US Army Corps of Engineers®
Buffalo District

FINAL

REMEDIAL INVESTIGATION REPORT

TONAWANDA LANDFILL VICINITY PROPERTY

TONAWANDA, NEW YORK

APPENDIX A - FIELD INVESTIGATION DETAILS

APRIL 2005

APPENDIX A

FIELD INVESTIGATION DETAILS

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LIST OF ACRONYMS, ABBREVIATIONS AND SYMBOLS

µg/L	Micrograms per Liter
σ	Standard Deviation
3-D	Three Dimensional
Am	Americium
ARAR	Applicable or Relevant and Appropriate Requirements
CFR	Code of Federal Regulations
CPM	counts per minute
DND	Data Needs Determination
DQO	Data Quality Objectives
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
ECWA	Erie County Water Authority
EPA	U.S. Environmental Protection Agency
FCR	Field Change Request
FSP	Field Sampling Plan
ft bgs	Feet Below Ground Surface
FUSRAP	Formerly Utilized Sites Remedial Action Program
GA	NYSDEC Groundwater Classification "A"
GIS	Geographical Information System
GM	Geiger-Mueller
GPS	Global Positioning System
GWS	Gamma Walkover Survey
IDW	investigation-derived waste
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
MED	Manhattan Engineer District
m	meters
m^2	meters squared
µm	micron
NAD 27	North American Datum of 1927
NAVD 88	North American Vertical Datum of 1988
NaI	Sodium Iodide
NFSS	Niagara Falls Storage Site
NMPC	Niagara Mohawk Power Corporation
NORM	Naturally Occurring Radioactive Material
NYSDEC	New York State Department of Environmental Conservation
ORNL	Oak Ridge National Laboratory
OU	Operable Unit
PARCC	Precision, Accuracy, Representativeness, Completeness and Comparability
PDOP	Positional Dilution of Precision
PPE	Personal Protective Equipment
QA/QC	quality assurance/quality control
QAPP	Quality Assurance Project Plan
Ra	Radium
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
SAIC	Science Applications International Corporation
SAP	Sampling and Analysis Plan
SOP	Standard Operating Procedures
TAL	Target Analyte List

Acronyms, Abbreviations and Symbols (cont'd)

TCL	Target Contaminant List
TCLP	Toxicity Characteristic Leaching Procedure
Th	Thorium
TVGA	TVGA Engineering, Surveying, P.C.
U	Uranium
UCL_{95}	Upper 95th Percentile Confidence Level
USACE	United States Army Corps of Engineers
USCS	Unified Soil Classification System
UTL 99/99.9	Upper 99 Percent Tolerance Limit, with 99.9% Coverage

APPENDIX A

FIELD INVESTIGATION DETAILS

1. INTRODUCTION

This Appendix to the Remedial Investigation (RI) report summarizes the investigation activities conducted in June through September 2001 by the United States Army Corps of Engineers (USACE) at the Tonawanda Landfill Vicinity Property, located in the Town of Tonawanda, New York (Tonawanda Landfill Vicinity Property). In 1992, the United States Department of Energy (DOE) designated the Tonawanda Landfill Vicinity Property as a "Vicinity Property" to the Linde Site due to the discovery of materials that appeared to have similar characteristics to Manhattan Engineer District (MED) materials [(DOE 1992, Oak Ridge National Laboratory (ORNL) 1992].

The Linde (now Praxair) Site (the Tonawanda Landfill Vicinity Property Site), ; the Ashland 1 Site; the Ashland 2 Site; and the Seaway Site are being investigated or remediated under the Formerly Utilized Sites Remedial Action Program (FUSRAP). For the purposes of this Appendix, these four (4) FUSRAP sites (The Linde Site, the Ashland 1 Site, the Ashland 2 Site, and the Seaway Site) have been collectively referred to as the "Tonawanda Site." The locations of the Tonawanda Site and the Tonawanda Landfill Vicinity Property are shown in Figures A1-1 and A1-2. The Town of Tonawanda Landfill (proper) and the "Mudflats" areas of the site are presented in Figure A1-3.

This Appendix also summarizes the results of radiological, chemical and geotechnical analyses of the soil and water samples. This Appendix provides the details of the investigation activities and analytical results in a level of detail that are not necessary in the main RI report. All sampling procedures and protocol were performed in accordance with the Sampling and Analysis Plan (SAP). The SAP includes the following three documents:

- The Field Sampling Plan (FSP), Volume 1 (USACE 2001a),
- The Quality Assurance Project Plan (QAPP), Volume 2 (USACE 2001b), and
- The Field Standard Operating Procedures (SOPs), Volume 3 (USACE 2001c).

In addition, as changes to the field procedures were made in response to field conditions, Field Change Requests (FCRs) were completed and approved by the USACE. These FCRs are included in Attachment A.

1.1 Background

The Tonawanda Landfill Vicinity Property was designated as a FUSRAP vicinity property in 1992 based on field sampling and gamma survey results that indicate the presence of MED-like material at several locations in the now non-operational landfill (ORNL 1992 and BNI 1995). Earlier reports indicated that the MED-like material detected at the Tonawanda Landfill Vicinity Property could have been generated at the former Linde Air Products (Linde) Site, now owned by Praxair, Inc. and could have ended up being placed in the Landfill as part of a by-product of wastewater treatment, waste handling, and possibly dredging activities (DOE 1994a, 1994b). Contaminants considered to be associated with MED activities are primarily uranium-238 (U-238), thorium-230 (Th-230), and radium-226 (Ra-226). Based on the historical use of the Tonawanda Landfill, radiological and/or chemical contaminants unrelated to MED activities may also be present at the Tonawanda Landfill Vicinity Property, but may only be remediated by USACE if mixed with MED constituents. Previous investigations at the Tonawanda Landfill Vicinity

Property indicated a minimum of three locations where MED–like material may be present at the Tonawanda Landfill Vicinity Property as shown in Figure A1-4 (ORNL 1992 and BNI 1995).

The Tonawanda Landfill is located approximately 1.5 miles north of the Linde FUSRAP Site in the Town of Tonawanda, New York (Figure A1-2). It is comprised of two main parcels – the Town of Tonawanda Landfill and the Mudflats (Figure A1-3). The Landfill parcel is located at the northern end of East Park Drive and is bounded by the residential developments to the north and northwest, a railroad line to the east, and a right of way owned by the Niagara Mohawk Power Corporation (NMPC) to the south. The Mudflats portion of the property is located on the opposite side of the NMPC right of way that borders the Landfill (Figure A1-3). The Mudflats parcel is approximately 115 acres and is bordered by the NMPC right-of-way to the north, a railroad line to the east, on the west by the former Town of Tonawanda incinerator, and to the south by the New York State Thruway property. A 48-inch diameter Erie County Water Authority (ECWA) water transmission line traverses through the NMPC easement. ECWA also has another easement for a second parallel 48-inch line through the NMPC right-of-way, for future use. Both properties are owned by the Town of Tonawanda, NY and the area is zoned as commercial/ industrial except for the bordering residential areas referenced above.

The focus of the 2001 investigations conducted by the USACE were on only the western portions of both the Tonawanda Landfill parcel and the Mudflats parcel where MED-like material was detected during previous investigations (ORNL 1992 and BNI 1995). Therefore, for the purposes of this Appendix, the western portions of the Town of Tonawanda Landfill and the Mudflats areas where the 2001 investigation was conducted are referred to as the Landfill Operable Unit (OU) and the Mudflats OU, respectively.

1.2 Study Area Investigation

Since the Tonawanda Landfill is broken up into two primary parcels - the former Landfill and the Mudflats areas, the investigation also was divided into the two following separate units: the Landfill OU and the Mudflats OU. Previous investigations demonstrated that the MED-like material was located primarily within the upper 4 to 8 feet of soil at both the Landfill and Mudflats OUs. Contamination was also found in isolated areas to 12 feet within the Landfill OU (ORNL 1992 and BNI 1995).

1.3 Purpose/Objectives of the RI

The principal objective of the RI was to determine the nature and extent of potential MED-like radiological contamination present at the Tonawanda Landfill Vicinity Property in accordance with the requirements of CERCLA. As part of this work, the following project goals were established (USACE 2001b):

- determine the extent of MED-like constituents in onsite soils and groundwater;
- acquire information to describe the fate and transport of contaminants within and from the Site;
- collect data of sufficient quality and quantity to be legally defensible under regulatory requirements;
- gather sufficient information to complete a BRA, including an assessment of both human health and ecological risk;
- determine whether MED-like contaminants present constitute a threat to human health.

1.4 Organization of This Appendix

Section 1.0 is an introductory chapter that provides a background and a brief introduction to the 2001 investigation, and the objectives of the investigation. Section 2.0 provides an overview of the

investigation activities. Section 3.0 provides a description of the Gamma Walkover Survey (GWS) methodology, instrumentation, and a brief discussion of the results. The procedures used during the surface and subsurface investigation are summarized in Section 4.0 along with a discussion of the radiological and chemical analytical results.

Section 5.0 summarizes the procedures used to collect the surface water and sediment samples from the Landfill OU and also discusses the radiological results of these sampling activities. Section 6.0 presents a summary of the groundwater sampling activities that Malcolm Pirnie conducted under subcontract to Science Applications International Corporation (SAIC). The radiological groundwater sampling was a one-time event, conducted by Malcolm Pirnie as part of their semi-annual sampling activities being performed for the Town of Tonawanda. Section 6.0 also briefly discusses the results of the radiological analysis. Section 7.0 discusses the Tonawanda Landfill Vicinity Property survey activities that were conducted following the completion of 2001 investigation activities as well as the global positioning system (GPS) activities that were conducted in conjunction with the GWS activities. Section 8.0 presents the references.

Attachment A presents the Field Change Notices that were completed during field activities. The software used to post-process the GWS data is described in Attachment B. The boring logs for the borings drilled during the 2001 investigation are presented in Attachment C. The report that summarizes the 2001 downhole geophysical survey is presented in Attachment D and the associated gamma logs are presented in Attachment E. The geotechnical analytical reports are presented in Attachment F. A field data report prepared by Malcolm Pirnie that summarizes their 2001 groundwater sampling activities is presented in Attachment G. The survey coordinates for all of the 2001 borings installed, as well as the surface water and sediment locations, are presented in Attachment H.

2. OVERVIEW OF FIELD ACTIVITIES

The 2001 characterization activities focused on the areas of the Tonawanda Landfill Vicinity Property (Mudflats OU and Landfill OU) that were designated as a FUSRAP property in 1992 based on field sampling and gamma survey results (DOE 1992, ORNL 1992, and BNI 1995). The 2001 field characterization effort consisted of the following primary tasks:

The GWS was conducted prior to the soil sampling activities in an effort to confirm previously identified areas of interest (due to activity measurements equal to or greater than background plus two standard deviations (2σ) to two times (2x) background), evaluate the potential for more MED related material at the Tonawanda Landfill Vicinity Property, and more clearly define the limits of the Geoprobe® sampling activities.

The Geoprobe® sampling consisted of the advancement of 210 boreholes. A minimum of two to four samples were collected from each borehole, including surficial soil samples, which were collected from the upper 0.5 feet. Including QA/QC samples, a total of 504 surficial and subsurface soil samples were submitted for laboratory analysis. Radiological field screening also was performed on all soil samples during the Geoprobing activities to select the sample interval for radiological analysis and to determine if the boring needed to be advanced deeper to characterize the vertical extent of contamination. In addition, down-hole logging was completed in the majority of the borings.

Soil samples were sent for laboratory analysis of isotopic Ra, Th, and U radionuclides, and gamma spectroscopy. The contaminants of concern for the Tonawanda Landfill Vicinity Property are U-238, Ra-226, and Th-230. These isotopes have been analyzed for during various preliminary assessment activities at the Tonawanda Landfill Vicinity Property (ORNL 1992, BNI 1995, and Malcolm Pirnie 1999). As identified in the SAP, analysis also was conducted for Am-241 using gamma spectroscopy (USACE

2001a). Am-241 contamination, unrelated to MED contamination, has been identified in the eastern portion of the landfill. In addition, a small number of soil samples were analyzed for full Target Contaminant List/Target Analyte List (TCL/TAL) parameters for material characterization and disposal purposes. A small percentage of soil samples also were submitted for geotechnical analyses (such as grain size analysis, moisture content, and Atterburg limits). In addition, sediment samples and associated surface water samples were collected from three locations within the Landfill OU and submitted for the same suite of radiological analysis.

Fourteen groundwater samples were collected to determine if radionuclide contamination had impacted groundwater at the Tonawanda Landfill Vicinity Property. During January and February 1995 groundwater sampling events conducted by the Town of Tonawanda groundwater samples were collected and submitted for radiological analysis. Gross alpha and Ra-226 were detected at concentrations above the Title 6 of the New York Code of Rules and Regulations (6NYCCR) 703, Class GA Groundwater Quality Standards, (Malcolm Pirnie 1999). During the 2001 groundwater sampling event, split samples were collected in coordination with the Town of Tonawanda's semi-annual groundwater sampling round at the Landfill and submitted to a laboratory for gross alpha analysis, isotopic radionuclide analysis for isotopic Ra, Th, and U, and total uranium, and gamma spectroscopy (isotope identification including Am-241).

The following sections outline these investigation activities and summarize the analytical results.

3. GAMMA WALKOVER SURVEY

During the summer of 2001 investigation, a GWS was conducted in both the Mudflats OU and Landfill OU areas. The purpose of the GWS was to confirm previous areas of identified MED-related material and to evaluate the potential for more MED-related material at the Tonawanda Landfill Vicinity Property. Section 3.0 will discuss the following:

- The methods used for collecting, tracking, reporting the GWS survey during the investigation; and
- The finding and conclusions of the GWS survey.

3.1 Methods

This section describes the GWS performed at the Tonawanda Landfill Vicinity Property during June and July of 2001, includes a description of GWS methodology and instrumentation, and provides a brief discussion of the results.

The purpose of the GWS was to identify elevated concentrations of gamma-emitting radionuclides (e.g., Ra-226) in surface soils. The general approach was to measure gamma radiation levels using gamma radiation detectors, which were linked to GPS instruments. The radiation instruments indicated relative levels of radionuclide concentrations while the GPS instruments provided coordinate (and time) information for each radiation measurement. The product of the GWS is a data set mapped to display relative levels of gamma radiation measurements across the Tonawanda Landfill Vicinity Property.

The Tonawanda Landfill Vicinity Property GWS was designed to focus on areas most likely to contain radiological contamination, but provided coverage for the remainder of the Tonawanda Landfill Vicinity Property (the Mudflats OU and the Landfill OU). To prepare for the survey, information from previous investigations was reviewed to identify areas more likely to contain residual MED contamination. Three target areas were designated as Class 1 Areas "A", "B", and "C", as indicated on Figure A3-1. Class 1

areas are "comprehensive" survey areas, and were surveyed in 1-meter parallel paths (transects). The Class 1 units encompass any radiologically contaminated area identified by previous investigations.

A buffer area was placed around each Class 1 area but outside of known contamination. Buffer areas were designated as Class 2, and were surveyed in 10-meter transects (20 percent coverage). The balance of the Tonawanda Landfill Vicinity Property (Mudflats OU and Landfill OU) was designated as Class 3, and was surveyed in 100-meter transects (1 percent coverage).

3.2 Survey Preparation

Prior to the GWS, a file naming convention was created to organize survey data collection files, which collectively comprise the GWS. Files were named to include the survey area, class designation, transect identification, instrument pack identification, and surface type. At the Tonawanda Landfill Vicinity Property, only soil surfaces were surveyed.

Licensed civil surveyors (TVGA Engineering, Surveying, P.C. [TVGA]) placed a monument near the field office so that gamma surveyors could perform GPS positional checks. A monument is a known location with a high degree of certainty. FCR number TTL-006 was approved by the USACE to allow a GPS positional check at this monument at the start and end of every day, rather than every file (Attachment A). The positional information collected at this monument was collected to assist data processors in making error corrections while post-processing data.

Each GPS instrument was paired with a survey meter, and assigned a pack number. In order to maintain accountability, the pack number was placed on each component of the pack (antenna, handset, backpack, survey meter). As a reference for field personnel, the file naming convention was placed on each GPS handset.

Acceptance criteria for background and source response were calculated for each survey instrument, in accordance with the SAP (USACE 2001a). In order to correlate instrument response with meteorological conditions, background acceptance criteria was calculated from data obtained on soil at a marked position nearby to the field office (east of the incinerator building). Prior to the survey, instrument background responses were compared, and each count-rate was verified to be within ten percent of the mean background of all site instruments.

In the SAP, three reference areas were designated within the Class 3 areas of the Tonawanda Landfill Vicinity Property (USACE 2001a). However, at the start of survey activities, Reference Area 2 was covered in 6 to 12 inches of water. Therefore, only the remaining two reference areas (Reference Areas 1 and 3) were surveyed to determine the instrument response to "background" soil (Figure A3-1). In order to determine the average background, ten integrated counts of one-minute each were collected in each of the two areas. The instrument response count-rate was averaged for each area. The calculated average of the two areas was 9,355 counts per minute (cpm).

An investigation level is a count-rate at which further investigation is warranted; in this case a soil sample would be collected. The investigation level was set at 16,000 cpm, which is approximately 2 times background.

3.3 Survey Methods

Surveys were performed with a ratemeter (Ludlum 2221) coupled with a 2-inch by 2-inch sodium iodide (NaI) detector (Ludlum 44-10). The ratemeter and detector were linked via cable to a Trimble 4000 Series Geographical Information System (GIS) Surveyor and a TDC1 data collector. Each meter/detector

was calibrated and checked daily, prior to and following use, to verify that the instruments background and source response were within acceptance criteria.

The technician walked at a slow rate (less than 0.5 meters per second) while swinging the NaI (gamma) detector in a slight pendulum motion of approximately 0.5 meters on either side. The NaI detector was kept at a target distance of 10 centimeters (cm) from the ground surface during the survey. The GPS equipment provided time and coordinate information, which was electronically recorded with detector readings (at two-second intervals) by the data logger.

The majority of the survey was collected in overdetermined three-dimensional (3-D) mode, with a positional dilution of precision (PDOP) threshold of 8. The 3-D mode and PDOP threshold of 8 represent configuration settings on the TSC1 Asset surveyor (handheld unit of the GPS). PDOP is a measurement of current satellite geometry, based on how spread out the satellites are over the location. The lower the PDOP (the greater spread out the satellites are), the more accurate the GPS positions are. GPS data was differentially corrected from a Continuously Operating Reference Station in "real time". Class 1 areas were flagged at the corners and normally walked by a few survey technicians standing shoulder to shoulder. Other survey paths were defined by placing a pin-flag intermittently along each transect.

A large tree within Area "A" blocked the satellites' signals. Under the tree, data was collected in Manual 2D mode while walking at a constant rate in a straight line from pinflagged start and stop positions. Each start and stop pinflag was placed in a known location. With known coordinates at the beginning and end of each transect, count rate data was post-processed using software created for the Niagara Falls Storage Site GWS (NFSS Software).

Upon arrival, Survey Area "C" was covered with a large pile of soil (approximately 20 feet) and soil fill (approximately 6 feet), as indicated on Figure A3-2. Because of the shielding provided by soil, a GWS on these covered areas would not have identified any MED-related contamination. Therefore, a brief walkover survey of native soil around the piles was performed. A limited survey of the access path on the side of the large pile, as well as the soil fill over the original elevated sample location also was performed.

Personnel safety considerations prevented data collection along a short section of a Class 3 transect due to a steep hillside. As discussed earlier, reference Area 3 and the adjacent area was covered with 6- to 12-inches of water, disqualifying it from the survey due to the shielding provided by water. However, generally, more areas than expected were surveyed because of the dry weather conditions during the survey.

3.4 GWS Results

At the end of each day of field activities, all GWS data was downloaded from a TDC1 data collector flash memory card to a site computer via Pathfinder® software. GWS data with coordinate information (unobstructed areas) was subsequently entered into ArcView® GIS software for processing.

GWS data without coordinate information (for instance in the vicinity of the Area "A" tree) was processed with NFSS Software in accordance with the Work Instructions provided in Attachment B, *Plotting Gamma Walkover Data Obtained From Areas With Overhead Interference.* Attachment "B" also provides a detailed description of the various programs within NFSS Software. NFSS software was used to; extract count-rate data from Pathfinder® files, extrapolate coordinate data between two points, match count-rate data with coordinate data, and output count-rate/coordinate data to a surface specific text file. The text file generated by NFSS software was then loaded into ArcView® for processing.

In Area B of the Landfill OU, four localized areas of elevated activity were detected. Two of these localized areas (up to 2 meters squared [m^2]) were measured at 17,000 cpm, which is just above the investigation level of 16,000 cpm. Up to 27,000 cpm (approximately 3 times background) was detected in a 1 m^2 area near the northern fence of the Landfill OU. The highest activity detected at Tonawanda Landfill Vicinity Property was 100,000 cpm (11 times background) in an 3-m by 6-m area. Areas "A" and "B" GWS results are presented in Figure A3-3, with elevated activity results in Figure A3-4.

However, in the remainder of the Landfill OU, the GWS did not detect any elevated activity outside of Area "B". In the Mudflats OU, no areas of elevated activity were detected within the active fill Class 1 and 2 portions of the Area C and the remainder of the Mudflats OU. Survey results for the balance of Tonawanda Landfill Vicinity Property are presented in Figure A3-2.

4. SURFACE AND SUBSURFACE SOILS

During the summer of 2001 investigation, a total of 210 boreholes were drilled for the purposes of determining the lateral and vertical extent of radiological contamination in the Mudflats and Landfill OUs. The analytical results were used to determine if the radiological contamination was MED-like. In addition, a limited number of soil samples were collected from the same locations where radiological contamination was detected during soil screening activities and were submitted for chemical analysis. The purpose of submitting these samples was to determine if MED-like materials were collocated with chemicals that may pose waste disposal restrictions during potential removal of the MED-like material. In addition, a limited number of soil samples also were submitted for geotechnical analysis. Section 4.0 discusses the following:

- The criteria for selecting radiological, chemical sampling, and geotechnical locations;
- The procedures used to collect the samples;
- Field decontamination and investigation derived waste;
- The radiological, chemical, and geotechnical results for the soil samples collected from the Mudflats and Landfill OUs

4.1 Summary of Radiological Soil Sampling Locations

Prior to conducting the 2001 investigation, a review of historical Tonawanda Landfill Vicinity Property assessments conducted by Oak Ridge National Laboratory (ORNL) and others was conducted to classify impacted and non-impacted areas within the Mudflats and Landfill OUs (ORNL 1992 and BNI 1995). Based on the review, the Mudflats and Landfill OUs were divided into the following three groups for the purposes of designing a soil investigation (Figure A4-1):

- Class 1 units that encompass any hot spots previously encountered;
- Class 2 units were established in the immediate vicinity of the Class I areas, but outside of known contamination; and
- Class 3 units encompassed the remainder of the Mudflats and Landfill OUs where there is no anticipated MED-like contamination.

Within the Landfill OU, the following units were identified (Figure A4-1):

- Area A – one Class 1 unit and one Class 2 unit;
- Area B – two Class 1 units and one Class 2 unit that encompasses both the Class 1 units;
- One Class 3 unit that encompasses the remainder of the area within the Landfill OU;

- One background area (reference area) that was used to establish background levels prior to commencing the investigations within the Landfill OU Class 1, 2, and 3 areas.

Within the Mudflats OU, the following units were identified:

- Area C – one Class 1 unit and one Class 2 unit;
- Two Class 3 units (since there were fewer historical investigations in the Mudflats OU);
- One background area (reference area) that was used to establish background levels prior to commencing the investigations within the Mudflats OU Class 1, 2, and 3 areas.

The limits of the Class 1, 2, and 3 units within the Mudflats OU and Landfill OU are presented on Figure A3-1.

Based on the level of previous investigations conducted in the Class 1 units, it was determined that no systematic locations (random locations) would be drilled within the Class 1 units. The locations of the Class 1 biased borings were selected based on the results of the GWS and where elevated radiological contamination was previously detected. Systematic sampling was performed in both the Class 2 and Class 3 areas. In addition, Class 3 biased sampling also was performed on the perimeter of the Class 2 areas.

As outlined in the FSP, the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) was used as guidance for selecting Class 2 and 3 sampling locations within the Landfill OU and Mudflats OU study areas (DOD 2000 and USACE 2001a).

While the MARSSIM guidance was not designed for subsurface explorations, its methodology was used in the FSP to derive the rationale for selecting sampling locations and quantities (USACE 2001a). The FSP describes the basis of the MARSSIM-related activities, therefore, the discussion is not repeated in this Appendix (USACE 2001a).

4.2 Summary of Chemical and Geotechnical Sampling

4.2.1 Chemical Sampling

The purpose of collecting the chemical samples was to determine if chemical or non-MED radiological wastes were commingled with the MED-related materials and for disposal purposes. These soil samples were analyzed for full Target Contaminant List (TCL)/Target Analyte List (TAL) parameters.

4.2.2 Physical Parameters

A small percentage of soil samples were also submitted for geotechnical analyses (such as grain size analysis, moisture content, and Atterburg limits). The purpose of collecting these samples was to identify the different types of soil types and associated soil characteristics.

4.3 Procedures

This section discusses the procedures used for soil sample collection as well as the analytical methods used by the laboratories to analyze the soil samples collected. The surface and subsurface soil samples were collected using direct-push drilling techniques. The downhole geophysical scanning that was conducted at each boring location following the completion of soil sampling activities is also discussed. The analytical methods used by the laboratories to analyze the soil samples are listed in Table A4-1. The field decontamination procedures and the handling of investigation derived waste is also discussed.

4.3.1 Direct-Push Sampling Method/Downhole Geophysical

The direct-push sampling and downhole geophysical activities were conducted in general accordance with the SOPs. The relevant SOPs for the various components of the soil characterization activities are outlined in the Field Standard Operating Procedures and therefore are not presented in this report (USACE 2001c).

Direct-Push Sampling Method

The direct-push drilling method (Geoprobe® probe-drive sampler) was used for soil sample collection. For the 2001 drilling activities, two drilling rigs were used to accomplish the task, a truck-mounted and a track-mounted Geoprobe® probe rigs. The drive mechanism for the Geoprobe® is a reciprocating hammer. With the Geoprobe® probe rig, the rapid strike of the hammer to the end of the sample rod plus the weight of the vehicle drives the sampler to the desired sample depth. The total depth of each boring was dictated by the results of the field scanning, which are discussed in Section 4.3.2.

Each of the soil borings drilled was continuously cored from ground surface to the desired total depth of the boring. The method consisted of driving the sampling tube at 4 or 5-foot intervals (depending on the drill rig). The diameter of the borings were 2-inches. The soil sample was collected in plastic sleeves that were inserted into the sampler. Once the sampler was retracted the tube was removed and was split with a knife to access the material. The sample collection procedures are discussed in more detail in Section 4.3.3.

In addition, for each boring, a boring log was prepared that described the soils encountered as well as the procedures used to collect the data. The data presented on these boring logs were collected in general accordance with the procedures outlined in the Field Standard Operating Procedures (USACE 2001c). The boring logs are included in Attachment C.

Downhole Geophysical Method

Downhole gamma logging was used qualitatively to determine the profile of radioactive materials in the subsurface. Primarily, the downhole gamma was used in conjunction with core scans to delineate any "peak" areas, and also to identify where the radiation levels returned to background levels.

At each boring location, following the completion of drilling activities, down-hole gamma logging was conducted using a NaI 0.875-inch by 3-inch detector. At some locations where borehole collapse occurred, 3-inch diameter steel casing was driven in the borehole to allow the gamma logging to occur. The borings in which 3-inch diameter steel casing was installed are noted on the boring logs (Attachment C). Background values were established for the Tonawanda Landfill Vicinity Property by conducting stationary time tests in the Mudflats OU reference area. Tests were conducted at the same boring with and without 3-inch diameter steel casing placed in the boring. The results of the stationary test allowed an estimate of average values for the Tonawanda Landfill Vicinity Property, and a determination of concern levels for down-hole gamma measurements. These concern levels for borings with steel casing and without steel casing were 45 cps and 65 cps, respectively for the shallow soils, and 75 cps and 110 cps, respectively, for the deeper soils (Attachment D).

The general procedures outlined in "Detailed Operating Procedure – Borehole Geophysical Survey" were followed (USACE 2001c). In addition, the field procedures are discussed in greater detail in the October 2001, *Borehole Geophysical Survey Report at the Town of Tonawanda Landfill Tonawanda, New York*, report that is presented in Attachment D. The gamma logs for each of the borings are included in Attachment E.

4.3.2 Field Measurement and Procedures and Criteria

The soil field measurements performed during drilling were limited to scanning for beta activity. The retrieved soil core was scanned with a shielded pancake Geiger-Mueller (GM) probe. Radioactivity was measured as cpm and recorded on the boring logs, which are presented in Attachment C. A description of the calibration requirements and performance checks for the field instruments used for field measurements during the 2001 investigation is presented in the Town of Tonawanda Landfill FUSRAP Site QAPP (USACE 2001b).

The GM data collected in each of the two reference areas was used to calculate the background gamma levels for the Mudflats OU and Landfill OU investigation areas. The background activity for each reference area was calculated by averaging the all of the shielded pancake GM probe measurements, which were collected at 0.5-foot intervals in each reference boring.

For the Mudflats OU reference area, an average GM measurement of 52 cpm was calculated for the gamma measurements collected from the 20 borings (TMR1-001 through TMR1-020). For the Landfill OU reference area, an average of 45 cpm was calculated for the gamma measurements collected from the 18 borings (TLFR3-001, TLFR3-002, TLFR3-004 through TLFR3-008, and TLFR3-010 through TLFR3-0020). For each of the investigation areas, the background GM levels were used to establish the criteria for selecting 6-inch intervals from which soil samples were collected for radiological analysis.

The GM criteria was background plus two standard deviations ($B+ 2\sigma$) to twice background (2B), which was established as 100 cpm for the Mudflats OU and 90 cpm for the Landfill OU. In most cases, the 6-inch long continuous region exhibiting the highest count rate was selected as the soil sample for radiological analysis. In situations where the same elevated reading was encountered at two distinct intervals of a given core, the soil sample was collected from the deepest interval. When there was no variation in count rate across the soil core, the soil sample was collected from the bottom 6 inches of the soil core. The soil core radioactivity measurements, soil sample intervals, and associated sample identification numbers are presented on the boring logs (Attachment C).

4.3.3 Sample Collection for Laboratory Analysis

As discussed earlier, subsurface samples designated for laboratory analyses were collected using a Geoprobe® sampler. In some cases, not enough material was collected from a single boring to fill the appropriate sample containers and in those instances, a second, and in some cases, a third boring was drilled adjacent to the previous boring.

Upon retrieval of the sampling device from the boring, the length of recovered material was recorded on the boring log and the material was scanned. Based on the scan results, a sample interval (six inches total) was selected for analysis, and the selected interval was sampled using rigid sampling tools (knifes or metal scoops) and transferred to disposable pie tins or similar containers. Once in the pie tins, the samples were well mixed and distributed to the appropriate laboratory-grade container(s), labeled with a unique sample number, and placed in a rigid-body plastic cooler. The container numbers and type depended on the analyses to be performed and followed the guidelines outlined in the QAPP (USACE 2001b).

Immediately after preparing the samples and completing the container label information, each sample container was placed into a sealable plastic bag and then placed into an ice-filled cooler (if required) to ensure preservation. The management of the subsurface soil samples followed the procedures outlined in the Field Standard Operating Procedures (USACE 2001c). These procedures included the following:

sample storage, packaging, shipment, field documentation, sample labeling, identification, traceability, and chain-of-custody.

In addition, duplicate QC samples and QA split samples were collected in association with the collection of subsurface soil samples. These duplicate and split subsurface soil samples were derived from the thoroughly mixed sample, as described above.

4.3.4 Analytical Methods for Soil Samples

All of the soil samples submitted for laboratory analysis were analyzed for the following parameters (also see Table A4-1A):

- Iso-Uranium 234, 235, and 238
- Iso-Thorium 228, 230, and 232
- Ra-226
- Ra-228
- Gamma Spectroscopy (Isotope identification including Am-241)

A total of 224 samples, including QA/QC samples, collected from the Mudflats OU were submitted for analysis at Paragon Analytics, Inc. of Fort Collins, Colorado. Acculabs, Inc. analyzed a total of 280 soil samples (including QA/QC samples) collected from the Landfill OU (Table A4-2).

In addition to the samples submitted for radiological analysis, six soil samples (three Mudflats OU and three Landfill OU) with positive field screening for radioactive constituents were also submitted for full total TCL/TAL parameter analysis. The samples for TCL/TAL analysis were selected based on radiological screening results at the borings. In accordance with the FSP, for approximately 1/3 of the soil samples where screening at the borehole (core or downhole) showed levels more than B+2σ to 2B, chemical samples were collected and submitted for analysis (USACE 2001a). In this way, only potentially collocated chemical contamination was investigated.

The soil samples submitted for chemical analysis were analyzed for the following parameters by the associated analytical method:

- TAL Metals, various analytical methods
- TCL Volatiles, EPA Method 8260B
- TCL SemiVolatiles, EPA Method 8270C
- TCL Pesticides/Polychlorinated Biphenyl (PCB), EPA Methods 8081A and 8082
- Total Cyanide, EPA Method 9010B and Method 9014

Additionally, five samples (three from the Landfill OU and two from the Mudflats OU) were submitted for geotechnical analysis.

4.3.5 Field Decontamination/Investigation Derived Waste

Decontamination of Geoprobe® equipment used for the collection of subsurface soil samples was conducted within a decontamination pad that was constructed at the work site. The decontamination pad was designed so that all decontamination liquids were contained and recovered for disposal as investigation derived waste (IDW). All downhole and nondedicated sampling equipment was

decontaminated after each use during soil boring interval sampling following the procedures outlined in the FSP (USACE 2001a).

The IDW generated during the field activities was collected, containerized, and labeled in accordance with the procedures outlined in the FSP (USACE 2001a). The water generated during decontamination activities, as well as personal protective equipment (PPE), was drummed in new 55-gallon Department of Transportation (DOT) Specification 17C open-top drums. However, since the amount of soil encountered during drilling activities that scanned above B+2σ to 2B was limited in volume, these impacted soils were placed in a 5-gallon bucket that was placed in a "rad bag."

In accordance with FCR number TTL-003, after completion of sample collection and downhole gamma measurements at each boring, the borings were backfilled with material removed from the hole (Attachment A).

4.4 Results of Surface and Subsurface Soil Sampling

This section discusses the radiological, chemical, and geotechnical analytical results for soil samples collected from the Mudflats OU and Landfill OU investigation. In addition, how the radiological soil results correlate with the downhole gamma investigation is also discussed.

4.4.1 Mudflats Surface and Subsurface Soil Investigation

During the 2001 investigation, a total of 96 boreholes were drilled for the purposes of reassessing the volume of MED-related residuals in the Mudflats OU and to determine the radiological and chemical characteristics of the material (Figure A4-2). Section 4.4.1 discusses the following:

- The radiological analytical results for soil samples (Section 4.4.1.1);
- the chemical analytical results for soil samples (Section 4.4.1.2);
- the geotechnical analytical results for soil samples (Section 4.4.1.3); and
- the results of the down hole geophysical survey (Section 4.4.1.4).

4.4.1.1 Radiological Analytical Results

As discussed in Section 4.1, the MARSSIM guidance was used to determine the study areas and to divide the Mudflats OU into the following three investigation areas. Class 1 (impacted), Class 2 (possibly impacted), and Class 3 (no expected impact). The analytical results for the three MED radiological constituents of concern for the Tonawanda Landfill Vicinity Property (U-238, Th-230, and Ra-226) for each of these three Classes of areas also are divided into the following six subsets, which are discussed below:

- Mudflats Reference Area (Table A4-3)
- Mudflats Class 3 Random Area 3A (Table A4-4)
- Mudflats Class 3 Random Samples 3B (Table A4-5)
- Mudflats Class 3 Biased Samples 3B, Perimeter of Area C (Table A4-6)
- Mudflats Class 2, Area C (Table A4-7)
- Mudflats Class 1, Area C (Table A4-8)

On each table, the boring from which the soil samples were collected, the sample depth, and selected analytical results are presented. In addition, a summary of the elevated concentrations of U-238, Th-230, and Ra-226 detected within the Mudflats OU is presented in Table A4-9. Due to the number of soil

samples collected and analyzed, the analytical results are discussed by investigation area within the Mudflats OU, starting with the Mudflats OU reference area.

Am-241 was also detected in a limited number of Mudflats OU borings and the results are summarized in Table A4-10. However, the Am-241 results are presented following the discussion of the U-238, Th-230, and Ra-226 analytical results.

Mudflats OU Reference Area

The Mudflats OU reference area was designated for the purpose of establishing background criteria for Th-230, U-238, and Ra-226 for use in comparison to the soil samples collected from the remainder of the Mudflats OU investigation area. As shown in Figure A4-2, the Mudflats OU reference area is located to the east of the Mudflats OU Class 1 and 2 areas. The analytical results for the 20 Mudflats OU reference area borings (Borings TMFR1-001 through TMFR1-020) are presented in Table A4-3. The locations of the 20 borings are presented in Figure A4-2.

In the soil samples collected from the Mudflats OU reference area borings, the following range in concentrations for Th-230, U-238, and Ra-226 were detected (Table A4-3):

- Th-230 concentrations ranged from 0.49 pCi/g (sample TMF-0011 collected from boring TMFR1-006,) to 1.49 pCi/g (sample TMF-0013 collected from boring TMFR1-007).
- U-238 concentrations ranged from 0.58 pCi/g (sample TMF-0035 collected from boring TMFR1-017) to 1.15 pCi/g (sample TMF-0029 collected from boring TMFR1-014).
- Ra-226 concentrations ranged from –0.03 pCi/g (sample TMF-0030 collected from boring TMFR1-014) to 1.74 pCi/g (sample TMF-0036 collected from boring TMFR1-017).

The Mudflats OU reference area analytical results were used to calculate the 99 percent upper confidence limit on the 99.9th percentile (UTL 99/99.9) background levels for Th-230, U-238, and Ra-226 for the Mudflats OU background reference data set. (Further details on the calculation of UTL 99/99.9 levels are provided in Section 4.1.2.1 of the RI report. The UTL 99/99.9 values for Th-230, U-238, and Ra-226 were used as a conservative screening tool to delineate the nature and extent of the MED-like material. The background levels detected within the Mudflats OU are for material that is considered non-impacted. These background (UTL 99/99.9) values are as follows:

- Th-230 – 1.69 pCi/g
- U-238 – 1.31 pCi/g
- Ra-226 – 2.22 pCi/g

Mudflats Class 3 Random (3A and 3B)

Due to the size of the area under consideration, the Class 3 area of the Mudflats OU was divided into two sections (Class 3A and 3B), which are located in the northern and southern portions of the Mudflats OU area, respectively (Figure A4-2). Eighteen randomly located borings were drilled in each Class 3 area (3A and 3B).

Mudflats Class 3 Random 3A

The analytical results for soil samples collected from the 18 Mudflats OU Class 3A Random borings (Borings TMF3A-001 through TMF3A-004, TMR3A-006 through TMF3A-012, TMF3A-014, TMF3A-017, and TMF3A-020 through TMF3A-024) are presented on Table A4-4. In the soil samples collected

from these borings, the following range in concentrations for Th-230, U-238, and Ra-226 were detected (Table A4-4):

- Th-230 concentrations ranged from 0.67 pCi/g (sample TMF-0062 collected from boring TMF3A-012) to 1.23 pCi/g (sample TMF-0083 collected from boring TMF3A-004).
- U-238 concentrations ranged from 0.58 pCi/g (sample TMF-0071 collected from boring TMF3A-024) to 1.06 pCi/g (sample TMF-0074 collected from boring TMF3A-010).
- Ra-226 concentrations ranged from 0.24 pCi/g (sample TMF-0084 collected from boring TMF3A-004) to 1.23 pCi/g (sample TMF-0062 collected from boring TMF3A-012).

However, there were no exceedances of the soil screening levels (UTL 99/99.9) for Th-230 (1.69 pCi/g), U-238 (1.39 pCi/g), and Ra-226 (2.22 pCi/g), in the soil samples collected from the Mudflats OU Class 3A Random borings (Table A4-4).

Mudflats Class 3 Random 3B

The analytical results for soil samples collected from the 18 Mudflats OU Class 3B Random borings (Borings TMF3B-001, TMF3B-003, TMF3B-004, TMF3B-006 through TMF3B-009, TMF3B-011 through TMF3B-014, TMF3B-015 through TMF3B-020, and TMF3B-024 are presented on Table A4-5. In the soil samples collected from these borings, the following range in concentrations for Th-230, U-238, and Ra-226 were detected:

- Th-230 concentrations ranged from 0.34 pCi/g (sample TMF-0101 collected from boring TMF3B-001) to 1.38 pCi/g (sample TMF-0112 collected from boring TMF3B-003).
- U-238 concentrations ranged from 0.39 pCi/g (sample TMF-0101 collected from boring TMF3B-001) to 1.06 pCi/g (sample TMF-0109 collected from boring TMF3B-023).
- Ra-226 concentrations ranged from 0.14 pCi/g (sample TMF-0111 collected from boring TMF3B-003) to 1.33 pCi/g (sample TMF-0112 collected from boring TMF3B-003).

However, there were no exceedances of the soil screening levels for (UTL 99/99.9) for Th-230 (1.69 pCi/g), U-238 (1.39 pCi/g), and Ra-226 (2.22 pCi/g), in the soil samples collected from the Mudflats OU Class 3B Random borings (Table A4-5).

Mudflats Class 3 Biased

Fifteen Class 3 biased borings (borings TMF3B-050 through TMF3B-058 and TMF3B-060 through TMF3B-065) were drilled adjacent to the boundary of the Class 2 (Area C) area. The locations of these 15 borings are presented on Figure A4-2. As presented on Figure A4-2, two large piles of debris cover parts of Area C's Class 1 and 2 areas, as well as portions of the surrounding Class 3 area. The western most pile was over 30 feet high and only Class 2 boring TMFC2-003 was drilled on the edge of this pile. However, the eastern pile was approximately 8 feet thick and where feasible, drilling activities were conducted through this pile.

Class 3 Biased borings TMF3B-051 TMF3B-052, TMF3B-053, TMF3B-64, and TMF3B-65 were drilled through the fill material of the eastern pile of debris (Figure A4-2). This fill material was placed by the Town of Tonawanda Highway department since the ORNL 1992 survey, and covers some of the previous boring locations within the Class 1 of Area C (ORNL 1992). In the soil samples collected from the 15 borings, the following range in concentrations for Th-230, U-238, and Ra-226 were detected:

- Th-230 concentrations ranged from 0.5 pCi/g (sample TMF-0175 collected from boring TMF3B-058) to 1.36 pCi/g (sample TMF-0187 collected from boring TMF3B-063).

- U-238 concentrations ranged from 0.39 pCi/g (sample TMF-0175 collected from boring TMF3B-058) to 1.21 pCi/g (sample TMF-0160 collected from boring TMF3B-053).
- Ra-226 concentrations ranged from 0.18 pCi/g (sample TMF-0191 collected from boring TMF3B-064) to 1.64 pCi/g (sample TMF-0160 collected from boring TMF3B-053).

However, there were no exceedances of the soil screening levels for (UTL 99/99.9) for Th-230 (1.69 pCi/g), U-238 (1.39 pCi/g), and Ra-226 (2.22 pCi/g), in the soil samples collected from the Mudflats OU Class 3B biased borings (Table A4-6).

Mudflats Class 2 – Area C

Eighteen borings (TMFC2-001 through TMFC2-006 and TMFC2-008 through TMFC2-017) were drilled on a grid within the Class 2 area of Area C (Figure A4-2). In the soil samples collected from the 18 borings, the following range in concentrations for Th-230, U-238, and Ra-226 were detected:

- Th-230 concentrations ranged from 0.5 pCi/g (sample TMF-0244 collected from boring TMFC2-009) to 1.79 pCi/g (sample TMF-0222 collected from boring TMFC2-012).
- U-238 concentrations ranged from 0.48 pCi/g (sample TMF-0234 collected from boring TMFC2-017) to 3.04 pCi/g (sample TMF-0223 collected from boring TMFC2-012).
- Ra-226 concentrations ranged from 0.07 pCi/g (sample TMF-0233 collected from boring TMFC2-002) to 1.37 pCi/g (sample TMF-0224 collected from boring TMFC2-015).

However, there were no exceedances of the soil screening levels (UTL 99/99.9) for Th-230 (1.69 pCi/g) and Ra-226 (2.22 pCi/g), in the soil samples collected from the Mudflats OU Class 2, Area C borings (Table A4-6). However, in the two soil samples collected from boring TMFC2-012, (TMF-0222 and TMF-0223), the screening criteria (UTL 99/99.9) for U-238 (1.31 pCi/g), was exceeded at concentrations of 2.73 pCi/g and 2.92 pCi/g, respectively. Boring TMFC2-012 is located south of the southern boundary of Area C, class 1 (Figure A4-2).

Mudflats Class 1 – Area C

Soil samples were collected from seven locations (TMFC1-001 through TMFC1-005, TMFC1-009, and TMFC1-013) within the Class 1 portion of Area C (Figure A4-2). Due to the piles of debris present in the Area, no areas of interest were identified during the 2001 gamma walkover survey. Therefore, samples were collected at the ORNL 1992 boring locations, and at three offset locations. The following are the four ORNL 1992 historical boring locations and the corresponding 2001 boring locations:

2001 Boring Designation	ORNL Boring Designation
TMFC1-001	USDOE B3A
TMFC1-005	USDOE B13A
TMFC1-009	USDOE B14A
TMFC1-013	USDOE B15A

During the drilling at locations TMFC1-001, TMFC1-005, TMFC1-009, and TMFC1-013, elevated levels of radioactive activity were not detected during the field screening activities at the horizons at which elevated concentrations were detected during the ORNL 1992 investigation. Therefore, it was believed that the MED material may have been moved during the Town of Tonawanda activities. To assess if the MED material was pushed to the north, soil borings TMFC1-002, TMFC1-003, and TMFC1-004 were installed (Figure A4-2). In the soil samples collected from the seven borings, the following range in concentrations for Th-230, U-238, and Ra-226 were detected:

- Th-230 concentrations ranged from 0.62 pCi/g (sample TMF-0282 collected from boring TMFC1-005) to 31.5 pCi/g (sample TMF-0285 collected from boring TMFC1-005).
- U-238 concentrations ranged from 0.65 pCi/g (sample TMF-0313 collected from boring TMFC1-003) to 27.9 pCi/g (sample TMF-0285 collected from boring TMFC1-005).
- Ra-226 concentrations ranged from 0.39 pCi/g (duplicate sample TMF-9342 collected from boring TMFC1-009) to 22.6 pCi/g (sample TMF-0285 collected from boring TMFC1-005).

The sample collected from 3.5 to 4 feet in boring TMFC1-005 (TMF-0285) exceeded the soil screening levels (UTL 99/99.9) for Th-230 (1.69 pCi/g), U-238 (1.31 pCi/g), and Ra-226 (2.22 pCi/g). This sample was from the fill material placed by the Town of Tonawanda. However, the elevated concentrations of MED-like material detected during in the four previous borings in this area were not replicated during the 2001 investigation indicating that the material may have been moved during the Town of Tonawanda's activities.

Mudflats OU Am-241 Results

As discussed earlier, Am-241, which represents another source of radiological contamination at the Tonawanda Landfill proper, also was detected in a limited number (11) of Mudflats OU soil samples (Table A4-10). The concentrations ranged from 0.079 pCi/g (sample TMF-0173 collected from soil boring TMF3B-057) to 0.5 pCi/g (sample TMF-0005 collected from soil boring TMFR1-003). Historically, Am-241 was primarily detected in only the western portion of the Tonawanda Landfill proper. Am-241 was not detected during the limited soil sampling activities conducted by ORNL in the vicinity of Area C of the Mudflats OU (ORNL 1992).

In the soil samples in which Am-241 was detected, there were no exceedances of the UTL 99/99.9 for U-238, Th-230, and/or Ra-226 indicating that at those locations the MED-like soil and soils containing concentrations of Am-241 are not commingled.

Additional Radiological Analytical Results

In addition to the contaminants of concern (U-238, Th-230, and Ra-226), as well as Am-241, a number of other radionuclides were analyzed for in the soil samples submitted for laboratory analysis. However, ranges of concentrations for these radionuclides within the Mudflats OU, along with the mean concentration, standard deviation, and the Upper 95th Percentile Confidence Level (UCL_{95}), are presented on Table A4-11.

4.4.1.2 Chemical Analytical Results

Chemical analyses of soil samples were conducted to determine if any hazardous materials are collocated with MED-like material within the Mudflats OU. The results of chemical analyses of soil samples collected from borings within the overburden overlaying Area C are provided in Table A4-11. While no suspected-MED-like material was encountered in Area C, samples were collected for chemical analysis from the overburden at Area C.

A total of three samples were collected from Area C of the Mudflats OU and submitted for chemical analysis. As discussed in Section 4.3.4, these soil samples were analyzed for volatile organic compounds; semi-volatile organic compounds; metals; pesticides/PCBs; and total cyanide.

For screening purposes, concentrations of chemical constituents in soils were compared to 20 times the U.S. Environmental Protection Agency (EPA) Resource Conservation and Recovery Act (RCRA)

Toxicity limits (40 Code of Federal Regulations (CFR), Chapter 1, Part 261.24) as presented in Table A4-11. In one sample collected from the Mudflats OU (TMF-0283), there was an exceedance of 20 times the lead standard (20 x 5 = 100 mg/kg) and an exceedance of 20 times the mercury standard (20 x 0.2 = 4 mg/kg). This indicates that lead and mercury concentrations in soil in Area C of the Mudflats OU may exceed the EPA toxicity levels.

4.4.1.3 Geotechnical Analytical Results

During the Mudflats OU investigation, two soil samples were collected and submitted for analysis for grain size, moisture content, and Atterburg limits. Soil samples TMF-0244A and TMF-0245A were collected from Mudflats OU Area C, Class 2 boring TMFC2-009, from depths of 3.0 to 4.5 feet below ground surface (ft bgs) and 11.0 to 11.5 ft bgs, respectively (Table A4-13). The location of boring TMFC2-009 is presented on Figure A4-2 .The Unified Soil Classification System (USCS) field classifications as well as the laboratory USCS classifications based on the grain size analysis and Atterburg limits are presented on Table A4-13.

Soil sample TMF-0244A was collected from the fill material that was placed on, and in the vicinity of Area C and soil sample TMF-0245A was collected from the underlying native Lean Clay material in boring TMFC2-009. The moisture content for each of the soil samples is presented on Table A4-13. The Atterberg limits for soil sample TMF-0245A is presented in the laboratory report, which is presented in Attachment F.

4.4.1.4 Downhole Geophysical Results

During the Mudflats OU investigation, downhole gamma logging was conducted at each of the borings. The borings in which "peaks" in the downhole gamma readings were measured are presented on Table A4-14. The downhole "peaks" were measured relative to background downhole gamma readings. In addition, the soil samples that had concentrations of Th-230, U-238, and/or Ra-226 exceeding the UTL 99/99.9 as determined by the Mudflats OU reference area are presented on Table A4-14. The downhole gamma logs are presented in Attachment E.

During the logging of the 96 borings drilled during the 2001 Mudflats OU investigation, elevated levels of gamma radiation (relative to background levels) were measured in only Class 1, Area C boring TMFC1-005 and Class 2, Area C boring TMFC2-012. The peak measured in boring TMFC1-005 correlated well to the depth from which sample TMF-0285 was collected, which exceeded the UTL 99/99.9. In boring TMFC2-012, the interval at which a peak was measured (approximately 1 to 2.2 feet bgs) was not sampled for radiological analysis. However, samples were collected above (TMF-0222 at 0 to 0.5 ft bgs) and below (TMF-0223) in boring TMFC2-012 that did exceed the UTL 99/99.9 screening criteria (Table A4-14).

Therefore, in the Mudflats OU, the "peaks" detected during downhole gamma logging correlated fairly well to soil samples that had concentrations of Th-230, U-238, and/or Ra-226 that exceeded the UTL 99/99.9 screening criteria.

4.4.2 Landfill Surface and Subsurface Soil Investigation

During the summer of 2001 investigation, a total of 114 boreholes were drilled for the purposes of reassessing the volume of MED-related residuals in the Landfill OU and to determine the radiological and chemical characteristics of the material. Section 4.4.2 discusses the following:

- The radiological analytical results for soil samples (4.4.2.1);
- the chemical analytical results for soil samples (4.4.2.2);
- the geotechnical analytical results for soil samples (4.4.2.3); and
- the results of the down hole geophysical survey (4.4.2.4).

4.4.2.1 Radiological Analytical Results

The MARSSIM guidance also was used to determine the study areas and divide the Landfill OU Investigation area into the following three study areas. Areas A and B within the Class 1 (impacted), Areas A and B within the Class 2 (possibly impacted), and Class 3 (no expected). The radiological analytical results for each of these areas also are divided into the following seven subsets, which are discussed below:

- Landfill Reference Area (Table A4-15)
- Landfill Class 3 Random Locations (Table A4-16)
- Landfill Class 3 Biased Samples, Perimeter of Areas A and B (Table A4-17)
- Landfill Class 2, Area B (Table A4-18)
- Landfill Class 2, Area A (Table A4-19)
- Landfill Class 1, Area A (Table A4-20)
- Landfill Class 1, Area B Samples (Table A4-21)
- In addition, the elevated soil results for samples collected within the Landfill OU are summarized in Table A4-22.

As with the Mudflats OU results, each table presents the boring from which the soil samples were collected, the soil sample depth, and the analytical results. Like the Mudflats OU results, only the radiological constituents of concern for the Tonawanda Landfill Vicinity Property, which are Ra-226, Th-230, and U-238, are shown in Tables A4-15 through A4-22. Am-241 was also detected in a limited number of Landfill OU borings and the results are summarized in Table A4-23. However, the Am-241 results are presented following the discussion of the U-238, Th-230, and Ra-226 analytical results.

<u>Landfill Reference Area</u>

Like the Mudflat reference area, the Landfill OU reference area was designated to establish background criteria for Th-230, U-238, and Ra-226 to assess the results of soil samples collected from the other areas of the Landfill OU. As shown in Figure A4-3, the Landfill OU reference area is located along the southern boundary of the Landfill OU Investigation Area, along the road to the south of the Landfill OU Area A Class 1 and 2 areas. The analytical results for the 18 Mudflats OU reference area borings (Borings TLFR3-001, TLFR3-002, TLFR3-004 through TLFR3-008, TLFR3-010 through TLFR3-020) are summarized in Table A4-15. The locations of the Landfill OU reference borings are presented on Figure A4-3.

In the soil samples collected from the Landfill OU reference area borings, the following ranges in concentrations for Th-230, U-238, and Ra-226 were detected (Table A4-15):

- Th-230 concentrations ranged from 0.62 pCi/g (sample TLF-0429 collected from boring TLFR3-015) to 1.28 pCi/g (duplicate sample TLF-9439 collected from boring TLFR3-016).
- U-238 concentrations ranged from 0.44 pCi/g (sample TLF-0403 collected from boring TLFR3-002) to 2.49 pCi/g (sample TLF-0433 collected from boring TLFR3-013).
- Ra-226 concentrations ranged from 0.026 pCi/g (sample TLF-0412 collected from boring TLFR3-007) to 1.91 pCi/g (sample TLF-0423 collected from boring TLFR3-012).

These Landfill OU reference area analytical results were used to calculate the UTL 99/99.9 background levels for Th-230, U-238, and Ra-226 for the Landfill OU background reference data set. (See Section 4.1.2.1 of the RI report for details on calculation of UTL 99/99.1 levels.) These background (UTL 99/99.9) values are as follows:

- Th-230 – 1.58 pCi/g
- U-238 – 2.34 pCi/g
- Ra-226 – 2.27 pCi/g

Landfill Class 3 Random

A total of 18 soil borings (TLF3-001, TLF3-003 through TLF-009, TLF3-012, TLF3-013, TLF3-015 through TLF3-017, TLF3-019, TLF-021 through TLF-024) were drilled at random locations within the Landfill OU Class 3 area (Figure A4-3). A summary of the analytical results for the soil samples collected from these 18 boring locations is presented in Table A4-15. In the soil samples, the following ranges in concentrations for Th-230, U-238, and Ra-226 were detected:

- Th-230 concentrations ranged from 0.62 pCi/g (sample TLF-0477 collected from boring TLF3-006) to 1.34 pCi/g (sample TLF-0461 collected from boring TLF3-007).
- U-238 concentrations ranged from 0.43 pCi/g (sample TLF-0481 collected from boring TLF3-001) to 1.07 pCi/g (sample TLF-0461 collected from boring TLF3-007).
- Ra-226 concentrations ranged from 0.52 pCi/g (sample TLF-0462 collected from boring TLF3-013) to 1.49 pCi/g (sample TLF-0487 collected from boring TLF3-004).

There were no exceedances of the UTL 99/99.9 soil screening levels for Th-230 (1.58 pCi/g), U-238 (2.34 pCi/g), or Ra-226 (2.27 pCi/g), in the soil samples collected from the Landfill OU Class 3 Random borings (Table A4-16).

Landfill Class 3 Biased

A total of 15 soil borings (TLF3-050 through TLF3-64) were drilled at selected locations around the edge of the Class 2 (Areas A and B) areas (Figure A4-3). A summary of the analytical results for the soil samples collected from these borings is presented in Table A4-17. In the soil samples, the following ranges in concentrations for Th-230, U-238, and Ra-226 were detected:

- Th-230 concentrations ranged from 0.53 pCi/g (sample TLF-0511 collected from boring TLF3-061) to 3.08 pCi/g (sample TLF-0515 collected from boring TLF3-063).
- U-238 concentrations ranged from –0.49 pCi/g (sample TLF-0509 collected from boring TLF3-059) to 3.13 pCi/g (sample TLF-0515 collected from boring TLF3-063).
- Ra-226 concentrations ranged from 0.4 pCi/g (sample TLF-0516 collected from boring TLF3-055) to 2.73 pCi/g (sample TLF-0515 collected from boring TLF3-063).

The concentrations of Th-230, U-238, and Ra-226 detected in sample TLF-0510, which was collected from boring TLF3-063, exceeded the following respective UTL 99/99.9 soil screening levels for Th-230 (1.58 pCi/g), U-238 (2.34 pCi/g), or Ra-226 (2.27 pCi/g) (Table A4-17). The location of boring TLF-063 is presented on Figure A4-3.

Landfill Class 2 – Area B

A total of 18 soil borings (TLFB2-001 through TLFB2-018) were drilled on a grid within the Class 2 area of Area B (Figure A4-3). A summary of the analytical results for the soil samples collected from these

borings is presented in Table A4-18. In the soil samples, the following ranges in concentrations for Th-230, U-238, and Ra-226 were detected:

- Th-230 concentrations ranged from 0.65 pCi/g (samples TLF-0741 and TLF-0742 collected from boring TLFB2-018) to 1.23 pCi/g (sample TLF-0748 collected from boring TLFB2-001).
- U-238 concentrations ranged from 0.42 pCi/g (sample TLF-0743 collected from boring TLFB2-015) to 1.48 pCi/g (sample TLF-0470 collected from boring TLFB2-017).
- Ra-226 concentrations ranged from 0.43 pCi/g (sample TLF-0762 collected from boring TLFB2-011) to 1.54 pCi/g (sample TLF-0751 collected from boring TLFB2-007).

There were no exceedances of the UTL 99/99.9 soil screening levels for Th-230 (1.58 pCi/g), U-238 (2.34 pCi/g), or Ra-226 (2.27 pCi/g), in the soil samples collected from the Class 2 area of Area B (Table A4-18).

Landfill Class 2 – Area A

A total of 19 soil borings (TLFA2-001 through TLFA2-018 and TLFA2-020) were drilled on a grid within the Class 2 area of Area A (Figure A4-3). A summary of the analytical results for the soil samples collected from these borings is presented in Table A4-19. In the soil samples, the following ranges in concentrations for Th-230, U-238, and Ra-226 were detected:

- Th-230 concentrations ranged from 0.49 pCi/g (sample TLF-0585 collected from boring TLFA2-009) to 6.3 pCi/g (sample TLF-0620 collected from boring TLFA2-008). Three samples (TLF-0619, TLF-0603, and TLF-0589) collected from borings TLFA2-008, TLFA2-015, and TLFA2-018, respectively, exceeded the UTL 99/99.9 screening level (1.58 pCi/g) for Th-230 (Tables A4-19 and A4-22).
- U-238 concentrations ranged from 0.0 pCi/g (sample TLF-0585 collected from boring TLFA2-009) to 9.7 pCi/g (sample TLF-0620 collected from boring TLFA2-008). A total of five samples exceeded the UTL 99/99.9 screening level for U-238 (2.34 pCi/g). These samples were two samples (TLF-0619, TLF-0620), collected from boring TLFA2-008, two samples (TLF-0602 and TLF-0603) collected from boring TLFA2-015, and one sample (TLF-0589) collected from boring TLFA2-018 (Tables A4-19 and A4-22).
- Ra-226 concentrations ranged from 0.26 pCi/g (sample TLF-0585 collected from boring TLFA2-009) to 4.45 pCi/g (sample TLF-0603 collected from boring TLFA2-015). Three samples (TLF-0619, TLF-0603, and TLF-0589) collected from borings TLFA2-008, TLFA2-015, and TLFA2-018, respectively, exceeded the UTL 99/99.9 screening level (2.27 pCi/g) for Ra-226 (Tables A4-19 and A4-22).

Landfill Class 1 – Area A

Due to wet conditions, no anomalies were encountered by the gamma walkover survey in the Class I portion of Area A. Therefore, during the 2001 investigation, confirmatory borings were installed at the locations where prior investigations had detected elevated radiological levels (ORNL 1992 and BNI 1995). In addition, borings also were drilled at offsets from these historical boring locations to evaluate the lateral extent of impacted soil.

During the 2001 investigation, a total of 17 soil borings (TLFA1-002 through TLFA1-004, TLFA1-006 through TLFA1-008, and TLFA1-010 through TLFA1-020 and TLFA2-020) were drilled within the Class

1 area of Area A (Figure A4-3). A total of 64 samples (including duplicates) were collected from 17 locations within Area A.

- Th-230 concentrations ranged from 0.58 pCi/g (sample TLF-0667 collected from boring TLFA1-019) to 76 pCi/g (duplicate sample TLF-9717 collected from boring TLFA1-003).
- U-238 concentrations ranged from 0.35 pCi/g (sample TLF-0682 collected from boring TLFA1-008) to 227 pCi/g (sample TLF-0692 collected from boring TLFA1-003).
- Ra-226 concentrations ranged from 0.49 pCi/g (sample TLF-0654 collected from boring TLFA1-020) to 20.10 (sample TLF-0653 collected from boring TLFA1-014).

Of the 64 samples, 42 exceed the UTL 99/99.9 screening level (Table A4-20). These exceedances were encountered at depths ranging from the ground surface to a depth of 11.5 feet below grade. The highest specific activity encountered in this area was at location TLFA1-003, at a depth of 5.75 feet below ground surface. Activities for this sample (TLF-0692/9717) area as follows: Th-230 – 76 pCi/g; U-238 – 227 pCi/g; Ra-226 – 19 pCi/g (Table A4-20). The locations of these borings are shown in Figure A4-3.

Landfill Class 1 – Area B

A total of 5 soil borings were drilled in the two Class 1 sections of Area B (B1A and B1B) (Figure A4-3). Three borings (TLFB1B-001, TLFB1B-005, and TLFB1B-009) were installed in Class 1 Area B1B and two borings (TLFB1A-001 and TLFB1A-005) were installed in Class 1Area B1A. A summary of the analytical results for the soil samples collected from these borings is presented in Table A4-21. In the soil samples, the following ranges in concentrations for Th-230, U-238, and Ra-226 were detected:

- Th-230 concentrations ranged from 0.8 pCi/g (sample TLF-0784 collected from boring TLFB1B-001) to 1.8 pCi/g (sample TLF-0786 collected from boring TLFB1B-009).
- U-238 concentrations ranged from 0.68 pCi/g (sample TLF-0781 collected from boring TLFB1B-005) to 1.82 pCi/g (sample TLF-0786 collected from boring TLFB1B-009).
- Ra-226 concentrations ranged from 0.75 pCi/g (sample TLF-0784 collected from boring TLFB1B-001) to 3.91 pCi/g (sample TLF-0871 collected from boring TLFB1B-001).

There were no exceedances of the UTL 99/99.9 soil screening levels for Th-230 (1.58 pCi/g) and U-238 (2.34 pCi/g), or Ra-226 (2.27 pCi/g), in the soil samples collected from the Class 1 area B1A (Table A4-21). However, the concentrations of Ra-226 exceeded the UTL 99/99.9 soil screening levels in soil samples collected from borings TLFB1A-001 and TLFB1B-009 (Table A4-21 and A4-22).

Like in the Mudflats OU, Am-241 was also detected in a limited number (10) of Landfill OU soil samples (Table A4-23). The concentrations ranged from 0.087 pCi/g (sample TLF-0400 collected from soil boring TMFR3-004) to 1.72 pCi/g (sample TLF-0476 collected from soil boring TLF3-006). Previous investigations also have detected Am-241 at limited locations along the Landfill access road that passes to the north of the Landfill OU reference area. The detections of Am-241 are consistent with the detections of Am-241 during previous investigations (ORNL 1992).

In the soil samples in which Am-241 was detected, there were no exceedances of the UTL 99/99.9 for U-238, Th-230, and/or Ra-226 indicating that at those locations, the MED-like soil and Am-241-impacted soil are not commingled.

Additional Radiological Analytical Results

As with the Mudflats OU soil samples, in addition to the contaminants of concern for the Tonawanda Landfill Vicinity Property (U-238, Th-230, and Ra-226), as well as Am-241, a number of other

radionuclides were analyzed for in the soil samples submitted for laboratory analysis. However, ranges of concentrations for these radionuclides within the Landfill OU, along with the mean concentration, standard deviation, and the Upper 95th Percentile Confidence Level (UCL_{95}), are presented in Table A4-24.

4.4.2.2 Chemical Analytical Results

Chemical analyses of soil samples were conducted to determine if any hazardous materials are collocated with MED-like material within the Landfill OU. A total of three samples and one duplicate soil sample were collected from the Class 1, Area A portion of the Landfill OU and submitted for chemical analysis. The samples for TCL/TAL analysis were selected based on radiological screening results at the borings. In accordance with the FSP, at approximately 1/3 of the soil samples where screening at the borehole (core or downhole) showed levels more than background + 2σ to 2x background, chemical samples were collected (USACE 2001a).

A total of three samples and one duplicate were collected from the Class 1, Area A portion of the Landfill OU and submitted for chemical analysis. As discussed in Section 4.3.4, these soil samples were analyzed for volatile organic compounds; semi-volatile organic compounds; priority pollutant metals; pesticides/PCBs; and total cyanide.

For screening purposes, concentrations were compared to 20 times the EPA RCRA Toxicity limits (40 CFR, Chapter 1, Part 261.24) as presented in Table A4-25. In the three samples, and one duplicate sample collected from the Landfill OU Area, there were exceedances of 20 times the lead standard (20 x 5 = 100 mg/kg). This indicates that the lead concentrations in soil in Area B of the Landfill OU Area may exceed the EPA toxicity levels. .

4.4.2.3 Geotechnical Analytical Results

During the Landfill OU investigation, three soil samples (TLF-0677, TMF-0670, and TLF-0600) were collected and submitted for analysis for grain size, moisture content, and Atterburg limits. Soil samples TLF-0677 and TMF-0670 were collected from Landfill OU Area A, Class 1 borings TLFA1-004 and TLFA1-006, respectively (Table A4-26). Soil sample TLF-0600 was collected from boring TLFA2-005 (Table A4-26). Each of the three soil samples were collected from 0 to 0.5 feet bgs. The location of borings TLFA1-004, TLFA1-006, and TLFA2-00 are presented in Figure A4-3. The USCS field classifications as well as the laboratory USCS classifications based on the grain size analysis and Atterburg limits are shown in Table A4-26.

All three soil samples (TLF-0677, TMF-0670, and TLF-0600) were collected from the shallow surface soils that are considered to be fill. The moisture content for each of the soil samples are shown in Table A4-26 and the Atterberg limits for each of the soil samples are presented in the laboratory report, which is included in Attachment F.

4.4.2.4 Downhole Geophysical Results

During the Landfill OU investigation, downhole gamma logging was conducted at each of the 114 borings, except for borings TLFA1-008 and TLF3-009. In an attempt to correlate the soil samples that exceed the UTL 99/99.9 screening criteria for Th-230, U-238, and/or Ra-226 are presented on the same table as the borings in which “peaks” in downhole gamma readings were detected Table A4-27. In general, the majority of the soil samples that exceeded the UTL 99/99.9 screening criteria did not have corresponding “peaks” in downhole gamma readings. The downhole gamma logs are presented in Attachment E.

However, in most of the borings where "peaks" in downhole gamma readings were detected, the soil samples collected from the same elevations were above the UTL 99/99.9 screening criteria Table A4-27. Of most interest, in the borings where the highest concentrations of Th-230, U-238, and/or Ra-226 were detected in soils (TLFA1-003, TLFA1-006, and TLFA1-014), there was good correlation between the elevated concentrations in the soil and the "peak" downhole gamma readings. Even though the shallow "peak" of downhole gamma readings, which was encountered at approximately 5.6 feet bgs, was not sampled in boring TLFA1-014, elevated concentrations were detected in the soil sample collected from the 7.0 to 7.5 ft bgs interval (Table A4-27). In addition, in boring TLFA1-014, a much higher peak was encountered at approximately 10.7 ft bgs that was not sampled due to poor recovery (Table A4-27).

Therefore, in the Landfill OU, the downhole gamma logging was generally a good tool for confirming the horizons within the subsurface where the majority of the highest concentrations of Th-230 (71 pCi/g, 8.7 pCi/g, and 32.5 pCi/g in borings TLFA1-003, TLF-006, and TLFA1-014, respectively), U-238 (227 pCi/g, 69 pCi/g, and 39.4 pCi/g in borings TLFA1-003, TLF-006, and TLFA1-014, respectively), and/or Ra-226 (18.6 pCi/g, 6 pCi/g, and 20.1 pCi/g in borings TLFA1-003, TLF-006, and TLFA1-014, respectively), were detected. However, for the remainder of the Landfill OU soil samples that exceeded the UTL 99/99.9 screening criteria, there were not corresponding downhole gamma log peaks.

5. SURFACE WATER AND SEDIMENT

During the summer of 2001, surface water/sediment sampling samples were collected from two locations within Landfill OU Class 1, Area A, where historical, elevated concentrations of MED-like residuals were detected. In addition, a Landfill OU, Class 2, Area B area surface water/sediment sampling location also was selected to assess a seep outside of the areas where MED-like residuals were anticipated. Section 5.0 discusses the following:

- The criteria for selecting radiological locations;
- The procedures used to collect the surface water and sediment samples;
- The procedures for field decontamination and handling of investigation derived waste;
- The radiological results for the surface water and sediment soil samples.

5.1 Summary of Radiological Sampling Locations

At four separate locations within the Landfill OU study area sediment samples were collected. At three of the sediment sampling locations, a surface water sample also was collected (Figure A5-1). The sediment sampling locations and associated surface water sample ID number are presented in the table below:

Sediment Sample Location	Surface Water ID	Investigation Area
TLFA1-S1	TLW-0100	Class 1 Area A
TLFA1-S2	TLW-0101 Duplicate Sample TLW-9103	Class 1 Area A
TLFA1-S3	Location not sampled	Class 1 Area A
TLF3-S4	TLW-0102	Class 2, Area B

Sediment sample TLF3-S4 actually was collected in the Class 2 portion of Area B, not in the Class 3 portion of the Landfill OU as labeled during sampling.

5.2 Procedures

This section discusses the procedures used during the collection of the surface water/sediment sampling samples.

5.2.1 Sediment and Surface Water Sampling Method

The surface water and sediment sampling activities were conducted in accordance with the relevant SOPs as outlined in the Field Standard Operating Procedures, and the details sampling activities are discussed below (USACE 2001c).

5.2.2 Field Measurement and Procedures and Criteria

Field measurements were limited to scanning the soil samples for gamma activity. The retrieved sediment samples were scanned with a shielded pancake GM probe, and the radioactivity was measured as cpm above background. These measurements were recorded on the boring logs for locations TLFA1-S1, TLFA1-S2, TLFA1-S2, and TLF3-S4, which are presented in Attachment C. A description of the calibration requirements and performance checks for the field instruments used for field measurements is presented in the QAPP (USACE 2001b).

5.2.3 Sample Collection for Laboratory Analysis

Sediment samples were collected using a hand auger. Samples designated for laboratory analyses were collected and transferred to disposable pie tins or similar containers as described in Section 4.3.3. The soil samples were well mixed and distributed to the appropriate laboratory-grade container(s), labeled with a unique sample number, and placed in a rigid-body plastic cooler. For radiological analysis, the surface water samples (total) were collected and were placed directly in the sample containers.

Immediately after preparing the soil and water samples and completing of container label information, each sample container was placed into a sealable plastic bag, placed into a cooler, packed for shipping, and transported to the laboratory under the chain-of-custody procedures

5.2.4 Analytical Methods for Soil/ Surface Water Samples

All of the sediment and surface water samples submitted for laboratory analysis were analyzed for the following parameters, which are summarized in Table A4-1:

- Iso-Uranium 234, 235, and 238
- Iso-Thorium 228, 230, and 232
- Ra-226
- Ra-228
- Gross Alpha
- Gamma Spectroscopy (Isotope identification including Am-241)
- Total Uranium

5.2.5 Field Decontamination/Investigation Derived Waste

Decontamination of the hand auger equipment used for the collection of sediment samples was conducted at the decontamination pad. The same decontamination procedures used on the Geoprobe® equipment, (as outlined in Section 4.3.5), were used on the sampling equipment used for the soil sampling equipment. Disposable bailers were used to collect the surface water samples for analysis. In addition, the IDW generated during the sediment/surface water sampling activities was collected, containerized, and labeled in accordance with the procedures outlined in the FSP (USACE 2001a).

5.3 Results of Radiological Analyses of Sediment and Surface Water Samples

This section discusses the radiological analytical results for both the sediment and surface water samples with the sediment sample results being discussed first. The analytical results for the four sediment sampling locations, (TLFA1-S1, TLFA1-S2, TLFA1-S3, and TLF3-S4), collected from the Landfill OU are presented on Table A5-1.

The UTL 99/99.9 values for Ra-226, Th-230, and U-238 for the Landfill OU also were used for a basis of comparison for the sediment sample analytical results. These values are as follows:

- Th-230 – 1.58 pCi/g
- U-238 – 2.34 pCi/g
- Ra-226 – 2.27 pCi/g

In the sediment samples, the following range in concentrations for Th-230, U-238, and Ra-226 were detected:

- Th-230 concentrations ranged from 1.02 pCi/g (sample TLF-0702 collected from boring TLFA1-S3) to 3.9 pCi/g (sample TLF-0700 collected from boring TLA1-S2). The three samples collected from Class 1, Area A sediment sampling location TLFA1-S2 (samples TLF-0700, TLF-0701, and duplicate sample TLF-9718) exceeded the UTL 99/99.9 values for Th-230 at concentrations of 3.9 pCi/g, 3.21 pCi/g, and 3.62 pCi/g, respectively, (Table A5-1).
- U-238 concentrations ranged from 0.77 pCi/g (sample TLF3-S4 collected from boring TLF-0490) to 25.3 pCi/g (sample TLF-0700 collected from boring TLA1-S2). All five sediment samples collected from Class 1, Area A locations TLFA1-S1 and TLFA1-S2 exceeded the UTL 99/99.9 values for U-238, which is 2.34 pCi/g (Table A5-1).
- Ra-226 concentrations ranged from 0.87 pCi/g (sample TLF3-S4 collected from boring TLF-0490) to 5.8 pCi/g (sample TLF-0701 collected from boring TLFA1-S2). The three samples collected from Class 1, Area A sediment sampling location TLFA1-S2 (samples TLF-0700, TLF-0701, and duplicate sample TLF-9718) exceeded the UTL 99/99.9 values for Ra-226 at concentrations of 2.77 pCi/g, 5.8 pCi/g, and 4.9 pCi/g, respectively, (Table A5-1).

In the sediment samples collected from Class 1, Area A location TLFA1-S3, and Class 2, Area B location TLF3-S4 concentrations of Ra-226, Th-230, and U-238 were not detected above the respective UTL 99/99.9 values (Table A5-1).

<u>Surface Water Analytical Results</u>

Surface water samples were collected from two leachate seeps/impoundment areas located within the Landfill OU area (Figure A5-1). Two samples and a duplicate (TLW-0100, TLW-0101, and duplicate TLW9103) were collected from one seep located within Area A. A third leachate seep sample (TLW-0102) was collected from a seep in the Class 3 area near Area B (Table A5-2). It should be noted that all

of the surface water samples that were collected were not field filtered and were extremely turbid. Even though these samples were surface water samples, for screening purposes the results were compared to the following applicable groundwater standards presented in 40 CFR Part 192, Subpart A:

- Combined Ra-226 and Ra-228 - 5 picocuries per liter (pCi/L),
- Gross Alpha (excluding radon and uranium) - 15 pCi/L,
- Combined U-234 and U-238 - 30 pCi/L,
- Total Uranium – 44 micrograms per liter (µg/L) where secular equilibrium is obtained between U-234 and U-238.

All of the surface water samples collected from the two leachate seeps had exceedances for at least one of the 40 CFR Part 192, Subpart A groundwater standards (40 CFR Levels) for either combined Ra-226 and Ra-228, gross Alpha (excluding radon and uranium), and, or for total Uranium (Table A5-2). These exceedences are briefly summarized below:

- The 40 CFR Level for Ra-226 + Ra-228 (5 pCi/L) was exceeded in one of the surface water samples from Area A (TLW-0101), the corresponding duplicate sample (TLW-9103), and the Area B surface water sample (TLW-0102), at concentrations of 5.23 pCi/L, 9.58 pCi/L, and 37.38 pCi/L, respectively (Table A5-2).
- The 40 CFR Level for total uranium (44 pCi/L) was exceeded in the Class I, Area A, surface samples (TLW-0100 and TLW-0101) and the corresponding duplicate sample (TLW-9103), at concentrations of 416 pCi/L, 459 pCi/L, and 294 pCi/L, respectively (Table A5-2).
- The 40 CFR Level for U-234 + U-238 was exceeded in both of the surface water samples from Area A (TLW-0100 and TLW-0101), and the duplicate sample collected at the location where sample TLW-0101 was collected (TLW9103), at concentrations of 449 pCi/L, 342 pCi/L, and 325 pCi/L, respectively (Table A5-2).
- The 40 CFR Level for gross-alpha (excluding radon and uranium) (15 pCi/L) was exceeded for the Class 2, Area B surface water sample TLW-0102, at a concentration of 23.91 pCi/L (Table A5-2).

6. SITE SURVEY/GPS

The base coordinate system for the characterization work is New York State Plane, referenced to the North American Datum of 1927 (NAD 27). Elevation data (e.g., ground surface elevations) are in feet above mean sea level and are referenced to the North American Vertical Datum of 1988 (NAVD 88). Depth data (e.g., depth to water table measurements, or depth to samples) are presented in feet below a known elevation reference point. The base level of accuracy for all mapping work at the Tonawanda Landfill Vicinity Property is 0.1 ft for horizontal coordinates and 0.1 ft for general vertical measurements.

As discussed in Section 3, a survey monument was placed by the licensed civil surveyor, TVGA, adjacent to the temporary field office. During GWS activities, GPS positional checks were performed daily at the survey monument. In addition, TVGA provided a hard-copy report and an electronic copy of the civil survey. The survey data for each of the soil boring and sediment/surface water sampling locations are tabulated and presented in Appendix H. In addition, sediment sample location TLF3-S4 was not surveyed by TVGA following the completion of field activities. However, a GPS reading was taken at this location and the horizontal coordinates for sediment sample location TLF3-S4 are presented in Appendix H.

7. GROUNDWATER SAMPLING

Malcolm Pirnie, under contract with SAIC, conducted the groundwater sampling activities for the USACE from September 19 through 21, 2001. The sampling event was part of the Town of Tonawanda's normal semi-annual compliance sampling activities at the Tonawanda Landfill. During the September 2001 sampling event, in addition to their standard groundwater samples, Malcolm Pirnie also collected split samples for radiological analysis. The results of this sampling were used to evaluate the impact that residual MED-like material may have had on the shallow and deep groundwater at the Tonawanda Landfill. Malcolm Pirnie's groundwater sampling activities are summarized in their October 2, 2001 report, *Town of Tonawanda Landfill Field Data Report*, which is included in Attachment G.

7.1 Summary of Radiological Sampling Locations and Depths

During the Town of Tonawanda's 2001 landfill sampling activities, groundwater samples were collected for radiological analysis from a total of 12 existing monitoring wells located both within the Landfill OU and on the perimeter of the Landfill, including areas outside of the Landfill OU and the Mudflats OU. In addition, groundwater samples also were collected from two existing monitoring wells located within the Mudflats parcel outside of the Mudflats OU. The locations of these 14 monitoring wells are shown on Figure A7-1. Based on previous groundwater investigations conducted at the Tonawanda Landfill by others it was assumed that the shallow groundwater flow direction for the Site was to the south/southwest (Malcolm Pirnie 1999).

Groundwater samples were collected from the following existing shallow overburden groundwater monitoring wells: L-1, L-2, L-3, BM-4, BM-8, BM-12, BM-15, BM-16, BM-17, BM-18, and BM-19 (Figure A7-1). The following describes the rational for sampling these shallow monitoring wells:

- Monitoring wells L-1 and L-2, which are located within the Class 1 areas of Area B of the Landfill OU;
- Monitoring wells L-3 and BM-4, which are located with the Class 1 and 2 areas, respectively, of Area A of the Landfill OU;
- Monitoring wells BM-17 and BM-18, which are located downgradient (south) of Area B of the Landfill OU;
- Monitoring well BM-19, which is located in what was assumed to be the downgradient direction (west, southwest) from Area B of the Landfill OU;
- Wells BM-8, BM-12, and BM-16, which are located in the Mudflats OU, were sampled due to their downgradient location from the Landfill OU. Monitoring wells BM-8 and BM-12 are not part of the Town of Tonawanda sampling program and were sampled as part of the one time sampling program;
- Monitoring well BM-7, which is located in what was assumed to be the cross-gradient direction (northeast), from the Landfill OU.

In addition to sampling the shallow monitoring wells, the following three deeper, contact-zone aquifer monitoring wells also were sampled:

- DW-1, DW-2, and DW-4R.

Contact-zone aquifer monitoring wells DW-4R and DW-2 are located to the northeast of the Landfill OU, outside of the 2001 investigation area. Deep monitoring well DW-1 is located in the western portion of

the Landfill parcel of the site, west of the Landfill OU (Figure A7-1). The regional direction of deep groundwater at and in the vicinity of the Tonawanda Landfill is generally considered to be the north towards the Niagara River (Wehran 1994).

7.2 Procedures

This section discusses the procedures used during the groundwater sampling activities conducted during this investigation. The groundwater purging/sampling was conducted in accordance with the procedures used by Malcolm Pirnie for semi-annual groundwater sampling activities, as outlined in their Post Closure Maintenance and Monitoring Plan (Malcolm Pirnie 1999)

7.2.1 Groundwater Sampling Method

Following the completion of purging activities, Malcolm Pirnie collected groundwater samples from each of the fourteen monitoring wells. Duplicate samples were collected from wells L-3 and BM-4. Prior to sampling, each well was purged of a minimum of three (3) well volumes, or until a "dry" condition (no standing water in well) was attained. The well was then allowed to sufficiently recharge with enough groundwater to fill the required amount of sample containers with the appropriate volumes. The well specifications and sample identification numbers are presented in Table A7-1.

7.2.2 Field Measurement and Procedures and Criteria

During groundwater purging and sampling collection activities, the following groundwater quality parameters were measured in the field: pH, specific conductivity, temperature, dissolved oxygen, redox potential, and turbidity. The water quality parameters measured at the completion of purging activities are presented in Table A7-2. In addition, the water sampling data sheets completed for each monitoring well also are presented in October 2, 2001, Malcolm Pirnie report, *Town of Tonawanda Landfill Field Data Report*, which is presented in Attachment G. The groundwater samples were scanned for gamma activity prior to shipping the samples offsite for laboratory analysis.

Also, as part of Malcolm Pirnie's Town of Tonawanda's semi-annual compliance sampling event, depth to groundwater measurements were taken at five deep monitoring wells and 24 shallow monitoring wells (Table A7-3).

7.2.3 Sample Collection

Each well was sampled using dedicated sampling equipment (tubing and/or bailers) to avoid cross contamination between sample locations. In addition, at each sampling location both total (unfiltered) and dissolved (0.45 micron [µm] filter) samples were collected for radiological analysis. Upon completion of the sampling activities, dedicated sampling equipment used to collect samples from wells BM-8 and BM-12 were left in each respective well for reuse in the event of future sampling activities. Following collection of the samples, the groundwater samples were transferred from Malcolm Pirnie to SAIC personnel under the chain-of-custody procedures outlined in the FSP (USACE 2001a). The monitoring wells sampled and the respective sample identification numbers are presented on Tables A7-4 and A7-5, respectively.

7.2.4 Analytical Methods for Groundwater Samples

Groundwater samples (total and dissolved) collected from the 14 monitoring wells (and the two duplicate samples) were submitted for the following analyses (Table A4-1):

- Iso-Uranium 234, 235, and 238
- Iso-Thorium 228, 230, and 232
- Ra-226
- Ra-228
- Gross Apha
- Gamma Spectroscopy (Isotope identification including Am-241)
- Total Uranium

7.2.5 Field Decontamination/Investigation Derived Waste

Since each well was purged and subsequently sampled using dedicated sampling equipment (tubing and/or bailers), field decontamination activities were not required.

7.3 Shallow Groundwater Flow

The shallow groundwater flow at the Tonawanda Landfill is generally in a radial pattern away from a groundwater mound that exists in the eastern portion of the Tonawanda Landfill (Figure A7-2). This groundwater mound is located to the east of the Landfill OU, in the vicinity of shallow piezometers P-3 and P-4 (Figure A7-2). According to previous investigations, within the Landfill OU, the groundwater flow for the shallow groundwater is primarily through the permeable landfill wastes. South of the Landfill OU, in the Mudflats OU, and beneath the landfill waste, groundwater flow within the glacial deposits is through relatively thin (less than 4 feet) sand and silty sand lenses. These sand units are considered limited in areal extent and previous studies did not consider these deposits as providing extensive migration pathways for leachate migration (Malcolm Pirnie 1999).

In addition, within the landfill where the water table intersects the land surface, leachate or shallow groundwater seeps are formed. For instance, the surface elevation of the seep within the Class 1 portion of Area A (approximately 618 ft msl) is similar to the shallow groundwater elevation measured in monitoring well L-3 (617.69 feet msl), which is located adjacent to the seep (Figure A7-2).

7.4 Results of Groundwater Sampling

Groundwater samples (total and dissolved) collected from 14 monitoring wells were submitted for radiological analysis. The analytical results for the total and dissolved groundwater samples are presented in Tables 7-4 and A7-5, respectively. These groundwater results were compared to the groundwater standards of 40 CFR Part 192, Subpart A listed below:

- Combined Ra-226 and Ra-228 - 5 pCi/L,
- Gross Alpha (excluding radon and uranium) 15 pCi/L,
- Combined U-234 and U-238 – 30 pCi/L,
- Total Uranium – 44 µg/L where secular equilibrium is obtained between uranium-234 and uranium-238.

Both total uranium and combined U-234 and U-238 were the only radiological constituents that were detected in groundwater at the Tonawanda Landfill Vicinity Property at concentrations above their

respective 40 CFR Part 192, Subpart A, groundwater standards. The 40 CFR Part 192, Subpart A, groundwater standards for total uranium and combined U-234 and U-238 are 44 µg/L, and 30 pCi/L, respectively. In the unfiltered (total) groundwater samples collected from monitoring well L-3, (TLW-0150 and duplicate sample TLW-9178), total uranium was detected at concentrations of 175 µg/L and 164 µg/L, respectively (Table A7-4). In the filtered (dissolved) groundwater samples collected from monitoring well L-3 (TLW-0177 and duplicate TLW-9180) total uranium was detected at concentrations of 133 µg/L and 134 µg/L, respectively (Table A7-5).

In the filtered (total) groundwater samples collected from monitoring well L-3, (TLW-0150 and duplicate sample TLW-9178), combined U-234 and U-238 was detected at concentrations of 116.5 pCi/L and 116.7 pCi/L, respectively (Table A7-4). In the filtered (dissolved) groundwater samples collected from monitoring well L-3 (TLW-0177 and duplicate sample TLW-9180), combined U-234 and U-238 was detected at concentrations of 93.7 µg/L and 107.8 µg/L, respectively (Table A7-5).

Monitoring well L-3 is located adjacent to the wet area in the Class 1 portion of Area A (Figure A7-2), where the majority of soil concentrations above UTL 99/99.9 for soil for Th-230, U-238, and Ra-226 are also located. In the total and dissolved groundwater samples that were collected from the other 13 monitoring wells, none of the samples exceeded the 40 CFR Part 192, Subpart A groundwater standards for either total uranium (44 µg/L), combined U-234 and U-238 (30 pCi/L), combined Ra-226 and Ra-228 (5 pCi/L), or gross Alpha (excluding radon and uranium) 15 pCi/L (Tables A7-4 and A7-5 and Figure A7-2).

8. REFERENCES

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Wehran 1994. *Town of Tonawanda Landfill – Draft Closure Plan*. March 1994.

FIGURES

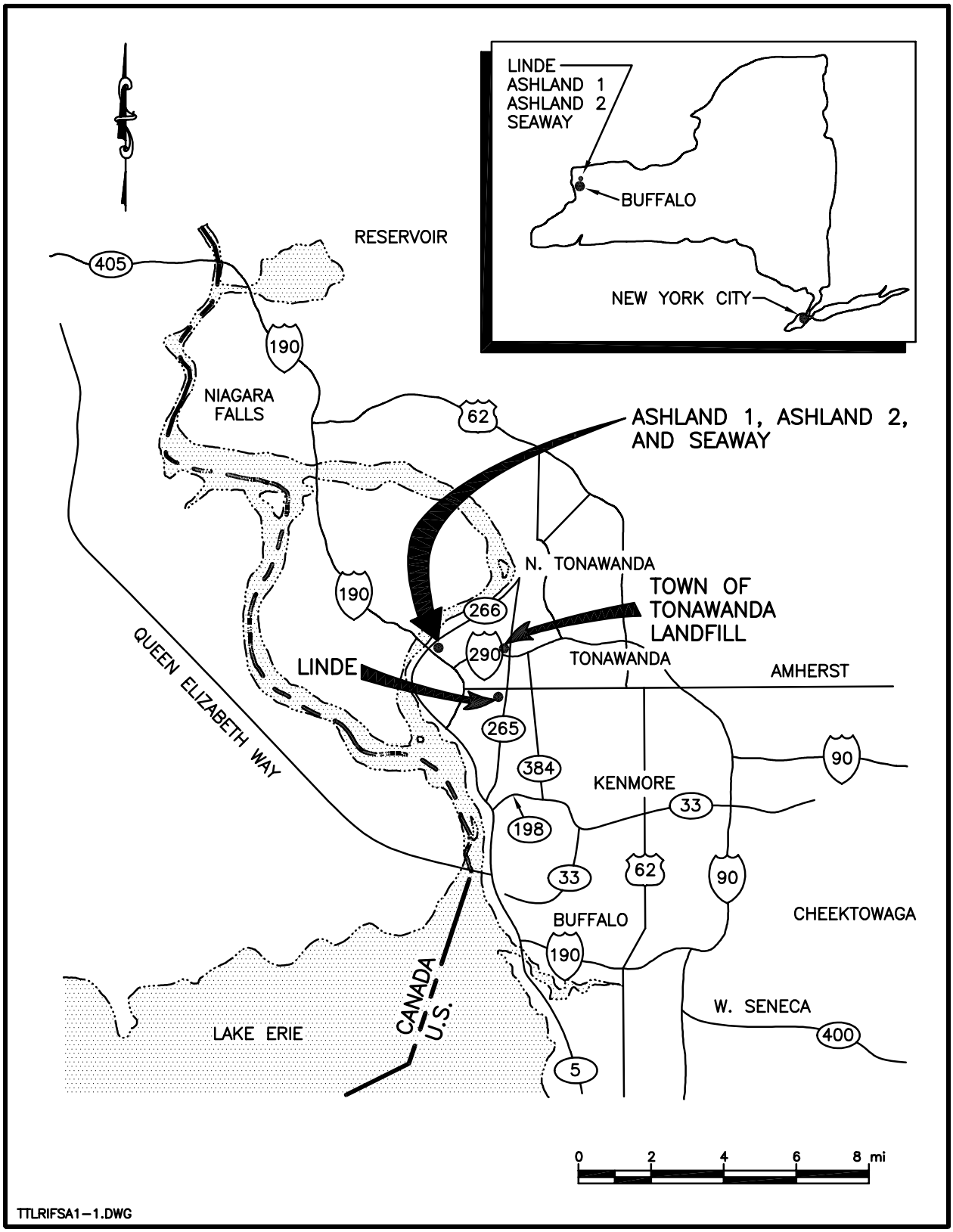

FIGURE A1-1
REGIONAL LOCATION OF THE TOWN OF TONAWANDA, NEW YORK AND THE ASHLAND 1, ASHLAND 2, SEAWAY, LINDE AND THE TOWN OF TONAWANDA LANDFILL SITES

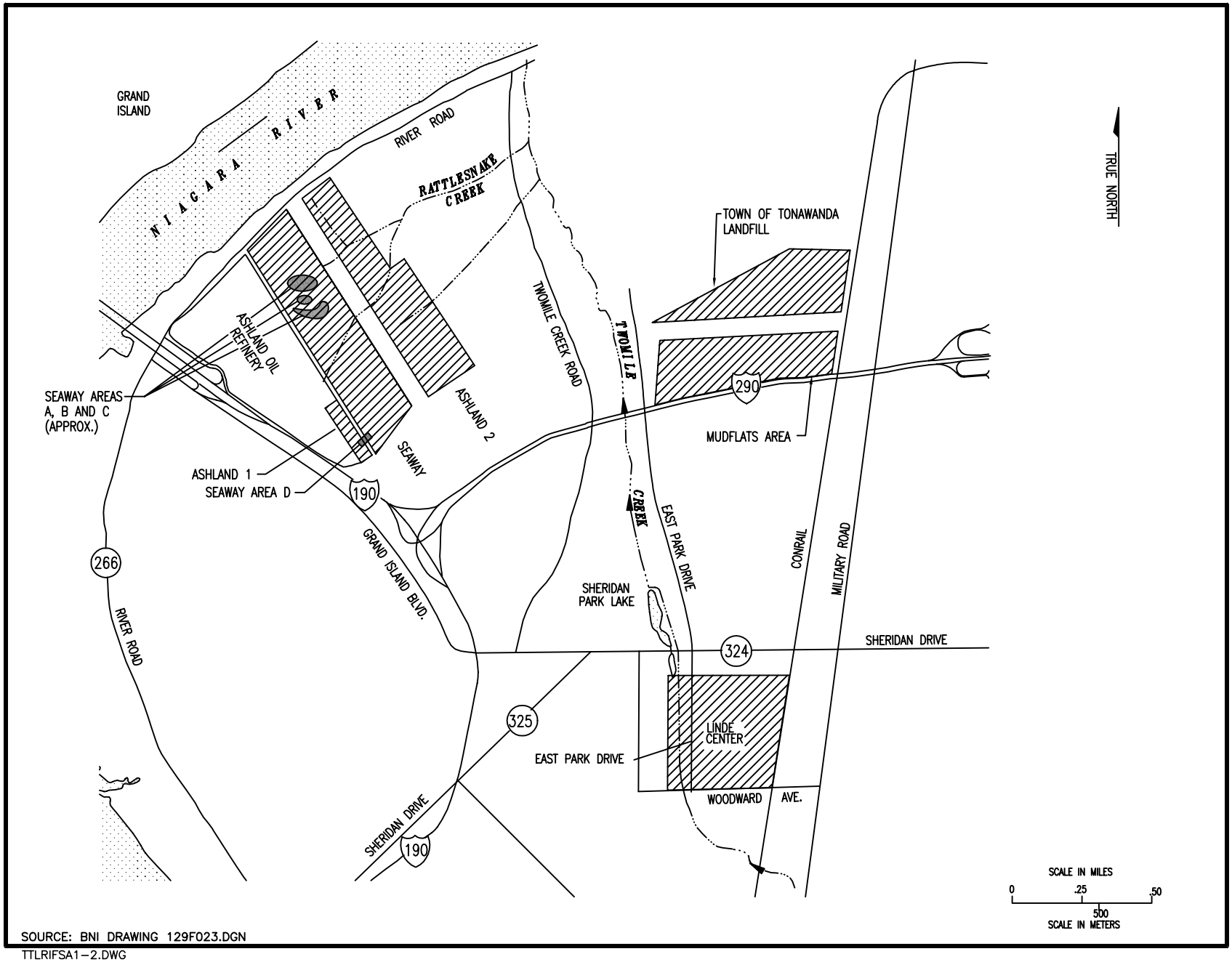

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FIGURE A1-2
LOCATIONS OF ASHLAND 1, ASHLAND 2,
SEAWAY, LINDE AND THE TOWN OF TONAWANDA LANDFILL SITES

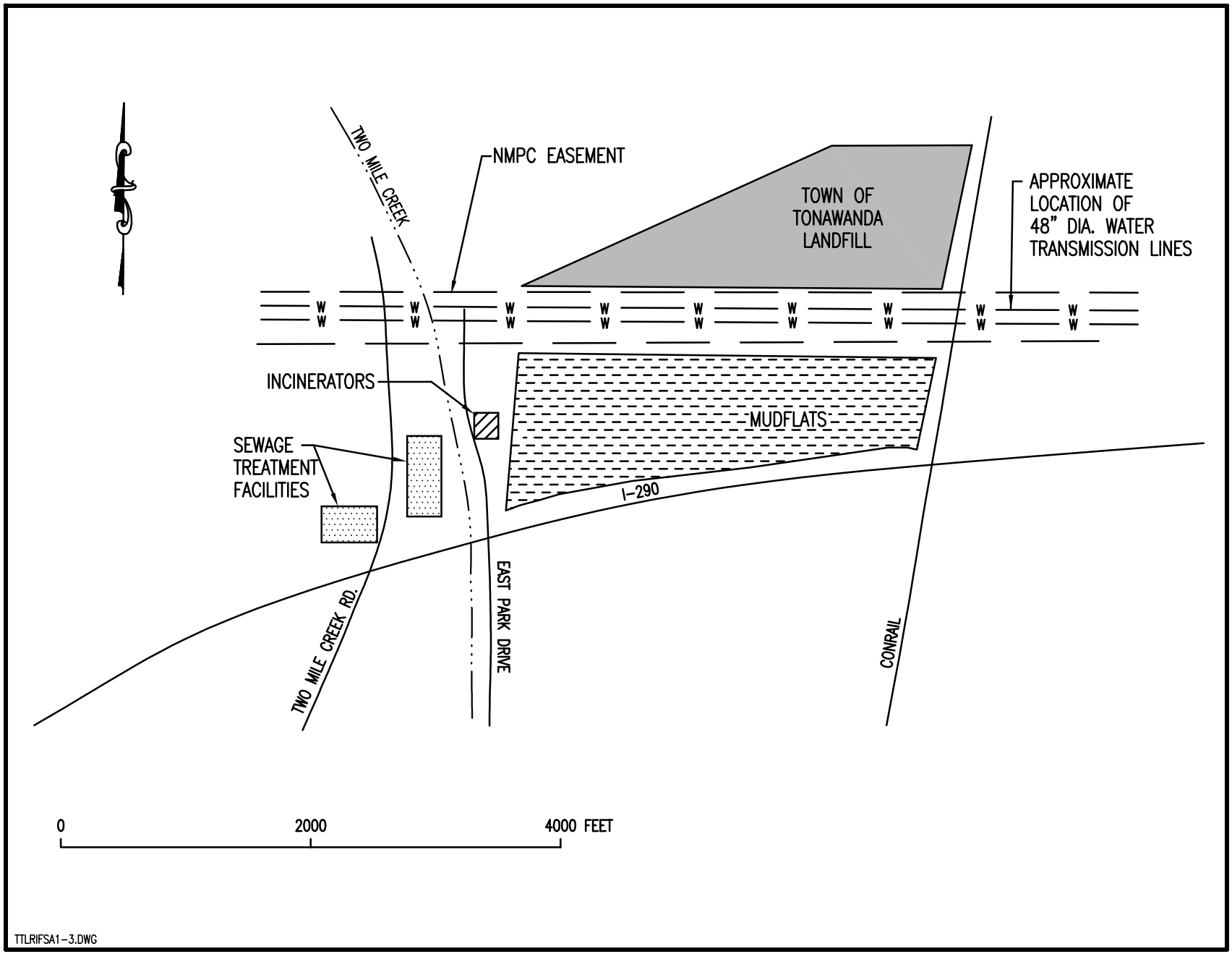
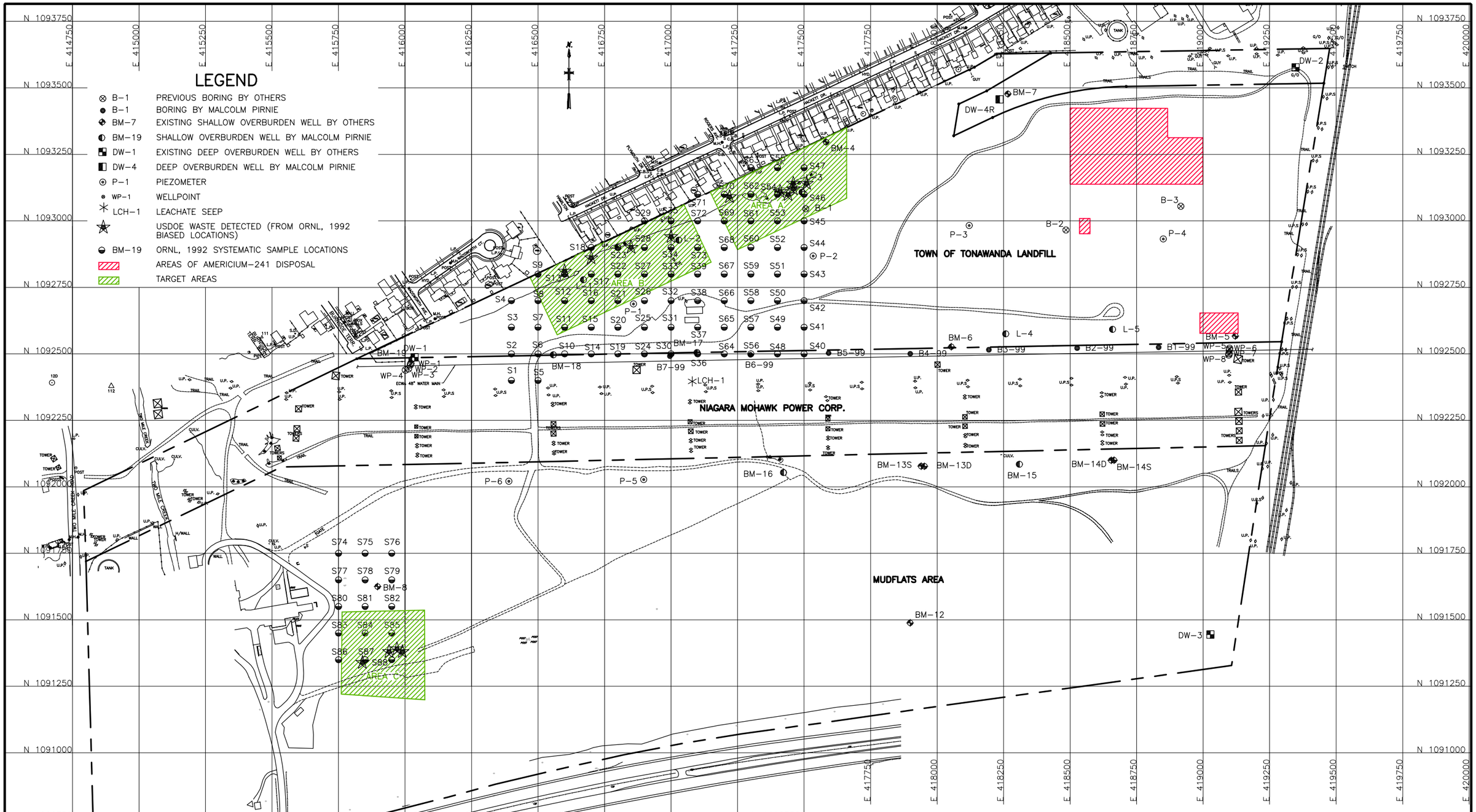


FIGURE A1-3
TOWN OF TONAWANDA LANDFILL APPROXIMATE LOCATIONS



NOTE: THIS DRAWING IS BASED ON PLANS "TONAWANDA LANDFILL SITE PLAN" BY MALCOLM PIRNIE, INC. DATED JUNE 1999 AND "TOWN OF TONAWANDA LANDFILL TEST SITES", BY ENGINEER'S OFFICE, TOWN OF TONAWANDA, N.Y., REV. 1, DATED 9-19-83.

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Lakeville, Massachusetts
02347

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Fax:(508)923-5101

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AREAS OF CONTAMINATION AND HISTORIC SAMPLE LOCATIONS

PROJECT
FUSRAP
TOWN OF TONAWANDA LANDFILL
TONAWANDA, NEW YORK

CLIENT
USACE - BUFFALO DISTRICT

SCALE 1"=350'

DATE 3-19-02

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FIGURE NO. A1-4

PROJECT NO. 01-0801-08-1165-220

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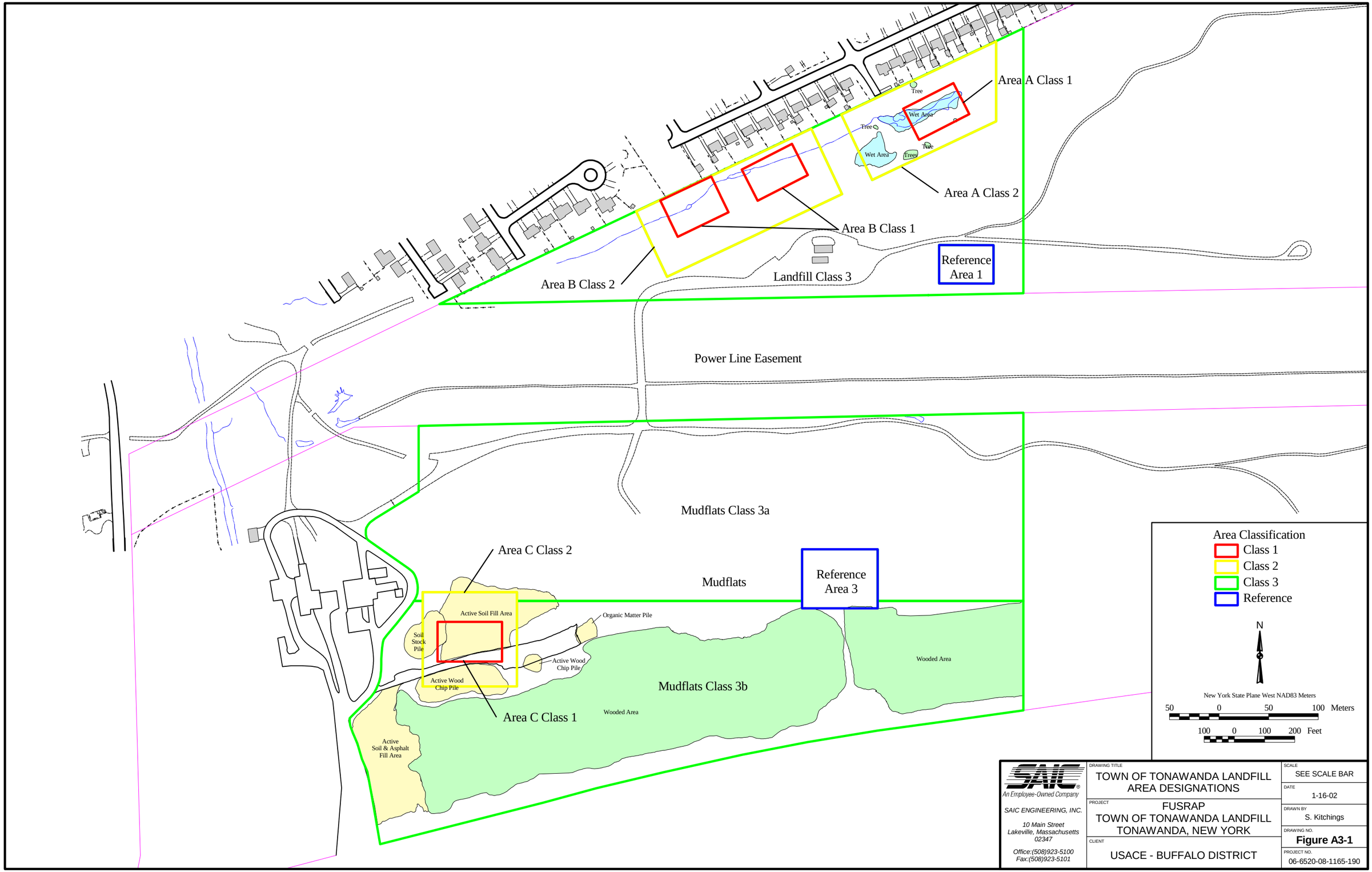

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DRAWING TITLE
TOWN OF TONAWANDA LANDFILL
AREA DESIGNATIONS

PROJECT
FUSRAP
TOWN OF TONAWANDA LANDFILL
TONAWANDA, NEW YORK

CLIENT
USACE - BUFFALO DISTRICT

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Figure A3-1

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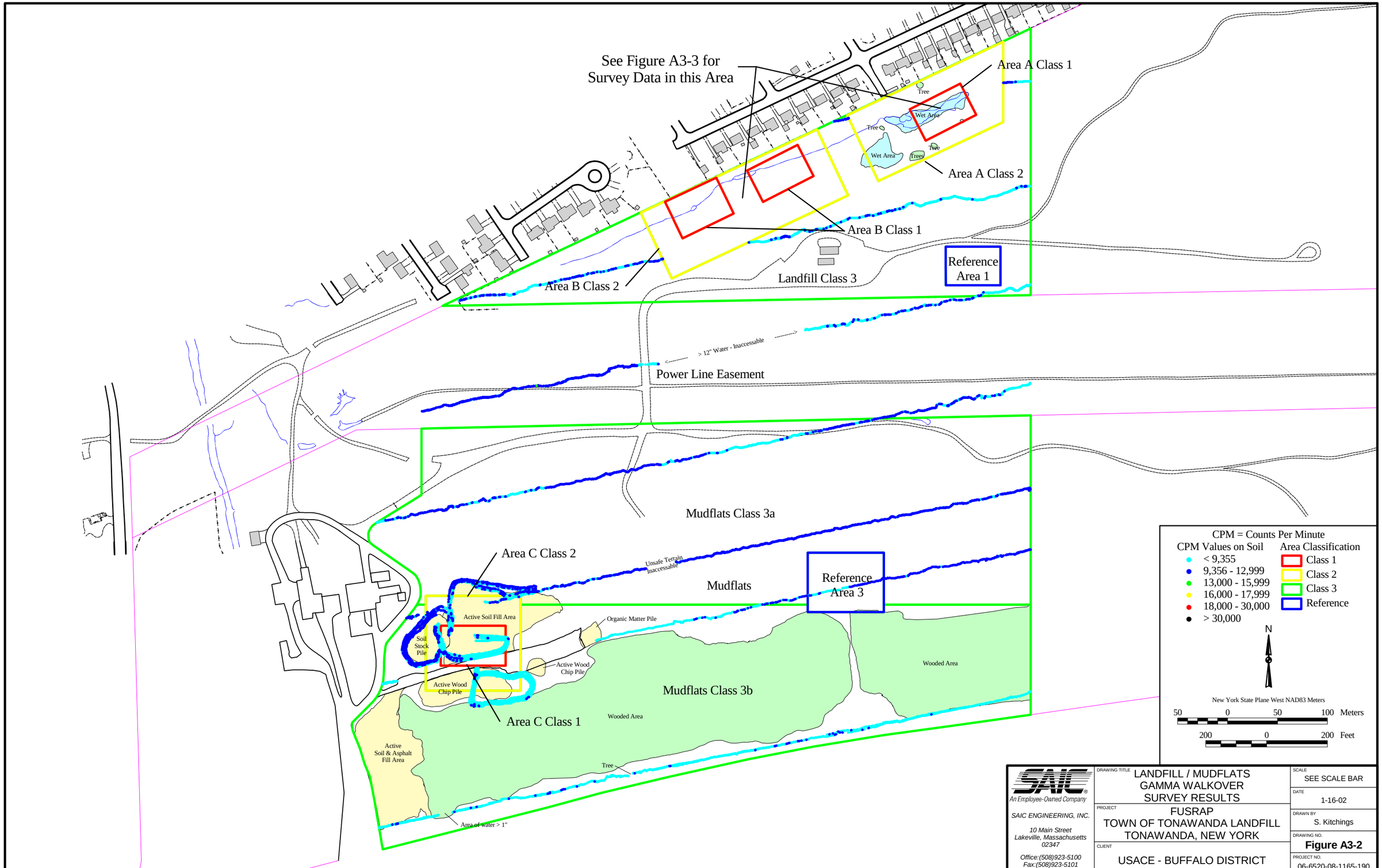

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DRAWING TITLE: LANDFILL / MUDFLATS GAMMA WALKOVER SURVEY RESULTS

PROJECT: FUSRAP TOWN OF TONAWANDA LANDFILL TONAWANDA, NEW YORK

CLIENT: USACE - BUFFALO DISTRICT

SCALE: SEE SCALE BAR

DATE: 1-16-02

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PROJECT NO.: 06-6520-08-1165-190

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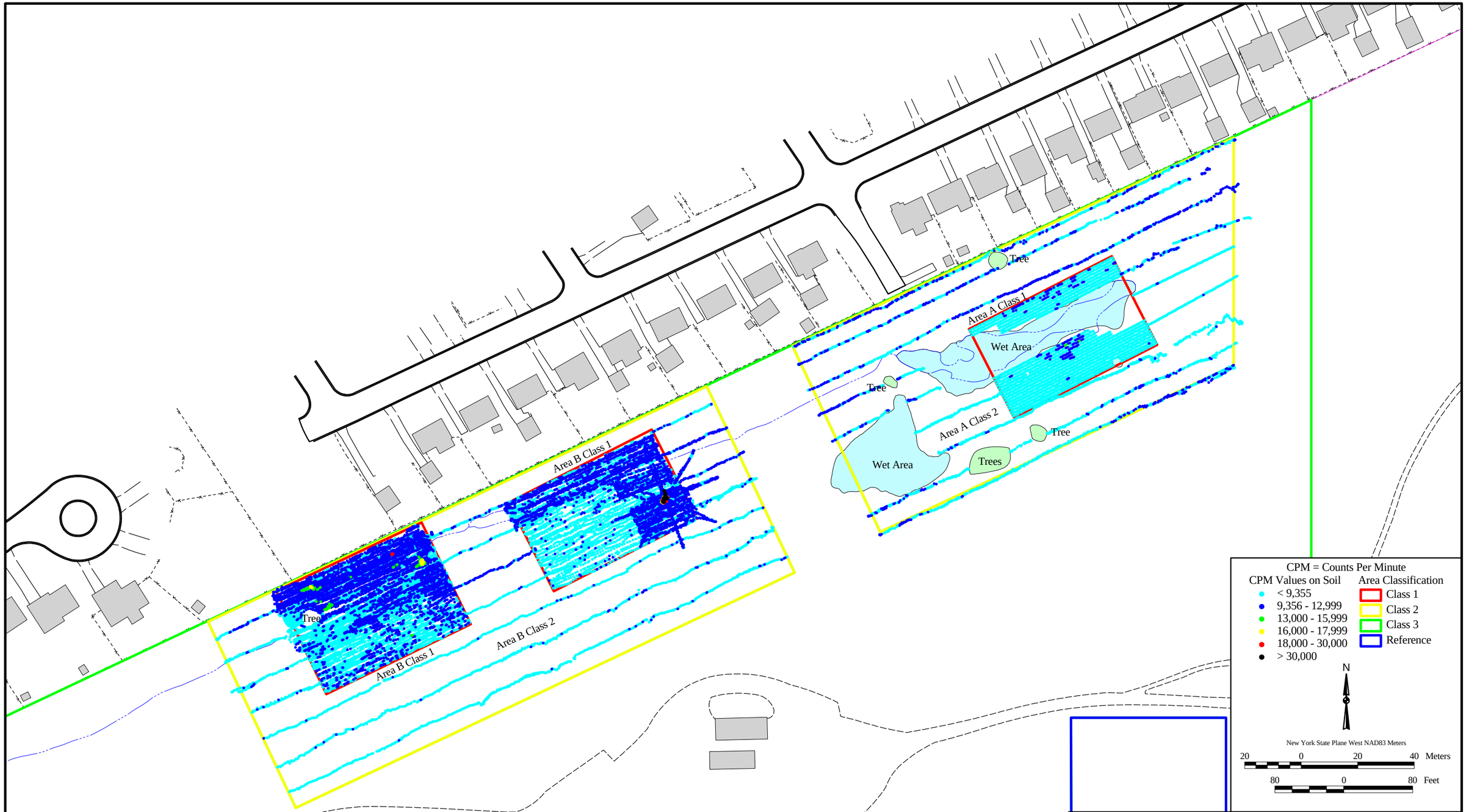

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DRAWING TITLE
LANDFILL AREAS "A" & "B"
GAMMA WALKOVER
SURVEY RESULTS

PROJECT
FUSRAP
TOWN OF TONAWANDA LANDFILL
TONAWANDA, NEW YORK

CLIENT
USACE - BUFFALO DISTRICT

SCALE
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DATE
1-16-02

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Figure A3-3

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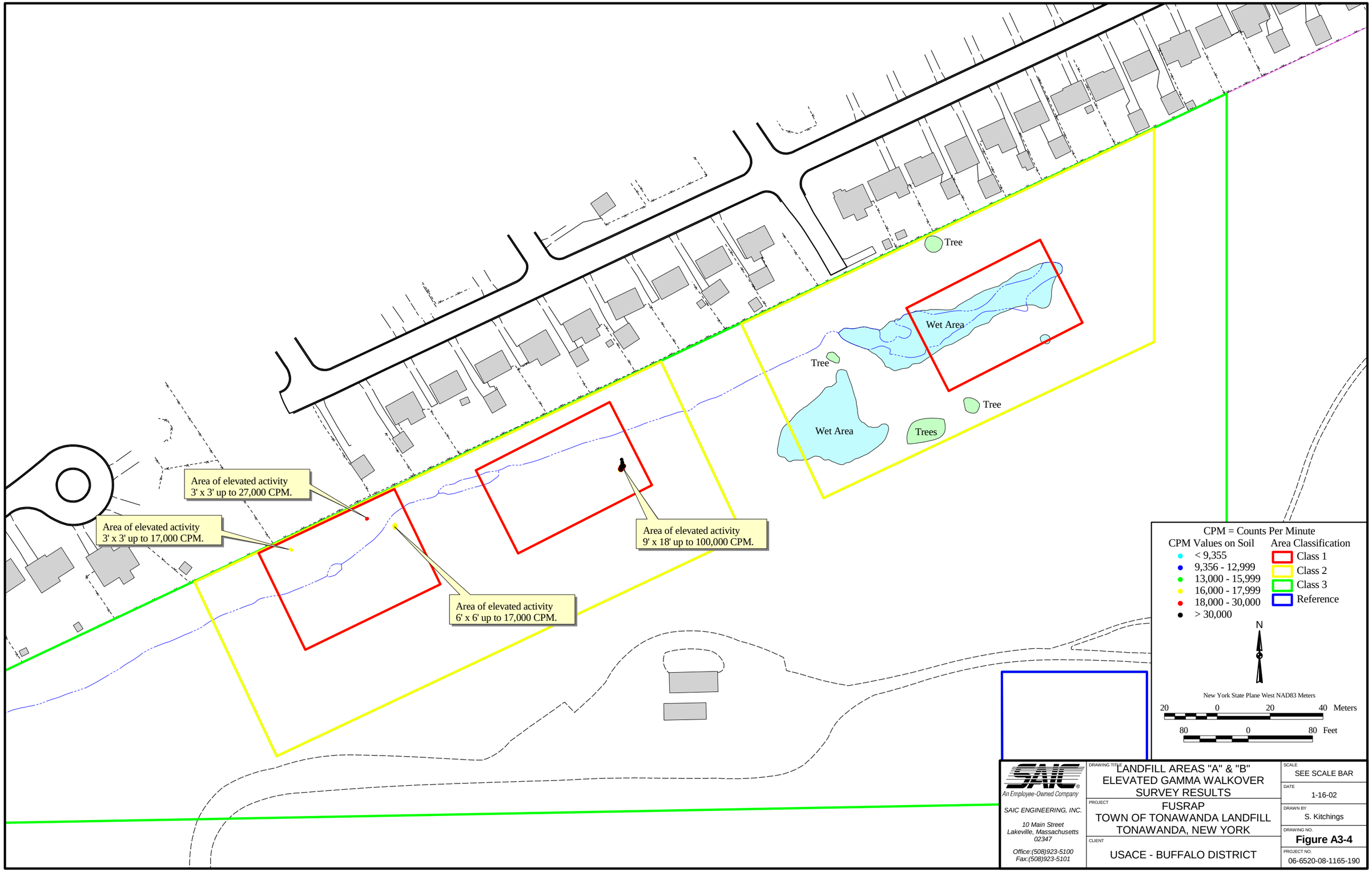

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LANDFILL AREAS "A" & "B"
ELEVATED GAMMA WALKOVER
SURVEY RESULTS

PROJECT
FUSRAP
TOWN OF TONAWANDA LANDFILL
TONAWANDA, NEW YORK

CLIENT
USACE - BUFFALO DISTRICT

SCALE
SEE SCALE BAR

DATE
1-16-02

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S. Kitchings

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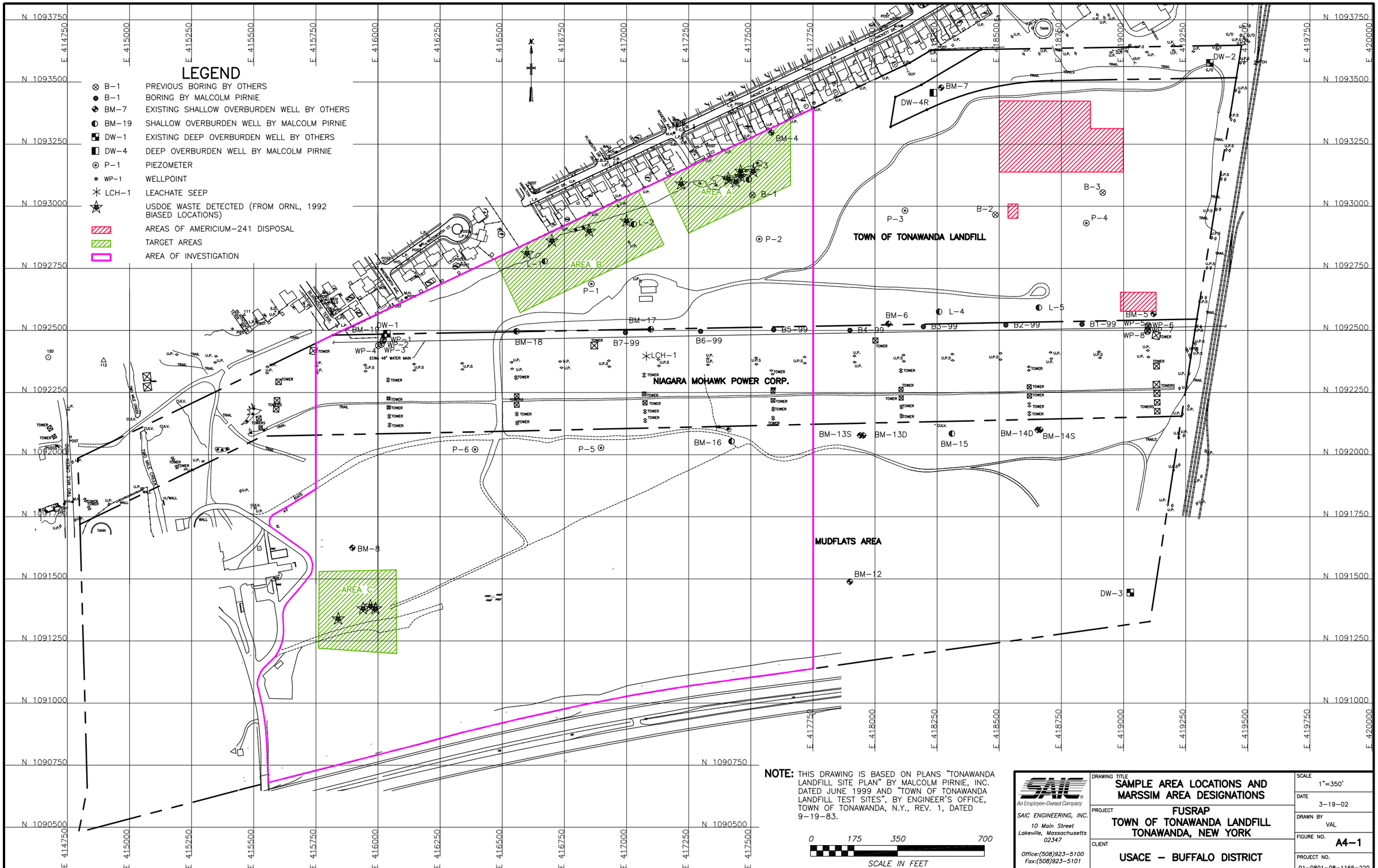

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DRAWING TITLE
SAMPLE AREA LOCATIONS AND MARSSIM AREA DESIGNATIONS

PROJECT
FUSRAP
TOWN OF TONAWANDA LANDFILL
TONAWANDA, NEW YORK

CLIENT
USACE – BUFFALO DISTRICT

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PROJECT NO.	01-0801-08-1165-220

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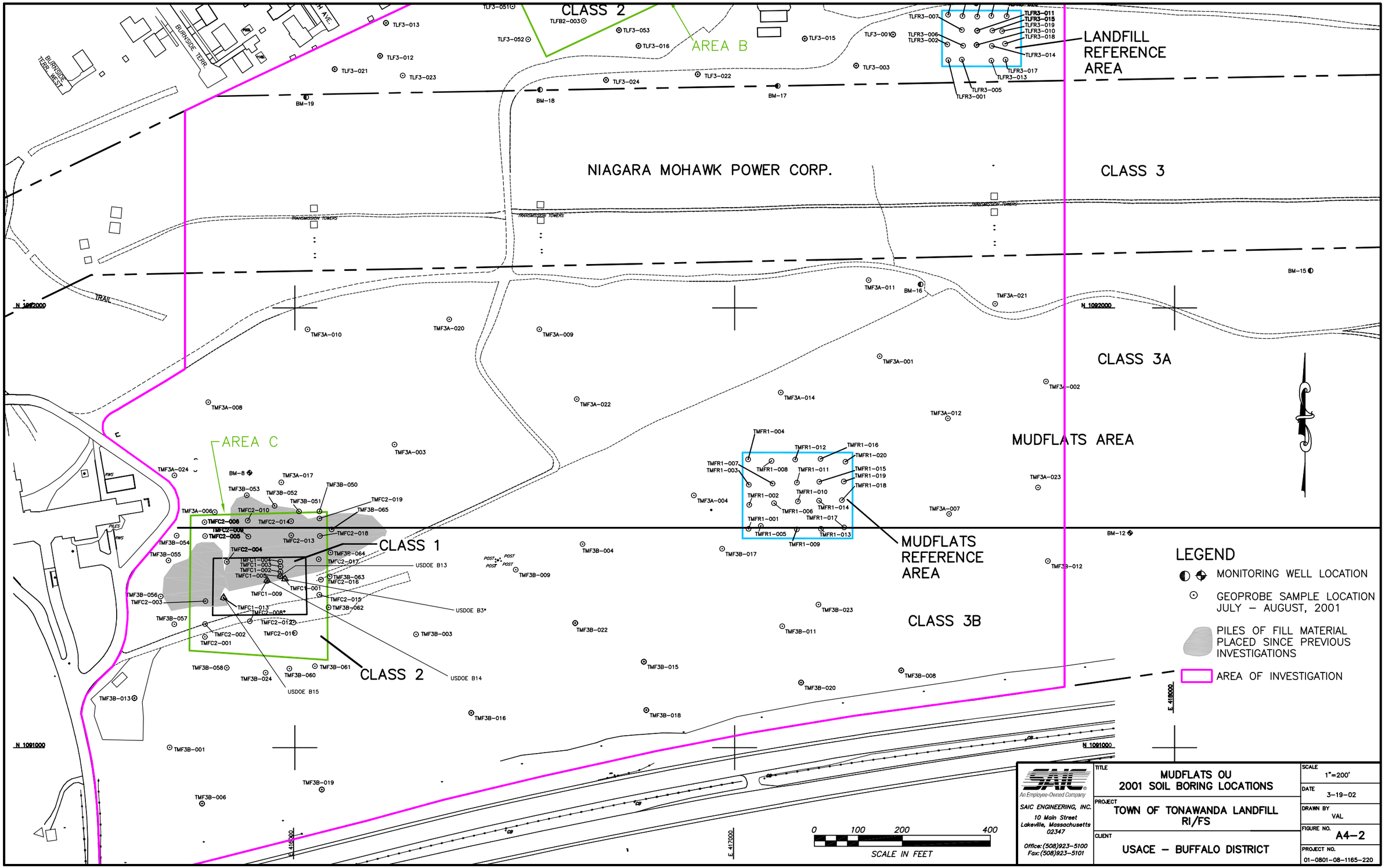
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NIAGARA MOHAWK POWER CORP.
CLASS 3
CLASS 3A
MUDFLATS AREA
AREA C
CLASS 1
CLASS 2
MUDFLATS REFERENCE AREA
CLASS 3B
TRANSMISSION TOWERS
TRAIL
BURNSIDE TERR.
BURNSIDE TERR. WEST
N 1092000
N 1091000
E 415000
E 417000
E 419000
USDOE B13
USDOE B3*
USDOE B14
USDOE B15
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0 100 200 400
SCALE IN FEET
SAIC
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SAIC ENGINEERING, INC.
10 Main Street
Lakeville, Massachusetts
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Fax: (508)923-5101
TITLE
MUDFLATS OU
2001 SOIL BORING LOCATIONS
PROJECT
TOWN OF TONAWANDA LANDFILL
RI/FS
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USACE – BUFFALO DISTRICT
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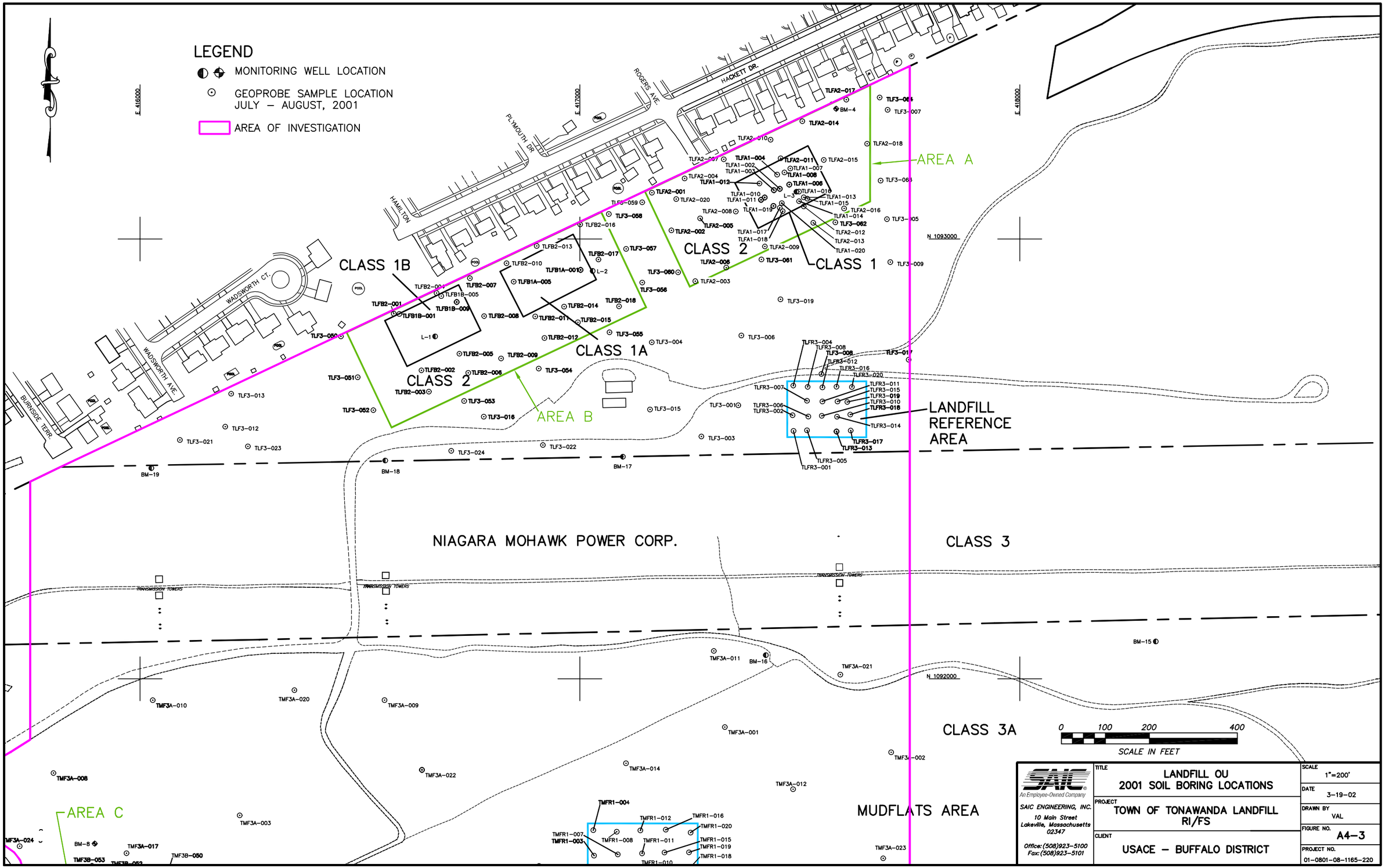
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CLASS 2
CLASS 1A
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AREA B
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TRANSMISSION TOWERS
CLASS 3
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0 100 200 400
SCALE IN FEET
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TITLE
LANDFILL OU
2001 SOIL BORING LOCATIONS
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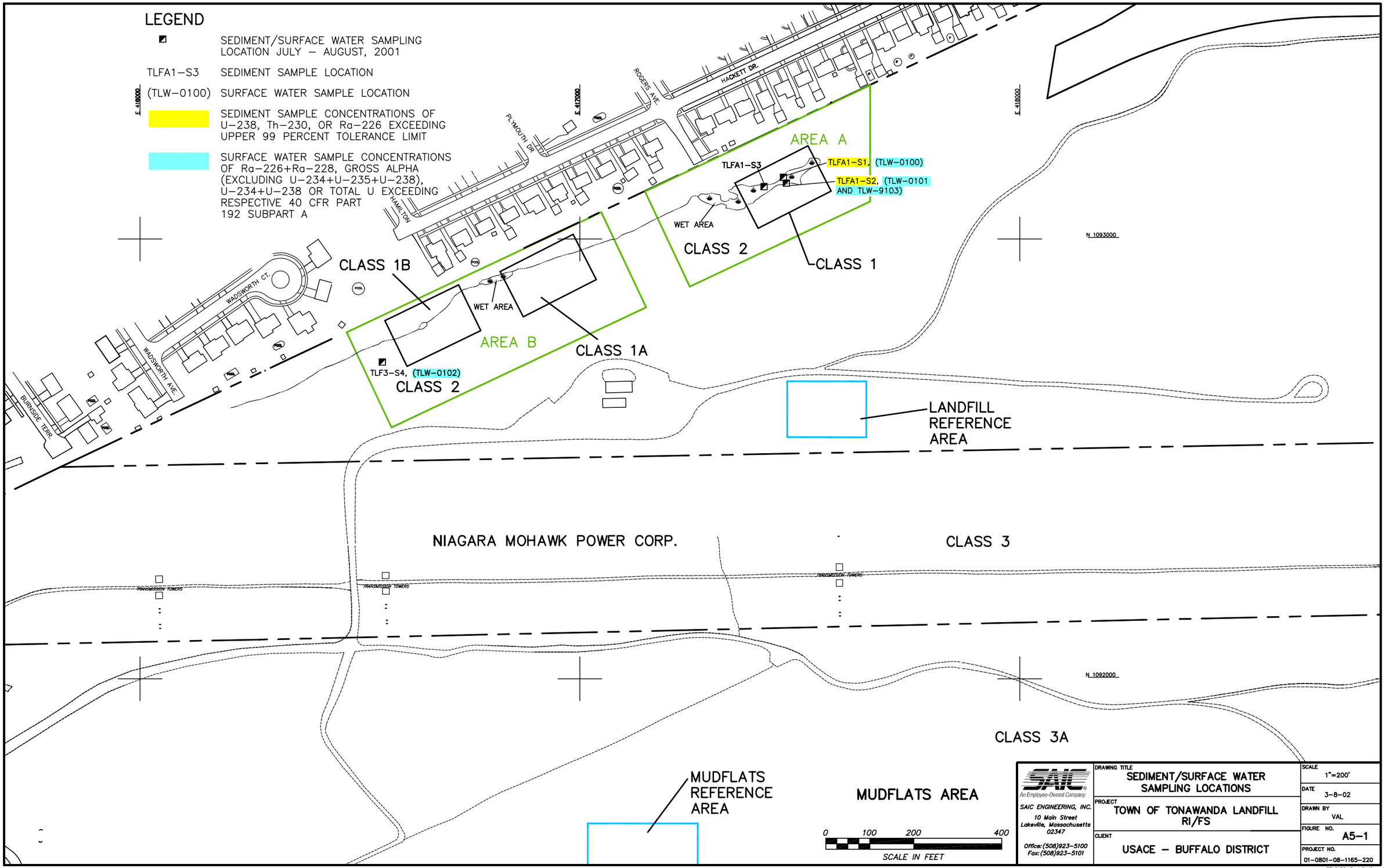
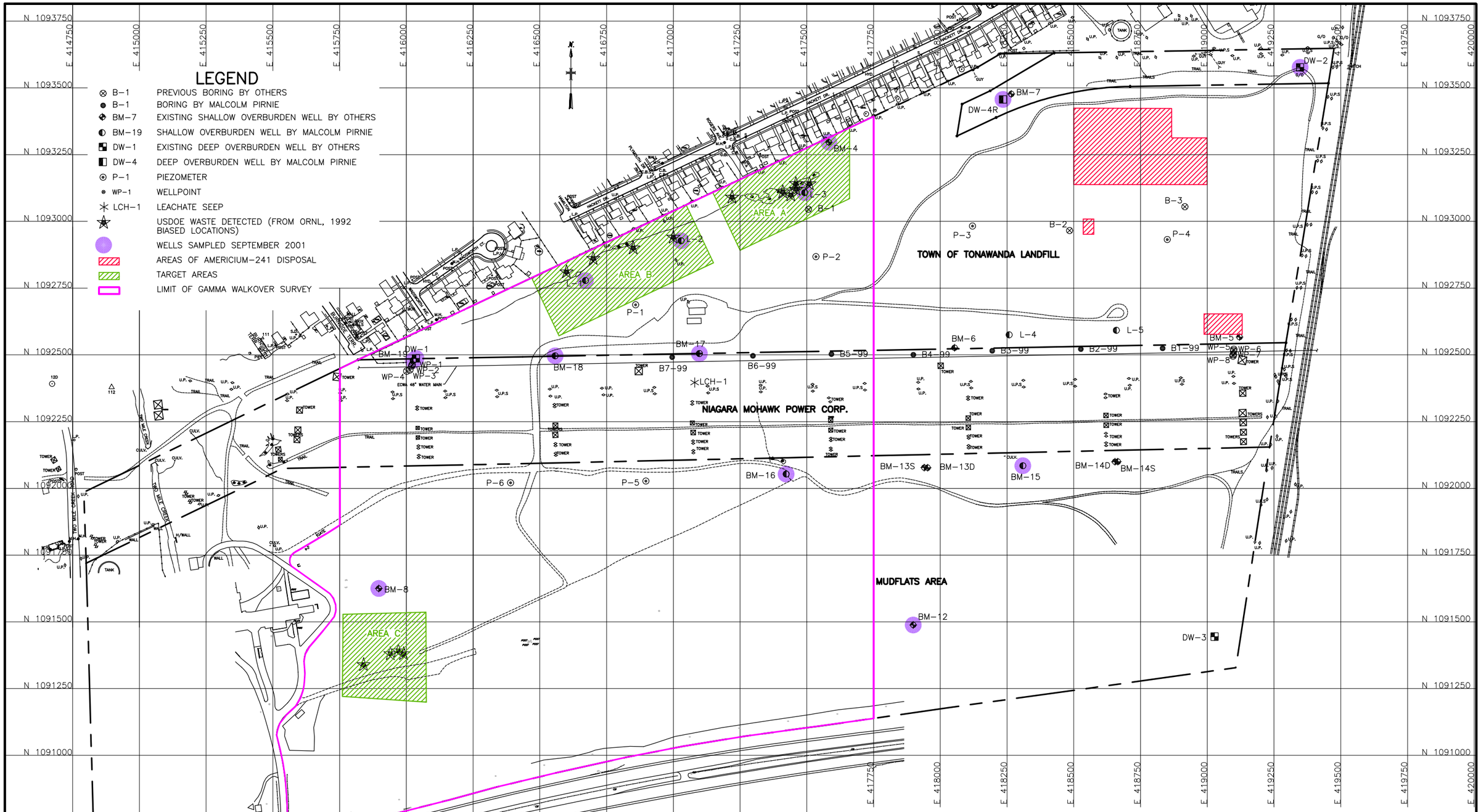
CLIENT
USACE – BUFFALO DISTRICT
SCALE 1"=200'
DATE 3-19-02
DRAWN BY VAL
FIGURE NO. A4-3
PROJECT NO. 01-0801-08-1165-220
TTLRIFSA4-2.DWG


LEGEND
SEDIMENT/SURFACE WATER SAMPLING LOCATION JULY – AUGUST, 2001
TLFA1–S3 SEDIMENT SAMPLE LOCATION
(TLW–0100) SURFACE WATER SAMPLE LOCATION
SEDIMENT SAMPLE CONCENTRATIONS OF U–238, Th–230, OR Ra–226 EXCEEDING UPPER 99 PERCENT TOLERANCE LIMIT
SURFACE WATER SAMPLE CONCENTRATIONS OF Ra–226+Ra–228, GROSS ALPHA (EXCLUDING U–234+U–235+U–238), U–234+U–238 OR TOTAL U EXCEEDING RESPECTIVE 40 CFR PART 192 SUBPART A
E 418000
E 412000
E 418000
N 1093000
N 1092000
ROGERS AVE.
HACKETT DR.
PLYMOUTH DR.
HAMILTON
WADSWORTH CT.
WADSWORTH AVE.
BURNSIDE TERR.
POOL
AREA A
TLFA1–S3
TLFA1–S1, (TLW–0100)
TLFA1–S2, (TLW–0101 AND TLW–9103)
WET AREA
CLASS 2
CLASS 1
CLASS 1B
WET AREA
AREA B
CLASS 1A
TLF3–S4, (TLW–0102)
CLASS 2
LANDFILL REFERENCE AREA
NIAGARA MOHAWK POWER CORP.
CLASS 3
TRANSMISSION TOWERS
TRANSMISSION TOWERS
TRANSMISSION TOWERS
CLASS 3A
MUDFLATS REFERENCE AREA
MUDFLATS AREA
0 100 200 400
SCALE IN FEET
SAIC
An Employee-Owned Company
SAIC ENGINEERING, INC.
10 Main Street
Lakeville, Massachusetts 02347
Office: (508)923–5100
Fax: (508)923–5101
DRAWING TITLE
SEDIMENT/SURFACE WATER SAMPLING LOCATIONS
PROJECT
TOWN OF TONAWANDA LANDFILL RI/FS
CLIENT
USACE – BUFFALO DISTRICT
SCALE 1"=200'
DATE 3–8–02
DRAWN BY VAL
FIGURE NO. A5–1
PROJECT NO. 01–0801–08–1165–220
TTLRIFSA5–1.DWG



NOTE: THIS DRAWING IS BASED ON PLANS "TONAWANDA LANDFILL SITE PLAN" BY MALCOLM PIRNIE, INC. DATED JUNE 1999 AND "TOWN OF TONAWANDA LANDFILL TEST SITES", BY ENGINEER'S OFFICE, TOWN OF TONAWANDA, N.Y., REV. 1, DATED 9-19-83.

SAIC
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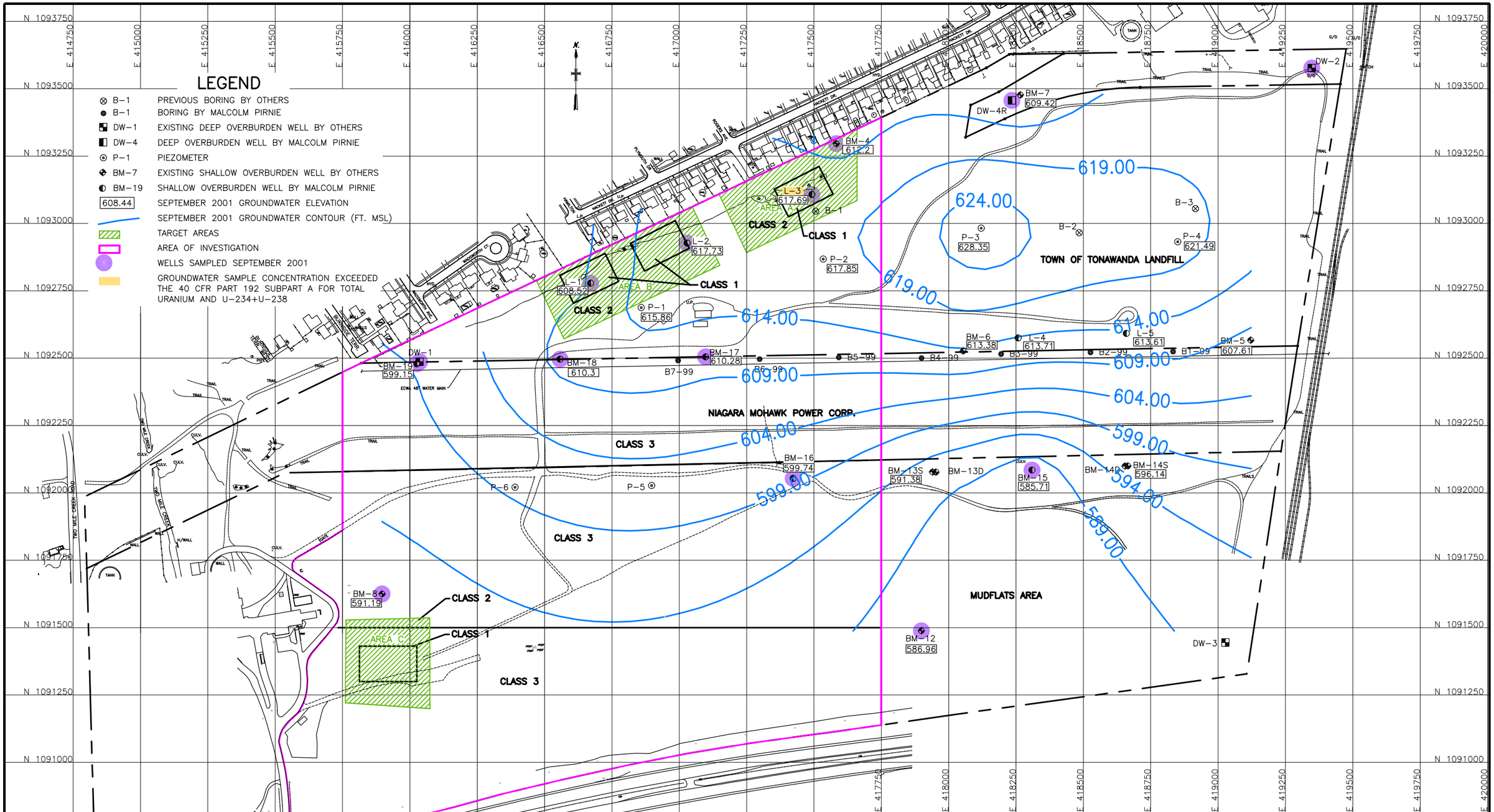
DRAWING TITLE	GROUNDWATER MONITORING WELL LOCATIONS, SAMPLED SEPTEMBER 2001
PROJECT	FUSRAP TOWN OF TONAWANDA LANDFILL TONAWANDA, NEW YORK
CLIENT	USACE – BUFFALO DISTRICT
SCALE	1"=350'
DATE	3-19-02
DRAWN BY	VAL
FIGURE NO.	A7-1
PROJECT NO.	01-0801-08-1165-220

TTLRIFSA7-1.DWG



NOTE: THIS DRAWING IS BASED ON PLANS "TONAWANDA LANDFILL SITE PLAN" BY MALCOLM PIRNIE, INC. DATED JUNE 1999 AND "TOWN OF TONAWANDA LANDFILL TEST SITES", BY ENGINEER'S OFFICE, TOWN OF TONAWANDA, N.Y., REV. 1, DATED 9-19-83.

0 175 350 700

SCALE IN FEET

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Fax:(508)923-5101

DRAWING TITLE
GROUNDWATER CONTOURS IN SHALLOW WELLS, SEPTEMBER 2001

PROJECT
FUSRAP
TOWN OF TONAWANDA LANDFILL
TONAWANDA, NEW YORK

CLIENT
USACE – BUFFALO DISTRICT

SCALE	1"=350'
DATE	3-19-02
DRAWN BY	VAL
FIGURE NO.	A7-2
PROJECT NO.	01-0801-08-1165-220

TTLRIFSA7-2.DWG

TABLES

Table A4-1
Radiological Analytical/Methods, Parameters, and Project Quantitation Limits

Parameters	Analytical Methods*		Project Quantitation Levels[a]	
	Water	Soil/Solid	Water	Soil
Radiochemical Parameters				
Iso-Uranium 234, 235, 238	Radiochemical Separation/Alpha Spectrometry [b]	Radiochemical Separation/Alpha Spectrometry [b]	1 pCi/L	1 pCi/g
Iso-Thorium 228, 230, 232	Radiochemical Separation/Alpha Spectrometry [b]	Radiochemical Separation/Alpha Spectrometry [b]	1 pCi/L	1 pCi/g
Radium 226	EPA 903.1 Rn Emanation Method[b]	Radiochemical Separation/Rn Emanation Method[b] or Gamma Spectrometry[b]	0.5 pCi/L	0.5 pCi/g
Radium 228	EPA 904.0 Method or equivalent[b]	Radiochemical Separation/Beta Count[b]	1 pCi/L	1 pCi/g
Gross Alpha	EPA 900.0 method or equivalent[b]	N/A	1 pCi/L	N/A
Gamma Spectroscopy (Isotope identification) (Including Am-241)	Gamma Spectrometry[b]	Gamma Spectrometry[b]	1 pCi/L (Not including Am-241)	1 pCi/g
Total Uranium	KPA or Fluorometry	N/A	10 µg/L	N/A

[a]These were expected quantitation limits based on reagent-grade water or a purified solid matrix. Actual quantitation limits depended upon the nature of the sample matrix. The limit reported on final laboratory reports take into account the actual sample volume or weight, percent solids (where applicable), and the dilution factor, if any. The quantitation limits for additional analytes to this list may vary, depending upon the results of laboratory studies. All solids were reported on a dry-weight basis, with the associated sample percent moisture reported separately.

[b]Laboratory-specific procedures, were conducted in accordance with the specified EPA-600/4-80-032 *Prescribed Procedures for Measurement of Radioactivity in Drinking Water*, August 1980; EPA SW-846 *Test Methods for Evaluating Solid Waste Physical/Chemical Methods*, December 1987; EPA 520/5-84-006 *Eastern Environmental Radiation Facility Radiochemistry Procedures Manual*, August 1984; EML HASL-300 *Environmental Measurements Laboratory Procedure Manual*, 26th or 27th editions; LA-10300-M *Health and Environmental Chemistry: Analytical Techniques, Data Management, and Quality Assurance*, October 1996; ISBN-157477-021-7 *DOE Methods for Evaluating Environmental and Waste Management Samples - 1997 edition*; any appropriate ASTM methods; or any additional project-approved methods.

