

**SUMMARY REPORT FOR
MAY 2006 GROUNDWATER AND LEACHATE SAMPLING
SEAWAY SITE**

BACKGROUND

The USACE has identified a need to establish baseline radionuclide concentration levels for the groundwater surrounding the Seaway landfill. This effort includes additional sampling to analyze water from the 16 existing groundwater monitoring wells and the leachate. The samples are collected in coordination with the site owner and its environmental contractor, and in conjunction with the quarterly sampling event that is regularly performed. The USACE provides a representative to provide surveillance during the sampling conducted by the site owner's environmental contractor, Environmental Sampling & Services, Inc. (ES&S). In addition to sampling these wells, a separate sample is taken and shipped to an independent laboratory approved by USACE.

Samples are analyzed for radiological parameters including, at a minimum, isotopic uranium, isotopic thorium and isotopic radium using appropriate methods consistent with the Quality Assurance Project Plan (QAPP) (USACE 2001: *Sampling and Analysis Plan, Volume 2 – Quality Assurance Project Plan, Seaway Site Areas A, B, and C, Tonawanda, New York.*) prepared for the United States Army Corps of Engineers, Buffalo District (USACE 2001).

For sampling conducted, SAIC furnishes USACE with all laboratory reports, including a Level IV Data Package, and a short narrative summary including an Excel table summarizing the results. Data verification is performed by SAIC but no data validation is to be performed.

RESULTS

Water samples were collected from sixteen (16) groundwater monitoring wells and from the leachate collection system at the Seaway (BFI-Niagara Landfill) in Tonawanda, New York on May 22, 23, 24, and 25, 2006. The samples were collected by ES&S personnel. The ES&S Field Sampling report is included as Attachment A to this report. As detailed in the sampling report, both unfiltered and filtered (field filtered with a 0.45 micron filter) samples were collected. The locations of the groundwater monitoring wells at the Seaway Landfill are shown in Figure 1. Monitoring well W-5 had insufficient recharge for sampling.

Following collection, all samples were submitted to General Engineering Laboratories (GEL) located in Charleston, South Carolina. The USACE QA sample was sent to Severn Trent Laboratories (STL) located in Earth City Missouri (STL St. Louis) or Richland, Washington (STL Richland). The laboratory analyses requested are summarized in Table 1. All samples were analyzed for radiological parameters in four sample delivery groups (SDGs) and the results were reported to SAIC in data packages corresponding to each SDG. These laboratory reports are being provided to USACE separately on a CD due to the size of the reports. Also included on the CD is a copy of the electronic data files provided to SAIC by the laboratories as well as a

summary Excel file containing all of the laboratory results and a summary tabulation of those results, which is contained in this report as Table 2.

Upon receipt of the data from the laboratories, SAIC conducted a verification of all data packages to determine compliance with completeness and applicable quality control (QC) criteria established in the QAPP (USACE 2001). A copy of that report is included in Attachment B.

As described above, the results of the May 2006 sampling are tabulated in Table 2 for the primary radionuclides of concern (i.e., isotopic radium, uranium, and thorium) as well as the gross alpha and gross beta results, which are parameters routinely monitored as part of the landfill monitoring program. The results and data qualifiers shown in Table 2 are as reported by the laboratories.

The filtered and unfiltered sample results for the May 2006 sampling effort were compared to the results from the August 2005 sampling effort. The comparisons of the two sets of results are shown in Tables 3 and 4 for the filtered and unfiltered sample results, respectively. The results and data qualifiers shown in these tables are as reported by the laboratories.

A review of the results in Tables 3 and 4 when compared to the previous sampling (August 2000) results of the groundwater shows no unusual results. A review of the leachate results shows results within the range obtained during the August 2000, January 2001, April 2001, and July 2001 leachate sampling events.

REFERENCES

USACE 2001: *Sampling and Analysis Plan, Volume 2 – Quality Assurance Project Plan, Seaway Site Areas A, B, and C, Tonawanda, New York.*) Prepared by SAIC for the United States Army Corps of Engineers, Buffalo District, July 2001.

FIGURES

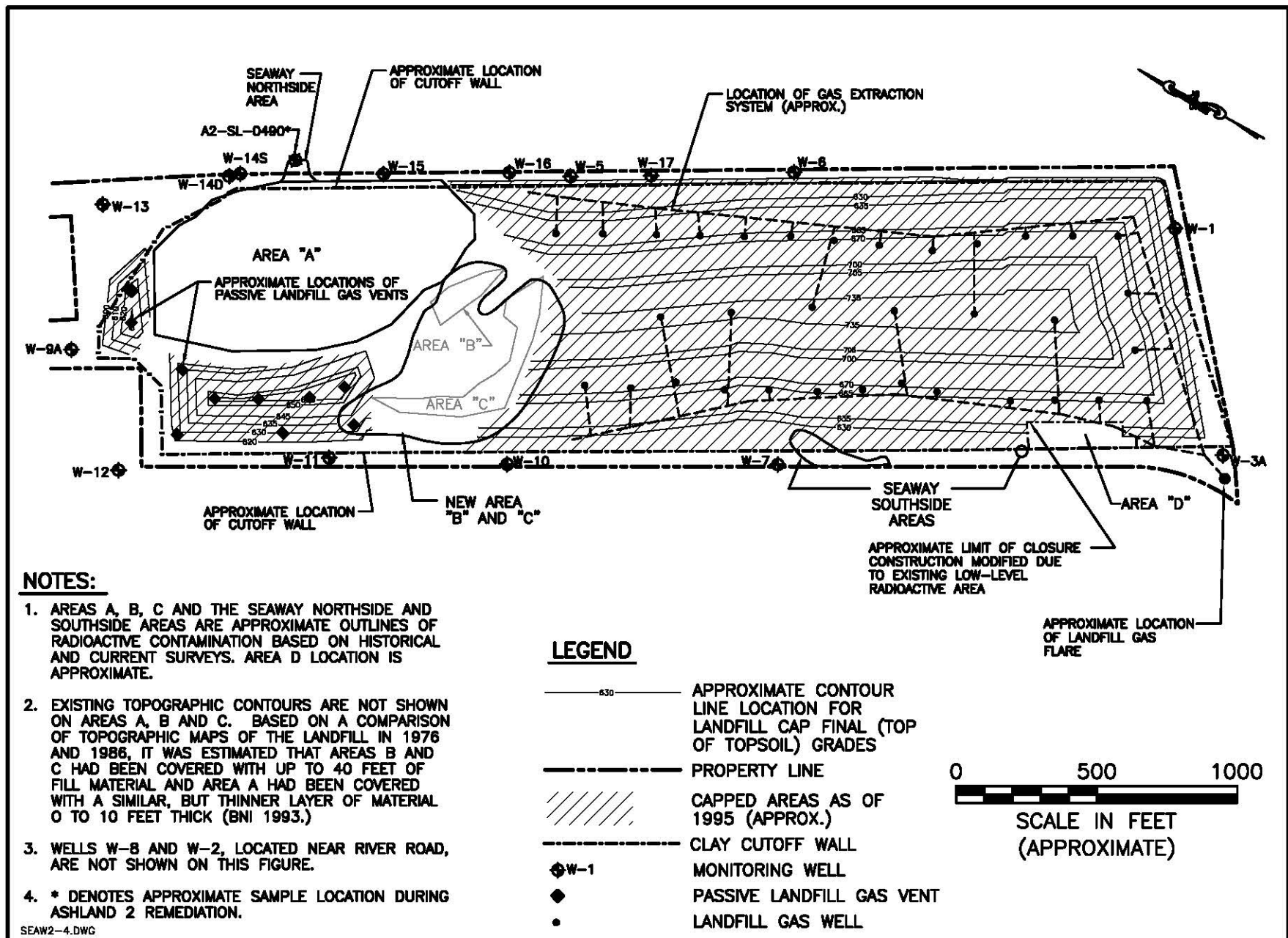


FIGURE 1
NIAGARA LANDFILL CLOSURE CONDITIONS

TABLES

Table 1: Requested Analytes and Associated Method for Each Groundwater and Leachate Sample
Analyte*
Gross Alpha
Gross Beta
U-233/234, 235/236, 238 using Alpha Spec.
Th-222, 230,232 using Alpha Spec.
Ra-228 using Gamma Spec.
Ra-226 using radon emanation method
Gamma Spec (at a minimum to identify and quantify any radionuclides contributing to above Gross Alpha and Gross Beta results)

*Note:

- (1) Detection Limit for Alpha Emitters is 0.1 pCi/L.
- (2) Detection Limit for Beta Emitters is 0.5 pCi/L.
- (3) Reporting Levels = 1 pCi/L for each isotope
- (4) Matrix Spike and Matrix Spike Duplicates are laboratory QA and there would be one MS/MSD per sampling event.
- (5) All samples were filtered in the field using 0.45 micron filter.
- (6) Analyses to be performed for both the filtered and unfiltered samples.

Table 2: Radium, Uranium and Thorium Isotopes and Gross Alpha and Gross Beta Radiation Results
for Groundwater and Leachate Samples
Seaway Landfill Sampling - May 2006
(Sheet 1 of 2)

August 29, 2006

(Results in pCi/L)

Well/Location	Radium-226		Radium-228		Uranium-233/234		Uranium-235/236		Uranium-238	
	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered
W-1	1.14	1.29	0.661 U	0.149 U	0.0193 U	-0.00244 U	-0.00752 U	0.0115 U	0.000338 U	-0.00585 U
W-2	1.12	0.86	0.793	1.38	0.0339 U	0.0314 U	0.0159 U	-0.0175 U	0.0128 U	0.0472 U
W-2 (Duplicate)	0.868	1.18	0.699 U	0.384 U	0.0698	0.0299 U	0 U	-0.00392 U	0.0388 U	0.00502 U
W-3A	0.808	0.748	0.597 U	0.897	0.043 U	0.0298	-0.00717 U	0.0246 U	0.00918 U	0 U
W-6	0.851	1.14	1.02	-0.142 U	0 U	-0.014 U	0.011 U	-0.0116 U	0 U	0.00273 U
W-7	0.872	1.35	1.61	0.823	0.0692 U	0.0352 U	0.00632 U	0.0218 U	0.0177 U	0 U
W-8	3.26	2.55	2.49	1.83	0.1	0.0938	0 U	0.0197 U	0.0219 U	0.03 U
W-9A	0.534	0.455	0.0859 U	0.757 U	0.0196 U	0.0543 U	0.00884 U	-0.00555 U	-0.00414 U	-0.0135 U
W-10	1.56	1.06	0.65 U	1.03	0.0115 U	0.0469 U	0.02 U	-0.0103 U	-0.00765 U	0.0297 U
W-11	2.29	2.85	1.99	3.72	0.0172 U	0.0283 U	0.00532 U	0.0162 U	0.0146 U	-0.0158 U
W-12	2.77	2.26	1.89	1.57	0.0612 U	0.0304 U	0.0264 U	0.0272 U	0.0549 U	-0.00264 U
W-13	1.19	1.7	0.772	0.371 U	0.137	0.0805	0.0662 U	0.039 U	0.058 U	0.0128 U
W-14D	1.77	1.84	1.3	1.62	0.058 U	0.0355 U	0 U	0.0439 U	0.0185 U	0.0533 U
W-14D (Duplicate)	2.47	2.7	1.61	2.14	0.0744	0.0582	0.0657	0 U	0.0106 U	0.0536 U
W-14S	0.579	0.415 U	0.421 U	0.24 U	0.0324 U	0.0158 U	0.0279 U	0.0195 U	0.0226 U	0.012 U
W-15	1.73	1.35	1.31	1.27	0.0767 U	0.189	0.0855 U	0 U	0.0291 U	0.0378
W-16	1.61	1.06	0.797	1.21	0.0666	0.0585	0.0353	0 U	0.0285	0 U
W-17	0.639	0.451	0.381 U	0.328 U	0.0398	0.0606 U	0.0164 U	0.0166 U	0.0133 U	0.0268 U
LEACHATE	2.75	1.93	0.177 U	1.01	3.27	4.75	0.233	0.336	3.05	4.68
USACE SAMPLE (W-7)	0.737 J	0.85 J	1.26	1.38	0.064 U*	0.018 U*	-0.009 U**	-0.009 U**	0.036 U	0.029 U

Note: The results and data qualifiers shown are as reported by the laboratories.

