
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS

SCALE:



PROJECT: TON LF- Buffalo DISTRICT FUSRAP PROJECT

HOLE NO: 1A-5-12

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR K Hoelscher

HOLE NUMBER 1A-5-12

SHEET 2 OF 7 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e) J	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B/J 1 MIN STATIC COUNT
	0				See note		
	1	NO RECOVERY	NO RECOVERY				
	2						
	3	FILL: Reddish-brown silt, clay, WASTE, glass, fine sand, gravel (<1"), paper, stuff, soft	60	5971			Top 6" 38/5806 (2.2-2.7')
	4		80	6180			Hand 41/5804 (3.3-4.3')
Recovery 34"	5		80	5893			
	6	NO RECOVERY	NO RECOVERY				
	7	FILL: SAME AS ABOVE	100	6085			Chemical 49/5596 (6.1-7.1')
	8		80	5988			
	9		100	6096			
Recovery 47"	10		60	5996			

PROJECT

HOLE NO. 1A-5-12

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR L Hoelscher

HOLE NUMBER 1A-5-12

SHEET 3 OF 7

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS ~~%~~ B	GEOTECH SAMPLE OR CORE BOX NO. ~~%~~ 2	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS 3/2 1 min static count
	10	NO RECOVERY	NO RECOVERY		See notes		
	11	Fill: continue from previous page	40	5781			
	12						
	13	Fill: Ash, soft, wet	60	5621			
	14		120	5707			HIGHB 45/5567 (13.0-14.0')
Recovery 48"	15	Fill: same as above w/ gravel (<2")	60	5907			
	16	NO RECOVERY	NO RECOVERY				
	17						
	18	Fill: same as above, wet	60	5847			
	19		80	5754			
Recovery 25"	20						

PROJECT

HOLE NO. 1A-5-12

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR K HOELscher

HOLE NUMBER 1A-S-12

SHEET 4 OF 7

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e) J	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h) 1min/6in count
	20				See NOTES		
	21	NO RECOVERY	NO RECOVERY				
	22						
	23	▼					
	24	Fill: Continue from previous page, WET-V. WET	60	5790			Saturated 47/5449 (23.0-24.0)
Recovery 26"	25		40	5767			
	26	NO RECOVERY	NO RECOVERY				
	27						
	28						
	29						
Recovery 0'	30						

PROJECT

HOLE NO. 1A-S-12

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER 1A-5-12

PROJECT

INSPECTOR K Hoelscher

SHEET 5 OF 7

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B/J 1 min static count
	30				SEE NOTE		
	31	NO RECOVERY	NO RECOVERY				
	32						
	33						
	34						
Recovery 0"	35						
	36						
	37						
	38						
	39						
Recovery 0"	40						

PROJECT

HOLE NO. 1A-5-12

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR K Hoelscher

HOLE NUMBER 1A-5-12

SHEET 6 OF 7 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e) X	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B/J 1min. Static count
	40				See notes		
	41						
	42	NO RECOVERY	NO RECOVERY				
	43						
	44						
Recovery 0"	45						
	46						
	47						
	48						
	49	FILL: Reddish-brown clay w/ coarse sand, glass, some waste, soft, moist	60	5518			
Recovery 4"	50	No Recovery	No Recovery				

PROJECT

HOLE NO 1A-5-12

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR [redacted]

HOLE NUMBER 1A-5-12

SHEET 7 OF 7 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS 1 min static count
	50				See Notes		
	51	NO RECOVERY	NO RECOVERY				
	52						
	53						
	54						
	55						
	56						
	57						
	58						
	59	REDISH-BROWN clay w/coarse SAND, SOFT, MOIST (CL)	80	6238			Native: 42/5583 (58-59')
			120	6091			
	60						

PROJECT

HOLE NO 1A-5-12

ENG FORM 5056A-R, AUG 94

NOTES: Weather, overcast, 30°F
- Gamma Reading = Count/min
- PID Reading = .2 ppm
* Refusal @ 5', moved 1 meter south, geology stated above

- Sample ID (Rad Analysis)
TLS-SB-1A5-12(2.2-2.7')022410 Top61
TLS-SB-1A5-12(23.0-24.0')022410 Saturated
TLS-SB-1A5-12(58.0-59.0)022410 Native
TLS-SB-1A5-12(13.0-14.0)022410 High B
TLS-SB-1A5-12(3.3-4.3)0240 High Duplicate
TLS-SB-1A5-12(6.1-7.1')022410 Chemical

J-555

HTRW DRILLING LOG

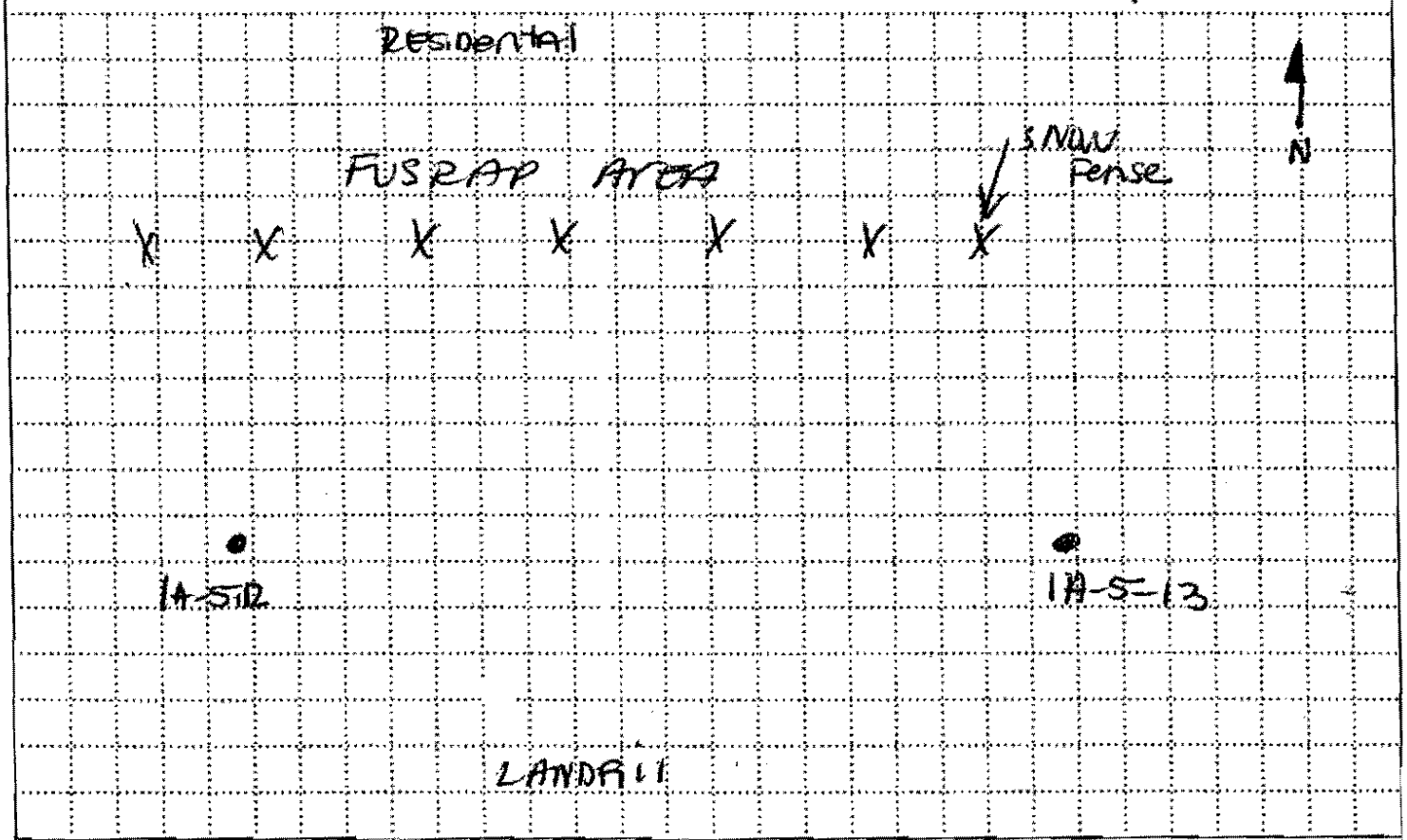
DISTRICT: Buffalo	HOLE NUMBER: 1A-5-13	
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 4 SHEETS
3. PROJECT: TOWN OF TONAWANDA LF OPERABLE UNIT - BUFFALO DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: Phil Orsi	6. MANUFACTURER'S DESIGNATION OF DRILL: Geoprobe 7720DT	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3¼ MACRO CORE W/ PLASTIC SLEEVES (8')	8. HOLE LOCATION: N 1092934 E 417323.9	
	9. SURFACE ELEVATION: 623.488	
	10. DATE STARTED: 2-23-10 9:00 AM	11. DATE COMPLETED: 2-23-10 10:30
12. OVERBURDEN THICKNESS: 25.8'	15. DEPTH GROUNDWATER ENCOUNTERED: 18.8'	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 30.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP TOTAL	TCLP TOTAL	SVOC TCLP TOTAL	PCB TOTAL	PEST. TOTAL	N/A %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
CUTTINGS DRUMMED	-	-	-	[redacted]

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON. LF - BUFFALO DISTRICT FUSRAP PROJECT — HOLE NO: 1A-5-13

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR K Hoelscher

HOLE NUMBER 1A-5-13

SHEET 2 OF 4 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h) B/J 1 MIN. SMA COUNT
	0	NO RECOVERY	NO RECOVERY		See NOTES		
	1						
	2	FILL: Reddish-brown clay, glass, organic matter, wood, paper, gravel, stiff, moist	80	6016			Top 6" 38/5138
	3		80	5388			
	4		60	5061			
	5						
	6	NO RECOVERY	NO RECOVERY				
	7						
	8	FILL: SAME AS ABOVE, WET	60	5185			
	9		80	5716			
	10						

PROJECT

HOLE NO 1A-5-13

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR: K Hoelscher

HOLE NUMBER: 1A-5-13

SHEET 3 OF 4 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e) 8	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B/8 1 min. stack count
	10				See NOTES		
	11	NO RECOVERY	NO RECOVERY				
	12						
	13						
	14	Fill: continued from previous page WET-VERY WET	120	6087			High 8 73/5410 (13.2'-14.2')
	15						
	16	NO RECOVERY	NO RECOVERY				
	17						
	18						
	19	Fill: same as above, w/ sand, loose WET - V. WET	80	5831			Saturated 57/5531 (18.8'-19.8')
	20		60	5733			

PROJECT

HOLE NO. 1A-5-13

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR: V Hoelscher

HOLE NUMBER: 1A-S-13

SHEET 4 OF 4 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e) J	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B/J 1mm Skale cont
	20				See notes		
	21						
	22	NO RECOVERY	NO RECOVERY				
	23						
							Hah B 129/5272 (23.5'-25.0')
	24	FILL: BLACK SAND, GLASS, GLASS, GRAVEL, WOOD, WASTE, LOOSE, WET	160	5830			
	25	FILL: REDDISH-BROWN CLAY W/ WASTE, GLASS, GRAVEL, SOFT, MOIST	80	6143			
	26	REDDISH-BROWN CLAY W/ COURSE SAND, GRAVEL (<1"), SOFT, MOIST (CL)	100	6289			Native 57/5238 (25.8-26.6')
	27		60	5685			chemical 63/5250 (27-28)
	28		120	5492			
	29		100	5445			
	30	Bottom of Boring @ 30.0'					

PROJECT

HOLE NO. 1A-S-13

ENG FORM 5056A-R, AUG 94

NOTE:
Weather: Overcast, 30°F
PID Reading: 0ppm
Gamma Reading: count/min.

SAMPLE I.D. (Rad. Analysis)
TLS-SS-1A-S-13 (1.7-2.3') 022310 Top 6"
TLS-SB-1A-S-13 (18.8-19.8') 022310 Saturated
TLS-SB-1A-S-13 (25.8-26.8') 022310 Native
TLS-SB-1A-S-13 (23.5-25') 022310 Hah B
TLS-SB-1A-S-13 (13.2-14.2') 022310 Hah J
TLS-SB-1A-S-13 (27-28) 022310 chemical

HTRW DRILLING LOG

DISTRICT: Buffalo		HOLE NUMBER: 1A-5-14
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 4 SHEETS
3. PROJECT: TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: Phil Orsi	6. MANUFACTURER'S DESIGNATION OF DRILL: Geoprobe 7720DT	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE	8. HOLE LOCATION: N 1092934 E 417222.5	
	9. SURFACE ELEVATION: 622.147	
	10. DATE STARTED: 2-24-10 10:35 am	11. DATE COMPLETED: 2-24-10
12. OVERBURDEN THICKNESS: 28.8'	15. DEPTH GROUNDWATER ENCOUNTERED: 9'	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 30.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

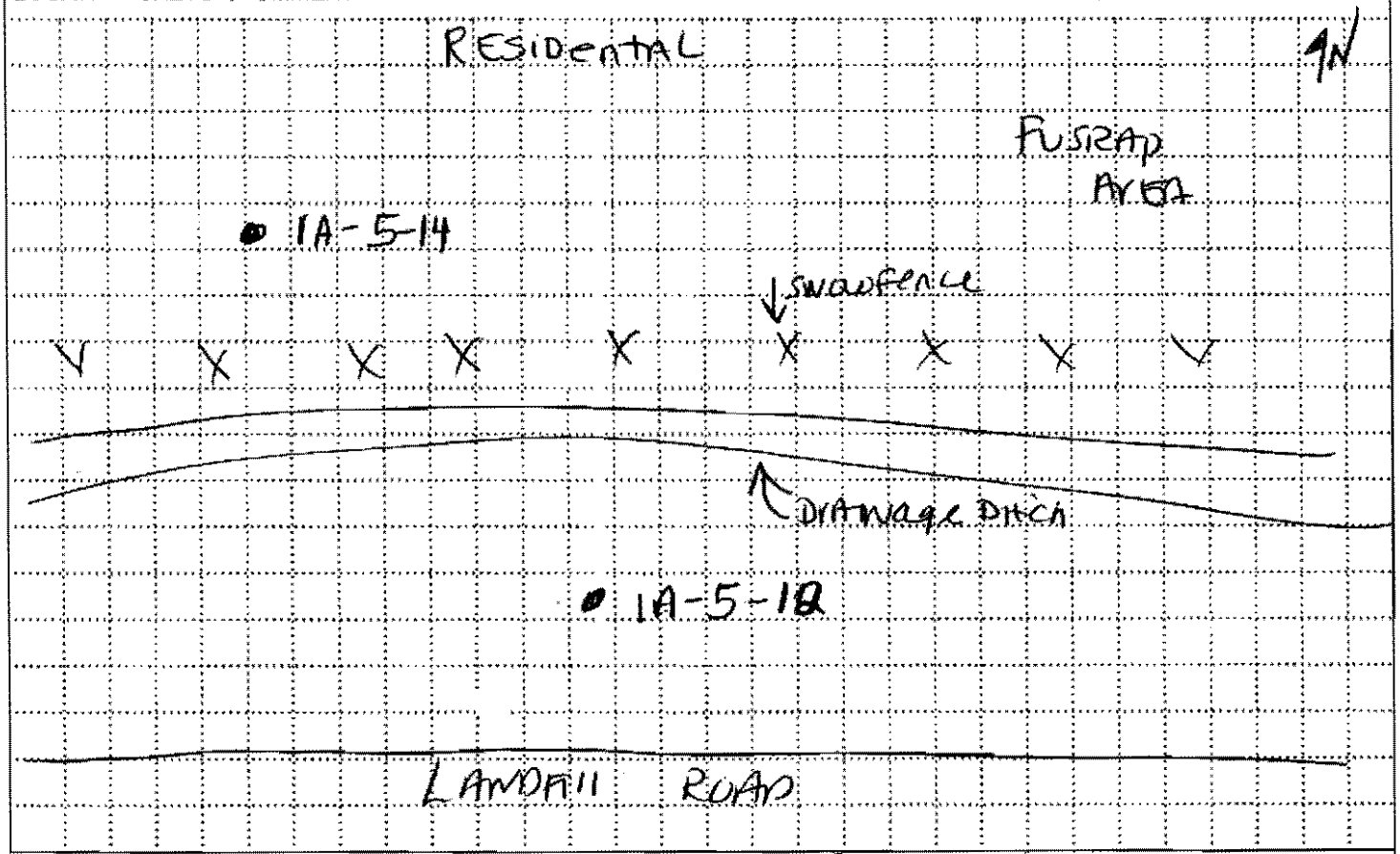
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP Total	TCLP Total	TCLP TLP Total	PCB Total	PCB Total	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)
CUTTINGS DRUMMED	–	–	–

LOCATION SKETCH/COMMENTS

SCALE:



PROJECT	HOLE NO.
TON LF- Buffalo DISTRICT FUSRAP PROJECT	1A-5-14

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR K Hoelscher

HOLE NUMBER 1A-5-14

SHEET 2 OF 4 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e) J	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B J 1 min shut count
	0				SEE NOTES		
	1	NO RECOVERY	NO RECOVERY				
	2	Fill: Reddish-brown silt, clay, w/ waste, organic matter, rootlets, stiff, frozen	100	6411			
	3		60	6300			Top 6" 44/6319 (2-2.5')
	4	Fill: glass, wood, waste, gravel, ash, brick, loose, moist	60	6246			
Recovery 36"	5		80	6416			High J 34/6056 Duplicate (4-5')
	6	NO RECOVERY	NO RECOVERY				
	7						
	8						
	9	Fill: Same as above w/ sand, wet, loose	100	6348			Saturated (8.7-10') 60/6499
Recovery 15"	10						

PROJECT

HOLE NO. 1A-5-14

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR

HOLE NUMBER 1A-5-14

SHEET 3 OF 4 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) PID	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS 1min static count
	10				See notes		
	11	NO RECOVERY	NO RECOVERY				
	12						
	13	Fill: continued from previous page w/ sand WET, loose	40	6212			Chemical 44/6450 (12.6-13.6)
	14						HighB 67/6518 (13.6-15')
Recovery 28"	15		140	6231			
	16	NO RECOVERY	NO RECOVERY				
	17						
	18						
		Fill: same as above					
	19		80	6309			
Recovery 20"	20		120	6357			

PROJECT

HOLE NO 1A-5-14

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER 717-5-14

PROJECT

INSPECTOR

SHEET 4 OF 4 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e) J	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B / J Imm. Stain cast
	20				SEE NOTES		
	21						
	22	NO RECOVERY	NO RECOVERY				
	23						
	24						
Recovery 0"	25						
	26						
	27						
	28	Fill, continued from previous page					
		Reddish brown Clay, Trace Fine sand (<2%), soft, moist (CL)	120	6164			Native 48/6401
	29		120	6266			
Recovery 24"	30						

PROJECT

HOLE NO 1A-5-14

ENG FORM 5056A-R, AUG 94

Notes: Weather, Sunny 30°F

Gamma Readings: Count/min

PID Readings: 0 ppm

Sample ID (Rad. Analysis)

TLS-SS-1A5-14(2.0-2.5')022410 Top 6"

TLS-SB-1A5-14(4.0-5.0')022410 High J, Duplicate

TLS-SB-1A5-14(8.7-10.0)022410 Saturated

TLS-SB-1A5-14(12.6-13.6)022410 Chemical

TLS-SB-1A5-14(13.6-14.6)022410 High B

TLS-SB-1A5-14(28.0-29.0)022410 Native

HTRW DRILLING LOG

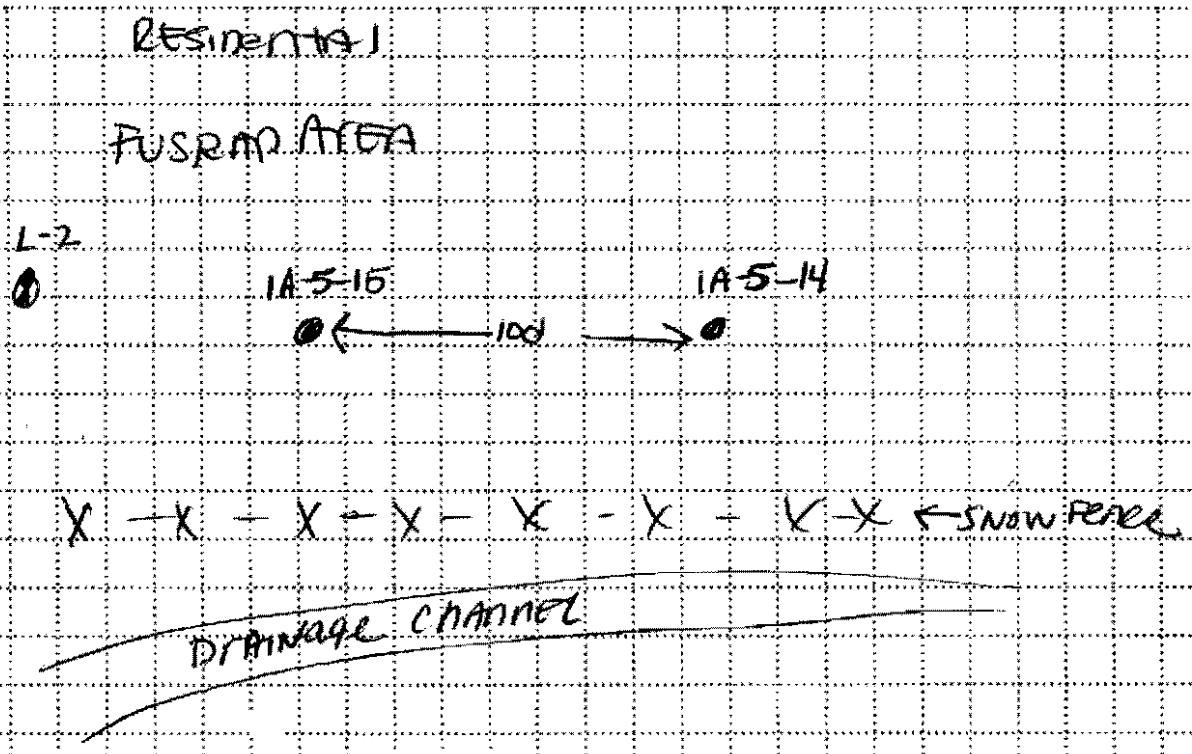
DISTRICT: Buffalo		HOLE NUMBER: 1A-5-15
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 5 SHEETS
3. PROJECT: TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: DOMINIC PINO	6. MANUFACTURER'S DESIGNATION OF DRILL: Geoprobe 7720DT	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE	8. HOLE LOCATION: N 1092933 E 417119.6	
	9. SURFACE ELEVATION: 622.049	
	10. DATE STARTED: 2-22-10 9:14 AM	11. DATE COMPLETED: 2-22-10 11:20 AM
12. OVERBURDEN THICKNESS: 35.0'	15. DEPTH GROUNDWATER ENCOUNTERED: 8.0'	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 40.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP/TOM	TCLP TOM	SVOC RLP TOM	PEST TOM	RB TOM	N/A

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)
CUTTINGS DRUMMED			[redacted]

LOCATION SKETCH/COMMENTS — SCALE:



PROJECT	HOLE NO
TON LF - Buffalo DISTRICT FUSRAP PROJECT	1A-5-15

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR K Hoelscher

HOLE NUMBER 1A-5-15

SHEET 2 OF 5 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e) J	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h) B/J 1-min static reading
	0	NO RECOVERY	NO RECOVERY		SEE NOTES		
	1	Fill: Reddish-brown clay, gravel, organic matter, waste, ash, moist, stiff	40	7107			Top 6" 29/6973
	2		60	7628			
	3		60	8003			High J 74/7266 (Duplicate)
	4		600	7643			
Recovery 59.5	5		40	7038			
	6	NO RECOVERY	NO RECOVERY				
	7	Fill: Same as above	40	7938			
	8	Fill: gravel, ash, sand, ash, glass, brick, paper, dark-brown clay, soft, moist-wet	40	7786			Saturated 47/7198
	9		40	7429			
Recovery 42"	10	NO RECOVERY	NO RECOVERY				

PROJECT

HOLE NO. 1A-5-15

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR K Hoelscher

HOLE NUMBER 1A-5-15

SHEET 3 OF 5 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B-	GEOTECH SAMPLE OR CORE BOX NO. (e) 8 8	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B/J 1min static count
	10	NO RECOVERY	NO RECOVERY		See NOTES		
	11	FILL: gravel, ash, sand, glass, brick, paper, dark-brown clay, soft, moist-wet	40	7108			
	12		60	7209			
	13		40	6650			
	14		60	7189			
Recovery 59"	15						
	16						
	17	NO RECOVERY	NO RECOVERY				
	18						
	19	FILL: Same as above w/ coarse sand	60	7140			
Recovery 12"	20						

PROJECT

HOLE NO. 1A-5-15

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR K Hoelscher

HOLE NUMBER 1A5-15

SHEET 5 OF 5 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
	20				SEE NOTE		1 MIN. STATIC COVA
	21	NO RECOVERY	NO RECOVERY				
	22						
	23						
	24	Fill: Continued from previous page	40	6870			
Recovery 12"	25						
	26	NO RECOVERY	NO RECOVERY				
	27						
	28						
	29						
Recovery 0'	30						

PROJECT

HOLE NO. 1A5-15

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR K Hoelscher

HOLE NUMBER 1A-5-15

SHEET 5 OF 5 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS PID	GEOTECH SAMPLE OR CORE BOX NO.	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS 8/d 1m inch Blow count
	30				See NOTES		
	31						
	32	NO RECOVERY	NO RECOVERY				
	33						
	34						
Recovery 10"	35	Reddish-brown silt, Clay w/ trace course + fine sand, sub-round gravel (<1"), soft, moist	90	6929			
	36		80	7436			Native 55/6941
	37		40	7001			Chemical 55/6737
	38		100	7027			High B 49/6592
	39		60	7147			
Recovery 40"	40	Bottom of Boring @ 40.0'	60	7170			

PROJECT

HOLE NO 1A-5-15

ENG FORM 5056A-R, AUG 94

Note: Weather: overcast, 24°F
- Gamma Reading: counts/min.
- PID Reading: 0 ppm
- Duplicate Taken

- Sample ID (Rad. Analysis)
TLS SS-1AS-15(.5-1)022210 = Rad 6"
TLS-SB-1AS-15(35.0-36.0)022210 = Native
TLS-SB-1AS-15T(7.6-8.6)022210 = Saturated
TLS-SB-1A-5-15T(37.0-38.0')022210 = High B
TLS-SB-1A-5-15(2.0-3.0')022210 = High & Duplicate
TLS-SB-1A-5-15(36.0-37.0)022210 = Chemical

HTRW DRILLING LOG

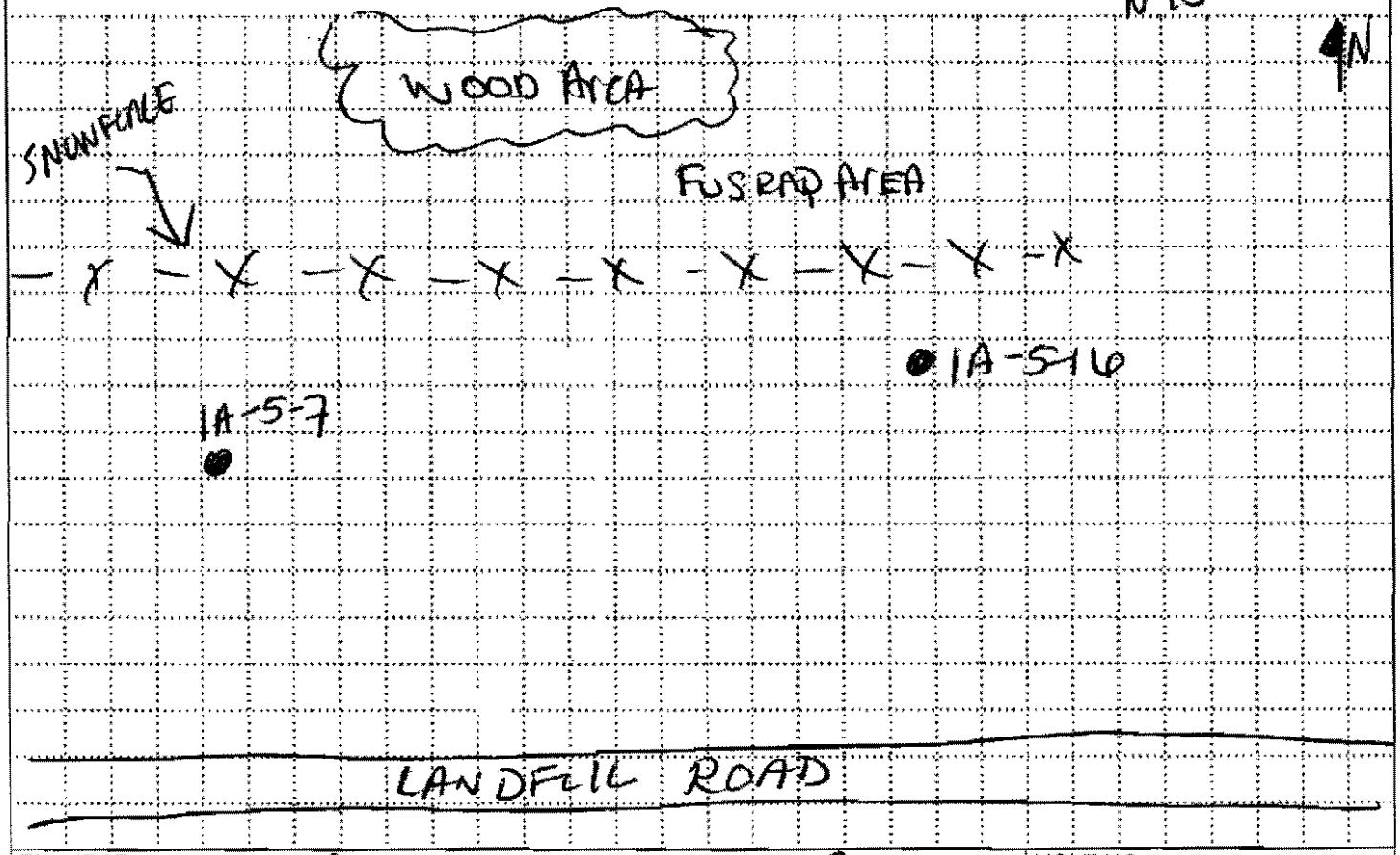
DISTRICT: Buffalo		HOLE NUMBER: 1A-5-16
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 7 SHEETS
3. PROJECT: TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: Phil Orsi	6. MANUFACTURER'S DESIGNATION OF DRILL: Geoprobe 7720 DT	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE	8. HOLE LOCATION: N1093037 E 417733.3	
	9. SURFACE ELEVATION: 636.007	
	10. DATE STARTED: 2-25-10	11. DATE COMPLETED: 2-25-10
12. OVERBURDEN THICKNESS: 49.0'	15. DEPTH GROUNDWATER ENCOUNTERED: NOT encountered	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 55.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP TOTAL	TCLP TOTAL	SVOC TOTAL	PCB TOTAL	TEST TOTAL	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. [redacted]
CUTTINGS DRUMMED	—	—	—	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON LF- Buffalo DISTRICT FUSRAP PROJECT — HOLE NO: 1A-5-16