* SW-846 Methods unless otherwise specified

Table A4-2 - Summary Table of Soil Borings and Soil Samples

Area	Number of Borings	Boring numbers	Sample Numbers	Number of Samples	Number of QA Samples	Total Number of Samples
Tonawanda Landfill - Mudflats Area						
Mudflats - Reference Area	20	TMFR1-001 - TMFR1-020	TMF-0001 - TMF-0050	40	4	44
Mudflats - Class 3A (Random)	18	TMFR3A-001 - 004, TMFR3A-006 - 012, TMFR3A-014, TMFR3A-017, TMFR3A-020 - 024	TMF-0051 - TMF-0099	36	4	40
Mudflats - Class 3B (Random)	18	TMF3B-001, TMF3B-003 - 004, TMF3B-006, TMF3B-008 - 009, TMF3B-011 - 013, TMF3B-015 - 020, TMF3B-022-024	TMF-0101 - TMF-0150	36	4	40
Mudflats - Class 3B - Biased	15	TMF3B-050 - 058, TMF3B-060 - 065	TMF-0151 - TMF-0209	30	4	34
Mudflats - Class 2 (Area C)	18	TMFC2-001 - 006, TMFC2-008 - 019	TMF-0210 - TMF-0269	36	5	41
Mudflats - Class 1 (Area C)	7	TMFC1-001 - 005, TMFC1-009, TMFC1-013	TMF-0270 - TMF-0399	22	3	25
Total Mudflats	**96**			**200**	**24**	**224**

Table A4-2 - Summary Table of Soil Borings and Soil Samples (continued)

Area	Number of Borings	Boring numbers	Sample Numbers	Number of Samples	Number of QA Samples	Total Number of Samples
Tonawanda Landfill - Mudflats Area						
Mudflats - Reference Area	20	TMFR1-001 - TMFR1-020	TMF-0001 - TMF-0050	40	4	44
Mudflats - Class 3A (Random)	18	TMFR3A-001 - 004, TMFR3A-006 - 012, TMFR3A-014, TMFR3A-017, TMFR3A-020 - 024	TMF-0051 - TMF-0099	36	4	40
Mudflats - Class 3B (Random)	18	TMF3B-001, TMF3B-003 - 004, TMF3B-006, TMF3B-008 - 009, TMF3B-011 - 013, TMF3B-015 - 020, TMF3B-022-024	TMF-0101 - TMF-0150	36	4	40
Mudflats - Class 3B - Biased	15	TMF3B-050 - 058, TMF3B-060 - 065	TMF-0151 - TMF-0209	30	4	34
Mudflats - Class 2 (Area C)	18	TMFC2-001 - 006, TMFC2-008 - 019	TMF-0210 - TMF-0269	36	5	41
Mudflats - Class 1 (Area C)	7	TMFC1-001 - 005, TMFC1-009, TMFC1-013	TMF-0270 - TMF-0399	22	3	25
Total Mudflats	**96**			**200**	**24**	**224**

Table A4-3 - Tonawanda Landfill - Mudflats Reference Area 1
Soil Samples

				Ra-226			Th-230			U-238		
Prefix	**No.**	**Depth (ft. bgs)**	**Sample #**	**Result (pCi/g)**	**2σ TPU (pCi/g)**	**Qual**	**Result (pCi/g)**	**2σ TPU (pCi/g)**	**Qual**	**Result (pCi/g)**	**2σ TPU (pCi/g)**	**Qual**
TMFR1	001	0.5	TMF-0001	1.23	0.27		0.7	0.13		0.98	0.25	
TMFR1	001	2.5	TMF-0002	0.42	0.16		0.76	0.13		0.64	0.19	
TMFR1	002	0.5	TMF-0003	0.44	0.19		0.9	0.35	J	0.91	0.23	
TMFR1	002	4	TMF-0004	0.67	0.27		1	0.31	J	0.72	0.21	
TMFR1	003	0.5	TMF-0005	0.67	0.28		1.35	0.46	J	0.81	0.23	
TMFR1	003	4	TMF-0006	0.78	0.26		0.78	0.29	J	0.72	0.2	
TMFR1	004	0.5	TMF-0007	1.08	0.25		0.93	0.18		0.97	0.27	
TMFR1	004	0.5	TMF-9043	0.9	0.25		0.98	0.17		0.99	0.24	
TMFR1	004	3	TMF-0008	0.95	0.39		0.81	0.14		0.73	0.2	
TMFR1	004	3	TMF-9044	1.33	0.34		0.82	0.14		0.66	0.18	
TMFR1	005	0.5	TMF-0009	0.97	0.27		0.78	0.14		0.62	0.2	
TMFR1	005	0.5	TMF-9019	1.02	0.28		0.78	0.14		0.72	0.2	
TMFR1	005	3.8	TMF-0010	0.89	0.34		0.77	0.14		0.89	0.24	
TMFR1	005	3.8	TMF-9020	0.81	0.25		0.85	0.14		0.84	0.22	
TMFR1	006	0.5	TMF-0011	0.32	0.2		0.49	0.22	J	0.82	0.22	
TMFR1	006	3.5	TMF-0012	0.46	0.21		0.74	0.29	J	0.86	0.23	
TMFR1	007	0.5	TMF-0013	1.07	0.3		1.49	0.51	J	0.68	0.19	
TMFR1	007	4	TMF-0014	0.63	0.23		0.79	0.28	J	0.79	0.22	
TMFR1	008	0.5	TMF-0015	0.91	0.22		0.95	0.18		0.76	0.21	
TMFR1	008	2.5	TMF-0016	0.91	0.28		0.84	0.16		0.77	0.21	
TMFR1	009	0.5	TMF-0017	0.82	0.22		0.88	0.16		0.77	0.2	
TMFR1	009	4	TMF-0018	0.92	0.22		0.89	0.15		0.94	0.23	
TMFR1	010	0.5	TMF-0021	0.3	0.27		0.94	0.34	J	0.94	0.25	
TMFR1	010	3.5	TMF-0022	0.49	0.23		0.79	0.26	J	0.76	0.23	
TMFR1	011	0.5	TMF-0023	0.91	0.29		1.16	0.35	J	0.74	0.21	
TMFR1	011	4	TMF-0024	0.83	0.38		0.68	0.24	J	0.6	0.19	
TMFR1	012	0.5	TMF-0025	0.65	0.23		1.24	0.39	J	0.83	0.21	
TMFR1	012	4	TMF-0026	0.69	0.25		0.78	0.31	J	0.78	0.22	
TMFR1	013	0.5	TMF-0027	0.89	0.25		0.78	0.14		0.86	0.23	

ft bgs: feet below ground surface
pCi/g: picocuries per gram
2σ TPU: total propagated uncertainty
UCL95: 95th percent upper confidence limit
J=Estimated; U=Not Detected, value below decision level; UJ=Estimated, value below decision level

Table A4-3 - Tonawanda Landfill - Mudflats Reference Area 1 (Continued)
Soil Samples

				Ra-226			Th-230			U-238		
Prefix	**No.**	**Depth (ft. bgs)**	**Sample #**	**Result (pCi/g)**	**2σ TPU (pCi/g)**	**Qual**	**Result (pCi/g)**	**2σ TPU (pCi/g)**	**Qual**	**Result (pCi/g)**	**2σ TPU (pCi/g)**	**Qual**
TMFR1	013	4	TMF-0028	1.18	0.28		0.86	0.15		0.8	0.21	
TMFR1	014	0.5	TMF-0029	0.68	0.23		1.17	0.39	J	1.15	0.28	
TMFR1	014	4	TMF-0030	-0.03	0.18	U	0.82	0.29	J	0.69	0.19	
TMFR1	015	0.5	TMF-0031	0.99	0.26		0.91	0.38	J	0.86	0.23	
TMFR1	015	4	TMF-0032	0.43	0.23		0.93	0.32		0.93	0.23	J
TMFR1	016	0.5	TMF-0033	0.6	0.32		0.98	0.33	J	0.78	0.2	
TMFR1	016	4	TMF-0034	0.55	0.22		1	0.3	J	0.9	0.22	
TMFR1	017	0.5	TMF-0035	1.03	0.27		0.73	0.13		0.58	0.19	
TMFR1	017	4	TMF-0036	1.74	0.36		0.69	0.13		0.84	0.23	
TMFR1	018	0.5	TMF-0037	1.4	0.32		1.11	0.2		0.92	0.25	
TMFR1	018	4	TMF-0038	1.01	0.27		0.87	0.16		0.73	0.2	
TMFR1	019	0.5	TMF-0039	1.22	0.28		1.03	0.17		0.95	0.24	
TMFR1	019	4	TMF-0040	0.78	0.22		0.73	0.13		0.84	0.22	
TMFR1	020	0.5	TMF-0041	0.96	0.25	J	0.63	0.14	J	0.79	0.21	
TMFR1	020	4	TMF-0042	1.1	0.25	J	0.78	0.17	J	0.84	0.21	

Summary Statistics							
N	44		44		44		
Max	1.74	0.36	1.49	0.51	1.15	0.28	
Min	-0.03	0.18	0.49	0.22	0.58	0.19	
Avg	0.83	0.04	0.88	0.04	0.81	0.03	
Med	0.89		0.85		0.81		
Stdev	0.33		0.19		0.12		
UCL95	0.91		0.93		0.84		

ft bgs: feet below ground surface
pCi/g: picocuries per gram
2σ TPU: total propagated uncertainty
UCL95: 95th percent upper confidence limit
J=Estimated; U=Not Detected, value below decision level; UJ=Estimated, value below decision level

Table A4-4 - Tonawanda Landfill - Mudflats Class 3A - Random Samples
Soil Samples

				Ra-226			Th-230			U-238		
Prefix	**No.**	**Depth (ft. bgs)**	**Sample #**	**Result (pCi/g)**	**2σ TPU (pCi/g)**	**Qual**	**Result (pCi/g)**	**2σ TPU (pCi/g)**	**Qual**	**Result (pCi/g)**	**2σ TPU (pCi/g)**	**Qual**
TMF3A	001	0.5	TMF-0051	0.96	0.25		0.77	0.13		0.83	0.22	
TMF3A	001	4	TMF-0052	0.92	0.24		0.83	0.14		0.64	0.2	
TMF3A	002	0.5	TMF-0059	1.2	0.26		0.73	0.14		0.75	0.2	
TMF3A	002	4	TMF-0060	0.81	0.27		0.79	0.14		0.74	0.2	
TMF3A	003	0.5	TMF-0085	0.89	0.24	J	0.78	0.23	J	0.94	0.19	
TMF3A	003	4	TMF-0086	1.06	0.33	J	0.72	0.22	J	0.82	0.17	
TMF3A	004	0.5	TMF-0083	0.7	0.2		1.23	0.22		0.82	0.22	
TMF3A	004	4	TMF-0084	0.24	0.14		0.86	0.15		0.84	0.21	
TMF3A	006	0.5	TMF-0077	0.97	0.23		1.2	0.19		0.91	0.23	
TMF3A	006	4	TMF-0078	1.03	0.22		0.88	0.15		0.69	0.21	
TMF3A	007	0.5	TMF-0065	0.64	0.22		0.82	0.14		0.89	0.23	
TMF3A	007	4	TMF-0066	0.71	0.21		0.92	0.16		0.88	0.23	
TMF3A	008	0.5	TMF-0079	1.11	0.25	J	1.23	0.25		0.99	0.25	
TMF3A	008	0.5	TMF-9089	0.85	0.26	J	0.8	0.26	J	1.02	0.25	
TMF3A	008	4	TMF-0080	0.84	0.22	J	0.86	0.18	J	0.97	0.26	
TMF3A	008	4	TMF-9090	0.89	0.26	J	0.94	0.28	J	0.74	0.16	
TMF3A	009	0.5	TMF-0069	0.77	0.22	J	0.98	0.21	J	0.97	0.24	
TMF3A	009	4	TMF-0070	0.71	0.18	J	0.73	0.16	J	0.75	0.23	
TMF3A	010	0.5	TMF-0073	0.73	0.3	J	0.78	0.17	J	0.59	0.2	
TMF3A	010	4	TMF-0074	0.84	0.21	J	1.01	0.21	J	1.06	0.29	
TMF3A	011	0.5	TMF-0053	0.78	0.22	J	0.94	0.19	J	0.92	0.23	
TMF3A	011	4	TMF-0054	1.09	0.23	J	0.84	0.18	J	0.92	0.33	
TMF3A	012	0.5	TMF-0061	0.86	0.24	J	0.77	0.15	J	0.74	0.2	
TMF3A	012	4	TMF-0062	1.23	0.27	J	0.67	0.15	J	1	0.24	
TMF3A	014	0.5	TMF-0055	0.87	0.34	J	0.94	0.2	J	0.9	0.25	
TMF3A	014	4	TMF-0056	0.9	0.22	J	0.83	0.18	J	1.01	0.25	
TMF3A	017	0.5	TMF-0081	1.23	0.28		0.93	0.16		0.81	0.22	
TMF3A	017	0.5	TMF-9087	1.05	0.24		0.92	0.15		0.97	0.24	
TMF3A	017	4	TMF-0082	1.08	0.25		0.85	0.15		0.61	0.19	

ft bgs: feet below ground surface
pCi/g: picocuries per gram
2σ TPU: total propagated uncertainty
UCL95: 95th percent upper confidence limit
J=Estimated; U=Not Detected, value below decision level; UJ=Estimated, value below decision level

Table A4-4 - Tonawanda Landfill - Mudflats Class 3A - Random Samples (Continued)
Soil Samples

				Ra-226			Th-230			U-238		
Prefix	**No.**	**Depth (ft. bgs)**	**Sample #**	**Result (pCi/g)**	**2s TPU (pCi/g)**	**Qual**	**Result (pCi/g)**	**2s TPU (pCi/g)**	**Qual**	**Result (pCi/g)**	**2s TPU (pCi/g)**	**Qual**
TMF3A	017	4	TMF-9088	0.92	0.21		0.88	0.16		0.72	0.2	
TMF3A	020	0.5	TMF-0067	0.78	0.21	J	0.91	0.2	J	0.86	0.23	
TMF3A	020	4	TMF-0068	1.03	0.23	J	0.92	0.18	J	0.83	0.23	
TMF3A	021	0.5	TMF-0057	0.48	0.17	J	0.75	0.16	J	0.63	0.18	
TMF3A	021	4	TMF-0058	0.92	0.25	J	0.74	0.17	J	0.82	0.23	
TMF3A	022	0.5	TMF-0075	1.01	0.24	J	0.99	0.2	J	0.99	0.26	
TMF3A	022	4	TMF-0076	0.85	0.21	J	0.93	0.19	J	1.03	0.25	
TMF3A	023	0.5	TMF-0063	1.1	0.26		1.1	0.18		1.03	0.28	
TMF3A	023	4	TMF-0064	0.88	0.22		0.81	0.14		1.04	0.26	
TMF3A	024	0.5	TMF-0071	0.97	0.26		0.91	0.15		0.58	0.18	
TMF3A	024	4	TMF-0072	0.98	0.28		0.84	0.14		0.81	0.23	

Summary Statistics							
N	40		40		40		
Max	1.23	0.28	1.23	0.25	1.06	0.29	
Min	0.24	0.14	0.67	0.15	0.58	0.18	
Avg	0.90	0.04	0.88	0.03	0.85	0.04	
Med	0.90		0.86		0.85		
Stdev	0.19		0.13		0.14		
UCL95	0.95		0.92		0.89		

ft bgs: feet below ground surface
pCi/g: picocuries per gram
2σ TPU: total propagated uncertainty
UCL95: 95th percent upper confidence limit
J=Estimated; U=Not Detected, value below decision level; UJ=Estimated, value below decision level

Table A4-5 - Tonawanda Landfill - Mudflats Class 3B - Random Samples
Soil Samples

				Ra-226			Th-230			U-238		
Prefix	No.	Depth (ft. bgs)	Sample #	Result (pCi/g)	2 s TPU (pCi/g)	Qual	Result (pCi/g)	2 s TPU (pCi/g)	Qual	Result (pCi/g)	2 s TPU (pCi/g)	Qual
TMF3B	001	0.5	TMF-0101	0.18	0.21	J	0.34	0.15	J	0.39	0.11	
TMF3B	001	6.2	TMF-0102	1.03	0.28	J	0.91	0.22	J	1.04	0.21	
TMF3B	003	0.5	TMF-0111	0.14	0.16	J	0.39	0.16	J	0.52	0.13	
TMF3B	003	4	TMF-0112	1.33	0.33	J	1.38	0.39	J	0.79	0.17	
TMF3B	004	0.5	TMF-0115	0.16	0.27	UJ	0.98	0.3	J	0.92	0.19	
TMF3B	004	4	TMF-0116	0.77	0.26	J	0.68	0.19	J	0.84	0.17	
TMF3B	006	0.5	TMF-0127	1.01	0.23		0.96	0.16		0.9	0.25	
TMF3B	006	4	TMF-0128	0.8	0.25		0.77	0.15		0.88	0.22	
TMF3B	008	0.5	TMF-0133	0.67	0.27	J	0.8	0.13	J	0.87	0.22	
TMF3B	008	3.5	TMF-0134	1.08	0.25		0.88	0.15	J	0.75	0.2	
TMF3B	009	0.5	TMF-0117	0.86	0.3	J	1	0.27	J	0.98	0.2	
TMF3B	009	4	TMF-0118	0.71	0.23	J	0.86	0.24	J	0.8	0.17	
TMF3B	011	0.5	TMF-0113	0.67	0.24		0.97	0.15		0.65	0.21	
TMF3B	011	0.5	TMF-9119	0.68	0.23		0.91	0.16		0.82	0.23	
TMF3B	011	3.5	TMF-0114	1.12	0.31		0.91	0.15		0.84	0.23	
TMF3B	011	3.5	TMF-9120	1.12	0.32		0.84	0.15		0.8	0.21	
TMF3B	012	0.5	TMF-0131	0.89	0.24		1.04	0.17		1	0.24	
TMF3B	012	3.5	TMF-0132	1.1	0.46		0.81	0.15		0.9	0.22	
TMF3B	013	1.5	TMF-0103	0.78	0.29		0.76	0.14		0.76	0.21	
TMF3B	013	4	TMF-0104	1.16	0.28		1.21	0.2		1.02	0.26	
TMF3B	015	0.5	TMF-0123	0.93	0.28		1	0.16		0.88	0.24	
TMF3B	015	3.5	TMF-0124	0.82	0.24		0.73	0.13		0.8	0.22	
TMF3B	016	0.5	TMF-0125	0.86	0.25		0.91	0.15		0.96	0.24	
TMF3B	016	3.5	TMF-0126	0.74	0.24		0.77	0.15		0.63	0.18	
TMF3B	017	0.5	TMF-0105	1.05	0.3		0.91	0.15		1.02	0.24	
TMF3B	017	3.5	TMF-0106	0.9	0.26		0.85	0.14		0.98	0.25	
TMF3B	018	0.5	TMF-0137	0.91	0.22	J	0.93	0.14	J	0.83	0.24	
TMF3B	018	4	TMF-0138	0.84	0.23	J	0.86	0.14	J	0.73	0.2	
TMF3B	019	0.5	TMF-0129	0.73	0.2	J	0.96	0.14		0.99	0.25	

ft bgs: feet below ground surface
pCi/g: picocuries per gram
2σ TPU: total propagated uncertainty
UCL95: 95th percent upper confidence limit
J=Estimated; U=Not Detected, value below decision level; UJ=Estimated, value below decision level

Table A4-5 - Tonawanda Landfill - Mudflats Class 3B - Random Samples (Continued)
Soil Samples

				Ra-226			Th-230			U-238		
Prefix	No.	Depth (ft. bgs)	Sample #	Result (pCi/g)	2s TPU (pCi/g)	Qual	Result (pCi/g)	2s TPU (pCi/g)	Qual	Result (pCi/g)	2s TPU (pCi/g)	Qual
TMF3B	019	0.5	TMF-9139	1.12	0.24	J	0.93	0.14	J	1.04	0.26	
TMF3B	019	3.5	TMF-0130	0.89	0.21	J	0.75	0.12	J	0.9	0.24	
TMF3B	019	3.5	TMF-9140	0.96	0.22	J	0.81	0.13	J	0.94	0.24	
TMF3B	020	0.5	TMF-0135	1.05	0.22		1.14	0.18	J	0.72	0.2	
TMF3B	020	3.5	TMF-0136	0.68	0.22	J	0.74	0.12	J	0.73	0.21	
TMF3B	022	0.5	TMF-0121	1.22	0.26		1.1	0.18		0.99	0.28	
TMF3B	022	4	TMF-0122	0.68	0.19		0.81	0.15		0.78	0.23	
TMF3B	023	0.5	TMF-0109	1.28	0.4		1.01	0.16		1.06	0.28	
TMF3B	023	3.5	TMF-0110	0.81	0.29		0.86	0.15		0.84	0.22	
TMF3B	024	0.5	TMF-0107	0.69	0.22	J	0.88	0.23	J	0.74	0.17	
TMF3B	024	4	TMF-0108	1.18	0.32	J	0.82	0.25		0.77	0.16	

Summary Statistics							
N	40		40		40		
Max	1.33	0.33	1.38	0.39	1.06	0.28	
Min	0.14	0.16	0.34	0.15	0.39	0.11	
Avg	0.87	0.04	0.88	0.03	0.85	0.03	
Med	0.88		0.88		0.84		
Stdev	0.27		0.18		0.14		
UCL95	0.94		0.93		0.88		

ft bgs: feet below ground surface
pCi/g: picocuries per gram
2σ TPU: total propagated uncertainty
UCL95: 95th percent upper confidence limit
J=Estimated; U=Not Detected, value below decision level; UJ=Estimated, value below decision level

Table A4-6 - Tonawanda Landfill - Mudflats Class 3B - Biased Samples
Soil Samples

				Ra-226			Th-230			U-238		
Prefix	No.	Depth (ft. bgs)	Sample #	Result (pCi/g)	2 s TPU (pCi/g)	Qual	Result (pCi/g)	2 s TPU (pCi/g)	Qual	Result (pCi/g)	2 s TPU (pCi/g)	Qual
TMF3B	050	0.5	TMF-0151	1.05	0.3		0.86	0.14	J	0.75	0.2	
TMF3B	050	3.5	TMF-0152	1.09	0.25		0.87	0.14	J	0.82	0.21	
TMF3B	051	0.5	TMF-0154	0.99	0.21	J	0.8	0.13	J	0.72	0.2	
TMF3B	051	3	TMF-0155	0.98	0.26	J	0.88	0.14	J	0.69	0.2	
TMF3B	052	0.5	TMF-0157	0.74	0.19	J	0.93	0.15	J	1	0.25	
TMF3B	052	3.5	TMF-0158	1.26	0.3	J	0.88	0.16	J	0.66	0.22	
TMF3B	053	0.5	TMF-0160	1.64	0.32		1.24	0.18	J	1.21	0.29	
TMF3B	053	4	TMF-0161	0.9	0.22	J	0.76	0.13		0.99	0.27	
TMF3B	054	0.5	TMF-0163	0.69	0.18	J	0.84	0.14	J	0.73	0.2	
TMF3B	054	0.5	TMF-9199	0.58	0.23		0.92	0.18		0.9	0.24	
TMF3B	054	3.5	TMF-0164	0.75	0.18	J	0.86	0.13	J	0.84	0.22	
TMF3B	054	3.5	TMF-9200	0.47	0.22		0.81	0.16		0.85	0.22	
TMF3B	055	0.5	TMF-0166	0.97	0.23		0.87	0.16		0.7	0.21	
TMF3B	055	3.5	TMF-0167	0.72	0.2		0.83	0.14		0.95	0.25	
TMF3B	056	0.5	TMF-0169	0.8	0.19	J	0.99	0.3		0.67	0.2	
TMF3B	056	4	TMF-0170	0.95	0.23	J	0.76	0.25		0.59	0.17	
TMF3B	057	0.5	TMF-0172	1.1	0.33	J	0.77	0.26		0.9	0.23	
TMF3B	057	3.5	TMF-0173	1.11	0.28	J	1.17	0.3		0.91	0.23	
TMF3B	058	0.5	TMF-0175	0.5	0.21		0.5	0.12		0.39	0.15	
TMF3B	058	6	TMF-0176	0.95	0.26		1.02	0.2		0.76	0.21	
TMF3B	060	0.5	TMF-0178	0.82	0.21		1.02	0.18		1.09	0.27	
TMF3B	060	3.5	TMF-0179	0.66	0.2		0.83	0.15		0.78	0.21	
TMF3B	061	0.5	TMF-0181	0.37	0.18		0.7	0.13		0.58	0.18	
TMF3B	061	4	TMF-0182	0.65	0.28		0.97	0.17		0.76	0.21	
TMF3B	062	0.5	TMF-0184	1.01	0.44		0.87	0.15		0.81	0.24	
TMF3B	062	4	TMF-0185	0.51	0.17		0.58	0.14		0.54	0.18	
TMF3B	063	1	TMF-0187	1.48	0.29		1.36	0.22		1.05	0.27	
TMF3B	063	8	TMF-0188	0.85	0.22		0.99	0.17		0.7	0.21	
TMF3B	064	0.5	TMF-0190	0.61	0.23		0.61	0.13		0.56	0.18	

ft bgs: feet below ground surface
pCi/g: picocuries per gram
2σ TPU: total propagated uncertainty
UCL95: 95th percent upper confidence limit
J=Estimated; U=Not Detected, value below decision level; UJ=Estimated, value below decision level

Table A4-6 - Tonawanda Landfill - Mudflats Class 3B - Biased Samples (Continued)
Soil Samples

				Ra-226			Th-230			U-238		
Prefix	**No.**	**Depth (ft. bgs)**	**Sample #**	**Result (pCi/g)**	**2σ TPU (pCi/g)**	**Qual**	**Result (pCi/g)**	**2σ TPU (pCi/g)**	**Qual**	**Result (pCi/g)**	**2σ TPU (pCi/g)**	**Qual**
TMF3B	064	0.5	TMF-9196	0.7	0.22		0.58	0.16		0.52	0.17	
TMF3B	064	13.5	TMF-0191	0.18	0.14		0.76	0.15		0.71	0.2	
TMF3B	064	13.5	TMF-9197	0.92	0.25		0.92	0.17		0.73	0.2	
TMF3B	065	0.5	TMF-0193	0.67	0.21		0.74	0.16		0.73	0.22	
TMF3B	065	9.85	TMF-0194	1.02	0.26		0.77	0.15		0.74	0.22	

Summary Statistics							
N	34		34		34		
Max	1.64	0.32	1.36	0.22	1.21	0.29	
Min	0.18	0.14	0.50	0.12	0.39	0.15	
Avg	0.84	0.04	0.86	0.03	0.77	0.04	
Med	0.84		0.86		0.75		
Stdev	0.30		0.18		0.17		
UCL95	0.93		0.91		0.83		

ft bgs: feet below ground surface
pCi/g: picocuries per gram
2σ TPU: total propagated uncertainty
UCL95: 95th percent upper confidence limit
J=Estimated; U=Not Detected, value below decision level; UJ=Estimated, value below decision level

Table A4-7 - Tonawanda Landfill - Mudflats Class 2, Area C
Soil Samples

				Ra-226			Th-230			U-238		
Prefix	No.	Depth (ft. bgs)	Sample #	Result (pCi/g)	2σ TPU (pCi/g)	Qual	Result (pCi/g)	2σ TPU (pCi/g)	Qual	Result (pCi/g)	2σ TPU (pCi/g)	Qual
TMFC2	001	0.5	TMF-0218	0.75	0.2	J	1.24	0.33		0.86	0.23	
TMFC2	001	3.5	TMF-0219	0.7	0.17	J	1.06	0.3		0.86	0.23	
TMFC2	002	1	TMF-0232	0.95	0.2		1.03	0.32	J	0.74	0.21	
TMFC2	002	6.5	TMF-0233	0.07	0.12	U	1.02	0.33		0.75	0.22	
TMFC2	003	0.5	TMF-0242	1.03	0.22		0.88	0.28	J	0.96	0.23	
TMFC2	003	11.5	TMF-0243	0.9	0.26		1.23	0.36		0.64	0.17	
TMFC2	004	0.5	TMF-0214	0.91	0.21	J	0.97	0.3		0.78	0.22	
TMFC2	004	3.5	TMF-0215	0.93	0.2	J	0.93	0.24		0.89	0.23	
TMFC2	005	0.5	TMF-0210	0.88	0.23	J	0.9	0.26		0.96	0.24	
TMFC2	005	0.5	TMF-9246	0.74	0.18	J	0.84	0.26		0.89	0.32	
TMFC2	005	3.5	TMF-0211	0.81	0.18	J	0.82	0.24		0.87	0.22	
TMFC2	005	3.5	TMF-9247	0.8	0.2	J	0.73	0.22		0.99	0.24	
TMFC2	006	0.5	TMF-0212	1.08	0.21	J	0.92	0.26		0.71	0.22	
TMFC2	006	4	TMF-0213	1.04	0.28	J	1.18	0.31		1	0.25	
TMFC2	008	4	TMF-0230	0.88	0.22		1.16	0.33	J	0.99	0.25	
TMFC2	008	7	TMF-0231	0.33	0.15		1.09	0.32	J	0.8	0.21	
TMFC2	009	0.5	TMF-0244	0.56	0.16		0.5	0.23		0.52	0.16	
TMFC2	009	11.5	TMF-0245	0.94	0.21		0.96	0.31		0.69	0.21	
TMFC2	010	1	TMF-0240	0.65	0.19		0.66	0.26		0.92	0.24	
TMFC2	010	9.5	TMF-0241	0.94	0.21		0.69	0.23	J	0.83	0.21	
TMFC2	011	0.5	TMF-0220	0.86	0.19	J	0.85	0.25		1.06	0.27	
TMFC2	011	3.5	TMF-0221	0.73	0.18	J	0.88	0.25		0.65	0.19	
TMFC2	012	0.5	TMF-0222	1.32	0.26	J	1.79	0.43		2.73	0.52	
TMFC2	012	3.5	TMF-0223	0.42	0.11	J	1.06	0.27		3.04	0.61	
TMFC2	013	0.5	TMF-0236	0.96	0.21		0.99	0.31	J	1.03	0.25	
TMFC2	013	13.5	TMF-0237	1.02	0.23		1.04	0.32	J	0.69	0.22	
TMFC2	014	0.5	TMF-0238	0.99	0.22		1.08	0.32		1.1	0.29	
TMFC2	014	12	TMF-0239	0.85	0.22		1.04	0.33	J	0.65	0.18	
TMFC2	015	2	TMF-0224	1.37	0.26		1.28	0.34	J	1.3	0.31	

ft bgs: feet below ground surface
pCi/g: picocuries per gram
2σ TPU: total propagated uncertainty
UCL95: 95th percent upper confidence limit
J=Estimated; U=Not Detected, value below decision level; UJ=Estimated, value below decision level

Table A4-7 - Tonawanda Landfill - Mudflats Class 2, Area C (Continued)
Soil Samples

				Ra-226			Th-230			U-238		
Prefix	**No.**	**Depth (ft. bgs)**	**Sample #**	**Result (pCi/g)**	**2s TPU (pCi/g)**	**Qual**	**Result (pCi/g)**	**2s TPU (pCi/g)**	**Qual**	**Result (pCi/g)**	**2s TPU (pCi/g)**	**Qual**
TMFC2	015	5	TMF-0225	1.34	0.24	J	1.29	0.34	J	0.95	0.25	
TMFC2	016	0.5	TMF-0226	1.07	0.22		1.36	0.35	J	1.08	0.26	
TMFC2	016	3.5	TMF-0227	0.94	0.21		1.16	0.31	J	1.06	0.27	
TMFC2	017	0.5	TMF-0234	0.47	0.14		0.69	0.27		0.48	0.16	
TMFC2	017	0.5	TMF-9250	0.96	0.19	J	0.79	0.28		0.66	0.19	
TMFC2	017	11	TMF-9248	0.98	0.21		0.81	0.3	J	0.78	0.22	
TMFC2	017	14	TMF-0235	1.05	0.3		0.69	0.27		0.78	0.21	
TMFC2	017	14	TMF-9249	1.05	0.25		0.86	0.27		0.87	0.22	
TMFC2	018	0.5	TMF-0228	0.74	0.21		0.68	0.16		0.8	0.24	
TMFC2	018	14	TMF-0229	0.45	0.34	J	0.81	0.17		0.88	0.24	
TMFC2	019	0.5	TMF-0216	0.75	0.2	J	0.92	0.28		0.58	0.18	
TMFC2	019	3.5	TMF-0217	1.04	0.22	J	1.17	0.31		0.87	0.22	

Summary Statistics							
N	41		41		41		
Max	1.37	0.26	1.79	0.43	3.04	0.61	
Min	0.07	0.12	0.50	0.23	0.48	0.16	
Avg	0.86	0.03	0.98	0.05	0.94	0.04	
Med	0.91		0.96		0.87		
Stdev	0.26		0.24		0.48		
UCL95	0.93		1.04		1.07		

ft bgs: feet below ground surface
pCi/g: picocuries per gram
2σ TPU: total propagated uncertainty
UCL95: 95th percent upper confidence limit
J=Estimated; U=Not Detected, value below decision level; UJ=Estimated, value below decision level

Table A4-8 - Tonawanda Landfill - Mudflats Class 1, Area C
Soil Samples

				Ra-226			Th-230			U-238		
Prefix	No.	Depth (ft. bgs)	Sample #	Result (pCi/g)	2 s TPU (pCi/g)	Qual	Result (pCi/g)	2 s TPU (pCi/g)	Qual	Result (pCi/g)	2 s TPU (pCi/g)	Qual
TMFC1	001	0.5	TMF-0270	1.06	0.27		1	0.19		1.05	0.27	
TMFC1	001	10.25	TMF-0271	0.72	0.22		0.66	0.13		1.15	0.29	
TMFC1	001	14	TMF-0272	0.66	0.26		0.92	0.18		0.91	0.23	
TMFC1	002	0.5	TMF-0315	0.91	0.23	J	1.14	0.36		0.98	0.25	
TMFC1	002	12.5	TMF-0316	0.72	0.15	J	0.77	0.28		0.95	0.23	
TMFC1	002	15	TMF-0317	1.05	0.24	J	1.08	0.31		0.73	0.22	
TMFC1	003	0.5	TMF-0312	0.81	0.19	J	0.9	0.29		0.78	0.22	
TMFC1	003	11	TMF-0313	0.86	0.18	J	1.03	0.32		0.65	0.18	
TMFC1	003	14.5	TMF-0314	0.83	0.16	J	0.92	0.29		0.88	0.23	
TMFC1	004	0.5	TMF-0309	1.03	0.22	J	1.35	0.41	J	1.24	0.29	
TMFC1	004	11	TMF-0310	0.66	0.19	J	0.86	0.19		0.73	0.2	
TMFC1	004	15	TMF-0311	0.82	0.16	J	0.91	0.34		0.83	0.22	
TMFC1	005	0.5	TMF-0282	0.5	0.19		0.62	0.13		0.98	0.28	
TMFC1	005	4	TMF-0285	22.6	2.4	J	31.5	4.4		27.9	4.5	
TMFC1	005	10.25	TMF-0283	0.98	0.23	J	1.06	0.19		1.37	0.33	
TMFC1	005	14	TMF-0284	0.99	0.26	J	0.78	0.14		0.83	0.22	
TMFC1	009	0.5	TMF-0294	0.8	0.2		0.94	0.29		0.71	0.2	
TMFC1	009	0.5	TMF-9342	0.39	0.16		1.32	0.36	J	0.84	0.21	
TMFC1	009	8.5	TMF-0295	0.49	0.15		0.93	0.32		1.09	0.27	
TMFC1	009	8.5	TMF-9343	0.92	0.21		1.03	0.33	J	0.74	0.21	
TMFC1	009	14	TMF-0296	1.04	0.24		0.78	0.25		0.99	0.24	
TMFC1	009	14	TMF-9344	0.68	0.19		0.98	0.32	J	0.8	0.23	
TMFC1	013	0.5	TMF-0306	0.67	0.17		1.16	0.35		0.7	0.21	
TMFC1	013	11.25	TMF-0307	0.83	0.19		0.97	0.31	J	0.88	0.24	
TMFC1	013	15	TMF-0308	0.93	0.19		1.04	0.3	J	0.84	0.23	

ft bgs: feet below ground surface
pCi/g: picocuries per gram
2σ TPU: total propagated uncertainty
UCL95: 95th percent upper confidence limit
J=Estimated; U=Not Detected, value below decision level; UJ=Estimated, value below decision level

Table A4-8 - Tonawanda Landfill - Mudflats Class 1, Area C (Continued)
Soil Samples

				Ra-226			Th-230			U-238		
Prefix	No.	Depth (ft. bgs)	Sample #	Result (pCi/g)	2s TPU (pCi/g)	Qual	Result (pCi/g)	2s TPU (pCi/g)	Qual	Result (pCi/g)	2s TPU (pCi/g)	Qual
Summary Statistics			**N**	25			25			25		
			Max	22.60	2.40		31.50	4.40		27.90	4.50	
			Min	0.39	0.16		0.62	0.13		0.65	0.18	
			Avg	1.68	0.10		2.19	0.18		1.98	0.19	
			Med	0.83			0.97			0.88		
			Stdev	4.36			6.11			5.40		
			UCL95	3.17			4.27			3.83		

ft bgs: feet below ground surface
pCi/g: picocuries per gram
2σ TPU: total propagated uncertainty
UCL95: 95th percent upper confidence limit
J=Estimated; U=Not Detected, value below decision level; UJ=Estimated, value below decision level

Table A4-9 - Summary of Elevated Soil Results
Mudflats
Th-230, U-238 and Ra-226

Prefix	No.	Depth (ft bgs)	Sample #	Th-230 Result (pCi/g)	U-238 Result (pCi/g)	Ra-226 Result (pCi/g)
MUDFLATS						
*** Screening Level UTL 99/99.9**				**1.69**	**1.31**	**2.22**
TMFC1	005	10.25	TMF-0283	1.06	1.37	0.98
TMFC1	005	4	TMF-0285	31.5	27.9	22.6
TMFC2	012	0.5	TMF-0222	1.79	2.73	1.32
TMFC2	012	3.5	TMF-0223	1.06	3.04	0.42

ft bgs: feet below ground surface
pCi/g: picocuries per gram
* UTL 99/99.9 : 99 percent confidence level that at least 99.9 percent of results will fall below the UTL 99/99.9

Table A4-10
Summary of Mudflats OU
Am-241 Detections

Prefix	No.	Depth (ft bgs)	Sample #	Result (pCi/g)	Qual
TMFR1	001	2.5	TMF-0002	0.15	
TMFR1	003	0.5	TMF-0005	0.5	
TMFR1	007	4	TMF-0014	0.092	
TMFR1	016	4	TMF-0034	0.112	
TMFR1	019	4	TMF-0040	0.13	
TMFC1	005	10	TMF-0283	0.07	UJ
TMFC1	005	14	TMF-0284	0.47	
TMFC2	001	3.5	TMF-0219	-0.134	UJ
TMFC2	004	0.5	TMF-0214	0.102	
TMFC2	008	7	TMF-0231	-0.21	UJ
TMFC2	013	0.5	TMF-0236	-0.19	UJ
TMFC2	015	2	TMF-0224	0.28	
TMF3A	002	4	TMF-0060	-0.42	UJ
TMF3B	001	6.2	TMF-0102	0.12	
TMF3B	006	4	TMF-0128	0.46	
TMF3B	057	3.5	TMF-0173	0.079	

Notes:
UJ - Estimated, value below decision level
ft bgs - feet below ground surface
pCi/g - picocuries per gram

Table A4-11
Results Summary for Tonawanda Landfill - Mudflats OU
Soil Results

Nuclide	Detections/ Results (1)	Maximum Concentration (pCi/g)	Minimum Concentration (pCi/g)	Mean Concentration (pCi/g)	Standard Deviation (pCi/g)	UCL95 Concentration (pCi/g)
Ra-226	160/162	22.6	0.07	1.01	1.72	1.23
Ra-228	162/162	1.36	0.14	0.72	0.18	0.75
Th-228	161/162	1.42	0.14	0.87	0.22	0.9
Th-230	162/162	31.5	0.34	1.11	2.41	1.42
Th-232	162/162	1.29	0.16	0.85	0.21	0.87
U-234	162/162	29	0.36	1.06	2.23	1.35
U-235	149/162	1.72	0.01	0.11	0.15	0.13
U-238	162/162	27.9	0.39	1.04	2.14	1.32
Am-241	6/162	0.47	-0.53	0	0.13	0.02
Pa-231	4/162	2.3	-3.6	-0.45	1.07	-0.31

Notes:
(1) Duplicate sample results were compared to the primary sample results and the greater value for each isotope was used in the calculations.
pCi/g - picocuries per gram
Ra - Radium
Th - Thorium
U - Uranium
Am - Americium
Pa - Protactinium
Cs - Cesium
K - Potassium

Table A4-12
Tonawanda Landfill Mudflats Chemical Results

Analyte	Sample #	EPA RCRA (20x TCLP)	Background	Result	Units	Dilution	Qual
Metals							
ALUMINUM	TMF-0282		13976	8000	mg/kg	1	
ALUMINUM	TMF-0283		13976	19000	mg/kg	1	
ALUMINUM	TMF-0284		13976	9400	mg/kg	1	
ANTIMONY	TMF-0282		8.24	0.67	mg/kg	1	
ANTIMONY	TMF-0283		8.24	1.8	mg/kg	1	
ANTIMONY	TMF-0284		8.24	0.84	mg/kg	1	
ARSENIC	TMF-0282	100	20.5	5.2	mg/kg	1	
ARSENIC	TMF-0283	100	20.5	4.6	mg/kg	1	
ARSENIC	TMF-0284	100	20.5	2.7	mg/kg	1	
BARIUM	TMF-0282	2000	113	79	mg/kg	1	
BARIUM	TMF-0283	2000	113	530	mg/kg	1	
BARIUM	TMF-0284	2000	113	79	mg/kg	1	
BERYLLIUM	TMF-0282		1	0.59	mg/kg	1	
BERYLLIUM	TMF-0283		1	0.34	mg/kg	1	
BERYLLIUM	TMF-0284		1	0.55	mg/kg	1	
CADMIUM	TMF-0282	20	1	0.23	mg/kg	3	
CADMIUM	TMF-0283	20	1	4.6	mg/kg	1	
CADMIUM	TMF-0284	20	1	0.024	mg/kg	3	U
CALCIUM	TMF-0282		32876	55000	mg/kg	3	
CALCIUM	TMF-0283		32876	63000	mg/kg	5	
CALCIUM	TMF-0284		32876	64000	mg/kg	3	
CHROMIUM	TMF-0282	100	21.5	15	mg/kg	1	
CHROMIUM	TMF-0283	100	21.5	43	mg/kg	1	
CHROMIUM	TMF-0284	100	21.5	15	mg/kg	1	
COBALT	TMF-0282		10.5	6.5	mg/kg	1	
COBALT	TMF-0283		10.5	3	mg/kg	1	
COBALT	TMF-0284		10.5	7.6	mg/kg	1	
COPPER	TMF-0282		18.3	23	mg/kg	1	
COPPER	TMF-0283		18.3	570	mg/kg	1	
COPPER	TMF-0284		18.3	18	mg/kg	1	
IRON	TMF-0282		23700	20000	mg/kg	3	
IRON	TMF-0283		23700	8800	mg/kg	1	
IRON	TMF-0284		23700	25000	mg/kg	3	
LEAD	TMF-0282	100	36	55	mg/kg	3	
LEAD	TMF-0283	100	36	300	mg/kg	5	
LEAD	TMF-0284	100	36	10	mg/kg	3	
MAGNESIUM	TMF-0282		10421	8700	mg/kg	1	
MAGNESIUM	TMF-0283		10421	6800	mg/kg	1	
MAGNESIUM	TMF-0284		10421	18000	mg/kg	1	
MANGANESE	TMF-0282		543	410	mg/kg	1	
MANGANESE	TMF-0283		543	290	mg/kg	1	
MANGANESE	TMF-0284		543	440	mg/kg	1	
MERCURY	TMF-0282	4		0.13	mg/kg	1	
MERCURY	TMF-0283	4		6.6	mg/kg	4	
MERCURY	TMF-0284	4		0.0063	mg/kg	1	U
NICKEL	TMF-0282		22.5	16	mg/kg	1	
NICKEL	TMF-0283		22.5	18	mg/kg	1	
NICKEL	TMF-0284		22.5	19	mg/kg	1	
POTASSIUM	TMF-0282		162.56	1200	mg/kg	1	
POTASSIUM	TMF-0283		162.56	610	mg/kg	1	
POTASSIUM	TMF-0284		162.56	2000	mg/kg	1	
SELENIUM	TMF-0282	20	149	0.89	mg/kg	3	
SELENIUM	TMF-0283	20	149	1.2	mg/kg	1	

µg/kg: micrograms per kilogram
mg/kg: milligrams per likogram
TCLP: Toxicity Characteristic Leaching Procedure
J=Estimated; U-Not Detected; UJ-Not Detected at an estimated quantity

Table A4-12
Tonawanda Landfill Mudflats Chemical Results

Analyte	Sample #	EPA RCRA (20x TCLP)	Background	Result	Units	Dilution	Qual
SELENIUM	TMF-0284	20	149	0.36	mg/kg	3	U
SILVER	TMF-0282	100	2.91	0.11	mg/kg	1	J
SILVER	TMF-0283	100	2.91	24	mg/kg	1	
SILVER	TMF-0284	100	2.91	0.024	mg/kg	1	U
SODIUM	TMF-0282		1023	1300	mg/kg	1	
SODIUM	TMF-0283		1023	1200	mg/kg	1	
SODIUM	TMF-0284		1023	260	mg/kg	1	
THALLIUM	TMF-0282		48.4	0.36	mg/kg	3	U
THALLIUM	TMF-0283		48.4	0.16	mg/kg	1	U
THALLIUM	TMF-0284		48.4	0.38	mg/kg	3	U
VANADIUM	TMF-0282		24.5	18	mg/kg	1	
VANADIUM	TMF-0283		24.5	10	mg/kg	1	
VANADIUM	TMF-0284		24.5	22	mg/kg	1	
ZINC	TMF-0282		84.8	81	mg/kg	1	
ZINC	TMF-0283		84.8	1100	mg/kg	5	
ZINC	TMF-0284		84.8	69	mg/kg	1	
PCBs							
AROCLOR-1016	TMF-0282			36	µg/kg	1	UJ
AROCLOR-1016	TMF-0283			230	µg/kg	5	UJ
AROCLOR-1016	TMF-0284			38	µg/kg	1	U
AROCLOR-1260	TMF-0282			38	µg/kg	1	J
AROCLOR-1260	TMF-0283			690	µg/kg	5	J
AROCLOR-1260	TMF-0284			38	µg/kg	1	U
Pesticides							
4,4'-DDD	TMF-0282			16	µg/kg	1	
4,4'-DDD	TMF-0283			41	µg/kg	1	J
4,4'-DDD	TMF-0284			3.8	µg/kg	1	U
4,4'-DDE	TMF-0282			25	µg/kg	1	
4,4'-DDE	TMF-0283			8.1	µg/kg	1	J
4,4'-DDE	TMF-0284			3.8	µg/kg	1	U
4,4'-DDT	TMF-0282			15	µg/kg	1	J
4,4'-DDT	TMF-0283			4.6	µg/kg	1	UJ
4,4'-DDT	TMF-0284			3.8	µg/kg	1	UJ
ALPHA-CHLORDANE	TMF-0282			18	µg/kg	1	J
ALPHA-CHLORDANE	TMF-0283			17	µg/kg	1	J
ALPHA-CHLORDANE	TMF-0284			1.9	µg/kg	1	U
DIELDRIN	TMF-0282			1.9	µg/kg	1	J
DIELDRIN	TMF-0283			33	µg/kg	1	J
DIELDRIN	TMF-0284			3.8	µg/kg	1	UJ
GAMMA-CHLORDANE	TMF-0282			17	µg/kg	1	J
GAMMA-CHLORDANE	TMF-0283			15	µg/kg	1	J
GAMMA-CHLORDANE	TMF-0284			1.9	µg/kg	1	U
HEPTACHLOR EPOXIDE	TMF-0282			3.9	µg/kg	1	J
HEPTACHLOR EPOXIDE	TMF-0283			2.3	µg/kg	1	U
HEPTACHLOR EPOXIDE	TMF-0284			1.9	µg/kg	1	U
Semi-Volatile Organic Compounds							
ACENAPHTHENE	TMF-0282			75	µg/kg	1	J
ACENAPHTHENE	TMF-0283			460	µg/kg	1	U
ACENAPHTHENE	TMF-0284			380	µg/kg	1	U
ACENAPHTHYLENE	TMF-0282			710	µg/kg	1	U
ACENAPHTHYLENE	TMF-0283			460	µg/kg	1	U

µg/kg: micrograms per kilogram
mg/kg: milligrams per likogram
TCLP: Toxicity Characteristic Leaching Procedure
J=Estimated; U-Not Detected; UJ-Not Detected at an estimated quantity

Table A4-12
Tonawanda Landfill Mudflats Chemical Results

Analyte	Sample #	EPA RCRA (20x TCLP)	Background	Result	Units	Dilution	Qual
ACENAPHTHYLENE	TMF-0284			380	µg/kg	1	U
ANTHRACENE	TMF-0282			170	µg/kg	1	J
ANTHRACENE	TMF-0283			43	µg/kg	1	J
ANTHRACENE	TMF-0284			380	µg/kg	1	U
BENZO(A)ANTHRACENE	TMF-0282			750	µg/kg	1	J
BENZO(A)ANTHRACENE	TMF-0283			180	µg/kg	1	J
BENZO(A)ANTHRACENE	TMF-0284			110	µg/kg	1	U
BENZO(A)PYRENE	TMF-0282			830	µg/kg	1	J
BENZO(A)PYRENE	TMF-0283			260	µg/kg	1	J
BENZO(A)PYRENE	TMF-0284			110	µg/kg	1	U
BENZO(B)FLUORANTHENE	TMF-0282			1100	µg/kg	1	J
BENZO(B)FLUORANTHENE	TMF-0283			370	µg/kg	1	J
BENZO(B)FLUORANTHENE	TMF-0284			110	µg/kg	1	U
BENZO(G,H,I)PERYLENE	TMF-0282			710	µg/kg	1	J
BENZO(G,H,I)PERYLENE	TMF-0283			290	µg/kg	1	J
BENZO(G,H,I)PERYLENE	TMF-0284			110	µg/kg	1	U
BENZO(K)FLUORANTHENE	TMF-0282			410	µg/kg	1	J
BENZO(K)FLUORANTHENE	TMF-0283			130	µg/kg	1	J
BENZO(K)FLUORANTHENE	TMF-0284			110	µg/kg	1	U
BIS(2-ETHYLHEXYL)PHTHALATE	TMF-0282			410	µg/kg	1	J
BIS(2-ETHYLHEXYL)PHTHALATE	TMF-0283			1400	µg/kg	1	J
BIS(2-ETHYLHEXYL)PHTHALATE	TMF-0284			380	µg/kg	1	U
CHRYSENE	TMF-0282			810	µg/kg	1	
CHRYSENE	TMF-0283			190	µg/kg	1	J
CHRYSENE	TMF-0284			380	µg/kg	1	U
DIBENZO(A,H)ANTHRACENE	TMF-0282			230	µg/kg	1	J
DIBENZO(A,H)ANTHRACENE	TMF-0283			140	µg/kg	1	UJ
DIBENZO(A,H)ANTHRACENE	TMF-0284			110	µg/kg	1	U
FLUORANTHENE	TMF-0282			650	µg/kg	1	J
FLUORANTHENE	TMF-0283			180	µg/kg	1	J
FLUORANTHENE	TMF-0284			380	µg/kg	1	U
FLUORENE	TMF-0282			74	µg/kg	1	J
FLUORENE	TMF-0283			460	µg/kg	1	U
FLUORENE	TMF-0284			380	µg/kg	1	U
INDENO(1,2,3-CD)PYRENE	TMF-0282			630	µg/kg	1	J
INDENO(1,2,3-CD)PYRENE	TMF-0283			330	µg/kg	1	J
INDENO(1,2,3-CD)PYRENE	TMF-0284			380	µg/kg	1	U
NAPHTHALENE	TMF-0282			62	µg/kg	1	J
NAPHTHALENE	TMF-0283			60	µg/kg	1	J
PHENANTHRENE	TMF-0282			800	µg/kg	1	
PHENANTHRENE	TMF-0283			160	µg/kg	1	J
PHENANTHRENE	TMF-0284			380	µg/kg	1	U
PYRENE	TMF-0282			2200	µg/kg	1	J
PYRENE	TMF-0283			480	µg/kg	1	J
PYRENE	TMF-0284			380	µg/kg	1	U

Volatile Organic Compounds							
ACETONE	TMF-0282			22	µg/kg	1	U
ACETONE	TMF-0283			23	µg/kg	1	U
ACETONE	TMF-0284			17	µg/kg	1	U
BENZENE	TMF-0282	10000		5.4	µg/kg	1	U
BENZENE	TMF-0283	10000		5.7	µg/kg	1	U
BENZENE	TMF-0284	10000		4.4	µg/kg	1	U
M+P-XYLENE	TMF-0282			5.4	µg/kg	1	U

µg/kg: micrograms per kilogram
mg/kg: milligrams per likogram
TCLP: Toxicity Characteristic Leaching Procedure
J=Estimated; U-Not Detected; UJ-Not Detected at an estimated quantity

Table A4-12
Tonawanda Landfill Mudflats Chemical Results

Analyte	Sample #	EPA RCRA (20x TCLP)	Background	Result	Units	Dilution	Qual
M+P-XYLENE	TMF-0283			5.7	µg/kg	1	U
M+P-XYLENE	TMF-0284			4.4	µg/kg	1	U
NAPHTHALENE	TMF-0284			4.4	µg/kg	1	U
TOLUENE	TMF-0282			5.4	µg/kg	1	U
TOLUENE	TMF-0283			5.7	µg/kg	1	U
TOLUENE	TMF-0284			4.4	µg/kg	1	U
TRICHLOROETHENE	TMF-0282	10000		5.4	µg/kg	1	U
TRICHLOROETHENE	TMF-0283	10000		5.7	µg/kg	1	U
TRICHLOROETHENE	TMF-0284	10000		4.4	µg/kg	1	U
Wet Chem							
CYANIDE, TOTAL	TMF-0282			1	mg/kg	1	
CYANIDE, TOTAL	TMF-0283			1	mg/kg	1	
CYANIDE, TOTAL	TMF-0284			0.57	mg/kg	1	U

µg/kg: micrograms per kilogram
mg/kg: milligrams per likogram
TCLP: Toxicity Characteristic Leaching Procedure
J=Estimated; U-Not Detected; UJ-Not Detected at an estimated quantity

Table A4-13 Tonawanda Landfill - Mudflats, Area C, Class 2 Geotechnical Samples

Boring #	Sample Interval, (ft bgs)	Field Sample #	Laboratory #	Moisture Content (Percent)	Field Classification (USCS)	Laboratory Classification (USCS)
TMFC2-009	3.0 to 4.5	TMF-0244A	46041001	20.6	SM	SC
TMFC2-009	11.0 to 11.5	TMF-0245A	46041002	15.7	CL	CL

Key:
CL - Lean Clay
SC - Clayey Sand
SM - Silty Sand
ft bgs - feet below ground surface
USCS - Unified Soils Classification System

Table A4-14

Comparison of Elevated Mudflats Soil Results[1]
Th - 230, U - 238, and Ra - 226
with Downhole Gamma Logging Activities

Prefix	No.	Sample Depth[2] (ft. bgs)	Sample #	Scan cpm[3]	Th - 230 Result pCi/g	U - 238 Result pCi/g	Ra - 226 Result pCi/g	Downhole Gamma Logging Depth 1 (ft bgs)[4]	Depth 2 (ft bgs)[5]	Peak Depth (bgs)	Peak Magnitude (cps)	Casing (Y/N)[6]
Mudflats - Soil												
Screening Level - UTL 99/99.9					1.69	1.31	2.22					
TMFC1	005	5	TMF-0285	360	31.5	27.9	22.6	3.75	5.75	5.2	190	Y
TMFC1	005	10	TMF-0283	54	1.06	1.37	0.98					
TMFC2	012	0.5	TMF-0222	32	1.79	2.73	1.32					
TMFC2	012	3.5	TMF-0223	60	1.06	3.04	0.42					
TMFC2	012	NS	NS	NS	NS	NS	NS	1	2.2	1.7	250	N

Notes:

1. Based on each analyte compared to UTL 99/99.9, as determined from the Mudflats reference area.
2. Sample depth presented represents the bottom of a six-inch sampling interval. For instance, a sample marked 8 feet was collected from 7.5 to 8 feet below ground surface.
3. cpm = counts per minute on Eberline G-M, based on 30 or 60 second counts performed on each 6" segment of retrieved core.
4. An approximation of the depth at which an increase in peak magnitude is noted.
5. An approximation of the depth at which the peak magnitude has decreased to its original levels.
6. Whether or not drive casing was placed in the boring to prevent the collapse of the borehole.

Exceedance based on laboratory data, however, a peak was not detected with downhole gamma scan.

cps - counts per second
ft bgs - feet below ground surface
NS - No sample exists for this interval
pCi/g - picocuries per gram
Th-230 - Thorium-230
U-238 - Uranium-238
Ra-226 - Radium-226
UTL 99 99.9 - 99% confidence level that at least 99.9% of results will fall below the UTL 99 99.9

Table A4-14a

Comparison of Mudflats Reference Area Soil Results
Th - 230, U - 238, and Ra - 226
with Downhole Gamma Logging Activities

					Th-230	U-238	Ra-226	Downhole Gamma Logging			
Prefix	No.	Sample Depth[1] (ft. bgs)	Sample #	Scan cpm[2]	Result pCi/g	Result pCi/g	Result pCi/g	Depth 1[3]	Depth 2[4]	Estimated Average Magnitude	Casing (Y/N)[5]
								(ft bgs)	(ft bgs)	(cps)	
TMFR1	1	0.5	TMF-0001	60	0.7	0.98	1.23	0	0.6	50	N
TMFR1	1	2.5	TMF-0002	59	0.76	0.64	0.42	1.3	2.5	90	N
TMFR1	2	0.5	TMF-0003	36	0.9	0.91	0.44	NA	NA	NA	N
TMFR1	2	4	TMF-0004	86	1	0.72	0.67	NA	NA	NA	N
TMFR1	3	0.5	TMF-0005	44	1.35	0.81	0.67	NA	NA	NA	N
TMFR1	3	4	TMF-0006	48	0.78	0.72	0.78	NA	NA	NA	N
TMFR1	4	0.5	TMF-0007	62	0.93	0.97	1.08	0	0.6	NA	N
TMFR1	4	0.5	TMF-9043	62	0.98	0.99	0.9	0	0.6	NA	N
TMFR1	4	3	TMF-0008	42	0.81	0.73	0.95	NA	NA	NA	N
TMFR1	4	3	TMF-9044	42	0.82	0.66	1.33	NA	NA	NA	N
TMFR1	5	0.5	TMF-0009	58	0.78	0.62	0.97	0	0.6	48	N
TMFR1	5	0.5	TMF-9019	58	0.78	0.72	1.02	0	0.6	48	N
TMFR1	5	3.8	TMF-0010	58	0.77	0.89	0.89	1.5	3.7	85	N
TMFR1	5	3.8	TMF-9020	58	0.85	0.84	0.81	1.5	3.7	85	N
TMFR1	6	0.5	TMF-0011	36	0.49	0.82	0.32	0	0.2	55	N
TMFR1	6	3.5	TMF-0012	64	0.74	0.86	0.46	1.1	3.3	95	N
TMFR1	7	0.5	TMF-0013	62	1.49	0.68	1.07	0	0.1	55	N
TMFR1	7	4	TMF-0014	62	0.79	0.79	0.63	NA	NA	NA	N
TMFR1	8	0.5	TMF-0015	72	0.95	0.76	0.91	NA	NA	NA	N
TMFR1	8	2.5	TMF-0016	72	0.84	0.77	0.91	0.7	4.5	90	N
TMFR1	9	0.5	TMF-0017	48	0.88	0.77	0.82	0	0.6	50	N
TMFR1	9	4	TMF-0018	80	0.89	0.94	0.92	NA	NA	NA	N
TMFR1	10	0.5	TMF-0021	66	0.94	0.94	0.3	0	0.1	55	N
TMFR1	10	3.5	TMF-0022	72	0.79	0.76	0.49	0.5	3.6	95	N
TMFR1	11	0.5	TMF-0023	70	1.16	0.74	0.91	NA	NA	NA	N
TMFR1	11	4	TMF-0024	46	0.68	0.6	0.83	NA	NA	NA	N
TMFR1	12	0.5	TMF-0025	52	1.24	0.83	0.65	NA	NA	NA	N
TMFR1	12	4	TMF-0026	46	0.78	0.78	0.69	NA	NA	NA	N
TMFR1	13	0.5	TMF-0027	46	0.78	0.86	0.89	0	0.5	NA	N
TMFR1	13	4	TMF-0028	62	0.86	0.8	1.18	NA	NA	NA	N
TMFR1	14	0.5	TMF-0029	62	1.17	1.15	0.68	0	0.6	NA	N
TMFR1	14	4	TMF-0030	54	0.82	0.69	-0.03	NA	NA	NA	N
TMFR1	15	0.5	TMF-0031	56	0.91	0.86	0.99	0	0.6	NA	N
TMFR1	15	4	TMF-0032	46	0.93	0.93	0.43	0.6	3.6	95	N
TMFR1	16	0.5	TMF-0033	60	0.98	0.78	0.6	0	0.7	NA	N
TMFR1	16	4	TMF-0034	54	1	0.9	0.55	NA	NA	NA	N
TMFR1	17	0.5	TMF-0035	38	0.73	0.58	1.03	0	0.7	NA	N
TMFR1	17	4	TMF-0036	48	0.69	0.84	1.74	NA	NA	NA	N
TMFR1	18	0.5	TMF-0037	62	1.11	0.92	1.4	0	0.7	NA	N
TMFR1	18	4	TMF-0038	48	0.87	0.73	1.01	0.7	4	85	N
TMFR1	19	0.5	TMF-0039	42	1.03	0.95	1.22	0	0.5	NA	N
TMFR1	19	4	TMF-0040	66	0.73	0.84	0.78	0.5	3.7	92	N
TMFR1	20	0.5	TMF-0041	38	0.63	0.79	0.96	0.2	0.6	58	N
TMFR1	20	4	TMF-0042	62	0.78	0.84	1.1	NA	NA	NA	N

1. Sample depth presented represents the bottom of a six-inch sampling interval. For instance, a sample marked 8 feet was collected from 7.5 to 8 feet below ground surface.
2. cpm = counts per minute on Eberline G-M, based on 30 or 60 second counts performed on each 6" segment of retrieved core.
3. An approximation of the depth at which the shallow, deep or transition interval begins.
4. An approximation of the depth at which the shallow, deep, or transition interval ends.
5. Whether or not drive casing was placed in the boring to prevent the collapse of the borehole.

cps - counts per second
ft bgs - feet below ground surface
NA - Not Applicable, borehole was not scanned for downhole geophysical purposes at specified sample depth.
pCi/g - picocuries per gram
Th-230 - Thorium-230
U-238 - Uranium-238
Ra-226 - Radium-226

Table A4-14b

Comparison of Mudflats Class 3 Area A Soil Results
Th - 230, U - 238, and Ra - 226
with Downhole Gamma Logging Activities

					Th-230	U-238	Ra-226	hole Gamma Logging			
Prefix	No.	Sample Depth[1] (ft. bgs)	Sample #	Scan cpm[2]	Result pCi/g	Result pCi/g	Result pCi/g	Depth 1[3]	Depth 2[4]	Estimated Average Magnitude	Casing (Y/N)[5]
								(ft bgs)	(ft bgs)	(cps)	
TMF3A	1	0.5	TMF-0051	62	0.77	0.83	0.96	0.1	0.7	52	N
TMF3A	1	4	TMF-0052	34	0.83	0.64	0.92	0.7	3.6	90	N
TMF3A	2	0.5	TMF-0059	52	0.73	0.75	1.2	0.2	0.7	52	N
TMF3A	2	4	TMF-0060	42	0.79	0.74	0.81	NA	NA	NA	N
TMF3A	3	0.5	TMF-0085	36	0.78	0.94	0.89	0	0.8	NA	N
TMF3A	3	4	TMF-0086	56	0.72	0.82	1.06	0.8	3.7	90	N
TMF3A	4	0.5	TMF-0083	60	1.23	0.82	0.7	0.1	0.8	52	N
TMF3A	4	4	TMF-0084	48	0.86	0.84	0.24	0.8	4.3	95	N
TMF3A	6	0.5	TMF-0077	74	1.2	0.91	0.97	0	0.7	NA	N
TMF3A	6	4	TMF-0078	56	0.88	0.69	1.03	0.7	4.5	98	N
TMF3A	7	0.5	TMF-0065	36	0.82	0.89	0.64	0.1	0.5	60	N
TMF3A	7	4	TMF-0066	54	0.92	0.88	0.71	0.5	4.5	90	N
TMF3A	8	0.5	TMF-0079	56	1.23	0.99	1.11	0	0.8	NA	N
TMF3A	8	0.5	TMF-9089	56	0.8	1.02	0.85	0	0.8	NA	N
TMF3A	8	4	TMF-0080	48	0.86	0.97	0.84	0.8	3.7	95	N
TMF3A	8	4	TMF-9090	48	0.94	0.74	0.89	0.8	3.7	95	N
TMF3A	9	0.5	TMF-0069	68	0.98	0.97	0.77	0	0.8	NA	N
TMF3A	9	4	TMF-0070	44	0.73	0.75	0.71	NA	NA	NA	N
TMF3A	10	0.5	TMF-0073	52	0.78	0.59	0.73	0	0.6	NA	N
TMF3A	10	4	TMF-0074	44	1.01	1.06	0.84	NA	NA	NA	N
TMF3A	11	0.5	TMF-0053	50	0.94	0.92	0.78	0.2	1.3	45	N
TMF3A	11	4	TMF-0054	56	0.84	0.92	1.09	NA	NA	NA	N
TMF3A	12	0.5	TMF-0061	48	0.77	0.74	0.86	0.1	0.7	50	N
TMF3A	12	4	TMF-0062	40	0.67	1	1.23	NA	NA	NA	N
TMF3A	14	0.5	TMF-0055	58	0.94	0.9	0.87	0	0.6	NA	N
TMF3A	14	4	TMF-0056	46	0.83	1.01	0.9	0.6	4	90	N
TMF3A	17	0.5	TMF-0081	64	0.93	0.81	1.23	0.1	0.7	55	N
TMF3A	17	0.5	TMF-9087	64	0.92	0.97	1.05	0.1	0.7	55	N
TMF3A	17	4	TMF-0082	66	0.85	0.61	1.08	0.7	4.5	92	N
TMF3A	17	4	TMF-9088	66	0.88	0.72	0.92	0.7	4.5	92	N
TMF3A	20	0.5	TMF-0067	110	0.91	0.86	0.78	0.2	0.7	50	N
TMF3A	20	4	TMF-0068	42	0.92	0.83	1.03	NA	NA	NA	N
TMF3A	21	0.5	TMF-0057	50	0.75	0.63	0.48	0	0.9	NA	N
TMF3A	21	4	TMF-0058	64	0.74	0.82	0.92	0.9	3.6	90	N
TMF3A	22	0.5	TMF-0075	44	0.99	0.99	1.01	0.1	0.4	50	N
TMF3A	22	4	TMF-0076	54	0.93	1.03	0.85	NA	NA	NA	N
TMF3A	23	0.5	TMF-0063	50	1.1	1.03	1.1	0.1	0.7	60	N
TMF3A	23	4	TMF-0064	40	0.81	1.04	0.88	0.7	3.6	95	N
TMF3A	24	0.5	TMF-0071	48	0.91	0.58	0.97	0.3	1	45	N
TMF3A	24	4	TMF-0072	56	0.84	0.81	0.98	1	4.5	92	N

1. Sample depth presented represents the bottom of a six-inch sampling interval. For instance, a sample marked 8 feet was collected from 7.5 to 8 feet below ground surface.
2. cpm = counts per minute on Eberline G-M, based on 30 or 60 second counts performed on each 6" segment of retrieved core.
3. An approximation of the depth at which the shallow, deep or transition interval begins.
4. An approximation of the depth at which the shallow, deep, or transition interval ends.
5. Whether or not drive casing was placed in the boring to prevent the collapse of the borehole.

cps - counts per second
ft bgs - feet below ground surface
NA - Not Applicable, borehole was not scanned for downhole geophysical purposes at specified sample depth.
pCi/g - picocuries per gram
Th-230 - Thorium-230
U-238 - Uranium-238
Ra-226 - Radium-226

Table A4-14c

Comparison of Mudflats Class 3 Area B Soil Results
Th - 230, U - 238, and Ra - 226
with Downhole Gamma Logging Activities

					Th-230	U-238	Ra-226	Downhole Gamma Logging			
Prefix	No.	Sample Depth[1] (ft. bgs)	Sample #	Scan cpm[2]	Result pCi/g	Result pCi/g	Result pCi/g	Depth 1[3]	Depth 2[4]	Estimated Average Magnitude	Casing (Y/N)[5]
								(ft bgs)	(ft bgs)	(cps)	
TMF3B	1	0.5	TMF-0101	30	0.34	0.39	0.18	NA	NA	NA	N
TMF3B	1	6.2	TMF-0102	54	0.91	1.04	1.03	NA	NA	NA	N
TMF3B	3	0.5	TMF-0111	38	0.39	0.52	0.14	0	3	NA	N
TMF3B	3	4	TMF-0112	28	1.38	0.79	1.33	NA	NA	NA	N
TMF3B	4	0.5	TMF-0115	42	0.98	0.92	0.16	0	0.5	NA	N
TMF3B	4	4	TMF-0116	52	0.68	0.84	0.77	0.5	3.62	95	N
TMF3B	6	0.5	TMF-0127	56	0.96	0.9	1.01	0	1	NA	N
TMF3B	6	4	TMF-0128	60	0.77	0.88	0.8	1	3.6	95	N
TMF3B	8	0.5	TMF-0133	54	0.8	0.87	0.67	0.1	1.6	NA	N
TMF3B	8	3.5	TMF-0134	42	0.88	0.75	1.08	1.6	4.4	95	N
TMF3B	9	0.5	TMF-0117	46	1	0.98	0.86	0	1.1	NA	N
TMF3B	9	4	TMF-0118	42	0.86	0.8	0.71	NA	NA	NA	N
TMF3B	11	0.5	TMF-0113	52	0.97	0.65	0.67	0	1.5	NA	N
TMF3B	11	0.5	TMF-9119	52	0.91	0.82	0.68	0	1.5	NA	N
TMF3B	11	3.5	TMF-0114	64	0.91	0.84	1.12	NA	NA	NA	N
TMF3B	11	3.5	TMF-9120	64	0.84	0.8	1.12	NA	NA	NA	N
TMF3B	12	0.5	TMF-0131	14	1.04	1	0.89	0	1.3	NA	Y
TMF3B	12	3.5	TMF-0132	46	0.81	0.9	1.1	1.3	3.2	90	Y
TMF3B	13	1.5	TMF-0103	46	0.76	0.76	0.78	1	1	15	N
TMF3B	13	4	TMF-0104	34	1.21	1.02	1.16	1	4.5	60	N
TMF3B	15	0.5	TMF-0123	40	1	0.88	0.93	0	1.3	NA	N
TMF3B	15	3.5	TMF-0124	60	0.73	0.8	0.82	1.3	4.5	100	N
TMF3B	16	0.5	TMF-0125	60	0.91	0.96	0.86	0	1.2	NA	N
TMF3B	16	3.5	TMF-0126	52	0.77	0.63	0.74	NA	NA	NA	N
TMF3B	17	0.5	TMF-0105	38	0.91	1.02	1.05	0	0.7	NA	N
TMF3B	17	3.5	TMF-0106	56	0.85	0.98	0.9	0.7	4.5	95	N
TMF3B	18	0.5	TMF-0137	52	0.93	0.83	0.91	0	1	NA	N
TMF3B	18	4	TMF-0138	52	0.86	0.73	0.84	1	4.4	90	N
TMF3B	19	0.5	TMF-0129	66	0.96	0.99	0.73	0	0.8	NA	N
TMF3B	19	0.5	TMF-9139	66	0.93	1.04	1.12	0	0.8	NA	N
TMF3B	19	3.5	TMF-0130	52	0.75	0.9	0.89	0.8	4.5	90	N
TMF3B	19	3.5	TMF-9140	52	0.81	0.94	0.96	0.8	4.5	90	N
TMF3B	20	0.5	TMF-0135	62	1.14	0.72	1.05	0	0.4	NA	N
TMF3B	20	3.5	TMF-0136	74	0.74	0.73	0.68	0.4	4.5	91	N
TMF3B	22	0.5	TMF-0121	60	1.1	0.99	1.22	0	1.2	NA	N
TMF3B	22	4	TMF-0122	62	0.81	0.78	0.68	1.2	3.6	100	N
TMF3B	23	0.5	TMF-0109	46	1.01	1.06	1.28	0	1.1	NA	N
TMF3B	23	3.5	TMF-0110	74	0.86	0.84	0.81	1.1	4.5	97	N
TMF3B	24	0.5	TMF-0107	34	0.88	0.74	0.69	0	1.3	NA	N
TMF3B	24	4	TMF-0108	40	0.82	0.77	1.18	1.3	3.6	95	N
TMF3B	50	0.5	TMF-0151	50	0.86	0.75	1.05	0	0.9	NA	N
TMF3B	50	3.5	TMF-0152	48	0.87	0.82	1.09	0.9	4.5	92	N
TMF3B	51	0.5	TMF-0154	40	0.8	0.72	0.99	0	0.1	48	N
TMF3B	51	3	TMF-0155	58	0.88	0.69	0.98	1	4.5	95	N
TMF3B	52	0.5	TMF-0157	46	0.93	1	0.74	0	1	NA	N
TMF3B	52	3.5	TMF-0158	72	0.88	0.66	1.26	1	4.5	93	N
TMF3B	53	0.5	TMF-0160	40	1.24	1.21	1.64	0	0.1	50	N
TMF3B	53	4	TMF-0161	40	0.76	0.99	0.9	0.6	4.6	97	N
TMF3B	54	0.5	TMF-0163	48	0.84	0.73	0.69	0	0.3	52	N
TMF3B	54	0.5	TMF-9199	48	0.92	0.9	0.58	0	0.3	52	N
TMF3B	54	3.5	TMF-0164	50	0.86	0.84	0.75	0.7	4.6	90	N
TMF3B	54	3.5	TMF-9200	50	0.81	0.85	0.47	0.7	4.6	90	N
TMF3B	55	0.5	TMF-0166	66	0.87	0.7	0.97	0	0.3	55	N
TMF3B	55	3.5	TMF-0167	44	0.83	0.95	0.72	0.6	4.6	93	N
TMF3B	56	0.5	TMF-0169	30	0.99	0.67	0.8	0	0.4	NA	N
TMF3B	56	4	TMF-0170	58	0.76	0.59	0.95	0.4	4.6	92	N
TMF3B	57	0.5	TMF-0172	36	0.77	0.9	1.1	NA	NA	NA	N
TMF3B	57	3.5	TMF-0173	46	1.17	0.91	1.11	1.3	4.4	98	N
TMF3B	58	0.5	TMF-0175	50	0.5	0.39	0.5	NA	NA	NA	N
TMF3B	58	6	TMF-0176	46	1.02	0.76	0.95	3.5	6.5	103	N
TMF3B	60	0.5	TMF-0178	38	1.02	1.09	0.82	NA	NA	NA	N
TMF3B	60	3.5	TMF-0179	50	0.83	0.78	0.66	NA	NA	NA	N

Table A4-14c

Comparison of Mudflats Class 3 Area B Soil Results
Th - 230, U - 238, and Ra - 226
with Downhole Gamma Logging Activities

					Th-230	U-238	Ra-226	Downhole Gamma Logging			
Prefix	No.	Sample Depth[1] (ft. bgs)	Sample #	Scan cpm[2]	Result pCi/g	Result pCi/g	Result pCi/g	Depth 1[3]	Depth 2[4]	Estimated Average Magnitude	Casing (Y/N)[5]
								(ft bgs)	(ft bgs)	(cps)	
TMF3B	61	0.5	TMF-0181	36	0.7	0.58	0.37	0	2.2	NA	N
TMF3B	61	4	TMF-0182	58	0.97	0.76	0.65	2.2	3.7	110	N
TMF3B	62	0.5	TMF-0184	42	0.87	0.81	1.01	0.2	1.8	15	N
TMF3B	62	4	TMF-0185	52	0.58	0.54	0.51	1.8	3.8	100	N
TMF3B	63	1	TMF-0187	42	1.36	1.05	1.48	0	0.3	40	N
TMF3B	63	8	TMF-0188	62	0.99	0.7	0.85	1	8.7	100	N
TMF3B	64	0.5	TMF-0190	40	0.61	0.56	0.61	0	7.2	30	Y
TMF3B	64	0.5	TMF-9196	40	0.58	0.52	0.7	0	7.2	30	Y
TMF3B	64	13.5	TMF-0191	30	0.76	0.71	0.18	NA	NA	NA	Y
TMF3B	64	13.5	TMF-9197	30	0.92	0.73	0.92	NA	NA	NA	Y
TMF3B	65	0.5	TMF-0193	48	0.74	0.73	0.67	0	8.7	20	Y
TMF3B	65	9.85	TMF-0194	66	0.77	0.74	1.02	9.5	13.5	68	Y

1. Sample depth presented represents the bottom of a six-inch sampling interval. For instance, a sample marked 8 feet was collected from 7.5 to 8 feet below ground surface.
2. cpm = counts per minute on Eberline G-M, based on 30 or 60 second counts performed on each 6" segment of retrieved core.
3. An approximation of the depth at which the shallow, deep or transition interval begins.
4. An approximation of the depth at which the shallow, deep, or transition interval ends.
5. Whether or not drive casing was placed in the boring to prevent the collapse of the borehole.

cps - counts per second
ft bgs - feet below ground surface
NA - Not Applicable, borehole was not scanned for downhole geophysical purposes at specified sample depth.
pCi/g - picocuries per gram
Th-230 - Thorium-230
U-238 - Uranium-238
Ra-226 - Radium-226

Table A4-14d

Comparison of Mudflats Class 2 Area C Soil Results
Th - 230, U - 238, and Ra - 226
with Downhole Gamma Logging Activities

					Th-230	U-238	Ra-226	Downhole Gamma Logging			
Prefix	No.	Sample Depth[1] (ft. bgs)	Sample #	Scan cpm[2]	Result pCi/g	Result pCi/g	Result pCi/g	Depth 1[3]	Depth 2[4]	Estimated Average Magnitude	Casing (Y/N)[5]
								(ft bgs)	(ft bgs)	(cps)	
TMFC2	1	0.5	TMF-0218	40	1.24	0.86	0.75	0	1.2	NA	N
TMFC2	1	3.5	TMF-0219	56	1.06	0.86	0.7	1.2	4.9	90	N
TMFC2	2	1	TMF-0232	30	1.03	0.74	0.95	0	1.6	NA	N
TMFC2	2	6.5	TMF-0233	42	1.02	0.75	0.07	NA	NA	NA	N
TMFC2	3	0.5	TMF-0242	43	0.88	0.96	1.03	0	0.2	55	N
TMFC2	3	11.5	TMF-0243	NA	1.23	0.64	0.9	0.5	11.5	95	N
TMFC2	4	0.5	TMF-0214	28	0.97	0.78	0.91	0	1.5	NA	N
TMFC2	4	3.5	TMF-0215	32	0.93	0.89	0.93	1.5	4.6	92	N
TMFC2	5	0.5	TMF-0210	72	0.9	0.96	0.88	0	1.1	NA	N
TMFC2	5	0.5	TMF-9246	72	0.84	0.89	0.74	0	1.1	NA	N
TMFC2	5	3.5	TMF-0211	50	0.82	0.87	0.81	1.1	4.6	95	N
TMFC2	5	3.5	TMF-9247	50	0.73	0.99	0.8	1.1	4.6	95	N
TMFC2	6	0.5	TMF-0212	58	0.92	0.71	1.08	0	0.2	51	N
TMFC2	6	4	TMF-0213	56	1.18	1	1.04	0.6	4.5	92	N
TMFC2	8	4	TMF-0230	22	1.16	0.99	0.88	0	4.2	15	Y
TMFC2	8	7	TMF-0231	28	1.09	0.8	0.33	4.2	13.3	60	Y
TMFC2	9	0.5	TMF-0244	50	0.5	0.52	0.56	0	5.6	20	Y
TMFC2	9	11.5	TMF-0245	56	0.96	0.69	0.94	6.8	13.5	60	Y
TMFC2	10	1	TMF-0240	54	0.66	0.92	0.65	0	2.8	40	N
TMFC2	10	9.5	TMF-0241	60	0.69	0.83	0.94	7.5	13.4	60	N
TMFC2	11	0.5	TMF-0220	44	0.85	1.06	0.86	0	0.3	28	N
TMFC2	11	3.5	TMF-0221	50	0.88	0.65	0.73	1.1	4.5	98	N
TMFC2	12	0.5	TMF-0222	32	1.79	2.73	1.32	0	0.2	30	N
TMFC2	12	3.5	TMF-0223	60	1.06	3.04	0.42	NA	6.5	110	N
TMFC2	13	0.5	TMF-0236	46	0.99	1.03	0.96	0	0.2	30	N
TMFC2	13	13.5	TMF-0237	56	1.04	0.69	1.02	NA	NA	NA	N
TMFC2	14	0.5	TMF-0238	40	1.08	1.1	0.99	NA	NA	NA	N
TMFC2	14	12	TMF-0239	64	1.04	0.65	0.85	NA	NA	NA	N
TMFC2	15	2	TMF-0224	30	1.28	1.3	1.37	0	0.3	32	N
TMFC2	15	5	TMF-0225	58	1.29	0.95	1.34	1.5	5.2	92	N
TMFC2	16	0.5	TMF-0226	38	1.36	1.08	1.07	0	0.2	50	N
TMFC2	16	3.5	TMF-0227	34	1.16	1.06	0.94	0.7	4.9	98	N
TMFC2	17	0.5	TMF-0234	34	0.69	0.48	0.47	0	2.5	20	Y
TMFC2	17	0.5	TMF-9250	34	0.79	0.66	0.96	0	2.5	20	Y
TMFC2	17	11	TMF-9248	34	0.81	0.78	0.98	2.5	13.5	60	Y
TMFC2	17	14	TMF-0235	36	0.69	0.78	1.05	2.5	13.5	60	Y
TMFC2	17	14	TMF-9249	36	0.86	0.87	1.05	2.5	13.5	60	Y
TMFC2	18	0.5	TMF-0228	58	0.68	0.8	0.74	0	8.4	20	Y
TMFC2	18	14	TMF-0229	46	0.81	0.88	0.45	9.4	13.6	60	Y
TMFC2	19	0.5	TMF-0216	48	0.92	0.58	0.75	0	0.3	42	N
TMFC2	19	3.5	TMF-0217	60	1.17	0.87	1.04	0.8	4.6	92	N

1. Sample depth presented represents the bottom of a six-inch sampling interval. For instance, a sample marked 8 feet was collected from 7.5 to 8 feet below ground surface.
2. cpm = counts per minute on Eberline G-M, based on 30 or 60 second counts performed on each 6" segment of retrieved core.
3. An approximation of the depth at which the shallow, deep or transition interval begins.
4. An approximation of the depth at which the shallow, deep, or transition interval ends.
5. Whether or not drive casing was placed in the boring to prevent the collapse of the borehole.

cps - counts per second
ft bgs - feet below ground surface
NA - Not Applicable, borehole was not scanned for downhole geophysical purposes at specified sample depth.
pCi/g - picocuries per gram
Th-230 - Thorium-230
U-238 - Uranium-238
Ra-226 - Radium-226

Table A4-14e

Comparison of Mudflats Class 1 Area C Soil Results
Th - 230, U - 238, and Ra - 226
with Downhole Gamma Logging Activities

					Th-230	U-238	Ra-226	Downhole Gamma Logging			
Prefix	No.	Sample Depth[1] (ft. bgs)	Sample #	Scan cpm[2]	Result pCi/g	Result pCi/g	Result pCi/g	Depth 1[3]	Depth 2[4]	Estimated Average Magnitude	Casing (Y/N)[5]
								(ft bgs)	(ft bgs)	(cps)	
TMFC1	1	0.5	TMF-0270	48	1	1.05	1.06	0	8.3	20	Y
TMFC1	1	10.25	TMF-0271	34	0.66	1.15	0.72	NA	NA	NA	Y
TMFC1	1	14	TMF-0272	48	0.92	0.91	0.66	10.6	13.2	60	Y
TMFC1	2	0.5	TMF-0315	40	1.14	0.98	0.91	0	3.1	50	N
TMFC1	2	12.5	TMF-0316	38	0.77	0.95	0.72	NA	NA	NA	N
TMFC1	2	15	TMF-0317	44	1.08	0.73	1.05	NA	NA	NA	N
TMFC1	3	0.5	TMF-0312	50	0.9	0.78	0.81	0	1.4	50	N
TMFC1	3	11	TMF-0313	42	1.03	0.65	0.86	1.6	10.9	80	N
TMFC1	3	14.5	TMF-0314	40	0.92	0.88	0.83	NA	NA	NA	N
TMFC1	4	0.5	TMF-0309	52	1.35	1.24	1.03	0	5.6	50	N
TMFC1	4	11	TMF-0310	62	0.86	0.73	0.66	NA	NA	NA	N
TMFC1	4	15	TMF-0311	32	0.91	0.83	0.82	NA	NA	NA	N
TMFC1	5	0.5	TMF-0282	34	0.62	0.98	0.5	NA	NA	NA	Y
TMFC1	5	4	TMF-0285	82	31.5	27.9	22.6	3.75	5.75	190	Y
TMFC1	5	10.25	TMF-0283	54	1.06	1.37	0.98	NA	NA	NA	Y
TMFC1	5	14	TMF-0284	54	0.78	0.83	0.99	NA	NA	NA	Y
TMFC1	9	0.5	TMF-0294	44	0.94	0.71	0.8	0	8.6	40	Y
TMFC1	9	0.5	TMF-9342	44	1.32	0.84	0.39	0	8.6	40	Y
TMFC1	9	8.5	TMF-0295	42	0.93	1.09	0.49	0	8.6	40	Y
TMFC1	9	8.5	TMF-9343	42	1.03	0.74	0.92	0	8.6	40	Y
TMFC1	9	14	TMF-0296	42	0.78	0.99	1.04	NA	NA	NA	Y
TMFC1	9	14	TMF-9344	42	0.98	0.8	0.68	NA	NA	NA	Y
TMFC1	13	0.5	TMF-0306	54	1.16	0.7	0.67	0	0.2	50	N
TMFC1	13	11.25	TMF-0307	68	0.97	0.88	0.83	1	12.5	95	N
TMFC1	13	15	TMF-0308	32	1.04	0.84	0.93	NA	NA	NA	N

1. Sample depth presented represents the bottom of a six-inch sampling interval. For instance, a sample marked 8 feet was collected from 7.5 to 8 feet below ground surface.
2. cpm = counts per minute on Eberline G-M, based on 30 or 60 second counts performed on each 6" segment of retrieved core.
3. An approximation of the depth at which the shallow, deep or transition interval begins.
4. An approximation of the depth at which the shallow, deep, or transition interval ends.
5. Whether or not drive casing was placed in the boring to prevent the collapse of the borehole.

cps - counts per second
ft bgs - feet below ground surface
NA - Not Applicable, borehole was not scanned for downhole geophysical purposes at specified sample depth.
pCi/g - picocuries per gram
Th-230 - Thorium-230
U-238 - Uranium-238
Ra-226 - Radium-226

Table A4-15 - Tonawanda Landfill - Landfill Reference Area 3
Soil Samples

				Ra-226			Th-230			U-238		
Prefix	No.	Depth (ft. bgs)	Sample #	Result (pCi/g)	2σ TPU (pCi/g)	Qual	Result (pCi/g)	2σ TPU (pCi/g)	Qual	Result (pCi/g)	2σ TPU (pCi/g)	Qual
TLFR3	001	0.5	TLF-0404	1.01	0.27		1.05	0.26		0.86	0.29	
TLFR3	001	2.5	TLF-0405	1.05	0.26		0.95	0.3		0.75	0.26	
TLFR3	002	0.5	TLF-0402	0.8	0.22		1.05	0.24		0.74	0.28	J
TLFR3	002	3.5	TLF-0403	0.97	0.24		0.87	0.37	J	0.44	0.18	
TLFR3	004	0.5	TLF-0400	1.02	0.28		0.94	0.31		0.65	0.26	J
TLFR3	004	0.5	TLF-9418	0.99	0.26		0.79	0.32	J	0.66	0.25	
TLFR3	004	4	TLF-0401	1.18	0.33		0.78	0.28		0.51	0.22	
TLFR3	004	4	TLF-9419	1.48	0.38		0.67	0.24		0.72	0.26	
TLFR3	005	0.5	TLF-0408	0.72	0.21		0.79	0.23		0.73	0.24	
TLFR3	005	2.5	TLF-0409	0.93	0.25		0.93	0.24		0.9	0.28	
TLFR3	006	0.5	TLF-0406	1.4	0.33		0.77	0.22		0.69	0.23	
TLFR3	006	3.5	TLF-0407	0.73	0.21		1.15	0.36	J	0.98	0.29	
TLFR3	007	0.5	TLF-0412	0.026	0.074	U	0.7	0.2		0.82	0.26	
TLFR3	007	2.5	TLF-0413	0.9	0.22		0.96	0.33	J	0.49	0.19	
TLFR3	008	0.5	TLF-0410	1.33	0.33		0.88	0.26		0.84	0.26	
TLFR3	008	4	TLF-0411	0.98	0.26		0.69	0.26		0.57	0.24	J
TLFR3	010	0.5	TLF-0414	1.06	0.25		1.12	0.25		0.66	0.24	
TLFR3	010	2.5	TLF-0415	0.58	0.19		0.7	0.24		0.79	0.27	
TLFR3	011	0.5	TLF-0424	1.23	0.3		0.88	0.2		0.88	0.28	
TLFR3	011	4	TLF-0425	1.01	0.26		0.77	0.2		0.77	0.25	
TLFR3	012	0.5	TLF-0422	0.93	0.25		0.9	0.28		0.72	0.25	
TLFR3	012	4	TLF-0423	1.91	0.43		1.08	0.23		1.1	0.34	
TLFR3	013	0.5	TLF-0432	0.97	0.24		1	0.24		1.86	0.58	J
TLFR3	013	3.5	TLF-0433	1.36	0.33		1.21	0.41	J	2.49	0.71	J
TLFR3	014	0.5	TLF-0434	0.78	0.22		0.75	0.2		0.61	0.21	
TLFR3	014	3.5	TLF-0435	1.15	0.28		1.06	0.33		1.02	0.28	
TLFR3	015	0.5	TLF-0428	0.79	0.22		0.97	0.29		0.93	0.27	
TLFR3	015	2.5	TLF-0429	0.86	0.24		0.62	0.22	J	0.71	0.23	
TLFR3	016	0.5	TLF-0426	0.91	0.25		1	0.26		0.86	0.28	

ft bgs: feet below ground surface
pCi/g: picocuries per gram
2σ TPU: total propagated uncertainty
UCL95: 95th percent upper confidence limit
J=Estimated; U=Not Detected, value below decision level; UJ=Estimated, value below decision level

Table A4-15 - Tonawanda Landfill - Landfill Reference Area 3 (Continued)
Soil Samples

				Ra-226			Th-230			U-238		
Prefix	**No.**	**Depth (ft. bgs)**	**Sample #**	**Result (pCi/g)**	**2s TPU (pCi/g)**	**Qual**	**Result (pCi/g)**	**2s TPU (pCi/g)**	**Qual**	**Result (pCi/g)**	**2s TPU (pCi/g)**	**Qual**
TLFR3	016	0.5	TLF-9438	0.87	0.25		1.08	0.3		1	0.3	
TLFR3	016	3.5	TLF-0427	1.1	0.27		1.07	0.27		0.89	0.27	
TLFR3	016	3.5	TLF-9439	0.76	0.2		1.28	0.31		0.68	0.24	
TLFR3	017	0.5	TLF-0430	1.28	0.3		1.02	0.27		0.83	0.26	
TLFR3	017	4	TLF-0431	0.84	0.23		0.8	0.23		0.68	0.24	
TLFR3	018	0.5	TLF-0436	0.97	0.24		0.82	0.18		0.96	0.3	
TLFR3	018	4	TLF-0437	0.78	0.22		0.91	0.2		0.73	0.26	
TLFR3	019	0.5	TLF-0416	1.25	0.31		0.97	0.21		0.89	0.29	
TLFR3	019	2.5	TLF-0417	1.21	0.31		0.81	0.19		0.74	0.24	
TLFR3	020	0.5	TLF-0420	0.71	0.2		0.96	0.31		0.78	0.25	
TLFR3	020	4	TLF-0421	1.18	0.31		0.91	0.26		1.08	0.33	

Summary Statistics							
N	40		40		40		
Max	1.91	0.43	1.28	0.31	2.49	0.71	
Min	0.03	0.07	0.62	0.22	0.44	0.18	
Avg	1.00	0.04	0.92	0.04	0.85	0.05	
Med	0.98		0.92		0.78		
Stdev	0.30		0.16		0.35		
UCL95	1.08		0.96		0.94		

ft bgs: feet below ground surface
pCi/g: picocuries per gram
2σ TPU: total propagated uncertainty
UCL95: 95th percent upper confidence limit
J=Estimated; U=Not Detected, value below decision level; UJ=Estimated, value below decision level

Table A4-16 - Tonawanda Landfill - Landfill Class 3 - Random Samples
Soil Samples

				Ra-226			Th-230			U-238		
Prefix	No.	Depth (ft. bgs)	Sample #	Result (pCi/g)	2σ TPU (pCi/g)	Qual	Result (pCi/g)	2σ TPU (pCi/g)	Qual	Result (pCi/g)	2σ TPU (pCi/g)	Qual
TLF3	001	0.5	TLF-0480	1.04	0.29		0.8	0.19	J	0.78	0.25	
TLF3	001	4	TLF-0481	0.58	0.21		0.74	0.14	J	0.43	0.14	
TLF3	003	0.5	TLF-0474	0.93	0.3		0.79	0.22	J	0.8	0.22	
TLF3	003	2	TLF-0475	1.17	0.38		0.82	0.23	J	0.67	0.2	
TLF3	004	0.5	TLF-0486	0.78	0.23		0.84	0.23	J	0.66	0.23	
TLF3	004	3	TLF-0487	1.49	0.37		1.06	0.23	J	0.93	0.29	
TLF3	005	0.5	TLF-0484	0.84	0.25		0.84	0.2		0.62	0.22	
TLF3	005	2.5	TLF-0485	0.96	0.26		0.78	0.19	J	0.81	0.26	
TLF3	006	0.5	TLF-0476	0.99	0.25		0.63	0.21		0.79	0.26	
TLF3	006	4	TLF-0477	0.86	0.26		0.62	0.22		0.63	0.23	
TLF3	007	0.5	TLF-0460	1.15	0.3		0.9	0.2		0.96	0.29	
TLF3	007	3	TLF-0461	1.1	0.28		1.22	0.25		1.07	0.31	
TLF3	008	0.5	TLF-0450	0.85	0.22		0.8	0.25		0.88	0.28	
TLF3	008	3.5	TLF-0451	1.02	0.25		0.86	0.26		0.95	0.31	
TLF3	009	0.5	TLF-0482	0.85	0.26		0.66	0.17	J	0.8	0.21	
TLF3	009	0.5	TLF-9488	0.91	0.28		0.95	0.24		0.69	0.18	
TLF3	009	3.5	TLF-0483	0.86	0.24		0.81	0.21	J	0.68	0.18	
TLF3	009	3.5	TLF-9489	0.63	0.2		0.89	0.26	J	0.74	0.26	
TLF3	012	0.5	TLF-0456	1.23	0.31		0.96	0.21		0.92	0.28	
TLF3	012	3.5	TLF-0457	1.15	0.29		0.89	0.2		0.89	0.26	
TLF3	013	0.5	TLF-0462	0.52	0.16		0.79	0.18		0.67	0.24	J
TLF3	013	4	TLF-0463	0.92	0.25		0.69	0.18		0.8	0.28	
TLF3	015	0.5	TLF-0472	0.79	0.3		0.91	0.23	J	0.93	0.27	
TLF3	015	2.5	TLF-0473	0.58	0.25		0.63	0.16	J	0.58	0.2	
TLF3	016	0.5	TLF-0466	1.1	0.32		1.04	0.26	J	0.94	0.3	
TLF3	016	4	TLF-0467	1.09	0.34		0.83	0.21	J	0.61	0.23	
TLF3	017	0.5	TLF-0452	0.84	0.24		0.83	0.23	J	0.84	0.27	
TLF3	017	3.5	TLF-0453	0.76	0.23		0.89	0.33	J	0.77	0.24	
TLF3	019	0.5	TLF-0478	0.69	0.2		0.79	0.2	J	0.62	0.21	

ft bgs: feet below ground surface
pCi/g: picocuries per gram
2σ TPU: total propagated uncertainty
UCL95: 95th percent upper confidence limit
J=Estimated; U=Not Detected, value below decision level; UJ=Estimated, value below decision level

Table A4-16 - Tonawanda Landfill - Landfill Class 3 - Random Samples (Continued)
Soil Samples

				Ra-226			Th-230			U-238		
Prefix	**No.**	**Depth (ft. bgs)**	**Sample #**	**Result (pCi/g)**	**2s TPU (pCi/g)**	**Qual**	**Result (pCi/g)**	**2s TPU (pCi/g)**	**Qual**	**Result (pCi/g)**	**2s TPU (pCi/g)**	**Qual**
TLF3	019	3.5	TLF-0479	0.87	0.26		0.74	0.18	J	0.88	0.27	
TLF3	021	0.5	TLF-0454	0.83	0.22		0.96	0.24		0.71	0.28	J
TLF3	021	3.5	TLF-0455	1.18	0.28		1.34	0.3		0.9	0.3	
TLF3	022	0.5	TLF-0470	1.41	0.34		0.95	0.26		1.05	0.27	
TLF3	022	0.5	TLF-9468	1.06	0.28		0.92	0.24		0.87	0.23	
TLF3	022	3	TLF-0471	0.73	0.2		0.72	0.22		0.75	0.2	
TLF3	022	3	TLF-9469	1.03	0.26		0.73	0.21		0.61	0.18	
TLF3	023	0.5	TLF-0458	1	0.26		1.11	0.27		1.02	0.32	
TLF3	023	4	TLF-0459	1.02	0.27		1.05	0.25		0.86	0.29	
TLF3	024	0.5	TLF-0464	1.38	0.36		1.2	0.35		0.73	0.2	
TLF3	024	3	TLF-0465	0.76	0.27		0.89	0.22		0.57	0.21	

Summary Statistics							
N	40		40		40		
Max	1.49	0.37	1.34	0.30	1.07	0.31	
Min	0.52	0.16	0.62	0.22	0.43	0.14	
Avg	0.95	0.04	0.87	0.04	0.79	0.04	
Med	0.93		0.84		0.80		
Stdev	0.22		0.16		0.15		
UCL95	1.01		0.91		0.82		

ft bgs: feet below ground surface
pCi/g: picocuries per gram
2σ TPU: total propagated uncertainty
UCL95: 95th percent upper confidence limit
J=Estimated; U=Not Detected, value below decision level; UJ=Estimated, value below decision level

Table A4-17 - Tonawanda Landfill - Landfill Class 3 - Biased Samples
Soil Samples

				Ra-226			Th-230			U-238		
Prefix	No.	Depth (ft. bgs)	Sample #	Result (pCi/g)	2σ TPU (pCi/g)	Qual	Result (pCi/g)	2σ TPU (pCi/g)	Qual	Result (pCi/g)	2σ TPU (pCi/g)	Qual
TLF3	050	0.5	TLF-0500	0.78	0.24		0.88	0.22		0.77	0.27	
TLF3	050	3.5	TLF-0501	1.06	0.27		0.82	0.21		0.82	0.29	
TLF3	051	0.5	TLF-0502	1.11	0.3		0.92	0.23	J	0.72	0.21	
TLF3	051	4	TLF-0503	0.79	0.24		0.83	0.22		0.78	0.22	
TLF3	052	0.5	TLF-0518	0.75	0.25		1.02	0.28		0.72	0.19	
TLF3	052	0.5	TLF-9547	1.14	0.29		1.1	0.3		0.86	0.19	
TLF3	052	9.5	TLF-0519	0.99	0.28		0.78	0.22	J	0.73	0.071	
TLF3	052	9.5	TLF-9548	0.75	0.24		0.84	0.23		0.8	0.2	
TLF3	053	0.5	TLF-0520	1.14	0.38		0.86	0.22		0.77	0.24	
TLF3	053	4.5	TLF-0521	0.56	0.26		0.91	0.21	J	0.64	0.21	
TLF3	054	0.5	TLF-0522	1.07	0.47		0.88	0.24		0.7	0.23	
TLF3	054	3.5	TLF-0523	0.82	0.29		0.76	0.18	J	0.72	0.24	
TLF3	055	0.5	TLF-0516	0.4	0.14		0.56	0.18	J	0.6	0.22	
TLF3	055	3.5	TLF-0517	0.76	0.22		0.59	0.22	J	0.52	0.2	
TLF3	056	0.5	TLF-0542	0.81	0.23		0.86	0.28		0.62	0.19	
TLF3	056	4	TLF-0543	0.74	0.21		0.87	0.27		0.9	0.24	
TLF3	057	0.5	TLF-0506	0.83	0.25		0.96	0.22		1.11	0.25	
TLF3	057	4	TLF-0507	0.9	0.28		0.57	0.12	J	0.54	0.16	
TLF3	058	0.5	TLF-0504	1.12	0.28		1.09	0.21		1.14	0.24	
TLF3	058	4	TLF-0505	0.82	0.27		0.78	0.24	J	0.95	0.21	
TLF3	059	0.5	TLF-0508	2.17	0.52		1.43	0.31		1.43	0.28	
TLF3	059	3.5	TLF-0509	0.68	0.23		0.76	0.23	J	0.49	0.15	
TLF3	060	0.5	TLF-0526	0.8	0.26		0.68	0.2		0.75	0.21	
TLF3	060	2.5	TLF-0527	0.97	0.29		1.01	0.21	J	1.24	0.32	
TLF3	061	0.5	TLF-0510	0.7	0.3		0.69	0.16	J	0.57	0.19	J
TLF3	061	2	TLF-0511	0.63	0.21		0.53	0.15	J			
TLF3	062	0.5	TLF-0512	0.69	0.24		0.77	0.21	J	0.55	0.21	
TLF3	062	3.5	TLF-0513	0.88	0.26		0.76	0.21	J	0.71	0.25	
TLF3	063	0.5	TLF-0514	0.74	0.57		0.57	0.2	J	0.6	0.22	

ft bgs: feet below ground surface
pCi/g: picocuries per gram
2σ TPU: total propagated uncertainty
UCL95: 95th percent upper confidence limit
J=Estimated; U=Not Detected, value below decision level; UJ=Estimated, value below decision level

Table A4-17 - Tonawanda Landfill - Landfill Class 3 - Biased Samples (Continued)
Soil Samples

				Ra-226			Th-230			U-238		
Prefix	**No.**	**Depth (ft. bgs)**	**Sample #**	**Result (pCi/g)**	**2σ TPU (pCi/g)**	**Qual**	**Result (pCi/g)**	**2σ TPU (pCi/g)**	**Qual**	**Result (pCi/g)**	**2σ TPU (pCi/g)**	**Qual**
TLF3	063	2.5	TLF-0515	2.73	0.59		3.08	0.57		3.13	0.66	
TLF3	064	0.5	TLF-0524	0.81	0.24		0.71	0.25		0.89	0.24	
TLF3	064	0.5	TLF-9549	0.99	0.29		0.77	0.19	J	0.76	0.25	
TLF3	064	3	TLF-0525	1.04	0.3		1.35	0.27	J	0.87	0.27	
TLF3	064	3	TLF-9550	1.54	0.36		1.37	0.31		0.96	0.25	

Summary Statistics							
N	34		34		33		
Max	2.73	0.59	3.08	0.57	3.13	0.66	
Min	0.40	0.14	0.53	0.15	0.49	0.15	
Avg	0.96	0.05	0.92	0.04	0.86	0.04	
Med	0.82		0.84		0.76		
Stdev	0.44		0.44		0.46		
UCL95	1.09		1.05		0.99		

ft bgs: feet below ground surface
pCi/g: picocuries per gram
2σ TPU: total propagated uncertainty
UCL95: 95th percent upper confidence limit
J=Estimated; U=Not Detected, value below decision level; UJ=Estimated, value below decision level

Table A4-18 - Tonawanda Landfill - Landfill Class 2, Area B
Soil Samples

				Ra-226			Th-230			U-238		
Prefix	No.	Depth (ft. bgs)	Sample #	Result (pCi/g)	2σ TPU (pCi/g)	Qual	Result (pCi/g)	2σ TPU (pCi/g)	Qual	Result (pCi/g)	2σ TPU (pCi/g)	Qual
TLFB2	001	0.5	TLF-0748	1.11	0.31		1.23	0.25		0.86	0.28	
TLFB2	001	4	TLF-0749	1.03	0.31		0.93	0.21		0.6	0.13	
TLFB2	002	0.5	TLF-0752	1.07	0.3		0.91	0.2		0.89	0.28	
TLFB2	002	0.5	TLF-9768	1.41	0.37		0.9	0.2		0.8	0.26	
TLFB2	002	4	TLF-0753	1.18	0.32		1.02	0.22		0.96	0.3	
TLFB2	002	4	TLF-9769	1.19	0.29		0.89	0.2		0.69	0.25	
TLFB2	003	0.5	TLF-0740B	0.73	0.27		0.87	0.22		0.74	0.19	
TLFB2	003	4	TLF-0745	0.94	0.27		0.94	0.23		0.78	0.2	
TLFB2	004	0.5	TLF-0730	1.2	0.32		0.97	0.22		0.78	0.29	J
TLFB2	004	0.5	TLF-9545	0.79	0.23		0.95	0.22		1.15	0.36	J
TLFB2	004	4	TLF-0731	1	0.26		1.04	0.22		0.93	0.31	
TLFB2	004	4	TLF-9546	1.29	0.33		1.23	0.27	J	0.83	0.22	
TLFB2	005	0.5	TLF-0734	1	0.26		0.95	0.26		0.9	0.24	
TLFB2	005	3	TLF-0735	0.73	0.25		0.93	0.24		0.73	0.21	
TLFB2	006	0.5	TLF-0754	1.02	0.24		1.21	0.31		0.8	0.23	
TLFB2	006	3.5	TLF-0755	0.98	0.25		0.96	0.29		0.8	0.23	
TLFB2	007	0.5	TLF-0750	1.25	0.33		0.93	0.21		0.78	0.28	
TLFB2	007	3.5	TLF-0751	1.54	0.41		0.98	0.21		0.93	0.27	
TLFB2	008	0.5	TLF-0732	1.03	0.29		0.72	0.23		0.59	0.19	
TLFB2	008	4	TLF-0733	0.64	0.24		0.7	0.21		0.67	0.21	
TLFB2	009	0.5	TLF-0746	1.03	0.28		0.91	0.23		0.68	0.18	
TLFB2	009	4	TLF-0747	0.86	0.26		0.7	0.19	J	0.69	0.18	
TLFB2	010	0.5	TLF-0756	1.05	0.27		1.22	0.25		1.06	0.32	
TLFB2	010	4	TLF-0757	0.9	0.25		0.8	0.18		0.56	0.21	
TLFB2	011	0.5	TLF-0762	0.43	0.19	J	1	0.23		0.73	0.27	
TLFB2	011	4	TLF-0763	0.89	0.25		0.85	0.2		0.91	0.3	
TLFB2	012	0.5	TLF-0764	1.05	0.33		0.78	0.2	J	0.73	0.25	
TLFB2	012	3.5	TLF-0765	0.79	0.25		0.9	0.2	J	0.61	0.22	
TLFB2	013	0.5	TLF-0758	1.02	0.25		1.15	0.26	J	1.02	0.26	

ft bgs: feet below ground surface
pCi/g: picocuries per gram
2σ TPU: total propagated uncertainty
UCL95: 95th percent upper confidence limit
J=Estimated; U=Not Detected, value below decision level; UJ=Estimated, value below decision level

Table A4-18 - Tonawanda Landfill - Landfill Class 2, Area B (Continued)
Soil Samples

				Ra-226			Th-230			U-238		
Prefix	**No.**	**Depth (ft. bgs)**	**Sample #**	**Result (pCi/g)**	**2σ TPU (pCi/g)**	**Qual**	**Result (pCi/g)**	**2σ TPU (pCi/g)**	**Qual**	**Result (pCi/g)**	**2σ TPU (pCi/g)**	**Qual**
TLFB2	013	3.8	TLF-0759	0.76	0.21		0.73	0.22		0.6	0.19	
TLFB2	014	0.5	TLF-0760	1.05	0.26		0.95	0.26		0.74	0.21	
TLFB2	014	3.5	TLF-0761	0.79	0.22		0.81	0.23		0.58	0.19	
TLFB2	015	0.5	TLF-0743	0.81	0.21		0.77	0.22		0.42	0.17	
TLFB2	015	4	TLF-0744	0.89	0.23		0.75	0.23	J	0.59	0.22	
TLFB2	016	0.5	TLF-0736	1.4	0.35		0.99	0.22	J	0.98	0.24	
TLFB2	016	4	TLF-0737	0.94	0.31		0.77	0.21		0.76	0.22	
TLFB2	017	0.5	TLF-0738	1.18	0.31		1.05	0.26	J	0.92	0.24	
TLFB2	017	2.5	TLF-0739	1.06	0.28	J	7.5	1.8		357	80	J
TLFB2	017	3.5	TLF-0740	1.25	0.32		1.21	0.25		1.48	0.47	J
TLFB2	018	0.5	TLF-0741	0.88	0.22		0.65	0.16		0.87	0.25	
TLFB2	018	3.5	TLF-0742	0.77	0.21		0.65	0.19		0.51	0.19	

Summary Statistics							
N	41		41		41		
Max	1.54	0.41	7.50	1.80	357.00	80.00	
Min	0.43	0.19	0.65	0.16	0.42	0.17	
Avg	1.00	0.04	1.08	0.06	9.48	1.95	
Med	1.02		0.93		0.78		
Stdev	0.22		1.04		55.63		
UCL95	1.06		1.36		24.11		

ft bgs: feet below ground surface
pCi/g: picocuries per gram
2σ TPU: total propagated uncertainty
UCL95: 95th percent upper confidence limit
J=Estimated; U=Not Detected, value below decision level; UJ=Estimated, value below decision level

Table A4-19 - Tonawanda Landfill - Landfill Class 2, Area A
Soil Samples

				Ra-226			Th-230			U-238		
Prefix	No.	Depth (ft. bgs)	Sample #	Result (pCi/g)	2σ TPU (pCi/g)	Qual	Result (pCi/g)	2σ TPU (pCi/g)	Qual	Result (pCi/g)	2σ TPU (pCi/g)	Qual
TLFA2	001	0.5	TLF-0570	0.77	0.25		0.83	0.23		0.67	0.17	
TLFA2	001	4	TLF-0571	0.8	0.25		0.9	0.23		0.56	0.17	
TLFA2	002	0.5	TLF-0590	0.9	0.23		0.75	0.2	J	0.94	0.26	
TLFA2	002	0.5	TLF-9606	0.95	0.24		0.88	0.22	J	0.65	0.23	
TLFA2	002	3.5	TLF-0591	0.64	0.19		0.65	0.24		0.92	0.27	
TLFA2	002	3.5	TLF-9607	0.77	0.21		0.81	0.26		0.89	0.26	
TLFA2	003	0.5	TLF-0594	0.88	0.26		0.64	0.18		0.75	0.25	
TLFA2	003	2.5	TLF-0595	0.96	0.35		0.92	0.21	J	1.24	0.35	
TLFA2	004	0.5	TLF-0572	0.68	0.24		0.69	0.21	J	0.75	0.19	
TLFA2	004	3.5	TLF-0573	0.98	0.29		1.02	0.26		0.9	0.3	
TLFA2	005	0.5	TLF-0600	0.87	0.24		1.11	0.33	J	0.59	0.17	
TLFA2	005	3.5	TLF-0601	1.31	0.34		1.32	0.38	J	1.63	0.35	
TLFA2	006	0.5	TLF-0592	0.85	0.22		0.73	0.21		0.54	0.19	
TLFA2	006	2	TLF-0593	0.85	0.23		0.73	0.2		0.95	0.29	
TLFA2	007	0.5	TLF-0574	0.83	0.25		0.83	0.2	J	0.63	0.23	
TLFA2	007	3.5	TLF-0575	0.89	0.25		0.56	0.2	J	0.5	0.2	
TLFA2	008	0.5	TLF-0619	1.01	0.3		1.06	0.23	J	2.55	0.53	
TLFA2	008	3	TLF-0620	3.91	0.83		6.3	1		9.7	1.7	
TLFA2	009	0.5	TLF-0584	0.74	0.23		0.75	0.18	J	0.9	0.28	
TLFA2	009	2	TLF-0585	0.26	0.2		0.49	0.14	J			
TLFA2	010	0.5	TLF-0576	0.53	0.24		0.79	0.2		0.69	0.25	
TLFA2	010	3.5	TLF-0577	1.24	0.34		0.77	0.19	J	0.56	0.22	
TLFA2	011	0.5	TLF-0604	1.83	0.4		1.53	0.38		1.96	0.38	
TLFA2	011	4	TLF-0605	1.04	0.28		0.77	0.21		0.79	0.22	
TLFA2	012	0.5	TLF-0582	1.04	0.31		1.06	0.22	J	1.57	0.37	
TLFA2	012	2	TLF-0583	0.99	0.34		0.59	0.17		0.98	0.26	
TLFA2	013	0.5	TLF-0596	0.96	0.29		1.04	0.35		0.74	0.2	
TLFA2	013	0.5	TLF-9608	0.64	0.21		0.9	0.29		0.73	0.2	
TLFA2	013	3.5	TLF-0597	0.8	0.21		0.57	0.18		0.66	0.18	

ft bgs: feet below ground surface
pCi/g: picocuries per gram
2σ TPU: total propagated uncertainty
UCL95: 95th percent upper confidence limit
J=Estimated; U=Not Detected, value below decision level; UJ=Estimated, value below decision level

Table A4-19 - Tonawanda Landfill - Landfill Class 2, Area A (Continued)
Soil Samples

				Ra-226			Th-230			U-238		
Prefix	**No.**	**Depth (ft. bgs)**	**Sample #**	**Result (pCi/g)**	**2σ TPU (pCi/g)**	**Qual**	**Result (pCi/g)**	**2σ TPU (pCi/g)**	**Qual**	**Result (pCi/g)**	**2σ TPU (pCi/g)**	**Qual**
TLFA2	013	3.5	TLF-9609	0.83	0.25		0.67	0.15		0.59	0.18	
TLFA2	014	0.5	TLF-0578	0.96	0.32		0.9	0.22		1.93	0.48	
TLFA2	014	3.5	TLF-0579	1.07	0.34		0.71	0.21		0.47	0.21	
TLFA2	015	0.5	TLF-0602	1.12	0.34		0.9	0.22		5.8	1	
TLFA2	015	2.5	TLF-0603	4.45	0.93		3.35	0.56		7.2	1.3	
TLFA2	016	0.5	TLF-0586	0.84	0.27		0.81	0.21		0.69	0.25	
TLFA2	016	3.5	TLF-0587	1.1	0.44		0.76	0.21	J	0.91	0.28	
TLFA2	017	0.5	TLF-0580	0.91	0.27		0.8	0.2	J	0.79	0.25	
TLFA2	017	3.5	TLF-0581	1.01	0.29		1.1	0.24		0.64	0.21	
TLFA2	018	0.5	TLF-0588	0.81	0.28		1	0.25	J	0.81	0.25	
TLFA2	018	3.5	TLF-0589	3.7	0.74		3.28	0.69	J	4.41	0.9	
TLFA2	020	0.5	TLF-0598	1.29	0.34		0.65	0.27		2.35	0.47	
TLFA2	020	3	TLF-0599	0.84	0.24		0.8	0.22		0.62	0.18	

Summary Statistics							
N	42		42		41		
Max	4.45	0.93	6.30	1.00	9.70	1.70	
Min	0.26	0.20	0.49	0.14	0.47	0.21	
Avg	1.14	0.05	1.09	0.05	1.52	0.07	
Med	0.91		0.81		0.79		
Stdev	0.85		1.00		1.92		
UCL95	1.36		1.35		2.02		

ft bgs: feet below ground surface
pCi/g: picocuries per gram
2σ TPU: total propagated uncertainty
UCL95: 95th percent upper confidence limit
J=Estimated; U=Not Detected, value below decision level; UJ=Estimated, value below decision level

Table A4-20 - Tonawanda Landfill - Landfill Class 1, Area A
Soil Samples

				Ra-226			Th-230			U-238		
Prefix	No.	Depth (ft. bgs)	Sample #	Result (pCi/g)	2σ TPU (pCi/g)	Qual	Result (pCi/g)	2σ TPU (pCi/g)	Qual	Result (pCi/g)	2σ TPU (pCi/g)	Qual
TLFA1	002	0.5	TLF-0694	2.81	0.59		1.44	0.38		3.61	0.58	
TLFA1	002	2	TLF-0695	3.73	0.77		3.38	0.7		5.51	0.84	
TLFA1	002	5	TLF-0696	3.68	0.78		2.28	0.47		8.1	1.3	
TLFA1	002	11.5	TLF-0697	3.64	0.75		5.15	0.91				
TLFA1	003	0.5	TLF-0690	1.58	0.38		1.29	0.23		3.66	0.76	
TLFA1	003	1.5	TLF-0691	2.06	0.48		1.4	0.24		34.2	5.3	
TLFA1	003	5.75	TLF-0692	18.6	3.6		71	10		227	43	J
TLFA1	003	5.75	TLF-9717	16.9	3.3		76	11		205	38	J
TLFA1	003	11.5	TLF-0693	7.9	1.6		11.8	1.8		72	12	
TLFA1	004	0.5	TLF-0677	1.09	0.26		0.99	0.18	J	1.39	0.28	
TLFA1	004	5	TLF-0678	0.86	0.23		0.62	0.15		0.84	0.27	
TLFA1	004	9	TLF-0679	0.74	0.23		0.7	0.17	J	0.8	0.28	
TLFA1	006	0.5	TLF-0670	2.79	0.61		3.3	0.57		10.4	1.7	
TLFA1	006	2	TLF-0671	14.9	2.8		13.8	2.2	J	40.5	6.2	
TLFA1	006	4.5	TLF-0672	6	1.2		8.7	1.3		69	11	
TLFA1	007	0.5	TLF-0673	0.64	0.23		0.74	0.22		0.85	0.28	
TLFA1	007	2	TLF-0674	0.96	0.28		1.05	0.29		1.75	0.46	
TLFA1	007	10	TLF-0675	0.99	0.28		0.93	0.3		0.8	0.27	
TLFA1	007	12	TLF-0676	0.62	0.22		0.88	0.29		0.53	0.21	
TLFA1	008	0.5	TLF-0680	0.87	0.27		1.07	0.29		0.64	0.17	J
TLFA1	008	4.5	TLF-0681	1.49	0.35		1.16	0.27		1.69	0.38	
TLFA1	008	12	TLF-0682	0.66	0.24		0.79	0.25		0.35	0.18	
TLFA1	010	0.5	TLF-0644	1.41	0.38		1.29	0.26		1.92	0.43	
TLFA1	010	3	TLF-0645	3.68	0.78		2.85	0.52		34.9	5.8	
TLFA1	010	6	TLF-0646	2.6	0.6		3.52	0.59	J	32.4	5.4	
TLFA1	011	0.5	TLF-0686	1.42	0.36		1.54	0.39		5.57	0.86	
TLFA1	011	1.5	TLF-0687	6	1.2		11.7	1.9		75	19	J
TLFA1	011	6.5	TLF-0688	4.26	0.87		3.53	0.76		23.3	3.5	
TLFA1	011	12.5	TLF-0689	4.42	0.9		3.51	0.72		28.8	4.4	

ft bgs: feet below ground surface
pCi/g: picocuries per gram
2σ TPU: total propagated uncertainty
UCL95: 95th percent upper confidence limit
J=Estimated; U=Not Detected, value below decision level; UJ=Estimated, value below decision level

Table A4-20 - Tonawanda Landfill - Landfill Class 1, Area A (Continued)
Soil Samples

				Ra-226			Th-230			U-238		
Prefix	No.	Depth (ft. bgs)	Sample #	Result (pCi/g)	2σ TPU (pCi/g)	Qual	Result (pCi/g)	2σ TPU (pCi/g)	Qual	Result (pCi/g)	2σ TPU (pCi/g)	Qual
TLFA1	012	0.5	TLF-0683	0.83	0.25		0.92	0.26		0.9	0.29	
TLFA1	012	5	TLF-0684	0.84	0.26		0.77	0.27		0.66	0.26	
TLFA1	012	12	TLF-0685	0.84	0.3		0.76	0.18		0.69	0.14	
TLFA1	013	0.5	TLF-0640	1.39	0.38		1.6	0.32		3.41	0.66	
TLFA1	013	0.5	TLF-9712	1.6	0.41		1.9	0.38		2.04	0.43	
TLFA1	013	1	TLF-0641	2.16	0.5		2.46	0.45		3.19	0.64	
TLFA1	013	1	TLF-9713	3.5	0.75		2.81	0.51		4.71	0.89	
TLFA1	013	5.5	TLF-0642	2.45	0.54		2.79	0.5		15.5	2.5	
TLFA1	013	11.5	TLF-0643	3.06	0.65		2.84	0.52	J	3.01	0.61	
TLFA1	014	0.5	TLF-0651	1	0.31		1.04	0.2	J	1.28	0.36	
TLFA1	014	4.5	TLF-0652	2.1	0.48		1.97	0.32	J	2	0.5	
TLFA1	014	7.5	TLF-0653	20.1	3.8		32.5	4.6	J	39.4	6.5	J
TLFA1	015	0.5	TLF-0647	1.21	0.33		1.02	0.19	J	1.2	0.25	
TLFA1	015	0.5	TLF-9714	0.9	0.29		1.05	0.19	J	1.16	0.28	
TLFA1	015	2	TLF-0648	2.97	0.63		3.55	0.56	J	4.04	0.76	
TLFA1	015	2	TLF-9715	2.4	0.53		2.15	0.36	J	3.37	0.66	
TLFA1	015	8	TLF-0649	6.7	1.3		6.49	0.97	J	12.4	2.2	
TLFA1	015	10.5	TLF-0650	5.8	1.2		4.36	0.69	J	8.6	1.5	
TLFA1	016	0.5	TLF-0661	0.83	0.25		1.24	0.21	J	2.41	0.56	J
TLFA1	016	0.5	TLF-9716	1.41	0.32		1.23	0.22	J	1.83	0.45	
TLFA1	016	5	TLF-0662	1.9	0.46		2.09	0.39	J	5.5	1.1	
TLFA1	016	8.5	TLF-0663	1.61	0.4		1.36	0.29		5.9	1.1	
TLFA1	017	0.5	TLF-0658	1.38	0.45		1.03	0.23		1.78	0.43	
TLFA1	017	2	TLF-0659	2.85	0.62		2.58	0.49		8.7	1.4	
TLFA1	017	5.5	TLF-0660	3.43	0.73		3.13	0.54		9.3	1.4	
TLFA1	018	0.5	TLF-0664	1.2	0.31		0.74	0.21		0.9	0.23	J
TLFA1	018	7	TLF-0665	3.56	0.73		3.65	0.75		23	3.8	
TLFA1	018	12	TLF-0666	1.89	0.45		5.13	0.92		14.5	2.5	
TLFA1	019	0.5	TLF-0667	1.33	0.49		0.58	0.15		14.2	2.1	

ft bgs: feet below ground surface
pCi/g: picocuries per gram
2σ TPU: total propagated uncertainty
UCL95: 95th percent upper confidence limit
J=Estimated; U=Not Detected, value below decision level; UJ=Estimated, value below decision level

Table A4-20 - Tonawanda Landfill - Landfill Class 1, Area A (Continued)
Soil Samples

				Ra-226			Th-230			U-238		
Prefix	**No.**	**Depth (ft. bgs)**	**Sample #**	**Result (pCi/g)**	**2σ TPU (pCi/g)**	**Qual**	**Result (pCi/g)**	**2σ TPU (pCi/g)**	**Qual**	**Result (pCi/g)**	**2σ TPU (pCi/g)**	**Qual**
TLFA1	019	5.5	TLF-0668	4.04	0.82		4.08	0.65	J	12	1.9	
TLFA1	019	6	TLF-0669	2.59	0.56		4.07	0.83	J	14.5	2.3	
TLFA1	020	0.5	TLF-0654	0.49	0.2		0.94	0.17	J	1.1	0.28	J
TLFA1	020	2.5	TLF-0655	1.99	0.45		1.82	0.34	J	7.2	1.3	
TLFA1	020	8	TLF-0656	3.01	0.68		2.91	0.48	J	9.2	1.6	
TLFA1	020	12	TLF-0657	3.31	0.74		2.75	0.45	J	5.7	1.1	

Summary Statistics							
N	64		64		63		
Max	20.10	3.80	76.00	11.00	227.00	43.00	
Min	0.49	0.20	0.58	0.15	0.35	0.18	
Avg	3.34	0.13	5.42	0.26	18.03	1.03	
Med	2.08		2.03		4.71		
Stdev	4.08		13.15		40.00		
UCL95	4.19		8.16		26.45		

ft bgs: feet below ground surface
pCi/g: picocuries per gram
2σ TPU: total propagated uncertainty
UCL95: 95th percent upper confidence limit
J=Estimated; U=Not Detected, value below decision level; UJ=Estimated, value below decision level

Table A4-21 - Tonawanda Landfill - Landfill Class 1, Area B Samples B1B and B1A
Soil Samples

				Ra-226			Th-230			U-238		
Prefix	**No.**	**Depth (ft. bgs)**	**Sample #**	**Result (pCi/g)**	**2σ TPU (pCi/g)**	**Qual**	**Result (pCi/g)**	**2σ TPU (pCi/g)**	**Qual**	**Result (pCi/g)**	**2σ TPU (pCi/g)**	**Qual**
TLFB1B	001	0.5	TLF-0783	1.42	0.35		1.51	0.35		1.71	0.47	J
TLFB1B	001	4	TLF-0784	0.75	0.22		0.8	0.21		0.93	0.33	J
TLFB1B	005	0.5	TLF-0780	0.97	0.26		0.96	0.24		1.01	0.33	
TLFB1B	005	4	TLF-0781	0.85	0.25		0.85	0.22		0.68	0.27	J
TLFB1B	009	0.5	TLF-0786	2.86	0.6		1.8	0.41		1.82	0.47	
TLFB1B	009	4	TLF-0787	1.04	0.3		0.96	0.25		0.83	0.31	J
TLFB1A	001	0.5	TLF-0871	3.91	0.8		0.82	0.26		0.86	0.23	
TLFB1A	001	4	TLF-0872	1.23	0.35		0.94	0.3		1	0.25	
TLFB1A	005	0.5	TLF-0868	1.28	0.32		0.98	0.22		0.81	0.29	
TLFB1A	005	4	TLF-0869	1.04	0.26		0.8	0.2		0.94	0.33	J

Summary Statistics							
N	10		10		10		
Max	3.91	0.80	1.80	0.41	1.82	0.47	
Min	0.75	0.22	0.80	0.20	0.68	0.27	
Avg	1.54	0.13	1.04	0.09	1.06	0.11	
Med	1.14		0.95		0.94		
Stdev	1.03		0.34		0.39		
UCL95	2.12		1.24		1.28		

ft bgs: feet below ground surface
pCi/g: picocuries per gram
2σ TPU: total propagated uncertainty
UCL95: 95th percent upper confidence limit
J=Estimated; U=Not Detected, value below decision level; UJ=Estimated, value below decision level

Table A4-22 - Summary of Elevated Soil Results
Landfill
Th-230, U-238 and Ra-226

Prefix	No.	Depth (ft bgs)	Sample #	Th-230 Result (pCi/g)	U-238 Result (pCi/g)	Ra-226 Result (pCi/g)
LANDFILL						
*** Screening Level UTL 99/99.9**				**1.58**	**2.34**	**2.27**
TLF3	063	2.5	TLF-0515	3.08	3.13	2.73
TLFA1	002	0.5	TLF-0694	1.44	3.61	2.81
TLFA1	002	2	TLF-0695	3.38	5.51	3.73
TLFA1	002	5	TLF-0696	2.28	8.1	3.68
TLFA1	002	11.5	TLF-0697	5.15		3.64
TLFA1	003	0.5	TLF-0690	1.29	3.66	1.58
TLFA1	003	1.5	TLF-0691	1.4	34.2	2.06
TLFA1	003	5.75	TLF-0692	71	227	18.6
TLFA1	003	11.5	TLF-0693	11.8	72	7.9
TLFA1	003	5.75	TLF-9717	76	205	16.9
TLFA1	006	0.5	TLF-0670	3.3	10.4	2.79
TLFA1	006	2	TLF-0671	13.8	40.5	14.9
TLFA1	006	4.5	TLF-0672	8.7	69	6
TLFA1	010	3	TLF-0645	2.85	34.9	3.68
TLFA1	010	6	TLF-0646	3.52	32.4	2.6
TLFA1	011	0.5	TLF-0686	1.54	5.57	1.42
TLFA1	011	1.5	TLF-0687	11.7	75	6
TLFA1	011	6.5	TLF-0688	3.53	23.3	4.26
TLFA1	011	12.5	TLF-0689	3.51	28.8	4.42
TLFA1	013	0.5	TLF-0640	1.6	3.41	1.39
TLFA1	013	1	TLF-0641	2.46	3.19	2.16
TLFA1	013	5.5	TLF-0642	2.79	15.5	2.45
TLFA1	013	11.5	TLF-0643	2.84	3.01	3.06
TLFA1	013	0.5	TLF-9712	1.9	2.04	1.6
TLFA1	013	1	TLF-9713	2.81	4.71	3.5
TLFA1	014	4.5	TLF-0652	1.97	2	2.1
TLFA1	014	7.5	TLF-0653	32.5	39.4	20.1
TLFA1	015	2	TLF-0648	3.55	4.04	2.97
TLFA1	015	8	TLF-0649	6.49	12.4	6.7
TLFA1	015	10.5	TLF-0650	4.36	8.6	5.8
TLFA1	015	2	TLF-9715	2.15	3.37	2.4
TLFA1	016	0.5	TLF-0661	1.24	2.41	0.83
TLFA1	016	5	TLF-0662	2.09	5.5	1.9
TLFA1	016	8.5	TLF-0663	1.36	5.9	1.61
TLFA1	017	2	TLF-0659	2.58	8.7	2.85
TLFA1	017	5.5	TLF-0660	3.13	9.3	3.43
TLFA1	018	7	TLF-0665	3.65	23	3.56
TLFA1	018	12	TLF-0666	5.13	14.5	1.89
TLFA1	019	0.5	TLF-0667	0.58	14.2	1.33
TLFA1	019	5.5	TLF-0668	4.08	12	4.04
TLFA1	019	6	TLF-0669	4.07	14.5	2.59

ft bgs: feet below ground surface

pCi/g: picocuries per gram

* UTL 99/99.9 : 99 percent confidence level that at least 99.9 percent of results will fall below the UTL 99/99.9

Blank results indicate rejected data.

Table A4-22 - Summary of Elevated Soil Results (Continued)
Landfill
Th-230, U-238 and Ra-226

Prefix	No.	Depth (ft bgs)	Sample #	Th-230 Result (pCi/g)	U-238 Result (pCi/g)	Ra-226 Result (pCi/g)
LANDFILL						
*** Screening Level UTL 99/99.9**				**1.58**	**2.34**	**2.27**
TLFA1	020	2.5	TLF-0655	1.82	7.2	1.99
TLFA1	020	8	TLF-0656	2.91	9.2	3.01
TLFA1	020	12	TLF-0657	2.75	5.7	3.31
TLFA2	008	0.5	TLF-0619	1.06	2.55	1.01
TLFA2	008	3	TLF-0620	6.3	9.7	3.91
TLFA2	015	0.5	TLF-0602	0.9	5.8	1.12
TLFA2	015	2.5	TLF-0603	3.35	7.2	4.45
TLFA2	018	3.5	TLF-0589	3.28	4.41	3.7
TLFA2	020	0.5	TLF-0598	0.65	2.35	1.29
TLFB1A	001	0.5	TLF-0871	0.82	0.86	3.91
TLFB1B	009	0.5	TLF-0786	1.8	1.82	2.86
TLFB2	017	2.5	TLF-0739	7.5	357	1.06

ft bgs: feet below ground surface
pCi/g: picocuries per gram
* UTL 99/99.9 : 99 percent confidence level that at least 99.9 percent of results will fall below the UTL 99/99.9

Table A4-23
Summary of Landfill OU
Am-241 Detections

Prefix	No.	Depth (ft bgs)	Sample #	Result (pCi/g)	Qual
TLFR3	004	0.5	TLF-0400	0.087	
TLFR3	016	3.5	TLF-0427	0.15	
TLFA1	006	4.5	TLF-0672	-1.08	UJ
TLFA2	004	0.5	TLF-0572	0.24	
TLFA2	007	3.5	TLF-0575	0.14	
TLF3	001	0.5	TLF-0480	0.14	
TLF3	003	0.5	TLF-0474	0.26	
TLF3	006	0.5	TLF-0476	1.72	
TLF3	009	0.5	TLF-9488	0.15	
TLF3	022	0.5	TLF-9468	0.32	
TLF3	022	3	TLF-0471	0.12	

Notes:
UJ - Estimated, value below decision level
ft bgs - feet below ground surface
pCi/g - picocuries per gram

Table A4-24
Results Summary for Tonawanda Landfill - Landfill OU
Soil Results (1)

Nuclide	Detections/ Results (2)	Maximum Concentration (pCi/g)	Minimum Concentration (pCi/g)	Mean Concentration (pCi/g)	Standard Deviation (pCi/g)	UCL95 Concentration (pCi/g)
Ra-226	217/217	20.1	0.26	1.69	2.28	1.94
Ra-228	211/217	4.3	0.22	1.02	0.81	1.12
Th-228	217/217	3.97	0.37	1.17	0.73	1.25
Th-230	217/217	76	0.49	2	5.75	2.65
Th-232	217/217	4.01	0.4	1.09	0.69	1.17
U-234	214/214	349	0.43	6.92	29.95	10.3
U-235	170/217	19.3	-0.02	0.4	1.82	0.61
U-238	214/214	357	0.35	6.96	30.34	10.39
Am-241	8/217	1.72	-5.7	-0.09	0.46	-0.04
Pa-231	25/217	5.4	-1.9	0.13	0.99	0.25

Notes:
(1) Includes sediment samples.
(2) Duplicate sample results were compared to the primary sample results and the greater value for each isotope was used in the calculations.
pCi/g - picocuries per gram
Ra - Radium
Th - Thorium
U - Uranium
Am - Americium
Pa - Protactinium

Table A4-25
Tonawanda Landfill Mudflats Chemical Results

Analyte	Sample #	EPA RCRA (20x TCLP)	Background	Result	Units	Dilution	Qual
Metals							
ALUMINUM	TLF-0661		13976	6600	mg/kg	10	J
ALUMINUM	TLF-0668		13976	5900	mg/kg	1	J
ALUMINUM	TLF-0677		13976	14000	mg/kg	1	J
ALUMINUM	TLF-9716		13976	11000	mg/kg	2	J
ANTIMONY	TLF-0661		8.24	5	mg/kg	10	J
ANTIMONY	TLF-0668		8.24	1	mg/kg	10	J
ANTIMONY	TLF-0677		8.24	5.4	mg/kg	10	UJ
ANTIMONY	TLF-9716		8.24	4	mg/kg	10	J
ARSENIC	TLF-0661	100	20.5	11	mg/kg	10	J
ARSENIC	TLF-0668	100	20.5	8.4	mg/kg	10	J
ARSENIC	TLF-0677	100	20.5	9.9	mg/kg	10	J
ARSENIC	TLF-9716	100	20.5	8.5	mg/kg	20	J
BARIUM	TLF-0661	2000	113	410	mg/kg	10	
BARIUM	TLF-0668	2000	113	230	mg/kg	10	
BARIUM	TLF-0677	2000	113	350	mg/kg	10	
BARIUM	TLF-9716	2000	113	470	mg/kg	10	
BERYLLIUM	TLF-0661		1	0.7	mg/kg	10	J
BERYLLIUM	TLF-0668		1	0.6	mg/kg	10	J
BERYLLIUM	TLF-0677		1	9.1	mg/kg	50	U
BERYLLIUM	TLF-9716		1	0.6	mg/kg	10	J
CADMIUM	TLF-0661	20	1	9.9	mg/kg	10	J
CADMIUM	TLF-0668	20	1	1.2	mg/kg	10	J
CADMIUM	TLF-0677	20	1	2.1	mg/kg	10	J
CADMIUM	TLF-9716	20	1	6.4	mg/kg	10	J
CALCIUM	TLF-0661		32876	37000	mg/kg	10	J
CALCIUM	TLF-0668		32876	5400	mg/kg	1	J
CALCIUM	TLF-0677		32876	48000	mg/kg	1	J
CALCIUM	TLF-9716		32876	58000	mg/kg	2	J
CHROMIUM	TLF-0661	100	21.5	87	mg/kg	10	
CHROMIUM	TLF-0668	100	21.5	31	mg/kg	1	
CHROMIUM	TLF-0677	100	21.5	29	mg/kg	1	
CHROMIUM	TLF-9716	100	21.5	49	mg/kg	2	
COBALT	TLF-0661		10.5	16	mg/kg	10	
COBALT	TLF-0668		10.5	8.3	mg/kg	1	
COBALT	TLF-0677		10.5	9.5	mg/kg	1	
COBALT	TLF-9716		10.5	12	mg/kg	2	
COPPER	TLF-0661		18.3	360	mg/kg	10	J
COPPER	TLF-0668		18.3	300	mg/kg	1	J
COPPER	TLF-0677		18.3	150	mg/kg	1	J
COPPER	TLF-9716		18.3	280	mg/kg	2	J
IRON	TLF-0661		23700	270000	mg/kg	10	J
IRON	TLF-0668		23700	58000	mg/kg	1	J
IRON	TLF-0677		23700	29000	mg/kg	1	J
IRON	TLF-9716		23700	120000	mg/kg	2	J
LEAD	TLF-0661	100	36	1200	mg/kg	10	J
LEAD	TLF-0668	100	36	220	mg/kg	10	J
LEAD	TLF-0677	100	36	490	mg/kg	10	J
LEAD	TLF-9716	100	36	740	mg/kg	10	J
MAGNESIUM	TLF-0661		10421	3900	mg/kg	10	J
MAGNESIUM	TLF-0668		10421	560	mg/kg	1	J
MAGNESIUM	TLF-0677		10421	13000	mg/kg	1	J
MAGNESIUM	TLF-9716		10421	7800	mg/kg	2	J
MANGANESE	TLF-0661		543	1800	mg/kg	10	J

µg/kg: micrograms per kilogram
mg/kg: milligrams per likogram
TCLP: Toxicity Characteristic Leaching Procedure
J=Estimated; U-Not Detected; UJ-Not Detected at an estimated quantity

Table A4-25
Tonawanda Landfill Mudflats Chemical Results

Analyte	Sample #	EPA RCRA (20x TCLP)	Background	Result	Units	Dilution	Qual
MANGANESE	TLF-0668		543	300	mg/kg	1	J
MANGANESE	TLF-0677		543	510	mg/kg	1	J
MANGANESE	TLF-9716		543	1400	mg/kg	2	J
NICKEL	TLF-0661		22.5	72	mg/kg	10	
NICKEL	TLF-0668		22.5	51	mg/kg	1	
NICKEL	TLF-0677		22.5	29	mg/kg	1	
NICKEL	TLF-9716		22.5	48	mg/kg	2	
POTASSIUM	TLF-0661		162.56	1500	mg/kg	10	J
POTASSIUM	TLF-0668		162.56	850	mg/kg	1	J
POTASSIUM	TLF-0677		162.56	3200	mg/kg	1	J
POTASSIUM	TLF-9716		162.56	2000	mg/kg	2	J
SELENIUM	TLF-0661	20	149	1	mg/kg	10	J
SELENIUM	TLF-0668	20	149	0.8	mg/kg	10	J
SELENIUM	TLF-0677	20	149	0.8	mg/kg	10	J
SELENIUM	TLF-9716	20	149	9.7	mg/kg	20	U
SILVER	TLF-0661	100	2.91	1	mg/kg	10	J
SILVER	TLF-0668	100	2.91	0.8	mg/kg	1	J
SILVER	TLF-0677	100	2.91	0.8	mg/kg	1	J
SILVER	TLF-9716	100	2.91	2.2	mg/kg	2	
SODIUM	TLF-0661		1023	1600	mg/kg	10	
SODIUM	TLF-0668		1023	1100	mg/kg	1	
SODIUM	TLF-0677		1023	1500	mg/kg	1	
SODIUM	TLF-9716		1023	1500	mg/kg	2	
THALLIUM	TLF-0661		48.4	0.4	mg/kg	10	J
THALLIUM	TLF-0668		48.4	0.2	mg/kg	10	J
THALLIUM	TLF-0677		48.4	0.2	mg/kg	10	J
THALLIUM	TLF-9716		48.4	0.1	mg/kg	10	J
VANADIUM	TLF-0661		24.5	18	mg/kg	10	
VANADIUM	TLF-0668		24.5	30	mg/kg	1	
VANADIUM	TLF-0677		24.5	24	mg/kg	1	
VANADIUM	TLF-9716		24.5	14	mg/kg	2	
ZINC	TLF-0661		84.8	1600	mg/kg	10	J
ZINC	TLF-0668		84.8	240	mg/kg	1	J
ZINC	TLF-0677		84.8	490	mg/kg	1	J
ZINC	TLF-9716		84.8	960	mg/kg	2	J
PCBs							
AROCLOR-1016	TLF-0661			140	µg/kg	1	J
AROCLOR-1016	TLF-0668			29	µg/kg	1	UJ
AROCLOR-1016	TLF-0677			31	µg/kg	1	UJ
AROCLOR-1016	TLF-9716			180	µg/kg	5	J
AROCLOR-1260	TLF-0661			27	µg/kg	1	UJ
AROCLOR-1260	TLF-0668			29	µg/kg	1	UJ
AROCLOR-1260	TLF-0677			68	µg/kg	1	J
AROCLOR-1260	TLF-9716			140	µg/kg	5	UJ
Pesticides							
4,4'-DDD	TLF-0661			200	µg/kg	10	J
4,4'-DDD	TLF-0668			3.5	µg/kg	1	J
4,4'-DDD	TLF-0677			6.5	µg/kg	1	J
4,4'-DDD	TLF-9716			170	µg/kg	10	J
4,4'-DDE	TLF-0661			130	µg/kg	10	
4,4'-DDE	TLF-0668			1	µg/kg	1	J
4,4'-DDE	TLF-0677			5.9	µg/kg	1	

µg/kg: micrograms per kilogram
mg/kg: milligrams per likogram
TCLP: Toxicity Characteristic Leaching Procedure
J=Estimated; U-Not Detected; UJ-Not Detected at an estimated quantity

Table A4-25
Tonawanda Landfill Mudflats Chemical Results

Analyte	Sample #	EPA RCRA (20x TCLP)	Background	Result	Units	Dilution	Qual
4,4'-DDE	TLF-9716			110	µg/kg	10	
4,4'-DDT	TLF-0661			210	µg/kg	10	
4,4'-DDT	TLF-0668			1	µg/kg	1	J
4,4'-DDT	TLF-0677			8.6	µg/kg	1	
4,4'-DDT	TLF-9716			420	µg/kg	10	
ALPHA-CHLORDANE	TLF-0661			45	µg/kg	10	
ALPHA-CHLORDANE	TLF-0668			1.4	µg/kg	1	U
ALPHA-CHLORDANE	TLF-0677			1.5	µg/kg	1	U
ALPHA-CHLORDANE	TLF-9716			43	µg/kg	10	
DIELDRIN	TLF-0661			20	µg/kg	10	J
DIELDRIN	TLF-0668			2.9	µg/kg	1	U
DIELDRIN	TLF-0677			3.1	µg/kg	1	U
DIELDRIN	TLF-9716			30	µg/kg	10	J
GAMMA-CHLORDANE	TLF-0661			51	µg/kg	10	
GAMMA-CHLORDANE	TLF-0668			1.4	µg/kg	1	U
GAMMA-CHLORDANE	TLF-0677			1.5	µg/kg	1	U
GAMMA-CHLORDANE	TLF-9716			45	µg/kg	10	
HEPTACHLOR EPOXIDE	TLF-0661			21	µg/kg	10	
HEPTACHLOR EPOXIDE	TLF-0668			1.4	µg/kg	1	U
HEPTACHLOR EPOXIDE	TLF-0677			1.5	µg/kg	1	U
HEPTACHLOR EPOXIDE	TLF-9716			17	µg/kg	10	
Semi-Volatile Organic Compounds							
ACENAPHTHENE	TLF-0661			100	µg/kg	1	J
ACENAPHTHENE	TLF-0668			570	µg/kg	1	U
ACENAPHTHENE	TLF-0677			600	µg/kg	1	U
ACENAPHTHENE	TLF-9716			1100	µg/kg	2	U
ACENAPHTHYLENE	TLF-0661			610	µg/kg	1	
ACENAPHTHYLENE	TLF-0668			570	µg/kg	1	U
ACENAPHTHYLENE	TLF-0677			600	µg/kg	1	U
ACENAPHTHYLENE	TLF-9716			700	µg/kg	2	J
ANTHRACENE	TLF-0661			810	µg/kg	1	
ANTHRACENE	TLF-0668			570	µg/kg	1	U
ANTHRACENE	TLF-0677			600	µg/kg	1	U
ANTHRACENE	TLF-9716			900	µg/kg	2	J
BENZO(A)ANTHRACENE	TLF-0661			3000	µg/kg	1	
BENZO(A)ANTHRACENE	TLF-0668			570	µg/kg	1	U
BENZO(A)ANTHRACENE	TLF-0677			200	µg/kg	1	J
BENZO(A)ANTHRACENE	TLF-9716			3000	µg/kg	2	
BENZO(A)PYRENE	TLF-0661			2900	µg/kg	1	
BENZO(A)PYRENE	TLF-0668			570	µg/kg	1	UJ
BENZO(A)PYRENE	TLF-0677			200	µg/kg	1	J
BENZO(A)PYRENE	TLF-9716			2800	µg/kg	2	J
BENZO(B)FLUORANTHENE	TLF-0661			2600	µg/kg	1	
BENZO(B)FLUORANTHENE	TLF-0668			570	µg/kg	1	UJ
BENZO(B)FLUORANTHENE	TLF-0677			200	µg/kg	1	J
BENZO(B)FLUORANTHENE	TLF-9716			2700	µg/kg	2	J
BENZO(G,H,I)PERYLENE	TLF-0661			650	µg/kg	1	
BENZO(G,H,I)PERYLENE	TLF-0668			570	µg/kg	1	UJ
BENZO(G,H,I)PERYLENE	TLF-0677			600	µg/kg	1	UJ
BENZO(G,H,I)PERYLENE	TLF-9716			1100	µg/kg	2	UJ
BENZO(K)FLUORANTHENE	TLF-0661			3100	µg/kg	1	
BENZO(K)FLUORANTHENE	TLF-0668			570	µg/kg	1	UJ
BENZO(K)FLUORANTHENE	TLF-0677			300	µg/kg	1	J

µg/kg: micrograms per kilogram
mg/kg: milligrams per likogram
TCLP: Toxicity Characteristic Leaching Procedure
J=Estimated; U-Not Detected; UJ-Not Detected at an estimated quantity

Table A4-25
Tonawanda Landfill Mudflats Chemical Results

Analyte	Sample #	EPA RCRA (20x TCLP)	Background	Result	Units	Dilution	Qual
BENZO(K)FLUORANTHENE	TLF-9716			3500	µg/kg	2	J
BIS(2-ETHYLHEXYL)PHTHALATE	TLF-0661			910	µg/kg	1	
BIS(2-ETHYLHEXYL)PHTHALATE	TLF-0668			570	µg/kg	1	U
BIS(2-ETHYLHEXYL)PHTHALATE	TLF-0677			80	µg/kg	1	J
BIS(2-ETHYLHEXYL)PHTHALATE	TLF-9716			400	µg/kg	2	J
CHRYSENE	TLF-0661			2800	µg/kg	1	
CHRYSENE	TLF-0668			570	µg/kg	1	U
CHRYSENE	TLF-0677			200	µg/kg	1	J
CHRYSENE	TLF-9716			2800	µg/kg	2	
FLUORANTHENE	TLF-0661			6500	µg/kg	1	
FLUORANTHENE	TLF-0668			570	µg/kg	1	U
FLUORANTHENE	TLF-0677			400	µg/kg	1	J
FLUORANTHENE	TLF-9716			7300	µg/kg	2	
FLUORENE	TLF-0661			300	µg/kg	1	J
FLUORENE	TLF-0668			570	µg/kg	1	U
FLUORENE	TLF-0677			600	µg/kg	1	U
FLUORENE	TLF-9716			400	µg/kg	2	J
INDENO(1,2,3-CD)PYRENE	TLF-0661			840	µg/kg	1	
INDENO(1,2,3-CD)PYRENE	TLF-0668			570	µg/kg	1	UJ
INDENO(1,2,3-CD)PYRENE	TLF-0677			60	µg/kg	1	J
INDENO(1,2,3-CD)PYRENE	TLF-9716			700	µg/kg	2	J
NAPHTHALENE	TLF-0661			100	µg/kg	1	J
NAPHTHALENE	TLF-0668			570	µg/kg	1	U
NAPHTHALENE	TLF-0677			600	µg/kg	1	U
NAPHTHALENE	TLF-9716			1100	µg/kg	2	U
PHENANTHRENE	TLF-0661			2800	µg/kg	1	
PHENANTHRENE	TLF-0668			570	µg/kg	1	U
PHENANTHRENE	TLF-0677			300	µg/kg	1	J
PHENANTHRENE	TLF-9716			3900	µg/kg	2	
PYRENE	TLF-0661			5900	µg/kg	1	J
PYRENE	TLF-0668			570	µg/kg	1	UJ
PYRENE	TLF-0677			400	µg/kg	1	J
PYRENE	TLF-9716			8800	µg/kg	2	J
Volatile Organic Compounds							
ACETONE	TLF-0661			580	µg/kg	1.04	J
ACETONE	TLF-0668			60	µg/kg	1.11	J
ACETONE	TLF-0677			180	µg/kg	0.967	J
ACETONE	TLF-9716			390	µg/kg	1.05	J
BENZENE	TLF-0661	10000		14	µg/kg	1.04	J
BENZENE	TLF-0668	10000		2	µg/kg	1.11	J
BENZENE	TLF-0677	10000		20	µg/kg	0.967	J
BENZENE	TLF-9716	10000		8	µg/kg	1.05	J
TOLUENE	TLF-0661			13	µg/kg	1.04	J
TOLUENE	TLF-0668			1	µg/kg	1.11	J
TOLUENE	TLF-0677			16	µg/kg	0.967	J
TOLUENE	TLF-9716			6	µg/kg	1.05	J
TRICHLOROETHENE	TLF-0661	10000		190	µg/kg	1.04	J
TRICHLOROETHENE	TLF-0668	10000		2	µg/kg	1.11	J
TRICHLOROETHENE	TLF-0677	10000		15	µg/kg	0.967	J
TRICHLOROETHENE	TLF-9716	10000		120	µg/kg	1.05	J
Wet Chem							
CYANIDE, TOTAL	TLF-0661			0.54	mg/kg	1	

µg/kg: micrograms per kilogram
mg/kg: milligrams per likogram
TCLP: Toxicity Characteristic Leaching Procedure
J=Estimated; U-Not Detected; UJ-Not Detected at an estimated quantity

Table A4-25
Tonawanda Landfill Mudflats Chemical Results

Analyte	Sample #	EPA RCRA (20x TCLP)	Background	Result	Units	Dilution	Qual
CYANIDE, TOTAL	TLF-0668			0.34	mg/kg	1	U
CYANIDE, TOTAL	TLF-0677			0.36	mg/kg	1	U
CYANIDE, TOTAL	TLF-9716			0.89	mg/kg	1	

µg/kg: micrograms per kilogram
mg/kg: milligrams per likogram
TCLP: Toxicity Characteristic Leaching Procedure
J=Estimated; U-Not Detected; UJ-Not Detected at an estimated quantity

Table A4-26 Tonawanda Landfill - Landfill Area A, Class 1 and 2 Geotechnical Samples

Boring #	Sample Interval, (ft bgs)	Field Sample #	Laboratory #	Moisture Content (Percent)	Field Classification	Laboratory Classification
TLFA1-004	0 to 0.5	TLF-0677	46756003	39.5	ML	OH-MH with Sand
TLFA1-006	0 to 0.5	TLF-0670	46756002	45.7	ML	SC [(a)]
TLFA2-005	0 to 0.5	TLF-0600	46756001	18.2	CL	OH with Sand

Note:
(a) The sample contained a significant amount of organic material

Key:
CL - Lean Clay
MH - Inorganic Silt
ML - Silt
OH - Organic Clay
SC - Clayey Sand
ft bgs - feet below ground surface

Table A4-27

Comparison of Elevated Landfill Soil Results[1]
Th - 230, U - 238, and Ra - 226
with Downhole Gamma Logging Activities

Prefix	No.	Sample Depth[2] (ft. bgs)	Sample #	Scan cpm[3]	Th - 230 Result pCi/g	U - 238 Result pCi/g	Ra - 226 Result pCi/g	Downhole Gamma Logging Depth 1 (ft bgs)[4]	Depth 2 (ft bgs)[5]	Peak Depth (bgs)	Peak Magnitude (cps)	Casing (Y/N)[6]
Landfill - Soil												
Screening Level - UTL 99/99.9					1.58	2.34	2.27					
TLF3	008			44				1.5	**	**	180	N
TLF3	063	2.5	TLF-0515	48	3.08	3.13	2.73					
TLF3	064			50				1.8	2.8	2.3	150	N
TLFA2	008	0.5	TLF-0619	52	1.06	2.55	1.01					
TLFA2	008	3	TLF-0620	42	6.3	9.7	3.91					
TLFA2	015	0.5	TLF-0602	44	0.9	5.8	1.12					
TLFA2	015	2.5	TLF-0603	44	3.35	7.2	4.45					
TLFA2	018	3.5	TLF-0589	46	3.28	4.41	3.7					
TLFA2	020	0.5	TLF-0598	48	0.65	2.35	1.29					
TLFB2	017	2.5	TLF-0739	280	7.5	357	1.06					
TLFA1	002	0.5	TLF-0694	46	1.44	3.61	2.81					
TLFA1	002	2	TLF-0695	50	3.38	5.51	3.73					
TLFA1	002	5	TLF-0696	62	2.28	8.1	3.68	2.25	11	2.7	118	Y
TLFA1	002	11.5	TLF-0697	36	5.15		3.64					
TLFA1	002	NS	NS	NS	NS	NS	NS	sharp peak		6.2	185	Y
TLFA1	003	0.5	TLF-0690	40	1.29	3.66	1.58					
TLFA1	003	1.5	TLF-0691	70	1.4	34.2	2.06					
TLFA1	003	5.75	TLF-0692	396	71	227	18.6	3.75	11	5.5	125	Y
TLFA1	003	11.5	TLF-0693	90	11.8	72	7.9					
TLFA1	003	5.75	TLF-9717	396	76	205	16.9	3.75	11	5.5	125	Y
TLFA1	006	0.5	TLF-0670	62	3.3	10.4	2.79					
TLFA1	006	2	TLF-0671	70	13.8	40.5	14.9					
TLFA1	006	4.5	TLF-0672	138	8.7	69	6	sharp peak		4.3	255	Y
TLFA1	010	3	TLF-0645	44	2.85	34.9	3.68					
TLFA1	010	6	TLF-0646	62	3.52	32.4	2.6	4	*	5.25	90	Y
TLFA1	011	0.5	TLF-0686	60	1.54	5.57	1.42					
TLFA1	011	1.5	TLF-0687	125	11.7	75	6					
TLFA1	011	6.5	TLF-0688	32	3.53	23.3	4.26	4	*	4.5	105	Y
TLFA1	011	12.5	TLF-0689	36	3.51	28.8	4.42	4	*	4.5	105	Y
TLFA1	013	0.5	TLF-0640	40	1.6	3.41	1.39					
TLFA1	013	1	TLF-0641	60	2.46	3.19	2.16					
TLFA1	013	5.5	TLF-0642	48	2.79	15.5	2.45	sharp peak		~5	**	Y
TLFA1	013	11.5	TLF-0643	52	2.84	3.01	3.06					
TLFA1	013	0.5	TLF-9712	40	1.9	2.04	1.6					
TLFA1	013	1	TLF-9713	60	2.81	4.71	3.5					
TLFA1	014	4.5	TLF-0652	48	1.97	2	2.1	4.6	6.5	5.6	180	Y
TLFA1	014	7.5	TLF-0653	70	32.5	39.4	20.1					
TLFA1	014	NS	NS	NS	NS	NS	NS	sharp peak		10.7	730	Y
TLFA1	015	2	TLF-0648	36	3.55	4.04	2.97					
TLFA1	015	8	TLF-0649	62	6.49	12.4	6.7					
TLFA1	015	10.5	TLF-0650	40	4.36	8.6	5.8					
TLFA1	015	2	TLF-9715	36	2.15	3.37	2.4					
TLFA1	016	0.5	TLF-0661	30	1.24	2.41	0.83					
TLFA1	016	5	TLF-0662	64	2.09	5.5	1.9					
TLFA1	016	8.5	TLF-0663	46	1.36	5.9	1.61					
TLFA1	016	NS	NS	NS	NS	NS	NS	sharp peak		12	365	Y
TLFA1	017	2	TLF-0659	50	2.58	8.7	2.85	N/A	N/A	N/A	N/A	N/A
TLFA1	017	5.5	TLF-0660	42	3.13	9.3	3.43	N/A	N/A	N/A	N/A	N/A
TLFA1	018	NS	NS	NS	NS	NS	NS	3.75	6	5.25	125	Y
TLFA1	018	7	TLF-0665	72	3.65	23	3.56					
TLFA1	018	12	TLF-0666	40	5.13	14.5	1.89					
TLFA1	019	0.5	TLF-0667	50	0.58	14.2	1.33					
TLFA1	019	5.5	TLF-0668	52	4.08	12	4.04					
TLFA1	019	6	TLF-0669	70	4.07	14.5	2.59					
TLFA1	020	2.5	TLF-0655	38	1.82	7.2	1.99					
TLFA1	020	8	TLF-0656	44	2.91	9.2	3.01					

Table A4-27

Comparison of Elevated Landfill Soil Results[1]
Th - 230, U - 238, and Ra - 226
with Downhole Gamma Logging Activities

					Th - 230	U - 238	Ra - 226	Downhole Gamma Logging				
Prefix	**No.**	**Sample Depth[2] (ft. bgs)**	**Sample #**	**Scan cpm[3]**	**Result pCi/g**	**Result pCi/g**	**Result pCi/g**	**Depth 1 (ft bgs)[4]**	**Depth 2 (ft bgs)[5]**	**Peak Depth (bgs)**	**Peak Magnitude (cps)**	**Casing (Y/N)[6]**
TLFA1	020	12	TLF-0657	54	2.75	5.7	3.31					
TLFB1B	009	0.5	TLF-0786	40	1.8	1.82	2.86					
TLFB1A	001	0.5	TLF-0871	42	0.82	0.86	3.91	0.2	1	0.6	110	Y

Notes:

1. Based on each analyte compared to UTL 99 99.9, as determined from the Landfill reference area.
2. Sample depth presented represents the bottom of a six-inch sampling interval. For instance, a sample marked 8 feet was collected from 7.5 to 8 feet below ground surface.
3. cpm = counts per minute on Eberline G-M, based on 30 or 60 second counts performed on each 6" segment of retrieved core.
4. An approximation of the depth at which an increase in peak magnitude is noted.
5. An approximation of the depth at which the peak magnitude has decreased to its original levels.
6. Whether or not drive casing was placed in the boring to prevent the collapse of the borehole.

No exceedance based on laboratory data, however, exhibited a peak with downhole gamma scan.
Exceedance based on laboratory data, however, a peak was not detected with downhole gamma scan.
Results Rejected in Data Validation

cps - counts per second
ft bgs - feet below ground surface
NS - No sample exists for this interval
N/A - Not Applicable, borehole was not scanned for downhole geophysical purposes.
pCi/g - picocuries per gram
Th-230 - Thorium-230
U-238 - Uranium-238
Ra-226 - Radium-226
UTL 99/99.9 - 99% confidence level that at least 99.9% of results will fall below the UTL 99/99.9
* Undetermined, reading remains elevated for the duration of the scan.
** Undetermined, evidence of elevated hit below where the probe scanned.