The results reported for all of the samples are from General Engineering Laboratories (GEL) except for USACE Sample (W-7), which are from Severn Trent Laboratories (STL).

U - Target analyte was analyzed for but not detected above the Method Detection Limit (MDL) or Limit of Detection (LOD).

J - Estimated Value

* U-234 only

** U-235 only

Table 2: Radium, Uranium and Thorium Isotopes and Gross Alpha and Gross Beta Radiation Results
for Groundwater and Leachate Samples
Seaway Landfill Sampling - May 2006
(Sheet 2 of 2)

August 29, 2006

(Results in pCi/L)

Well/Location	Thorium-230		Thorium-232		Thorium-228		Gross Alpha		Gross Beta	
	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered
W-1	0.0121 U	0.0274 U	0 U	0.0184	0.032	0.0201 U	1.89 U	1.56 U	11	4.28 U
W-2	0.00736 U	0.0136 U	-0.00932 U	0.00276 U	0.0448 U	0.0386 U	-0.835 U	-0.788 U	84.5	10.8
W-2 (Duplicate)	0.0291 U	-0.00317 U	-0.0132 U	-0.00986 U	0.0658	0.0541 U	-1.63 U	-1.8 U	77.2	12.3
W-3A	0.0725	-0.00562 U	0.0045 U	0.0121 U	0.0168 U	0.058 U	1.81 U	-2.01 U	5.11	6.69 U
W-6	0.0237 U	0.0258	0.00185 U	-0.00269 U	0.0916	0.0146 U	3.1 U	-0.908 U	21	9.81 U
W-7	0.0721	0.0166 U	0 U	-0.00366 U	0.0712	0.0475 U	-0.392 U	2 U	12.8	8.63
W-8	-0.00647 U	0.0332 U	0.0257 U	0.00225 U	0.432	0.0499 U	12.2 U	4.14 U	75.9	38.7
W-9A	0.0812	0.0215 U	0.0205 U	-0.00926 U	0.0341 U	0.0236 U	-0.126 U	3.03 U	1.02 U	4.14
W-10	0.0125 U	0.026	0.00558 U	0.0043 U	0.0103 U	0.0289 U	-0.0207 U	0.706 U	17.2	7.29
W-11	0.0126 U	-0.00661 U	-0.0348 U	-0.0128 U	0.0582 U	0.0697	2.82 U	5.66	55.3	47.9
W-12	0.0196 U	0.0307 U	0.0118 U	0.00261 U	0.0629 U	0.0493	4.9 U	8.2	40.5	115
W-13	0.00566 U	-0.00963 U	-0.0184 U	0.00668 U	0.00717 U	0.0626 U	0.435 U	0.62 U	11.8	16.1
W-14D	-0.00108 U	0.039 U	-0.00239 U	-0.00456 U	0.0467 U	0.0831	5.48 U	2.99 U	24.6	17.7
W-14D (Duplicate)	0.0504	0.044	-0.00227 U	0 U	0.0418 U	0.0319 U	3.53 U	-0.0559 U	16.1	19.8
W-14S	0.065	0.0034 U	-0.00171 U	-0.00232 U	0.0312 U	0.00589 U	-1.14 U	1.42 U	3.55 U	5.38 U
W-15	0.0435 U	0.0103 U	0 U	0 U	0.0758	0.0468	2.05 U	6.69 U	37.1	27.3
W-16	0.0488 U	0.0341	0.00997 U	0 U	0.024 U	0.0642	-2.8 U	1.28 U	15.8	8.14 U
W-17	0.0489	0.0786	0 U	-0.00157 U	0.0154 U	0.0366	-0.897 U	0.613 U	3.21 U	-2.05 U
LEACHATE	0.863	0.41 U	0.355 U	-0.00179 U	-0.244 U	-0.246 U	5.94 U	13.2	89.7	104
USACE SAMPLE (W-7)	0.8 J	0.43 J	-0.008 U	0.034 U	0.19 J	0.02 U	1.9 U	-0.7 U	12 U	14.1 U

Note: The results and data qualifiers shown are as reported by the laboratories.

The results reported for all of the samples are from General Engineering Laboratories (GEL) except for USACE Sample (W-7), which are from Severn Trent Laboratories (STL).

U - Target analyte was analyzed for but not detected above the Method Detection Limit (MDL) or Limit of Detection (LOD).

J - Estimated Value

* U-234 only

** U-235 only

Table 3: Comparison of Radiological Results
for Filtered Groundwater and Leachate Samples
Seaway Landfill Sampling - August 2005 and May 2006
(Sheet 1 of 2)

August 29, 2006

(Filtered Sample Results in pCi/L)

Well/Location	Radium-226		Radium-228		Uranium-233/234		Uranium-235/236		Uranium-238	
	Aug-05	May-06	Aug-05	May-06	Aug-05	May-06	Aug-05	May-06	Aug-05	May-06
W-1	1.03	1.29	0.972	0.149 U	0.123	-0.00244 U	-0.015 U	0.0115 U	0.00875 U	-0.00585 U
W-2	0.0599 U	0.86	1.65	1.38	0.0682 U	0.0314 U	0.0328 U	-0.0175 U	0.0229 U	0.0472 U
W-2 (Duplicate)	1.1	1.18	1.09	0.384 U	0.0617 U	0.0299 U	0 U	-0.00392 U	0.0315 U	0.00502 U
W-3A	0.691	0.748	1.67	0.897	0.0835	0.0298	0.0281 U	0.0246 U	0.0152 U	0 U
W-6	0.521	1.14	0.637 U	-0.142 U	0.0236 U	-0.014 U	-0.00344 U	-0.0116 U	0.0116 U	0.00273 U
W-7	1.43	1.35	1.91	0.823	0.145	0.0352 U	0.0432 U	0.0218 U	0.0307 U	0 U
W-8	0.522	2.55	3.26	1.83	0.278	0.0938	-0.0114 U	0.0197 U	0.138	0.03 U
W-9A	0 U	0.455	0.395 U	0.757 U	0.0688 U	0.0543 U	-0.0081 U	-0.00555 U	0.0175 U	-0.0135 U
W-10	1.52	1.06	1.4	1.03	0.00934 U	0.0469 U	0.0666	-0.0103 U	0 U	0.0297 U
W-11	2	2.85	4.13	3.72	0.0518 U	0.0283 U	0.00547 U	0.0162 U	0.0398 U	-0.0158 U
W-11 (Duplicate)	2.3		3.77		0.116		-0.0137 U		0.0234 U	
W-12	1.65	2.26	1.3	1.57	0.0617 U	0.0304 U	0.00853 U	0.0272 U	0.025 U	-0.00264 U
W-13	1.9	1.7	1.49	0.371 U	0.0884	0.0805	0.0242 U	0.039 U	0.0217 U	0.0128 U
W-14D	1.77	1.84	4.54	1.62	0.713 U	0.0355 U	0.881 U	0.0439 U	0.713 U	0.0533
W-14D (Duplicate)		2.7		2.14		0.0582		0 U		0.0536 U
W-14S	0.273 U	0.415 U	0.0321 U	0.24 U	0.00343 U	0.0158 U	0.00424 U	0.0195 U	-0.00588 U	0.012 U
W-15	1.97	1.35	2.24	1.27	0.0391 U	0.189	0.00813 U	0 U	0.0305 U	0.0378
W-16	0.628	1.06	1.92	1.21	0.0708	0.0585	0 U	0 U	0.00472 U	0 U
W-17	0.684	0.451	1.07	0.328 U	0.0458 U	0.0606 U	0.039	0.0166 U	0.0259 U	0.0268 U
LEACHATE	3.1	1.93	0.77	1.01	2.68	4.75	0.161	0.336	2.76	4.68
USACE SAMPLE (W-7)	1.29	0.85 J	2.24 J	1.38	0.07 U*	0.018 U*	0.001 U**	-0.009 U**	0.015 U	0.029 U

Note: The results and data qualifiers shown are as reported by the laboratories.

The results reported for all of the samples are from General Engineering Laboratories (GEL) except for USACE Sample (W-7), which are from Severn Trent Laboratories (STL).

U - Target analyte was analyzed for but not detected above the Method Detection Limit (MDL) or Limit of Detection (LOD).