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR K Hoelscher

HOLE NUMBER 1A-516

SHEET 2 OF 7 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) LB	GEOTECH SAMPLE OR CORE BOX NO. (e) Y	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS 57 y 1 min. state cavit
	0				SEE NOTES		
	1	NO RECOVERY	NO RECOVERY				
	2	Fill: Brown clay w/ silt, gravel, concrete, Brick, glass, stiff, moist	60	6374			
	3		120	6423			
	4		120	6473			
Recovery 40"	5		60	6690			
	6	NO RECOVERY	NO RECOVERY				
	7						
	8						
		Fill: SAME AS ABOVE					
	9						
Recovery 20"	10		100	6539			

PROJECT

HOLE NO. 1A-516

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR K Hoetscher

HOLE NUMBER 1A5-16

SHEET 3 OF 7

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e) J	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B/J 1 min. static count
	10	NO RECOVERY	NO RECOVERY		See NOTES		
	11						
	12	Fill: Brown clay, silt, gravel, concrete, waste, stiff, moist-wet	100	6543			Hgn B 53/6035 (12.4-13.4')
	13		140	6668			
	14		120	6691			
Recovery 40'	15		80	6734			
	16	NO RECOVERY	NO RECOVERY				
	17						
	18	Fill: Brown clay, wood, gravel, sand, wet-moist, stiff	80	6577			
	19						Hgn J 66/6207 (19.0-20.0)
Recovery 30'	20		80	6753			

PROJECT

HOLE NO 1A5-16

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR L Hoelscher

HOLE NUMBER 1A-5-16

SHEET 4 OF 7 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e) J	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h) B/J 1min static count
	20				See NOTES		
	21	NO RECOVERY	NO RECOVERY				
	22						
	23						
	24	Fill: continue from previous page	120	6642			Chemical 511/5858 (24-25')
Recovery 22'	25						
	26	NO RECOVERY	NO RECOVERY				
	27						
	28						
	29	Fill: continue from previous page, w/ plaster, loose	140	6520			Satur Aero Sub. 61/6563 (29-30')
Recovery 0'	30						

PROJECT

HOLE NO 1A-5-16

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER 1A5-16

PROJECT

INSPECTOR Y. Hoelscher

SHEET 5 OF 7

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS 91d Inno State Count
	30				See Notes		
	31	NO RECOVERY	NO RECOVERY				
	32						
	33						
	34						
Recovery 04	35						
	36						
	37						
	38						
	39						
Recovery 01	40						

PROJECT

HOLE NO 1A5-16

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR K HOELSCHER

HOLE NUMBER 1A-576

SHEET 6 OF 7 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e) J	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B/J LMNIUJ DAME COUNTY
	40				SEE NOTES		
	41	NO RECOVERY	NO RECOVERY				
	42						
	43						
	44						
Recovery 0"	45						
	46						
	47						
	48						
	49						
Recovery 12"	50	REDDISH-BROWN SILT + CLAY, TRACE COURSE SAND, SOFT, WET (CL)	140	6368			Native 53/6264

PROJECT

HOLE NO. 1A576

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT	INSPECTOR	HOLE NUMBER	SHEET	SHEETS
	K. HOELSCHER	1A5-16	7	7

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e) J	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B/J 1mn statcount
	50				SEE NOTE		
	51	NO RECOVERY	NO RECOVERY				
	52						
	53						
	54	REDISH BROWN SILT + CLAY, TRACE COURSE SAND, SOFT, WET	60	6461			
Recovery 15"	55						
	56	BOTTOM OF BORING @ 55'					
	57	NOTES: -WEATHER; OVERCAST - SNOW 25°F -GAMMA READINGS: COUNT/MIN -PID READING: 0ppm -SAMPLE I.D. (LEAD ANALYSIS) TLS-SS-1A5-16(1.8-2.3')022510	Top 6"				
		TLS-SB-1A5-16(12.4-13.4')022510	HIGH B				
	58	TLS-SB-1A5-16(19.0-20.0)022510	HIGH J				
		TLS-SB-1A5-16(24.0-25.0)022510	CHEMICAL				
		TLS-SB-1A5-16(29.0-30.0)022510	SATURATED	SUB(HD PICK)			
		TLS-SB-1A5-16(49.0-50.0)022510	NOTHING				
	59						
	60						

PROJECT	HOLE NO.
	1A5-16

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

DISTRICT: Buffalo		HOLE NUMBER: 1A-5-17
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 6 SHEETS
3. PROJECT: TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: Phil Orsi	6. MANUFACTURER'S DESIGNATION OF DRILL: Geoprobe 7726DT	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE	8. HOLE LOCATION: N 1093067.87 E 1065995.25	
	9. SURFACE ELEVATION: 627.11	
	10. DATE STARTED: 2-22-10 2:45 pm	11. DATE COMPLETED: 2-22-10 4:45pm
12. OVERBURDEN THICKNESS: Native NOT ENCOUNTERED	15. DEPTH GROUNDWATER ENCOUNTERED: 18.81'	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 44.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

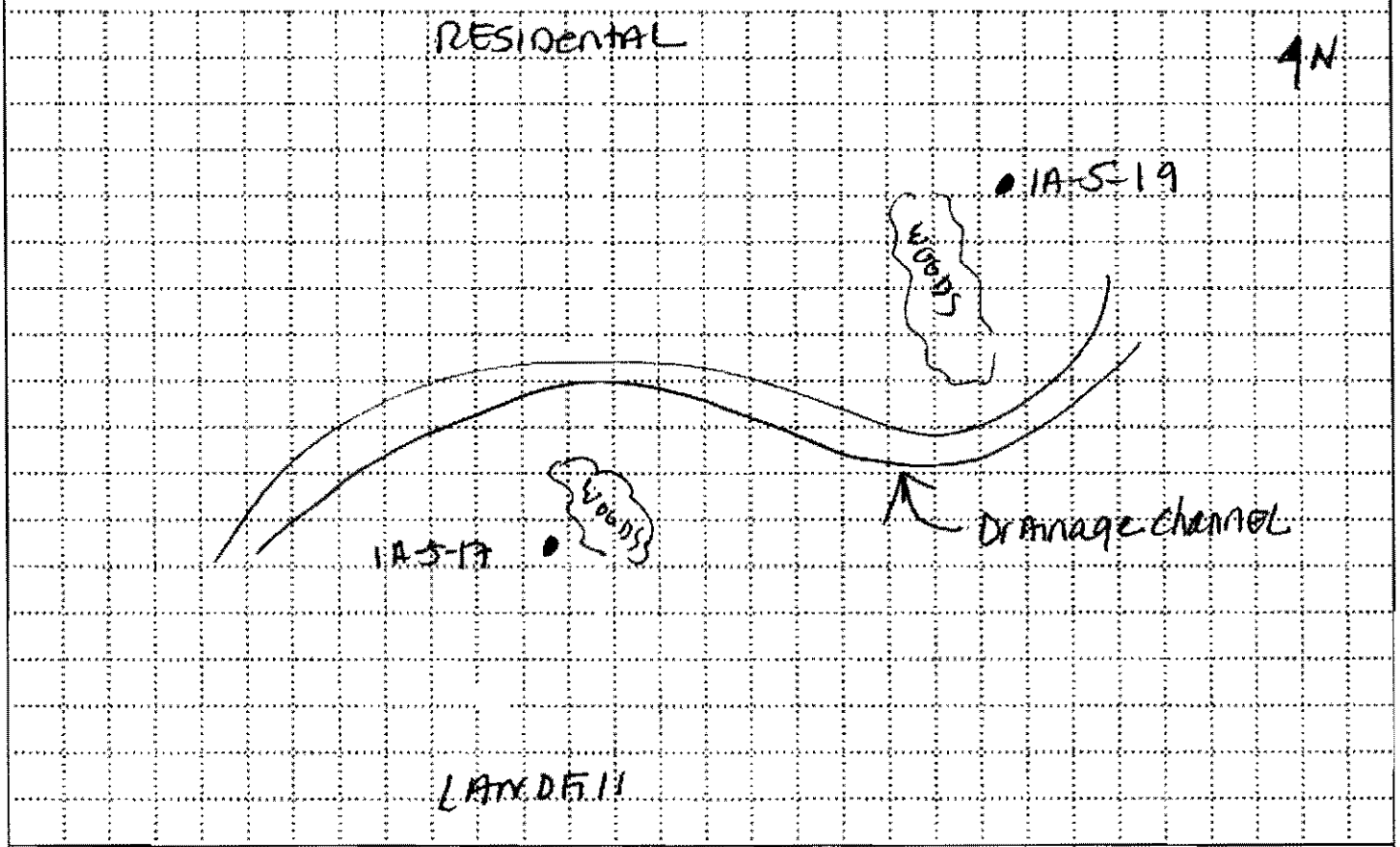
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
—	—	—	—	—	—	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
CUTTINGS DRUMMED				K Hoelscher K Hol

LOCATION SKETCH/COMMENTS

SCALE:



PROJECT	HOLE NO
TON LF- Buffalo DISTRICT FUSRAP PROJECT	1A-5-17

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR K Hoelscher

HOLE NUMBER 1A-5-17

SHEET 2 OF 6 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS NB-	GEOTECH SAMPLE OR CORE BOX NO. Nd	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B-1d 1 min. Static count
	0	NO RECOVERY	NO RECOVERY		SEE NOTES		
	1						
	2	Fill: Ash, wood, brick, gravel, SAND, organic matter, rootlets, reddish-brown clay, SOFT, MOIST	40	7125			Top 6" 60/7574
	3		100	7299			
	4		120	6833			High B 65/7167
Recovery 36"	5		80	7059			
	6	NO RECOVERY	NO RECOVERY				
	7	Fill: SAME AS ABOVE, W/ FINE + COURSE SAND, STIFF, MOIST	60	7073			
	8		80	7377			High d 95/7525
	9						
Recovery 45"	10		80	6925			

PROJECT

HOLE NO

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR K Hoelscher

HOLE NUMBER 1A-5-17

SHEET 3 OF 6 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e) J	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B/J 1-Min. static count
	10				SEE NOTES		
	11	NO RECOVERY	NO RECOVERY				
	12						
	13	Fill: Continued from previous page	80	7166			
	14						
Recovery 28"	15		60	7017			
	16	NO RECOVERY	NO RECOVERY				
	17						
	18						
		Fill: Same as above, ▼ w/ wet-v. wet					
	19		120	7420			87/7617 Saturated
Recovery 20"	20						

PROJECT

HOLE NO 1A-5-17

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR K Hoelscher

HOLE NUMBER 1A-517

SHEET 4 OF 6

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e) J	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h) B/J 1-min static count
	20				SEE NOTES		
	21	NO RECOVERY	NO RECOVERY				
	22						
	23						
	24						
		Fill: continued from previous page					
Recovery 20"	25		100	7327			
	26						
	27	NO RECOVERY	NO RECOVERY				
	28						
	29						
Recovery 0"	30						

PROJECT

HOLE NO 1A-517

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR: K Hoelscher

HOLE NUMBER: 1A-5-17

SHEET 5 OF 6 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e) J	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS 8/J 1min static counts
	30	NO RECOVERY	NO RECOVERY		See NOTES		
	31						
	32						
	33						
	34						
Recovery 0"	35						
	36						
	37						
	38						
	39						
Recovery 0"	40						

PROJECT

HOLE NO 1A-5-17

ENG FORM 5056A-R, AUG 94

INSPECTOR: KHOELSCHER

SHEET 6 OF SHEETS 6

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS
	40		PB		See NOTES		1mm - stain cover
	41	NO RECOVERY	NO RECOVERY				
	42						
	43						
Recovery 0"	44	REFUSAL @ 44.0'					
	45						
	46	NOTES: weather: RAIN/SNOW 30°F					
		- Hole 1A-5-17 had refusal at 33.0', moved 1 meter southeast, see field notes)					
	47	- Sample ID (Reg. Analysis)					
		TLS-SS-1A-5-17(1.8-2.3)022210	Top 6"				
		TLS-SB-1A-5-17(18.8-19.8)022210	Saturated				
		TLS-SB-1A-5-17(3.3-4.3)022210	High B				
	48	TLS-SB-1A-5-17(7.4-8.4)022210	High B				
		PID READINGS: 0ppm					
		Gamma Readings: count/min					
	49						
	50						

PROJECT

HOLE NO. 1A-5-17

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

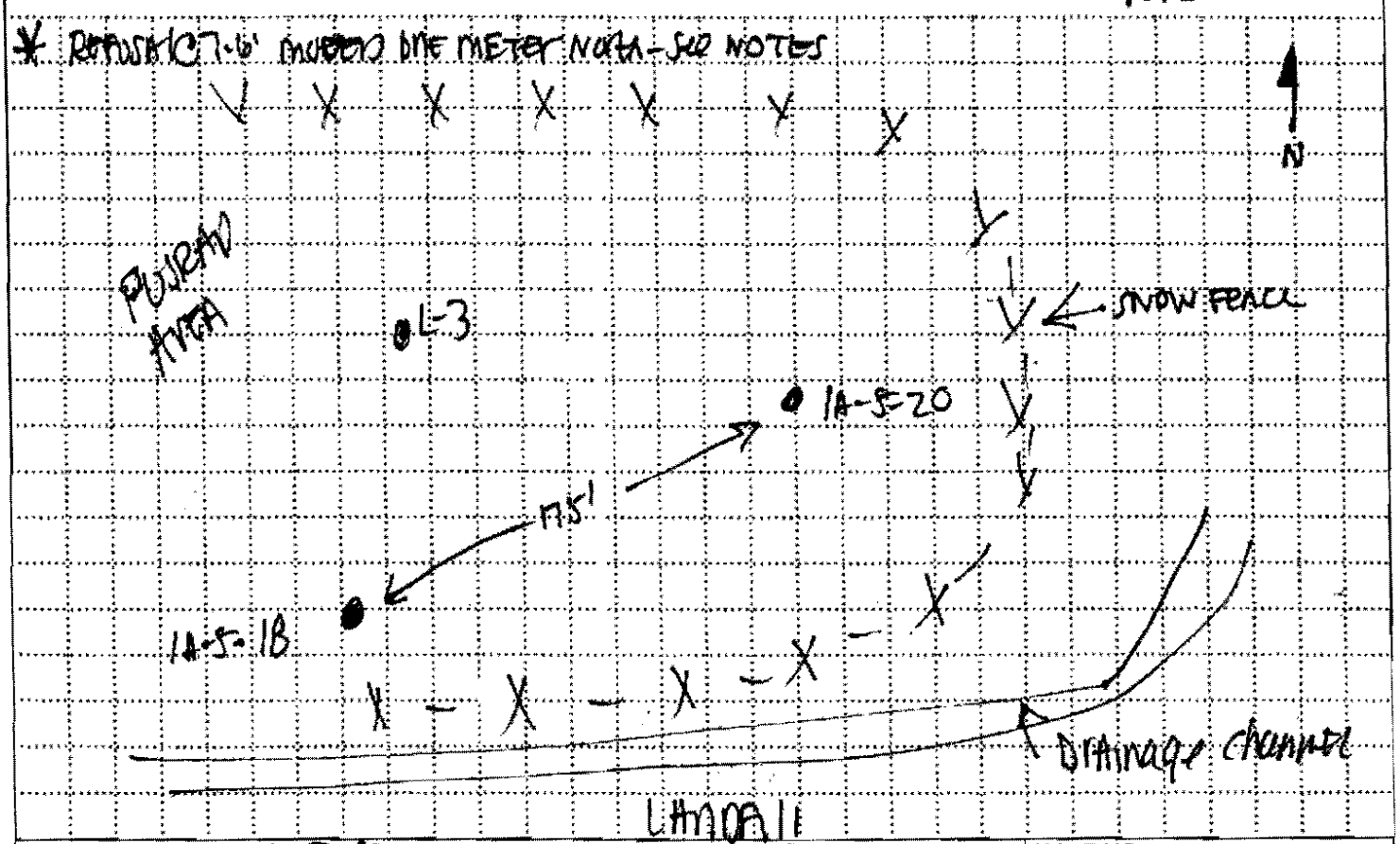
DISTRICT: Buffalo		HOLE NUMBER: 1A5-18
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 4
3. PROJECT: TOWN OF TONAWANDA LF OPERABLE UNIT - BUFFALO DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: DOMONIC PINO	6. MANUFACTURER'S DESIGNATION OF DRILL: Geoprobe 7720DT	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" OVC W/ PLASTIC SLEEVES (4')	8. HOLE LOCATION: N 1093039 E 417526.1	
	9. SURFACE ELEVATION: 623.107	
	10. DATE STARTED: 2-18-10 1220pm	11. DATE COMPLETED: 2-19-10 330pm
12. OVERBURDEN THICKNESS: NOT Encountered	15. DEPTH GROUNDWATER ENCOUNTERED: 18.8'	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 25.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
-	-	-	-	-	-	N/A %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
CUTTINGS DRUMMED	-	-	-	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON. LF - BUFFALO DISTRICT FUSRAP PROJECT | HOLE NO: 1A-5-18

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR K HOEFLICHER

HOLE NUMBER 1A-5-18

SHEET 2 OF 4 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e) γ	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B / γ 1min static count
	0	NO RECOVERY	NO RECOVERY		SEE NOTES		
	1	Fill: Reddish-brown Clay, glass, wood, gravel, loose, moist	80	5598			Top 6" 47/5361
	2		120	5798			
	3		80	6184			High B 45/5452
	4		60	5817			
	5		100	6279			High γ 49/5622
	6	NO RECOVERY	NO RECOVERY				
	7						
	8						
	9	Fill: Wood, Ash, glass, sand, gravel (1") soft, loose	60	5744			
	10						

PROJECT

HOLE NO 1A-5-18

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR K. Hoelscher

HOLE NUMBER 1A-5-18

SHEET 3 OF 4 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS B	GEOTECH SAMPLE OR CORE BOX NO.	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B/J 1hm-Static Cond
	10	NO RECOVERY	NO RECOVERY				
	11						
	12						
	13						
	14	Fill: glass, sand, wood, course sand, gravel (<2"), wet-v. wet, loose	100	5774			
	15						
	16	NO RECOVERY	NO RECOVERY				
	17						
	18	Fill: glass, sand, wood, course + fine sand, gravel (<2") - wet to v. wet, loose	60	5795			Saturated 59/5643
	19		80	5668			Not WL 58/5469 (SUB.)
	20						

PROJECT

HOLE NO 1A-5-18

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: 1A-5-18

PROJECT:

INSPECTOR: K Hoelscher

SHEET 4 OF 4

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) B	GEOTECH SAMPLE OR CORE BOX NO. (e) J	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B/J 1-min Static count
	20				See NOTES		
	21	NO RECOVERY	NO RECOVERY				
	22						
	23						
	24						
	25	REFUSAL @ 25' Bottom of boring @ 25.0'					
	26	NOTE:					
		WEATHER: OVERCAST, 25°F					
		SAMPLE ID (RAM ANALYSIS)					
	27	TLS-SS-1A5-18 (0.8-1.3') 022010	TOP 6"				
		TLS-SB-1A5-18 (18-19') 022010	SATURATED				
		TLS-SB 1A5-18 (19-20') 022010	Bottom 6" = IN PLACE OF Native - HP DISCOLOR				
	28	TLS-SB 1A5-18 (1.2-2.3') 022010	HIGH B				
		TLS-SB 1A5-18 (4-5') 022010	HIGH J				
		* 1st REFUSAL encountered @ 7.6' = MOVED 1 METER NORTH					
	29	* NO Native Soils encountered					
	30						

PROJECT

HOLE NO. 1A-5-18

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

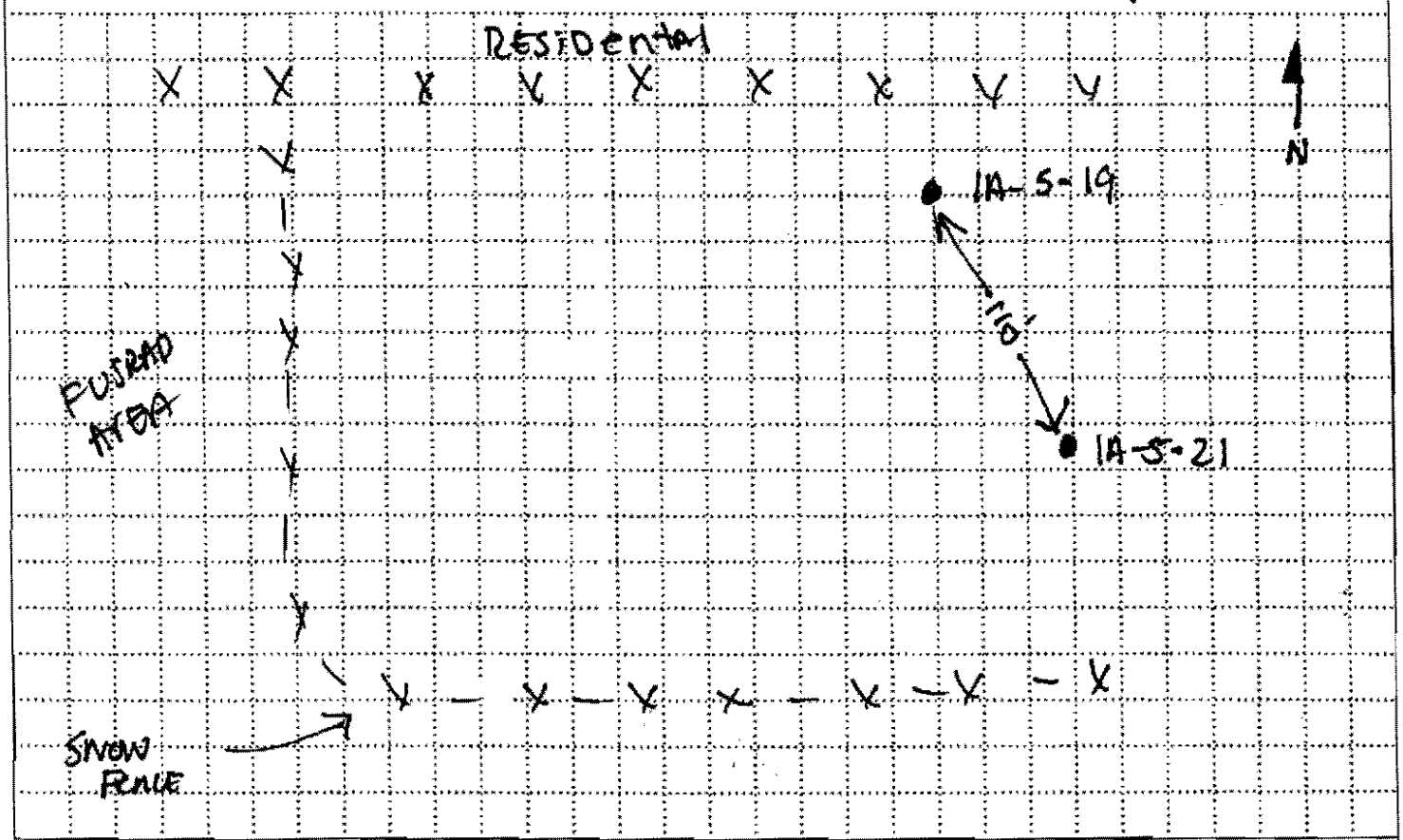
DISTRICT: BUFFALO		HOLE NUMBER: 1A-5-19
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 3 SHEETS
3. PROJECT: TOWN OF TONAWANDA LF OPERABLE UNIT - BUFFALO DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: Domonx Dino	6. MANUFACTURER'S DESIGNATION OF DRILL: Geoprobe 6620	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CORE W/ PLASTIC SLEEVES (4')	8. HOLE LOCATION: N1093192.683 E1066086.752	
	9. SURFACE ELEVATION: N/A	
	10. DATE STARTED: 2-18-10 2:35 pm	11. DATE COMPLETED: 2-18-10 4:05 pm
12. OVERBURDEN THICKNESS: 10.5'	15. DEPTH GROUNDWATER ENCOUNTERED: 5.8'	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 13.3'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
						N/A %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
CUTTINGS DRUMMED	-	-	-	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON. LF - BUFFALO DISTRICT FUSRAP PROJECT — HOLE NO. 1A 5-19

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR K. Hoelscher

HOLE NUMBER 1A-5-19

SHEET 2 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS γ (e)	GEOTECH SAMPLE OR CORE BOX NO. B (d)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS B-1γ 1 minute static count
	0	Reddish-brown clayey Topsoil, gravel, rootlets stiff, moist	6632	80			Top 6" 52/6230
	1		6643	80			
							High B 46/5981
	2	Fill! Gravel, wood, ash, brick, glass, moist, stiff-soft	6547	120			
	3		6602	60			
			6714	40			
	4		6735	60			
	5		7000	80			High γ 53/6875 Recovery 42%
	6		6670	60			Saturated: 45/6389
	7		6802	60			
	8		6772	80			
	9		6562	60			
	10		6879	80			Recovery

PROJECT

HOLE NO. 1A-5-19

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR K Hoelscher

HOLE NUMBER 1A-5-19

SHEET 3 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
	10	CONTINUED FROM PREVIOUS PAGE →					1-min Static count
	11	REDISH-BROWN CLAY + SILT, GRAVEL (<1"), TRACE FINE SAND + GRAVEL, SOFT, MOIST (CL)	6950	80			NATIVE 56/6151
	12		6650	40			
	13		6396	40			
		Bottom of Boring @ 13.3'					
	14						
	15						
	16						
	17	NOTES: WEATHER: OVERCAST, 23°F Sample I.D.-(Rad. Analysis)					
	18	TLS-SS-1A-5-19 (0.0-0.5') 021810	TUD 6"				
		TLS-SB-1A-5-19 (10.5-11.5') 021810	Native				
		TLS-SB-1A-5-19 (5.5-6.5') 021810	saturated				
		TLS-SB-1A-5-19 (1.0-2.0') 021810	High B				
		TLS-SB-1A-5-19 (4.5-5.5') 021810	High γ				
	19	PID Reading = 0ppm					
		Gamma Reading: count/min					
	20	* AT 1A-5-19 soils were combined - actual pushed to 30'					