Table A4-27a

Comparison of Landfill Reference Area Soil Results
Th - 230, U - 238, and Ra - 226
with Downhole Gamma Logging Activities

					Th-230	U-238	Ra-226	Downhole Gamma Logging			
Prefix	No.	Sample Depth[1] (ft. bgs)	Sample #	Scan cpm[2]	Result pCi/g	Result pCi/g	Result pCi/g	Depth 1[3]	Depth 2[4]	Estimated Average Magnitude	Casing (Y/N)[5]
								(ft bgs)	(ft bgs)	(cps)	
TLFR3	1	0.5	TLF-0404	50	1.05	0.86	1.01	NA	NA	NA	N
TLFR3	1	2.5	TLF-0405	30	0.95	0.75	1.05	NA	NA	NA	N
TLFR3	2	0.5	TLF-0402	48	1.05	0.74	0.8	NA	NA	NA	N
TLFR3	2	3.5	TLF-0403	18	0.87	0.44	0.97	NA	NA	NA	N
TLFR3	4	0.5	TLF-0400	26	0.94	0.65	1.02	0	2.7	40	N
TLFR3	4	0.5	TLF-9418	26	0.79	0.66	0.99	0	2.7	40	N
TLFR3	4	4	TLF-0401	38	0.78	0.51	1.18	2.7	4.6	80	N
TLFR3	4	4	TLF-9419	38	0.67	0.72	1.48	2.7	4.6	80	N
TLFR3	5	0.5	TLF-0408	64	0.79	0.73	0.72	0	0.1	50	N
TLFR3	5	2.5	TLF-0409	32	0.93	0.9	0.93	1	2.6	90	N
TLFR3	6	0.5	TLF-0406	64	0.77	0.69	1.4	0	0.1	50	N
TLFR3	6	3.5	TLF-0407	72	1.15	0.98	0.73	1	4.5	80	N
TLFR3	7	0.5	TLF-0412	42	0.7	0.82	0.026	0	0.4	50	N
TLFR3	7	2.5	TLF-0413	48	0.96	0.49	0.9	0.5	2.6	70	N
TLFR3	8	0.5	TLF-0410	62	0.88	0.84	1.33	NA	NA	60	N
TLFR3	8	4	TLF-0411	48	0.69	0.57	0.98	NA	5	80	N
TLFR3	10	0.5	TLF-0414	50	1.12	0.66	1.06	0	0.2	45	N
TLFR3	10	2.5	TLF-0415	40	0.7	0.79	0.58	1	3.3	85	N
TLFR3	11	0.5	TLF-0424	64	0.88	0.88	1.23	NA	NA	NA	Y
TLFR3	11	4	TLF-0425	50	0.77	0.77	1.01	NA	NA	NA	Y
TLFR3	12	0.5	TLF-0422	64	0.9	0.72	0.93	NA	NA	NA	Y
TLFR3	12	4	TLF-0423	44	1.08	1.1	1.91	NA	NA	NA	Y
TLFR3	13	0.5	TLF-0432	50	1	1.86	0.97	NA	NA	NA	Y
TLFR3	13	3.5	TLF-0433	60	1.21	2.49	1.36	NA	NA	NA	Y
TLFR3	14	0.5	TLF-0434	48	0.75	0.61	0.78	NA	NA	NA	Y
TLFR3	14	3.5	TLF-0435	46	1.06	1.02	1.15	NA	NA	NA	Y
TLFR3	15	0.5	TLF-0428	52	0.97	0.93	0.79	NA	NA	NA	Y
TLFR3	15	2.5	TLF-0429	36	0.62	0.71	0.86	NA	NA	NA	Y
TLFR3	16	0.5	TLF-0426	42	1	0.86	0.91	NA	NA	NA	Y
TLFR3	16	0.5	TLF-9438	42	1.08	1	0.87	NA	NA	NA	Y
TLFR3	16	3.5	TLF-0427	46	1.07	0.89	1.1	NA	NA	NA	Y
TLFR3	16	3.5	TLF-9439	46	1.28	0.68	0.76	NA	NA	NA	Y
TLFR3	17	0.5	TLF-0430	46	1.02	0.83	1.28	NA	NA	NA	Y
TLFR3	17	4	TLF-0431	30	0.8	0.68	0.84	NA	NA	NA	Y
TLFR3	18	0.5	TLF-0436	52	0.82	0.96	0.97	NA	NA	NA	Y
TLFR3	18	4	TLF-0437	54	0.91	0.73	0.78	NA	NA	NA	Y
TLFR3	19	0.5	TLF-0416	42	0.97	0.89	1.25	NA	NA	NA	Y
TLFR3	19	2.5	TLF-0417	40	0.81	0.74	1.21	NA	NA	NA	Y
TLFR3	20	0.5	TLF-0420	47	0.96	0.78	0.71	NA	NA	NA	Y
TLFR3	20	4	TLF-0421	56	0.91	1.08	1.18	NA	NA	NA	Y

1. Sample depth presented represents the bottom of a six-inch sampling interval. For instance, a sample marked 8 feet was collected from 7.5 to 8 feet below ground surface.
2. cpm = counts per minute on Eberline G-M, based on 30 or 60 second counts performed on each 6" segment of retrieved core.
3. An approximation of the depth at which the shallow, deep or transition interval begins.
4. An approximation of the depth at which the shallow, deep, or transition interval ends.
5. Whether or not drive casing was placed in the boring to prevent the collapse of the borehole.

cps - counts per second
ft bgs - feet below ground surface
NA - Not Applicable, borehole was not scanned for downhole geophysical purposes at specified sample depth.
pCi/g - picocuries per gram
Th-230 - Thorium-230
U-238 - Uranium-238
Ra-226 - Radium-226

Table A4-27b

Comparison of Landfill Class 3 Soil Results
Th - 230, U - 238, and Ra - 226
with Downhole Gamma Logging Activities

					Th-230	U-238	Ra-226	Downhole Gamma Logging			
Prefix	No.	Sample Depth[1] (ft. bgs)	Sample #	Scan cpm[2]	Result pCi/g	Result pCi/g	Result pCi/g	Depth 1[3]	Depth 2[4]	Estimated Average Magnitude	Casing (Y/N)[5]
								(ft bgs)	(ft bgs)	(cps)	
TLF3	1	0.5	TLF-0480	42	0.8	0.78	1.04	0	0.7	40	N
TLF3	1	4	TLF-0481	32	0.74	0.43	0.58	2.1	5.1	60	N
TLF3	3	0.5	TLF-0474	34	0.79	0.8	0.93	0	2.4	30	Y
TLF3	3	2	TLF-0475	26	0.82	0.67	1.17	0	2.4	30	Y
TLF3	4	0.5	TLF-0486	44	0.84	0.66	0.78	0	1.5	60	N
TLF3	4	3	TLF-0487	52	1.06	0.93	1.49	NA	NA	NA	N
TLF3	5	0.5	TLF-0484	42	0.84	0.62	0.84	NA	NA	NA	N
TLF3	5	2.5	TLF-0485	30	0.78	0.81	0.96	0.5	2.9	70	N
TLF3	6	0.5	TLF-0476	40	0.63	0.79	0.99	NA	NA	NA	N
TLF3	6	4	TLF-0477	44	0.62	0.63	0.86	NA	NA	NA	N
TLF3	7	0.5	TLF-0460	36	0.9	0.96	1.15	NA	NA	NA	N
TLF3	7	3	TLF-0461	36	1.22	1.07	1.1	NA	NA	NA	N
TLF3	8	0.5	TLF-0450	38	0.8	0.88	0.85	0	0.1	25	N
TLF3	8	3.5	TLF-0451	50	0.86	0.95	1.02	NA	NA	NA	N
TLF3	9	0.5	TLF-0482	42	0.66	0.8	0.85	NA	NA	NA	N
TLF3	9	0.5	TLF-9488	42	0.95	0.69	0.91	NA	NA	NA	N
TLF3	9	3.5	TLF-0483	46	0.81	0.68	0.86	NA	NA	NA	N
TLF3	9	3.5	TLF-9489	46	0.89	0.74	0.63	NA	NA	NA	N
TLF3	12	0.5	TLF-0456	38	0.96	0.92	1.23	NA	NA	NA	N
TLF3	12	3.5	TLF-0457	38	0.89	0.89	1.15	0.9	5.95	85	N
TLF3	13	0.5	TLF-0462	42	0.79	0.67	0.52	NA	NA	NA	N
TLF3	13	4	TLF-0463	62	0.69	0.8	0.92	2	5.2	80	N
TLF3	15	0.5	TLF-0472	34	0.91	0.93	0.79	NA	NA	30	Y
TLF3	15	2.5	TLF-0473	38	0.63	0.58	0.58	NA	NA	NA	Y
TLF3	16	0.5	TLF-0466	38	1.04	0.94	1.1	0	0.5	20	Y
TLF3	16	4	TLF-0467	36	0.83	0.61	1.09	NA	NA	NA	Y
TLF3	17	0.5	TLF-0452	50	0.83	0.84	0.84	NA	NA	NA	Y
TLF3	17	3.5	TLF-0453	50	0.89	0.77	0.76	NA	3.5	40	Y
TLF3	19	0.5	TLF-0478	36	0.79	0.62	0.69	NA	NA	NA	N
TLF3	19	3.5	TLF-0479	52	0.74	0.88	0.87	0.6	5.3	70	N
TLF3	21	0.5	TLF-0454	50	0.96	0.71	0.83	NA	NA	NA	N
TLF3	21	3.5	TLF-0455	58	1.34	0.9	1.18	1.8	4.8	95	N
TLF3	22	0.5	TLF-0470	40	0.95	1.05	1.41	NA	NA	NA	N
TLF3	22	0.5	TLF-9468	40	0.92	0.87	1.06	NA	NA	NA	N
TLF3	22	3	TLF-0471	38	0.72	0.75	0.73	1	3.1	50	N
TLF3	22	3	TLF-9469	38	0.73	0.61	1.03	1	3.1	50	N
TLF3	23	0.5	TLF-0458	34	1.11	1.02	1	NA	NA	NA	N
TLF3	23	4	TLF-0459	60	1.05	0.86	1.02	NA	NA	NA	N
TLF3	24	0.5	TLF-0464	52	1.2	0.73	1.38	NA	NA	NA	N
TLF3	24	3	TLF-0465	62	0.89	0.57	0.76	0.4	2.9	60	N
TLF3	50	0.5	TLF-0500	50	0.88	0.77	0.78	NA	NA	NA	N
TLF3	50	3.5	TLF-0501	74	0.82	0.82	1.06	1.5	5.4	80	N
TLF3	51	0.5	TLF-0502	34	0.92	0.72	1.11	NA	NA	NA	Y
TLF3	51	4	TLF-0503	54	0.83	0.78	0.79	0.9	3.6	50	Y
TLF3	52	0.5	TLF-0518	44	1.02	0.72	0.75	NA	NA	NA	Y
TLF3	52	0.5	TLF-9547	44	1.1	0.86	1.14	NA	NA	NA	Y
TLF3	52	9.5	TLF-0519	62	0.78	0.73	0.99	NA	NA	NA	Y
TLF3	52	9.5	TLF-9548	62	0.84	0.8	0.75	NA	NA	NA	Y
TLF3	53	0.5	TLF-0520	44	0.86	0.77	1.14	NA	NA	NA	N
TLF3	53	4.5	TLF-0521	28	0.91	0.64	0.56	NA	NA	NA	N
TLF3	54	0.5	TLF-0522	30	0.88	0.7	1.07	NA	NA	NA	Y
TLF3	54	3.5	TLF-0523	44	0.76	0.72	0.82	0.4	3.4	45	Y
TLF3	55	0.5	TLF-0516	54	0.56	0.6	0.4	NA	NA	NA	N
TLF3	55	3.5	TLF-0517	50	0.59	0.52	0.76	1.4	4.45	80	N
TLF3	56	0.5	TLF-0542	54	0.86	0.62	0.81	NA	NA	NA	N
TLF3	56	4	TLF-0543	40	0.87	0.9	0.74	0.9	3.9	85	N
TLF3	57	0.5	TLF-0506	34	0.96	1.11	0.83	NA	NA	NA	Y
TLF3	57	4	TLF-0507	30	0.57	0.54	0.9	NA	NA	NA	Y
TLF3	58	0.5	TLF-0504	48	1.09	1.14	1.12	NA	NA	NA	N
TLF3	58	4	TLF-0505	48	0.78	0.95	0.82	0.8	5	95	N
TLF3	59	0.5	TLF-0508	40	1.43	1.43	2.17	NA	NA	NA	N
TLF3	59	3.5	TLF-0509	52	0.76	0.49	0.68	0.4	3.9	90	N

Table A4-27b

Comparison of Landfill Class 3 Soil Results
Th - 230, U - 238, and Ra - 226
with Downhole Gamma Logging Activities

					Th-230	U-238	Ra-226	Downhole Gamma Logging			
Prefix	No.	Sample Depth[1] (ft. bgs)	Sample #	Scan cpm[2]	Result pCi/g	Result pCi/g	Result pCi/g	Depth 1[3]	Depth 2[4]	Estimated Average Magnitude	Casing (Y/N)[5]
								(ft bgs)	(ft bgs)	(cps)	
TLF3	60	0.5	TLF-0526	37	0.68	0.75	0.8	NA	NA	NA	N
TLF3	60	2.5	TLF-0527	46	1.01	1.24	0.97	0.6	3.2	75	N
TLF3	61	0.5	TLF-0510	18	0.69	0.57	0.7	NA	NA	30	N
TLF3	61	2	TLF-0511	38	0.53		0.63	NA	NA	NA	N
TLF3	62	0.5	TLF-0512	62	0.77	0.55	0.69	NA	NA	NA	N
TLF3	62	3.5	TLF-0513	38	0.76	0.71	0.88	0.6	3.2	80	N
TLF3	63	0.5	TLF-0514	56	0.57	0.6	0.74	0	0.6	25	Y
TLF3	63	2.5	TLF-0515	48	3.08	3.13	2.73	2	3.2	54	Y
TLF3	64	0.5	TLF-0524	40	0.71	0.89	0.81	NA	NA	NA	N
TLF3	64	0.5	TLF-9549	40	0.77	0.76	0.99	NA	NA	NA	N
TLF3	64	3	TLF-0525	50	1.35	0.87	1.04	0.4	5	85	N
TLF3	64	3	TLF-9550	50	1.37	0.96	1.54	0.4	5	85	N

1. Sample depth presented represents the bottom of a six-inch sampling interval. For instance, a sample marked 8 feet was collected from 7.5 to 8 feet below ground surface.
2. cpm = counts per minute on Eberline G-M, based on 30 or 60 second counts performed on each 6" segment of retrieved core.
3. An approximation of the depth at which the shallow, deep or transition interval begins.
4. An approximation of the depth at which the shallow, deep, or transition interval ends.
5. Whether or not drive casing was placed in the boring to prevent the collapse of the borehole.

cps - counts per second
ft bgs - feet below ground surface
NA - Not Applicable, borehole was not scanned for downhole geophysical purposes at specified sample depth.
pCi/g - picocuries per gram
Th-230 - Thorium-230
U-238 - Uranium-238
Ra-226 - Radium-226

Table A4-27c

Comparison of Landfill Class 2 Area A Soil Results
Th - 230, U - 238, and Ra - 226
with Downhole Gamma Logging Activities

					Th-230	U-238	Ra-226	Downhole Gamma Logging			
Prefix	No.	Sample Depth[1] (ft. bgs)	Sample #	Scan cpm[2]	Result pCi/g	Result pCi/g	Result pCi/g	Depth 1[3]	Depth 2[4]	Estimated Average Magnitude	Casing (Y/N)[5]
								(ft bgs)	(ft bgs)	(cps)	
TLFA2	1	0.5	TLF-0570	52	0.83	0.67	0.77	NA	NA	NA	N
TLFA2	1	4	TLF-0571	50	0.9	0.56	0.8	0.6	5	80	N
TLFA2	2	0.5	TLF-0590	28	0.75	0.94	0.9	NA	NA	NA	N
TLFA2	2	0.5	TLF-9606	28	0.88	0.65	0.95	NA	NA	NA	N
TLFA2	2	3.5	TLF-0591	58	0.65	0.92	0.64	0.8	3.9	80	N
TLFA2	2	3.5	TLF-9607	58	0.81	0.89	0.77	0.8	3.9	80	N
TLFA2	3	0.5	TLF-0594	34	0.64	0.75	0.88	NA	NA	NA	N
TLFA2	3	2.5	TLF-0595	34	0.92	1.24	0.96	0.6	3.2	75	N
TLFA2	4	0.5	TLF-0572	48	0.69	0.75	0.68	0	0.2	40	Y
TLFA2	4	3.5	TLF-0573	34	1.02	0.9	0.98	1.8	5	95	Y
TLFA2	5	0.5	TLF-0600	42	1.11	0.59	0.87	0	0.4	30	Y
TLFA2	5	3.5	TLF-0601	68	1.32	1.63	1.31	NA	NA	NA	Y
TLFA2	6	0.5	TLF-0592	30	0.73	0.54	0.85	NA	NA	NA	N
TLFA2	6	2	TLF-0593	50	0.73	0.95	0.85	0.4	4.2	60	N
TLFA2	7	0.5	TLF-0574	62	0.83	0.63	0.83	NA	NA	NA	N
TLFA2	7	3.5	TLF-0575	42	0.56	0.5	0.89	0.5	5	75	N
TLFA2	8	0.5	TLF-0619	52	1.06	2.55	1.01	0	2.4	40	Y
TLFA2	8	3	TLF-0620	42	6.3	9.7	3.91	NA	NA	NA	Y
TLFA2	9	0.5	TLF-0584	50	0.75	0.9	0.74	NA	NA	35	N
TLFA2	9	2	TLF-0585	38	0.49	NA	0.26	NA	NA	NA	N
TLFA2	10	0.5	TLF-0576	50	0.79	0.69	0.53	NA	NA	NA	N
TLFA2	10	3.5	TLF-0577	50	0.77	0.56	1.24	0.6	5	85	N
TLFA2	11	0.5	TLF-0604	46	1.53	1.96	1.83	NA	NA	NA	Y
TLFA2	11	4	TLF-0605	38	0.77	0.79	1.04	NA	NA	NA	Y
TLFA2	12	0.5	TLF-0582	26	1.06	1.57	1.04	NA	NA	28	Y
TLFA2	12	2	TLF-0583	42	0.59	0.98	0.99	NA	NA	NA	Y
TLFA2	13	0.5	TLF-0596	46	1.04	0.74	0.96	NA	NA	40	N
TLFA2	13	0.5	TLF-9608	46	0.9	0.73	0.64	NA	NA	40	N
TLFA2	13	3.5	TLF-0597	44	0.57	0.66	0.8	NA	NA	NA	N
TLFA2	13	3.5	TLF-9609	44	0.67	0.59	0.83	NA	NA	NA	N
TLFA2	14	0.5	TLF-0578	54	0.9	1.93	0.96	NA	NA	NA	Y
TLFA2	14	3.5	TLF-0579	36	0.71	0.47	1.07	0.5	3.3	50	Y
TLFA2	15	0.5	TLF-0602	44	0.9	5.8	1.12	NA	NA	NA	Y
TLFA2	15	2.5	TLF-0603	44	3.35	7.2	4.45	2.1	3.4	90	Y
TLFA2	16	0.5	TLF-0586	38	0.81	0.69	0.84	NA	NA	NA	N
TLFA2	16	3.5	TLF-0587	38	0.76	0.91	1.1	NA	NA	NA	N
TLFA2	17	0.5	TLF-0580	36	0.8	0.79	0.91	NA	NA	NA	N
TLFA2	17	3.5	TLF-0581	54	1.1	0.64	1.01	1.5	4.6	95	N
TLFA2	18	0.5	TLF-0588	46	1	0.81	0.81	0	0.4	21	Y
TLFA2	18	3.5	TLF-0589	46	3.28	4.41	3.7	1.9	3.5	100	Y
TLFA2	20	0.5	TLF-0598	48	0.65	2.35	1.29	NA	NA	NA	Y
TLFA2	20	3	TLF-0599	32	0.8	0.62	0.84	NA	NA	NA	Y

1. Sample depth presented represents the bottom of a six-inch sampling interval. For instance, a sample marked 8 feet was collected from 7.5 to 8 feet below ground surface.
2. cpm = counts per minute on Eberline G-M, based on 30 or 60 second counts performed on each 6" segment of retrieved core.
3. An approximation of the depth at which the shallow, deep or transition interval begins.
4. An approximation of the depth at which the shallow, deep, or transition interval ends.
5. Whether or not drive casing was placed in the boring to prevent the collapse of the borehole.

cps - counts per second
ft bgs - feet below ground surface
NA - Not Applicable, borehole was not scanned for downhole geophysical purposes at specified sample depth.
pCi/g - picocuries per gram
Th-230 - Thorium-230
U-238 - Uranium-238
Ra-226 - Radium-226

Table A4-27d

Comparison of Landfill Class 2 Area B Soil Results
Th - 230, U - 238, and Ra - 226
with Downhole Gamma Logging Activities

					Th-230	U-238	Ra-226	Downhole Gamma Logging			
Prefix	No.	Sample Depth[1] (ft. bgs)	Sample #	Scan cpm[2]	Result pCi/g	Result pCi/g	Result pCi/g	Depth 1[3]	Depth 2[4]	Estimated Average Magnitude	Casing (Y/N)[5]
								(ft bgs)	(ft bgs)	(cps)	
TLFB2	1	0.5	TLF-0748	78	1.23	0.86	1.11	NA	NA	NA	N
TLFB2	1	4	TLF-0749	50	0.93	0.6	1.03	0.4	5.2	85	N
TLFB2	2	0.5	TLF-0752	34	0.91	0.89	1.07	NA	NA	NA	Y
TLFB2	2	0.5	TLF-9768	34	0.9	0.8	1.41	NA	NA	NA	Y
TLFB2	2	4	TLF-0753	38	1.02	0.96	1.18	NA	NA	NA	Y
TLFB2	2	4	TLF-9769	38	0.89	0.69	1.19	NA	NA	NA	Y
TLFB2	3	0.5	TLF-0740B	34	0.87	0.74	0.73	NA	NA	NA	N
TLFB2	3	4	TLF-0745	60	0.94	0.78	0.94	NA	NA	NA	N
TLFB2	4	0.5	TLF-0730	34	0.97	0.78	1.2	NA	NA	NA	N
TLFB2	4	0.5	TLF-9545	34	0.95	1.15	0.79	NA	NA	NA	N
TLFB2	4	4	TLF-0731	42	1.04	0.93	1	NA	NA	NA	N
TLFB2	4	4	TLF-9546	42	1.23	0.83	1.29	NA	NA	NA	N
TLFB2	5	0.5	TLF-0734	40	0.95	0.9	1	NA	NA	NA	Y
TLFB2	5	3	TLF-0735	50	0.93	0.73	0.73	0.5	3.7	50	Y
TLFB2	6	0.5	TLF-0754	44	1.21	0.8	1.02	NA	NA	NA	Y
TLFB2	6	3.5	TLF-0755	40	0.96	0.8	0.98	0.4	3.4	40	Y
TLFB2	7	0.5	TLF-0750	44	0.93	0.78	1.25	0	0.3	30	Y
TLFB2	7	3.5	TLF-0751	56	0.98	0.93	1.54	NA	NA	NA	Y
TLFB2	8	0.5	TLF-0732	56	0.72	0.59	1.03	NA	NA	NA	Y
TLFB2	8	4	TLF-0733	58	0.7	0.67	0.64	NA	NA	NA	Y
TLFB2	9	0.5	TLF-0746	32	0.91	0.68	1.03	NA	NA	NA	Y
TLFB2	9	4	TLF-0747	36	0.7	0.69	0.86	NA	NA	NA	Y
TLFB2	10	0.5	TLF-0756	46	1.22	1.06	1.05	NA	NA	NA	Y
TLFB2	10	4	TLF-0757	58	0.8	0.56	0.9	NA	NA	NA	Y
TLFB2	11	0.5	TLF-0762	44	1	0.73	0.43	NA	NA	NA	N
TLFB2	11	4	TLF-0763	56	0.85	0.91	0.89	0.6	6.5	78	N
TLFB2	12	0.5	TLF-0764	58	0.78	0.73	1.05	NA	NA	NA	N
TLFB2	12	3.5	TLF-0765	50	0.9	0.61	0.79	0.5	4.9	80	N
TLFB2	13	0.5	TLF-0758	54	1.15	1.02	1.02	NA	NA	NA	N
TLFB2	13	3.8	TLF-0759	52	0.73	0.6	0.76	0.8	4.9	80	N
TLFB2	14	0.5	TLF-0760	52	0.95	0.74	1.05	NA	NA	NA	N
TLFB2	14	3.5	TLF-0761	54	0.81	0.58	0.79	0.4	5.5	80	N
TLFB2	15	0.5	TLF-0743	52	0.77	0.42	0.81	NA	NA	NA	N
TLFB2	15	4	TLF-0744	58	0.75	0.59	0.89	1	4.7	80	N
TLFB2	16	0.5	TLF-0736	44	0.99	0.98	1.4	NA	NA	NA	N
TLFB2	16	4	TLF-0737	52	0.77	0.76	0.94	0.6	5.7	85	N
TLFB2	17	0.5	TLF-0738	46	1.05	0.92	1.18	NA	NA	NA	Y
TLFB2	17	2.5	TLF-0739	280	7.5	357	1.06	0.7	3.2	50	Y
TLFB2	17	3.5	TLF-0740	52	1.21	1.48	1.25	0.7	3.2	50	Y
TLFB2	18	0.5	TLF-0741	54	0.65	0.87	0.88	NA	NA	NA	N
TLFB2	18	3.5	TLF-0742	48	0.65	0.51	0.77	0.6	3.7	80	N

1. Sample depth presented represents the bottom of a six-inch sampling interval. For instance, a sample marked 8 feet was collected from 7.5 to 8 feet below ground surface.
2. cpm = counts per minute on Eberline G-M, based on 30 or 60 second counts performed on each 6" segment of retrieved core.
3. An approximation of the depth at which the shallow, deep or transition interval begins.
4. An approximation of the depth at which the shallow, deep, or transition interval ends.
5. Whether or not drive casing was placed in the boring to prevent the collapse of the borehole.

cps - counts per second
ft bgs - feet below ground surface
NA - Not Applicable, borehole was not scanned for downhole geophysical purposes at specified sample depth.
pCi/g - picocuries per gram
Th-230 - Thorium-230
U-238 - Uranium-238
Ra-226 - Radium-226

Table A4-27e

Comparison of Landfill Class 1 Area B1A Soil Results
Th - 230, U - 238, and Ra - 226
with Downhole Gamma Logging Activities

Prefix	No.	Sample Depth[1] (ft. bgs)	Sample #	Scan cpm[2]	Th-230 Result pCi/g	U-238 Result pCi/g	Ra-226 Result pCi/g	Downhole Gamma Logging Depth 1[3] (ft bgs)	Depth 2[4] (ft bgs)	Estimated Average Magnitude (cps)	Casing (Y/N)[5]
TLFB1A	1	0.5	TLF-0871	42	0.82	0.86	3.91	0.2	1	110	Y
TLFB1A	1	4	TLF-0872	38	0.94	1	1.23	NA	NA	NA	Y
TLFB1A	5	0.5	TLF-0868	40	0.98	0.81	1.28	NA	NA	NA	N
TLFB1A	5	4	TLF-0869	44	0.8	0.94	1.04	NA	NA	NA	N

1. Sample depth presented represents the bottom of a six-inch sampling interval. For instance, a sample marked 8 feet was collected from 7.5 to 8 feet below ground surface.
2. cpm = counts per minute on Eberline G-M, based on 30 or 60 second counts performed on each 6" segment of retrieved core.
3. An approximation of the depth at which the shallow, deep or transition interval begins.
4. An approximation of the depth at which the shallow, deep, or transition interval ends.
5. Whether or not drive casing was placed in the boring to prevent the collapse of the borehole.

cps - counts per second
ft bgs - feet below ground surface
NA - Not Applicable, borehole was not scanned for downhole geophysical purposes at specified sample depth.
pCi/g - picocuries per gram
Th-230 - Thorium-230
U-238 - Uranium-238
Ra-226 - Radium-226

Table A4-27f

Comparison of Landfill Class 1 Area B1B Soil Results
Th - 230, U - 238, and Ra - 226
with Downhole Gamma Logging Activities

Prefix	No.	Sample Depth[1] (ft. bgs)	Sample #	Scan cpm[2]	Th-230 Result pCi/g	U-238 Result pCi/g	Ra-226 Result pCi/g	Downhole Gamma Logging Depth 1[3] (ft bgs)	Depth 2[4] (ft bgs)	Estimated Average Magnitude (cps)	Casing (Y/N)[5]
TLFB1B	1	0.5	TLF-0783	52	1.51	1.71	1.42	NA	NA	NA	N
TLFB1B	1	4	TLF-0784	48	0.8	0.93	0.75	NA	NA	NA	N
TLFB1B	5	0.5	TLF-0780	52	0.96	1.01	0.97	NA	NA	NA	N
TLFB1B	5	4	TLF-0781	42	0.85	0.68	0.85	NA	NA	NA	N
TLFB1B	9	0.5	TLF-0786	40	1.8	1.82	2.86	NA	NA	NA	Y
TLFB1B	9	4	TLF-0787	44	0.96	0.83	1.04	NA	NA	NA	Y

1. Sample depth presented represents the bottom of a six-inch sampling interval. For instance, a sample marked 8 feet was collected from 7.5 to 8 feet below ground surface.
2. cpm = counts per minute on Eberline G-M, based on 30 or 60 second counts performed on each 6" segment of retrieved core.
3. An approximation of the depth at which the shallow, deep or transition interval begins.
4. An approximation of the depth at which the shallow, deep, or transition interval ends.
5. Whether or not drive casing was placed in the boring to prevent the collapse of the borehole.

cps - counts per second
ft bgs - feet below ground surface
NA - Not Applicable, borehole was not scanned for downhole geophysical purposes at specified sample depth.
pCi/g - picocuries per gram
Th-230 - Thorium-230
U-238 - Uranium-238
Ra-226 - Radium-226

Table A4-27g

Comparison of Landfill Class 1 Area A Soil Results
Th - 230, U - 238, and Ra - 226
with Downhole Gamma Logging Activities

					Th-230	U-238	Ra-226	Downhole Gamma Logging			
Prefix	No.	Sample Depth[1] (ft. bgs)	Sample #	Scan cpm[2]	Result pCi/g	Result pCi/g	Result pCi/g	Depth 1[3]	Depth 2[4]	Estimated Average Magnitude	Casing (Y/N)[5]
								(ft bgs)	(ft bgs)	(cps)	
TLFA1	2	0.5	TLF-0694	46	1.44	3.61	2.81	NA	NA	NA	Y
TLFA1	2	2	TLF-0695	50	3.38	5.51	3.73	1	13.1	85	Y
TLFA1	2	5	TLF-0696	62	2.28	8.1	3.68	2.25	11	118	Y
TLFA1	2	11.5	TLF-0697	36	5.15	NA	3.64	1	13.1	85	Y
TLFA1	3	0.5	TLF-0690	40	1.29	3.66	1.58	0	0.9	25	Y
TLFA1	3	1.5	TLF-0691	70	1.4	34.2	2.06	0	0.9	25	Y
TLFA1	3	5.75	TLF-0692	484	71	227	18.6	3.75	11	125	Y
TLFA1	3	5.75	TLF-9717	484	76	205	16.9	3.75	11	125	Y
TLFA1	3	11.5	TLF-0693	90	11.8	72	7.9	4.1	13.1	85	Y
TLFA1	4	0.5	TLF-0677	40	0.99	1.39	1.09	NA	NA	NA	Y
TLFA1	4	5	TLF-0678	62	0.62	0.84	0.86	0.5	13.2	45	Y
TLFA1	4	9	TLF-0679	66	0.7	0.8	0.74	0.5	13.2	45	Y
TLFA1	6	0.5	TLF-0670	62	3.3	10.4	2.79	0	0.4	30	Y
TLFA1	6	2	TLF-0671	70	13.8	40.5	14.9	NA	NA	NA	Y
TLFA1	6	4.5	TLF-0672	138	8.7	69	6	4.3	4.3	255	Y
TLFA1	7	0.5	TLF-0673	60	0.74	0.85	0.64	NA	NA	NA	Y
TLFA1	7	2	TLF-0674	50	1.05	1.75	0.96	1.3	12.6	55	Y
TLFA1	7	10	TLF-0675	30	0.93	0.8	0.99	1.3	12.6	55	Y
TLFA1	7	12	TLF-0676	62	0.88	0.53	0.62	1.3	12.6	55	Y
TLFA1	8	0.5	TLF-0680	58	1.07	0.64	0.87	NA	NA	NA	N
TLFA1	8	4.5	TLF-0681	22	1.16	1.69	1.49	NA	NA	NA	N
TLFA1	8	12	TLF-0682	64	0.79	0.35	0.66	NA	NA	NA	N
TLFA1	10	0.5	TLF-0644	48	1.29	1.92	1.41	0	3.5	30	Y
TLFA1	10	3	TLF-0645	44	2.85	34.9	3.68	0	3.5	30	Y
TLFA1	10	6	TLF-0646	62	3.52	32.4	2.6	4	*	90	Y
TLFA1	11	0.5	TLF-0686	60	1.54	5.57	1.42	0	3.7	40	Y
TLFA1	11	1.5	TLF-0687	125	11.7	75	6	0	3.7	40	Y
TLFA1	11	6.5	TLF-0688	32	3.53	23.3	4.26	4	*	105	Y
TLFA1	11	12.5	TLF-0689	36	3.51	28.8	4.42	4	*	105	Y
TLFA1	12	0.5	TLF-0683	40	0.92	0.9	0.83	NA	NA	NA	Y
TLFA1	12	5	TLF-0684	46	0.77	0.66	0.84	0.6	12.8	50	Y
TLFA1	12	12	TLF-0685	40	0.76	0.69	0.84	0.6	12.8	50	Y
TLFA1	13	0.5	TLF-0640	40	1.6	3.41	1.39	NA	NA	NA	Y
TLFA1	13	0.5	TLF-9712	40	1.9	2.04	1.6	NA	NA	NA	Y
TLFA1	13	1	TLF-0641	60	2.46	3.19	2.16	NA	NA	NA	Y
TLFA1	13	1	TLF-9713	60	2.81	4.71	3.5	NA	NA	NA	Y
TLFA1	13	5.5	TLF-0642	48	2.79	15.5	2.45	5	5	**	Y
TLFA1	13	11.5	TLF-0643	52	2.84	3.01	3.06	1.2	13.7	85	Y
TLFA1	14	0.5	TLF-0651	50	1.04	1.28	1	0	1.9	25	Y
TLFA1	14	4.5	TLF-0652	48	1.97	2	2.1	4.6	6.5	180	Y
TLFA1	14	7.5	TLF-0653	70	32.5	39.4	20.1	2.7	13.2	85	Y
TLFA1	15	0.5	TLF-0647	64	1.02	1.2	1.21	0	0.5	25	Y
TLFA1	15	0.5	TLF-9714	64	1.05	1.16	0.9	0	0.5	25	Y
TLFA1	15	2	TLF-0648	36	3.55	4.04	2.97	NA	NA	NA	Y
TLFA1	15	2	TLF-9715	36	2.15	3.37	2.4	NA	NA	NA	Y
TLFA1	15	8	TLF-0649	62	6.49	12.4	6.7	2	11.6	80	Y
TLFA1	15	10.5	TLF-0650	40	4.36	8.6	5.8	2	11.6	80	Y
TLFA1	16	0.5	TLF-0661	60	1.24	2.41	0.83	0	3.5	25	Y
TLFA1	16	0.5	TLF-9716	60	1.23	1.83	1.41	0	3.5	25	Y
TLFA1	16	5	TLF-0662	64	2.09	5.5	1.9	4.9	13.5	50	Y
TLFA1	16	8.5	TLF-0663	46	1.36	5.9	1.61	4.9	13.5	50	Y
TLFA1	17	0.5	TLF-0658	28	1.03	1.78	1.38	0	2.4	25	Y
TLFA1	17	2	TLF-0659	50	2.58	8.7	2.85	0	2.4	25	Y
TLFA1	17	5.5	TLF-0660	42	3.13	9.3	3.43	3	13.2	60	Y
TLFA1	18	0.5	TLF-0664	34	0.74	0.9	1.2	0	3.4	30	Y
TLFA1	18	7	TLF-0665	72	3.65	23	3.56	NA	13.4	70	Y
TLFA1	18	12	TLF-0666	40	5.13	14.5	1.89	NA	13.4	70	Y
TLFA1	19	0.5	TLF-0667	50	0.58	14.2	1.33	0	1.5	25	Y
TLFA1	19	5.5	TLF-0668	52	4.08	12	4.04	2	13.4	80	Y
TLFA1	19	6	TLF-0669	70	4.07	14.5	2.59	2	13.4	80	Y
TLFA1	20	0.5	TLF-0654	36	0.94	1.1	0.49	0	2.5	25	Y
TLFA1	20	2.5	TLF-0655	38	1.82	7.2	1.99	0	2.5	25	Y
TLFA1	20	8	TLF-0656	44	2.91	9.2	3.01	3.4	13.2	75	Y
TLFA1	20	12	TLF-0657	54	2.75	5.7	3.31	3.4	13.2	75	Y

1. Sample depth presented represents the bottom of a six-inch sampling interval. For instance, a sample marked 8 feet was collected from 7.5 to 8 feet below ground surface.
2. cpm = counts per minute on Eberline G-M, based on 30 or 60 second counts performed on each 6" segment of retrieved core.
3. An approximation of the depth at which the shallow, deep or transition interval begins.
4. An approximation of the depth at which the shallow, deep, or transition interval ends.
5. Whether or not drive casing was placed in the boring to prevent the collapse of the borehole.

cps - counts per second

ft bgs - feet below ground surface

NA - Not Applicable, borehole was not scanned for downhole geophysical purposes at specified sample depth.

pCi/g - picocuries per gram

Th-230 - Thorium-230

U-238 - Uranium-238

Ra-226 - Radium-226

*Undetermined, reading remains elevated for the duration of the scan

**Undetermined, evidence of elevated hit below where the probe scanned

Table A5-1 - Tonawanda Landfill - Landfill Class 1, Area A and Class 3
Sediment Samples

				Ra-226			Th-230			U-238		
Prefix	**No.**	**Depth (ft. bgs)**	**Sample #**	**Result (pCi/g)**	**2 s TPU (pCi/g)**	**Qual**	**Result (pCi/g)**	**2 s TPU (pCi/g)**	**Qual**	**Result (pCi/g)**	**2 s TPU (pCi/g)**	**Qual**
Screening Level UTL 99/99.9				**2.27**			**1.58**			**2.34**		
TLFA1	S1	0.5	TLF-0698	1.14	0.34		1.18	0.21	J	2.78	0.63	
TLFA1	S1	3	TLF-0699	1.9	0.46		1.67	0.29		10.6	1.7	
TLFA1	S2	0.5	TLF-0700	2.77	0.62		3.9	0.64		25.3	3.8	
TLFA1	S2	4	TLF-0701	5.8	1.2		3.21	0.51		16.8	2.8	
TLFA1	S2	4	TLF-9718	4.9	1		3.62	0.59		16.9	2.5	
TLFA1	S3	0.5	TLF-0702	1.2	0.32		1.02	0.2		1.61	0.28	
TLFA1	S3	2	TLF-0703	0.98	0.31		1.15	0.23		1.62	0.28	
TLF3	S4	0.5	TLF-0490	0.87	0.27		1.07	0.21		0.77	0.15	
TLF3	S4	1	TLF-0491	1.1	0.33		1.04	0.22		1.06	0.2	

Summary Statistics							
N	9		9		9		
Max	5.80	1.20	3.90	0.64	25.30	3.80	
Min	0.87	0.27	1.02	0.20	0.77	0.15	
Avg	2.30	0.21	1.98	0.13	8.60	0.63	
Med	1.20		1.18		2.78		
Stdev	1.84		1.22		9.14		
UCL95	3.42		2.73		14.19		

ft bgs: feet below ground surface
pCi/g: picocuries per gram
2σ TPU: total propagated uncertainty
UCL95: 95th percent upper confidence limit
UTL 99/99.9 : 99 percent confidence level that at least 99.9 percent of results will fall below the UTL 99 99.9
J=Estimated; U=Not Detected, value below decision level; UJ=Estimated, value below decision level

Table A5-2 - Tonawanda Landfill
Surface Water Analysis

	U-234			U-235			U-238			U-234 + U-235 + U-238			U-234 + U-238		
Method	DOE EML HASL 30			DOE EML HASL 30			DOE EML HASL 30								
40 CFR 192	NA	2 σ TPU		NA	2 σ TPU		NA	2 σ TPU		NA	2 σ TPU		30 pCi/L	2 σ TPU	
Units	pCi/L	pCi/L	Qual	pCi/L	pCi/L	Qual	pCi/L	pCi/L	Qual	pCi/L	pCi/L	Qual	pCi/L	pCi/L	Qual
Sample ID															
TLFA1-S1 TLW-0100	217.00	35.60	J	20.70	3.92	J	211.00	34.60	J	448.70	49.80		428.00	49.64	
TLFA1-S2 TLW-0101	172.00	32.90	J	9.21	2.53	J	170.00	32.50	J	351.21	46.31		342.00	46.25	
TLF3-S4 TLW-0102	3.56	0.76	J	0.33	0.18	J	3.21	0.70	J	7.10	1.05		6.77	1.03	
TLFA1-S2 TLW-9103	160.00	31.20	J	15.50	3.84	J	165.00	32.20	J	340.50	45.00		325.00	44.84	

pCi/L: picocuries per liter ug/L: micrograms per liter
2σ TPU: total propagated uncertainty
40 CFR 192: 40 CFR, Part 192, Subpart A
NA: Not applicable
J=Estimated; U=Not Detected, value below decision level; UJ=Estimated, value below decision level

Table A5-2 - Tonawanda Landfill (Continued)
Surface Water Analysis

	Gross Alpha			**Gross Alpha excluding U-234 + U-235 + U-238**			**Ra-226**			**Ra-228**			**Ra-226+Ra-228**		
Method	EPA 900.0						EPA 903.1			EPA 904.0					
40 CFR 192	NA	2 σ TPU		15 pCi/L	2 σ TPU		NA	2 σ TPU		NA	2 σ TPU		5 pCi/L	2 σ TPU	
Units	pCi/L	pCi/L	Qual	pCi/L	pCi/L	Qual	pCi/L	pCi/L	Qual	pCi/L	pCi/L	Qual	pCi/L	pCi/L	Qual
Sample ID															
TLFA1-S1 TLW-0100	266.00	129.00		-182.70	138.28		3.06	2.13	J	1.89	1.29	J	4.95	2.49	
TLFA1-S2 TLW-0101	318.00	146.00		-33.21	153.17		2.00	1.46	J	3.23	2.32	J	5.23	2.74	
TLF3-S4 TLW-0102	31.00	30.90		23.91	30.92		5.08	3.47		32.30	6.29		37.38	7.18	
TLFA1-S2 TLW-9103	228.00	105.00		-112.50	114.24		7.20	4.90		2.38	1.36	J	9.58	5.09	

pCi/L: picocuries per liter ug/L: micrograms per liter
2σ TPU: total propagated uncertainty
40 CFR 192: 40 CFR, Part 192, Subpart A
NA: Not applicable
J=Estimated; U=Not Detected, value below decision level; UJ=Estimated, value below decision level

Table A5-2 - Tonawanda Landfill (Continued)
Surface Water Analysis

	Th-230			**Th-232**			**Total Uranium**		
Method	DOE EML HASL 30			DOE EML HASL 30			ASTM D 5174		
40 CFR 192	NA	2σ TPU		NA	2σ TPU		44 ug/L	2σ TPU	
Units	pCi/L	pCi/L	Qual	pCi/L	pCi/L	Qual	ug/L	ug/L	Qual
Sample ID									
TLFA1-S1 TLW-0100	0.22	0.18	J	0.15	0.13	J	416.00	28.70	
TLFA1-S2 TLW-0101	0.53	0.31	J	0.08	0.15	UJ	459.00	32.60	
TLF3-S4 TLW-0102	4.34	1.05	J	2.77	0.74	J	5.16	0.26	
TLFA1-S2 TLW-9103	0.47	0.31	J	0.08	0.11	UJ	294.00	20.30	

pCi/L: picocuries per liter ug/L: micrograms per liter
2σTPU: total propagated uncertainty
40 CFR 192: 40 CFR, Part 192, Subpart A
NA: Not applicable
J=Estimated; U=Not Detected, value below decision level; UJ=Estimated, value below decision level

Table A7-1
Tonawanda Landfill
Well Information

Well	Date Installed	Elevation - top of riser (ft msl)	Total Well Depth (ft bgs)	Screened Interval (ft bgs)	Water Level* (ft bgs)	GW Elevation (ft msl)	Sample ID (total)	Sample ID (dissolved)
L-1	5/11/1999	616.12	16.1	4.0-14.0	7.60	608.52	TLW-0174	TLW-0175
L-2	5/11/1999	622.03	21.7	9.0-19.0	4.30	617.73	TLW-0176	TLW-0177
L-3	5/12/1999	621.34	21.35	9.0-19.0	3.65	617.69	TLW-0150 TLW-9178	TLW-0151 TLW-9180
BM-4	4/11/1983	621.6	25.9	9.5-24.5	9.40	612.2	TLW-0172 TLW-9179	TLW-0173 TLW-9181
BM-8	4/6/1983	600.54	29.7	N/A	9.35	591.19	TLW-0162	TLW-0163
BM-12	4/8/1983	603.24	31.66	N/A	16.28	586.96	TLW-0160	TLW-0161
BM-15	8/2/1994	606.2	31.48	N/A	20.49	585.71	TLW-0152	TLW-0153
BM-16	8/1/1994	613.86	42.25	28.0-38.0	14.12	599.74	TLW-0154	TLW-0155
BM-17	12/6/1994	621.73	27	14.5-24.5	11.45	610.28	TLW-0166	TLW-0167
BM-18	12/7/1994	619.51	28.5	14.5-24.5	9.21	610.3	TLW-0164	TLW-0165
BM-19	8/1/1994	610.2	26.77	14.5-24.5	11.05	599.15	TLW-0156	TLW-0157
DW-1	4/5/1983	610.65	93.45	89.5-94.5	41.69	568.96	TLW-0158	TLW-0159
DW-2	3/30/1983	608.81	55.65	49.5-54.5	39.63	569.18	TLW-0170	TLW-0171
DW-4R	12/13/1994	622.83	74.77	62.8-72.8	52.72	570.11	TLW-0168	TLW-0169

Notes:
N/A - Not Available
ft bgs - Feet below ground surface
ft msl - feet relative to mean seal level
* Measured - 9/2001
Reference - Field Data Report, Town of Tonawanda Landfill - Malcolm Pirnie, October, 2001

Table A7-2
Tonawanda Landfill
Well Purging Details
September, 2001

			Readings at completion of purge				
Well	**Date**	**Purge Volume (gallons)**	**Eh (mV)**	**Temp (oC)**	**pH (S.U.)**	**Cond. (mmhos/cm)**	**Turbidity (NTU)**
L-1	9/19/2001	10	-186	17.6	8.4	3410	>1100
L-2	9/19/2001	24	-242	15.2	9.02	3940	161
L-3	9/19/2001	18	-111	13.9	9.75	4150	21.5
BM-4	9/17/2001	14	-59	16.5	6.73	1668	>1100
BM-8	9/19/2001	7	-63	16.1	6.83	1140	62.8
BM-12	9/19/2001	8	-163	17	7.26	1175	8.96
BM-15	9/17/2001	3.5	-23	15.2	6.49	1463	22.1
BM-16	9/17/2001	3	-107	18.2	7.21	1529	>1100
BM-17	9/17/2001	6.5	-26	17.7	6.92	1526	34.6
BM-18	9/17/2001	5	-100	17.9	6.66	2600	116
BM-19	9/17/2001	7.5	-84	17.4	6.83	1838	230
DW-1	9/17/2001	32	-104	16.1	6.96	2090	16
DW-2	9/17/2001	15	-206	13.6	7.36	860	4.35
DW-4R	9/17/2001	12	-61	15.2	7.34	767	>1100

Notes:
oC - degrees centigrade
Eh - Redox Potential (millivolts)
S.U. - Standard Units (pH units)
Cond - Conductivity (micromhos /cm)
NTU - Nephelometric Turbidity Units
Reference - Field Data Report, Town of Tonawanda Landfill - Malcolm Pirnie, October, 2001

TABLE A7-3
TONAWANDA LANDFILL
SUMMARY OF MONITORING WELL WATER ELEVATIONS

WELL LOCATION	RISER ELEVATION[1]	BOTTOM DEPTH[2]	DATE OF MEASUREMENT September , 2001 ROUND 2	
			Depth[2]	Elevation[1]
BM-4	621.60	25.90	9.40	612.20
BM-5	618.91	31.11	11.30	607.61
BM-6	619.66	21.66	5.75	613.91
BM-7	625.24	26.72	15.82	609.42
BM-8	600.54	30.44	9.35	591.19
BM-12	603.24	31.74	16.28	586.96
BM-13S	605.78	21.91	14.40	591.38
BM-13D	605.69	46.84	18.65	587.04
BM-14S	610.90	22.40	14.76	596.14
BM-14D	609.92	45.22	obstruction	-
BM-15	606.20	31.48	20.49	585.71
BM-16	613.86	42.25	14.12	599.74
BM-17	621.73	27.00	11.45	610.28
BM-18	619.51	28.50	9.21	610.30
BM-19	610.20	26.77	11.05	599.15
P-1	622.46	29.80	6.60	615.86
P-2	628.84	33.26	10.99	617.85
P-3	636.37	22.22	8.02	628.35
P-4	639.49	31.37	18.00	621.49
P-5	615.82	21.72	dry	-
DW-1	610.65	93.45	41.69	568.96
DW-2	608.81	55.65	39.63	569.18
DW-3	611.86	65.41	25.87	585.99
DW-4R	622.83	74.77	52.72	570.11
L-1	616.12	16.10	7.60	608.52
L-2	622.03	21.70	4.30	617.73
L-3	621.34	21.35	3.65	617.69
L-4	633.41	30.35	19.70	613.71
L-5	638.43	27.00	24.82	613.61

Notes:
(1) Measured in feet; elevation above mean sea level.
(2) Measured in feet; elevation below top of riser.
Source of Groundwater Elevation Data: Malcom Pirnie

Table A7-4 - Tonawanda Landfill
Results of Groundwater Sampling in September, 2001
Total Analysis (Unfiltered Samples)

	U-234			U-235			U-238			U-234 + U-235 + U-238			U-234 + U-238		
Method	DOE EML HASL 30			DOE EML HASL 30			DOE EML HASL 30								
40 CFR 192	NA	2 σ TPU		NA	2 σ TPU		NA	2 σ TPU		NA	2 σ TPU		30 pCi/L	2 σ TPU	
Units	pCi/L	pCi/L	Qual	pCi/L	pCi/L	Qual	pCi/L	pCi/L	Qual	pCi/L	pCi/L	Qual	pCi/L	pCi/L	Qual
Sample ID															
L-3 TLW-0150	58.20	8.77		2.45	0.61		58.30	8.79		118.95	12.43		116.50	12.42	
BM-15 TLW-0152	7.43	1.12		0.40	0.14		5.98	0.92		13.81	1.46		13.41	1.45	
BM-16 TLW-0154	13.20	1.92		0.56	0.17		9.92	1.47		23.68	2.42		23.12	2.42	
BM-19 TLW-0156	12.10	1.81		0.74	0.22		10.60	1.61		23.44	2.43		22.70	2.42	
DW-1 TLW-0158	0.32	0.12		-0.01	0.03	U	0.16	0.08		0.47	0.15		0.48	0.15	
BM-12 TLW-0160	4.26	0.72		0.32	0.13		3.14	0.57		7.72	0.93		7.40	0.92	
BM-8 TLW-0162	2.53	0.46		0.16	0.08		1.98	0.38		4.67	0.61		4.51	0.60	
BM-18 TLW-0164	12.20	1.88		0.56	0.20		9.99	1.57		22.75	2.46		22.19	2.45	
BM-17 TLW-0166	9.19	1.47		0.71	0.24		7.96	1.30		17.86	1.98		17.15	1.96	
DW-4R TLW-0168	0.19	0.13		0.04	0.06	U	0.13	0.10		0.36	0.17		0.31	0.16	
DW-2 TLW-0170	0.18	0.17		0.04	0.10	U	0.11	0.14	U	0.33	0.24		0.29	0.22	
BM-4 TLW-0172	14.40	2.54		0.39	0.23		12.30	2.22		27.09	3.38		26.70	3.37	
L-1 TLW-0174	1.79	0.57		0.11	0.15	U	1.41	0.50		3.31	0.77		3.20	0.75	
L-2 TLW-0176	1.15	0.44		0.05	0.10	U	1.56	0.52		2.76	0.69		2.71	0.68	
L-3 TLW-9178	59.00	8.85		3.96	0.85		57.70	8.66		120.66	12.41		116.70	12.38	
BM-4 TLW-9179	13.60	2.34		0.54	0.26		11.60	2.04		25.74	3.11		25.20	3.10	

pCi/L: picocuries per liter ug/L: micrograms per liter
2σ TPU: total propagated uncertainty
40 CFR 192: 40 CFR, Part 192, Subpart A
NA: Not applicable
J=Estimated; U=Not Detected, value below decision level; UJ=Estimated, value below decision level

Table A7-4 - Tonawanda Landfill (Continued)
Results of Groundwater Sampling in September, 2001
Total Analysis (Unfiltered Samples)

	Gross Alpha			**Gross Alpha excluding U-234 + U-235 + U-238**			**Ra-226**			**Ra-228**			**Ra-226+Ra-228**		
Method	EPA 900.0						EPA 903.1			EPA 904.0					
40 CFR 192	NA	2 σ TPU		15 pCi/L	2 σ TPU		NA	2 σ TPU		NA	2 σ TPU		5 pCi/L	2 σ TPU	
Units	pCi/L	pCi/L	Qual	pCi/L	pCi/L	Qual	pCi/L	pCi/L	Qual	pCi/L	pCi/L	Qual	pCi/L	pCi/L	Qual
Sample ID															
L-3 TLW-0150	114.00	70.80		-4.95	71.88		0.93	0.39	J	0.71	0.60	J	1.64	0.72	
BM-15 TLW-0152	17.10	40.30	U	3.29	40.33		0.59	0.34	J	0.58	0.58	J	1.17	0.67	
BM-16 TLW-0154	25.40	49.30	U	1.72	49.36		0.44	0.26	J	1.03	0.66	J	1.47	0.71	
BM-19 TLW-0156	21.10	58.30	U	-2.34	58.35		0.71	0.34		1.25	0.66		1.96	0.74	
DW-1 TLW-0158	-3.28	46.70	U	-3.75	46.70		1.66	0.64		1.47	1.06		3.13	1.24	
BM-12 TLW-0160	10.30	28.70	U	2.58	28.72		1.17	0.59		0.68	0.59		1.85	0.84	
BM-8 TLW-0162	5.60	24.90	U	0.93	24.91		0.16	0.24	U	1.90	1.04		2.06	1.07	
BM-18 TLW-0164	28.20	69.40	U	5.45	69.44		2.24	0.64		1.54	1.05		3.78	1.23	
BM-17 TLW-0166	16.60	36.80	U	-1.26	36.85		1.52	0.56		2.49	1.25		4.01	1.37	
DW-4R TLW-0168	9.08	11.70	U	8.72	11.70		0.51	0.37		0.87	0.92		1.38	1.00	
DW-2 TLW-0170	0.86	7.58	U	0.53	7.58		0.58	0.33		2.11	1.08		2.69	1.13	
BM-4 TLW-0172	26.80	66.60	U	-0.29	66.69		1.52	0.48		3.17	1.39		4.69	1.47	
L-1 TLW-0174	-0.50	79.70	UJ	-3.81	79.70		0.30	0.26	J	0.32	0.65	UJ	0.63	0.70	
L-2 TLW-0176	0.57	127.00	UJ	-2.19	127.00		0.73	0.41	J	1.58	1.32	J	2.31	1.38	
L-3 TLW-9178	111.00	187.00	U	-9.66	187.41		0.81	0.42	J	2.33	0.92	J	3.14	1.01	
BM-4 TLW-9179	26.00	67.00	UJ	0.26	67.07		1.68	0.49	J	1.19	0.92	J	2.87	1.04	

pCi/L: picocuries per liter ug/L: micrograms per liter
2σ TPU: total propagated uncertainty
40 CFR 192: 40 CFR, Part 192, Subpart A
NA: Not applicable
J=Estimated; U=Not Detected, value below decision level; UJ=Estimated, value below decision level

Table A7-4 - Tonawanda Landfill (Continued)
Results of Groundwater Sampling in September, 2001
Total Analysis (Unfiltered Samples)

	Th-230			**Th-232**			**Total Uranium**		
Method	DOE EML HASL 30			DOE EML HASL 30			ASTM D 5174		
40 CFR 192	NA	2σ TPU		NA	2σ TPU		44 ug/L	2σ TPU	
Units	pCi/L	pCi/L	Qual	pCi/L	pCi/L	Qual	ug/L	ug/L	Qual
Sample ID									
L-3 TLW-0150	2.96	0.63	J	0.31	0.16	J	175.00	12.00	
BM-15 TLW-0152	0.14	0.10	J	0.19	0.11	J	14.80	0.95	
BM-16 TLW-0154	-0.01	0.13	UJ	0.01	0.07	UJ	27.00	1.73	
BM-19 TLW-0156	0.08	0.07		0.01	0.04	U	34.80	2.20	
DW-1 TLW-0158	-0.03	0.08	U	0.01	0.10	U	0.50	0.02	
BM-12 TLW-0160	0.10	0.12	U	0.16	0.13		5.68	0.23	
BM-8 TLW-0162	0.08	0.10	U	0.05	0.07	U	9.44	0.60	
BM-18 TLW-0164	0.40	0.20		0.16	0.12		30.70	1.96	
BM-17 TLW-0166	0.27	0.19		0.12	0.13		22.50	1.48	
DW-4R TLW-0168	0.44	0.22		0.31	0.18		1.13	0.07	
DW-2 TLW-0170	0.22	0.12		0.10	0.08		0.30	0.02	
BM-4 TLW-0172	0.32	0.17		0.31	0.17		30.10	1.92	
L-1 TLW-0174	0.31	0.16	J	0.15	0.10	J	3.62	0.18	
L-2 TLW-0176	1.08	0.40	J	1.09	0.39	J	4.53	0.30	
L-3 TLW-9178	4.27	0.80	J	0.69	0.23	J	164.00	10.40	
BM-4 TLW-9179	0.33	0.18	J	0.28	0.15	J	35.60	2.25	

pCi/L: picocuries per liter ug/L: micrograms per liter
2σ TPU: total propagated uncertainty
40 CFR 192: 40 CFR, Part 192, Subpart A
NA: Not applicable
J=Estimated; U=Not Detected, value below decision level; UJ=Estimated, value below decision level

Table A7-5 - Tonawanda Landfill
Results of Groundwater Sampling in September, 2001
Dissolved Analysis (Filtered Samples)

	U-234			U-235			U-238			U-234 + U-235 + U-238			U-234 + U-238		
Method	DOE EML HASL 30			DOE EML HASL 30			DOE EML HASL 30								
40 CFR 192	NA	2 σ TPU		NA	2 σ TPU		NA	2 σ TPU		NA	2 σ TPU		30 pCi/L	2 σ TPU	
Units	pCi/L	pCi/L	Qual	pCi/L	pCi/L	Qual	pCi/L	pCi/L	Qual	pCi/L	pCi/L	Qual	pCi/L	pCi/L	Qual
Sample ID															
L-3 TLW-0151	46.80	7.01		3.38	0.74		46.90	7.03		97.08	9.96		93.70	9.93	
BM-15 TLW-0153	6.34	1.33		0.36	0.23		5.05	1.12		11.75	1.75		11.39	1.74	
BM-16 TLW-0155	13.30	1.94		0.85	0.23		9.64	1.45		23.79	2.43		22.94	2.42	
BM-19 TLW-0157	13.00	1.92		0.62	0.19		10.40	1.57		24.02	2.49		23.40	2.48	
DW-1 TLW-0159	0.19	0.11		0.07	0.07		0.03	0.06	U	0.29	0.14		0.22	0.12	
BM-12 TLW-0161	4.15	0.96		0.12	0.15	U	2.64	0.71		6.91	1.20		6.79	1.19	
BM-8 TLW-0163	3.94	0.66		0.20	0.09		2.39	0.44		6.53	0.79		6.33	0.79	
BM-18 TLW-0165	10.40	1.61		0.67	0.22		8.93	1.40		20.00	2.14		19.33	2.13	
BM-17 TLW-0167	9.32	1.57		0.60	0.24		7.88	1.37		17.80	2.10		17.20	2.08	
DW-4R TLW-0169	0.17	0.11		0.03	0.07	U	0.07	0.09	U	0.27	0.16		0.24	0.14	
DW-2 TLW-0171	0.07	0.13	U	-0.02	0.03	U	-0.01	0.06	U	0.03	0.14		0.06	0.14	
BM-4 TLW-0173	12.20	2.14		0.79	0.32		11.60	2.05		24.59	2.98		23.80	2.96	
L-1 TLW-0175	1.75	0.61		0.08	0.19	U	2.04	0.64		3.87	0.90		3.79	0.88	
L-2 TLW-0177	0.51	0.27		0.04	0.09	U	0.61	0.29		1.17	0.41		1.12	0.40	
L-3 TLW-9180	54.10	8.16		2.46	0.61		53.70	8.10		110.26	11.51		107.80	11.50	
BM-4 TLW-9181	12.50	2.24		0.48	0.26		10.80	1.99		23.78	3.01		23.30	3.00	

pCi/L: picocuries per liter ug/L: micrograms per liter
2σ TPU: total propagated uncertainty
40 CFR 192: 40 CFR, Part 192, Subpart A
NA: Not applicable
J=Estimated; U=Not Detected, value below decision level; UJ=Estimated, value below decision level

Table A7-5 - Tonawanda Landfill (Continued)
Results of Groundwater Sampling in September, 2001
Dissolved Analysis (Filtered Samples)

	Gross Alpha			**Gross Alpha excluding U-234 + U-235 + U-238**			**Ra-226**			**Ra-228**			**Ra-226+Ra-228**		
Method	EPA 900.0						EPA 903.1			EPA 904.0					
40 CFR 192	NA	2 σ TPU		15 pCi/L	2 σ TPU		NA	2 σ TPU		NA	2 σ TPU		5 pCi/L	2 σ TPU	
Units	pCi/L	pCi/L	Qual	pCi/L	pCi/L	Qual	pCi/L	pCi/L	Qual	pCi/L	pCi/L	Qual	pCi/L	pCi/L	Qual
Sample ID															
L-3 TLW-0151	60.30	145.00	U	-36.78	145.34		0.45	0.31	J	0.66	0.74	J	1.11	0.80	
BM-15 TLW-0153	11.10	32.30	UJ	-0.65	32.35		0.62	0.35	J	2.09	0.99	J	2.71	1.05	
BM-16 TLW-0155	19.70	41.40	U	-4.09	41.47		0.43	0.30		-0.08	0.57	U	0.35	0.64	
BM-19 TLW-0157	26.50	68.80	U	2.48	68.84		0.39	0.40		0.04	0.60	U	0.43	0.72	
DW-1 TLW-0159	-1.04	19.60	U	-1.33	19.60		0.73	0.40		1.87	1.18		2.60	1.25	
BM-12 TLW-0161	4.94	22.00	UJ	-1.97	22.03		0.74	0.37	J	1.52	0.84	J	2.26	0.92	
BM-8 TLW-0163	6.88	23.20	U	0.35	23.21		0.60	0.48		-0.74	0.62	U	-0.14	0.78	
BM-18 TLW-0165	16.70	50.00	U	-3.30	50.05		0.89	0.49		0.31	0.57	U	1.19	0.75	
BM-17 TLW-0167	13.60	35.50	U	-4.20	35.56		0.97	0.51		0.30	0.58	U	1.28	0.77	
DW-4R TLW-0169	-0.11	6.80	U	-0.37	6.80		0.70	0.38		1.03	0.78		1.73	0.87	
DW-2 TLW-0171	-0.06	5.15	U	-0.09	5.15		0.65	0.37		1.23	0.83		1.88	0.90	
BM-4 TLW-0173	23.90	62.90	U	-0.69	62.97		0.68	0.43		1.36	1.06		2.04	1.14	
L-1 TLW-0175	-0.69	80.00	UJ	-4.56	80.01		0.45	0.29	J	0.34	0.57	UJ	0.79	0.64	
L-2 TLW-0177	-0.67	28.90	UJ	-1.84	28.90		0.46	0.34	J	0.10	0.79	UJ	0.56	0.86	
L-3 TLW-9180	83.30	159.00	U	-26.96	159.42		0.96	0.42	J	0.53	0.79	UJ	1.49	0.89	
BM-4 TLW-9181	29.70	66.70	UJ	5.92	66.77		0.88	0.43	J	1.77	0.87	J	2.65	0.97	

pCi/L: picocuries per liter ug/L: micrograms per liter
2σ TPU: total propagated uncertainty
40 CFR 192: 40 CFR, Part 192, Subpart A
NA: Not applicable
J=Estimated; U=Not Detected, value below decision level; UJ=Estimated, value below decision level

Table A7-5 - Tonawanda Landfill (Continued)
Results of Groundwater Sampling in September, 2001
Dissolved Analysis (Filtered Samples)

	Th-230			**Th-232**			**Total Uranium**		
Method	DOE EML HASL 30			DOE EML HASL 30			ASTM D 5174		
40 CFR 192	NA	2σ TPU		NA	2σ TPU		44 ug/L	2σ TPU	
Units	pCi/L	pCi/L	Qual	pCi/L	pCi/L	Qual	ug/L	ug/L	Qual
Sample ID									
L-3 TLW-0151	0.47	0.20	J	0.10	0.10	J	133.00	8.81	
BM-15 TLW-0153	0.07	0.08	UJ	-0.01	0.03	UJ	15.40	0.98	
BM-16 TLW-0155	0.05	0.08	U	-0.02	0.05	U	27.00	1.71	
BM-19 TLW-0157	0.09	0.11	U	0.03	0.05	U	31.60	1.99	
DW-1 TLW-0159	0.18	0.18		-0.05	0.07	U	0.38	0.02	
BM-12 TLW-0161	0.08	0.08	J	-0.02	0.02	UJ	5.42	0.22	
BM-8 TLW-0163	0.18	0.20		0.02	0.07	U	7.47	0.30	
BM-18 TLW-0165	0.00	0.05	U	-0.02	0.03	U	31.00	1.97	
BM-17 TLW-0167	0.14	0.11		-0.01	0.01	U	24.00	1.52	
DW-4R TLW-0169	0.08	0.11	U	-0.02	0.03	U	0.40	0.02	
DW-2 TLW-0171	0.06	0.07		0.02	0.04	U	0.24	0.02	
BM-4 TLW-0173	0.05	0.07	U	0.01	0.04	U	32.10	2.03	
L-1 TLW-0175	0.12	0.09	J	0.05	0.07	UJ	2.90	0.11	
L-2 TLW-0177	0.06	0.09	UJ	0.05	0.06	J	1.62	0.07	J
L-3 TLW-9180	0.69	0.25	J	0.09	0.09	J	134.00	9.10	
BM-4 TLW-9181	0.01	0.07	UJ	0.00	0.00	J(u)	37.70	2.39	

pCi/L: picocuries per liter ug/L: micrograms per liter
2σ TPU: total propagated uncertainty
40 CFR 192: 40 CFR, Part 192, Subpart A
NA: Not applicable
J=Estimated; U=Not Detected, value below decision level; UJ=Estimated, value below decision level

ATTACHMENT A

Field Change Notices

Field Change Request (FCR)

MONITORING WELLS

FCR NO. TTL-001 DATE INITIATED 6/22/01

PROJECT FUSRAP Town of Tonawanda Landfill

CONTRACT NO. NGB - DAHA 90-94-D-0007 DN05

REQUESTOR IDENTIFICATION

NAME Steve McIrall ORGANIZATION SAIC PHONE 508 923 5100

TITLE Project Engineer SIGNATURE

PROJ. MGR

BASELINE IDENTIFICATION

BASELINE(S) AFFECTED ☒ Cost ☒ Scope ○ Milestone ○ Method of Accomplishment

AFFECTED DOCUMENT (TITLE, NUMBER AND SECTION) FSP § 2.6

DESCRIPTION OF CHANGE:

For groundwater samples, drop BM-13S and BM-13D from Sampling Plan. Add piezometers L-1, L-2 and L-3 to Sampling Plan.

JUSTIFICATION: Based on discussions with John Hilton of Malcolm Pirnie, Inc. (the Town of Tonawanda's consultant), wells BM-13S and BM-13D have very poor recharge. Additionally, these wells are outside the area of interest. Wells L-1, L-2 and L-3 are 2" piezometers with good recharge. They are located in the suspected MED-areas. Sampling of these wells will yield relevant information on mobility of MED material.

IMPACT OF NOT IMPLEMENTING REQUEST:

Longer field time for well purging/sampling, less data.

PARTICIPANTS AFFECTED BY IMPLEMENTING REQUEST:

Field crew, Project Mgr. COE Project Manager.

COST ESTIMATE ($) Minimal (1 additional GW sample) ESTIMATOR SIGNATURE

PHONE DATE

PREVIOUS FCR AFFECTED ○ YES ○ NO; IF YES, FCR NO.

CLIENT PROJECT MANAGER DATE

CLIENT QA SPECIALIST DATE

SAIC H&S MANAGER SIGNATURE (IF APPLICABLE) DATE

Field Change Request (FCR)

BACKGROUND AREA

FCR NO. TTL-002 DATE INITIATED 6/24/01

PROJECT FUSRAP- Town of Tonawanda Landfill

CONTRACT NO. NGB DAHA 90-94-D-0007 DN05

REQUESTOR IDENTIFICATION

NAME S. McIntall ORGANIZATION SAIC PHONE 518 523 3700

TITLE Proj. Engineer. SIGNATURE [illegible]

BASELINE IDENTIFICATION

BASELINE(S) AFFECTED ○ Cost ○ Scope ○ Milestone ☒ Method of Accomplishment

AFFECTED DOCUMENT (TITLE, NUMBER AND SECTION) SP 8.2.4.3 Fig 2-1, 2-3

DESCRIPTION OF CHANGE:

Move Background Area from under power lines to out by Front Gate.

JUSTIFICATION:

Current location is inaccessible. Proposed move would put the Background area in a 'clean' (Non-Class-3) area.

IMPACT OF NOT IMPLEMENTING REQUEST:

Schedule. locate another area.

PARTICIPANTS AFFECTED BY IMPLEMENTING REQUEST:

Field Crew, Proj. Mgmt.

COST ESTIMATE ($) 0 ESTIMATOR SIGNATURE _____

PHONE _____ DATE _____

PREVIOUS FCR AFFECTED ○ YES ☒ NO; IF YES, FCR NO. _____

CLIENT PROJECT MANAGER _____ DATE _____

CLIENT QA SPECIALIST _____ DATE _____

SAIC H&S MANAGER SIGNATURE (IF APPLICABLE) _____ DATE _____

Field Change Request (FCR)

SOIL REUSE

FCR NO. TTL-003 DATE INITIATED 6/26/01

PROJECT FUSRAP - Town of Tonawanda Landfill

CONTRACT NO. NGB DAHA-90-94-D-0007 DO 05

REQUESTOR IDENTIFICATION

NAME Steve McInall ORGANIZATION SAIC PHONE 508 723 5500

TITLE Proj. Engineer SIGNATURE [signature]

BASELINE IDENTIFICATION

BASELINE(S) AFFECTED ☒ Cost ○ Scope ○ Milestone ☒ Method of Accomplishment

AFFECTED DOCUMENT (TITLE, NUMBER AND SECTION) FSP 8.2.18, 8.5

DESCRIPTION OF CHANGE:

For holes where both downhole and core scan show no activity over background, replace leftover core sample into the hole. This approach was approved by NYSDEC at Seneca. Current approach will be used for any scans > background

JUSTIFICATION:

Save on IDW generation and handling, clean fill materials. Speed up sampling process

IMPACT OF NOT IMPLEMENTING REQUEST:

Cost and schedule impact

PARTICIPANTS AFFECTED BY IMPLEMENTING REQUEST:

Field Crew, SAIC Mgmnt, CGE Mgmnt

COST ESTIMATE ($)_____ ESTIMATOR SIGNATURE_____

PHONE_____ DATE_____

PREVIOUS FCR AFFECTED ○ YES ○ NO; IF YES, FCR NO. _____

CLIENT PROJECT MANAGER _____ DATE_____

CLIENT QA SPECIALIST _____ DATE _____

SAIC H&S MANAGER SIGNATURE (IF APPLICABLE)_____ DATE _____

Field Change Request (FCR)

FCR NO. TTC-004 DATE INITIATED 6/26/01

PROJECT FUSRAP- Town of Tonawanda Landfill

CONTRACT NO. NGB DAHA 90 94 D 0007 DN05

REQUESTOR IDENTIFICATION

NAME Steve McInnall ORGANIZATION SAIC PHONE 508 933 5100

TITLE Proj. Engineer SIGNATURE [signature]

BASELINE IDENTIFICATION

BASELINE(S) AFFECTED ○ Cost ○ Scope ○ Milestone ☒ Method of Accomplishment

AFFECTED DOCUMENT (TITLE, NUMBER AND SECTION) FSP- Figures

DESCRIPTION OF CHANGE:

Add location of DECON PAD to Figures (See Attached)

JUSTIFICATION:

Decon Pad + other features (Relief station, BASE of operations) are field located → Not Reflected in plans.

IMPACT OF NOT IMPLEMENTING REQUEST:

Figures not up to date

PARTICIPANTS AFFECTED BY IMPLEMENTING REQUEST:

Proj. Mgmnt. / Field Crew

COST ESTIMATE ($)_____ ESTIMATOR SIGNATURE_____

PHONE_____ DATE_____

PREVIOUS FCR AFFECTED ○ YES ○ NO; IF YES, FCR NO. _____

CLIENT PROJECT MANAGER _____ DATE_____

CLIENT QA SPECIALIST _____ DATE _____

SAIC H&S MANAGER SIGNATURE (IF APPLICABLE)_____ DATE _____

Field Change Request (FCR) Class1 Background ~~Count Times~~

FCR NO. TTL-005 DATE INITIATED 6/26/01

PROJECT FUSRAP - Town of Tonawanda Landfill

CONTRACT NO. NGB DAHA 90 94D 0007 DN05

REQUESTOR IDENTIFICATION

NAME Steve McIntyre / Rob Hayes ORGANIZATION SAIC PHONE 508 923 5700

TITLE Proj. Eng / Proj. Mgr SIGNATURE [illegible]

BASELINE IDENTIFICATION

BASELINE(S) AFFECTED ○ Cost ○ Scope ○ Milestone ☒ Method of Accomplishment

AFFECTED DOCUMENT (TITLE, NUMBER AND SECTION) FSP 8.2.4.3.1

DESCRIPTION OF CHANGE:

Clarification - Class 1 level walk over survey is not to be performed in Background areas. Statement ("MARSSIM Class 1 level surveys will also be conducted in 3 background survey units") refers to subsurface surveys.

JUSTIFICATION:

CLARIFICATION ONLY

IMPACT OF NOT IMPLEMENTING REQUEST:

SCHEDULE, REDO GWS in background areas

PARTICIPANTS AFFECTED BY IMPLEMENTING REQUEST:

Field Crew

COST ESTIMATE ($)_____ ESTIMATOR SIGNATURE_____

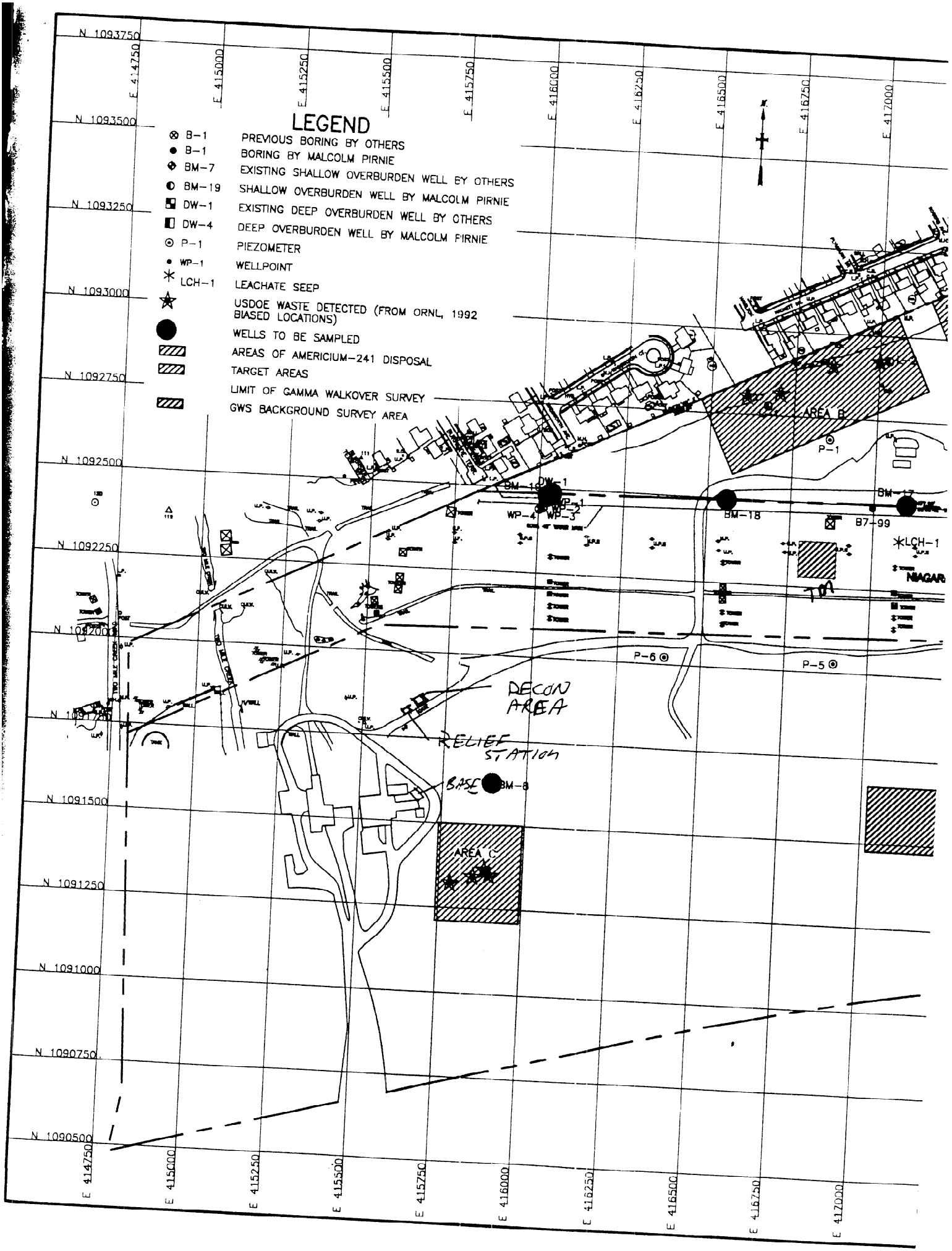
PHONE_____ DATE_____

PREVIOUS FCR AFFECTED ○ YES ○ NO; IF YES, FCR NO. _____

CLIENT PROJECT MANAGER _____ DATE_____

CLIENT QA SPECIALIST _____ DATE _____

SAIC H&S MANAGER SIGNATURE (IF APPLICABLE)_____ DATE _____


LEGEND
B-1 PREVIOUS BORING BY OTHERS
B-1 BORING BY MALCOLM PIRNIE
BM-7 EXISTING SHALLOW OVERBURDEN WELL BY OTHERS
BM-19 SHALLOW OVERBURDEN WELL BY MALCOLM PIRNIE
DW-1 EXISTING DEEP OVERBURDEN WELL BY OTHERS
DW-4 DEEP OVERBURDEN WELL BY MALCOLM PIRNIE
P-1 PIEZOMETER
WP-1 WELLPOINT
LCH-1 LEACHATE SEEP
USDOE WASTE DETECTED (FROM ORNL, 1992 BIASED LOCATIONS)
WELLS TO BE SAMPLED
AREAS OF AMERICIUM-241 DISPOSAL
TARGET AREAS
LIMIT OF GAMMA WALKOVER SURVEY
GWS BACKGROUND SURVEY AREA
N 1093750
N 1093500
N 1093250
N 1093000
N 1092750
N 1092500
N 1092250
N 1092000
N 1091750
N 1091500
N 1091250
N 1091000
N 1090750
N 1090500
E 414750
E 415000
E 415250
E 415500
E 415750
E 416000
E 416250
E 416500
E 416750
E 417000
AREA B
AREA C
P-1
P-6
P-5
BM-18
B7-99
LCH-1
WP-4
WP-3
DECON AREA
RELIEF STATION
BASE
BM-8

Field Change Request (FCR) Class 1 Background

FCR NO. TTL-005 Rev. 1 DATE INITIATED 6/26/01

PROJECT FUSRAP - Town of Tonawanda Landfill

CONTRACT NO. NCB-OAHA-90-94-D-0007 DO 05

REQUESTOR IDENTIFICATION

NAME Steve McInall / Doug Haas ORGANIZATION SAIC PHONE 508 9235117

TITLE Proj. Engr / Proj. HP SIGNATURE [signature]

BASELINE IDENTIFICATION

BASELINE(S) AFFECTED ○ Cost ○ Scope ○ Milestone ☒ Method of Accomplishment

AFFECTED DOCUMENT (TITLE, NUMBER AND SECTION) §2.4.3.1, §2.5 (FSP)

DESCRIPTION OF CHANGE. CLARIFICATION - C

Section 2.4.3.1 (p. 2-6) states MARSSIM Class 1 level surveys will also be conducted in three background survey units! This refers to the subsurface work described in §2.5 (Geoprobe, core scan, ~~γ walkover~~ downhole γ scan), which will actually be performed in two units (no subsurface in Niagara Mohawk ROW). The γ walkover is doing 10 1-minute counts in the reference areas (background survey units), not a Class 1 walkover. As detailed in the FSP, reference areas are in the landfill and the mudflat

JUSTIFICATION:
Clarification only

IMPACT OF NOT IMPLEMENTING REQUEST:
Schedule, Redo GWS in background/reference Areas

PARTICIPANTS AFFECTED BY IMPLEMENTING REQUEST:
Field Crew

COST ESTIMATE ($)_____ ESTIMATOR SIGNATURE_____

PHONE_____ DATE_____

PREVIOUS FCR AFFECTED ○ YES ○ NO; IF YES, FCR NO. _____

CLIENT PROJECT MANAGER _____ DATE_____

CLIENT QA SPECIALIST _____ DATE _____

SAIC H&S MANAGER SIGNATURE (IF APPLICABLE)_____ DATE _____

NaI Scintillation Detector Scan MDCs for Potential Radiological Contaminants at the Town of Tonawanda Landfill Site

Radionuclide/Radioactive Material	2" × 2" NaI Detector [a] Scan MDC (pCi/g)
Th-230	2,120
Ra-226 (In equilibrium with progeny)	2.8
Th-232 [b] decay series (In equilibrium with progeny in decay series)	1.8
Natural Uranium [c]	60

[a] Refer to NUREG-1507 text for complete explanation of factors used to calculate scan MDCs. This table has been reduced to only include information relevant to the Site walkover survey. See also MARSSIM Table 6.7

[b] Note that the scan of MDCs for Th-232 were determined by dividing scan MDC for entire Th-232 series by 10 to account for individual progeny (e.g., Th-232, Ra-228, Ac-228, etc.).

[c] Scan MDC for uranium includes sum of U-238, U-235, and U-234. Pace for survey will be modified so that the scan MDC for U is 60 pCi/g.

Standard MDC default assumptions used in NUREG guidance are acceptable for use at the Site. The MDCR represents the lowest detection capability of the instrumentation. Using the default assumptions, the walkover survey MDCR at the Site is approximately 2,000 CPM above background (Equation 6-9 in MARSSIM). Surface specific MDCRs will be calculated following reference area surveys. In the absence of site-specific soil cleanup goals, surface specific MDCRs will be used as the basis for bounding elevated areas and scrutinizing walkover data.

Scan MDCRs reflected above are less than the DCGLs for Ra-226 and Th-232. Accounting for the Area Factor, the scan MDCR is less than the DCGL for total uranium. The scan MDCR for Th-230, however, exceeds the DCGL. This is due to the nature of Th-230 (alpha emitter).

As previously stated, the GWS is designed to locate elevated concentrations of gamma-emanating radionuclide in surface soil. If there is a foot or more of soil covering the residual radioactivity, the MDC is infinity (cannot be detected).

2.4.3 Method of Survey

2.4.3.1 Reference Area Background Determination

Prior to the start of the GWS activities, surface specific background measurements will be made by averaging 10 one-minute integrated counts, distributed within a 10-m by 10-m grid of each surface type likely to be encountered on the site. Surface types will include soil, asphalt, and concrete. MARSSIM Class 1 level subsurface surveys will also be conducted in three two background survey units.

This is GWS Background

This Refers TO SUBSURFACE - NOT GWS

Background grid locations are presented in Figure 2-1. Because the Site is relatively large, soil in different areas of the site may have varying background activity due to the geology of the soil. In order to maximize the value of the walkover data, alternate reference areas may be established, with approval from USACE.

Field Change Request (FCR)

Area C Overburden

FCR NO. TTL-006 DATE INITIATED 7/9/01

PROJECT FUSRAP - Town of Tonawanda Landfill

CONTRACT NO. NCB-DAHA-90-94-D-0007 DO05

REQUESTOR IDENTIFICATION

NAME Steve McInall ORGANIZATION SAIC PHONE 508 923 5717

TITLE Project Engineer SIGNATURE [signature]

BASELINE IDENTIFICATION

BASELINE(S) AFFECTED ○ Cost ○ Scope ○ Milestone ☒ Method of Accomplishment

AFFECTED DOCUMENT (TITLE, NUMBER AND SECTION) FSP §2.5.1.1, Figure 2-4 (See 2-1 attached)

DESCRIPTION OF CHANGE:

The Area of the site designated as 'Area C' has had several feet of material deposited over it by the town. It is proposed to alter the sampling scheme to reflect this change. Sampling will be as follows: Top 6" will be collected. Probe will advance to native soil, in 4-5' increments (depending on length of sampler) All cores will be scanned in 6" intervals. The decision tree (Fig 2-4) (see revised attachment) will resume after native soil is encountered. If elevated levels are encountered, samples will be collected per FSP

JUSTIFICATION:

Revision to plan is required to reflect change in topography.

IMPACT OF NOT IMPLEMENTING REQUEST: Additional samples will need to be collected, or important information may be missed.

PARTICIPANTS AFFECTED BY IMPLEMENTING REQUEST:

Field Crews, SAIC project management, ACOE project management

COST ESTIMATE ($)_____ ESTIMATOR SIGNATURE_____

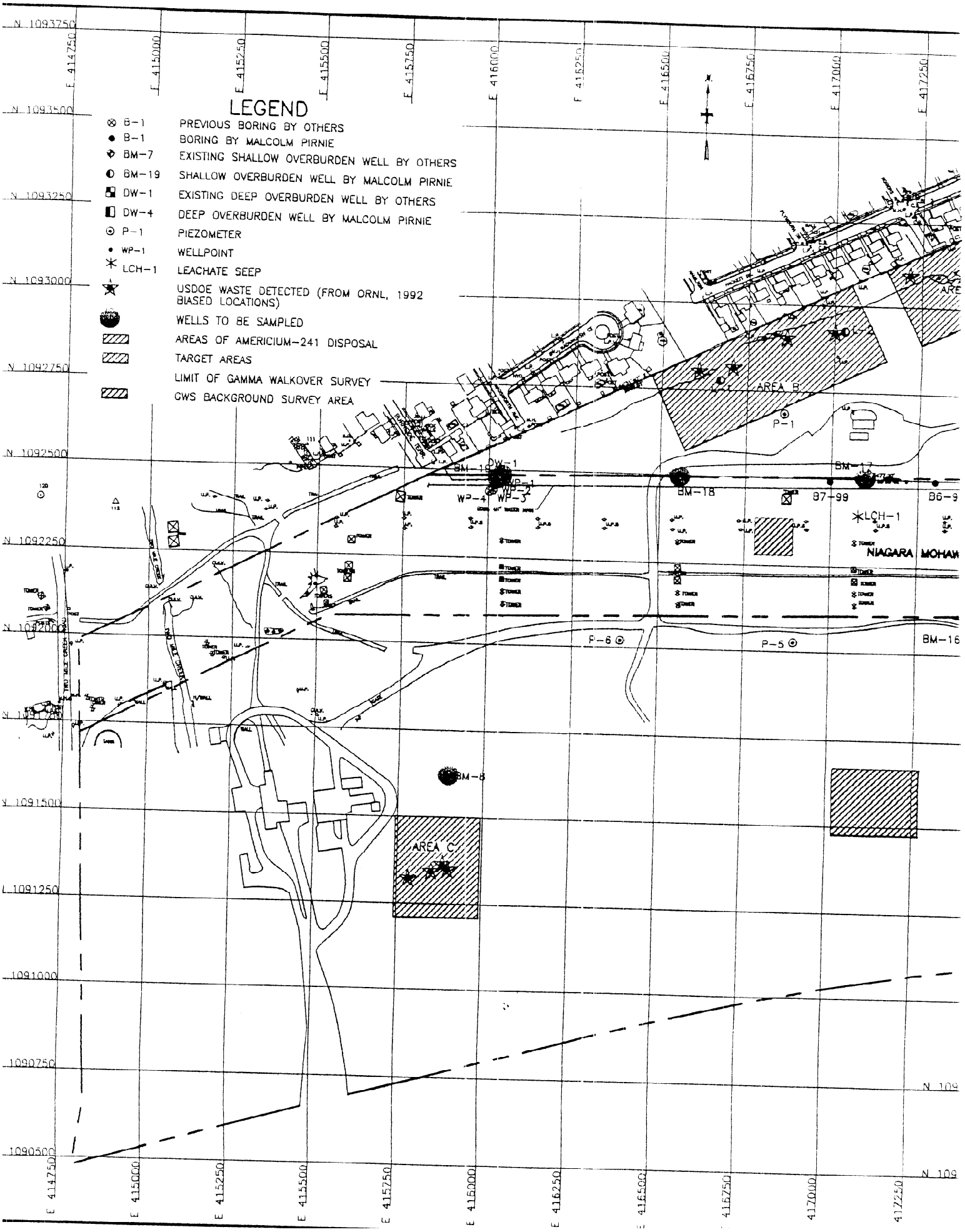
PHONE_____ DATE_____

PREVIOUS FCR AFFECTED ○ YES ○ NO; IF YES, FCR NO. _____

CLIENT PROJECT MANAGER _____ DATE_____

CLIENT QA SPECIALIST _____ DATE _____

SAIC H&S MANAGER SIGNATURE (IF APPLICABLE)_____ DATE _____


LEGEND
B-1 PREVIOUS BORING BY OTHERS
B-1 BORING BY MALCOLM PIRNIE
BM-7 EXISTING SHALLOW OVERBURDEN WELL BY OTHERS
BM-19 SHALLOW OVERBURDEN WELL BY MALCOLM PIRNIE
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P-1 PIEZOMETER
WP-1 WELLPOINT
LCH-1 LEACHATE SEEP
USDOE WASTE DETECTED (FROM ORNL, 1992 BIASED LOCATIONS)
WELLS TO BE SAMPLED
AREAS OF AMERICIUM-241 DISPOSAL
TARGET AREAS
LIMIT OF GAMMA WALKOVER SURVEY
GWS BACKGROUND SURVEY AREA
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N 1092250
N 1092000
N 1091500
N 1091250
N 1091000
N 1090750
N 1090500
E 414750
E 415000
E 415250
E 415500
E 415750
E 416000
E 416250
E 416500
E 416750
E 417000
E 417250
AREA B
AREA C
P-1
P-5
P-6
DW-1
WP-1
WP-2
WP-3
WP-4
BM-19
BM-18
BM-17
BM-16
BM-8
B7-99
B6-9
LCH-1
NIAGARA
MOHAW
THIRD MILE CREEK

FIGURE 2-4
TOWN OF TONAWANDA LANDFILL – SURFACE AND SUBSURFACE INVESTIGATION LOGIC DIAGRAM – AREA 'C' REVISION

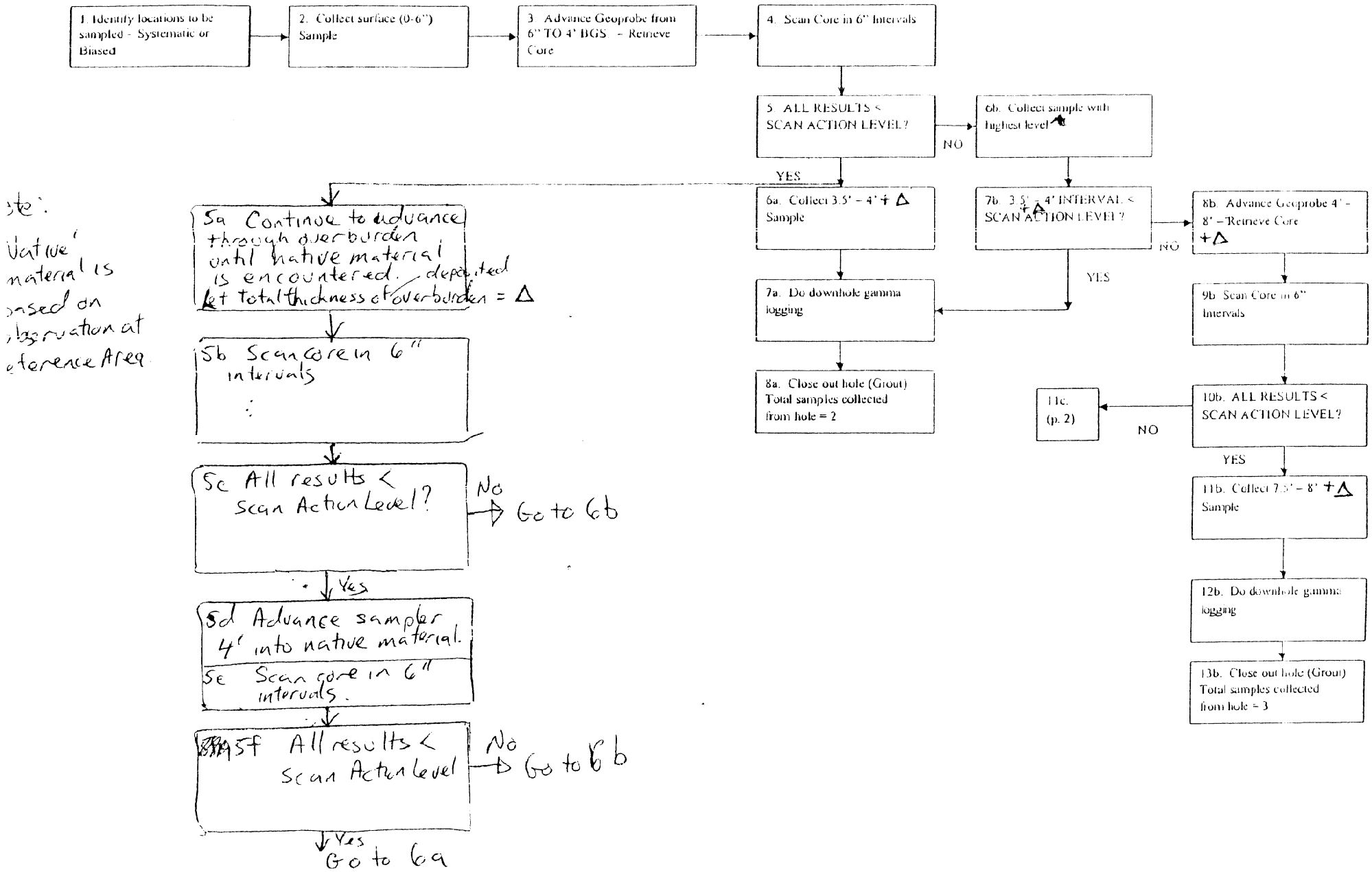
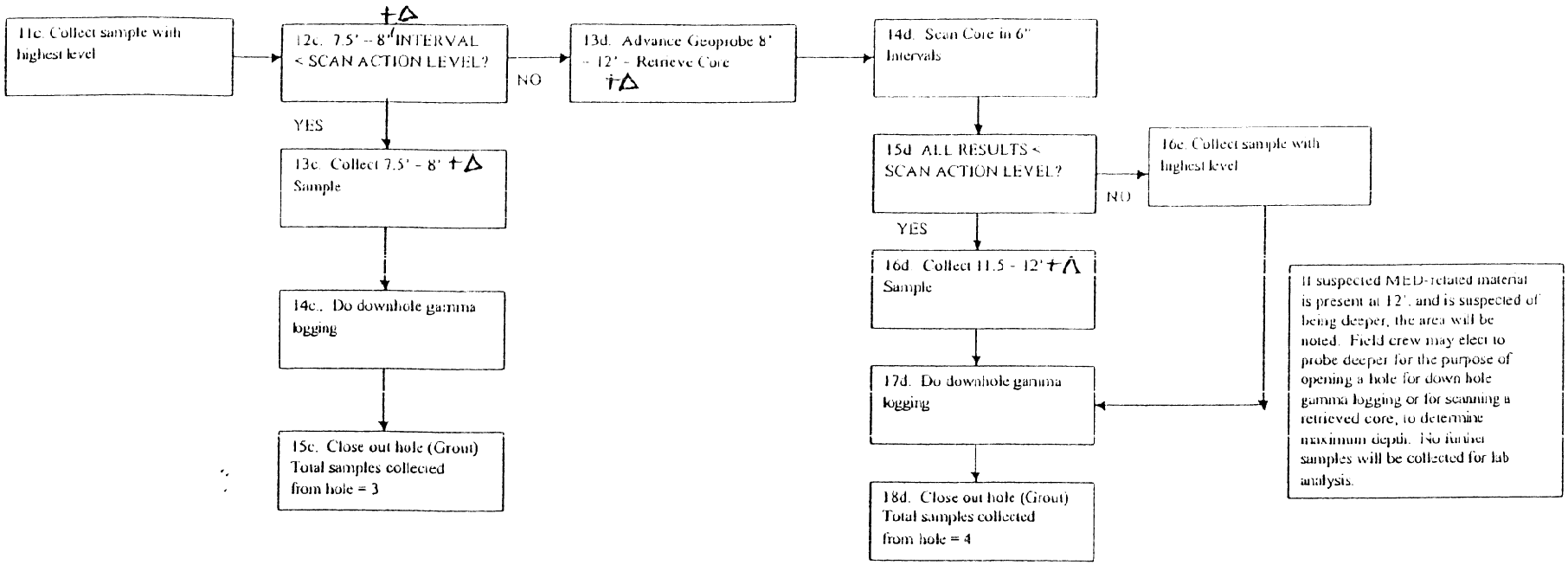


FIGURE 2-4
TOWN OF TONAWANDA LANDFILL – SURFACE AND SUBSURFACE INVESTIGATION LOGIC DIAGRAM – PAGE 2



NOTE: The retrieved soil core will be scanned with a shielded pancake GM probe. Criteria shall be Background + 2σ to 2x Background.

Field Change Request (FCR)

FCR NO. TTL-07 DATE INITIATED 7-10-01

PROJECT FUSRAP - Town of Tonawanda Landfill

CONTRACT NO. NCB-OAHA-90-94-D-0007 DNO5

REQUESTOR IDENTIFICATION

NAME Doug Haas ORGANIZATION SAIC PHONE 314-422-4308

TITLE RSO/ & WALKOVER SURVEY SIGNATURE [signature]

BASELINE IDENTIFICATION

BASELINE(S) AFFECTED ○ Cost ○ Scope ○ Milestone ● Method of Accomplishment

AFFECTED DOCUMENT (TITLE, NUMBER AND SECTION) SAMPLING + ANALYSIS PLAN, VOL. 1 FIELD SAMPLING PLAN TONAWANDA LANDFILL FUSRAP SITE (6/1/2001) ~~SECTION 2.4.1 "GWS INSTRUMENTATION" QA~~ 2.4.3.2 "PROCEDURES"

DESCRIPTION OF CHANGE:

- STATES - "THE SURVEYOR WILL COLLECT WITHIN EACH DATA FILE AT LEAST 1 MINUTE OF GPS DATA AT A MONUMENT"
- CHANGE TO - "THE SURVEYOR WILL COLLECT AT LEAST 1 MINUTE OF GPS DATA AT A MONUMENT PRIOR TO, AND FOLLOWING EACH DAY"

JUSTIFICATION:

ORIGINALLY, A FILE WAS TO BE COLLECTED EACH DAY. TRANSECTS/AREAS MUST BE HELD UNDER DIFFERENT FILE NAMES. IT WOULD NOT BE PRACTICAL TO RETURN TO THE MONUMENT BETWEEN EACH FILE.

IMPACT OF NOT IMPLEMENTING REQUEST:

ADDITIONAL BACK AND FORTH ACROSS THE SITE. (EVERY 5 MINUTES)

PARTICIPANTS AFFECTED BY IMPLEMENTING REQUEST:

GWS CREW AT TTL

COST ESTIMATE ($)_____ ESTIMATOR SIGNATURE_____

PHONE_____ DATE_____

PREVIOUS FCR AFFECTED ○ YES ○ NO; IF YES, FCR NO. _____

CLIENT PROJECT MANAGER _____ DATE_____

CLIENT QA SPECIALIST _____ DATE _____

SAIC H&S MANAGER SIGNATURE (IF APPLICABLE)_____ DATE _____

ATTACHMENT B

NFSS Software Instruction

Attachment B

NFSS Software Work Instructions
Plotting Gamma Walkover Data Obtained From Areas With Overhead Interference

These software work instructions were prepared for the gamma walkover survey (GWS) that was conducted for the Niagara Falls Storage Site (NFSS). The same protocols were used for the Town of Tonawanda Landfill investigation and are presented for informational purposes only.

Purpose

Satellite availability to position GWS data is not always adequate due to overhead interference (i.e. trees, buildings). Therefore, a series of programs have been written to manually position this GWS data. This work instruction describes the methodology that was used to extract sensor readings from Pathfinder Office .ssf files that were collected in Manual two dimensional (2D) mode, to match this count-rate data with derived coordinates, and to produce a text file that can be exported to Arcview.

The following software must be available to process this data:

1. Microsoft Excel
2. Pathfinder Office
3. Textpad
4. Arcview (Only necessary to view the finished .txt files)
5. java.exe (The directory this file is in must be set as a classpath)

In order for these programs to operate correctly:

The following file naming convention must be followed when naming transects – VVtWWXYZ. Where VV = Survey Area, WW = Transect Number, X = Segment Letter, Y = Surface Type, Z = Pack Number. (i.e. 23t14as7 would be the first segment of soil on the fourteenth transect in survey area twenty-three which was surveyed with pack seven, and 01t38bc5 would be the second segment of concrete on the thirty-eighth transect in survey area one which was surveyed with pack five.)

The following files must be present in your survey area folder (these files are moved by typing "getjava"):

- BatchMaker.class,
- BatchRunner.class, DataRetriever2.class
- MainWindow.class
- BasicDataReader.class
- MyPoint.class,
- OutputBox.class,
- PointMaker.class,
- CoordinateGetter.class,

- OffsetMaker.class".

To collect data in an area without satellite coverage, transects (a straight path to be walked along, preferably with flags marking each end) should be spaced evenly spanning the area. Determine the coordinates of the starting and ending point of each transect. The preferable way to find these coordinates is to collect a 20 second point generic feature with a GPS over the flags at each end. (One way to make this possible is to extend the transect beyond the survey area into a more open area that satellite coverage is available).

Necessary knowledge to process a survey area:

1. The starting/ending points of every transect known?
2. Which transects are segmented? (What surface type, if any, is causing the segments?)
3. Are all files present for all segments?
4. How long are offsets and broken transects?
5. Which direction were the transects surveyed? (North to South vs. South to North)

Programs

The following programs were written and are used to position the GWS data and associated CPM data:

- OffsetMaker – Measures the distance between two points and calculates an unknown segment length.
- PointMaker – Used to generate a preset number of evenly spaced points between two known points.
- DataRetriever2 – Retrieves CPM counts (from an .ssf file created from Pathfinder Office) and starting and ending points, and pairs them with a position on a line between the two points. No user interface.
- BatchMaker – Creates a batch file of DataRetriever2 commands, and then runs BatchRunner.
- CoordinateGetter – Used when there are more than three segments in a transect. This program calculates the starting and ending points of middle segments.
- BatchRunner – Internal program to increase efficiency by keeping the Java environment open. The User only needs to run this program when manually editing a Batch File.

OffsetMaker

In situations where an offset is immeasurable, (i.e. standing water), OffsetMaker subtracts the length of the walked segment from the distance between the starting and ending points, and returns the remaining distance. The length of the offset is displayed on the screen. OffsetMaker is used with the following syntax:

```
java OffsetMaker <Starting Northing> <Starting Easting> <Ending Northing> <Ending
        Easting> <Summed Length Of Known Segments>
```

This formula is used to find the distance between the two points:

Length of the transect = Sqrt((N_1-N_0)^2+(E_1-E_0)^2)

(Where N_1 is the Ending Northing, N_0 is the Starting Northing, E_1 is the Ending Easting, and E_0 is the Starting Easting.)

PointMaker

In situations where the starting and ending points are all situated at even intervals, PointMaker generates the coordinates of each point based on the coordinates of the first and last transects in that survey area. The majority of its use is for points along fences and areas where standing water and trees prevented point generics to be collected on the starting and ending points. It must be run separately for starting and ending points. After the points are generated, they are output to a .txt file named, which is entered at the prompt. PointMaker is used with the following syntax:

> java PointMaker <First Northing> < First Easting> <Last Northing> <LastEasting> <Number of Points> <Output Filename>

This formula is used to find the points between the two known points:

Transect X's starting or ending point northing = (X - 1)*(N_1-N_0)/(# of Transects – 1)
Transect X's starting or ending point easting = (X - 1)*(E_1-E_0)/(# of Transects – 1)

(Where X is the transect number, N_1 is the Northing of the last starting/ending point, N_0 is the Northing of the first starting/ending point, E_1 is the Easting of the last starting/ending point, and E_0 is the Easting of the first starting/ending point.)

DataRetriever2

DataRetriever2 is the "Active Ingredient" of the programs. It retrieves the CPM counts from an .ssf file created from Pathfinder Office®, and given known starting and ending points and pairs them with a position on a line between the two points. DataRetriever is used with the following syntax:

> java DataRetriever <.ssf filename> <Initial Northing> <Initial Easting> <FinalNorthing> <Final Easting> <Output Filename>

The retrieval of the counts per minute (CPM) data is accomplished in the following fashion. The contents of the .ssf file are read and converted into a collection of characters. Starting at the beginning of the collection, DataRetriever2 checks the characters one by one to see if they are numerical digits. If six numerical digits (the number of digits output by a NaI 2x2 detector paired with a Ludlum 2221 meter) in a row are found, that six-digit number is stored to be paired with a coordinate. The number of CPM readings is then recorded.

Once the .ssf file has been processed, and all the CPM readings have been retrieved, the coordinates are generated. The generated coordinates are evenly spaced between two known

points according to the number of readings retrieved. The coordinates to be paired with the CPM data was found using the following formula:

E_x = Initial Easting + X * (Final Easting – Initial Easting)/(Number of Counts - 1)

(Where X is a counter incrementing by 1 between 0 and the number of CPM readings.)
DataRetriever2 outputs all the files in a survey area of a particular background into a single .txt file. If a seventh parameter is entered, the output file will be overwritten, instead of added to. Adding the seventh parameter the first time an output file is used in a particular Batch File (usually the first line if the output file is for soil) ensures that duplicate data is not added to the output file if the Batch File is run multiple times. The output file is laid out in the following manner: <Easting, Northing, CPM, Datafile (the .ssf file the CPM data was extracted from).

BatchMaker

BatchMaker creates a batch file that is used to process a survey area at a time using DataRetriever2, instead of transect segment at a time using DataRetriever. All transects are assumed to be soil, and not broken into more than three segments; if either of these criteria are not met, than that transect must be manually altered in the Batch File.

BatchMaker asks if any starting or ending points need to be generated, (for the same reasons that PointMaker would be used), and generates them if necessary. This process uses the same formula as PointMaker.

The user is then prompted for the survey area number, which is used to read the files XXstart.txt and XXend.txt, (Where XX is the number of the survey area being processed) which contain the starting and ending coordinates of the transects. (These files are only used if points are not generated. The number of coordinates in each file is checked to make sure they are even and this number is used for the number of transects in the survey area.

The current directory is then scanned for which .ssf files are present and segmented transects are checked for by the presence of multiple files. BatchMaker then asks if any transects are offset at the start or at the end. If offsets are present, the transect number and length off the offset is asked for.

BatchMaker then starts adding lines to the Batch File that in the following manner:

```
java DataRetriever2 <filename> <Northing from XXstart.txt>
<Easting from XXstart.txt> <Northing from XXend.txt>
<Easting from XXend.txt> XXsoil.txt
```

This continues until a transect with multiple files is found. The user is then prompted for the length of the first segment followed by the length of the second segment. The formula for the offsets and the coordinates at the end of the segmented transects use the following formulas:

Northing = (N_1-N_0)*length/Sqrt((N_1-N_0)^2+(E_1-E_0)^2)
Easting = (E_1-E_0)*length/Sqrt((N_1-N_0)^2+(E_1-E_0)^2)

(Where length is the length of the segment or the offset, N_1 is the Ending Northing, N_0 is the Starting Northing, E_1 is the Ending Easting, and E_0 is the Starting Easting.)

The Batch File is then continued in the manner stated above until all transects have been added.

CoordinateGetter

In situations where coordinates need to be found and its not possible to collect a point generic due to lack of satellite coverage, Coordinate Getter generates the coordinates based on an offset of an already known transect. This is particularly useful when the transect is broken into more than three files, in which case BatchMaker will not break the transect down enough to enter it into the Batch File. CoordinateGetter is used with the following syntax:

java CoordinateGetter <Transect #> <Distance> <Type>

The coordinate files must be present in order for the CoordinateGetter to work. The <Type> parameter is "f" for if the distance is measured from the starting coordinate and "b" for if the distance is measured from the ending coordinate. CoordinateGetter reads the coordinates from the desired transect and then uses the following formulas:

Northing = (N_1-N_0)*length/Sqrt((N_1-N_0)^2+(E_1-E_0)^2)
Easting = (E_1-E_0)*length/Sqrt((N_1-N_0)^2+(E_1-E_0)^2)

(Where length is the length of the segment or the offset, N_1 is the Ending Northing, N_0 is the Starting Northing, E_1 is the Ending Easting, and E_0 is the Starting Easting.) Coordinate Getter then displays the coordinates on the screen.

BatchRunner

When a Java program is run from the DOS prompt, a Java Runtime Environment (JRE) must be created to run the file. The creation of the JRE takes memory resources and time (approximately one second) to create. Upon the completion of the Java program, the JRE is closed. When a Batch File is run, it executes each line individually, and as a result the JRE is opened and closed each time the DataRetriever2 program is run. (Once per transect segment). To more efficiently use the computers time and resources, BatchRunner was created. When this program is run, it searches the directory for a Batch File and reads it. This allows the JRE to be created, all of the transects to be processed, and then the JRE is closed. This cuts down on the resources and time since the JRE is created only once instead of multiple times.

The following assumptions are made when working with GWS data:

- The walking rate used is even for the entire transect segment.
- Each segment is a straight line between the starting and ending point.
- Hotspots encountered during a transect are investigated following the walking of the transect and not during it.

The following is a step by step process that should be used when processing GWS data:

1. Look at survey map for files, and check for which files should be present.
2. Check the directory the .ssf files are stored in to verify all files are present.
3. Verify that the number of files equals the number of transects.
4. Check map for direction surveyed (N to S vs. S to N)
5. Open Pathfinder Office.
6. Create a new project for the survey unit.
7. Open both point generic files.
8. If map is not visible, under the menu **View**, select **Menu**.
9. Check to see if there are point generics for both ends of all the transects. If not, they can probably be generated in a straight line based on two coordinates using PointMaker.
10. Reopen the starting points file only.
11. Export starting points to D:\GPS\NFSS\Projects\SXX\Export\ (XX denotes survey area number)
12. Open Point_ge.dbf in Excel from the directory in step 10.
13. If the transect numbers (comments) are not arranged in ascending order, then complete the following:
    a. Create a new column with the heading "Point #"
    b. In the 2nd cell of the new column type "=value(D2)"
    c. Hit Enter.
    d. Highlight the 2nd cell again.
    e. Click the box in the lower right corner of the cell and drag it to the bottom of the table.
    f. Highlight the 2nd cell a third time.
    g. Under the menu **Data**, select **Sort**.
    h. Sort by Point #
14. Switch the Northing and Easting columns.
15. Highlight the coordinates and copy them.
16. Open Textpad.
17. Create XXstart.txt in the folder D:\Gps\NFSS\Project\SXX\ and open it.
18. Paste the coordinates in the .txt file.
19. An extra line will be created after the last coordinate, backspace it. (The program will exit with an error without this)
20. Save XXstart.txt.
21. Process the ending points by repeating steps 10 – 20.
22. Check the survey map for offsets and their measurements.
23. Open the DOS prompt.
24. Type "NFSS"
25. Type "cd SXX" where XX is the survey are #.
26. Type "getJava"
27. Type "java BatchMaker"
28. Enter the survey area # and hit enter.
29. Check map for starting offsets, if none type "0".
    a. Type the number of transects with starting offsets.

   b. Type the transect number off the offset transect followed by a space and the length of the offset.
   c. Repeat steps a and b for all transects with starting offsets.
30. Check map for ending offsets, if none exists type “0”.
   a. Type the number of transects with ending offsets.
   b. Type the transect number off the offset transect followed by a space and the length of the offset.
   c. Repeat steps a and b for all transects with ending offsets.
31. If segmented transects are present, enter the length of the first soil segment and hit enter, then enter the length of the second soil segment and hit enter.
32. BatchMaker automatically processes the Batch File, though if more than one surface type is present, the Batch File will have to be manually edited and then BatchRunner will have to be run to use the Batch File.

Manually Editing a Batch File

The main reason to manually edit a Batch File is to add segments to a segmented transect. Open the file XXdata.bat in Textpad. If the segment that needs to be manually entered is a second surface type between two soil segments, enter a line after the first soil segment. Copy the line from the first soil segment. Change the filename to the filename of the new surface type segment. Delete the first Northing and Easting on the new line. Copy the first Northing and Easting from the second soil segment’s line. Paste that Northing and Easting after the new surface type segment’s remaining Northing and Easting. Change XXsoil to reflect the new surface type. (i.e. XXconcrete) From the directory the .ssf files are in, run BatchRunner. If more than one file per transect needs to be added, then CoordinateGetter should be used to get the starting and ending coordinates of each segment on that transect.

Offsets

An offset transect is one in which the walking was begun and finished from a point other than where the pt generic feature was created. There are two types off offsets, starting offsets and ending offsetsand BatchMaker will ask whether either is present. If an offset can not be measured due to standing water, use OffsetMaker.

Coordinate Files

Coordinate files are necessary to run CoordinateGetter and BatchMaker. There are two files per survey area. One contains the starting points (XXstart.txt) and the second contains the ending points. (XXend.txt) XX denotes the survey area the coordinates are from. They are .txt files containing one Northing followed by one Easting per transect on a line.

Transect vs. Transect Segment

A transect is a complete line walked across a survey area. A transect segment is one .ssf file on a particular transect. The majority of transects are one segment long consisting of only soil, however due to obstacles and different surface types, some segments consist of more than one segment. Each segment is its own .ssf file for one of the two following reasons:

1. When the segment is a different soil type, a different background must be applied to the data.

2. When there is an obstacle that cannot be walked, the data up to that obstacle must be collected on a separate file than the data after the obstacle because it is being spread evenly between the starting and ending points and going around the obstacle or pausing to go around the obstacle would cause the positions to be inaccurate.

For instance, a transect with a concrete pad in its path would consist of 3 segments. The first being the soil leading up to the pad. The second being the pad itself. The third being the soil following the pad.

When surveying in the woods, it is sometimes impossible to get satellite signals to obtain GPS coordinates to pair with the sensor data. In order to survey in these areas, transects were set up. A transect is a line with a known starting and ending point. Surveying along this line at a constant rate allowed the sensor readings to be spread evenly between the two endpoints. A java program was written in order to do this. The program reads the sensor readings out of the file saved by the GPS handset, in order. The program then generates one evenly spaced coordinate for each sensor reading. The coordinates and sensor readings are paired and written to a text file that can be used in ArcView®.

ATTACHMENT C

Boring Logs

Landfill
Class 1 Area A

Science Applications International Corporation
An Employee-Owned Company

BORING LOG TLFA1-002

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/31/01
Date Completed	: 7/31/01
Hole Diameter	: 2 inches
Depth of Boring	: 11.5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1093114.13
Easting Coord.	: 417454.49

Logged By	: D. Minese
Elevation	: 619.33 ft msl
Location	: Landfill Class 1 Area A
Temporary Casing	: 3-inch steel
Total Core Recovery	: 39%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 619.33	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	619	ML		LOAM - brown, fine sand, wet	TLF-0694	46
		SP/AR		SAND WITH FILL - black, fine sand, glass, rock, brick fragments		60
1	618	SP		SAND - fine grained, with ash, glass, rock, and brick		54
					TLF-0695	50
2	617			no recovery from 2 to 4 feet		
3	616					
4	615	SP		SAND - fine grained, with glass, ash, rock, and brick		46
		SM		SILTY SAND - gray black, 2.5 Y 3/1, fine grained	TLF-0696	62
5	614			no recovery from 5 to 10.5 feet		
6	613					
7	612					
8	611					
9	610					
10						

Backfilled with Boring Cuttings

01-24-2002 U:\PUBLIC\MTech\TonawandaLandfill\Class 1 Area A\TLFA1-002.BOR

Science Applications International Corporation
An Employee-Owned Company

BORING LOG TLFA1-002

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/31/01
Date Completed	: 7/31/01
Hole Diameter	: 2 inches
Depth of Boring	: 11.5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1093114.13
Easting Coord.	: 417454.49

Logged By	: D. Minese
Elevation	: 619.33 ft msl
Location	: Landfill Class 1 Area A
Temporary Casing	: 3-inch steel
Total Core Recovery	: 39%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 619.33	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
10	609			no recovery from 5 to 10.5 feet		
11	608	SM/AR		SILTY SAND - fine grained, with ash, glass, rock, coal, and debris	TLF-0697	32 36
12	607					
13	606					
14	605					
15	604					
16	603					
17	602					
18	601					
19	600					
20						

Backfilled with Boring Cuttings

The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

Science Applications International Corporation
An Employee-Owned Company

BORING LOG TLFA1-003

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

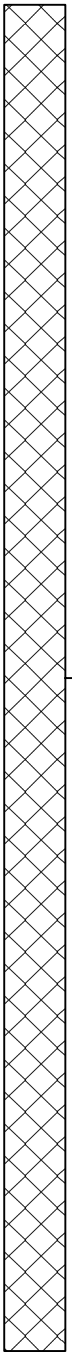
Date Started	: 7/31/01
Date Completed	: 7/31/01
Hole Diameter	: 2 inches
Depth of Boring	: 15 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1093111.23
Easting Coord.	: 417441.09

Logged By	: S. McInall
Elevation	: 618.91 ft msl
Location	: Landfill Class 1 Area A
Temporary Casing	: 3-inch steel
Total Core Recovery	: 33%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 618.91	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		SM		SILTY SAND - brown, 10 YR 3/2, vertical roots, glass, debris, dry	TLF-0690	40
		ML		SILT - very dark grayish brown, 10 YR 3/2, gravel, moist		70
1	618	ML		SILT - very dark gray, 10 YR 3/1, organic looking fragments, wet	TLF-0691	70
						52
2	617			no recovery from 2 to 4 feet		
3	616					
4	615	SM		SILTY SAND - gray, 10 YR 5/1, fine to medium gravel, coarse grained sand, glass, debris, wet		66
						52
5	614			slight gradation in color, dark to lighter gray		484
					TLF-0692	
					TLF-9717	
6	613					138
						74
7	612			no recovery from 6.5 to 11 feet		
8	611					
9	610					
10	609					



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Science Applications International Corporation
An Employee-Owned Company

BORING LOG TLFA1-003

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/31/01
Date Completed	: 7/31/01
Hole Diameter	: 2 inches
Depth of Boring	: 15 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1093111.23
Easting Coord.	: 417441.09

Logged By	: S. McInall
Elevation	: 618.91 ft msl
Location	: Landfill Class 1 Area A
Temporary Casing	: 3-inch steel
Total Core Recovery	: 33%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 618.91	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
10				no recovery from 6.5 to 11 feet		
11	608	GP		GRAVEL - gray, 10 YR 5/1, debris, fragments (potentially slough from above)	TLF-0693	90
				no recovery from 11.5 to 15 feet		
12	607					
13	606					
14	605					
15	604					
16	603					
17	602					
18	601					
19	600					
20	599					

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The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

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Science Applications International Corporation
An Employee-Owned Company

BORING LOG TLFA1-004

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/30/01
Date Completed	: 7/30/01
Hole Diameter	: 2 inches
Depth of Boring	: 12 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1093146.55
Easting Coord.	: 417448.39

Logged By	: S. McInall
Elevation	: 618.87 ft msl
Location	: Landfill Class 1 Area A
Temporary Casing	: 3-inch steel
Total Core Recovery	: 75%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 618.87	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		ML		SILT - very dark grayish brown, 10 YR 3/2, clayey, vertical roots	TLF-0677	40
	618					48
1		SM		SILTY SAND - black, 10 YR 2/1, fine grained gravel		40
	617	GM		SILTY GRAVEL - dark yellowish brown, 10 YR 4/4, with fine to medium grained gravel, debris, wet		40
2				no recovery from 2 to 4 feet		
3	616			Static water measured at 4 feet below ground surface		
4	615	ML		SILT - dark gray, 10 YR 4/1, with coarse to fine grained gravel, debris		44
	614				TLF-0678	62
5		CL		LEAN CLAY - dark yellowish brown, 10 YR 4/4, moist, low plasticity		40
6	613					30
						26
7	612					52
						44
8	611					54
						30
9	610				TLF-0679	66
						40
10	609					38

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BORING LOG TLFA1-004

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/30/01
Date Completed	: 7/30/01
Hole Diameter	: 2 inches
Depth of Boring	: 12 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1093146.55
Easting Coord.	: 417448.39

Logged By	: S. McInall
Elevation	: 618.87 ft msl
Location	: Landfill Class 1 Area A
Temporary Casing	: 3-inch steel
Total Core Recovery	: 75%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 618.87	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
10		CL		LEAN CLAY - dark yellowish brown, 10 YR 4/4, moist, low plasticity		50
	608					40
11				no recovery from 11 to 12 feet		
	607					
12						
	606					
13						
	605					
14						
	604					
15						
	603					
16						
	602					
17						
	601					
18						
	600					
19						
	599					
20						

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The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

Science Applications International Corporation
An Employee-Owned Company

BORING LOG TLFA1-006

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/30/01
Date Completed	: 7/30/01
Hole Diameter	: 2 inches
Depth of Boring	: 8 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1093123.90
Easting Coord.	: 417476.02

Logged By	: S. McInall
Elevation	: 618.71 ft msl
Location	: Landfill Class 1 Area A
Temporary Casing	: 3-inch steel
Total Core Recovery	: 53%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 618.71	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		ML		SILT - very dark brown, 10 YR 3/1, with glass, debris	TLF-0670	62
	618					64
1		ML		SILT - black, 10 YR 2/1, with glass, debris		54
	617			thin yellow layer, wet	TLF-0671	70
2						78
	616			no recovery from 2.25 to 3 feet		
3				low recovery, weak red, 10 R 4/3, soil recovered from shoe of core-barrel Static water measured at 3 feet below ground surface		72
	615					78
4					TLF-0672	138
	614					
5				no recovery from 5 to 8 feet		
	613					
6						
	612					
7						
	611					
8						
	610					
9						
	609					
10						

Backfilled with Boring Cuttings

The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

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Science Applications International Corporation
An Employee-Owned Company

BORING LOG TLFA1-007

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/30/01
Date Completed	: 7/30/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 12.5 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1093160.43
Easting Coord.	: 417478.31

Logged By	: D. Minese
Elevation	: 619.04 ft msl
Location	: Landfill Class 1 Area A
Temporary Casing	: 3-inch steel
Total Core Recovery	: 76%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 619.04	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	619	CL		LEAN CLAY - reddish brown, 5 YR 4/3, low to medium plasticity	TLF-0673	60
						34
1	618	CL		LEAN CLAY - reddish brown, 5 YR 4/4, low to medium plasticity		42
		CL		LEAN CLAY - glass, brick, rocks, wet	TLF-0674	50
2	617			no recovery from 2 to 5 feet		
3	616					
4	615					
5	614	CL		LEAN CLAY - reddish brown, 5 YR 4/4, up to 1-inch sub-rounded gravel, dry, low to medium plasticity		42
						20
6	613					48
						48
7	612					42
						34
8	611					56
						54
9	610					34
					TLF-0675	30
10						

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Science Applications International Corporation
An Employee-Owned Company

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/30/01
Date Completed	: 7/30/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 12.5 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1093160.43
Easting Coord.	: 417478.31

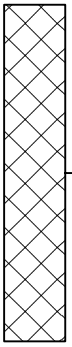
BORING LOG TLFA1-007

Logged By	: D. Minese
Elevation	: 619.04 ft msl
Location	: Landfill Class 1 Area A
Temporary Casing	: 3-inch steel
Total Core Recovery	: 76%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 619.04	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
10	609	CL		LEAN CLAY - reddish brown, 5 YR 4/4, up to 1-inch sub-rounded gravel, dry, low to medium plasticity		34
						32
11	608					56
				Deepest with full recovery	TLF-0676	62
12	607					42
13	606					
14	605					
15	604					
16	603					
17	602					
18	601					
19	600					
20						



Backfilled with Boring Cuttings

The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

Science Applications International Corporation
An Employee-Owned Company

BORING LOG TLFA1-008

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/30/01
Date Completed	: 7/30/01
Hole Diameter	: 2 inches
Depth of Boring	: 12 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1093151.41
Easting Coord.	: 417465.04

Logged By	: D. Greenman
Elevation	: 618.73 ft msl
Location	: Landfill Class 1 Area A
Temporary Casing	: N/A
Total Core Recovery	: 75%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 618.73	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		CL		LEAN CLAY - moderate brown, 5 YR 4/4, roots, soft, low plasticity, moist	TLF-0680	58
	618					48
1		CL		LEAN CLAY - grayish brown, 5 YR 3/2, mottled with pale yellowish brown, 10 YR 6/2, wet		34
	617					42
2						40
	616			no recovery from 2.75 to 4 feet		
3						
	615					
4		CL		LEAN CLAY - grayish brown, 5 YR 3/2, mottled with pale yellowish brown, 10 YR 6/2, wet	TLF-0681	22
	614					50
5		CL		LEAN CLAY - dark yellowish brown, 10 YR 4/2, firm, moist		52
	613					42
6						38
	612			no recovery from 6.5 to 8 feet		
7						
	611					
8		CL		LEAN CLAY - dark yellowish brown, 10 YR 4/2, firm, slightly moist		50
	610					38
9						44
	609					46
10						

Backfilled with Boring Cuttings

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Science Applications International Corporation
An Employee-Owned Company

BORING LOG TLFA1-008

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/30/01
Date Completed	: 7/30/01
Hole Diameter	: 2 inches
Depth of Boring	: 12 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1093151.41
Easting Coord.	: 417465.04

Logged By	: D. Greenman
Elevation	: 618.73 ft msl
Location	: Landfill Class 1 Area A
Temporary Casing	: N/A
Total Core Recovery	: 75%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 618.73	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
10		CL		LEAN CLAY - dark yellowish brown, 10 YR 4/2, firm, slightly moist		46
	608					48
11						52
	607				TLF-0682	64
12						
	606					
13						
	605					
14						
	604					
15						
	603					
16						
	602					
17						
	601					
18						
	600					
19						
	599					
20						

Backfilled with Boring Cuttings

The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

Science Applications International Corporation
An Employee-Owned Company

BORING LOG TLFA1-010

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/28/01
Date Completed	: 7/28/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 15 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1093094.49
Easting Coord.	: 417420.20

Logged By	: S. McInall
Elevation	: 620.79 ft msl
Location	: Landfill Class 1 Area A
Temporary Casing	: 3-inch steel
Total Core Recovery	: 28%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Surf. Elev. 620.79

Depth in Feet	Elev.	USCS	DESCRIPTION	Samples	Field Screening (CPM)
0		SP	SAND - yellowish brown, 10 YR 5/4, vertical roots, dry, with glass	TLF-0644	48
	620				40
1		ML	SILT - black, 10 YR 2/1, organic, moist		38
	619				26
2		AR	FILL - very dark gray, 10 YR 3/1, gravel, glass		48
	618			TLF-0645	44
3			no recovery from 3 to 5 feet		
	617				
4					
	616				
5		AR	FILL - very dark gray, 10 YR 3/1, gravel, glass		64
	615		Deepest with full recovery	TLF-0646	62
6		SP	SAND - gray to light gray, 10 YR 5/1		44
			no recovery from 6.25 to 15 feet		
	614				
7					
	613				
8					
	612				
9					
	611				
10					

Backfilled with Boring Cuttings

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Science Applications International Corporation
An Employee-Owned Company

BORING LOG TLFA1-010

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/28/01
Date Completed	: 7/28/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 15 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1093094.49
Easting Coord.	: 417420.20

Logged By	: S. McInall
Elevation	: 620.79 ft msl
Location	: Landfill Class 1 Area A
Temporary Casing	: 3-inch steel
Total Core Recovery	: 28%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 620.79	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
10				no recovery from 6.25 to 15 feet		
	610					
11						
	609					
12						
	608					
13						
	607					
14						
	606					
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	605					
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	604					
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	603					
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19						
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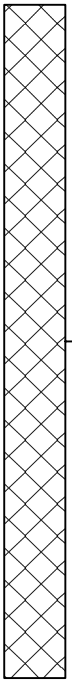
20						



The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

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An Employee-Owned Company

BORING LOG TLFA1-011

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/31/01
Date Completed	: 7/31/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 15 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1093089.30
Easting Coord.	: 417411.84

Logged By	: D. Minese
Elevation	: 620.45 ft msl
Location	: Landfill Class 1 Area A
Temporary Casing	: 3-inch steel
Total Core Recovery	: 37%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Surf. Elev. 620.45

Depth in Feet	USCS	DESCRIPTION	Samples	Field Screening (CPM)
0	ML	SANDY LOAM FILL - dark yellowish brown, 10 YR 4/4, with fill - glass, rock, brick, wet	TLF-0686	60
				38
1	AR	FILL - trash, glass, rock, ash, fine silty sand	TLF-0687	125
		no recovery from 1.5 to 5 feet		
5	AR	FILL - glass, rock, ash, fine silty sand		38
				34
6			TLF-0688	32
		no recovery from 6.5 to 10 feet		

Elevations: 620, 619, 618, 617, 616, 615, 614, 613, 612, 611

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Science Applications International Corporation
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BORING LOG TLFA1-011

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/31/01
Date Completed	: 7/31/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 15 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1093089.30
Easting Coord.	: 417411.84

Logged By	: D. Minese
Elevation	: 620.45 ft msl
Location	: Landfill Class 1 Area A
Temporary Casing	: 3-inch steel
Total Core Recovery	: 37%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 620.45	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
10				no recovery from 6.5 to 10 feet		
	610	AR		FILL - glass, rock, ash, fine silty sand		30
						36
11						28
	609					38
12					TLF-0689	36
	608			no recovery from 12.5 to 15 feet		
13						
	607					
14						
	606					
15						
	605					
16						
	604					
17						
	603					
18						
	602					
19						
	601					
20						

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The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

Science Applications International Corporation
An Employee-Owned Company

BORING LOG TLFA1-012

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/31/01
Date Completed	: 7/31/01
Hole Diameter	: 2 inches
Depth of Boring	: 12 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1093126.33
Easting Coord.	: 417408.27

Logged By	: D. Greenman
Elevation	: 618.43 ft msl
Location	: Landfill Class 1 Area A
Temporary Casing	: 3-inch steel
Total Core Recovery	: 88%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 618.43	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		CL		LEAN CLAY - moderate brown, 5 YR 4/4, soft, moist, low plasticity	TLF-0683	40
	618					50
1						60
	617	GM		SILTY GRAVEL - dark yellowish brown, 10 YR 4/2, poorly sorted		40
2						60
	616					54
3				no recovery from 3 to 4 feet		
	615					
4		GM		SILTY GRAVEL - dark yellowish brown, 10 YR 4/2, poorly sorted, wet		44
	614	CL		LEAN CLAY - light brown, 5 YR 5/6, mottled with pale yellowish brown, 10 YR 6/2, firm to hard, dry, low plasticity	TLF-0684	46
5						54
	613					36
6						46
	612					42
7						28
	611			no recovery from 7.5 to 8 feet		
8		CL		LEAN CLAY - light brown, 5 YR 5/6, mottled with pale yellowish brown, 10 YR 6/2, firm to hard, dry, low plasticity		42
	610					50
9						44
	609					54
10						

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BORING LOG TLFA1-012

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/31/01
Date Completed	: 7/31/01
Hole Diameter	: 2 inches
Depth of Boring	: 12 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1093126.33
Easting Coord.	: 417408.27

Logged By	: D. Greenman
Elevation	: 618.43 ft msl
Location	: Landfill Class 1 Area A
Temporary Casing	: 3-inch steel
Total Core Recovery	: 88%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 618.43	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
10	608	CL		LEAN CLAY - light brown, 5 YR 5/6, mottled with pale yellowish brown, 10 YR 6/2, firm to hard, dry, low plasticity		42
11	607					38
						42
12					TLF-0685	40
13	606					
14	605					
15	604					
16	603					
17	602					
18	601					
19	600					
20	599					

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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TLFA1-013

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/27/01
Date Completed	: 7/27/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 15 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1093094.85
Easting Coord.	: 417508.89

Logged By	: S. McInall
Elevation	: 619.53 ft msl
Location	: Landfill Class 1 Area A
Temporary Casing	: 3-inch steel
Total Core Recovery	: 45%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Surf. Elev. 619.53

Depth in Feet	USCS	DESCRIPTION	Samples	Field Screening (CPM)
0	ML	SILT - very dark brown, 10 YR 2/2, vertical roots, glass, moist, non to low plasticity	TLF-0640, TLF-9712	40
619	ML	SILT - brown, 10 YR 4/3, with coarse gravel, wet Static water measured at approximately 0.6 feet below ground surface	TLF-0641, TLF-9713	60
1				30
618	ML	SILT - dark gray, 10 YR 4/1, with gravel		44
2				28
617				32
3	ML	SILT - very dark gray, 10 YR 3/1, with gravel		
616		no recovery from 3.25 to 5 feet		
4				
615				
5	GM	GRAVEL - coarse gravel with silt, gray to dark gray, wet	TLF-0642	48
614				46
6				32
613		no recovery from 6.5 to 10 feet		
7				
612				
8				
611				
9				
610				
10				

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BORING LOG TLFA1-013

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

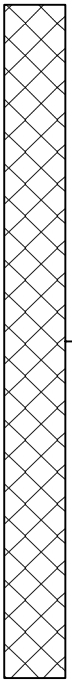
Date Started	: 7/27/01
Date Completed	: 7/27/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 15 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1093094.85
Easting Coord.	: 417508.89

Logged By	: S. McInall
Elevation	: 619.53 ft msl
Location	: Landfill Class 1 Area A
Temporary Casing	: 3-inch steel
Total Core Recovery	: 45%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 619.53	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
10				no recovery from 6.5 to 10 feet		
	609	GM		GRAVEL - coarse gravel with silt, gray to dark gray, wet		38 50
11						
	608	GM		GRAVEL - gray gravel and silt, with glass Deepest with full recovery	TLF-0643	52 48
12				no recovery from 12 to 15 feet		
	607					
13						
	606					
14						
	605					
15						
	604					
16						
	603					
17						
	602					
18						
	601					
19						
	600					
20						



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The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

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BORING LOG TLFA1-014

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

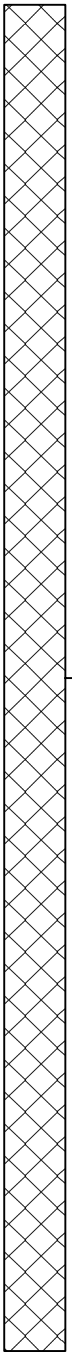
Date Started	: 7/29/01
Date Completed	: 7/29/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 12 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1093086.09
Easting Coord.	: 417498.18

Logged By	: D. Greenman
Elevation	: 619.81 ft msl
Location	: Landfill Class 1 Area A
Temporary Casing	: 3-inch steel
Total Core Recovery	: 38%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 619.81	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		GM		SILTY GRAVEL - pale yellowish brown, 10 YR 6/2, poorly graded	TLF-0651	50
1	619	CL		LEAN CLAY - dark yellowish brown, 10 YR 4/2, wet to very wet, glass and gravel throughout		44 46
2	618			no recovery from 1.5 to 4 feet		
3	617					
4	616	CL		LEAN CLAY - dark yellowish brown, 10 YR 4/2, wet to very wet, glass and gravel throughout	TLF-0652	48
5	615					48 44
6	614	CL		LEAN CLAY - same as above, but color change to pale brown, 5 YR 5/2		
				no recovery from 6 to 6.5 feet		
7	613	CL		LEAN CLAY - pale brown, 5 YR 5/2, wet to very wet, glass and gravel throughout		64
					TLF-0653	70
8	612			no recovery from 7.5 to 12 feet		
9	611					
10	610					



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BORING LOG TLFA1-014

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

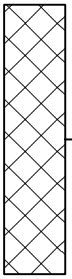
Date Started	: 7/29/01
Date Completed	: 7/29/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 12 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1093086.09
Easting Coord.	: 417498.18

Logged By	: D. Greenman
Elevation	: 619.81 ft msl
Location	: Landfill Class 1 Area A
Temporary Casing	: 3-inch steel
Total Core Recovery	: 38%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 619.81	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
10				no recovery from 7.5 to 12 feet		
11	609					
	608					
12						
13	607					
14	606					
15	605					
16	604					
17	603					
18	602					
19	601					
20	600					



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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TLFA1-015

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/29/01
Date Completed	: 7/29/01
Hole Diameter	: 2 inches
Depth of Boring	: 16 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1093091.73
Easting Coord.	: 417517.09

Logged By	: D. Minese
Elevation	: 619.48 ft msl
Location	: Landfill Class 1 Area A
Temporary Casing	: 3-inch steel
Total Core Recovery	: 45%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 619.48	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		AR		FILL - glass, metals, rock, concrete, some silty clay	TLF-0647	64
	619				TLF-9714	
1						40
						40
	618				TLF-0648	36
2					TLF-9715	
				no recovery from 2 to 5 feet		
	617					
3						
	616					
4						
	615					
5		AR		FILL - rocks, glass, wet		44
	614					38
6		AR		FILL - black decomposing matter, fine sand, blackish gray, sheen on soil		40
	613					
7						48
						36
	612	GM		SANDY GRAVEL - with fine sheen on soil	TLF-0649	62
8				no recovery from 8 to 9.5 feet		
	611					
9						
	610	AR		FILL - glass, fine sandy gravel fill, sheen on soil		50
10						

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BORING LOG TLFA1-015

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/29/01
Date Completed	: 7/29/01
Hole Diameter	: 2 inches
Depth of Boring	: 16 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1093091.73
Easting Coord.	: 417517.09

Logged By	: D. Minese
Elevation	: 619.48 ft msl
Location	: Landfill Class 1 Area A
Temporary Casing	: 3-inch steel
Total Core Recovery	: 45%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 619.48	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
10		AR		FILL - glass, fine sandy gravel fill, sheen on soil	TLF-0650	40
	609			no recovery from 10.5 to 16 feet		
11						
	608					
12						
	607					
13						
	606					
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	603					
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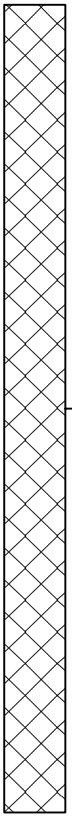
	602					
18						
	601					
19						
	600					
20						



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BORING LOG TLFA1-016

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/30/01
Date Completed	: 7/30/01
Hole Diameter	: 2 inches
Depth of Boring	: 12 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1093107.83
Easting Coord.	: 417498.23

Logged By	: S. McInall
Elevation	: 619.08 ft msl
Location	: Landfill Class 1 Area A
Temporary Casing	: 3-inch steel
Total Core Recovery	: 19%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 619.08	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	619	ML		SILT - dark brown, 10 YR 3/3, vertical roots, with fine to medium grained gravel, black, 10 YR 2/1, moist, glass, non to low plasticity	TLF-0661 TLF-9716	30
				no recovery from .5 to 4 feet		
1	618					
2	617			Static water measured at 2.0 feet below ground surface		
3	616					
4	615	ML		SILT - black, 10 YR 2/1, with fine gravel, debris, glass		48
					TLF-0662	64
5	614					50
				no recovery from 5.25 to 8 feet		
6	613					
7	612					
8	611	ML		SILT - black, 10 YR 2/1, with fine gravel, debris, glass	TLF-0663	46
				no recovery from 8.5 to 12 feet		
9	610					
10						

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BORING LOG TLFA1-016

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

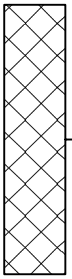
Date Started	: 7/30/01
Date Completed	: 7/30/01
Hole Diameter	: 2 inches
Depth of Boring	: 12 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1093107.83
Easting Coord.	: 417498.23

Logged By	: S. McInall
Elevation	: 619.08 ft msl
Location	: Landfill Class 1 Area A
Temporary Casing	: 3-inch steel
Total Core Recovery	: 19%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 619.08	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
10	609			no recovery from 8.5 to 12 feet		
11	608					
12	607					
13	606					
14	605					
15	604					
16	603					
17	602					
18	601					
19	600					
20						



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The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

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BORING LOG TLFA1-017

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/29/01
Date Completed	: 7/29/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 12 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1093071.10
Easting Coord.	: 417454.48

Logged By	: S. McInall
Elevation	: 619.95 ft msl
Location	: Landfill Class 1 Area A
Temporary Casing	: 3-inch steel
Total Core Recovery	: 30%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 619.95	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		SP		SAND - very dark grayish brown, 10 YR 3/2, dry	TLF-0658	28
1	619	ML		SILT - very dark brown, 10 YR 2/2, with glass fragments, fine gravel, moist		38 36
		ML		SILT - same as above, but wet	TLF-0659	50
2	618			no recovery from 2 to 4 feet		
3	617					
4	616	ML		SILT - very dark brown, 10 YR 2/2, with glass fragments, fine to medium gravel, wet		42 50
5	615				TLF-0660	42
6	614			no recovery from 5.75 to 8 feet		
7	613					
8	612	AR		FILL - coarse, poorly graded fragments, trash		48
				no recovery from 8.5 to 12 feet		
9	611					
10	610					

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Science Applications International Corporation
An Employee-Owned Company

BORING LOG TLFA1-017

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/29/01
Date Completed	: 7/29/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 12 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1093071.10
Easting Coord.	: 417454.48

Logged By	: S. McInall
Elevation	: 619.95 ft msl
Location	: Landfill Class 1 Area A
Temporary Casing	: 3-inch steel
Total Core Recovery	: 30%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 619.95	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
10				no recovery from 8.5 to 12 feet		
11	609					
12	608					
13	607					
14	606					
15	605					
16	604					
17	603					
18	602					
19	601					
20	600					

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The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

Science Applications International Corporation
An Employee-Owned Company

BORING LOG TLFA1-018

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/30/01
Date Completed	: 7/30/01
Hole Diameter	: 2 inches
Depth of Boring	: 12 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1093063.35
Easting Coord.	: 417461.16

Logged By	: D. Minese
Elevation	: 620.58 ft msl
Location	: Landfill Class 1 Area A
Temporary Casing	: 3-inch steel
Total Core Recovery	: 33%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Surf. Elev. 620.58

Depth in Feet	USCS	DESCRIPTION	Samples	Field Screening (CPM)
0	ML	SILTY LOAM - yellowish brown, 5 YR 5/4, with glass, rubble, debris, brick, gravel	TLF-0664	34
620				42
1		Static water measured at 1.5 feet below ground surface		54
619		no recovery from 1.5 to 6 feet		
2				
618				
3				
617				
4				
616				
5				
615				
6	SM	SILTY SAND - fine to medium grained sand, wet		32
614			TLF-0665	72
7	AR	FILL - 10 R 8/1, ash and cinders, looks like coal ash		46
613				66
8		no recovery from 8 to 11.5 feet		
612				
9				
611				
10				

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BORING LOG TLFA1-018

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

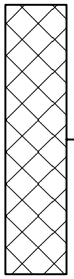
Date Started	: 7/30/01
Date Completed	: 7/30/01
Hole Diameter	: 2 inches
Depth of Boring	: 12 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1093063.35
Easting Coord.	: 417461.16

Logged By	: D. Minese
Elevation	: 620.58 ft msl
Location	: Landfill Class 1 Area A
Temporary Casing	: 3-inch steel
Total Core Recovery	: 33%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 620.58	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
10				no recovery from 8 to 11.5 feet		
11	610					
12	609	SM/AR		SILTY SAND - fine sand, with metal, glass, rock, and brick	TLF-0666	40
13	608					
14	607					
15	606					
16	605					
17	604					
18	603					
19	602					
20	601					



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The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

BORING LOG TLFA1-019

(Page 1 of 2)

Science Applications International Corporation
An Employee-Owned Company

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/30/01
Date Completed	: 7/30/01
Hole Diameter	: 2 inches
Depth of Boring	: 12 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1093075.27
Easting Coord.	: 417440.02

Logged By	: S. McInall
Elevation	: 619.03 ft msl
Location	: Landfill Class 1 Area A
Temporary Casing	: 3-inch steel
Total Core Recovery	: 35%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 619.03	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	619	ML		SILT - very dark brown, 10 YR 3/1, vertical roots, debris, moist	TLF-0667	50
						34
1	618	ML		SILT - dark gray, 10 YR 4/1, with fine to medium gravel, debris, glass, wet		42
						56
2	617			no recovery from 2 to 4 feet		
3	616					
4	615	ML		SILT - dark gray, 10 YR 4/1, with fine to medium gravel, debris, glass, wet		52
						54
5	614	SM		SILTY SAND - gray, 10 YR 5/1, to light gray, 10 YR 7/1, with medium to coarse grained gravel	TLF-0668	52
					TLF-0669	70
6	613			no recovery from 6 to 8 feet		
7	612					
8	611	ML		SILT - gray, 10 YR 5/1, to light gray, 10 YR 7/1, with medium to coarse grained gravel		
				no recovery from 8.25 to 12 feet		
9	610					
10						

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Science Applications International Corporation
An Employee-Owned Company

BORING LOG TLFA1-019

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

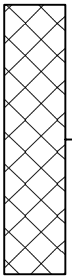
Date Started	: 7/30/01
Date Completed	: 7/30/01
Hole Diameter	: 2 inches
Depth of Boring	: 12 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1093075.27
Easting Coord.	: 417440.02

Logged By	: S. McInall
Elevation	: 619.03 ft msl
Location	: Landfill Class 1 Area A
Temporary Casing	: 3-inch steel
Total Core Recovery	: 35%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 619.03	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
10	609			no recovery from 8.25 to 12 feet		
11	608					
12	607					
13	606					
14	605					
15	604					
16	603					
17	602					
18	601					
19	600					
20						



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The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

Science Applications International Corporation
An Employee-Owned Company

BORING LOG TLFA1-020

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

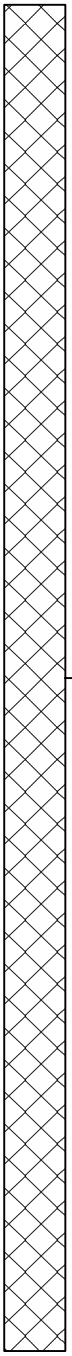
Date Started	: 7/29/01
Date Completed	: 7/29/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 12 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1093081.48
Easting Coord.	: 417459.01

Logged By	: D. Minese
Elevation	: 619.95 ft msl
Location	: Landfill Class 1 Area A
Temporary Casing	: 3-inch steel
Total Core Recovery	: 42%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 619.95	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		ML		LOAM - brown, 7.5 YR 4/3, dry	TLF-0654	36
						44
1	619	SM		SILTY SAND - with glass and rock		36
						40
2	618				TLF-0655	38
				no recovery from 2.5 to 6.5 feet		
3	617					
4	616					
5	615					
6	614					
		SP		SAND - gray/black, fine grained sand, with glass and rock, very wet		46
7	613					40
					TLF-0656	44
8	612			no recovery from 8 to 11 feet		
9	611					
10	610					



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Science Applications International Corporation
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BORING LOG TLFA1-020

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/29/01
Date Completed	: 7/29/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 12 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1093081.48
Easting Coord.	: 417459.01

Logged By	: D. Minese
Elevation	: 619.95 ft msl
Location	: Landfill Class 1 Area A
Temporary Casing	: 3-inch steel
Total Core Recovery	: 42%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 619.95	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
10				no recovery from 8 to 11 feet		
11	609	AR		FILL - gray/black, fine grained sand, with glass and rock, wet		62
					TLF-0657	54
12	608					
13	607					
14	606					
15	605					
16	604					
17	603					
18	602					
19	601					
20	600					

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The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

Landfill
Class 1 Area B

Science Applications International Corporation
An Employee-Owned Company

BORING LOG TLFB1A-001

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/25/01
Date Completed	: 7/25/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 4.5 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1092929.77
Easting Coord.	: 417001.58

Logged By	: S. McInall
Elevation	: 618.01 ft msl
Location	: Landfill Class 1 Area B
Temporary Casing	: 3-inch steel
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 618.01	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	618	ML		SILT - grayish brown, 10 YR 5/2, angular gravel, no roots, dry, non to low plasticity	TLF-0871	42
						58
1	617					46
		GP		COARSE GRAVEL		42
2	616	ML		SILT - dark brown, 7.5YR 3/2, with fine gravel, moist, non to low plasticity		32
						58
3	615	GP		COARSE GRAVEL		26
		CL		LEAN CLAY - dark brown, 7.5 YR 3/3, moist	TLF-0872	38
4	614	CL		LEAN CLAY - black, 10 YR 2/2, moist		
		CL		LEAN CLAY - brown, 7.5 YR 4/3, moist, slight plasticity		62
5	613					
6	612					
7	611					
8	610					
9	609					
10						

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The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

Science Applications International Corporation
An Employee-Owned Company

BORING LOG TLFB1A-005

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/25/01
Date Completed	: 7/25/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 4 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1092903.01
Easting Coord.	: 416849.55

Logged By	: S. Fox
Elevation	: 614.25 ft msl
Location	: Landfill Class 1 Area B
Temporary Casing	: N/A
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 614.25	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	614	AR		FILL - yellowish brown, 10 YR 5/6, gravel, clay, debris, grass, dry	TLF-0868	40
						52
1	613					48
						46
2	612	AR		FILL - concrete and brick debris, dry to slightly moist		33
						50
3	611	CL		LEAN CLAY - strong brown, 7.5 YR 5/6		42
					TLF-0869	44
4	610					
5	609					
6	608					
7	607					
8	606					
9	605					
10						

Backfilled with Boring Cuttings

The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

Science Applications International Corporation
An Employee-Owned Company

BORING LOG TLFB1B-001

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/25/01
Date Completed	: 7/25/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1092829.62
Easting Coord.	: 416589.41

Logged By	: S. Fox
Elevation	: 611.49 ft msl
Location	: Landfill Class 1 Area B
Temporary Casing	: None
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Surf. Elev. 611.49

USCS	DESCRIPTION	Samples	Field Screening (CPM)
AR	TOP SOIL - brown, 7.5 YR 5/3, grass, dry	TLF-0783	52
			46
SP	SAND - yellowish brown, 10 YR 5/6, fine to medium grained, dry to slightly moist		56
			60
CL	LEAN CLAY - yellowish brown, 10 YR 5/6, low to medium plasticity, soft to firm, becomes moist with depth, mottled with gray, 10 YR 6/1		34
			56
			60
		TLF-0784	48
			50
			60

Depth in Feet: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

Elevations: 611, 610, 609, 608, 607, 606, 605, 604, 603, 602

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The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

Science Applications International Corporation
An Employee-Owned Company

BORING LOG TLFB1B-005

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

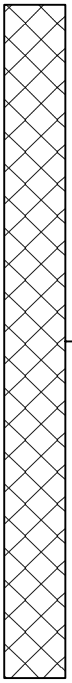
Date Started	: 7/25/01
Date Completed	: 7/25/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1092870.28
Easting Coord.	: 416684.80

Logged By	: S. McInall
Elevation	: 611.79 ft msl
Location	: Landfill Class 1 Area B
Temporary Casing	: None
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 611.79	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		ML		SILT - brown, 10 YR 5/3, vertical roots, trace gravel, poorly graded, fine to medium grained, dry, non to low plasticity	TLF-0780	52
	611					50
1						52
	610					44
2		CL		LEAN CLAY - dark yellowish brown, 10 YR 3/4, trace gravel, low plasticity		82
	609					42
3						46
	608			Rad and chemical samples taken at both depth intervals	TLF-0781	42
4						72
	607					50
5						
	606					
6						
	605					
7						
	604					
8						
	603					
9						
	602					
10						



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The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

Science Applications International Corporation
An Employee-Owned Company

BORING LOG TLFB1B-009

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/25/01
Date Completed	: 7/25/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1092856.78
Easting Coord.	: 416719.95

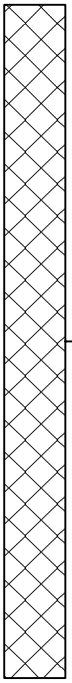
Logged By	: S. McInall
Elevation	: 612.74 ft msl
Location	: Landfill Class 1 Area B
Temporary Casing	: 3-inch steel
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Surf. Elev. 612.74

Depth in Feet	USCS	DESCRIPTION	Samples	Field Screening (CPM)
0	ML	SILT - brown, 10 YR 5/3, with gravel fill, poorly graded, dry, non to low plasticity	TLF-0786	40
612	ML	SILT - gray, 10 YR 5/1, dry		38
1	GP	GRAVEL - black, 10 YR 2/1, rocks		40
611	ML	SILT - dark yellowish brown, 10 YR 3/4, trace gravel, dry, non to low plasticity		56
2				60
610				46
3				46
609	ML	SILT - dark yellowish brown, 10 YR 3/4, trace gravel, moist, non to low plasticity	TLF-0787	44
4				44
608				36
5				
607				
6				
606				
7				
605				
8				
604				
9				
603				
10				



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The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

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Landfill
Class 2 Area A

Science Applications International Corporation
An Employee-Owned Company

BORING LOG TLFA2-001

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/25/01
Date Completed	: 7/25/01
Hole Diameter	: 2 inches
Depth of Boring	: 6.5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1093105.36
Easting Coord.	: 417163.75

Logged By	: D. Minese
Elevation	: 617.12 ft msl
Location	: Landfill Class 2 Area A
Temporary Casing	: None
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 617.12	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	617	ML		SILTY LOAM - moderate brown, 5 YR 3/4	TLF-0570	52
1	616	AR		FILL - dark yellowish brown, 10 YR 4/2, glass, rock, concrete		44 48
2	615	CL		LEAN CLAY - light brown, 5 YR 5/6, dry, low to medium plasticity		52 58 36
3	614					76
					TLF-0571	50
4	613			Pushed to 6.5 feet for geophysical downhole gamma scan purposes, core not logged		
5	612					
6	611					
7	610					
8	609					
9	608					
10						

Backfilled with Boring Cuttings

The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

03-19-2002 U:\PUBLIC\MTech\TonawandaLandfill\Class 2 Area A\TLFA2-001.BOR

Science Applications International Corporation
An Employee-Owned Company

BORING LOG TLFA2-002

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/27/01
Date Completed	: 7/27/01
Hole Diameter	: 2 inches
Depth of Boring	: 6.5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1093019.74
Easting Coord.	: 417208.06

Logged By	: D. Greenman
Elevation	: 619.65 ft msl
Location	: Landfill Class 2 Area A
Temporary Casing	: None
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Surf. Elev. 619.65

Depth in Feet	USCS	DESCRIPTION	Samples	Field Screening (CPM)
0	CL	LEAN CLAY - moderate brown, 5 YR 3/4, firm, moist to dry, slight plasticity	TLF-0590	28
			TLF-9606	42
1				62
				48
2	SP	SAND - gravelly sand, very pale orange, 10 YR 8/2, mostly angular gravel, dry		50
			TLF-0591	58
3	CL	LEAN CLAY - dark yellowish brown, 10 YR 4/2 Deepest with full recovery	TLF-9607	38
				52
4				36
				42
5		Pushed to 6.5 feet for geophysical downhole gamma scan purposes, core not logged		
6				
7				
8				
9				
10				

Surf. Elev. 619.65: 619, 618, 617, 616, 615, 614, 613, 612, 611, 610

Backfilled with Boring Cuttings

The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TLFA2-003

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/27/01
Date Completed	: 7/27/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 2.5 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1092904.16
Easting Coord.	: 417262.25

Logged By	: S. McInall
Elevation	: 623.15 ft msl
Location	: Landfill Class 2 Area A
Temporary Casing	: None
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Surf. Elev. 623.15

Depth in Feet	Elev.	USCS	DESCRIPTION	Samples	Field Screening (CPM)
0	623	SM	SILTY SAND - dark yellowish brown, 10 YR 3/4, vertical roots, dry, with glass	TLF-0594	34
		SP	SAND - yellowish brown, 10 YR 5/4, dry low plasticity		62
		AR	FILL - plastic chunks, grease		
1	622	SP	SAND - yellowish brown, 10 YR 5/4, dry, with medium gravel		48
		SP	FILL - black, 10 YR 2/1, sand with wood, pieces of metal		28
2	621	SP	SAND - black, 10 YR 2/1, with fill - wood, metal bits, wet, ash, cinders, with organic/creosote odor, 12 ppm (parts per million) bag headspace	TLF-0595	34
3	620				
4	619				
5	618				
6	617				
7	616				
8	615				
9	614				
10					

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The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

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Science Applications International Corporation
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BORING LOG TLFA2-004

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/25/01
Date Completed	: 7/25/01
Hole Diameter	: 2 inches
Depth of Boring	: 6.5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1093137.76
Easting Coord.	: 417238.02

Logged By	: D. Minese
Elevation	: 617.88 ft msl
Location	: Landfill Class 2 Area A
Temporary Casing	: None
Total Core Recovery	: 88%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 617.88	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		ML		SILT - moderate brown, 5 YR 3/4	TLF-0572	48
1	617	CL		LEAN CLAY - light brown, 5 YR 5/6, dry, low to medium plasticity, with some fine grained sand		66
						42
2	616					70
						26
3	615					62
					TLF-0573	34
4	614			no recovery from 3.5 to 4 feet		
				Pushed to 6.5 feet for geophysical downhole gamma scan purposes, core not logged		
5	613					
6	612					
7	611					
8	610					
9	609					
10	608					

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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TLFA2-005

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/26/01
Date Completed	: 7/26/01
Hole Diameter	: 2 inches
Depth of Boring	: 6.5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1093047.02
Easting Coord.	: 417273.37

Logged By	: S. McInall
Elevation	: 619.31 ft msl
Location	: Landfill Class 2 Area A
Temporary Casing	: 3-inch steel
Total Core Recovery	: 90%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 619.31	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	619	CL		LEAN CLAY - dark yellowish brown, 10 YR 4/4, vertical roots, moist, low plasticity Geotechnical and RAD samples taken	TLF-0600	42
1	618					44
						32
2	617					42
						62
3	616	ML		SILT - very dark gray, 5 YR 3/1, some glass, trace gravel, dry, non to low plasticity		42
				Deepest with full recovery	TLF-0601	68
4	615	ML		SILT - very dark gray, 5 YR 3/1, some glass, trace gravel, wet, non to low plasticity		42
		ML		SILT - very dark gray, 5 YR 3/1, some glass, coarse gravel, wet, non to low plasticity		36
						54
5	614			Pushed to 6.5 feet for geophysical downhole gamma scan purposes, core not logged		
6	613					
7	612					
8	611					
9	610					
10						

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The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

BORING LOG TLFA2-006

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Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/27/01
Date Completed	: 7/27/01
Hole Diameter	: 2 inches
Depth of Boring	: 8 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1092935.08
Easting Coord.	: 417332.67

Logged By	: D. Greenman
Elevation	: 622.50 ft msl
Location	: Landfill Class 2 Area A
Temporary Casing	: None
Total Core Recovery	: 44%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 622.50	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		CL		LEAN CLAY - moderate brown, 5 YR 4/4, angular gravel, dry to moist, low plasticity	TLF-0592	30
	622					42
1						28
	621				TLF-0593	50
2				Deepest with full recovery		30
	620					40
3						42
	619			no recovery from 3.5 to 8 feet		
4						
	618					
5						
	617					
6						
	616					
7						
	615					
8						
	614					
9						
	613					
10						

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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TLFA2-007

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/25/01
Date Completed	: 7/25/01
Hole Diameter	: 2 inches
Depth of Boring	: 6.5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1093181.30
Easting Coord.	: 417327.02

Logged By	: D. Minese
Elevation	: 619.01 ft msl
Location	: Landfill Class 2 Area A
Temporary Casing	: None
Total Core Recovery	: 88%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 619.01	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	619	ML		SILT - moderate brown, 5 YR 3/4, with glass chips, 1-inch gravel, dry, crumbly	TLF-0574	62
1	618	CL		LEAN CLAY - light brown, 5 YR 5/6, with glass chips, 1/4-inch gravel, dry, crumbly		54
2	617	AR		SILTY FILL - dusky brown, 5 YR 2/2, with glass, rock, brick		56 48
3	616	CL		LEAN CLAY - moderate brown, 5 YR 4/4, moist, low to medium plasticity		42 58
				Deepest with full recovery	TLF-0575	42
4	615			no recovery from 3.5 to 4 feet		
				Pushed to 6.5 feet for geophysical downhole gamma scan purposes, core not logged		
5	614					
6	613					
7	612					
8	611					
9	610					
10						

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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TLFA2-008

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/28/01
Date Completed	: 7/28/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1093062.64
Easting Coord.	: 417354.32

Logged By	: S. McInall
Elevation	: 618.35 ft msl
Location	: Landfill Class 2 Area A
Temporary Casing	: 3-inch steel
Total Core Recovery	: 60%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Surf. Elev. 618.35

Depth in Feet	USCS	DESCRIPTION	Samples	Field Screening (CPM)
0	ML	SILT - dark brown, 10 YR 3/3, vertical roots, moist to wet, with glass Static water measured at 0.5 feet below ground surface	TLF-0619	52
				34
1	SM	SILT - very dark brown, 10 YR 2/2, organic		40
				32
2	SP	SAND - gray to light gray, 10 YR 5/1		26
			TLF-0620	42
3		no recovery from 3 to 5 feet		
4				
5				
6				
7				
8				
9				
10				

Surface elevations: 618, 617, 616, 615, 614, 613, 612, 611, 610, 609

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The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

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BORING LOG TLFA2-009

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Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/26/01
Date Completed	: 7/26/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 9 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1092983.07
Easting Coord.	: 417420.54

Logged By	: D. Greenman
Elevation	: 622.09 ft msl
Location	: Landfill Class 2 Area A
Temporary Casing	: None
Total Core Recovery	: 22%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 622.09	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	622	ML		SILT - moderate yellowish brown, 10 YR 5/4, angular gravel, with wood, glass, non to low plasticity	TLF-0584	50
1	621	ML		same as above, but very wet		34 32
					TLF-0585	38
2	620			no recovery from 2 to 9 feet		
3	619					
4	618					
5	617					
6	616					
7	615					
8	614					
9	613					
10						

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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TLFA2-010

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Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/25/01
Date Completed	: 7/25/01
Hole Diameter	: 2 inches
Depth of Boring	: 6.5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1093225.84
Easting Coord.	: 417433.51

Logged By	: D. Minese
Elevation	: 619.38 ft msl
Location	: Landfill Class 2 Area A
Temporary Casing	: None
Total Core Recovery	: 88%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 619.38	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	619	ML		SILT - moderate brown, 5 YR 3/4, 1-inch gravel, dry, crumbly	TLF-0576	50
1		CL		LEAN CLAY - light brown, 5 YR 5/6, 1/4-inch gravel, dry, crumbly		30
	618	CL/AR		LEAN CLAY (FILL) - dusky brown, 5 YR 2/2, with glass, rock, and brick		44
2	617					46
						50
3	616	CL		LEAN CLAY - moderate brown, 5 YR 4/4, moist, low to medium plasticity	TLF-0577	58
						50
4				no recovery from 3.5 to 4 feet		
	615			Pushed to 6.5 feet for geophysical downhole gamma scan purposes, core not logged		
5	614					
6	613					
7	612					
8	611					
9	610					
10						

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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TLFA2-011

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/26/01
Date Completed	: 7/26/01
Hole Diameter	: 2 inches
Depth of Boring	: 6.5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1093183.66
Easting Coord.	: 417456.45

Logged By	: S. McInall
Elevation	: 619.35 ft msl
Location	: Landfill Class 2 Area A
Casing	: 3-inch steel
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 619.35	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	619	SM		SILTY SAND - very dark brown, 10 YR 2/2, vertical roots, moist	TLF-0604	46
						66
1	618	AR		FILL - gravel, coarse sand, wet Static water measured at 1.5 feet below ground surface		38
						50
2	617	CL		LEAN CLAY - dark brown, 10 YR 3/3, with gravel, fill, moist, low plasticity (fill)		46
						34
3	616	CL		LEAN CLAY - dark yellowish brown, 10 YR 4/4, moist, low plasticity		62
4	615			Deepest with full recovery	TLF-0605	38
						44
						26
5	614			Pushed to 6.5 feet for geophysical downhole gamma scan purposes, core not logged		
6	613					
7	612					
8	611					
9	610					
10						

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The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

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BORING LOG TLFA2-012

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/26/01
Date Completed	: 7/26/01
Hole Diameter	: 2 inches
Depth of Boring	: 12 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1093074.30
Easting Coord.	: 417508.95

Logged By	: S. McInall
Elevation	: 620.33 ft msl
Location	: Landfill Class 2 Area A
Temporary Casing	: 3-inch steel
Total Core Recovery	: 25%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 620.33	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	620	ML		SILT - very dark brown, 10 YR 2/2, vertical roots, with glass, dry, non to low plasticity	TLF-0582	26
1	619	CL		LEAN CLAY - very dark brown, 10 YR 2/2, some fill, moist, low plasticity		42 50
2	618	CL		LEAN CLAY - same as above, but wet Deepest with full recovery	TLF-0583	42
		GM		SILTY GRAVEL - very dark gray, 5 Y 3/1, wet, saturated		38 30
3	617			Pushed to 12 feet for geophysical downhole gamma scan purposes Static water measured at 3.0 feet below ground surface		
4	616					
5	615					
6	614					
7	613					
8	612					
9	611					
10						

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Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/26/01
Date Completed	: 7/26/01
Hole Diameter	: 2 inches
Depth of Boring	: 12 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1093074.30
Easting Coord.	: 417508.95

Logged By	: S. McInall
Elevation	: 620.33 ft msl
Location	: Landfill Class 2 Area A
Temporary Casing	: 3-inch steel
Total Core Recovery	: 25%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 620.33	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
10	610			Pushed to 12 feet for geophysical downhole gamma scan purposes Static water measured at 3.0 feet below ground surface		
11	609					
12	608					
13	607					
14	606					
15	605					
16	604					
17	603					
18	602					
19	601					
20						

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Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/26/01
Date Completed	: 7/26/01
Hole Diameter	: 2 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1093036.85
Easting Coord.	: 417530.60

Logged By	: S. McInall
Elevation	: 622.22 ft msl
Location	: Landfill Class 2 Area A
Temporary Casing	: None
Total Core Recovery	: 95%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Surf. Elev. 622.22

Depth in Feet	USCS	DESCRIPTION	Samples	Field Screening (CPM)
0 (622)	ML	SILT - dark yellowish brown, 10 YR 4/4, trace coarse-grained gravel, vertical roots, dry, non to low plasticity	TLF-0596	46
			TLF-9608	26
1 (621)				42
	CL	LEAN CLAY - very dark brown, 10 YR 2/2, some fill - glass shards, low plasticity		42
2 (620)				48
				34
3 (619)		Deepest with full recovery	TLF-0597	44
			TLF-9609	40
4 (618)	ML	SILT - black, 10 YR 2/1, non to low plasticity		48
	AR	large wood chips		38
5 (617)				
6 (616)				
7 (615)				
8 (614)				
9 (613)				
10				

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Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/25/01
Date Completed	: 7/25/01
Hole Diameter	: 2 inches
Depth of Boring	: 6.5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1093268.01
Easting Coord.	: 417505.73

Logged By	: D. Minese
Elevation	: 619.12 ft msl
Location	: Landfill Class 2 Area A
Temporary Casing	: 3-inch steel
Total Core Recovery	: 88%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 619.12	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	619	ML		SILT - grayish brown, 5 YR 3/2, rocks, concrete, glass	TLF-0578	54
						50
1	618	CL		LEAN CLAY - moderate brown, 5 YR 4/4, tight, moist, low to medium plasticity		52
						48
2	617					46
						58
3	616				TLF-0579	36
				no recovery from 3.5 to 4 feet		
4	615			Pushed to 6.5 feet for geophysical downhole gamma scan purposes, core not logged		
5	614					
6	613					
7	612					
8	611					
9	610					
10						

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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/27/01
Date Completed	: 7/27/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1093179.90
Easting Coord.	: 417554.50

Logged By	: S. McInall
Elevation	: 618.62 ft msl
Location	: Landfill Class 2 Area A
Temporary Casing	: 3-inch steel
Total Core Recovery	: 60%

Notes:

Elevations represented in feet above mean sea level (msl)

CPM - counts per minute on Eberline G-M

30 second count unless noted otherwise

N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 618.62	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		AR		FILL - black, 10 YR 2/1, organic muck, with gravel, leaves, and glass, low plasticity	TLF-0602	44
	618	ML		SILT - dark brown, 10 YR 3/3, with some coarse gravel, non to low plasticity		36
1						42
	617	ML		SILT - dark gray, 10 YR 4/4, with some coarse gravel, low plasticity, gray ash-type material, glass		48
2				Deepest with full recovery	TLF-0603	44
	616					42
3				no recovery from 3 to 5 feet		
	615					
4						
	614					
5						
	613					
6						
	612					
7						
	611					
8						
	610					
9						
	609					
10						

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The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

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BORING LOG TLFA2-016

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

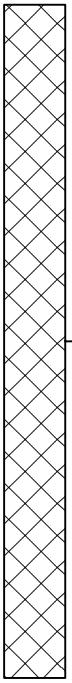
Date Started	: 7/26/01
Date Completed	: 7/26/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1093069.55
Easting Coord.	: 417600.62

Logged By	: D. Greenman
Elevation	: 621.29 ft msl
Location	: Landfill Class 2 Area A
Temporary Casing	: None
Total Core Recovery	: 80%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 621.29	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	621	CL		LEAN CLAY - moderate brown, 5 YR 4/4, angular gravel, some roots, dry, low plasticity	TLF-0586	38
1	620					56
						42
2	619	CL		LEAN CLAY - dusky yellowish brown, 10 YR 2/2, soft, wet to very wet, low plasticity		28
						28
						34
3	618			Deepest with full recovery	TLF-0587	38
						44
4	617			no recovery from 4 to 5 feet		
5	616					
6	615					
7	614					
8	613					
9	612					
10						



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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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An Employee-Owned Company

BORING LOG TLFA2-017

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/26/01
Date Completed	: 7/26/01
Hole Diameter	: 2 inches
Depth of Boring	: 3.5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1093316.95
Easting Coord.	: 417605.76

Logged By	: S. Fox
Elevation	: 620.17 ft msl
Location	: Landfill Class 2 Area A
Temporary Casing	: None
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 620.17	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	620	CL		LEAN CLAY - moderate yellowish brown, 10 YR 5/4, firm, moist, low plasticity	TLF-0580	36
						52
1	619					56
		AR		FILL - thin layer of black material		
		CL		LEAN CLAY - dark yellowish brown, 10 YR 4/2, soft		38
2	618	CL		LEAN CLAY - mottled pale yellowish brown, 10 YR 6/2, to moderate yellowish brown, 10 YR 5/4, minor coarse grained sand and gravel, moist, soft to firm		50
						50
3	617				TLF-0581	54
4	616					
5	615					
6	614					
7	613					
8	612					
9	611					
10						

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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TLFA2-018

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

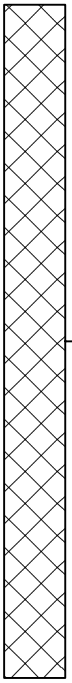
Date Started	: 7/26/01
Date Completed	: 7/26/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1093216.75
Easting Coord.	: 417653.00

Logged By	: D. Greenman
Elevation	: 619.59 ft msl
Location	: Landfill Class 2 Area A
Temporary Casing	: 3-inch steel
Total Core Recovery	: 70%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 619.59	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	619	ML		SILT - dark yellowish brown, 10 YR 4/2, some gravel, moist, non to low plasticity	TLF-0588	46
						42
1	618	ML		SILT - dusky yellowish brown, 10 YR 2/2, with sandy inclusions of very pale orange, 10 YR 8/2, moist		60
						62
2	617	ML		SILT - same as above, but wet to very wet		44
						60
3					TLF-0589	46
	616			no recovery from 3.5 to 5 feet		
4	615					
5	614					
6	613					
7	612					
8	611					
9	610					
10						



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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TLFA2-020

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/26/01
Date Completed	: 7/26/01
Hole Diameter	: 2 inches
Depth of Boring	: 6.5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1093090.94
Easting Coord.	: 417218.99

Logged By	: S. McInall
Elevation	: 618.01 ft msl
Location	: Landfill Class 2 Area A
Temporary Casing	: 3-inch steel
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 618.01	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	618	ML		SILT - brown, 7.5 YR 4/4, vertical roots, phragmites, moist, non to low plasticity	TLF-0598	48
		AR		FILL - glass, debris		
		CL		LEAN CLAY - dark yellowish brown, 10 YR 4/4, moist, low plasticity		36
1	617					38
						54
2	616					64
					TLF-0599	32
3	615					30
						28
4	614					38
						56
5	613			Pushed to 6.5 feet for geophysical downhole gamma scan purposes, core not logged		
6	612					
7	611					
8	610					
9	609					
10						

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The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

Landfill
Class 2 Area B

Science Applications International Corporation
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BORING LOG TLFB2-001

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

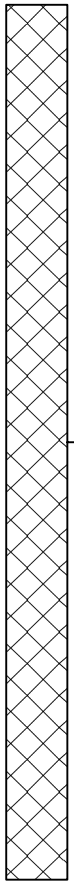
Date Started	: 7/24/01
Date Completed	: 7/24/01
Hole Diameter	: 2 inches
Depth of Boring	: 6.5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1092830.32
Easting Coord.	: 416576.75