J - Estimated Value

* U-234 only

** U-235 only

Table 3: Comparison of Radiological Results
for Filtered Groundwater and Leachate Samples
Seaway Landfill Sampling - August 2005 and May 2006
(Sheet 2 of 2)

August 29, 2006

(Filtered Sample Results in pCi/L)

Well/Location	Thorium-230		Thorium-232		Thorium-228		Gross Alpha		Gross Beta	
	Aug-05	May-06	Aug-05	May-06	Aug-05	May-06	Aug-05	May-06	Aug-05	May-06
W-1	0.00576 U	0.0274 U	0.00237 U	0.0184	0.0417 U	0.0201 U	2.45 U	1.56 U	22.7	4.28 U
W-2	0.0522 U	0.0136 U	0.00301 U	0.00276 U	0.0752 U	0.0386 U	1.94 U	-0.788 U	16.4	10.8
W-2 (Duplicate)	-0.0057 U	-0.00317 U	-0.00586 U	-0.00986 U	0.0588 U	0.0541 U	4.89 U	-1.8 U	10.3 U	12.3
W-3A	0.017 U	-0.00562 U	-0.00258 U	0.0121 U	0.0499 U	0.058 U	1.31 U	-2.01 U	11.4	6.69 U
W-6	0.0239 U	0.0258	-0.00552 U	-0.00269 U	0.0471 U	0.0146 U	3.56 U	-0.908 U	10.3 U	9.81 U
W-7	0.0167 U	0.0166 U	-0.00236 U	-0.00366 U	0.0113 U	0.0475 U	2.47 U	2 U	20.4	8.63
W-8	1.85	0.0332 U	0.12 U	0.00225 U	-0.516 U	0.0499 U	3.43 U	4.14 U	34.6	38.7
W-9A	0.0204 U	0.0215 U	-0.0000645 U	-0.00926 U	0.0835	0.0236 U	1.12 U	3.03 U	3.61 U	4.14
W-10	0.0356	0.026	-0.00297 U	0.0043 U	0.0333 U	0.0289 U	3.83	0.706 U	15.6	7.29
W-11	0.0186 U	-0.00661 U	0.0102 U	-0.0128 U	0.215	0.0697	6.27 U	5.66	51.9	47.9
W-11 (Duplicate)	0.014 U		-0.0000562 U		0.0725 U		4.7 U		47.7	
W-12	-0.0187 U	0.0307 U	-0.00309 U	0.00261 U	0.0719 U	0.0493	1.37 U	8.2	54.8	115
W-13	-0.00601 U	-0.00963 U	0.00672 U	0.00668 U	0.127	0.0626 U	2.9 U	0.62 U	12.3	16.1
W-14D	0.0121 U	0.039 U	0 U	-0.00456 U	0.0822 U	0.0831	1.11 U	2.99 U	38.7	17.7
W-14D (Duplicate)		0.044		0 U		0.0319 U		-0.0559 U		19.8
W-14S	0.0166 U	0.0034 U	0.00623 U	-0.00232 U	0.0886 U	0.00589 U	-1.95 U	1.42 U	2.13 U	5.38 U
W-15	0.0466	0.0103 U	0.0124 U	0 U	0.0694	0.0468	1.58 U	6.69 U	24.5	27.3
W-16	0.0389 U	0.0341	0.0158 U	0 U	0.0411 U	0.0642	-3.62 U	1.28 U	19.1	8.14 U
W-17	0.00696 U	0.0786	-0.0021 U	-0.00157 U	0.028 U	0.0366	0.671 U	0.613 U	-5.31 U	-2.05 U
LEACHATE	0.411 U	0.41 U	0.346 U	-0.00179 U	0.788 U	-0.246 U	5.72 U	13.2	109	104
USACE SAMPLE (W-7)	0.2 J	0.43 J	0.005 U	0.034 U	0.04 U	0.02 U	-4 U	-0.7 U	16 U	14.1 U

Note: The results and data qualifiers shown are as reported by the laboratories.

The results reported for all of the samples are from General Engineering Laboratories (GEL) except for USACE Sample (W-7), which are from Severn Trent Laboratories (STL).

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J - Estimated Value

* U-234 only

** U-235 only

Table 4: Comparison of Radiological Results
for Unfiltered Groundwater and Leachate Samples
Seaway Landfill Sampling - August 2005 and May 2006
(Sheet 1 of 2)

August 29, 2006

(Unfiltered Sample Results in pCi/L)

Well/Location	Radium-226		Radium-228		Uranium-233/234		Uranium-235/236		Uranium-238	
	Aug-05	May-06	Aug-05	May-06	Aug-05	May-06	Aug-05	May-06	Aug-05	May-06
W-1	1.11	1.14	0.973	0.661 U	0.11	0.0193 U	0.0133 U	-0.00752 U	0.0855 U	0.000338 U
W-2	1.25	1.12	1.99	0.793	0.0322 U	0.0339 U	0.00442 U	0.0159 U	0.00664 U	0.0128 U
W-2 (Duplicate)	0.664	0.868	1.17	0.699 U	0.0327 U	0.0698	0.0111 U	0 U	0.0356	0.0388 U
W-3A	0.877	0.808	1.38	0.597 U	0.0415 U	0.043 U	0.028 U	-0.00717 U	0.00755 U	0.00918 U
W-6	0.689	0.851	0.803	1.02	0.0441 U	0 U	-0.00371 U	0.011 U	-0.003 U	0 U
W-7	0.304	0.872	1.91	1.61	0.117 U	0.0692 U	0 U	0.00632 U	0.0294 U	0.0177 U
W-8	3.53	3.26	4.28	2.49	0.319	0.1	0.0406 U	0 U	0.194	0.0219 U
W-9A	0.378 U	0.534	0.694	0.0859 U	-0.0023 U	0.0196 U	-0.00342 U	0.00884 U	0.0203 U	-0.00414 U
W-10	1.59	1.56	0.913	0.65 U	0.104	0.0115 U	-0.00803 U	0.02 U	0.091	-0.00765 U
W-11	2.62	2.29	2.58	1.99	0.0316 U	0.0172 U	0.00995 U	0.00532 U	0.039 U	0.0146 U
W-11 (Duplicate)	2.23		3.02		0.0709 U		0.0156 U		0.0126 U	
W-12	0.265 U	2.77	1.7	1.89	0.0179 U	0.0612 U	-0.00283 U	0.0264 U	0.00641 U	0.0549 U
W-13	1.38	1.19	0.954	0.772	0.0713	0.137	0.0234 U	0.0662 U	0.0171 U	0.058 U
W-14D	1.34	1.77	4.71	1.3	0.745	0.058 U	0.057 U	0 U	0.441	0.0185 U
W-14D (Duplicate)		2.47		1.61		0.0744		0.0657		0.0106 U
W-14S	0.672	0.579	0.533 U	0.421 U	0.000425 U	0.0324 U	0.0231 U	0.0279 U	-0.00255 U	0.0226 U
W-15	2.57	1.73	2.28	1.31	0.0459 U	0.0767 U	0.00689 U	0.0855 U	0.0403 U	0.0291 U
W-16	1.58	1.61	2.22	0.797	0.0218 U	0.0666	0.0333 U	0.0353	0.023	0.0285
W-17	0.581 U	0.639	0.496 U	0.381 U	0.0626 U	0.0398	0.0102 U	0.0164 U	0.0334 U	0.0133 U
LEACHATE	2.06	2.75	1.12	0.177 U	2.18	3.27	0.159	0.233	2.24	3.05
USACE SAMPLE (W-7)	1.09	0.737 J	2.06 J	1.26	0.06 U*	0.064 U*	0.09 U**	-0.009 U**	0.12 U	0.036 U

Note: The results and data qualifiers shown are as reported by the laboratories.

The results reported for all of the samples are from General Engineering Laboratories (GEL) except for USACE Sample (W-7), which are from Severn Trent Laboratories (STL).

U - Target analyte was analyzed for but not detected above the Method Detection Limit (MDL) or Limit of Detection (LOD).

J - Estimated Value

* U-234 only

** U-235 only

Table 4: Comparison of Radiological Results
for Unfiltered Groundwater and Leachate Samples
Seaway Landfill Sampling - August 2005 and May 2006
(Sheet 2 of 2)

August 29, 2006

(Unfiltered Sample Results in pCi/L)

Well/Location	Thorium-230		Thorium-232		Thorium-228		Gross Alpha		Gross Beta	
	Aug-05	May-06	Aug-05	May-06	Aug-05	May-06	Aug-05	May-06	Aug-05	May-06
W-1	-0.00617 U	0.0121 U	0.00474 U	0 U	0.0417 U	0.032	2.61 U	1.89 U	20.2	11
W-2	0.0296 U	0.00736 U	0.00762 U	-0.00932 U	0.0467 U	0.0448 U	0.215 U	-0.835 U	14.7	84.5
W-2 (Duplicate)	0.0358	0.0291 U	0.0166	-0.0132 U	0.0454 U	0.0658	5.25 U	-1.63 U	14.4	77.2
W-3A	0.0312 U	0.0725	-0.0107 U	0.0045 U	0.0133 U	0.0168 U	-0.921 U	1.81 U	12.3	5.11
W-6	0.00787 U	0.0237 U	0.0191 U	0.00185 U	0.0506 U	0.0916	18.6	3.1 U	13.8	21
W-7	0.066	0.0721	0 U	0 U	0.029 U	0.0712	1.92 U	-0.392 U	15.9	12.8
W-8	1.01	-0.00647 U	0.211 U	0.0257 U	0.514 U	0.432	11	12.2 U	34.4	75.9
W-9A	0.0666 U	0.0812	0.00591 U	0.0205 U	0.0248 U	0.0341 U	0.0868 U	-0.126 U	5.29	1.02 U
W-10	0.0188 U	0.0125 U	-0.0023 U	0.00558 U	0.0183 U	0.0103 U	1.78 U	-0.0207 U	15.7	17.2
W-11	0.0135 U	0.0126 U	0.00267 U	-0.0348 U	0.0741	0.0582 U	6.44 U	2.82 U	48	55.3
W-11 (Duplicate)	0.0293 U		0 U		0.0852 U		9.84		49.7	
W-12	0.0133 U	0.0196 U	-0.00414 U	0.0118 U	0.118	0.0629 U	2.32 U	4.9 U	44.4	40.5
W-13	0.00483 U	0.00566 U	0.00245 U	-0.0184 U	0.0615 U	0.00717 U	2.78 U	0.435 U	18	11.8
W-14D	0.0326 U	-0.00108 U	-0.00926 U	-0.00239 U	0.105 U	0.0467 U	7.56 U	5.48 U	28.4	24.6
W-14D (Duplicate)		0.0504		-0.00227 U		0.0418 U		3.53 U		16.1
W-14S	0.0473	0.065	-0.0000486 U	-0.00171 U	0.0219 U	0.0312 U	-0.0344 U	-1.14 U	3.57 U	3.55 U
W-15	0.00867 U	0.0435 U	-0.0018 U	0 U	0.0627 U	0.0758	3.68 U	2.05 U	20.6	37.1
W-16	0.0119 U	0.0488 U	-0.0025 U	0.00997 U	0.0664 U	0.024 U	-0.546 U	-2.8 U	14	15.8
W-17	0.00411 U	0.0489	0.00717 U	0 U	0.0493 U	0.0154 U	-1.14 U	-0.897 U	12.6	3.21 U
LEACHATE	0.943	0.863	-0.00286 U	0.355 U	0.17 U	-0.244 U	10.6 U	5.94 U	106	89.7
USACE SAMPLE (W-7)	0.44 J	0.8 J	0 U	-0.008 U	0.031 U	0.19 J	0.8 U	1.9 U	23	12 U

Note: The results and data qualifiers shown are as reported by the laboratories.

The results reported for all of the samples are from General Engineering Laboratories (GEL) except for USACE Sample (W-7), which are from Severn Trent Laboratories (STL).