PROJECT

HOLE NO. 1A-5-19

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

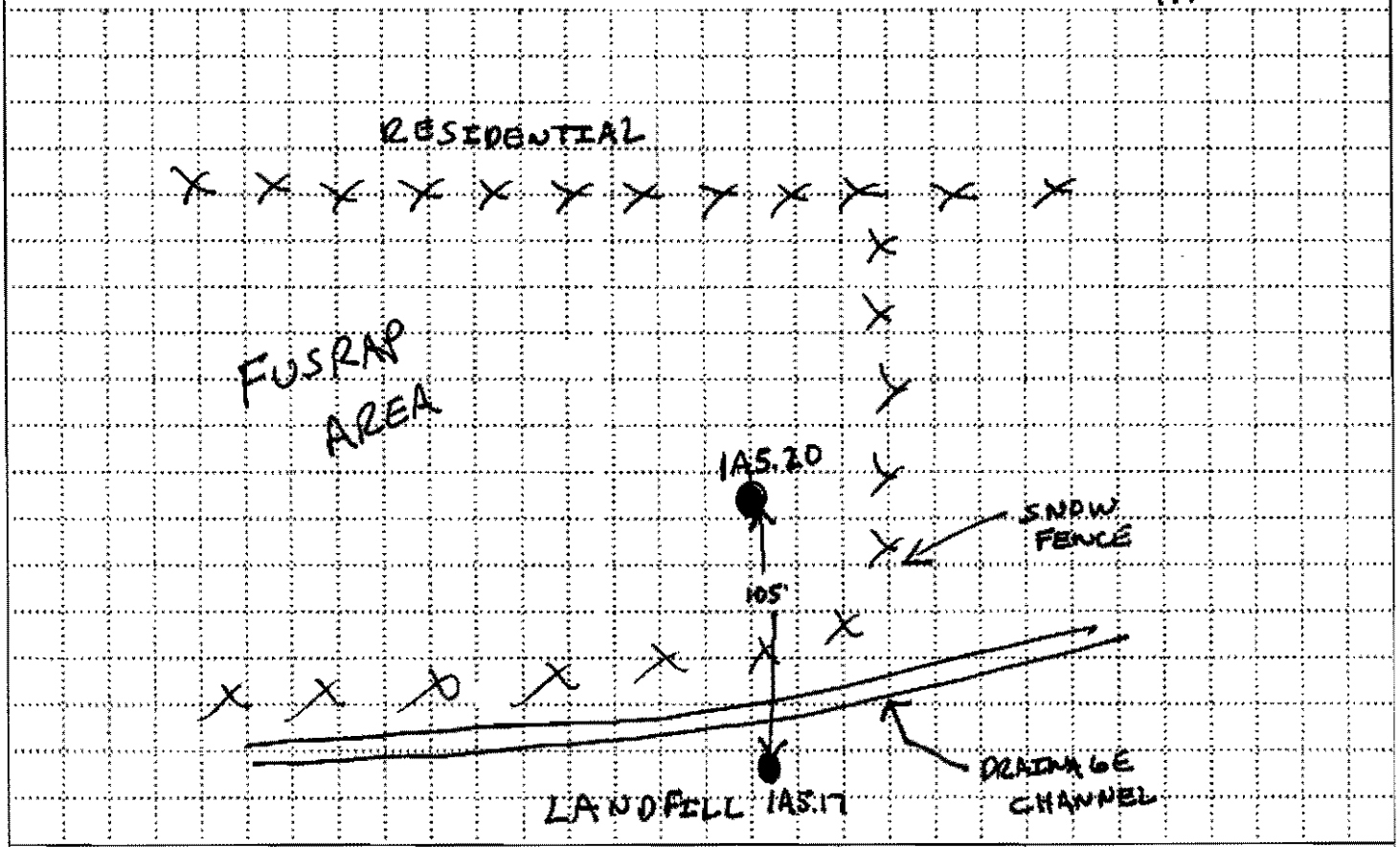
DISTRICT: Buffalo		HOLE NUMBER: 1A5.20
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF SHEETS 5
3. PROJECT: TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: Jeff SNYDER	6. MANUFACTURER'S DESIGNATION OF DRILL: 6620 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE	8. HOLE LOCATION: N = 1093136 E = 417632.8	
	9. SURFACE ELEVATION: 621.312	
	10. DATE STARTED: 2/19/10 1310	11. DATE COMPLETED: 2/19/10 1530
12. OVERBURDEN THICKNESS: 27.2'	15. DEPTH GROUNDWATER ENCOUNTERED: 9.0' bgs	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 35.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	–	–	–	–	–	N/A

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23 [redacted]
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT	HOLE NO
TON LF - Buffalo DISTRICT FUSRAP PROJECT	1A5.20

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER 1A5.20

PROJECT

INSPECTOR D. Popp

SHEET 2 OF 5 SHEETS

~~ELEV.~~ REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS REMARKS (h)	
	0–1	NO RECOVERY					→	
	2	FILL: WASTE (CLAY, BRICK, GLASS, ASH, CONCRETE, SLAG) LOOSE, WET.	5722	60		TOP 6"	X 4991	B 44
	3		5700	40				
	4		5631	40	SEE NOTES			
42"	5		5413	50				
	6–7	NO RECOVERY					→	
	8–9	FILL: WASTE (ASH, BRICK, GRAVEL, CLAY) LOOSE, WET.	5820	30				
22"	10		5520	30		SAT.	5513	49

PROJECT

HOLE NO 1A5.20

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT	INSPECTOR D. Popp	HOLE NUMBER 1A5.20
		SHEET 3 OF 5

REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h)
	10						
	11						
	12						
	13						
	14						
0"	15	NO RECOVERY					
	16						
	17						
	18						
	19						
0"	20						

PROJECT	HOLE NO 1A5.20

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. PoPP

HOLE NUMBER 1A5.20

SHEET 4 OF 5

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) ~~X~~ γ	GEOTECH SAMPLE OR CORE BOX NO. (e) ~~X~~ B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)	
	20							
	21							
	22				SEE NOTES			
	23	NO RECOVERY →						
	24							
0"	25							
	26							
	27							
	28	REDDISH-BROWN SILT AND CLAY W/ TRACE COURSE SAND, SOFT, WET. (CL)	5444	30		NATIVE	γ 5297	B 46
	29		5733	50				
32"	30		5519	90				

PROJECT

HOLE NO 1A5.20

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A5.20

SHEET 5 OF 5

REC'D ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)	
	30	CONTINUED FROM PREVIOUS PAGE						
			5603	80				
	31						X	B
			5809	70		HIGH X	5564	40
	32							
			5745	110		HIGH B	5414	70
	33							
			5644	100				
	34							
			5404	100				
60"	35							
		BOTTOM of BORING AT 35.0'						
	36	NOTES:						
		- OVERCAST, 30°F						
		- SAMPLE I.D.						
	37	TLS-SS-1A5.20 (1.4-1.9) 021910						
		TLS-SB-1A5.20 (9.0-10.0) 021910						
		TLS-SB-1A5.20 (27.2-28.2) 021910						
	38	TLS-SB-1A5.20 (31.0-32.0) 021910						
		TLS-SB-1A5.20 (32.0-33.0) 021910						
	39	- GAMMA READINGS ARE COUNTS/MIN.						
		- PID READINGS = 0 ppm (VOC's), EXCEPT AT 25.0'-30.0' (0.2 ppm)						
	40							

PROJECT

HOLE NO 1A5.20

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

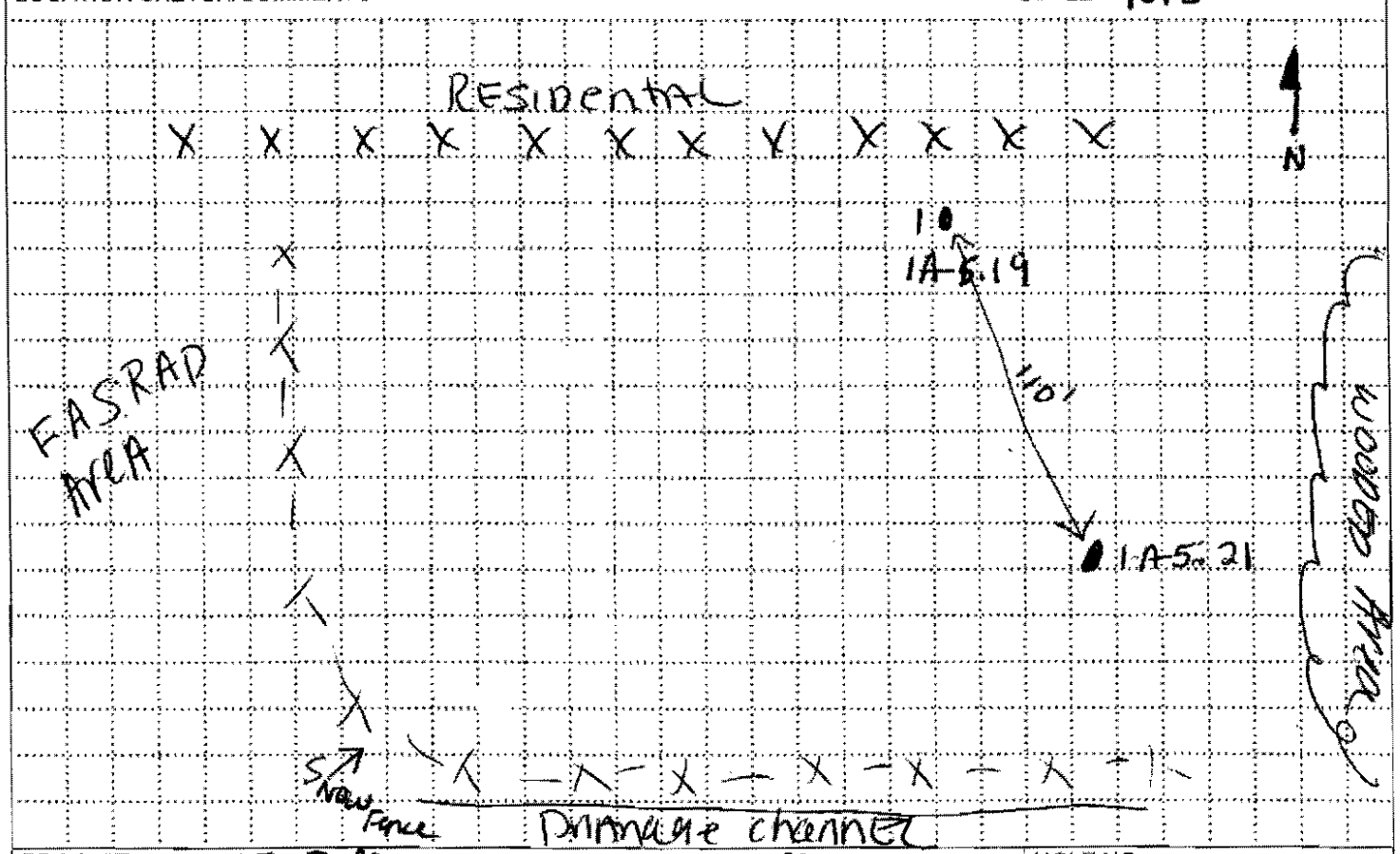
DISTRICT: Buffalo		HOLE NUMBER: 1A5.21
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 4 SHEETS
3. PROJECT: TOWN OF TONAWANDA LF OPERABLE UNIT - BUFFALO DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: Dominic Pino	6. MANUFACTURER'S DESIGNATION OF DRILL: Geoprob 7220DT	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3" PVC CASING W/ PLASTIC SLEEVES (5')	8. HOLE LOCATION: N 1093241 E 417732.8	
	9. SURFACE ELEVATION: 621.548	
	10. DATE STARTED: 12/18/10 11:22am	11. DATE COMPLETED: 2/18/10 12:50pm
12. OVERBURDEN THICKNESS: 17.6'	15. DEPTH GROUNDWATER ENCOUNTERED: 17.2'	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 24.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	-	-	-	-	-	N/A %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. [redacted]
CUTTINGS DRUMMED	-	-	-	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON. LF - BUFFALO DISTRICT FUSRAP PROJECT — HOLE NO. 1A5.21

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: 1A5.21

PROJECT:

INSPECTOR: K. HOELSCHER

SHEET 2 OF 4

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
	0	NO RECOVERY			SEE NOTES		
	1	Fill: REDISH-BROWN Clay, rootlets, organic matter, stiff, moist	100 (0.8'-1.3')	7116			56/6959
			100 (1.3'-1.8')	7003			
	2		80 (1.6'-2.8')	7246			
	3		60 (2.8'-3.8')	7320			
	4		40 (3.8'-4.8')	7549			41/7205
	5	NO RECOVERY					
	6						
	7						
	8						
	9						
	10						

PROJECT: TOWLE - BUFFALO DISTRICT FUSRAP PROJECT

HOLE NO. 1A5.21

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER 1A5121

PROJECT

INSPECTOR K Hoelscher

SHEET 3 OF 4 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) J	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h) B/J 1min static count
	10				SEE NOTE		
	11	NO RECOVERY					
	12						
	13						
	14						
	15						
	16						
	17						
		Fill: Ash, gravel, wood, loose, wet - v. wet	80	7155			57/7145
	18	Reddish-brown silt clay w/ gravel (21"), gray mottling, gray desiccation cracks w/ silt infilling	(17.2'-	18.2')			
			80	7223			73/7280
	19	moist, stiff	(18.2'-	19.2')			
		NO RECOVERY					
	20						

PROJECT TOW LF - Buffalo District FUSRAP Project

HOLE NO. 1A5.21

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR: K Hoelscher

HOLE NUMBER: 1A5.21

SHEET 1 OF 4

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
	20						1 min Gamma count / 87 J
	21	NO RECOVERY					
	22						
	23	Reddish brown silt clay w/ trace fine sand + gravel (<2"), stiff, moist	120	7122			61/6887
	24		(22.7'-24.0')				
		END BORING AT 24.0'					
	25	NOTES:					
		OVERCAST, 22°F					
		- Sample ID (Rad. Analysis					
	26	TLS-SS-1A5.21-(0.8'-1.3')021810		Top 6"			
		TLS-SB-1A5.21 (3.8'-4.8')021810		high J			
		TLS-SB-1A5.21 (17.2'-18.2')021810		Saturated			
	27	TLS-SB-1A5.21 (18.2'-19.2')021810		Native			
		TLS-SB-1A5.21 (22.7'-23.7') 021810		high B			
	28						
	29	Gamma Readings ARE COUNTS PER MINUTE					
	30						

PROJECT: TON LF Buffalo District FUSRAP project

HOLE NO: 1A5.21

ENG FORM 5056A-R, AUG 94

NOTE: PID Reading = 0ppm

HTRW DRILLING LOG

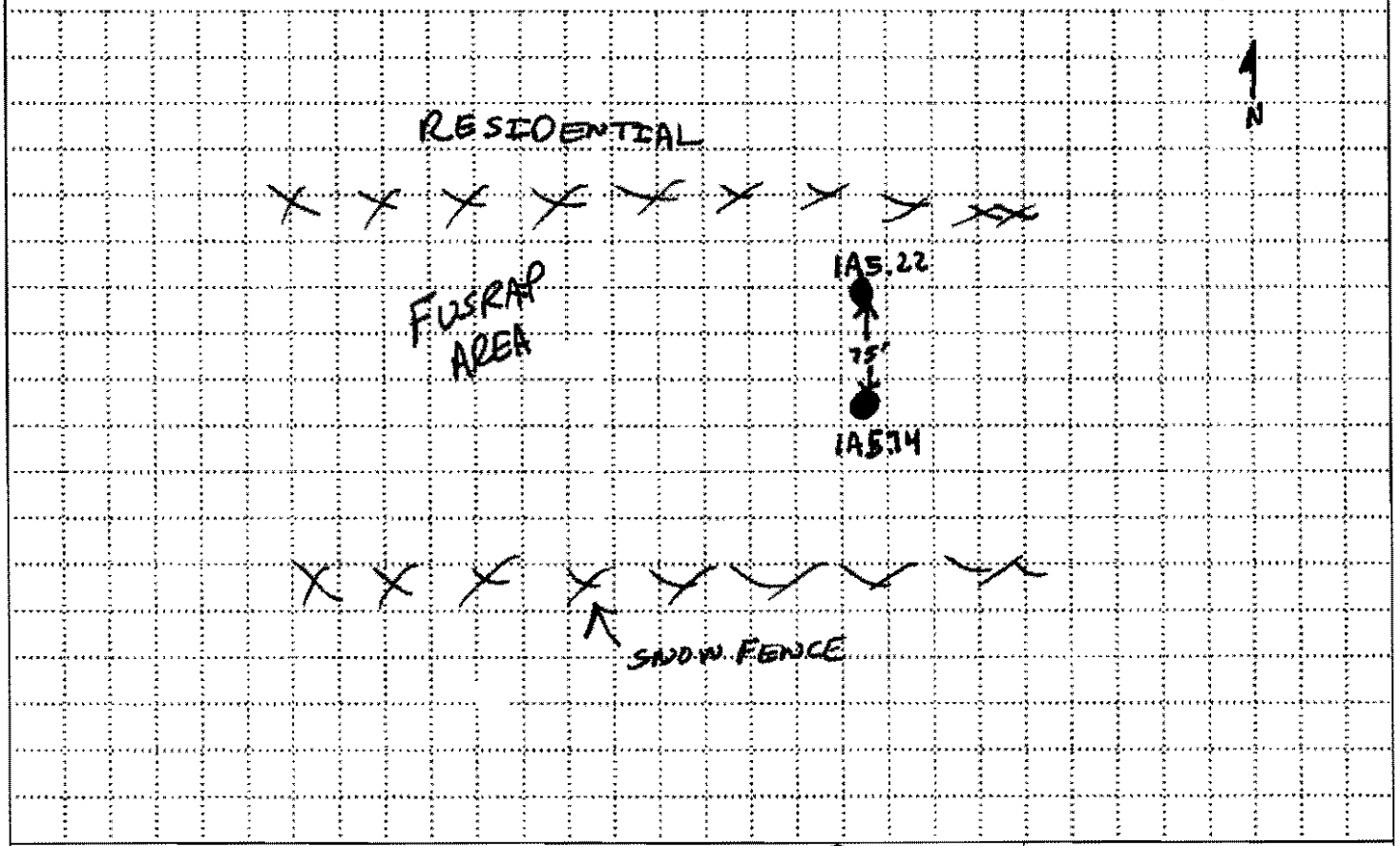
DISTRICT	Buffalo
HOLE NUMBER	1A5.22
1. COMPANY NAME	ENSOL, INC.
2. DRILLING CONTRACTOR	ZEBRA ENVIRONMENTAL CORP.
SHEET / SHEETS	1 OF 4
3. PROJECT	TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT
4. LOCATION	TONAWANDA LF, TONAWANDA, NY
5. NAME OF DRILLER	Jeff SNYDER
6. MANUFACTURER'S DESIGNATION OF DRILL	6620 DT GEOPROBE
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE
8. HOLE LOCATION	N = 1093015 E = 417223.1
9. SURFACE ELEVATION	619.356
10. DATE STARTED	2/22/10 0900
11. DATE COMPLETED	2/22/10 1045
12. OVERBURDEN THICKNESS	21.4'
15. DEPTH GROUNDWATER ENCOUNTERED	7.5' bgs
13. DEPTH DRILLED INTO ROCK	N/A
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	N/A
14. TOTAL DEPTH OF HOLE	25.0'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	N/A

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP / TOTALS	TCLP / TOTALS	SVOC-TCLP / TOTALS	PEST-TCLP / TOTALS	PCB-TOTALS	N/A

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	2[redacted]
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT TON LF- Buffalo DISTRICT FUSRAP PROJECT HOLE NO 1A5.22

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER IAS 22

SHEET 2 OF 4

REC'O ~~CLEN~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) ~~γ~~	GEOTECH SAMPLE OR CORE BOX NO. (e) ~~B~~	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)	
	0							
	1	NO RECOVERY →						
	2							
	3	DARK-BROWN CLAYEY TOPSOIL W/ ROOTLETS, STIFF, FROZEN	5595	40		TOP 6"	γ 5463	B 40
	4	FILL: REDDISH-BROWN CLAY, WASTE CASH, GLASS), LOOSE, MOIST	6071	50	SEE NOTES	CHEM	5570	52
29"	5		6831	50		HIGH γ	6926	63
	6	NO RECOVERY →						
	7	FILL: WASTE CASH, GLASS), LOOSE, WET.	5629	70		SAT.	5729	49
	8		6012	40				
	9							
36"	10		6229	110		HIGH B	6159	55

PROJECT

HOLE NO IAS.22

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: 1A5.22

PROJECT:

INSPECTOR: D. Popp

SHEET 3 OF 4 SHEETS

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h) 1 MIN. STATIC COUNTS
	10						
	11						
	12						
	13						
	14	NO RECOVERY					
0"	15						
	16						
	17						
	18						
	19						
0"	20						

PROJECT:

HOLE NO: 1A5.22

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. PoPP

HOLE NUMBER 1A5.22

SHEET 4 OF 4

REC'D ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) ~~X~~	GEOTECH SAMPLE OR CORE BOX NO. (e) ~~X~~ B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. ~~REMARKS~~ STATIC COUNTS (h)	
	20	NO RECOVERY →						
	21	REDDISH-BROWN SILT AND CLAY, TRACE COURSE SAND, MED. STIFF, MOIST (CL)	5889	30	SEE NOTES	NATIVE	5382	51
	22		6035	60				
	23		6018	40				
	24		6122	100				
50"	25		6442	60				
		BOTTOM of BORING AT 25.0'						
	26	NOTES:						
		-CLOUDY, 28°F						
		- SAMPLE I.D.						
	27	TLS-SS-1A5.22(2.4-2.9)022210						
		TLS-SB-1A5.22(3.0-4.0)022210						
		TLS-SB-1A5.22(4.0-5.0)022210						
		TLS-SB-1A5.22(7.5-8.5)022210						
	28	TLS-SB-1A5.22(9.0-10.0)022210						
		TLS-SB-1A5.22(21.4-22.4)022210						
		-GAMMA READINGS ARE COUNTS/MIN.						
	29	- PID READINGS = 0 ppm (VOC's)						
	30							

PROJECT

HOLE NO 1A5.22

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

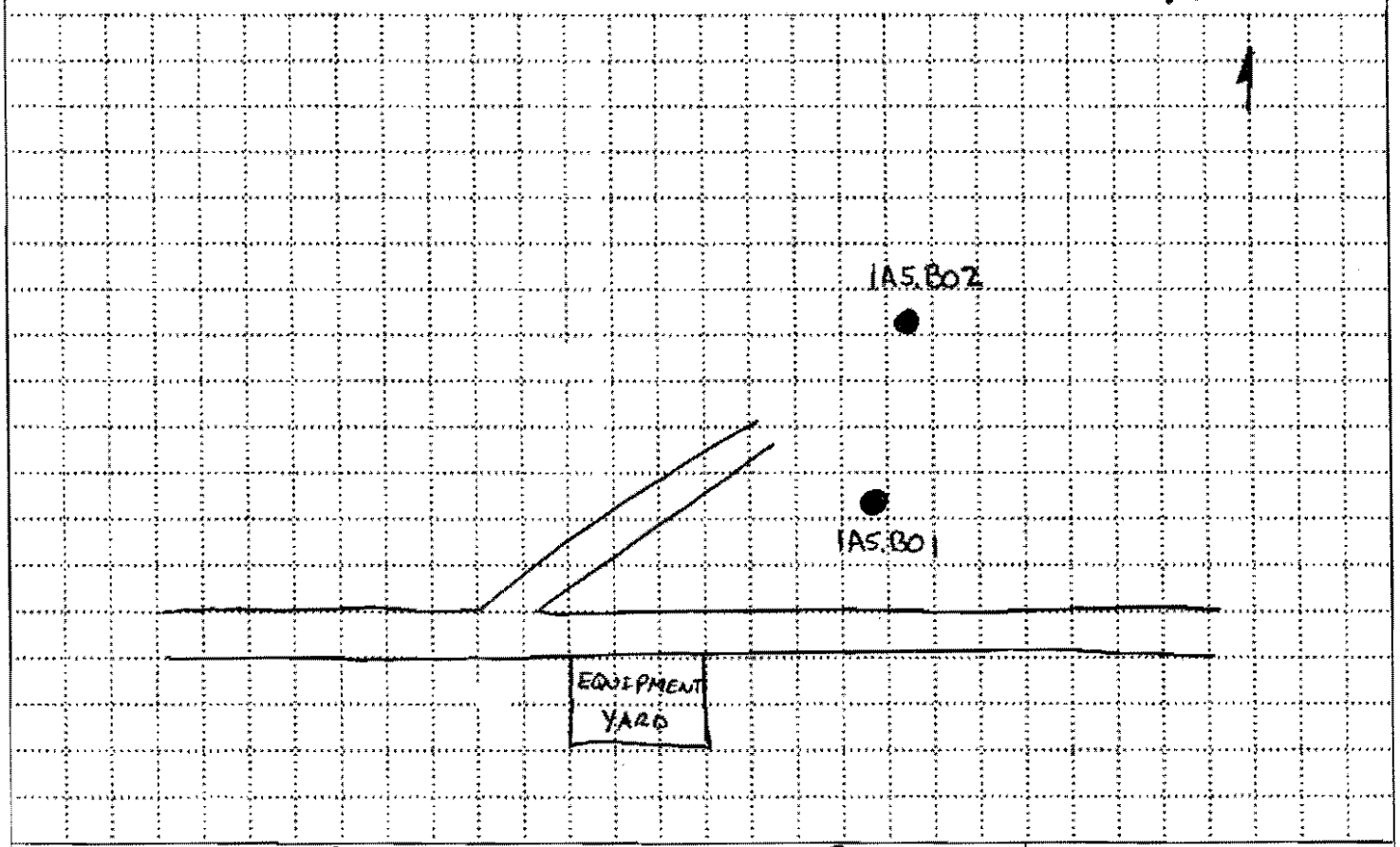
DISTRICT: Buffalo		HOLE NUMBER: 1A5.B01
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 3
3. PROJECT: TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: PHIL ORSI	6. MANUFACTURER'S DESIGNATION OF DRILL: 7720 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE W/ 5' PLASTIC SLEEVE	8. HOLE LOCATION: N= 109287.96 E= 1066043.66	
	9. SURFACE ELEVATION:	
	10. DATE STARTED: 3/10/10 1000	11. DATE COMPLETED: 3/10/10 1450
12. OVERBURDEN THICKNESS: NATIVE NOT ENCOUNTERED (REFUSAL AT 17.0')	15. DEPTH GROUNDWATER ENCOUNTERED: NOT ENCOUNTERED	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 17.0' - REFUSAL	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	-	-	-	-	-	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	[redacted]
CUTTINGS DRUMMED	-	-	-	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON LF- Buffalo DISTRICT FUSRAP PROJECT — HOLE NO: 1A5.B01

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A5.B01

SHEET 2 OF 3

RECID (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h)	
	0	NO RECOVERY →						
	1	FILL: DARK-BROWN CLAY, SHALE, GRAVEL, BRICK, ASPHALT, CONCRETE, STIFF, MOIST.	4920	50	SEE NOTES	TOP 6"	X 5000	B 42
	2		5020	90				
	3		5295	80		HIGH X	4877	65
	4		5034	110		HIGH B	4993	51
51"	5		5272	80		SAT. (2ND HIGH X)	4895	61
	6	NO RECOVERY →						
	7							
	8							
	9	FILL: CONCRETE, WASTE (ROOFING MATERIALS, PLASTIC), REDDISH-BROWN CLAY, GRAVEL, LOOSE, MOIST.	5069	50				
24"	10		4946	70				

PROJECT

HOLE NO 1A5.B01

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A5, B01

SHEET 3 OF 3

REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h)
	10						
	11	NO RECOVERY →					→
	12						
	13	FILL: DARK-BROWN CLAY, CONCRETE, WASTE (PLASTIC), MED. STIFF, MOIST.	5035	40			
	14		4897	60			
26"	15		5113	50			
	16	NO RECOVERY →					→
0"	17						
	18	BOTTOM of BORING AT 17.0' (REFUSAL) NOTES: - OVERCAST, 48°F - SAMPLE I.D., TLS-SS-1A5, B01 (0.8-1.3) 031010 TLS-SB-1A5, B01 (2.0-3.0) 031010					
	19	TLS-SB-1A5, B01 (3.0-4.0) 031010 TLS-SB-1A5, B01 (4.0-5.0) 031010 - MOVED 1m E of ORIGINAL LOCATION (REFUSAL AT 4.5')					
	20	- PID READINGS = 0 ppm (VOC'S) - SOIL READINGS ARE COUNTS/MIN.					