Logged By	: S. McInall
Elevation	: 611.56 ft msl
Location	: Landfill Class 2 Area B
Temporary Casing	: None
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 611.56	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		ML		SILT - dark yellowish brown, 10 YR 3/6, non to low plasticity, dry, angular gravel, vertical roots	TLF-0748	78
	611					54
1		ML		SILT - dark grayish brown, angular gravel, non to low plasticity, dry		24
	610					50
2		CL		LEAN CLAY - dark yellowish brown, angular gravel, moist, low plasticity		80
	609					66
3						50
	608			Deepest with full recovery	TLF-0749	50
4						44
	607					56
5				Pushed to 6.5 feet for geophysical downhole gamma scan purposes, core not logged		
	606					
6						
	605					
7						
	604					
8						
	603					
9						
	602					
10						



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The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

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BORING LOG TLFB2-002

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

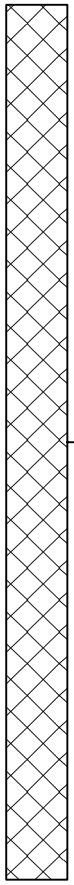
Date Started	: 7/24/01
Date Completed	: 7/24/01
Hole Diameter	: 2 inches
Depth of Boring	: 6.5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1092701.41
Easting Coord.	: 416639.68

Logged By	: S. McInall
Elevation	: 616.10 ft msl
Location	: Landfill Class 2 Area B
Temporary Casing	: 3-inch steel
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 616.10	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	616	ML		SILT - yellowish brown, 10 YR 5/4, vertical roots, angular gravel, dry, non to low plasticity	TLF-0752 TLF-9768	34 64
1	615	GP		COARSE GRAVEL		40
		ML		SILT - brown, 10 YR 5/3, angular fine gravel, dry, non to low plasticity		44
2	614	ML		SILT - very dark grayish brown, 10 YR 3/2, dry, non to low plasticity		58 42
3	613	CL		LEAN CLAY - very dark brown, 10 YR 2/2, moist, low plasticity Deepest with full recovery	TLF-0753 TLF-9769	58 38
4	612	AR		FILL - glass		50
				ORGANIC - black, 10 YR 2/1, moist, medium plasticity		32
5	611			Pushed to 6.5 feet for geophysical downhole gamma scan purposes, core not logged		
6	610					
7	609					
8	608					
9	607					
10						



The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

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BORING LOG TLFB2-003

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/28/01
Date Completed	: 7/28/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1092652.98
Easting Coord.	: 416656.69

Logged By	: D. Minese
Elevation	: 617.88 ft msl
Location	: Landfill Class 2 Area B
Temporary Casing	: None
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Surf. Elev. 617.88

Depth in Feet	USCS	DESCRIPTION	Samples	Field Screening (CPM)
0	ML	LOAM - brown, dry	TLF-0740B	34
				52
1 (617)	GP	ROCK - concrete		38
				54
2 (616)				56
	CL	LEAN CLAY - reddish brown, 5 YR 4/3, 1-inch sub-rounded gravel, low to medium plasticity		44
3 (615)				54
	CL	LEAN CLAY - reddish brown, 5 YR 4/4, low to medium plasticity, with black decomposing matter mixed in from 3.5 to 4 feet Deepest with full recovery	TLF-0745	60
4 (614)				34
5 (613)				42
6 (612)				
7 (611)				
8 (610)				
9 (609)				
10 (608)				

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The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

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BORING LOG TLFB2-004

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/24/01
Date Completed	: 7/24/01
Hole Diameter	: 2 inches
Depth of Boring	: 4 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1092877.14
Easting Coord.	: 416674.22

Logged By	: D. Minese
Elevation	: 613.51 ft msl
Location	: Landfill Class 2 Area B
Temporary Casing	: None
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 613.51	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		ML		LOAM - moderate brown, 5 YR 3/4	TLF-0730	34
					TLF-9545	
	613	CL		LEAN CLAY - moderate brown, 5 YR 4/4, dry, crumbly, tight		62
1						42
	612					48
2						48
	611	CL		LEAN CLAY - dark yellowish brown, 10 YR 4/2, dry		
		CL		LEAN CLAY - moderate brown, 5 YR 4/4, moderately moist		64
3						28
	610				TLF-0731	42
4					TLF-9546	
	609					
5						
	608					
6						
	607					
7						
	606					
8						
	605					
9						
	604					
10						

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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

BORING LOG TLFB2-005

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Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/24/01
Date Completed	: 7/24/01
Hole Diameter	: 2 inches
Depth of Boring	: 4.5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1092739.17
Easting Coord.	: 416725.97

Logged By	: D. Minese
Elevation	: 615.69 ft msl
Location	: Landfill Class 2 Area B
Temporary Casing	: 3-inch steel
Total Core Recovery	: 67%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Surf. Elev. 615.69

Depth in Feet	USCS	DESCRIPTION	Samples	Field Screening (CPM)
0	CL	LEAN CLAY - grayish brown, 5 YR 3/2, with glass, concrete chips, and rubber	TLF-0734	40
615				32
1	CL	LEAN CLAY - dusky brown, 5 YR 2/2, glass and concrete chips		40
614				52
2	ML/AR	SILTY FILL - dusty yellowish brown, 10 YR 2/2, mixed with concrete, glass		48
613	CL	LEAN CLAY - moderate brown, 5 YR 4/4, tight	TLF-0735	50
3		no recovery from 3 to 4.5 feet		
612				
4				
611				
5				
610				
6				
609				
7				
608				
8				
607				
9				
606				
10				

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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TLFB2-006

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/24/01
Date Completed	: 7/24/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 4.5 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1092695.70
Easting Coord.	: 416746.17

Logged By	: S. Fox
Elevation	: 617.27 ft msl
Location	: Landfill Class 2 Area B
Temporary Casing	: 3-inch steel
Total Core Recovery	: 95%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 617.27	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	617	CL		LEAN CLAY - brown, 10 YR 4/3, dry, low plasticity	TLF-0754	44
						44
1	616	AR		CONCRETE		32
						34
2	615	AR		FILL - black, 10 YR 2/1, with glass, slightly moist		40
						48
3	614			Deepest with full recovery	TLF-0755	40
4	613	CL		LEAN CLAY - dark yellowish brown, 10 YR 4/4, low to medium plasticity, slightly moist, with fill - paper, debris, plastic		44
						66
5	612					
6	611					
7	610					
8	609					
9	608					
10						

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The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

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BORING LOG TLFB2-007

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/24/01
Date Completed	: 7/24/01
Hole Diameter	: 2 inches
Depth of Boring	: 6.5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1092910.97
Easting Coord.	: 416749.91

Logged By	: S. McInall
Elevation	: 613.75 ft msl
Location	: Landfill Class 2 Area B
Temporary Casing	: 3-inch steel
Total Core Recovery	: 95%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 613.75	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		ML		SILT - yellowish brown, 10 YR 5/4, vertical roots, angular gravel, dry, non to low plasticity	TLF-0750	44
	613					40
1		ML		SILT - same as above, but without roots		36
	612					58
2						62
	611					60
3		CL		LEAN CLAY - dark yellowish brown, 10 YR 4/4, moist, low plasticity Deepest with full recovery	TLF-0751	56
	610					64
4						40
	609					36
5				Pushed to 6.5 feet for geophysical downhole gamma scan purposes, core not logged		
	608					
6						
	607					
7						
	606					
8						
	605					
9						
	604					
10						

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The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

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BORING LOG TLFB2-008

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/24/01
Date Completed	: 7/24/01
Hole Diameter	: 2 inches
Depth of Boring	: 7 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1092824.75
Easting Coord.	: 416782.27

Logged By	: D. Minese
Elevation	: 617.07 ft msl
Location	: Landfill Class 2 Area B
Temporary Casing	: 3-inch steel
Total Core Recovery	: 88%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 617.07	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	617	CL		LEAN CLAY - moderate brown, 5 YR 4/4, angular to sub-angular gravel up to 1-inch in size, dry, crumbly, tight	TLF-0732	56
						76
1	616					60
						56
2	615	CL		LEAN CLAY - moderate brown, 5 YR 4/4, sub-angular gravel up to 1-inch in size, moist		52
						52
3	614			Deepest with full recovery	TLF-0733	58
				no recovery from 3.5 to 4 feet		
4	613			Pushed to 7.0 feet for geophysical downhole gamma scan purposes, core was not logged		
5	612					
6	611			Artesian groundwater conditions when boring was completed to 7 feet		
7	610					
8	609					
9	608					
10						

Backfilled with Boring Cuttings

The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TLFB2-009

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/28/01
Date Completed	: 7/28/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1092728.44
Easting Coord.	: 416820.85

Logged By	: D. Minese
Elevation	: 619.34 ft msl
Location	: Landfill Class 2 Area B
Temporary Casing	: 3-inch steel
Total Core Recovery	: 80%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Surf. Elev. 619.34

Depth in Feet	USCS	DESCRIPTION	Samples	Field Screening (CPM)
0	AR	FILL - decomposing wood, brown loam, with glass, plastic, and bottle caps	TLF-0746	32
				34
1				36
				48
2				50
	CL	LEAN CLAY - moderate brown, 5 YR 5/6, dry, low to medium plasticity, with roots, glass		42
3				44
	AR	FILL - decomposing matter Deepest with full recovery	TLF-0747	36
4		SILT - moist, some odor, little recovery from 4 to 5 feet		
5				
6				
7				
8				
9				
10				

Elevations: 619, 618, 617, 616, 615, 614, 613, 612, 611, 610

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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TLFB2-010

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

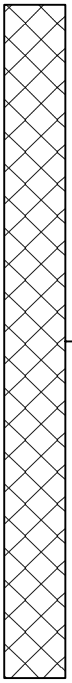
Date Started	: 7/24/01
Date Completed	: 7/24/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1092944.92
Easting Coord.	: 416833.22

Logged By	: S. McInall
Elevation	: 612.90 ft msl
Location	: Landfill Class 2 Area B
Temporary Casing	: 3-inch steel
Total Core Recovery	: 90%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 612.90	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		CL		LEAN CLAY - dark yellowish brown, 10 YR 4/4, vertical roots, angular gravel, moist, low plasticity	TLF-0756	46
1	612	CL		LEAN CLAY - black, 10 YR 2/1, moist, low plasticity		30
						48
2	611					40
						40
3	610	CL		LEAN CLAY - dark brown, 10 YR 3/3, moist, low plasticity		50
						48
4	609				TLF-0757	58
						48
5	608			no recovery from 4.5 to 5 feet		
6	607					
7	606					
8	605					
9	604					
10	603					



Backfilled with Boring Cuttings

The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

BORING LOG TLFB2-011

(Page 1 of 1)

Science Applications International Corporation
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Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/24/01
Date Completed	: 7/24/01
Hole Diameter	: 2 inches
Depth of Boring	: 6.5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1092823.89
Easting Coord.	: 416898.44

Logged By	: S. McInall
Elevation	: 621.92 ft msl
Location	: Landfill Class 2 Area B
Temporary Casing	: None
Total Core Recovery	: 100%

Notes:

Elevations represented in feet above mean sea level (msl)

CPM - counts per minute on Eberline G-M

30 second count unless noted otherwise

N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 621.92	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		ML		SILT - yellowish brown, 10 YR 5/4, vertical roots, trace gravel, dry, non to low plasticity	TLF-0762	44
1	621					48
						40
						36
2	620	CL		LEAN CLAY - dark yellowish brown, 10 YR 3/4, moist, low plasticity		42
						36
3	619					46
					TLF-0763	56
4	618					36
						70
5	617			Pushed to 6.5 feet for geophysical downhole gamma scan purposes, core not logged		
6	616					
7	615					
8	614					
9	613					
10	612					

Backfilled with Boring Cuttings

The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

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Science Applications International Corporation
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BORING LOG TLFB2-012

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/28/01
Date Completed	: 7/28/01
Hole Diameter	: 2 inches
Depth of Boring	: 7 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1092774.91
Easting Coord.	: 416919.51

Logged By	: D. Greenman
Elevation	: 623.78 ft msl
Location	: Landfill Class 2 Area B
Temporary Casing	: None
Total Core Recovery	: 95%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Surf. Elev. 623.78

Depth in Feet	USCS	DESCRIPTION	Samples	Field Screening (CPM)
0	ML	SILT - light to moderate brown, 5 YR 5/6 to 4/4, angular gravel, dry, non to low plasticity	TLF-0764	58
1 (623)	CL	LEAN CLAY - light brown, 5 YR 5/6, angular gravel, firm, dry to moist, low plasticity		38
				52
2 (622)				62
				52
3 (621)				54
		Deepest with full recovery	TLF-0765	50
4 (620)				36
				36
5 (619)				34
		Pushed to 7.0 feet for geophysical downhole gamma scan purposes, core not logged		
6 (618)				
7 (617)				
8 (616)				
9 (615)				
10 (614)				

Backfilled with Boring Cuttings

The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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Science Applications International Corporation
An Employee-Owned Company

BORING LOG TLFB2-013

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/24/01
Date Completed	: 7/24/01
Hole Diameter	: 2 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1092984.30
Easting Coord.	: 416901.76

Logged By	: S. Fox
Elevation	: 614.15 ft msl
Location	: Landfill Class 2 Area B
Temporary Casing	: None
Total Core Recovery	: 96%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 614.15	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	614	CL		LEAN CLAY - dark yellowish brown, 10 YR 5/4, hard, medium plasticity, dry to slightly moist, minor gravel, and coarse grained sand	TLF-0758	54
						46
1	613					48
						54
2	612					62
						52
3	611			Deepest with full recovery	TLF-0759	52
						54
				no recovery from 3.8 to 4.0 feet		
4	610	CL		LEAN CLAY - dark yellowish brown, 10 YR 5/4, hard, medium plasticity, dry to slightly moist, minor gravel, coarse grained sand		72
						54
5	609					
6	608					
7	607					
8	606					
9	605					
10						

Backfilled with Boring Cuttings

The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TLFB2-014

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/24/01
Date Completed	: 7/24/01
Hole Diameter	: 2 inches
Depth of Boring	: 6.5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1092846.17
Easting Coord.	: 416964.07

Logged By	: S. McInall
Elevation	: 624.74 ft msl
Location	: Landfill Class 2 Area B
Temporary Casing	: None
Total Core Recovery	: 90%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Surf. Elev. 624.74

Depth in Feet	USCS	DESCRIPTION	Samples	Field Screening (CPM)
0	ML	SILT - brown, 10 YR 5/3, vertical roots, trace gravel, dry, non to low plasticity	TLF-0760	52
624				56
1				46
623				52
2				42
622				30
3	CL	LEAN CLAY - dark yellowish brown, 10 YR 3/4, moist, low plasticity Deepest with full recovery	TLF-0761	54
621				42
4				48
620				48
5		Pushed to 6.5 feet for geophysical downhole gamma scan purposes, core not logged		
619				
6				
618				
7				
617				
8				
616				
9				
615				
10				

Backfilled with Boring Cuttings

The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

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BORING LOG TLFB2-015

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Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/27/01
Date Completed	: 7/27/01
Hole Diameter	: 2 inches
Depth of Boring	: 6.5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1092810.60
Easting Coord.	: 416995.36

Logged By	: D. Greenman
Elevation	: 624.30 ft msl
Location	: Landfill Class 2 Area B
Temporary Casing	: None
Total Core Recovery	: 100%

Notes:

Elevations represented in feet above mean sea level (msl)

CPM - counts per minute on Eberline G-M

30 second count unless noted otherwise

N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 624.30	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	624	ML		SILT - light brown, 5 YR 5/6, roots, angular gravel, dry, non to low plasticity	TLF-0743	52
1	623	CL		LEAN CLAY - light brown, 5 YR 6/4, firm, angular gravel, dry, low plasticity		48
						66
2	622					48
						46
3	621					42
						56
4	620			Deepest with full recovery	TLF-0744	58
						56
5	619					60
6	618			Pushed to 6.5 feet for geophysical downhole gamma scan purposes, core not logged		
7	617					
8	616					
9	615					
10						

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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TLFB2-016

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/24/01
Date Completed	: 7/24/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 4.5 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1093033.07
Easting Coord.	: 417000.65

Logged By	: D. Minese
Elevation	: 615.59 ft msl
Location	: Landfill Class 2 Area B
Temporary Casing	: None
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 615.59	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		CL		LEAN CLAY - dusky brown, 5 YR 2/2	TLF-0736	44
	615					40
1		CL		LEAN CLAY - dark yellowish brown, 10 YR 4/2, dry, crumbly		50
	614					32
2		CL		LEAN CLAY - moderate brown, 5 YR 3/4, dry		56
	613	CL		LEAN CLAY - moderate brown, 5 YR 4/4, tight, moist		46
3						44
	612				TLF-0737	52
4						52
	611					
5						
	610					
6						
	609					
7						
	608					
8						
	607					
9						
	606					
10						

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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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Science Applications International Corporation
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BORING LOG TLFB2-017

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

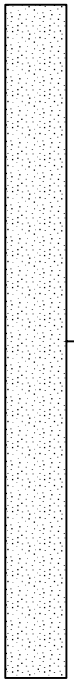
Date Started	: 7/24/01
Date Completed	: 7/24/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1092953.47
Easting Coord.	: 417042.24

Logged By	: D. Minese
Elevation	: 617.31 ft msl
Location	: Landfill Class 2 Area B
Temporary Casing	: 3-inch steel
Total Core Recovery	: 70%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 617.31	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	617	CL		LEAN CLAY - moderate brown, 5 YR 3/4, moist, medium plasticity	TLF-0738	46
1	616					42 52 152
2	615	AR		PORCELAIN - white, hard, porcelain-like material, almost glass-like	TLF-0739	280
3	614	CL/AR		LEAN CLAY WITH FILL - moderate brown, 5 YR 4/4, with concrete rubble and rocks, very wet, water bubbling out of hole		50
				Deepest with full recovery	TLF-0740	52
4	613			no recovery from 3.5 to 5 feet		
5	612					
6	611					
7	610					
8	609					
9	608					
10						



Hydrated Bentonite Pellets

The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

Science Applications International Corporation
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BORING LOG TLFB2-018

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/27/01
Date Completed	: 7/27/01
Hole Diameter	: 2 inches
Depth of Boring	: 6.5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1092846.96
Easting Coord.	: 417088.99

Logged By	: D. Greenman
Elevation	: 622.48 ft msl
Location	: Landfill Class 2 Area B
Temporary Casing	: None
Total Core Recovery	: 90%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 622.48	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	622	ML		SILT - dark yellowish brown, 10 YR 4/2, roots, moist, non to low plasticity	TLF-0741	54
1	621	CL		LEAN CLAY - light brown to moderate brown, 5 YR 5/6 to 5 YR 4/4, firm to hard, angular gravel, dry, low plasticity		36
						66
						82
2	620					58
						34
3	619			Deepest with full recovery	TLF-0742	48
4	618					44
						44
						54
5	617			Pushed to 6.5 feet for geophysical downhole gamma scan purposes, core not logged		
6	616					
7	615					
8	614					
9	613					
10						

Backfilled with Boring Cuttings

The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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Landfill
Class 3 Biased

Science Applications International Corporation
An Employee-Owned Company

BORING LOG TLF3-050

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/24/01
Date Completed	: 7/24/01
Hole Diameter	: 2 inches
Depth of Boring	: 4 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1092778.44
Easting Coord.	: 416456.68

Logged By	: D. Minese
Elevation	: 609.92 ft msl
Location	: Landfill Class 3 Biased
Temporary Casing	: None
Total Core Recovery	: 88%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Surf. Elev. 609.92

Depth in Feet	USCS	DESCRIPTION	Samples	Field Screening (CPM)
0	SM	SANDY LOAM - moderate brown, 5 YR 3/4, chips of glass, concrete, dry	TLF-0500	50
	CL	LEAN CLAY - light brown, 5 YR 5/6, dry		34
1 (609)	GP	1/8 to 1/4 inch angular gravel		
	CL	LEAN CLAY - moderate brown, 5 YR 4/4, moderate moisture, tight		44
				36
2 (608)				60
	CL	LEAN CLAY - moderate brown, 5 YR 4/4, more moist than above, tight		62
3 (607)		Deepest with full recovery	TLF-0501	74
		no recovery from 3.5 to 4 feet		
4 (606)				
5 (605)				
6 (604)				
7 (603)				
8 (602)				
9 (601)				
10 (600)				

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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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Science Applications International Corporation
An Employee-Owned Company

BORING LOG TLF3-051

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/24/01
Date Completed	: 7/24/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1092685.70
Easting Coord.	: 416494.88

Logged By	: D. Minese
Elevation	: 614.53 ft msl
Location	: Landfill Class 3 Biased
Temporary Casing	: 3-inch steel
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 614.53	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		CL		LEAN CLAY - moderate brown, 5 YR 4/4, dry and crumbly	TLF-0502	34
	614					52
1		CL		LEAN CLAY - pale brown, 5 YR 5/2, tight, dry		60
	613					30
2						52
	612	CL		LEAN CLAY - moderate brown, 5 YR 4/4		58
3						50
	611			Deepest with full recovery	TLF-0503	54
4						74
	610					46
5		AR		TRASH - decomposing, black		
	609					
6						
	608					
7						
	607					
8						
	606					
9						
	605					
10						

Backfilled with Boring Cuttings

The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

Science Applications International Corporation
An Employee-Owned Company

BORING LOG TLF3-052

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/28/01
Date Completed	: 7/28/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 10 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1092610.80
Easting Coord.	: 416530.35

Logged By	: D. Minese
Elevation	: 622.12 ft msl
Location	: Landfill Class 3 Biased
Temporary Casing	: 3-inch steel
Total Core Recovery	: 95%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 622.12	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	622	CL		LEAN CLAY - reddish brown, 5 YR 4/3, mixed with concrete, 1/4 to 1/2-inch sub-rounded gravel, glass	TLF-0518 TLF-9547	44
						28
1	621					42
						30
2	620					62
						34
3	619					26
						48
4	618			The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.		60
						48
5	617					38
						42
6	616					70
						30
7	615					34
						44
8	614	CL		LEAN CLAY - olive color, 2.5 Y 4/2, moist, medium plasticity		40
		CL		LEAN CLAY - moderate brown, 5 YR 4/4, low to medium plasticity, 1/4-inch sub-rounded gravel, dry		42
9	613				TLF-0519 TLF-9547	62
				no recovery from 9.5 to 10 feet		
10						

Backfilled with Boring Cuttings

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An Employee-Owned Company

BORING LOG TLF3-053

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/28/01
Date Completed	: 7/28/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1092631.70
Easting Coord.	: 416736.88

Logged By	: D. Greenman
Elevation	: 619.70 ft msl
Location	: Landfill Class 3 Biased
Temporary Casing	: None
Total Core Recovery	: 95%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Surf. Elev. 619.70

Depth in Feet	USCS	DESCRIPTION	Samples	Field Screening (CPM)
0	ML	SILT - moderate yellowish brown, 10 YR 5/4, some angular gravel, non to low plasticity, dry	TLF-0520	44
619				48
1				54
618	CL	LEAN CLAY - moderate brown, 5 YR 4/4, some angular gravel, firm, dry		66
2				34
617				38
3				48
616				40
4		Deepest with full recovery	TLF-0521	28
615				58
5				
614				
6				
613				
7				
612				
8				
611				
9				
610				
10				

Backfilled with Boring Cuttings

The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TLF3-054

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/28/01
Date Completed	: 7/28/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 5.0 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1092705.44
Easting Coord.	: 416906.50

Logged By	: D. Greenman
Elevation	: 620.89 ft msl
Location	: Landfill Class 3 Biased
Temporary Casing	: 3-inch steel
Total Core Recovery	: 70%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 620.89	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		ML		SILT - moderate yellowish brown, 10 YR 5/4, angular gravel, non to low plasticity, dry	TLF-0522	30
1	620					32
						34
2	619	CL		LEAN CLAY - dark yellowish brown, 10 YR 4/2, firm, low plasticity, dry		48
						44
						48
3	618			Deepest with full recovery	TLF-0523	44
4	617			no recovery from 3.5 to 5 feet		
5	616					
6	615					
7	614					
8	613					
9	612					
10	611					

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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

Science Applications International Corporation
An Employee-Owned Company

BORING LOG TLF3-055

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/27/01
Date Completed	: 7/27/01
Hole Diameter	: 2 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1092788.01
Easting Coord.	: 417067.32

Logged By	: D. Greenman
Elevation	: 622.11 ft msl
Location	: Landfill Class 3 Biased
Temporary Casing	: None
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Surf. Elev. 622.11

Depth in Feet	USCS	DESCRIPTION	Samples	Field Screening (CPM)
0 (622)	ML	SILT - light brown to pale brown, 5 YR 5/6 to 5/2, roots, non to low plasticity, dry	TLF-0516	54
				68
1 (621)	CL	LEAN CLAY - moderate brown, 5 YR 3/4, firm, dry, low plasticity		46
				50
2 (620)				46
				56
3 (619)		Deepest with full recovery	TLF-0517	50
				36
4 (618)				30
				62
5 (617)				
6 (616)				
7 (615)				
8 (614)				
9 (613)				
10				

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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TLF3-056

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/25/01
Date Completed	: 7/25/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 4.5 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1092901.06
Easting Coord.	: 417141.74

Logged By	: S. McInall
Elevation	: 622.78 ft msl
Location	: Landfill Class 3 Biased
Temporary Casing	: None
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 622.78	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		ML		SILT - dark yellowish brown, 10 YR 4/4, vertical roots, dry, non to low plasticity	TLF-0542	54
	622					24
1						46
	621					40
2		CL		LEAN CLAY - yellowish brown, 10 YR 5/4, trace gravel, moist, low plasticity		26
	620					34
3						62
	619			Deepest with full recovery	TLF-0543	40
4						56
	618					
5						
	617					
6						
	616					
7						
	615					
8						
	614					
9						
	613					
10						

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The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

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BORING LOG TLF3-057

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Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/25/01
Date Completed	: 7/25/01
Hole Diameter	: 2 inches
Depth of Boring	: 6.5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1092977.50
Easting Coord.	: 417105.12

Logged By	: D. Minese
Elevation	: 618.30 ft msl
Location	: Landfill Class 3 Biased
Temporary Casing	: 3-inch steel
Total Core Recovery	: 97%

Notes:

Elevations represented in feet above mean sea level (msl)

CPM - counts per minute on Eberline G-M

30 second count unless noted otherwise

N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 618.30	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	618	CL		LEAN CLAY - light brown, 5 YR 5/6, sub-rounded gravel, moist, low plasticity	TLF-0506	34
		CL		LEAN CLAY - dark yellowish brown, 10 YR 4/2		68
1	617	CL		LEAN CLAY - moderate brown, 5 YR 4/4, moist, low plasticity, tight		44
						36
2	616					86
		AR		FILL - dusky yellowish brown, 10 YR 2/2, decomposing matter, with concrete, rock, glass, dry		56
3	615					40
					TLF-0507	30
4	614			Pushed to 6.5 feet for geophysical downhole gamma scan purposes, core not logged		
5	613					
6	612					
7	611					
8	610					
9	609					
10						

Backfilled with Boring Cuttings

The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

03-19-2002 U:\PUBLIC\MTech\Tonawanda\Landfill\Class 3 Biased\TLF3-057.BOR

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BORING LOG TLF3-058

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/25/01
Date Completed	: 7/25/01
Hole Diameter	: 2 inches
Depth of Boring	: 6.5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1093056.84
Easting Coord.	: 417065.74

Logged By	: D. Minese
Elevation	: 615.77 ft msl
Location	: Landfill Class 3 Biased
Temporary Casing	: None
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 615.77	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		ML		LOAM - dusky brown, 5 YR 2/2, 1/4-inch rounded gravel, moist	TLF-0504	48
	615					54
1		CL		LEAN CLAY - dark yellowish orange, 10 YR 5/4, fine sand, 1/4-inch rounded gravel, glass, moist		46
	614	CL		LEAN CLAY - light brown, 5 YR 5/6 to moderate brown, 5 YR 4/4, tight, dry		42
2						52
	613					42
3						52
	612				TLF-0505	48
4				Pushed to 6.5 feet for geophysical downhole gamma scan purposes, core not logged		
	611					
5						
	610					
6						
	609					
7						
	608					
8						
	607					
9						
	606					
10						

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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TLF3-059

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/25/01
Date Completed	: 7/25/01
Hole Diameter	: 2 inches
Depth of Boring	: 6.5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1093083.50
Easting Coord.	: 417141.60

Logged By	: D. Minese
Elevation	: 617.08 ft msl
Location	: Landfill Class 3 Biased
Temporary Casing	: None
Total Core Recovery	: 87%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 617.08	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	617	ML		SILTY LOAM - dusky brown, 5 YR 2/2, with light brown, 5 YR 5/6, moist	TLF-0508	40
						30
1	616	CL		LEAN CLAY - moderate brown, 5 YR 4/4, moist, low plasticity		44
						60
2	615					54
		CL		LEAN CLAY - light brown, 5 YR 5/6, sandy, crumbly		48
3	614				TLF-0509	52
				no recovery from 3.5 to 4 feet		
4	613			Pushed to 6.5 feet for geophysical downhole gamma scan purposes, core not logged		
5	612					
6	611					
7	610					
8	609					
9	608					
10						

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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TLF3-060

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/27/01
Date Completed	: 7/27/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1092924.24
Easting Coord.	: 417223.29

Logged By	: S. McInall
Elevation	: 622.67 ft msl
Location	: Landfill Class 3 Biased
Temporary Casing	: 3-inch steel
Total Core Recovery	: 60%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Surf. Elev. 622.67

Depth in Feet	USCS	DESCRIPTION	Samples	Field Screening (CPM)
0	ML	SILTY SAND - dark yellowish brown, 10 YR 3/4, dry, vertical roots	TLF-0526	37
622	ML	SILT - yellowish brown, 10 YR 5/4, dry, non to low plasticity		32
1				60
621	ML	SILT - very pale brown, 10 YR 7/3, dry, non to low plasticity		44
2	ML	SILT - light reddish brown, 5 YR 6/3, dry, non to low plasticity, Deepest with full recovery	TLF-0527	46
620	AR	FILL - black, 10 YR 2/1, sand with wood, glass, wet		38
3		no recovery from 3 to 5 feet		
619				
4				
618				
5				
617				
6				
616				
7				
615				
8				
614				
9				
613				
10				

Backfilled with Boring Cuttings

The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

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BORING LOG TLF3-061

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Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/26/01
Date Completed	: 7/26/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1092953.50
Easting Coord.	: 417412.64

Logged By	: D. Greenman
Elevation	: 622.70 ft msl
Location	: Landfill Class 3 Biased
Temporary Casing	: None
Total Core Recovery	: 40%

Notes:

Elevations represented in feet above mean sea level (msl)

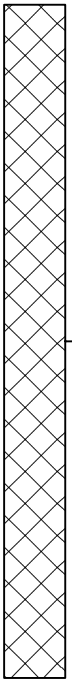
CPM - counts per minute on Eberline G-M

30 second count unless noted otherwise

N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 622.70	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		ML		SILT - moderate brown, 5 YR 3/4, angular gravel, non to low plasticity, glass	TLF-0510	18
	622					34
1						42
	621			Deepest with full recovery	TLF-0511	38
2				no recovery from 2 to 5 feet		
	620					
3						
	619					
4						
	618					
5						
	617					
6						
	616					
7						
	615					
8						
	614					
9						
	613					
10						



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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TLF3-062

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

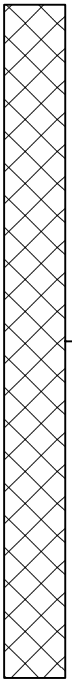
Date Started	: 7/26/01
Date Completed	: 7/26/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1093037.86
Easting Coord.	: 417580.83

Logged By	: D. Greenman
Elevation	: 625.74 ft msl
Location	: Landfill Class 3 Biased
Temporary Casing	: None
Total Core Recovery	: 80%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 625.74	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		ML		SILT - moderate brown, 5 YR 4/4, angular gravel, non to low plasticity, dry	TLF-0512	62
	625					34
1						58
	624	CL		LEAN CLAY - moderate brown, 5 YR 4/4, with dark yellowish brown, 10 YR 4/2 throughout, firm, low plasticity, dry		40
2						58
	623					36
3				Deepest with full recovery	TLF-0513	38
	622					34
4				no recovery from 4 to 5 feet		
	621					
5						
	620					
6						
	619					
7						
	618					
8						
	617					
9						
	616					
10						



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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TLF3-063

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/26/01
Date Completed	: 7/26/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1093132.93
Easting Coord.	: 417683.65

Logged By	: D. Greenman
Elevation	: 619.69 ft msl
Location	: Landfill Class 3 Biased
Casing	: 3-inch steel
Total Core Recovery	: 80%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 619.69	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		ML		SILT - moderate brown, 5 YR 4/4, rocks, roots, wood, non to low plasticity	TLF-0514	56
	619					24
1		CL		LEAN CLAY - light brown, 5 YR 5/6, firm, moist		20
	618					32
2				Deepest with full recovery	TLF-0515	48
	617	ML		SILT - dusky yellowish brown, 10 YR 2/2, non to low plasticity, wet to very wet		32
3						54
	616					32
4				no recovery from 4 to 5 feet		
	615					
5						
	614					
6						
	613					
7						
	612					
8						
	611					
9						
	610					
10						

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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TLF3-064

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/26/01
Date Completed	: 7/26/01
Hole Diameter	: 2 inches
Depth of Boring	: 6.5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1093321.92
Easting Coord.	: 417681.47

Logged By	: S. McInall
Elevation	: 620.83 ft msl
Location	: Landfill Class 3 Biased
Temporary Casing	: None
Total Core Recovery	: 90%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 620.83	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		CL		LEAN CLAY - dark yellowish brown, 10 YR 4/6, trace gravel, low plasticity, dry	TLF-0524	40
					TLF-9549	
	620					34
1						38
		GP		COARSE GRAVEL		
	619	AR		FILL - glass, bricks, sand is orangey brown		48
2						30
	618	CL		LEAN CLAY - very dark grayish brown, 10 YR 3/2, low plasticity, moist Deepest with full recovery	TLF-0525	50
3					TLF-9550	
						58
	617					72
4						44
	616					48
5				Pushed to 6.5 feet for geophysical downhole gamma scan purposes, core not logged		
6	615					
7	614					
8	613					
9	612					
10	611					

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The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

Landfill
Class 3 Random

BORING LOG TLF3-001

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Science Applications International Corporation
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Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/29/01
Date Completed	: 7/29/01
Hole Diameter	: 2 inches
Depth of Boring	: 6.5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1092621.87
Easting Coord.	: 417360.13

Logged By	: D. Minese
Elevation	: 624.67 ft msl
Location	: Landfill Class 3 Random
Temporary Casing	: None
Total Core Recovery	: 100%

Notes:

Elevations represented in feet above mean sea level (msl)

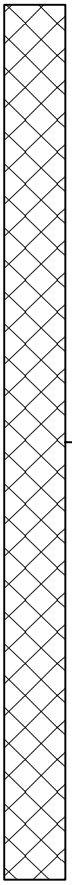
CPM - counts per minute on Eberline G-M

30 second count unless noted otherwise

N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 624.67	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		ML		LEAN CLAY FILL - concrete, rocks, glass, 1-inch gravel	TLF-0480	42
	624					42
1						60
	623					36
2						54
	622					52
3		ML		LEAN CLAY - reddish brown, 5 YR 4/4, low to medium plasticity, dry, glass, with decomposing matter, black olive color		50
	621				TLF-0481	32
4				pushed to 6.5 feet for geophysical downhole gamma scan purposes, core not logged		
	620					
5						
	619					
6						
	618					
7						
	617					
8						
	616					
9						
	615					
10						



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The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

BORING LOG TLF3-003

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Science Applications International Corporation
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Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/28/01
Date Completed	: 7/28/01
Hole Diameter	: 2 inches
Depth of Boring	: 2 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1092551.03
Easting Coord.	: 417276.20

Logged By	: S. McInall
Elevation	: 620.37 ft msl
Location	: Landfill Class 3 Random
Temporary Casing	: 3-inch steel
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 620.37	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	620	ML		SILT - brown, 10 YR 5/3, dry, angular gravel, vertical roots	TLF-0474	34
1	619					24
						42
2	618	ML		SILT - very dark gray, 5 YR 3/1, with medium gravel	TLF-0475	26
3	617					
4	616					
5	615					
6	614					
7	613					
8	612					
9	611					
10						

Backfilled with Boring Cuttings

Deepest with full recovery, refusal hit

The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

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BORING LOG TLF3-004

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Science Applications International Corporation
An Employee-Owned Company

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/29/01
Date Completed	: 7/29/01
Hole Diameter	: 2 inches
Depth of Boring	: 6.5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1092765.11
Easting Coord.	: 417163.51

Logged By	: D. Greenman
Elevation	: 628.23 ft msl
Location	: Landfill Class 3 Random
Temporary Casing	: None
Total Core Recovery	: 90%

Notes:

Elevations represented in feet above mean sea level (msl)

CPM - counts per minute on Eberline G-M

30 second count unless noted otherwise

N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 628.23	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	628	ML		SILT - dark yellowish-brown, 10 YR 4/2, angular gravel, dry, non-plastic	TLF-0486	44
1	627	CL		LEAN CLAY - moderate brown, 5 YR 4/4, dry, low plasticity, angular gravel		46 48 58
2	626	GC		SILTY GRAVEL - grayish orange pink, 5 YR 7/2, large sub-angular gravel, poorly graded, low to no plasticity, dry Deepest with full recovery	TLF-0487	46 52
3	625	CL		LEAN CLAY - same as from .75 to 2.25 feet pushed to 6.5 feet for geophysical downhole gamma scan purposes, core not logged		62
4	624					
5	623					
6	622					
7	621					
8	620					
9	619					
10						

Backfilled with Boring Cuttings

The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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Science Applications International Corporation
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BORING LOG TLF3-005

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/29/01
Date Completed	: 7/29/01
Hole Diameter	: 2 inches
Depth of Boring	: 6.5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1093045.19
Easting Coord.	: 417698.19

Logged By	: D. Greenman
Elevation	: 627.78 ft msl
Location	: Landfill Class 3 Random
Temporary Casing	: None
Total Core Recovery	: 50%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 627.78	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		ML		SILT - moderate yellowish-brown, 10 YR 5/4, dry, angular gravel, non to low plasticity	TLF-0484	42
	627					28
1		ML		SILT - dark yellowish-brown, 10 YR 4/2, moist, angular gravel, non to low plasticity		50
	626	CL		LEAN CLAY - moderate brown, 5 YR 4/4, firm, low plasticity		46
2				Deepest with full recovery	TLF-0485	30
	625					46
3						34
	624			no recovery from 3.5 to 6.5 feet		
4						
	623					
5						
	622					
6						
	621					
7						
	620					
8						
	619					
9						
	618					
10						

Backfilled with Boring Cuttings

The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

Science Applications International Corporation
An Employee-Owned Company

BORING LOG TLF3-006

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/28/01
Date Completed	: 7/28/01
Hole Diameter	: 2 inches
Depth of Boring	: 5.5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1092780.67
Easting Coord.	: 417367.14

Logged By	: D. Minese
Elevation	: 626.16 ft msl
Location	: Landfill Class 3 Random
Temporary Casing	: None
Total Core Recovery	: 73%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 626.16	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	626	ML		SILT - reddish brown, 5 YR 4/3, low plasticity, dry, glass and 1-inch gravel	TLF-0476	40
1	625					52
						42
						44
2	624	CL		LEAN CLAY - reddish brown, 5 YR 4/4, low to medium plasticity, dry, 1 1/2" gravel, sub-angular		50
3	623					44
						42
		CL		LEAN CLAY - low to medium plasticity, slightly moist, glass, rock, gravel	TLF-0477	44
4	622			no recovery from 4 to 5.5 feet		
5	621					
6	620					
7	619					
8	618					
9	617					
10						

Backfilled with Boring Cuttings

The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

Science Applications International Corporation
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BORING LOG TLF3-007

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

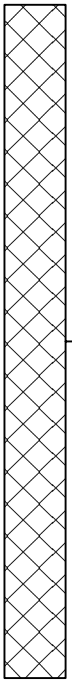
Date Started	: 7/23/01
Date Completed	: 7/23/01
Hole Diameter	: 2 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1092693.14
Easting Coord.	: 417699.6

Logged By	: S. McInall
Elevation	: 621.16 ft msl
Location	: Landfill Class 3 Random
Temporary Casing	: None
Total Core Recovery	: 60%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 621.16	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	621	ML		SILT - 10 YR 5/3, brown, vertical roots	TLF-0460	36
						30
1	620					58
		ML/AR		SILT WITH FILL - reddish black, 18 R 2.5/2, glass, rocks, rust		56
2	619	CL		LEAN CLAY - very dark gray, 10 YR 3/1		42
		CL		LEAN CLAY - yellowish brown, 10 YR 5/4 Deepest with full recovery	TLF-0461	36
3	618			no recovery from 3 to 5 feet		42
						52
4	617					34
						56
5	616					
6	615					
7	614					
8	613					
9	612					
10						



Backfilled with Boring Cuttings

The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

BORING LOG TLF3-008

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Science Applications International Corporation
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Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/17/01
Date Completed	: 7/17/01
Hole Diameter	: 2 inches
Depth of Boring	: 6.5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1092693.14
Easting Coord.	: 417549.08

Logged By	: D. Greenman
Elevation	: 626.95 ft msl
Location	: Landfill Class 3 Random
Temporary Casing	: None
Total Core Recovery	: 90%

Notes:

Elevations represented in feet above mean sea level (msl)

CPM - counts per minute on Eberline G-M

30 second count unless noted otherwise

N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 626.95	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		ML		SILT - dark yellowish brown, 10 YR 4/2, moderate angular gravel, dry, non to low plasticity	TLF-0450	38
1	626					36
						40
						44
2	625	CL		LEAN CLAY - dark yellowish brown, 10 YR 4/2, to dusky yellowish brown, 10 YR 2/2, moist, firm to very firm		52
						50
3	624			Deepest with full recovery	TLF-0451	50
						46
4	623					34
						36
5	622			Pushed to 6.5 feet for geophysical downhole gamma scan purposes, core not logged		
6	621					
7	620					
8	619					
9	618					
10	617					

Backfilled with Boring Cuttings

The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TLF3-009

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Science Applications International Corporation
An Employee-Owned Company

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/28/01
Date Completed	: 7/28/01
Hole Diameter	: 2 inches
Depth of Boring	: 3.5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1092947.49
Easting Coord.	: 417705.71

Logged By	: D. Minese
Elevation	: 627.94 ft msl
Location	: Landfill Class 3 Random
Temporary Casing	: N/A
Total Core Recovery	: 100%

Notes:

Elevations represented in feet above mean sea level (msl)

CPM - counts per minute on Eberline G-M

30 second count unless noted otherwise

N/A - not applicable

Boring Completion Details:
Elev.: N/A

Surf. Elev. 627.94

Depth in Feet	USCS	DESCRIPTION	Samples	Field Screening (CPM)
0	CL	LEAN CLAY FILL - reddish brown, 5 YR 5/4, low to medium plasticity, with rocks, glass, and concrete	TLF-0482	42
			TLF-9488	
1 (627)				28
				58
2 (626)				44
				50
3 (625)		Hit refusal four times, deepest with full recovery		42
			TLF-0483	46
			TLF-9489	
4 (624)				
5 (623)				
6 (622)				
7 (621)				
8 (620)				
9 (619)				
10 (618)				

Backfilled with Boring Cuttings

The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

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Science Applications International Corporation
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BORING LOG TLF3-012

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/23/01
Date Completed	: 7/23/01
Hole Diameter	: 2 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1092573.29
Easting Coord.	: 416193.68

Logged By	: S. McInall
Elevation	: 610.14 ft msl
Location	: Landfill Class 3 Random
Temporary Casing	: None
Total Core Recovery	: 90%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 610.14	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	610	ML		SILT - pale yellowish brown, 10 YR 6/2, vertical roots, dry, non to low plasticity, angular gravel, with some fill	TLF-0456	38
1	609					52
						48
						40
2	608	ML		SILT - dark yellowish brown, 10 YR 3/3, some brick, stiff, moist, non to low plasticitiy		50
						56
3	607			Deepest with full recovery	TLF-0457	38
4	606	CL		LEAN CLAY - 10 YR 2/1, moist, low plasticity, very dark brown/black		46
						40
						60
5	605					
6	604					
7	603					
8	602					
9	601					
10						

Backfilled with Boring Cuttings

The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

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BORING LOG TLF3-013

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/23/01
Date Completed	: 7/23/01
Hole Diameter	: 2 inches
Depth of Boring	: 4 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1092648.13
Easting Coord.	: 416207.16

Logged By	: D. Minese
Elevation	: 607.34 ft msl
Location	: Landfill Class 3 Random
Temporary Casing	: None
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 607.34	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	607	ML		LOAM - moderate brown, 5 YR 3/4 to pale brown, 5 YR 5/2, dry, no visible gravel	TLF-0462	42
						52
1		CL		LEAN CLAY - dark yellowish brown, moist, low plasticity		
	606	CL		LEAN CLAY - moderate brown, 5 YR 4/4, moist, low plasticity, some pale yellowish brown to gray, 10 YR 6/2, mottling (5-10%)		46
						42
2	605					94
						50
3	604					58
					TLF-0463	62
4	603					
5	602					
6	601					
7	600					
8	599					
9	598					
10						

Backfilled with Native Material

The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

Science Applications International Corporation
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BORING LOG TLF3-015

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

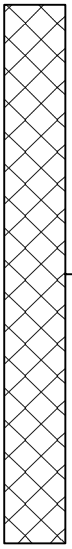
Date Started	: 7/28/01
Date Completed	: 7/28/01
Hole Diameter	: 2 inches
Depth of Boring	: 4 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1092612.38
Easting Coord.	: 417159.35

Logged By	: S. Fox
Elevation	: 620.39 ft msl
Location	: Landfill Class 3 Random
Temporary Casing	: 3-inch steel
Total Core Recovery	: 63%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 620.39	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	620	AR		FILL - sand, gravel, asphalt, loose	TLF-0472	34
1	619					46
						32
						46
2		CL		LEAN CLAY FILL - non-plastic to low plasticity, moist, soft		
	618	CL		same as above, but wet	TLF-0473	38
3	617			no recovery from 2.5 to 4 feet		
4	616					
5	615					
6	614					
7	613					
8	612					
9	611					
10						



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BORING LOG TLF3-016

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/28/01
Date Completed	: 7/28/01
Hole Diameter	: 2 inches
Depth of Boring	: 5.5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1092595.97
Easting Coord.	: 416781.41

Logged By	: S. Fox
Elevation	: 619.68 ft msl
Location	: Landfill Class 3 Random
Temporary Casing	: 3-inch steel
Total Core Recovery	: 90%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 619.68	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		AR		FILL - dark brown, 7.5 YR 3/2, fine to coarse grained sand, concrete present (fill)	TLF-0466	38
	619					40
1						52
	618	CL		LEAN CLAY - dark yellowish brown, 10 YR 4/4, low plasticity, hard, dry to slightly moist, some concrete mixed in, glass and nail present		28
2						46
	617					42
3						46
	616			Deepest with full recovery	TLF-0467	36
4						50
	615					40
5						54
	614					
6						
	613					
7						
	612					
8						
	611					
9						
	610					
10						

Backfilled with Boring Cuttings

The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

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BORING LOG TLF3-017

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/17/01
Date Completed	: 7/17/01
Hole Diameter	: 2 inches
Depth of Boring	: 4 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1092725.53
Easting Coord.	: 417747.46

Logged By	: D. Greenman
Elevation	: 630.72 ft msl
Location	: Landfill Class 3 Random
Temporary Casing	: 3-inch steel
Total Core Recovery	: 90%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Surf. Elev. 630.72

USCS	DESCRIPTION	Samples	Field Screening (CPM)
ML	SILT - light brown, 5 YR 5/6, roots, angular gravel, dry, non to low plasticity	TLF-0452	50
			54
CL	LEAN CLAY - light brown, 5 YR 5/6, firm		40
			50
CL	LEAN CLAY - same as above, but color change to moderate brown, 5 YR 3/4 with dusky brown, 5 YR 2/2		54
			44
		TLF-0453	50
	no recovery from 3.5 to 4 feet		

Depth in Feet: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

Elevations: 630, 629, 628, 627, 626, 625, 624, 623, 622, 621

Backfilled with Boring Cuttings

The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TLF3-019

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/28/01
Date Completed	: 7/28/01
Hole Diameter	: 2 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1092862.88
Easting Coord.	: 417456.05

Logged By	: D. Greenman
Elevation	: 625.74 ft msl
Location	: Landfill Class 3 Random
Temporary Casing	: None
Total Core Recovery	: 90%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 625.74	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		CL		LEAN CLAY - light to moderate brown, 5 YR 5/6 to 4/4, angular gravel throughout, firm, dry to moist	TLF-0478	36
	625					44
1						32
	624					34
2						36
	623					54
3				Deepest with full recovery	TLF-0479	52
	622					48
4		CL		LEAN CLAY - same clay as above, but moist to wet, mottled with dark yellowish brown, 10 YR 4/2		42
	621					52
5						
	620					
6						
	619					
7						
	618					
8						
	617					
9						
	616					
10						

Backfilled with Boring Cuttings

The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TLF3-021

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Science Applications International Corporation
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Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/23/01
Date Completed	: 7/23/01
Hole Diameter	: 2 inches
Depth of Boring	: 4 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1092543.04
Easting Coord.	: 416090.60

Logged By	: D. Minese
Elevation	: 608.13 ft msl
Location	: Landfill Class 3 Random
Temporary Casing	: None
Total Core Recovery	: 88%

Notes:

Elevations represented in feet above mean sea level (msl)

CPM - counts per minute on Eberline G-M

30 second count unless noted otherwise

N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 608.13	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	608	AR		FILL - brown loam, roots, dry, gravel, concrete	TLF-0454	50
						52
1	607	CL		LEAN CLAY - moderate brown, 5 YR 3/4, dry, medium plasticity		50
						54
2	606					44
		CL		LEAN CLAY - moderate brown, 5 YR 4/4, moist, medium plasticity		72
3	605			Deepest with full recovery	TLF-0455	58
				no recovery from 3.5 to 4 feet		
4	604					
5	603					
6	602					
7	601					
8	600					
9	599					
10						

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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TLF3-022

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Science Applications International Corporation
An Employee-Owned Company

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/28/01
Date Completed	: 7/28/01
Hole Diameter	: 2 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1092531.52
Easting Coord.	: 416915.93

Logged By	: S. McInall
Elevation	: 618.71 ft msl
Location	: Landfill Class 3 Random
Temporary Casing	: 3-inch steel
Total Core Recovery	: 75%

Notes:

Elevations represented in feet above mean sea level (msl)

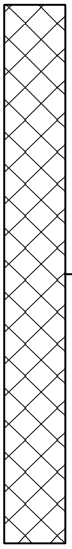
CPM - counts per minute on Eberline G-M

30 second count unless noted otherwise

N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 618.71	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		CL		LEAN CLAY - dark brown, 10 YR 3/3, moist, vertical roots	TLF-0470	40
					TLF-9468	
	618					38
1		GP		COARSE GRAVEL - mixed with concrete		
		CL		LEAN CLAY - dark brown, 10 YR 3/3, moist, vertical roots		36
	617					46
2						52
	616	CL		LEAN CLAY - black, very dark gray, 5 YR 2.5/1 to 5 YR 3/1, moist, mixed with wood, glass, plastic bags	TLF-0471	38
3					TLF-9469	
				Deepest with full recovery		24
	615					
4						
	614					
5						
	613					
6						
	612					
7						
	611					
8						
	610					
9						
	609					
10						



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The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

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BORING LOG TLF3-023

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Science Applications International Corporation
An Employee-Owned Company

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/23/01
Date Completed	: 7/23/01
Hole Diameter	: 2 inches
Depth of Boring	: 4 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1092528.44
Easting Coord.	: 416245.10

Logged By	: D. Minese
Elevation	: 612.60 ft msl
Location	: Landfill Class 3 Random
Temporary Casing	: None
Total Core Recovery	: 100%

Notes:

Elevations represented in feet above mean sea level (msl)

CPM - counts per minute on Eberline G-M

30 second count unless noted otherwise

N/A - not applicable

Boring Completion Details:
Elev.: N/A

Surf. Elev. 612.60

Depth in Feet	USCS	DESCRIPTION	Samples	Field Screening (CPM)
0	AR	brown sandy loam with concrete chips	TLF-0458	34
612	AR	concrete rubble		24
1				32
611	CL	LEAN CLAY - moderate brown, 5 YR 3/4, dry, tight, some sub-rounded 1-inch gravel		42
2				64
610	CL	LEAN CLAY - moderate brown, 5 YR 4/4, moist, medium plasticity		48
3				54
609			TLF-0459	60
4				
608				
5				
607				
6				
606				
7				
605				
8				
604				
9				
603				
10				

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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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Science Applications International Corporation
An Employee-Owned Company

BORING LOG TLF3-024

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/28/01
Date Completed	: 7/28/01
Hole Diameter	: 2 inches
Depth of Boring	: 6.5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1092518.41
Easting Coord.	: 416707.50

Logged By	: S. McInall
Elevation	: 618.09 ft msl
Location	: Landfill Class 3 Random
Temporary Casing	: 3-inch steel
Total Core Recovery	: 80%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 618.09	USCS	DESCRIPTION	Samples	Field Screening (CPM)
0	618	GP	COARSE GRAVEL	TLF-0464	52
		ML	SILT - brown, 10 YR 5/3, dry, vertical roots, angular gravel		50
1	617	AR	ASPHALT		
		CL	LEAN CLAY - dark brown, 10 YR 3/3, dry		46
					60
2	616				56
			Deepest with full recovery	TLF-0465	62
3	615	GP	COARSE GRAVEL		36
		CL	LEAN CLAY - dark brown, 10 YR 3/3, dry		34
4	614				62
					38
5	613	AR	wet, glass, muck		
6	612				
7	611				
8	610				
9	609				
10					

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The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

Landfill
Reference Area

Science Applications International Corporation
An Employee-Owned Company

BORING LOG TLFR3-001

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

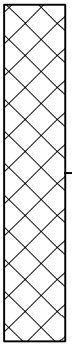
Date Started	: 7/16/01
Date Completed	: 7/16/01
Hole Diameter	: 2 inches
Depth of Boring	: 2.5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1092563.65
Easting Coord.	: 417485.70

Logged By	: D. Greenman
Elevation	: 627.60 ft msl
Location	: Landfill Reference Area
Temporary Casing	: None
Total Core Recovery	: 95%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 627.60	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		ML		SILT - moderate yellowish brown, 10 YR 5/4, dry, angular gravel (little), non to low plasticity (fill)	TLF-0404	50
	627					44
1		CL		LEAN CLAY - moderate brown, 5 YR 3/4, low plasticity, dry, little angular gravel		40
	626					56
2					TLF-0405	30
	625					
3						
	624					
4						
	623					
5						
	622					
6						
	621					
7						
	620					
8						
	619					
9						
	618					
10						



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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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Science Applications International Corporation
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BORING LOG TLFR3-002

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

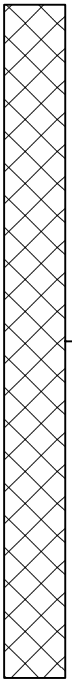
Date Started	: 7/16/01
Date Completed	: 7/16/01
Hole Diameter	: 2 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1092599.29
Easting Coord.	: 417483.53

Logged By	: D. Greenman
Elevation	: 628.95 ft msl
Location	: Landfill Reference Area
Temporary Casing	: None
Total Core Recovery	: 95%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 628.95	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		ML		SILT - light brown, 5 YR 6/4, angular gravel, dry, non to low plasticity, roots (fill)	TLF-0402	48
1	628					60
						64
2	627					50
						40
3	626	CL		LEAN CLAY - dark yellowish-brown, 10 YR 4/2, moist, firm, low plasticity		30
				Deepest with full recovery	TLF-0403	18
4	625					46
						34
5	624					50
6	623					
7	622					
8	621					
9	620					
10	619					



The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

BORING LOG TLFR3-004

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Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/16/01
Date Completed	: 7/16/01
Hole Diameter	: 2 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1092666.72
Easting Coord.	: 417485.17

Logged By	: D. Greenman
Elevation	: 626.34 ft msl
Location	: Landfill Reference Area
Temporary Casing	: None
Total Core Recovery	: 95%

Notes:

Elevations represented in feet above mean sea level (msl)

CPM - counts per minute on Eberline G-M

30 second count unless noted otherwise

N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 626.34	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		ML		SILT - light brown, 5 YR 6/4, angular gravel, dry, non to low plasticity, little angular gravel (fill)	TLF-0400	26
	626				TLF-9418	
1						32
	625	CL		LEAN CLAY - moderate brown, 5 YR 4/4, dry to moist, firm, low plasticity		24
2						46
	624					44
3						52
	623					46
				Deepest with full recovery	TLF-0401	38
4					TLF-9419	
	622					56
5						50
	621					
6						
	620					
7						
	619					
8						
	618					
9						
	617					
10						

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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TLFR3-005

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

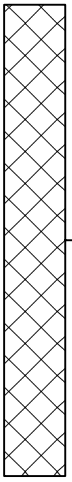
Date Started	: 7/16/01
Date Completed	: 7/16/01
Hole Diameter	: 2 inches
Depth of Boring	: 3.5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1092564.99
Easting Coord.	: 417516.46

Logged By	: D. Greenman
Elevation	: 627.62 ft msl
Location	: Landfill Reference Area
Temporary Casing	: None
Total Core Recovery	: 95%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 627.62	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		ML		SILT - moderate brown, 5 YR 4/4, roots, dry, non to low plasticity, angular gravel (fill)	TLF-0408	64
	627					40
1						50
	626					36
2				Deepest with full recovery	TLF-0409	32
	625					32
3						34
	624					
4						
	623					
5						
	622					
6						
	621					
7						
	620					
8						
	619					
9						
	618					
10						



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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TLFR3-006

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/16/01
Date Completed	: 7/16/01
Hole Diameter	: 2 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1092596.31
Easting Coord.	: 417519.45

Logged By	: D. Greenman
Elevation	: 629.54 ft msl
Location	: Landfill Reference Area
Temporary Casing	: None
Total Core Recovery	: 95%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 629.54	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		ML		SILT - moderate yellowish-brown, 10 YR 5/4, dry, non to low plasticity (fill)	TLF-0406	64
	629					48
1		ML		same as above except change to hard to very hard, and with moderate angular gravel (fill)		34
	628					56
2						58
	627					52
3		CL		LEAN CLAY - dusky yellowish-brown, 10 YR 2/2, moist, soft, low plasticity Deepest with full recovery	TLF-0407	72
	626					38
4						38
	625					58
5						
	624					
6						
	623					
7						
	622					
8						
	621					
9						
	620					
10						

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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TLFR3-007

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

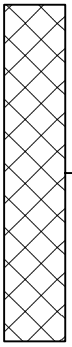
Date Started	: 7/17/01
Date Completed	: 7/17/01
Hole Diameter	: 2 inches
Depth of Boring	: 4 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1092632.19
Easting Coord.	: 417516.36

Logged By	: D. Greenman
Elevation	: 629.40 ft msl
Location	: Landfill Reference Area
Temporary Casing	: None
Total Core Recovery	: 63%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 629.40	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	629	ML		SILT - moderate yellowish-brown, 10 YR 5/4, roots, angular gravel, dry, non to low plasticity (fill)	TLF-0412	42
						90
1	628	CL		LEAN CLAY - moderate brown, 5 YR 3/4, with dusky yellowish-brown, 10 YR 2/2, low plasticity, moist, soft to firm		52
						36
2	627			Deepest with full recovery	TLF-0413	48
3	626			no recovery from 2.5 to 4 feet		
4	625					
5	624					
6	623					
7	622					
8	621					
9	620					
10						



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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

BORING LOG TLFR3-008

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Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/17/01
Date Completed	: 7/17/01
Hole Diameter	: 2 inches
Depth of Boring	: 7 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1092663.77
Easting Coord.	: 417517.82

Logged By	: D. Greenman
Elevation	: 627.95 ft msl
Location	: Landfill Reference Area
Temporary Casing	: None
Total Core Recovery	: 64%

Notes:

Elevations represented in feet above mean sea level (msl)

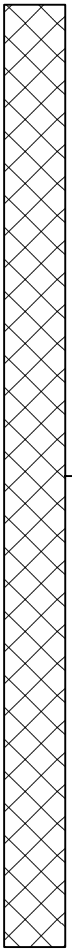
CPM - counts per minute on Eberline G-M

30 second count unless noted otherwise

N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 627.95	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		ML		SILT - moderate yellowish-brown, 10 YR 5/4, dry, non to low plasticity, little angular gravel	TLF-0410	62
						54
1	627	GP		GRAVEL - core of large rock		48
		CL		LEAN CLAY - moderate brown, 5 YR 3/4, moist, firm to slightly firm, low plasticity		30
2	626					42
						62
3	625					44
				Deepest with full recovery	TLF-0411	48
4	624					44
				no recovery from 4.5 to 7 feet		
5	623					
6	622					
7	621					
8	620					
9	619					
10	618					



The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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Science Applications International Corporation
An Employee-Owned Company

BORING LOG TLFR3-010

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

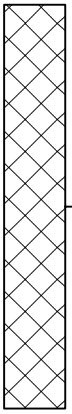
Date Started	: 7/17/01
Date Completed	: 7/17/01
Hole Diameter	: 2 inches
Depth of Boring	: 3 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1092598.03
Easting Coord.	: 417549.89

Logged By	: D. Greenman
Elevation	: 629.27 ft msl
Location	: Landfill Reference Area
Temporary Casing	: None
Total Core Recovery	: 80%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 629.27	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	629	ML		SILT - moderate brown, 5 YR 3/4, dry, little angular gravel, non to low plasticity (fill)	TLF-0414	50
1	628					48
						58
						58
2	627	CL		LEAN CLAY - light brown, 5 YR 5/6, mottled with dark yellowish-brown, 10 YR 4/2, large gravel, dry, firm to very firm Deepest with full recovery	TLF-0415	40
						30
3	626					
4	625					
5	624					
6	623					
7	622					
8	621					
9	620					
10						



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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TLFR3-011

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/16/01
Date Completed	: 7/16/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 4 feet
Drilling Method	: Geoprobe 66 DT
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1092630.54
Easting Coord.	: 417551.3

Logged By	: M. Hilyard
Elevation	: 629.43 ft msl
Location	: Landfill Reference Area
Temporary Casing	: 3-inch steel
Total Core Recovery	: 75%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 629.43	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		ML		SILT - reddish brown, 5 YR 4/3, little fine gravel, trace medium gravel, wood, debris, soft, dry (fill)	TLF-0424	64
	629					40
1						46
	628					50
2						44
	627					52
3						48
	626				TLF-0425	50
4						
	625					
5						
	624					
6						
	623					
7						
	622					
8						
	621					
9						
	620					
10						

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The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

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Science Applications International Corporation
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BORING LOG TLFR3-012

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

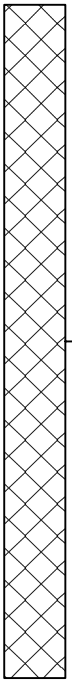
Date Started	: 7/16/01
Date Completed	: 7/16/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe 66 DT
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1092662.58
Easting Coord.	: 417551.36

Logged By	: M. Hilyard
Elevation	: 627.36 ft msl
Location	: Landfill Reference Area
Temporary Casing	: 3-inch steel
Total Core Recovery	: 96%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 627.36	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	627	ML		SILT - reddish brown, 5 YR 4/3, little fine gravel, trace wood, soft, dry	TLF-0422	54
						50
1	626	CL		LEAN CLAY - dark gray, 10 YR 4/1, little fine gravel, root structure, medium plasticity, moist		50
						40
2	625					34
						42
3	624					46
						46
4	623				TLF-0423	44
						34
5	622					
6	621					
7	620					
8	619					
9	618					
10						



The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

Science Applications International Corporation
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BORING LOG TLFR3-013

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/17/01
Date Completed	: 7/17/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 6 feet
Drilling Method	: Geoprobe 66 DT
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1092562.35
Easting Coord.	: 417583.53

Logged By	: M. Hilyard
Elevation	: 625.95 ft msl
Location	: Landfill Reference Area
Temporary Casing	: 3-inch steel
Total Core Recovery	: 41%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 625.95	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		ML		SILT - brown, 10 YR 4/3, little fine gravel, roots, soft, dry (fill)	TLF-0432	50
1	625					48
						44
						52
2	624	ML		SILT - dark gray/brown, moist, medium hard, low plasticity, little fine gravel, trace concrete, interbedded with gravel layers (fill)		46
						48
3	623				TLF-0433	60
				no recovery from 3.5 to 6 feet		
4	622					
5	621					
6	620					
7	619					
8	618					
9	617					
10	616					

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The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

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BORING LOG TLFR3-014

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

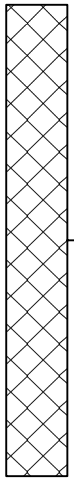
Date Started	: 7/17/01
Date Completed	: 7/17/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 3.5 feet
Drilling Method	: Geoprobe 66 DT
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1092595.88
Easting Coord.	: 417584.58

Logged By	: M. Hilyard
Elevation	: 628.61 ft msl
Location	: Landfill Reference Area
Temporary Casing	: 3-inch steel
Total Core Recovery	: 40%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 628.61	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		ML		SILT - brown, 10 YR 4/3, little fine gravel, soft, dry, roots (fill)	TLF-0434	48
	628					28
1						44
	627					48
2						56
	626	ML		same as above but moist		48
3					TLF-0435	46
	625					
4						
	624					
5						
	623					
6						
	622					
7						
	621					
8						
	620					
9						
	619					
10						



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The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

BORING LOG TLFR3-015

Science Applications International Corporation
An Employee-Owned Company

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

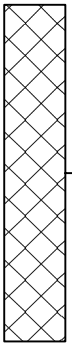
Date Started	: 7/16/01
Date Completed	: 7/16/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 2.5 feet
Drilling Method	: Geoprobe 66 DT
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1092630.70
Easting Coord.	: 417585.79

Logged By	: M. Hilyard
Elevation	: 628.91 ft msl
Location	: Landfill Reference Area
Temporary Casing	: 3-inch steel
Total Core Recovery	: 50%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 628.91	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		ML		SILT - reddish brown, 5 YR 4/3, little fine gravel, trace medium gravel, soft, dry	TLF-0428	52
1	628					54
						64
						44
2	627			Refusal hit four times, low recovery in each liner	TLF-0429	36
3	626					
4	625					
5	624					
6	623					
7	622					
8	621					
9	620					
10	619					



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The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

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BORING LOG TLFR3-016

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

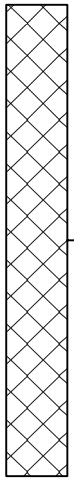
Date Started	: 7/16/01
Date Completed	: 7/16/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 3.5 feet
Drilling Method	: Geoprobe 66 DT
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1092664.09
Easting Coord.	: 417583.31

Logged By	: M. Hilyard
Elevation	: 628.51 ft msl
Location	: Landfill Reference Area
Temporary Casing	: 3-inch steel
Total Core Recovery	: 90%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 628.51	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	628	ML		SILT - reddish brown, 5 YR 4/3, little fine gravel, trace wood, soft, dry (fill)	TLF-0426	42
					TLF-9438	58
1	627	ML		SILT - dark gray, 10 YR 4/1, little fine gravel, trace glass, wood, concrete, plastic (fill)		40
						48
2	626					44
						42
3	625				TLF-0427	46
					TLF-9439	
4	624					
5	623					
6	622					
7	621					
8	620					
9	619					
10						



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The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

BORING LOG TLFR3-017

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Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/17/01
Date Completed	: 7/17/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 10 feet
Drilling Method	: Geoprobe 66 DT
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1092564.52
Easting Coord.	: 417615.73

Logged By	: M. Hilyard
Elevation	: 626.26 ft msl
Location	: Landfill Reference Area
Temporary Casing	: 3-inch steel
Total Core Recovery	: 40%

Notes:

Elevations represented in feet above mean sea level (msl)

CPM - counts per minute on Eberline G-M

30 second count unless noted otherwise

N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 626.26	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	626	ML		SILT - reddish brown, 5 YR 4/3, little fine gravel, dry, soft (fill)	TLF-0430	46
						36
1	625					42
		ML/AR		SILT - organic debris, leaves, roots, wood, black, moist, interbedded with silt, medium brown, 10 YR 4/3, moist, low plasticity, soft, gravel, red brick, glass (fill)		40
2	624					30
						32
3	623					30
					TLF-0431	30
4	622					54
						28
5	621			no recovery from 5 to 10 feet		58
6	620					
7	619					
8	618					
9	617					
10				The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.		

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BORING LOG TLFR3-018

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/17/01
Date Completed	: 7/17/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 4 feet
Drilling Method	: Geoprobe 66 DT
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1092600.86
Easting Coord.	: 417614.76

Logged By	: M. Hilyard
Elevation	: 628.66 ft msl
Location	: Landfill Reference Area
Temporary Casing	: 3-inch steel
Total Core Recovery	: 60%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 628.66	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		ML/AR		SILT - reddish brown, 10 YR 4/3, little fine sand, soft, dry, rubber tire (auto), plastic fiber, rags, asphalt, interbedded with dark yellowish brown, 10 YR 4/6, silt, low plasticity, moist (fill)	TLF-0436	52
	628					48
1						38
	627					42
2						46
	626					52
3						50
	625				TLF-0437	54
4						
	624					
5						
	623					
6						
	622					
7						
	621					
8						
	620					
9						
	619					
10						

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The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

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BORING LOG TLFR3-019

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/17/01
Date Completed	: 7/17/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 2.7 feet
Drilling Method	: Geoprobe 66 DT
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1092629.45
Easting Coord.	: 417607.89

Logged By	: M. Hilyard
Elevation	: 628.89 ft msl
Location	: Landfill Reference Area
Temporary Casing	: 3-inch steel
Total Core Recovery	: 60%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 628.89	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		AR		concrete for 8-inches	TLF-0416	42
1	628	ML/AR		SILT - dark yellowish brown, 10 YR 4/4, very hard, low plasticity, dry, trace fine gravel (fill)		42 40 46
2	627	AR		cloth, wood, some silt, loose (fill) Hit refusal four times	TLF-0417	40
3	626					
4	625					
5	624					
6	623					
7	622					
8	621					
9	620					
10	619					

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The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

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BORING LOG TLFR3-020

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/17/01
Date Completed	: 7/17/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 4 feet
Drilling Method	: Geoprobe 66 DT
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1092663.48
Easting Coord.	: 417618.41

Logged By	: M. Hilyard
Elevation	: 629.15 ft msl
Location	: Landfill Reference Area
Temporary Casing	: 3-inch steel
Total Core Recovery	: 80%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 629.15	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	629	ML		SILT - reddish brown, 5 YR 4/3, little fine gravel, trace wood fragments, soft, dry	TLF-0420	47
						26
1	628	ML		SILT - fine gravel, dark gray, 10 YR 4/1, gravel, wood, plant debris		56
						24
2	627	ML		SILT - dark grayish brown, 10 YR 4/2, trace fine gravel, root structure, low plasticity, moist		38
						46
3	626					42
					TLF-0421	56
4	625					
5	624					
6	623					
7	622					
8	621					
9	620					
10						

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The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

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Science Applications International Corporation
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BORING LOG TLF3-S1

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/31/01
Date Completed	: 7/31/01
Hole Diameter	: N/A
Depth of Boring	: 3 feet
Drilling Method	: Hand Auger
Sampling Method	: grab
Company Name	: SAIC
Company Rep.	: N/A
Northing Coord.	: 1093140.36
Easting Coord.	: 417462.71

Logged By	: S. McInall
Elevation	: 618.31 ft msl
Location	: Landfill Class 1 Area A
Temporary Casing	: N/A
Total Core Recovery	: N/A

Notes:

Elevations represented in feet above mean sea level (msl)

CPM - counts per minute on Eberline G-M

30 second count unless noted otherwise

N/A - not applicable

Depth in Feet	Surf. Elev. 618.31	DESCRIPTION	Samples	Field Screening (CPM)
0	618	Sediment Samples	TLF-0698	50
1	617			34
2	616			54
3	615		TLF-0699	46
4	614			
5	613			
6	612			
7	611			
8	610			
9	609			
10				

Science Applications International Corporation
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BORING LOG TLF3-S2

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/31/01
Date Completed	: 7/31/01
Hole Diameter	: N/A
Depth of Boring	: 4 feet
Drilling Method	: Hand Auger
Sampling Method	: grab
Company Name	: SAIC
Company Rep.	: N/A
Northing Coord.	: 1093127.17
Easting Coord.	: 417469.39

Logged By	: S. McInall
Elevation	: 618.25 ft msl
Location	: Landfill Class 1 Area A
Temporary Casing	: N/A
Total Core Recovery	: N/A

Notes:

Elevations represented in feet above mean sea level (msl)

CPM - counts per minute on Eberline G-M

30 second count unless noted otherwise

N/A - not applicable

Depth in Feet	Surf. Elev. 618.25	DESCRIPTION	Samples	Field Screening (CPM
0	618	Sediment Samples	TLF-0700	56
1	617			
2	616			64
3	615			
			TLF-0700	44
			TLF-9718	
4	614			
5	613			
6	612			
7	611			
8	610			
9	609			
10				

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Science Applications International Corporation
An Employee Owned Company

BORING LOG TLF3-S3

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/31/01
Date Completed	: 7/31/01
Hole Diameter	: N/A
Depth of Boring	: 2 feet
Drilling Method	: Hand Auger
Sampling Method	: grab
Company Name	: SAIC
Company Rep.	: N/A
Northing Coord.	: 1093119.24
Easting Coord.	: 417418.65

Logged By	: S. McInall
Elevation	: 618.06 ft msl
Location	: Landfill Class 1 Area A
Temporary Casing	: N/A
Total Core Recovery	: N/A

Notes:

Elevations represented in feet above mean sea level (msl)

CPM - counts per minute on Eberline G-M

30 second count unless noted otherwise

N/A - not applicable

Depth in Feet	Surf. Elev. 618.06	DESCRIPTION	Samples	Field Screening (CPM
0	618	Sediment Samples	TLF-0702	42
1	617			46
			TLF-0703	44
2	616			
3	615			
4	614			
5	613			
6	612			
7	611			
8	610			
9	609			
10				

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Science Applications International Corporation
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BORING LOG TLF3-S4

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/31/01
Date Completed	: 7/31/01
Hole Diameter	: N/A
Depth of Boring	: 1 foot
Drilling Method	: Hand Auger
Sampling Method	: grab
Company Name	: SAIC
Company Rep.	: N/A
Northing Coord.	: 1092720.26
Easting Coord.	: 416550.89

Logged By	: S. McInall
Elevation	: N/A
Location	: Landfill Class 1 Area A
Temporary Casing	: N/A
Total Core Recovery	: N/A

Notes:

Elevations represented in feet above mean sea level (msl)

CPM - counts per minute on Eberline G-M

30 second count unless noted otherwise

N/A - not applicable

Depth in Feet	Surf. Elev. N/A	DESCRIPTION	Samples	Field Screening (CPM
0	0	Sediment Samples	TLF-0490	36
			TLF-0491	60
1	-1			
2	-2			
3	-3			
4	-4			
5	-5			
6	-6			
7	-7			
8	-8			
9	-9			
10				

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Mudflats
Class 1 Area C

Science Applications International Corporation
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BORING LOG TMFC1-001

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/13/01
Date Completed	: 7/13/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 15 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1091384.03
Easting Coord.	: 415976.92

Logged By	: M. Hilyard
Elevation	: 606.67 ft msl
Location	: Mudflats Class 1 Area C
Temporary Casing	: 3-inch steel
Total Core Recovery	: 88%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 606.67	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		SM		SILTY SAND - yellowish brown, 10 YR 5/6, trace medium and fine gravel, dry	TMF-0270	48
	606					36
1						44
	605	ML		SILT - dark yellowish brown, 10 YR 4/6, trace fine to medium gravel, moist		52
2						46
	604					50
3						32
	603			no recovery from 3.5 to 5 feet		
4						
	602					
5		ML		SILT - dark yellowish brown, 10 YR 4/6, trace fine to medium gravel, moist		54
	601					58
6						60
	600					52
7						62
	599					54
8		SM		SILTY SAND - very dark brown, 10 YR 2/2, woody debris, soft, wet		52
	598					48
9						30
	597			6-inch sample with 3 inches of no recovery	TMF-0271	
10				no recovery from 9.75 to 10 feet		

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Science Applications International Corporation
An Employee-Owned Company

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/13/01
Date Completed	: 7/13/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 15 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1091384.03
Easting Coord.	: 415976.92

BORING LOG TMFC1-001

Logged By	: M. Hilyard
Elevation	: 606.67 ft msl
Location	: Mudflats Class 1 Area C
Temporary Casing	: 3-inch steel
Total Core Recovery	: 88%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 606.67	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
10		CL		no recovery from 9.75 to 10 feet	TMF-0271	34
				LEAN CLAY - dark yellowish brown, 10 YR 4/6, trace fine gravel, moist		44
11	596					34
	595					32
12						42
	594					52
13						44
	593				TMF-0272	48
14						56
	592					46
15						
	591					
16						
	590					
17						
	589					
18						
	588					
19						
	587					
20						

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The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

Science Applications International Corporation
An Employee-Owned Company

BORING LOG TMFC1-002

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/31/01
Date Completed	: 7/31/01
Hole Diameter	: 2 inches
Depth of Boring	: 15 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1091399.99
Easting Coord.	: 415967.13

Logged By	: S. McInall
Elevation	: 606.55 ft msl
Location	: Mudflats Class 1 Area C
Temporary Casing	: None
Total Core Recovery	: 87%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 606.55	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		ML		SILT - dark brown, 10 YR 3/3, coarse to medium grained angular gravel, dry	TMF-0315	40
	606					44
1		SP		SAND - black, 10 YR 1/1, with white powder, some medium grained gravel, tar/organic odor		60
	605					44
2						46
	604	ML		SILT - black, 10 YR 1/1, organic, medium grained angular gravel, moist		38
3						38
	603	GM		GRAVEL - coarse grained medium gravel with sand		40
		ML		SILT - brown, 10 YR 5/3, dry		
4		GM		GRAVEL - coarse grained medium gravel		30
	602	ML		SILT - dark brown, 10 YR 3/3, coarse gravel		44
5						40
	601					62
6						56
	600			no recovery from 6.5 to 8 feet		
7						
	599					
8		ML		SILT - dark brown, 10 YR 3/3, coarse gravel		64
	598					60
9		ML		SILT - black, 10 YR 1/1, some fine to coarse grained sand, organic odor		50
	597					42
10						

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Science Applications International Corporation
An Employee-Owned Company

BORING LOG TMFC1-002

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/31/01
Date Completed	: 7/31/01
Hole Diameter	: 2 inches
Depth of Boring	: 15 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1091399.99
Easting Coord.	: 415967.13

Logged By	: S. McInall
Elevation	: 606.55 ft msl
Location	: Mudflats Class 1 Area C
Temporary Casing	: None
Total Core Recovery	: 87%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Surf. Elev. 606.55

Depth in Feet	USCS	DESCRIPTION	Samples	Field Screening (CPM)
10	ML	SILT - black, 10 YR 1/1, some fine to coarse grained sand, organic odor		44
596	ML	SILT - dark yellowish brown, 10 YR 4/4, trace coarse gravel, non to low plasticity		46
11	ML			56
595		no recovery from 11.5 to 12 feet		
12	ML	SILT - black, 10 YR 1/1, organic, soft, wet, non to low plasticity	TMF-0316	38
594	CL	LEAN CLAY - dark yellowish brown, 10 YR 4/4, trace coarse gravel, low plasticity (native material, fill above)		38
13	CL			36
593	CL			56
14	CL	Static water measured at 12.0 feet below ground surface		40
592	CL		TMF-0317	44
15				
591				
16				
590				
17				
589				
18				
588				
19				
587				
20				

Backfilled with Boring Cuttings

The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

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Science Applications International Corporation
An Employee-Owned Company

BORING LOG TMFC1-003

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/31/01
Date Completed	: 7/31/01
Hole Diameter	: 2 inches
Depth of Boring	: 16 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1091411.98
Easting Coord.	: 415967.55

Logged By	: D. Minese
Elevation	: 606.65 ft msl
Location	: Mudflats Class 1 Area C
Temporary Casing	: None
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 606.65	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	606	CL		LEAN CLAY - moderate brown, 5 YR 3/4, trace fine sand, dry, low to medium plasticity	TMF-0312	50 62
1	605	CL		LEAN CLAY - grayish brown, 5 YR 3/2, gravel fill		44 52
2		CL		LEAN CLAY - dark yellowish, 10 YR 4/2		42
3	604	CL		LEAN CLAY - grayish brown, 5 YR 3/2, gravel blackish		34 50
4	603 602	CL		LEAN CLAY - grayish brown, 5 YR 3/2, gravel fill		38 48 46 30
5	601	AR		FILL - gravel, concrete, rock		38 40
6	600 599	CL		LEAN CLAY - grayish olive, 10 Y 4/2, fine sand		52 66 46
7	598	CL		LEAN CLAY - moderate brown, 5 YR 3/4, gravel fill with asphalt chunks, low to medium plasticity		48 38 42
8	597					62
9						
10						

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Science Applications International Corporation
An Employee-Owned Company

BORING LOG TMFC1-003

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

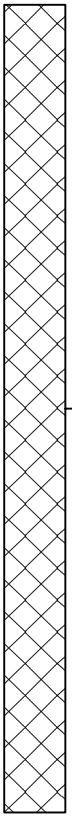
Date Started	: 7/31/01
Date Completed	: 7/31/01
Hole Diameter	: 2 inches
Depth of Boring	: 16 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1091411.98
Easting Coord.	: 415967.55

Logged By	: D. Minese
Elevation	: 606.65 ft msl
Location	: Mudflats Class 1 Area C
Temporary Casing	: None
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 606.65	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
10		CL		LEAN CLAY - moderate brown, 5 YR 3/4, gravel fill with asphalt chunks, low to medium plasticity		36
	596	CL		LEAN CLAY - moderate brown, 5 YR 4/4, low to medium plasticity (native material, fill above)	TMF-0313	42
11						74
	595					66
12						38
	594					40
13						66
	593					60
14					TMF-0314	40
	592					40
15						38
	591					60
16						
	590					
17						
	589					
18						
	588					
19						
	587					
20						



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The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

Science Applications International Corporation
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BORING LOG TMFC1-004

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/31/01
Date Completed	: 7/31/01
Hole Diameter	: 2 inches
Depth of Boring	: 15 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1091423.07
Easting Coord.	: 415966.87

Logged By	: D. Greenman
Elevation	: 607.04 ft msl
Location	: Mudflats Class 1 Area C
Temporary Casing	: None
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 607.04	USCS	DESCRIPTION	Samples	Field Screening (CPM)
0	607	ML	SILT - moderate yellowish brown, 10 YR 5/4, gravel, firm to hard, dry, non to low plasticity (fill)	TMF-0309	52
					32
1	606	CL	LEAN CLAY - dark yellowish brown, 10YR 4/2, soft to firm, moist, low plasticity (fill)		60
					46
2	605				36
					64
3	604				42
					26
4	603				30
					44
5	602				42
					44
6	601	GM	GRAVEL - grayish orange, 10 YR 7/4, poorly graded, very dry (fill)		42
					64
7	600				38
					30
8	599				62
					42
9	598				40
					50
10					

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Science Applications International Corporation
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BORING LOG TMFC1-004

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

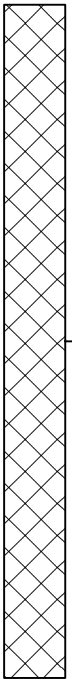
Date Started	: 7/31/01
Date Completed	: 7/31/01
Hole Diameter	: 2 inches
Depth of Boring	: 15 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1091423.07
Easting Coord.	: 415966.87

Logged By	: D. Greenman
Elevation	: 607.04 ft msl
Location	: Mudflats Class 1 Area C
Temporary Casing	: None
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 607.04	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
10	597	GM		GRAVEL - grayish orange, 10 YR 7/4, poorly graded, very dry (fill)		52
		CL		LEAN CLAY - moderate brown, 5 YR 4/4, mottled with dark yellowish brown, 10 YR 4/2 (native)	TMF-0310	62
11	596					34
						56
12	595					52
						46
13	594					62
						38
14	593					54
					TMF-0311	32
15	592					
16	591					
17	590					
18	589					
19	588					
20						



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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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Science Applications International Corporation
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BORING LOG TMFC1-005

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/13/01
Date Completed	: 7/13/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 17 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1091389.56
Easting Coord.	: 415966.54

Logged By	: M. Hilyard
Elevation	: 606.70 ft msl
Location	: Mudflats Class 1 Area C
Temporary Casing	: 3-inch steel
Total Core Recovery	: 91%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 606.70	USCS	DESCRIPTION	Samples	Field Screening (CPM)
0		GM	GRAVEL - pale brown, 10 YR 6/3, dry (fill)	TMF-0282	34
	606				34
1					46
	605				32
2		ML	SILT - very dark brown, 10 YR 2/2, medium firmness, moist to wet, low plasticity (fill)		38
	604				54
3		ML	SILT - brown, 10 YR 4/3, trace wood fragments (burnt), medium gravel, some clay, moist, low plasticity (fill)		48
	603			TMF-0285	82
4					86
	602		no recovery from 4.5 to 5 feet		
5		ML	SILT - brown, 10 YR 4/3, trace wood fragments (burnt), medium gravel, some clay, moist, low plasticity (fill)		54
	601				42
6					68
	600				54
7					70
	599				60
8					34
	598				56
9					48
	597			TMF-0283	54
10					

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Science Applications International Corporation
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Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/13/01
Date Completed	: 7/13/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 17 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1091389.56
Easting Coord.	: 415966.54

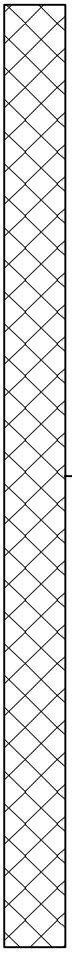
BORING LOG TMFC1-005

Logged By	: M. Hilyard
Elevation	: 606.70 ft msl
Location	: Mudflats Class 1 Area C
Temporary Casing	: 3-inch steel
Total Core Recovery	: 91%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 606.70	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
10		CL		SILT - brown, 10 YR 4/3, trace wood fragments (burnt), medium gravel, some clay, moist, low plasticity (fill)	TMF-0283	40
	596			LEAN CLAY - dark yellowish brown, 10 YR 4/6, small fractures filled with gray clay, gley 2 8/1, root structures, trace fine gravel, firm, moist, low plasticity (native material)		60
11						60
	595					48
12						40
	594					40
13						41
	593			Deepest with full recovery	TMF-0284	54
14				no recovery from 14 to 15 feet		
	592					
15		CL		LEAN CLAY - dark yellowish brown, 10 YR 4/6, small fractures filled with gray clay, gley 2 8/1, root structures, trace fine gravel, firm, moist, low plasticity (native material)		45
	591					60
16						52
	590					50
17						
	589					
18						
	588					
19						
	587					
20						



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The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

Science Applications International Corporation
An Employee-Owned Company

BORING LOG TMFC1-009

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/14/01
Date Completed	: 7/14/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 15 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1091378.83
Easting Coord.	: 415936.47

Logged By	: M. Hilyard
Elevation	: 606.54 ft msl
Location	: Mudflats Class 1 Area C
Temporary Casing	: 3-inch steel
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 606.54	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		GC/GM		GRAVEL - light brownish gray, 10 YR 6/2, medium gravel, silty, variable silt and clay content, hard, dry (fill)	TMF-0294	44
	606				TMF-9342	48
1						28
	605					28
2						54
	604					50
3						24
	603					38
4						48
	602					46
5						49
	601					46
6						48
	600					40
7						40
	599					38
8		ML		SILT - black, 10 YR 2/1, sand, woody debris, wet (fill)	TMF-0295	42
	598				TMF-9343	32
9						42
	597	CL		LEAN CLAY - dark yellowish brown, 10 YR 4/6, trace fine gravel, root structures, moist		46
10						

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Science Applications International Corporation
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Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/14/01
Date Completed	: 7/14/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 15 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1091378.83
Easting Coord.	: 415936.47

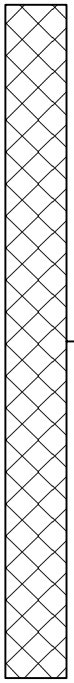
BORING LOG TMFC1-009

Logged By	: M. Hilyard
Elevation	: 606.54 ft msl
Location	: Mudflats Class 1 Area C
Temporary Casing	: 3-inch steel
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 606.54	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
10		CL		LEAN CLAY - dark yellowish brown, 10 YR 4/6, trace fine gravel, root structures, moist		40
	596					48
11						44
	595					32
12						54
	594					40
13						34
	593				TMF-0296	42
14					TMF-9344	46
	592					51
15						
	591					
16						
	590					
17						
	589					
18						
	588					
19						
	587					
20						



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The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

Science Applications International Corporation
An Employee-Owned Company

BORING LOG TMFC1-013

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/14/01
Date Completed	: 7/14/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 15 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1091340.59
Easting Coord.	: 415837.40

Logged By	: M. Hilyard
Elevation	: 605.76 ft msl
Location	: Mudflats Class 1 Area C
Temporary Casing	: 3-inch steel
Total Core Recovery	: 92%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 605.76	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		SP		SAND - very pale brown, 10 YR 7/3, gravely sand fill, soft, dry to moist (fill)	TMF-0306	54
	605					68
1						50
	604					48
2						30
	603	ML		SILT - dark yellowish brown, 10 YR 4/6, some clay, trace medium gravel, dry (fill)		62
3						34
	602					50
4				no recovery from 4 to 5.25 feet		
	601					
5						36
	600	ML		SILT - very pale brown, 10 YR 7/3, little clay, dry, medium plasticity (fill)		54
6						64
	599					50
7						60
	598					50
8						42
	597					34
9						52
	596					50
10						

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Science Applications International Corporation
An Employee-Owned Company

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/14/01
Date Completed	: 7/14/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 15 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1091340.59
Easting Coord.	: 415837.40

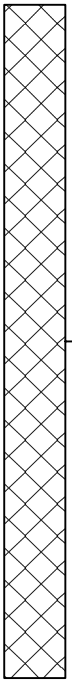
BORING LOG TMFC1-013

Logged By	: M. Hilyard
Elevation	: 605.76 ft msl
Location	: Mudflats Class 1 Area C
Temporary Casing	: 3-inch steel
Total Core Recovery	: 92%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 605.76	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
10		ML		SILT - very pale brown, 10 YR 7/3, little clay, dry, medium plasticity (fill)		54
	595					60
11		ML		SILT - dark yellowish brown, 10 YR 4/6, trace gravel, root structures, hard, moist, low plasticity	TMF-0307	68
	594					58
12						42
	593					62
13						36
	592					40
14						52
	591				TMF-0308	32
15						
	590					
16						
	589					
17						
	588					
18						
	587					
19						
	586					
20						



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The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

Mudflats
Class 2 Area C

Science Applications International Corporation
An Employee-Owned Company

BORING LOG TMFC2-001

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/13/01
Date Completed	: 7/13/01
Hole Diameter	: 2 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1091251.88
Easting Coord.	: 415795.39

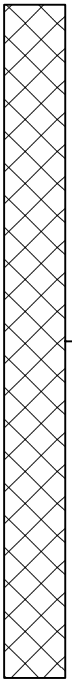
Logged By	: D. Greenman
Elevation	: 602.22 ft msl
Location	: Mudflats Class 2 Area C
Temporary Casing	: None
Total Core Recovery	: 90%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Surf. Elev. 602.22

Depth in Feet	Elev.	USCS	DESCRIPTION	Samples	Field Screening (CPM)
0	602	ML	SILT - dark yellowish brown, 10 YR 4/2, roots, moist to very moist, non to low plasticity	TMF-0218	40
		CL	LEAN CLAY - moderate yellowish brown, 10 YR 5/4, moist, low plasticity		32
1	601				62
					66
2	600				48
					52
3	599		Deepest with full recovery	TMF-0219	56
					38
4	598				42
					48
5	597				
6	596				
7	595				
8	594				
9	593				
10					



Backfilled with Boring Cuttings

The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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Science Applications International Corporation
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BORING LOG TMFC2-002

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

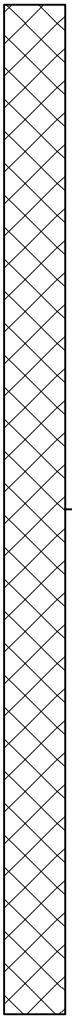
Date Started	: 7/14/01
Date Completed	: 7/14/01
Hole Diameter	: 2 inches
Depth of Boring	: 7.5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1091281.20
Easting Coord.	: 415795.88

Logged By	: D. Greenman
Elevation	: 602.15 ft msl
Location	: Mudflats Class 2 Area C
Temporary Casing	: 3-inch steel
Total Core Recovery	: 95%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 602.15	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	602	GM		SILTY GRAVEL - pale yellowish brown, 10 YR 6/2, asphalt fill		42
		ML		SILT - dark yellowish brown, 10 YR 4/2, firm to hard, moist, non to low plasticity	TMF-0232	30
1	601					46
						48
2	600					34
						54
3	599					36
		CL		LEAN CLAY - moderate yellowish brown, 10 YR 5/4, hard to very hard, dry, low plasticity		38
4	598					34
						60
5	597					58
						62
6	596			Deepest with full recovery	TMF-0233	42
						52
7	595					38
8	594					
9	593					
10						



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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

Science Applications International Corporation
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BORING LOG TMFC2-003

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/15/01
Date Completed	: 7/15/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 13 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1091333.22
Easting Coord.	: 415796.78

Logged By	: M. Hilyard
Elevation	: 604.94 ft msl
Location	: Mudflats Class 2 Area C
Temporary Casing	: None
Total Core Recovery	: 92%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 604.94	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		SM		SILTY SAND - pale brown, 10 YR 6/3, trace medium gravel in discrete layers, soft, moist to dry	TMF-0242	43
						48
1	604					60
		ML		SILT - dark yellowish brown, 10 YR 4/6, trace fine gravel, moist		58
2	603					36
						38
3	602					58
						46
4	601			no recovery from 4 to 5 feet		
5	600	ML		SILT - dark yellowish brown, 10 YR 4/6, trace fine gravel, moist		48
						52
6	599					50
						56
7	598					40
		CL		LEAN CLAY - dark yellowish brown, 10 YR 4/6, trace fine gravel, trace root structures, hard, moist, native		40
8	597					50
						52
9	596					42
						58
10	595					

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BORING LOG TMFC2-003

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/15/01
Date Completed	: 7/15/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 13 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1091333.22
Easting Coord.	: 415796.78

Logged By	: M. Hilyard
Elevation	: 604.94 ft msl
Location	: Mudflats Class 2 Area C
Temporary Casing	: None
Total Core Recovery	: 92%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 604.94	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
10		CL		LEAN CLAY - dark yellowish brown, 10 YR 4/6, trace fine gravel, trace root structures, hard, moist, native No field screen from 10 to 13 feet		
11	594			Deepest with full recovery	TMF-0243	
12	593					
13	592					
14	591					
15	590					
16	589					
17	588					
18	587					
19	586					
20	585					

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The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

Science Applications International Corporation
An Employee-Owned Company

BORING LOG TMFC2-004

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/12/01
Date Completed	: 7/12/01
Hole Diameter	: 2 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1091422.66
Easting Coord.	: 415845.24

Logged By	: D. Greenman
Elevation	: 600.60 ft msl
Location	: Mudflats Class 2 Area C
Temporary Casing	: None
Total Core Recovery	: 95%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 600.60	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		ML		SILT - yellowish brown, 10 YR 4/2, roots, moist, non to low plasticity	TMF-0214	28
	600					48
1		CL		LEAN CLAY - moderate yellowish brown, 10 YR 5/4, mottled with dark yellowish brown, 10 YR 2/2, firm to soft, moist to dry, low plasticity		64
	599					54
2						48
	598					80
3				Deepest with full recovery	TMF-0215	32
	597					40
4						64
	596					36
5						
	595					
6						
	594					
7						
	593					
8						
	592					
9						
	591					
10						

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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

BORING LOG TMFC2-005

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Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/12/01
Date Completed	: 7/12/01
Hole Diameter	: 2 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1091481.19
Easting Coord.	: 415795.80

Logged By	: D. Greenman
Elevation	: 598.80 ft msl
Location	: Mudflats Class 2 Area C
Temporary Casing	: None
Total Core Recovery	: 90%

Notes:

Elevations represented in feet above mean sea level (msl)

CPM - counts per minute on Eberline G-M

30 second count unless noted otherwise

N/A - not applicable

Boring Completion Details:
Elev.: N/A

Surf. Elev. 598.80

Depth in Feet	USCS	DESCRIPTION	Samples	Field Screening (CPM)
0	ML	SILT - moderate yellowish brown, 10 YR 5/4, roots, dry, non to low plasticity	TMF-0210	72
			TMF-9246	
598				52
1	CL	LEAN CLAY - light brown, 5 YR 5/6, moist, fine coarse sandy inclusions/mottled with pale yellowish brown, 10 YR 6/2, moist, low plasticity		74
597				60
2				44
596				76
3		Deepest with full recovery	TMF-0211	50
			TMF-9247	
595				36
4				72
594				48
5				
593				
6				
592				
7				
591				
8				
590				
9				
589				
10				

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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TMFC2-006

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/12/01
Date Completed	: 7/12/01
Hole Diameter	: 2 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1091512.82
Easting Coord.	: 415794.66

Logged By	: D. Greenman
Elevation	: 598.01 ft msl
Location	: Mudflats Class 2 Area C
Temporary Casing	: None
Total Core Recovery	: 95%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Surf. Elev. 598.01

Depth in Feet	USCS	DESCRIPTION	Samples	Field Screening (CPM)
0 (598)	ML	SILT - moderate yellowish brown, 10 YR 5/4, angular gravel, roots, soft, dry, non to low plasticity	TMF-0212	58
				42
1 (597)	CL	LEAN CLAY - light brown, 5 YR 5/6, hard to very hard, moist, low plasticity		64
				72
2 (596)				70
				50
3 (595)				70
		Deepest with full recovery	TMF-0213	56
4 (594)				70
				42
5 (593)				
6 (592)				
7 (591)				
8 (590)				
9 (589)				
10				

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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TMFC2-008

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/13/01
Date Completed	: 7/13/01
Hole Diameter	: 2 inches
Depth of Boring	: 7 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1091287.55
Easting Coord.	: 415897.63

Logged By	: D. Greenman
Elevation	: 604.95 ft msl
Location	: Mudflats Class 2 Area C
Temporary Casing	: 3-inch steel
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 604.95	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		GC		SILTY GRAVEL - pale yellowish brown, 10 YR 6/2, fill		42
						38
1	604					26
						22
2	603					22
						34
3	602					36
		CL		LEAN CLAY - moderate yellowish brown to dark yellowish orange, 10 YR 5/4 to 6/6, hard to very hard, moist to dry, low plasticity	TMF-0230	22
4	601					52
						46
5	600					42
						40
6	599					54
					TMF-0231	28
7	598					
8	597					
9	596					
10	595					

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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TMFC2-009

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/15/01
Date Completed	: 7/15/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 11.5 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1091480.04
Easting Coord.	: 415894.28

Logged By	: M. Hilyard
Elevation	: 606.36 ft msl
Location	: Mudflats Class 2 Area C
Temporary Casing	: 3-inch steel
Total Core Recovery	: 96%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 606.36	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	606	SM		SILTY SAND - light yellowish brown, 10 YR 6/4, fine sand, little fine gravel, trace medium gravel, soft, dry to moist	TMF-0244	50
1	605	ML		SILT - dark yellowish brown, 10 YR 4/4, moist, low plasticity (fill)		64 44
2 3 4	604 603 602	SM		SILTY SAND - black, 10 YR 2/1, trace medium gravel, trace glass, little wood debris, soft, moist, (fill) Geotechnical sample from 3 to 4.5 feet		32 36 42 48 36 34
				no recovery from 4.5 to 5 feet		
5 6 7	601 600 599	SM		SILTY SAND - black, 10 YR 2/1, trace medium gravel, trace glass, little wood debris, soft, moist, (fill)		40 32 46 44
		SC		CLAYEY SAND - dark yellowish brown, 10 YR 4/4, fine sand and clay, soft, wet		50
8 9 10	598 597	CL		LEAN CLAY - dark yellowish brown, 10 YR 4/6, trace fine gravel, root structures, hard, moist (native)		48 46 50 44 46

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BORING LOG TMFC2-009

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/15/01
Date Completed	: 7/15/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 11.5 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1091480.04
Easting Coord.	: 415894.28

Logged By	: M. Hilyard
Elevation	: 606.36 ft msl
Location	: Mudflats Class 2 Area C
Temporary Casing	: 3-inch steel
Total Core Recovery	: 96%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 606.36	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
10	596	CL		LEAN CLAY - dark yellowish brown, 10 YR 4/6, trace fine gravel, root structures, hard, moist (native)		26
						46
11	595			Deepest with full recovery Geotechnical sample from 11 to 11.5 feet	TMF-0245	56
12	594					
13	593					
14	592					
15	591					
16	590					
17	589					
18	588					
19	587					
20						

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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TMFC2-010

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/15/01
Date Completed	: 7/15/01
Hole Diameter	: 2 inches
Depth of Boring	: 9.5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1091516.41
Easting Coord.	: 415892.92

Logged By	: D. Greenman
Elevation	: 605.61 ft msl
Location	: Mudflats Class 2 Area C
Temporary Casing	: None
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 605.61	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		GM		SILTY GRAVEL - dusky yellowish brown, 10 YR 2/2, angular gravel, soft, dry to moist (fill)		44
	605				TMF-0240	54
1						48
	604					44
2						34
	603					44
3						38
	602					36
4						24
	601					40
5						48
	600					62
6		CL		LEAN CLAY - moderate brown, 5 YR 4/4, hard to very hard, dry, low plasticity (native material, fill above)		38
	599					58
7						50
	598					60
8						50
	597					54
9					TMF-0241	60
	596					
10						

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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TMFC2-011

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/13/01
Date Completed	: 7/13/01
Hole Diameter	: 2 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1091260.78
Easting Coord.	: 415999.65

Logged By	: D. Greenman
Elevation	: 607.54 ft msl
Location	: Mudflats Class 2 Area C
Temporary Casing	: None
Total Core Recovery	: 90%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 607.54	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		CL		LEAN CLAY - moderate yellowish brown, 10 YR 5/4, fine grain sandy inclusions, firm to very firm, dry	TMF-0220	44
	607					46
1						30
	606	CL		LEAN CLAY - color change to dark yellowish brown, 10 YR 4/2		34
2		CL		LEAN CLAY - same as above, mottled with pale yellowish brown, 10 YR 6/2		56
	605					44
3				Deepest with full recovery	TMF-0221	50
	604					46
4						52
	603					64
5						
	602					
6						
	601					
7						
	600					
8						
	599					
9						
	598					
10						

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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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Science Applications International Corporation
An Employee-Owned Company

BORING LOG TMFC2-012

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/13/01
Date Completed	: 7/13/01
Hole Diameter	: 2 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1091284.72
Easting Coord.	: 415996.92

Logged By	: D. Greenman
Elevation	: 607.80 ft msl
Location	: Mudflats Class 2 Area C
Temporary Casing	: None
Total Core Recovery	: 90%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Surf. Elev. 607.80

Depth in Feet	USCS	DESCRIPTION	Samples	Field Screening (CPM)
0	ML	SILT - dusky yellowish brown, 10 YR 2/2, angular gravel, dry, non to low plasticity	TMF-0222	32
607	CL	LEAN CLAY - dark yellowish brown, 10 YR 4/2, soft to firm, moist, low plasticity		46
1				68
606				44
2				86
605				64
3		Deepest with full recovery	TMF-0223	60
604				56
4				62
603				56
5				
602				
6				
601				
7				
600				
8				
599				
9				
598				
10				

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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TMFC2-013

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/14/01
Date Completed	: 7/14/01
Hole Diameter	: 2 inches
Depth of Boring	: 15 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1091482.95
Easting Coord.	: 415991.71

Logged By	: D. Greenman
Elevation	: 607.55 ft msl
Location	: Mudflats Class 2 Area C
Temporary Casing	: 3-inch steel
Total Core Recovery	: 90%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 607.55	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		GM		SILTY GRAVEL - dark yellowish brown, 10 YR 4/2, roots, organic decay, angular gravel, dry (fill)	TMF-0236	46
	607					48
1		ML		SILT - dusky yellowish brown, 10 YR 4/2, non to low plasticity (fill)		46
	606					46
2						48
	605					28
3						60
	604					50
4		ML		SILT - dark yellowish brown, to dusky yellowish brown, 10 YR 4/2 to 2/2, soft, very moist, low plasticity (fill)		42
	603					46
5						50
	602					48
6						48
	601					52
7						38
	600					50
8						34
	599	SM		SILTY SAND - pale yellowish brown, 10 YR 6/2, dry, hard		54
9		CL		LEAN CLAY - light brown, 5 YR 5/6, firm, moist to slightly moist, low plasticity (native material, fill above)		42
	598					38
10						

Backfilled with Boring Cuttings

01-24-2002 U:\PUBLIC\MTech\Tonawanda\Mudflats\Class 2 Area C\TMFC2-013.BOR

Science Applications International Corporation
An Employee-Owned Company

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/14/01
Date Completed	: 7/14/01
Hole Diameter	: 2 inches
Depth of Boring	: 15 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1091482.95
Easting Coord.	: 415991.71

BORING LOG TMFC2-013

Logged By	: D. Greenman
Elevation	: 607.55 ft msl
Location	: Mudflats Class 2 Area C
Temporary Casing	: 3-inch steel
Total Core Recovery	: 90%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 607.55	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
10		CL		LEAN CLAY - light brown, 5 YR 5/6, firm, moist to slightly moist, low plasticity (native material, fill above)		46
	597					56
11						54
	596					52
12						56
	595					44
13				Deepest with full recovery	TMF-0237	56
	594					50
14						54
	593					64
15						
	592					
16						
	591					
17						
	590					
18						
	589					
19						
	588					
20						

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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

03-18-2002 U:\PUBLIC\MTech\Tonawanda\Mudflats\Class 2 Area C\TMFC2-013.BOR

Science Applications International Corporation
An Employee-Owned Company

BORING LOG TMFC2-014

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/15/01
Date Completed	: 7/15/01
Hole Diameter	: 2 inches
Depth of Boring	: 12.5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1091515.02
Easting Coord.	: 415991.48

Logged By	: D. Greenman
Elevation	: 606.39 ft msl
Location	: Mudflats Class 2 Area C
Temporary Casing	: None
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 606.39	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	606	ML		SILT - moderate brown, 5 YR 3/4, mottled with dark yellowish brown, 10 YR 4/2, angular gravel, soft, moist (fill)	TMF-0238	40
1	605					32
						36
2	604					50
						36
3	603					66
						62
4	602	CL		LEAN CLAY - moderate brown, 5 YR 4/4, hard, dry to moist, low plasticity (fill)		36
						44
5	601	CL		LEAN CLAY - moderate brown, 5 YR 4/4, hard, wet, low plasticity (fill)		44
						38
6	600					46
						56
7	599	CL		LEAN CLAY - moderate brown, 5 YR 4/4, 2-inch layer of angular rock, hard, dry to moist, low plasticity (native material, fill above)		48
						46
8	598			wet to very wet, soft for 5-inches		44
						38
9	597					54
						38
10						48

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Science Applications International Corporation
An Employee-Owned Company

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/15/01
Date Completed	: 7/15/01
Hole Diameter	: 2 inches
Depth of Boring	: 12.5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1091515.02
Easting Coord.	: 415991.48

BORING LOG TMFC2-014

Logged By	: D. Greenman
Elevation	: 606.39 ft msl
Location	: Mudflats Class 2 Area C
Temporary Casing	: None
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 606.39	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
10	596	CL		LEAN CLAY - moderate brown, 5 YR 4/4, 2-inch layer of angular rock, hard, dry to moist, low plasticity (native material, fill above)		52
						40
11	595					38
				Deepest with full recovery	TMF-0239	64
12	594					58
13	593					
14	592					
15	591					
16	590					
17	589					
18	588					
19	587					
20						

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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TMFC2-015

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/13/01
Date Completed	: 7/13/01
Hole Diameter	: 2 inches
Depth of Boring	: 6.5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1091347.84
Easting Coord.	: 416055.62

Logged By	: D. Greenman
Elevation	: 608.09 ft msl
Location	: Mudflats Class 2 Area C
Temporary Casing	: None
Total Core Recovery	: 95%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 608.09	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	608	GM		SILTY GRAVEL - dusky yellowish brown, 10 YR 2/2 (fill)		40
						48
1	607					42
		CL		LEAN CLAY - moderate yellowish brown, 10 YR 5/4, mottled with dark yellowish brown, 10 YR 4/2, hard, dry, low plasticity	TMF-0224	30
2	606					38
						52
3	605					52
						38
4	604					30
				Deepest with full recovery	TMF-0225	58
5	603					48
				Pushed to 6.5 feet for geophysical downhole gamma scan purposes		62
6	602					42
7	601					
8	600					
9	599					
10						

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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TMFC2-016

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Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/13/01
Date Completed	: 7/13/01
Hole Diameter	: 2 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1091382.07
Easting Coord.	: 416059.12

Logged By	: D. Greenman
Elevation	: 608.85 ft msl
Location	: Mudflats Class 2 Area C
Temporary Casing	: None
Total Core Recovery	: 90%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 608.85	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		ML		SILT - grayish orange, 10 YR 7/4, hard to very hard, dry, non to low plasticity	TMF-0226	38
	608					32
1		CL		LEAN CLAY - dark yellowish brown, 10 YR 4/2, to moderate yellowish brown, 10 YR 5/4, firm to hard, moist, medium plasticity		56
	607					46
2						38
	606					46
3				Deepest with full recovery	TMF-0227	34
	605					40
4						46
	604					44
5						
	603					
6						
	602					
7						
	601					
8						
	600					
9						
	599					
10						

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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/14/01
Date Completed	: 7/14/01
Hole Diameter	: 2 inches
Depth of Boring	: 14.5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1091428.53
Easting Coord.	: 416054.19

Logged By	: D. Greenman
Elevation	: 607.65 ft msl
Location	: Mudflats Class 2 Area C
Temporary Casing	: 3-inch steel
Total Core Recovery	: 98%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 607.65	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		GM		SILTY GRAVEL - dark yellowish brown, 10 YR 4/2, roots, organic decay, angular gravel, dry (fill)	TMF-0234	34
					TMF-9250	
	607					32
1						34
	606	ML		SILT - dusky yellowish brown, 10 YR 4/2, moist to very moist, non to low plasticity (fill)		34
2						30
	605					48
3						38
	604					52
4						54
	603	AR		wood		40
5		ML		SILT - dark yellowish brown to dusky yellowish brown, 10 YR 4/2 to 2/2, soft, very moist, non to low plasticity		36
	602					28
6						38
	601					40
7						62
	600					34
8						34
	599					44
9						44
	598					22
10						

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BORING LOG TMFC2-017

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

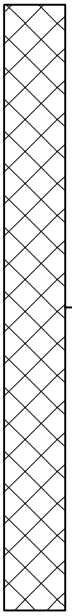
Date Started	: 7/14/01
Date Completed	: 7/14/01
Hole Diameter	: 2 inches
Depth of Boring	: 14.5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1091428.53
Easting Coord.	: 416054.19

Logged By	: D. Greenman
Elevation	: 607.65 ft msl
Location	: Mudflats Class 2 Area C
Temporary Casing	: 3-inch steel
Total Core Recovery	: 98%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 607.65	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
10		ML		SILT - dark yellowish brown to dusky yellowish brown, 10 YR 4/2 to 2/2, soft, very moist, non to low plasticity		24
	597	CL		LEAN CLAY - light brown, 5 YR 5/6, sub-angular gravel, firm, moist to slightly moist, low plasticity (native material, fill above)	TMF-9248	34
11						36
	596	CL		LEAN CLAY - moderate brown, 5 YR 4/4, firm, dry, low plasticity		38
12						36
	595					58
13						42
	594			Deepest with full recovery	TMF-0235	36
14					TMF-9249	44
	593					
15						
	592					
16						
	591					
17						
	590					
18						
	589					
19						
	588					
20						



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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

Science Applications International Corporation
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BORING LOG TMFC2-018

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

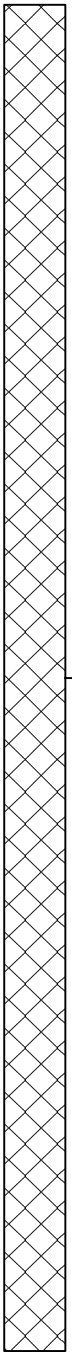
Date Started	: 7/12/01
Date Completed	: 7/12/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 14 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1091481.35
Easting Coord.	: 416056.84

Logged By	: M. Hilyard
Elevation	: 608.26 ft msl
Location	: Mudflats Class 2 Area C
Temporary Casing	: 3-inch steel
Total Core Recovery	: 75%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 608.26	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	608	SM		SILTY SAND - very dark grayish brown, 10 YR 3/2, some coarse sand, sub-angular grains, soft (fill)	TMF-0228	58
1	607					32 44 30
2	606	ML		SILT - dark yellowish brown, 10 YR 4/6, moist, medium plasticity (fill)		60
3	605	SM		SILTY SAND - black, 10 YR 2/1, trace medium gravel, soft, moist (fill)		50 54 44
4	604					22
5	603			no recovery from 4.5 to 8 feet		
6	602					
7	601					
8	600	ML		SILT - black, woody debris, trace fine gravel, soft, wet (fill) no field screening from 8 to 10 feet		
9	599					
10						



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Science Applications International Corporation
An Employee-Owned Company

BORING LOG TMFC2-018

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/12/01
Date Completed	: 7/12/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 14 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1091481.35
Easting Coord.	: 416056.84

Logged By	: M. Hilyard
Elevation	: 608.26 ft msl
Location	: Mudflats Class 2 Area C
Temporary Casing	: 3-inch steel
Total Core Recovery	: 75%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 608.26	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
10	598	CL		SILT - black, woody debris, trace fine gravel, soft, wet (fill)		44
				LEAN CLAY - dark yellowish brown, 10 YR 4/6, firm, moist, low plasticity		42
11	597					48
						36
12	596					42
						56
13	595					68
					TMF-0229	46
14	594					
15	593					
16	592					
17	591					
18	590					
19	589					
20						

Backfilled with Boring Cuttings

The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

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Science Applications International Corporation
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BORING LOG TMFC2-019

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/12/01
Date Completed	: 7/12/01
Hole Diameter	: 2 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1091521.22
Easting Coord.	: 416055.86

Logged By	: D. Greenman
Elevation	: 600.40 ft msl
Location	: Mudflats Class 2 Area C
Temporary Casing	: None
Total Core Recovery	: 90%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Surf. Elev. 600.40

Depth in Feet	Elev.	USCS	DESCRIPTION	Samples	Field Screening (CPM)
0	600	ML	SILT - dark yellowish brown, 10 YR 4/2, roots, angular gravel, moist, non to low plasticity	TMF-0216	48
		CL	LEAN CLAY - light brown, 10 YR 4/2, hard to very hard, dry to moist, low plasticity		54
1	599				54
					50
2	598				48
					50
3	597		Deepest with full recovery	TMF-0217	60
					36
4	596				68
					58
5	595				
6	594				
7	593				
8	592				
9	591				
10					

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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

03-18-2002 U:\PUBLIC\MTech\Tonawanda\Mudflats\Class 2 Area C\TMFC2-019.BOR

Mudflats
Class 3A Random

Science Applications International Corporation
An Employee-Owned Company

BORING LOG TMF3A-001

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 6/30/01
Date Completed	: 6/30/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 4.5 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1091890.14
Easting Coord.	: 417329.54

Logged By	: S. McInall
Elevation	: 599.97 ft msl
Location	: Mudflats Class 3A Random
Temporary Casing	: None
Total Core Recovery	: 95%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 599.97	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		ML		SILT - pale yellowish brown, 10 YR 6/2, vertical roots, dry, non to low plasticity	TMF-0051	62
						62
1	599					48
						60
2	598					42
						54
3	597	CL		LEAN CLAY - dark yellowish brown, 10 YR 4/2, trace coarse-grained angular gravel, stiff, moist, low plasticity		40
					TMF-0052	34
4	596					64
5	595					
6	594					
7	593					
8	592					
9	591					
10	590					

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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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Science Applications International Corporation
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BORING LOG TMF3A-002

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 6/30/01
Date Completed	: 6/30/01
Hole Diameter	: 2 inches
Depth of Boring	: 6 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1091832.73
Easting Coord.	: 417707.61

Logged By	: S. McInall
Elevation	: 599.72 ft msl
Location	: Mudflats Class 3A Random
Temporary Casing	: None
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 599.72	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		ML		SILT - pale yellowish brown, 10 YR 6/2, angular gravel, vertical roots, dry, non to low plasticity	TMF-0059	52
	599					55
1						56
	598					34
2		CL		LEAN CLAY - dark yellowish brown, 10 YR 4/2, angular gravel, stiff, moist, low plasticity		52
	597					60
3						62
	596				TMF-0060	42
4						56
	595					48
5				Pushed to 6 feet for geophysical downhole gamma scan purposes, core not logged		
	594					
6						
	593					
7						
	592					
8						
	591					
9						
	590					
10						

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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TMF3A-003

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/1/01
Date Completed	: 7/1/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1091689.35
Easting Coord.	: 416226.59

Logged By	: D. Minese
Elevation	: 597.60 ft msl
Location	: Mudflats Class 3A Random
Temporary Casing	: None
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 597.60	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		CL		LEAN CLAY - moderate brown, 5 YR 3/4, crumbly	TMF-0085	36
	597					42
1						50
	596	CL		LEAN CLAY - moderate brown, 5 YR 4/4, with 1 to 1-1/2-inch sub-angular gravel, moist, low to medium plasticity		60
2						44
	595					32
3						44
	594				TMF-0086	56
4						42
	593					64
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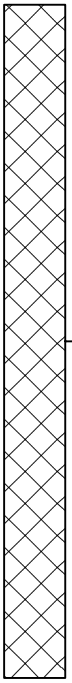

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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TMF3A-004

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/1/01
Date Completed	: 7/1/01
Hole Diameter	: 2 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1091573.65
Easting Coord.	: 416907.10

Logged By	: S. McInall
Elevation	: 598.40 ft msl
Location	: Mudflats Class 3A Random
Temporary Casing	: None
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 598.40	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		ML		SILT - pale yellowish brown, 10 YR 6/2, angular gravel, vertical roots, dry, non to low plasticity	TMF-0083	60
	598					48
1						50
	597					62
2		CL		LEAN CLAY - dark yellowish brown, 10 YR 4/2, angular gravel, stiff, moist, low plasticity		62
	596					46
3						64
	595				TMF-0084	48
4						54
	594					50
5						
	593					
6						
	592					
7						
	591					
8						
	590					
9						
	589					
10						

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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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An Employee-Owned Company

BORING LOG TMF3A-006

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

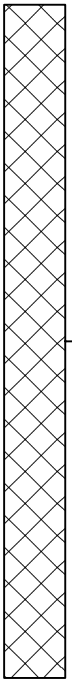
Date Started	: 7/1/01
Date Completed	: 7/1/01
Hole Diameter	: 2 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1091535.58
Easting Coord.	: 415817.81

Logged By	: S. McInall
Elevation	: 598.09 ft msl
Location	: Mudflats Class 3A Random
Temporary Casing	: None
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 598.09	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	598	ML		SILT - pale yellowish brown, 10 YR 6/2, some gravel, vertical roots, dry, non to low plasticity	TMF-0077	74
						56
1	597					56
						44
2	596					52
						58
3	595					52
4	594	CL		LEAN CLAY - dark yellowish brown, 10 YR 4/2, angular gravel, stiff, moist, low plasticity	TMF-0078	56
						52
						62
5	593					
6	592					
7	591					
8	590					
9	589					
10						



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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TMF3A-007

(Page 1 of 1)

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Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 6/30/01
Date Completed	: 6/30/01
Hole Diameter	: 2 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1091531.48
Easting Coord.	: 417487.50

Logged By	: S. McInall
Elevation	: 599.96 ft msl
Location	: Mudflats Class 3A Random
Temporary Casing	: None
Total Core Recovery	: 100%

Notes:

Elevations represented in feet above mean sea level (msl)

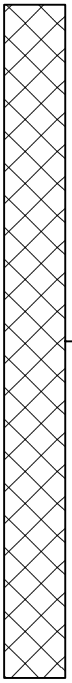
CPM - counts per minute on Eberline G-M

30 second count unless noted otherwise

N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 599.96	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		ML		SILT - pale yellowish brown, 10 YR 6/2, trace gravel, vertical roots, dry, non to low plasticity	TMF-0065	36
						66
1	599					46
						44
2	598					44
		CL		LEAN CLAY - dark yellowish brown, 10 YR 4/2, trace gravel, stiff, moist, low plasticity		44
3	597					46
					TMF-0066	54
4	596					40
						58
5	595					
6	594					
7	593					
8	592					
9	591					
10	590					



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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TMF3A-008

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/1/01
Date Completed	: 7/1/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1091785.59
Easting Coord.	: 415803.12

Logged By	: D. Minese
Elevation	: 601.93 ft msl
Location	: Mudflats Class 3A Random
Temporary Casing	: None
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 601.93	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		CL		LEAN CLAY - moderate brown, 5 YR 3/4, some gravel up to 1-inch, dry, crumbly	TMF-0079	56
					TMF-9089	
1	601					56
						58
2	600	CL		LEAN CLAY - moderate brown, 5 YR 4/4, some concrete chips up to 1-inch		38
						44
3	599					72
						54
4	598	CL		LEAN CLAY - moderate brown, 5 YR 4/4, with olive black, 5 Y 2/1, 1-inch angular gravel	TMF-0080	48
					TMF-9090	
						40
5	597					38
6	596					
7	595					
8	594					
9	593					
10	592					

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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TMF3A-009

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 6/30/01
Date Completed	: 6/30/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 4 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1091951.48
Easting Coord.	: 416555.88

Logged By	: D. Minese
Elevation	: 615.10 ft msl
Location	: Mudflats Class 3A Random
Temporary Casing	: None
Total Core Recovery	: 80%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 615.10	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	615	CL		LEAN CLAY - 5 YR 3/4, with fill - concrete, medium plasticity	TMF-0069	68
						32
1	614					52
						52
2	613					34
						34
3	612					60
					TMF-0070	44
4	611			no recovery from 4 to 5 feet		
5	610					
6	609					
7	608					
8	607					
9	606					
10						

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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TMF3A-010

Science Applications International Corporation
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Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/1/01
Date Completed	: 7/1/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1091951.30
Easting Coord.	: 416028.86

Logged By	: D. Minese
Elevation	: 614.66 ft msl
Location	: Mudflats Class 3A Random
Temporary Casing	: None
Total Core Recovery	: 90%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 614.66	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		CL		LEAN CLAY - light brown, 5 YR 5/6, dry, crumbly	TMF-0073	52
	614					58
1						46
	613	AR		FILL - moderate brown, 5 YR 3/4, with some dark yellowish brown, 10 YR 4/2, concrete chips		70
2						62
	612					52
3		CL		LEAN CLAY - moderate brown, 5 YR 4/4, with red brick chips		72
	611				TMF-0074	44
4						52
	610			no recovery from 4.5 to 5 feet		
5						
	609					
6						
	608					
7						
	607					
8						
	606					
9						
	605					
10						

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Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 6/30/01
Date Completed	: 6/30/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1092063.23
Easting Coord.	: 417304.50

Logged By	: D. Minese
Elevation	: 613.61 ft msl
Location	: Mudflats Class 3A Random
Temporary Casing	: None
Total Core Recovery	: 90%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 613.61	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		ML		SILT - dusky brown, 5 YR 2/2, up to 1-inch angular gravel	TMF-0053	50
	613					54
1						50
	612					50
2		CL		LEAN CLAY - moderate brown, 5 YR 3/4, sub-angular gravel		56
	611					36
3						56
	610				TMF-0054	56
4						44
	609			no recovery from 4.5 to 5 feet		
5						
	608					
6						
	607					
7						
	606					
8						
	605					
9						
	604					
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Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 6/30/01
Date Completed	: 6/30/01
Hole Diameter	: 2 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1091748.83
Easting Coord.	: 417484.63

Logged By	: D. Minese
Elevation	: 598.95 ft msl
Location	: Mudflats Class 3A Random
Temporary Casing	: None
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 598.95	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		CL		LEAN CLAY - moderate brown, 5 YR 3/4, 1-inch sub-angular gravel, dry, crumbly	TMF-0061	48
						48
1	598					62
		CL		LEAN CLAY - moderate brown, 5 YR 4/4, coarse-grained sand, moist, low to medium plasticity		54
2	597					32
						34
3	596					42
					TMF-0062	40
4	595					32
						56
5	594					
6	593					
7	592					
8	591					
9	590					
10	589					

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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

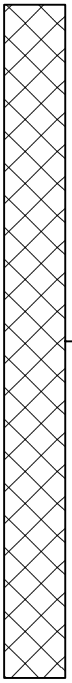
Date Started	: 6/30/01
Date Completed	: 6/30/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1091807.74
Easting Coord.	: 417104.81

Logged By	: D. Minese
Elevation	: 598.70 ft msl
Location	: Mudflats Class 3A Random
Temporary Casing	: None
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 598.70	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		CL		LEAN CLAY - moderate brown, 5 YR 3/4, up to 1-inch angular gravel, dry, tight	TMF-0055	58
	598					72
1						58
	597					58
2		CL		LEAN CLAY - moderate brown, 5 YR 4/4, more moist than above, low plasticity		64
	596					68
3						38
	595				TMF-0056	46
4						62
	594					44
5						
	593					
6						
	592					
7						
	591					
8						
	590					
9						
	589					
10						



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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TMF3A-017

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/1/01
Date Completed	: 7/1/01
Hole Diameter	: 2 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1091603.28
Easting Coord.	: 415969.15

Logged By	: S. McInall
Elevation	: 598.62 ft msl
Location	: Mudflats Class 3A Random
Temporary Casing	: None
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 598.62	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		ML		SILT - pale yellowish brown, 10 YR 6/2, angular gravel, dry, non to low plasticity	TMF-0081	64
					TMF-9087	
	598					48
1						68
	597	CL		LEAN CLAY - dark yellowish brown, 10 YR 4/2, angular gravel, stiff, moist, low plasticity		68
2						60
	596					50
3						44
	595				TMF-0082	66
4					TMF-9088	
						48
	594					54
5						
	593					
6						
	592					
7						
	591					
8						
	590					
9						
	589					
10						

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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TMF3A-020

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

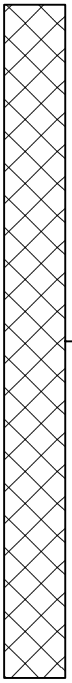
Date Started	: 6/30/01
Date Completed	: 6/30/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1091974.09
Easting Coord.	: 416350.95

Logged By	: D. Minese
Elevation	: 619.52 ft msl
Location	: Mudflats Class 3A Random
Temporary Casing	: None
Total Core Recovery	: 80%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 619.52	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		CL		LEAN CLAY - moderate brown, 5 YR 3/4, dry, crumbly	TMF-0067	110
	619			Field screening - 54 cpm on minute count		44
1						44
	618			Concrete chips from 1.5 to 2.0 feet		48
2		CL		LEAN CLAY - moderate brown, 5 YR 4/4, mottled with dark yellowish brown, 10 YR 4/2, soft, moist, low to medium plasticity		46
	617					51
3						58
	616				TMF-0068	42
4				no recovery from 4 to 5 feet		
	615					
5						
	614					
6						
	613					
7						
	612					
8						
	611					
9						
	610					
10						



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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TMF3A-021

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 6/30/01
Date Completed	: 6/30/01
Hole Diameter	: 2 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1092009.43
Easting Coord.	: 417592.02

Logged By	: D. Minese
Elevation	: 602.20 ft msl
Location	: Mudflats Class 3A Random
Temporary Casing	: None
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 602.20	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	602	CL		LEAN CLAY - moderate brown, 5 YR 3/4, up to 1-inch sub-angular gravel, dry, crumbly	TMF-0057	50
1	601					50
						44
2	600	CL		LEAN CLAY - moderate brown, 5 YR 4/4, up to 1-inch sub-rounded gravel, moist, low to medium plasticity		52
						54
						46
3	599					46
					TMF-0058	64
4	598					44
						44
5	597					
6	596					
7	595					
8	594					
9	593					
10						

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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TMF3A-022

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/1/01
Date Completed	: 7/1/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1091792.71
Easting Coord.	: 416640.92

Logged By	: D. Minese
Elevation	: 614.15 ft msl
Location	: Mudflats Class 3A Random
Temporary Casing	: None
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Surf. Elev. 614.15

Depth in Feet	USCS	DESCRIPTION	Samples	Field Screening (CPM)
0	CL	LEAN CLAY - light brown, 5 YR 6/4, with concrete and 1-inch angular gravel, dry	TMF-0075	44
				44
1				50
				48
2				46
	CL	LEAN CLAY - moderate brown, 5 YR 3/4, moist, low to medium plasticity		52
3				60
			TMF-0076	54
4				36
	CL	LEAN CLAY - olive black, 5 Y 2/1, 1 1/2-inch sub-angular gravel, soft, moist		66
5				
6				
7				
8				
9				
10				

Elevations: 614, 613, 612, 611, 610, 609, 608, 607, 606, 605

Backfilled with Boring Cuttings

The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

Science Applications International Corporation
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BORING LOG TMF3A-023

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

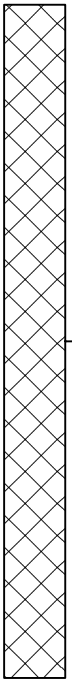
Date Started	: 6/30/01
Date Completed	: 6/30/01
Hole Diameter	: 2 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1091591.68
Easting Coord.	: 417689.56

Logged By	: S. McInall
Elevation	: 600.56 ft msl
Location	: Mudflats Class 3A Random
Temporary Casing	: None
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 600.56	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		ML		SILT - pale yellowish brown, 10 YR 6/2, vertical roots, trace gravel, dry, non to low plasticity	TMF-0063	50
	600					64
1						50
	599					54
2		CL		LEAN CLAY - dark yellowish brown, 10 YR 4/2, trace gravel, stiff, moist, low plasticity		54
	598					48
3						62
	597				TMF-0064	40
4						56
	596					42
5						
	595					
6						
	594					
7						
	593					
8						
	592					
9						
	591					
10						



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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TMF3A-024

(Page 1 of 1)

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Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/1/01
Date Completed	: 7/1/01
Hole Diameter	: 2 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1091619.21
Easting Coord.	: 415726.19

Logged By	: S. McInall
Elevation	: 596.84 ft msl
Location	: Mudflats Class 3A Random
Temporary Casing	: None
Total Core Recovery	: 100%

Notes:

Elevations represented in feet above mean sea level (msl)

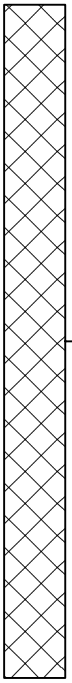
CPM - counts per minute on Eberline G-M

30 second count unless noted otherwise

N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 596.84	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		ML		SILT - pale yellowish brown, 10 YR 6/2, angular gravel, vertical roots, dry, non to low plasticity	TMF-0071	48
	596					46
1						40
	595					62
2						32
	594	CL		LEAN CLAY - dark yellowish brown, 10 YR 4/2, angular gravel, stiff, moist, low plasticity		34
3						48
	593				TMF-0072	56
4						58
	592					68
5						
	591					
6						
	590					
7						
	589					
8						
	588					
9						
	587					
10						



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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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Mudflats
Class 3B Biased

Science Applications International Corporation
An Employee-Owned Company

BORING LOG TMF3B-050

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/11/01
Date Completed	: 7/11/01
Hole Diameter	: 2 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1091537.36
Easting Coord.	: 416055.89

Logged By	: D. Greenman
Elevation	: 599.98 ft msl
Location	: Mudflats Class 3B Biased
Temporary Casing	: None
Total Core Recovery	: 90%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 599.98	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		ML		SILT - pale yellowish brown, 10 YR 6/2, roots, minor angular gravel, dry, non to low plasticity	TMF-0151	50
						52
1	599					42
		CL		LEAN CLAY - moderate yellowish brown, 10 YR 5/4, mottled with dark yellowish brown, 10 YR 4/2, firm, moist, medium plasticity		40
2	598					56
						30
3	597			Deepest with full recovery	TMF-0152	48
						46
4	596					34
						56
5	595					
6	594					
7	593					
8	592					
9	591					
10	590					

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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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An Employee-Owned Company

BORING LOG TMF3B-051

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/11/01
Date Completed	: 7/11/01
Hole Diameter	: 2 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1091537.21
Easting Coord.	: 416009.40

Logged By	: D. Greenman
Elevation	: 600.21 ft msl
Location	: Mudflats Class 3B Biased
Temporary Casing	: None
Total Core Recovery	: 90%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 600.21	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	600	ML		SILT - pale yellowish brown, 10 YR 6/2, roots, some sub-angular gravel, soft to hard, dry, non to low plasticity	TMF-0154	40
						56
1	599					44
						66
2	598					54
		CL		Deepest with full recovery LEAN CLAY - moderate yellowish brown, 10 YR 5/4, mottled with dark yellowish brown, 10 YR 4/2, roots, fine-grained sandy inclusions, hard to firm, moist, medium plasticity	TMF-0155	58
3	597					52
						58
4	596					62
						58
5	595					
6	594					
7	593					
8	592					
9	591					
10						

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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TMF3B-052

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/11/01
Date Completed	: 7/11/01
Hole Diameter	: 2 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1091549.87
Easting Coord.	: 415954.01

Logged By	: D. Greenman
Elevation	: 599.50 ft msl
Location	: Mudflats Class 3B Biased
Temporary Casing	: None
Total Core Recovery	: 90%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 599.50	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		ML		SILT - pale yellowish brown, 10 YR 6/2, roots, dry, non to low plasticity	TMF-0157	46
	599					60
1		CL		LEAN CLAY - moderate yellowish brown, 10 YR 5/4, hard to firm, moist, medium plasticity		54
	598					42
2						36
	597					52
3				Deepest with full recovery	TMF-0158	72
	596					48
4						42
	595					28
5						
	594					
6						
	593					
7						
	592					
8						
	591					
9						
	590					
10						

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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

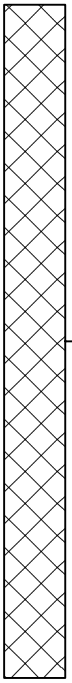
Date Started	: 7/11/01
Date Completed	: 7/11/01
Hole Diameter	: 2 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1091573.97
Easting Coord.	: 415890.76

Logged By	: D. Greenman
Elevation	: 598.87 ft msl
Location	: Mudflats Class 3B Biased
Temporary Casing	: None
Total Core Recovery	: 95%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 598.87	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		ML		SILT - dark yellowish brown, 10 YR 4/2, roots, angular gravel, soft, moist, low to medium plasticity	TMF-0160	40
						50
1	598	CL		LEAN CLAY - moderate brown, 5 YR 4/4, mottled with dark yellowish brown, 10 YR 4/2, trace fine to coarse sandy inclusions, hard, dry, medium plasticity		56
	597					40
2						40
						46
3	596					56
	595				TMF-0161	40
4						42
	594					36
5						
6	593					
7	592					
8	591					
9	590					
10	589					



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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TMF3B-054

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/11/01
Date Completed	: 7/11/01
Hole Diameter	: 2 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1091481.98
Easting Coord.	: 415731.17

Logged By	: D. Greenman
Elevation	: 596.78 ft msl
Location	: Mudflats Class 3B Biased
Temporary Casing	: None
Total Core Recovery	: 90%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Surf. Elev. 596.78

Depth in Feet	USCS	DESCRIPTION	Samples	Field Screening (CPM)
0	ML	SILT - moderate yellowish brown, 10 YR 5/4, roots, angular gravel, soft, dry, non to low plasticity	TMF-0163	48
			TMF-9199	
596				74
1	CL	LEAN CLAY - light brown, 5 YR 5/6, mottled with dark yellowish brown, 10 YR 4/2, medium plasticity		66
595				50
2				52
594				62
3		Deepest with full recovery	TMF-0164	50
			TMF-9200	
593				62
4				34
592				52
5				
591				
6				
590				
7				
589				
8				
588				
9				
587				
10				

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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TMF3B-055

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/11/01
Date Completed	: 7/11/01
Hole Diameter	: 2 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1091425.61
Easting Coord.	: 415712.70

Logged By	: D. Greenman
Elevation	: 596.38 ft msl
Location	: Mudflats Class 3B Biased
Temporary Casing	: None
Total Core Recovery	: 90%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 596.38	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	596	ML		SILT - moderate yellowish brown, 10 YR 5/4, roots, dry, non to low plasticity	TMF-0166	66
						60
1	595	CL		LEAN CLAY - moderate brown, 5 YR 4/4, hard to very hard, dry, medium plasticity		54
						42
2	594					48
						42
3	593			Deepest with full recovery	TMF-0167	44
						50
4	592					54
						48
5	591					
6	590					
7	589					
8	588					
9	587					
10						

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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TMF3B-056

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/12/01
Date Completed	: 7/12/01
Hole Diameter	: 2 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1091343.87
Easting Coord.	: 415694.92

Logged By	: D. Greenman
Elevation	: 597.88 ft msl
Location	: Mudflats Class 3B Biased
Temporary Casing	: None
Total Core Recovery	: 95%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Surf. Elev. 597.88

Depth in Feet	USCS	DESCRIPTION	Samples	Field Screening (CPM)
0	ML	SILT - dark yellowish orange, 10 YR 6/6, angular gravel, soft to firm, dry, non to low plasticity	TMF-0169	30
				68
1 (597)	CL	LEAN CLAY - light brown, 5 YR 5/6, hard to very hard, medium plasticity		72
				36
2 (596)				58
				50
3 (595)				54
			TMF-0170	58
4 (594)				52
				58
5 (593)				
6 (592)				
7 (591)				
8 (590)				
9 (589)				
10 (588)				

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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TMF3B-057

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/12/01
Date Completed	: 7/12/01
Hole Diameter	: 2 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1091280.67
Easting Coord.	: 415725.86

Logged By	: D. Greenman
Elevation	: 600.22 ft msl
Location	: Mudflats Class 3B Biased
Temporary Casing	: None
Total Core Recovery	: 90%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Surf. Elev. 600.22

Depth in Feet	Elev.	USCS	DESCRIPTION	Samples	Field Screening (CPM)
0	600	ML	SILT - grayish orange, 10 YR 7/4, roots, angular gravel, asphalt, dry, non to low plasticity	TMF-0172	36
		CL	LEAN CLAY - dark to moderate yellowish brown, 10 YR 5/4 to 4/2, soft, slightly moist to moist		40
1	599				62
					48
2	598				48
					54
3	597		Deepest with full recovery	TMF-0173	46
					54
4	596				52
					64
5	595				
6	594				
7	593				
8	592				
9	591				
10					

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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TMF3B-058

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/11/01
Date Completed	: 7/11/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 9 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1091181.65
Easting Coord.	: 415845.10

Logged By	: M. Hilyard
Elevation	: 604.95 ft msl
Location	: Mudflats Class 3B Biased
Temporary Casing	: 3-inch steel
Total Core Recovery	: 97%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 604.95	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		ML		SILT - dark brown, 10 YR 3/3, some fine gravel, little medium grained sand, trace wood chips, dry (fill)	TMF-0175	50
						30
1	604					32
						38
2	603	CL		LEAN CLAY - dark gray, 10 YR 4/1, moist, medium plasticity (native)		60
		ML		SILT - dark yellowish brown, 10 YR 4/6, moist, non to low plasticity		34
3	602					66
						44
4	601					52
		ML		SILT - dark yellowish brown, 10 YR 4/6, moist, low plasticity		46
5	600					46
		ML		SILT - dark reddish brown, 2.5 YR 3/4, hard, moist, non to low plasticity	TMF-0176	46
6	599					32
						62
7	598					40
						40
8	597					40
						52
9	596					
10	595					

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The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

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BORING LOG TMF3B-060

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

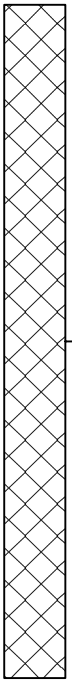
Date Started	: 7/11/01
Date Completed	: 7/11/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1091179.75
Easting Coord.	: 415987.53

Logged By	: M. Hilyard
Elevation	: 605.71 ft msl
Location	: Mudflats Class 3B Biased
Temporary Casing	: 3-inch steel
Total Core Recovery	: 98%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 605.71	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		CL		LEAN CLAY - dark gray, 10 YR 4/1, wet, medium to high plasticity	TMF-0178	38
	605	ML		SILT - dark yellowish brown, 10 YR 4/6, moist		38
1						40
	604					56
2						44
	603					42
3		ML		SILT - dark yellowish brown, 10 YR 4/6, interbedded with white, 10 YR 8/1, clay, moist, non to low plasticity Deepest with full recovery	TMF-0179	50
	602					28
4						48
	601					48
5						
	600					
6						
	599					
7						
	598					
8						
	597					
9						
	596					
10						



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The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

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BORING LOG TMF3B-061

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/11/01
Date Completed	: 7/11/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1091185.24
Easting Coord.	: 416045.54

Logged By	: M. Hilyard
Elevation	: 606.17 ft msl
Location	: Mudflats Class 3B Biased
Temporary Casing	: None
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 606.17	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	606	ML		SILT - black, 10 YR 2/1, some fine gravel, wood mulch	TMF-0181	36
		CL		LEAN CLAY - dark gray, 10 YR 4/1, low plasticity		46
1	605	ML		SILT - dark yellowish brown, 10 YR 4/6, medium hard, non to low plasticity		36
						30
2	604					62
						48
3	603					52
					TMF-0182	58
4	602					58
						48
5	601					
6	600					
7	599					
8	598					
9	597					
10						

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The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

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BORING LOG TMF3B-062

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/11/01
Date Completed	: 7/11/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1091319.01
Easting Coord.	: 416076.92

Logged By	: M. Hilyard
Elevation	: 609.25 ft msl
Location	: Mudflats Class 3B Biased
Temporary Casing	: None
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 609.25	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	609	AR		FILL - bituminous asphalt		
		GP		GRAVEL/SILT	TMF-0184	42
		ML		SILT - dark red, 2.5 YR 3/6, trace fine gravel, moist		38
1	608					50
						54
2	607					60
						60
3	606					40
		ML		SILT - dark yellowish brown, 10 YR 4/6, burnt wood fragments, black and gray mottling, moist, non to low plasticity	TMF-0185	52
4	605					34
						28
5	604					
6	603					
7	602					
8	601					
9	600					
10						

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The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

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BORING LOG TMF3B-063

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/11/01
Date Completed	: 7/11/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 8.5 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1091389.44
Easting Coord.	: 416079.20

Logged By	: M. Hilyard
Elevation	: 610.75 ft msl
Location	: Mudflats Class 3B Biased
Temporary Casing	: None
Total Core Recovery	: 91%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Surf. Elev. 610.75

Depth in Feet	Elev.	USCS	DESCRIPTION	Samples	Field Screening (CPM)
0		GC	GRAVEL - dark reddish brown, 5 YR 3/4, little fines, dry		58
		ML	SILT - dark reddish brown, 5 YR 3/4, some fine gravel, dry	TMF-0187	42
1	610	SM	SAND - reddish yellow, 7.5 YR 7/6, fine-grained, some coarse-grained sand, soft, moist		56
	609				50
2					54
	608				50
3					72
	607	ML	SILT - dark yellowish brown, 10 YR 4/6, trace fine gravel, hard, moist (native material, fill above)		54
4					50
	606				48
5					52
	605				58
6					74
	604				40
7					62
	603			TMF-0188	62
8					50
	602				
9					
	601				
10					

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The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

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BORING LOG TMF3B-064

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/11/01
Date Completed	: 7/12/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 14 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1091443.65
Easting Coord.	: 416080.99

Logged By	: M. Hilyard
Elevation	: 607.88 ft msl
Location	: Mudflats Class 3B Biased
Temporary Casing	: N/A
Total Core Recovery	: 94%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 607.88	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		SM		SILTY SAND - pale brown, 10 YR 6/3, some coarse sand, sub-angular grains, poorly sorted, soft, dry (fill)	TMF-0190 TMF-9196	40 22
1	607	SM		SILTY SAND - very dark brown, 10 YR 2/2, dry, (fill)		50 44 38 40
2	606					
3	605	CL		LEAN CLAY - dark gray, 10 YR 4/1, fill moist, medium plasticity (fill)		32 44 34
4	604					
5	603	SM		SILTY SAND - dark yellowish brown, 10 YR 4/6, some coarse grained sub-angular sand, moist (fill)		48 44 42 36 38
6	602					
7	601	ML		SILT - black, 10 YR 2/1, with fill - organic, some wood fragments, wet		56 32 36 54 30
8	600					
9	599					
		ML		SILT - black, flowing		42
10	598	ML				

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Science Applications International Corporation
An Employee-Owned Company

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/11/01
Date Completed	: 7/12/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 14 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1091443.65
Easting Coord.	: 416080.99

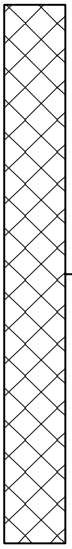
BORING LOG TMF3B-064

Logged By	: M. Hilyard
Elevation	: 607.88 ft msl
Location	: Mudflats Class 3B Biased
Temporary Casing	: N/A
Total Core Recovery	: 94%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 607.88	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
10		ML		SILT - dark yellowish brown, 10 YR 4/4, trace fine gravel, moist, (native material, fill above)		46
	597					32
11						26
	596					44
12						54
	595					56
13					TMF-0191	30
					TMF-9197	
	594					46
14						
15	593					
16	592					
17	591					
18	590					
19	589					
20	588					



The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

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BORING LOG TMF3B-065

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/12/01
Date Completed	: 7/12/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 10 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1091496.41
Easting Coord.	: 416083.55

Logged By	: M. Hilyard
Elevation	: 608.62 ft msl
Location	: Mudflats Class 3B Biased
Temporary Casing	: 3-inch steel
Total Core Recovery	: 98%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 608.62	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		SM		SILTY SAND - brown, 10 YR, 5/3, some coarse sand, sub-angular grains poorly sorted, soft, dry (fill)	TMF-0193	48
	608					24
1		SM		SILTY SAND - very dark brown, 10 YR 2/2, some silt, sub-angular grains, soft, dry (fill)		32
	607					48
2		CL		LEAN CLAY - dark yellowish brown, 10 YR 4/6, stiff, moist, low plasticity		40
	606	SM		SILTY SAND - very dark brown, 10 YR 2/2, some silt, sub-angular grains, fill - woody debris, leaves, soft, moist		28
3						36
	605					34
4						34
	604					42
5						30
	603	CL		LEAN CLAY - dark yellowish brown, 10 YR 4/6, trace fine gravel, firm, moist, low plasticity (native material, fill above)		32
6						28
	602					34
7						60
	601					40
8						42
	600					62
9				The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.		66
	599			no recovery from 9.85 to 10 feet	TMF-0194	
10						

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Mudflats
Class 3B Random

BORING LOG TMF3B-001

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Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/1/01
Date Completed	: 7/1/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 10 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1091000.60
Easting Coord.	: 415715.15

Logged By	: D. Minese
Elevation	: 603.18 ft msl
Location	: Mudflats Class 3B Random
Temporary Casing	: N/A
Total Core Recovery	: 85%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 603.18	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	603	AR		FILL - black/gray, sandy gravel fill	TMF-0101	30
						28
1	602					14
						28
2	601					32
						30
3	600	AR		FILL - olive black, clay-like, concrete rubble, wet		44
				no recovery from 3.5 to 5 feet		
4	599					
5	598	GP		GRAVEL - black		42
						42
6	597	CL		LEAN CLAY - light brown, 5 YR 5/6, some sub-rounded gravel up to 1 1/2-inch	TMF-0102	54
						44
7	596					40
						52
8	595					36
						38
9	594					56
				The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.		26
10						

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Science Applications International Corporation
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BORING LOG TMF3B-003

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/2/01
Date Completed	: 7/2/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1091257.64
Easting Coord.	: 416275.42

Logged By	: D. Minese
Elevation	: 610.09 ft msl
Location	: Mudflats Class 3B Random
Temporary Casing	: None
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 610.09	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	610	CL/AR		LEAN CLAY FILL - olive color, with woodchips and concrete rubble	TMF-0111	38
						46
1	609					32
						46
2	608					46
						38
3	607	CL		LEAN CLAY - moderate brown, 5 YR 4/4, some sub-angular 1/2-inch coarse-grained sand, slightly moist, firm		42
					TMF-0112	28
4	606					34
						48
5	605					
6	604					
7	603					
8	602					
9	601					
10						

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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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Science Applications International Corporation
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BORING LOG TMF3B-004

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/2/01
Date Completed	: 7/2/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1091462.89
Easting Coord.	: 416654.02

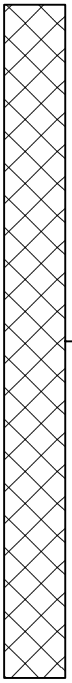
Logged By	: D. Minese
Elevation	: 599.87 ft msl
Location	: Mudflats Class 3B Random
Temporary Casing	: None
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Surf. Elev. 599.87

Depth in Feet	Elev.	USCS	DESCRIPTION	Samples	Field Screening (CPM)
0		CL	LEAN CLAY - moderate brown, 5 YR 3/4, some coarse-grained sand, dry, tight, crumbly	TMF-0115	42
	599				36
1					54
		CL	LEAN CLAY - moderate brown, 5 YR 4/4, dry, tight		50
	598				
2					50
					46
	597				
3					50
				TMF-0116	52
	596				
4					60
					64
	595				
5					
	594				
6					
	593				
7					
	592				
8					
	591				
9					
	590				
10					



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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TMF3B-006

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/10/01
Date Completed	: 7/10/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1090872.84
Easting Coord.	: 415789.02

Logged By	: M. Hilyard
Elevation	: 603.03 ft msl
Location	: Mudflats Class 3B Random
Temporary Casing	: None
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 603.03	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	603	ML		SILT - dark yellowish brown, 10 YR 3/6, trace fine gravel, moist	TMF-0127	56
						56
1	602					64
		ML		SILT - yellowish brown, 10 YR 5/6, trace fine gravel, small diagonal fractures filled with gray clay, hard, moist, low plasticity		42
2	601					52
						60
3	600					46
					TMF-0128	60
4	599					70
						46
5	598					
6	597					
7	596					
8	595					
9	594					
10						

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The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

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BORING LOG TMF3B-008

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Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

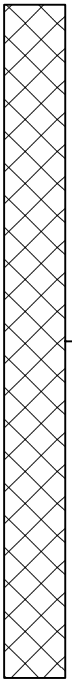
Date Started	: 7/10/01
Date Completed	: 7/10/01
Hole Diameter	: 2 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1091175.58
Easting Coord.	: 417378.77

Logged By	: D. Greenman
Elevation	: 612.37 ft msl
Location	: Mudflats Class 3B Random
Temporary Casing	: None
Total Core Recovery	: 95%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 612.37	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	612	ML		SILT - pale yellowish brown, 10 YR 6/2, vertical roots, dry, non to low plasticity	TMF-0133	54
						50
1	611	ML		same as above, but color change to grayish orange, 10 YR 7/4		46
						38
2	610	CL		LEAN CLAY - dark yellowish brown, 10 YR 4/2, stiff, moist, low plasticity		56
						50
3	609			Deepest with full recovery	TMF-0134	42
						66
4	608					50
5						56
6	607					
7	606					
8	605					
9	604					
10	603					



The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TMF3B-009

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/2/01
Date Completed	: 7/2/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1091404.62
Easting Coord.	: 416502.06

Logged By	: D. Minese
Elevation	: 601.28 ft msl
Location	: Mudflats Class 3B Random
Temporary Casing	: None
Total Core Recovery	: 90%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Surf. Elev. 601.28

Depth in Feet	USCS	DESCRIPTION	Samples	Field Screening (CPM)
0 – 1.5	CL	LEAN CLAY - moderate brown, 5 YR 3/4, with concrete chunks, dry, crumbly	TMF-0117	46
				42
				58
1.5 – 4.5	CL	LEAN CLAY - moderate brown, 5 YR 4/4, with coarse-grained sand, moist		54
				60
				36
				54
			TMF-0118	42
				66
4.5 – 5		no recovery from 4.5 to 5 feet		

Elevations: 601, 600, 599, 598, 597, 596, 595, 594, 593, 592

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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TMF3B-011

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

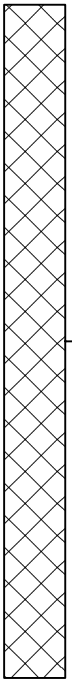
Date Started	: 7/2/01
Date Completed	: 7/2/01
Hole Diameter	: 2 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1091276.14
Easting Coord.	: 417108.02

Logged By	: S. McInall
Elevation	: 611.13 ft msl
Location	: Mudflats Class 3B Random
Temporary Casing	: None
Total Core Recovery	: 95%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 611.13	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	611	ML		SILT - dark yellowish brown, 10 YR 4/2, with trace gravel, stiff, moist, non to low plasticity	TMF-0113 TMF-9119	52
		ML		SILT - yellowish brown, dry, non to low plasticity		54
1	610	CL		LEAN CLAY - dark yellowish brown, 10 YR 4/2, with trace coarse gravel, stiff, moist, low plasticity		60
						48
2	609					44
						40
3	608			Deepest with full recovery	TMF-0114 TMF-9120	64
						46
4	607					40
						72
5	606					
6	605					
7	604					
8	603					
9	602					
10						



The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

Science Applications International Corporation
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BORING LOG TMF3B-012

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

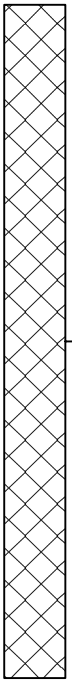
Date Started	: 7/10/01
Date Completed	: 7/10/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1091424.37
Easting Coord.	: 417712.00

Logged By	: M. Hilyard
Elevation	: 602.85 ft msl
Location	: Mudflats Class 3B Random
Temporary Casing	: None
Total Core Recovery	: 70%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 602.85	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		ML		SILT - black, dark brown, with some fine gravel, moist	TMF-0131	14
1	602	CL		LEAN CLAY - dark yellowish brown, 10 YR 4/4, with wet gray clay (N/2), fine fractures, trace fine gravel, moist, medium plasticity		28
						38
2	601					66
						34
3	600					54
					TMF-0132	46
4	599			no recovery from 3.5 to 5 feet		
5	598					
6	597					
7	596					
8	595					
9	594					
10	593					



Backfilled with Boring Cuttings

The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

BORING LOG TMF3B-013

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Science Applications International Corporation
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Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/1/01
Date Completed	: 7/1/01
Hole Diameter	: 2 inches
Depth of Boring	: 8 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1091112.71
Easting Coord.	: 415635.20

Logged By	: S. McInall
Elevation	: 600.27 ft msl
Location	: Mudflats Class 3B Random
Temporary Casing	: 3-inch steel
Total Core Recovery	: 88%

Notes:

Elevations represented in feet above mean sea level (msl)

CPM - counts per minute on Eberline G-M

30 second count unless noted otherwise

N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 600.27	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	600	AR		FILL - gray asphalt rocks and sub-base		40 40
1	599	ML		SILT - dark yellowish brown to pale yellowish brown, 10 YR 4/2 to 10 YR 6/2, angular gravel, dry, non to low plasticity	TMF-0103	46 52
2	598	ML		SILT - gray/brown, fine-grained sand		48
3	597	CL		LEAN CLAY - dark yellowish brown, 10 YR 4/2, some gravel, stiff, moist, low plasticity	TMF-0104	42 36 34
4	596					60
5	595	CL		LEAN CLAY - same as above, but with trace gravel		30 48
6	594					34 42
7	593			no recovery from 7 to 8 feet		28
8	592					
9	591					
10						

Backfilled with Boring Cuttings

The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

03-18-2002 U:\PUBLIC\MTech\Tonawanda\Mudflats\Class 3B Random\TMF3B-013.BOR

BORING LOG TMF3B-015

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Science Applications International Corporation
An Employee-Owned Company

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

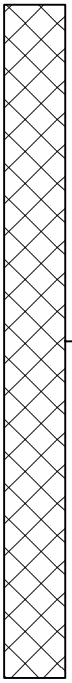
Date Started	: 7/2/01
Date Completed	: 7/2/01
Hole Diameter	: 2 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1091195.49
Easting Coord.	: 416793.44

Logged By	: S. McInall
Elevation	: 610.32 ft msl
Location	: Mudflats Class 3B Random
Temporary Casing	: None
Total Core Recovery	: 90%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 610.32	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	610	ML		SILT - dark brown, vertical roots, dry, non to low plasticity	TMF-0123	40
						50
1	609					70
		ML		SILT - pale yellowish brown, 10 YR 6/2, angular gravel, stiff, moist, non to low plasticity		48
2	608					50
		CL		LEAN CLAY - dark yellowish brown, 10 YR 4/2, some gravel, stiff, moist, low plasticity		44
3	607				TMF-0124	60
						76
4	606					40
5	605					40
6	604					
7	603					
8	602					
9	601					
10						



Backfilled with Boring Cuttings

The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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Science Applications International Corporation
An Employee-Owned Company

BORING LOG TMF3B-016

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

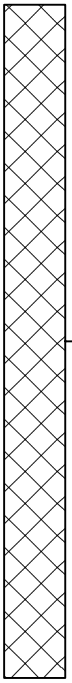
Date Started	: 7/2/01
Date Completed	: 7/2/01
Hole Diameter	: 2 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1091079.17
Easting Coord.	: 416401.04

Logged By	: S. McInall
Elevation	: 608.07 ft msl
Location	: Mudflats Class 3B Random
Temporary Casing	: None
Total Core Recovery	: 90%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 608.07	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	608	ML		SILT - pale yellowish brown, 10 YR 6/2, angular gravel, dry, non to low plasticity	TMF-0125	60
		CL		LEAN CLAY - dark yellowish brown, 10 YR 4/2, some gravel, stiff, moist, low plasticity		50
1	607					36
						42
2	606					48
						60
3	605			Deepest with full recovery	TMF-0126	52
						50
4	604					40
						58
5	603					
6	602					
7	601					
8	600					
9	599					
10						



Backfilled with Boring Cuttings

The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TMF3B-017

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Science Applications International Corporation
An Employee-Owned Company

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/2/01
Date Completed	: 7/2/01
Hole Diameter	: 2 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1091452.31
Easting Coord.	: 416971.33

Logged By	: S. McInall
Elevation	: 600.95 ft msl
Location	: Mudflats Class 3B Random
Temporary Casing	: None
Total Core Recovery	: 90%

Notes:

Elevations represented in feet above mean sea level (msl)

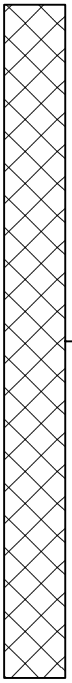
CPM - counts per minute on Eberline G-M

30 second count unless noted otherwise

N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 600.95	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		ML		SILT - pale yellowish brown, 10 YR 6/2, angular gravel, vertical roots, dry, non to low plasticity	TMF-0105	38
						66
1	600	AR		FILL - dark gray, gravel,		
		ML		SILT - pale yellowish brown, 10 YR 6/2, angular gravel, dry, non to low plasticity		52
						48
2	599					62
		CL		LEAN CLAY - dark yellowish brown, 10 YR 4/2, angular gravel, stiff, moist, low plasticity		60
3	598			Deepest with full recovery	TMF-0106	56
						56
4	597					56
						48
5	596					
6	595					
7	594					
8	593					
9	592					
10	591					



Backfilled with Boring Cuttings

The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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Science Applications International Corporation
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BORING LOG TMF3B-018

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/10/01
Date Completed	: 7/10/01
Hole Diameter	: 2 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1091085.43
Easting Coord.	: 416798.97

Logged By	: D. Greenman
Elevation	: 610.57 ft msl
Location	: Mudflats Class 3B Random
Temporary Casing	: None
Total Core Recovery	: 95%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 610.57	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	610	ML		SILT - moderate yellowish brown, 10 YR 5/4, medium gravel, subangular-subrounded, roots, dry, non to low plasticity	TMF-0137	52
		CL		LEAN CLAY - dark yellowish orange, 10 YR 6/6, hard to very hard, low plasticity		58
1	609					48
						42
2	608			From 2.5 to 3 feet - stringers of pale yellowish brown, 10 YR 6/2		42
						42
3	607					62
					TMF-0138	52
4	606					56
						28
5	605					
6	604					
7	603					
8	602					
9	601					
10						

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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

Science Applications International Corporation
An Employee-Owned Company

BORING LOG TMF3B-019

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

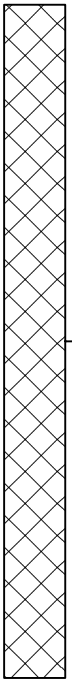
Date Started	: 7/10/01
Date Completed	: 7/10/01
Hole Diameter	: 2 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1090904.72
Easting Coord.	: 416061.26

Logged By	: D. Greenman
Elevation	: 604.68 ft msl
Location	: Mudflats Class 3B Random
Temporary Casing	: None
Total Core Recovery	: 90%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 604.68	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		ML		SILT - moderate yellowish brown, 10 YR 5/4, dry, non to low plasticity	TMF-0129	66
					TMF-9139	
	604					52
1		CL		LEAN CLAY - dark yellowish orange, 10 YR 6/6, hard to very hard, non to low plasticity		60
	603					42
2						52
	602					66
3				Deepest with full recovery	TMF-0130	52
					TMF-9140	
	601					40
4						70
	600					50
5						
	599					
6						
	598					
7						
	597					
8						
	596					
9						
	595					
10						



Backfilled with Boring Cuttings

The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

03-18-2002 U:\PUBLIC\MTech\Tonawanda\Mudflats\Class 3B Random\TMF3B-019.BOR

Science Applications International Corporation
An Employee-Owned Company

BORING LOG TMF3B-020

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/10/01
Date Completed	: 7/10/01
Hole Diameter	: 2 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1091148.00
Easting Coord.	: 417150.92

Logged By	: D. Greenman
Elevation	: 610.36 ft msl
Location	: Mudflats Class 3B Random
Temporary Casing	: None
Total Core Recovery	: 90%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 610.36	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	610	CL		LEAN CLAY - dark yellowish orange to moderate yellowish brown, 10 YR 6/6 to 5/4, minor fine to coarse-grained sand, hard, dry to slightly moist, low to medium plasticity	TMF-0135	62
						38
1	609					72
						50
2	608			Stringers of pale yellowish brown, 10 YR 6/2		58
						44
3	607			Deepest with full recovery	TMF-0136	74
						88
4	606					62
5						54
	605					
6	604					
7	603					
8	602					
9	601					
10						

Backfilled with Boring Cuttings

The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

03-18-2002 U:\PUBLIC\MTech\Tonawanda\Mudflats\Class 3B Random\TMF3B-020.BOR

Science Applications International Corporation
An Employee-Owned Company

BORING LOG TMF3B-022

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/10/01
Date Completed	: 7/10/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1091283.32
Easting Coord.	: 416637.33

Logged By	: M. Hilyard
Elevation	: 609.12 ft msl
Location	: Mudflats Class 3B Random
Temporary Casing	: None
Total Core Recovery	: 90%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Surf. Elev. 609.12

Depth in Feet	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	ML		SILT - dark yellowish brown, 10 YR 3/4, fine grained, trace fine gravel, dry, gradational color change to 3.5 feet	TMF-0121	60
					42
1					44
					56
2					60
					66
3					44
4	ML		SILT - yellowish brown, 10 YR 5/4, trace fine gravel, trace gray mottling (N/8), very firm	TMF-0122	62
					58
5			no recovery from 4.5 to 5 feet		
6					
7					
8					
9					
10					

Surface elevations: 609, 608, 607, 606, 605, 604, 603, 602, 601, 600

Backfilled with Boring Cuttings

The year 2000 revised washable edition of the Munsell Soil Color Chart was used to classify soil colors.