U - Target analyte was analyzed for but not detected above the Method Detection Limit (MDL) or Limit of Detection (LOD).

J - Estimated Value

* U-234 only

** U-235 only

ATTACHMENT A
ES&S FIELD SAMPLING REPORT

ENVIRONMENTAL SAMPLING & SERVICES, INC.
7183 BALLA DRIVE
NORTH TONAWANDA, NEW YORK 14120
(716) 807-0482

June 1, 2006

SAIC
10 Main Street
Lakeville, MA 02347
Attention: Mr. Al Davis

Dear [REDACTED]

Attached please find the field report describing the May sampling at Seaway Landfill in Tonawanda, New York.

Please contact me at [REDACTED] with any questions regarding this project.
Thanks again for this opportunity to work with SAIC.

Sincerely,

[REDACTED]

President

FIELD REPORT

**SAMPLING OF
GROUNDWATER MONITORING WELLS
SEAWAY LANDFILL
TONAWANDA, NEW YORK**

MAY 2006

PREPARED FOR:

**SAIC, INC.
10 MAIN STREET
LAKEVILLE, MASSACHUSETTS 02347
ATTENTION: MR. AL DAVIS**

PREPARED BY:

**ENVIRONMENTAL SAMPLING & SERVICES, INC.
7183 BALLA DRIVE
NORTH TONAWANDA, NEW YORK 14120**

1.0 INTRODUCTION

This report describes the sampling of sixteen (16) groundwater monitoring wells at the Seaway Landfill (BFI – Niagara Landfill) located in Tonawanda, New York. Monitoring well W-5 had insufficient recharge for sampling. Sampling was performed May 22, 23, and 24, 2006, by Environmental Sampling & Services, Inc. (ES&S) personnel. Samples were collected as both unfiltered and filtered for the full parameter list at each sample location.

2.0 METHODOLOGIES

2.1 Water Level Measurements

Static water levels of all seventeen (17) groundwater wells were measured from the top of the well casing/riser, with a weighted electronic water level indicator (QED). All measurements were recorded to the nearest hundredth of a foot (0.01 feet). The length of the measuring device, which contacted the water, was cleaned between wells with liquinox, deionized water rinse and paper towel wipe. The data for the wells sampled is presented on Table I.

2.2 Well Evacuation

Prior to evacuation, the volume of standing water was calculated by subtracting the depth to groundwater from the bottom of the well depth and multiplying that number by a constant for the corresponding size well. $V=H (.16)$ – 2 inch well, $V=H (.36)$ – 3 inch well, $V=H (.65)$ – 4 inch well, where H is the height of the water column and .16, .36, and .65 are volumetric constants.

Prior to sampling, three (3) times the standing water volume was purged from each well which exhibited a moderate to high recharge. Wells, which exhibited a low recharge rate, were evacuated to dryness.

The wells were evacuated using dedicated Well Wizard Purging / Sampling Pumps or dedicated stainless steel bailers. Data pertaining to each evacuation is presented on Table I.

3.0 SAMPLING

3.1 Monitoring Wells

After well purging, a second depth to water level measurement was taken at each well to insure there was sufficient recharge.

Wells were sampled using the Well Wizard Sampling Pumps. Sample containers were filled directly from the sampling discharge tube. One set of parameters was sampled unfiltered and a second set was sampled using a 0.45 micron inline filter. An additional unfiltered sample was taken to facilitate measurement of field analytical parameters.

An additional sample was collected from each well in order to facilitate the measurement of field parameters.

4.0 FIELD MEASUREMENT

On site field measurements include pH, specific conductivity, temperature, eH and turbidity. This data is presented on Table II.

All instruments, which contacted groundwater, were cleaned after each measurement by rinsing with deionized water and wiping dry with paper towels.

5.0 EQUIPMENT CALIBRATION

Prior to mobilization, all field equipment and instrumentation were checked for condition. In field calibrations were done before field measurements were facilitated. Calibration checks were done twice a day, recalibration of field instruments was performed if necessary.

- pH / eH meters were two-point calibrated with either; 4.00 S.U. and 7.00 S.U. or 7.00 S.U. and 10.00 S.U. buffer solutions.
- Conductivity meters were four-point calibrated with 101.8, 1002, and 9320 umhos/cm buffer solutions.
- Turbidity meters were two-point calibrated with 0.50 NTU and 5.00 NTU standards.

6.0 SAMPLE CONTAINER PREPARATION

All containers used in the collection of samples for this project were provided new and clean from GEL Laboratories. These bottles were shipped to ES&S and stored in a clean environment prior to their use.

7.0 QUALITY ASSURANCE / QUALITY CONTROL

7.1 Field Duplicate

A field duplicate was collected at a frequency of two (2) per sampling event. The field duplicate consisted of a set of all parameters and was obtained at the same time a well was being sampled. Duplicates were collected at W-14D and W-2.

An additional sample was taken at well W-7 and sent to STL-St. Louis for the USACE as a split sample.

7.2 Analytical Duplicate

Analytical duplicates (matrix spike / spike duplicates) were collected as part of the laboratory QA/QC Program. These samples were collected at a frequency of one (1) per sampling event. A triplicate sample set was collected from Well W-14D.

8.0 SAMPLE CONTROL AND CHAIN OF CUSTODY

Sample containers were labeled with the following information:

- Sample Location
- Initials of Individual Collecting Samples
- Date / Time

A chain of custody manifest was initiated at the time of sample collection and accompanied the samples through delivery to GEL Laboratories in Charleston, South Carolina.

TABLE I

SEAWAY LANDFILL

PURGE INFORMATION

SAMPLE ID #	RISER (IN.)	PURGE DATE	PURGE TIME		DEPTH TO WATER (FT.)	WATER ELEV. (MSL) (FT.)	DEPTH TO BOTTOM (FT.)	STAND. VOLUME (GALS)	VOLUME PURGED (GALS)	START APPEARANCE	END APPEARANCE	END DTW (FT.)	PURGE METH. -SEE-NOTE
			START	END									
W-1	4	5/22/06	12:58	13:42	43.74	568.25	77.15	21.72	66.00	CLEAR	CLEAR	47.66	1
W-2	4	5/24/06	7:04	8:06	26.78	566.64	100.34	47.81	144.00	CLEAR	CLEAR	36.58	1
W-3A	4	5/22/06	11:56	12:36	41.07	568.34	73.02	20.77	63.00	CLEAR	CLEAR	44.02	1
W-5	1.5	5/22/06	8:34	8:38	15.89	574.63	16.87	0.09	DRY@<0.1	TURBID-TAN	TURBID-TAN	DRY	2
W-6	4	5/22/06	8:22	8:46	38.51	567.85	109.84	46.36	DRY @ 65	CLEAR	CLEAR	DRY	1
W-7	4	5/22/06	10:28	11:20	26.06	567.68	87.25	39.77	120.00	CLEAR	CLEAR	30.02	1
W-8	4	5/24/06	8:38	9:48	14.69	566.53	91.52	49.94	150.00	TURBID-BLACK	SL.TURBID-BLACK	26.70	1
W-9A	2	5/22/06	15:10	15:42	19.58	566.03	61.42	6.69	21.00	CLEAR	CLEAR	21.52	1
W-10	4	5/22/06	9:08	9:58	34.48	568.25	91.15	36.84	111.00	CLEAR	CLEAR	36.60	1
W-11	4	5/24/06	10:14	11:10	46.59	567.26	118.65	46.84	141.00	CLR-BLACK TINT	CLR-BLACK TINT	58.02	1
W-12	4	5/24/06	11:30	12:40	16.59	567.26	103.72	56.63	170.00	CLR-BLACK TINT	CLR-BLACK TINT	49.72	1
W-13	4	5/24/06	13:02	14:07	20.98	566.64	102.40	52.92	159.00	CLR-BLACK TINT	CLR-BLACK TINT	27.96	1
W-14D	4	5/23/06	11:10	12:15	36.07	567.44	115.43	51.58	155.00	CLR-BLACK TINT	CLR-BLACK TINT	40.05	1
W-14S	2	5/23/06	12:36	13:06	35.99	567.60	70.42	5.51	17.00	CLEAR	CLEAR	38.90	1
W-15	4	5/23/06	9:45	10:45	33.00	567.74	98.15	42.35	128.00	CLEAR	CLEAR	39.80	1
W-16	4	5/23/06	8:28	9:23	31.91	568.16	95.80	41.53	125.00	CLEAR	CLEAR	38.80	1
W-17	4	5/23/06	7:16	8:10	32.35	568.26	99.32	43.53	131.00	CLEAR	CLEAR	39.15	1

PURGE METHOD

1-DEDICATED WELL WIZARD PUMP

2-DEDICATED STAINLESS STEEL BAILER

TABLE II A

SEAWAY LANDFILL

FIELD INFORMATION

SAMPLE ID #	SAMPLE DATE	SAMPLE TIME	SAMPLE METH. -SEE- NOTE	DEPTH TO WATER (FT)	WATER ELEV. (MSL) (FT)	DEPTH TO BOTTOM (FT)	pH (S.U.)	SPEC. CONDUCT. (umhos/cm)	TEMP. (C)	TURB. (NTU)	eH (ppm)	SAMPLE APPEARANCE
W-1	5/22/06	13:42	1	47.66	564.33	77.15	7.89	3080	10.9	1.04	-39.9	CLEAR
W-2	5/24/06	8:06	1	36.58	556.84	100.34	8.62	3490	11.6	1.02	-77.2	CLEAR
W-3A	5/22/06	12:36	1	44.02	565.39	73.02	7.58	2990	10.4	1.32	-24.4	CLEAR
W-5	5/22/06	NS	NS	DRY	DRY	16.87	NS	NS	NS	NS	NS	NOT SAMPLED
W-6	5/22/06	14:28	1	75.06	531.30	109.84	9.42	3150	10.7	1.56	-112.1	CLEAR
W-7	5/22/06	11:20	1	30.02	563.72	87.25	7.85	3290	11.3	1.62	-37.9	CLEAR
W-8	5/24/06	9:48	1	26.70	554.52	91.52	8.42	4240	11.2	13.30	-67.3	SL.TURBID-BLACK
W-9A	5/22/06	15:42	1	21.52	564.09	61.42	9.87	1599	10.8	5.95	-135.2	CLEAR
W-10	5/22/06	9:58	1	36.60	566.13	91.15	7.99	3060	10.3	0.98	-45.1	CLEAR

SAMPLE METHOD

1-DEDICATED WELL WIZARD PUMP

2-DEDICATED STAINLESS STEEL BAILER

3-DIP SAMPLE BOTTLE

WEATHER CONDITIONS - CLOUDY, 55 F (5/22), SUNNY, 55 F (5/23), SUNNY, 60 F (5/24)

DUPLICATE SAMPLE TAKEN AT W-14D @ 12:20 (5/23) AND W-2 @ 8:11 (5/24)