PROJECT

HOLE NO 1A5, B01

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

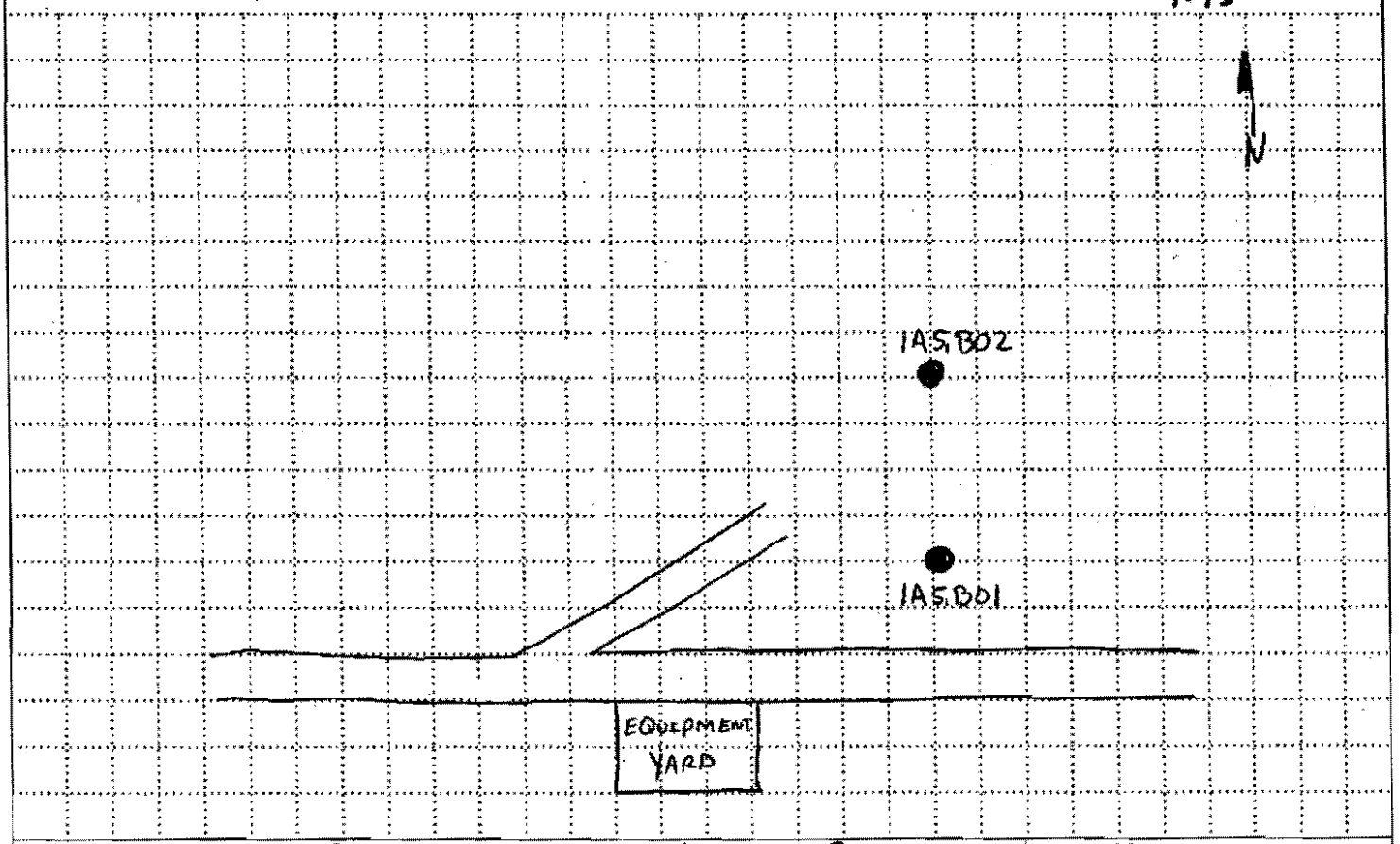
DISTRICT: Buffalo		HOLE NUMBER: 1A5,B02
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 3 SHEETS
3. PROJECT: TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: PHIL ORSI	6. MANUFACTURER'S DESIGNATION OF DRILL: 7720 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE W/ 5' PLASTIC SLEEVE	8. HOLE LOCATION: N= 1092850.52 E= 1066009.91	
	9. SURFACE ELEVATION:	
	10. DATE STARTED: 3/10/10 0845	11. DATE COMPLETED: 3/10/10 0950
12. OVERBURDEN THICKNESS: NATIVE NOT ENCOUNTERED (REFUSAL AT 14.0')	15. DEPTH GROUNDWATER ENCOUNTERED: NOT ENCOUNTERED	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 14.0' - REFUSAL	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	-	-	-	-	-	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
CUTTINGS DRUMMED	-	-	-	[redacted]

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT: TON LF- Buffalo DISTRICT FUSRAP PROJECT HOLE NO: 1A5, B02

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Poff

HOLE NUMBER 1A5.B02

SHEET 2 OF 3

REC'D ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS ~~REMARKS~~ (h)	
	0	NO RECOVERY →					→	
	1	FILL: DARK-BROWN/GRAY/ REDDISH-BROWN CLAY, SHALE, BRICK, GRAVEL, WOOD, WASTE (ROOFING MATERIALS), STIFF, MOIST.	4477	80	SEE NOTES	TOP 6"	X 4830	B 65
	2		5194	70				
	3		5156	90				
	4		5632	105		HIGH B	5241	63
54"	5		5312	70				
	6	NO RECOVERY →					→	
	7	FILL: WASTE (ROOFING MATERIALS), GRAVEL, REDDISH-BROWN CLAY, CONCRETE, STIFF, MOIST	4969	80				
	8		5538	50		SAT. (2ND HIGH B)	5116	45
	9		5969	90		HIGH X	5027	43
40"	10		4983	50				

PROJECT

HOLE NO 1A5.B02

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. PoPP

HOLE NUMBER 1AS.B02

SHEET 3 OF 3 SHEETS

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS REMARKS (h)
	10						
	11	NO RECOVERY →					
	12						
	13	FILL: DARK-BROWN CLAY, GRAVEL, SAND, WASTE (GLASS), MED. STIFF, MOIST.					
20"	14	BOTTOM of BORING AT 14.0' (REFUSAL)					
	15	NOTES: - OVERCAST, 36°F - SAMPLE I.D. TLS-SS-1AS.B02(0.5-1.0)031010					
	16	TLS-SB-1AS.B02(3.0-4.0)031010 TLS-SB-1AS.B02(7.0-8.0)031010 TLS-SB-1AS.B02(8.0-9.0)031010					
	17	- PID READINGS = 0 ppm (VOC'S) - SOIL READINGS ARE COUNTS/MIN.					
	18	- MOVED 1m NORTH of ORIGINAL LOCATION (REFUSAL AT 14.0')					
	19						
	20						

PROJECT

HOLE NO 1AS.B02

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

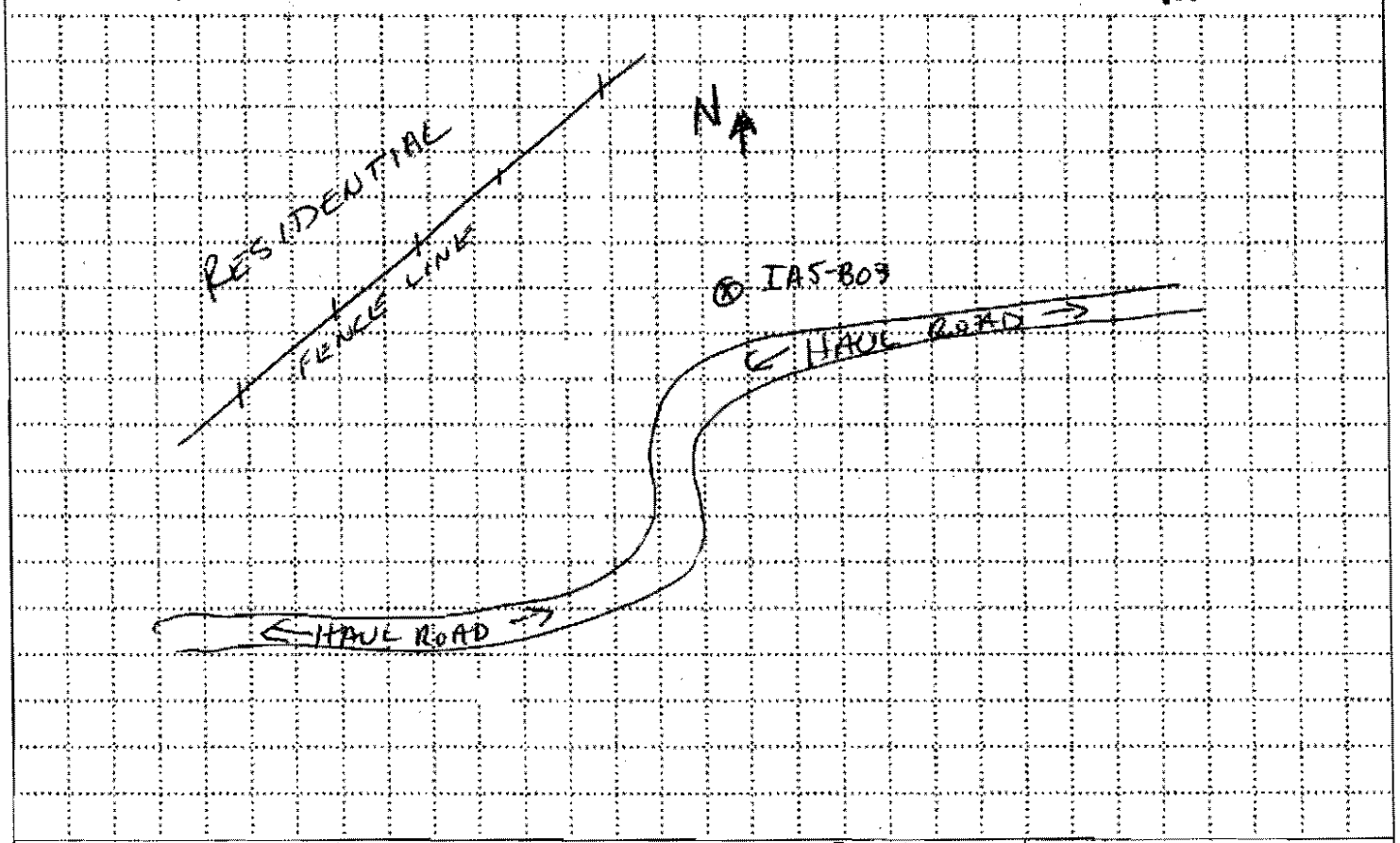
DISTRICT	Buffalo
HOLE NUMBER	IA5-B03
1. COMPANY NAME	ENSOL, INC.
2. DRILLING CONTRACTOR	ZEBRA ENVIRONMENTAL CORP.
SHEET	1 OF 7
3. PROJECT	TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT
4. LOCATION	TONAWANDA LF, TONAWANDA, NY
5. NAME OF DRILLER	JEFF SNYDER
6. MANUFACTURER'S DESIGNATION OF DRILL	6620 DT GEOPROBE
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	3 1/4" CASING 2" CORE W/ 5' PLASTIC SLEEVE
8. HOLE LOCATION	N= 1092867.41 E= 1065887.47
9. SURFACE ELEVATION	
10. DATE STARTED	3/10/10
11. DATE COMPLETED	3/10/10
12. OVERBURDEN THICKNESS	
15. DEPTH GROUNDWATER ENCOUNTERED	NOT ENCOUNTERED
13. DEPTH DRILLED INTO ROCK	N/A
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	N/A
14. TOTAL DEPTH OF HOLE	49'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	N/A

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	-	-	-	-	-	N/A

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23 [redacted]
CUTTINGS DRUMMED	-	-	-	

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT TON LF- Buffalo DISTRICT FUSRAP PROJECT HOLE NO. IA5-B03

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: IA5 B03

PROJECT:

INSPECTOR: S. PRYCE

SHEET 2 OF 7

RECID ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) 8	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS ~~REMARKS~~ (h)	
	0	NO RECOVERY					8	b
	1	FILL: GREY SOIL, MIXED WITH LARGE ROCK 1½" BRICK, TAN CLAY, FIRM, DRY.	8609	60		TOP 6"	8362	63
			8678	60				66
	2							
			8615	40				
	3							
			8827	80		SAT	8349	66
	4							
			8560	140		Hib	8368	58
53"	5							
	6	NO RECOVERY						
			8704	12 D				
	7	FILL: REDDISH BROWN CLAY, COARSE SAND, CEMENT STONE <½" FIRM, MOIST.						
			8750	100				
	8							
			8443	40				
	9							
			8418	40				
42"	10							

PROJECT

HOLE NO. IA5-B03

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR S. PRYCE

HOLE NUMBER IA5B03

SHEET 3 OF 7

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h) γ	b
	10							
	11							
	12	No RECOVERY						
	13							
	14		8976	80		14:8	8154	73
			8513	60				
18"	15							
	16							
	17	No RECOVERY						
	18							
	19							
8"	20							

PROJECT

HOLE NO. IA5B03

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR S. PRYCE

HOLE NUMBER IAS-B03

SHEET 4 OF 7

RECID ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	20						
	21						
	22	NO RECOVERY					
	23						
	24						
Q"	25						
	26						
	27	NO RECOVERY					
	28						
	29						
Q"	30						

PROJECT

HOLE NO. IAS-B03

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR S. PRYCE

HOLE NUMBER IA5-B03

SHEET 5 OF 7

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	30						
	31						
	32	NO RECOVERY					
	33						
	34						
Q"	35						
	36						
	37	NO RECOVERY					
	38						
	39						
Q"	40						

PROJECT

HOLE NO. IA5-B03

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

HOLE NUMBER: IAS-B03

INSPECTOR: S. PRYCE

SHEET 6 OF 7

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN STATIC ~~REMARKS~~ COUNTS (h)
	40						
	41						
	42	NO RECOVERY					
	43						
	44						
Q"	45						
	46						
	47	NO RECOVERY					
	48						
	49	* REFUSAL @ 49' END OF BORING @ 49'					
Q"	50	SEE NOTES ON PAGE #7					

PROJECT

HOLE NO. IAS-B03

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR S. PRYCE

HOLE NUMBER IAS-B03

SHEET 7 OF 7 SHEETS

RECID (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h)
	50						
		NOTES:					
	51						
		SAMPLE ID #s					
	52	TLS-SS-IAS B03(.7-1.2) 031010 (TOP 6")					
		TLS-SB-IAS B03(3.0-4.0) 031010 (SAT)					
		TLS-SB-IAS B03(4.0-5.0) 031010 (Hi beta)					
	53	TLS-SB-IAS B03(13.5-14.5) 031010 (Hi gamma)					
		TLS-SB-IAS B03(14.0-15.0) 031010 (NAT)					
	54	PID: 0 ppm (VOCs)					
		GROUND WATER: NOT ENCOUNTERED					
		NATIVE: NOT ENCOUNTERED					
	55	*MOVED FROM					
		Original IAS-B03					
	56	1 meter SOUTHWEST					
		REFUSAL @48' NO					
		SAMPLES TAKEN					
	57	TOTAL RECOVERY: 113"					
	58						
	59						
	60	WEATHER: CLOUDY 48°					

PROJECT

HOLE NO. IAS-B03

ENG FORM 5056A-R, AUG 94

USACE ENG HTRW Forms
Investigative Area 6

HTRW DRILLING LOG

DISTRICT	Buffalo
HOLE NUMBER	1A6.1
1. COMPANY NAME	ENSOL, INC.
2. DRILLING CONTRACTOR	ZEBRA ENVIRONMENTAL CORP.
SHEET / SHEETS	1 OF 2
3. PROJECT	TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT
4. LOCATION	TONAWANDA LF, TONAWANDA, NY
5. NAME OF DRILLER	JEFF SNYDER
6. MANUFACTURER'S DESIGNATION OF DRILL	6620 DT GEOPROBE
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	3 1/4" CASING 2" CORE W/ 5' PLASTIC SLEEVE
8. HOLE LOCATION	N= 1092583.92 E= 1066413.02
9. SURFACE ELEVATION	623.365
10. DATE STARTED	3/19/10 1010
11. DATE COMPLETED	3/19/10 1100
12. OVERBURDEN THICKNESS	NATIVE NOT ENCOUNTERED
15. DEPTH GROUNDWATER ENCOUNTERED	NOT ENCOUNTERED
13. DEPTH DRILLED INTO ROCK	N/A
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	N/A
14. TOTAL DEPTH OF HOLE	7.0' (REFUSAL)
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	N/A

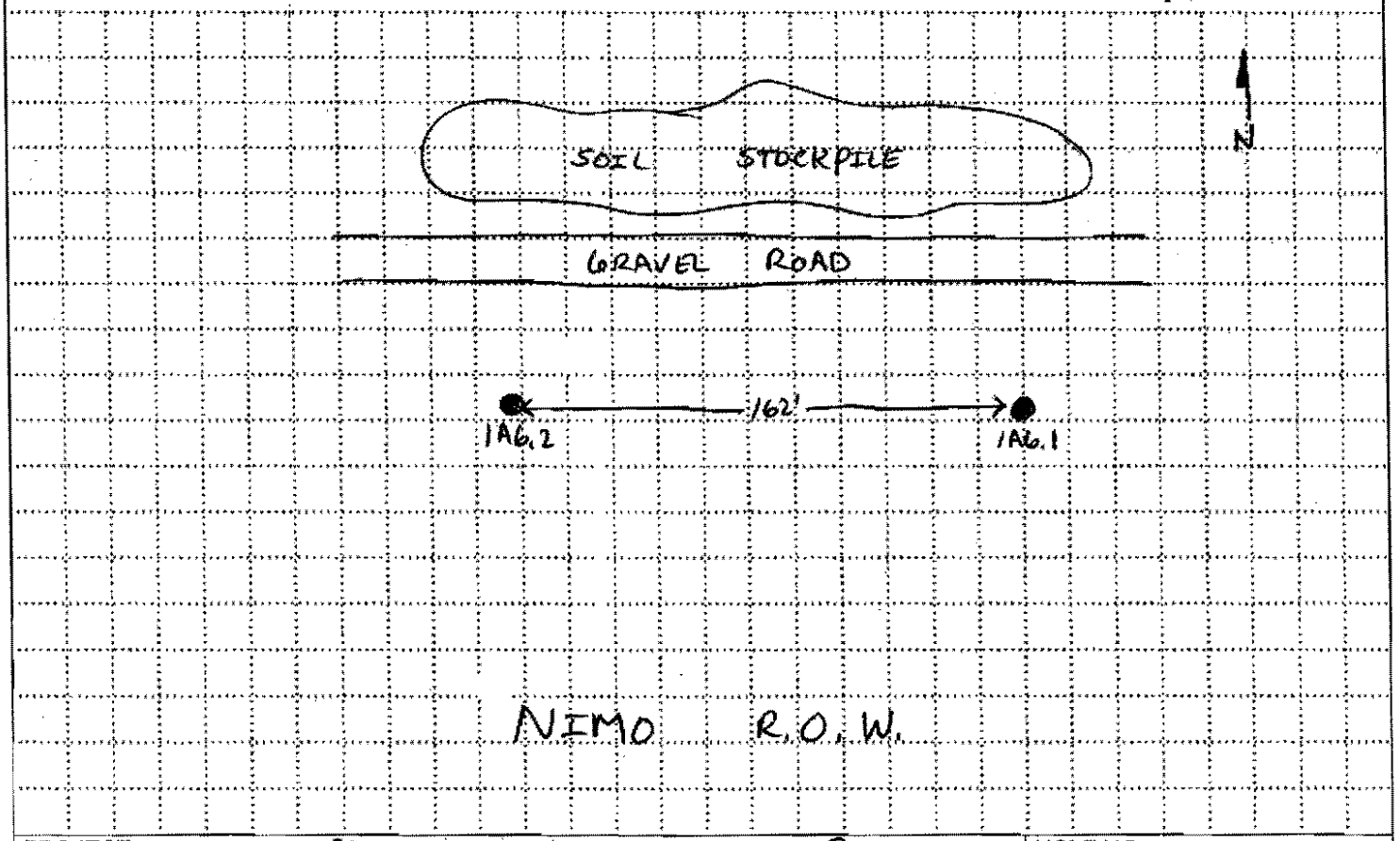
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	–	–	–	–	–	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23 [redacted]
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS

SCALE: NTS



PROJECT	HOLE NO
TON LF- Buffalo DISTRICT FUSRAP PROJECT	1A6.1

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER 1A6.1

PROJECT

INSPECTOR D. Popp

SHEET 2 OF 2

RECID ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. ~~REMARKS~~ STATIC COUNTS (h)
	0	NO RECOVERY →					
	1						
	2						
	3	STRUCTURAL FILL: REDDISH-BROWN CLAY, GRASS, GRAVEL, STIFF, MOIST.	7380	40	SEE NOTES	TOP 6"	X 7326 B 46
	4						
20"	5	FILL: REDDISH-BROWN CLAY, GRAVEL, WASTE (PLASTIC), STIFF, MOIST.	7113	60		HIGH B	7004 46
		NO RECOVERY →					
	6	FILL: REDDISH-BROWN CLAY, GRAVEL, STIFF, MOIST.	7160	60		HIGH B	6803 52
12"	7	BOTTOM OF BORING AT 7.0' (REFUSAL)					
	8	NOTES: - CLEAR, 42° F - SAMPLE I.D. TLS-SS-1A6.1(3.0-3.5) 031910 TLS-SB-1A6.1(4.0-5.0) 031910					
	9	TLS-SB-1A6.1 (6.0-7.0) 031910 - PID READINGS = 0ppm (VOCs) - SOIL READINGS ARE COUNTS/MIN.					
	10	- REFUSAL AT ORIGINAL LOCATION AT 1.5', MOVED 1M EAST (REFUSAL AT 1.5'), MOVED 1M EAST.					

PROJECT

HOLE NO 1A6.1

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

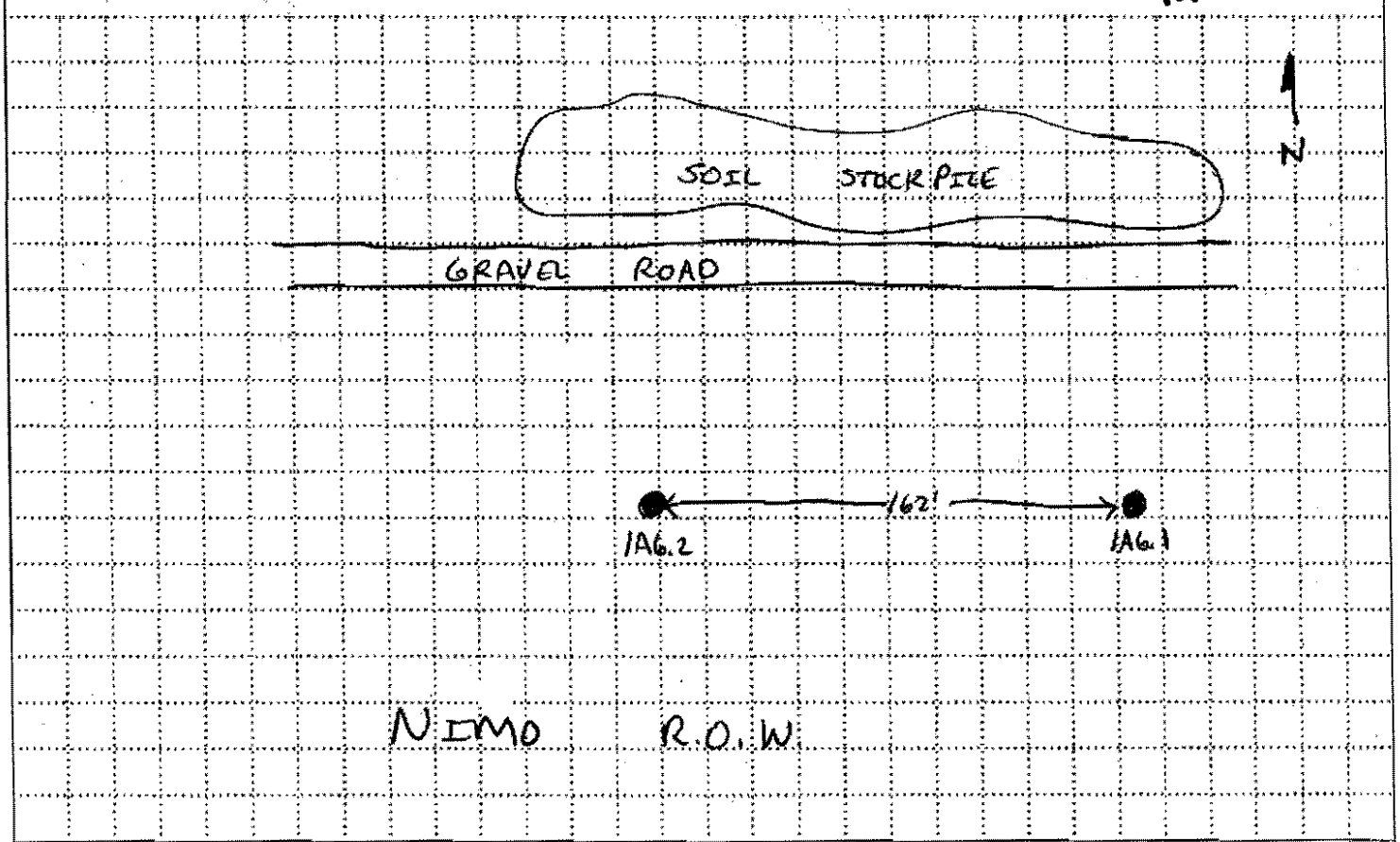
DISTRICT: Buffalo		HOLE NUMBER: 1A6.2
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 4 SHEETS
3. PROJECT: TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: Jeff SNYDER	6. MANUFACTURER'S DESIGNATION OF DRILL: 6620 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE W/ 5' PLASTIC SLEEVE	8. HOLE LOCATION: N= 1092583.92 E= 1066250.59	
	9. SURFACE ELEVATION: 626.071	
	10. DATE STARTED: 3/19/10 0850	11. DATE COMPLETED: 3/19/10 1005
12. OVERBURDEN THICKNESS: NATIVE NOT ENCOUNTERED	15. DEPTH GROUNDWATER ENCOUNTERED: 9.1' bgs	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 25.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	–	–	–	–	–	N/A

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	2
CUTTINGS DRUMMED	–	–	–	[redacted]

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT	HOLE NO
TON LF - Buffalo DISTRICT FUSRAP PROJECT	1A6.2

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A6.2

SHEET 2 OF 4

RECID ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	0	NO RECOVERY →					→
	1						
	2						
	3						
	4	STRUCTURAL FILL: DARK-BROWN CLAY, GRAVEL, STIFF, MOIST					γ 7087 / B 49
		FILL: DARK-BROWN CLAY, BRICK, GRAVEL, STIFF, MOIST.	7267	90	SEE NOTES	TOP 6"	
14"	5						
	6						
	7	NO RECOVERY →					→
	8						
	9						
		FILL: DARK-BROWN CLAY, WOOD, WASTE (PLASTIC), GRAVEL, MED. STIFF, WET.	6970	80		SAT.	7124 63
9"	10						

PROJECT

HOLE NO 1A6.2

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A6.2

SHEET 3 OF 4

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	10						
	11						
	12	NO RECOVERY →					
	13						
	14						
12"	15	FILL: REDDISH-BROWN CLAY, GRAVEL, SOFT, WET	7350	80	SEE NOTES	HIGH γ	γ 6920 B 67
	16						
	17						
	18	NO RECOVERY →					
	19						
0"	20						

PROJECT

HOLE NO 1A6.2

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A6.2

SHEET 4 OF 4

RECID ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	20						
	21						
	22	NO RECOVERY →					
	23						
	24						
0"	25	BOTTOM of BORING AT 25.0'					
	26	NOTES: - CLEAR, 40°F					
		- SAMPLE I.D. TLS-SS-1A6.2(3.7-4.2)031910					
	27	TLS-SB-1A6.2(9.2-10.0)031910					
		TLS-SB-1A6.2(14.0-15.0)031910					
		- PID READINGS = 0ppm (VOC's)					
	28	- SOIL READINGS ARE COUNTS/MIN.					
		- MOVED 1m SOUTH of ORIGINAL LOCATION (REFUSAL					
	29	AT 3.0')					
	30						

PROJECT

HOLE NO 1A6.2

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

DISTRICT: BUFFALO		HOLE NUMBER: IA6-3
1. COMPANY NAME: ENSOL	2. DRILLING CONTRACTOR: ZEBRA	SHEET 1 OF 3 SHEETS
3. PROJECT: TOWN OF TONAWANDA LP OPERABLE UNIT: BUFFALO DISTRICT FUSRAP	4. LOCATION: TONAWANDA LANDFILL, TONAWANDA, N.Y.	
5. NAME OF DRILLER: PHIL ORSI / DOM PINO	6. MANUFACTURER'S DESIGNATION OF DRILL: 7720 DT GEO-PRODE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE W/5' SLEEVE	8. HOLE LOCATION: N=1092583.92 E=1066088.15	
	9. SURFACE ELEVATION: N/A	
	10. DATE STARTED: 3/19/10	11. DATE COMPLETED: 3/19/10
12. OVERBURDEN THICKNESS: N/A	15. DEPTH GROUNDWATER ENCOUNTERED: N/A	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 13'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

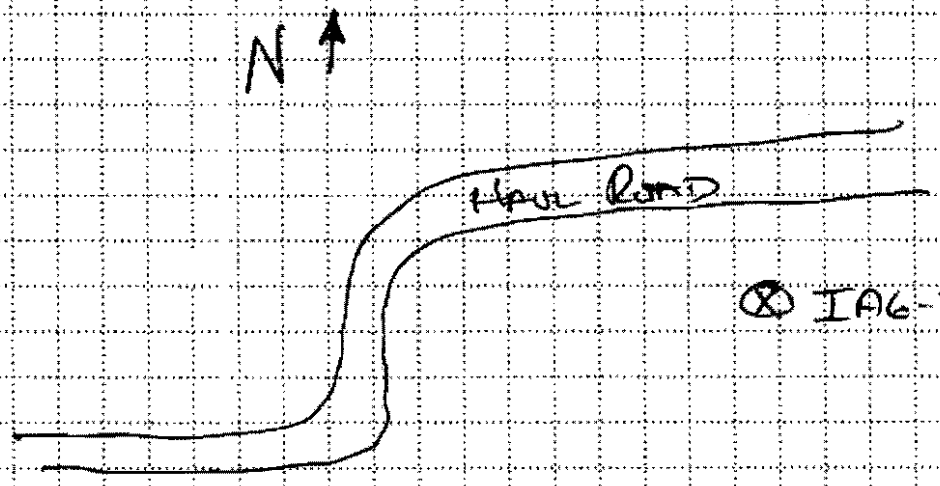
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	N/A	N/A	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %
N/A	—	—	—	—	—	

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. [redacted]
—	—	—	—	

LOCATION SKETCH/COMMENTS — SCALE:

REFUSAL AT FIRST LOCATION MOVED 1 METER SOUTH.