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BORING LOG TMF3B-023

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Science Applications International Corporation
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Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/2/01
Date Completed	: 7/2/01
Hole Diameter	: 2 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1091325.34
Easting Coord.	: 417190.39

Logged By	: S. McInall
Elevation	: 610.83 ft msl
Location	: Mudflats Class 3B Random
Temporary Casing	: None
Total Core Recovery	: 90%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 610.83	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		ML		SILT - pale brown, vertical roots, dry	TMF-0109	46
1	610	ML		SILT - pale yellowish brown, 10 YR 6/2, angular gravel, dry, non to low plasticity		48
						40
2	609					54
						52
3	608	CL		LEAN CLAY - dark yellowish brown, 10 YR 4/2, some gravel, stiff, moist, low plasticity		54
				Deepest with full recovery	TMF-0110	74
4	607					48
						46
5	606					70
6	605					
7	604					
8	603					
9	602					
10	601					

Backfilled with Boring Cuttings

The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

03-18-2002 U:\PUBLIC\MTech\Tonawanda\Mudflats\Class 3B Random\TMF3B-023.BOR

Science Applications International Corporation
An Employee-Owned Company

BORING LOG TMF3B-024

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 7/2/01
Date Completed	: 7/2/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1091170.34
Easting Coord.	: 415933.48

Logged By	: S. Fox
Elevation	: 604.02 ft msl
Location	: Mudflats Class 3B Random
Temporary Casing	: None
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 604.02	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	604	AR		FILL - top soil	TMF-0107	34
		CL		LEAN CLAY - moderate yellowish brown, 10 YR 5/4, minor sand, firm, slightly moist, low plasticity		62
1	603					40
						48
2	602					28
						52
3	601					40
					TMF-0108	40
4	600					40
						42
5	599					
6	598					
7	597					
8	596					
9	595					
10						

Backfilled with Boring Cuttings

The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

03-18-2002 U:\PUBLIC\MTech\Tonawanda\Mudflats\Class 3B Random\TMF3B-024.BOR

Mudflats
Reference Area

Science Applications International Corporation
An Employee-Owned Company

BORING LOG TMFR1-001

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

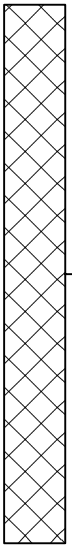
Date Started	: 6/27/01
Date Completed	: 6/27/01
Hole Diameter	: 2 inches
Depth of Boring	: 4 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1091497.52
Easting Coord.	: 417031.43

Logged By	: S. McInall
Elevation	: 599.14 ft msl
Location	: Mudflats Reference Area
Temporary Casing	: None
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 599.14	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	599	ML		SILT - pale yellowish brown, 10 YR 6/2, angular gravel, dry, non to low plasticity	TMF-0001	60
						32
1	598					47
						54
2	597				TMF-0002	59
		CL		LEAN CLAY - dark yellowish brown, 10 YR 4/2, angular gravel, stiff, moist, low plasticity		40
3	596					46
						40
4	595					
5	594					
6	593					
7	592					
8	591					
9	590					
10						



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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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Science Applications International Corporation
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BORING LOG TMFR1-002

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

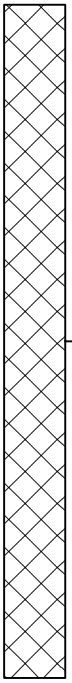
Date Started	: 6/29/01
Date Completed	: 6/29/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1091552.12
Easting Coord.	: 417033.00

Logged By	: D. Minese
Elevation	: 599.29 ft msl
Location	: Mudflats Reference Area
Temporary Casing	: None
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 599.29	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	599	CL		LEAN CLAY - moderate brown, 5 YR 3/4, coarse-grained sand, dry	TMF-0003	36
						42
1	598					40
		CL		LEAN CLAY - moderate brown, 5 YR 4/4, tight, some sub-rounded gravel		30
2	597					48
						62
3	596					70
					TMF-0004	86
4	595					66
						36
5	594					
6	593					
7	592					
8	591					
9	590					
10						



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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TMFR1-003

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

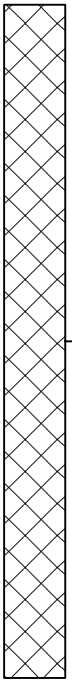
Date Started	: 6/29/01
Date Completed	: 6/29/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1091597.88
Easting Coord.	: 417032.18

Logged By	: D. Minese
Elevation	: 598.18 ft msl
Location	: Mudflats Reference Area
Temporary Casing	: None
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 598.18	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	598	CL		LEAN CLAY - moderate brown, 5 YR 3/4, some coarse-grained sand, tight, dry	TMF-0005	44
						62
1	597	CL		LEAN CLAY - moderate brown, 5 YR 4/4, moist, medium plasticity		60
						46
2	596					50
						50
3	595					54
					TMF-0006	48
4	594					13
						42
5	593					
6	592					
7	591					
8	590					
9	589					
10						



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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TMFR1-004

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 6/29/01
Date Completed	: 6/29/01
Hole Diameter	: 2 inches
Depth of Boring	: 4 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1091655.65
Easting Coord.	: 417030.50

Logged By	: S. McInall
Elevation	: 598.18 ft msl
Location	: Mudflats Reference Area
Temporary Casing	: None
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 598.18	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	598	ML		SILT - pale yellowish brown, 10 YR 6/2, trace medium gravel, dry, non to low plasticity	TMF-0007	62
					TMF-9043	62
1	597					54
		CL		LEAN CLAY - dark yellowish brown, 10 YR 4/2, angular gravel, stiff, moist, low plasticity		38
2	596					46
				Deepest with full recovery	TMF-0008	42
					TMF-9044	
3	595					60
						60
4	594					
5	593					
6	592					
7	591					
8	590					
9	589					
10						

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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TMFR1-005

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 6/27/01
Date Completed	: 6/27/01
Hole Diameter	: 2 inches
Depth of Boring	: 4 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1091504.27
Easting Coord.	: 417059.26

Logged By	: S. McInall
Elevation	: 599.41 ft msl
Location	: Mudflats Reference Area
Temporary Casing	: None
Total Core Recovery	: 97%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 599.41	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		ML		SILT - pale yellowish brown, 10 YR 6/2, angular gravel, dry, non to low plasticity	TMF-0009	58
	599				TMF-9019	
1						52
	598					44
2		CL		LEAN CLAY - dark yellowish brown, 10 YR 4/2, fine grained sand, vertical roots, trace angular gravel, stiff, moist, low plasticity		50
	597					36
3						56
	596				TMF-0010	44
					TMF-9020	58
4						
	595					
5						
	594					
6						
	593					
7						
	592					
8						
	591					
9						
	590					
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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TMFR1-006

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 6/28/01
Date Completed	: 6/28/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1091556.02
Easting Coord.	: 417089.33

Logged By	: D. Minese
Elevation	: 598.78 ft msl
Location	: Mudflats Reference Area
Temporary Casing	: None
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 598.78	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		GP		GRAVEL - 1 to 2-inch angular to sub-angular gravel	TMF-0011	36
	598					60
1						48
	597	CL		LEAN CLAY - moderate brown, 5 YR 4/4, moderate to tight		46
2						36
	596					44
3				Deepest with full recovery	TMF-0012	64
	595	CL		LEAN CLAY - grayish brown, 5 YR 3/2, moderate to soft		42
4						46
	594					54
5						
	593					
6						
	592					
7						
	591					
8						
	590					
9						
	589					
10						

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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

03-18-2002 U:\PUBLIC\MTech\Tonawanda\Mudflats\Reference Area\TMFR1-006.BOR

Science Applications International Corporation
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BORING LOG TMFR1-007

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 6/29/01
Date Completed	: 6/29/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1091600.54
Easting Coord.	: 417086.21

Logged By	: D. Minese
Elevation	: 598.60 ft msl
Location	: Mudflats Reference Area
Temporary Casing	: None
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Surf. Elev. 598.60

Depth in Feet	USCS	DESCRIPTION	Samples	Field Screening (CPM)
0	CL	LEAN CLAY - dusty yellowish brown, 10 YR 2/2, roots	TMF-0013	62
598	CL	LEAN CLAY - moderate brown, 5 YR 3/4, dry, tight		58
1	CL	LEAN CLAY - moderate brown, 5 YR 4/4, moist, medium plasticity		50
597				52
2				44
596				64
3				52
595			TMF-0014	62
4				56
594				42
5				
593				
6				
592				
7				
591				
8				
590				
9				
589				
10				

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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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Science Applications International Corporation
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BORING LOG TMFR1-008

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 6/29/01
Date Completed	: 6/29/01
Hole Diameter	: 2 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1091652.08
Easting Coord.	: 417083.75

Logged By	: S. McInall
Elevation	: 598.38 ft msl
Location	: Mudflats Reference Area
Temporary Casing	: None
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 598.38	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		ML		SILT - pale yellowish brown, 10 YR 6/2, trace medium gravel, dry, non to low plasticity	TMF-0015	72
	598					46
1						66
	597					50
		CL		LEAN CLAY - dark yellowish brown, 10 YR 4/2, angular gravel, stiff, moist, low plasticity		
2				Deepest with full recovery	TMF-0016	72
	596					60
3						52
	595					44
4						50
	594					60
5						
	593					
6						
	592					
7						
	591					
8						
	590					
9						
	589					
10						

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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TMFR1-009

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

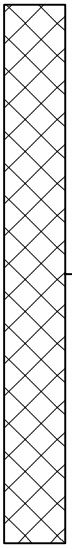
Date Started	: 6/27/01
Date Completed	: 6/27/01
Hole Diameter	: 2 inches
Depth of Boring	: 4 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1091496.39
Easting Coord.	: 417141.18

Logged By	: S. McInall
Elevation	: 600.01 ft msl
Location	: Mudflats Reference Area
Temporary Casing	: None
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 600.01	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	600	ML		SILT - pale yellowish brown, 10 YR 6/2, angular gravel, dry, non to low plasticity	TMF-0017	48
						62
1	599					32
		CL		LEAN CLAY - dark yellowish brown, 10 YR 4/2, angular gravel, stiff, moist, low plasticity		44
2	598					54
						50
3	597			Field screening - 43 cpm on minute count		80
				Field screening - 37 cpm on minute count	TMF-0018	80
4	596					
5	595					
6	594					
7	593					
8	592					
9	591					
10						



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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TMFR1-010

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

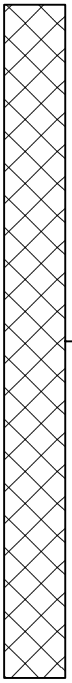
Date Started	: 6/27/01
Date Completed	: 6/27/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1091560.07
Easting Coord.	: 417143.59

Logged By	: D. Minese
Elevation	: 599.21 ft msl
Location	: Mudflats Reference Area
Temporary Casing	: None
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 599.21	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	599	CL		LEAN CLAY - moderate brown, 5 YR 4/4, dry	TMF-0021	66
		CL		LEAN CLAY - light brown, 5 YR 6/4, dry to slightly moist		58
1	598	CL		LEAN CLAY - moderate brown, 5 YR 3/4, some sub-angular gravel up to 1-inch in size, trace sand, hard to very hard, dry to slightly moist, low plasticity		56
						52
2	597					46
						38
3	596			Deepest with full recovery	TMF-0022	72
						62
4	595					
5	594					
6	593					
7	592					
8	591					
9	590					
10						



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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TMFR1-011

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

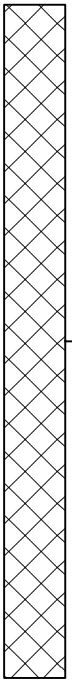
Date Started	: 6/29/01
Date Completed	: 6/29/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1091602.72
Easting Coord.	: 417141.31

Logged By	: D. Minese
Elevation	: 600.34 ft msl
Location	: Mudflats Reference Area
Temporary Casing	: 3-inch steel/None
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 600.34	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	600	CL		LEAN CLAY - moderate brown, 5 YR 3/4, tight, dry	TMF-0023	70
1	599					40
						40
2	598	CL		LEAN CLAY - moderate brown, 5 YR 4/4, some 1-inch angular gravel, more moist than above, low to medium plasticity		56
						52
						52
3	597					62
					TMF-0024	46
4	596					42
						44
5	595					
6	594					
7	593					
8	592					
9	591					
10						



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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TMFR1-012

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

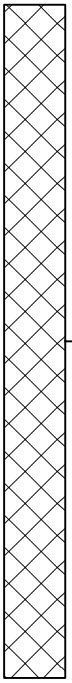
Date Started	: 6/29/01
Date Completed	: 6/29/01
Hole Diameter	: 2 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1091655.20
Easting Coord.	: 417137.51

Logged By	: D. Minese
Elevation	: 598.43 ft msl
Location	: Mudflats Reference Area
Temporary Casing	: None
Total Core Recovery	: 80%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 598.43	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		CL		LEAN CLAY - moderate brown, 5 YR 3/4, hard, dry	TMF-0025	52
	598					44
1						44
	597	CL		LEAN CLAY - moderate brown, 5 YR 4/4, some 1-inch sub-angular gravel, hard, slightly moist		36
2						56
	596					58
3						44
	595				TMF-0026	46
4				no recovery from 4 to 5 feet		
	594					
5						
	593					
6						
	592					
7						
	591					
8						
	590					
9						
	589					
10						



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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TMFR1-013

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

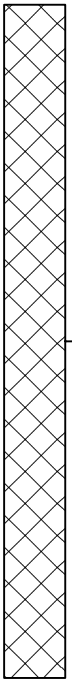
Date Started	: 6/28/01
Date Completed	: 6/28/01
Hole Diameter	: 2 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1091497.64
Easting Coord.	: 417196.07

Logged By	: S. McInall
Elevation	: 600.09 ft msl
Location	: Mudflats Reference Area
Temporary Casing	: None
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 600.09	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	600	ML		SILT - pale yellowish brown, 10 YR 6/2, vertical roots, gravel, dry, non to low plasticity	TMF-0027	46
		ML		SILT - color change to dusty yellowish brown, 10 YR 2/2		46
1	599	ML		SILT - pale yellowish brown, 10 YR 6/2, vertical roots, gravel, dry, non to low plasticity		52
		CL		Field screening - 52 on minute count LEAN CLAY - dark yellowish brown, 10 YR 4/2, angular gravel, stiff, moist, low plasticity		56
2	598					32
				Field screening - 49 cpm on minute count		58
3	597			Field screening - 86 cpm on minute count		60
				Field screening - 48 cpm on minute count	TMF-0028	62
4	596			Pushed to 5 feet for geophysical downhole gamma scan purposes		26
						48
5	595					
6	594					
7	593					
8	592					
9	591					
10						



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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TMFR1-014

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 6/28/01
Date Completed	: 6/28/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1091561.61
Easting Coord.	: 417191.86

Logged By	: D. Minese
Elevation	: 599.67 ft msl
Location	: Mudflats Reference Area
Temporary Casing	: None
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 599.67	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		CL		LEAN CLAY - grayish brown, 5 YR 3/2, with trace sand and 1-inch gravel, hard, dry	TMF-0029	62
	599					66
1						72
	598					48
2						64
	597	CL		LEAN CLAY - moderate brown, 5 YR 4/4		52
3						54
	596				TMF-0030	54
4						44
	595					62
5						
	594					
6						
	593					
7						
	592					
8						
	591					
9						
	590					
10						

Backfilled with Boring Cuttings

The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

03-18-2002 U:\PUBLIC\MTech\Tonawanda\Mudflats\Reference Area\TMFR1-014.BOR

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BORING LOG TMFR1-015

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

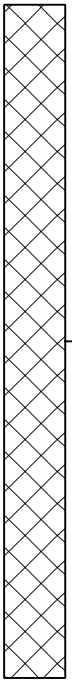
Date Started	: 6/29/01
Date Completed	: 6/29/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1091604.73
Easting Coord.	: 417192.28

Logged By	: D. Minese
Elevation	: 598.56 ft msl
Location	: Mudflats Reference Area
Temporary Casing	: None
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 598.56	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		CL		LEAN CLAY - dark brown, 7.5 YR 3/3, with trace fine sand, some 1-inch sub-angular gravel, dry, medium plasticity	TMF-0031	56
	598					58
1						54
	597	CL		LEAN CLAY - moderate brown, 5 YR 4/4, some 1-inch sub-angular gravel, more moist than above, low to medium plasticity		64
2						64
	596					46
3						54
	595				TMF-0032	46
4						58
	594					58
5						
	593					
6						
	592					
7						
	591					
8						
	590					
9						
	589					
10						



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Science Applications International Corporation
An Employee-Owned Company

BORING LOG TMFR1-016

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 6/28/01
Date Completed	: 6/28/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back
Northing Coord.	: 1091656.73
Easting Coord.	: 417195.21

Logged By	: D. Minese
Elevation	: 598.37 ft msl
Location	: Mudflats Reference Area
Temporary Casing	: None
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 598.37	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	598	CL		LEAN CLAY - dark brown, 7.5 YR 3/3, with trace fine sand, some 1-inch sub-rounded gravel, dry, medium plasticity	TMF-0033	60
						68
1	597					58
						48
2	596	CL		LEAN CLAY - same as above, but moderate brown, 5 YR 4/4, more moist		50
						76
3	595					48
					TMF-0034	54
4	594					60
						80
5	593					
6	592					
7	591					
8	590					
9	589					
10						

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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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BORING LOG TMFR1-017

(Page 1 of 1)

Science Applications International Corporation
An Employee-Owned Company

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

Date Started	: 6/28/01
Date Completed	: 6/28/01
Hole Diameter	: 2 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1091500.89
Easting Coord.	: 417248.91

Logged By	: S. McInall
Elevation	: 599.88 ft msl
Location	: Mudflats Reference Area
Temporary Casing	: None
Total Core Recovery	: 100%

Notes:

Elevations represented in feet above mean sea level (msl)

CPM - counts per minute on Eberline G-M

30 second count unless noted otherwise

N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 599.88	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		ML		SILT - pale yellowish brown, 10 YR 6/2, vertical roots, gravel, dry, non to low plasticity	TMF-0035	38
1	599					64
						58
2	598	CL		LEAN CLAY - dark yellowish brown, 10 YR 4/2, angular gravel, stiff, moist, low plasticity		66
						42
3	597					42
						54
4	596				TMF-0036	48
				Pushed to 5 feet for geophysical downhole gamma scan purposes		66
5	595					
6	594					
7	593					
8	592					
9	591					
10	590					

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Science Applications International Corporation
An Employee-Owned Company

BORING LOG TMFR1-018

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

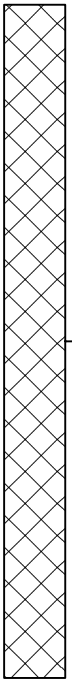
Date Started	: 6/28/01
Date Completed	: 6/28/01
Hole Diameter	: 2 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1091562.85
Easting Coord.	: 417243.82

Logged By	: S. McInall
Elevation	: 599.86 ft msl
Location	: Mudflats Reference Area
Temporary Casing	: None
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 599.86	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		ML		SILT - pale yellowish brown, 10 YR 6/2, vertical roots, gravel, dry, non to low plasticity	TMF-0037	62
1	599					48
						60
	598					58
2		CL		LEAN CLAY - dark yellowish brown, 10 YR 4/2, angular gravel, stiff, moist, low plasticity		54
3	597					50
						34
	596				TMF-0038	48
4				Pushed to 5 feet for geophysical downhole gamma scan purposes		52
	595					54
5						
6	594					
7	593					
8	592					
9	591					
10	590					



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An Employee-Owned Company

BORING LOG TMFR1-019

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

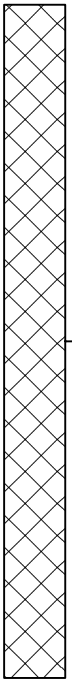
Date Started	: 6/28/01
Date Completed	: 6/28/01
Hole Diameter	: 2 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe 5400
Sampling Method	: macro-core
Company Name	: SAIC
Company Rep.	: John Nace
Northing Coord.	: 1091605.29
Easting Coord.	: 417248.02

Logged By	: S. McInall
Elevation	: 599.05 ft msl
Location	: Mudflats Reference Area
Temporary Casing	: None
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 599.05	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0	599	ML		SILT - pale yellowish brown, 10 YR 6/2, vertical roots, gravel, dry, hard	TMF-0039	42
						42
1	598					56
		CL		LEAN CLAY - dark yellowish brown, 10 YR 4/2, some gravel, stiff, moist, low plasticity		42
2	597					56
						62
3	596					48
					TMF-0040	66
4	595			Pushed to 5 feet for geophysical downhole gamma scan purposes		48
						42
5	594					
6	593					
7	592					
8	591					
9	590					
10						



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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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Science Applications International Corporation
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BORING LOG TMFR1-020

Town of Tonawanda
Landfill and Mudflats
Tonawanda, NY

Project #01-0801-08-1165-190

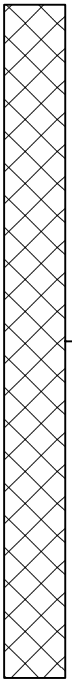
Date Started	: 6/29/01
Date Completed	: 6/29/01
Hole Diameter	: 2.5 inches
Depth of Boring	: 5 feet
Drilling Method	: Geoprobe DT 66
Sampling Method	: ATV macro-core
Company Name	: SAIC
Company Rep.	: Michael Back/John Nace
Northing Coord.	: 1091650.20
Easting Coord.	: 417251.67

Logged By	: D. Minese
Elevation	: 598.61 ft msl
Location	: Mudflats Reference Area
Temporary Casing	: None
Total Core Recovery	: 100%

Notes:
Elevations represented in feet above mean sea level (msl)
CPM - counts per minute on Eberline G-M
30 second count unless noted otherwise
N/A - not applicable

Boring Completion Details:
Elev.: N/A

Depth in Feet	Surf. Elev. 598.61	USCS	GRAPHIC	DESCRIPTION	Samples	Field Screening (CPM)
0		CL		LEAN CLAY - moderate brown, 5 YR 3/4, 1 to 2-inch gravel, dry	TMF-0041	38
	598					50
1						48
	597	CL		LEAN CLAY - moderate brown, 5 YR 4/4, some 1-inch sub-angular gravel, more moist than above, low to medium plasticity		54
2						78
	596					52
3						48
	595			Deepest with full recovery	TMF-0042	62
4						38
	594					
5						
	593					
6						
	592					
7						
	591					
8						
	590					
9						
	589					
10						



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The Geological Society of America Rock-Color Chart, 1991 was used to classify soil colors.

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ATTACHMENT D

Borehole Geophysical Survey Report at the Town of Tonawanda Landfill, Tonawanda, New York

Science Applications International Corporation
An Employee-Owned Company

BOREHOLE GEOPHYSICAL SURVEY REPORT AT THE TOWN OF TONAWANDA LANDFILL TONOWANDA, NEW YORK

SAIC Project 01-0801-08-1165-190

Prepared for

Army Corps of Engineers
Buffalo District
Buffalo New York

October 2001

BOREHOLE GEOPHYSICAL SURVEY REPORT AT THE TOWN OF TONAWANDA LANDFILL TONAWANDA, NEW YORK

SAIC Project 01-0801-08-1165-190

Prepared for

Army Corps of Engineers
Buffalo District
Buffalo, New York

Prepared by

Science Applications International Corporation
6310 Allentown Boulevard
Harrisburg, PA 17112

October 2001

Reviewed By:

George R.A. Fields, P.G.
Senior Geophysicist

Respectfully Submitted:

Richard A. Hoover, P.G.
Senior Geophysicist/Project Director

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List of Acronyms and Abbreviations

ACOE	-	Army Corps of Engineers, Buffalo District
API	-	American Petroleum Institute
ASTM	-	American Society of Testing and Materials
BGL	-	Below grade or ground level
BGS	-	Below grade or ground surface
CPM	-	Counts per minute
CPS	-	Counts per second
DOP	-	Detailed Operating Procedure(s)
FADL	-	Field Activity Daily Log
FUSRAP		Formerly Utilized Sites Remedial Action Program
mCi	-	millicuries
pCi/g	-	picocuries per gram
SAIC	-	Science Applications International Corporation

Glossary

Attenuation: A measure of the loss of energy and subsequent loss of amplitude as energy travels through a medium.

Geophysical Anomaly: A change in a measured geophysical quantity or field (i.e., magnetic field, conductivity, resistivity, gravity) over background values; a measured change caused by different physical properties of the subsurface.

Log: The digital or printed record of geophysical measurements performed within a boring, borehole or well.

Sonde: A general term used for any subsurface tool that is used within a borehole or well. The Sonde contains the basic components necessary to make measurements, and transmit the measurements to the surface.

1.0 INTRODUCTION

This report presents the results of the borehole geophysical investigation conducted by Science Applications International Corporation (SAIC) for the Army Corps of Engineers Buffalo District (ACOE) between June 27 and August 1, 2001, at the Town of Tonawanda Landfill Site located in Tonawanda, New York.

The objectives for the geophysical investigation were identified in the *Sampling and Analysis Plan, Tonawanda Landfill FUSRAP Site, Tonawanda, NY* (SAIC June 1, 2001). The following sections describe the purpose and scope of the geophysical investigation at the Town of Tonawanda Landfill site and outline the report organization.

1.1 Background

The Landfill was designated as a FUSRAP vicinity property in 1992 based on field sampling and gamma survey results that indicated the presence of Manhattan Engineer District (MED)-like material at several locations in the now non-operational landfill (DOE 1992, ORNL 1992). The MED-like material detected in the Landfill is believed to have been generated at the former Linde Air Products (Linde) site Tonawanda, NY, and likely emplaced in the Landfill as part of a by-product of wastewater treatment waste handling, and possibly dredging activities (DOE 1994a, 1994b). Materials associated with MED activities for this project consist of radio nuclides generated during uranium processing activities at the former Linde site between 1942-1948. Contaminants of concentration at the landfill are primarily uranium-238 (U-238), thorium-230 (Th-230) and radium-226 (Ra-226). Based on the historical use of the landfill, radiological and/or chemical contaminants unrelated to MED activities may also be present at the site, but may only be remediated by USACE if mixed with MED constituents. Therefore, elevated measurements of radioactivity identified through this investigation require comparison to landfilling historical records to verify the relative time and location of emplacement. Previous investigations have indicated a minimum of three locations where MED-like material may be present at the site (ORNL 1992).

The Tonawanda Landfill Site (Site) is located approximately 1.5 miles north of the Linde (Praxair) FUSRAP Site in the Town of Tonawanda, New York. It is comprised of two main parcels – the Town of Tonawanda Landfill (Landfill) and the Mudflats Area (Mudflats). The Landfill parcel is located at the northern end of East Park Drive and is bounded by the residential developments to the north and northwest, a railroad line to the east, and a right-of-way owned by Niagara Mohawk Power Company (NMPC) to the south. The Mudflats parcel is approximately 115 acres and is bordered by the NMPC right-of-way to the north, a railroad line to the east, on the west by the Town of Tonawanda incinerator and to the south by the Youngman Expressway (I-290) property. The Town of Tonawanda, NY owns both properties.

1.2 Purpose and Scope of Work

Core samples were collected using Geoprobe equipment. Downhole gamma logging was used in the coreholes to qualitatively determine the profile of radioactive materials in the subsurface. Primarily, downhole gamma logging will be used in conjunction with core scans to delineate any "peak" areas identified in the cores, and also to identify when radiation levels return to background levels. The rationale for using this technique is described in further detail in Section 2.0, Theoretical Background.

During the geophysical investigation, a total of 203 different boreholes were logged using geophysical logging methods.

1.3 Report Organization

This report has been organized into discrete parts for ease of review. Section 2.0 provides the theoretical background of the geophysical method and equipment used during this investigation. Section 3.0 describes the field procedures for the geophysical logging, and Section 4.0 describes the data processing techniques for the method. Section 5.0 presents the geophysical investigation results and interpretation. Section 6.0 provides the bibliographic sources referenced in this report. Location maps from the sampling plan follow the text for reference to areas and site features of interest. Appendix A contains the detailed operating procedures (DOPs) utilized in the survey.

2.0 THEORETICAL BACKGROUND

This section presents the theoretical background and rational for using the following geophysical methods during this investigation. Borehole geophysical logging has been used to supplement standard descriptive logging. Borehole geophysical logging measures physical properties within the borehole and the subsurface materials penetrated. The American Society of Testing and Materials (ASTM) has developed a standard guide for planning and conducting borehole geophysical logging designated as D-5753. The work on this project generally followed the ASTM standard.

Borehole geophysical logging consists of the measurement probes, cable, draw works, depth measurement system, interfaces and surface controls, and digital and analog recording equipment. This section will address the theoretical background of using various probes, sondes or tools, and the sensors contained within, for measuring the subsurface properties, and transmitting those measurements to the surface.

2.1 Gamma Log

The gamma sonde is used to measure the presence of gamma radiation in the subsurface. A Gamma ray is electromagnetic energy produced from the conversion of part of the nuclear mass to energy. The gamma log is normally used as a lithological indicator in the subsurface. The usual sources of natural gamma radiation are potassium (K-40) or the daughter products of uranium or thorium decay series. Potassium is present in most shale as feldspar and mica that decomposes into clay. Commonly, shale's have twice as much radioactivity as sands. Coal, limestone, and dolomite (unless they contain deposits of uranium), are usually less radioactive than clay.

The natural gamma measurement is made by the use of a Sodium Iodide (NaI) crystal, which when struck by a gamma ray (photon), emits a pulse of light. This light is amplified by a photo multiplier tube, which then emits a current pulse whose amplitude is proportional to the radiation energy that caused it. The current pulse is detected, and transmitted up the cable by the probe electronics. Normal reported and recorded units for natural gamma logging are counts per second (CPS). The gamma detectors used in borehole sondes typically have a depth of investigation of 8 to 11 inches radially outward from the center of the borehole, into the material being investigated.

Interpretation of the gamma ray log is relatively simple for an experienced geophysicist or well log analyst, as applied to petroleum formation evaluation, and is used to evaluate the clay or shale content of reservoir rocks. This approach is commonly used in engineering and hydrogeologic applications. However in uranium exploration, where the gamma ray tool is used as a quantitative tool, interpretation of the gamma ray log is much more sophisticated, and theoretically complex.

The diameter of the well or borehole, in addition to the nature of the borehole fluid affects the count rate measured in the hole. In an air-filled hole, the correction factor is small, and is usually neglected. For a fluid-filled hole, the attenuation of gamma radiation can be substantial, and correction factors are available.

In a similar manner, casing within a drill hole will attenuate the gamma ray flux from the formation. Therefore a correction based upon the casing thickness and casing materials may be applied.

3.0 FIELD PROCEDURES

This section describes the geophysical field procedures used during this investigation, including procedures for acquiring geophysical data. The field procedures (Detailed Operating Procedures [DOPs]) used during this investigation included the following: "Field Activities Documentation"

and "Borehole Geophysical Survey". Copies of these DOPs are contained in Appendix A. The DOPs are summarized in this section, and any additions or modifications to the DOPs are discussed. Additionally, procedures specific to this investigation, such as digital field-file naming conventions, are discussed below.

3.1 Site Preparation

Before beginning the borehole geophysical survey, the characteristics of the individual well or boring are evaluated. A working area is established for the logger, personal computer and sonde. An evaluation of the amount of casing or protection pipe sticking up above grade is made, in order to properly reference the probe to a datum. The datum used for measuring each borehole for this project was the ground surface, since the site was relatively flat. Elevations are available for these features from other sources.

The borehole or wellhead was inspected for access. In the case of an open borehole, a dummy sonde is lowered down the borehole to determine access and stability of the borehole. When access and stability are verified, a measurement sonde is prepared for use in the borehole. For this site, a combination sonde was used that includes the capabilities to measure resistance, spontaneous potential (SP) and natural gamma radiation. Measurements of SP and resistance were not performed at this site since the objective of the investigation was to develop a nuclear energy profile of each boring location. Therefore, only natural gamma radiation measurements were collected.

3.2 Borehole Logging System

The borehole logging equipment used at this site consists of three primary components:

1. The borehole logger (which includes the cable, cable draw works, depth measurement system and recording interface),
2. The sonde or downhole tool, and
3. The management and recording software that is loaded on a field computer.

The borehole logger used at this site is a MGX II logging system, manufactured by Mount Sopris Instrument Company of Golden, Colorado. The MGX II system consists of a motorized winch with clutch and electronic brake; an integral precision hardened steel measuring wheel and an optical encoder to provide digital depth data. The 200-meter (656-feet), 0.125-inch diameter cable is a steel armored single conductor cable.

The probe used at this site was the HLP-2375S also manufactured by Mount Sopris Instrument Company. The probe is capable of measuring natural gamma, Spontaneous Potential (SP) and resistance. The probe is 1.67 inches in diameter, 47.2 inches long, and weighs 14.3 pounds. The natural gamma radiation detector is a 22.22-millimeters (0.875-inches) by 76.2-millimeters (3.0-

inches) sodium iodide detector. Mount Sopris Instrument Company calibrated the probe at the Denver Federal Center on December 9, 1998. At the request of the project health physicist, American Petroleum Institute (API) standardized units are not presented in this report.

The data was collected and managed on a personal computer using MSLog software package written by Mount Sopris Instrument Company. MSLog provides a display and optional printout of the data as it is being collected. This information is used for field interpretation and quality control/quality assurance.

3.3 Quality Control

Quality control procedures include the operator monitoring the logging speed of the sonde, data values (individually displayed with MSLog as they are measured) and data trends of the data collected. The information is compared to other sensors used within the borehole, and geophysical knowledge to determine if the values recorded are sensible. In the event odd or unusual values or trends are identified, the operator will verify equipment operability, and re-log the interval in question to verify the data.

3.4 Data Collection

All activities and settings that occur in the field are digitally recorded. Field paper plots were provided to the site manager. The sonde to be used is connected to the logging cable and suspended across a pulley, which is placed over the borehole. Upon connecting the computer to the logger with a serial cable, the operator enters the logging menu of MSLog. After identifying the sonde being used, the operator is provided with a probe specific checklist to ensure proper configuration of steps that must be taken. The starting depth of logging is entered into MSLog, which in turn programs the logging unit. Typically, the starting depth is the location of connection between the cable head and the sonde. Software automatically adjusts the presented information to the depth of the sensor. During data logging operations, the operator monitors the depth to the bottom of the sonde.

A data file name is chosen which relates to the boring number. The program automatically appends a file extension, which relates to the type of log, and the sequence number of log that is being collected for this borehole. Borehole naming convention included a “T” for Tonawanda, “LF” or “MF” for the landfill or mudflats areas respectively, “1”, “2” or “3” for the boring class (1 anticipated to be collected in an area of high gamma measurement, with 3 in an area expected to have natural conditions), and a boring number for the area. For this site a typical well log file name would be “TLF3004U.RD”. The “TLF3” relates to Tonawanda landfill, class 3 boring, 4th programmed borehole logged in an upward (“U”) direction. The extension “RD” is used to denote raw borehole data. For some projects, a numeral suffix would be sequenced for multiple passes of the same tool within the same borehole (i.e. if the well were drilled deeper after the initial logging). MSLog allows the operator to enter information for a well or boring description to be included in the log header.

Having identified the starting depth and identified the data file and well description the operator turns on the data recording on the computer, and turns the winch on to raise or lower the sonde in the well or borehole. As the sonde is traversing the well, the operator monitors the logging speed and recorded data on the computer monitor. In the event the logging speed is significantly different from the designed rate, the operator can make the proper adjustment on the logging unit. The normal logging speed for the natural gamma sonde is 15 feet per minute. For this project, the natural gamma was sampled every 1,000 millisecond, with a logging speed of approximately 3-feet per minute or less. The slower speed was intended to improve data resolution. This has the effect of sampling every 0.05-feet or every 0.60-inches.

At the conclusion of data collection, files were immediately copied from the field PC to backup diskettes, which are then stored separately. Operator comments and data file names and other pertinent information are recorded in the geophysical field-book established for the project.

Occasionally, a borehole was observed to be unstable during sample collection. In this event, a 3-inch steel casing was pushed into the sample location to provide stable logging access for the borehole sonde. These conditions are noted in the well log header, and were interpreted with an adjusted (reduced) baseline.

4.0 DATA PROCESSING TECHNIQUES

This section presents processing details for the borehole geophysical logs acquired during this investigation. The data processing was conducted in accordance with the DOPs (Appendix A). Data processing typically included interpolation of the data, smoothing or filtering, cross-correlation with other measurements, the application of various arithmetic functions to develop the desired physical property from the measured parameters and scale adjustments for presentation. Much of the preliminary data processing was conducted in the field.

4.1 Basic Borehole Data Processing

WellCAD, a commercial software package written by Advanced Logic Technology (ALT) of Grand Duché du Luxembourg was used to organize and manage the logged data.

4.2 Natural Gamma Data Processing

Data from each logging pass (down and up) were consolidated onto a single presentation track. Any header information that was overlooked during field operations, or that was entered in an inconsistent or incorrect fashion was inserted for the purpose of presentation. No other processing occurred on the natural gamma data collected at the Site. On occasion, the entire borehole could not be surveyed in both directions, due to hole collapse or instability concerns.

Therefore only the downward pass is presented. Based upon review of the data, this does not appear to represent a material loss of data.

In the event the data requires conversion to American Petroleum Institute (API) units, the raw counts per second (CPS) recorded can be multiplied by 1.10 and added to 3.6. Using this particular sonde in one of five specially designated boreholes in the United States, and comparing the measured results to standard results established this calibration factor. The data for this project were not converted to API units at the request of health physics personnel.

5.0 DATA PRESENTATION AND INTERPRETATION

Over 200 separate boreholes were logged. The well logs are presented in Appendix B. The following sections discuss the findings and interpretation of the logging.

5.1 Repeatability Evaluation

All boreholes were logged twice (down and up) to demonstrate the repeatability of the geophysical measurements at each borehole. All geophysical logs presented in Appendix B show the downward logging run with a solid line, and the upward run with a broken line. Comparison of the two data sets indicates that the trends of measurement are consistent.

Differences in discrete values at any given depth are within the standard deviation identified during the stationary test (described below) when there is variation in the absolute number of counts per second for any specific depth interval. These results are consistent with the statistical nature of radioactive measurements.

5.2 Background Evaluation

Two separate means were used to evaluate background measurements at this site. Comparing the logging results from borehole to borehole permitted an interpretation of natural lithologic variations. Little significant lateral variation was observed at this site. However, three separate zones were observed vertically within many boreholes. By observation, two natural gamma baselines can be interpreted at the site, with a transition zone between them as shown on the Figure to the right. The zones are referred to as shallow and deep. The shallow zone was not present in all boreholes, but the transition zone was frequently observed.

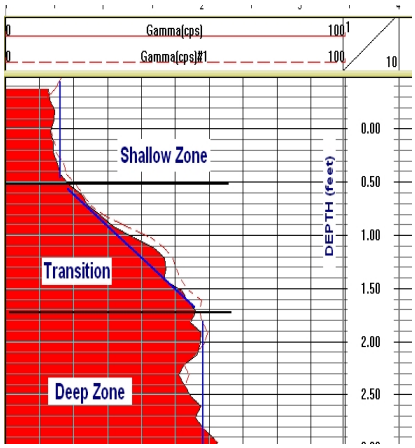


Figure 5-1 Observed Data Zones

As a second means of establishing background values, stationary tests were performed in the reference areas to evaluate measurement variability. Over 700 samples were collected with the sonde suspended in the air, 1.5 feet above ground surface, in the shallow root zone (0.2 feet below ground surface), in an observed transition zone, and at the deepest part of the borehole. Similar tests were performed at a boring with 3-inch steel casing placed into the well. The results of the stationary tests are summarized in Table 1.

Table 1 - Summary of Stationary Time Test Measurements

Boring Number	Casing	Location	Average (cps)	Standard Deviation (cps)	Average+ 1 St.Dev.	Average+. 2 St.Dev
TMFR1-001	None	Air	47.68	6.97	54.65	61.62
TMFR1-013	None	Shallow	53.14	6.99	60.13	67.12
TMFR1-013	None	Transition	84.83	9.46	94.29	103.75
TMFR1-013	None	Deep	90.98	9.59	100.57	110.16
TMFR1-011	3" Steel	Air	33.96	5.84	39.8	45.64
TMFR1-011	3" Steel	Shallow	34.88	5.87	40.75	46.62
TMFR1-011	3" Steel	Deep	57.37	8.25	65.62	73.87

The results of this stationary test allowed an estimate of average values for the site, and a determination of concern levels. These concern levels for borings with steel casing and without casing were 45 and 65 cps respectively for the shallow soils of the site, and 75 and 110 cps respectively for deeper soils of the site.

5.3 Gamma Logging Observations

A summary of natural gamma logging activities is presented on a series of tables following the text. The estimated average natural gamma measurements in the shallow and deep zones are noted on the tables as well as the top and bottom of the transition zone. No effort was made to develop a statistical average for the purpose of this investigation.

Areas of elevated gamma energy that may not be natural were observed at several borehole locations. Normally the elevated, un-natural gamma energy was significantly elevated to the degree that it was easily distinguished from the estimated average for the shallow or deep zones as shown on Figure 5-2.

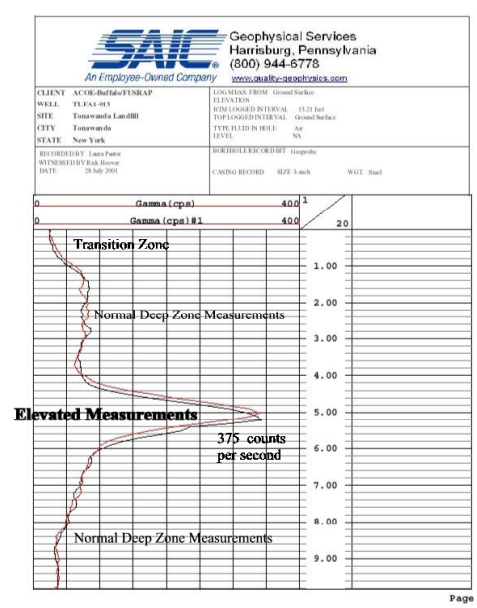


Figure 5-2 Sample Gamma Log with Elevated Zone

Areas of elevated natural gamma measurements were

identified at twelve separate locations. These locations are summarized in Table 2.

Table 2 Elevated Gamma Measurements

Boring Number	Est. Average (cps)	Peak Meas. (cps)	Max. Peak Depth (Feet bgs)	Anomaly Top (Feet bgs)	Anomaly Bottom (Feet bgs)	Anomaly Thickness (Feet)	Comments
TMFC2-012	110	260	1.6	1.0	2.3	1.3	
TMFC1-005	60	195	5.1	3.2	5.7	2.5	Double peak
TLF3-008	85	135	2.2 to2.5	1.6	2.8	1.2	
TLFA1-018	70	120	5.4	4.2	6.1	1.9	Elevated at transition base
TLF3-64	85	140	2.5	1.7	3.0	1.3	
TLFB1A-001	50	110	0.55	0.1	1.0	0.9	
TLFA1-002	85	285	6.1	5.0	7.6	2.6	
TLFA1-003	85	125	5.1 to 6.0	4.8	6.2	2.4	
TLFA1-006	70	255	4.25	3.3	4.8	1.5	
TLFA1-013	85	350	5.1	4.2	6.3	2.1	
TLFA1-014	85	1000	10.7	4.6	6.6	2.0	
TLFA1-016	50	375	11.9	10.8	13.5	2.8	Elevated at base of log

It should be noted that of the 12 locations with elevated measurements, four are just above the level of concern established through stationary measurements (TLF3-008, TLF3-018, TLF3-064, TLFB1A-001, TLFA1-003). Six locations are significantly elevated above 200 cps, with one location (TLFA1-014) elevated to 1,000 cps.

6.0 GEOPHYSICAL DATA SUMMARY AND CONCLUSIONS

The proposed investigation work scope includes standard and/or routinely accepted practices of the geophysical industry. However, by its nature, no subsurface survey is 100 percent accurate, and SAIC cannot accept responsibility for inherent technique limitations, survey limitations or unforeseen site-specific conditions. The identified boundaries separating materials of different physical properties may or may not coincide with boundaries separating materials of different lithologic, geologic or soil composition. This may result in the geophysical interpretation varying somewhat from the gross geologic, lithologic or soils setting of the site. With these constraints in mind, SAIC has drawn the following conclusions:

1. The geophysical gamma measurements were able to be collected on 0.1-foot increments in all but one borehole, which collapsed during logging activities.

2. The gamma measurements from the geophysical logging, were found to be repeatable for successive logging runs within individual boreholes.

3. The geophysical measurements of gamma were found to be repeatable with logging each borehole in two directions.

4. Comparing a number of logs, shallow and deep gamma zones were identified along with a transition zone between.

5. Time tests conducted at several depths within several boreholes were found to present average values for individual zones from which levels of concern could be identified and quantified. Visual inspection of the trends contained within the geophysical logs tended to confirm the mathematical indication of elevated measurements within all areas of concern identified.

6. Over 200 boreholes were geophysically logged, with areas of concern identified in 12 boreholes.

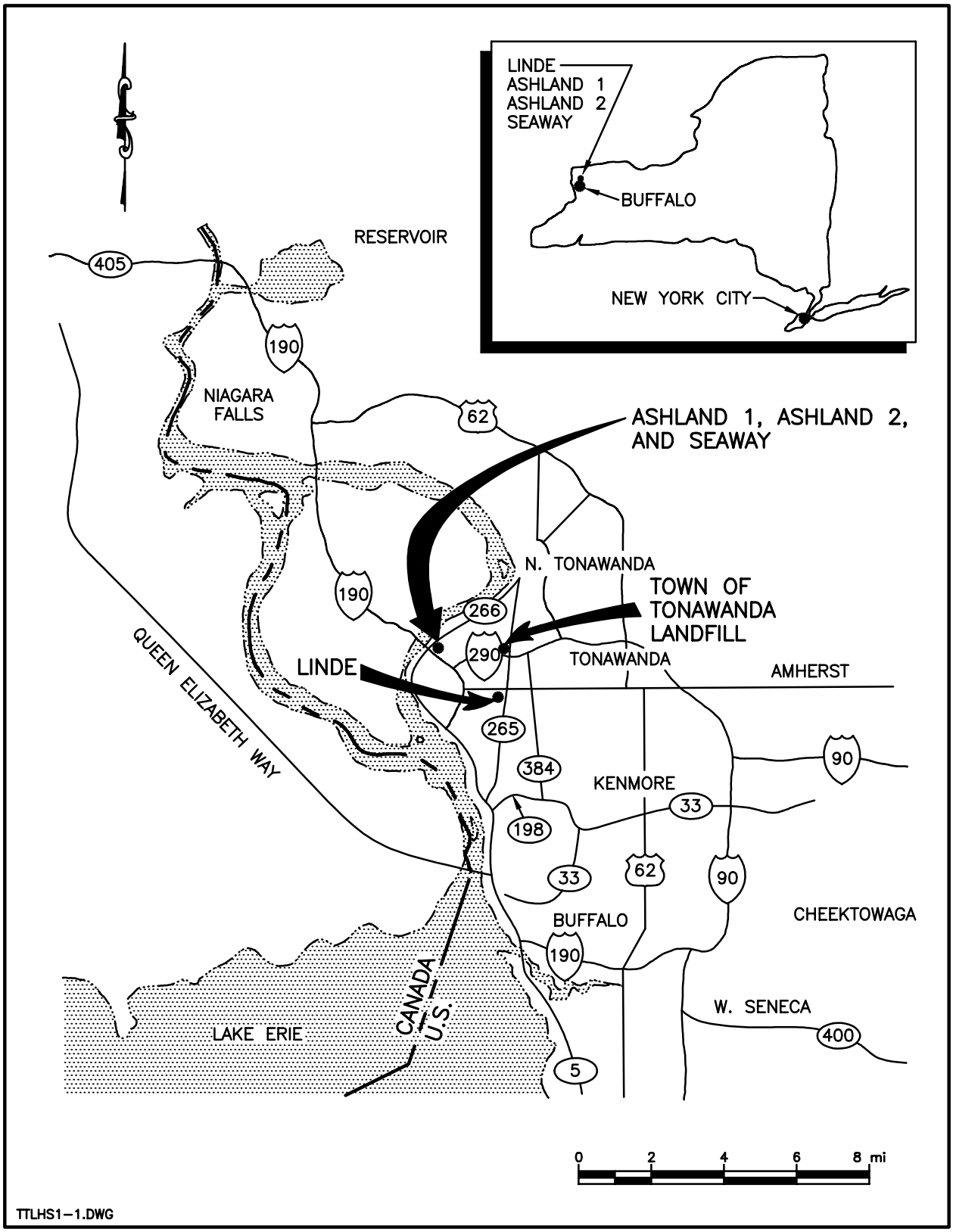
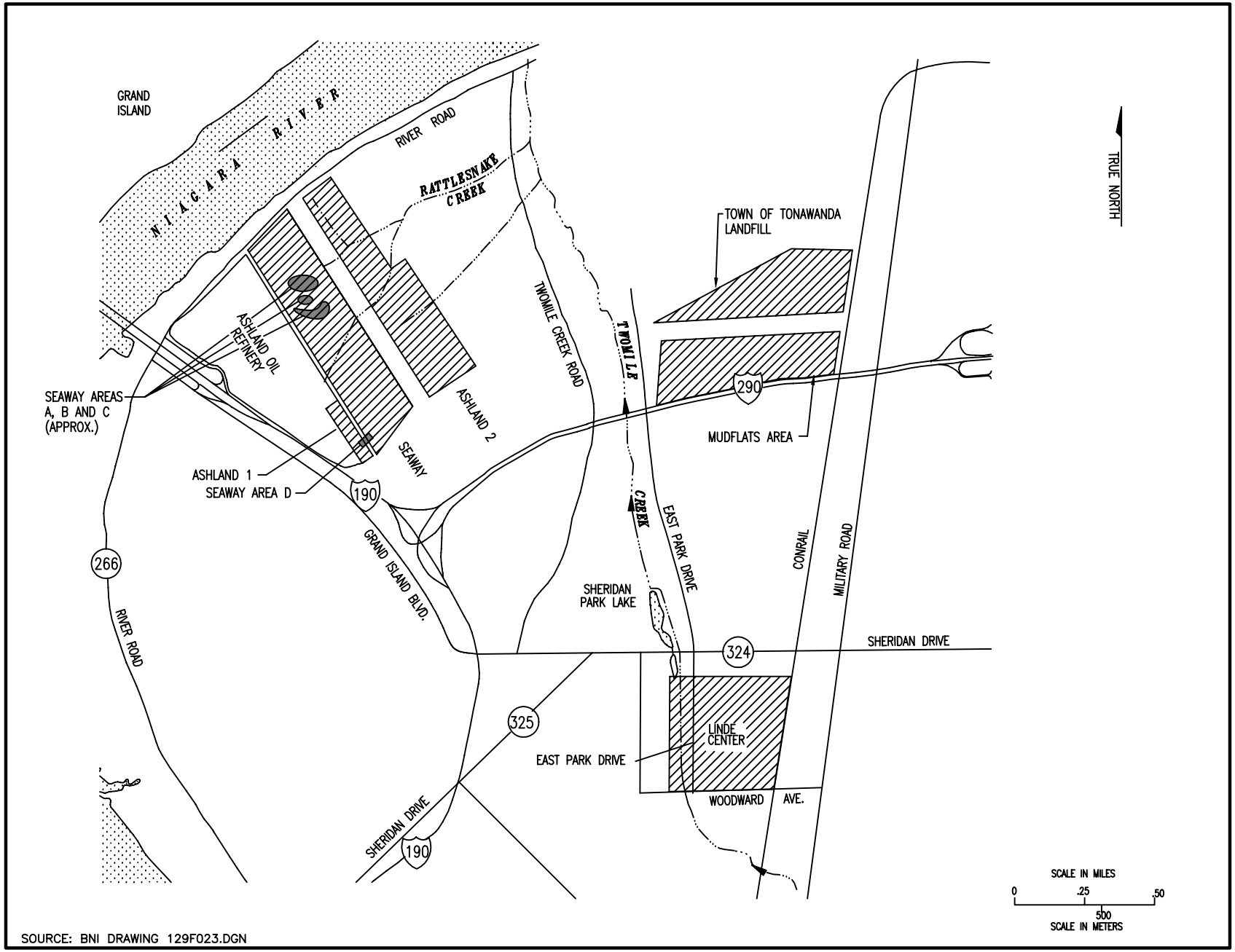


FIGURE 1-1

REGIONAL LOCATION OF THE TOWN OF TONAWANDA, NEW YORK AND THE ASHLAND 1, ASHLAND 2, SEAWAY, LINDE AND THE TOWN OF TONAWANDA LANDFILL SITES



SOURCE: BNI DRAWING 129F023.DGN
TTLHS1-2.DWG

FIGURE 1-2
LOCATIONS OF ASHLAND 1, ASHLAND 2,
SEAWAY, LINDE AND THE TOWN OF TONAWANDA LANDFILL SITES

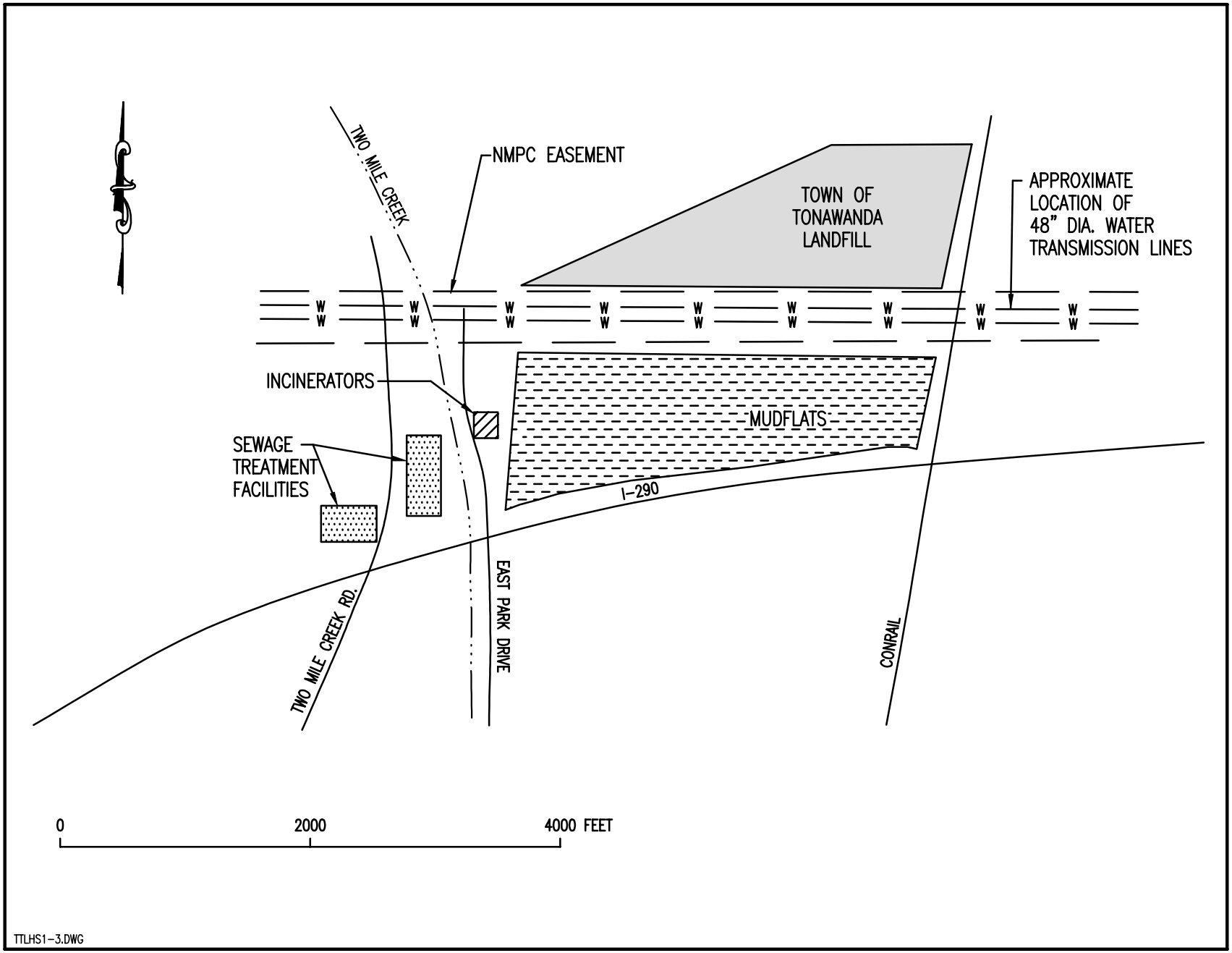
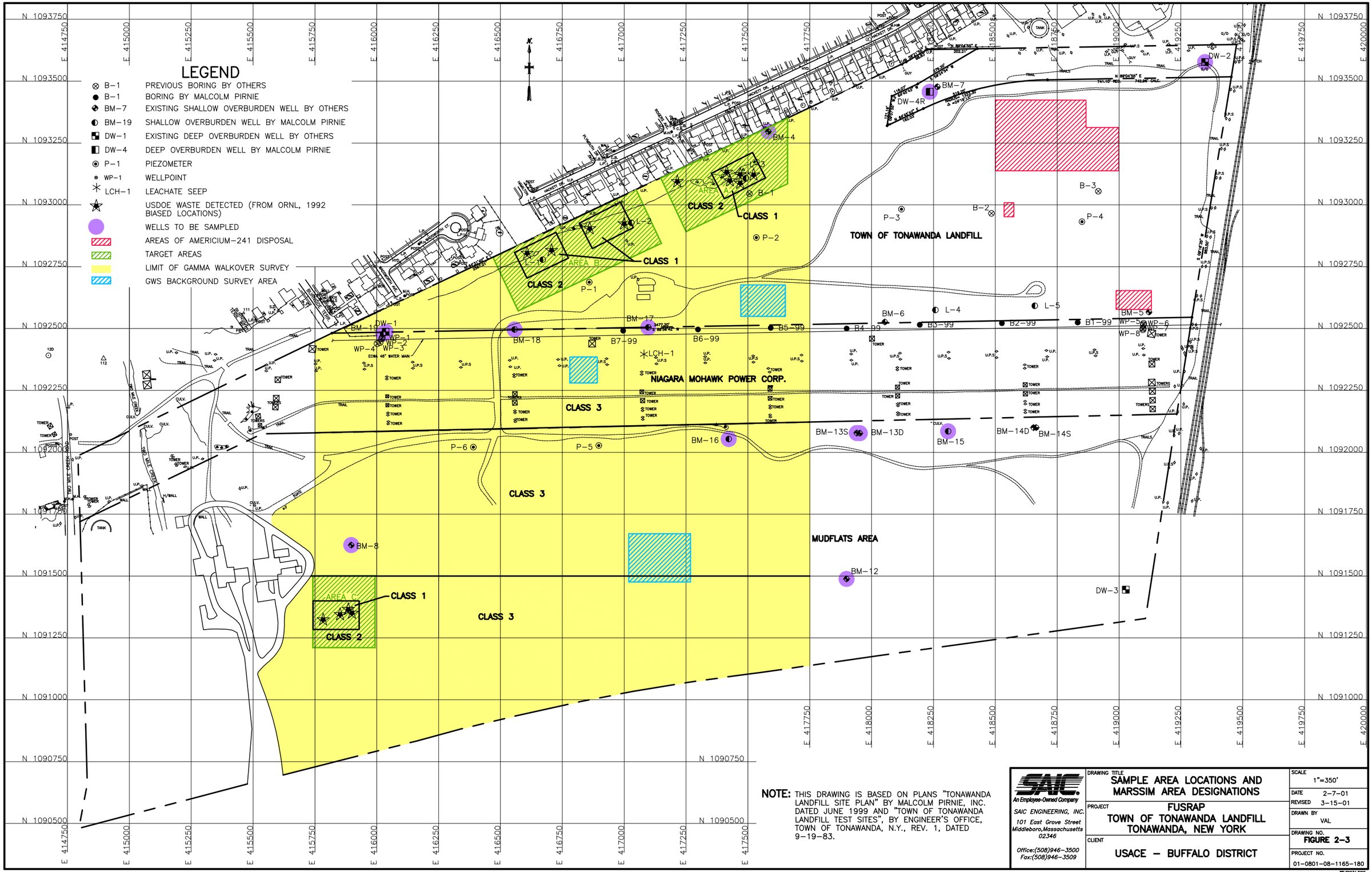


FIGURE 1-3
TOWN OF TONAWANDA LANDFILL APPROXIMATE LOCATIONS



NOTE: THIS DRAWING IS BASED ON PLANS "TONAWANDA LANDFILL SITE PLAN" BY MALCOLM PIRNIE, INC. DATED JUNE 1999 AND "TOWN OF TONAWANDA LANDFILL TEST SITES", BY ENGINEER'S OFFICE, TOWN OF TONAWANDA, N.Y., REV. 1, DATED 9-19-83.

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DRAWING TITLE
SAMPLE AREA LOCATIONS AND MARSSIM AREA DESIGNATIONS

PROJECT
FUSRAP
TOWN OF TONAWANDA LANDFILL
TONAWANDA, NEW YORK

CLIENT
USACE – BUFFALO DISTRICT

SCALE	1"=350'
DATE	2-7-01
REVISED	3-15-01
DRAWN BY	VAL
DRAWING NO.	FIGURE 2-3
PROJECT NO.	01-0801-08-1165-180

TTLFS23A.DWG

Table 3

Town of Tonawanda Landfill

Natural Gamma Borehole Logging Summary

Mudflat Reference Area Sample Locations

Boring	Date Logged	Est. Average Shallow (cps)	Bottom Shallow (feet)	Bottom Transition (feet)	Est. Average Deep (cps)	TD Geophys (feet)	TD Driller (feet)	Casing	Comments
TMFR1-001	27 June '01	50	0.6	1.3	90	2.5	4	None	
TMFR1-002	29 June '01	NA	0.0	1.0	90	3.1	NR	None	
TMFR1-003	29 June '01	NA	0.0	0.6	95	3.7	NR	None	
TMFR1-004	29 June '01	NA	0.0	0.6	25	2.1	3.44	None	
TMFR1-005	27 June '01	48	0.6	1.5	85	3.7	NR	None	
TMFR1-006	28 June '01	55	0.2	1.1	95	3.3	NR	None	
TMFR1-007	29 June '01	55	0.1	0.9	92	2.6	NR	None	
TMFR1-008	29 June '01	NA	0.0	0.7	90	4.5	NR	None	
TMFR1-009	27 June '01	50	0.6	1.1	95	2.4	NR	None	
TMFR1-010	27 June '01	55	0.1	0.5	95	3.6	NR	None	
TMFR1-011	29 June '01	NA	0.0	0.7	100	3.2	NR	None	
TMFR1-011	29 June '01	NA	0.0	0.4	65	3.1	NR	None	Replicate with 3" Steel Casing
TMFR1-012	29 June '01	NA	0.0	0.7	92	2.5	NR	None	
TMFR1-013	28 June '01	NA	0.0	0.5	92	3.2	NR	None	
TMFR1-014	28 June '01	NA	0.0	0.6	95	2.8	NR	None	
TMFR1-015	28 June '01	NA	0.0	0.6	95	3.6	NR	None	
TMFR1-016	28 June '01	NA	0.0	0.7	95	3.0	NR	None	
TMFR1-017	28 June '01	NA	0.0	1.5	95	2.8	NR	None	
TMFR1-018	28 June '01	NA	0.0	0.7	85	4.0	NR	None	Slightly elevated to 105 at 1.1' BGS
TMFR1-019	28 June '01	NA	0.0	0.5	92	3.7	NR	None	
TMFR1-020	29 June '01	58	0.2	0.6	90	2.8	NR	None	

NA - Not Applicable
BGS - Below Ground Surface
NR- Not Recorded

20 Locations logged

Table 4

Town of Tonawanda Landfill

Natural Gamma Borehole Logging Summary

Mudflat Class 3 Area A Sample Locations

Boring	Date Logged	Est. Average Shallow (cps)	Bottom Shallow (feet)	Bottom Transition (feet)	Est. Average Deep (cps)	TD Geophys (feet)	TD Driller (feet)	Casing	Comments
TMF3A-001	30 June '01	52	0.1	0.7	90	3.6	4.93	None	
TMF3A-002	30 June '01	52	0.2	0.7	90	2.9	3.94	None	
TMF3A-003	1 July '01	Na	0	0.8	90	3.7	5.08	None	
TMF3A-004	1 July '01	52	0.1	0.8	95	4.3	5.63	None	
TMF3A-005									No borehole installed
TMF3A-006	1 July '01	NA	0	0.7	98	4.5	5.9	None	
TMF3A-007	30 June '01	60	0.1	0.5	90	4.5	5.63	None	
TMF3A-008	1 July '01	NA	0	0.8	95	3.7	5.08	None	
TMF3A-009	30 June '01	NA	0	0.8	84	3		None	
TMF3A-010	1 July '01	NA	0	.6?	95	3.1	4.59	None	
TMF3A-011	30 June '01	45	0.2	1.3	95	3.4	4.73	None	Two baselines deep 85cps and 102 cps
TMF3A-012	30 June '01	50	0.1	0.7	90	3.2	4.63	None	
TMF3A-013									No borehole installed
TMF3A-014	30 June '01	NA	0	0.6	90	4	5.23	None	
TMF3A-015									No borehole installed
TMF3A-016									No borehole installed
TMF3A-017	1 July '01	55	0.1	0.7	92	4.5	6.06	None	
TMF3A-018									No borehole installed
TMF3A-019									No borehole installed
TMF3A-020	30 June '01	50	0.2	0.7	90	3.4	4.83	None	
TMF3A-021	30 June '01	NA	0	0.9	90	3.6	4.93	None	
TMF3A-022	1 July '01	50	0.1	0.4	70	2.5	3.9	None	Second transition zone from 1.6 to bottom
TMF3A-023	30 June '01	60	0.1	0.7	95	3.6	4.93	None	
TMF3A-024	1 July '01	45	0.3	1	92	4.5	5.93	None	

NA - Not Applicable
BGS - Below Ground Surface
NR- Not Recorded

18 Locations logged

Table 5

Town of Tonawanda Landfill

Natural Gamma Borehole Logging Summary

Mudflat Class 3, Area B Sample Locations

Boring	Date Logged	Est. Average Shallow (cps)	Bottom Shallow (feet)	Bottom Transition (feet)	Est. Average Deep (cps)	TD Geophys (feet)	TD Driller (feet)	Casing	Comments
TMF3B-001	1 July '01	No Log					9.42	None	No Log-Sonde Stuck in Hole-Excavate
TMF3B-002									No borehole installed
TMF3B-003	2 July '01	NA	0	3	95	3.0	4.33	None	
TMF3B-004	2 July '01	NA	NA	0.5	95	3.62	5.03	None	
TMF3B-005									No borehole installed
TMF3B-006	10 July '01	NA	0	1	95	3.6	5.03	None	
TMF3B-007									No borehole installed
TMF3B-008	10 July '01	NA	0.1	1.6	95	4.4	5.23	None	
TMF3B-009	2 July '01	NA	0	1.1	98	3.2	4.63	None	
TMF3B-010								None	
TMF3B-011	2 July '01	NA	0	1.5	105	2.4	3.83	None	
TMF3B-012	10 July '01	NA	0	1.3	90	3.2	4.53	Steel	
TMF3B-013	2 July '01	15	1	1	60	4.5	NR	None	
TMF3B-014									No borehole installed
TMF3B-015	2 July '01	NA	0	1.3	100	4.5	5.83	None	
TMF3B-016	2 July '01	NA	0	1.2	107	2.6	3.94	None	
TMF3B-017	2 July '01	NA	0	0.7	95	4.5	5.73	None	
TMF3B-018	10 July '01	NA	0	1	90	4.4	5.63	None	
TMF3B-019	10 July '01	NA	0	0.8	90	4.5	5.83	None	
TMF3B-020	10 July '01	NA	0	0.4	91	4.5	5.83	None	
TMF3B-021									No borehole installed
TMF3B-022	10 July '01	NA	0	1.2	100	3.6	4.93	None	
TMF3B-023	2 July '01	NA	0	1.1	97	4.5	5.93	None	
TMF3B-024	2 July '01	NA	0	1.3	95	3.6	4.93	None	

NA - Not Applicable
BGS - Below Ground Surface
NR- Not Recorded

17 boring locations logged-One stuck location without log.

Table 6

Town of Tonawanda Landfill

Natural Gamma Borehole Logging Summary

Mudflat Class 3 Area B Biased Sample Locations

Boring	Date Logged	Est. Average Shallow (cps)	Bottom Shallow (feet)	Bottom Transition (feet)	Est. Average Deep (cps)	TD Geophys (feet)	TD Driller (feet)	Casing	Comments
TMF3B-050	11 July '01	NA	0	0.9	92	4.5	5.83	None	
TMF3B-051	11 July '01	48	0.1	1	95	4.5	5.43	None	
TMF3B-052	11 July '01	NA	0	1	93	4.5	5.57	None	
TMF3B-053	11 July '01	50	0.1	0.6	97	4.6	6.03	None	
TMF3B-054	11 July '01	52	0.3	0.7	90	4.6	5.83	None	
TMF3B-055	12 July '01	55	0.3	0.6	93	4.6	NR	None	
TMF3B-056	12 July '01	NA	0	0.4	92	4.6	5.74	None	
TMF3B-057	12 July '01	40	0.5	1.3	98	4.4	5.63	None	
TMF3B-058	11 July '01	30	2	3.5	103	6.5	7.63	None	
TMF3B-059									No borehole installed
TMF3B-060	11 July '01	NA	NA	4	90	8.9	10.12	None	LOG STARTS AT 1.5 ft BGS!
TMF3B-061	11 July '01	NA	0	2.2	110	3.7	4.83	None	
TMF3B-062	11 July '01	15	0.2	1.8	100	3.8	5.13	None	elevated at base of transition zone
TMF3B-063	11 July '01	40	0.3	1	100	8.7	10.12	None	
TMF3B-064	12 July '01	NA	0	NA	30	7.2	8.35	Steel	elevated to 60 at 3.5
TMF3B-065	12 July '01	20	8.7	9.5	68	13.5	14.9	Steel	

NA - Not Applicable
BGS - Below Ground Surface
NR- Not Recorded

15 locations logged

Table 7

Town of Tonawanda Landfill

Natural Gamma Borehole Logging Summary

Mudflat Class 2, Area C Sample Locations

Boring	Date Logged	Est. Average Shallow (cps)	Bottom Shallow (feet)	Bottom Transition (feet)	Est. Average Deep (cps)	TD Geophys (feet)	TD Driller (feet)	Casing	Comments
TMFC2-001	13 July '01	NA	0	1.2	90	4.9	6.23	None	
TMFC2-002	14 July '01	NA	0	1.6	105	5.7	6.93	None	
TMFC2-003	15 July '01	55	0.2	0.5	95	11.5	12.81	None	Slight elevation to 115 cps at 4.8
TMFC2-004	12 July '01	NA	0	1.5	92	4.6	5.83	None	
TMFC2-005	12 July '01	NA	0	1.1	95	4.6	5.93	None	
TMFC2-006	12 July '01	51	0.2	0.6	92	4.5	5.93	None	
TMFC2-007									No borehole installed
TMFC2-008	16 July '01	15	4.2	4.8	60	13.3	14.7	Steel	
TMFC2-009	15 July '01	20	5.6	6.8	60	13.5	14.7	Steel	
TMFC2-010	16 July '01	40	2.8	7.5	60	13.4	NR	None	
TMFC2-011	13 July '01	28	0.3	1.1	98	4.5	5.93	None	
TMFC2-012	13 July '01	30	0.2	NA	110	6.5	5.53	None	**Elevated to 260 cps at 1.6 feet BGS**
TMFC2-013	14 July '01	NA	0	NA	60	13.6	14.9	Steel	
TMFC2-014	15 July '01	NA	0	0.9	80	11.2	12.61	None	two deep baselines 70 cps and 90 cps
TMFC2-015	13 July '01	32	0.3	1.5	92	5.2	5.63	None	
TMFC2-016	13 July '01	50	0.2	0.7	98	4.9	6.23	None	
TMFC2-017	14 July '01	20	2.5	11	60	13.5	14.8	Steel	
TMFC2-018	14 July '01	20	8.4	9.4	60	13.6	14.9	Steel	
TMFC2-019	12 July '01	42	0.3	0.8	92	4.6	6.03	None	

NA - Not Applicable
BGS - Below Ground Surface
NR- Not Recorded

18 Locations Logged

18 Locations logged

Table 8

Town of Tonawanda Landfill

Natural Gamma Borehole Logging Summary

Mudflat Class 1, Area C Sample Locations

Boring	Date Logged	Est. Average Shallow (cps)	Bottom Shallow (feet)	Bottom Transition (feet)	Est. Average Deep (cps)	TD Geophys (feet)	TD Driller (feet)	Casing	Comments
TMFC1-001	13 July '01	20	8.3	10.6	60	13.2	14.41	Steel	
TMFC1-002	1 Aug '01	50	3.1	4.5	85	10.6	12.01	None	
TMFC1-003	1 Aug '01	50	1.4	1.6	80	10.9	12.31	None	Slight elevation to 125 cps at 8.2 to 8.4 feet BGS
TMFC1-004	1 Aug '01	50	5.6	6.2	70	9.1	10.52	None	Slight elevation to 105 cps at 2.4 feet BGS
TMFC1-005	14 July '01	40	NA	NA	60	13.6	14.9	Steel	**Elevated to 195 cps at 5.1 feet BGS -double peak!**
TMFC1-009	15 July '01	40	8.6	9.7	55	13.4	14.7	Steel	55 cps at 1.5 feet breaks up the shallow zone.
TMFC1-013	14 July '01	50	0.2	1	95	12.5	13.75	None	Slight elevation ot 125 at 5.0 to 5.5 ft BGS

NA - Not Applicable
BGS - Below Ground Surface
NR- Not Recorded

7 locations logged

Table 9

Town of Tonawanda Landfill

Natural Gamma Borehole Logging Summary

Landfill Reference Area C Sample Locations

Boring	Date Logged	Est. Average Shallow (cps)	Bottom Shallow (feet)	Bottom Transition (feet)	Est. Average Deep (cps)	TD Geophys (feet)	TD Driller (feet)	Casing	Comments
TLFR3-001	16 July '01	50			70	4.5	4.53	None	slight elevation to 95cps at transition zone
TLFR3-002	16 July '01	42			50	4.6	5.83	None	
TLFR3-003									No borehole installed
TLFR3-004	16 July '01	40	0	2.7	80	4.6	5.83	None	
TLFR3-005	17 July '01	50	0.1	1	90	2.6	3.90	None	
TLFR3-006	17 July '01	50	0.1	1	80	4.5	5.63	None	Decreasing counts as depth increases
TLFR3-007	17 July '01	50	0.4	0.5	70	2.6	4.00	None	Decreasing counts as depth increases
TLFR3-008	17 July '01	60	NA	NA	80	5	6.13	None	No transition
TLFR3-009									No borehole installed
TLFR3-010	17 July '01	45	0.2	1	85	3.3	4.53	None	
TLFR3-011	23 July '01	NA	NA	0.5	60	2.6	3.84	Steel	
TLFR3-012	23 July '01	NA	NA	NA	30	3.5	4.73	Steel	
TLFR3-013	24 July '01	NA	NA	NA	30	6	8.02	Steel	
TLFR3-014	23 July '01	NA	NA	NA	40	3.5	4.73	Steel	
TLFR3-015	23 July '01	NA	NA	NA	35	3.5	4.83	Steel	
TLFR3-016	23 July '01	NA	NA	NA	35	3.6	4.93	Steel	
TLFR3-017	24 July '01	NA	NA	NA	30	8.3	9.52	Steel	
TLFR3-018	23 July '01	NA	NA	NA	30	3.4	4.53	Steel	
TLFR3-019	23 July '01	NA	NA	NA	30	3.5	4.73	Steel	
TLFR3-020	23 July '01	NA	NA	NA	35	2.7	4.24	Steel	

NA - Not Applicable
BGS - Below Ground Surface
NR- Not Recorded

Table 10

Town of Tonawanda Landfill

Natural Gamma Borehole Logging Summary

Landfill Class 3 Sample Locations

Boring	Date Logged	Est. Average Shallow (cps)	Bottom Shallow (feet)	Bottom Transition (feet)	Est. Average Deep (cps)	TD Geophys (feet)	TD Driller (feet)	Casing	Comments
TLF3-001	29 July '01	40	0.7	2.1	60	5.1	5.63	None	
TLF3-002									No borehole installed
TLF3-003	31July '01	30	2.4	2.9	70	3.45	4.63	Steel	
TLF3-004	23 July '01	60	1.5	3	85	4.9	6.13	None	Slightly elevated to 135 cps at 2.2 to 2.5 feet BGS
TLF3-005	29 July '01	NA	NA	0.5	70	2.9	4.33	None	
TLF3-006	29 July '01	NA	NA	0.6	65	3.5	4.83	None	
TLF3-007	29 July '01						6.33	None	
TLF3-008	23 July '01	25	0.1	1	65	2.9	4.14	None	
TLF3-009									No borehole installed
TLF3-010									No borehole installed
TLF3-011									No borehole installed
TLF3-012	23 July '01	NA	NA	0.9	85	5.95	6.83	None	
TLF3-013	23 July '01	NA	NA	2	80	5.2	6.53	None	
TLF3-014									No borehole installed
TLF3-015	31July '01	30	NA	NA	NA	3.2	4.53	Steel	
TLF3-016	31July '01	20	0.5	1.4	50	3.4	4.24	Steel	
TLF3-017	27 July '01	NA	NA	NA	40	3.5	4.83	Steel	
TLF3-018									No borehole installed
TLF3-019	29 July '01	NA	NA	0.6	70	5.3	6.43	None	
TLF3-020									No borehole installed
TLF3-021	23 July '01	NA	NA	1.8	95	4.8	6.23	None	
TLF3-022	31July '01	NA	NA	1	50	3.1	4.43	None	
TLF3-023	23 July '01	NA	NA	3.5	NA	3.5	5.03	None	
TLF3-024	31July '01	NA	NA	0.4	60	2.9	4.24	None	

NA - Not Applicable
BGS - Below Ground Surface
NR- Not Recorded

Table 11

Town of Tonawanda Landfill

Natural Gamma Borehole Logging Summary

Landfill Class 3 Biased Sample Locations

Boring	Date Logged	Est. Average Shallow (cps)	Bottom Shallow (feet)	Bottom Transition (feet)	Est. Average Deep (cps)	TD Geophys (feet)	TD Driller (feet)	Casing	Comments
TLF3-050	24 July '01	NA	NA	1.5	80	5.4	6.73	None	
TLF3-051	26 July '01	NA	NA	0.9	50	3.6	4.93	Steel	
TLF3-052	1 Aug '01	NA	NA	0.5	40	3.49	NR	Steel	
TLF3-053	28 July '01	NA	NA	0.9	75	3.3	4.53	None	
TLF3-054	28 July '01	NA	NA	0.4	45	3.4	4.63	Steel	
TLF3-55	27 July '01	NA	NA	1.4	80	4.45	5.73	None	
TLF3-56	26 July '01	NA	NA	0.9	85	3.9	4.93	None	
TLF3-57	28 July '01	NA	NA	0.5	55	3.2	4.73	Steel	
TLF3-58	25 July '01	NA	NA	0.8	95	5	6.33	None	Sonde hung up at 2.5 ft on first insertion
TLF3-59	25 July '01	NA	NA	0.4	90	3.9	5.03	None	
TLF3-60	27 July '01	NA	NA	0.6	75	3.2	4.53	None	
TLF3-61	27 July '01	30	NA	NA	NA	3.2	4.43	None	
TLF3-62	26 July '01	NA	NA	0.6	80	3.2	NR	None	
TLF3-63	27 July '01	25	0.6	2	54	3.2	4.63	Steel	
TLF3-64	26 July '01	NA	NA	0.4	85	5	6.23	None	Slight elevated to 140cps at 2.5 ft. BGS

NA - Not Applicable
BGS - Below Ground Surface
NR- Not Recorded

14 Locations Logged

Table 12

Town of Tonawanda Landfill

Natural Gamma Borehole Logging Summary

Landfill Area B Class 2 Sample Locations

Boring	Date Logged	Est. Average Shallow (cps)	Bottom Shallow (feet)	Bottom Transition (feet)	Est. Average Deep (cps)	TD Geophys (feet)	TD Driller (feet)	Casing	Comments
TLFB2-001	24 July '01	NA	NA	0.4	85	5.2	6.53	None	
TLFB2-002	24 July '01	NA	NA	0.45	50	3.2	4.63	Steel	
TLFB2-003	30 July '01	NA	NA	0.7	75	3.3	4.63	None	
TLFB2-004	24 July '01	NA	NA	0.4	85	2.6	3.94	None	
TLFB2-005	24 July '01	NA	NA	0.5	50	3.7	4.53	Steel	
TLFB2-006	26 July '01	NA	NA	0.4	40	3.4	4.73	Steel	
TLFB2-007	24 July '01	30.0	0.3	0.5	55	3.0	4.63	Steel	
TLFB2-008	26 July '01	NA	NA	0.4	50	3.3	4.63	Steel	
TLFB2-009	28 July '01	NA	NA	0.4	48	3.0	4.33	Steel	
TLFB2-010	24 July '01	NA	NA	1.4	60	3.45	4.63	Steel	
TLFB2-011	24 July '01	NA	NA	0.6	78	6.5	7.63	None	Only 1 direction logged due to hole stability
TLFB2-012	28 July '01	NA	NA	0.5	80	4.9	6.73	None	
TLFB2-013	24 July '01	NA	NA	0.8	80	4.9	6.39	None	
TLFB2-014	24 July '01	NA	NA	0.4	80	5.5	6.93	None	Only 1 direction logged due to hole stability
TLFB2-015	27 July '01	NA	NA	1.0	80	4.7	6.13	None	
TLFB2-016	24 July '01	NA	NA	0.6	85	5.7	5.03	None	
TLFB2-017	26 July '01	NA	NA	0.7	50	3.2	4.59	Steel	
TLFB2-018	27 July '01	NA	NA	0.6	80	3.7	5.63	None	

NA - Not Applicable
BGS - Below Ground Surface
NR- Not Recorded

18 Locations Logged

Table 13

Town of Tonawanda Landfill

Natural Gamma Borehole Logging Summary

Landfill Class 1 Area B1A Sample Locations

Boring	Date Logged	Est. Average Shallow (cps)	Bottom Shallow (feet)	Bottom Transition (feet)	Est. Average Deep (cps)	TD Geophys (feet)	TD Driller (feet)	Casing	Comments
TLFB1A-001	27 July '01	NA	NA	NA	50	3.4	4.73	Steel	Slightly elevated to 110cps at 0.55 ft. BGS
TLFB1A-005	27 July '01	NA	NA	0.5	75	3.5	4.73	None	

NA - Not Applicable
BGS - Below Ground Surface
NR- Not Recorded

2 Locations Logged

Table 14

Town of Tonawanda Landfill

Natural Gamma Borehole Logging Summary

Landfill Class 1 Area B1B Sample Locations

Boring	Date Logged	Est. Average Shallow (cps)	Bottom Shallow (feet)	Bottom Transition (feet)	Est. Average Deep (cps)	TD Geophys (feet)	TD Driller (feet)	Casing	Comments
TLFB1B-001	25 July '01	NA	NA	0.5	85	3.45	4.83	None	
TLFB1B-005	25 July '01	NA	NA	0.6	95	3.5	4.83	None	
TLFB1B-009	28 July '01	NA	NA	NA	60	3.4	4.93	Steel	Slight elevation to 90 cps at bottom of transition zone

NA - Not Applicable
BGS - Below Ground Surface
NR- Not Recorded

3 Locations Logged

Table 15

Town of Tonawanda Landfill

Natural Gamma Borehole Logging Summary

Landfill Area A Class 2 Sample Locations

Boring	Date Logged	Est. Average Shallow (cps)	Bottom Shallow (feet)	Bottom Transition (feet)	Est. Average Deep (cps)	TD Geophys (feet)	TD Driller (feet)	Casing	Comments
TLFA2-001	25 July '01	NA	NA	0.6	80	5.0	6.43	None	
TLFA2-002	27 July '01	NA	NA	0.8	80	3.9	5.23	None	
TLFA2-003	27 July '01	NA	NA	0.6	75	3.2	4.43	None	
TLFA2-004	26 July '01	40	0.2	1.8	95	5.0	6.63	Steel	
TLFA2-005	1 Aug '01	30	0.4	1.0	50	3.0	NR	Steel	
TLFA2-006	27 July '01	NA	NA	0.4	60	4.2	5.53	None	
TLFA2-007	26 July '01	NA	NA	0.5	75	5.0	6.43	None	
TLFA2-008	31 July '01	40	2.4	3.0	90	3.6	5.03	Steel	Bottom 0.5 feet are a bit elevated for steel cased hole
TLFA2-009	27 July '01	35	NA	NA	NA	3.6	4.93	None	
TLFA2-010	26 July '01	NA	NA	0.6	85	5.0	6.43	None	
TLFA2-011	27 July '01	NA	NA	0.5	75	3.3	4.63	Steel	
TLFA2-012	27 July '01	28	NA	NA	NA	3.5	4.93	Steel	
TLFA2-013	26 July '01	40	NA	NA	NA	3.6	5.13	None	
TLFA2-014	27 July '01	NA	NA	0.5	50	3.3	4.63	Steel	
TLFA2-015	28 July '01	NA	NA	2.1	90	3.4	4.83	Steel	Bottom 1.2 feet are a bit elevated for steel cased hole
TLFA2-016									No borehole installed
TLFA2-017	26 July '01	NA	NA	1.5	95	4.6	4.24	None	
TLFA2-018	28 July '01	21	0.4	1.9	100	3.5	6.03	Steel	Bottom 1.5 feet are a bit elevated for steel cased hole
TLFA2-019									No borehole installed
TLFA2-020	27 July '01	NA	NA	5.0	55	3.3	4.73	Steel	

NA - Not Applicable
BGS - Below Ground Surface
NR- Not Recorded

17 Locations Logged

Table 16

Town of Tonawanda Landfill

Natural Gamma Borehole Logging Summary

Landfill Area A Class 1 Sample Locations

Boring	Date Logged	Est. Average Shallow (cps)	Bottom Shallow (feet)	Bottom Transition (feet)	Est. Average Deep (cps)	TD Geophys (feet)	TD Driller (feet)	Casing	Comments
TLFA1-002	1 Aug '01	NA	NA	1.0	85	13.1	14.41	Steel	**Elevated to 285 cps at 6.1 feet BGS**
TLFA1-003	1 Aug '01	25	0.9	4.1	85	13.1	14.41	Steel	Slightly elevated to 125 at 5.1 to 6.0 feet BGS
TLFA1-004	1 Aug '01	NA	NA	0.5	45	13.2	14.51	Steel	
TLFA1-005									No borehole installed
TLFA1-006	31 July '01	30	0.4	2.3	70	13.6	15.00	Steel	**Elevated to 255 cps at 4.25 feet BGS**
TLFA1-007	30 July '01	NA	NA	1.3	55	12.6	13.91	Steel	
TLFA1-008									No borehole installed
TLFA1-009									No borehole installed
TLFA1-010	31 July '01	30	3.5	4.3	80	13.5	14.60	Steel	
TLFA1-011	31 July '01	40	3.7	4.1	80	13.8	14.60	Steel	
TLFA1-012	1 Aug '01	NA	NA	0.6	50	12.8	14.51	Steel	
TLFA1-013	28 July "01	NA	NA	1.2	85	13.7	15.10	Steel	**Elevated to 350 cps at 5.1 feet BGS**
TLFA1-014	31 July '01	25	1.9	2.7	85	13.2	14.60	Steel	**Elevated to 1000 cps at 10.7 feet BGS**
TLFA1-015	31 July '01	25	0.5	2.0	80	11.6	14.60	Steel	
TLFA1-016	31 July '01	25	3.5	4.9	50	13.5	14.70	Steel	**Elevated to 375 and cps at 11.9 feet BGS**
TLFA1-017	31 July '01	25	2.4	3.0	60	13.2	14.60	Steel	
TLFA1-018	31 July '01	30	3.4	NA	70	13.4	14.60	Steel	**Elevated to 120 cps at 5.4 feet BGS**
TLFA1-019	31 July '01	25	1.5	2.0	80	13.4	14.70	Steel	
TLFA1-020	31 July '01	25	2.5	3.4	75	13.2	14.31	Steel	

NA - Not Applicable
BGS - Below Ground Surface
NR- Not Recorded

16 Locations Logged

APPENDIX A

DETAILED OPERATING PROCEDURE
BOREHOLE GEOPHYSICAL SURVEY

Science Applications International Corporation
An Employee-Owned Company

DETAILED OPERATING PROCEDURE
BOREHOLE GEOPHYSICAL SURVEY

January 1999

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1.0 SCOPE AND OBJECTIVES

1.1 Scope

This Detailed Operating Procedure (DOP) provides instructions and establishes requirements for conducting borehole geophysical surveys. This procedure is applicable to all Science Applications International Corporation (SAIC) personnel involved in borehole geophysical surveys.

Borehole geophysical surveys are used to record a variety of physical measurements within a borehole. Among the measurements commonly performed are Gamma Ray, Spontaneous Potential, Resistance, Temperature, and caliper (diameter).

1.2 Objectives

The objective of this DOP is to provide uniform methods and instructions for conducting borehole geophysical surveys including:

1. Borehole/Well preparation.
2. Survey field procedures.
3. Borehole data processing.

2.0 DEFINITIONS

Anomaly - An anomaly is a geological feature distinguished by geophysical means that is different from the general surroundings (i.e., departure from the expected or normal).

Environmental Restoration (ER) Site - Any facility, location, or structure where waste is or was disposed or contained in an ER site. ER sites may contain various waste types (e.g., radioactive, mixed, suspected hazardous, hazardous, generated, or unknown) and may include buried structures such as tanks, sumps, sewage lagoons, leach fields, muck piles, waste dumps, mud pits, landfills, injection wells, disposal trenches, hazardous waste accumulation sites, tunnel ponds, or other waste containment structures used for the intentional or unintentional disposal, storage, or management of wastes. Designation as a site under the ER project does not imply classification accordance to any known regulatory framework.

Geophysical Surveyor - The geophysicist who operates the borehole geophysical surveying instruments and records the results in the field.

3.0 RESPONSIBILITIES AND QUALIFICATIONS

For small projects, a borehole geophysical project may require a field crew of only one-person. In this instance, the field person shall be responsible for performing all of the activities described below.

3.1 SAIC Project Manager

The SAIC Project Manager, in concert with the SAIC Geophysical Manager, shall be responsible for ensuring that the borehole geophysical surveyors are trained and

indoctrinated in the content of this procedure and related procedures prior to performing the activity. Furthermore, these Managers shall ensure that borehole geophysical survey activities are documented in accordance with SAIC requirements.

3.2 SAIC Field Geophysical Supervisor

For a multi-person survey crew, one of the SAIC borehole geophysical surveyors shall be designated as the field supervisor and shall be responsible for ensuring the completion of all applicable forms and for notifying the SAIC Project Manager or designee of site-specific activities, survey progress, problems, and results. The SAIC field supervisor shall be a geophysicist; responsible for ensuring that borehole geophysical survey activities are performed in accordance with this DOP.

3.3 SAIC Geophysical Surveyor

The geophysical survey field team shall consist of appropriately trained and qualified personnel, as determined by the SAIC Project Manager and the SAIC Geophysical Manager. The SAIC geophysical surveyor shall be responsible for ensuring that the borehole geophysical survey activities are performed and documented in accordance with this DOP.

4.0 MATERIAL/EQUIPMENT AND CALIBRATION

4.1 Material and Equipment

Specific equipment used to conduct borehole geophysical surveys may consist of one or more of the items shown in Table 1 below.

Table 1 **Borehole Geophysical Survey Specific Equipment**
MGX Motorized Winch
MGX II Integrally mounted electronics console
MGX Single Conductor Cable and Cable Head
HLP-2375/S stratigraphic gamma/SP/single point resistance probe
CLP/CTP-2492 Three Armed Caliper and Temperature probe
Mud plug, power cable, serial cable
110 V or 220 V Power Source
Tripod Assembly for ground or derrick operations
Pulley Box
Project Specific Probes identified in the work plan
MSLog software for data acquisition and processing
Laptop Computer

The following is a list of additional equipment necessary to complete a borehole geophysical survey:

1. Dummy Probe
2. Rope
3. Measuring Tape (non conductive)
4. Shovel
5. Water for rinse
6. Diskettes
7. 12 V DC to 110 V AC Converters
6. Field notebook
7. Portable Printer
8. Hand Crank
9. Non-conductive Grease
10. White Lubricant (Water Resistant)
11. "O" Rings
12. Rags (Clean)
13. Volt-Ohm Meter

4.2 Calibration Requirements

Some geophysical probes require periodic calibration. Calibration and use of the instruments shall be in accordance with the manufacturer's instructions. Calibration checks shall be performed on a periodic basis by the manufacturer, or by personnel certified by the manufacturer. Documentation of the most recent calibration will be on-site during logging activities.

5.0 METHODS

Borehole geophysical surveys are conducted to aid in the characterization of the subsurface lithology, hydrogeologic parameters, borehole/well construction and integrity, and ground water quality. Instrument output depends on the probe that is being utilized. Some of the probes utilized by SAIC include caliper, formation density, fluid temperature, normal resistivity, fluid conductivity, acoustic velocity, gamma ray, neutron-neutron, resistivity, induced polarization, complex resistivity, magnetic directional, dipmeter, magnetic susceptibility, magnetometer, electromagnetic induction, flow meter and acoustic televiewer. In a typical configuration, data is recorded digitally on a laptop computer and printed on a portable printer. In the case of the televiewer, data is most commonly recorded on videotape.

5.1 Borehole Geophysical Survey Preparation

Prior to performing borehole geophysical surveys, the following activities should be performed by the SAIC field geophysical supervisor:

1. Existing site information shall be reviewed such as vehicle access to the borehole(s) and/or well(s).
2. Diameter (inside) of the borehole and/or well and casing material (if any) should be noted.
3. Internal access (locks) to borehole and/or well should be verified.
4. Well Construction (if known) and method of construction (drilling) should be identified.
5. Geologic Log(s) should be acquired if available.

6. Health and safety hazards shall be defined.
7. Potential for stand by time should be identified, and the basis for determining.

The parameters of the subsurface to be detected and measured will be established, along with the required depth of investigation, and vertical resolution (scale) shall be established. This information will be used to determine the proper probe(s) to be used to make the measurements, the rate at which the borehole and/or well is logged, and the amount of cable needed to achieve the depth of exploration.

5.2 Site Preparation

The geophysicist will establish that the borehole and/or well to be surveyed are corroborated with the information stated in Section 5.1. A clear path from the top of the borehole and/or well will be established to the borehole logger to allow the logging cable smooth and unimpeded access. A constant power source (120 volts, 300 watts) should also be established to the MGX logger.

For uncased wells that a televiewer survey is to be conducted, the down-looking view will be monitored during probe decent to observe borehole obstructions. In the event a televiewer survey is not to be conducted in an uncased hole, a “dummy” probe will be launched down the borehole and/or well to determine if the borehole and/or well can be surveyed and the annulus is “clear” and free of obstructions. If in the opinion of the field geophysical supervisor the borehole is clear and stable, the temperature probe may be slowly lowered in place of the dummy probe.

5.3 Survey Field Procedures

A standard procedure for conducting borehole geophysical surveys is provided below. The Field Geophysical Supervisor shall insure that the following preparations are preformed before logging commences:

1. MGX Logging Software MSLog is properly loaded on a PC
2. Adequate Power Supply (300-watt minimum) is available with proper voltage.
3. Grounded power supply cables are used to operate the system.
4. Set up logger in a level and dry location.
5. Keep computer and console controls out of bright sunlight, if possible.

Logging with a PC acquisition system requires that the user take extra care in setting up the unit to avoid moisture and excess dust.

The tripod assembly can be set up in a standard wellhead position or the sheave assembly can be removed from the yoke and hung on a derrick with the safety hook. This is accomplished by removing the two (2) pins from the tripod head that hold the sheave, and attach the wheel assembly to the hook and one of the pins. The long pin that serves, as the axle for the sheave must be pulled so that the cable can be run over the inside of the sheave. Re-install the long pin through the wheel and sheave so that the cable will run over the “top” of the wheel, when attached and hung from the hook.

When using the resistivity or SP logging probes, the mud plug and attaching cable must be utilized. Plug the pin on the end of the cable into the console marked **SURFACE ELECTRODE.** Place the lead electrode in a mud pit if available. If not, dig a shallow hole, keep it full of water, and place the

lead electrode in the hole. If the hole will not hold water and conditions are dry, it will be necessary to drive a stake into the ground and clamp the lead electrode to the stake. This will allow for greater moisture contact.

It is very important that the **cables** be laid out in a fashion to avoid tripping hazards. The logger will have a serial cable going to the computer, a mud plug (if doing resistivity or SP probes) cable going to the mud plug electrode, and a power cable going to a power supply. In addition, the cables to the PC and the optional printer should also be laid out in a similar manner.

Before starting the logging procedure, the drive clutch should be placed in **disengage/manual crank** position. This can be accomplished by grasping the knurled knob on the side of the logger and pulling out (i.e., away from the console) and turning it a few degrees. This will disengage the motor drive and allows the cable to be pulled out by hand or driven by the hand crank when the hand crank is attached.

Pull out enough cable to allow the probe to be connected near the borehole and lifted over the sheave. Once this is done, re-engage the motor drive with the clutch knob by pulling the knob out, turning back a few degrees and allowing the knob to reset in the motor drive sprocket.

The cable should be inspected for insulation with an ohmmeter daily. The center pin on the cable head should be electrically isolated from the armor or cable bulkhead by at least 20 megaohms resistance. The center conductor can be checked for continuity by shorting the bulkhead or armor to the center pin, and measuring between the armor and conductor pins on the end of the console. Cable resistance should be approximately 25.4-ohms/1000 ft. (or 87 ohms/Km) of cable. The mechanical and electrical properties of the cable are important to overall system performance and must be within acceptable limits for a successful operation. **If the cable or cable head does not meet specifications, correct the problem before attempting to log.**

The following hardware set-up must be followed in the order presented herein:

1. Connect Serial Port Cable between D89 connector on the MGX II to PC Com-1 serial port.
2. Connect AC Power to Logger, PC and (optional) Printer
3. Connect Printer cable between Printer and PC
4. Turn on PC
5. Connect mud plug cable (if used) to MGX II Surface Electrode jack (green).
6. Turn on MGX II console

When powering down and disassembling the equipment, the reverse order (6 to 1) should be performed.

To operate the MSLog software supplied by the manufacturer must be installed on the PC. Installation of the software should follow the manufacture's instructions. The software trade name is MSLog. The software MSLog should be used to operate the MGX II logger and record the data. Detailed instructions for the operation are contained in the software manual.

This software allows the geophysicist operator the ability to manage all functions of the MGX II logger and control the borehole logging activities. Principal controls include

1. Logging depths
2. Logging tool selection
3. Communication rates
4. Acquisition parameters
5. Ancillary browsers and processors

As previously stated detailed instructions can be found in the manufacturer's manual. The geophysical operator should have a copy of the manual with him or her at all times during logging operations.

Unless otherwise specified, logs will be collected from the top of casing (or ground surface if no casing is present) to borehole bottom and vice versa. Logging speed will be adjusted to meet the appropriate speed for the data being collected. Logging speeds are summarized on Table 2.

Table 2
Recommended Logging Speeds

Tool	**Speed Ft/Min**
Temperature	15
Caliper	15
Resistance/SP	15
Natural Gamma	15
Spinner Tool	10 and 20
Fluid Conductivity	12

If partial reruns are undertaken, an overlap distance of 20 feet is standard with a deep (over 100 feet) well. When logs do not appear to be accurate based upon previously gathered well logs or information, changes in speed, time constant, scale, or spacing may improve the record

Whenever possible, paper plots of all logs shall be generated in the field during the logging process. Logs are normally printed out at a scale of 10 feet per inch, but the depth of the well may necessitate choosing using another scale. Digitized logs stored on a field PC and can be further processed in the office. All logs printed in the field should include, in the header, well name and number, well location, data filename, log types, scale for each log, date, and client. Other information which will be included in the data file includes owner of well and address, logging contractor and address, logging operator, drilling contractor and address, elevation of top of casing and distance above ground level, casing description, log depth datum, drilling method, type of drilling fluid, static water level, model of tool, logged interval, and logging speed and direction.

5.4 Data Processing and Interpretation

After logging has been completed the geophysicist may want to re-plot some or all of the data on different scales, combine data from different logging runs, or make higher resolution "final prints."

Minor processing can occur using MSLog, otherwise, SAIC utilizes WellCAD or VIEWLOG for sophisticated well log processing and analysis. A full explanation of these programs can be found in the manufacturer's manual.

Data interpretation can best be described as the comparison of the geophysical log data to known geologic data. Depending on the probe used and the parameter's measured, data collected in the logging operation can be inferred to changes in the subsurface in materials in the vicinity of the borehole. No automated programs for data interpretation with sufficient accuracy have been developed at this time. The geophysicist's experience of making comparisons of the data collected to reality is how many interpretations are made.

Facilitating interpretation, SAIC may use VIEWLOG or WellCAD. Both commercially available software packages allow log calculations and presentation in order to facilitate client needs. Use and applications for each of these software packages can be found in the software manuals.

6.0 REQUIRED INSPECTION/ACCEPTANCE CRITERIA

Comparison to geologic logs and well construction logs with the measured geophysical survey logs is necessary when the geologic and construction logs are available.

7.0 RECORDS

The following records generated as a result of implementation of this procedure shall be maintained in a safe manner and submitted to the project central files for storage:

1. Field Daily Activity Logs
2. Daily Geophysical Operations Log
3. Borehole Logging Data Acquisition Log
4. Paper copy of each well Log.

8.0 REFERENCES

8.1 Requirements and Specifications

U.S. Environmental Protection Agency, 1987. *A Compendium of Superfund Field Operations Methods*. EPA/540/P-87/001.

U.S. Environmental Protection Agency, 1988. *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA*. EPA, Interim Final.

U.S. Environmental Protection Agency, 1989. *RCRA Facility Investigation Guidance*, EPA, Interim Final.

American Society of Testing and Materials, 1995 *Standard Guide for planning and Conducting Borehole Geophysical Logging*, ASTM Designation D5753-95.

8.2 Related Procedures

ITLV-INV-0401, "Field Activities Documentation"

8.3 Others

Manufacturer's Manual for MSLog with the MGX-II Logging System

9.0 ATTACHMENTS

Attachment A, Daily Geophysical Operations Log
Attachment B, Borehole Logging Data Acquisition Log

DAILY GEOPHYSICAL OPERATIONS LOGS

DATE:_____ TEAM LEADER:_____ PROJECT NO.
FIELD CREW:_____ PROJECT NAME:
SITE LOCATION:

SURVEY TYPE: Seismic Refraction Seismic Reflection
EM-31 EM-61 EM-34 EM-47 SP
Utility Metal Detector Gravity Magnetometer
Electrical Imaging Resistivity
Borehole Geophysics Borehole Camera (Color or Black & White)
Other: _____

DATA RECORDED:

PROBLEMS:

Copy: Project File, Project Manager, Equipment & Supply

BOREHOLE LOGGING
DATA ACQUISITION LOG

Project Name: _____ Project Number: _____ Sheet ___ of ___
Site Name: _____ Operator: _____
Date:_____ Datum:_____

Well	File Name	Log Type	Speed	Log Direction	Top Log Interval	Btm. Log Interval	Comments

Log Types: Gamma Ray (GR), Resistance/Spontaneous Potential (R/SP), Temperature (T), Caliper (C)

ATTACHMENT E

Gamma Logs

Landfill
Class 1 Area A

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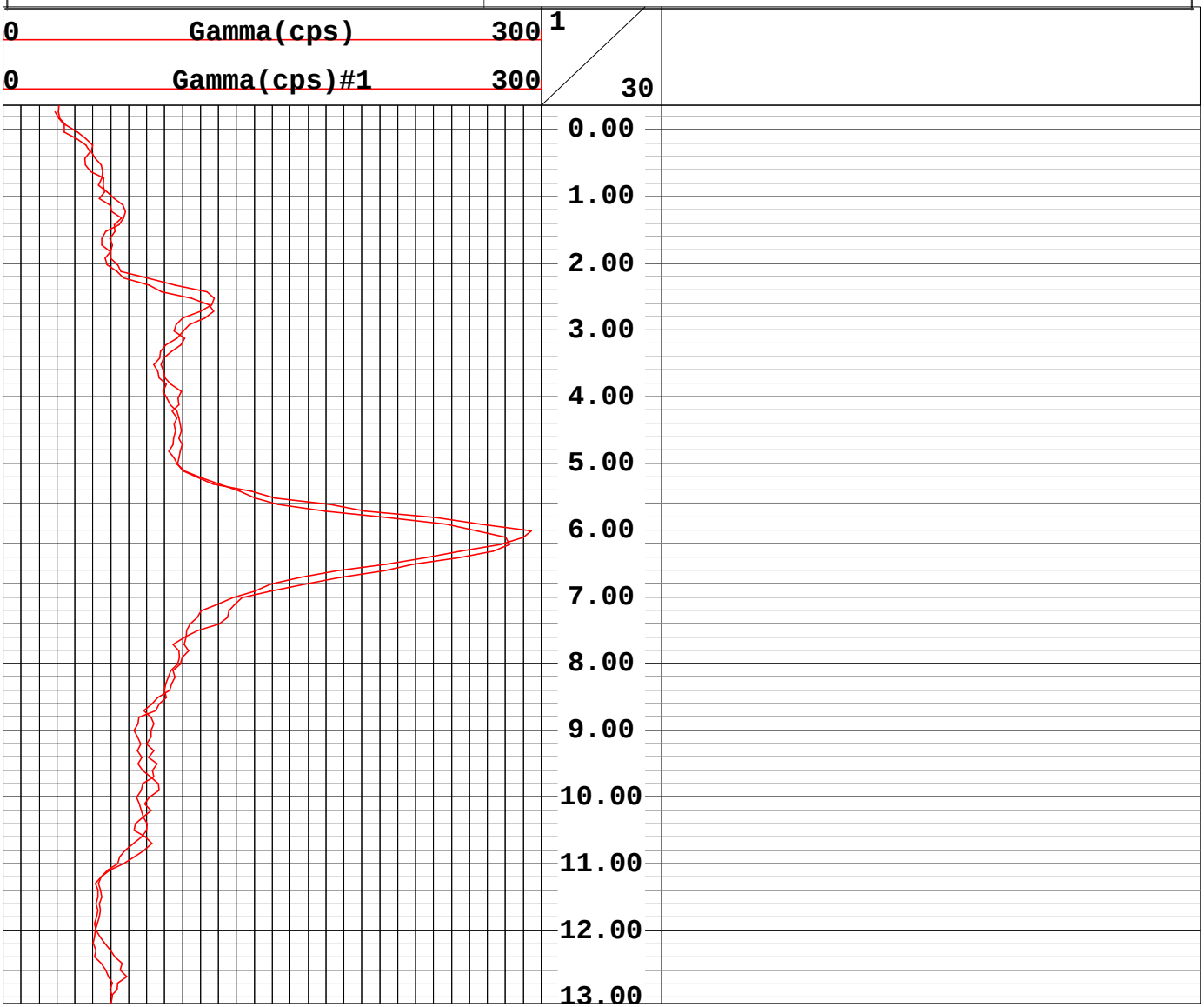
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFA1-002	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 1 August 2001	CASING RECORD SIZE 3-inch WGT. Steel



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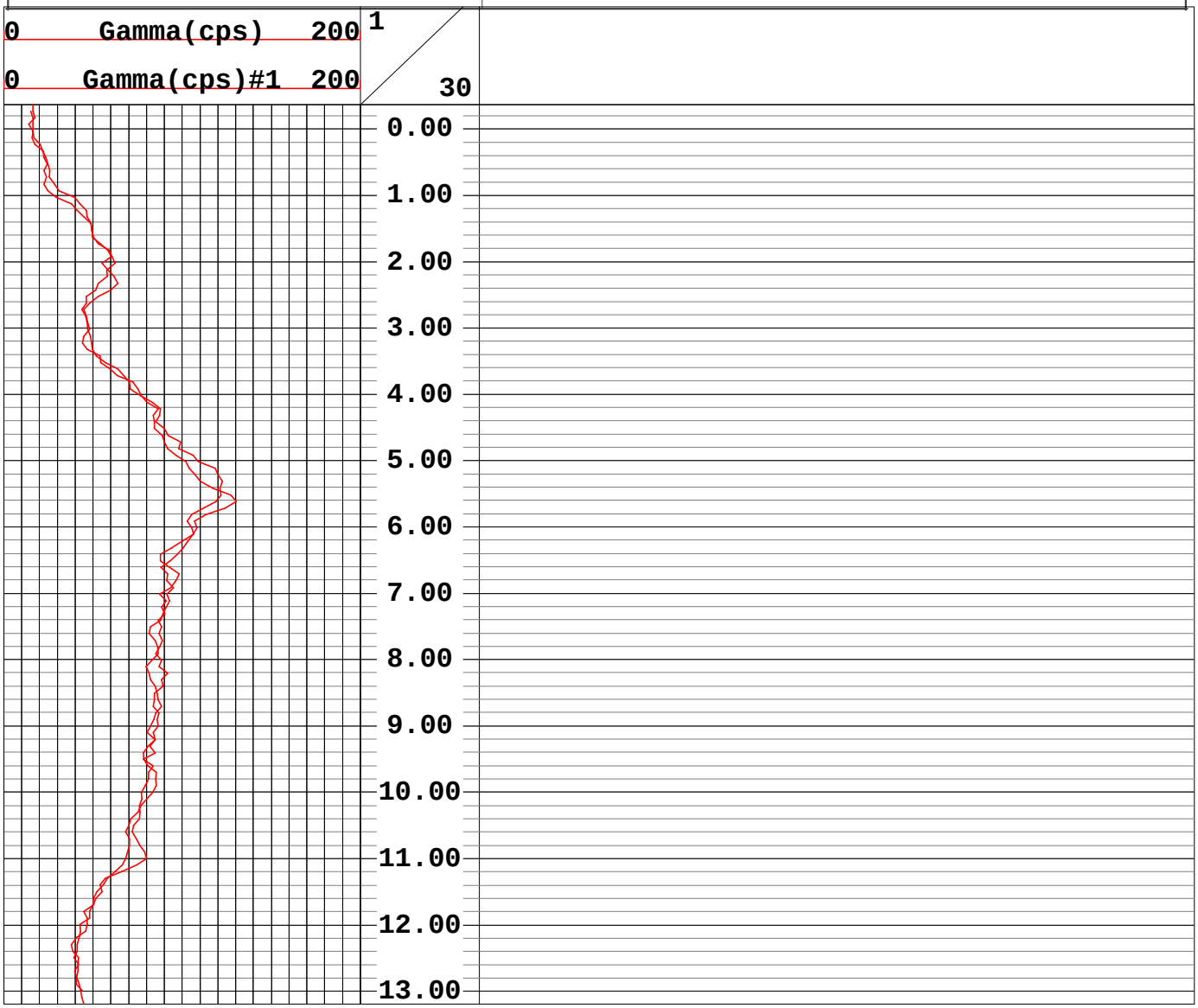
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFA1-003	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 1 August 2001	CASING RECORD SIZE 3-inch WGT. Steel



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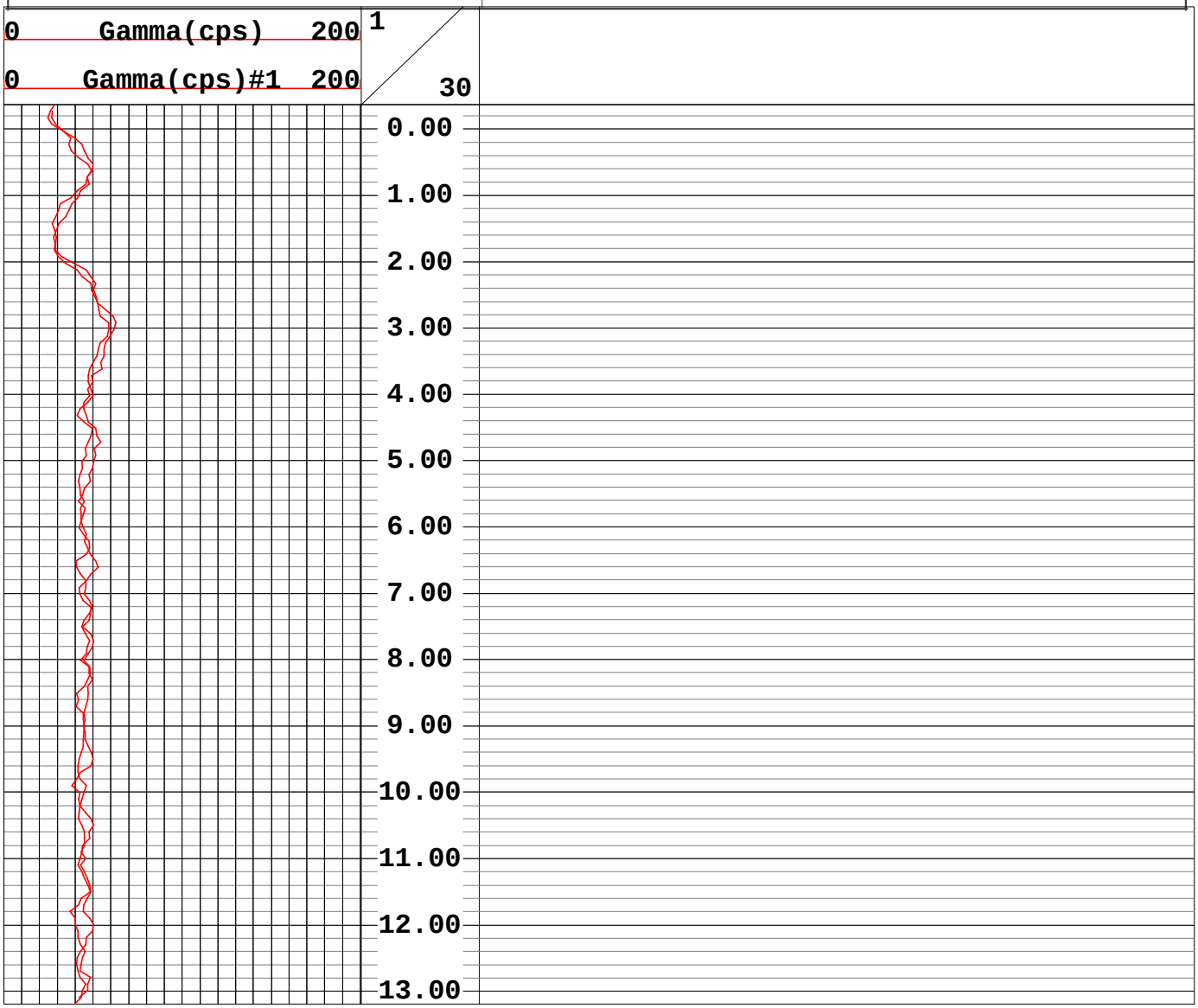
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFA1-004	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 1 August 2001	CASING RECORD SIZE 3-inch WGT. Steel



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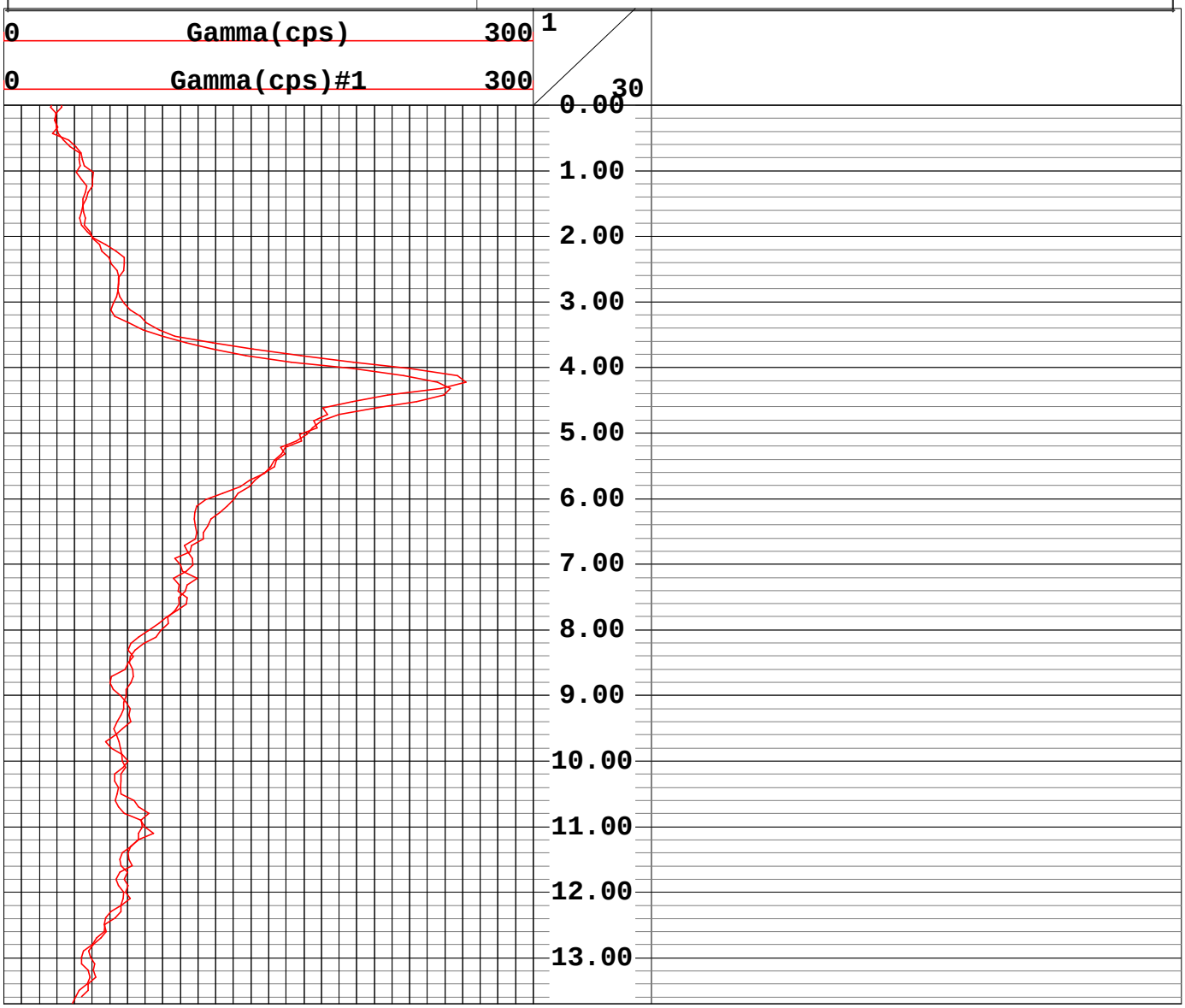
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFA1-006	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 31 July 2001	CASING RECORD SIZE 3-inch WGT. Steel



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CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFA1-007	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
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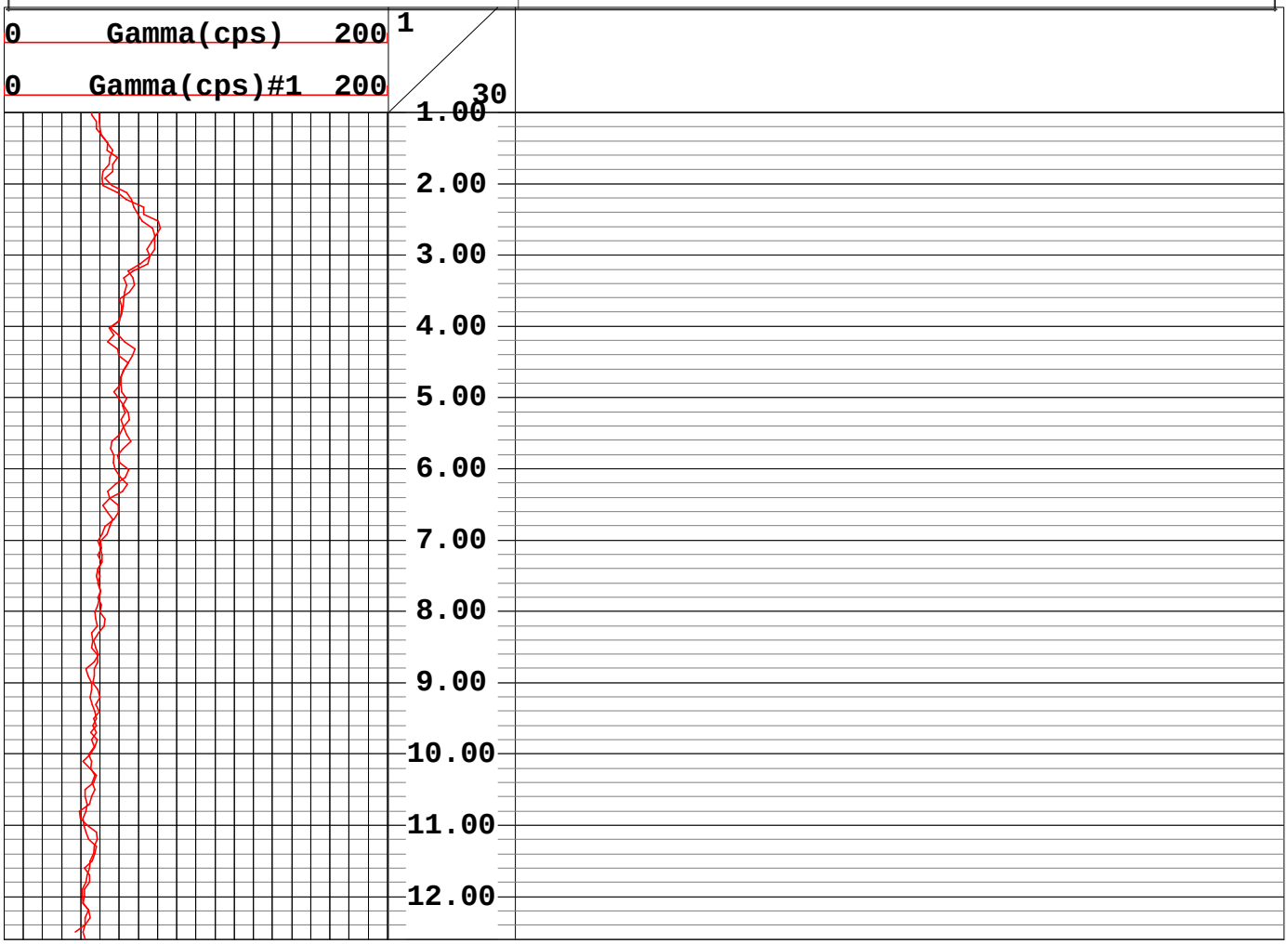
WITNESSED BY	
DATE 30 July 2001	CASING RECORD SIZE 3-inch WGT. Steel



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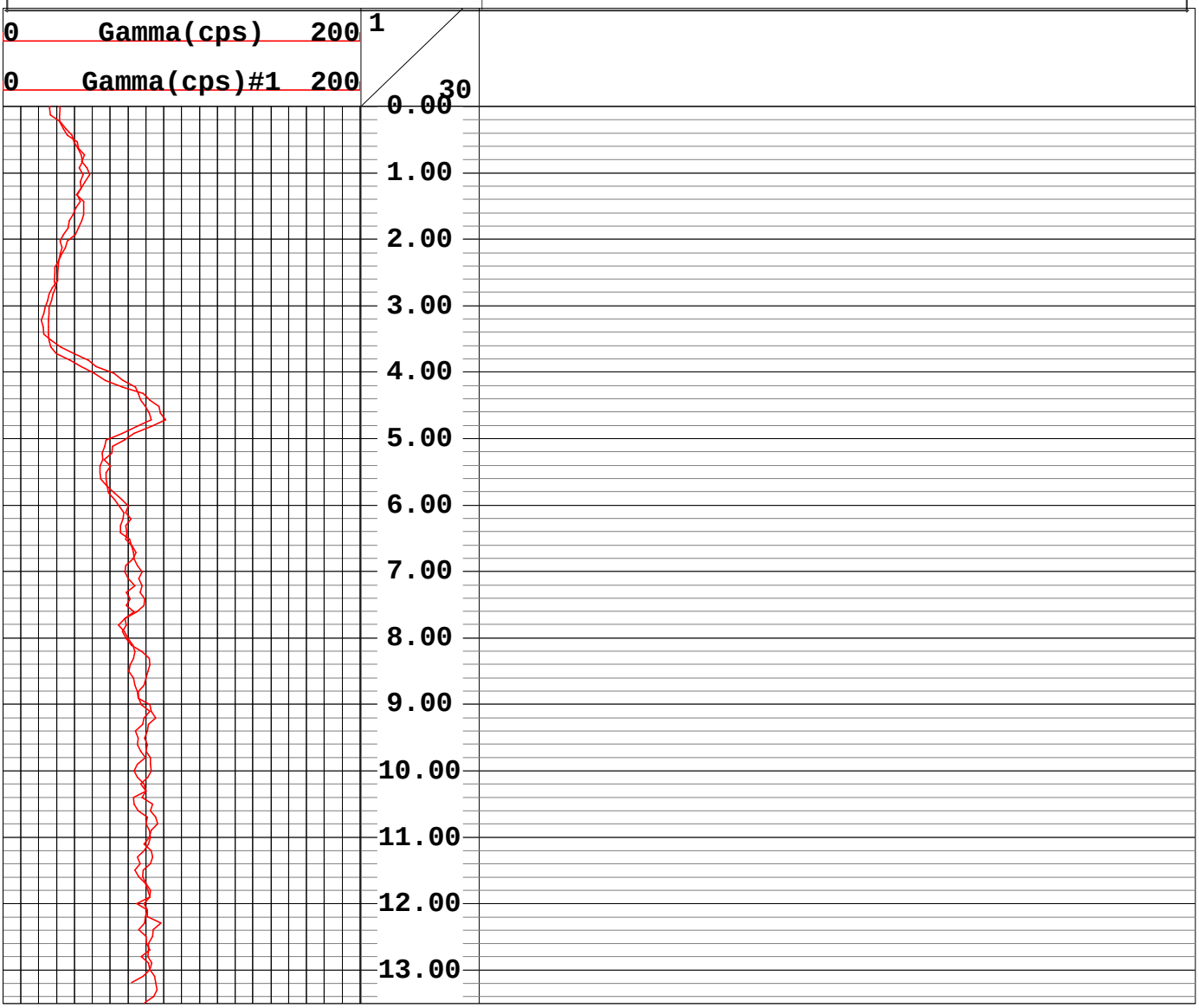
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFA1-010	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 31 July 2001	CASING RECORD SIZE 3-inch WGT. Steel



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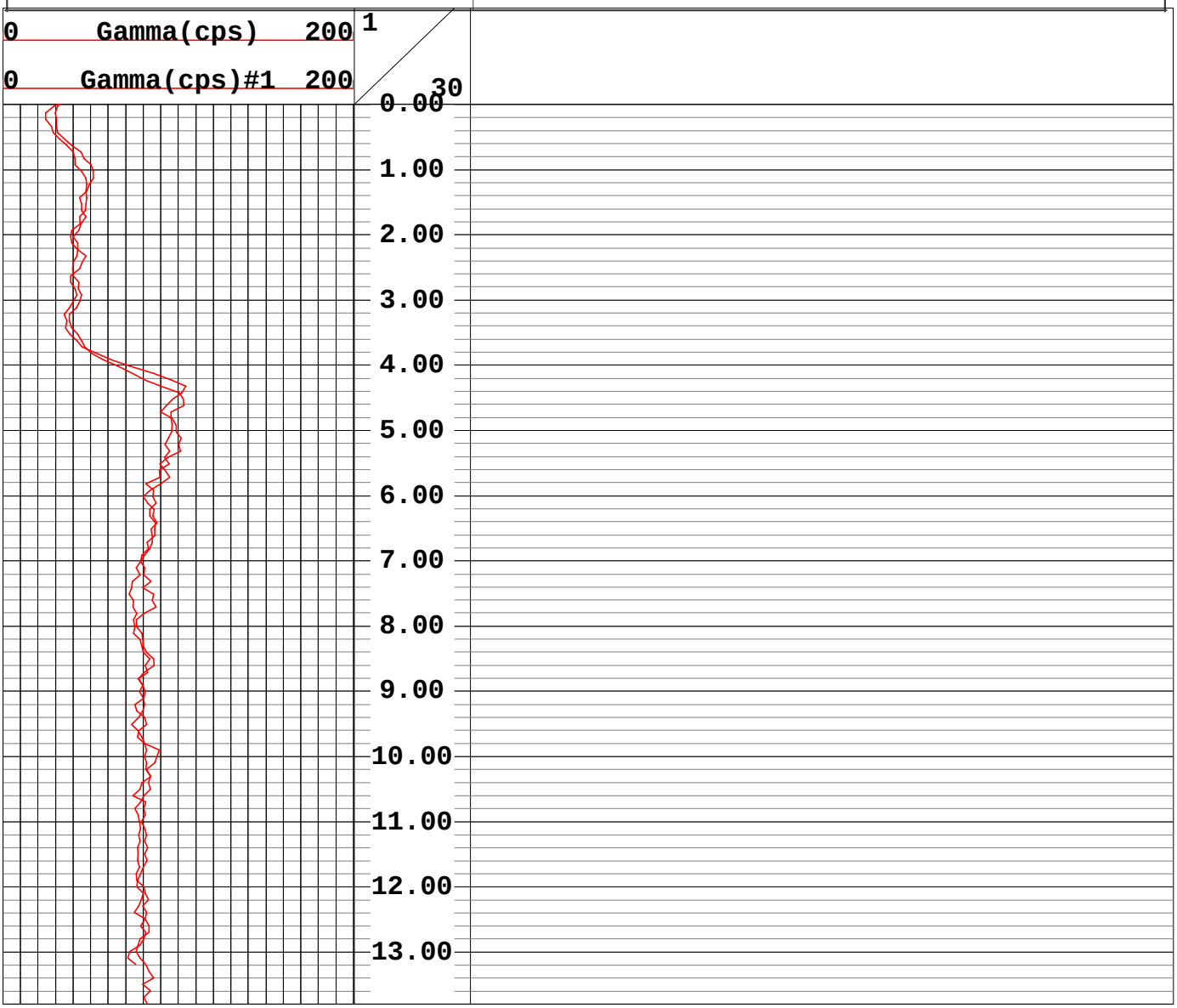
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFA1-011	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 31 July 2001	CASING RECORD SIZE 3-inch WGT. Steel



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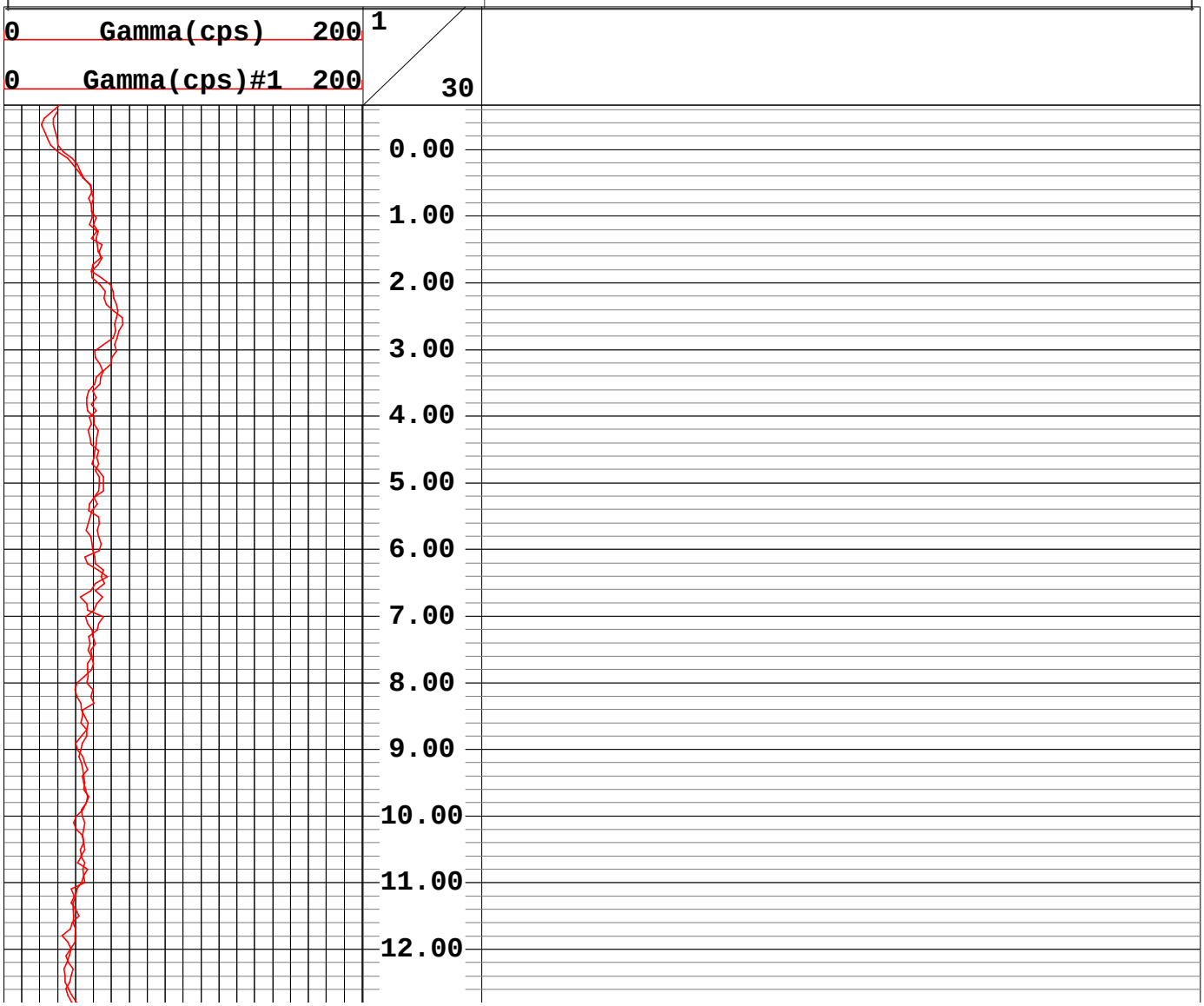
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFA1-012	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 1 August 2001	CASING RECORD SIZE 3-inch WGT. Steel



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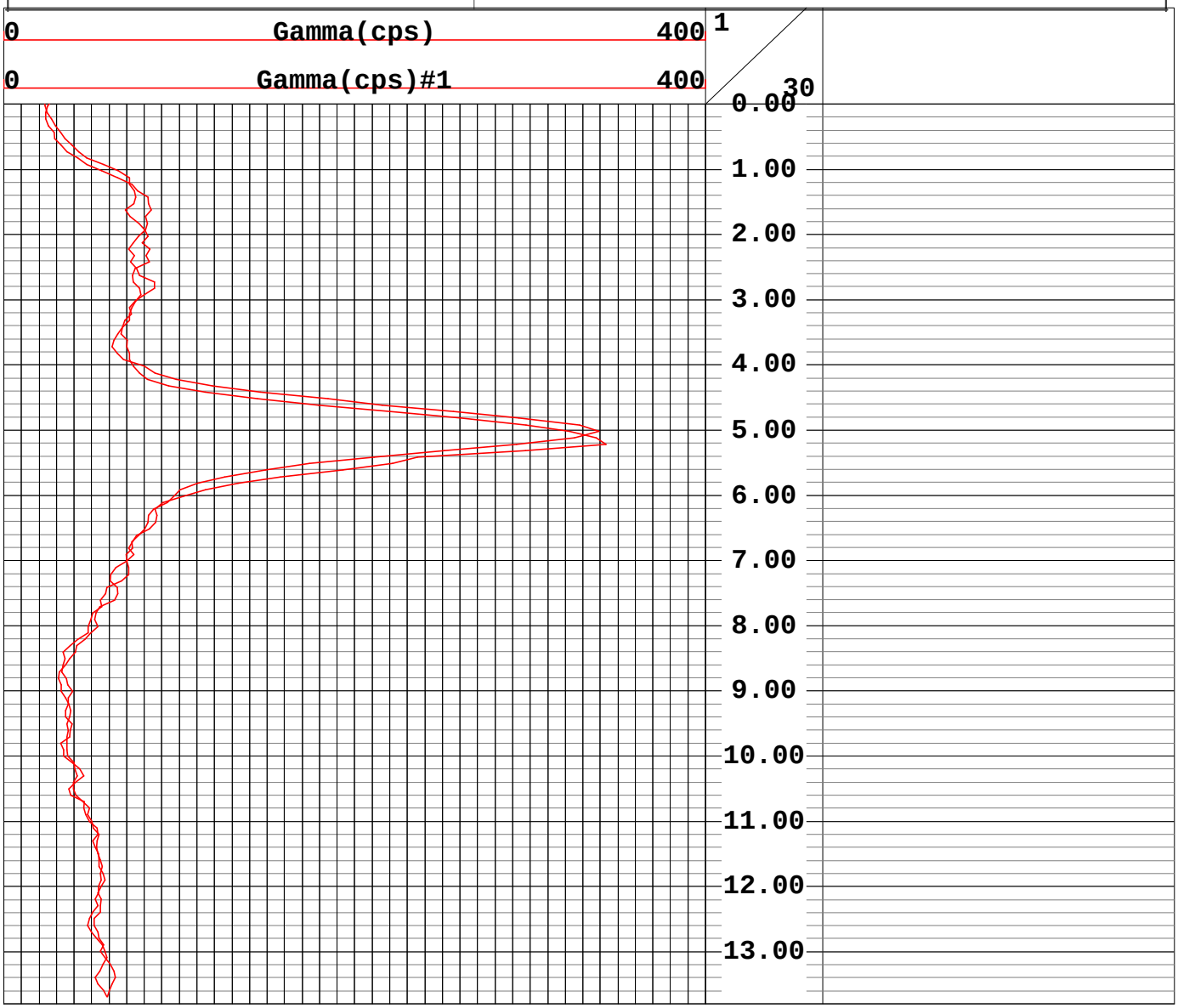
CLIENT **ACOE-Buffalo/FUSRAP**	LOG MEAS. FROM Ground Surface
WELL **TLFA1-013**	ELEVATION
SITE **Tonawanda Landfill**	BTM LOGGED INTERVAL
CITY **Tonawanda**	TOP LOGGED INTERVAL
STATE **New York**	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 28 July 2001	CASING RECORD SIZE 3-inch WGT. Steel



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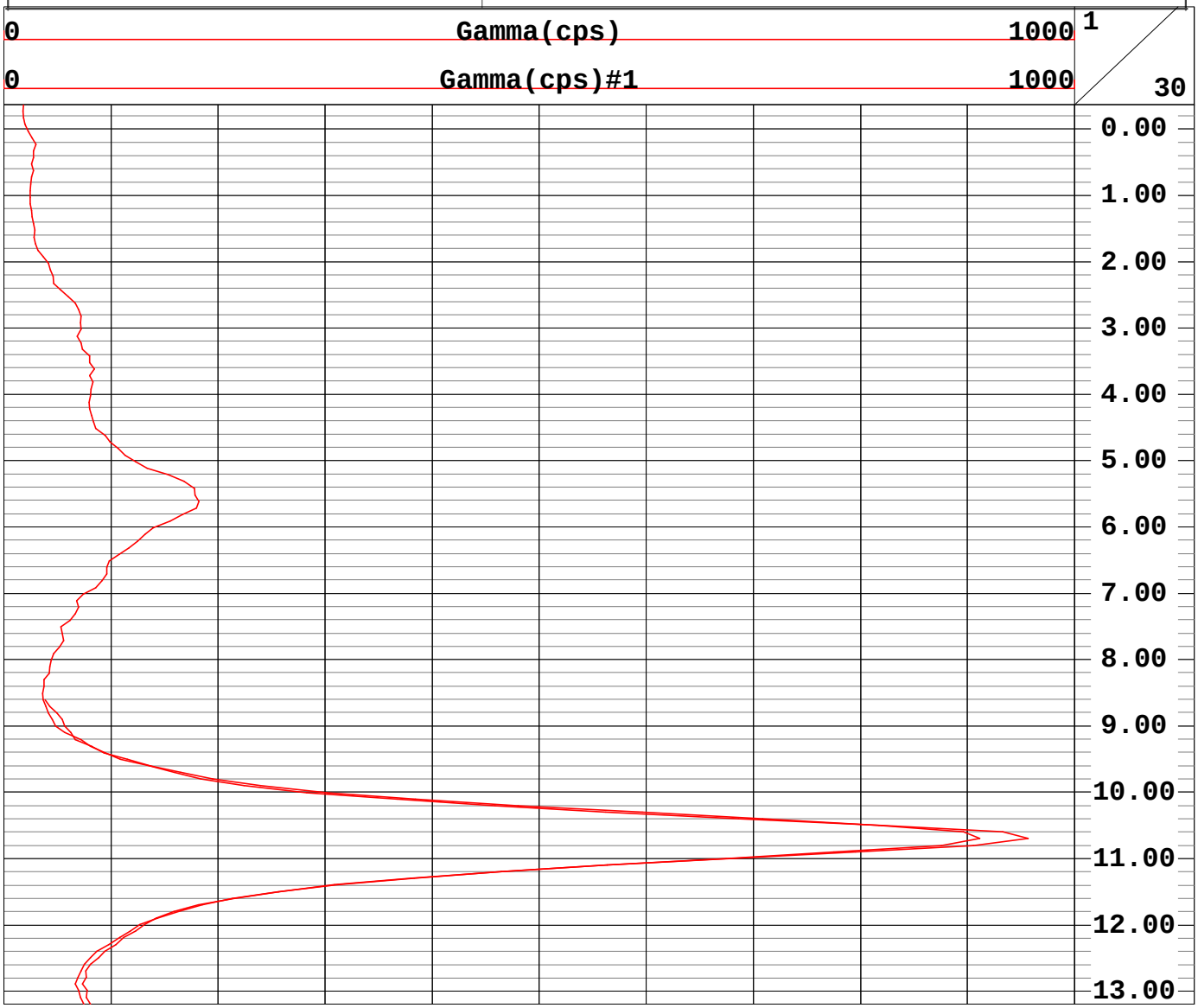
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFA1-014	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 31 July 2001	CASING RECORD SIZE 3-inch WGT. Steel



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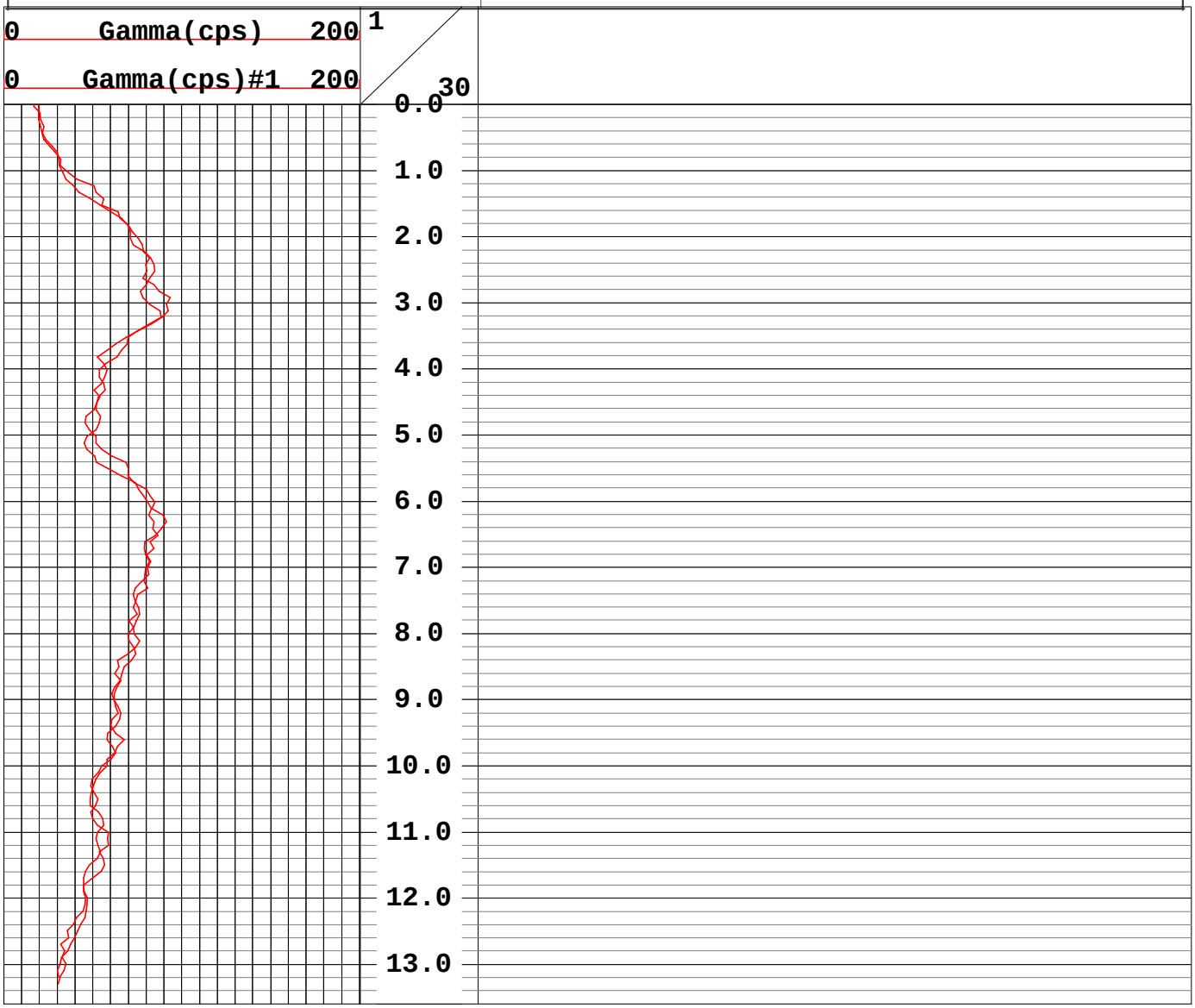
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFA1-015	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 31 July 2001	CASING RECORD SIZE 3-inch WGT. Steel



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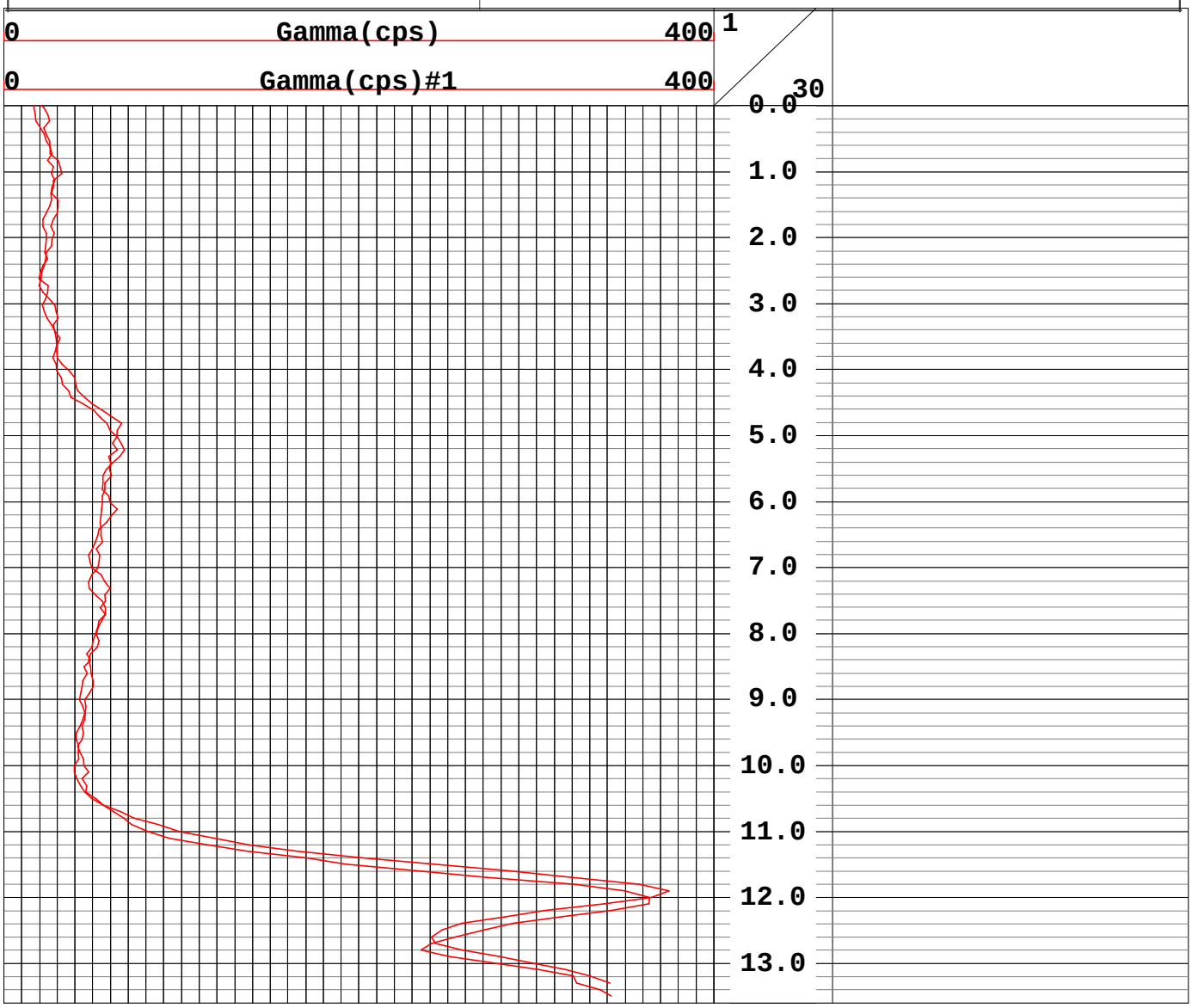
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFA1-016	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 31 July 2001	CASING RECORD SIZE 3-inch WGT. Steel



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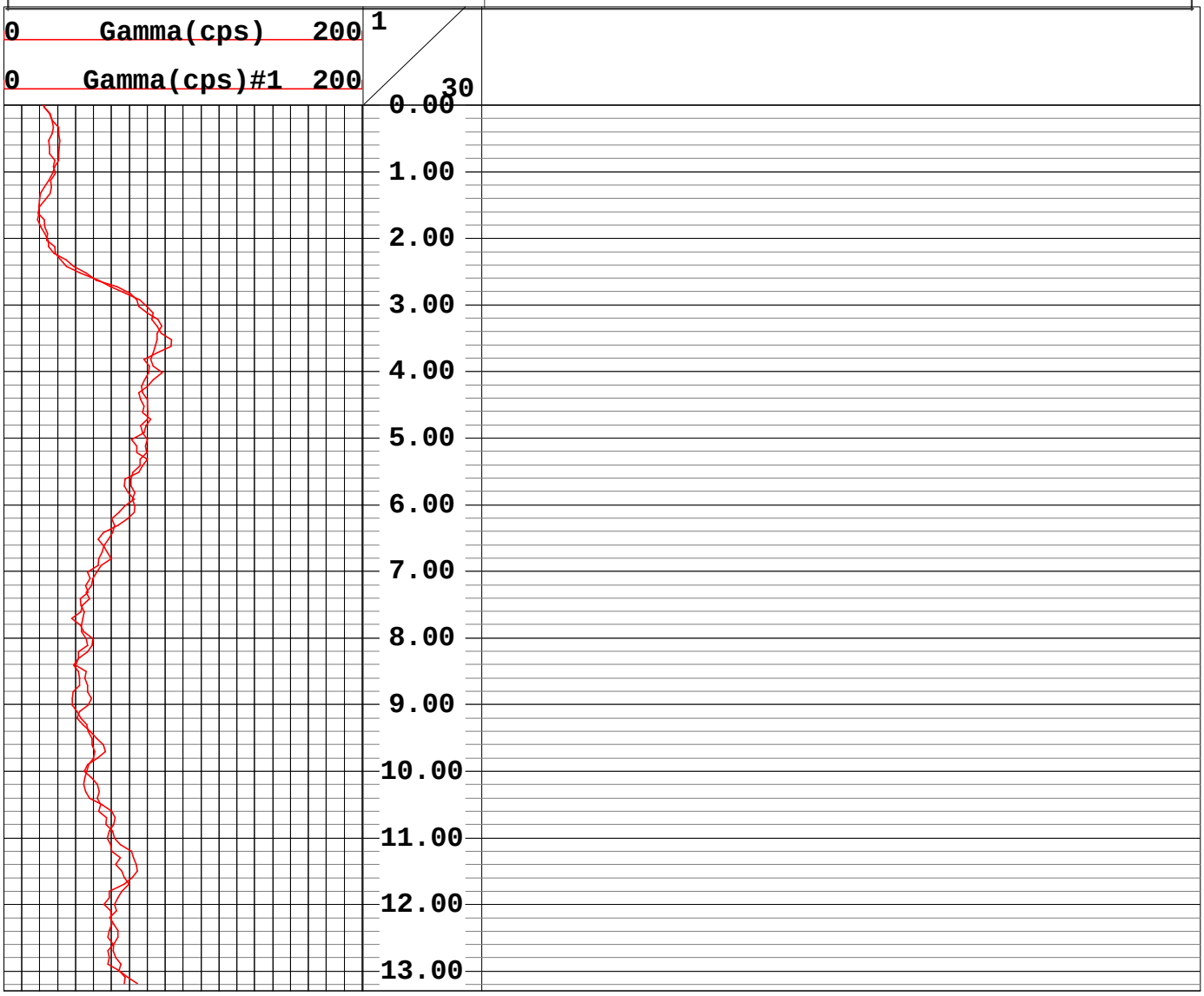
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFA1-017	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 31 July 2001	CASING RECORD SIZE 3-inch WGT. Steel



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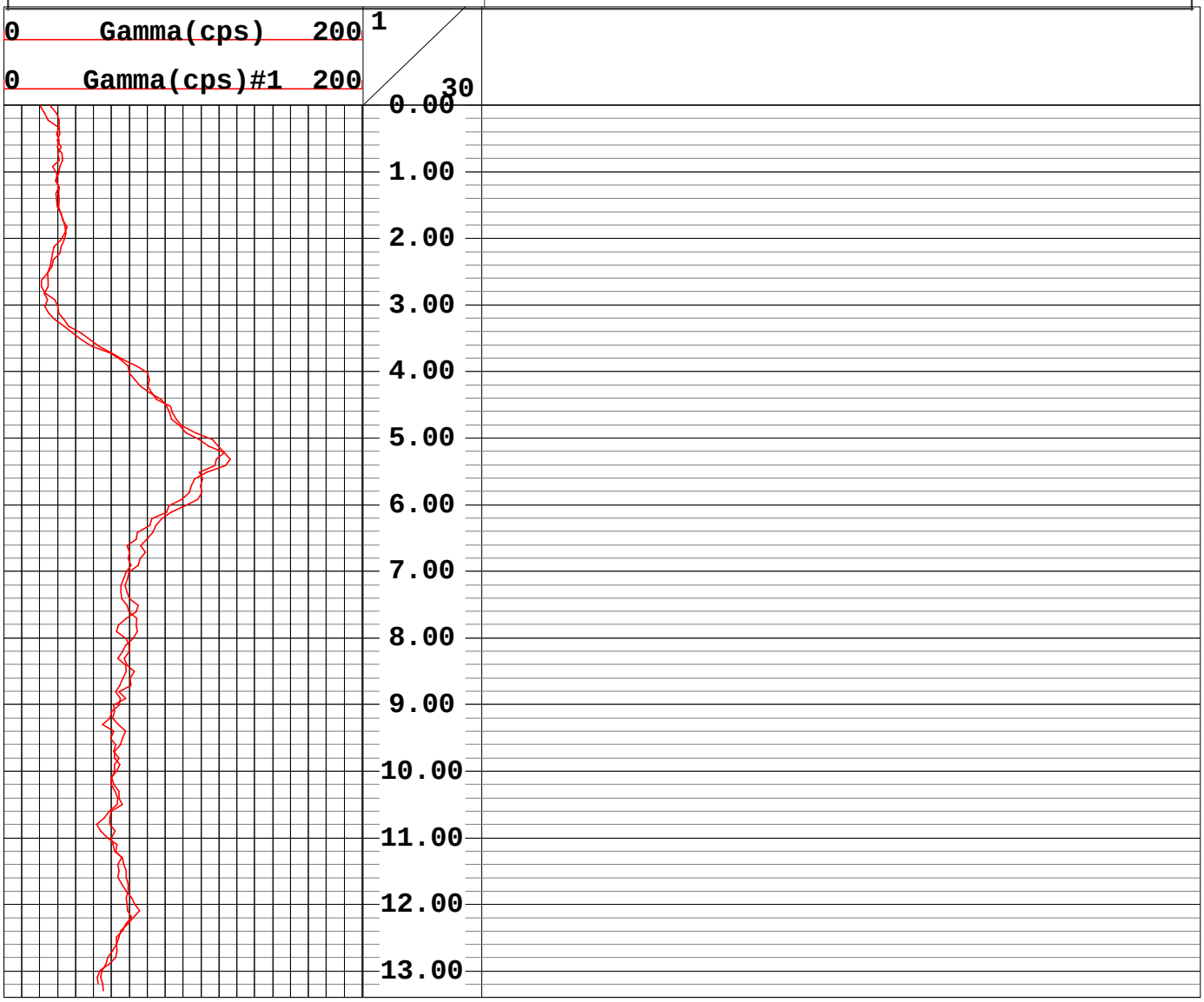
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFA1-018	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 31 July 2001	CASING RECORD SIZE 3-inch WGT. Steel



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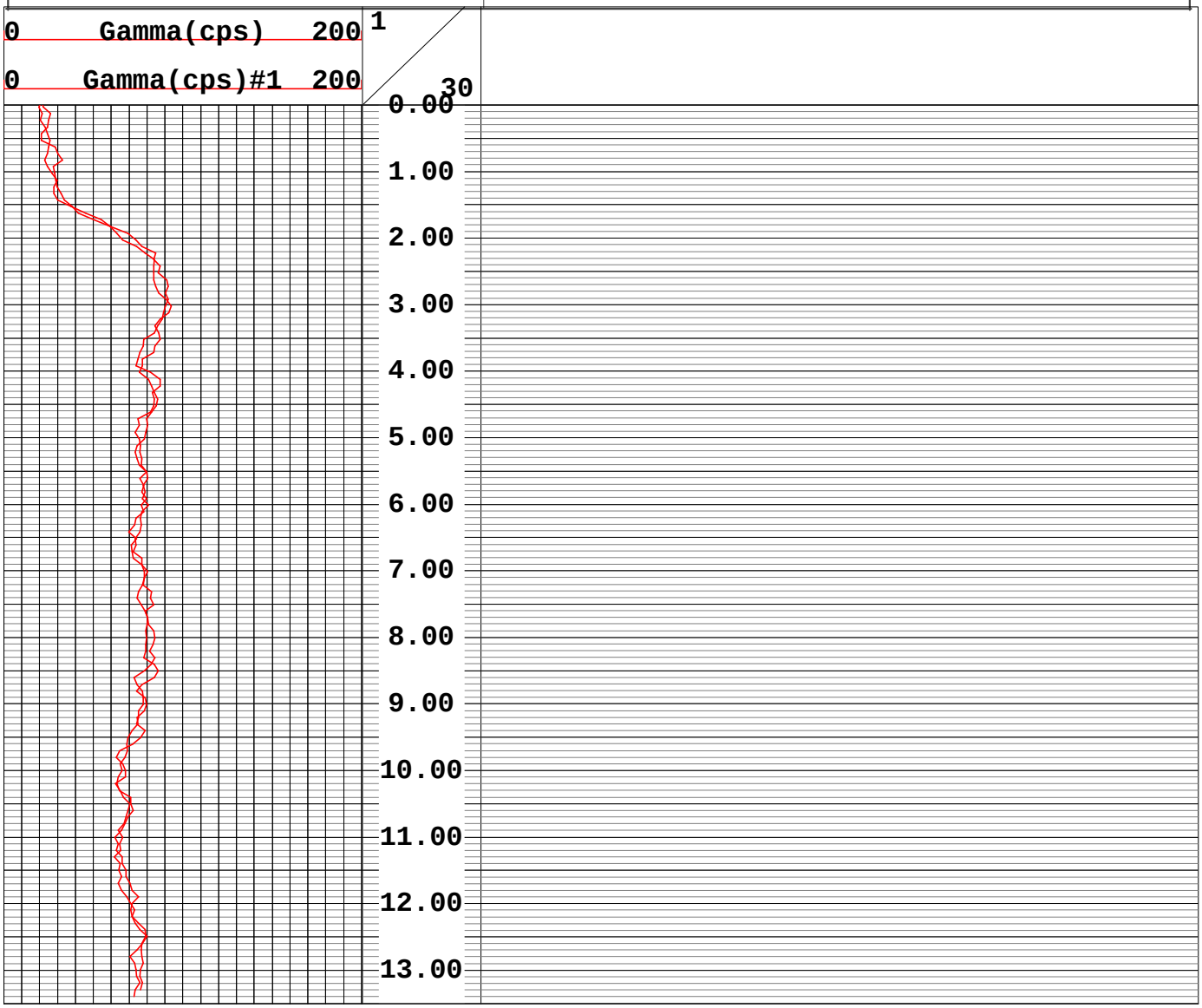
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFA1-019	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 31 July 2001	CASING RECORD SIZE 3-inch WGT. Steel