MS/MSD TAKEN AT W-14D

WELL W-5 - NOT SAMPLED - INSUFFICIENT RECHARGE

SAMPLE ID #	SAMPLE DATE	SAMPLE TIME	SAMPLE METH. -SEE- NOTE	DEPTH TO WATER (FT)	WATER ELEV. (MSL) (FT)	DEPTH TO BOTTOM (FT)	pH (S.U.)	SPEC. CONDUCT. (umhos/cm)	TEMP. (C)	TURB. (NTU)	eH (ppm)	SAMPLE APPEARANCE
W-11	5/24/06	11:10	1	58.02	555.83	118.65	8.36	3800	12.5	3.65	-64.6	CLR-BLACK TINT
W-12	5/24/06	12:40	1	49.72	534.13	103.72	7.92	4380	16.6	7.27	-42.7	CLR-BLACK TINT
W-13	5/24/06	14:07	1	27.96	559.66	102.40	8.65	3270	13.1	1.15	-79.4	CLR-BLACK TINT
W-14D	5/23/06	12:15	1	40.05	563.46	115.43	7.84	3760	14.1	6.60	-38.2	CLR-BLACK TINT
W-14S	5/23/06	13:06	1	38.90	564.69	70.42	8.98	1926	12.5	1.75	-96.0	CLEAR
W-15	5/23/06	10:45	1	39.80	560.94	98.15	9.28	3120	13.0	4.39	-90.1	CLEAR
W-16	5/23/06	9:23	1	38.80	561.27	95.80	8.30	3230	12.0	3.20	-61.4	CLEAR
W-17	5/23/06	8:10	1	39.15	561.46	99.32	8.34	2960	10.7	0.81	-70.5	CLEAR

SAMPLE METHOD

- 1-DEDICATED WELL WIZARD PUMP
- 2-DEDICATED STAINLESS STEEL BAILER
- 3-DIP SAMPLE BOTTLE

WEATHER CONDITIONS - CLOUDY, 55 F (5/22), SUNNY, 55 F (5/23), SUNNY, 60 F (5/24)

DUPLICATE SAMPLE TAKEN AT W-14D @ 12:20 (5/23) AND W-2 @ 8:11 (5/24)

MS/MSD TAKEN AT W-14D

FIELD REPORT

**LEACHATE SAMPLING
SEAWAY LANDFILL
TONAWANDA, NEW YORK**

MAY 2006

PREPARED FOR:

**SAIC, INC.
10 MAIN STREET
LAKEVILLE, MASSACHUSETTS 02347
ATTENTION: [REDACTED]**

PREPARED BY:

**ENVIRONMENTAL SAMPLING & SERVICES, INC.
7183 BALLA DRIVE
NORTH TONAWANDA, NEW YORK 14120**

1.0 INTRODUCTION

This report describes the sampling of the leachate discharge metering manhole at the Seaway Landfill located in Tonawanda, New York. Environmental Sampling & Services, Inc. (ES&S) personnel performed the sampling on May 25, 2006.

2.0 EQUIPMENT CALIBRATION

Prior to mobilization, all field equipment and instrumentation were checked for condition and calibration.

- pH meter was two-point calibrated with 7.00 S.U. and 10.00 S.U. buffer solutions.
- Conductivity meter was three-point calibrated with 101.8, 1002 and 9320 umhos/cm buffer solutions.
- Turbidity meter was two-point calibrated with 5.0 NTU and 20.0 NTU standards.

4.0 SAMPLE CONTAINER PREPARATION

All containers used in the collection of samples for this project were provided new and clean from GEL Laboratories. These bottles were shipped to ES&S and stored in a clean environment prior to their use.

5.0 LEACHATE SAMPLE COLLECTION

Leachate samples were collected as a grab sample directly from the metering manhole discharge flume using an ISCO Model 1580 peristaltic pump with dedicated silicone rubber pump hose and polyethylene tubing. Sample containers were filled directly from the ISCO peristaltic pump discharge tube. One set of parameters was sampled unfiltered and a second set was sampled using an inline filter. An additional unfiltered sample was taken to facilitate measurement of field analytical parameters.

6.0 FIELD MEASUREMENT

On site field measurements include pH, specific conductivity, temperature, eH, and turbidity. This data is presented on the Field Observation Forms.

7.0 CHAIN OF CUSTODY

A chain of custody manifest was initiated at the time of sample collection and accompanied the samples through delivery to GEL Laboratories in Charleston, South Carolina.

SAMPLING INFORMATION

TYPE OF SAMPLE: (X) GRAB () 24 HOUR COMPOSITE

DATE / TIME 5 - 25 - 06 / 10:25

SAMPLED BY ES & S - R. CHIDO

FIELD MEASUREMENT INFORMATION

pH (STANDARD UNITS)

SPECIFIC CONDUCTANCE (UMHOS/CM)

DATE 5 - 25 - 06

DATE 5 - 25 - 06

TIME 10:30

TIME 10:30

TAKEN BY ES & S - R. CHIDO

TAKEN BY ES & S - R. CHIDO

UNIT-BRAND BECKMAN

UNIT-BRAND FISHER SCIENTIFIC

MODEL # pH I 11

MODEL # 09 - 326 - 2

STANDARDS USED: () 4 (X) 7 (X) 10

STANDARDS USED: (X) 102.8 (X) 1002 (X) 9975

TEMPERATURE (C) 12.4

TEMPERATURE (C) 12.4

pH 6.93 (SU)

SPECIFIC CONDUCTANCE 4930 ushos/cm

eH +8.4 mV

TURBIDITY 5.86 NTU

SAMPLE CHARACTERISTICS: CLEAR - TAN TINT

WEATHER CONDITIONS AT TIME OF SAMPLING: CLOUDY, 60 F

DISCHARGE - TOTALIZER: 1285177

COMMENTS:

ATTACHMENT B
SAIC VERIFICATION CHECKLIST REPORT

**Results of Verification of Groundwater Data
Radiochemistry Parameters
Seaway FUSRAP Site, Tonawanda, New York
August 2006**

1.0 Introduction

Groundwater/liquid samples were collected May 22, 2006 through May 25, 2006 from the Seaway FUSRAP site located in Tonawanda, New York. Following collection, samples were submitted to General Engineering Laboratories (GEL) located in Charleston, South Carolina, Severn Trent Laboratories (STL) located in Earth City Missouri (STL St. Louis), and STL located in Richland, Washington (STL Richland). All GEL samples were analyzed for radiological parameters in four sample delivery groups (SDGs) and the results were reported to SAIC in data packages corresponding to each SDG as follows:

- SDG 163473
- SDG 163582
- SDG 163683
- SDG 163792

One sample was also analyzed for radiological parameters by STL St. Louis and STL Richland (the latter for only radium-226 analysis) as a quality assurance split sample. The split was logged into STL St. Louis and STL Richland under Lot Nos. F6F210306 and F6F210312, respectively.

Upon receipt of data packages from the laboratories, SAIC conducted a verification of all data to determine compliance with completeness and applicable quality control (QC) criteria established in the Quality Assurance Project Plan (QAPP) (USACE 2001: *Sampling and Analysis Plan, Volume 2 – Quality Assurance Project Plan, Seaway Site Areas A, B, and C, Tonawanda, New York.*) prepared for the United States Army Corps of Engineers, Buffalo District (USACE 2001). However, it should be noted that the QAPP (USACE 2001) DQO summary (Table 3-1), which presents criteria for precision, accuracy, and completeness was prepared for analyses of soil samples and did not provide requirements specific to groundwater/liquid samples. Therefore, completeness goals established in the QAPP (USACE 2001) for soil data were applied to the groundwater/liquid data acquired for this project. Additionally, this verification utilized batch QC requirements established by the laboratory as the benchmark for determining overall data quality in each SDG. The verification was not performed for the purpose of applying validation qualifiers denoting data usability toward meeting project-specific objectives. A review checklist of reporting requirements and QC criteria was used to evaluate all data packages individually. The checklist was derived from Section 11.2 of the QAPP (USACE 2001).

2.0 Summary of Findings

Sections 3.0 and 4.0 discuss the results of the verifications of the GEL and STL data packages, respectively. In summary, all data and supporting QC results reported in all SDGs are consistent with the data quality requirements as defined in the QAPP (USACE 2001), as well as with those established by the laboratories. Only minor issues were observed as documented in Sections 3.0 and 4.0. All elements of the most recent versions of the laboratory data packages are present and complete and meet with the laboratory reporting requirements established in the QAPP (USACE 2001).

The percent (%) completeness goal for all radiochemistry data (i.e., the number of valid results over the total number of reported results) for this project, as set forth by the QAPP (USACE 2001) is 90%. Some data were rejected by GEL (i.e., flagged “UI”) due to low abundance or invalid peaks. Therefore, for this project, percent completeness was calculated using the following equation:

$$\%Completeness = ([Total\ No.\ Results - "UI"-Flagged\ Results]/Total\ No.\ Results) \times 100\%$$

The percent completenesses over all three GEL data packages ranged from 96 to 98%. The percent completeness for both STL data package was 100%. Additionally, all GEL and STL packages met the minimum reporting requirements for hardcopy data deliverables presented in Table 11-1 of the QAPP (USACE, 2001). Therefore the overall data and reporting completeness goals for this project have been met.

For a small number of detections, it is recommended that the results be treated as non-detects because the specified results (i.e., detailed in the following subsections) were either less than an associated method blank detection or were less than the absolute value of the associated analysis uncertainties.

It should be noted here that in their data packages, GEL and STL apply different yet synonymous terminologies/acronyms when presenting results for the “minimum detectable activity” (MDA) versus the “minimum detectable concentration” (MDC), and when presenting values for the “reporting limit” (RL) versus the “reporting detection limit” (RDL) versus the “contract required detection limit” (CRDL). The QAPP (USACE, 2001) refers only to “method detection limits” (MDL), which are not applicable to radiochemistry parameters, and “project reporting levels” (with no acronym). In order to maintain consistency throughout the discussions presented in Sections 3.0 and 4.0 of this verification report, and unless specific references are being cited from the laboratories’ reports (e.g., the gamma spec summary table presented in all of GEL’s packages entitled “Failed RDL Report”), only the terms/acronyms “minimum detectable activity” (MDA) and “reporting limit” (RL) will be discussed hereinafter.

3.0 GEL Data Verification Checklists

The following subsections present the checklist and summarize the findings of the data verification for each GEL SDG.