PROJECT | HOLE NO. IA6-3

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: IA6-3

PROJECT:

INSPECTOR: JOE CHIUDO

SHEET 2 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	~~FIELD SCREENING RESULTS (d)~~ γ	~~GEOTECH SAMPLE OR CORE BOX NO. (e)~~ B	~~ANALYTICAL SAMPLE NO. (f)~~	~~BLOW COUNT (g)~~	~~REMARKS (h)~~ γ	B
	1' 2'	0-2.4' NO RECOVERY						
	3'	2.4-5.0'	9016	40		Top 6"	7487	53
	4'	Fill:	7551	120		Hi Beta	7470	54
	5'		7623	110		2ND Hi γ	7642	49
	6' 7'	NO RECOVERY						
	8'	7.5-10.0'	7729	80				
	9'	Fill. WASTE, DARK BLACK CLAY, FINE SAND CLOTH, FABRIC, PLASTIC 1/2" STONE, WET, SOFT.	8469	120		Hi γ	7457	57
			7622	70				
	10'							

PROJECT:

HOLE NO. IA6-3

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR: JOE CHIUDO

HOLE NUMBER: IA6-3

SHEET 3 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	~~FIELD SCREENING RESULTS~~ (d) γ	~~GEOTECH SAMPLE OR CORE BOX NO.~~ (e) B	~~ANALYTICAL SAMPLE NO.~~ (f)	~~BLOWCOUNT~~ (g)	REMARKS (h) γ B
	10'	10-13'					
	11'	No Recovery					
	12'						
	13'	END OF BORING 2ND REFUSAL					
		PID = 0 ppm VOC's NATIVE @ N/A GROUND WATER @ N/A					
		SAMPLE ID # S					
		TLS-SS-IA6-3(2.4-2.9) 031910 — TOP 6"					
		TLS-SB-IA6-3(3.0-4.0) 031910 — Hi B					
		TLS-SB-IA6-3(4.0-5.0) 031910 — 2ND Hi γ					
		TLS-SB-IA6-3(8.0-9.0) 031910 — Hi γ					
		WEATHER - SUNNY 40°					

PROJECT

HOLE NO. IA6-3

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

DISTRICT: Buffalo		HOLE NUMBER: IA6-4
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 1 SHEETS
3. PROJECT: TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: PHIL ORSI / DOM PINO	6. MANUFACTURER'S DESIGNATION OF DRILL: 7720 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE W/ 5' PLASTIC SLEEVE	8. HOLE LOCATION: N= 1082583.72 E= 1065925.72	
	9. SURFACE ELEVATION	
	10. DATE STARTED: 3/19/10	11. DATE COMPLETED: 3/19/10
12. OVERBURDEN THICKNESS: N/A	15. DEPTH GROUNDWATER ENCOUNTERED: N/A	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: REFUSAL	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP / TOTALS	TCLP / TOTALS	PAC-TCLP / TOTALS	PCB-TCLP / TOTALS	RCO-TOTALS	N/A

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
CUTTINGS DRUMMED	–	–	–	[redacted]

LOCATION SKETCH/COMMENTS — SCALE: NTS

N ↑

0840: REFUSAL @ 5' DEPTH, MOVED 1 METER SOUTH. HAD REFUSAL @ 3' SAMPLE COLLECTED FROM ORIGINAL LOCATION.

SAMPLE ID #S	γ	1 MIN STATIC COUNT B
TOP 6" → TLS-SS-IA6-4 (2.0-3.3) 031910	7121	61
HI γ - TLS-SB-IA6-4 (4.0-5.0) 031910	7580	66

TOTAL RECOVERY = 26"

PROJECT: TON LF - Buffalo DISTRICT FUSRAP PROJECT — HOLE NO. IA6-4

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG

DISTRICT: Buffalo		HOLE NUMBER: IA6-5
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 4 SHEETS
3. PROJECT: TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: PHIL ORSI / DOM PINO	6. MANUFACTURER'S DESIGNATION OF DRILL: 7720 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE W/ 5' PLASTIC SLEEVE	8. HOLE LOCATION: N= 1092583.92 E= 1065763.28	
	9. SURFACE ELEVATION:	
	10. DATE STARTED: 3/18/10	11. DATE COMPLETED: 3/18/10
12. OVERBURDEN THICKNESS: N/A	15. DEPTH GROUNDWATER ENCOUNTERED: 18'	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 25'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

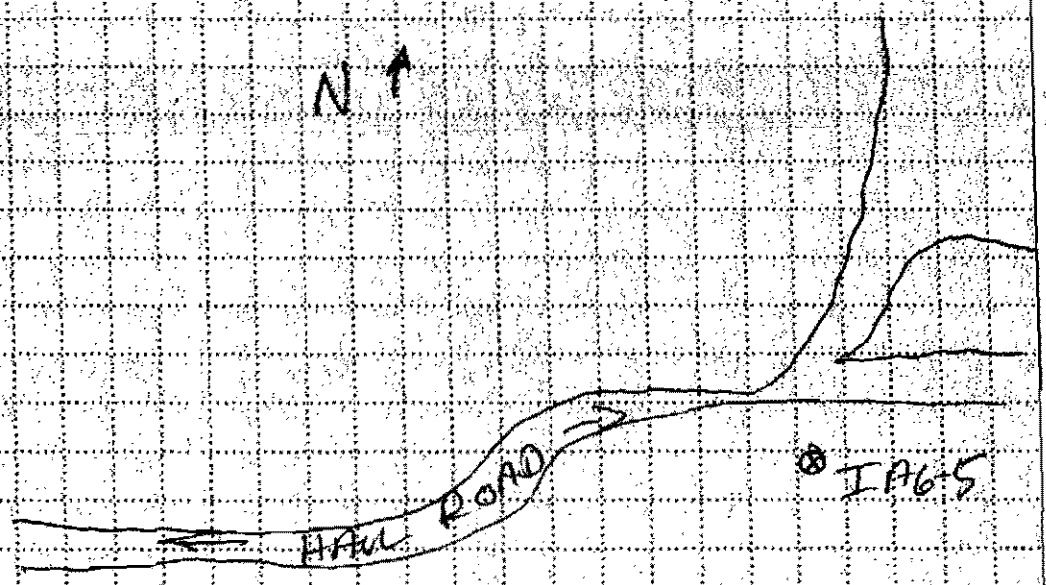
20. SAMPLES FOR CHEMICAL ANALYSIS	VOC		METALS		OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP	TOTALS	TCLP	TOTALS	SVOC-TCLP	TOTALS	PCB-TCLP	TOTALS	PCB-TOTALS	N/A

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)
CUTTINGS DRUMMED	-	-	-

[redacted]

LOCATION SKETCH/COMMENTS — SCALE: NTS

X REFUSAL AT 1ST LOCATION MOVED 1 METER SOUTH



PROJECT: TON LF- BUFFALO DISTRICT FUSRAP PROJECT — HOLE NO. IA6-5

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: IA6-5

PROJECT:

INSPECTOR: STUART PRYCE

SHEET 2 OF 4 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC REMARKS COUNT (h) γ	B
	10							
	11	NO RECOVERY →						
	12							
	13	FILL: RED BROWN CLAY, FIRM, MOIST. NATIVE @ 12.5'	8141	60		(12.3-12.8) TOP 6"	7750	59
	14		8528	70				
23'	15		8270	60				
	16	FILL: RED-BROWN CLAY, COARSE SAND + STONE, FIRM, MOIST.	8045	60				
	17		7948	90		Hi beta	7674	67
	18		7620	80				
	19		8634	40		SAT	7813	55
60'	20		8430	90				

PROJECT:

HOLE NO. IA6-5

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: IA6-5

PROJECT:

INSPECTOR: STUART PRYCE

SHEET 3 OF 4 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	~~FIELD SCREENING RESULTS~~ (d) γ	~~GEOTECH SAMPLE~~ OR CORE BOX NO. (e) B	~~ANALYTICAL SAMPLE NO.~~ (f)	~~BLOW COUNT~~ (g)	REMARKS (h) MIN. STATIC γ COUNT B
	0						
	1	No Recovery					
	2	(1.8-5.0) Fill: Reddish Brown Clay, Coarse Sand + Stone, Wet, Firm	7821	60			
	3						
			8381	60			
	4						
			8853	90			
	5						
	6	No Recovery					
	7		8192	40			
	8	Fill: Organic Material, Roots, Wood, Waste, Metal, Glass (to 8.5.) Reddish Brown Clay Coarse Sand + Stone, Firm Moist.	7687	20			
			8018	50			
	9		8326	80			
	10						

PROJECT:

HOLE NO. IA6-5

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: IA6-5

PROJECT:

INSPECTOR: STUART PRYCE

SHEET 4 OF 4 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR BORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h) 1 MIN. STATIC COUNT γ	B
	20							
			8302	40				
	21							
		FILL: RED-BROWN CLAY, COARSE SAND + STONES, FIRM, MOIST - WET.	7798	80				
	22							
			8010	90				
	23							
			8736	70		(23-24.0') Hi γ	7811	60
	24							
			8393	110		CHEM	7275	67
	25							
		END OF BORING @ 25'						
	26	NOTES:						
		GROUNDWATER = 18'						
		NATIVE = 12.5'						
	27	PID = 0 ppm VOC'S						
		SAMPLE ID #'S						
	28	TLS SSIA6-S(12.3-12.8)031810 - TOP 6"						
		TLS SBIA6-S(18-19.0)031810 - SAT						
		TLS SBIA6-S(18.0-17.0)031810 - Hi BETA						
		TLS SBIA6-S(23.0-24.0)031810 - Hi γ						
	29	TLS SBIA6-S(24.0-25.0)031810 - CHEM						
	30	WEATHER: SUNNY 47°						

PROJECT:

HOLE NO. IA6-5

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

DISTRICT	BUFFALO
HOLE NUMBER	IA6-6
1. COMPANY NAME	EJ Sol INC.
2. DRILLING CONTRACTOR	ZEBA ENVIR. DRILLING
SHEET / SHEETS	1 OF
3. PROJECT	Town of Tonawanda UP operable Unit - BUFFALO District FUSRAP Project
4. LOCATION	Tonawanda LF Tonawanda, NY
5. NAME OF DRILLER	Phil ORSI
6. MANUFACTURER'S DESIGNATION OF DRILL	7720 DT Geoprobe
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	3¼" casing 2¼ core w/ 5' plastic sleeve.
8. HOLE LOCATION	
9. SURFACE ELEVATION	
10. DATE STARTED	3-18-10 13:50
11. DATE COMPLETED	3-18-10 14:45
12. OVERBURDEN THICKNESS	7.0'
15. DEPTH GROUNDWATER ENCOUNTERED	14.0'
13. DEPTH DRILLED INTO ROCK	N/A
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	N/A
14. TOTAL DEPTH OF HOLE	20.0'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	N/A

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	—	—	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	FLD/TOTALS	FLD/TOTALS	SVOC FLD/TOTALS	PCB FLD/TOTALS	PCB TOTALS	N/A %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
Cuttings drummed	—	—	—	

LOCATION SKETCH/COMMENTS SCALE:

* Refusal - 1st Attempt Refused @ - moved 1m. South

PROJECT	HOLE NO
Ton LF - Buffalo District FUSRAP Project	IA6-6

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: 1A6-6

PROJECT: TN LF FUSRAP Project-1

INSPECTOR:

SHEET 2 OF SHEETS

ELEV. / RECOVERY	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h) 1 MIN Static Counts
	0	No Recovery	No Recovery				
	1	Fill) organic matter (roots, wood), stone 7 1/2", black cinder (waste, glass), clay, firm, dry	8251	30			
	2		7019	40			
54"	3		7106	40			
	4		7670	70			
	5	Same as above	7220	60			Top 6" 53 (4.5-5.0') 7077
	6	No Recovery	No Recovery				
	7	Reddish brown clay, coarse sand, stone 7 1/4", firm, moist Natural @ 7.0'	7842	80			
42"	8		7539	70			
			7634	100			Hgn B 6.2 (8-9.0') 6698
	9	Fill: waste (wood, paper, plastic, glass)	8105	80			
	10						

PROJECT: TN LF Buffalo FUSRAP Project

HOLE NO: 1A6-6

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: IA6-6

PROJECT: TN LF FUSRAP Project-1

INSPECTOR:

SHEET 2 OF SHEETS

ELEV. Recovery	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO (f)	BLOW COUNT (g)	REMARKS (h) 1 min Static Counts
	10						
	11	NO RECOVERY	NO RECOVERY				
	12						
15"	13						
	14	FILL! WASTE (GLASS, plastic, PULP, WOOD), VERY WET, LOOSE G.WATER @ 14.0'	7438	50			
			8072	30			SAT, (14-15.0') 43/6778
	15						
	16	NO RECOVERY	NO RECOVERY				
	17	Redish brown Clay, COURSE SAND + STONE, FIRM, MOIST (CL)	7143	30			
42"	18		7671	50			Chem. (17-18.0') 39/7185
	19		8411	30			High (18-19.0') 36/7165
			7841	30			
	20	Bottom of BORING					

PROJECT: TN LF Buffalo FUSRAP Project

HOLE NO: IA6-6

ENG FORM 5056A-R, AUG 94

Sample ID

up 6" - TLS SS IA6-6 (4.5-5.0') 031810
gh beta - TLS SSB IA6-6 (8-9.0') 031810
ATURATED - TLS SB IA6-6 (14.0-15.0') 031810
hemical - TLS SB IA6-6 (17-18.0') 031810

NOTES

- Gamma = count/min.
- PID Reading = 0ppm
- Native - 7'
- G.WATER - 14.0'
- Sunny 45°F

HTRW DRILLING LOG

DISTRICT: BUFFALO		HOLE NUMBER: IA6-7
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL	SHEET 1 OF 1 SHEETS
3. PROJECT: TONAWANDA LANDFILL, BUFFALO FUSRAP	4. LOCATION: TONAWANDA LANDFILL, TONAWANDA NY.	
5. NAME OF DRILLER: PHIL ORSI / DOM PINO	6. MANUFACTURER'S DESIGNATION OF DRILL: 7720 DT - GEO-PROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3¼" CASTING, 2" CORE W/5' SLEEVE.	8. HOLE LOCATION: N= 1092583.92 E= 1065438.41	
	9. SURFACE ELEVATION: /	
	10. DATE STARTED: 3/18/10	11. DATE COMPLETED: 3/18/10
12. OVERBURDEN THICKNESS: N/A	15. DEPTH GROUNDWATER ENCOUNTERED: N/A	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: REFUSAL @ 6' + 20'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

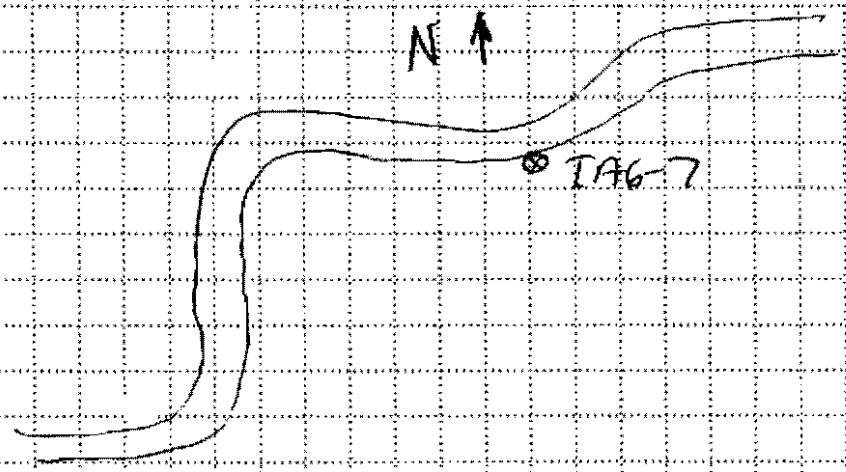
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	N/A	N/A	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
—	—	—	—	—	—	— %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. S[redacted]
CUTTINGS DRUMMED	—	—	—	

LOCATION SKETCH/COMMENTS — SCALE: NTS

1045 - REFUSAL @ 6' MOVE 1 METER WEST @ 1100. 2ND REFUSAL @ 20' 1115. MOVE TO NEXT LOCATION. - NO SAMPLES TAKEN -



PROJECT	HOLE NO. IA6-7

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG

DISTRICT: BUFFALO		HOLE NUMBER: IA6-8
1. COMPANY NAME: ENSOL, INC	2. DRILLING CONTRACTOR: ZEBRA	SHEET 1 OF 1 SHEETS
3. PROJECT: TONAWANDA LANDFILL, BUFFALO FUSRAP	4. LOCATION: TONAWANDA LANDFILL, TONAWANDA NY	
5. NAME OF DRILLER: PHIL ORSI / DOM PINO	6. MANUFACTURER'S DESIGNATION OF DRILL: 7720 DT. GEO-PROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE W/5' SLEEVE	8. HOLE LOCATION: N= 1092583.92 E= 1065275.97	
	9. SURFACE ELEVATION	
	10. DATE STARTED: 3/18/10	11. DATE COMPLETED: 3/18/10
12. OVERBURDEN THICKNESS: N/A	15. DEPTH GROUNDWATER ENCOUNTERED: N/A	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: N/A	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	N/A	N/A	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
—	—	—	—	—	—	%

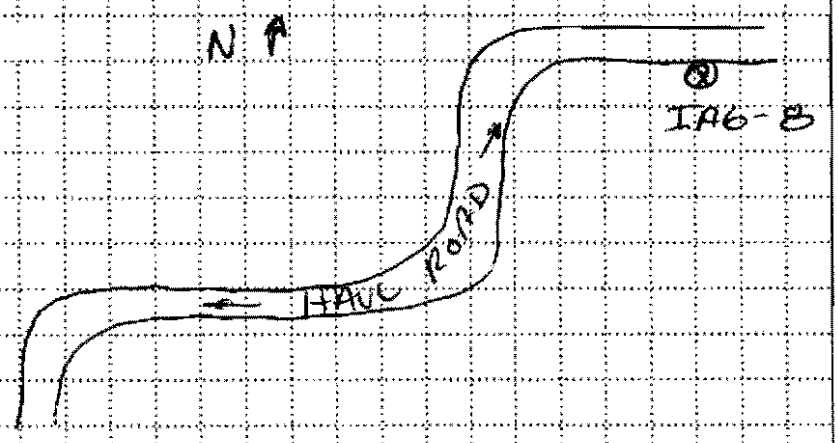
22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATU[redacted]
CUTTINGS DRUMMED	—	—	—	

LOCATION SKETCH/COMMENTS — SCALE: NTS

0930 - 1000 REFUSAL - MOVED 1 meter W OF ORIGINAL LOCATION.

1000-1030 = REFUSALS @ LOCATION IA6-8 BOTH @ 20' DEPTH.

- NO SAMPLES TAKEN -



PROJECT	HOLE NO. IA6-8

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG

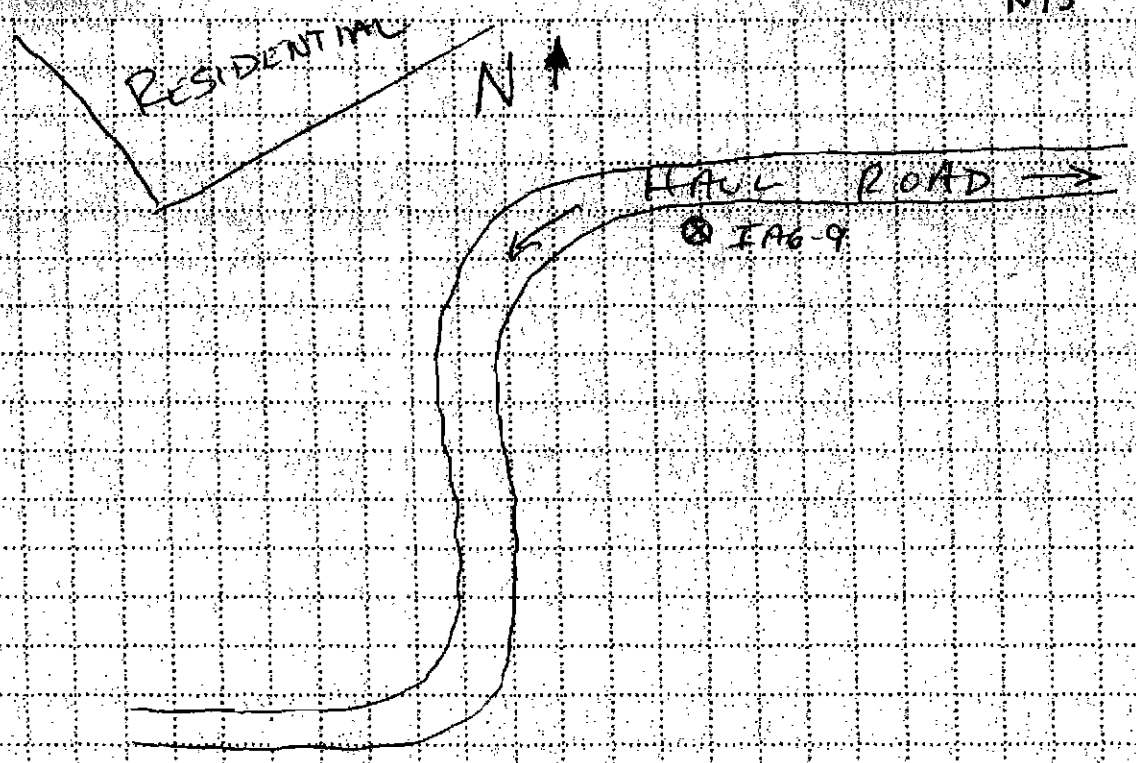
DISTRICT: Buffalo		HOLE NUMBER: IA6-9
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 3 SHEETS
3. PROJECT: TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: PHIL ORSI / DOM PINO	6. MANUFACTURER'S DESIGNATION OF DRILL: DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE	8. HOLE LOCATION: N= 1092583.92 E= 1065113.54	
	9. SURFACE ELEVATION	
	10. DATE STARTED: 3/18/10	11. DATE COMPLETED: 3/18/10
12. OVERBURDEN THICKNESS: N/A	15. DEPTH GROUNDWATER ENCOUNTERED: 14'	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 20'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP / TOTALS	TCLP / TOTALS	SVOC-TCLP / TOTALS	PEST-TCLP / TOTALS	[illegible]	N/A

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIG[redacted]
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON LF - Buffalo DISTRICT FUSRAP PROJECT — HOLE NO. IA6-9

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: IA6-9

PROJECT:

INSPECTOR: STUART PRYCE

SHEET 2 OF 3

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	~~FIELD SCREENING RESULTS~~ (d) γ	~~GEOTECH SAMPLE OR CORE BOX NO.~~ (e) B	~~ANALYTICAL SAMPLE NO.~~ (f)	~~BLOW COUNT~~ (g)	~~REMARKS~~ (h) 1 MIN-STATIC γ	~~COUNT~~ B
	0		5627	50				
	1	FILL: ROAD BASE, STONE >1/4" GRAVEL, CLAY RED-BROWN, COARSE SAND + STONE. STIFF, DRY	5651	100				
	2		5586	70				
	3		5696	120		TOP 6" (3.5-4.0)	4822	72
	4		5447	130		(4.0-5.0) Hi Beta	5380	46
	5							
	6	NO RECOVERY →						
	7							
	8		5902	110		(7.4-8.4) Hi γ	5181	43
	9	FILL: BLACK ORGANIC MATERIAL, ROOTS, WOOD, STONE GREY CLAY, MOIST, ~~SOFT~~	5784	60		CHEM (8.4-9.4)	5048	74
	10		5612	100				

PROJECT:

HOLE NO. IA6-9

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT	INSPECTOR	HOLE NUMBER
	STUART PRYCE	IA6-9
		SHEET 3 OF 3

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	~~FIELD SCREENING RESULTS~~ (d) γ	GEOTECH ~~SAMPLE OR CORE BOX NO.~~ (e) B	~~ANALYTICAL SAMPLE NO.~~ (f)	~~BLOW COUNT~~ (g)	1 MIN. STATIC ~~REMARKS~~ COUNT (h) γ B
	10						
	11	NO RECOVERY →					
	12						
	13						
	14	FILL:	5536	60			
	15		5615	80		SAT (14-15.0)	4893 41
	16						
	17	NO RECOVERY →					
	18	(NATIVE @ 9' GROUND WATER @ 14' PID = Ø ppM VOC'S)					
	19			SAMPLE ID		#'S	
				TLS SS IA6-9(0.5-4.0)031810-TOP 6"			
				TLS SB IA6-9(4.0-5.0)031810-H: BETA			
				TLS SB IA6-9(7.4-8.4)031810-H: γ			
				TLS SB IA6-9(14.0-15.0)031810-SAT.			
	20	SUNNY 40°		TLS SB IA6-9(8.4-9.4)031810-CHEM.			