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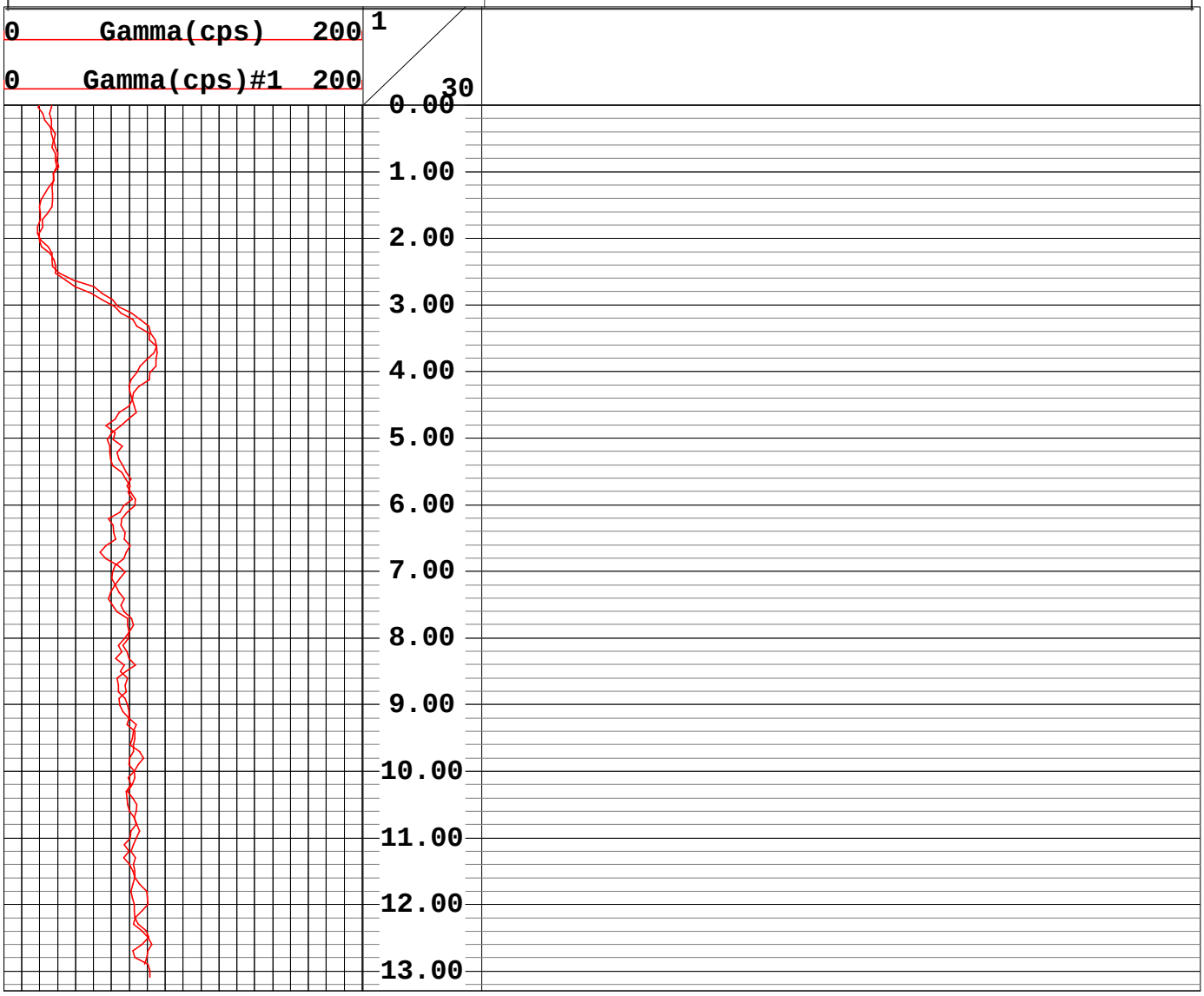
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFA1-020	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 31 July 2001	CASING RECORD SIZE 3-inch WGT. Steel



Landfill
Class 2 Area A

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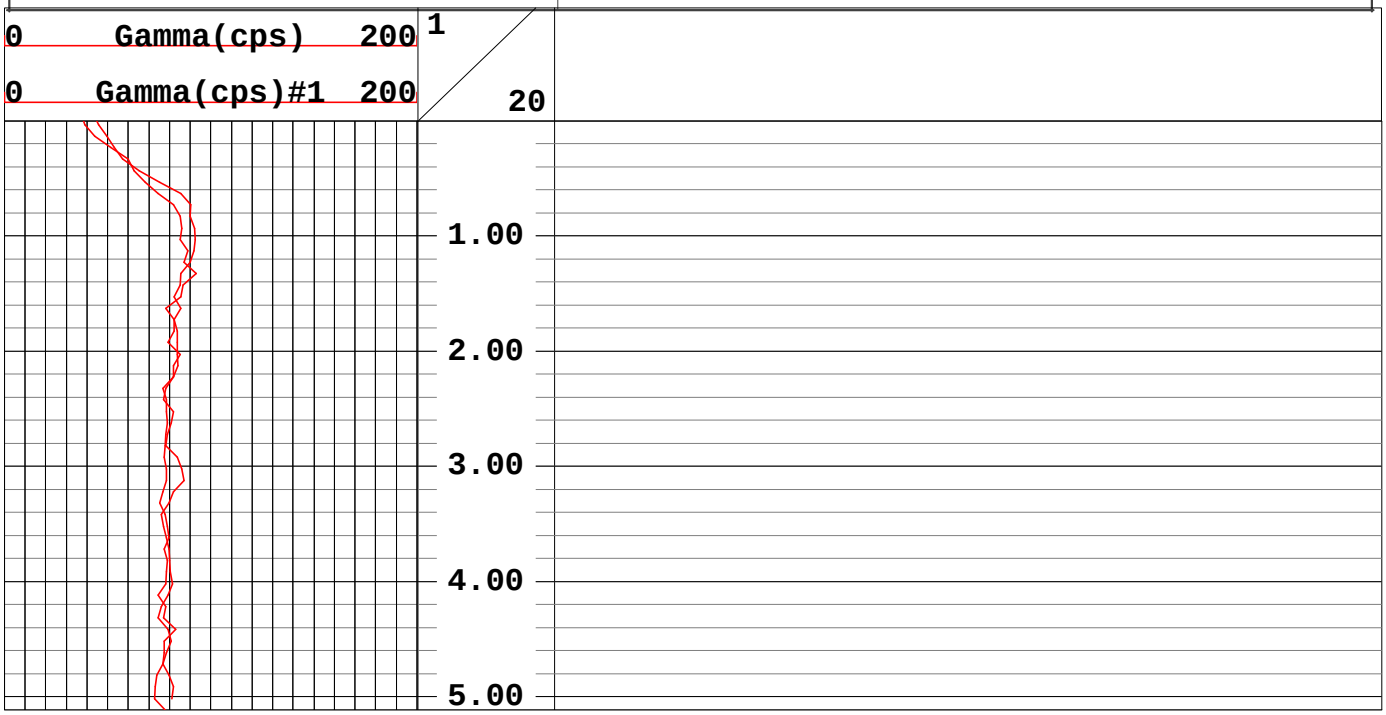
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFA2-001	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 25 July 2001	CASING RECORD SIZE None WGT. None



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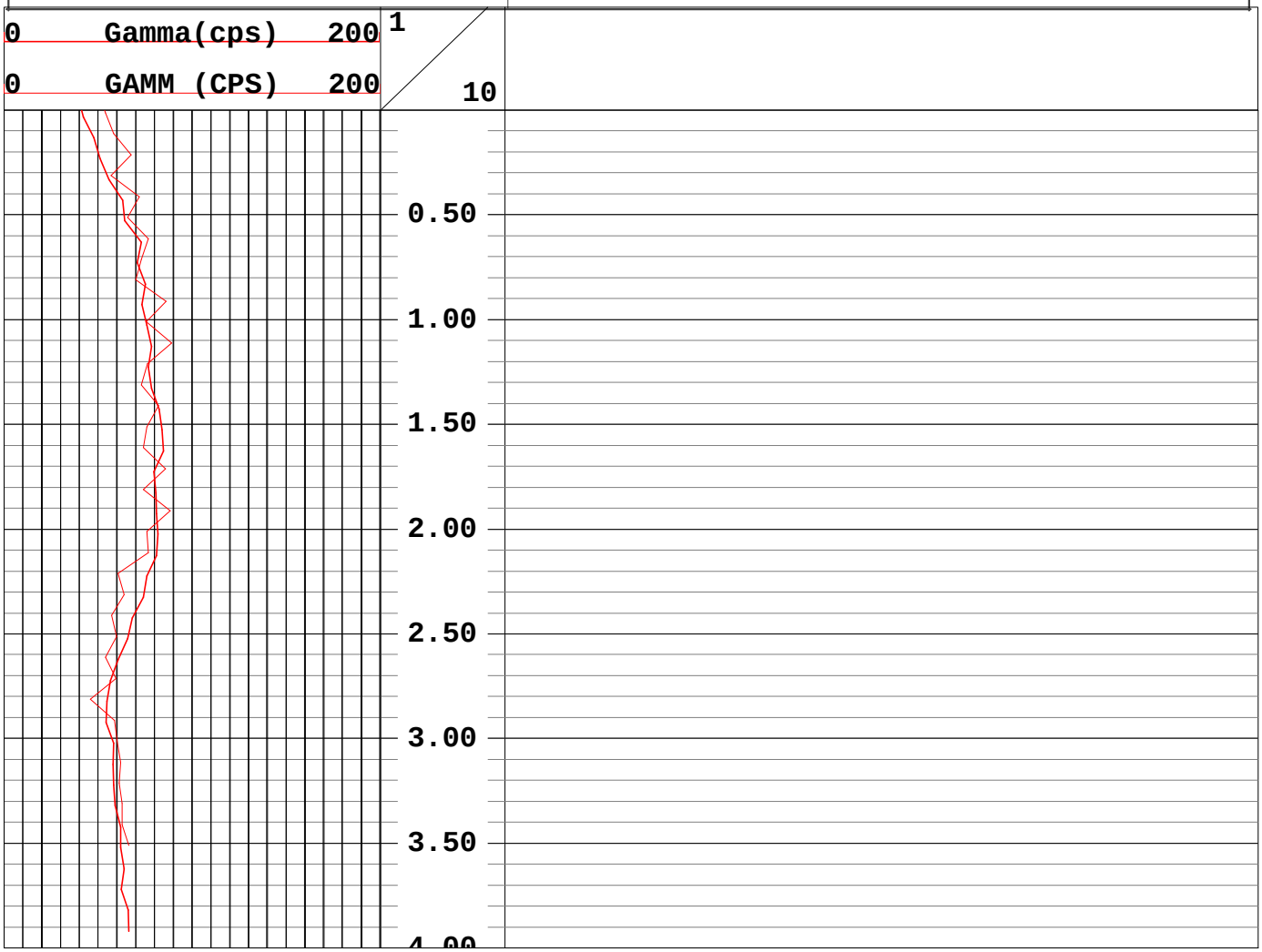
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFA2-002	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 27 July 2001	CASING RECORD SIZE None WGT. None



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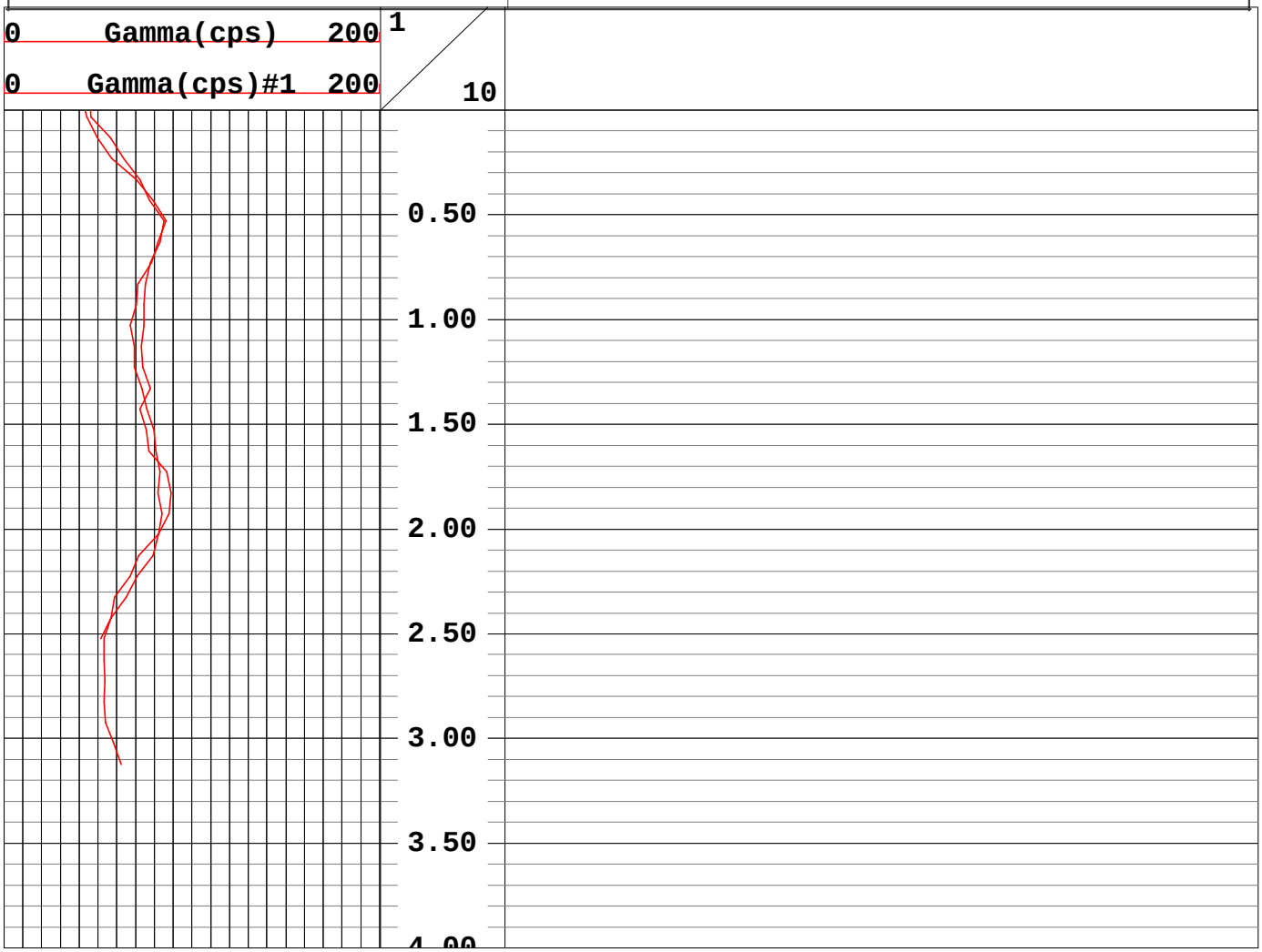
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFA2-003	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 27 July 2001	CASING RECORD SIZE None WGT. None



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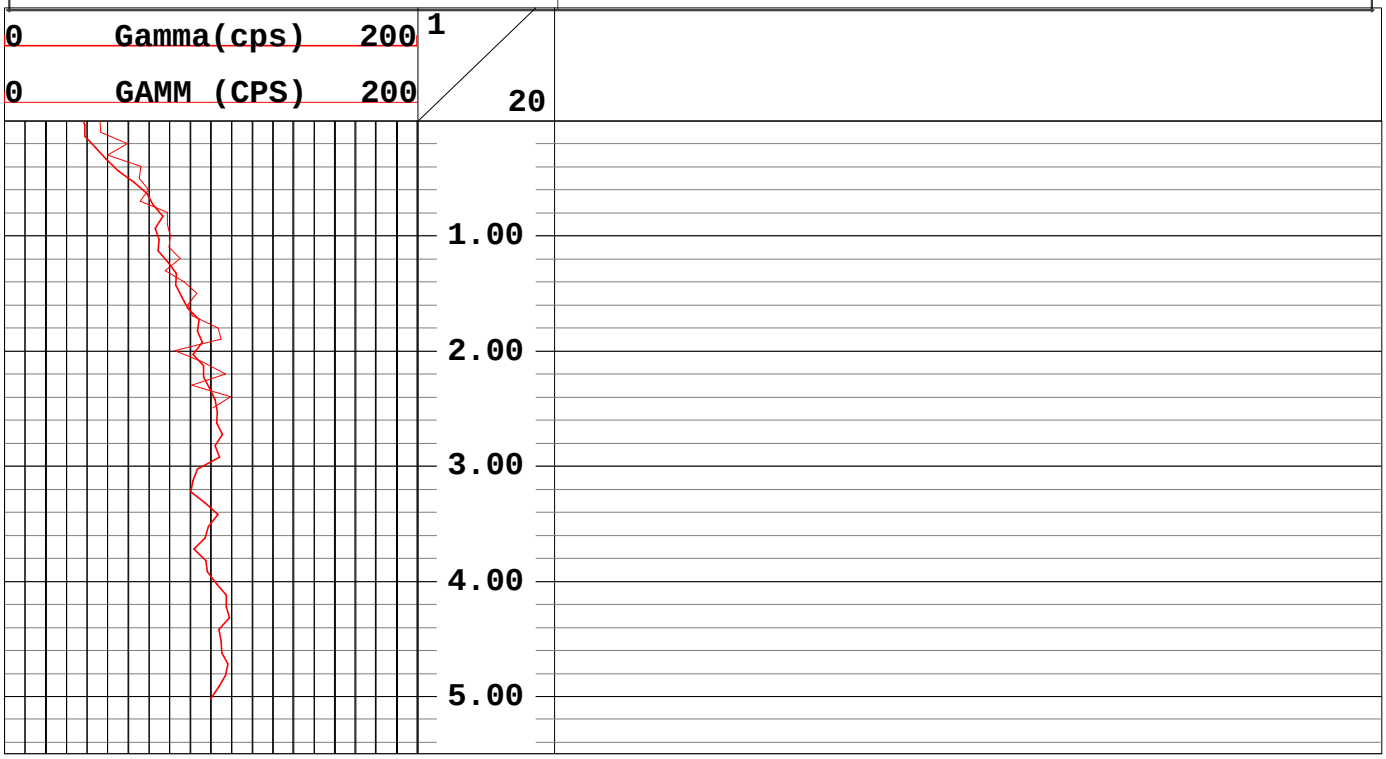
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFA2-004	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 26 July 2001	CASING RECORD SIZE None WGT. None



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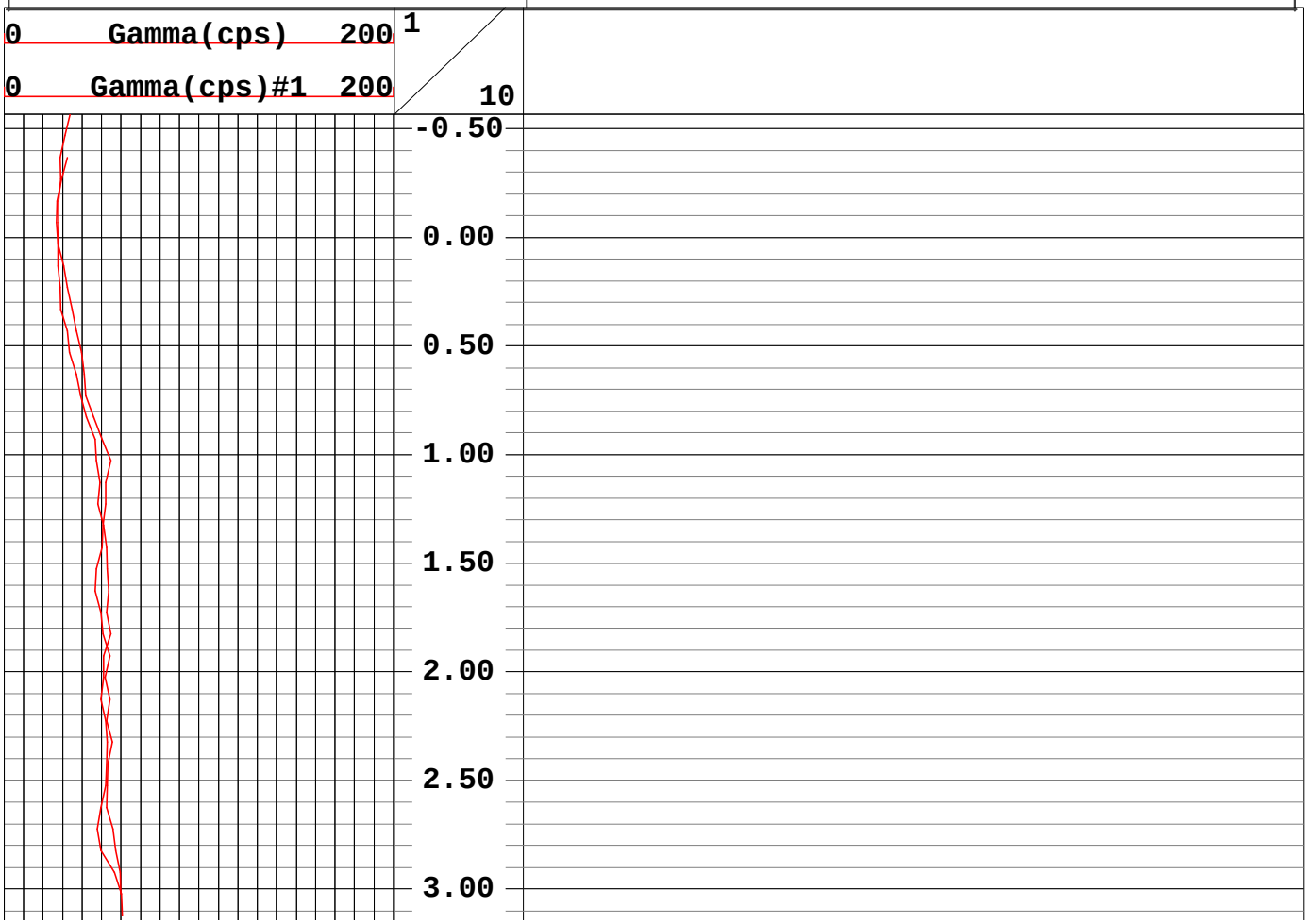
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFA2-005	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 1 August 2001	CASING RECORD SIZE 3-inch WGT. Steel



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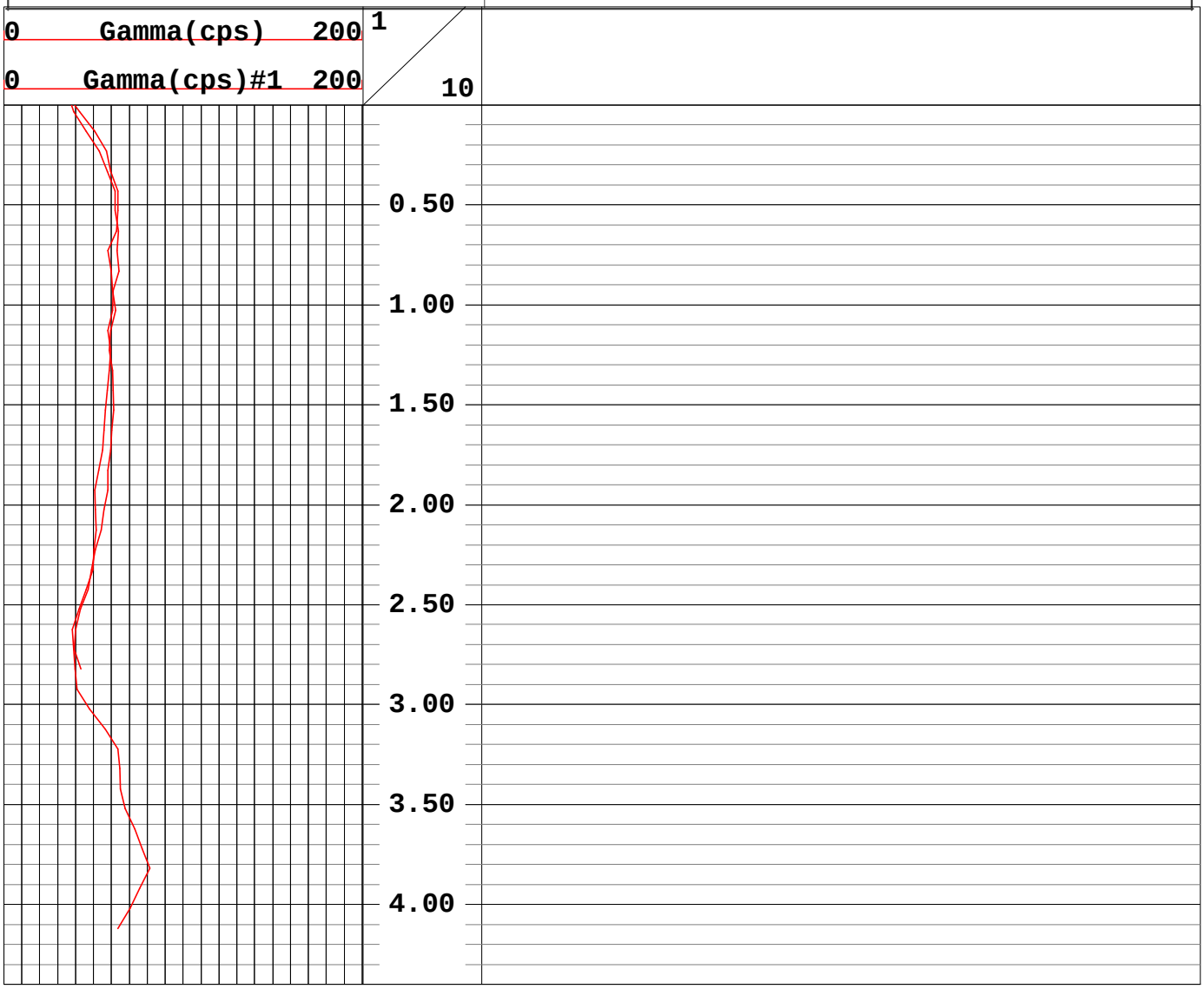
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFA2-006	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 27 July 2001	CASING RECORD SIZE None WGT. None



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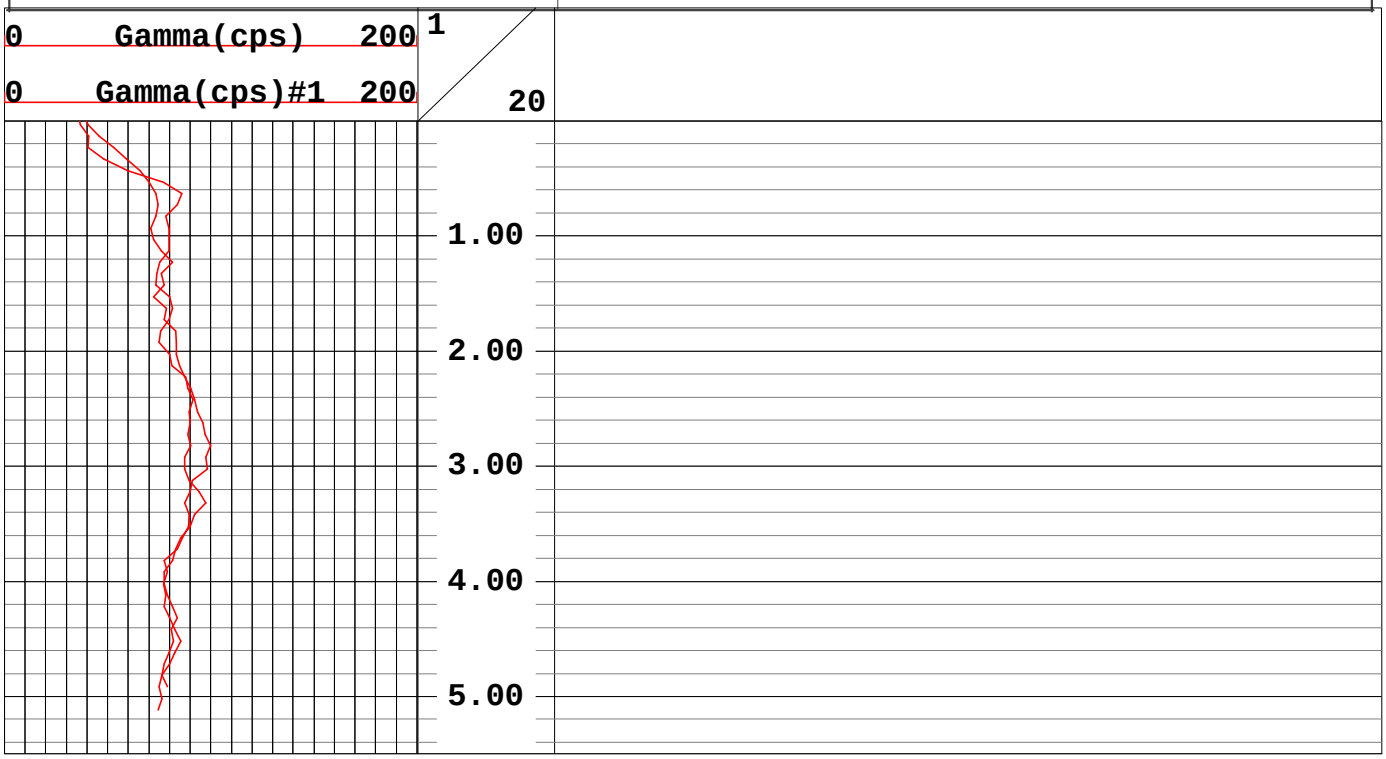
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFA2-007	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 26 July 2001	CASING RECORD SIZE None WGT. None



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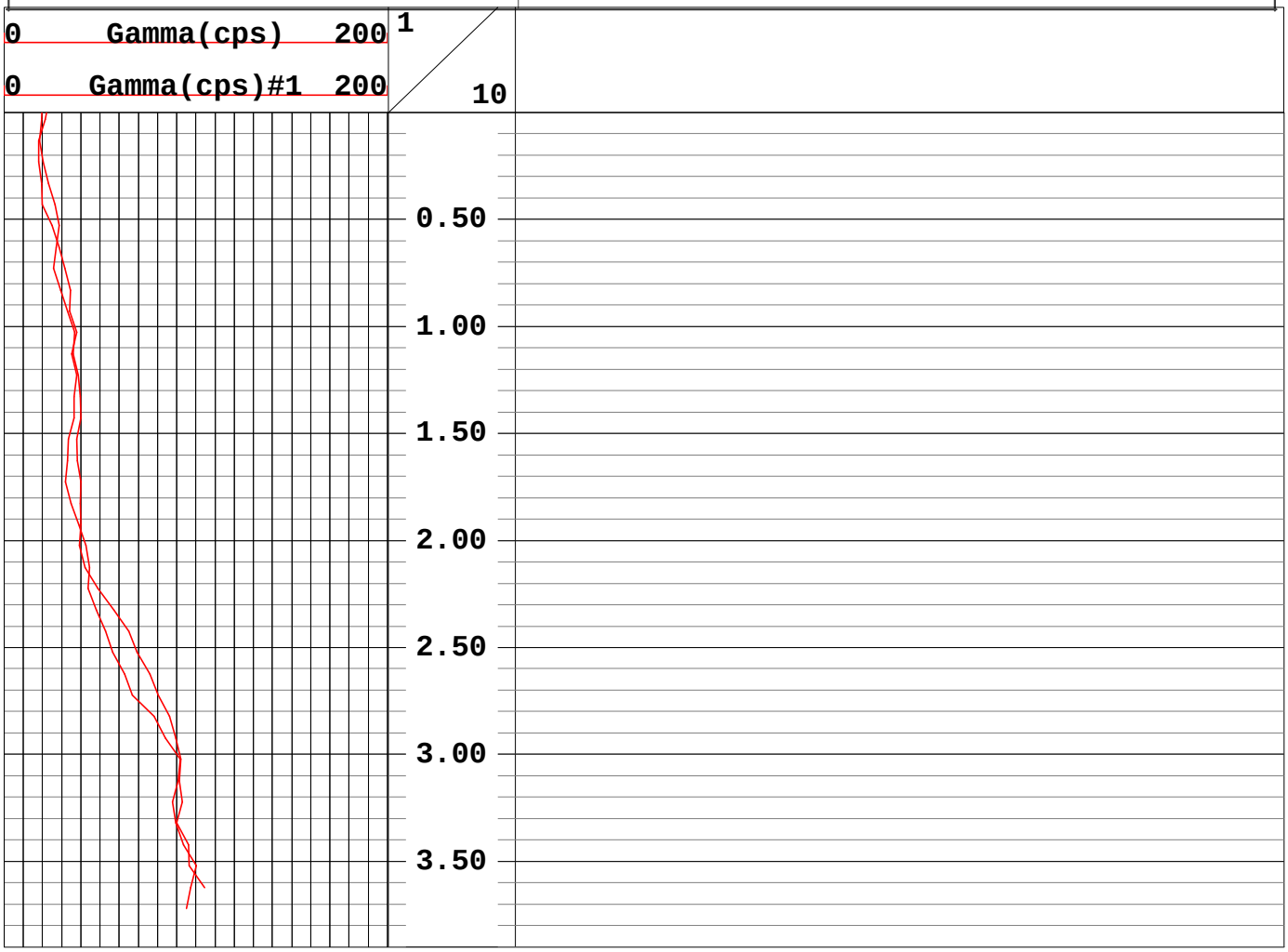
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFA2-008	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 31 July 2001	CASING RECORD SIZE 3-inch WGT. Steel



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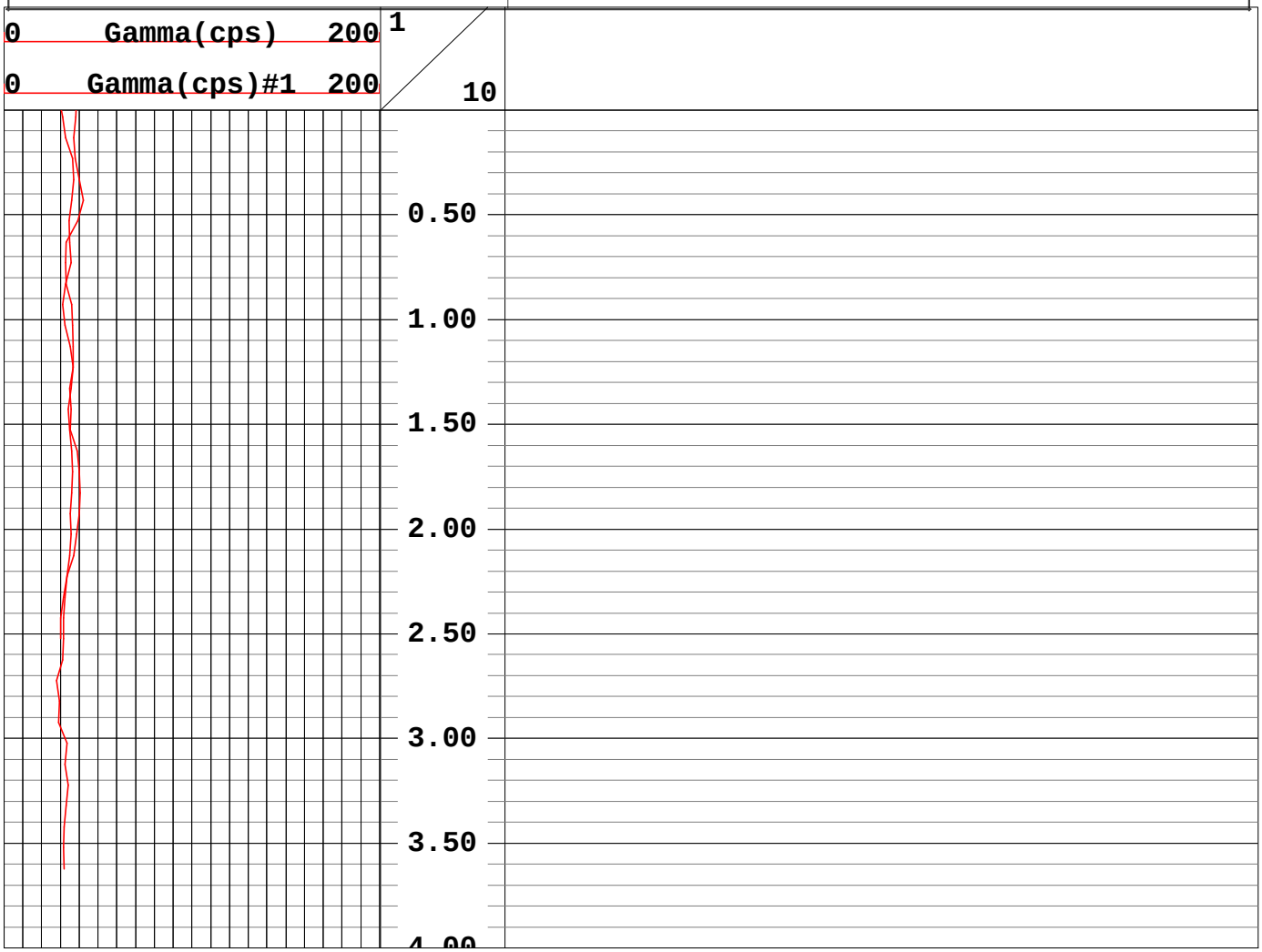
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFA2-009	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 27 July 2001	CASING RECORD SIZE None WGT. None



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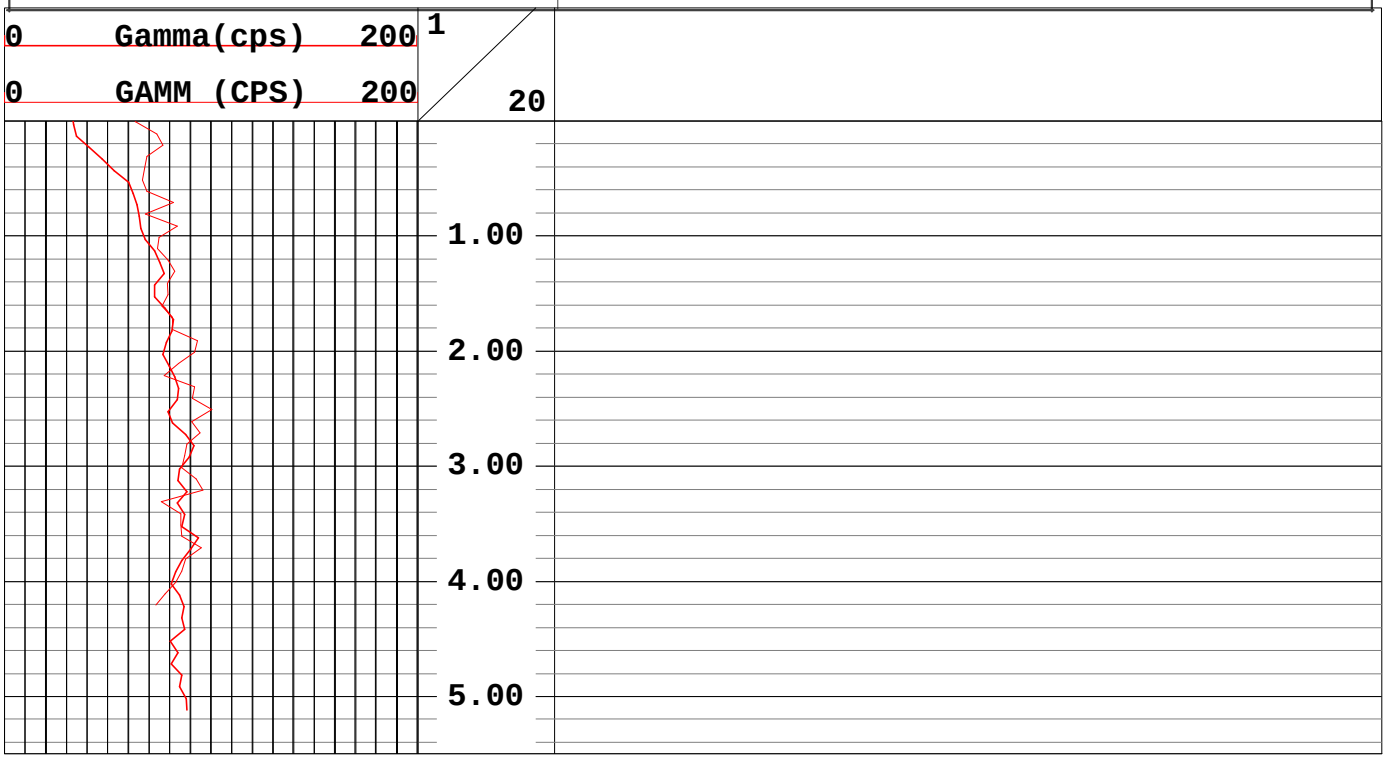
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFA2-010	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 26 July 2001	CASING RECORD SIZE None WGT. None



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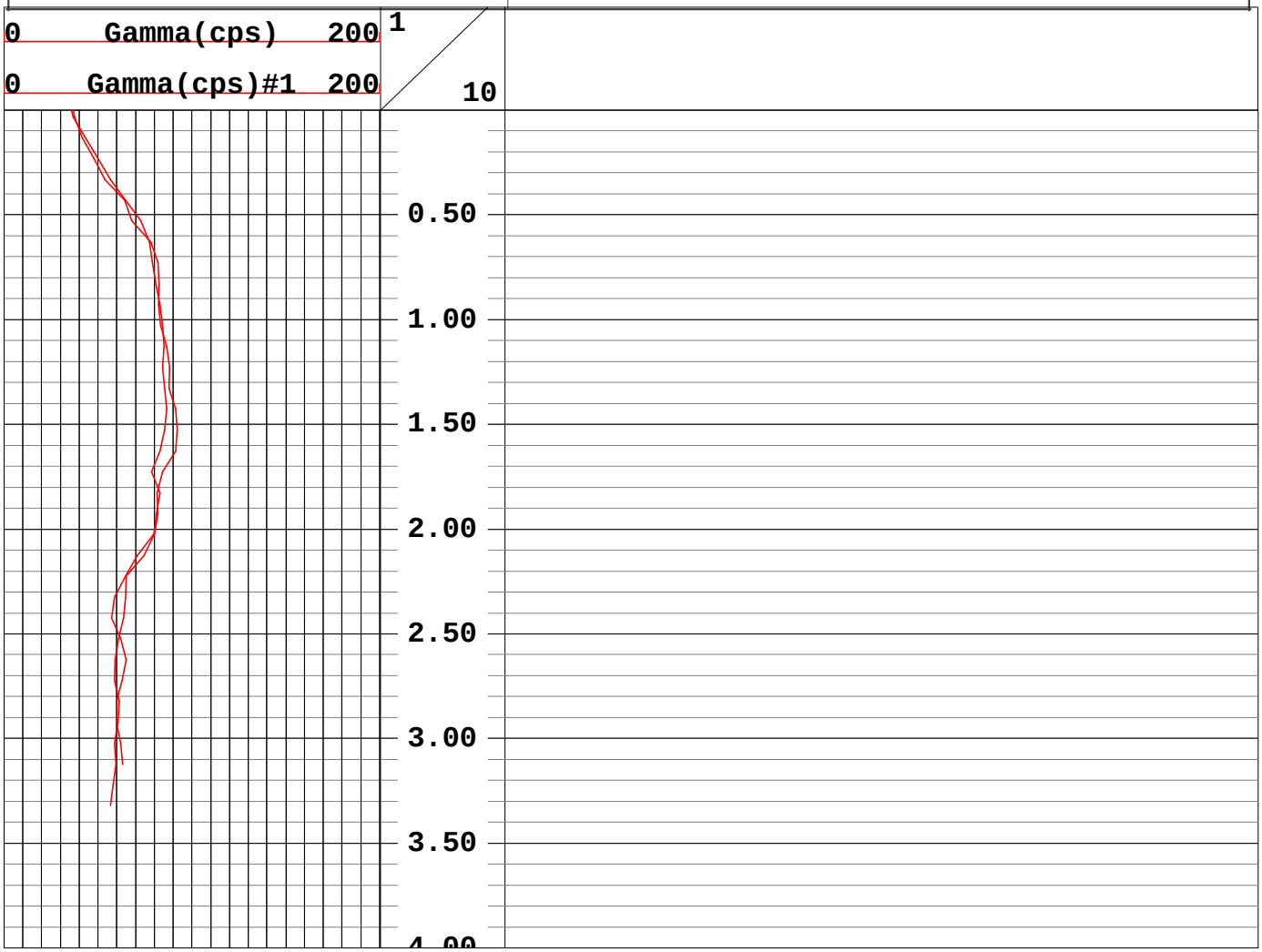
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFA2-011	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 27 July 2001	CASING RECORD SIZE 3-inch WGT. Steel



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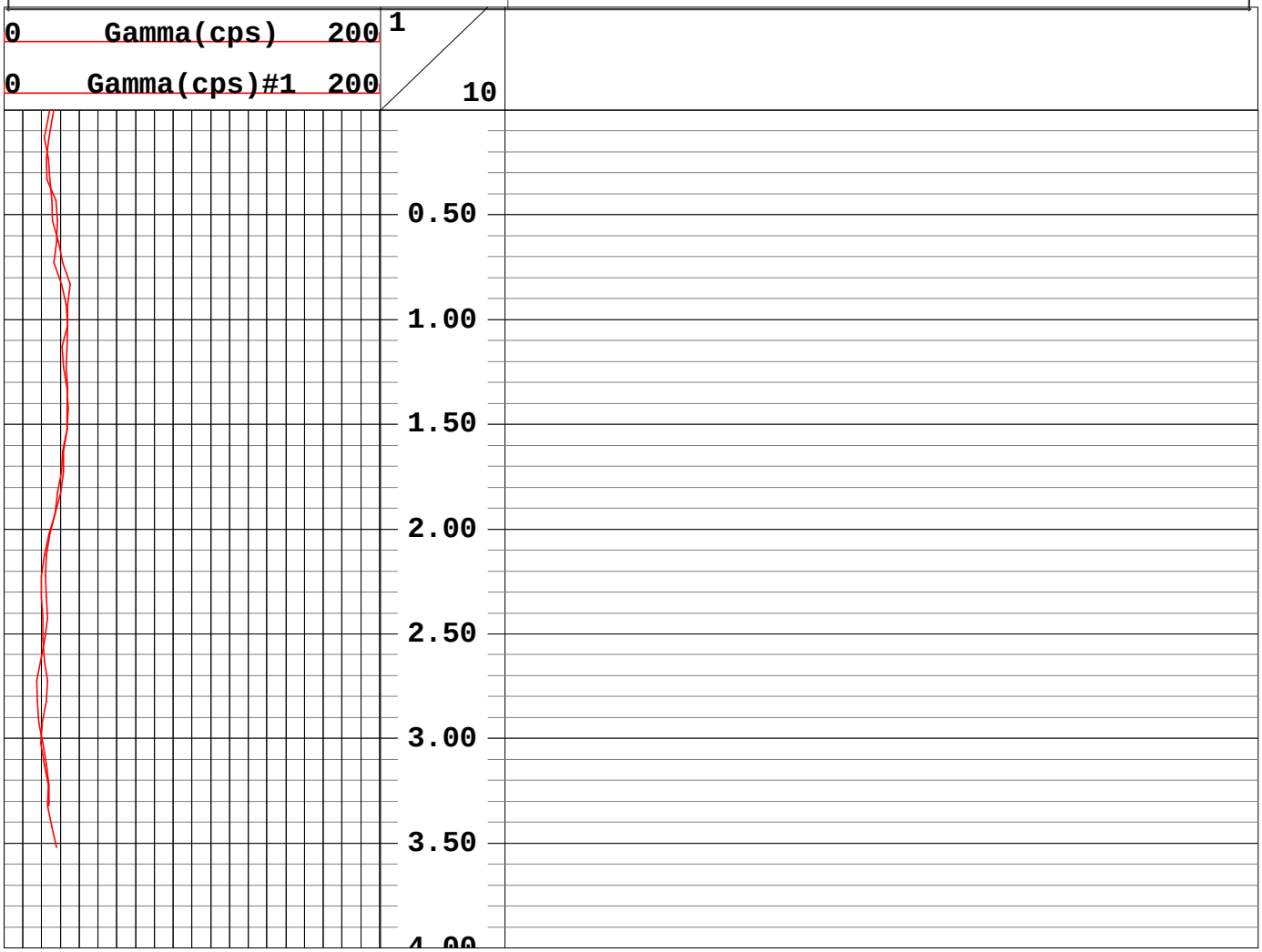
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFA2-012	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 27 July 2001	CASING RECORD SIZE 3-inch WGT. Steel



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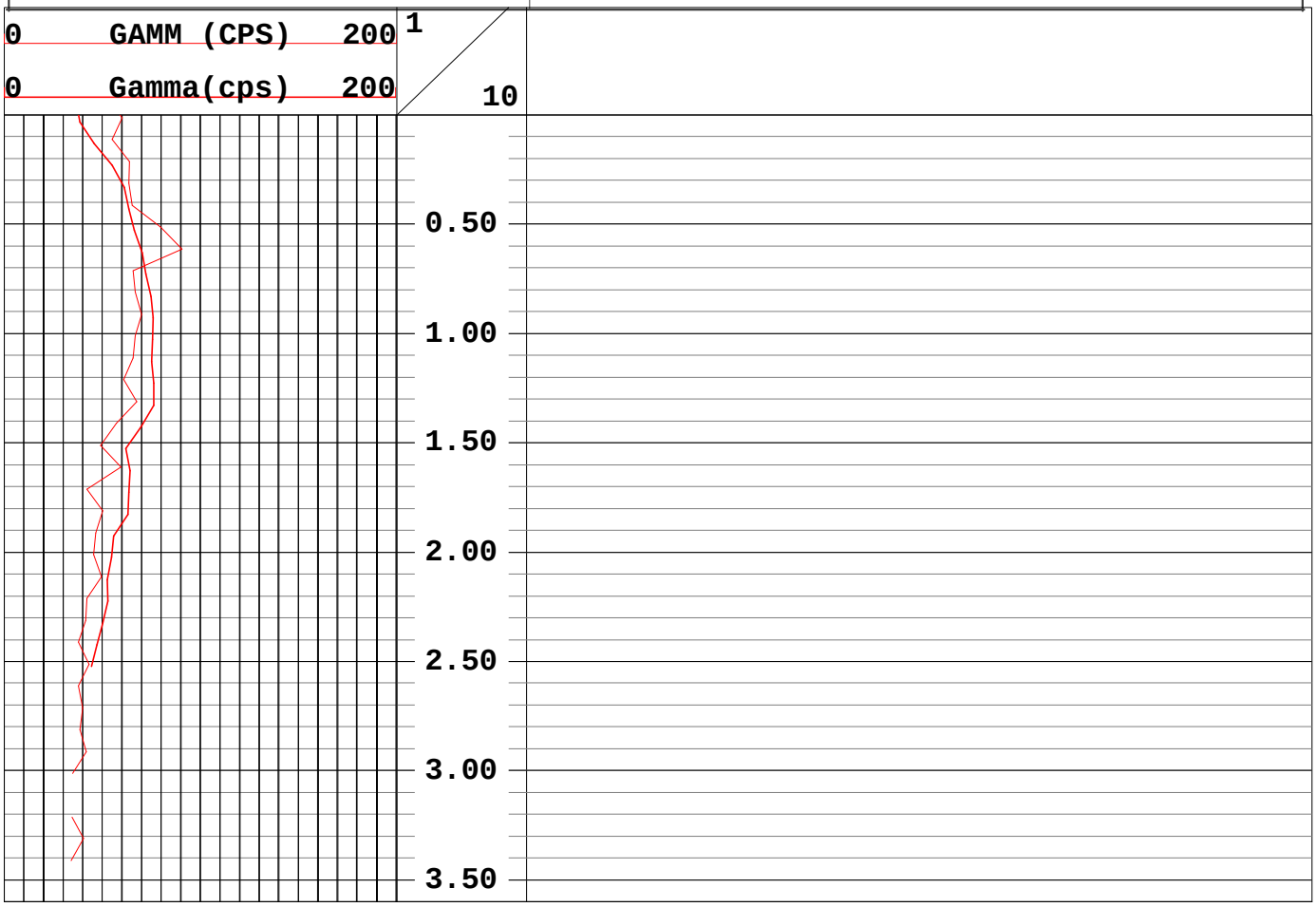
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFA2-013	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 26 July 2001	CASING RECORD SIZE None WGT. None



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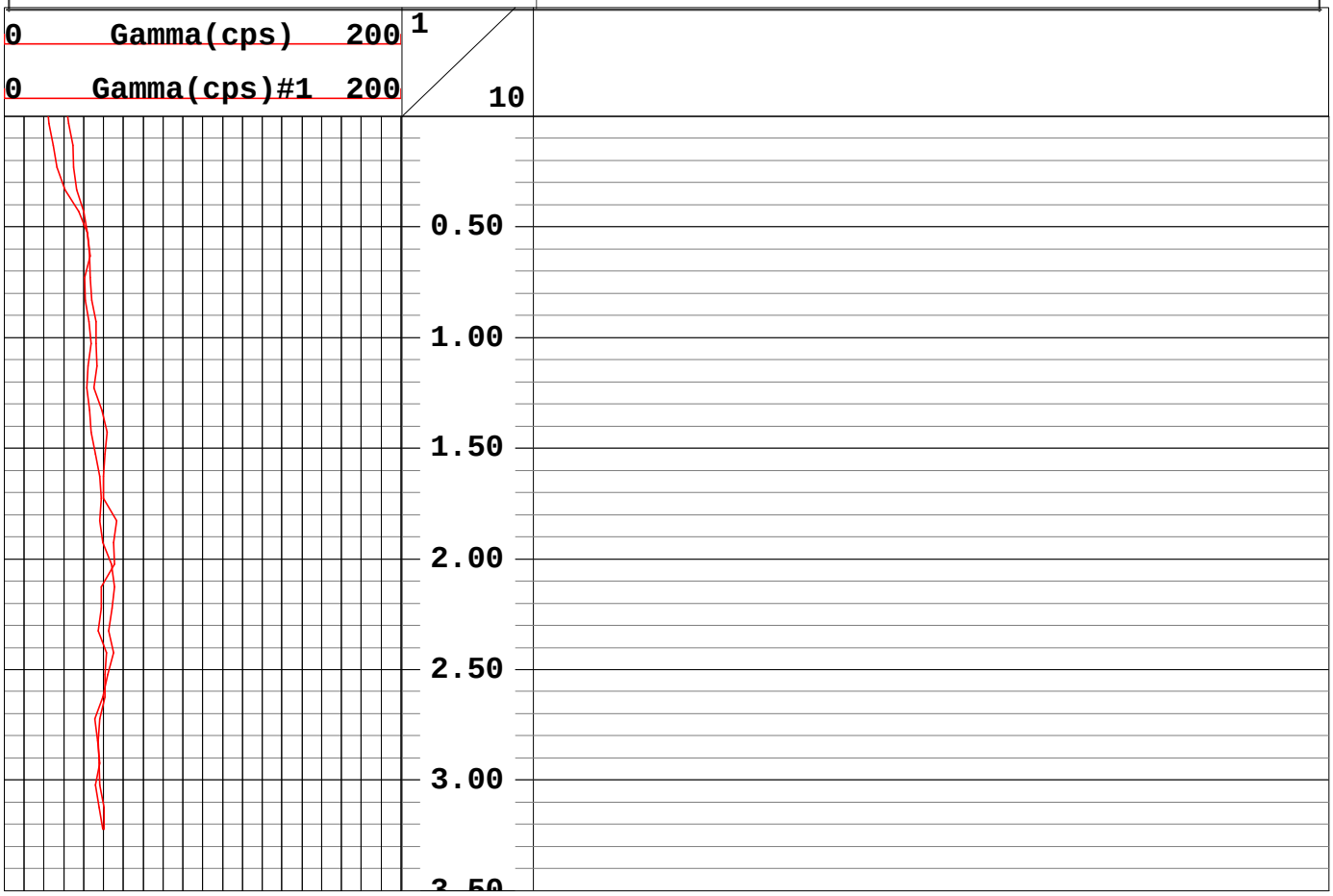
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFA2-014	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 27 July 2001	CASING RECORD SIZE 3-inch WGT. Steel



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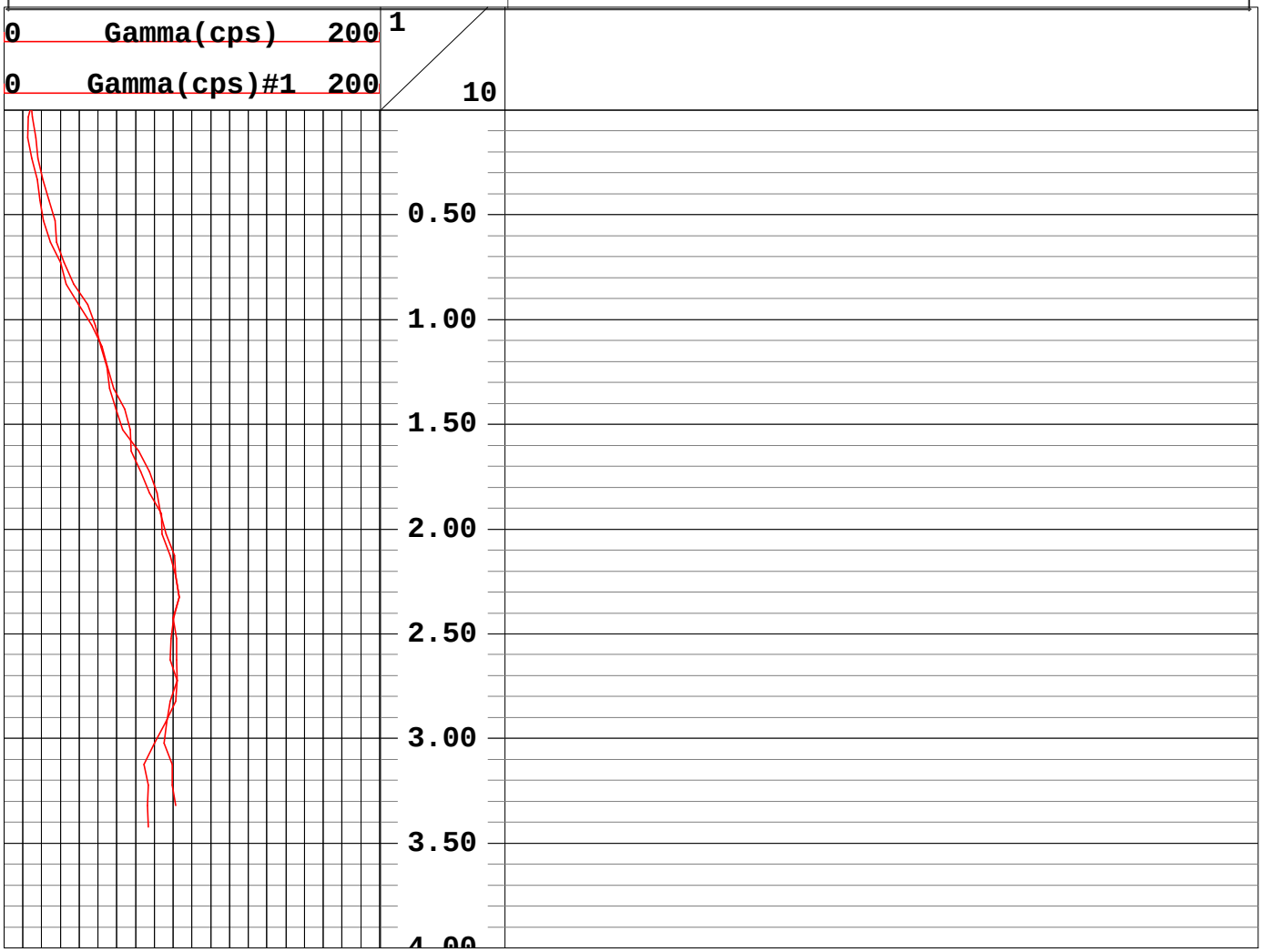
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFA2-015	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 28 July 2001	CASING RECORD SIZE 3-inch WGT. Steel



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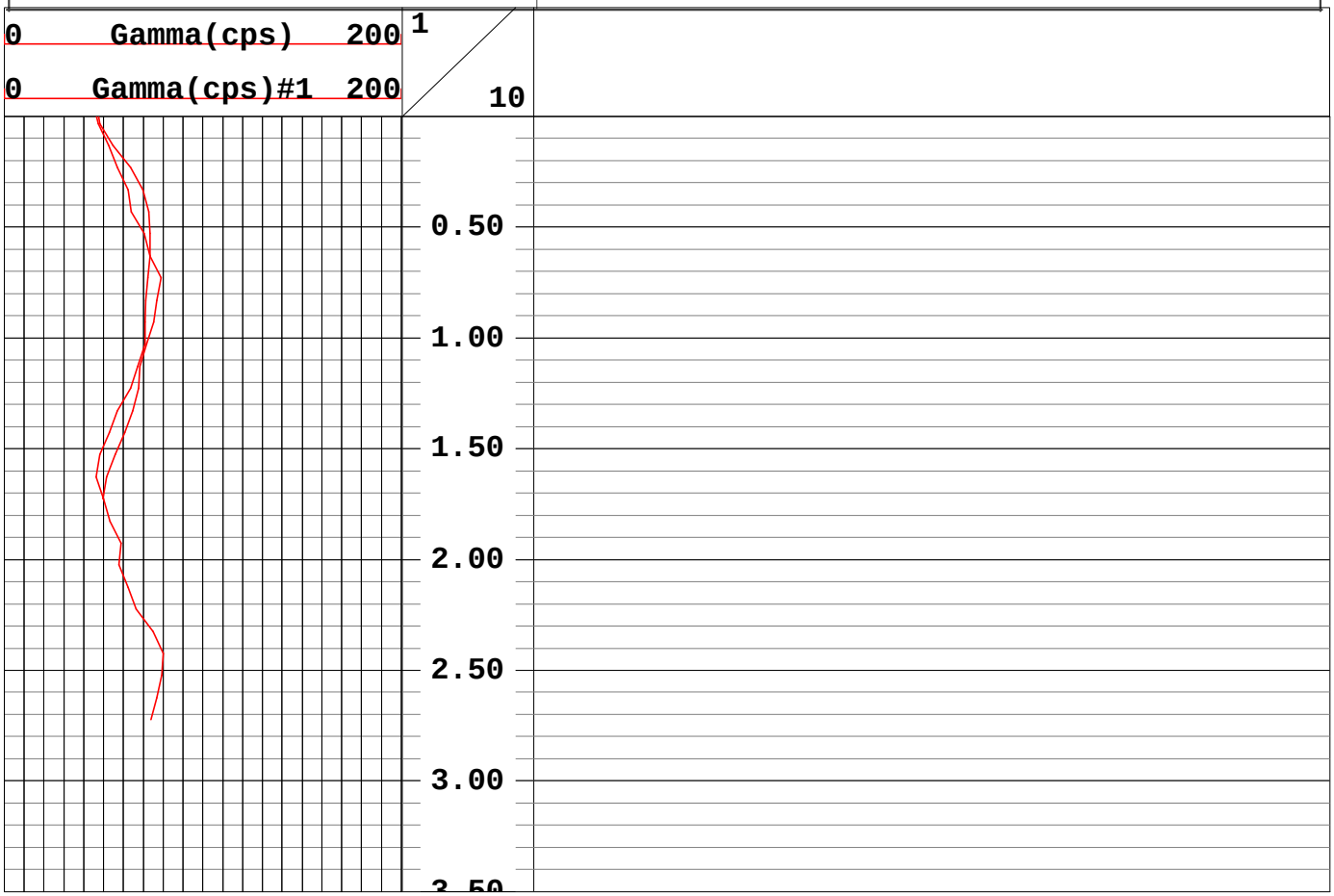
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLF3-016	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 26 July 2001	CASING RECORD SIZE None WGT. None



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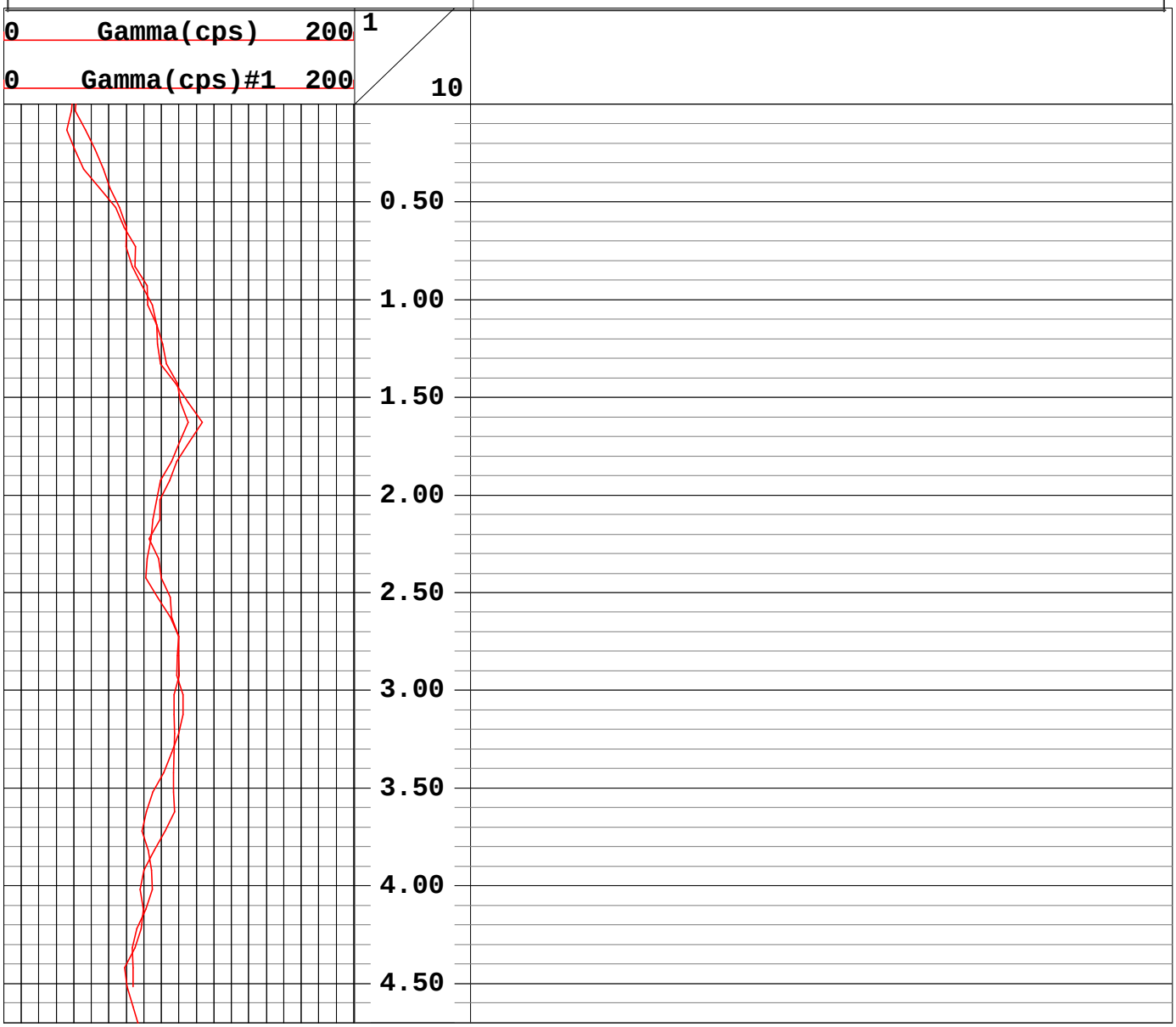
CLIENT	ACOE-Buffalo/FUSRAP	LOG MEAS. FROM	Ground Surface
WELL	TLFA2-017	ELEVATION	
SITE	Tonawanda Landfill	BTM LOGGED INTERVAL	
CITY	Tonawanda	TOP LOGGED INTERVAL	
STATE	New York	TYPE FLUID IN HOLE	Air
		LEVEL	
RECORDED BY	Laura Pastor	BOREHOLE RECORD BIT	Geoprobe
WITNESSED BY			
DATE	26 July 2001	CASING RECORD	SIZE None WGT. None



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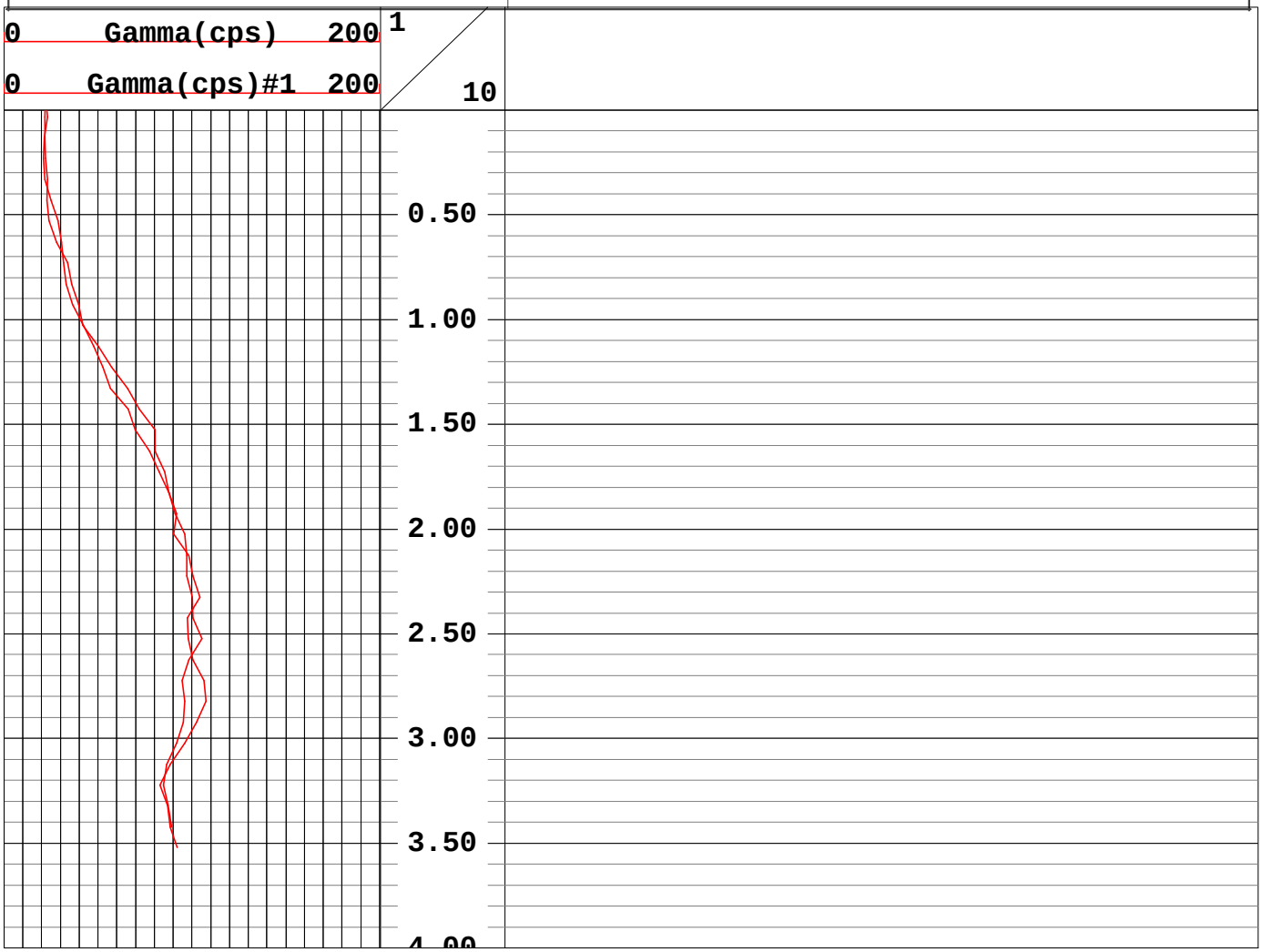
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFA2-018	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 28 July 2001	CASING RECORD SIZE 3-inch WGT. Steel



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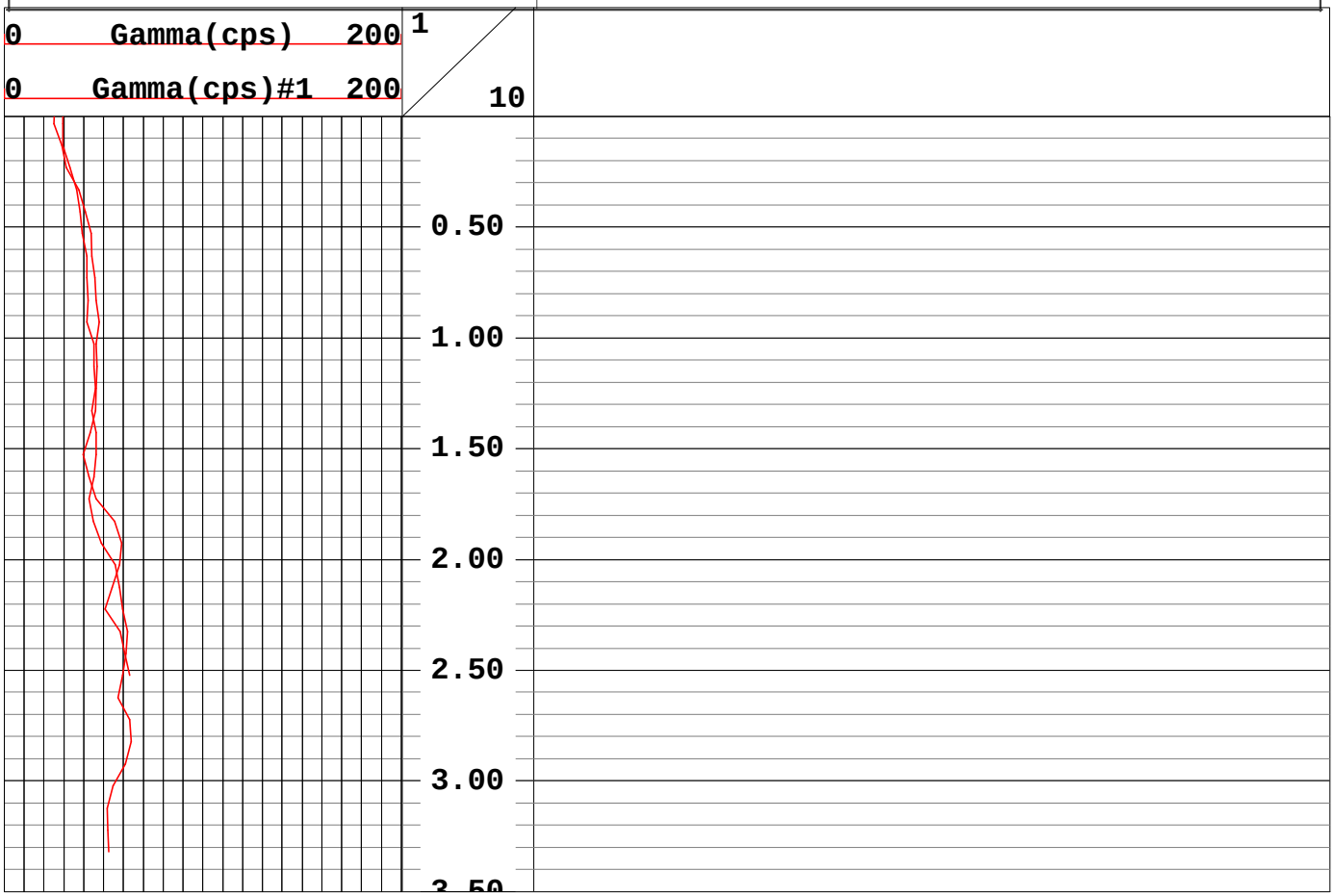
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFA2-020	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 27 July 2001	CASING RECORD SIZE 3-inch WGT. Steel



Landfill
Class 2 Area B

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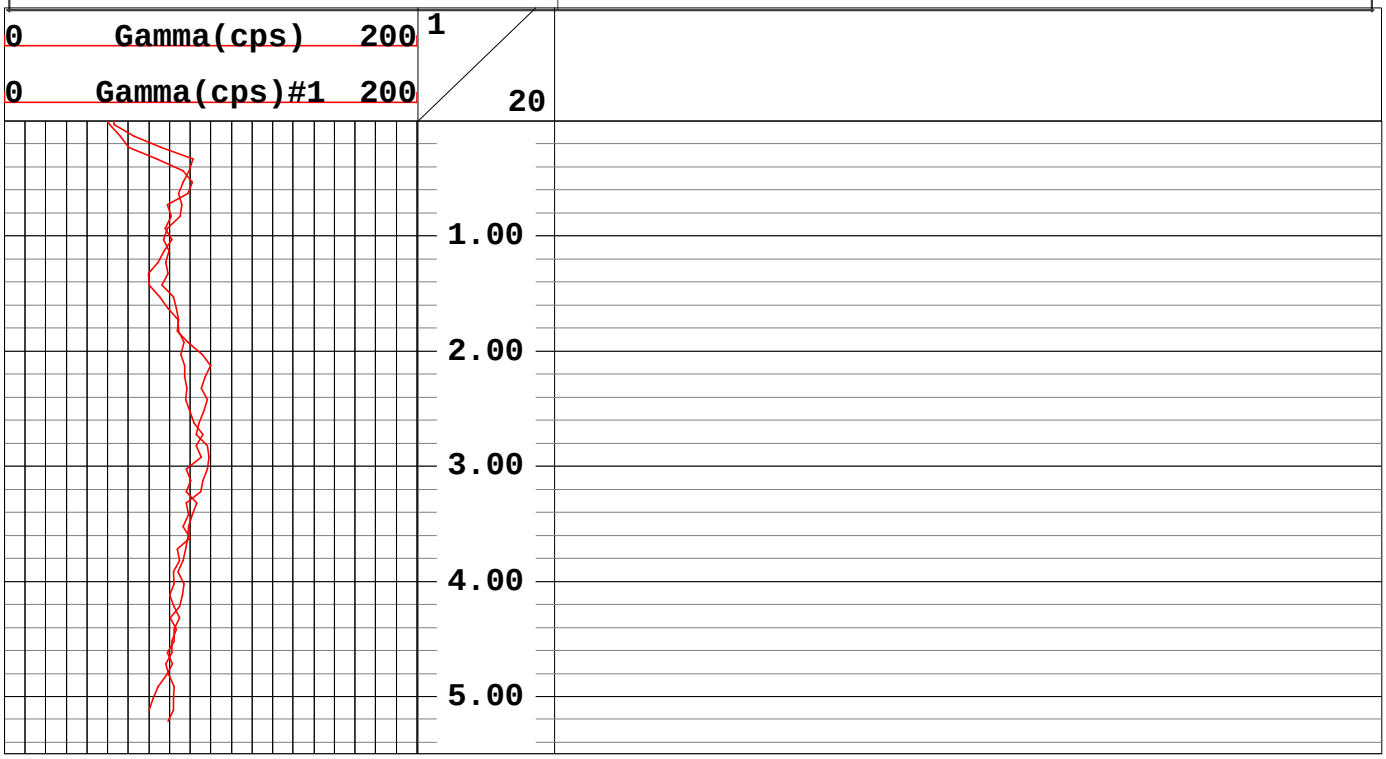
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFB2-001	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 24 July 2001	CASING RECORD SIZE None WGT. None



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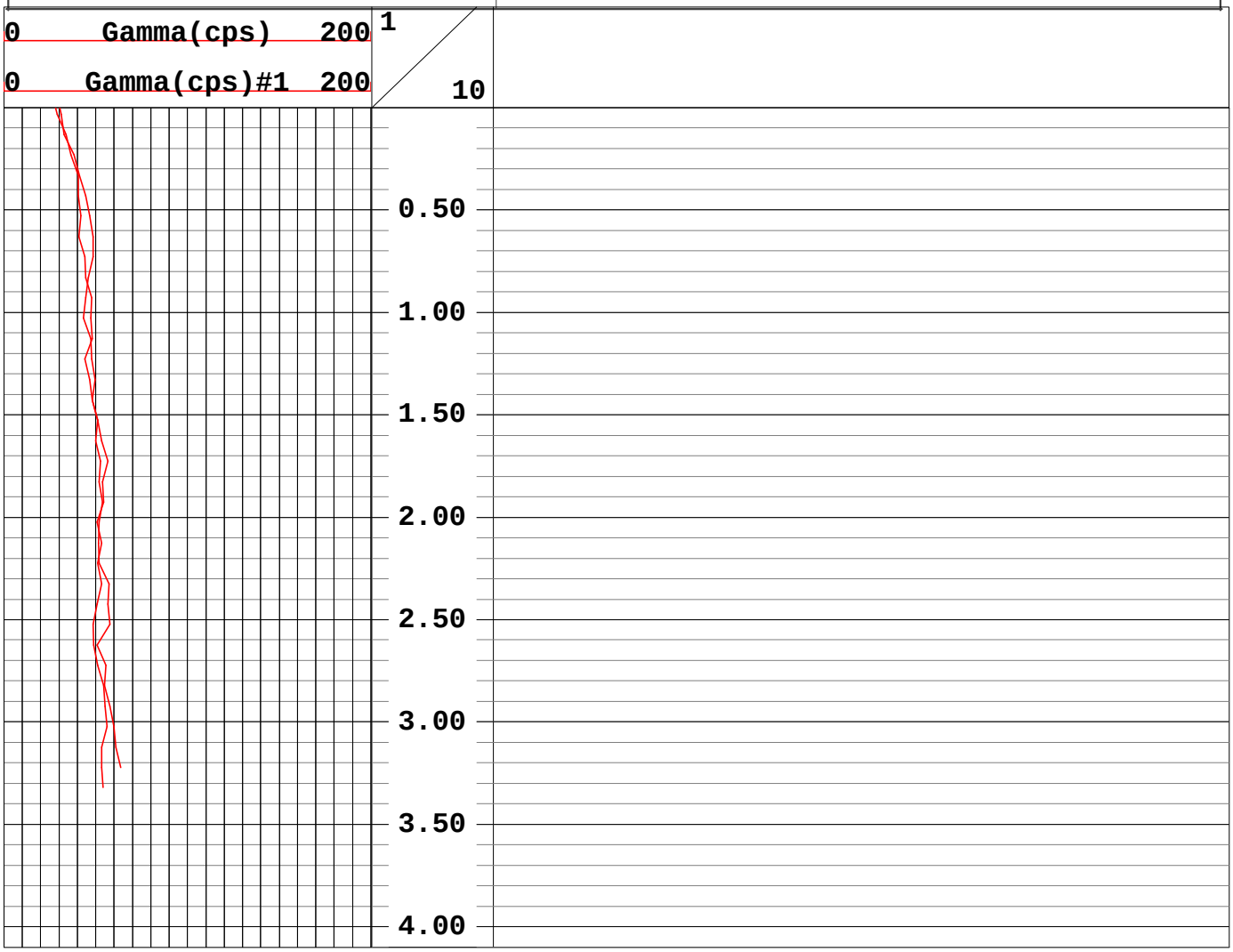
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFB2-002	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 24 July 2001	CASING RECORD SIZE 3-inch WGT. Steel



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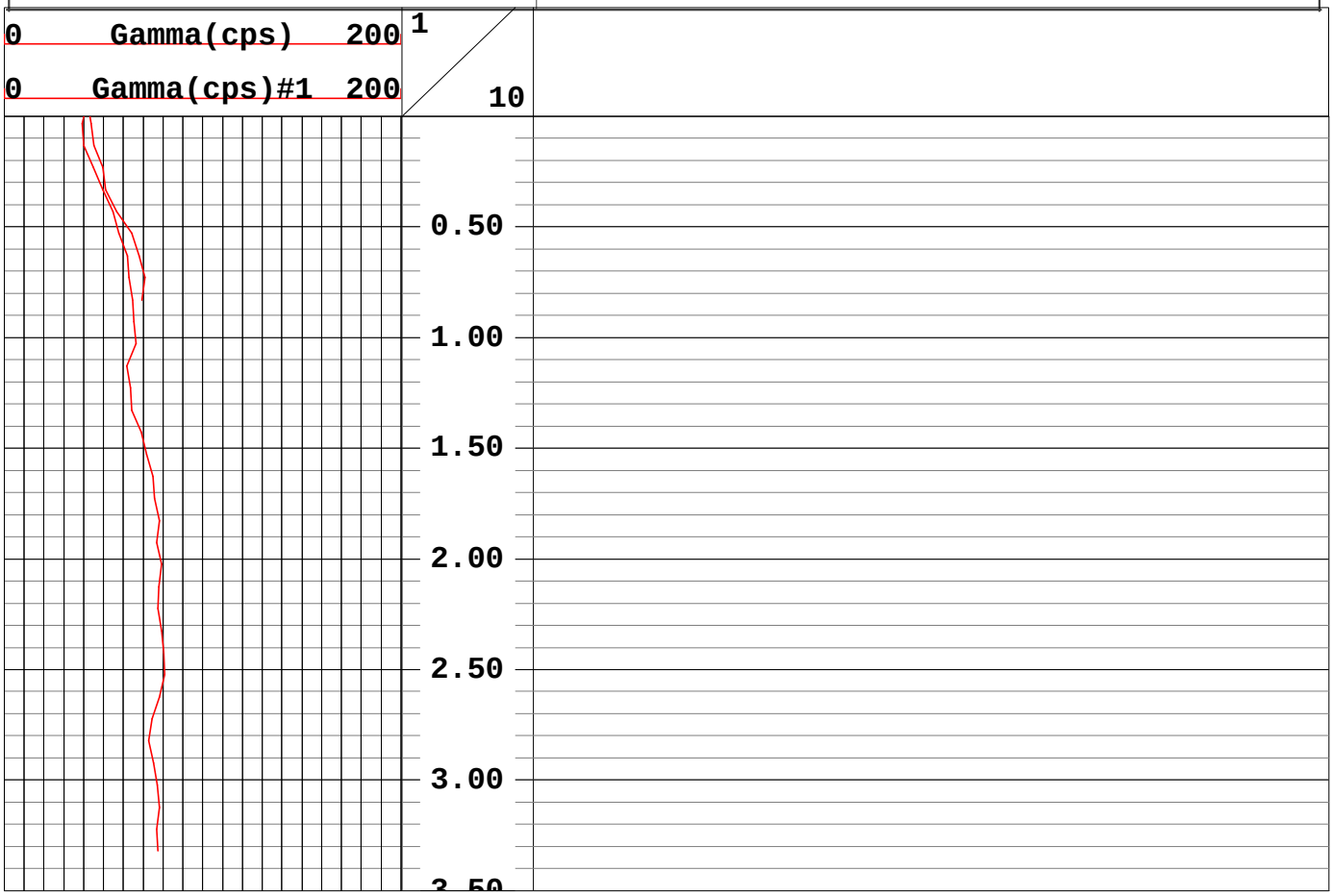
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFB2-003	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 30 July 2001	CASING RECORD SIZE None WGT. None



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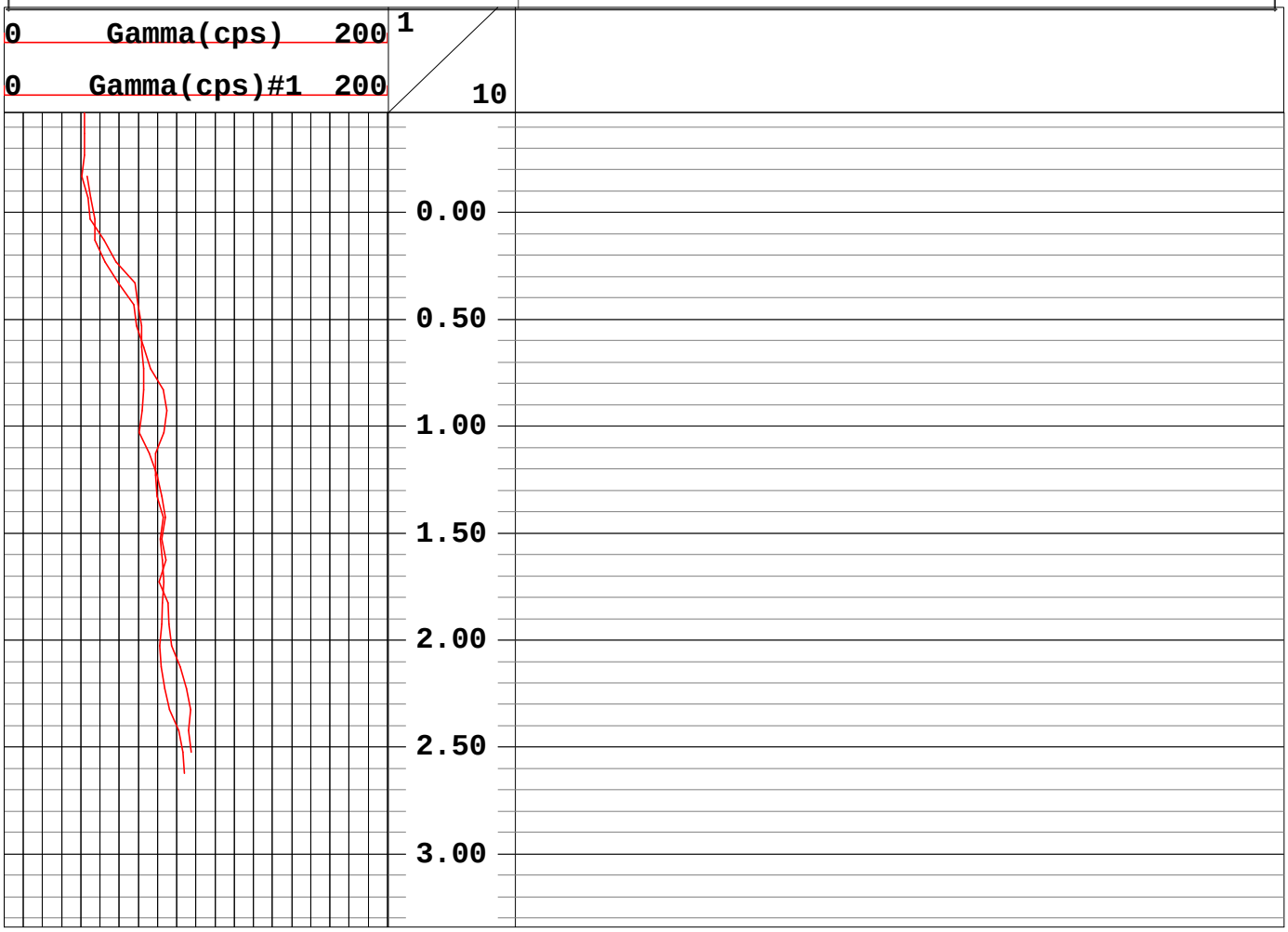
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFB2-004	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 24 July 2001	CASING RECORD SIZE None WGT. None



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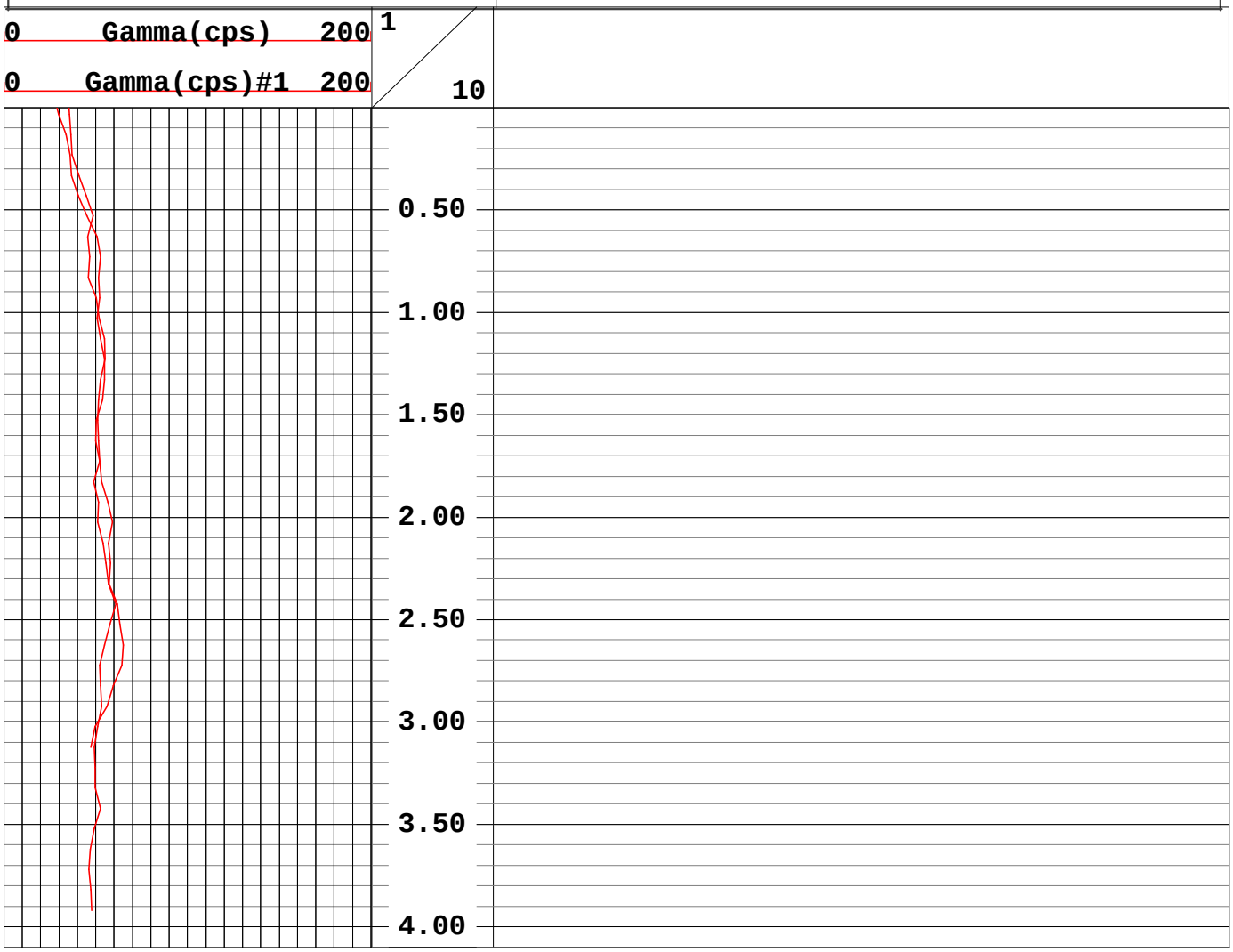
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFB2-005	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 24 July 2001	CASING RECORD SIZE 3-inch WGT. Steel



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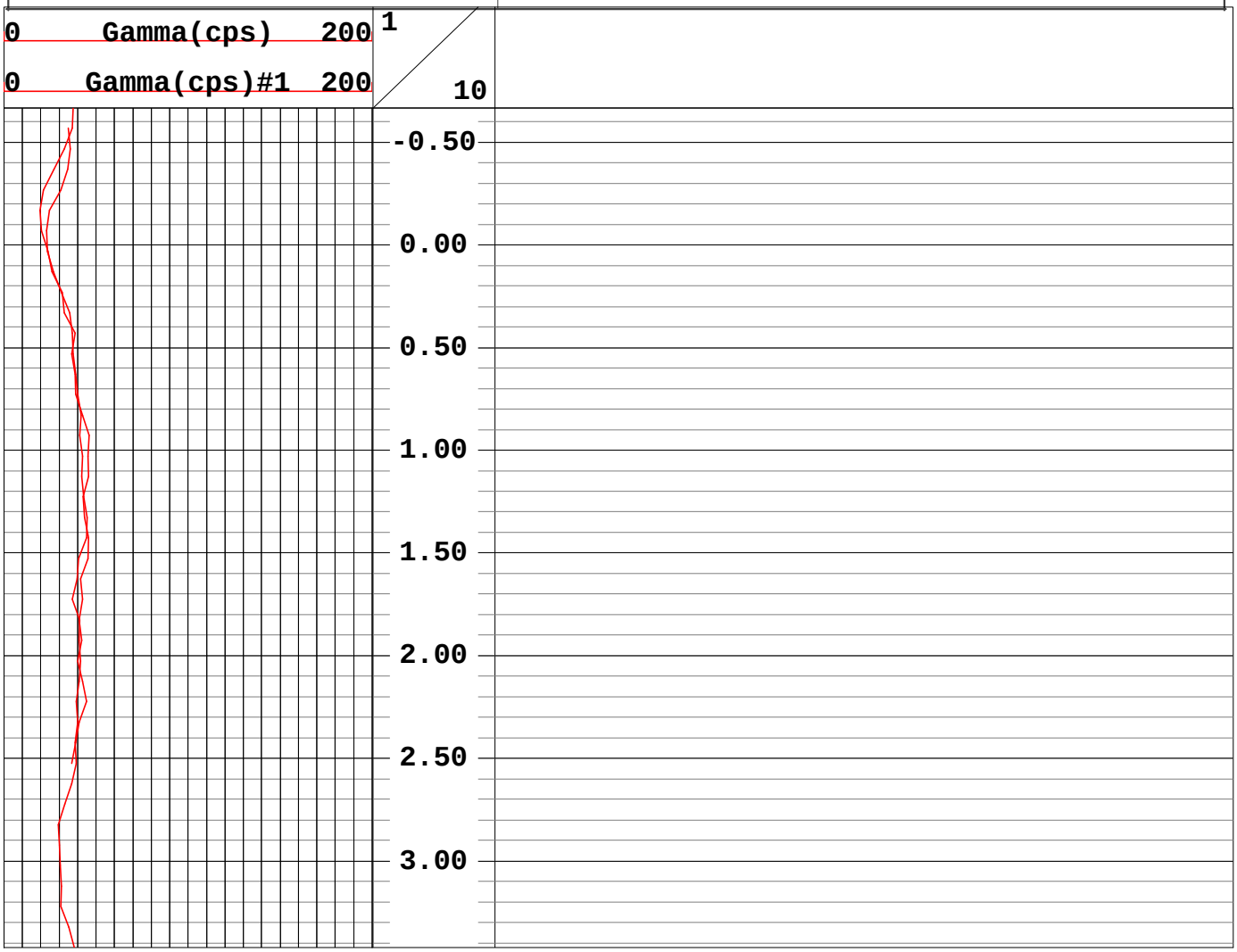
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFB2-006	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 26 July 2001	CASING RECORD SIZE 3-Inch WGT. Steel



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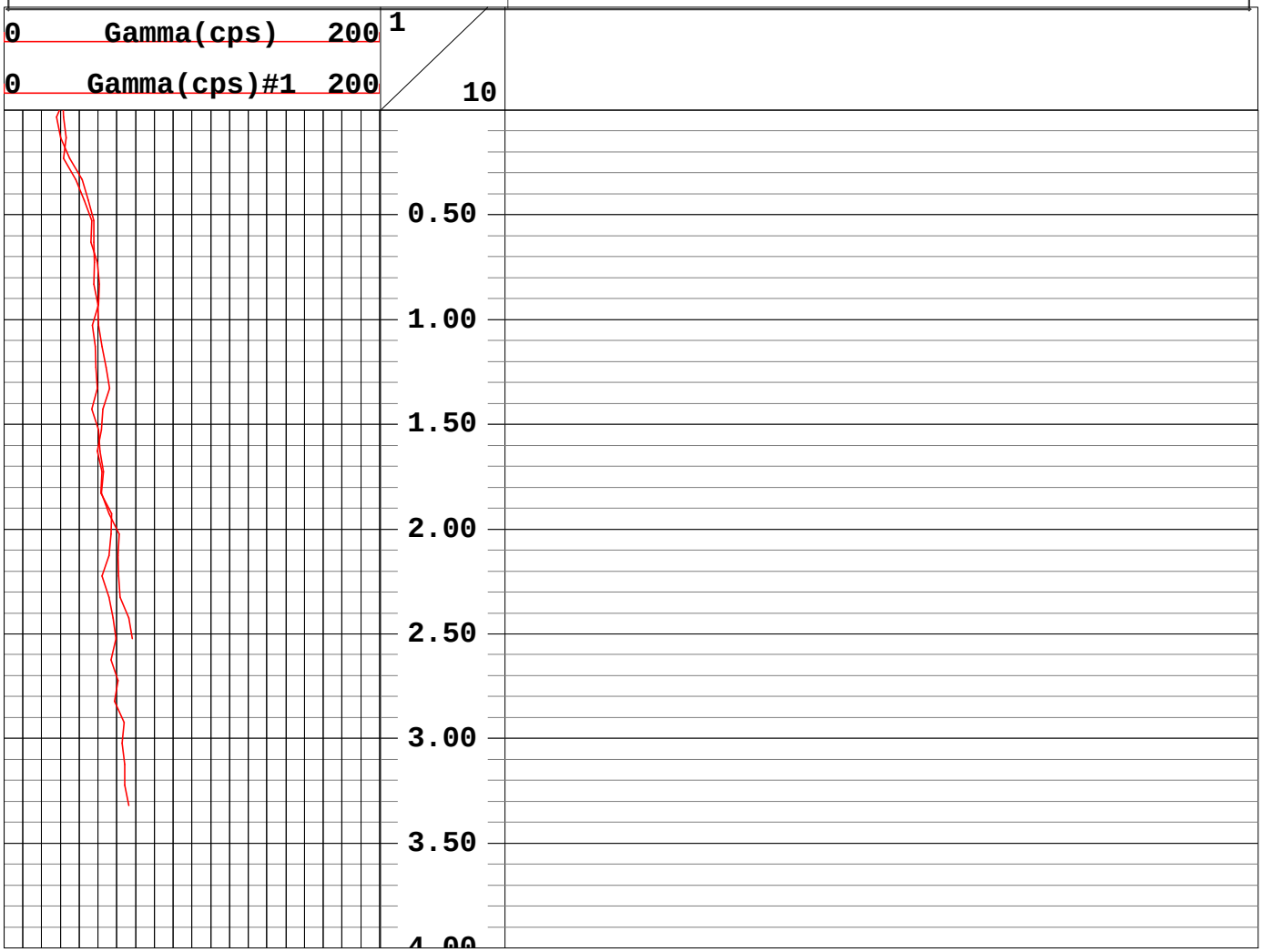
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFB2-007	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 24 July 2001	CASING RECORD SIZE 3-inch WGT. Steel



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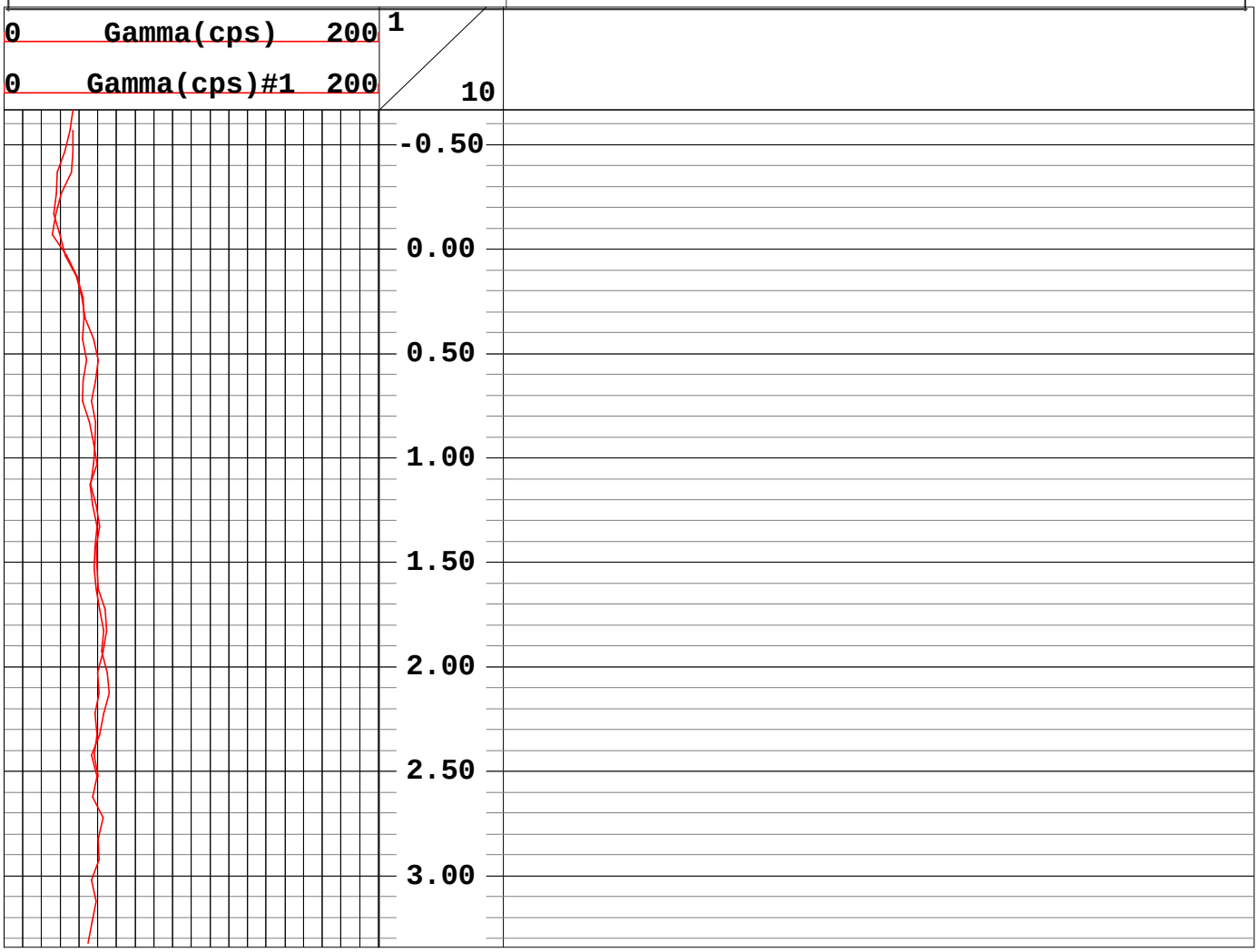
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFB2-008	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 26 July 2001	CASING RECORD SIZE 3-Inch WGT. Steel



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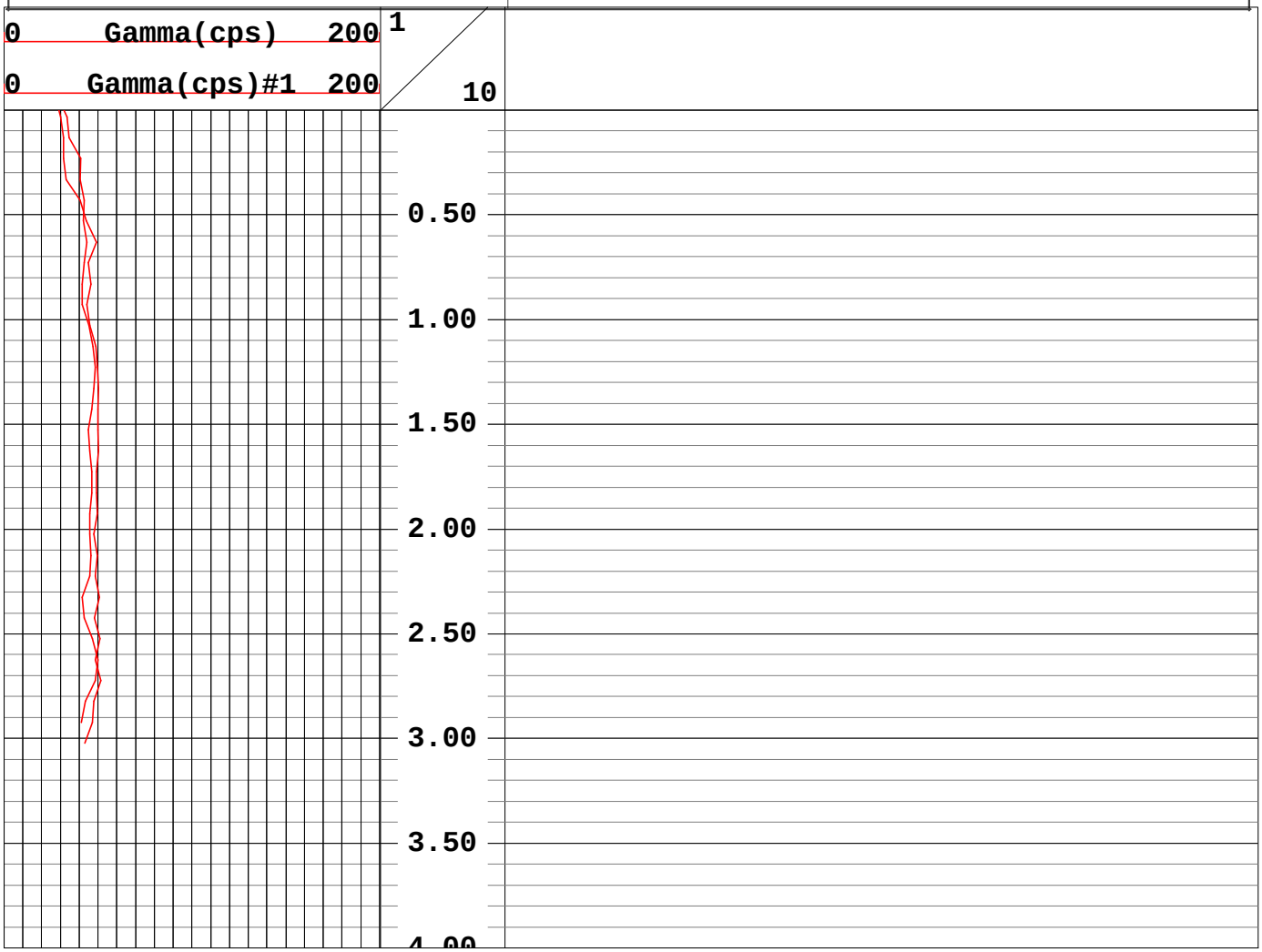
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFB2-009	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 28 July 2001	CASING RECORD SIZE 3-inch WGT. Steel



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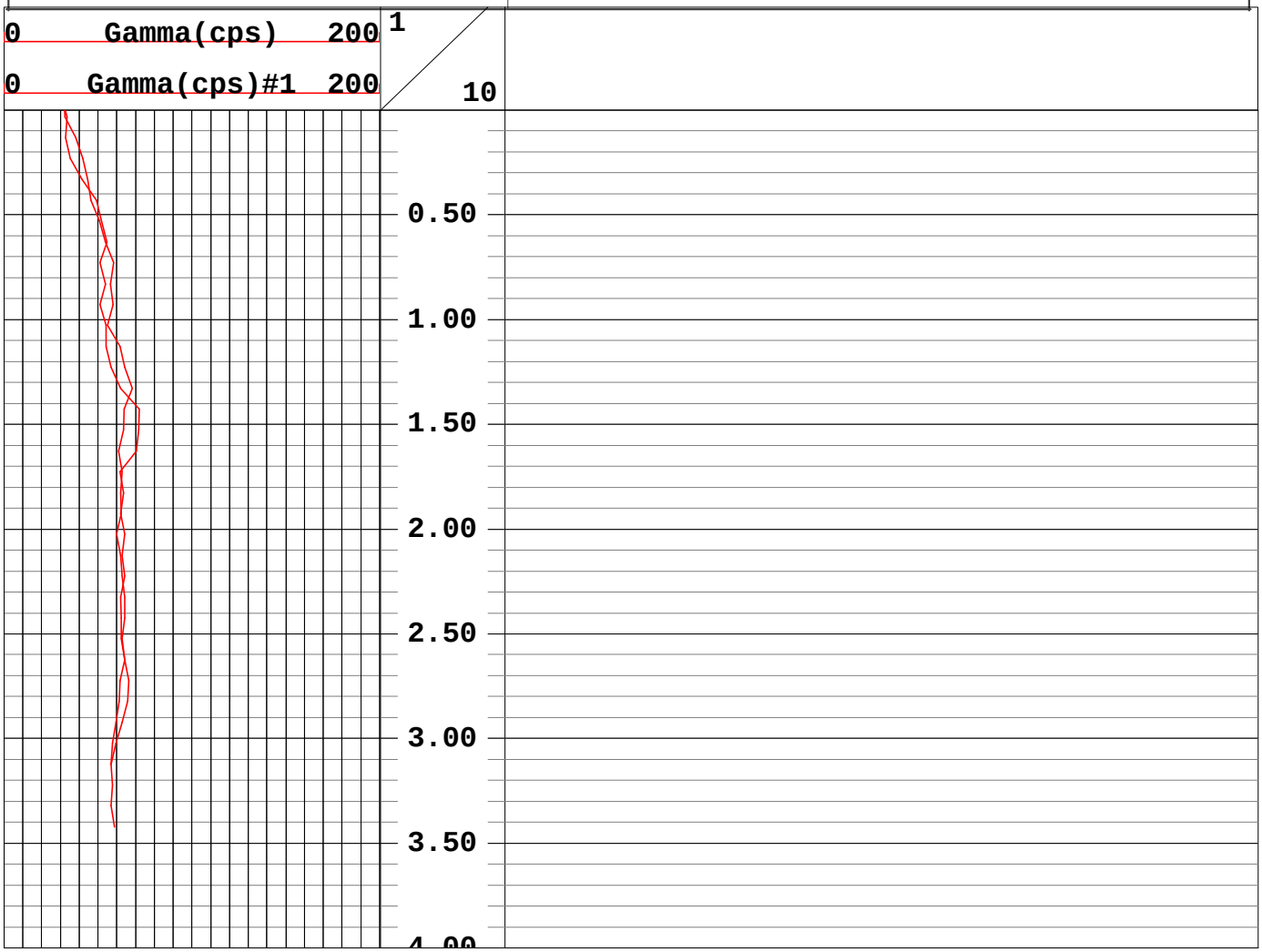
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFB2-010	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 24 July 2001	CASING RECORD SIZE 3-inch WGT. Steel



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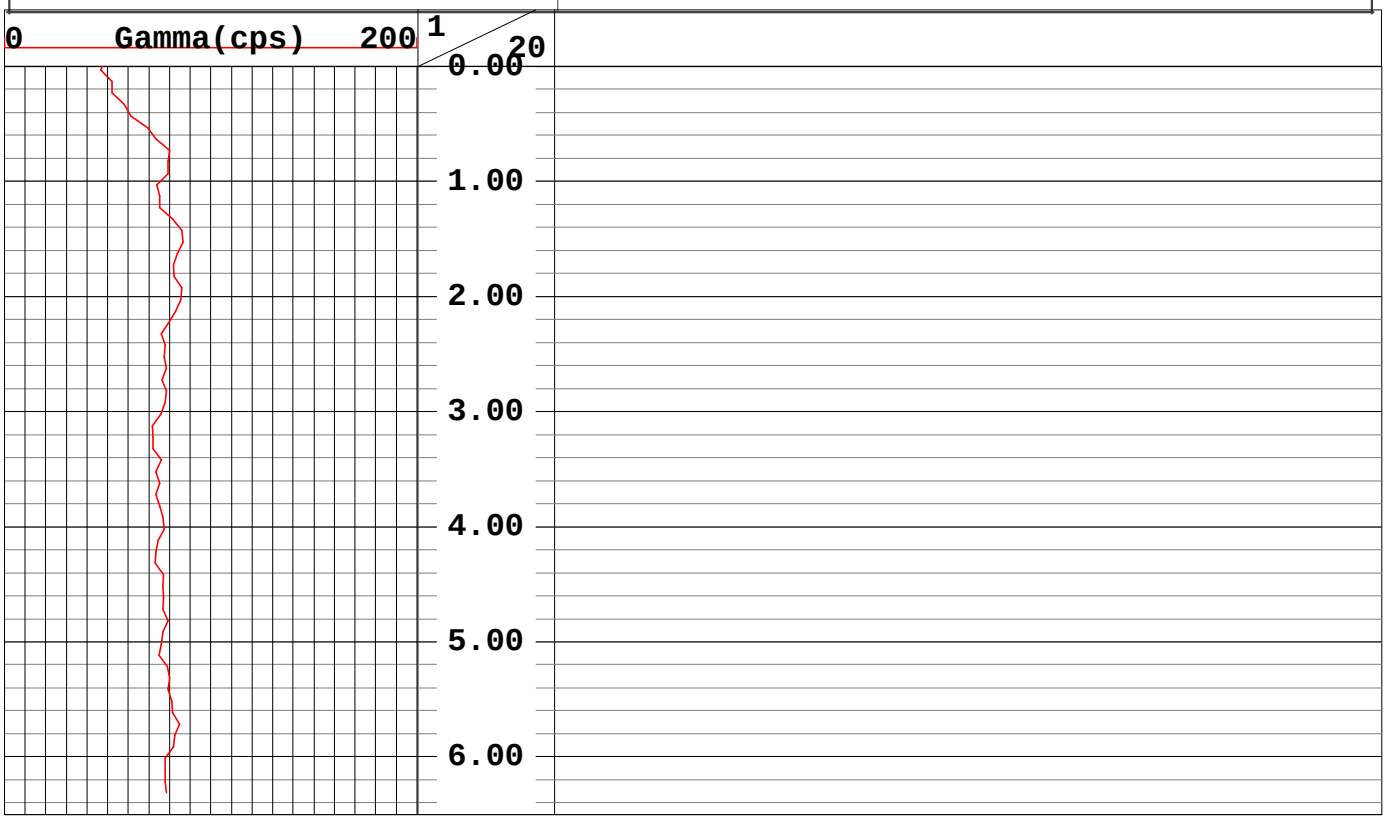
CLIENT **ACOE-Buffalo/FUSRAP**	LOG MEAS. FROM Ground Surface
WELL **TLFB2-011**	ELEVATION
SITE **Tonawanda Landfill**	BTM LOGGED INTERVAL
CITY **Tonawanda**	TOP LOGGED INTERVAL
STATE **New York**	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 24 July 2001	CASING RECORD SIZE None WGT. None



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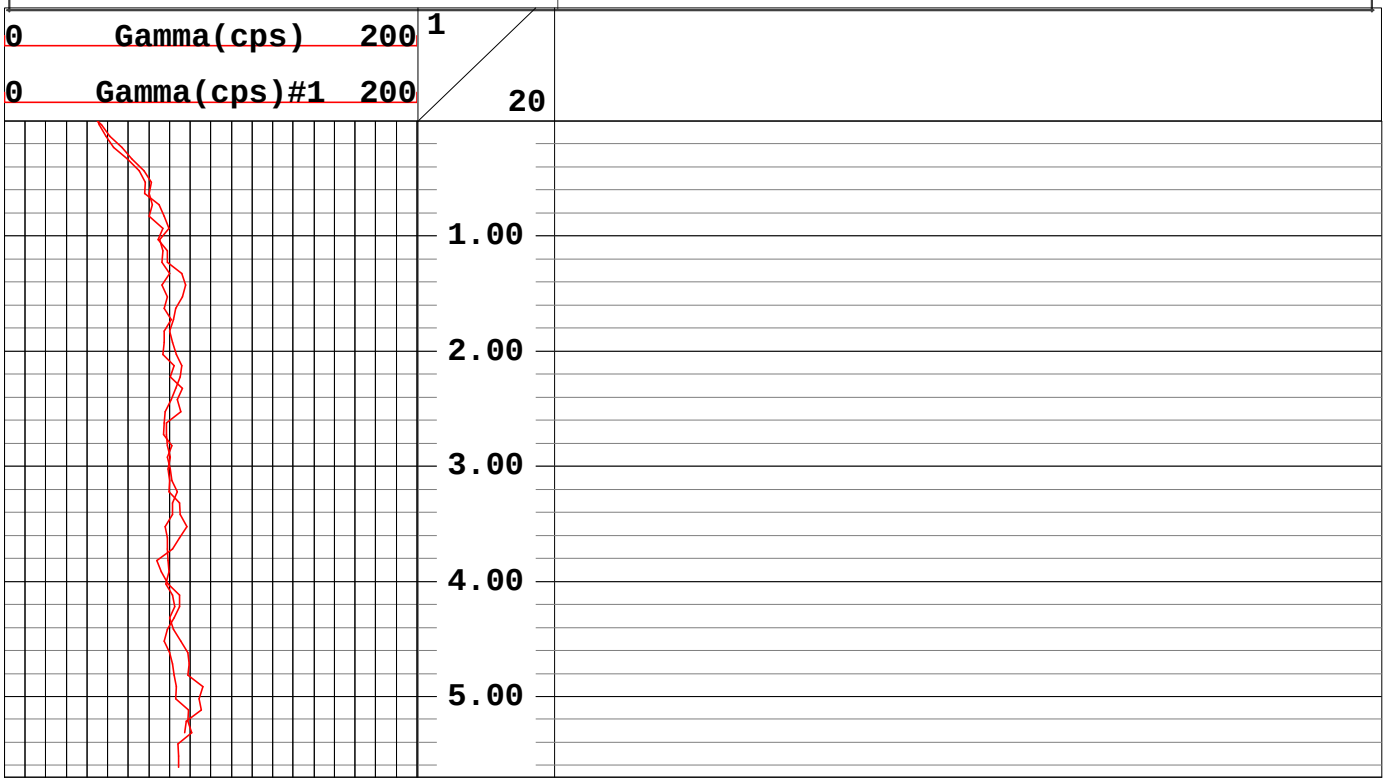
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFB2-012	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 28 July 2001	CASING RECORD SIZE None WGT. None



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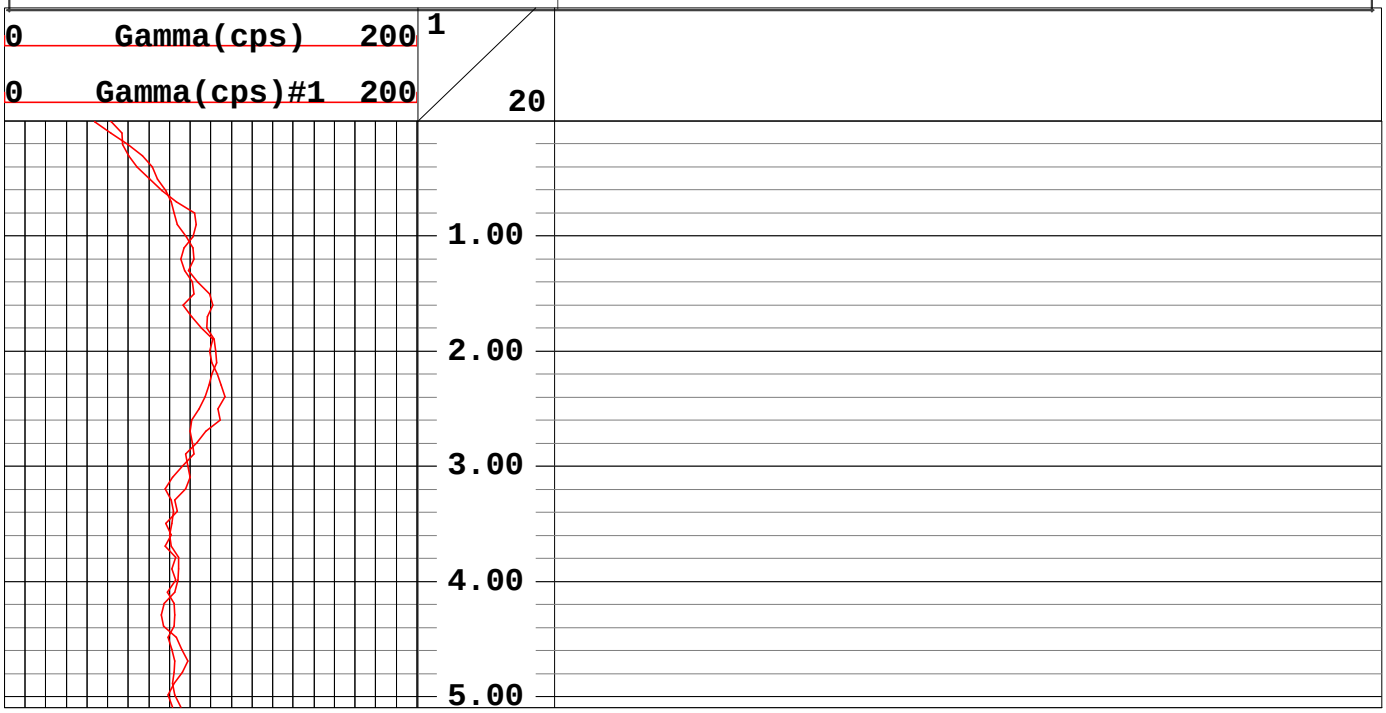
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFB2-013	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 24 July 2001	CASING RECORD SIZE None WGT. None



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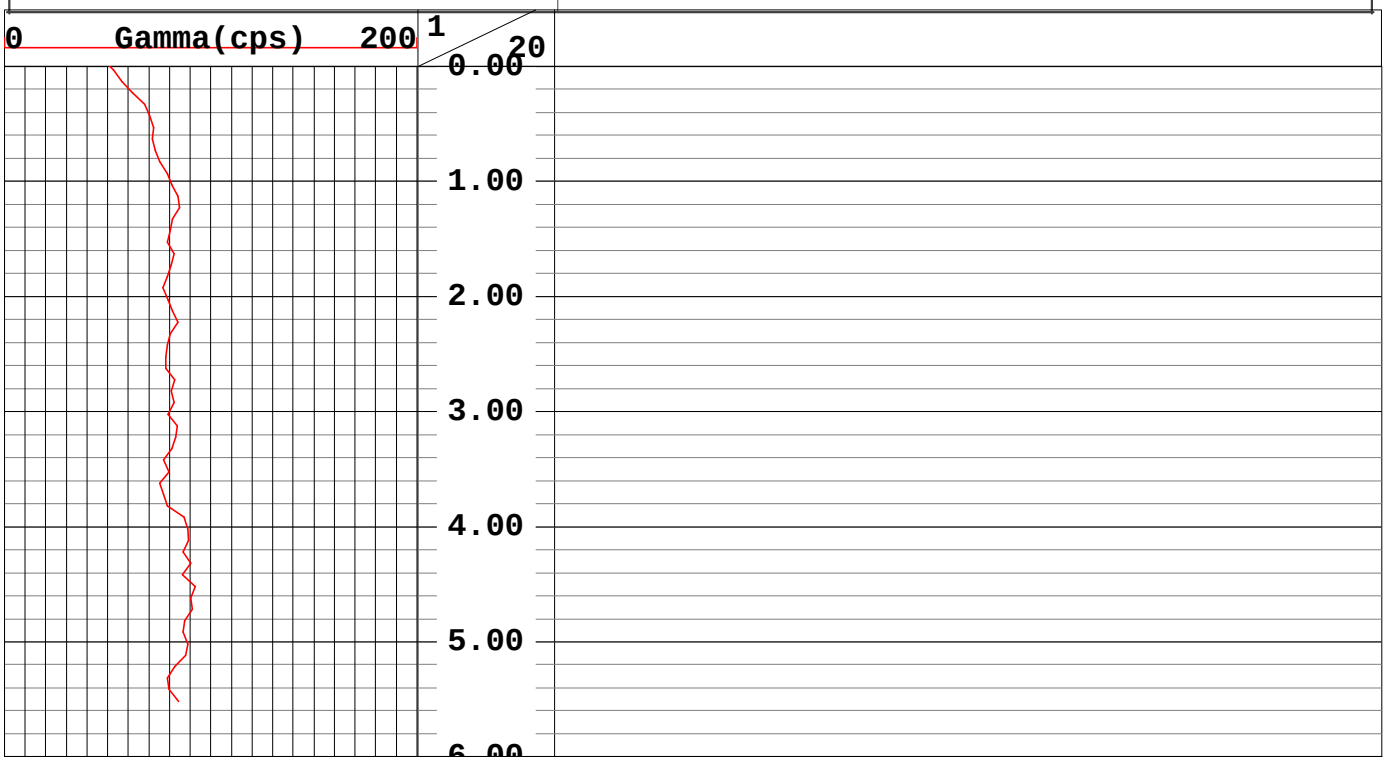
CLIENT **ACOE-Buffalo/FUSRAP**	LOG MEAS. FROM Ground Surface
WELL **TLFB2-014**	ELEVATION
SITE **Tonawanda Landfill**	BTM LOGGED INTERVAL
CITY **Tonawanda**	TOP LOGGED INTERVAL
STATE **New York**	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 24 July 2001	CASING RECORD SIZE None WGT. None



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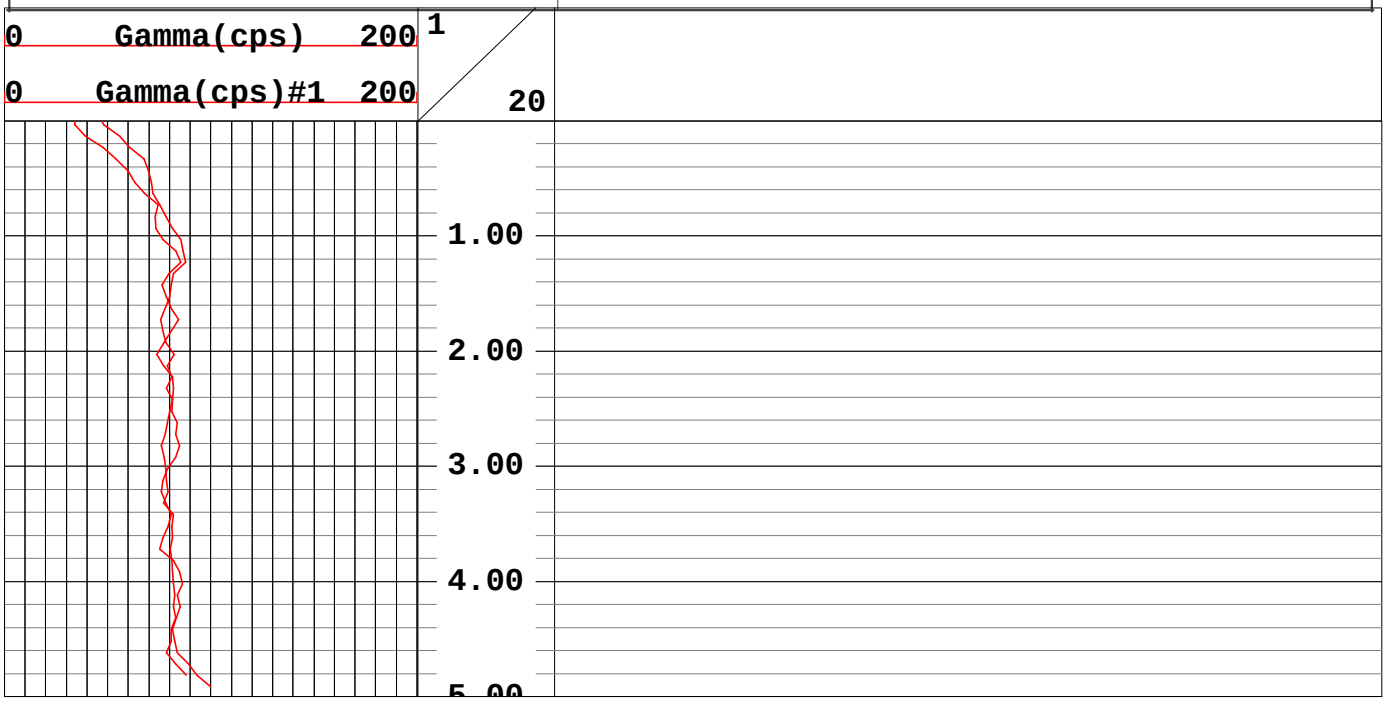
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFB2-015	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 27 July 2001	CASING RECORD SIZE None WGT. None



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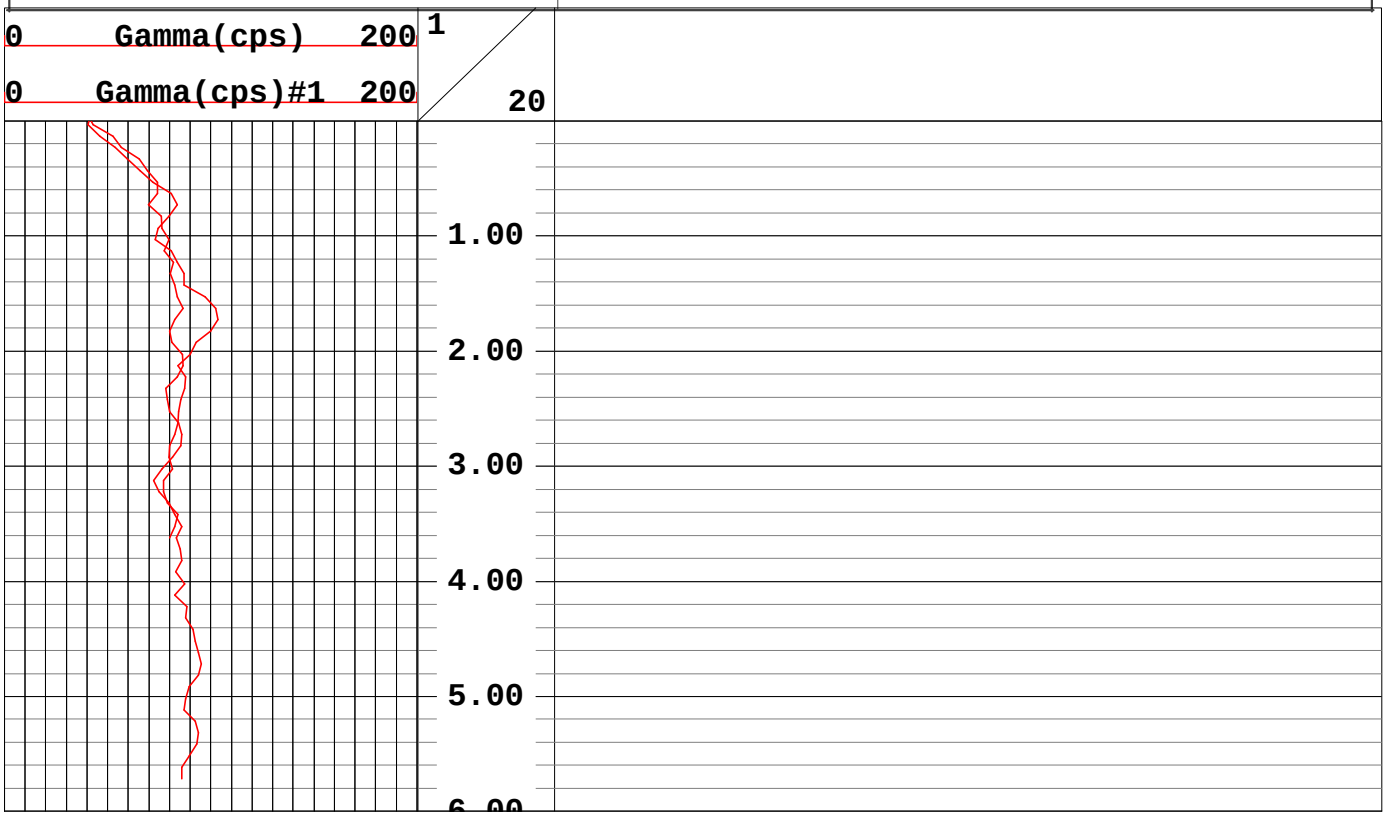
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFB2-016	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY Rick Hoover	
DATE 24 July 2001	CASING RECORD SIZE None WGT. None



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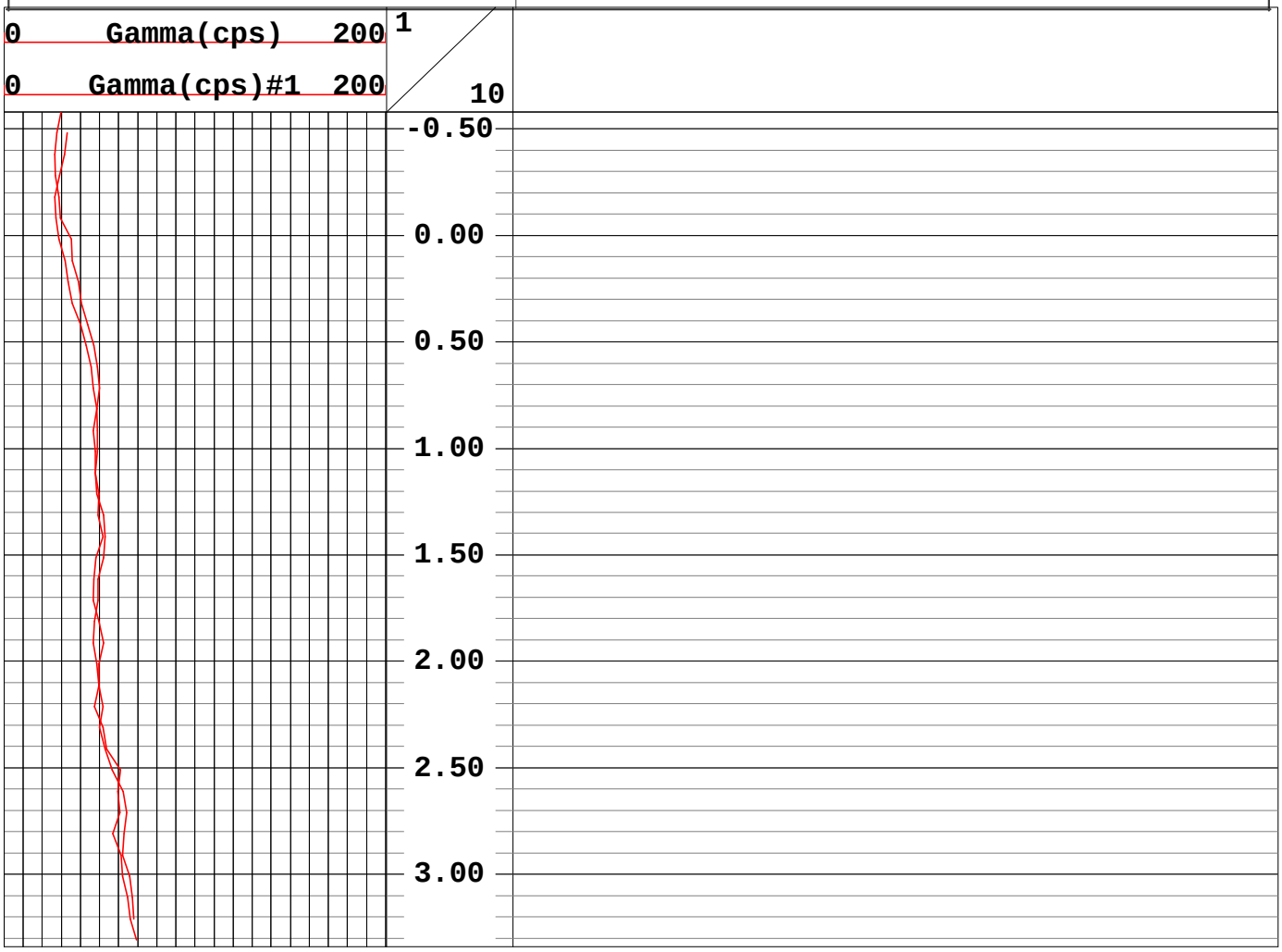
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFB2-017	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 26 July 2001	CASING RECORD SIZE 3-Inch WGT. Steel



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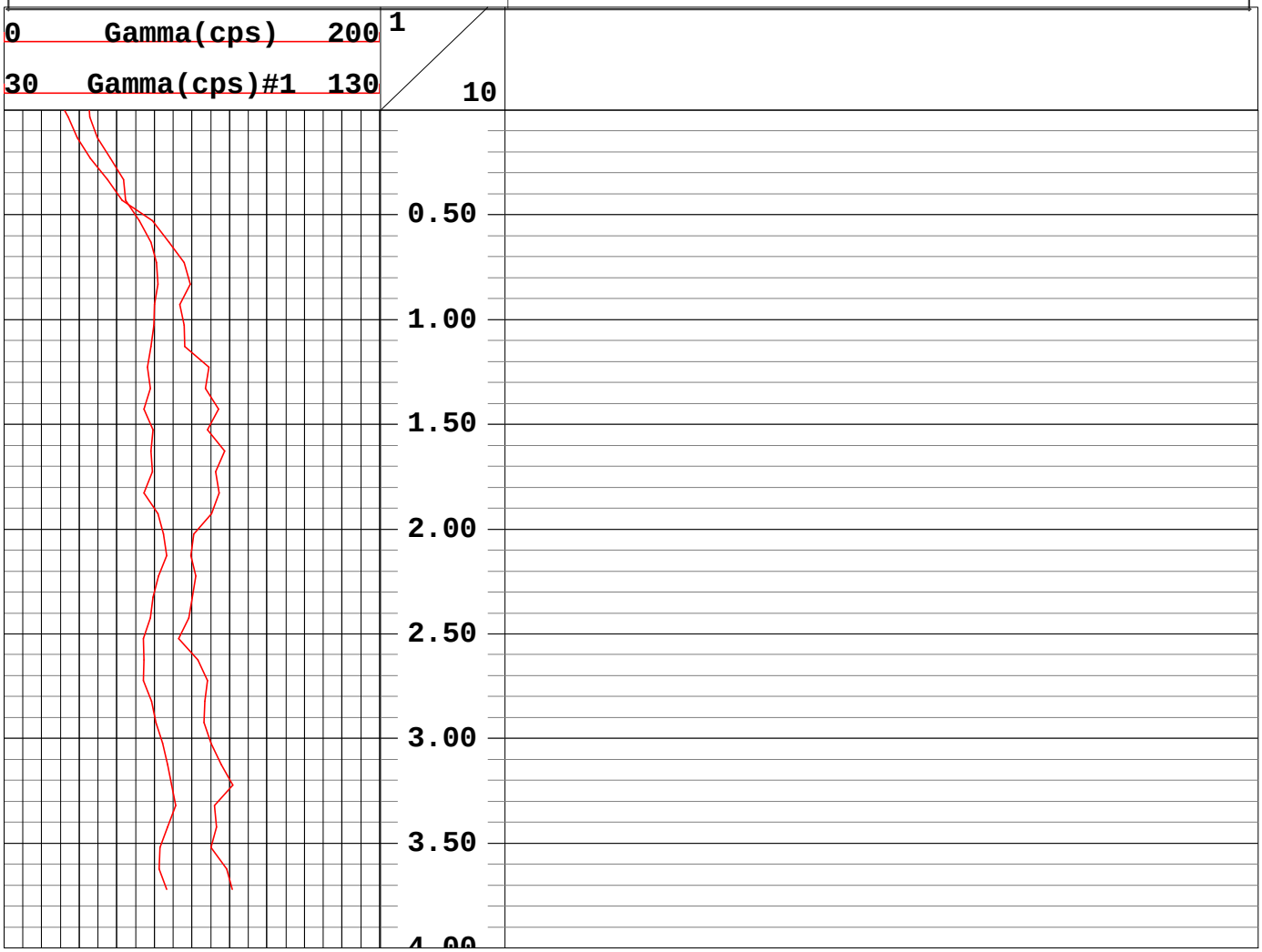
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFB2-018	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 27 July 2001	CASING RECORD SIZE None WGT. None



Landfill
Class 3 Biased

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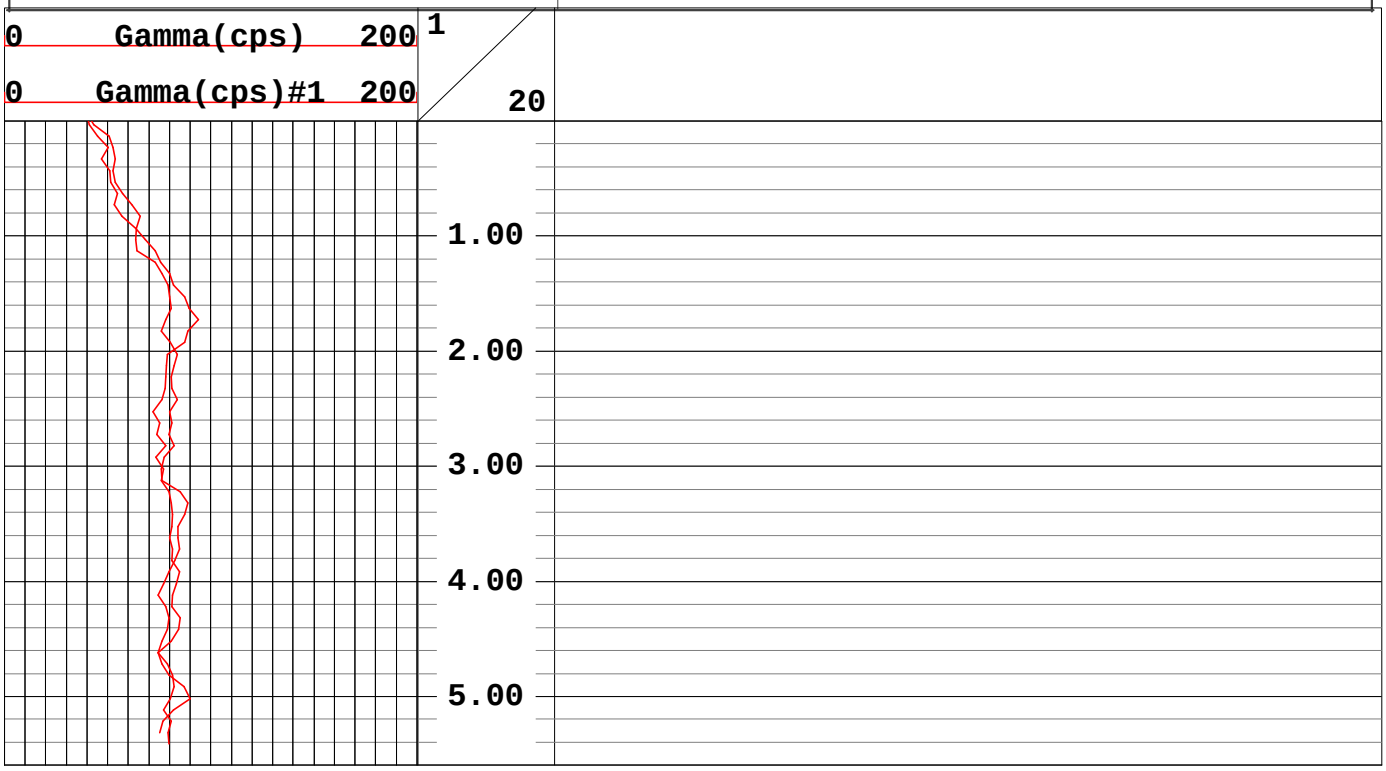
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLF3-050	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 24 July 2001	CASING RECORD SIZE None WGT. None



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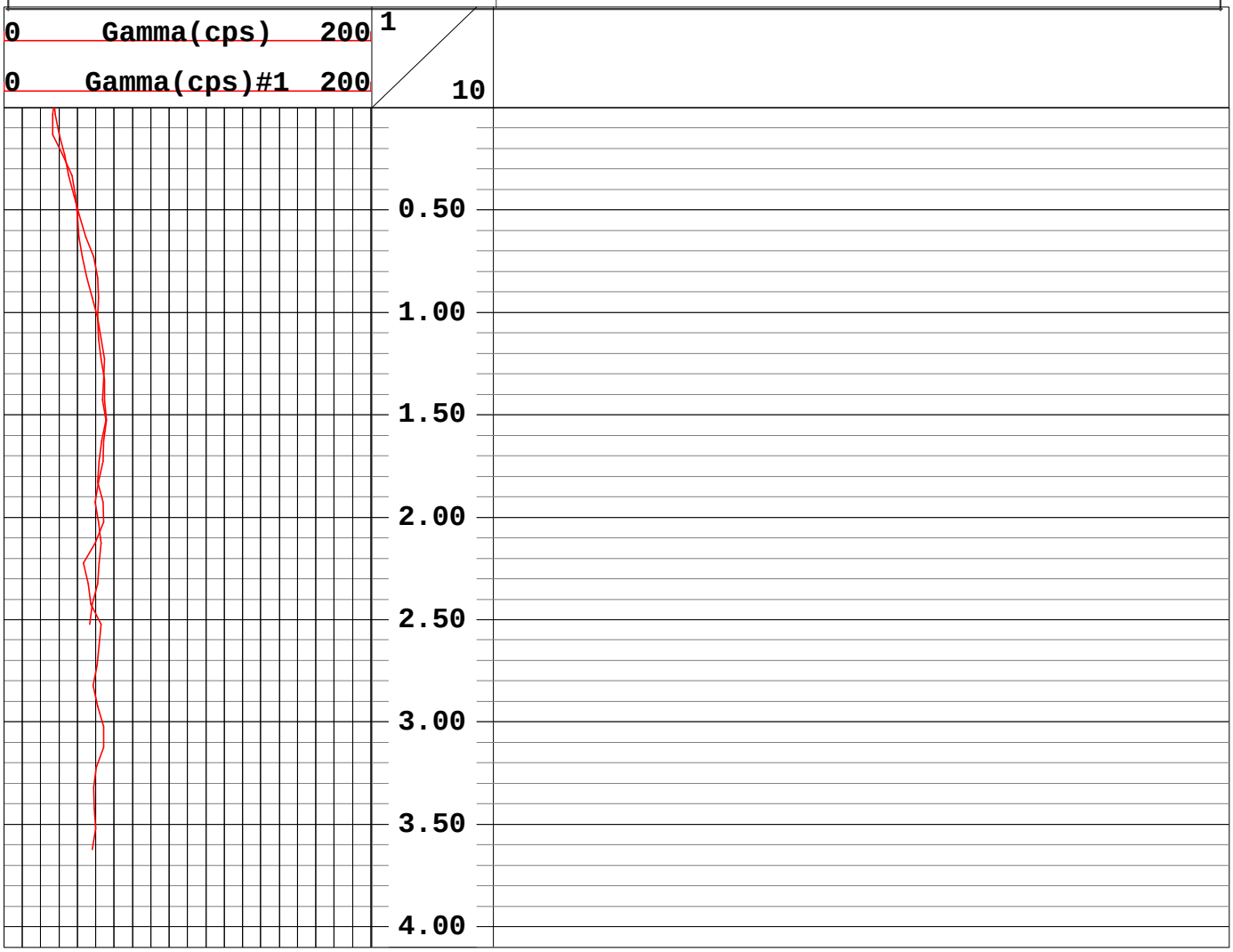
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLF3-051	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 26 July 2001	CASING RECORD SIZE 3-Inch WGT. Steel



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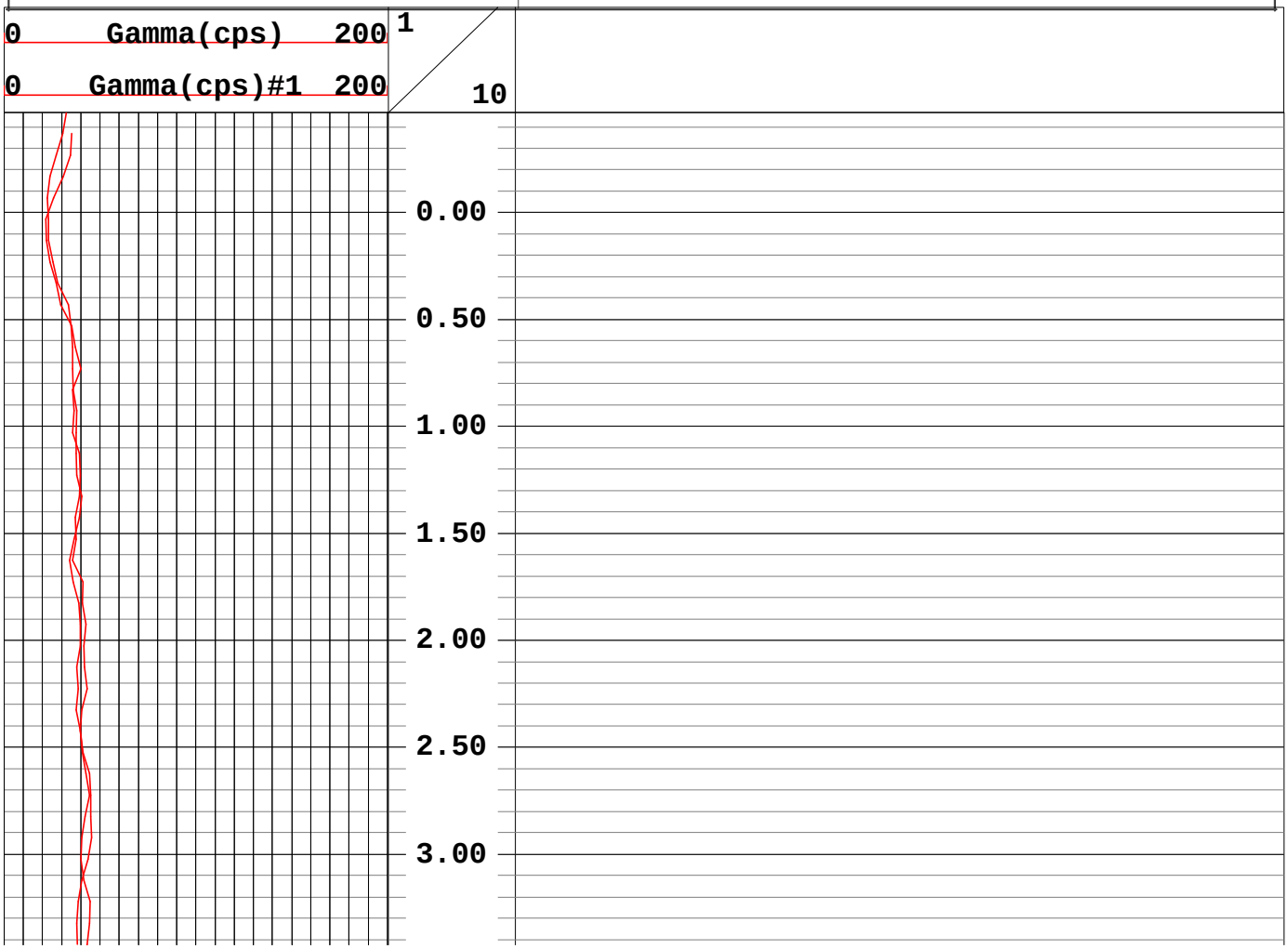
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLF3-052	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 1 August 2001	CASING RECORD SIZE 3-inch WGT. Steel



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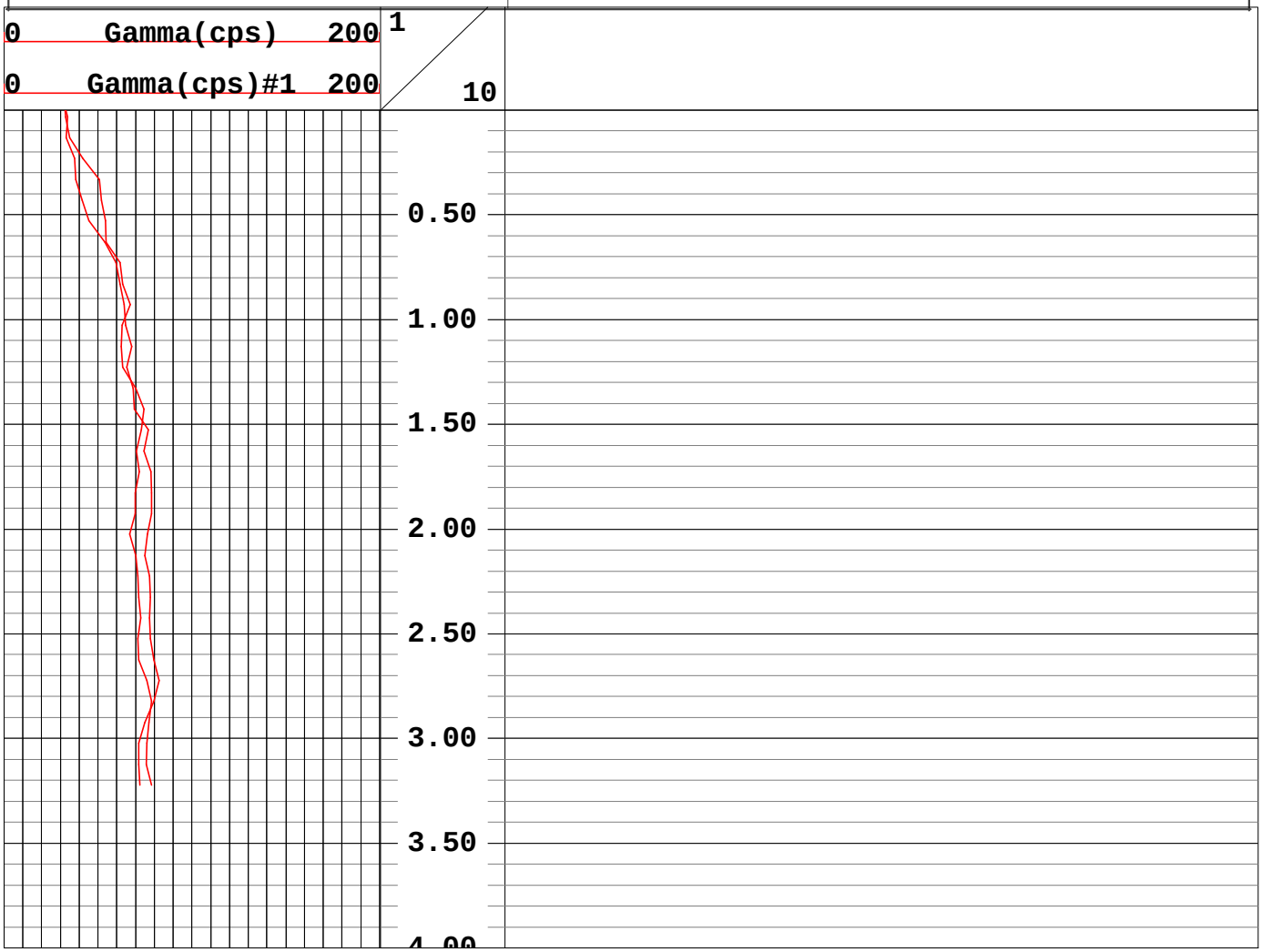
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLF3-053	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 28 July 2001	CASING RECORD SIZE None WGT. None



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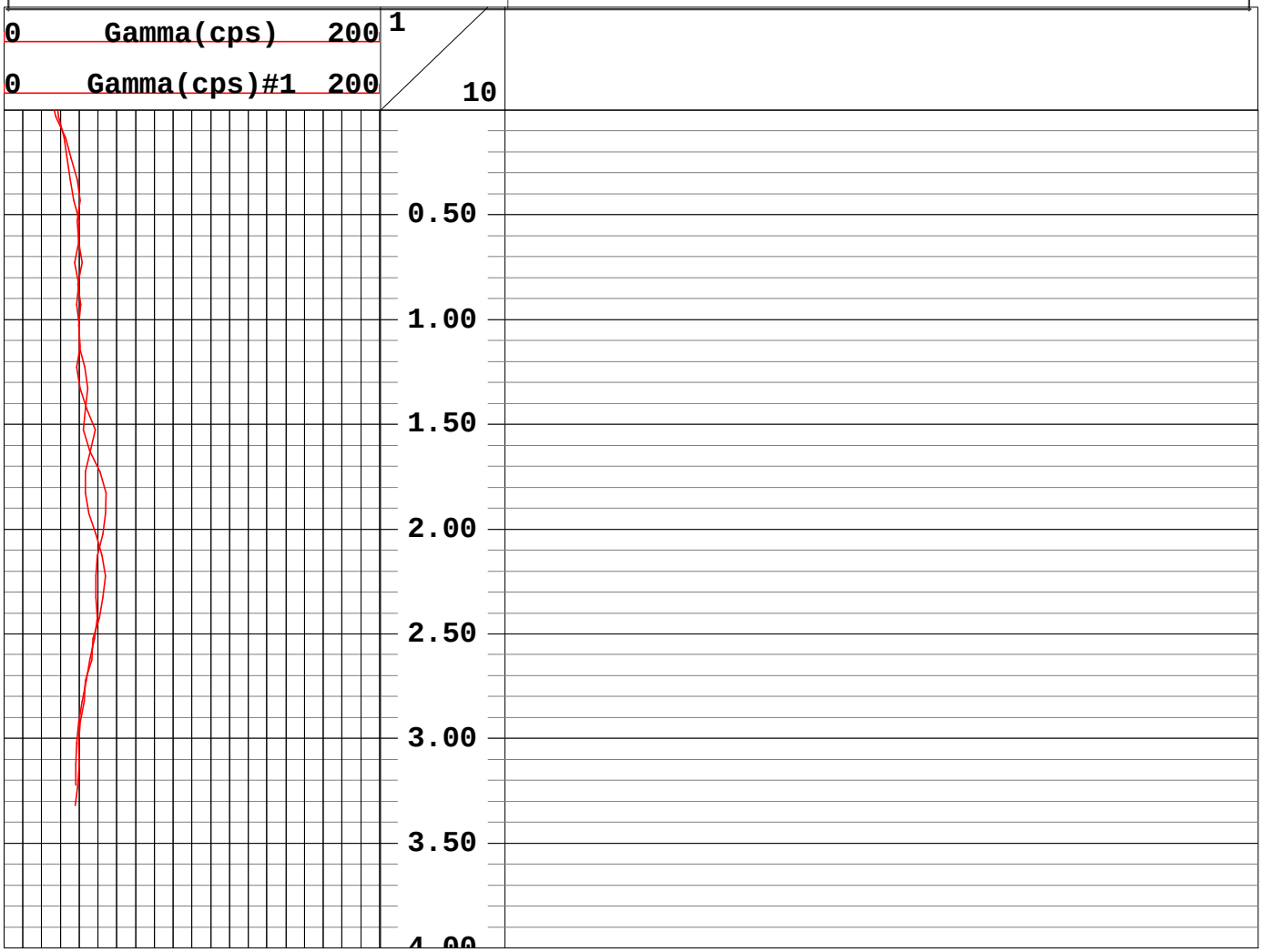
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLF3-054	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 28 July 2001	CASING RECORD SIZE 3-inch WGT. Steel



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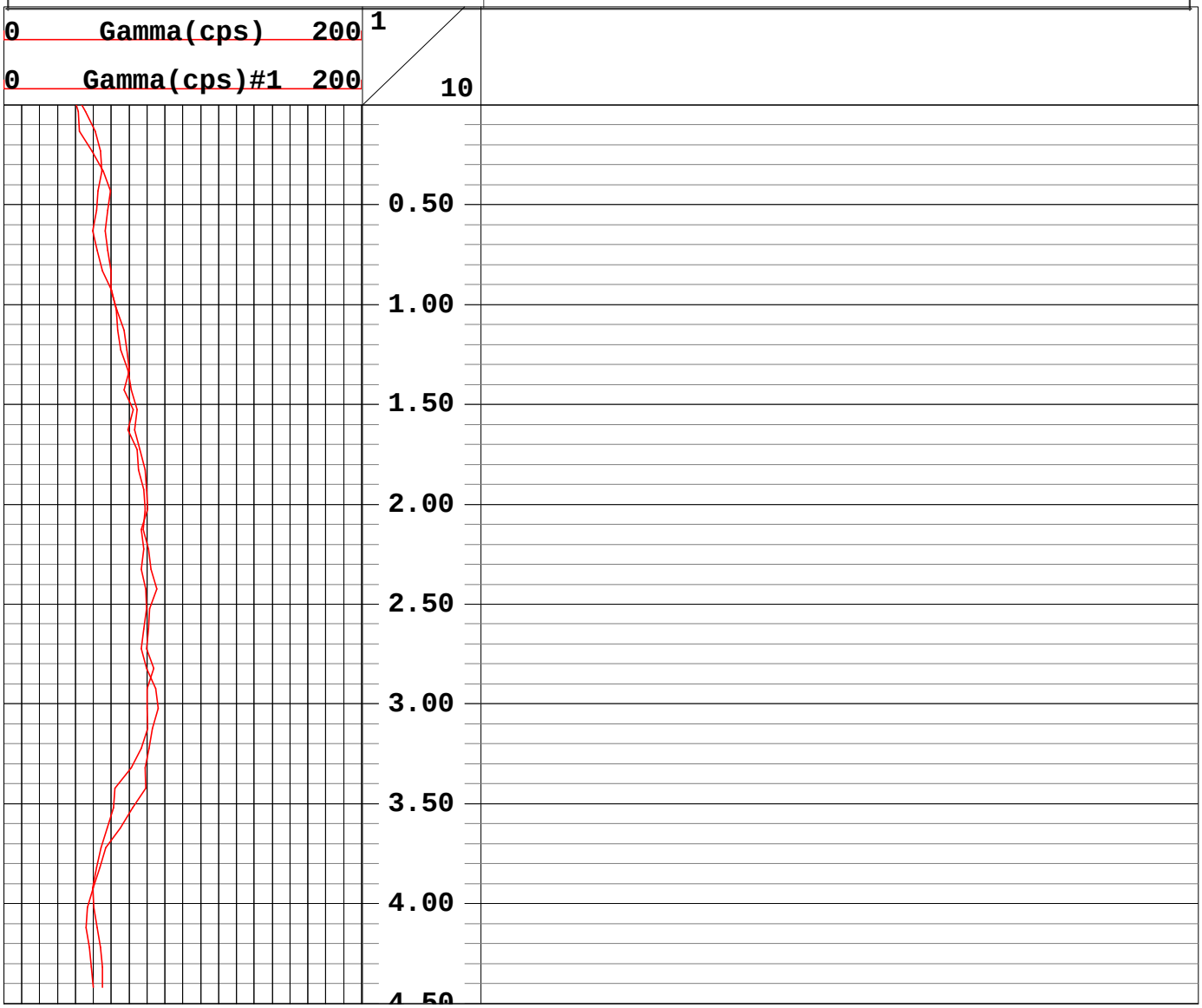
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLF3-055	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 27 July 2001	CASING RECORD SIZE None WGT. None