3.1 GEL SDG 163473

SDG 163473 included radiochemistry data for 6 unfiltered groundwater samples (W-10, W-7, W-3A, W-1, W-6, and W-9A) and 6 filtered groundwater samples (W-10 F, W-7 F, W-3A F, W-1 F, W-6 F, and W-9A F). All samples were collected May 22, 2006 from the Seaway FUSRAP site located in Tonawanda, New York and were submitted to GEL. Samples were received by GEL on May 23, 2006. The following analyses were requested for all samples:

- Uranium and Thorium Isotopes by Alpha Spectroscopy (DOE EML HASL-300, U-02-RC Modified and Th-01-RC Modified, respectively)
- Radium-226 (Lucas Cell via EPA Method 903.1 Modified)
- Radium-228 (GFPC via EPA Method 904.0 Modified)
- Gamma Spectroscopy (EPA Method 901.1)
- Gross Alpha/Beta (GFPC via EPA Method 900.0)

The chain of custody is present, complete, and signed. The following checklist summarizes the laboratory's compliance with the appropriate review categories:

- **Holding Times:** The recommended holding time for radiochemistry analyses is 180 days. All analyses were performed within this specified holding time.
- **Sample Results:** All analyses were performed by the laboratory as requested with all sample results being reported in the data package. Results qualified "UI" (uncertain identification for gamma spectroscopy) by the laboratory are considered synonymous to being unusable by the laboratory. Some nondetect gamma spec results were qualified "UUI" due to the following reasons (provided on page 15 of the data package):
 - high Full-Width Half-Maximum,
 - counting uncertainty,
 - low abundance, and
 - no valid peak
- **Sample Detections versus Analysis Uncertainties:** The following detections (i.e., results reported as having been greater than the MDA) were less than the absolute values of the associated uncertainties, and as such, should be considered as non-detects:
 - W-3A F – Uranium-233/234 (Alpha Spec)
 - W-1 F – Thorium-232 (Alpha Spec)

- **Initial and Continuing Calibration:** All initial and continuing calibration data are present in the data package and the laboratory requirements have been met.
- **Efficiency Checks:** Presented in raw data.
- **Background Counts:** Presented in raw data.
- **Detection Limits:** Detection limits for all parameters were reported by the laboratory. Alpha spec thorium and uranium analyses met QAPP RL requirements (Table 3-6). RLs for applicable gamma spec isotopes (i.e., those listed in QAPP – actinium-227 and actinium-228) did not meet QAPP requirement of 1 pCi/L. No QAPP RL requirements were established for the remaining gamma spec isotopes, gross alpha/beta, radium-226 (Lucas Cell), or radium-228 (GFPC). A “Failed RDL Report” is provided for gamma spec results on pages 113 through 115 of the data package. Additionally, gross alpha and/or beta MDAs exceeded RLs for most site samples, and the radium-228 MDA exceeded the corresponding RL in sample W-6 F.
- **Method Blank:** All method blank results were reported in the “QC Summary” section of the data package. The following were detections reported for method blanks (identified by MB followed by the prep batch number:
 - MB 534507 – Thorium 228 (Alpha Spec) = 0.0888 pCi/L

Detected Thorium-228 results for samples W-1 and W-7 in prep batch 534507 were less than the MB concentration and should be considered as nondetects.

- **Laboratory Duplicate QC:** Duplicate relative percent differences (RPDs) were reported in the “QC Summary” section of the data package. All RPDs for detected pairs of results were within the 35% acceptance limit specified in Table 3-1 of the QAPP.
- **Matrix Spike (MS):** MS recoveries were reported in the “QC Summary” section of the data package. All MS and MSD percent recoveries were within the QAPP accuracy control limits of 75 – 125%.
- **Isotopic tracers (Alpha Spec Thorium and Uranium and Radium-228 [GFPC]):** Tracer yields are presented in the data package. All percent yields were within the acceptable laboratory limits of 15 – 125%.
- **Laboratory Control Sample (LCS):** LCS recoveries were reported in the “QC Summary” section of the data package. All reported LCS percent recoveries were within the QAPP acceptance limits of 75 – 125%.
- **Field Duplicates:** No field duplicates were included as part of this SDG.
- **Sample Reanalysis:** Repreparations and reanalyses were performed on some samples in order to meet laboratory QC requirements. These are detailed in the individual

case narratives. The following are problems that necessitated sample repreparations and/or reanalyses (more details provided in the individual analysis narratives):

- Alpha Spec Thorium:
 - High MDAs
 - Alpha Spec Uranium:
 - High MDAs
 - GFPC Gross Alpha/Beta:
 - High MDAs
 - GFPC Radium-228:
 - Batch was re-eluted/reanalyzed due to low MS and LCS recoveries.
 - Lucas Cell Radium-226:
 - High RPD (i.e., RPD > 50%)
- **Secondary Dilutions:** No secondary dilutions were necessary for samples in this SDG.
 - **Laboratory Case Narrative:** The general narrative and individual analysis narratives are present, complete and accurate.
 - **Completeness:** A total of 21 out of 684 total analyses were qualified as UUI in this SDG, which equates to a percent completeness of 97%. Therefore the data completeness goal of 90% has been met for this SDG. Additionally, the data package met the minimum reporting requirements for hardcopy data deliverables presented in Table 11-1 of the QAPP (USACE, 2001). Therefore the overall data and reporting completeness goals for this SDG have been met.

3.2 GEL SDG 163582

SDG 163582 included radiochemistry data for 6 unfiltered groundwater samples (W-17, W-16, W-15, W-14D, DUP@W-14D, and W-14S) and 6 filtered groundwater samples (W-17 F, W-16 F, W-15 F, W-14D F, DUP@W-14D F, and W-14S F). Additional volumes were collected for MS and MSD analyses on sample W-14D and W-14D F. All samples were collected May 23, 2006 from the Seaway FUSRAP site located in Tonawanda, New York and were submitted to GEL. Samples were received at the laboratory on May 24, 2006. The following analyses were requested for all samples:

- Uranium and Thorium Isotopes by Alpha Spectroscopy (DOE EML HASL-300, U-02-RC Modified and Th-01-RC Modified, respectively)
- Radium-226 (Lucas Cell via EPA Method 903.1 Modified)
- Radium-228 (GFPC via EPA Method 904.0 Modified)
- Gamma Spectroscopy (EPA Method 901.1)
- Gross Alpha/Beta (GFPC via EPA Method 900.0)

The chain of custody is present, complete, and signed. The following checklist summarizes the laboratory's compliance with the appropriate review categories:

- **Holding Times:** The recommended holding time for radiochemistry analyses is 180 days. All analyses were performed within this specified holding time.
- **Sample Results:** All analyses were performed by the laboratory as requested with all sample results being reported in the data package. Results qualified “UI” (uncertain identification for gamma spectroscopy) by the laboratory are considered to be rejected data by the laboratory. Gamma spec results were qualified “UI” due to the following reasons (provided on page 15 of the data package):
 - high Full-Width Half-Maximum,
 - counting uncertainty,
 - low abundance, and
 - no valid peak
- **Sample Detections versus Analysis Uncertainties:** The following detections (i.e., results reported as having been greater than the MDA) were less than the absolute values of the associated uncertainties, and as such, should be considered as non-detects:
 - W-17 – Uranium-233/234 (Alpha Spec)
 - W-16 – Uranium-235/236 and Uranium-238 (Alpha Spec)
 - W-15 F – Uranium-238 (Alpha Spec)
 - W-14D F – Uranium-238 (Alpha Spec)
 - DUP@W-14D F – Uranium-233/234 (Alpha Spec)
- **Initial and Continuing Calibration:** All initial and continuing calibration data are present in the data package and the laboratory requirements have been met.
- **Efficiency Checks:** Presented in raw data.
- **Background Counts:** Presented in raw data.
- **Detection Limits:** Detection limits for all parameters were reported by the laboratory. Alpha spec thorium and uranium analyses met QAPP RL requirements (Table 3-6). RLs for applicable gamma spec isotopes (i.e., those listed in QAPP – actinium-227 and actinium-228) did not meet QAPP requirement of 1 pCi/L. No QAPP RL requirements were established for the remaining gamma spec isotopes, gross alpha/beta, radium-226 (Lucas Cell), or radium-228 (GFPC). A “Failed RDL Report” is provided for gamma spec results on pages 121 through 123 of the data package and indicates that the MDAs reported for actinium-227 and antimony-124 exceeded RLs for all site samples. Additionally, gross alpha and beta MDAs exceeded RLs for all site samples.
- **Method Blank:** All method blank results were reported in the “QC Summary” section of the data package. The following were detections reported for Alpha Spec method blanks (identified by MB followed by the prep batch number):
 - MB 534786 – thorium 228 = 0.0234 pCi/L; thorium-230 = 0.056 pCi/L
 - MB 537947 – uranium 233/234 = 0.0654 pCi/L; uranium 235/236 = 0.0385 pCi/L

The following detected results were less than the corresponding MB concentrations indicated above and should be considered as nondetects:

- W-17 thorium 230
 - W-17 uranium 233/234
 - W-16 uranium 235/236
 - DUP@W-14D thorium 230
 - W-16 F thorium 230
 - W-16 F uranium 233/234
 - DUP@W-14D F thorium 230
 - DUP@W-14D F uranium 233/234
- **Laboratory Duplicate QC:** Duplicate relative percent differences (RPDs) were reported in the “QC Summary” section of the data package. All RPDs for detected pairs of results were within the 35% acceptance limit specified in Table 3-1 of the QAPP, except for that calculated for gross beta RPDs for samples W-14D and W-14D F. Gross beta results for those samples should be considered estimated due to poor precision.
 - **Matrix Spike (MS):** MS recoveries were reported in the “QC Summary” section of the data package and were within the accuracy control limits of 75 – 125%, except for the radium-228 MS recovery performed using sample W-14D. The detected radium-228 result for sample W-14D should be considered estimated.
 - **Isotopic tracers (Alpha Spec Thorium and Uranium and Radium-228 [GFPC]):** Tracer yields are presented in the data package. All percent yields were within the acceptable laboratory limits of 15 – 125%.
 - **Laboratory Control Sample (LCS):** LCS recoveries were reported in the “QC Summary” section of the data package. All reported LCS percent recoveries were within the acceptance limits of 75 – 125%.
 - **Field Duplicates:** Samples W-14D and DUP@W-14D, and samples W-14D F and DUP@W-14D F were collected and analyzed as field duplicate pairs. For both duplicate pairs, no RPDs could be calculated for alpha spec thorium analyses, alpha spec uranium analyses, gamma spec analyses, or gross alpha analyses due to non-detects. The following RPDs were estimated for samples W-14D and DUP@W-14D:
 - Gross Beta (GFPC) – 41.8%
 - Radium-228 (GFPC) – 21.3% (sample and duplicate results were reported to be slightly above the RL)
 - Radium-226 (Lucas Cell) – 33% (sample and duplicate results were reported to be slightly above the RL)

Likewise, the following were RPDs calculated for samples W-14D F and DUP@W-14D F:

- Gross Beta (GFPC) – 11.2%

- Radium-228 (GFPC) – 27.7% (sample and duplicate results were reported to be slightly above the RL)
- Radium-226 (Lucas Cell) – 37.9% (sample and duplicate results were reported to be slightly above and less than the RL, respectively)

Therefore, all field duplicate RPDs were within the QAPP acceptance limit of 50%.