PROJECT	HOLE NO.
	IA6-9

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

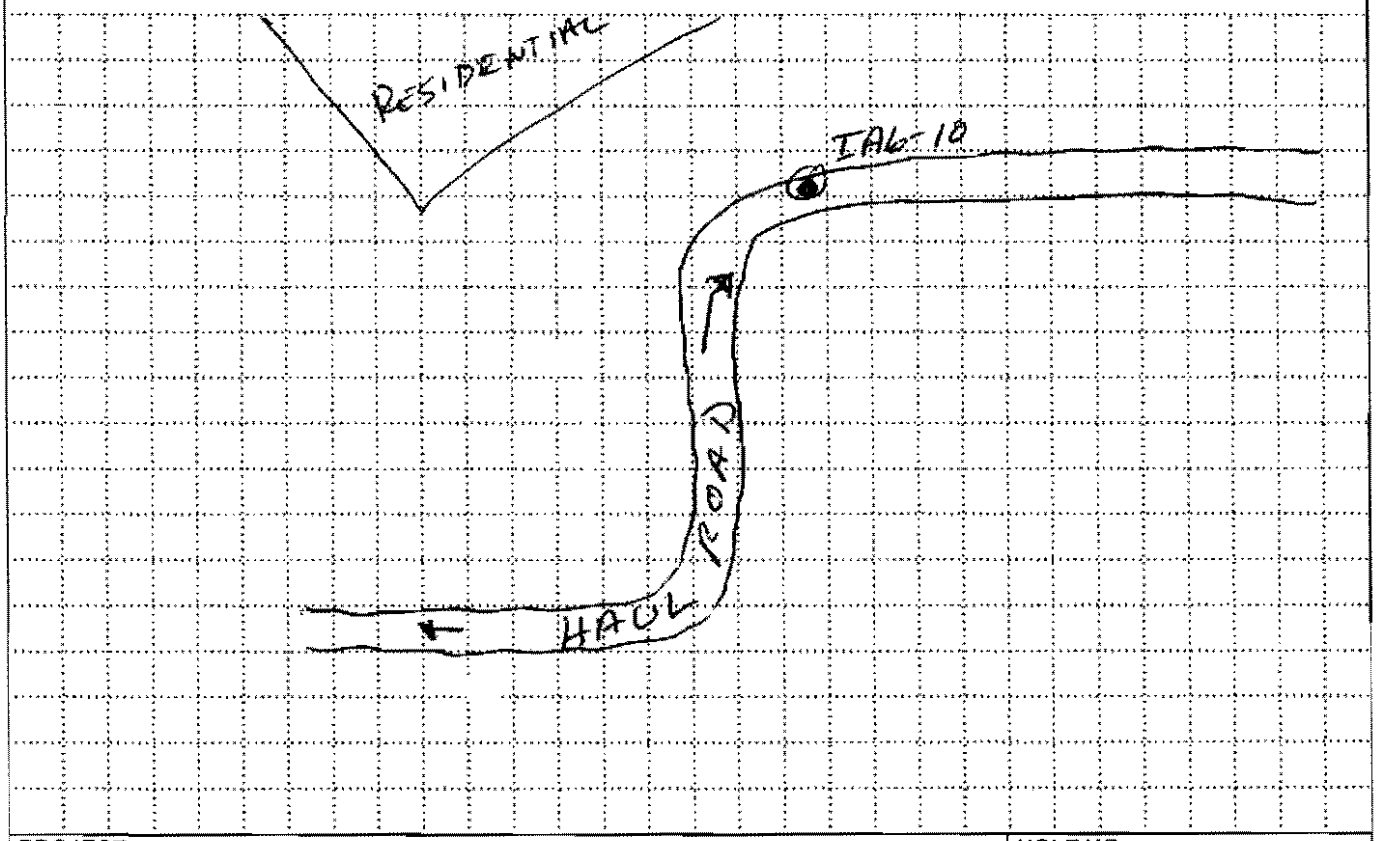
DISTRICT: BUFFALO		HOLE NUMBER: IA6-10
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL	SHEET 1 OF 6 SHEETS
3. PROJECT: TOWN OF TONAWANDA LF OPERABLE UNIT. - BUFFALO DISTRICT FUSRAP PROJECT.	4. LOCATION: TONAWANDA LF, TONAWANDA, N.Y.	
5. NAME OF DRILLER: PHIL ORSI / DOM PINO.	6. MANUFACTURER'S DESIGNATION OF DRILL: 7720 DT - GEO-PROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASTING 2" CORE W/ 5' PLASTIC SLEEVE	8. HOLE LOCATION: N= 1092583.92 E= 1064951.1	
	9. SURFACE ELEVATION	
	10. DATE STARTED: 3/17/10	11. DATE COMPLETED: 3/17/10
12. OVERBURDEN THICKNESS: N/A	15. DEPTH GROUNDWATER ENCOUNTERED: 18'	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 45'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	N/A	N/A	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %
—	—	—	—	—	—	

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. [redacted]
CUTTINGS DRUMMED	—	—	—	

LOCATION SKETCH/COMMENTS SCALE:



PROJECT	HOLE NO. IA6-10

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: IA6-10

PROJECT:

INSPECTOR: STUART PRYCE

SHEET 2 OF 6 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	~~FIELD SCREENING RESULTS~~ (d) γ	~~GEOTECH SAMPLE OR CORE BOX NO.~~ (e) B	~~ANALYTICAL SAMPLE NO.~~ (f)	BLOW COUNT (g)	~~REMARKS~~ 1 MIN STATIC COUNT (h) γ b
	0	NO RECOVERY					
	1	FILL: ROAD BASE, LARGE STONE >1", COMPACTED SOIL + SAND, GRAVEL, SOME REDDISH BROWN CLAY, FIRM, VERY DRY.	5387	90			
	2		5747	90			
	3		6273	40			
	4		5600	80			
	5		5208	70			
	6	NO RECOVERY					
	7	FILL: REDDISH BROWN CLAY, TRACE COARSE SAND + STONE FIRM, MOIST.	5291	110			
	8	NO RECOVERY					
	9	FILL: REDDISH BROWN CLAY TRACE COARSE SAND, STONE FIRM MOIST, EXPANSIVE CLAY	5404	70		(9.1-9.7) TOP 6"	5503 55
	10						

PROJECT:

HOLE NO: IA6-10

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: IA6-10

PROJECT:

INSPECTOR: STUART PRYCE

SHEET 3 OF 6 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	AVIATION SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h) 1 MIN. STATIC γ	COUNT TB
		FILL: CONT. FROM 9.1' TO 13.0 LAST PAGE	5699	80				
	11'		6152	60				
	12'		4813	90		H: γ	5743	60
	13'							
	14'	NO RECOVERY						
	15'							
	16'		5311	90		H: beta	5431	51
		FILL: REDDISH BROWN CLAY, FIRM, MOIST, ORGANIC MATERIAL: WOOD, ROOTS @ 17'	4717	80				
	17'		5806	60		2ND H: γ	5455	46
	18'							
	19'	NO RECOVERY						
	20'							

PROJECT:

HOLE NO. IA6-10

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: IA6-10

PROJECT:

INSPECTOR: STUART PRYCE

SHEET 24 OF 6 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	~~FIELD SCREENING RESULTS~~ (d) γ	~~GEOTECH SAMPLE OR CORE BOX NO.~~ (e) B	~~ANALYTICAL SAMPLE NO.~~ (f)	~~BLOW COUNT~~ (g)	~~REMARKS~~ (h) 1 MIN. STATIC COUNT γ B
		20-25'					
		NO RECOVERY					
0"							
		25-30'					
		NO RECOVERY					
0"							

21' 22' 23' 24' 25' 26' 27' 28' 29' 30'

PROJECT:

HOLE NO. IA6-10

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: IA6-10

PROJECT:

INSPECTOR: STUART PRYCE

SHEET 5 OF 6

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	~~FIELD SCREENING RESULTS~~ (d)	~~GEOTECH SAMPLE OR CORE BOX NO.~~ (e) B	~~ANALYTICAL SAMPLE NO.~~ (f)	~~BLOW COUNT~~ (g)	~~REMARKS~~ (h) B
		30-35' NO RECOVERY					
		35'-40' NO RECOVERY					

30' 31' 32' 33' 34' 35' 36' 37' 38' 39' 40'

PROJECT:

HOLE NO. IA6-10

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: IA6-10

PROJECT:

INSPECTOR: STUART PRYCE

SHEET 6 OF 6 SHEETS

ELEV. (e)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h) γ B
	40	40 - 43'					
	41	NO RECOVERY					
	42						
	43						
	44	NO RECOVERY					
0"	45	*END HYDRAULIC LINE BROKE ON GEO PROBE					
	6	1115 - TALKED TO MARK + PENNY DECIDED TO SAMPLE CALLED TOP 6" @ 9.1'					
		GROUNDWATER: ~~NOT ENCOUN.~~ 18' (SP)					
	7	NATIVE @ 9'					
		PID = 0 ppm	VOC'S				
		TOTAL RECOVERY = 147"					
		SAMPLE ID TLS					
	8	TLS SS IA6-10(9.1-9.6)031710 — TOP 6"					
		TLS SBIA6-10(12.0-17.0)031710 - 1st γ					
		TLS SBIA6-10(15.6-16.6)031710 — 4th Beta					
	9	TLS SBIA6-10(17.0-18.0)031710 — 2ND 4th γ					
	10	WEATHER: 90°					

PROJECT:

HOLE NO. IA6-10

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

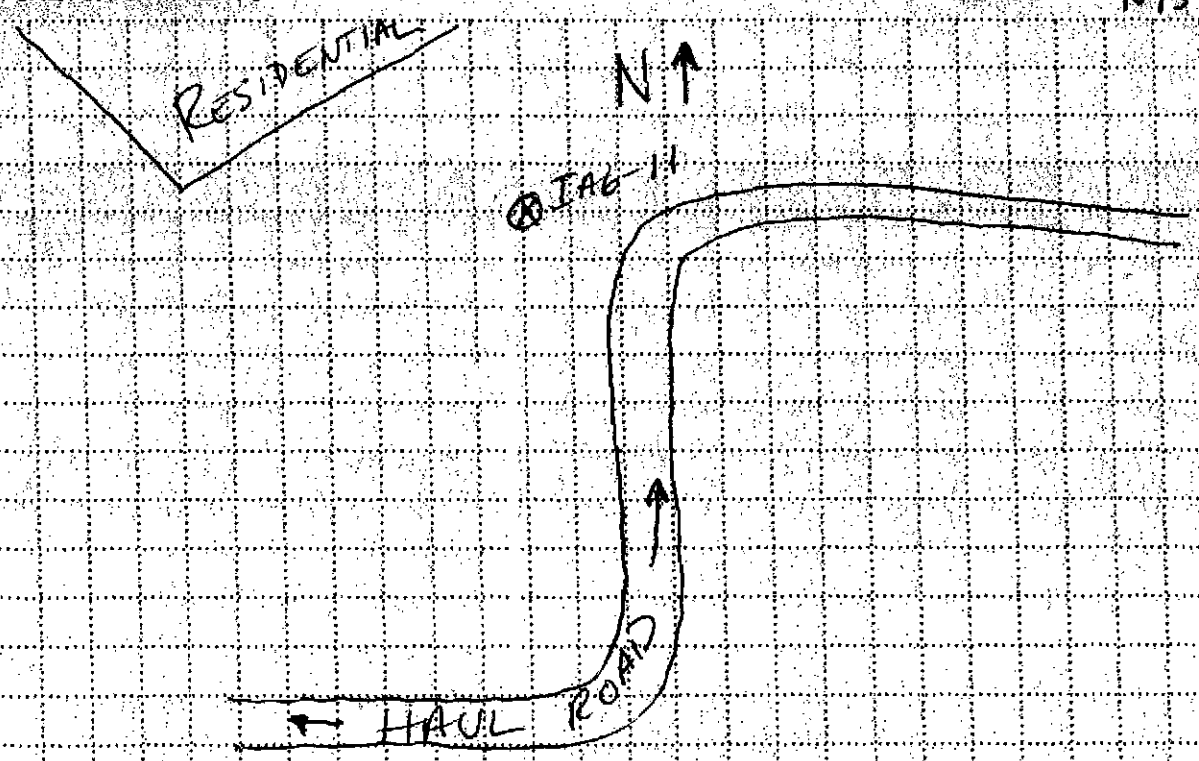
DISTRICT: BUFFALO	HOLE NUMBER: IA6-11	
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 3
3. PROJECT: TOWN of TONAWANDA LF OPERABLE UNIT - BUFFALO DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: PHIL ORSI / DOM PINO	6. MANUFACTURER'S DESIGNATION OF DRILL: 7720 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE W/5' PLASTIC SLEEVE	8. HOLE LOCATION: N= 1092583.92 E= 1064788.67	
	9. SURFACE ELEVATION	
	10. DATE STARTED: 3/16/10	11. DATE COMPLETED: 3/16/10
12. OVERBURDEN THICKNESS: N/A	15. DEPTH GROUNDWATER ENCOUNTERED: NOT ENCOUNTERED	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 17'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP / TOTALS	TCLP / TOTALS	SVOC-TCLP / TOTALS	PBS-TCLP / TOTALS	PCB-TOTALS	N/A

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	2[redacted]
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON LF - BUFFALO DISTRICT FUSRAP PROJECT — HOLE NO. IA6-11

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER IA6-11

PROJECT

INSPECTOR STUART PRYCE

SHEET 2 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	~~FIELD SCREENING RESULTS~~ (d) X	~~GEOTECH SAMPLE OR CORE BOX NO.~~ (e) B	~~ANALYTICAL SAMPLE NO.~~ (f)	~~BLOW COUNT~~ (g)	REMARKS (h) X MIN. STATIC COUNT B
	0	NO RECOVERY					
	1	FILL: ORGANIC MATERIAL: ROOTS, STONE, CEMENT, GRANULAR BLACK SOIL, REDDISH BROWN CLAY, STIFF, MOIST.	7090	110			
	2		7429	70			
	3		7276	80			
	4		7021	140			
50"	5	FILL: REDDISH BROWN, SILTY CLAY, COARSE SAND + STONE, FIRM, MOIST.	7695	100			
	6		7928	90			
	7		7731	110			
	8		8078	60			
	9		7572	60			
60"	10						

PROJECT

HOLE NO IA6-11

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: IA6-11

PROJECT

INSPECTOR: STUART PRYCE

SHEET 3 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	~~FIELD SCREENING RESULTS~~ (d) γ	~~GEOTECH SAMPLE OR CORE BOX NO.~~ (e) B	~~ANALYTICAL SAMPLE NO.~~ (f)	~~BLOW COUNT~~ (g)	IN-SITU ~~REMARKS~~ COUNT (h) γ	B
	11'	NO RECOVERY →						
	12'	FILL: GREY, BROWN CLAY, REDDISH BROWN, STIFF, MOIST.	8083	60		TOP 6"	7110	25
	13'	NO RECOVERY →						
	14'	FILL: REDDISH BROWN CLAY, COARSE SAND + STONE, STIFF + MOIST	7888	70		Hi Beta	7210	50
			8082	80		2ND Hi γ	7249	58
	15'	FILL: REDDISH BROWN CLAY, STIFF MOIST, EXPANSIVE,	7995	80		CHEM	7189	71
	16'		8456	80		Hi γ	7099	55
	17'	END OF BORING @ EXPANSIVE CLAY	17'					

NOTES:

GROUND WATER: NOT ENC.

NATIVE @ 8'

PID = Ø ppm VOC's

TOTAL RECOVERY 182"

WEATHER: SUNNY 60°

SAMPLE ID #'S

TLS SS IA6-11 (12.0-12.5) 031610 - TOP 6"
TLS SB IA6-11 (12.5-13.0) (13.5-14.0) 031610 - Hi' beta
TLS SB IA6-11 (14.0-15.5) 031610 - 2ND Hi γ
TLS SB IA6-11 (15.0-16.0) 031610 - CHEM
TLS SB IA6-11 (16.0-17.0) 031610 - Hi γ

PROJECT

HOLE NO. IA6-11

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

DISTRICT: Buffalo	HOLE NUMBER: IA6-12	
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 3 SHEETS
3. PROJECT: TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: PHIL ORSI / DOM PINO	6. MANUFACTURER'S DESIGNATION OF DRILL: T720 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE	8. HOLE LOCATION: N= 1092583.92 E= 1064626.23	
	9. SURFACE ELEVATION:	
	10. DATE STARTED: 3/16/10	11. DATE COMPLETED: 3/16/10
12. OVERBURDEN THICKNESS: N/A	15. DEPTH GROUNDWATER ENCOUNTERED: NOT ENCOUNTERED	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 18'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

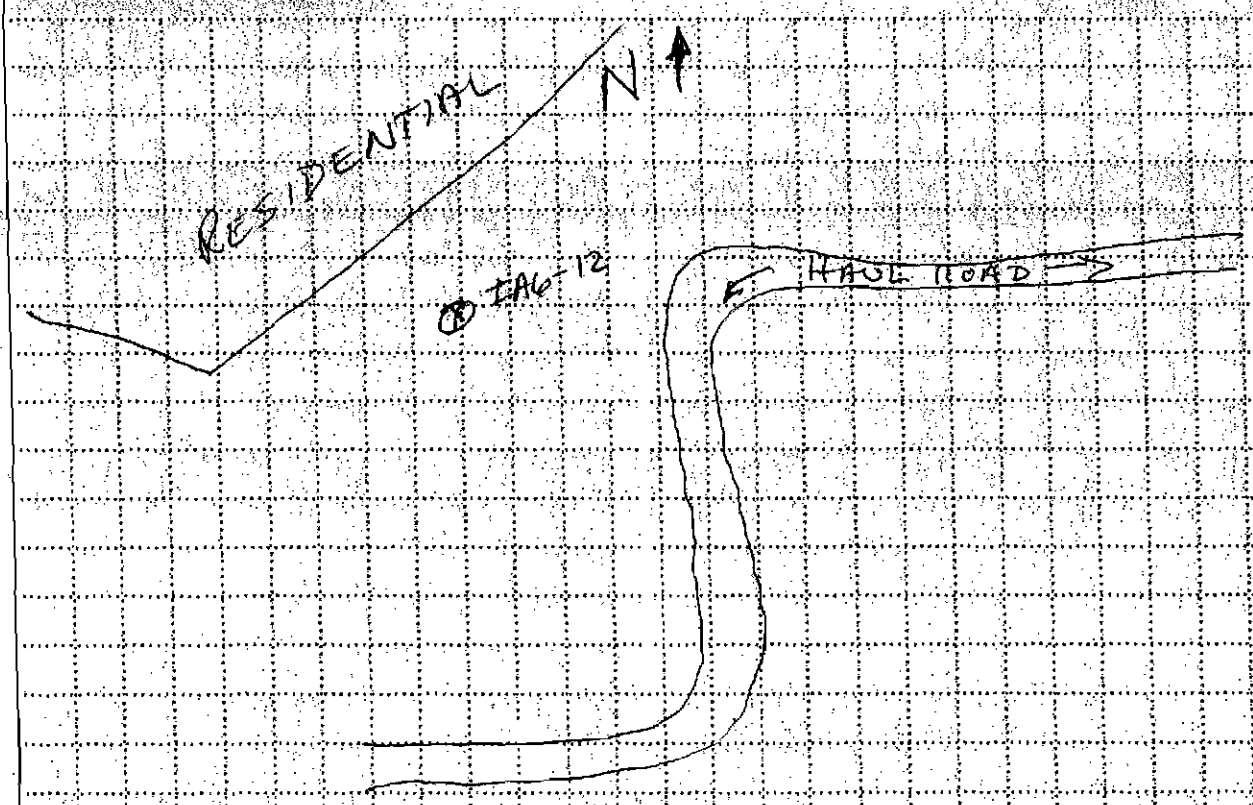
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY (%)
5	TCLP / TOTALS	TCLP / TOTALS	SVOC-TCLP / TOTALS	PCB-TCLP / TOTALS		

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SI[redacted]
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS

SCALE: NTS



PROJECT: TON LF - Buffalo DISTRICT FUSRAP PROJECT

HOLE NO: IA6-12

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: IA6-12

PROJECT:

INSPECTOR: STUART PRYCE

SHEET 2 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC REMARKS COUNT (h) γ	B
	0	NO RECOVERY →					→	
	1							
	2	Fill: Organic Material: grass, roots, stone, cement, reddish brown clay, firm, moist.	7569	90		(1.0-1.5) TOP 6"	7204	60
			7222	50				
	3		7531	80				
	4		7626	105				
48"	5	Fill: Reddish Brown clayey stone, firm, moist.	7875	80		(5.6-6.0) CHEM	7168	44
	6		7850	110		(6.6-7.0) Hi beta	7228	50
	7		7700	70				
	8		7472	100				
	9		7316	90				
60"	10							

PROJECT:

HOLE NO. IA6-12

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: IA6-12

PROJECT:

INSPECTOR: STUART PRYCE

SHEET 3 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h) 1 MIN STATIC COUNT γ B
	11'	NO RECOVERY →					
	12'	FILL: SOFT GREY CLAY, TURNING REDDISH BROWN, FIRM, MOIST, NATIVE AT 13'.	7497	80			
			7229	60			
	13'		7560	80		(13.0-14.0) NATIVE	7397 59
	14'		7459	100			
39"	15'	NO RECOVERY →					
	16'	FILL: REDDISH BROWN CLAY, COARSE SAND + STONE, FIRM, MOIST.	7570	70			
			7883	90		(16.0-17.0) 2ND HI γ	7697 56
	17'		8473	50		(17.0-18.0) HI γ	7180 60
	18'						

*STOPPED DUE TO EXPANSIVE CLAY.

NOTES: RAD + CHEM DUPES TAKEN.

PID = 0 PPM VOC'S

NATIVE @ 13'

GROUND WATER - NOT ENC.

WEATHER: SUNNY 50°

SAMPLE ID #S

TLSSIA6-12(1.0-1.5)031610 — TOPC'11

TLSSBIA6-12(5.0-6.0)031610 — CHEM

TLSSBIA6-12(6.0-7.0)031610 — HI B

TLSSBIA6-12(13.0-14.0)031610 — NATIVE

TLSSBIA6-12(16.0-17.0)021610 — 2ND HI γ

TLSSBIA6-12(17.0-18.0)021610 — HI γ

PROJECT

HOLE NO. IA6-12

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

DISTRICT	Buffalo
HOLE NUMBER	1A6.13
1. COMPANY NAME	ENSOL, INC.
2. DRILLING CONTRACTOR	ZEBRA ENVIRONMENTAL CORP.
SHEET / SHEETS	1 OF 4
3. PROJECT	TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT
4. LOCATION	TONAWANDA LF, TONAWANDA, NY
5. NAME OF DRILLER	JEFF SNYDER
6. MANUFACTURER'S DESIGNATION OF DRILL	6620 DT GEOPROBE
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	3 1/4" CASING 2" CORE W/ 5' PLASTIC SLEEVE
8. HOLE LOCATION	N= 1092746.35 E= 1066413.02
9. SURFACE ELEVATION	637.486
10. DATE STARTED	3/16/10 0950
11. DATE COMPLETED	3/16/10 1345
12. OVERBURDEN THICKNESS	NATIVE NOT ENCOUNTERED
15. DEPTH GROUNDWATER ENCOUNTERED	21.6' bgs
13. DEPTH DRILLED INTO ROCK	N/A
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	N/A
14. TOTAL DEPTH OF HOLE	28.0' (REFUSAL)
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	N/A

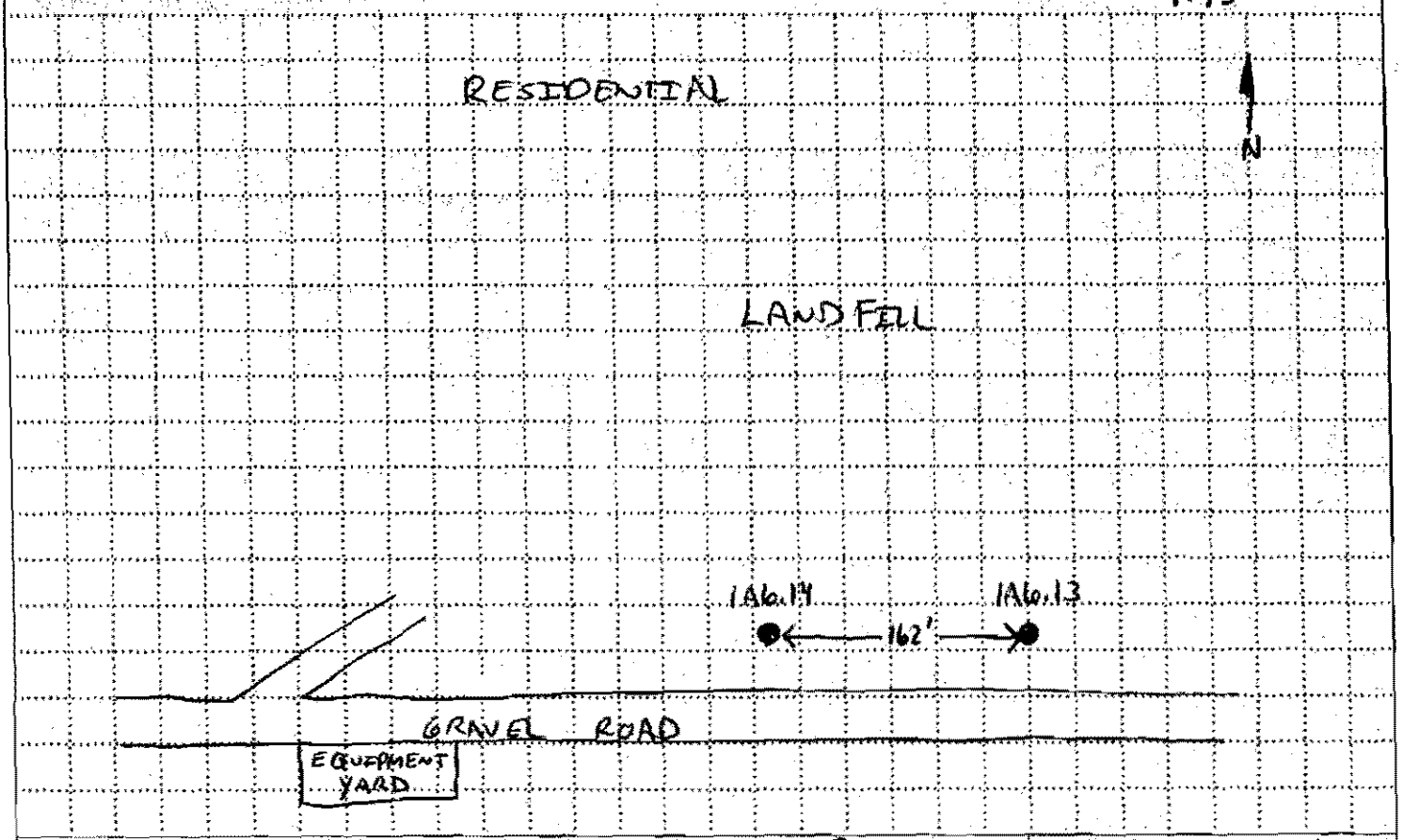
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP / TOTALS	TCLP / TOTALS	SVOC-TCLP / TOTALS	PEST-TCLP / TOTALS	PCB- TOTALS	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	[redacted]
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS

SCALE: NTS



PROJECT	HOLE NO
TON LF- Buffalo DISTRICT FUSRAP PROJECT	1A6.13

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER 1A6.13

PROJECT

INSPECTOR D. Popp

SHEET 2 OF 4

REC'D ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) 8	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	0	NO RECOVERY →					
	1						
	2	FILL: RED-BROWN CLAY, GRAVEL, SAND, WOOD, MED. STIFF, MOIST	6790	100			
	3		6507	80			
	4		6402	120			
			6670	60			
44"	5	NO RECOVERY →					
	6	FILL: REDDISH-BROWN CLAY, WOOD, GRAVEL, WASTE (PAPER), MED. STIFF, MOIST.	6777	60			
	7		6714	80			
	8		6947	80			
	9		6973	120			
55	10		6791	80			

PROJECT

HOLE NO 1A6.13

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

HOLE NUMBER 1A6.13

INSPECTOR D. Popp

SHEET 3 OF 4

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS REMARKS (h)
	10	NO RECOVERY →					
	11						
	12	FILL: REDDISH-BROWN CLAY, WASTE (PAPER, ASH), WOOD, MED, STIFF, MOIST.	6955	60			
	13		6791	80	SEE NOTES	Top 6"	γ 6862 B 61
	14		6714	80			
45"	15		6803	100			
	16	NO RECOVERY →					
	17	FILL: REDDISH-BROWN CLAY, WOOD, GRAVEL, WASTE (GLASS), soft, MOIST.	6743	120			
	18		6691	120			
	19		6580	120			
44"	20						

PROJECT

HOLE NO 1A6.13

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. PoPP

HOLE NUMBER 1A6.13

SHEET 4 OF 4

RECO ~~FLEW~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	20						
	21	NO RECOVERY →					→
	22	FILL: REDDISH-BROWN CLAY, GRAVEL, WASTE (GLASS, PLASTIC), LEAVES, MED. STIFF, MOIST.	6711	60	SEE NOTES	SAT.	X B 6765 45
	23		6517	120			
	24		7001	140		HIGH X	6702 45
	25		6762	60		CHEM.	6666 66
	26		6916	140		HIGH B	6971 56
	27		6775	100			
	28		6777	80			
		BOTTOM of BORING AT 28.0' (REFUSAL)					
	29	NOTES: - CLEAR, 42°F - SAMPLE I.D. TLS-SS-1A6.1B(12.0-12.5) 031610 TLS-SB-1A6.13(21.6-22.6)031610					
	30						

PROJECT

HOLE NO 1A6.13

ENG FORM 5056A-R, AUG 94

TLS-SB-1A6.13(23.0-24.0)031610
TLS-SB-1A6.13(24.0-25.0)031610
TLS-SB-1A6.13(25.0-26.0)031610

- PID READINGS = 0 ppm (VOC's)
- SOIL READINGS ARE COUNTS/MIN.
- MOVED 1m NORTH of ORIGINAL LOCATION (REFUSAL AT 23.0')

HTRW DRILLING LOG

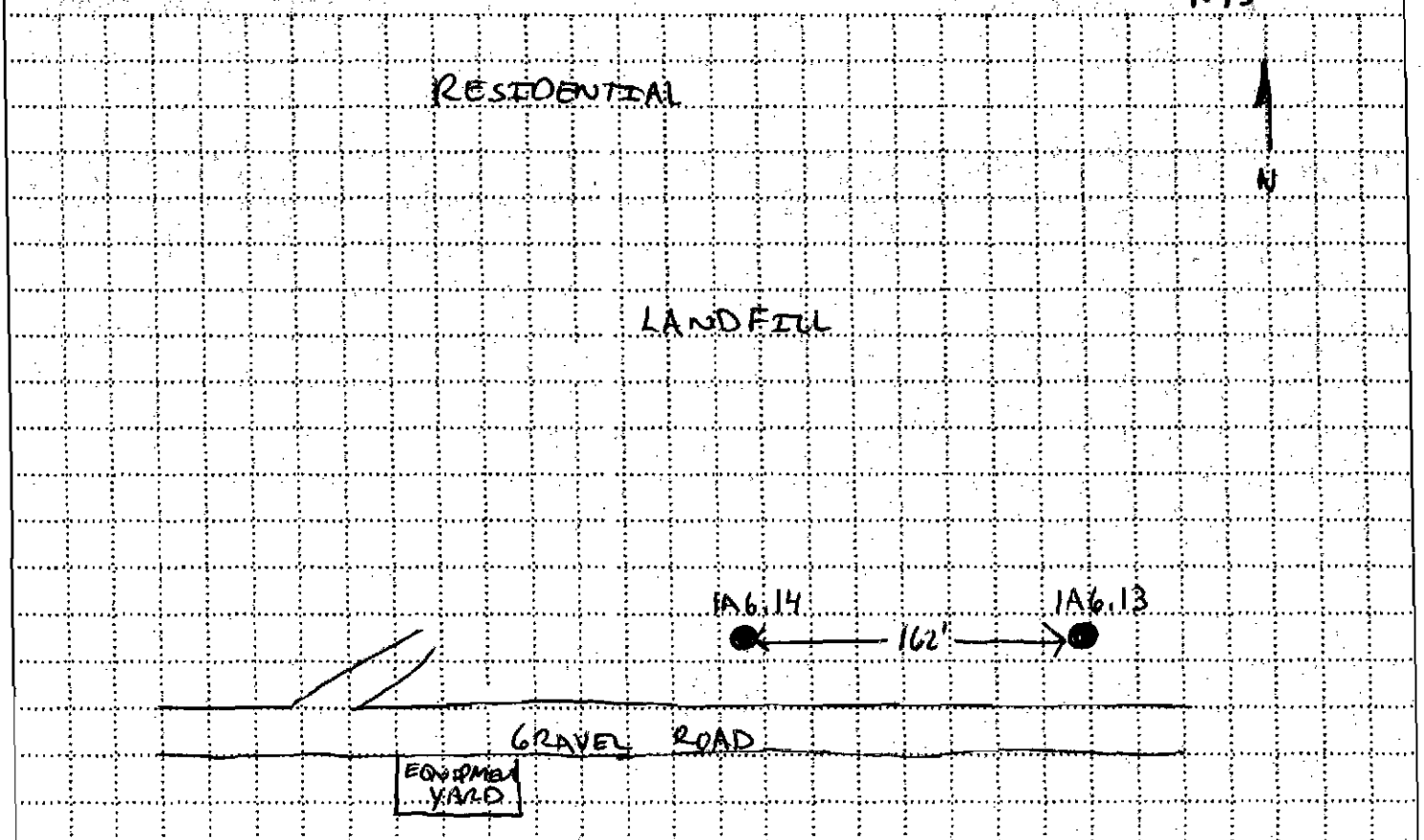
DISTRICT: Buffalo		HOLE NUMBER: 1A6.14
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 4 SHEETS
3. PROJECT: TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: JEFF SNYDER	6. MANUFACTURER'S DESIGNATION OF DRILL: 6620 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE	8. HOLE LOCATION: N= 1092746.35 E= 1066250.59	
	9. SURFACE ELEVATION: 637.905	
	10. DATE STARTED: 3/16/10 1400	11. DATE COMPLETED: 3/17/10 1015
12. OVERBURDEN THICKNESS: NATIVE NOT ENCOUNTERED	15. DEPTH GROUNDWATER ENCOUNTERED: NOT ENCOUNTERED	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 24.5' (REFUSAL)	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP / TOTALS	TCLP / TOTALS	SVOC-TCLP / TOTALS	PEST-TCLP / TOTALS	PCB-TOTALS	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23
CUTTINGS DRUMMED	–	–	–	[redacted]