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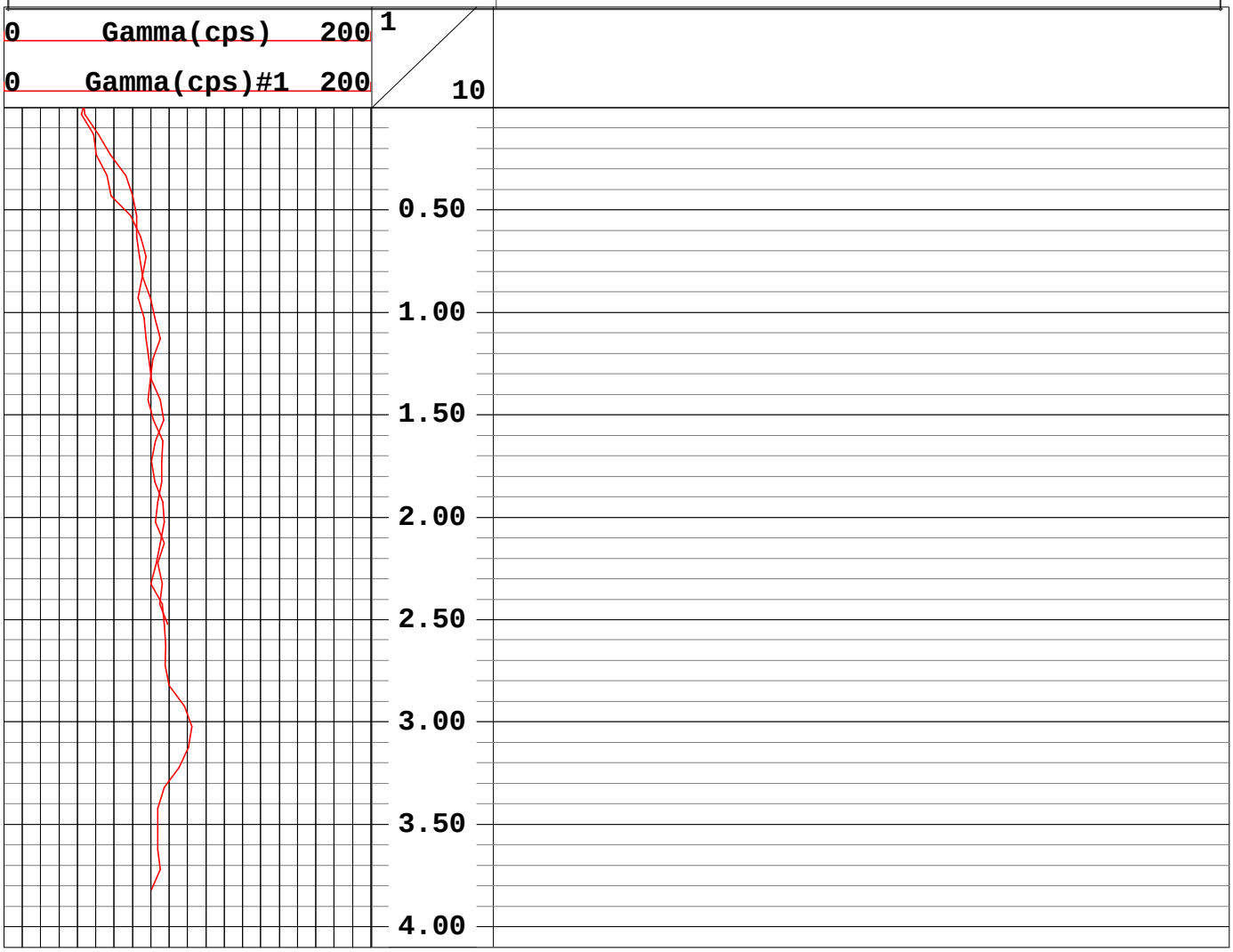
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLF3-056	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 26 July 2001	CASING RECORD SIZE None WGT. None



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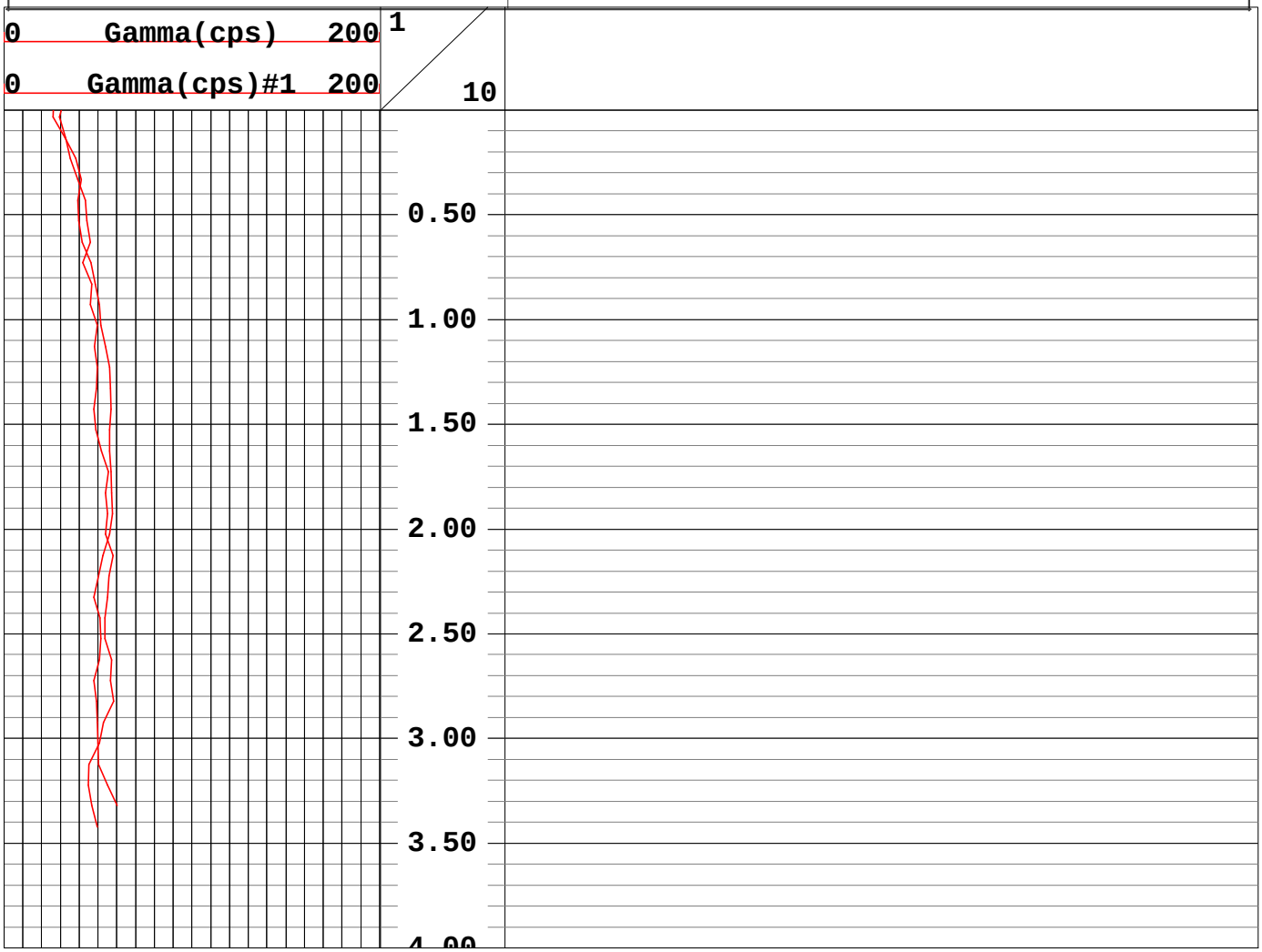
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLF3-057	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 28 July 2001	CASING RECORD SIZE 3-inch WGT. Steel



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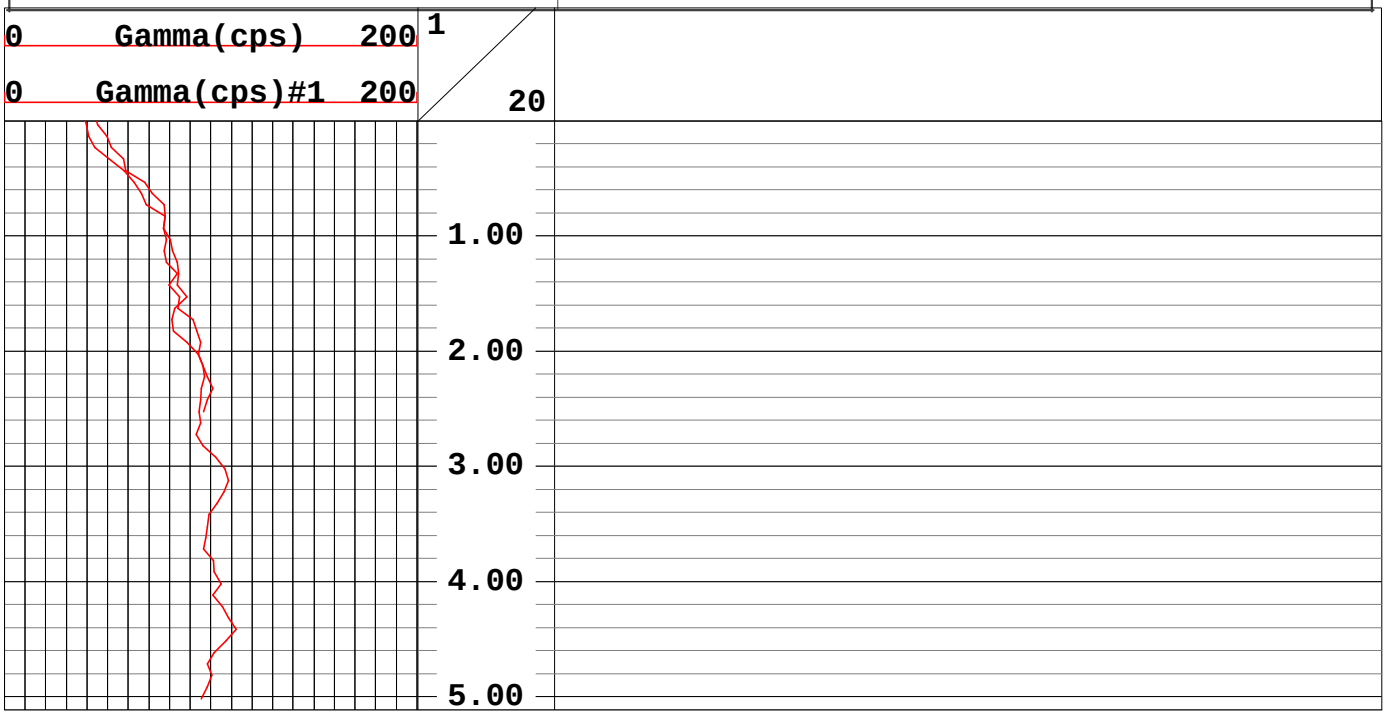
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLF3-058	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 26 July 2001	CASING RECORD SIZE None WGT. None



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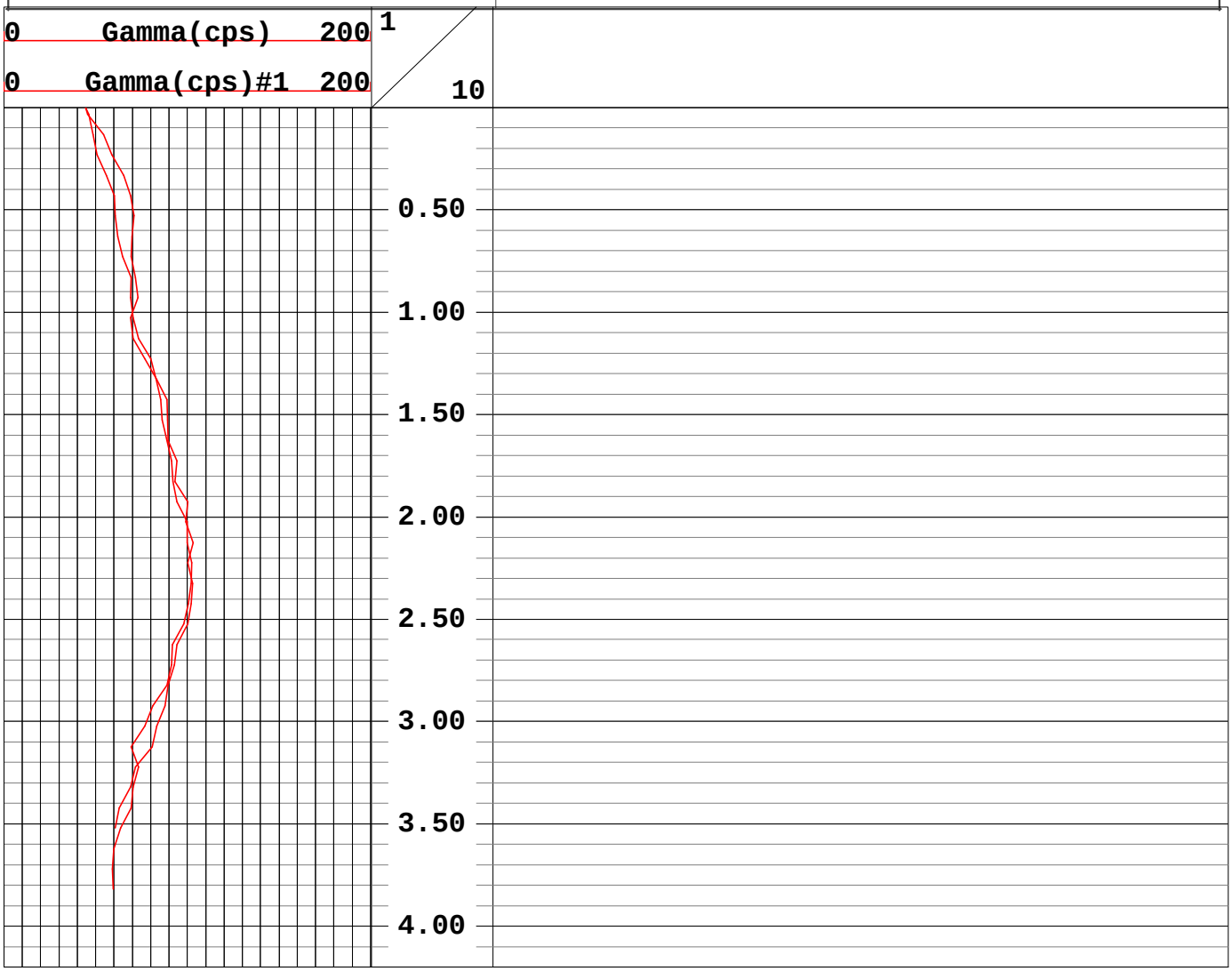
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLF3-059	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 25 July 2001	CASING RECORD SIZE None WGT. None



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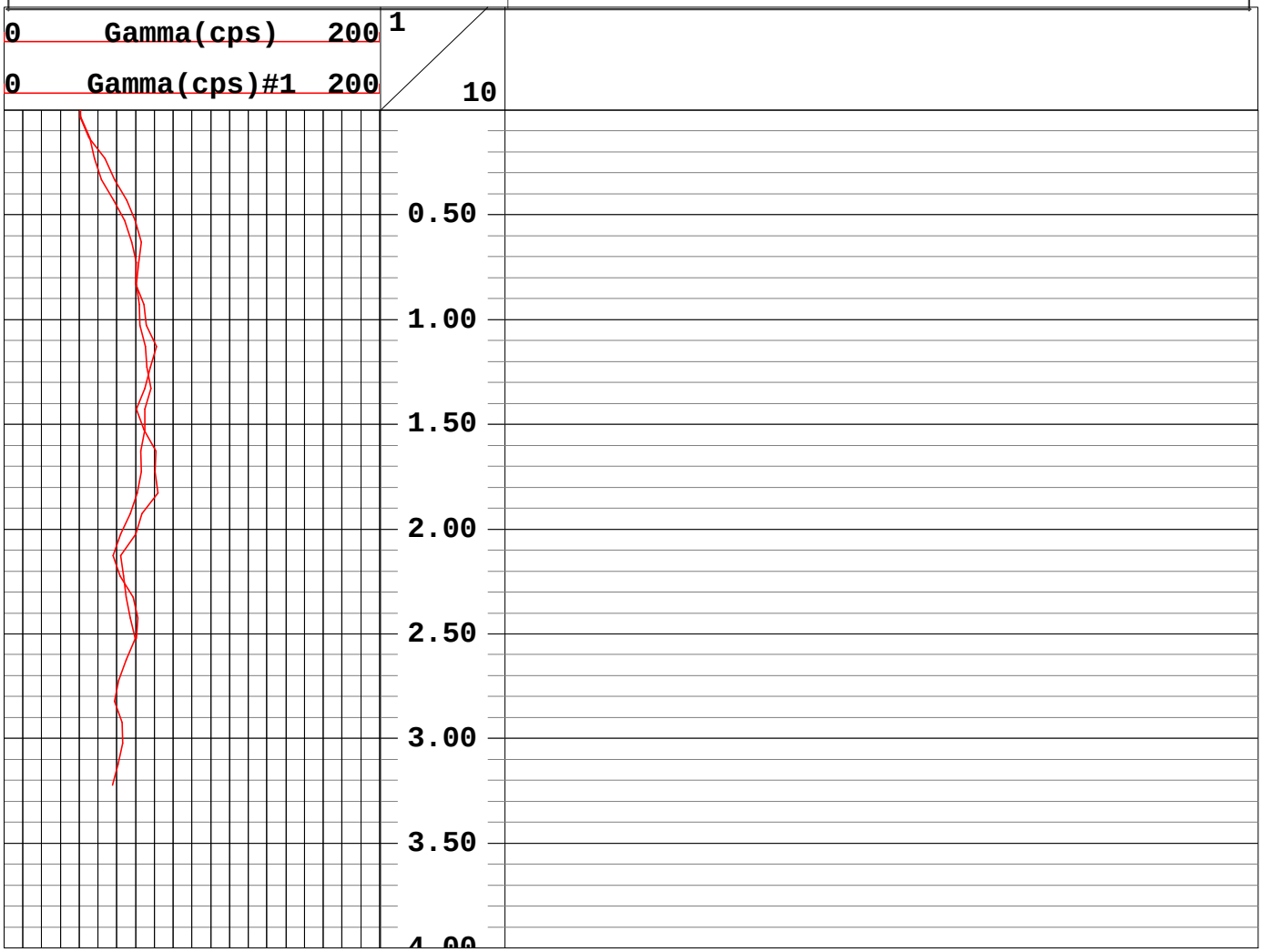
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLF3-060	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 27 July 2001	CASING RECORD SIZE 3-inch WGT. Steel



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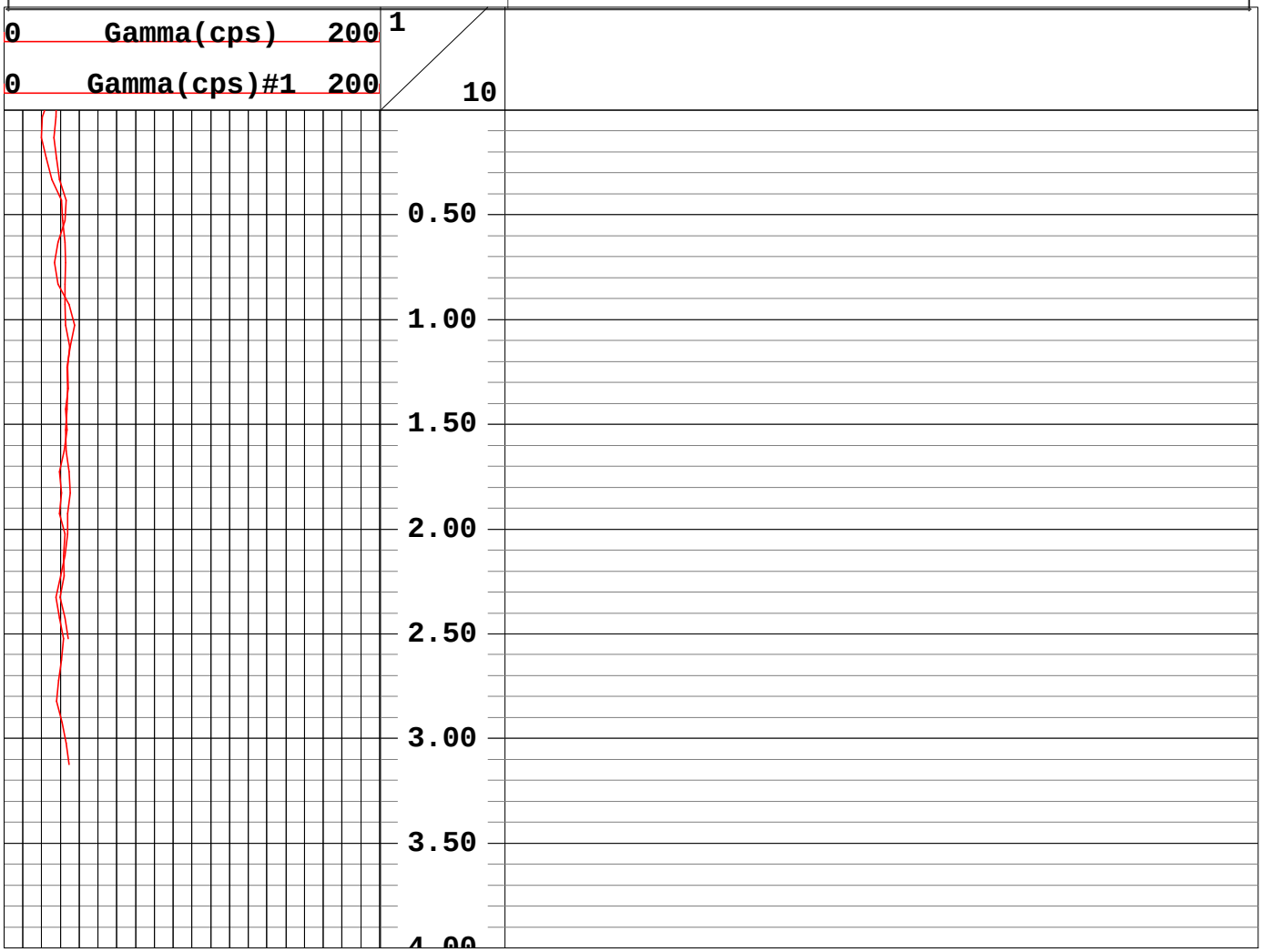
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLF3-061	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 27 July 2001	CASING RECORD SIZE None WGT. None



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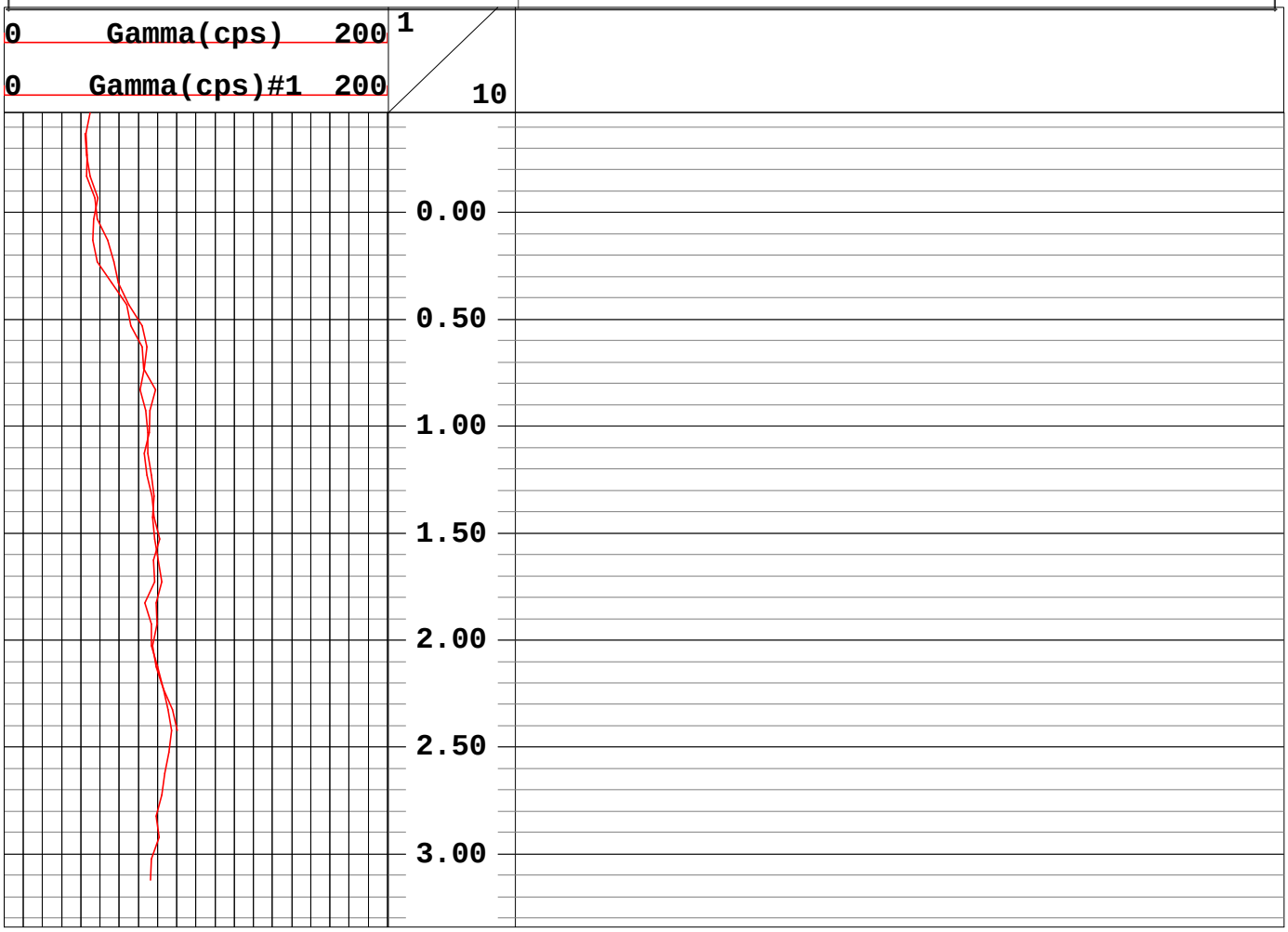
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLF3-062	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 26 July 2001	CASING RECORD SIZE None WGT. None



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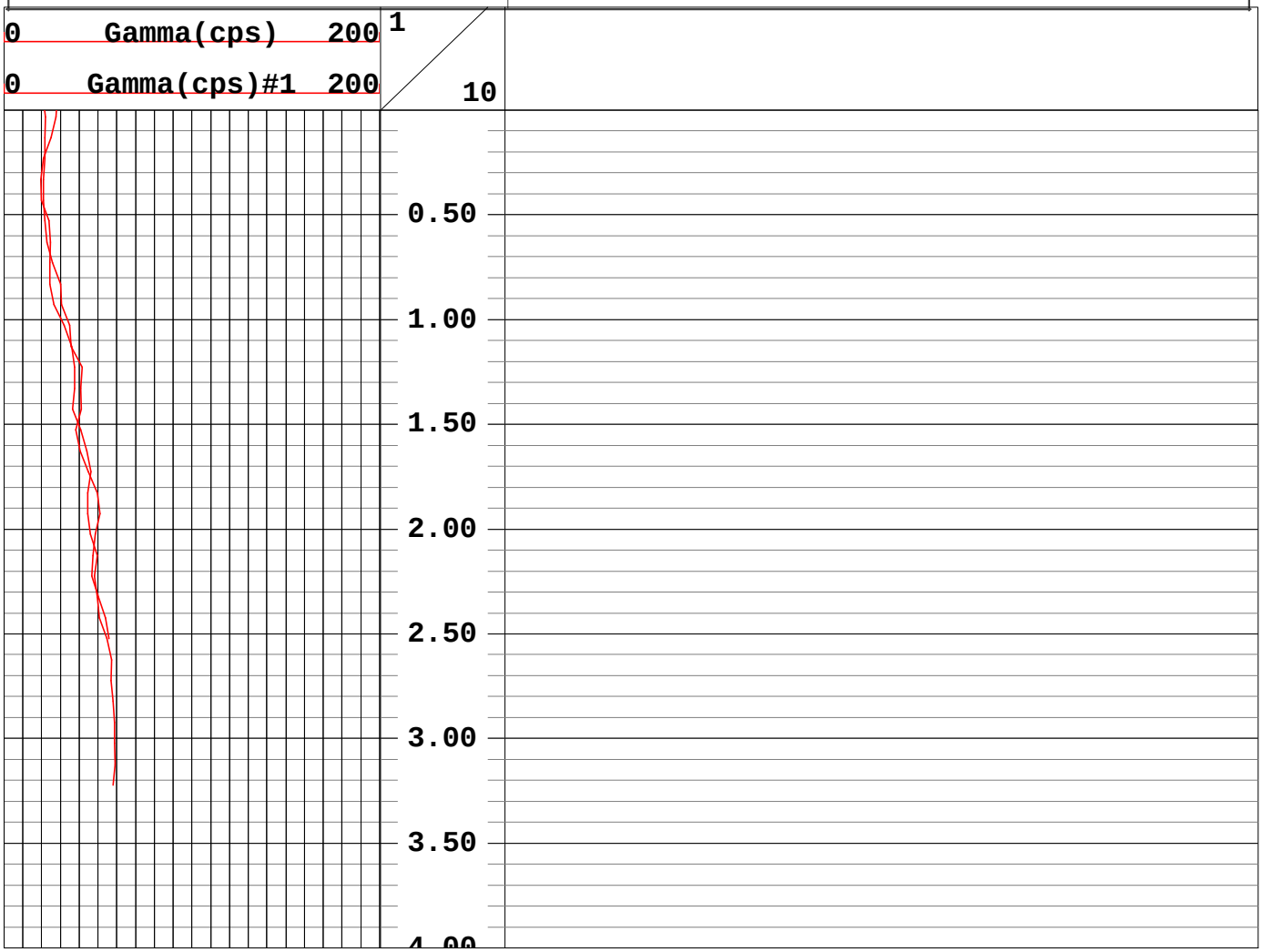
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLF3-063	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 27 July 2001	CASING RECORD SIZE 3-inch WGT. Steel



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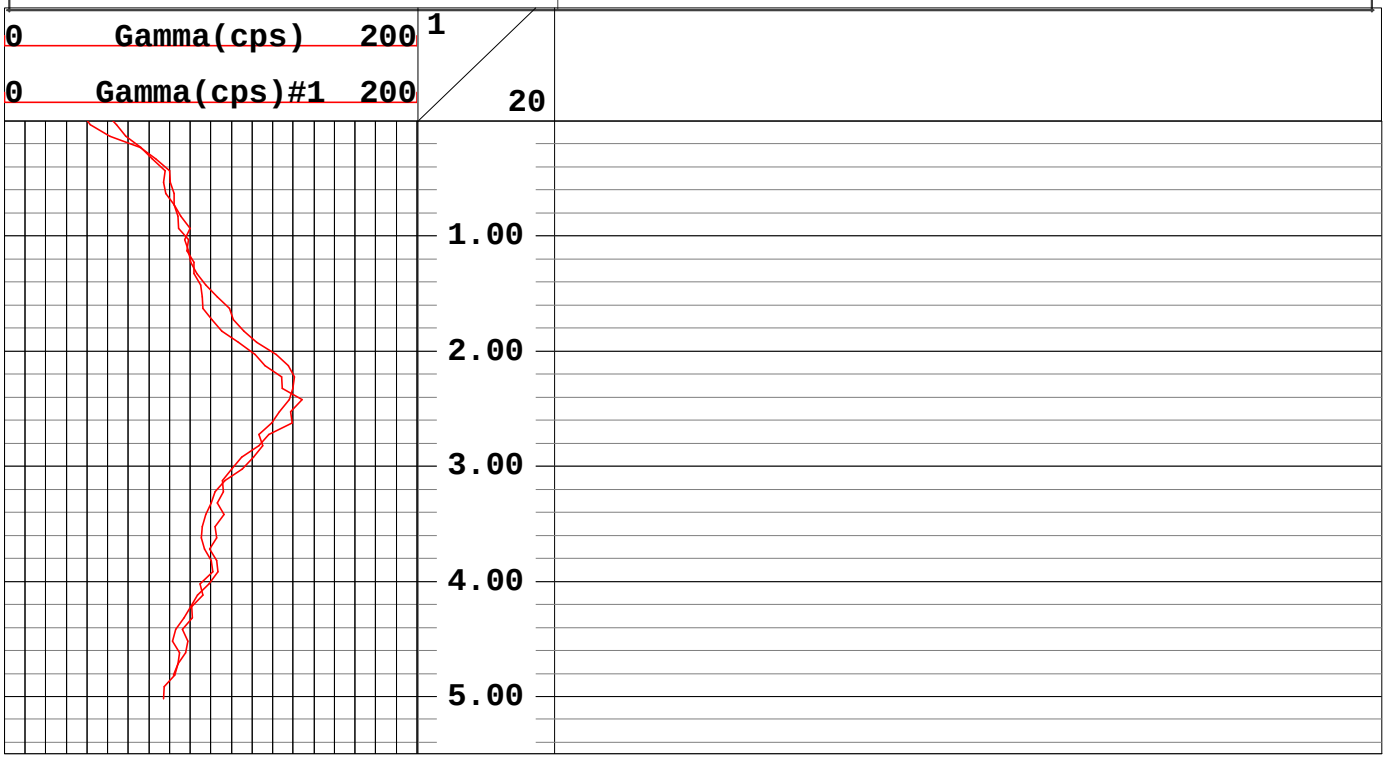
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLF3-064	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 26 July 2001	CASING RECORD SIZE None WGT. None



Landfill
Class 3 Random

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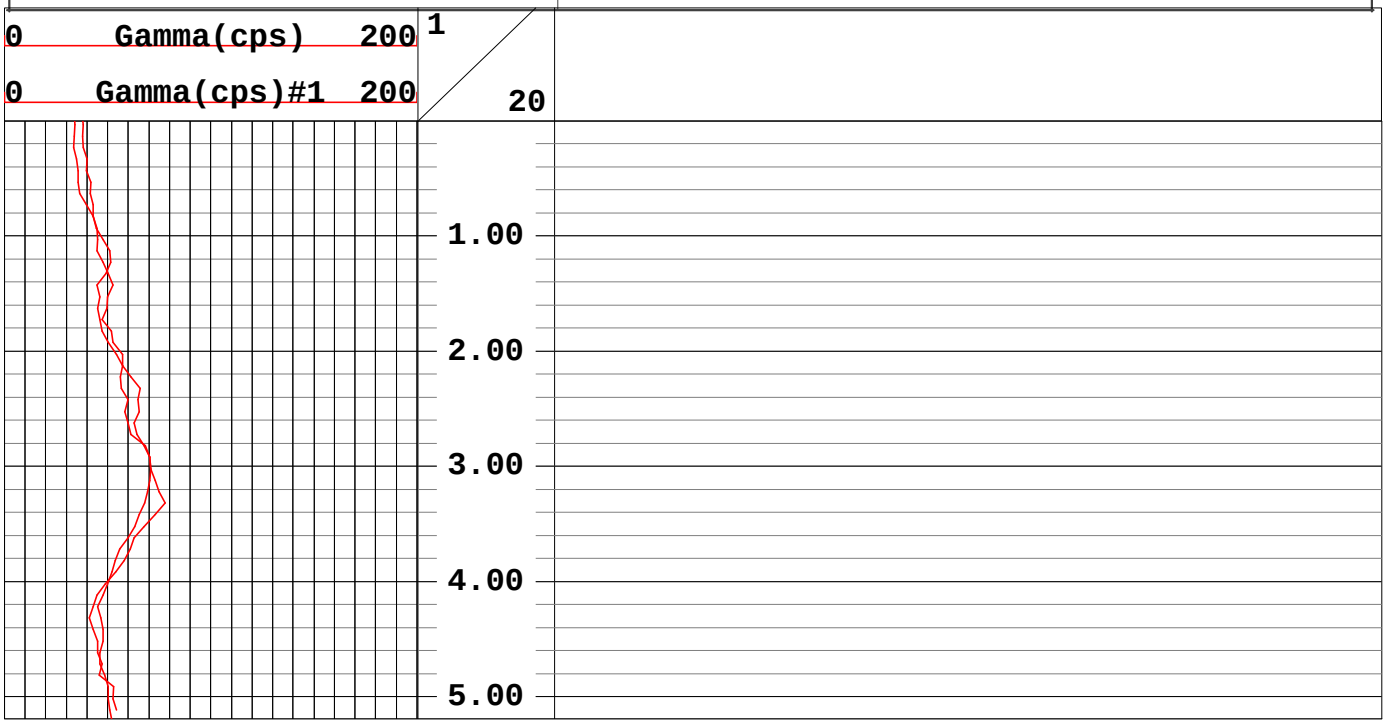
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLF3-001	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 29 July 2001	CASING RECORD SIZE None WGT. None



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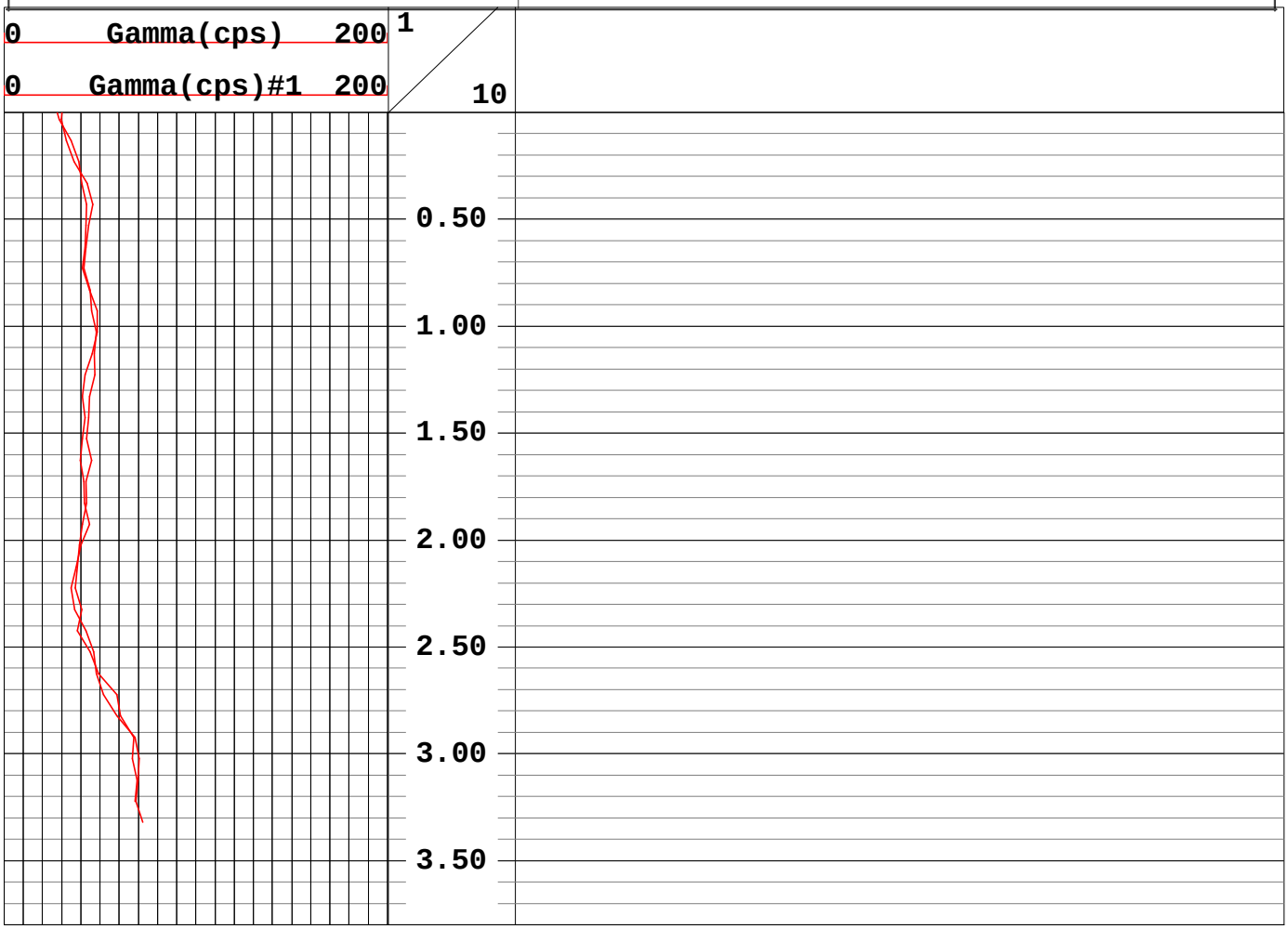
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLF3-003	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 31 July 2001	CASING RECORD SIZE 3-inch WGT. Steel



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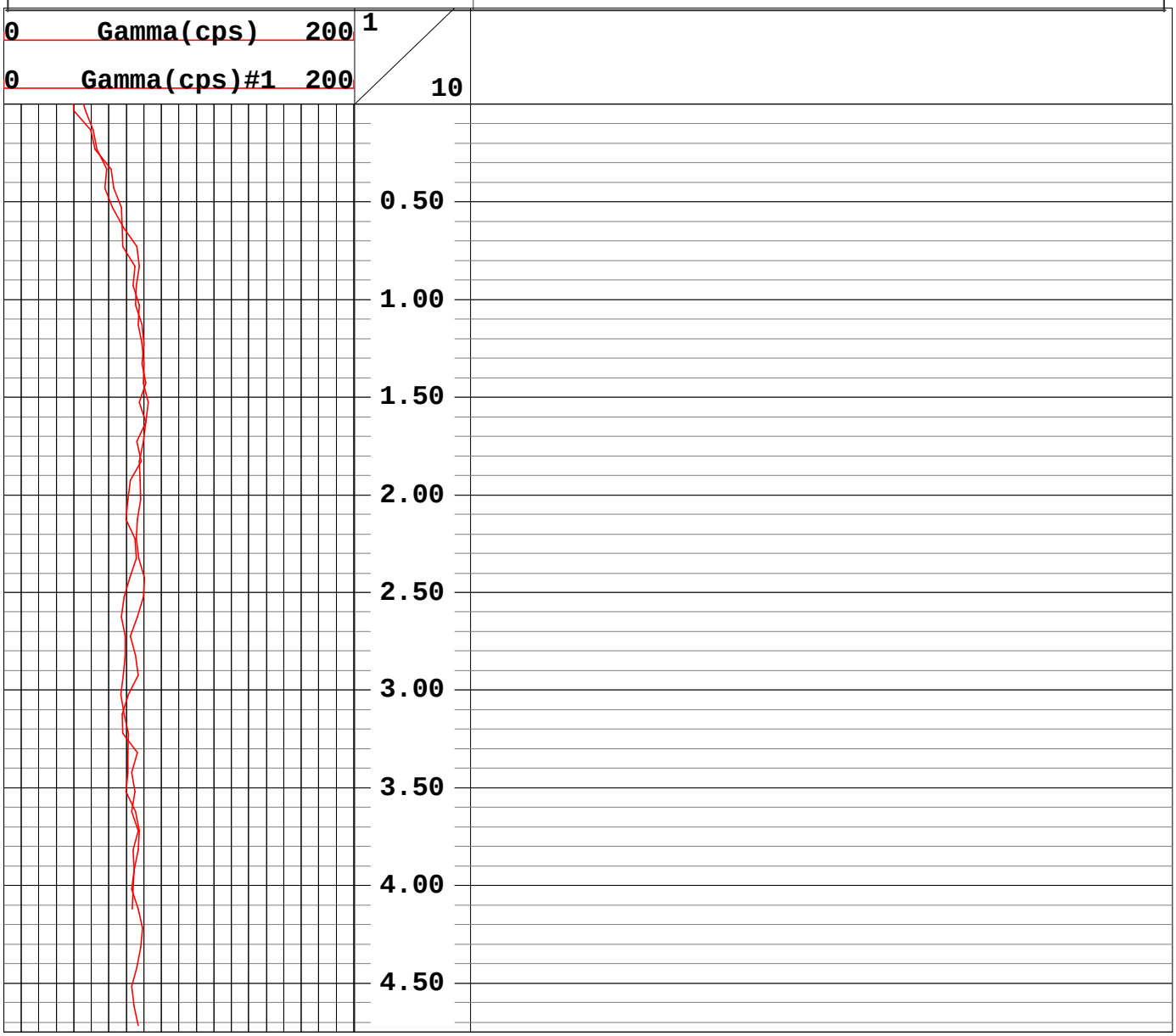
CLIENT	ACOE-Buffalo/FUSRAP	LOG MEAS. FROM	Ground Surface
WELL	TLF3-004	ELEVATION	
SITE	Tonawanda Landfill	BTM LOGGED INTERVAL	
CITY	Tonawanda	TOP LOGGED INTERVAL	
STATE	New York	TYPE FLUID IN HOLE	Air
		LEVEL	
RECORDED BY	Laura Pastor	BOREHOLE RECORD BIT	Geoprobe
WITNESSED BY			
DATE	29 July 2001	CASING RECORD	SIZE None WGT. None



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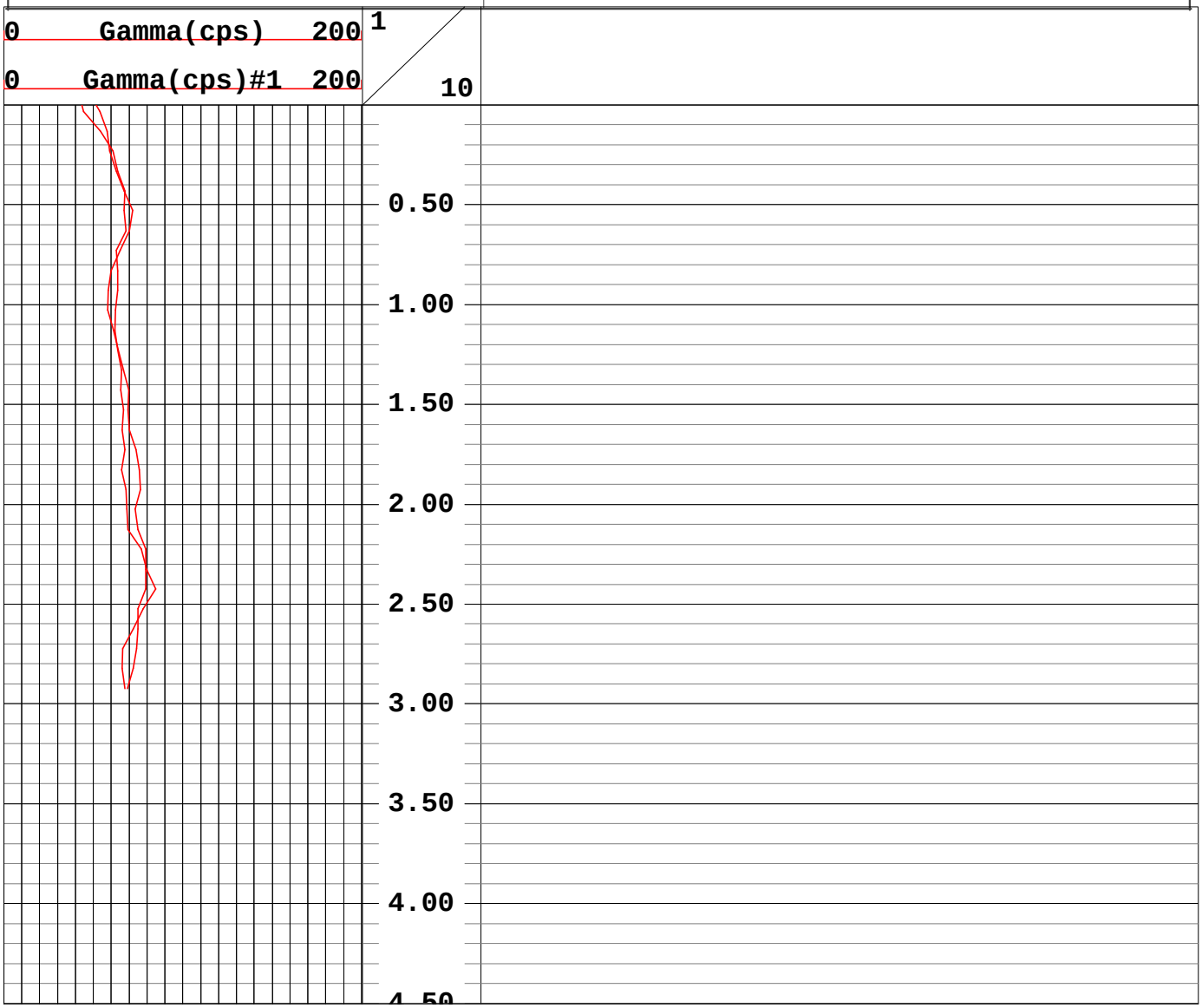
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLF3-005	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 29 July 2001	CASING RECORD SIZE None WGT. None



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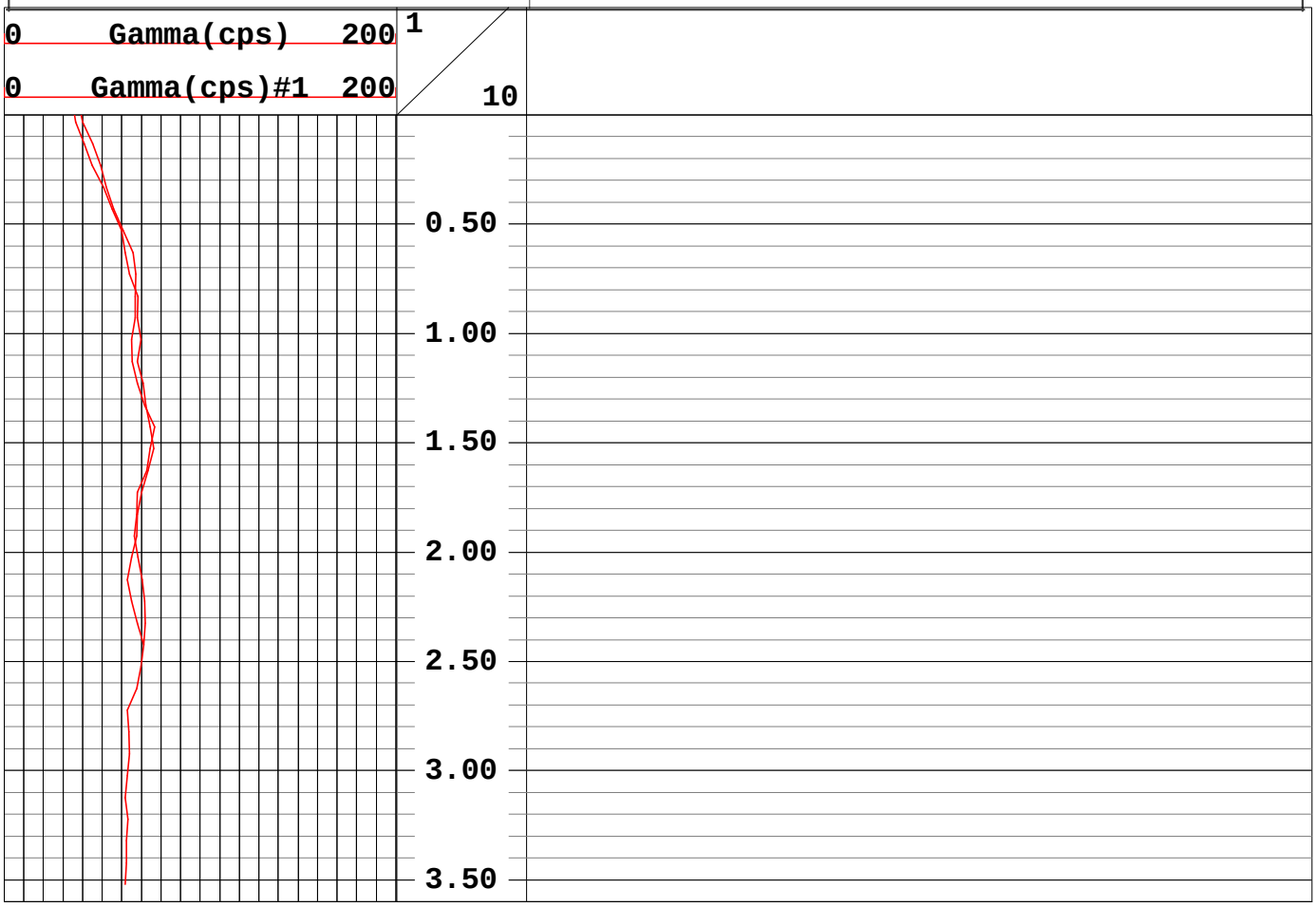
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLF3-006	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 29 July 2001	CASING RECORD SIZE None WGT. None



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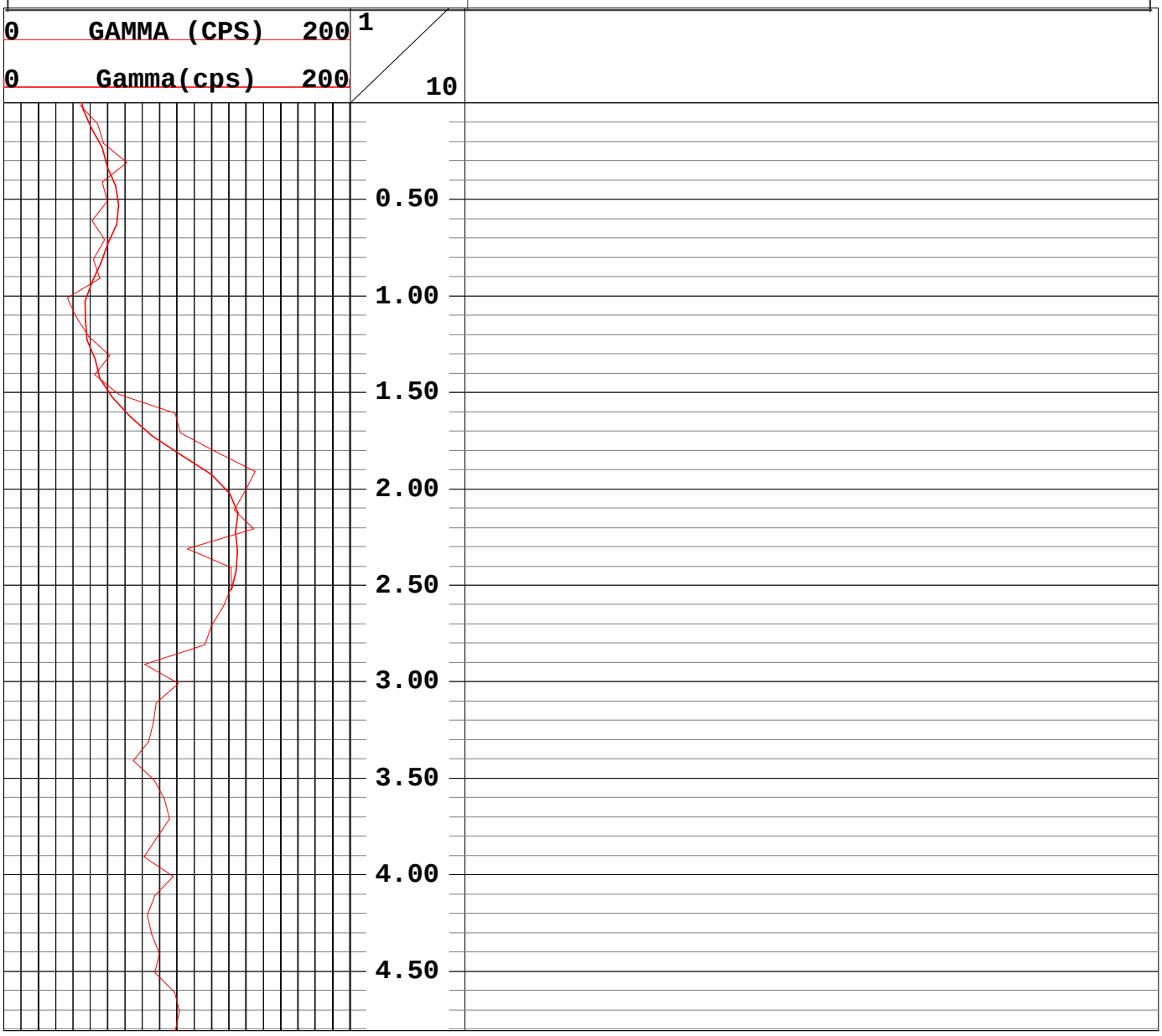
CLIENT	ACOE-Buffalo/FUSRAP	LOG MEAS. FROM	Ground Surface
WELL	TLF3-007	ELEVATION	
SITE	Tonawanda Landfill	BTM LOGGED INTERVAL	
CITY	Tonawanda	TOP LOGGED INTERVAL	
STATE	New York	TYPE FLUID IN HOLE	Air
		LEVEL	
RECORDED BY	Rick Hoover	BOREHOLE RECORD BIT	Geoprobe
WITNESSED BY	Laura Pastor		
DATE	23 July 2001	CASING RECORD	SIZE None WGT. None



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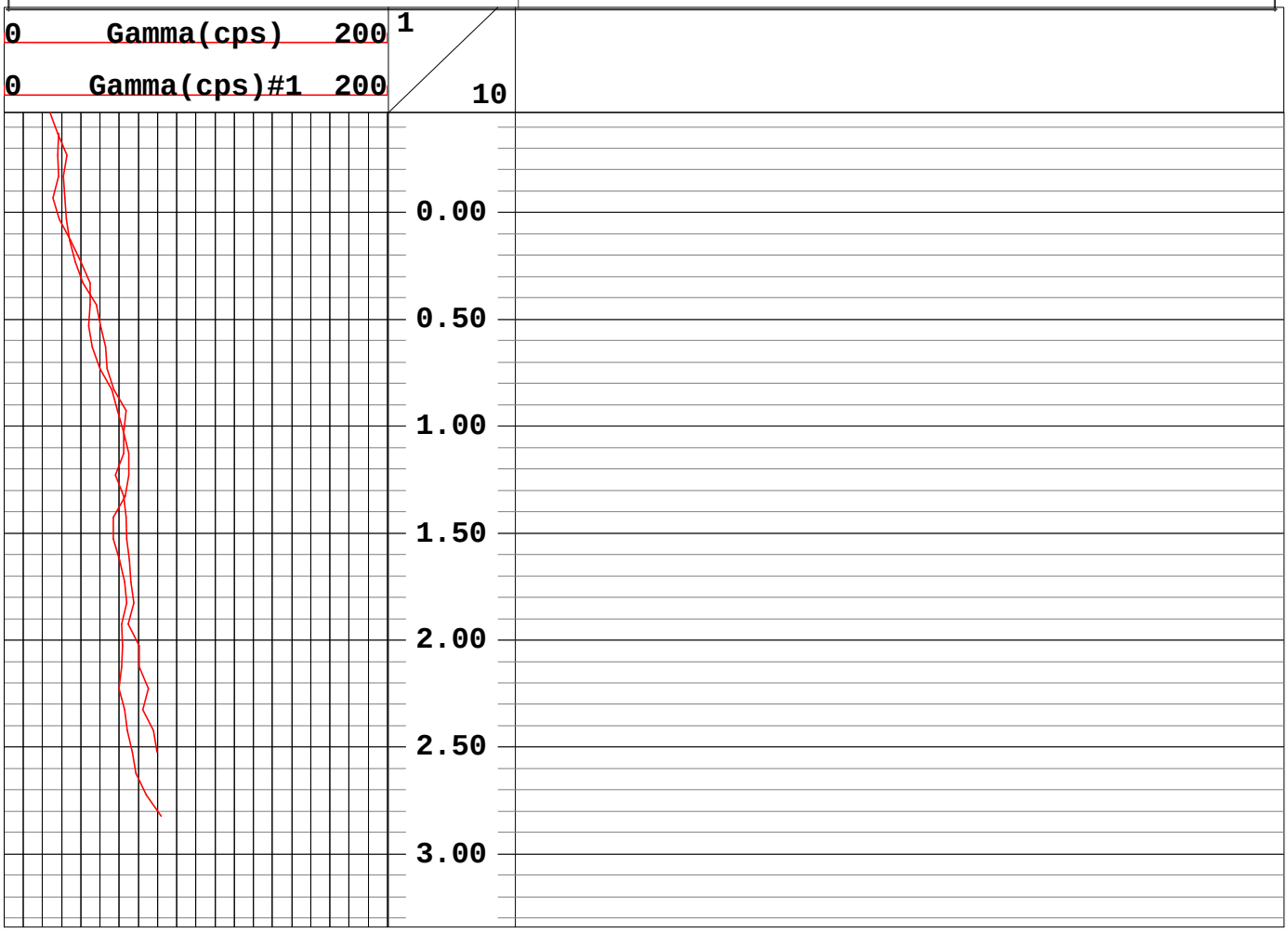
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLF3-008	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Rick Hoover	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY Laura Pastor	
DATE 23 July 2001	CASING RECORD SIZE None WGT. None



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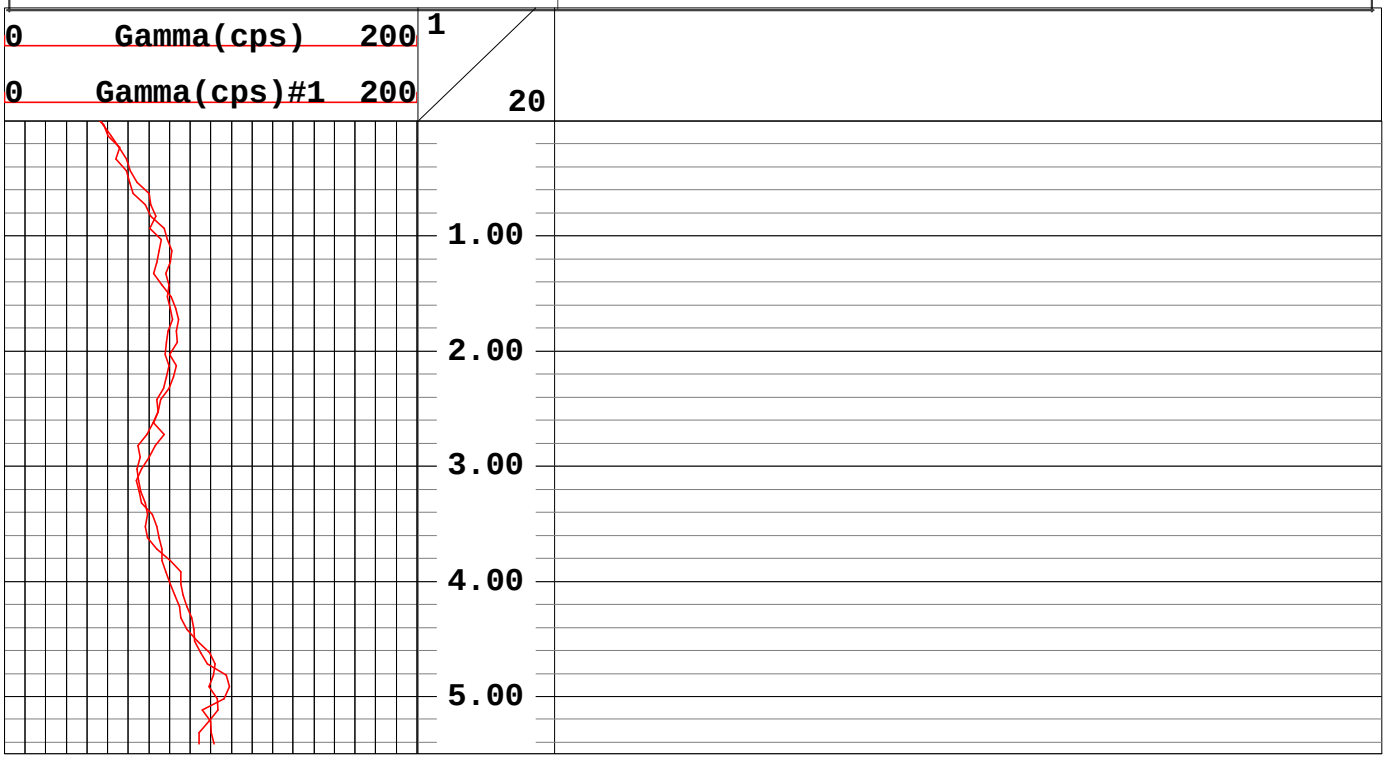
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLF3-012	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Rick Hoover	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY Laura Pastor	
DATE 23 July 2001	CASING RECORD SIZE None WGT. None



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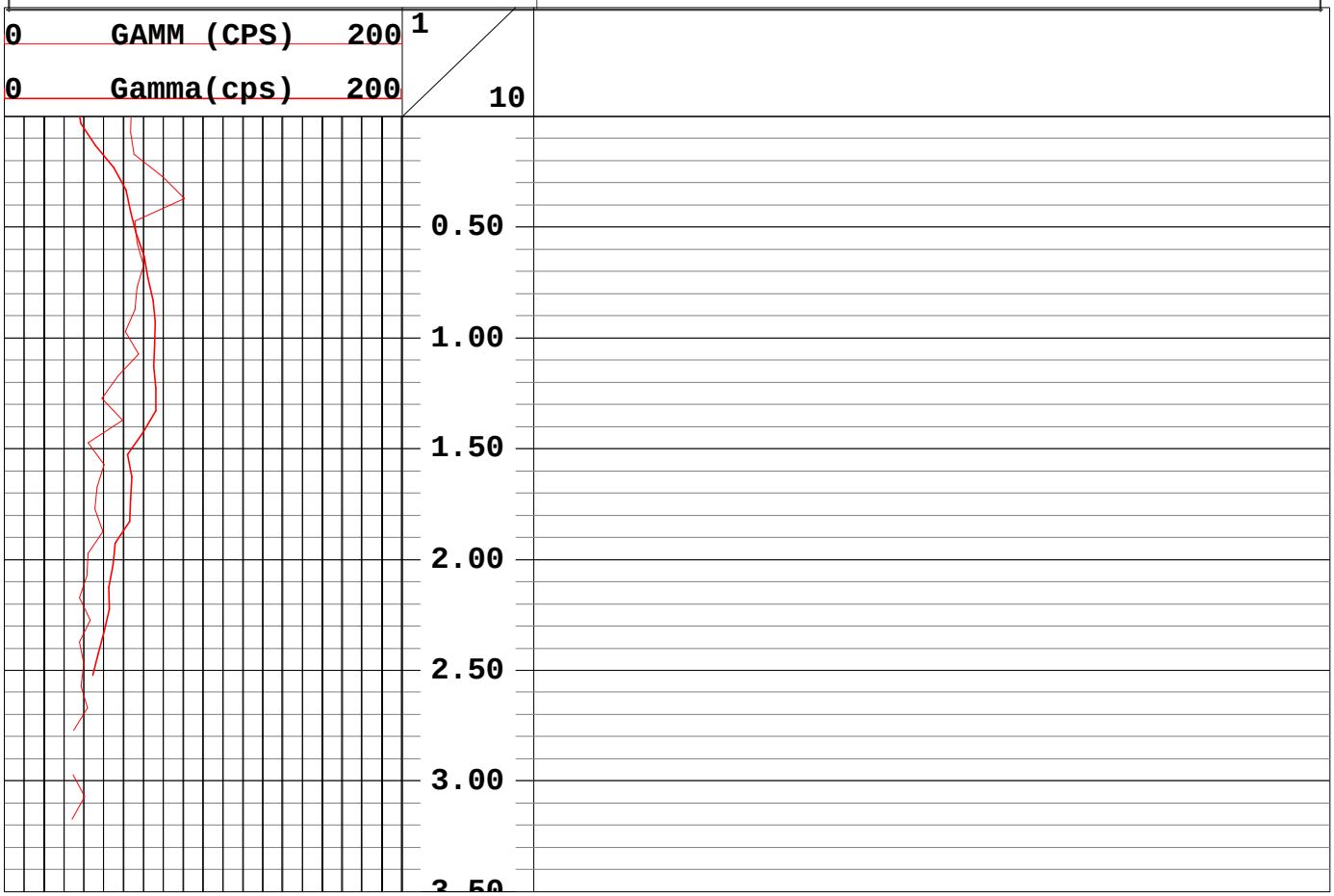
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLF3-013	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 26 July 2001	CASING RECORD SIZE None WGT. None



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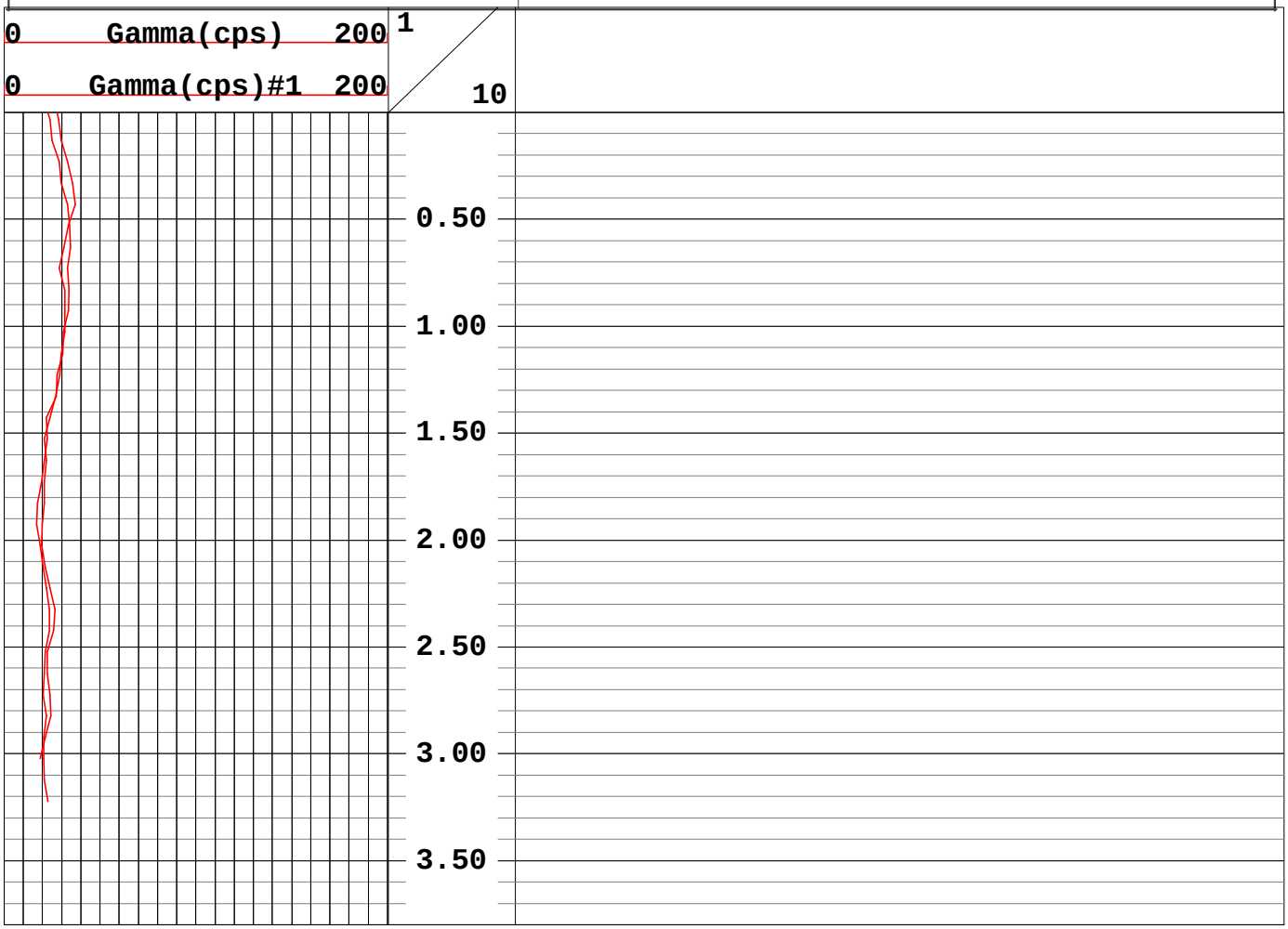
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLF3-015	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 31 July 2001	CASING RECORD SIZE 3-inch WGT. Steel



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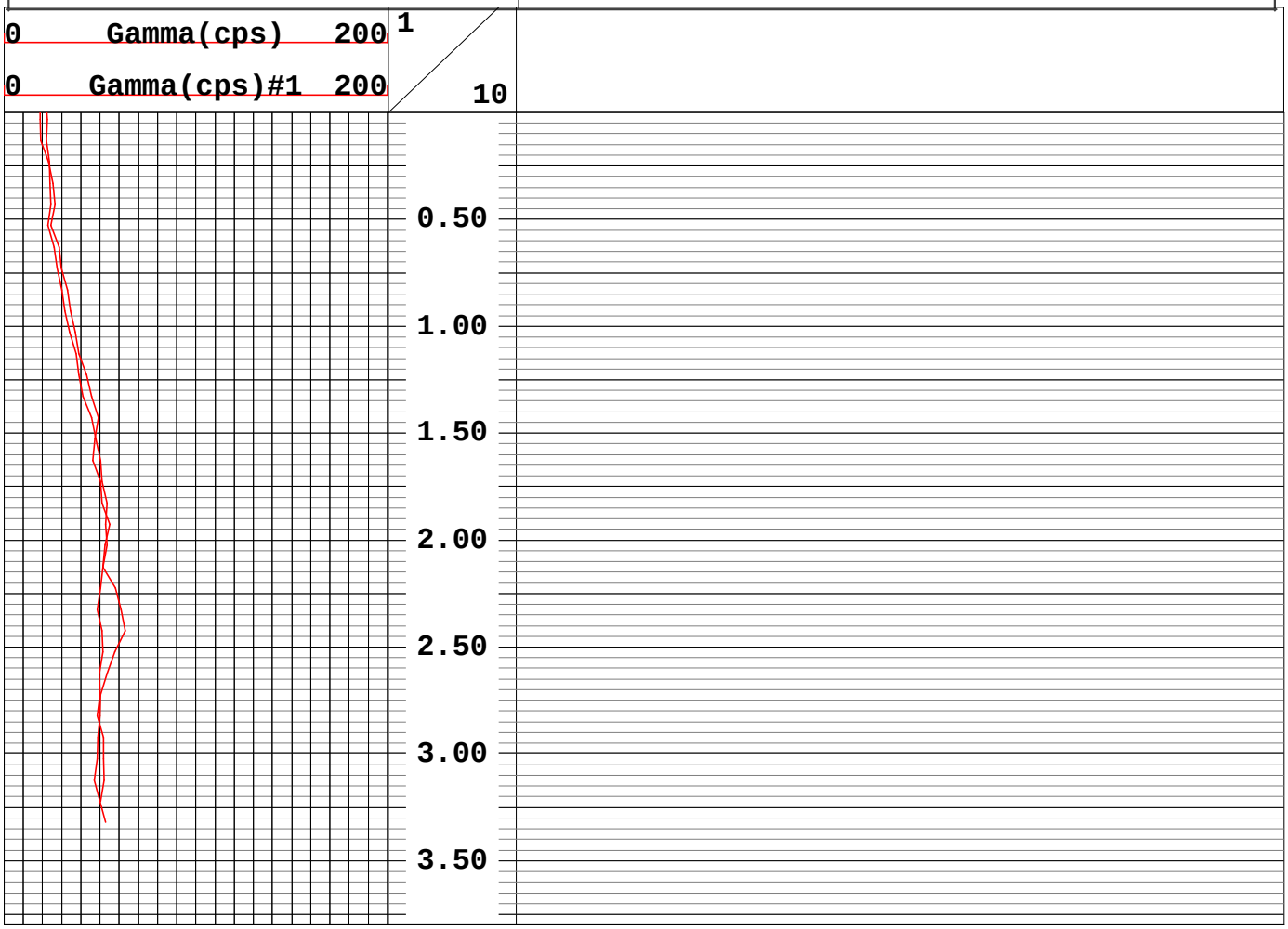
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLF3-016	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 31 July 2001	CASING RECORD SIZE 3-inch WGT. Steel



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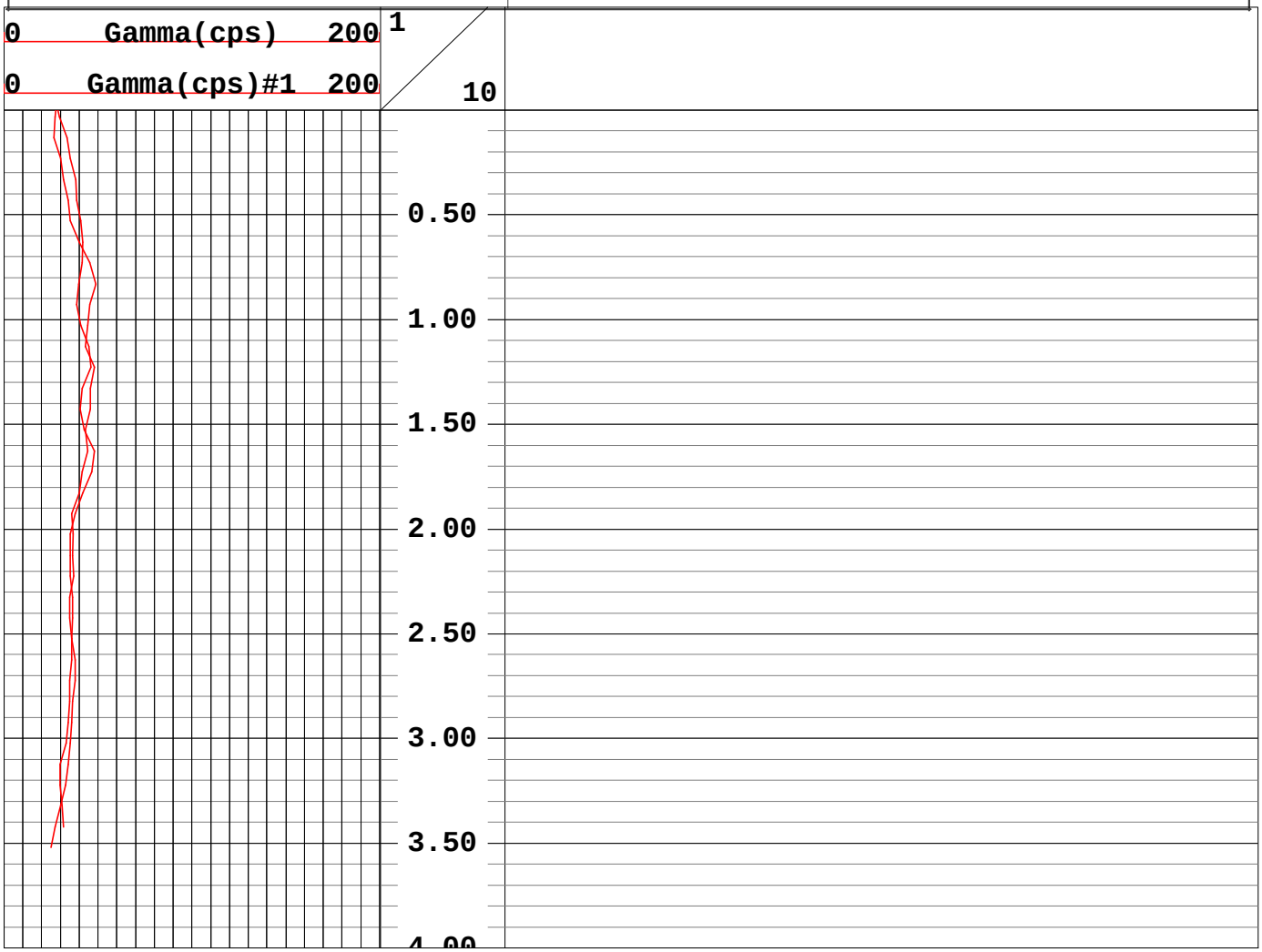
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLF3-017	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 27 July 2001	CASING RECORD SIZE 3-inch WGT. Steel



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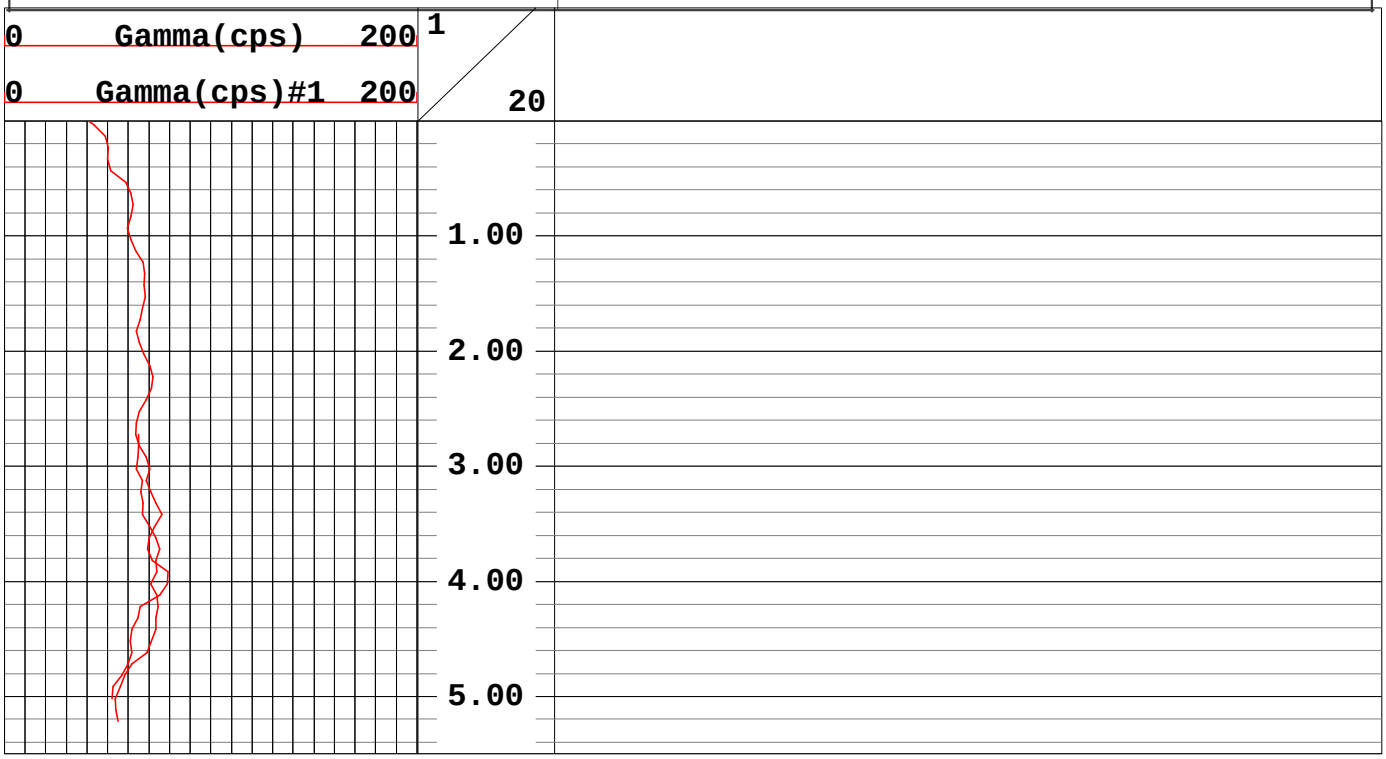
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLF3-019	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 29 July 2001	CASING RECORD SIZE None WGT. None



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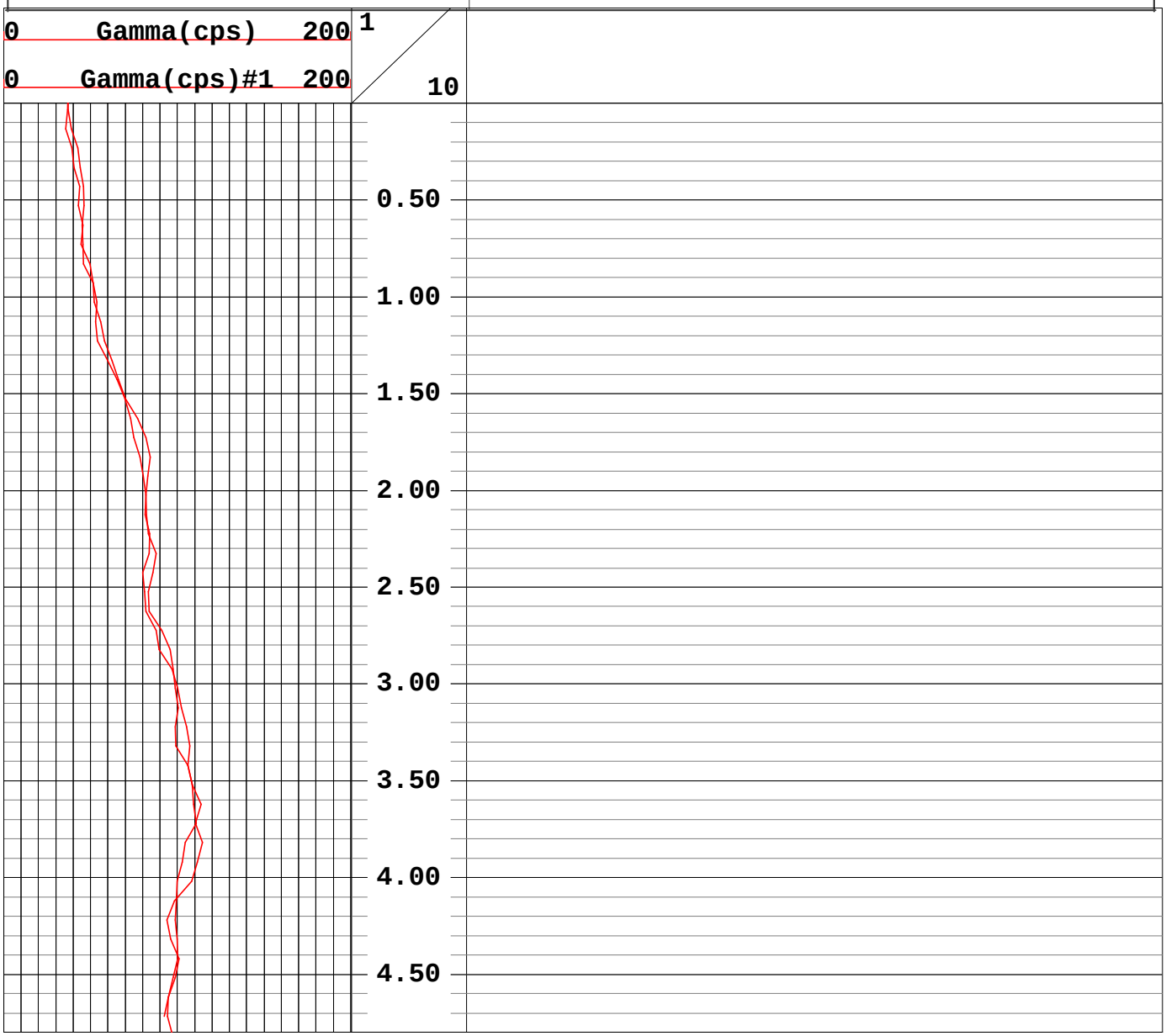
CLIENT	ACOE-Buffalo/FUSRAP	LOG MEAS. FROM	Ground Surface
WELL	TLF3-021	ELEVATION	
SITE	Tonawanda Landfill	BTM LOGGED INTERVAL	
CITY	Tonawanda	TOP LOGGED INTERVAL	
STATE	New York	TYPE FLUID IN HOLE	Air
		LEVEL	
RECORDED BY	Rick Hoover	BOREHOLE RECORD BIT	Geoprobe
WITNESSED BY	Laura Pastor		
DATE	23 July 2001	CASING RECORD	SIZE None WGT. None



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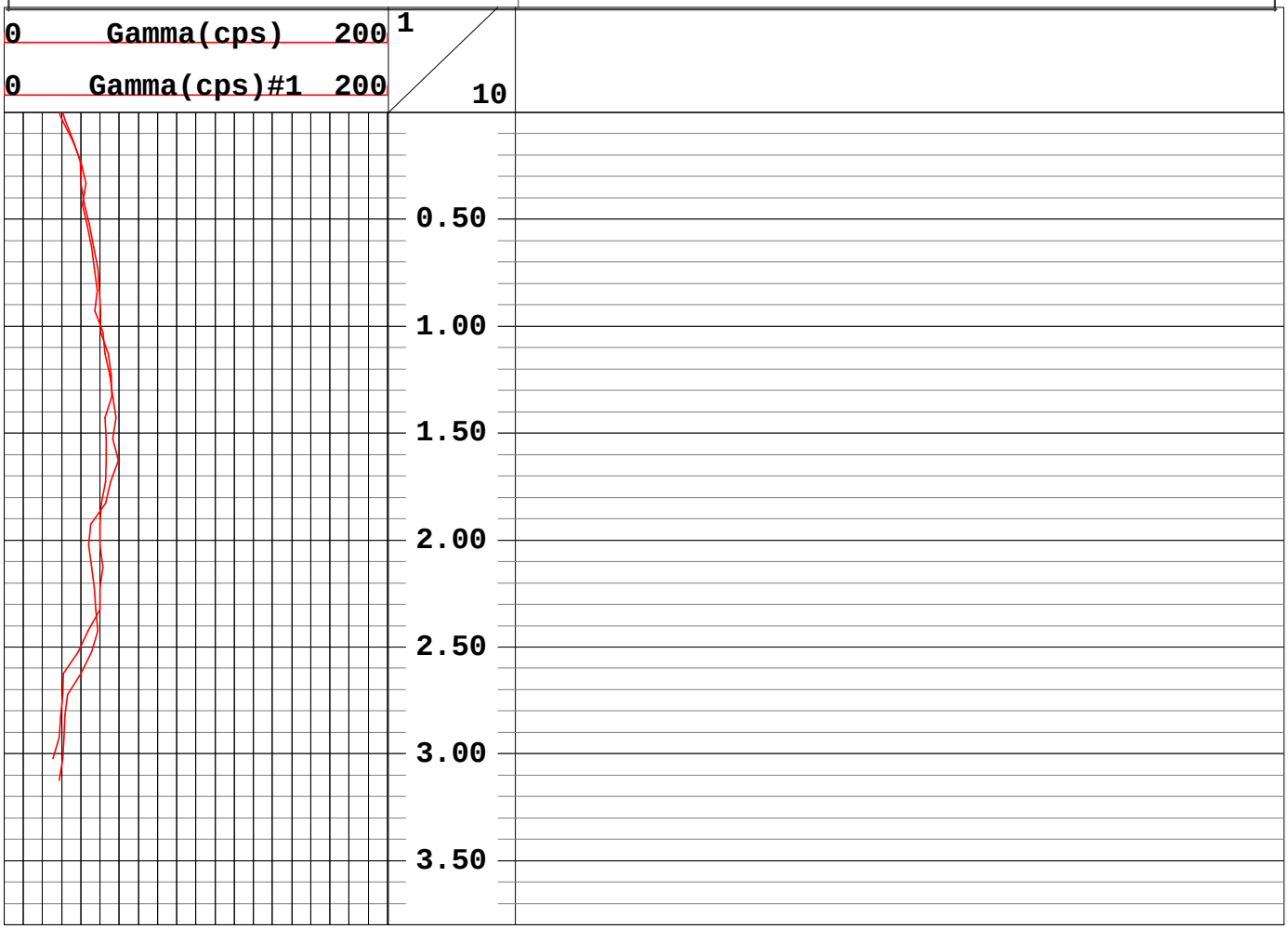
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLF3-022	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 31 July 2001	CASING RECORD SIZE 3-inch WGT. Steel



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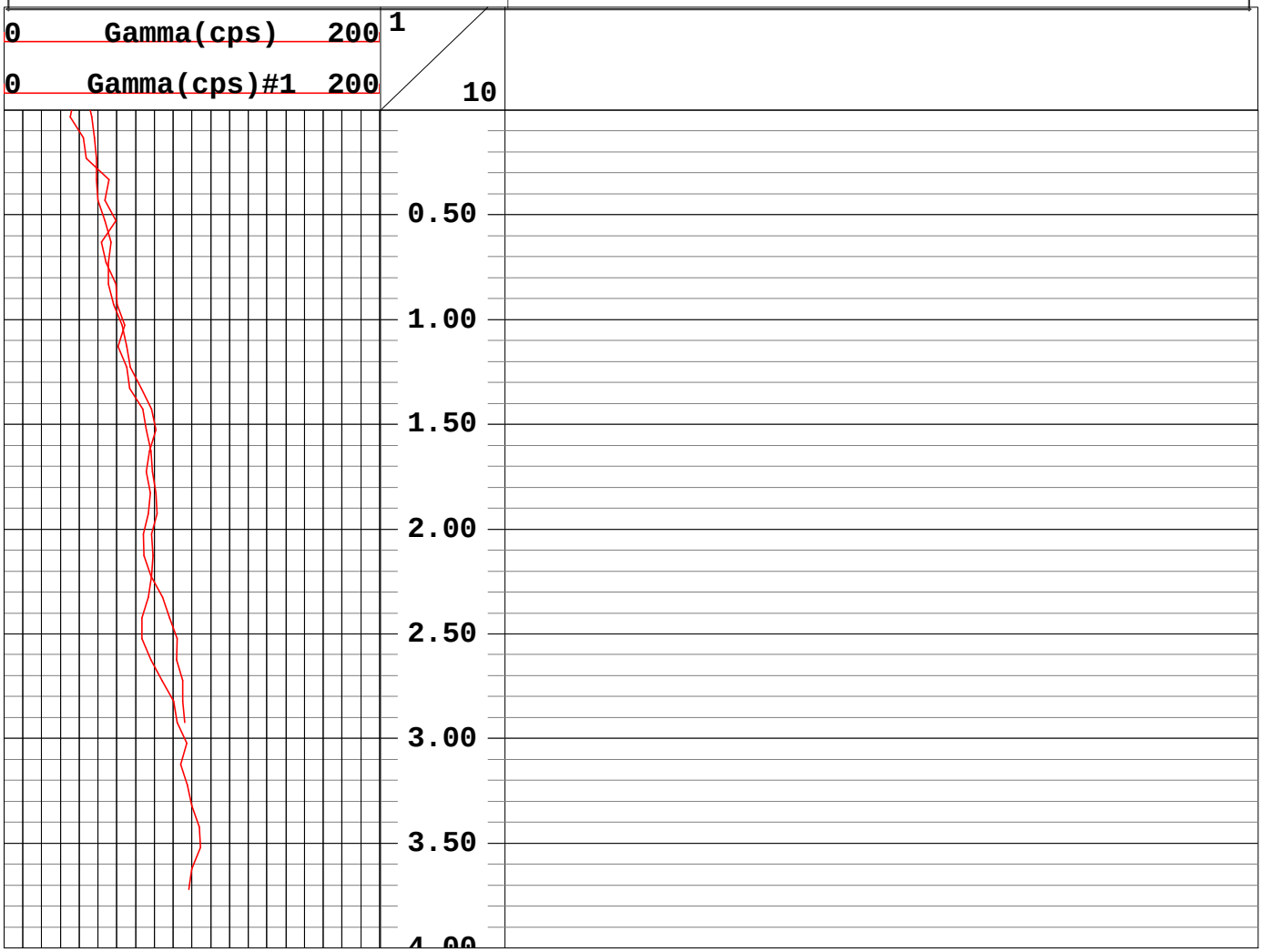
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLF3-023	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Rick Hoover	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY Laura Pastor	
DATE 23 July 2001	CASING RECORD SIZE None WGT. None



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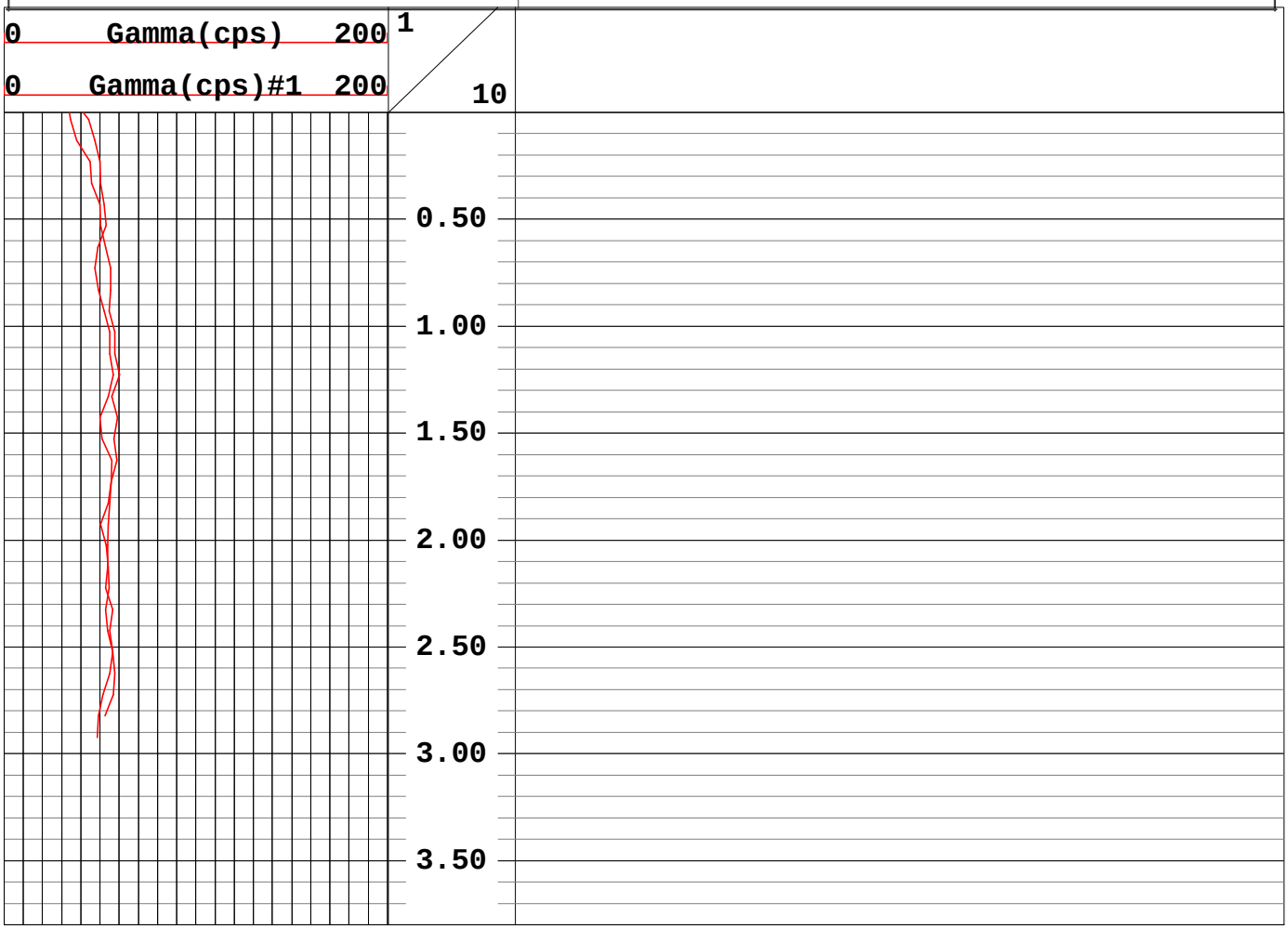
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLF3-024	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 31 July 2001	CASING RECORD SIZE 3-inch WGT. Steel



Landfill
Class 1 Area B

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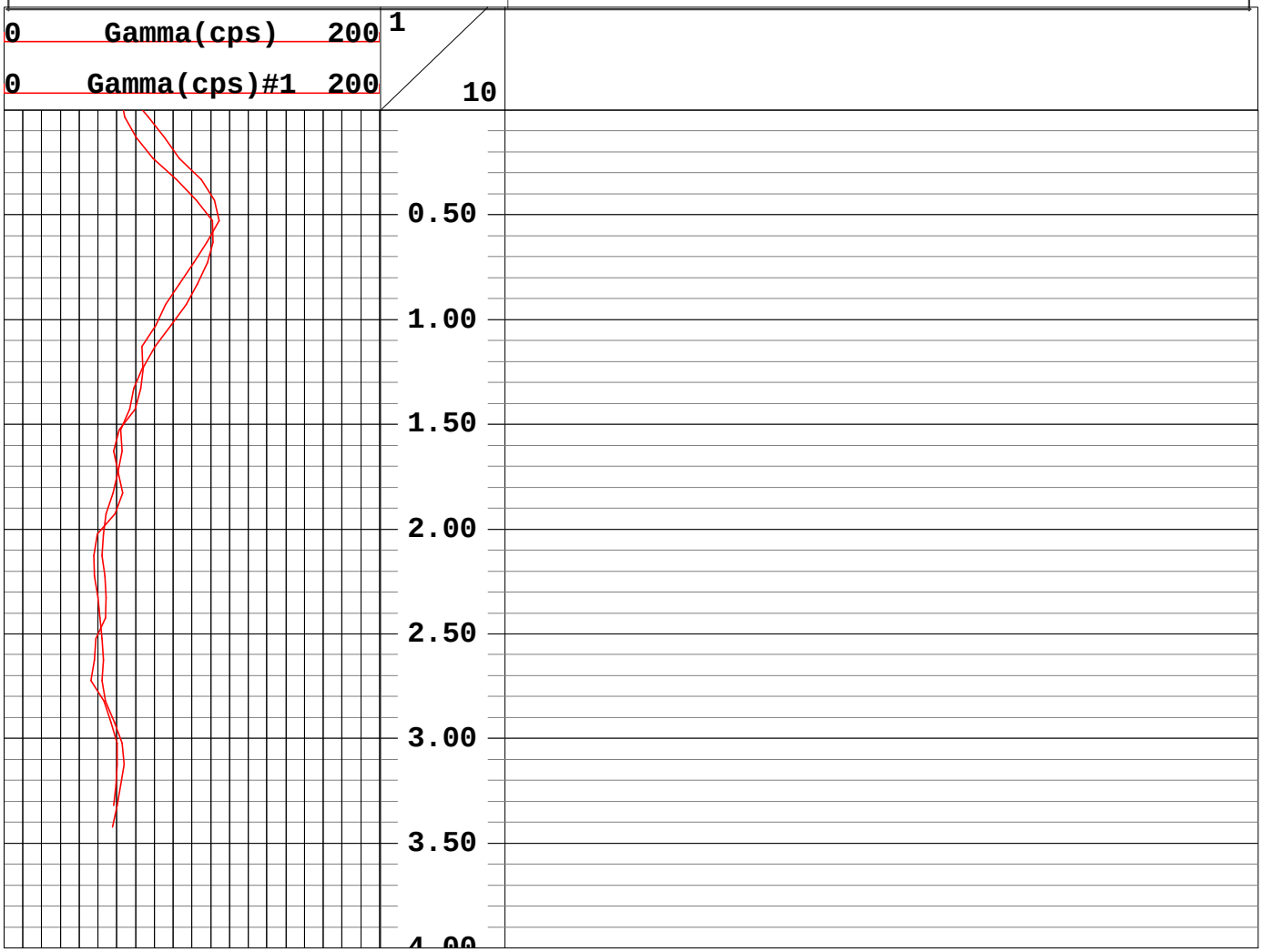
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFB1A-001	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 27 July 2001	CASING RECORD SIZE 3-inch WGT. Steel



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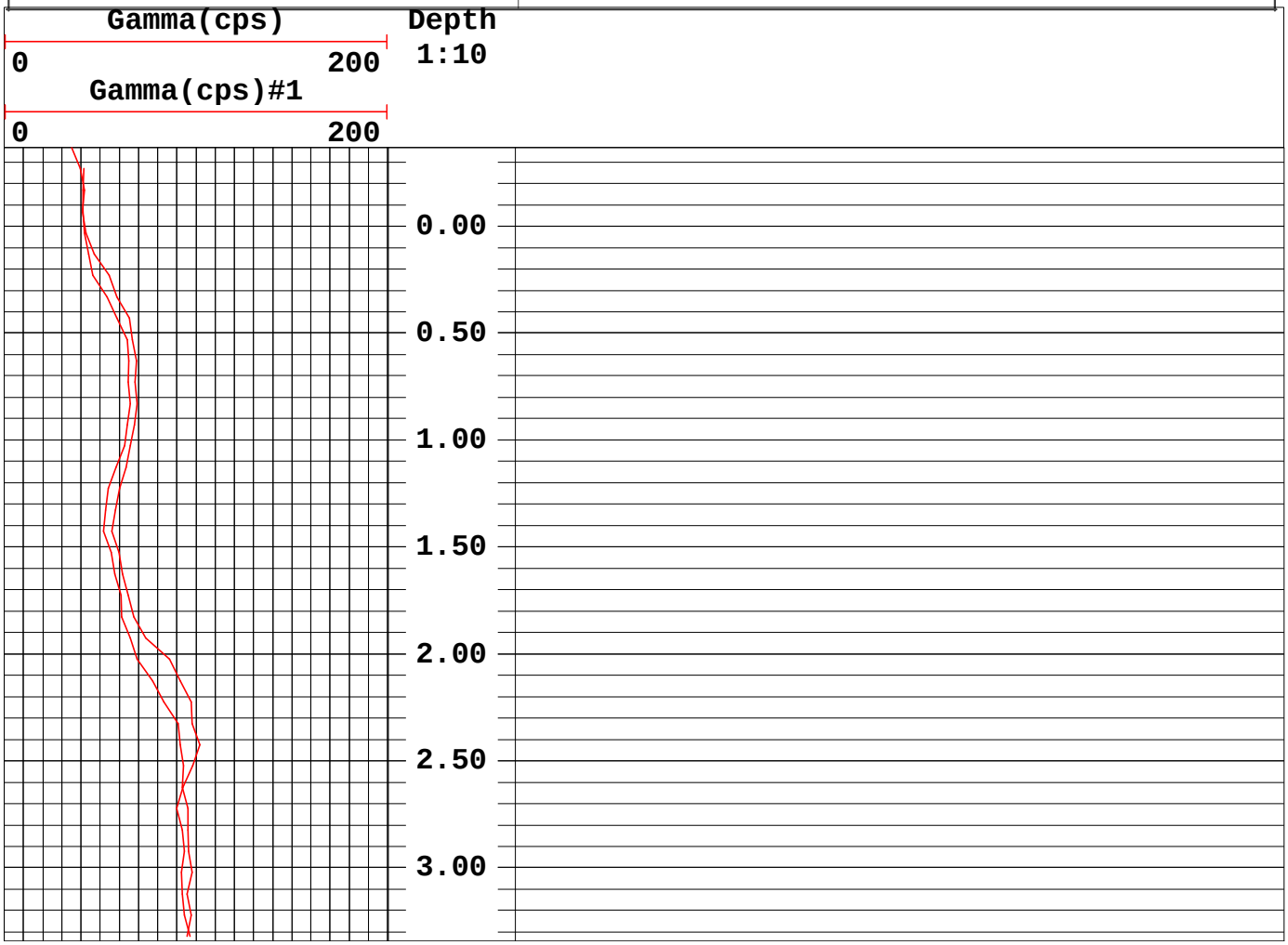
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFB1A-005	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 25 July 2001	CASING RECORD SIZE None WGT. None



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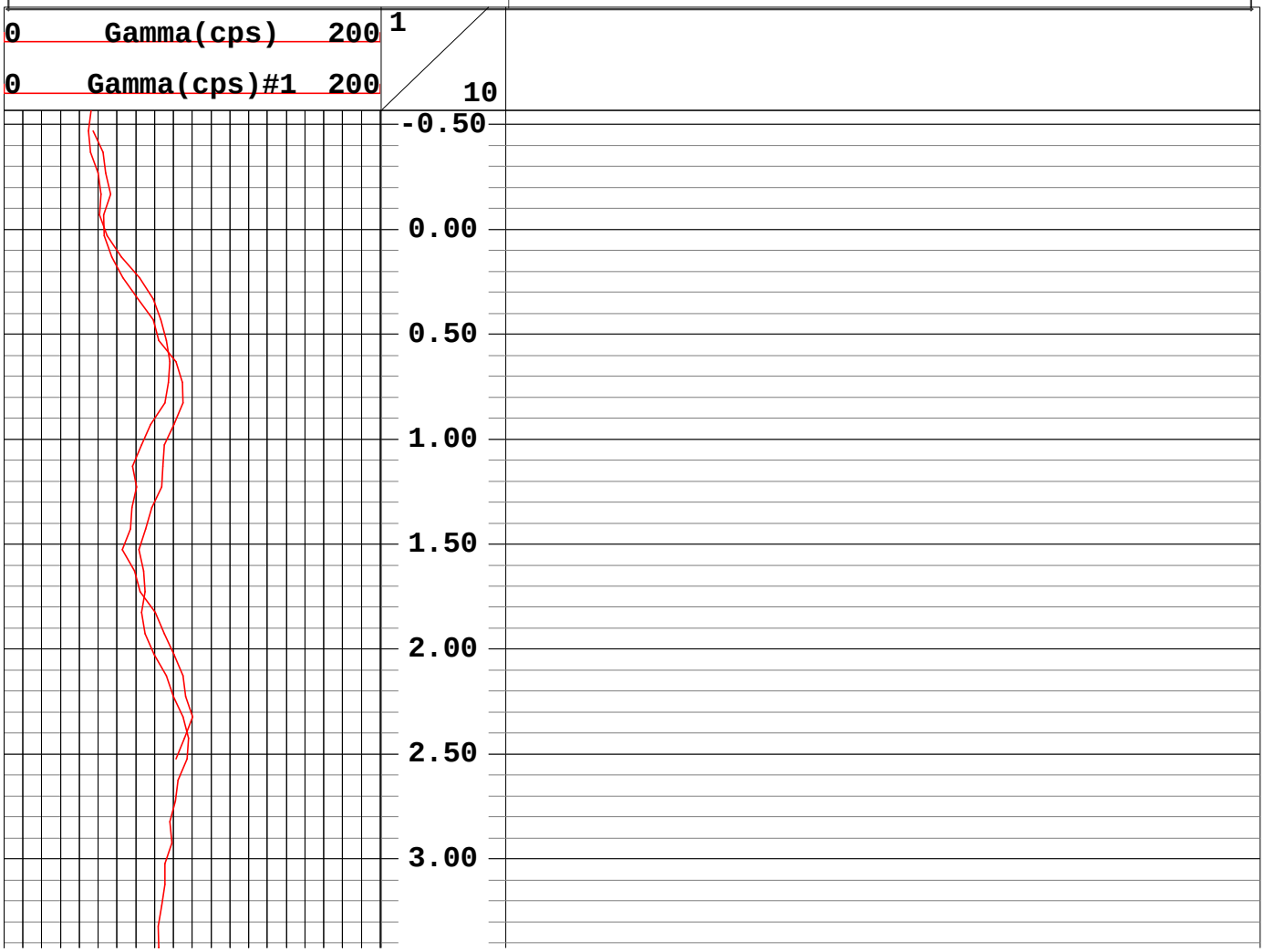
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFB1B-001	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 25 July 2001	CASING RECORD SIZE None WGT. None



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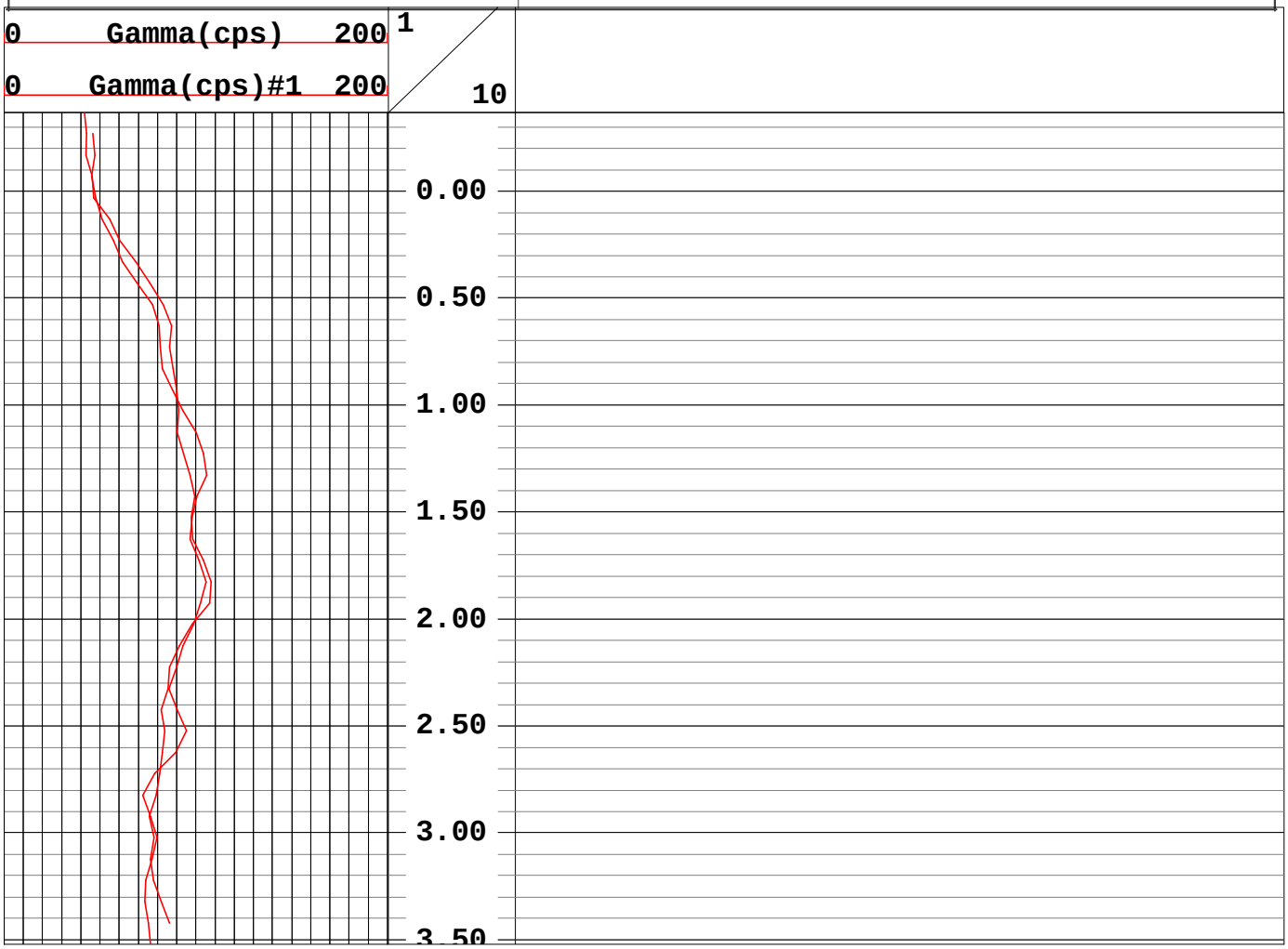
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFB1B-005	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 25 July 2001	CASING RECORD SIZE None WGT. None



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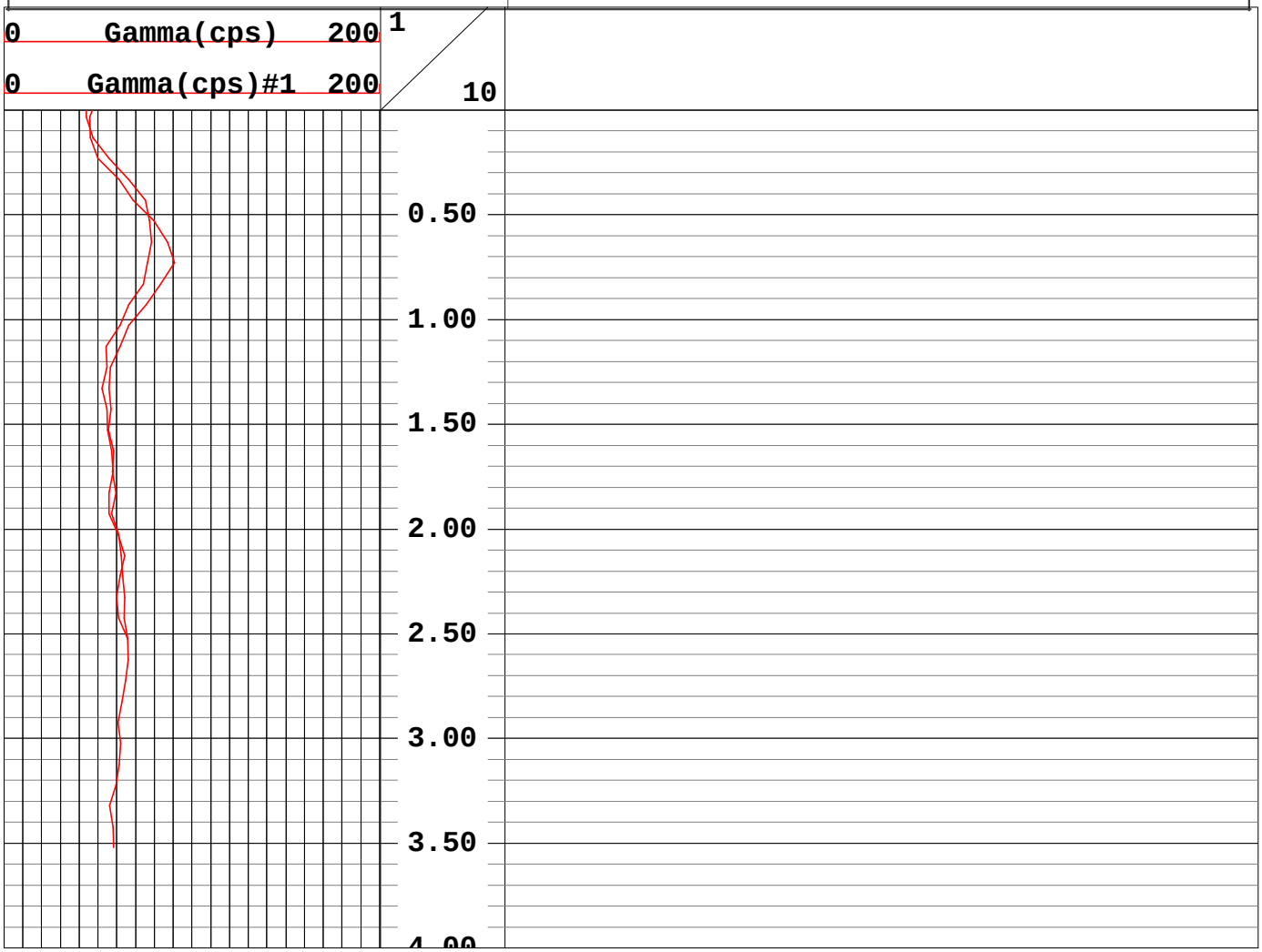
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFB1B-009	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 28 July 2001	CASING RECORD SIZE 3-inch WGT. Steel



Landfill
Reference Area

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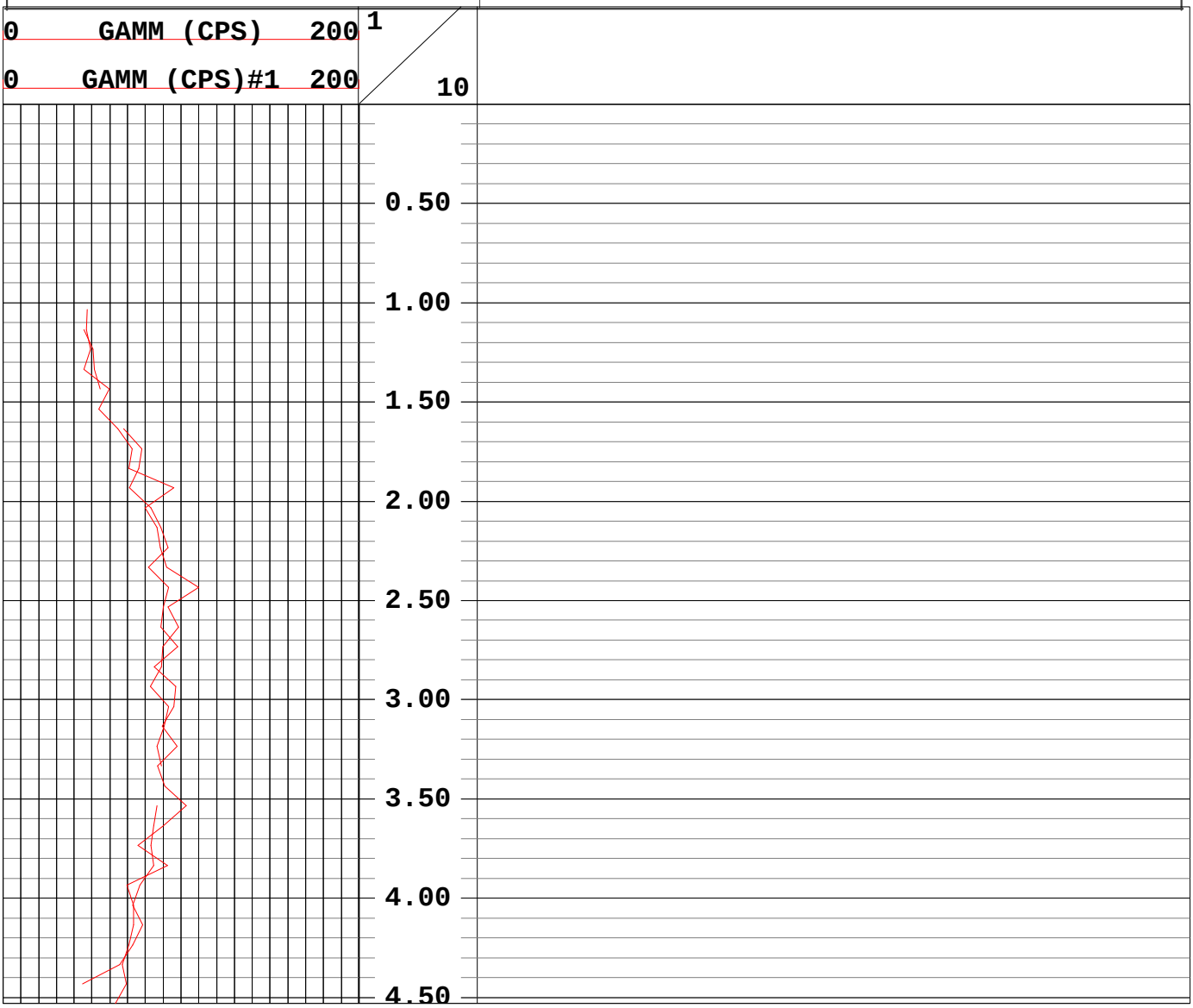
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFR3-001	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Bruce Wappman	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 16 July 2001	CASING RECORD SIZE None WGT. None



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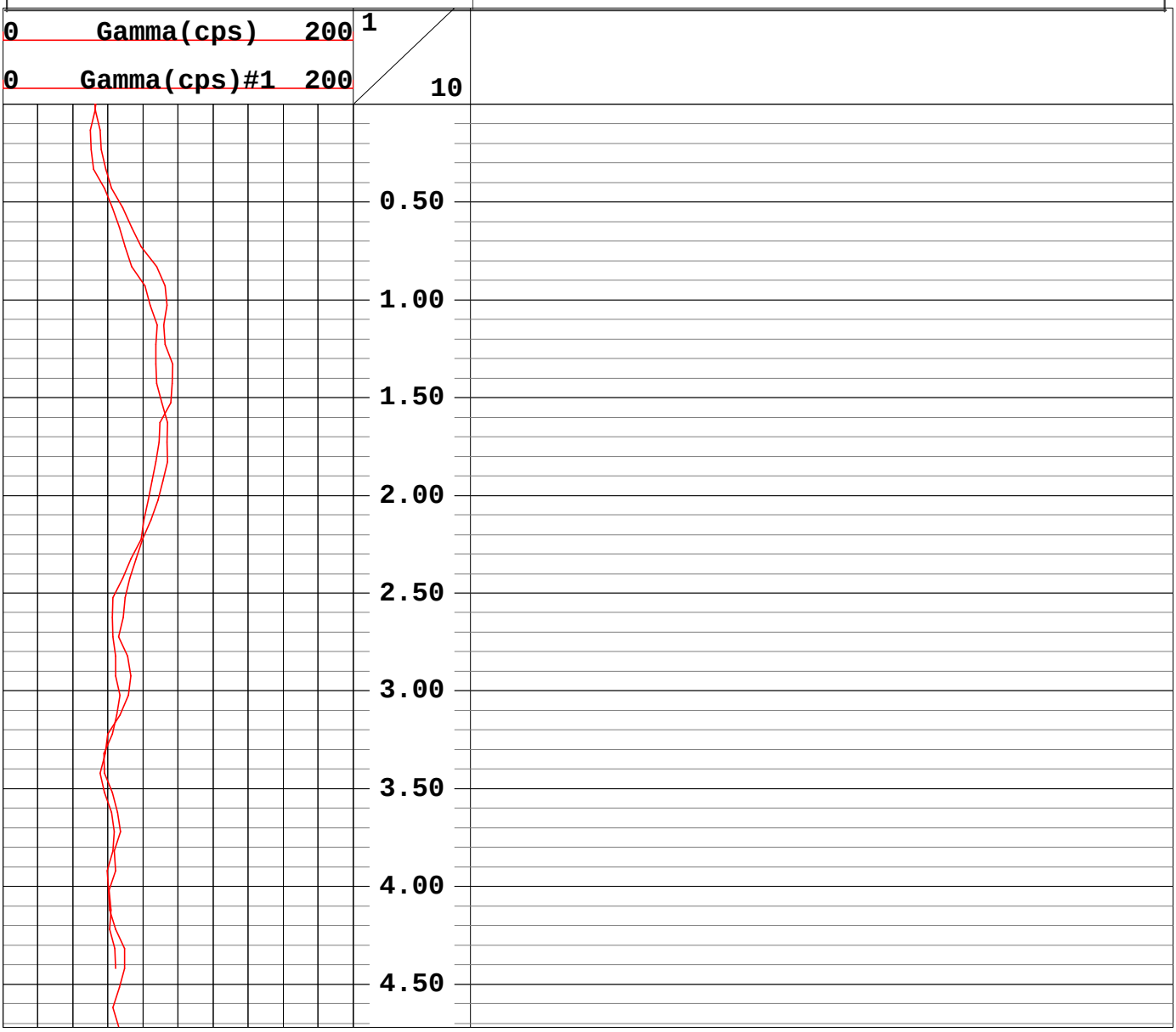
CLIENT	ACOE-Buffalo/FUSRAP	LOG MEAS. FROM	Ground Surface
WELL	TLFR3-002	ELEVATION	
SITE	Tonawanda Landfill	BTM LOGGED INTERVAL	
CITY	Tonawanda	TOP LOGGED INTERVAL	
STATE	New York	TYPE FLUID IN HOLE	Air
		LEVEL	
RECORDED BY	Bruce Wappman	BOREHOLE RECORD BIT	Geoprobe
WITNESSED BY			
DATE	16 July 2001	CASING RECORD	SIZE None WGT. None



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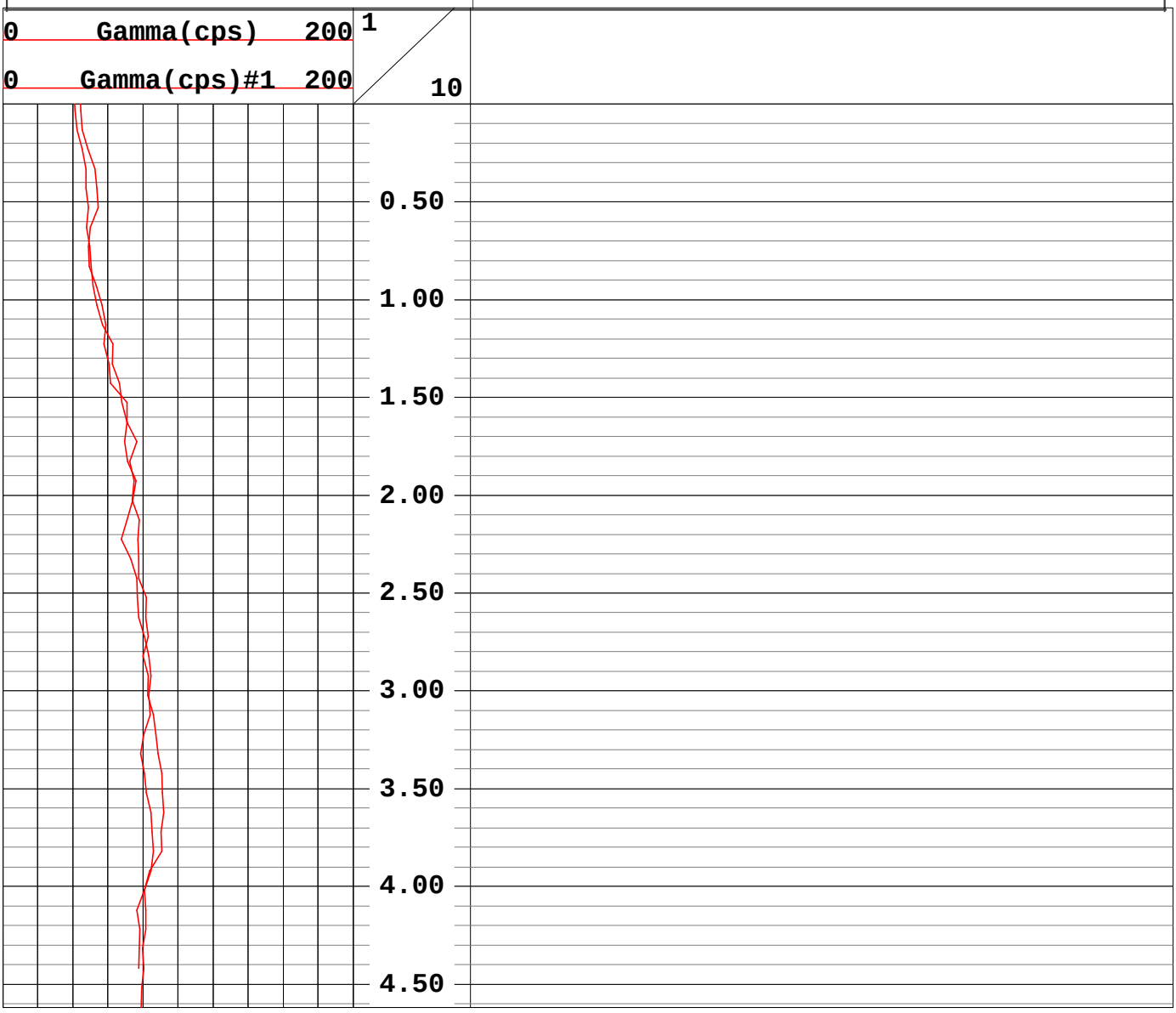
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFR3-004	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Bruce Wappman	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 16 July 2001	CASING RECORD SIZE None WGT. None



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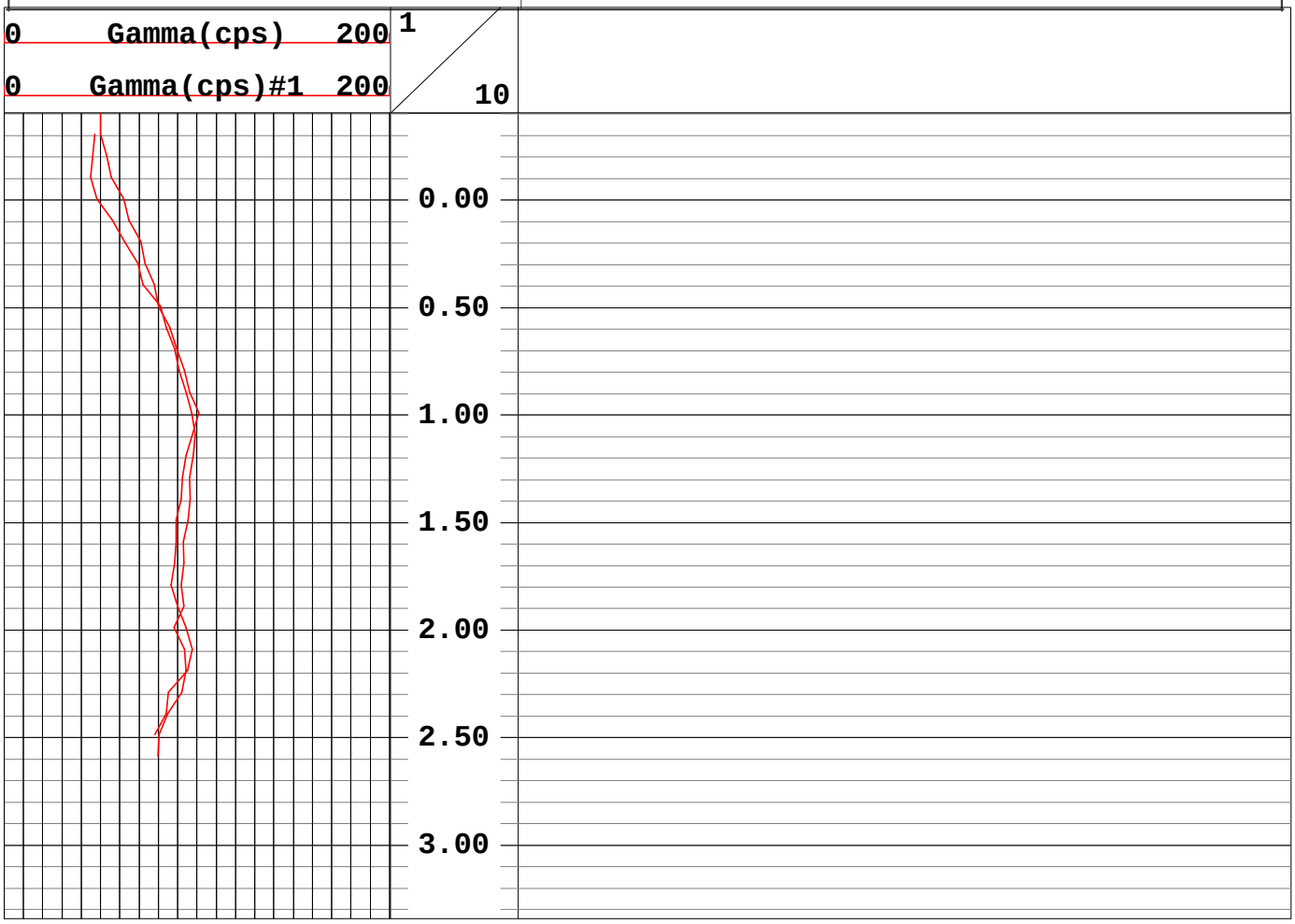
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFR3-005	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Bruce Wappman	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 17 July 2001	CASING RECORD SIZE None WGT. None



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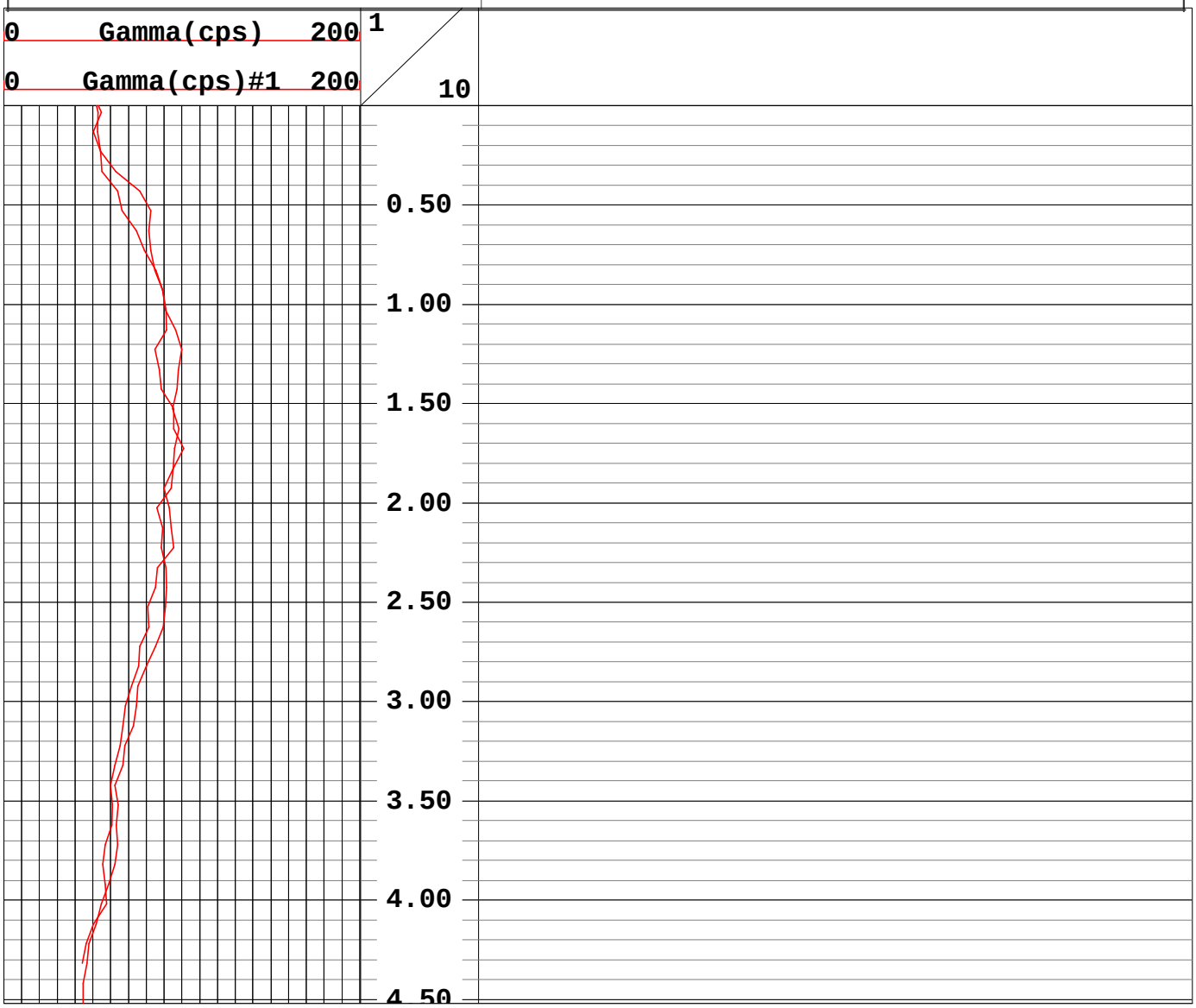
CLIENT **ACOE-Buffalo/FUSRAP**	LOG MEAS. FROM Ground Surface
WELL **TLFR3-006**	ELEVATION
SITE **Tonawanda Landfill**	BTM LOGGED INTERVAL
CITY **Tonawanda**	TOP LOGGED INTERVAL
STATE **New York**	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Bruce Wappman	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 17 July 2001	CASING RECORD SIZE None WGT. None



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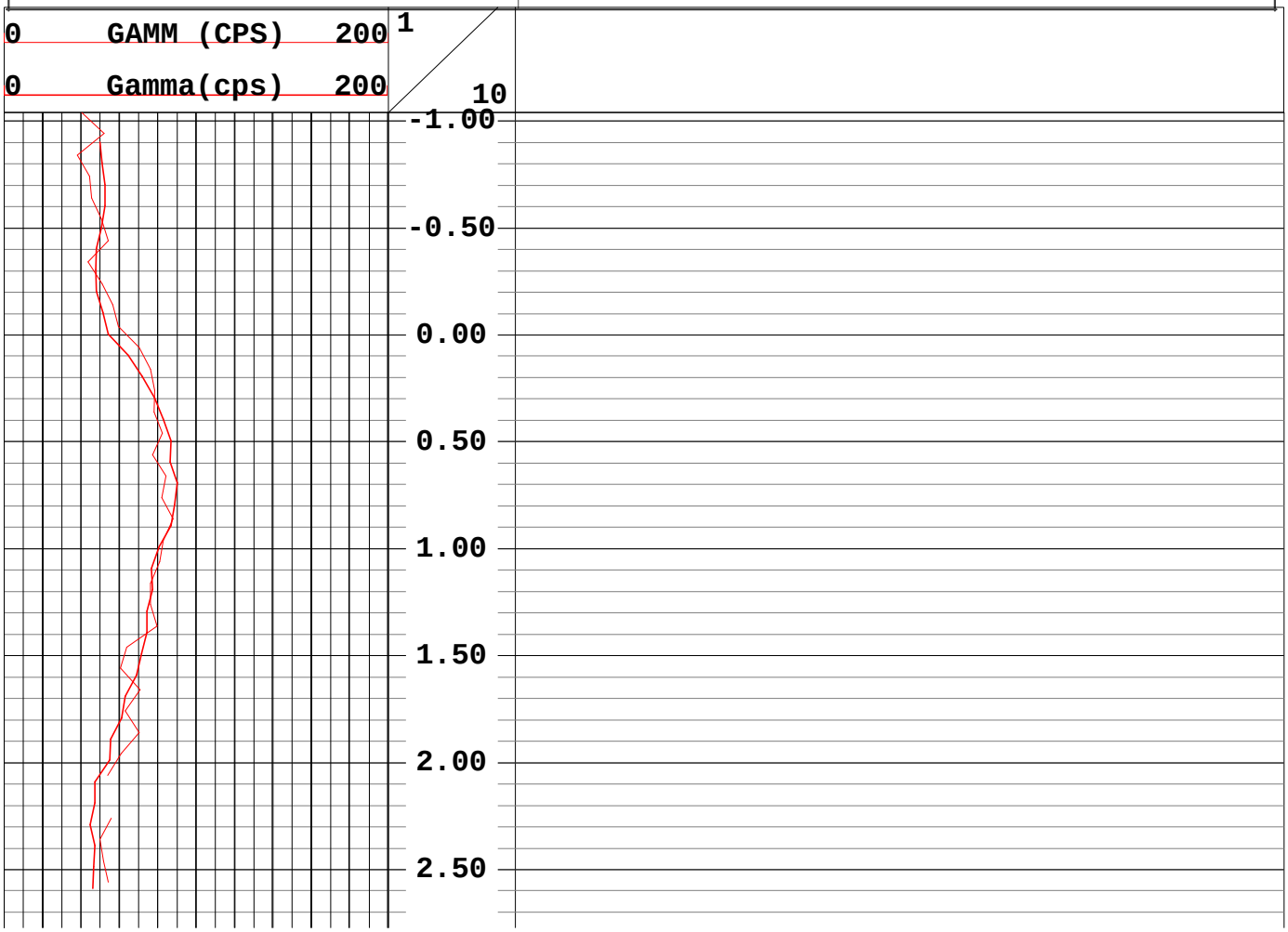
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFR3-007	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Bruce Wappman	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 17 July 2001	CASING RECORD SIZE None WGT. None



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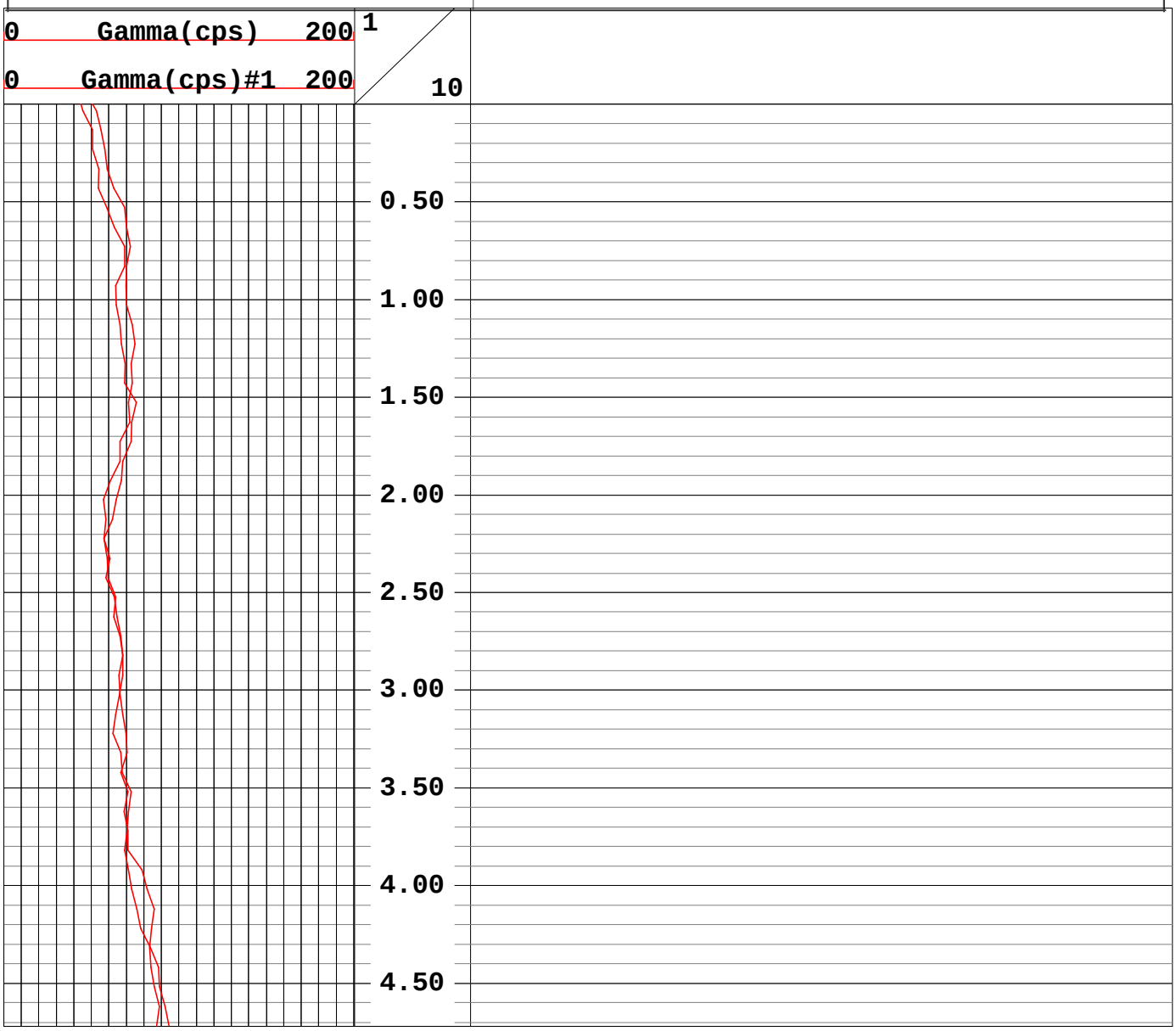
CLIENT	ACOE-Buffalo/FUSRAP	LOG MEAS. FROM	Ground Surface
WELL	TLFR3-008	ELEVATION	
SITE	Tonawanda Landfill	BTM LOGGED INTERVAL	
CITY	Tonawanda	TOP LOGGED INTERVAL	
STATE	New York	TYPE FLUID IN HOLE	Air
		LEVEL	
RECORDED BY	Bruce Wappman	BOREHOLE RECORD BIT	Geoprobe
WITNESSED BY			
DATE	17 July 2001	CASING RECORD	SIZE None WGT. None



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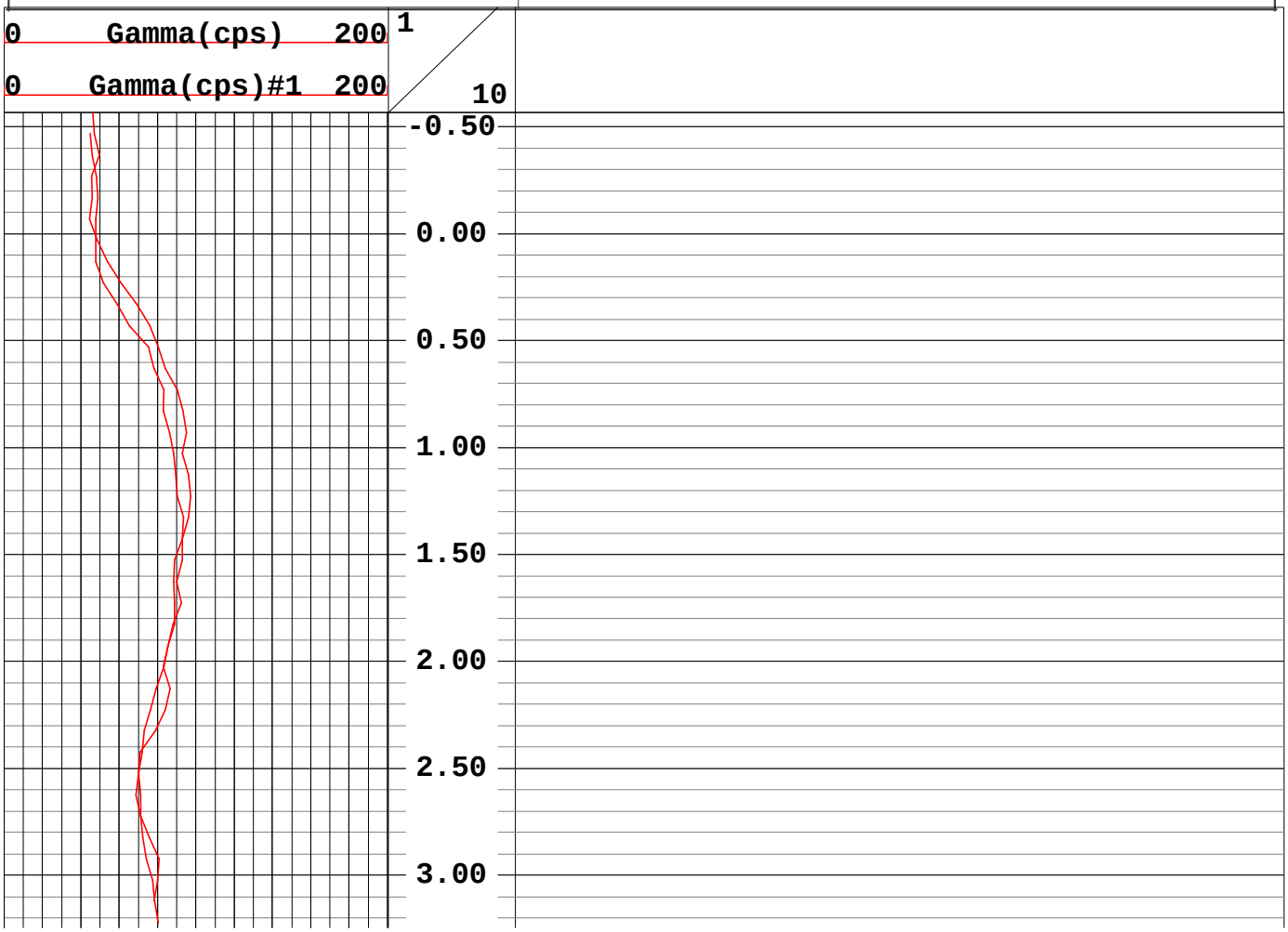
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFR3-010	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Bruce Wappman	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 17 July 2001	CASING RECORD SIZE None WGT. None



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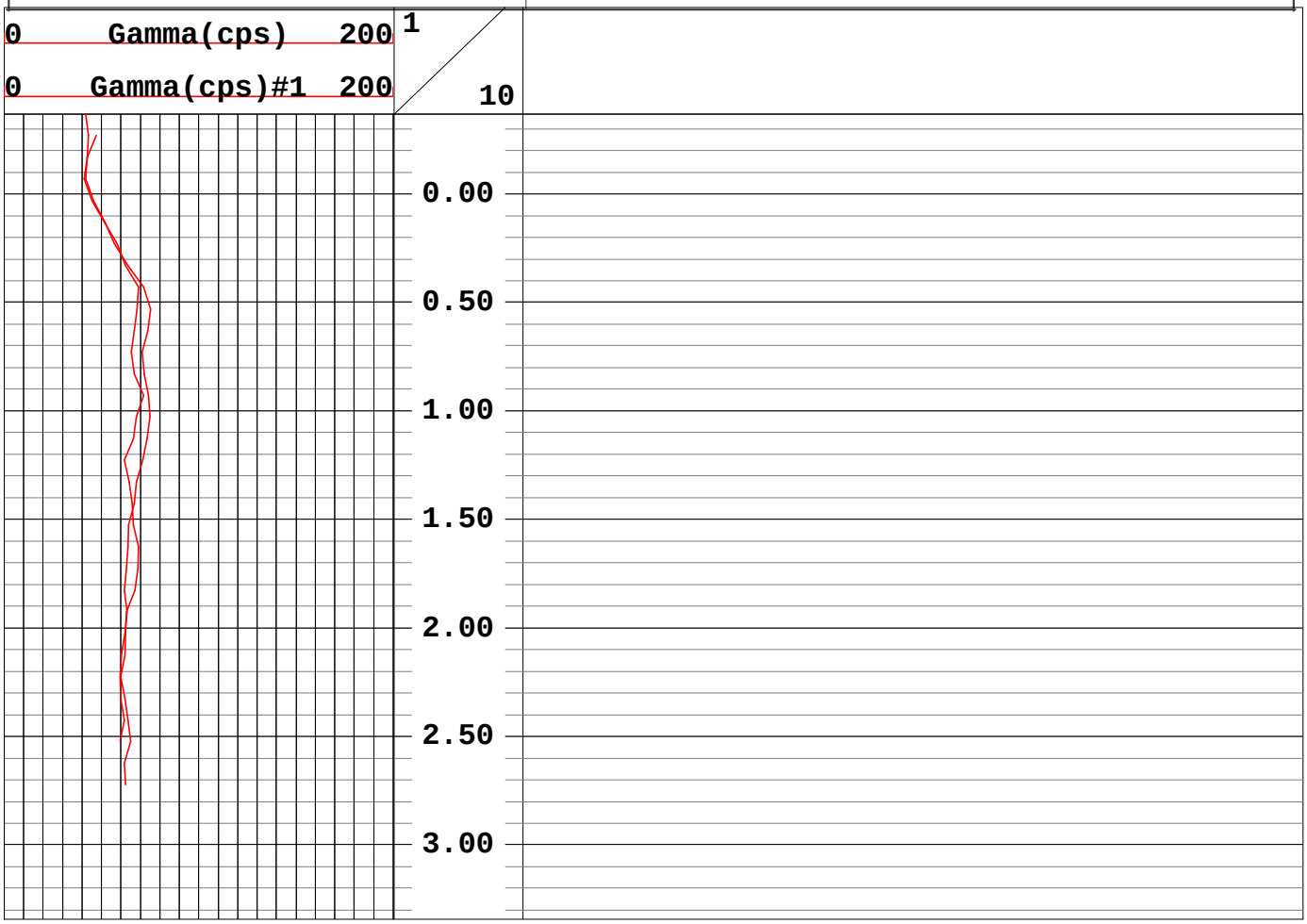
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFR3-011	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Rick Hoover	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY Laura Pastor	
DATE 23 July 2001	CASING RECORD SIZE 3-inch WGT. Steel



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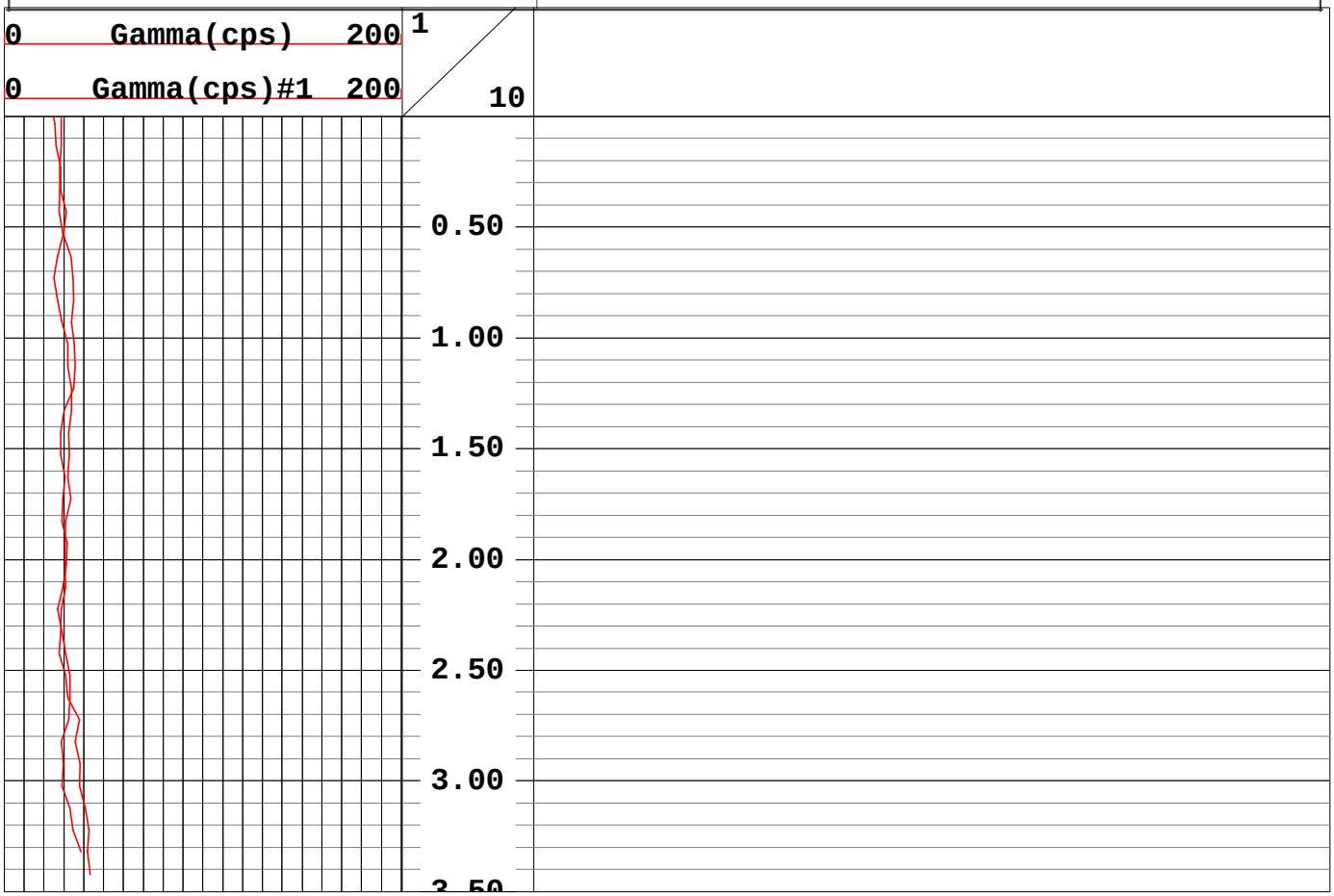
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFR3-012	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Rick Hoover	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY Laura Pastor	
DATE 23 July 2001	CASING RECORD SIZE 3-inch WGT. Steel



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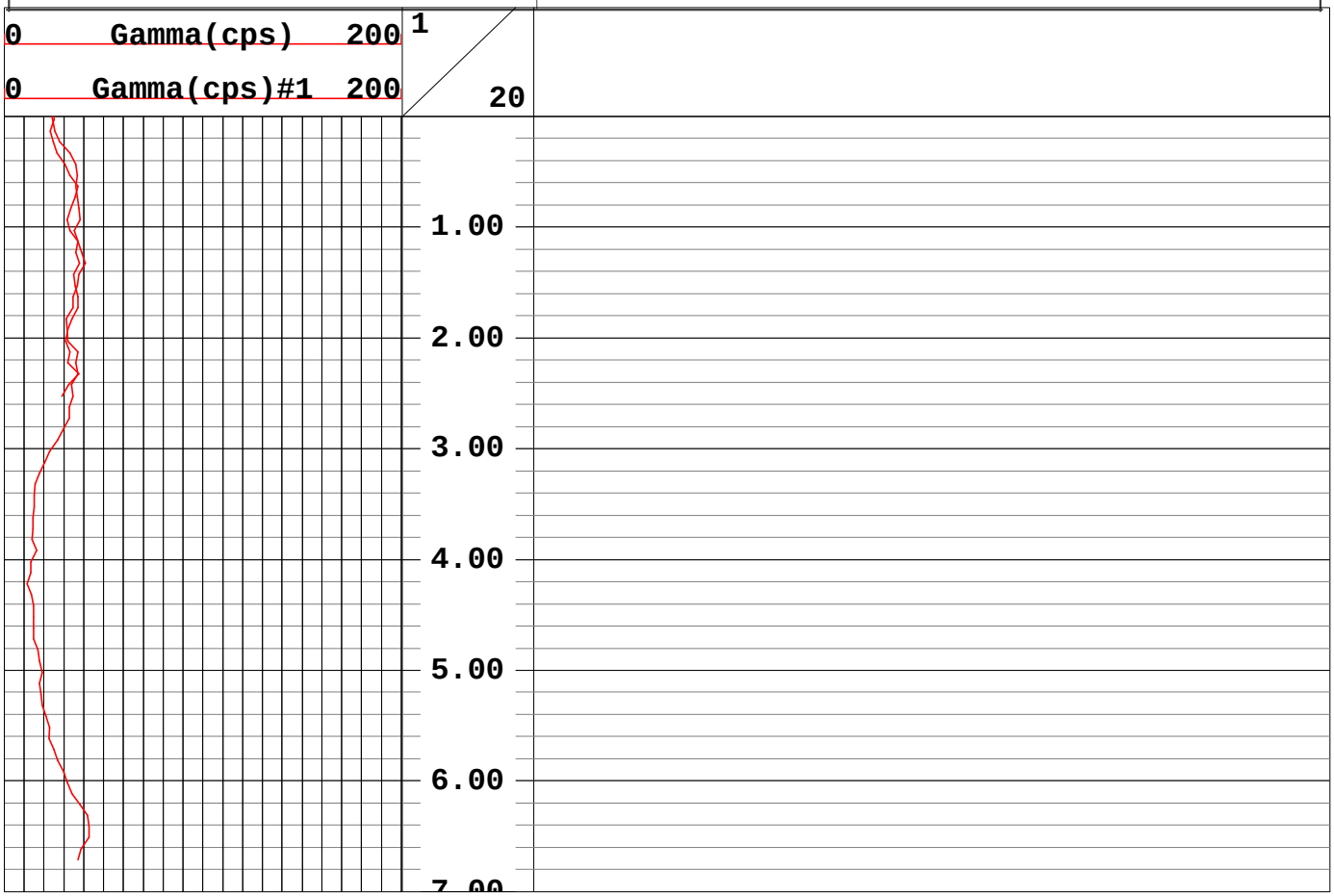
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFR3-013	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY Rick Hoover	
DATE 24 July 2001	CASING RECORD SIZE 3-inch WGT. Steel