- **Sample Reanalysis:** Repreparations and reanalyses were performed on some samples in order to meet laboratory QC requirements. These are detailed in the individual case narratives. The following are problems that necessitated sample repreparations and/or reanalyses (more details provided in the individual analysis narratives):
 - Alpha Spec Thorium:
 - Low/high recovery
 - Alpha Spec Uranium:
 - Low carrier/tracer yields
 - High MDAs
 - GFPC Gross Alpha/Beta:
 - High beta RPD on duplicates
 - GFPC Radium-228:
 - High RPDs on duplicates
 - Low/high recoveries
- **Secondary Dilutions:** No secondary dilutions were necessary for samples in this SDG.
- **Laboratory Case Narrative:** The general narrative and individual analysis narratives are present, complete and accurate.
- **Completeness:** A total of 19 out of 684 total analyses were qualified as UI in this SDG, which equates to a percent completeness of 97%. Therefore the completeness goal of 90% has been met for this SDG. Additionally, the data package met the minimum reporting requirements for hardcopy data deliverables presented in Table 11-1 of the QAPP (USACE, 2001). Therefore the overall data and reporting completeness goals for this SDG have been met.

3.3 GEL SDG 163683

SDG 163683 included radiochemistry data for 6 unfiltered groundwater samples (W-2, DUP@W-2, W-8, W-11, W-12, and W-13) and 6 filtered groundwater samples (W-2 F, DUP@W-2 F, W-8 F, W-11 F, W-12 F, and W-13 F). All samples were collected on May 24, 2006 from the Seaway FUSRAP site located in Tonawanda, New York and were submitted to GEL. Samples were received at the laboratory on May 25, 2006. The following analyses were requested for all samples:

- Uranium and Thorium Isotopes by Alpha Spectroscopy (DOE EML HASL-300, U-02-RC Modified and Th-01-RC Modified, respectively)

- Radium-226 (Lucas Cell via EPA Method 903.1 Modified)
- Radium-228 (GFPC via EPA Method 904.0 Modified)
- Gamma Spectroscopy (EPA Method 901.1)
- Gross Alpha/Beta (GFPC via EPA Method 900.0)

The chain of custody is present, complete, and signed.

The following checklist summarizes the laboratory's compliance with the appropriate review categories:

- **Holding Times:** The recommended holding time for radiochemistry analyses is 180 days. All analyses were performed within this specified holding time.
- **Sample Results:** All analyses were performed by the laboratory as requested with all sample results being reported in the data package. Results qualified “UI” (uncertain identification for gamma spectroscopy) by the laboratory are considered to be rejected data by the laboratory. Gamma spec results were qualified “UI” due to the following reasons (provided on page 13 of the data package):
 - high peak width,
 - counting uncertainty,
 - low abundance, and
 - no valid peak
- **Sample Detections versus Analysis Uncertainties:** Sample detections were compared with associated uncertainties. None of the reported detections (i.e., results reported as having been greater than the MDA) were less than the absolute values of the associated uncertainties.
- **Initial and Continuing Calibration:** All initial and continuing calibration data are present in the data package and the laboratory requirements have been met.
- **Efficiency Checks:** Presented in raw data.
- **Background Counts:** Presented in raw data.
- **MDAs/Detection Limits:** Detection limits for all parameters were reported by the laboratory. Alpha spec thorium and uranium analyses met QAPP RL requirements (Table 3-6). RLs for applicable gamma spec isotopes (i.e., those listed in QAPP – actinium-227 and actinium-228) did not meet QAPP requirement of 1 pCi/L. No QAPP RL requirements were established for the remaining gamma spec isotopes, gross alpha/beta, radium-226 (Lucas Cell), or radium-228 (GFPC). A “Failed RDL Report” is provided for gamma spec results on pages 111 through 113 of the data package and indicates that MDAs reported for actinium-227 and antimony-124 exceeded corresponding RLs in all samples. MDAs reported for other isotopes exceeded corresponding RLs for samples W-8, W-11, DUP@W-2 F, W-8 F, W-12 F,

and W-13 F. Additionally, gross alpha and beta MDAs exceeded RLs for all site samples, except for the gross alpha result for sample W-11 F.

- **Method Blank:** All method blank results were reported in the “QC Summary” section of the data package. All method blank results were reported as being nondetect (i.e., below corresponding RLs).
- **Laboratory Duplicate OC:** Duplicate relative percent differences (RPDs) were reported in the “QC Summary” section of the data package. All RPDs for detected pairs of results were within the 35% acceptance limit specified in Table 3-1 of the QAPP.
- **Matrix Spike (MS):** MS recoveries were reported in the “QC Summary” section of the data package and were within the accuracy control limits of 75 – 125%, except for the following:
 - W-8 F gross alpha MS percent recovery = 57%
 - W-8 F gross alpha MSD percent recovery = 47%
 - W-13 F radium-228 MS percent recovery = 45%

Associated sample results for the above MS and MSDs were reported as nondetect. Therefore, the gross alpha nondetect result for sample W-8 F and the radium-228 nondetect result for sample W-13 F should be considered estimated due to the low spike recoveries.

- **Isotopic tracers (Alpha Spec Thorium and Uranium and Radium-228 [GFPC]):** Tracer yields were presented in the data package. All percent yields were within the acceptable laboratory limits of 15 – 125%.
- **Laboratory Control Sample (LCS):** LCS recoveries were reported in the “QC Summary” section of the data package. All reported LCS percent recoveries were within the acceptance limits of 75 – 125%.
- **Field Duplicates:** Samples W-2 and DUP@W-2, and samples W-2 F and DUP@W-2 F were collected and analyzed as field duplicate pairs. For both duplicate pairs, no RPDs could be calculated for alpha spec thorium analyses, alpha spec uranium analyses, gamma spec analyses, gross alpha analyses or radium-228 analyses due to non-detects. The following RPDs were estimated for samples W-2 and DUP@W-2:
 - Gross Beta (GFPC) – 9.0%
 - Radium-226 (Lucas Cell) – 25.4% (sample and duplicate results were reported to be slightly above and less than the RL, respectively)

Likewise, the following were RPDs calculated for samples W-2 F and DUP@W-2 F:

- Gross Beta (GFPC) – 13%
- Radium-226 (Lucas Cell) – 31.4% (sample and duplicate results were reported to be slightly less than and above the RL, respectively)

Therefore, all field duplicate RPDs were within the QAPP acceptance limit of 50%.

- **Sample Reanalysis:** Repreparations and reanalyses were performed on some samples in order to meet laboratory QC requirements. The following are problems that necessitated sample repreparations and/or reanalyses (more details provided in the individual analysis narratives):
 - Alpha Spec Thorium
 - Plutonium contamination
 - High MDA
 - Poor resolution
 - Alpha Spec Uranium:
 - High MDAs
 - Confirmation of duplicate RPDs
 - GFPC Gross Alpha/Beta:
 - Elevated MDA
 - Verification of sample results
 - High blank activity
 - GFPC Radium-228:
 - High blank activity
 - Low/high recoveries
- **Secondary Dilutions:** No secondary dilutions were necessary for samples in this SDG.
- **Laboratory Case Narrative:** The general narrative and individual analysis narratives are present, complete and accurate.
- **Completeness:** A total of 14 out of 684 total analyses were qualified as UI in this SDG, which equates to a percent completeness of 98%. Therefore the completeness goal of 90% has been met for this SDG. Additionally, the data package met the minimum reporting requirements for hardcopy data deliverables presented in Table 11-1 of the QAPP (USACE, 2001). Therefore the overall data and reporting completeness goals for this SDG have been met.

3.4 GEL SDG 163792

SDG 163792 included radiochemistry data for 1 unfiltered liquid sample (LEACHATE) and 1 filtered liquid sample (LEACHATE F). Both samples were collected on May 25, 2006 from the Seaway FUSRAP site located in Tonawanda, New York and were submitted to GEL. Both samples were received at the laboratory on May 26, 2006. The following analyses were requested for the samples:

- Uranium and Thorium Isotopes by Alpha Spectroscopy (DOE EML HASL-300, U-02-RC Modified and Th-01-RC Modified, respectively)
- Radium-226 (Lucas Cell via EPA Method 903.1 Modified)
- Radium-228 (GFPC via EPA Method 904.0 Modified)

- Gamma Spectroscopy (EPA Method 901.1)
- Gross Alpha/Beta (GFPC via EPA Method 900.0)

The chain of custody is present, complete, and signed.

The following checklist summarizes the laboratory's compliance with the appropriate review categories:

- **Holding Times:** The recommended holding time for radiochemistry analyses is 180 days. All analyses were performed within this specified holding time.
- **Sample Results:** All analyses were performed by the laboratory as requested with all sample results being reported in the data package. Results qualified “UI” (uncertain identification for gamma spectroscopy) by the laboratory are considered to be rejected data by the laboratory. Gamma spec results were qualified “UI” due to the following reasons (provided on page 13 of the data package):
 - counting uncertainty
 - low abundance
- **Sample Detections versus Analysis Uncertainties:** The following detection (i.e., result reported as having been greater than the MDA) was less than the absolute value of the associated uncertainty, and as such, should be considered a non-detect:
 - LEACHATE –Uranium-238 (Alpha Spec)
- **Initial and Continuing Calibration:** All initial and continuing calibration data are present in the data package and the laboratory requirements have been met.
- **Efficiency Checks:** Presented in raw data.
- **Background Counts:** Presented in raw data.
- **MDAs/Detection Limits:** Detection limits for all parameters were reported by the laboratory. Alpha spec uranium analyses met QAPP RL requirements (Table 3-6); however, the MDAs reported for all alpha spec thorium analyses exceeded corresponding RLs. RLs for applicable gamma spec isotopes (i.e., those listed in QAPP – actinium-227 and actinium-228) did not meet QAPP requirement of 1 pCi/L. No QAPP RL requirements were established for the remaining gamma spec isotopes, gross alpha/beta, radium-226 (Lucas Cell), or radium-228 (GFPC). A “Failed RDL Report” is provided for gamma spec results for samples LEACHATE and LEACHATE F on page 63 of the data package, and indicates that MDAs reported for numerous isotopes exceeded corresponding RLs in both samples. Additionally, gross alpha and beta MDAs exceeded RLs for both samples.
- **Method Blank:** All method blank results were reported in the “QC Summary” section of the data package. The following detection was reported for an Alpha Spec method blank (identified by MB followed by the prep batch number):

- MB 535133 – uranium 233/234 = 0.0818 pCi/L

However, the uranium 233/234 results for both samples were reported at detected concentrations significantly greater than the MB detection; therefore, the sample results are not impacted.