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT	HOLE NO
TON LF- Buffalo DISTRICT FUSRAP PROJECT	1A6.14

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. POPP

HOLE NUMBER 1A6.14

SHEET 2 OF 4

RECID ~~REV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	~~FIELD SCREENING RESULTS~~ (d) γ	~~GEOTECH SAMPLE OR CORE BOX NO.~~ (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS ~~REMARKS~~ (h)
	0						
	1	NO RECOVERY →					→
	2	FILL	6461	60			
	3		6065	120			
	4		6091	100			
	5		6208	120			
	6						
	7	NO RECOVERY →					→
	8	FILL	6125	60			
	9		6345	100			
	10		6008	80			

PROJECT

HOLE NO 1A6.14

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER 1A6.14

PROJECT

INSPECTOR D. PoPP

SHEET 3 OF 4

REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h)
	10						
	11	NO RECOVERY →					→
	12						
			6268	140		TOP 6"	γ 6100 B 62
	13	FILL					
			6236	100	SEE NOTES	HIGH γ	5889 62
	14						
			6227	60		CHEM	6046 50
	15						
	16	NO RECOVERY →					→
	17		6021	80		HIGH B	6035 50
		FILL					
	18		6114	80		2ND HIGH γ	5962 44
	19		6104	60			
			6001	60			
	20						

PROJECT

HOLE NO 1A6.14

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A6.14

SHEET 4 OF 4

RECID ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	20						
	21						
	22	NO RECOVERY					
	23						
	24						
	25	BOTTOM of BORING AT 24.5' (REFUSAL)					
		NOTES:					
	26	- CLEAR, 37° F					
		- SAMPLE I.D.					
		TLS-SS-1A6.14(12.0-12.5) 031710					
		TLS-SB-1A6.14(13.0-14.0) 031710					
	27	TLS-SB-1A6.14(14.0-15.0) 031710					
		TLS-SB-1A6.14(16.4-17.4) 031710					
		TLS-SB-1A6.14(17.4-18.4) 031710					
	28	- PID READINGS = 0ppm (VOCS)					
		- SOIL READINGS ARE COUNTS/MIN.					
	29	- MOVED 1M NORTH of ORIGINAL LOCATION (REFUSAL AT 28.0')					
	30						

PROJECT

HOLE NO 1A6.14

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

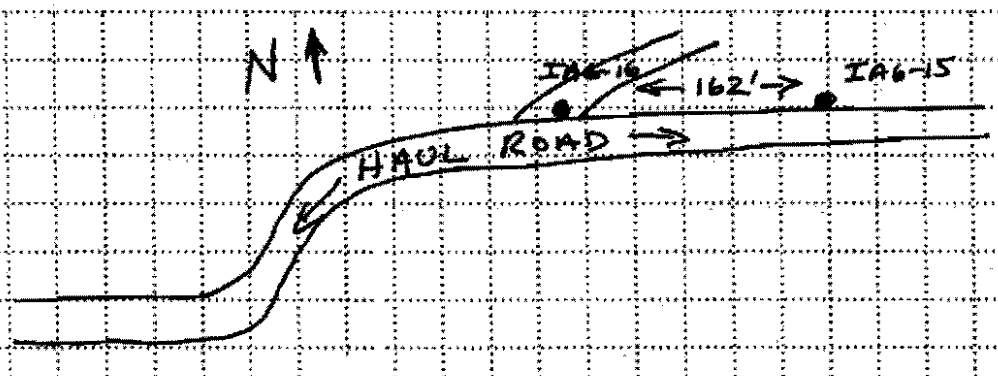
DISTRICT: Buffalo		HOLE NUMBER: IA6-15
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 3
3. PROJECT: TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: JEFF SNYDER	6. MANUFACTURER'S DESIGNATION OF DRILL: 6620 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE	8. HOLE LOCATION: N= 1092746.35 E= 1066088.15	
	9. SURFACE ELEVATION:	
	10. DATE STARTED: 03.08.10	11. DATE COMPLETED: 03.08.10
12. OVERBURDEN THICKNESS:	15. DEPTH GROUNDWATER ENCOUNTERED: NOT ENCOUNTERED	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 15'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	–	–	–	–	–	N/A

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23 [redacted]
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON LF- Buffalo DISTRICT FUSRAP PROJECT	HOLE NO. IA6-15

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR S. PRYCE

HOLE NUMBER I46-15

SHEET 2 OF 3

RECID ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) ~~/~~ γ	GEOTECH SAMPLE OR CORE BOX NO. (e) ~~/~~ B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. ~~READING~~ STATIC COUNTS (h)
	0	No Recovery →					γ b
	1		5355	40		Top 6"	5228 / 46
			4835	60			
	2	Fill: Black granular soil, ash, stone, clay, dry, firm.	5455	50		Hi Gamma	5244 / 43
	3		5499	40			
	4		5595	50			
48"	5	No Recovery →					
	6		5153	70			
		Fill: Firm dry clay, gravel, organic material (roots, wood)	5136	100		Hi beta	5654 / ~~49~~ 50 49
	7		5432	70			
	8		5542	90			
	9		5690	90		SAT (9.7-10.0)	5654 / 59
54"	10						

PROJECT

HOLE NO. I46-15

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: IA6-15

PROJECT:

INSPECTOR: S. PRYCE

SHEET 3 OF 3

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~READING~~ COUNTS (h)
	10						γ b
	11						
		No Recovery					
	12						
	13						
	14						
7"	15	FILL: BLACK SOIL, gravel, ASH, WASTE: glass, wood.	6123	110		SAT	5320 / 43
		BOTTOM OF BORING - 15'					
	16	NOTES: SAMPLE ID #S:					
	17	TLS-SB-IA6-15(1.0-1.5) Top 6" TLS-SB-IA6-15(2.0-3.0) Hi γ TLS-SB-IA6-15(6.0-7.0) Hi b TLS-SB-IA6-15(9.7-10.0, 14.3-15.0) SAT.					
	18	TOTAL RECOVERY: 109" PID = 0 ppm (VOCs)					
	19	NATIVE CLAY NOT ENCOUNTERED					
		FINISH DAY @ 1415					
	20	WEATHER - SUNNY 42°					

PROJECT

HOLE NO. IA6-15

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

DISTRICT: Buffalo		HOLE NUMBER: IA6-16
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 3 SHEETS
3. PROJECT: TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: JEFF SNYDER	6. MANUFACTURER'S DESIGNATION OF DRILL: 6620 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE	8. HOLE LOCATION: N= 1092746.35 E= 1065925.72	
	9. SURFACE ELEVATION	
	10. DATE STARTED: 03-08-10	11. DATE COMPLETED: 03-08-10
12. OVERBURDEN THICKNESS	15. DEPTH GROUNDWATER ENCOUNTERED: NOT ENCOUNTERED	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 15'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

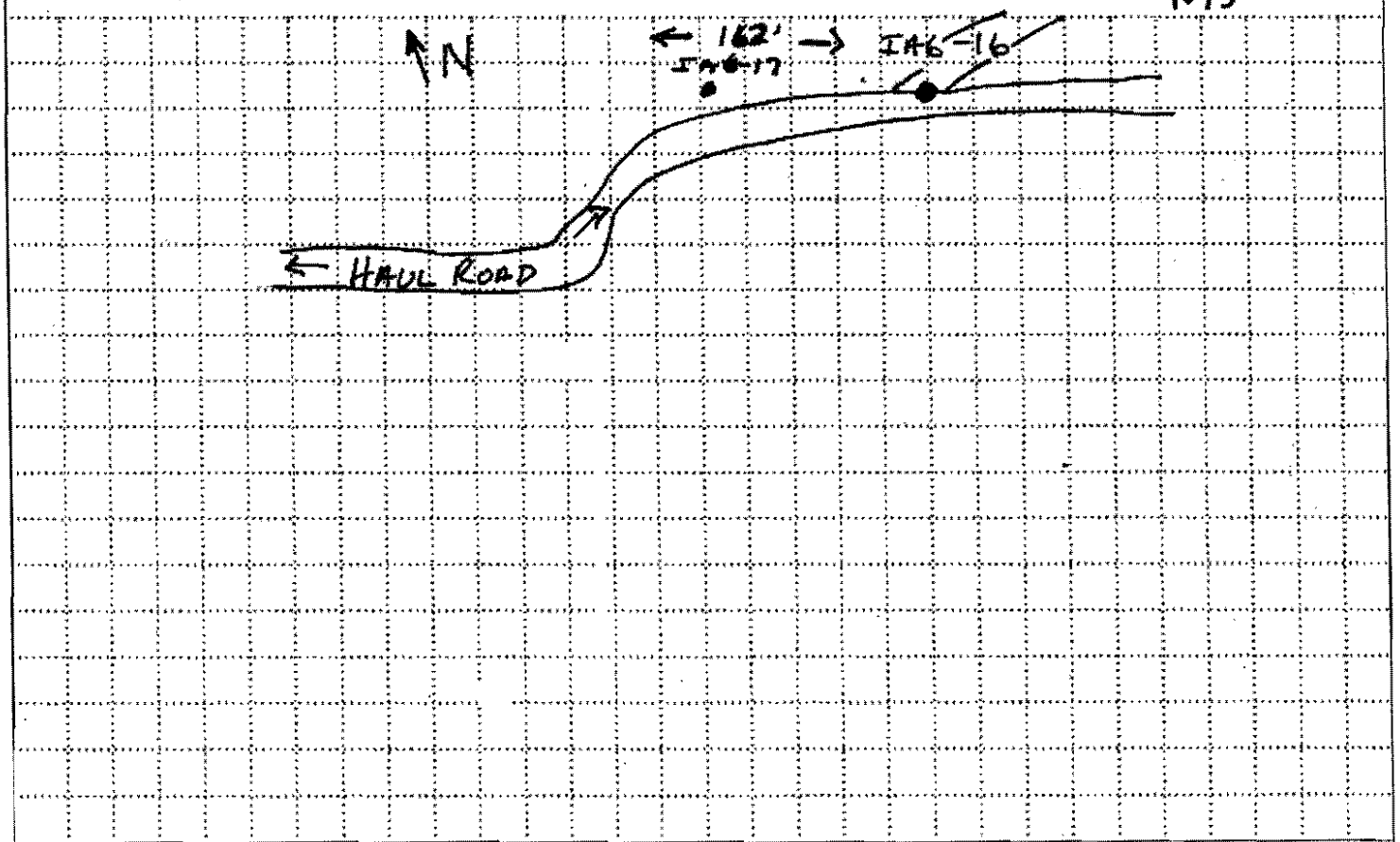
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP / TOTALS	TCLP / TOTALS	SVOC-TCLP / TOTALS	PEST-TCLP / TOTALS	PCB-TOTALS	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
CUTTINGS DRUMMED	–	–	–	[redacted]

LOCATION SKETCH/COMMENTS

SCALE: NTS



PROJECT	HOLE NO.
TON LF- Buffalo DISTRICT FUSRAP PROJECT	IA6-16

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR S. PRYCE

HOLE NUMBER IA6-16

SHEET 2 OF 3

REC'D ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS ~~REMARKS~~ (h)
	0	No Recovery →					γ beta
	1						
	2	FILL: ROAD BASE, LOOSE, DRY, FIRM, DARK CLAY MIXED WITH SMALL CINDERS, GRAVEL.	5306	70			
			4466	90			
	3		5082	60		Top 6"	4902 / 43
	4		5704	100		Hi beta	4965 / 61
45"	5	No Recovery →					
	6						
	7	FILL: DARK BROWN CLAY, SAND ORGANIC MATERIAL, MOIST, FIRM.	4338	50			
			5396	40		Hi γ	4807 / 62
	8		4715	100		CHEM	4739 / 44
	9		5133	70			
42"	10						

PROJECT

HOLE NO. IA6-16

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR: S. PRYCE

HOLE NUMBER: IA6-16

SHEET 3 OF 3

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	10						
	11	No Recovery →					
	12						γ beta
			5111	100			
	13	FILL: DARK BROWN CLAY, MOIST, FIRM, ASH, gravel, WASTE (glass).					
			4388	40			
	14						
			4905	50		SAT	4490 / 47
32"	15						
		BOTTOM OF BORING AT 15'					
		NOTES:					
	16	SAMPLE ID #'S:					
		TLS-SS-IA6.16 (3.0-3.5) 030810 Top 6"					
		TLS-SB-IA6.16 (4.0-5.0) 030810 Hi beta					
	17	TLS-SB-IA6.16 (7.0-8.0) 030810 Hi gamma					
		TLS-SB-IA6.16 (8.0-9.0) 030810 Chem.					
		TLS-SB-IA6.16 (14.0-15.0) 030810 SAT.					
	18	PID READINGS = 0 ppm					
		TOTAL RECOVERY = 119"					
		RAD DUPE collected					
	19						
	20	WEATHER: SUNNY - 40°					

PROJECT

HOLE NO. IA6-16

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

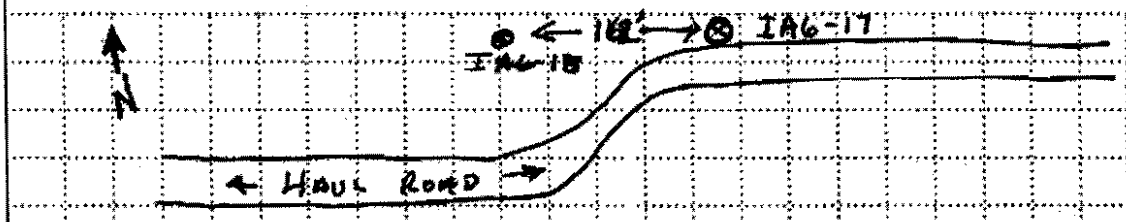
DISTRICT: Buffalo		HOLE NUMBER: IA6-17
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 4 SHEETS
3. PROJECT: TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: JEFF SNYDER	6. MANUFACTURER'S DESIGNATION OF DRILL: 6620 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE W/ 5' PLASTIC SLEEVE	8. HOLE LOCATION: N= 1092746.35 E= 1065763.28	
	9. SURFACE ELEVATION:	
	10. DATE STARTED: 03.08.10	11. DATE COMPLETED: 03.08.10
12. OVERBURDEN THICKNESS:	15. DEPTH GROUNDWATER ENCOUNTERED: NOT ENCOUNTERED	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 24' REFUSAL	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	-	-	-	-	-	N/A

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. S[redacted]
CUTTINGS DRUMMED	-	-	-	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON LF - Buffalo DISTRICT FUSRAP PROJECT — HOLE NO: IA6-17

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: IA6.17

PROJECT:

INSPECTOR: S. Pryce

SHEET 2 OF 4

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h) γ	B
	0							
	1	No Recovery →						
	2		5487	30		Top 6"	5275	40
		Fill: Dark Brown clay, gravel, wood, stiff, moist.	4839	50				50 (gr)
	3		5817	70		Hi γ	5250	50
	4		5640	60				
38"	5							
	6	No Recovery →						
	7		5203	60				
		Fill: Dark Brown clay, stone, small gravel, waste: (glass, metal), organic material.	5807	90		Hi beta	5348	50
	8		5769	70				
	9		5404	50		SAT	5090	60
41"	10							

PROJECT

HOLE NO: IA6.17

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR S. PRYCE

HOLE NUMBER IA6-17

SHEET 3 OF 4

REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h)
	10						
	11						
	12	No Recovery →					
	13						
	14						
0"	15						
	16						
	17	No Recovery →					
	18						
	19						
0"	20						

PROJECT

HOLE NO. IA6-17

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR S. PRYCE

HOLE NUMBER IA6-17

SHEET 4 OF 4

RECID (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h)
	20						
	21	No RECOVERY →					
	22						
	23						
0"	24	* REFUSAL @ 24'					
		BOTTOM OF BORING AT 24'					
	25	NOTES:					
		II. SAMPLE ID #s:					
		(TLS-SS-IA6.17(2.0-2.5) 020810 (TOP 6")					
		TLS-SB-IA6.17 (@ 7.0-8.0) 020810 (Hi beta)					
	26	TLS-SB-IA6.17 (8.0-9.0) 030810 (Hi gamma)					
		TLS-SB-IA6.17 (9.0-10.0) 030810 (SAT)* (BOTTOM 1" SAT)					
	27	* OFFSET 22' North of original location.					
		PID READINGS = 0 ppm (VOC's)					
		TOTAL RECOVERY = 79"					
	28						
	29						
	30	WEATHER - SUNNY 40°					

PROJECT

HOLE NO IA6-17

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

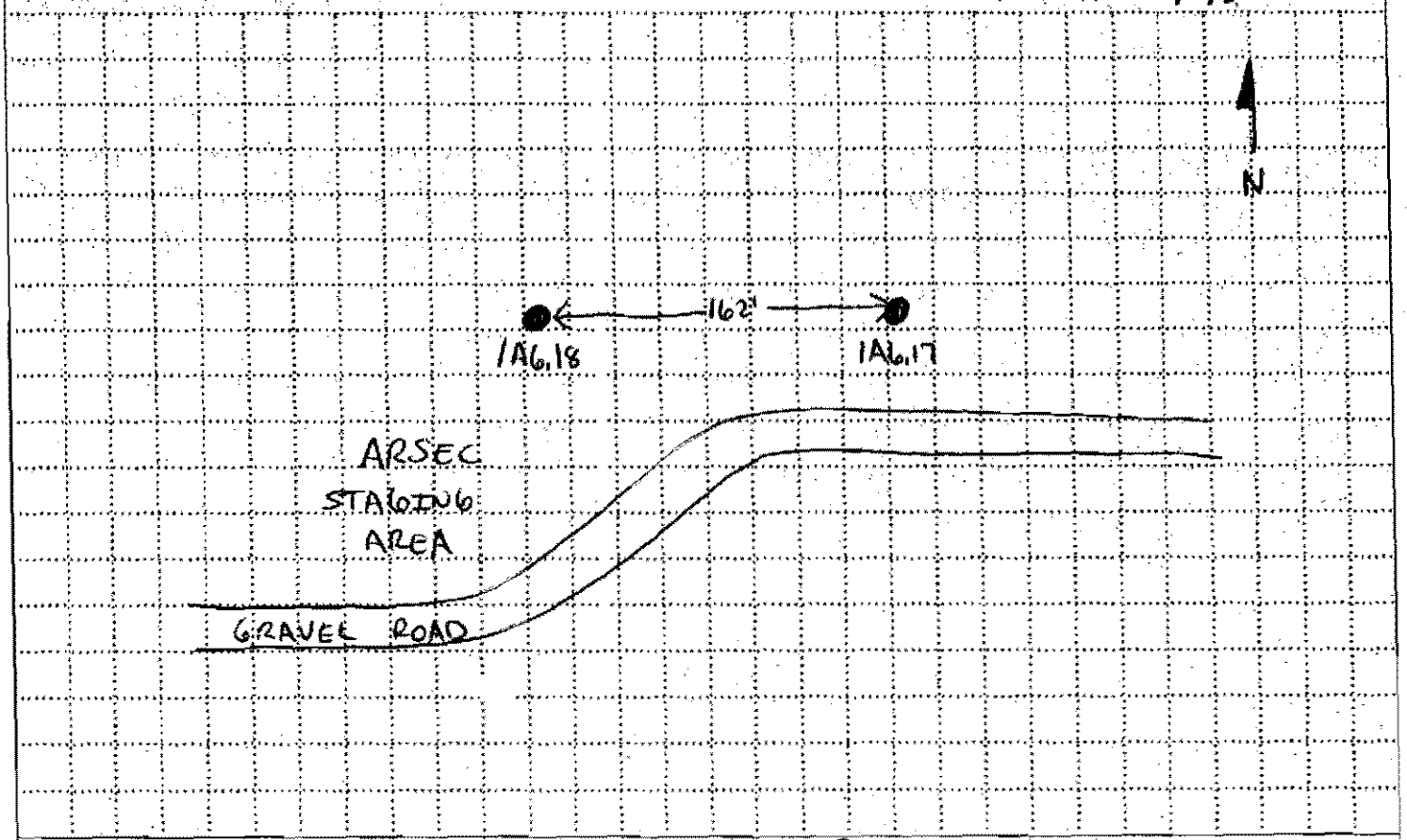
DISTRICT	Buffalo
HOLE NUMBER	1A6.18
1. COMPANY NAME	ENSOL, INC.
2. DRILLING CONTRACTOR	ZEBRA ENVIRONMENTAL CORP.
SHEET / SHEETS	1 OF 4
3. PROJECT	TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT
4. LOCATION	TONAWANDA LF, TONAWANDA, NY
5. NAME OF DRILLER	Jeff SNYDER
6. MANUFACTURER'S DESIGNATION OF DRILL	6620 DT GEOPROBE
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	3 1/4" CASING 2" CORE W/ 5' PLASTIC SLEEVE
8. HOLE LOCATION	N= 1092746.35 E= 1065600.85
9. SURFACE ELEVATION	627.064
10. DATE STARTED	3/17/10 1025
11. DATE COMPLETED	3/17/10 1530
12. OVERBURDEN THICKNESS	NATIVE NOT ENCOUNTERED
15. DEPTH GROUNDWATER ENCOUNTERED	NOT ENCOUNTERED
13. DEPTH DRILLED INTO ROCK	N/A
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	N/A
14. TOTAL DEPTH OF HOLE	26.0' (REFUSAL)
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	N/A
18. GEOTECHNICAL SAMPLES	N/A
DISTURBED	–
UNDISTURBED	–
19. TOTAL NUMBER OF CORE BOXES	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP / TOTALS	TCLP / TOTALS	SVOC-TCLP / TOTALS	PEST-TCLP / TOTALS	PCB- TOTALS	N/A

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	[redacted]
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS

SCALE: NTS



PROJECT TON LF- Buffalo DISTRICT FUSRAP PROJECT

HOLE NO 1A6.18

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A6.18

SHEET 2 OF 4

RECID (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h)
	0–1	NO RECOVERY					
	2	STRUCTURAL FILL	6619	80			
	3		6733	60	SEE		
	4		6864	60	NOTES		
		FILL	6609	80		TOP 6"	α 6384 β 43
	6–7	NO RECOVERY					
	9	FILL	6847	50		HIGH B	6333 60

PROJECT

HOLE NO 1A6.18

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A6.18

SHEET 3 OF 4

REC'D ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	~~FIELD SCREENING RESULTS~~ (d) 8	~~GEOTECH SAMPLE OR CORE BOX NO.~~ (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	10						
	11						
	12						
	13						
	14	NO RECOVERY →					
	15						
	16						
	17						
	18						
	19						
	20						

PROJECT

HOLE NO 1A6.18

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. PoPP

HOLE NUMBER 1A6.18

SHEET 4 OF 4

REC'D ~~FLEW~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) ~~X~~	GEOTECH SAMPLE OR CORE BOX NO. (e) ~~B~~	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS REMARKS (h)	
	20							
	21		6826	100				
	22		6595	60	SEE			
		FILL			NOTES		X	B
	23		6627	120		HIGH X	6600	54
	24		6491	60		CHEM.	6531	58
	25		6504	80				
	26		6569	80		BOTTOM INTERVAL	6488	50
		BOTTOM of BORING AT 26.0' (REFUSAL)						
	27	NOTES: - CLEAR, 50° F - SAMPLE I.D.						
	28	TLS-SS-1A6.18(4.0-4.5)031710 TLS-SB-1A6.18(8.9-9.9)031710 TLS-SB-1A6.18(22.0-23.0)031710 TLS-SB-1A6.18(23.0-24.0)031710 TLS-SB-1A6.18(25.0-26.0)031710						
	29	- PID READINGS = 0ppm (VOC'S) - SOIL READINGS ARE COUNTS/MIN.						
	30							

PROJECT

HOLE NO 1A6.18

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

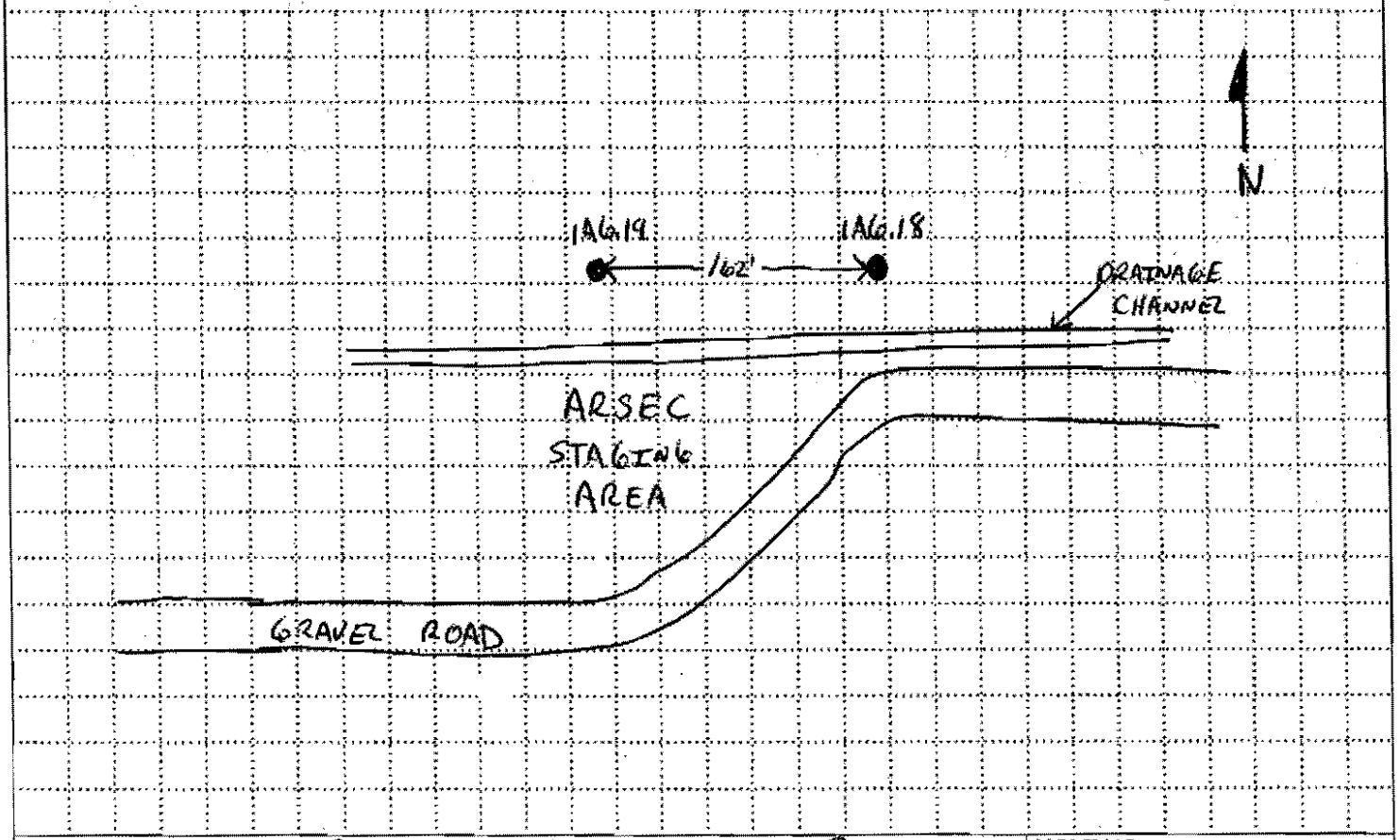
DISTRICT: Buffalo		HOLE NUMBER: 1A6.19
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 3 SHEETS
3. PROJECT: TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: J. SNYDER	6. MANUFACTURER'S DESIGNATION OF DRILL: 6620 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE	8. HOLE LOCATION: N= 1092746.35 E= 1065438.41	
	9. SURFACE ELEVATION: 622.494	
	10. DATE STARTED: 3/18/10 0840	11. DATE COMPLETED: 3/18/10 0945
12. OVERBURDEN THICKNESS: 3.2' (BOTTOM of STRUCTURAL FILL)	15. DEPTH GROUNDWATER ENCOUNTERED: 7.2' bgs	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 20.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	–	–	–	–	–	N/A