- **Laboratory Duplicate QC:** Duplicate relative percent differences (RPDs) were reported in the “QC Summary” section of the data package. All RPDs for detected pairs of results were within the 35% acceptance limit specified in Table 3-1 of the QAPP, except for those calculated for the following:
 - LEACHATE thorium-230 RPD = 83%
 - LEACHATE F gross alpha RPD = 38%

Therefore, the original sample results corresponding to the thorium-230 and gross alpha duplicates above should be considered estimated due to poor precision.

- **Matrix Spike (MS):** MS recoveries were reported in the “QC Summary” section of the data package and were within the accuracy control limits of 75 – 125%, except for the following MS/MSD associated with this SDG:
 - LEACHATE F gross alpha MS percent recovery = 65%
 - LEACHATE F gross alpha MSD percent recovery = 64%

The gross alpha sample result for LEACHATE F was reported as a detection (13.2 pCi/L) and should be considered estimated due to the low spike recoveries.

- **Isotopic tracers (Alpha Spec Thorium and Uranium and Radium-228 [GFPC]):** Tracer yields were presented in the data package. All percent yields were within the acceptable laboratory limits of 15 – 125%.
- **Laboratory Control Sample (LCS):** LCS recoveries were reported in the “QC Summary” section of the data package. All reported LCS percent recoveries were within the acceptance limits of 75 – 125%.
- **Field Duplicates:** No field duplicates were collected and analyzed as part of this SDG.
- **Sample Reanalysis:** Repreparations and reanalyses were performed on some samples in order to meet laboratory QC requirements. The following are problems that necessitated sample repreparations and/or reanalyses (more details provided in the individual analysis narratives):
 - Alpha Spec Thorium
 - Poor tracer yields
 - GFPC Gross Alpha/Beta:
 - Elevated MDA
 - GFPC Radium-228:
 - Low/high recoveries

- High blank recovery
- **Secondary Dilutions:** No secondary dilutions were necessary for samples in this SDG.
- **Laboratory Case Narrative:** The general narrative and individual analysis narratives are present, complete and accurate.
- **Completeness:** A total of 4 out of 114 total analyses were qualified as UI in this SDG, which equates to a percent completeness of 96%. Therefore the completeness goal of 90% has been met for this SDG. Additionally, the data package met the minimum reporting requirements for hardcopy data deliverables presented in Table 11-1 of the QAPP (USACE, 2001). Therefore the overall data and reporting completeness goals for this SDG have been met.

4.0 STL Data Verification Checklists

The following subsections present the checklist and summarize the findings of the data verification for each STL Lot.

4.1 STL Lot F6F210306

Lot F6F210306 included radiochemistry data for 1 unfiltered groundwater samples (W-7) and 1 filtered groundwater samples (W-7 F). Both samples were collected May 22, 2006 from the Seaway FUSRAP site located in Tonawanda, New York and were submitted to STL St. Louis. Samples were received at the laboratory on May 23, 2006. The following analyses were requested for all samples:

- Uranium and Thorium Isotopes by Alpha Spectroscopy (DOE EML HASL-300, U-02-RC Modified and Th-01-RC Modified, respectively)
- Radium-226 (Lucas Cell via EPA Method 903.1 Modified)
- Radium-228 (GFPC via EPA Method 904.0 Modified)
- Cesium-137 (Gamma Spectroscopy via EPA Method 901.1)
- Gross Alpha/Beta (GFPC via EPA Method 900.0)

The chain of custody (COC no. 242481) is present, complete, and signed. The following checklist summarizes the laboratory's compliance with the appropriate review categories:

- **Holding Times:** The recommended holding time for radiochemistry analyses is 180 days. All analyses were performed within this specified holding time.
- **Sample Results:** All analyses were performed by the laboratory as requested with all sample results being reported in the data package. No data were rejected by the laboratory due to uncertain identifications.
- **Sample Detections versus Analysis Uncertainties:** All detections (i.e., results reported as having been greater than the MDA) were greater than the absolute values of the associated uncertainties.
- **Initial and Continuing Calibration:** All initial and continuing calibration data are present in the data package and the laboratory requirements have been met.
- **Efficiency Checks:** Presented in raw data.
- **Background Counts:** Presented in raw data.
- **Detection Limits:** Detection limits for all parameters were reported by the laboratory. Alpha spec thorium and uranium analyses met QAPP RL requirements (Table 3-6). The MDAs reported for cesium-137 (gamma spec isotope) met laboratory requirements by being less than the RL. No QAPP RL requirements were established for radium-228 (GFPC). Additionally, gross alpha and beta MDAs exceeded RLs for

both the filtered and unfiltered samples due to a reduction in sample size which was attributed to the sample's high mass.

- **Method Blank:** All method blank results were reported in the data package. The following detection was reported for an Alpha Spec method blank (identified by MB followed by the prep batch number):
 - MB 6173564 – thorium-230 = 0.12 pCi/L

However, because thorium-230 was detected at concentrations in both samples that were greater than that reported for the MB, there was no impact to the sample results.

- **Laboratory Duplicate QC:** Duplicate relative percent differences (RPDs) were reported for all analyte pairs; however only the thorium-230 duplicate results for sample W-7 Unfiltered were both reported as detections. The RPD for this pair exceeded the 35% acceptance limit specified in Table 3-1 of the QAPP. However, because the original sample result was reported to be between the MDA and RL, and was already qualified as estimated (J) by the laboratory for being less than the RL, the elevated RPD does not represent any further impact to the original sample result.
- **Matrix Spike (MS):** MS analyses were performed only for gross alpha and beta using sample W-7 Filtered. Both percent recoveries were within laboratory control limits for accuracy, but the gross alpha recovery was below the QAPP accuracy control limits of 75 – 125%. Therefore, the nondetect gross alpha sample result for W-7 Filtered should be considered estimated due to the low spike recovery.
- **Isotopic tracers (Alpha Spec Thorium and Uranium and Radium-228 [GFPC]):** Tracer yields are presented in the data package. All percent yields were within the acceptable laboratory limits of 15 – 125%.
- **Laboratory Control Sample (LCS):** All reported LCS percent recoveries were within the QAPP acceptance limits of 75 – 125%, except for gross alpha, which was within laboratory acceptance limits. Therefore, the results of both samples (W-7 Filtered and W-7 Unfiltered) should be treated as estimated.
- **Field Duplicates:** No field duplicates were collected and analyzed as part of this Lot.
- **Sample Reanalysis:** There was no evidence of sample reparations or reanalyses in this Lot.
- **Secondary Dilutions:** No secondary dilutions were necessary for samples in this SDG.
- **Laboratory Case Narrative:** The general narrative and individual analysis narratives are present, complete and accurate.

- **Completeness:** Because no results were rejected, the percent completeness of this Lot was 100%. Therefore the completeness goal of 90% has been met for this Lot. Additionally, the data package met the minimum reporting requirements for hardcopy data deliverables presented in Table 11-1 of the QAPP (USACE, 2001). Therefore the overall data and reporting completeness goals for this Lot have been met.

4.2 STL Lot F6F210312

Lot F6F210312 included radiochemistry data for 1 unfiltered groundwater samples (W-7) and 1 filtered groundwater samples (W-7 F). Both samples were collected May 22, 2006 from the Seaway FUSRAP site located in Tonawanda, New York and were submitted to STL Richland. The following analyses were requested for all samples:

- Radium-226 (Alpha Scintillation via Method RICH-RC-5005 [cross-referenced to EPA Method 903.1])

A copy of an STL Inter-Company Log was provided in the data package, in lieu of a Chain of Custody form, which shows the transfer of sample from STL St. Louis to STL Richland. Both the Log and the Case Narrative indicate that although the samples were received by STL St. Louis on May 23, 2006, they were not relinquished to STL Richland for radium-226 analysis until June 21, 2006. The samples were received at STL Richland on June 22, 2006. The following checklist summarizes the laboratory's compliance with the appropriate review categories:

- **Holding Times:** The recommended holding time for radiochemistry analyses is 180 days. All analyses were performed within this specified holding time.
- **Sample Results:** Both the filtered and unfiltered analyses were performed by the laboratory as requested with sample results being reported in the data package. No data were rejected by the laboratory due to uncertain identifications.
- **Sample Detections versus Analysis Uncertainties:** Both sample results were reported as detections (i.e., results reported as having been greater than the MDA) that were greater than the absolute values of the associated uncertainties.
- **Initial and Continuing Calibration:** All initial and continuing calibration data are present in the data package and the laboratory requirements have been met.
- **Efficiency Checks:** Presented in raw data.
- **Background Counts:** Presented in raw data.
- **Detection Limits:** The RL reported for radium-226 analyses was 1.0 pCi/L. The corresponding sample MDAs met laboratory requirements by being less than the RL.

- **Method Blank:** A method blank detection of 0.114 J pCi/L was reported; however, because this is less than both sample results, the sample results are not impacted by the blank detection.
- **Laboratory Duplicate QC:** No laboratory duplicate was analyzed due to insufficient sample volume.
- **Matrix Spike (MS):** No MS was analyzed.
- **Isotopic tracers (Alpha Spec Thorium and Uranium and Radium-228 [GFPC]):** Tracer yields are not applicable to radium-226 analysis.
- **Laboratory Control Sample (LCS):** The reported LCS percent recovery (103%) was within the QAPP acceptance limits of 75 – 125%.
- **Field Duplicates:** No field duplicates were collected and analyzed as part of this Lot.
- **Sample Reanalysis:** There was no evidence of sample repreparations or reanalyses in this Lot.
- **Secondary Dilutions:** No secondary dilutions were necessary for samples in this SDG.
- **Laboratory Case Narrative:** The Case Narrative is present and complete. However, the Section V (Comments) incorrectly states the following:

“Except as noted, the LCS, batch blank, sample, sample matrix spike and the sample duplicate results are within acceptance limits.”

The above statement is inaccurate as stated because, other than a method (batch) blank and LCS, no MS or sample duplicate was analyzed as part of this Lot. The section even seems to contradict itself because in the first sentence, it is indicated that there was insufficient sample volume to generate a sample duplicate. However, it's possible that the laboratory analyzed a MS and sample duplicate on a non-project-related sample(s) that was part of the same batch. If this is the case, then the Case Narrative is just unclear and not necessarily inaccurate.

- **Completeness:** Because no results were rejected, the percent completeness of this Lot was 100%. Therefore the completeness goal of 90% has been met for this Lot. Additionally, to the extent that no MS or MSD was analyzed and reported, the data package met the minimum reporting requirements for hardcopy data deliverables presented in Table 11-1 of the QAPP (USACE, 2001). Therefore the overall data and reporting completeness goals for this Lot have been met.

5.0 References

USACE 2001. *Sampling and Analysis Plan, Volume 2 – Quality Assurance Project Plan, Seaway Site Areas A, B, and C, Tonawanda, New York*. Prepared by SAIC for the Buffalo District, July.