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. [redacted]
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS SCALE: NTS



PROJECT: TON LF- Buffalo DISTRICT FUSRAP PROJECT HOLE NO: 1A6.19

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Poff

HOLE NUMBER 1A6.19

SHEET 2 OF 3

REC ID ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h)
	0	NO RECOVERY →					
	1						
	2	STRUCTURAL FILL - REDDISH-BROWN CLAY, GRAVEL, STIFF, MOIST.	6656	120		TOP 6"	γ 6755 B 71
	3		6781	120	SEE NOTES		
	4	FILL - LEAVES, SOFT, MOIST.	6883	100			
46"	5		7234	80		HIGH γ	6707 62
	6	NO RECOVERY →					
	7						
	8	FILL - WASTE (GLASS, PAPER, PLASTIC), GRAVEL, WOOD, REDDISH-BROWN CLAY, MED. STIFF, WET.	6386	100		SAT.	6749 51
	9		6624	80		HIGH B	6706 49
32"	10		6452	60			

PROJECT

HOLE NO 1A6.19

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A6.19

SHEET 3 OF 3

REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h)
	10						
	11						
	12						
	13						
	14						
0"	15	NO RECOVERY (10.0'-20.0')					
	16	NOTES: - CLEAR, 39°F - SAMPLE I.D.					
	17	TLS-SS-1A6.19(1.1-1.6)031810 TLS-SB-1A6.19(4.0-5.0)031810 TLS-SB-1A6.19(7.2-8.2)031810					
	18	TLS-SB-1A6.19(8.2-9.2)031810 - PID READINGS = 0ppm (VOCs)					
	19	- SOIL READINGS ARE COUNTS/MIN.					
0"	20						

PROJECT

HOLE NO 1A6.19

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

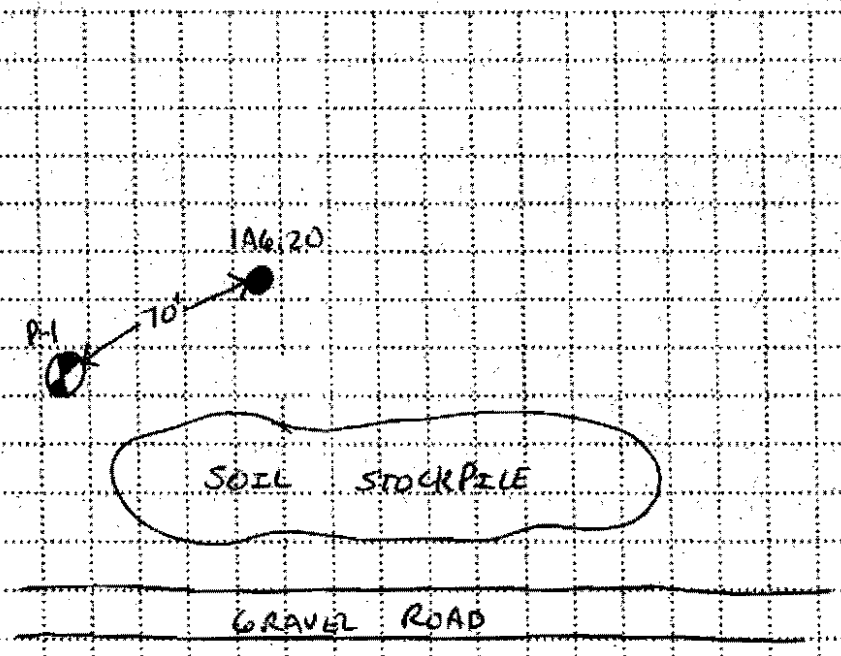
DISTRICT: Buffalo		HOLE NUMBER: 1A6.20
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 4
3. PROJECT: TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: J. SNYDER	6. MANUFACTURER'S DESIGNATION OF DRILL: DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASDOG 2" CORE w/ 5' PLASTIC SLEEVE	8. HOLE LOCATION: N= 1092746.35 E= 1065275.97	
	9. SURFACE ELEVATION: 622.032	
	10. DATE STARTED: 3/18/10 0950	11. DATE COMPLETED: 3/18/10 1030
12. OVERBURDEN THICKNESS: 5.0' (Bottom of structural fill)	15. DEPTH GROUNDWATER ENCOUNTERED: 9.0' bgs	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE:	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP / TOTALS	TCLP / TOTALS	SVOC-TCLP / TOTALS	PCB-TCLP / TOTALS	PCB-TOTALS	N/A

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	[redacted]
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON LF - Buffalo DISTRICT FUSRAP PROJECT — HOLE NO: 1A6.20

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR: D. Poff

HOLE NUMBER: 1A6.20

SHEET 2 OF 4

REC'D ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) ~~X~~	GEOTECH SAMPLE OR CORE BOX NO. (e) ~~B~~	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	0						
	1	NO RECOVERY →					→
	2	DARK-BROWN CLAYEY TOPSOIL, GRASS, ROOTLETS, SOFT, WET	7080	60		TOP 6"	X 7105 B 63
	3	STRUCTURAL FILL - REDDISH-BROWN CLAY, GRAVEL, STIFF, MOIST.	7226	60	SEE NOTES		
	4		7361	80		CHEM.	6908 54
40"	5		7399	60		HIGH X	7071 78
	6	NO RECOVERY →					→
	7	FILL - GRAVEL, WASTE (GLASS, PLYWOOD, PLASTIC, ASH), REDDISH-BROWN CLAY, STIFF, MOIST.	7362	80		HIGH B	7193 61
	8						
	9	▼	7242	80			
39"	10		7328	120		SAT.	7017 54

PROJECT

HOLE NO 1A6.20

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A6.20

SHEET 3 OF 4

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	10						
	11						
	12						
	13						
	14						
0"	15	NO RECOVERY (10.0'-20.0')					
	16						
	17						
	18						
	19						
0"	20						

PROJECT

HOLE NO 1A6.20

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR: DANIEL POFF

HOLE NUMBER: 1A6.20

SHEET 1 OF 4

RECID (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS (h)
	20						
	21						
	22						
	23						
	24	NO RECOVERY (20.0'-30.0')					
0"	25	NOTES:					
	26	- CLEAR, 40° F - SAMPLE I.D. TLS-SS-1A6.20(1.5-2.0)031810					
	27	TLS-SB-1A6.20(3.0-4.0)031810 TLS-SB-1A6.20(4.0-5.0)031810 TLS-SB-1A6.20(6.6-7.6)031810					
	28	TLS-SB-1A6.20(9.0-10.0)031810 - COLLECTED CHEM. DUPLIZATE AND MS/MSD.					
	29	- PID READINGS = 0ppm (VOC'S)					
0"	30	- DUE TO SMALL SAMPLE QUANTITY, MOVED 1M SOUTH IN ORDER TO OBTAIN MORE SAMPLE (REFUSAL AT 22.0' - 40" of SAMPLE RECOVERY)					

PROJECT

HOLE NO 1A6.20

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

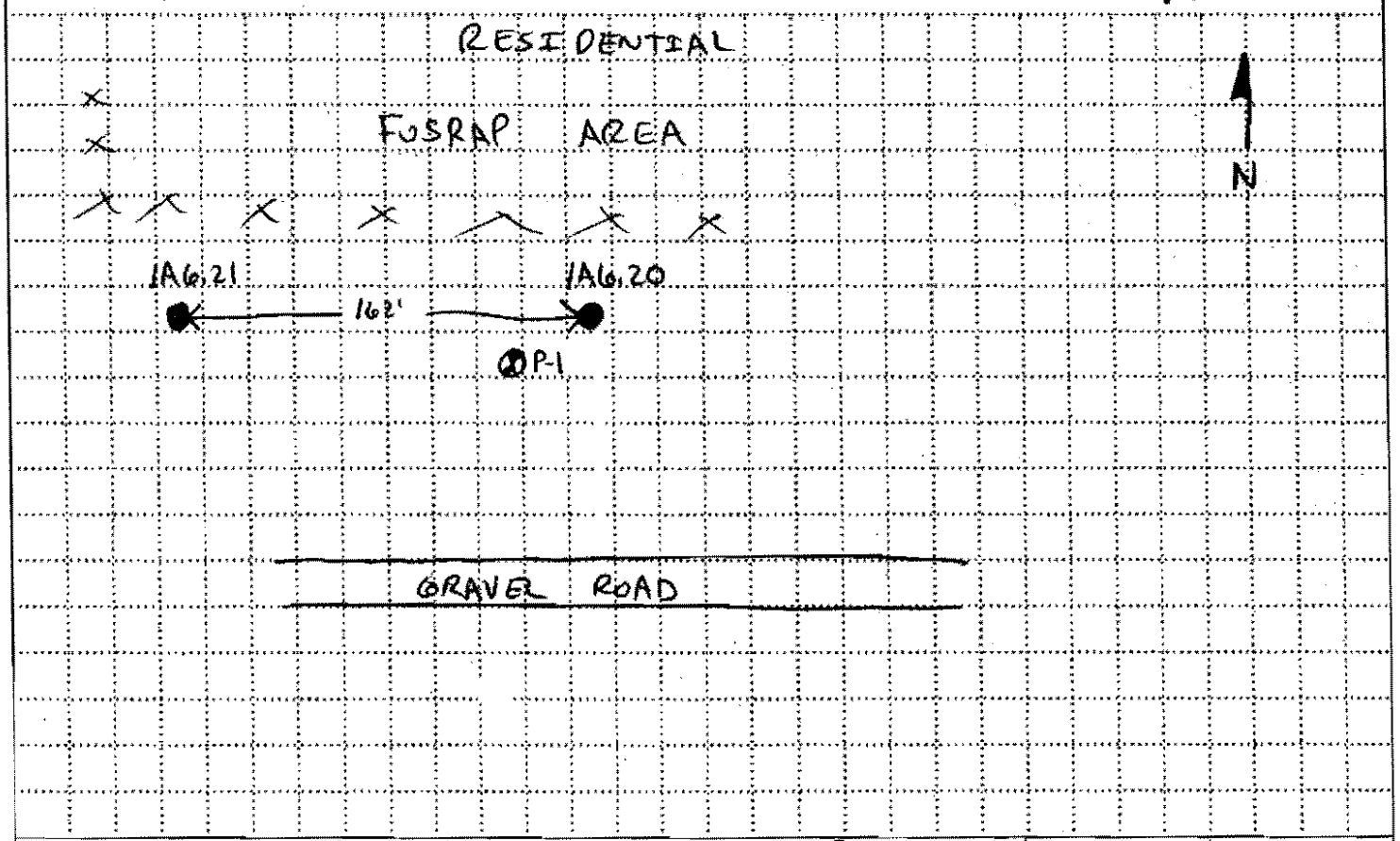
DISTRICT: BUFFALO		HOLE NUMBER: 1A6.21
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 3 SHEETS
3. PROJECT: TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: Jeff SNYDER	6. MANUFACTURER'S DESIGNATION OF DRILL: 6620DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE w/ 5' PLASTIC SLEEVE	8. HOLE LOCATION: N= 1092746.35 E= 1065113.54	
	9. SURFACE ELEVATION: 616.708	
	10. DATE STARTED: 3/18/10 1335	11. DATE COMPLETED: 3/18/10 1440
12. OVERBURDEN THICKNESS: NATIVE NOT ENCOUNTERED	15. DEPTH GROUNDWATER ENCOUNTERED: NOT ENCOUNTERED	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 15.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	–	–	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	–	–	–	–	–	N/A

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. [redacted]
CUTTINGS DRUMMED	–	–	–	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT: TON LF - Buffalo DISTRICT FUSRAP PROJECT — HOLE NO: 1A6.21

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A6.21

SHEET 2 OF 3

~~ELEV.~~ REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC COUNTS REMARKS (h) γ	B
	0							
	1	NO RECOVERY →						
	2	DARK-BROWN CLAYEY TOPSOIL, GRASS, ROOTLETS, SOFT, WET						
	3	FILL: CONCRETE, WASTE (METAL, GLASS, PLASTIC), WOOD, REDDISH-BROWN CLAY, MED. STIFF, MOIST.	6644	80		TOP 6"	6553	51
			6844	120	SEE NOTES	HIGH γ	6200	66
	4					HIGH B	6306	59
39"	5		6518	80				
	6							
	7	NO RECOVERY →						
	8							
	9	FILL: REDDISH-BROWN CLAY, GRAVEL, WASTE (GLASS), STIFF, MOIST.	6511	60		BOTTOM INTERVAL	6458	49
14"	10							

PROJECT

HOLE NO 1A6.21

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: 1A6.21

PROJECT:

INSPECTOR: D. Popp

SHEET 3 OF 3

REC'D ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~READING~~ COUNTS (h)
	10						
	11						
	12	NO RECOVERY →					
	13						
	14						
0"	15	BOTTOM of BORING AT 15.0'					
	16	NOTES:					
		- CLEAR, 43° F					
		- SAMPLE I.D.					
		TLS-SS-1A6.21(1.7-2.2)031810					
		TLS-SB-1A6.21(2.5-3.5)031810					
	17	TLS-SB-1A6.21(3.5-4.5)031810					
		TLS-SB-1A6.21(9.0-10.0)031810					
		- STRUCTURAL FILL NOT ENCOUNTERED					
	18	- PID READINGS = 0ppm (VOC'S)					
		- SOIL READINGS ARE COUNTS/MIN.					
	19	- MOVED 1 M SOUTH of ORIGINAL LOCATION (REFUSAL AT 7.0')					
	20						

PROJECT:

HOLE NO: 1A6.21

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG

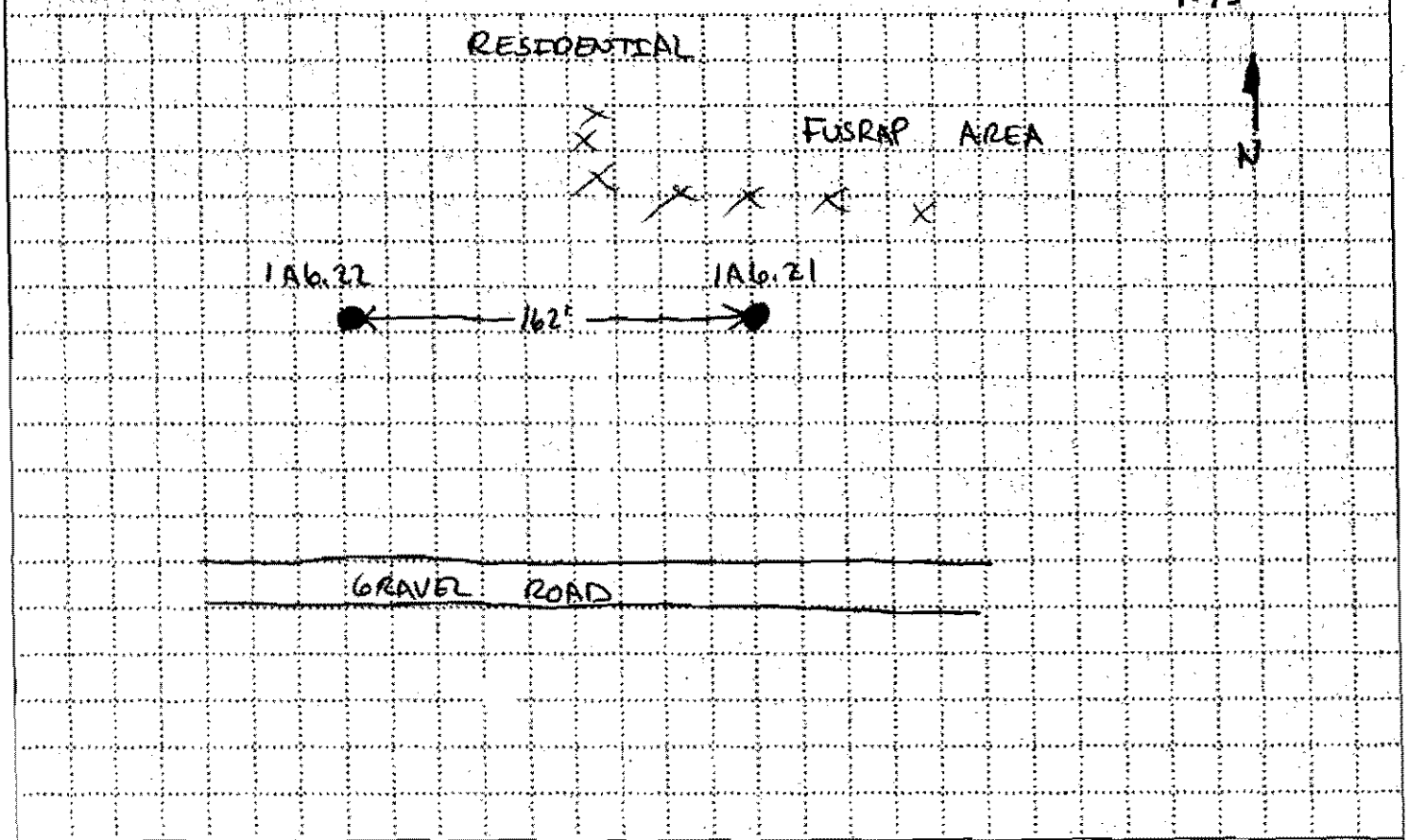
DISTRICT: Buffalo		HOLE NUMBER: 1A6.22
1. COMPANY NAME: ENSOL, INC.	2. DRILLING CONTRACTOR: ZEBRA ENVIRONMENTAL CORP.	SHEET 1 OF 3 SHEETS
3. PROJECT: TOWN of TONAWANDA LP OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT	4. LOCATION: TONAWANDA LF, TONAWANDA, NY	
5. NAME OF DRILLER: Jeff SNYDER	6. MANUFACTURER'S DESIGNATION OF DRILL: 6620 DT GEOPROBE	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 3 1/4" CASING 2" CORE w/5' PLASTIC SLEEVE	8. HOLE LOCATION: N= 1092746.35 E= 1064951.1	
	9. SURFACE ELEVATION: 616.112	
	10. DATE STARTED: 3/18/10 1445	11. DATE COMPLETED: 3/18/10 1540
12. OVERBURDEN THICKNESS: NATIVE NOT ENCOUNTERED	15. DEPTH GROUNDWATER ENCOUNTERED: 18.3' bgs	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A	
14. TOTAL DEPTH OF HOLE: 20.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5	TCLP / TOTALS	TCLP / TOTALS	SVOC-TCLP / TOTALS	PEST-TCLP / TOTALS	PCB-TOTALS	N/A

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	[redacted]
CUTTINGS DRUMMED	-	-	-	

LOCATION SKETCH/COMMENTS — SCALE: NTS



PROJECT	HOLE NO
TON LF - Buffalo DISTRICT FUSRAP PROJECT	1A6.22

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: 1A6.22

PROJECT:

INSPECTOR: D. Poff

SHEET 2 OF 3

REC'D ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)
	0	NO RECOVERY →					
	1						
		DARK-BROWN CLAYEY TOPSOIL, GRASS, ROOTLETS, SOFT, WET					
	2	STRUCTURAL FILL: REDDISH-BROWN CLAY, WASTE (PAPER) GRAVEL, STIFF, MOIST.	6142	40	SEE NOTES	TOP 6"	X 6326 B 64
	3		6602	40			
	4		6749	50		HIGH X	6426 75
40"	5	FILL: WASTE (METAL, GLASS), GRAVEL, MED. STIFF, MOIST.	6585	60		CHEM.	6420 56
	6	NO RECOVERY →					
	7						
	8						
	9		6483	100		HIGH B	6520 60
13"	10						

PROJECT

HOLE NO 1A6.22

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR D. Popp

HOLE NUMBER 1A6.22

SHEET 3 OF 3

REC'D (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) X	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC REMARKS COUNTS (h)
	10						
	11						
	12						
	13	NO RECOVERY →					
	14						
0"	15						
	16						
	17						
	18						
	19	FILL: WOOD, REDDISH - BROWN CLAY, STIFF, WET.	6453	80	SEE NOTES	SAT.	X 6453 B 71
			6427	80			
18"	20						

PROJECT

BOTTOM of BORING AT 20.0'

HOLE NO 1A6.22

ENG FORM 5056A-R, AUG 94

NOTES:

- CLEAR, 45°F
- SAMPLE I.D.
  TLS-SS-1A6.22 (1.5-2.0) 031810
  TLS-SB-1A6.22 (3.0-4.0) 031810
  TLS-SB-1A6.22 (4.0-5.0) 031810
  TLS-SB-1A6.22 (8.7-9.7) 031810
  TLS-SB-1A6.22 (18.3-19.3) 031810
- PID READINGS = 0ppm (VOC's)
- SOIL READINGS ARE COUNTS/MIN.

HTRW DRILLING LOG

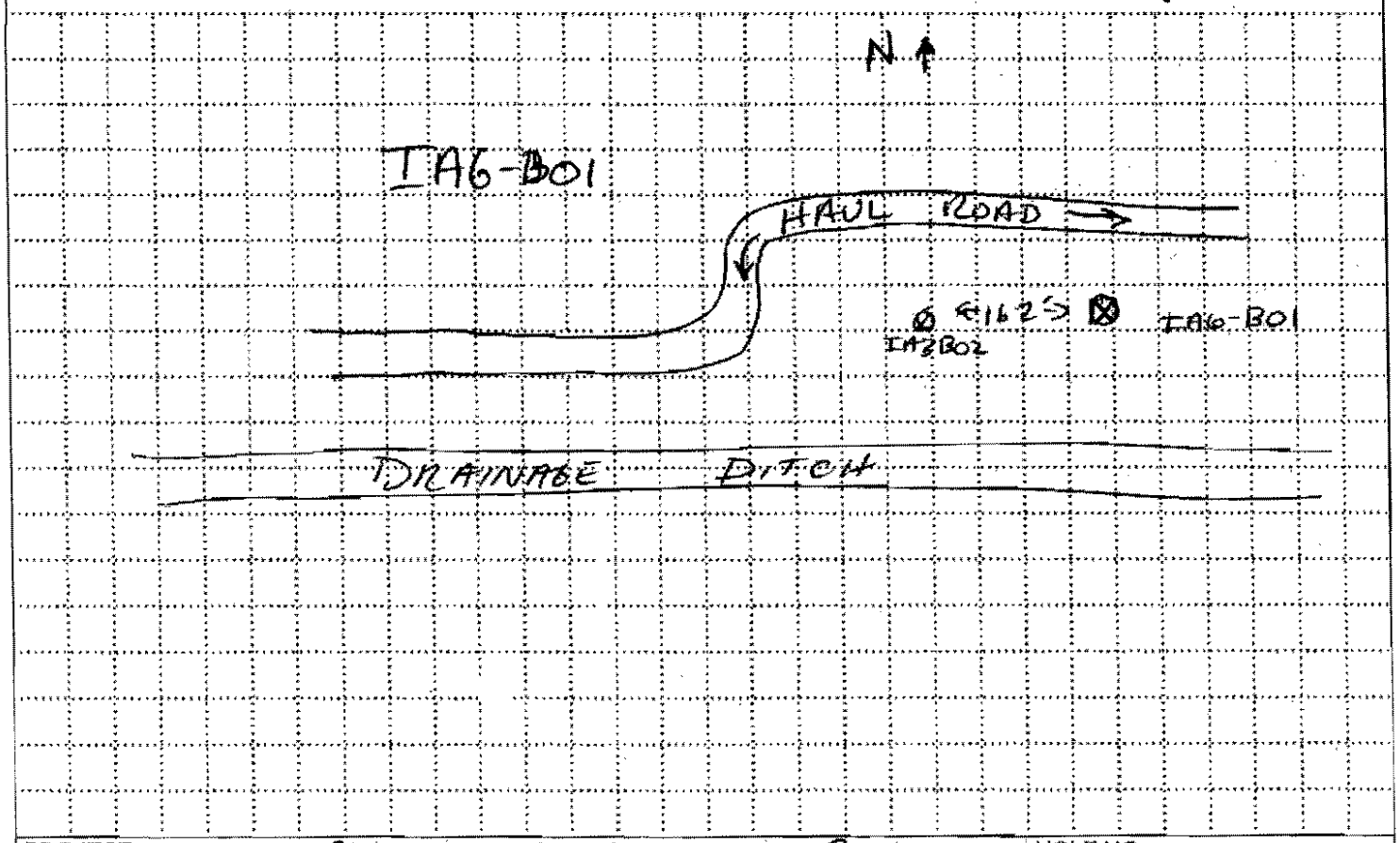
DISTRICT	Buffalo
HOLE NUMBER	IA6-B01
1. COMPANY NAME	ENSOL, INC.
2. DRILLING CONTRACTOR	ZEBRA ENVIRONMENTAL CORP.
SHEET / SHEETS	1 OF 4
3. PROJECT	TOWN of TONAWANDA LF OPERABLE UNIT - Buffalo DISTRICT FUSRAP PROJECT
4. LOCATION	TONAWANDA LF, TONAWANDA, NY
5. NAME OF DRILLER	JEFF SNYDER
6. MANUFACTURER'S DESIGNATION OF DRILL	6620 DT GEOPROBE
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	3 1/4" CASING 2" CORE W/ 5' PLASTIC SLEEVE
8. HOLE LOCATION	N= 1092583.42 E= 1066413.02
9. SURFACE ELEVATION	
10. DATE STARTED	3/10/10
11. DATE COMPLETED	3/10/10
12. OVERBURDEN THICKNESS	
15. DEPTH GROUNDWATER ENCOUNTERED	16.9'
13. DEPTH DRILLED INTO ROCK	N/A
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	N/A
14. TOTAL DEPTH OF HOLE	25'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	N/A

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A	-	-	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	-	-	-	-	-	N/A%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	[redacted]
CUTTINGS DRUMMED	-	-	-	

LOCATION SKETCH/COMMENTS



PROJECT	TON LF- Buffalo DISTRICT FUSRAP PROJECT
HOLE NO.	IA6-B01

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR S. PRYCE

HOLE NUMBER IA6B01

SHEET 2 OF 4

REC'D ~~ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) 8	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. ~~READING~~ STATIC COUNTS (h)	
	0	No Recovery						
	1	Fill: Stone<1/4", gravel, clay Reddish Brown, Firm, Dry.	8961	60		TOP 6"	8400	70
			8929	80				
	2							
			8784	120		Hib	7957	54
	3							
			8526	100				
	4							
			8918	60				
56"	5	No Recovery						
	6	Fill: Black Ash, cinder, Stone < 1/4", Reddish Brown Clay, Firm, moist.	8932	50				
			8727	50				
	7							
			8869	80				
	8							
			8434	80				
	9							
			8600	110				
58"	10							

PROJECT

HOLE NO. IA6B01

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: IA6-B01

PROJECT:

INSPECTOR: S. PRYCE

SHEET 3 OF 4

~~REC'D ELEV.~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) γ	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~REMARKS~~ COUNTS (h)	
	10							
	11	No Recovery →						
	12							
	13						γ	b
	14	Fill: ORGANIC MATERIAL, (ROOTS, WOOD) BLACK, ASH, CINDERS.	8947	60		11i γ	8640	50
				60				
19"	15							
	16	No Recovery →						
	17							
	18	FILL: WASTE: (PLASTIC, WOOD) STONE, REDDISH BROWN CLAY, grey mottle, FIRM, MOIST.	8664	40		SAT	8568	43
			8886	120				
	19		8820	80				
37"	20							

PROJECT:

HOLE NO. IA6-B01

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT

INSPECTOR S. PRYCE

HOLE NUMBER IA6-B01

SHEET 4 OF 4

RECID ~~ELEV~~ (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d) 8	GEOTECH SAMPLE OR CORE BOX NO. (e) B	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	1 MIN. STATIC ~~DELTA~~ COUNTS (h)	
	20	No Recovery						
	21		8779	40			8	6
	22	Fill: Reddish Brown, silty clay, coarse sand, firm, moist.	8677	100		NAT	8687	62
	23		8488	60				
	24		8578	100				
57"	25		8618	80				
	26	END OF BORING @ 25'						
	27	PID = 0 ppm (VOC's)						
	28	SAMPLE ID #'S TLS-SS IA6B01(0.4-0.9)031010 (TOP 6") TLS-SB IA6B01(20-3.0)031010 (Hi beta) TLS-SB IA6B01(13.3-14.3)031010 (Hi Gamma) TLS-SB IA6B01(16.9-17.9)031010 (SAT) TLS-SB IA6B01(21.0-22.0)031010 (NATIVE)						
	29	TOTAL RECOVERY: 227"						
	30	WEATHER: CLOUDY 37°						

PROJECT

HOLE NO. IA6B01

ENG FORM 5056A-R, AUG 94