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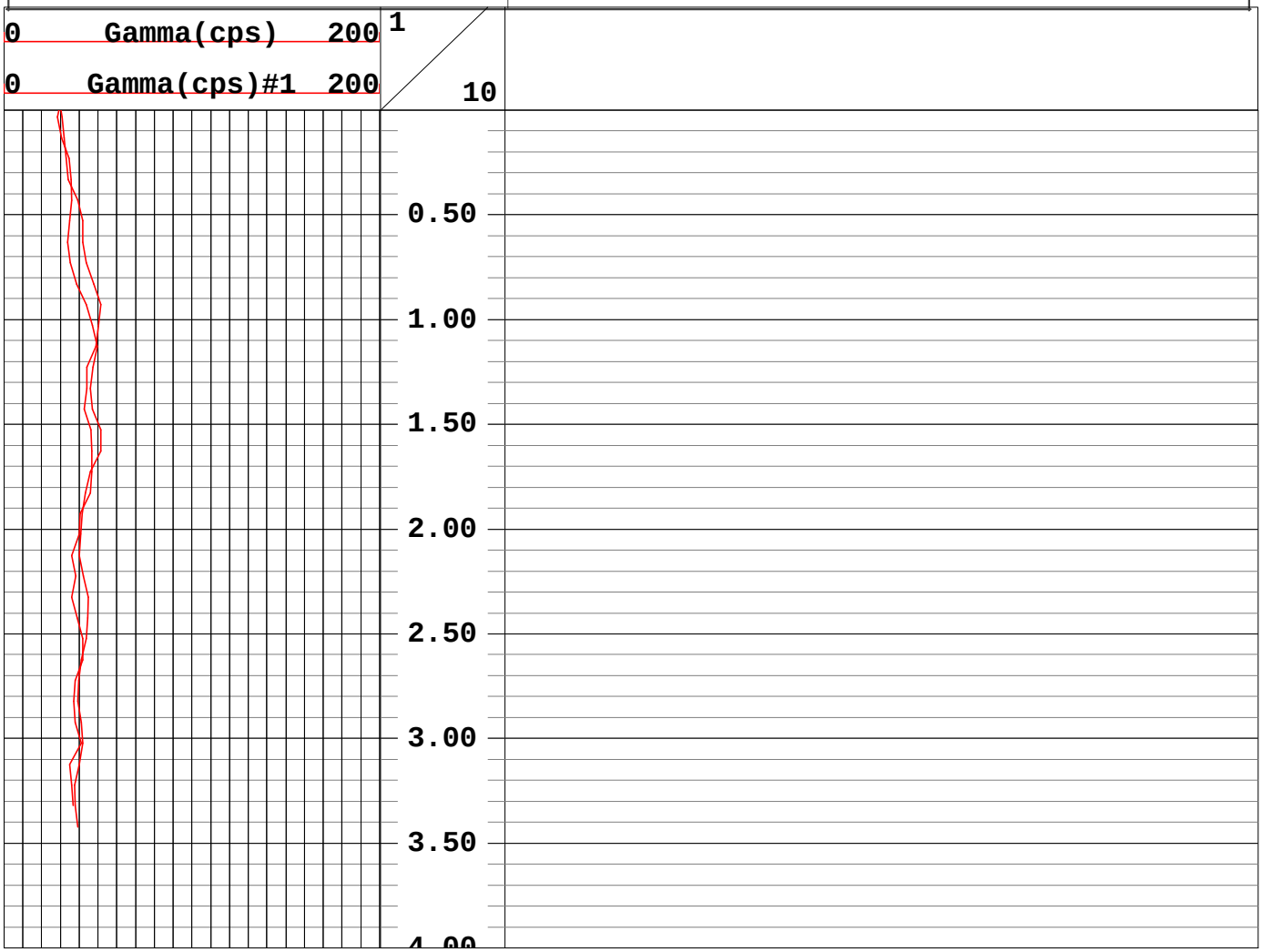
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFR3-014	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Rick Hoover	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY Laura Pastor	
DATE 23 July 2001	CASING RECORD SIZE 3-inch WGT. Steel



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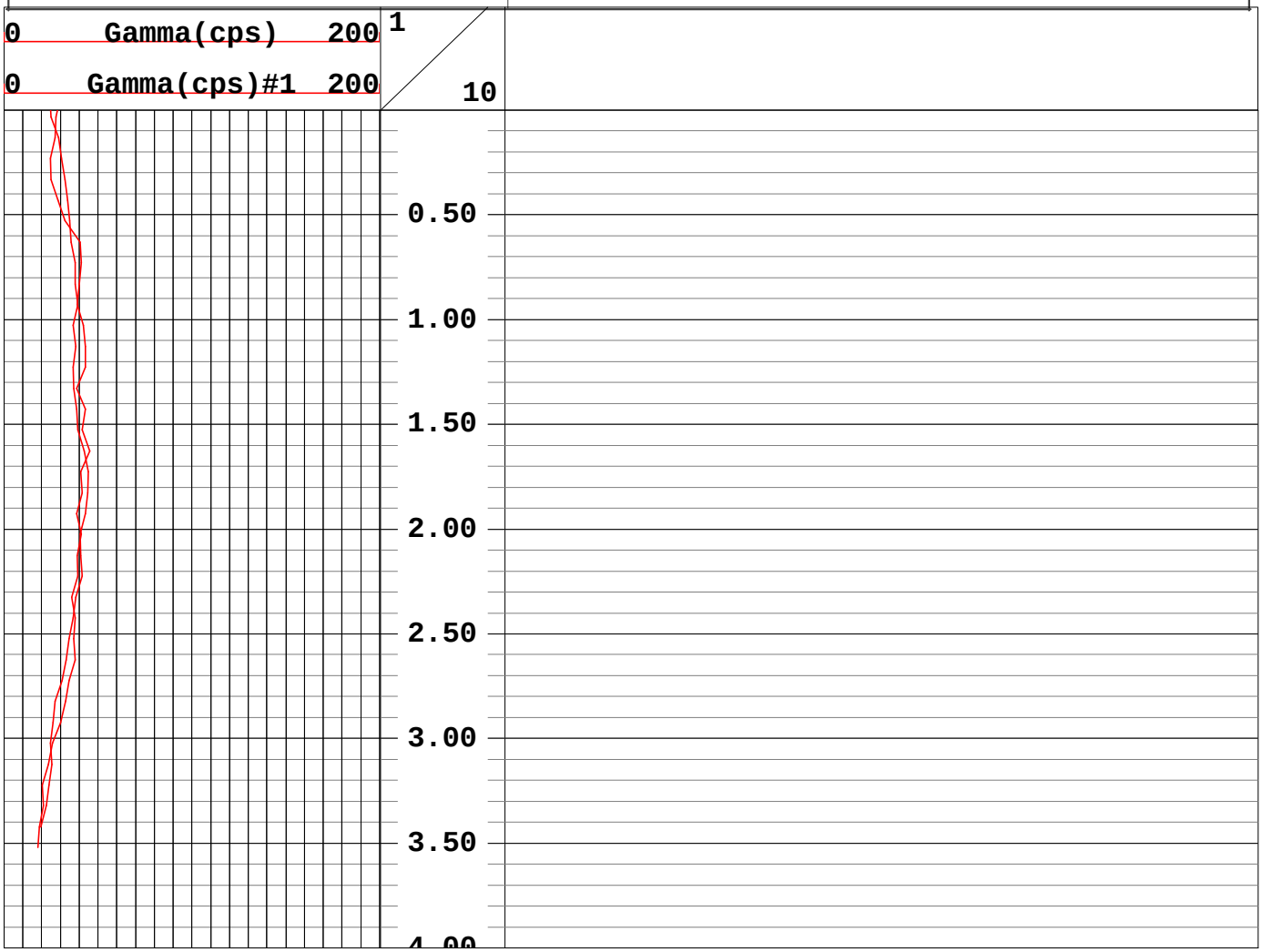
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFR3-015	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Rick Hoover	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY Laura Pastor	
DATE 23 July 2001	CASING RECORD SIZE 3-inch WGT. Steel



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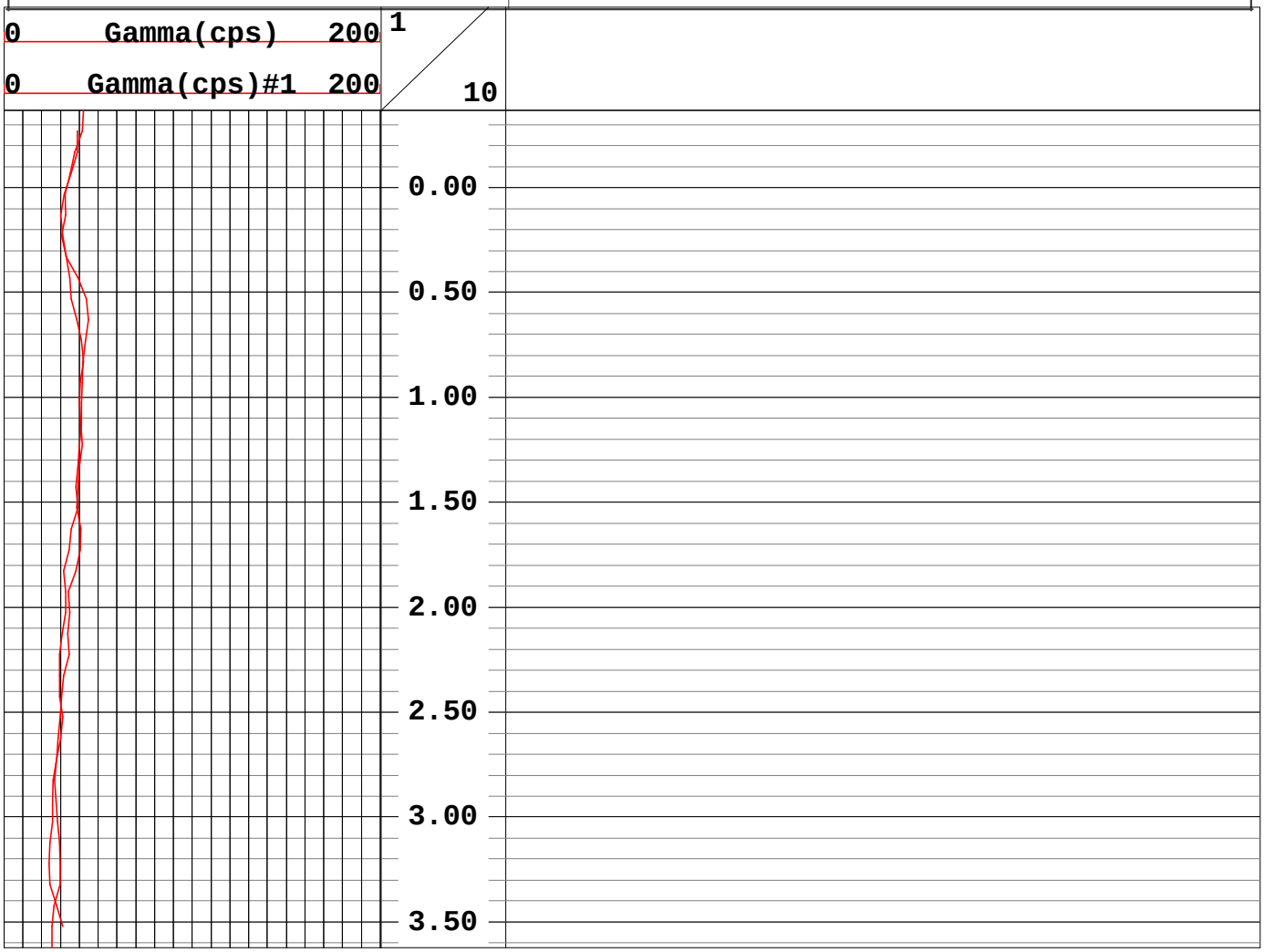
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFR3-016	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Rick Hoover	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY Laura Pastor	
DATE 23 July 2001	CASING RECORD SIZE 3-inch WGT. Steel



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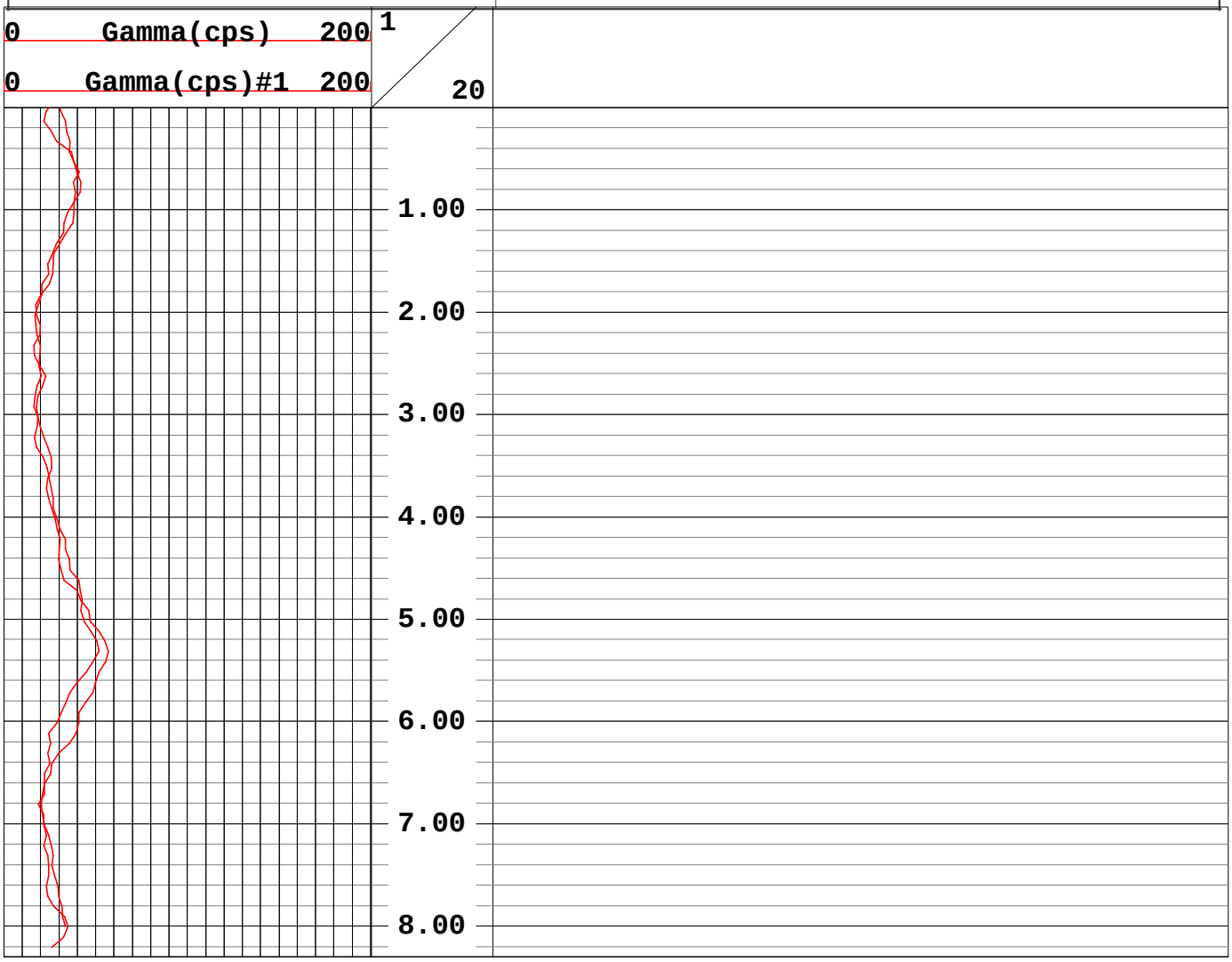
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFR3-017	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY Rick Hoover	
DATE 24 July 2001	CASING RECORD SIZE 3-inch WGT. Steel



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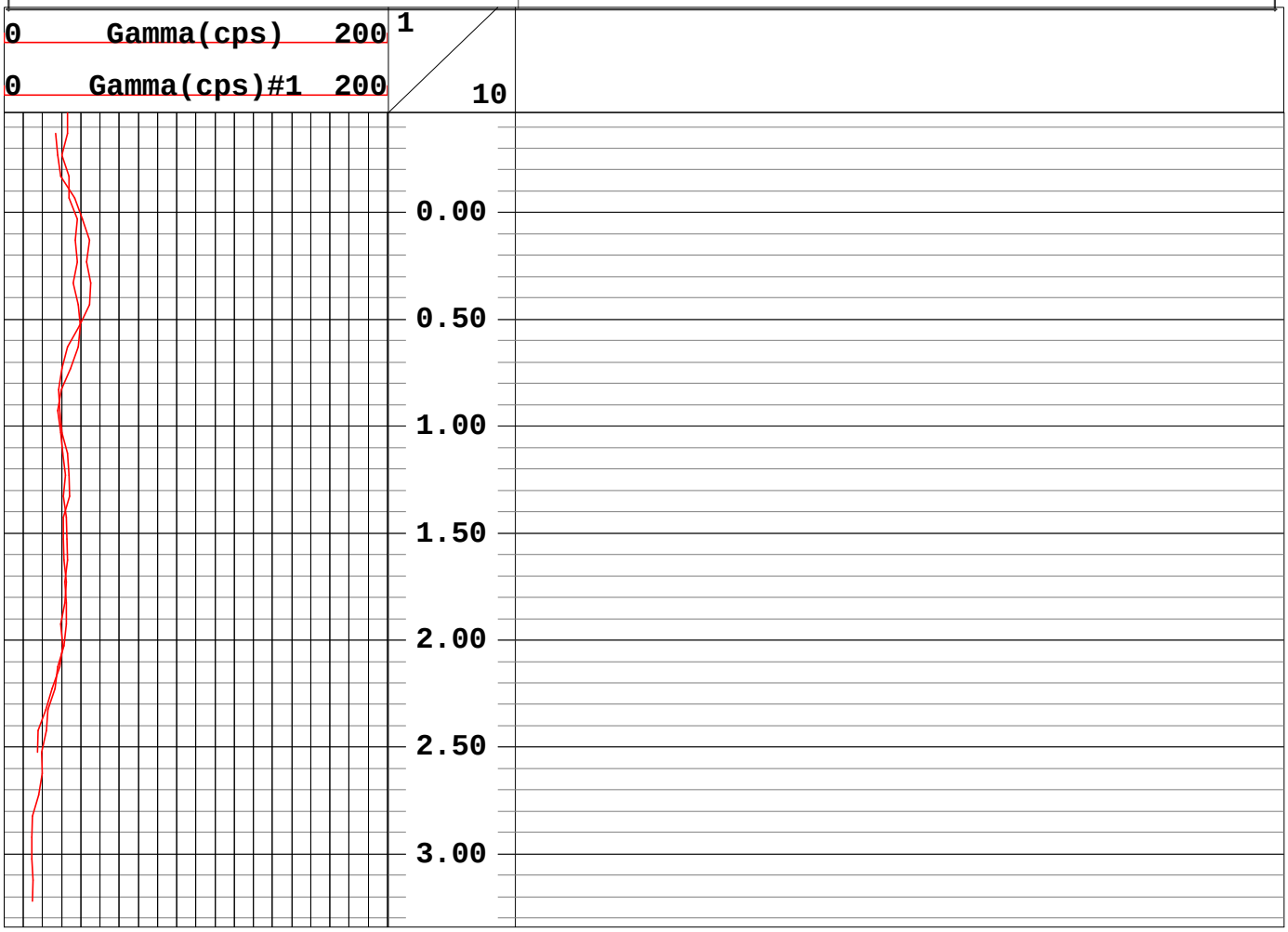
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFR3-018	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Rick Hoover	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY Laura Pastor	
DATE 23 July 2001	CASING RECORD SIZE 3-inch WGT. Steel



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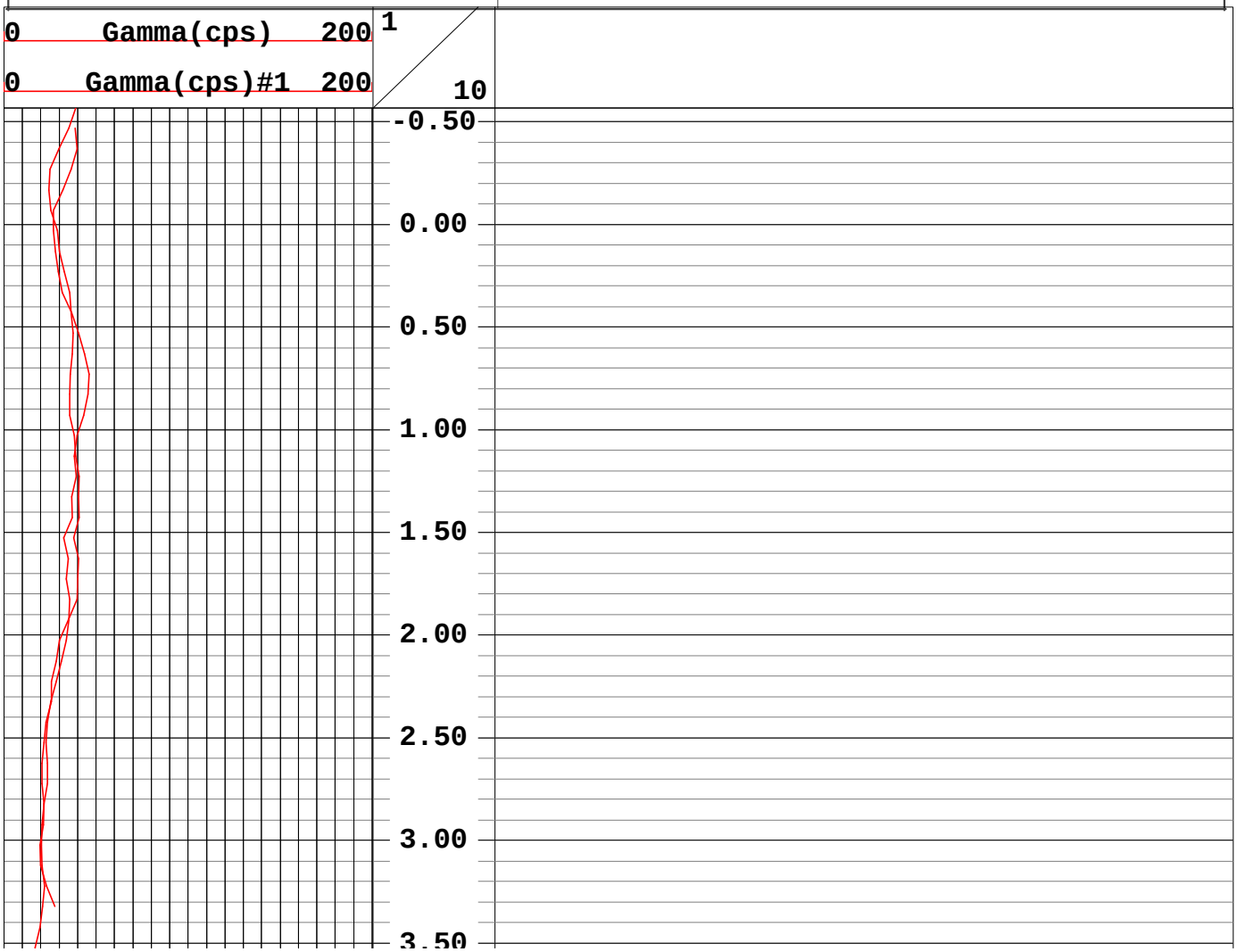
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFR3-019	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Rick Hoover	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY Laura Pastor	
DATE 23 July 2001	CASING RECORD SIZE 3-inch WGT. Steel



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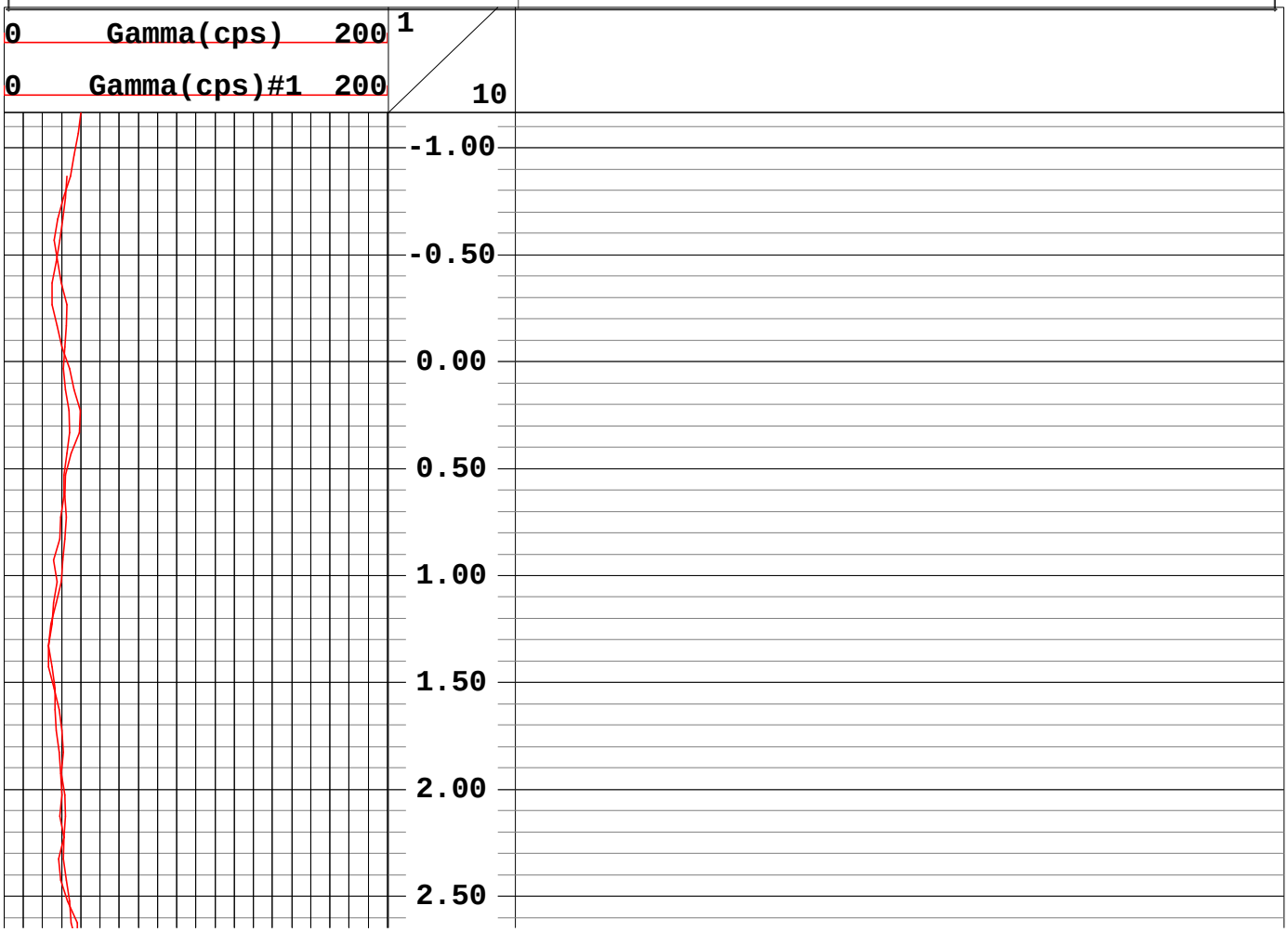
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TLFR3-020	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Rick Hoover	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY Laura Pastor	
DATE 23 July 2001	CASING RECORD SIZE 3-inch WGT. Steel



Mudflats
Class 1 Area C

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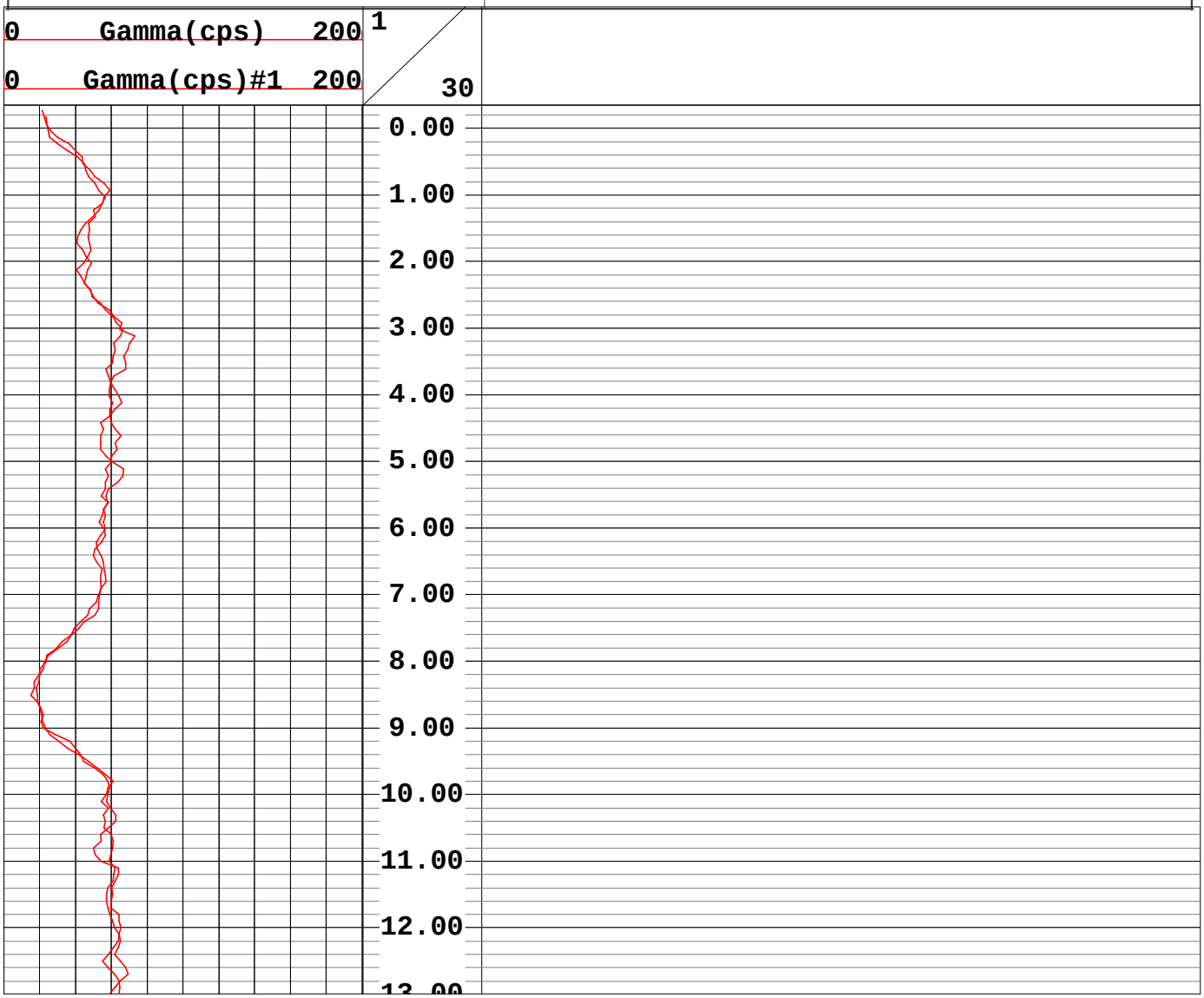
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMFC1-001	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Bruce Wapman	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 13 July 2001	CASING RECORD SIZE 3-inch WGT. Steel



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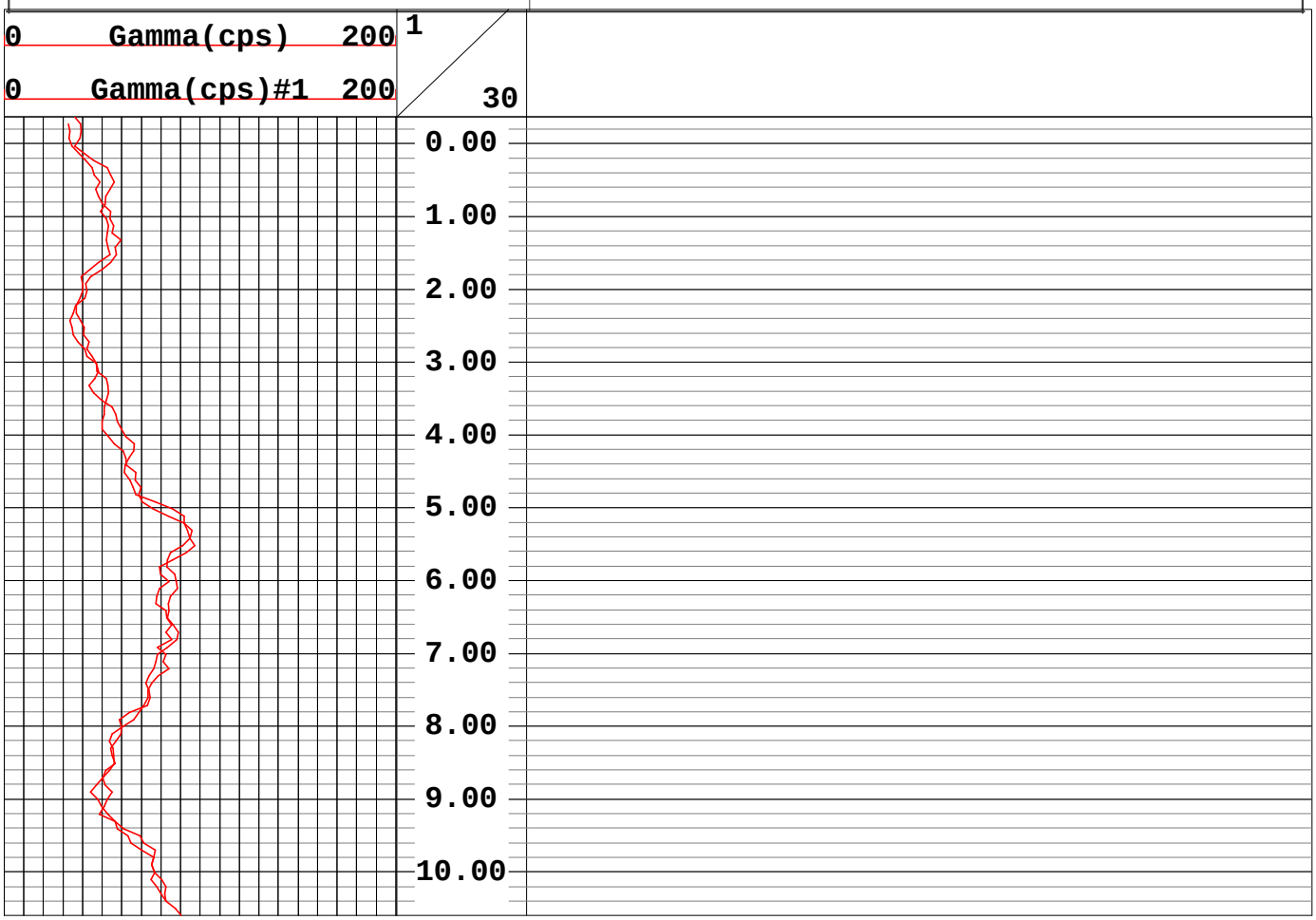
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMFC1-002	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 1 August 2001	CASING RECORD SIZE None WGT. None



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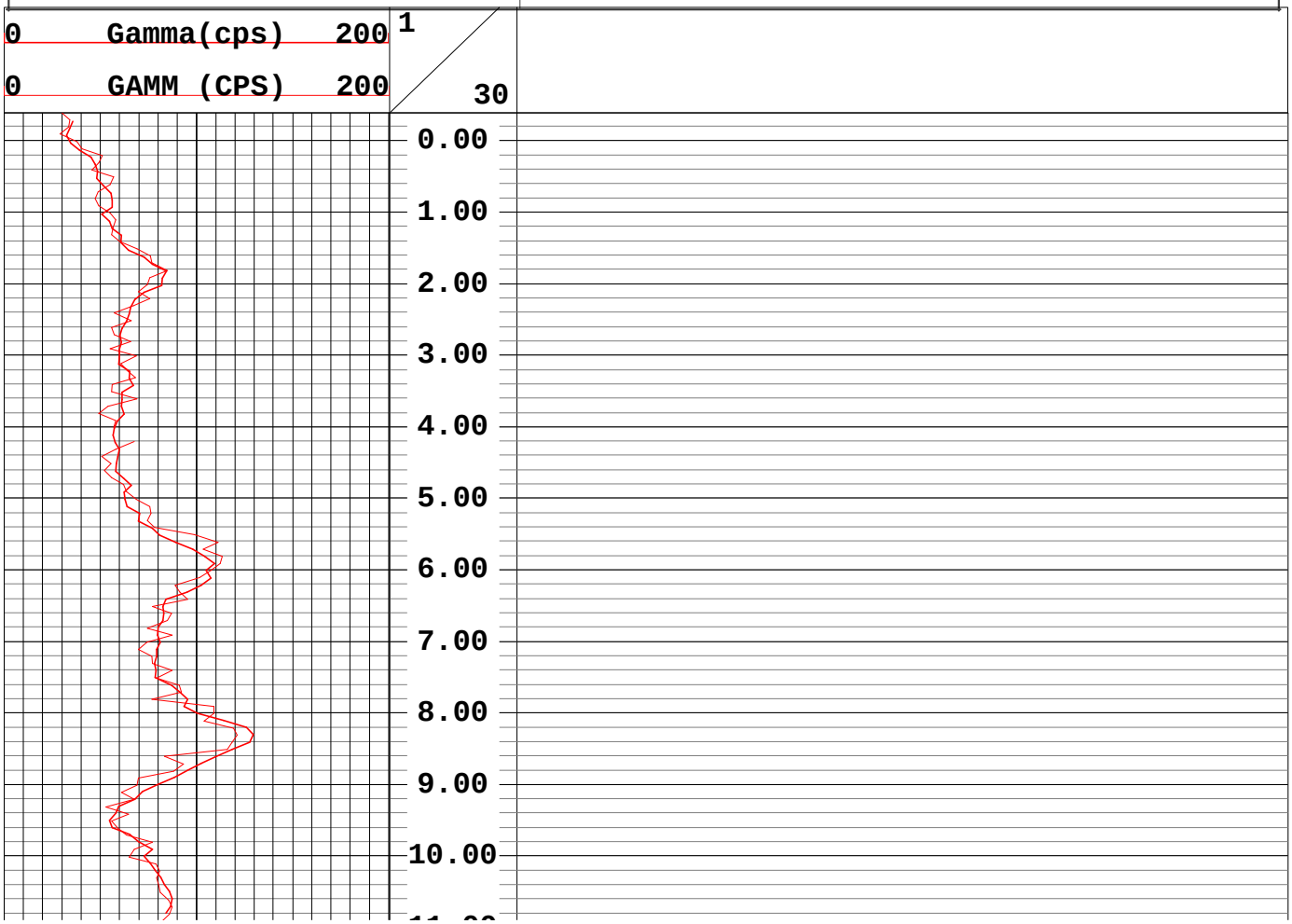
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMFC1-003	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 1 August 2001	CASING RECORD SIZE None WGT. None



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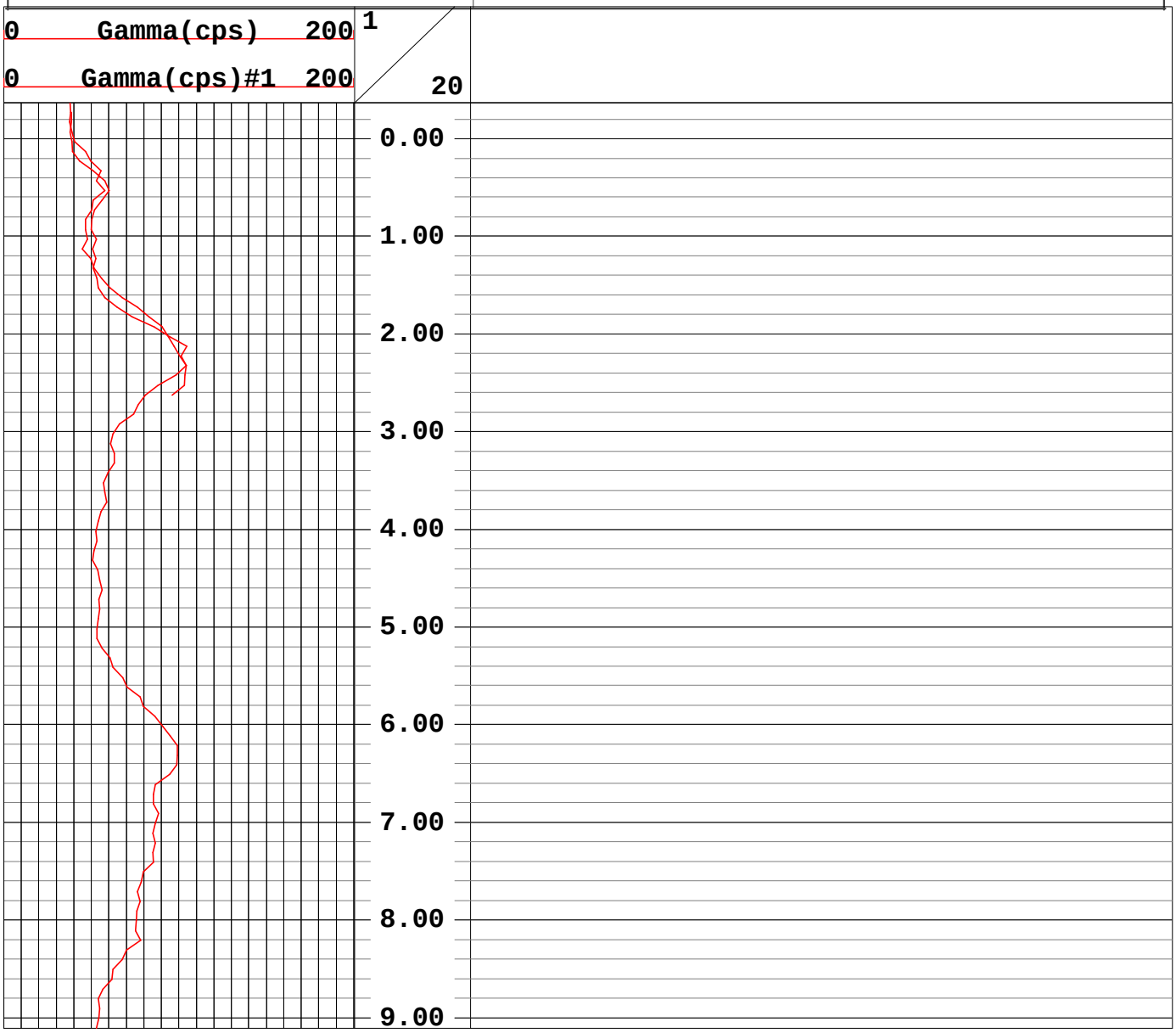
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMFC1-004	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Laura Pastor	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 1 August 2001	CASING RECORD SIZE None WGT. None



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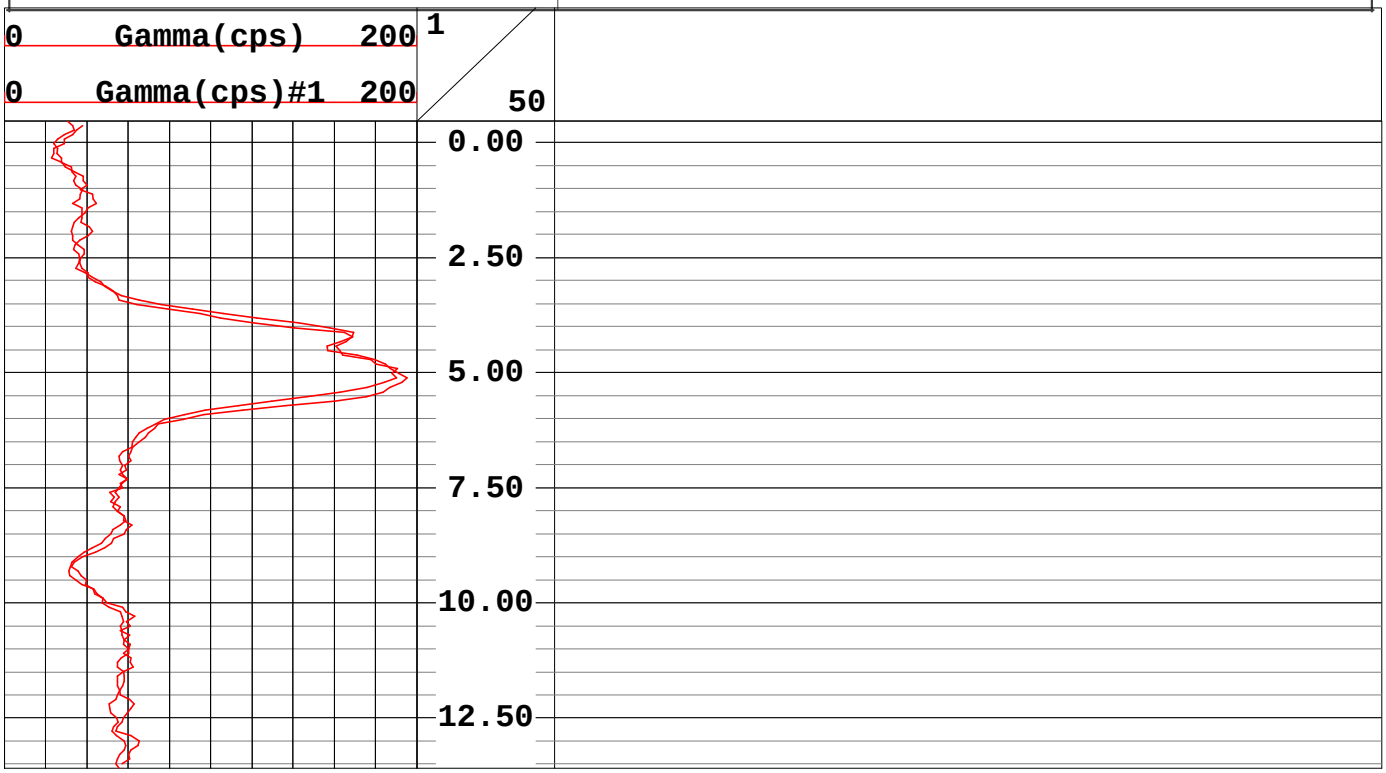
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMFC1-005	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Bruce Wapman	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 14 July 2001	CASING RECORD SIZE 3-inch WGT. Steel



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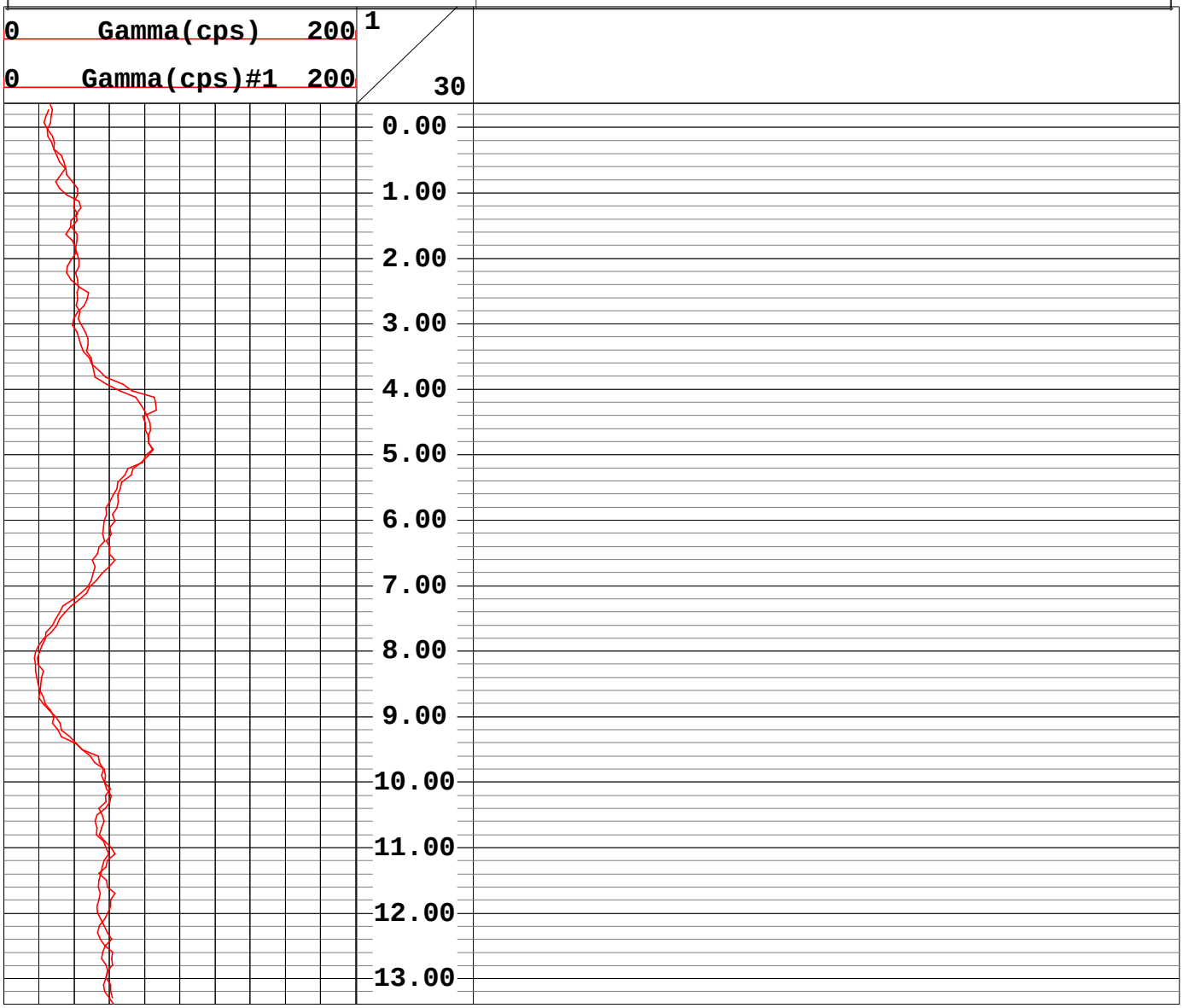
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMFC1-009	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Bruce Wapman	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 15 July 2001	CASING RECORD SIZE 3-inch WGT. Steel



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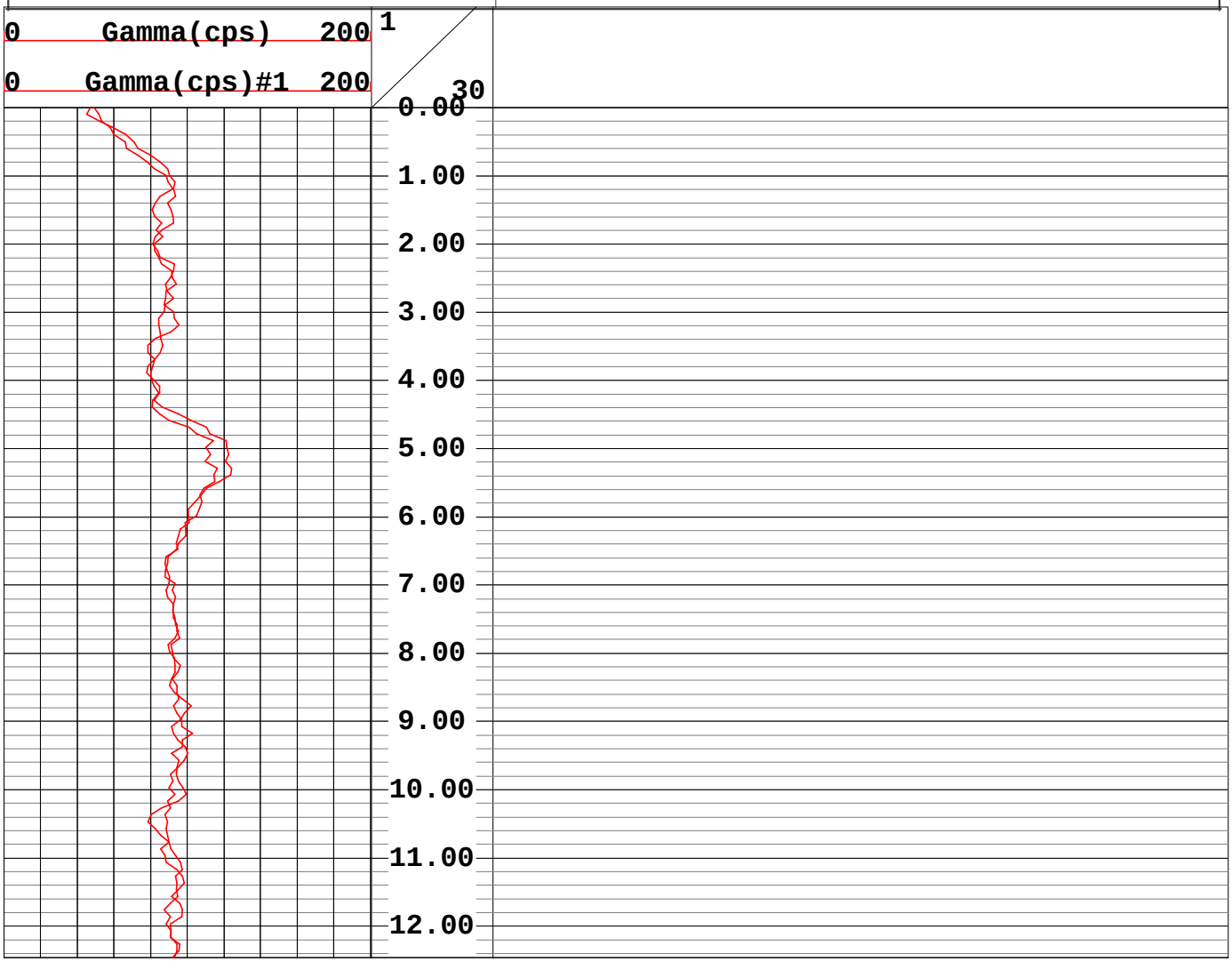
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMFC1-013	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Bruce Wapman	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 14 July 2001	CASING RECORD SIZE 3-inch WGT. Steel



Mudflats
Class 2 Area C

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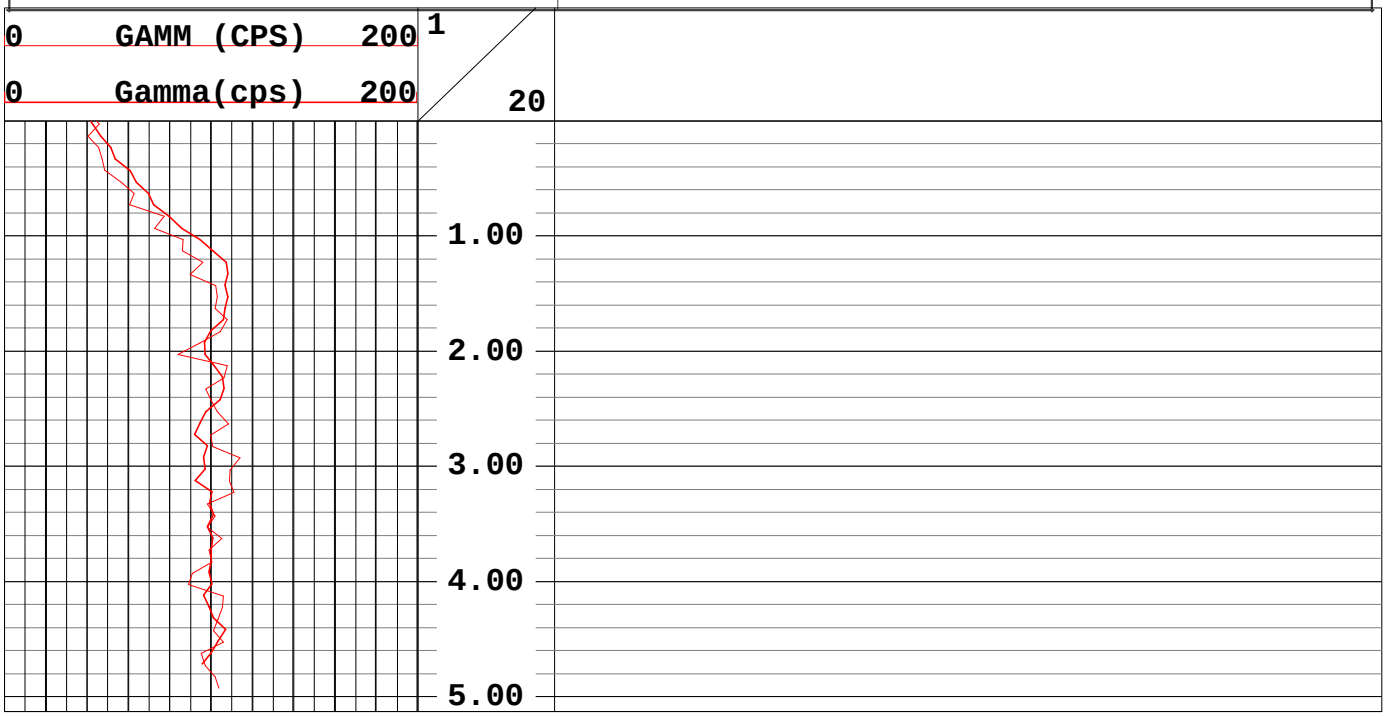
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMFC2-001	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Bruce Wapman	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 13 July 2001	CASING RECORD SIZE None WGT.



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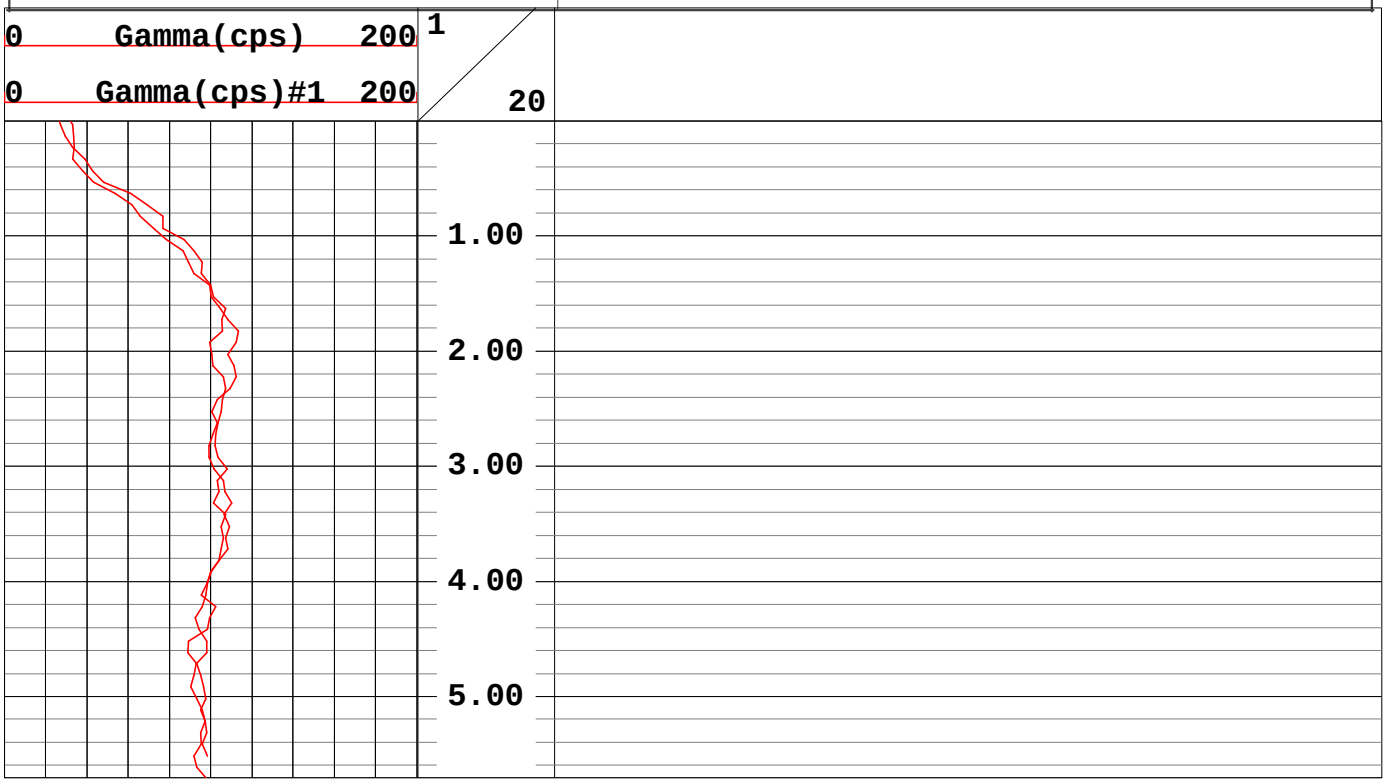
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMFC2-002	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Bruce Wapman	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 14 July 2001	CASING RECORD SIZE 3-inch WGT. Steel



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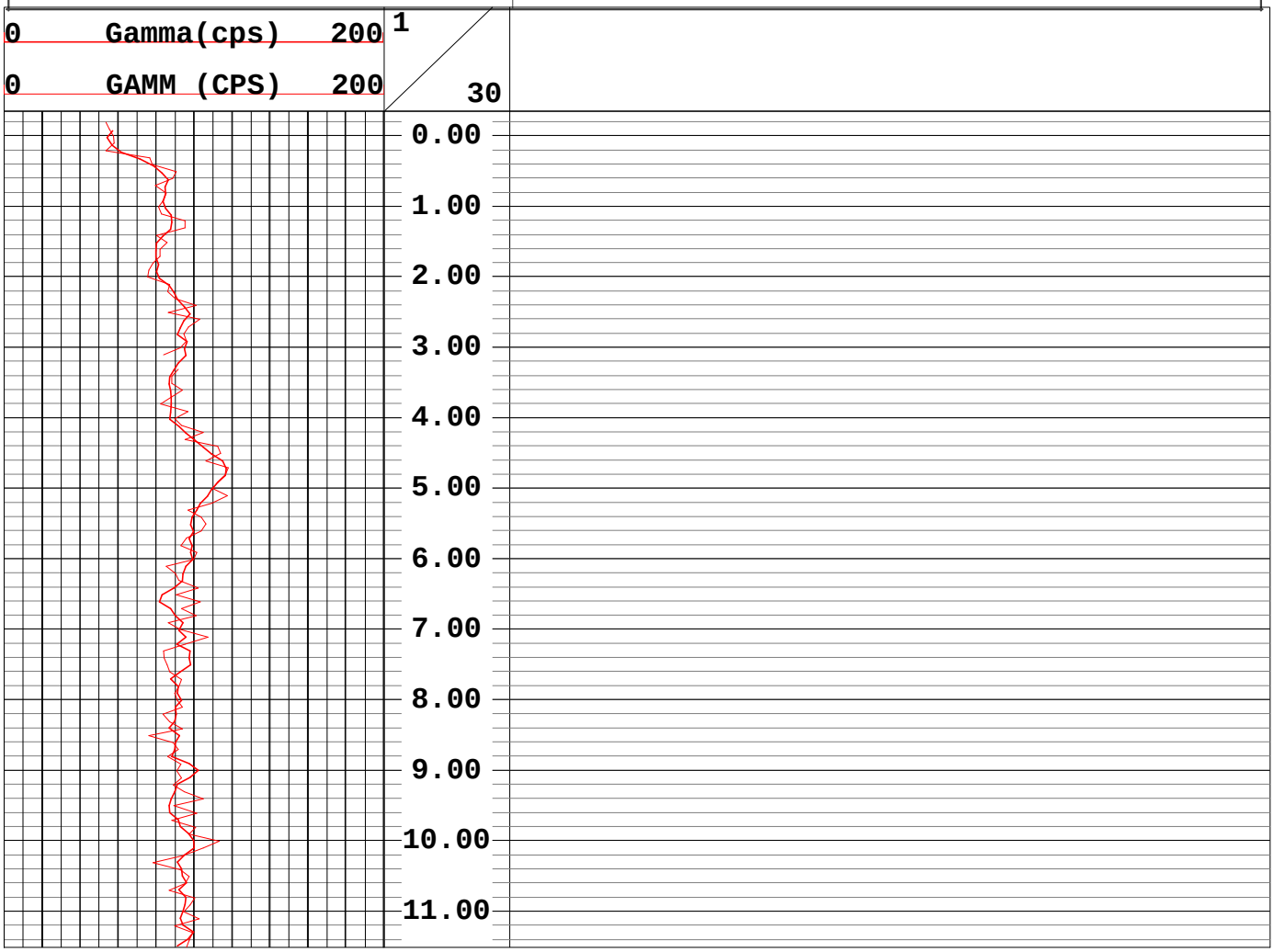
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMFC2-003	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Bruce Wapman	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 15 July 2001	CASING RECORD SIZE None WGT.



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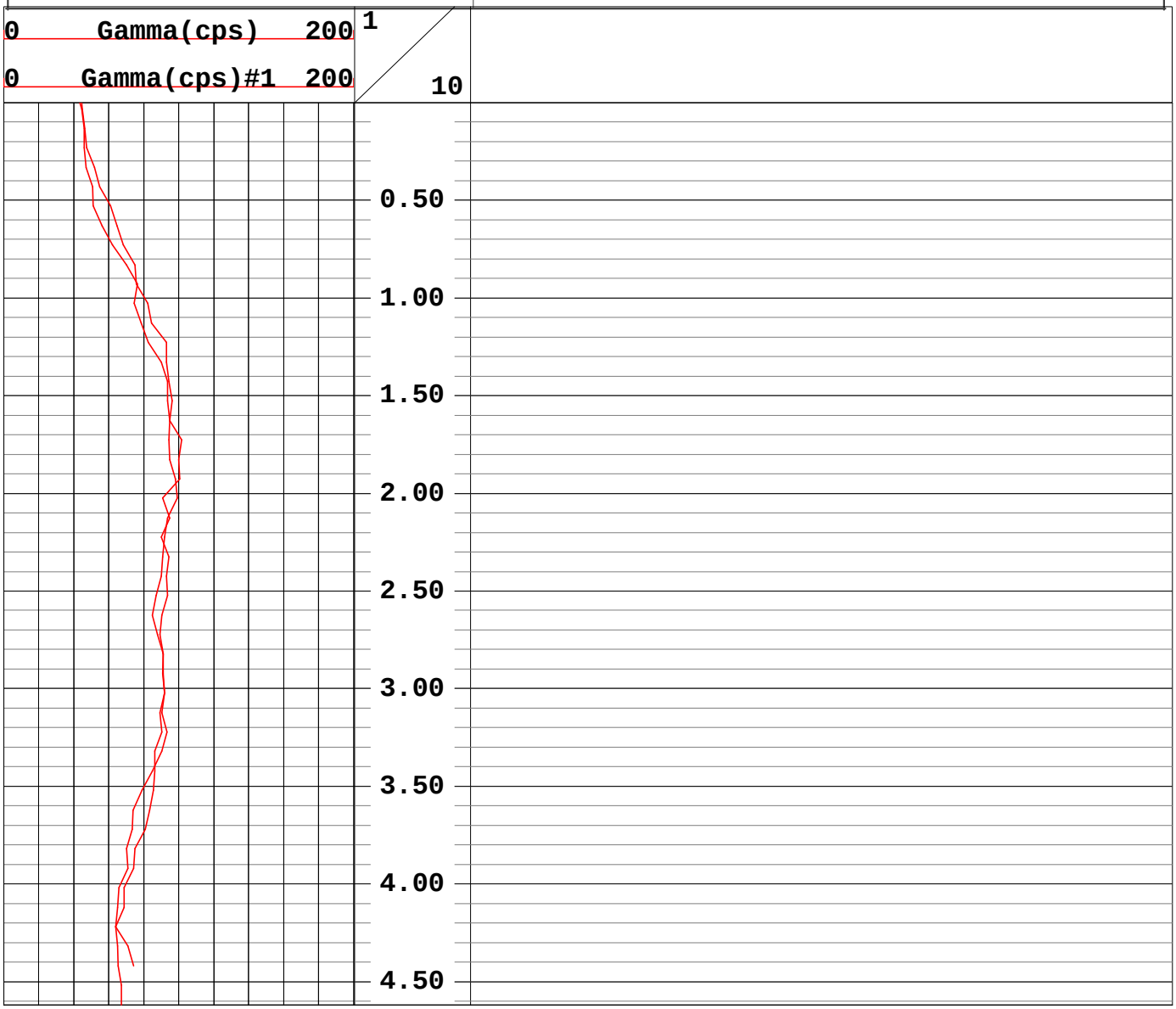
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMFC2-004	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Bruce Wapman	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 12 July 2001	CASING RECORD SIZE None WGT.



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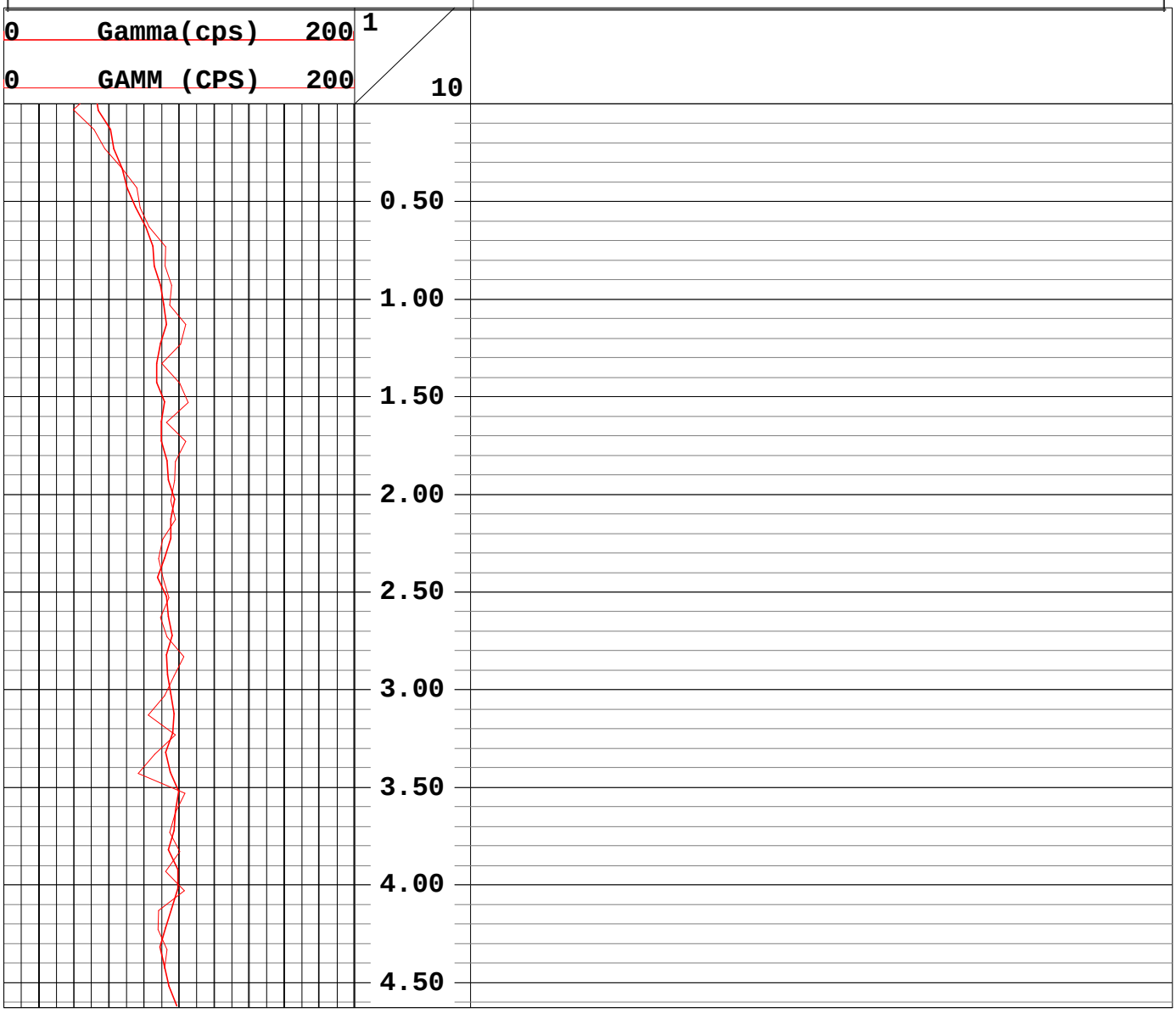
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMFC2-005	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Bruce Wapman	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 12 July 2001	CASING RECORD SIZE None WGT.



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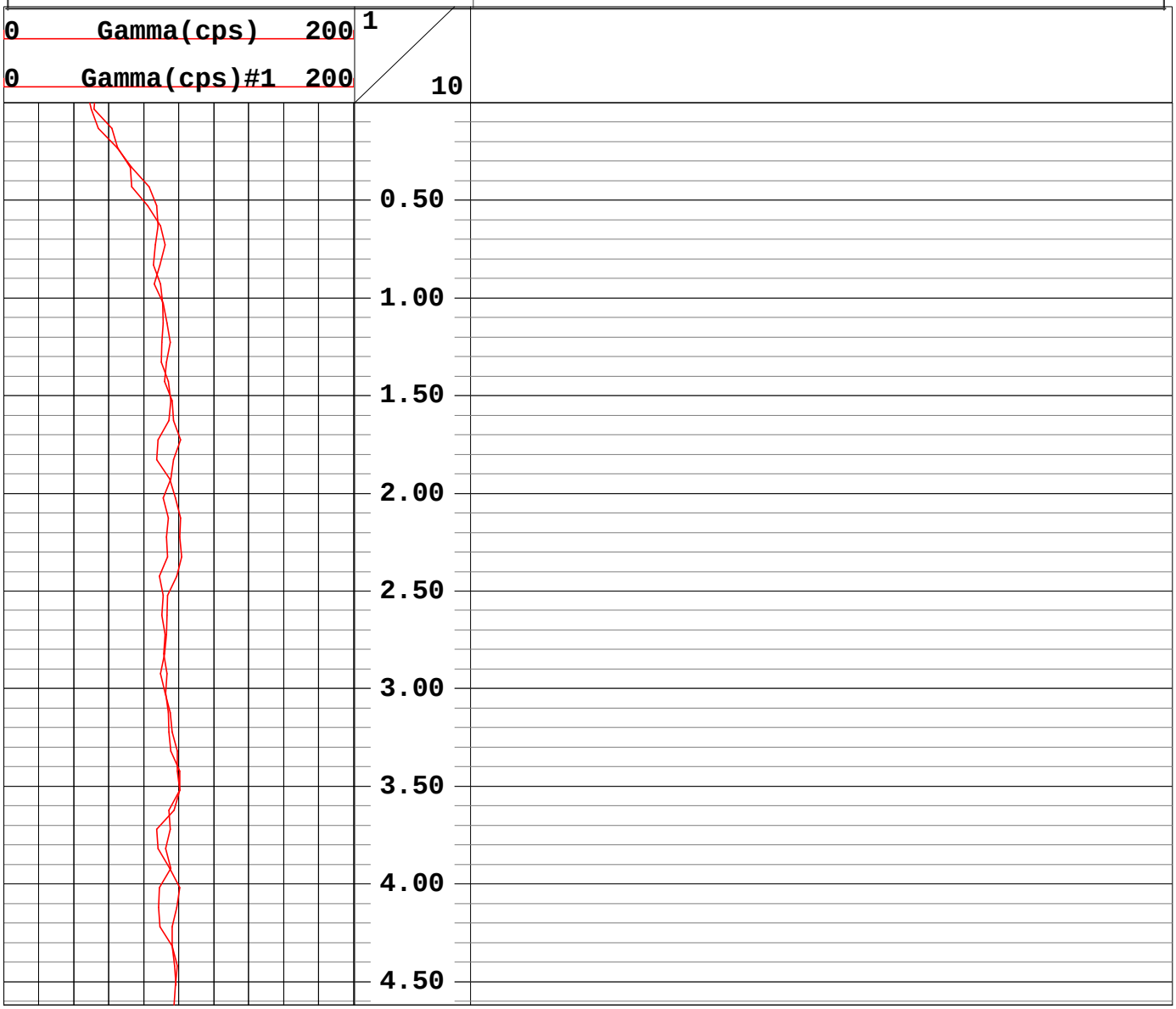
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMFC2-006	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Bruce Wapman	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 12 July 2001	CASING RECORD SIZE None WGT.



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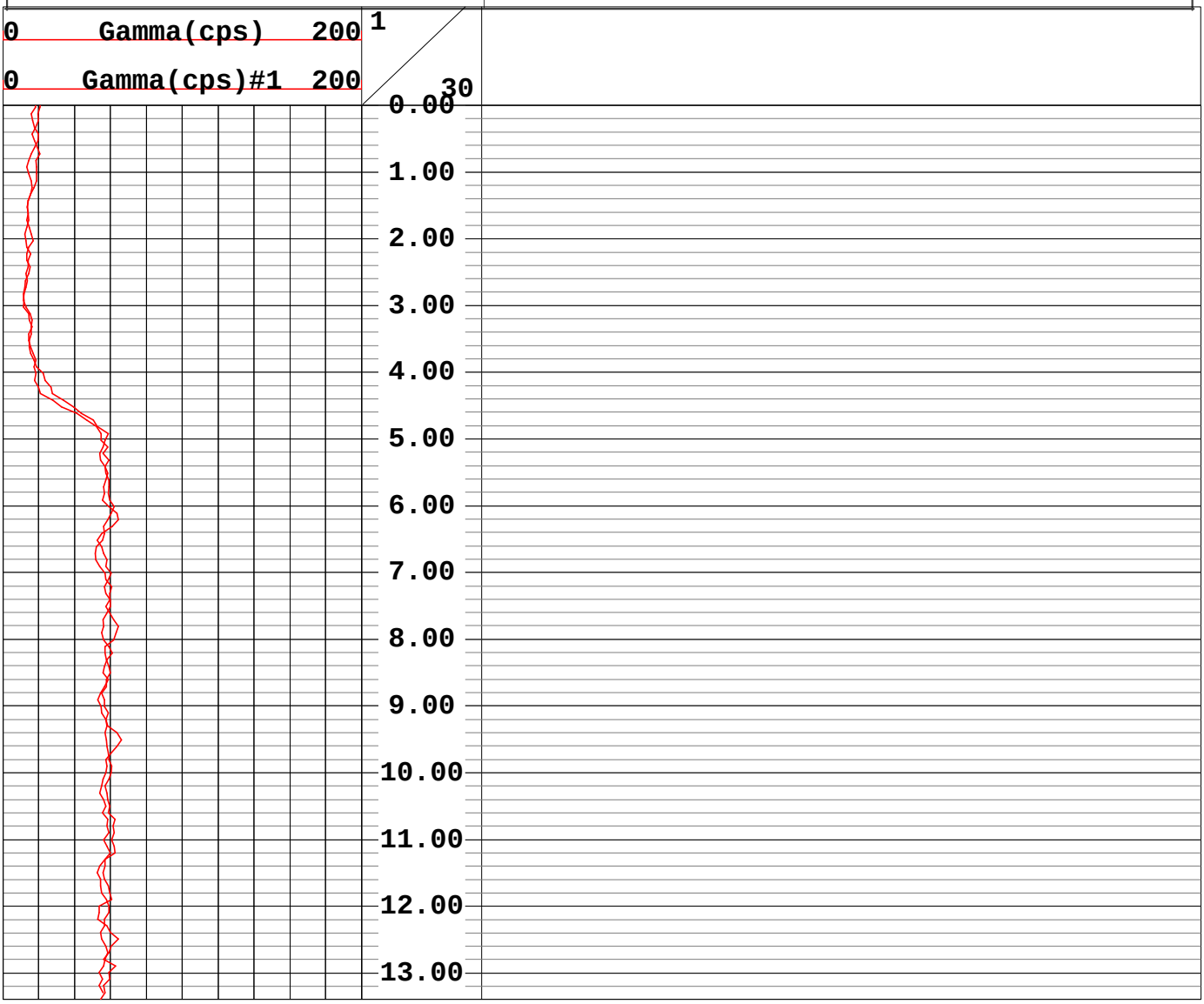
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMFC2-008	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Bruce Wappman	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 16 July 2001	CASING RECORD SIZE 3-inch WGT. Steel



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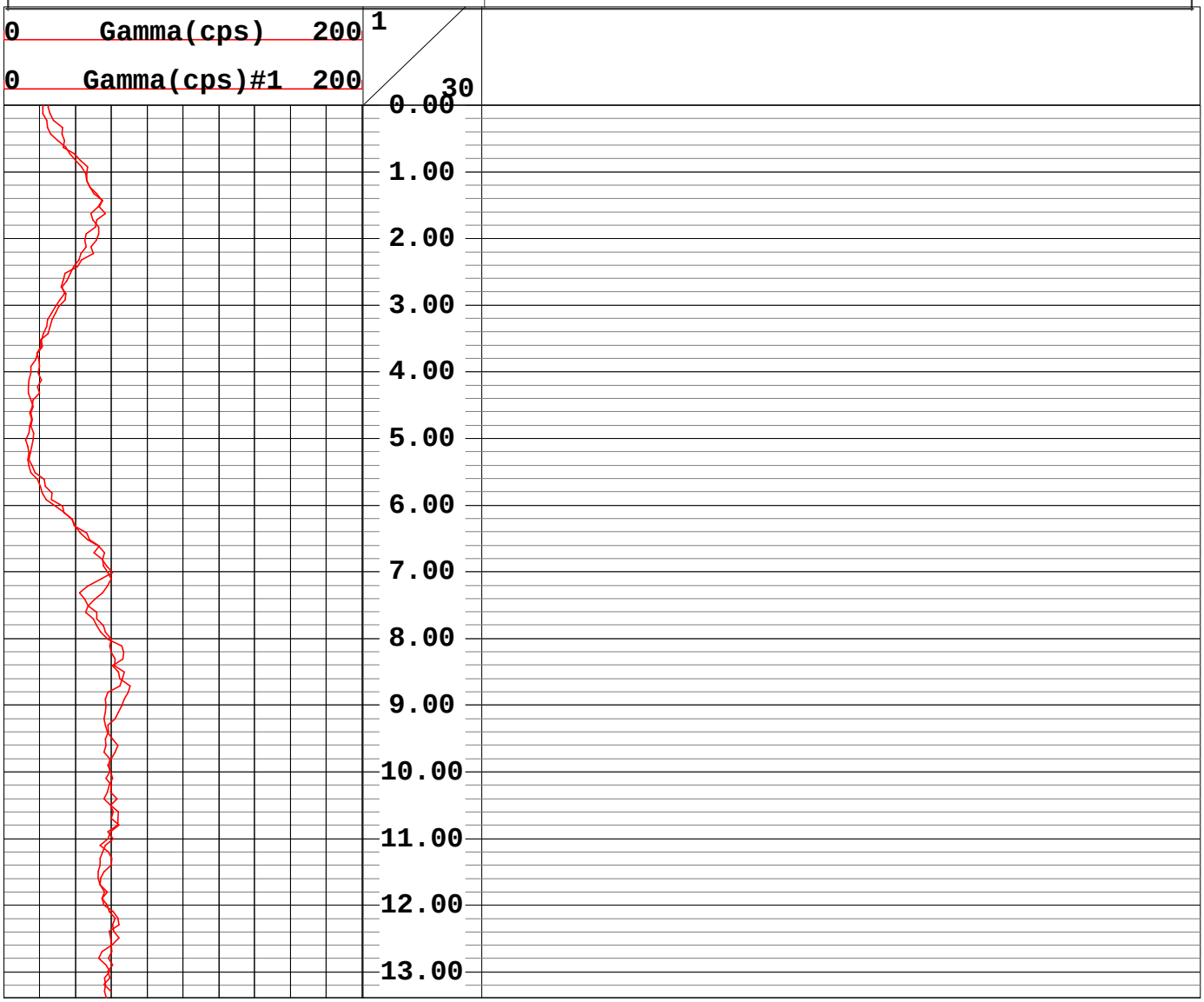
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMFC2-009	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Bruce Wapman	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 15 July 2001	CASING RECORD SIZE 3-inch WGT. Steel



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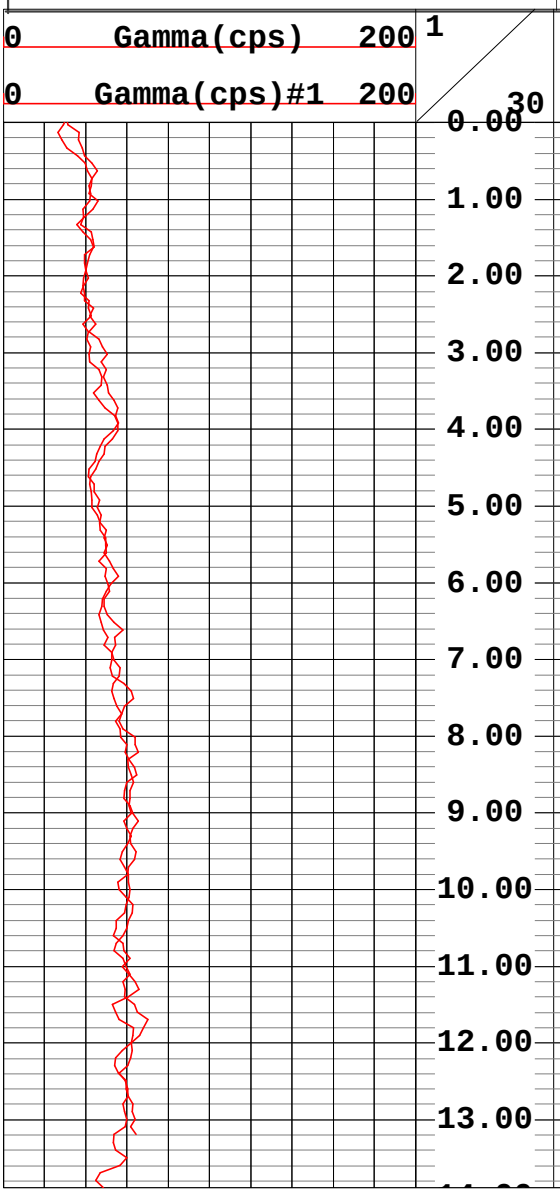
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMFC2-010	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Bruce Wappman	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 16 July 2001	CASING RECORD SIZE None WGT. None



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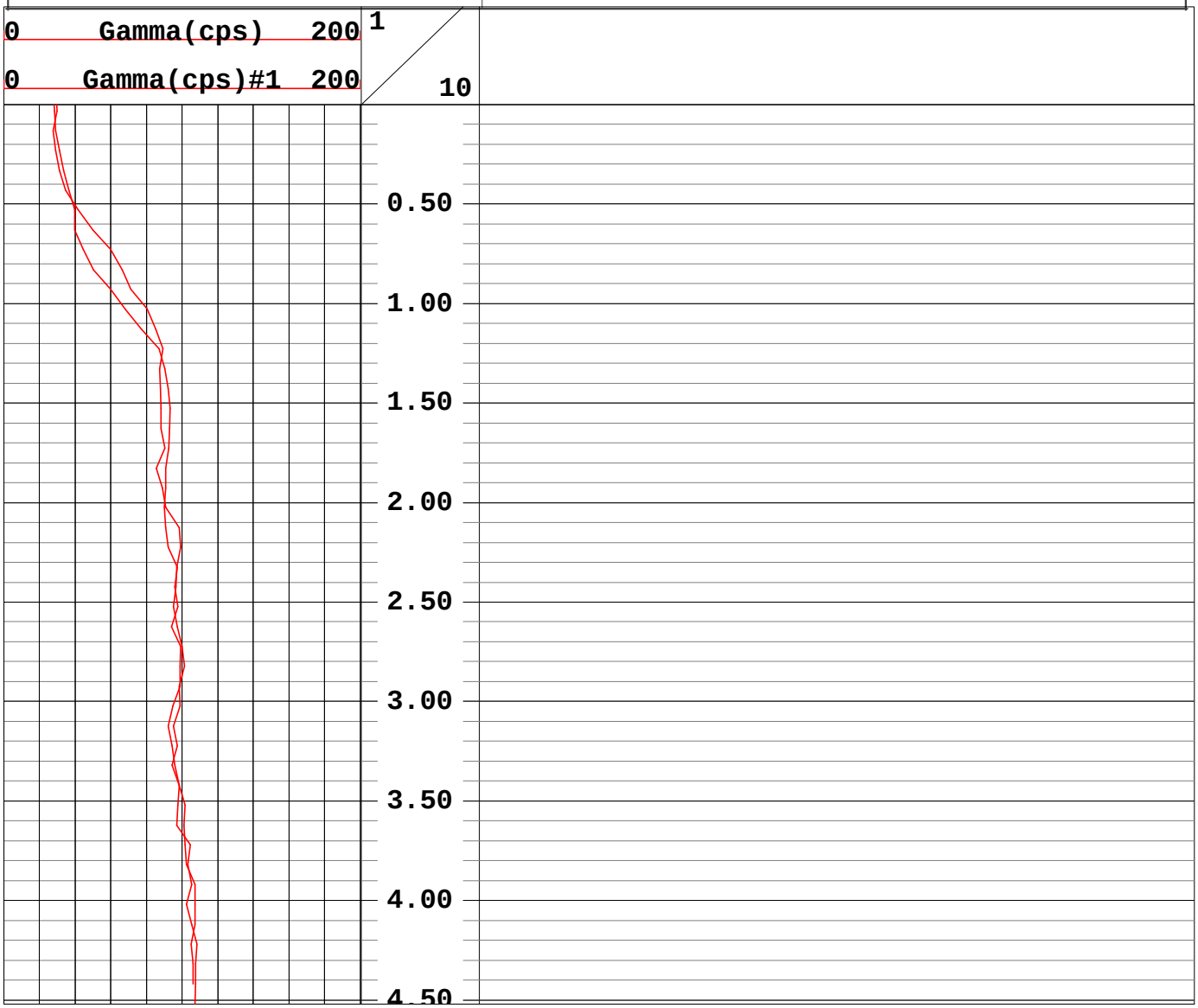
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMFC2-011	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Bruce Wapman	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 13 July 2001	CASING RECORD SIZE None WGT.



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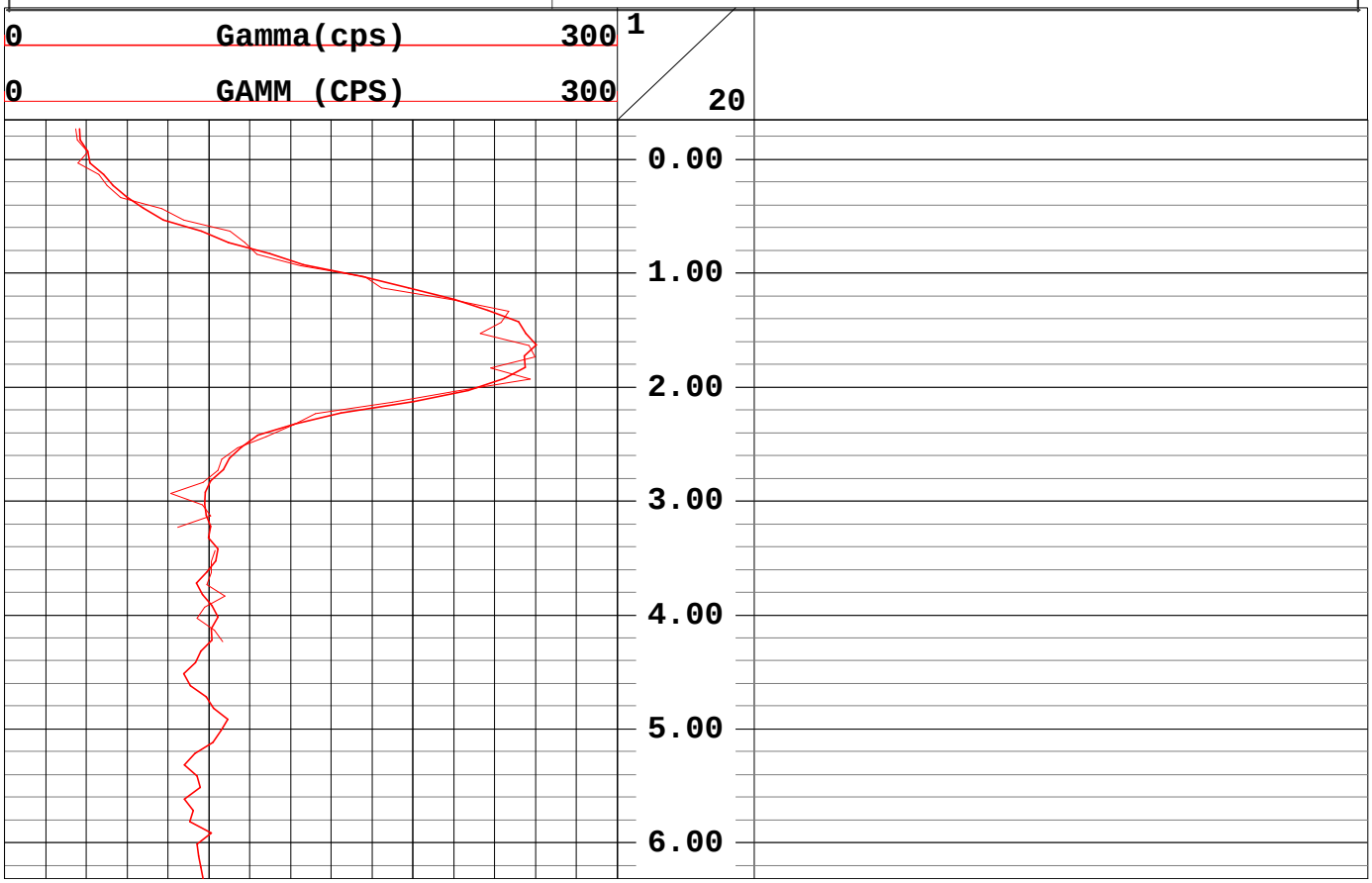
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMFC2-012	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Bruce Wapman	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 13 July 2001	CASING RECORD SIZE None WGT.



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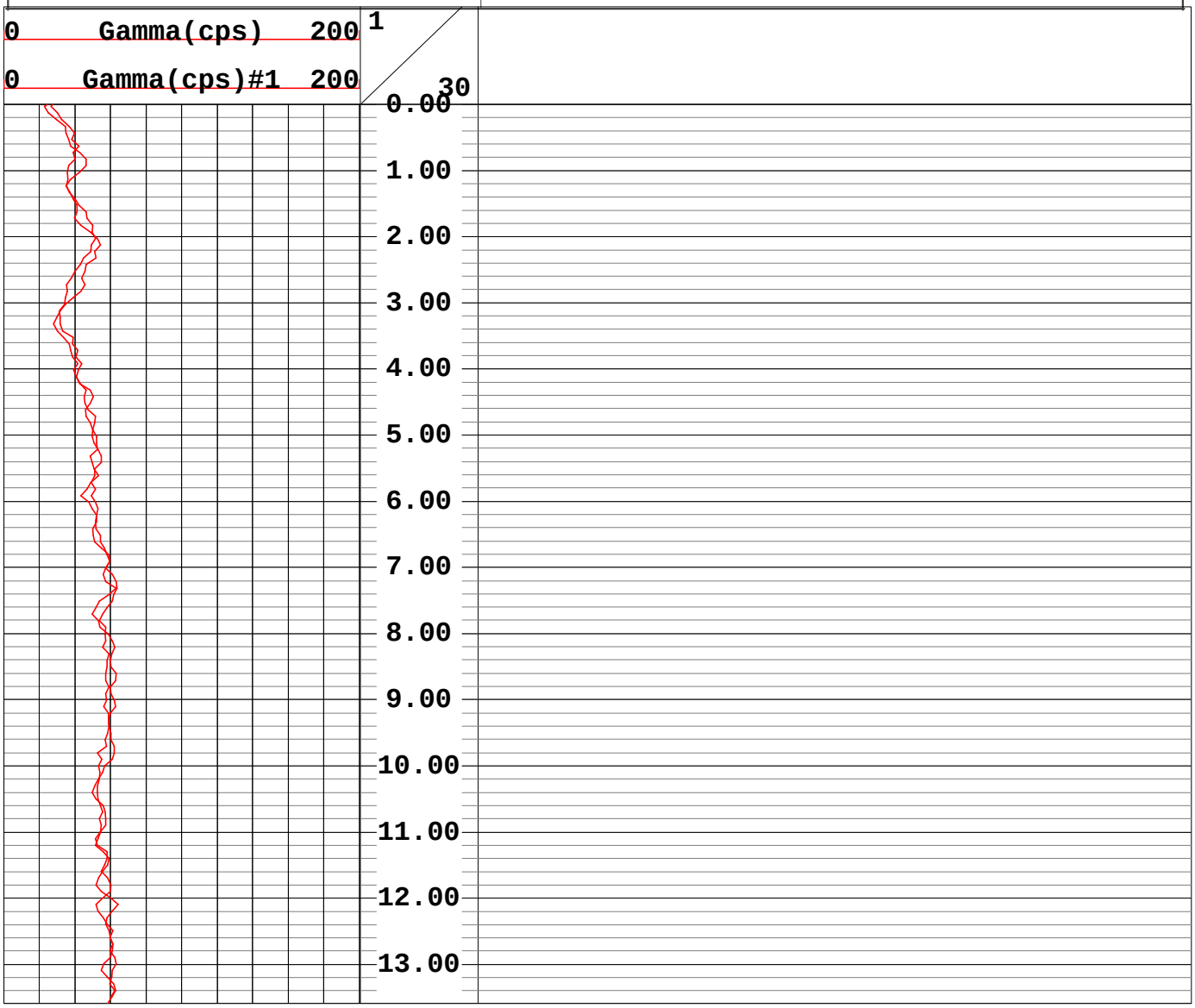
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMFC2-013	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Bruce Wapman	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 14 July 2001	CASING RECORD SIZE 3-inch WGT. Steel



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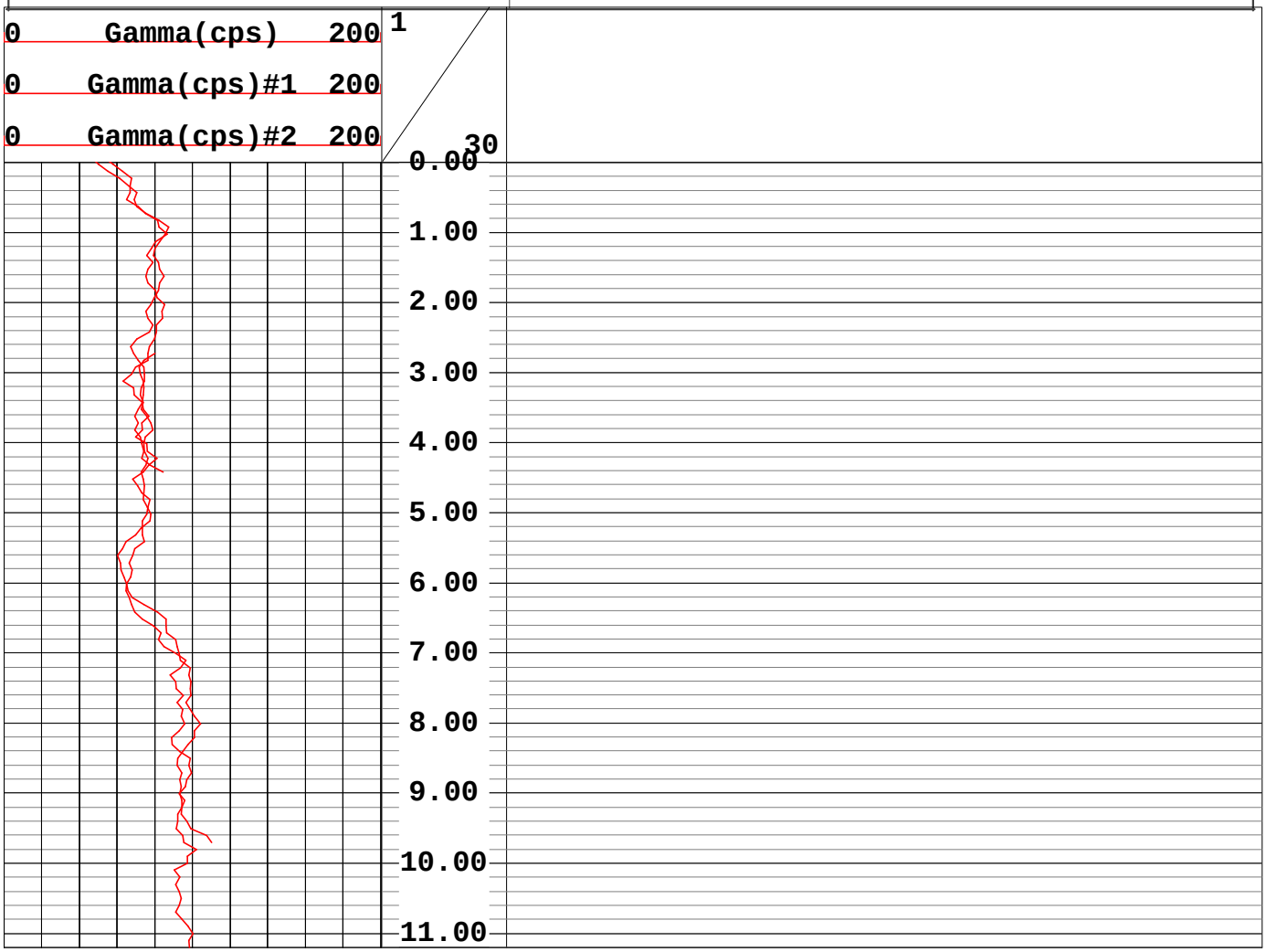
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMFC2-014	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Bruce Wapman	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 15 July 2001	CASING RECORD SIZE None WGT.



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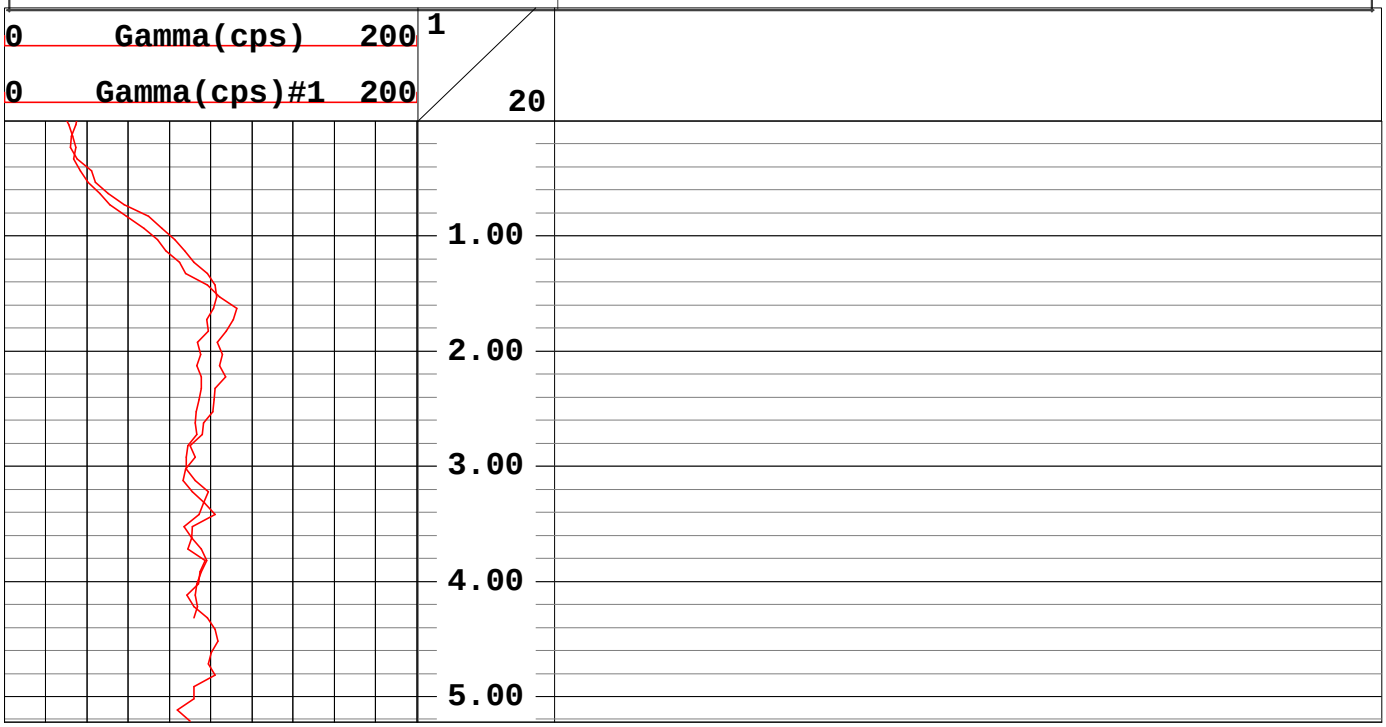
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMFC2-015	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Bruce Wapman	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 13 July 2001	CASING RECORD SIZE None WGT.



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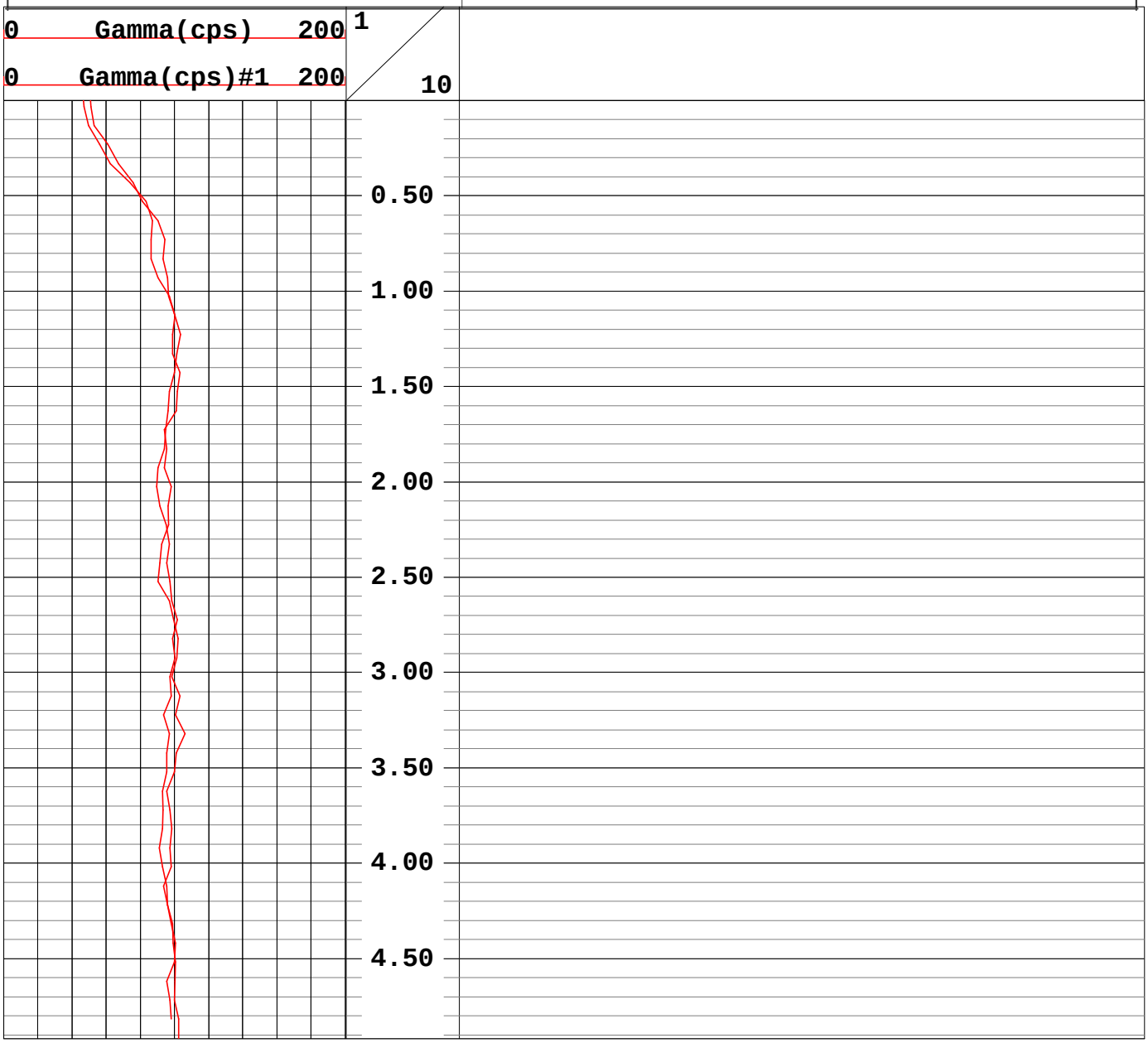
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMFC2-016	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Bruce Wapman	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 13 July 2001	CASING RECORD SIZE None WGT.



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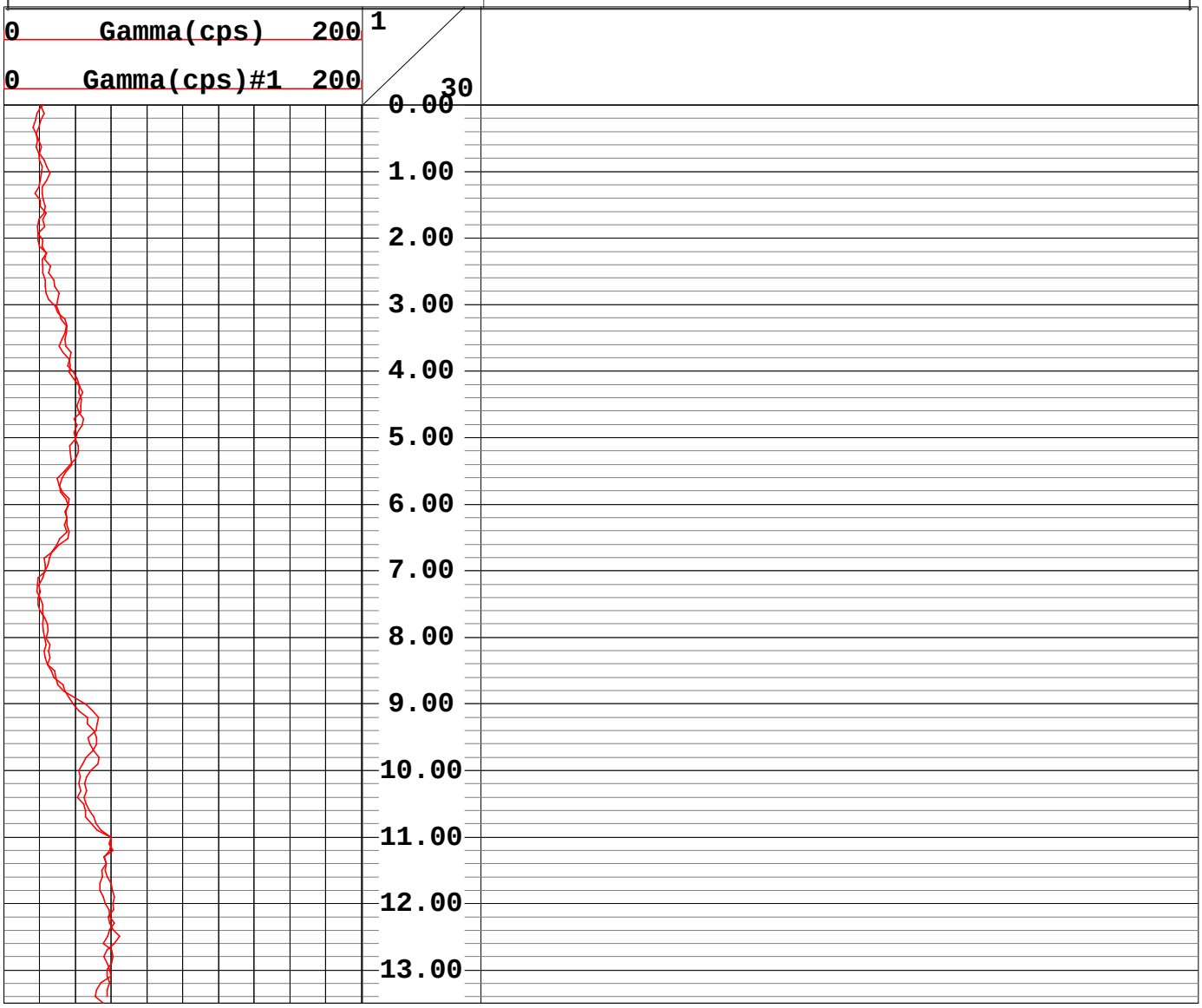
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMFC2-017	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Bruce Wapman	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 14 July 2001	CASING RECORD SIZE 3-inch WGT. Steel



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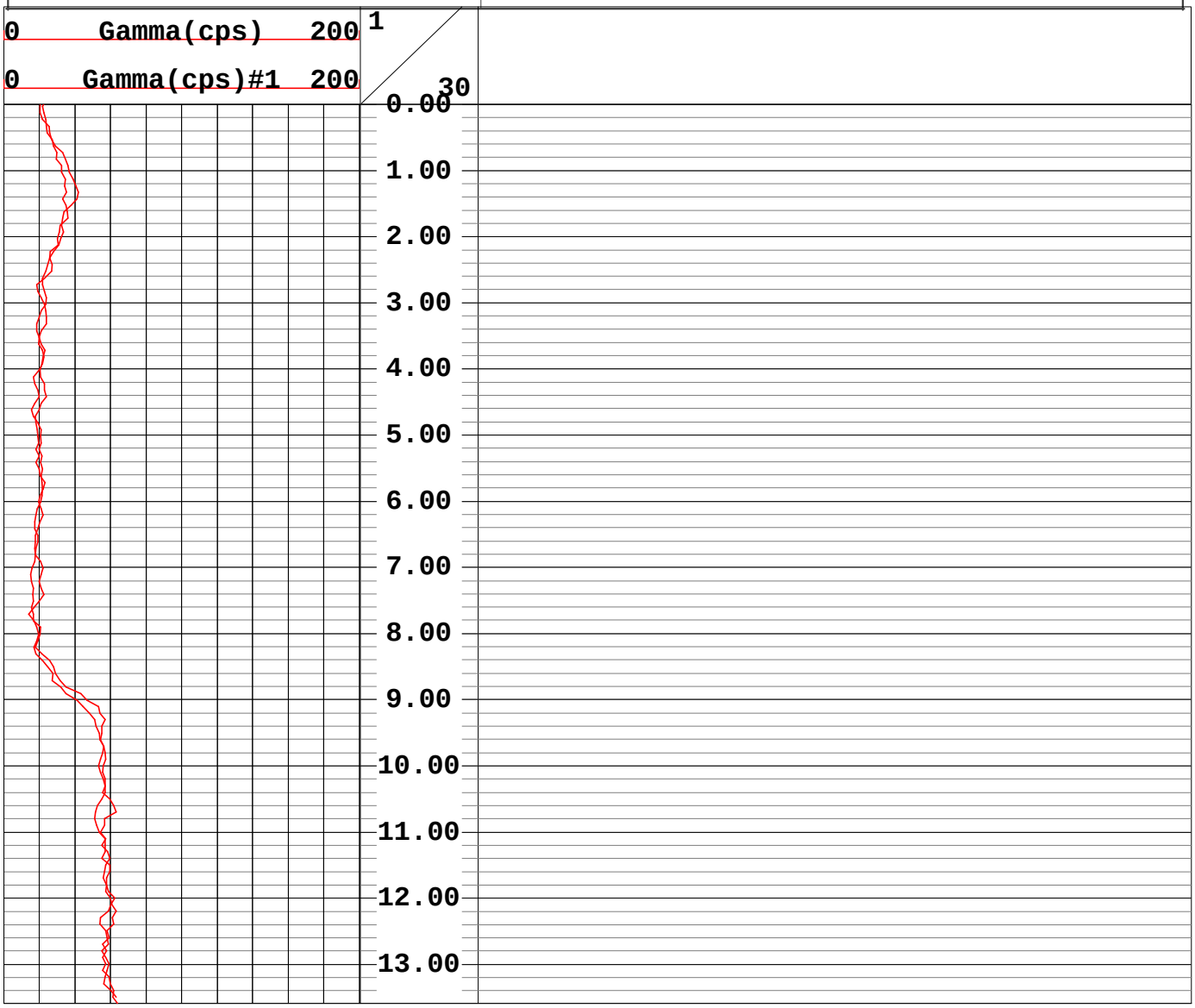
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMFC2-018	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Bruce Wapman	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 14 July 2001	CASING RECORD SIZE 3-inch WGT. Steel



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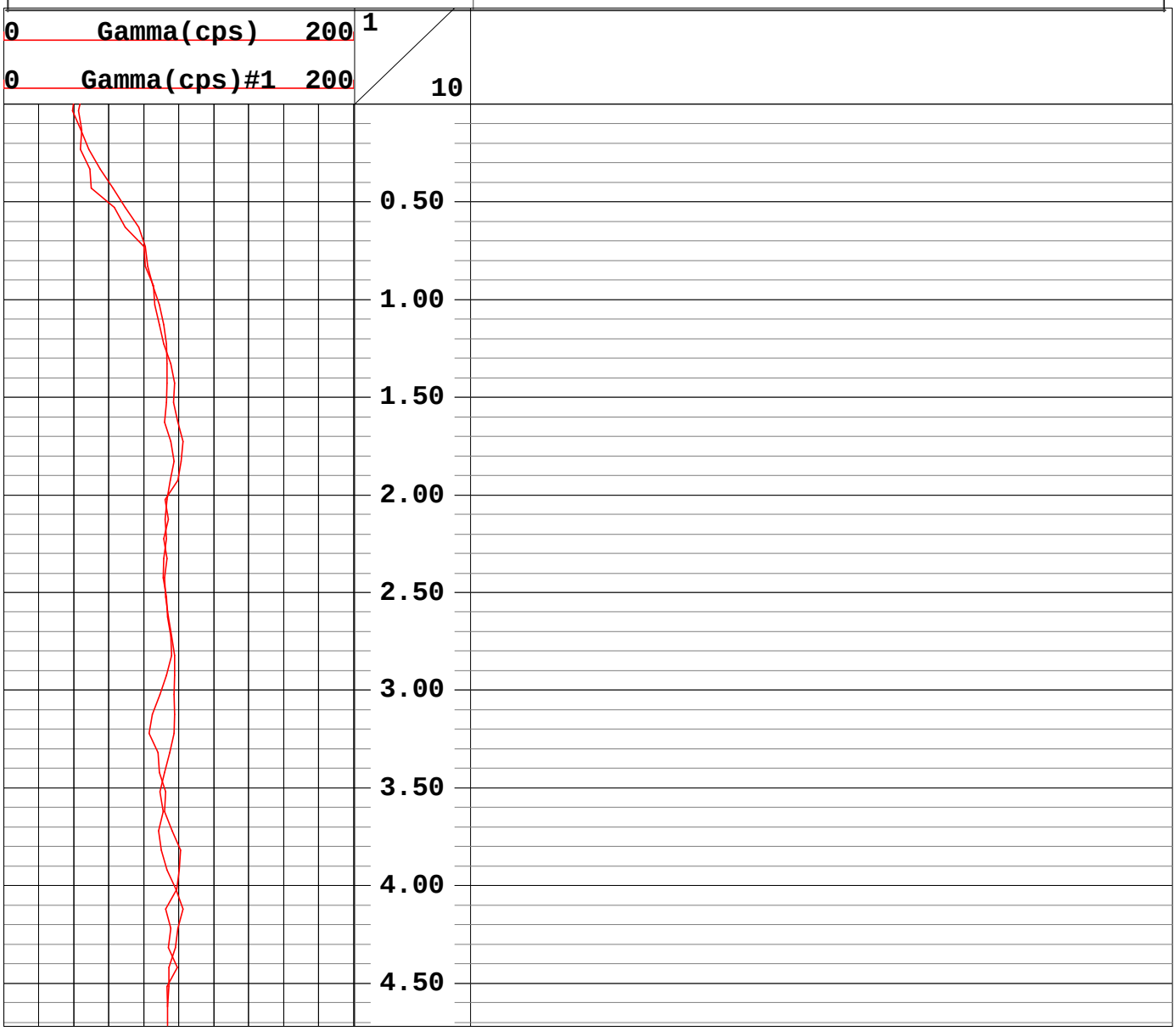
CLIENT	ACOE-Buffalo/FUSRAP	LOG MEAS. FROM	Ground Surface
WELL	TMFC2-019	ELEVATION	
SITE	Tonawanda Landfill	BTM LOGGED INTERVAL	
CITY	Tonawanda	TOP LOGGED INTERVAL	
STATE	New York	TYPE FLUID IN HOLE	Air
		LEVEL	
RECORDED BY	Bruce Wapman	BOREHOLE RECORD BIT	Geoprobe
WITNESSED BY			
DATE	12 July 2001	CASING RECORD	SIZE None WGT.



Mudflats
Class 3A Random

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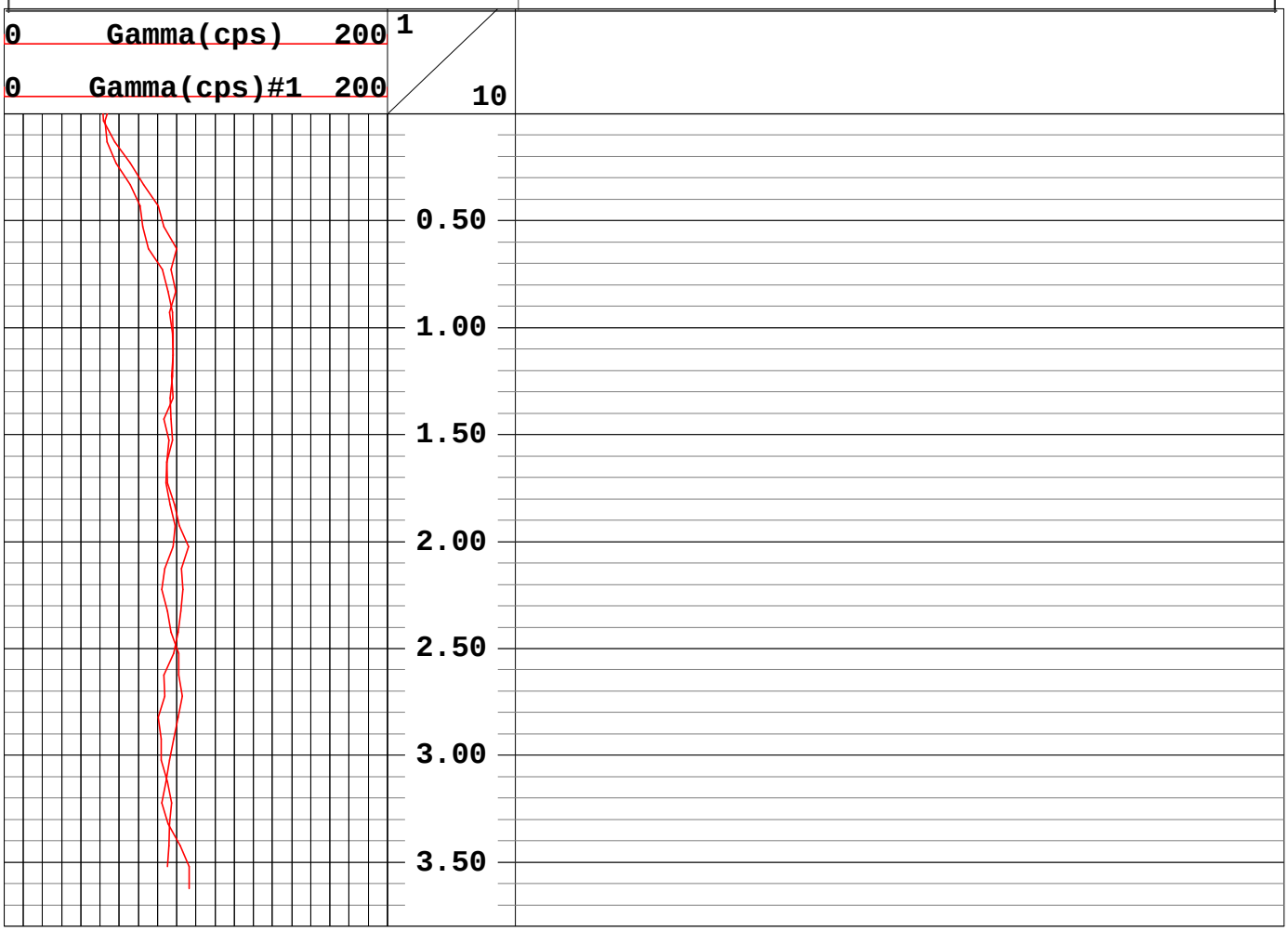
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMF3A-001	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Rick Hoover	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 30 June 2001	CASING RECORD SIZE None WGT. None



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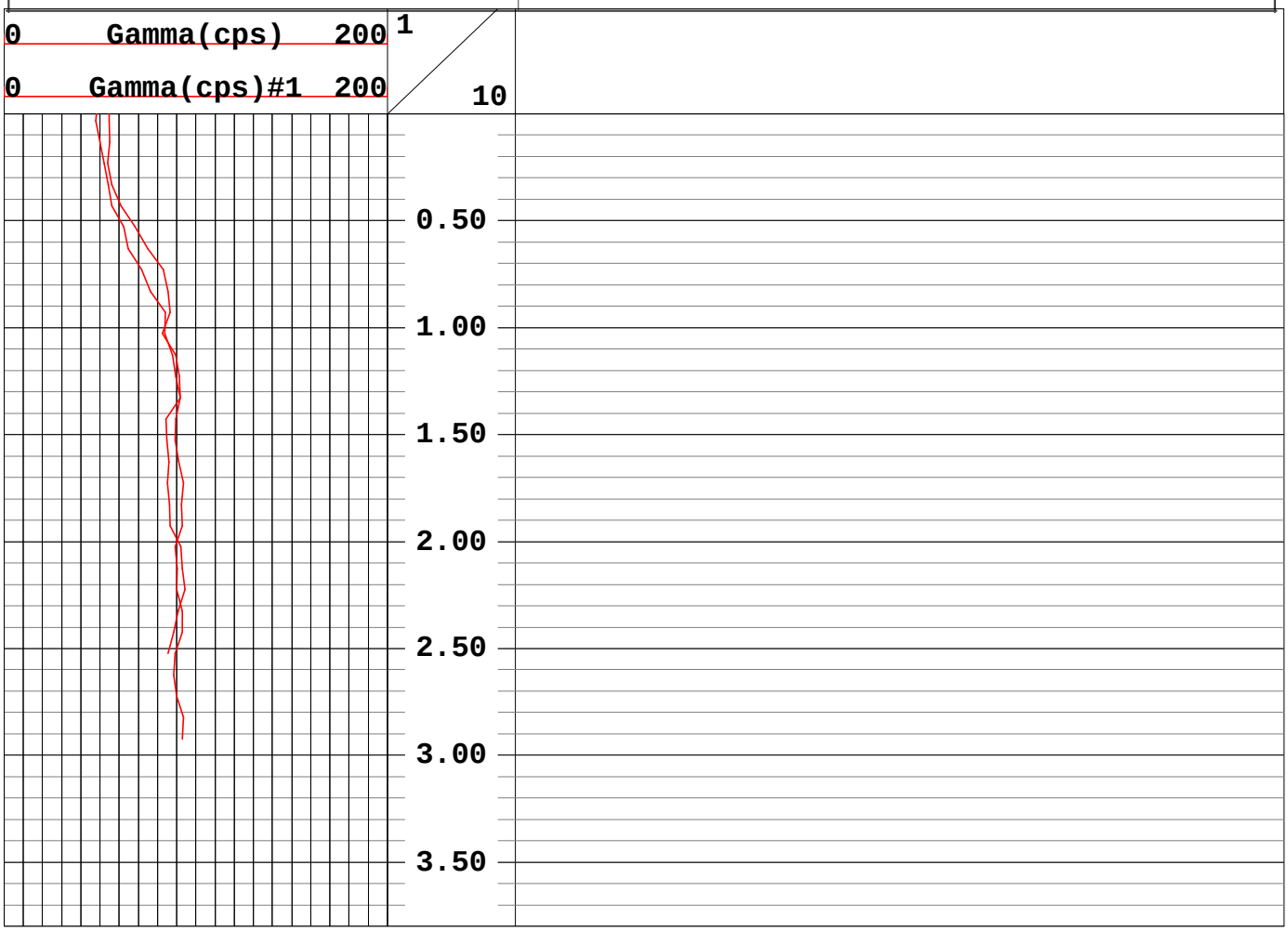
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMF3A-002	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Rick Hoover	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 30 June 2001	CASING RECORD SIZE None WGT. None



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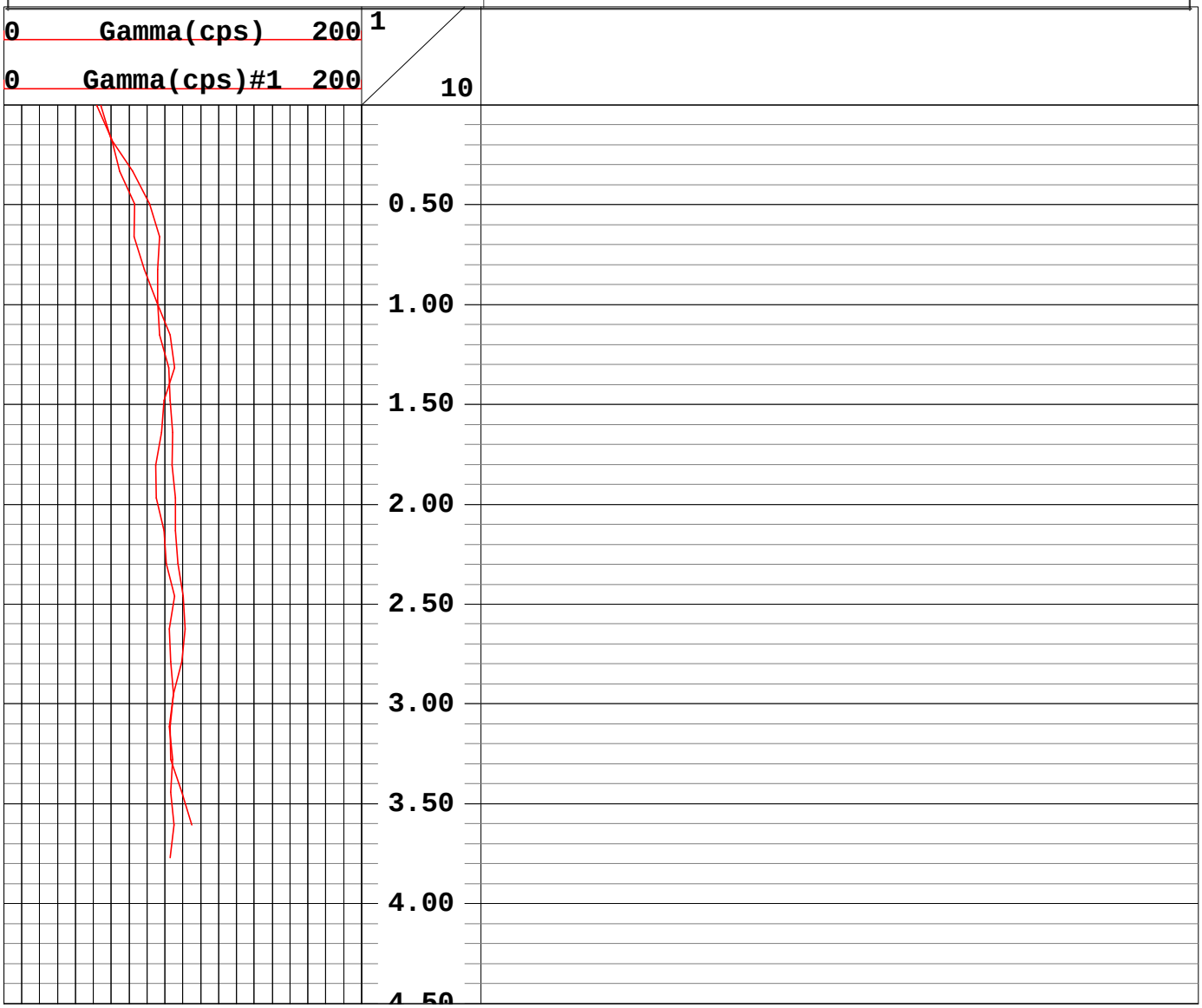
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMF3A-003	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Rick Hoover	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 1 July 2001	CASING RECORD SIZE None WGT. None



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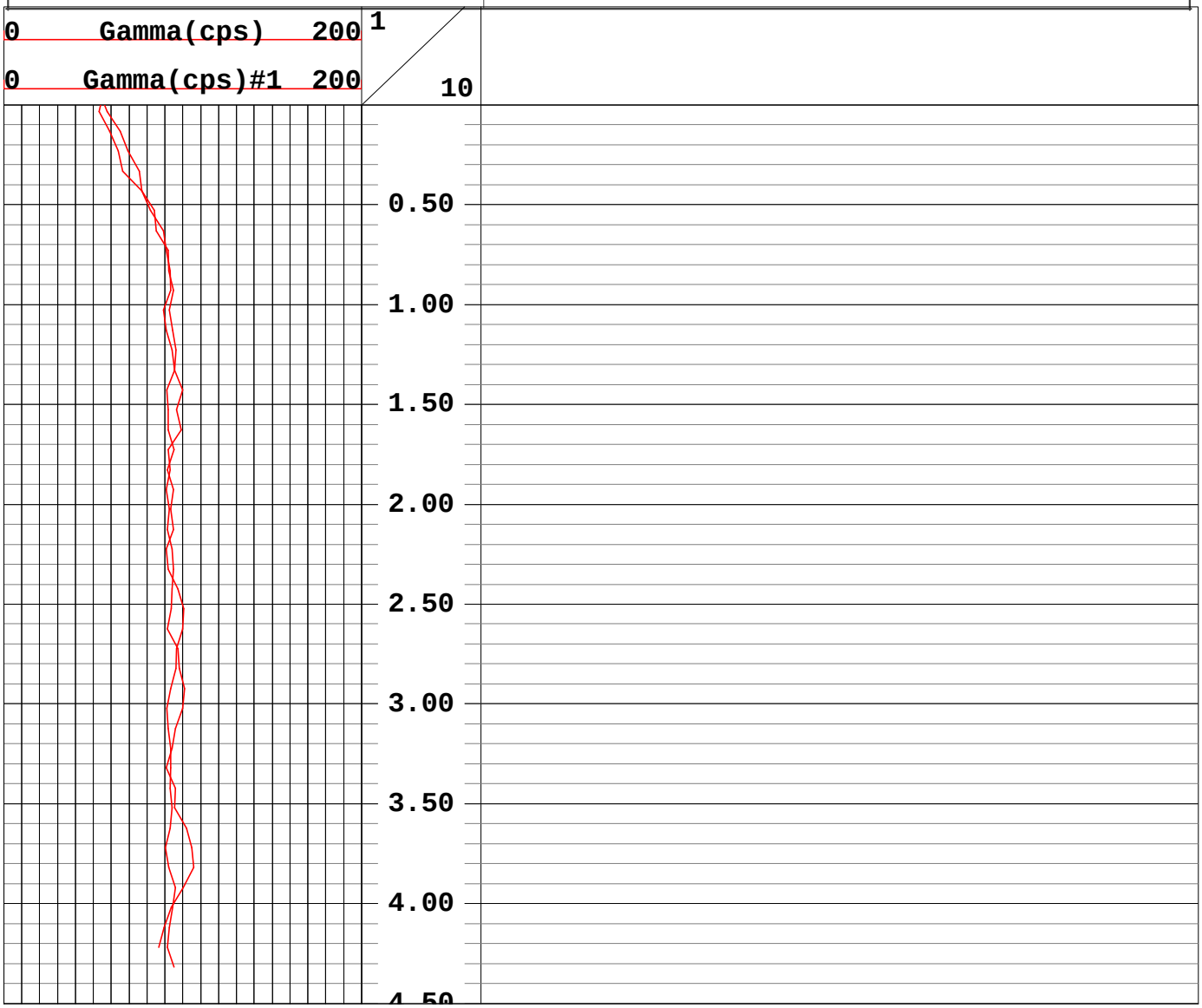
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMF3A-004	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Rick Hoover	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 1 July 2001	CASING RECORD SIZE None WGT. None



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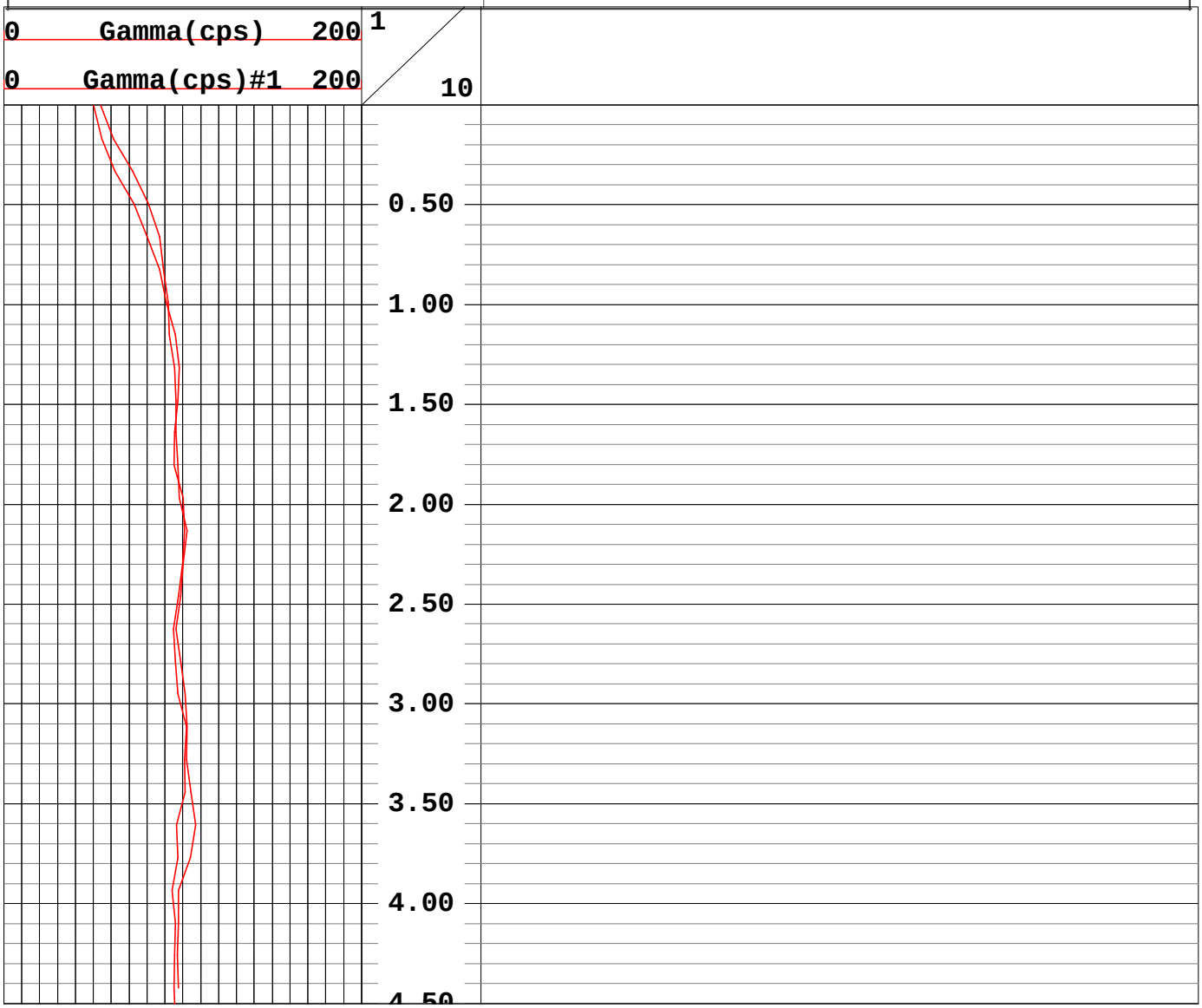
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMF3A-006	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Rick Hoover	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 1 July 2001	CASING RECORD SIZE None WGT. None



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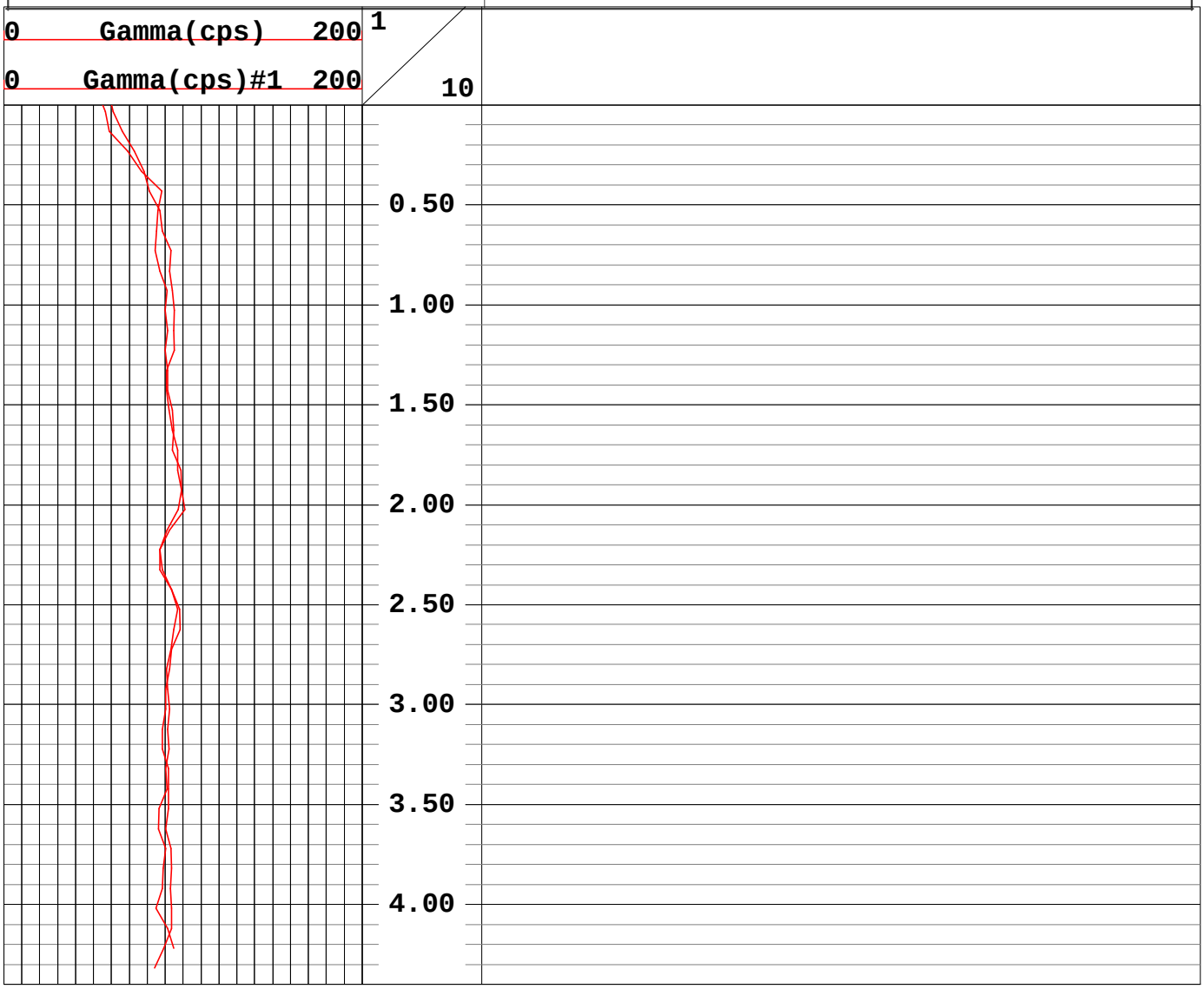
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMF3A-007	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Rick Hoover	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 30 June 2001	CASING RECORD SIZE None WGT. None



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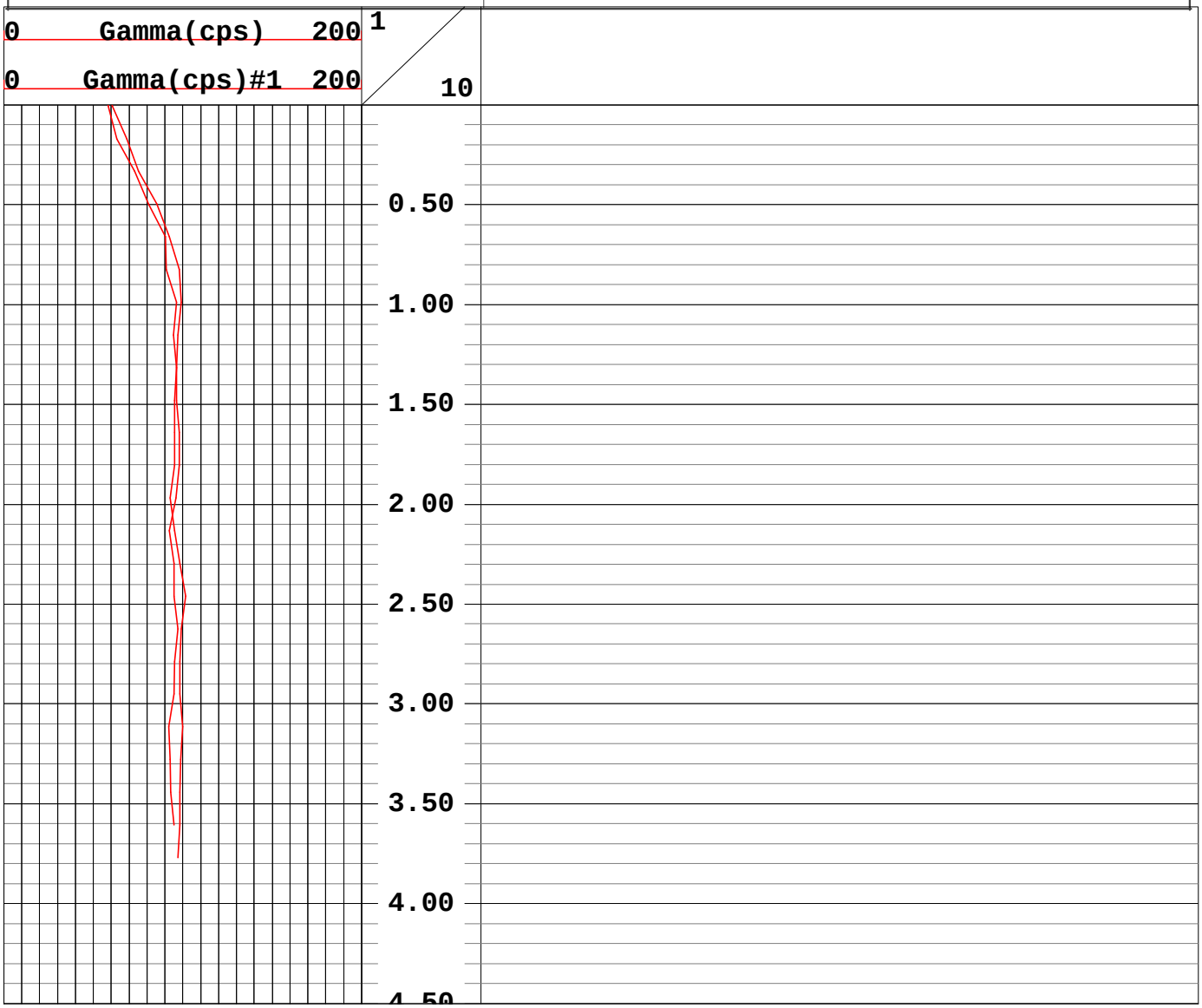
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMF3A-008	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Rick Hoover	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 1 July 2001	CASING RECORD SIZE None WGT. None



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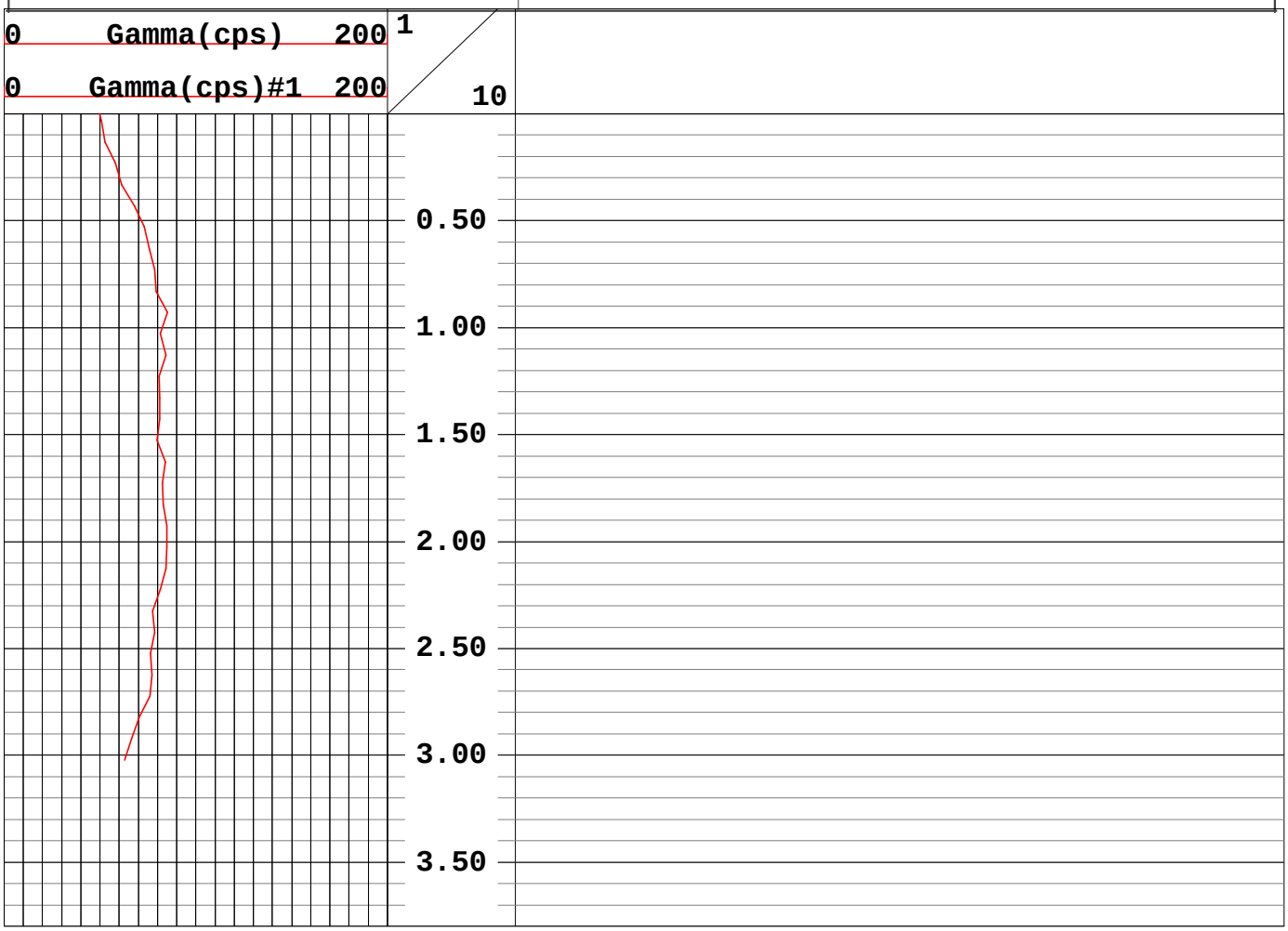
CLIENT **ACOE-Buffalo/FUSRAP**	LOG MEAS. FROM Ground Surface
WELL **TMF3A-009**	ELEVATION
SITE **Tonawanda Landfill**	BTM LOGGED INTERVAL
CITY **Tonawanda**	TOP LOGGED INTERVAL
STATE **New York**	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Rick Hoover	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 30 June 2001	CASING RECORD SIZE None WGT. None



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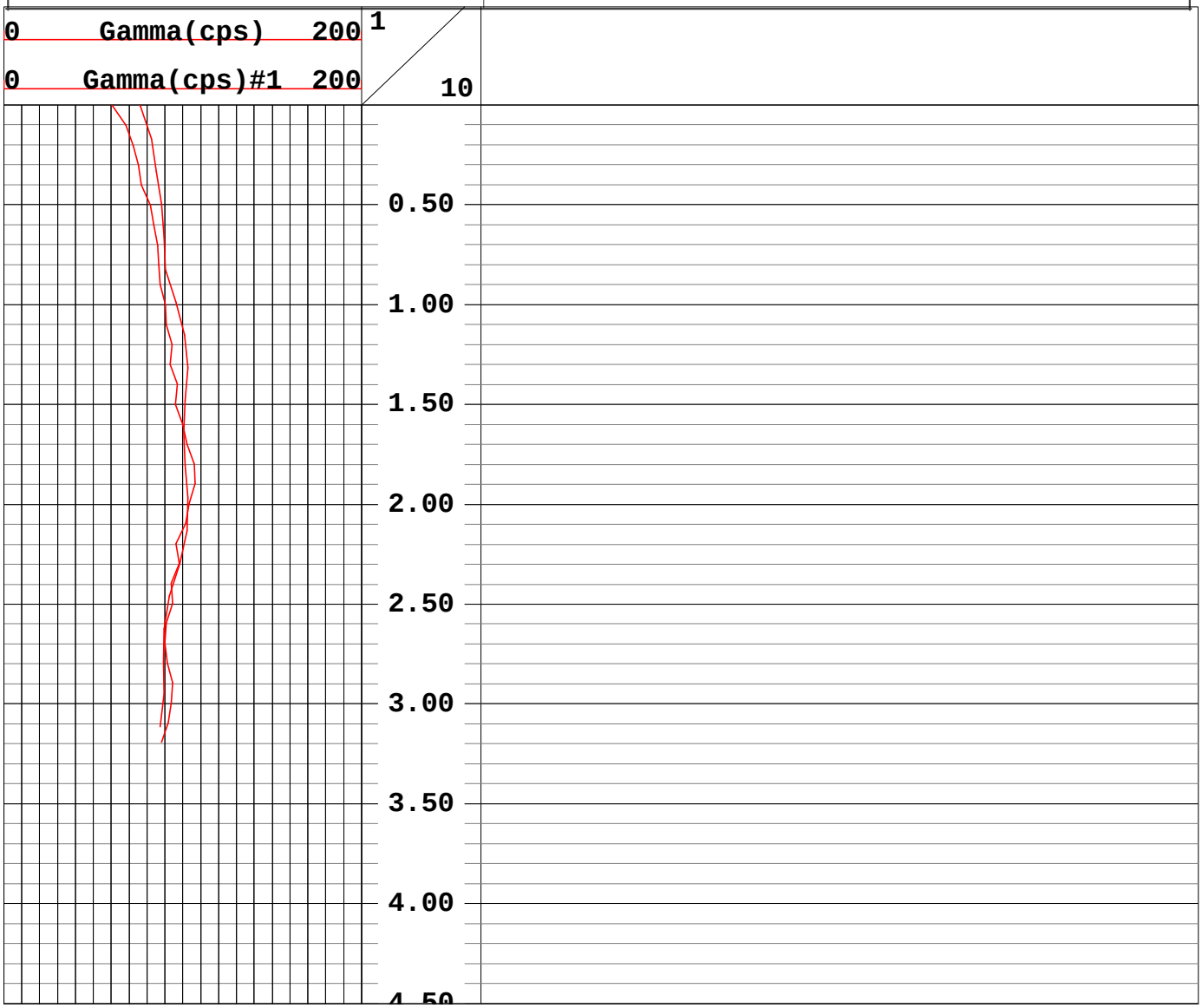
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMF3A-010	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Rick Hoover	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 1 July 2001	CASING RECORD SIZE None WGT. None



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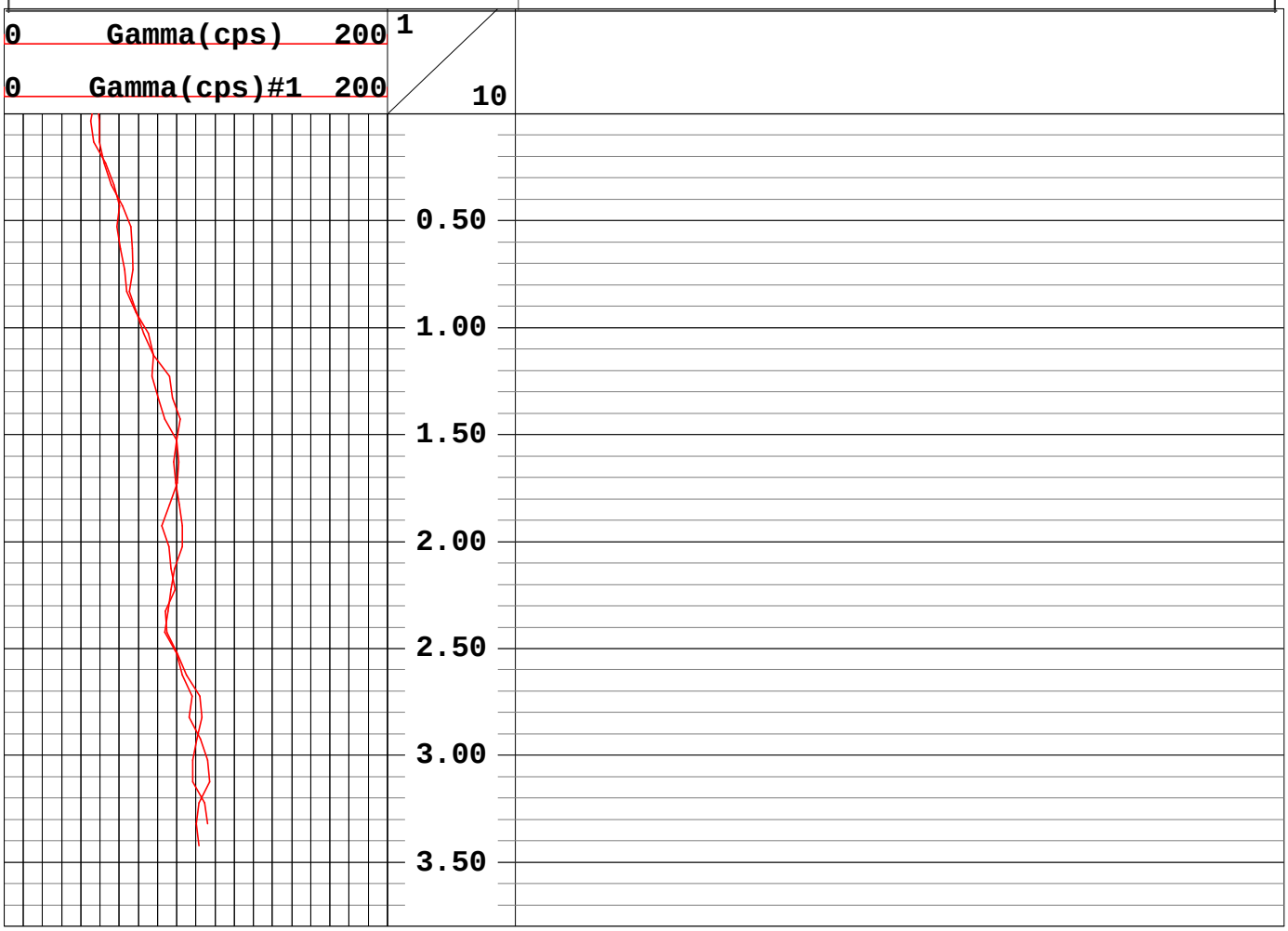
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMF3A-011	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Rick Hoover	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 30 June 2001	CASING RECORD SIZE None WGT. None



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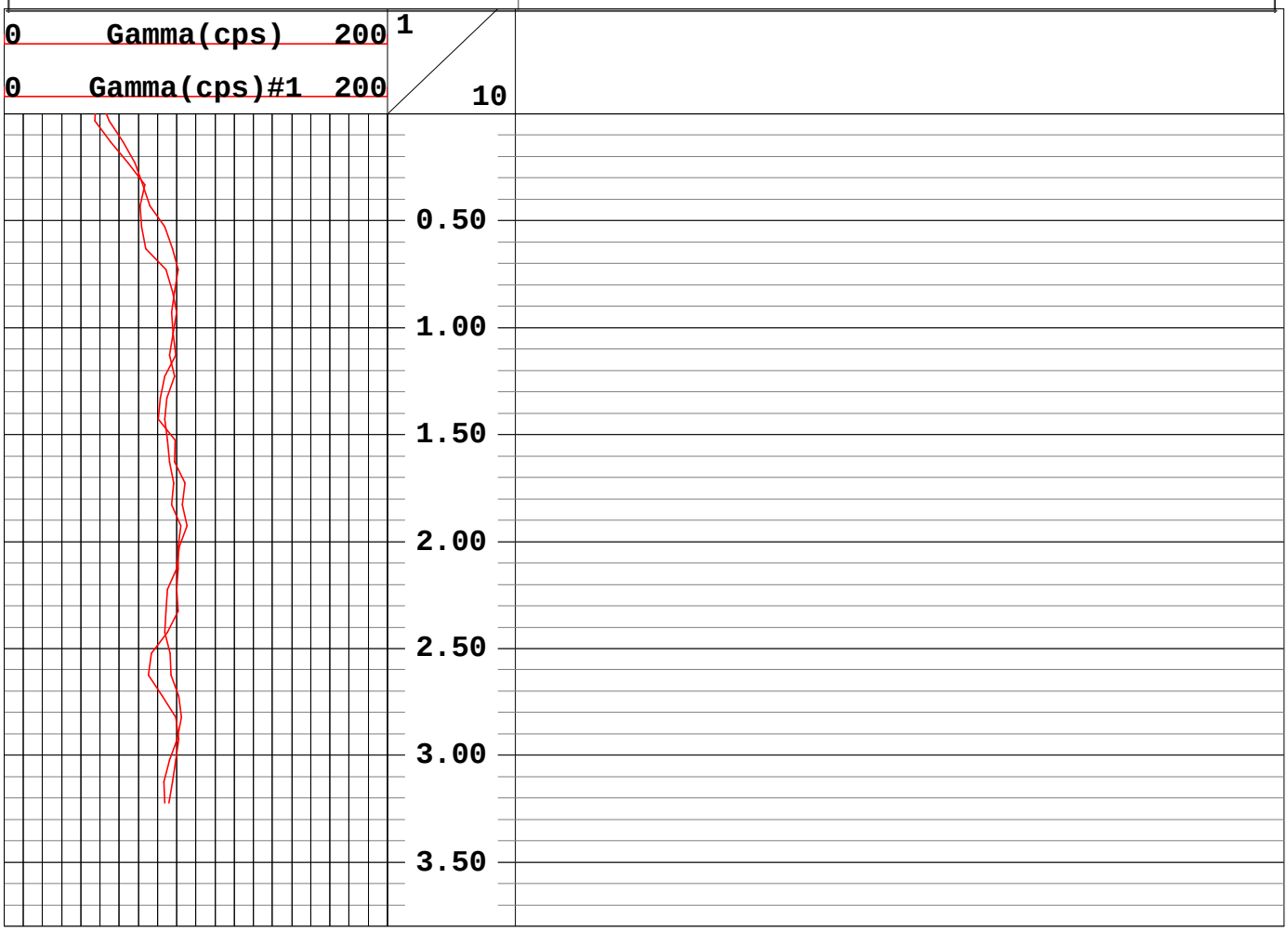
CLIENT **ACOE-Buffalo/FUSRAP**	LOG MEAS. FROM Ground Surface
WELL **TMF3A-012**	ELEVATION
SITE **Tonawanda Landfill**	BTM LOGGED INTERVAL
CITY **Tonawanda**	TOP LOGGED INTERVAL
STATE **New York**	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Rick Hoover	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 30 June 2001	CASING RECORD SIZE None WGT. None



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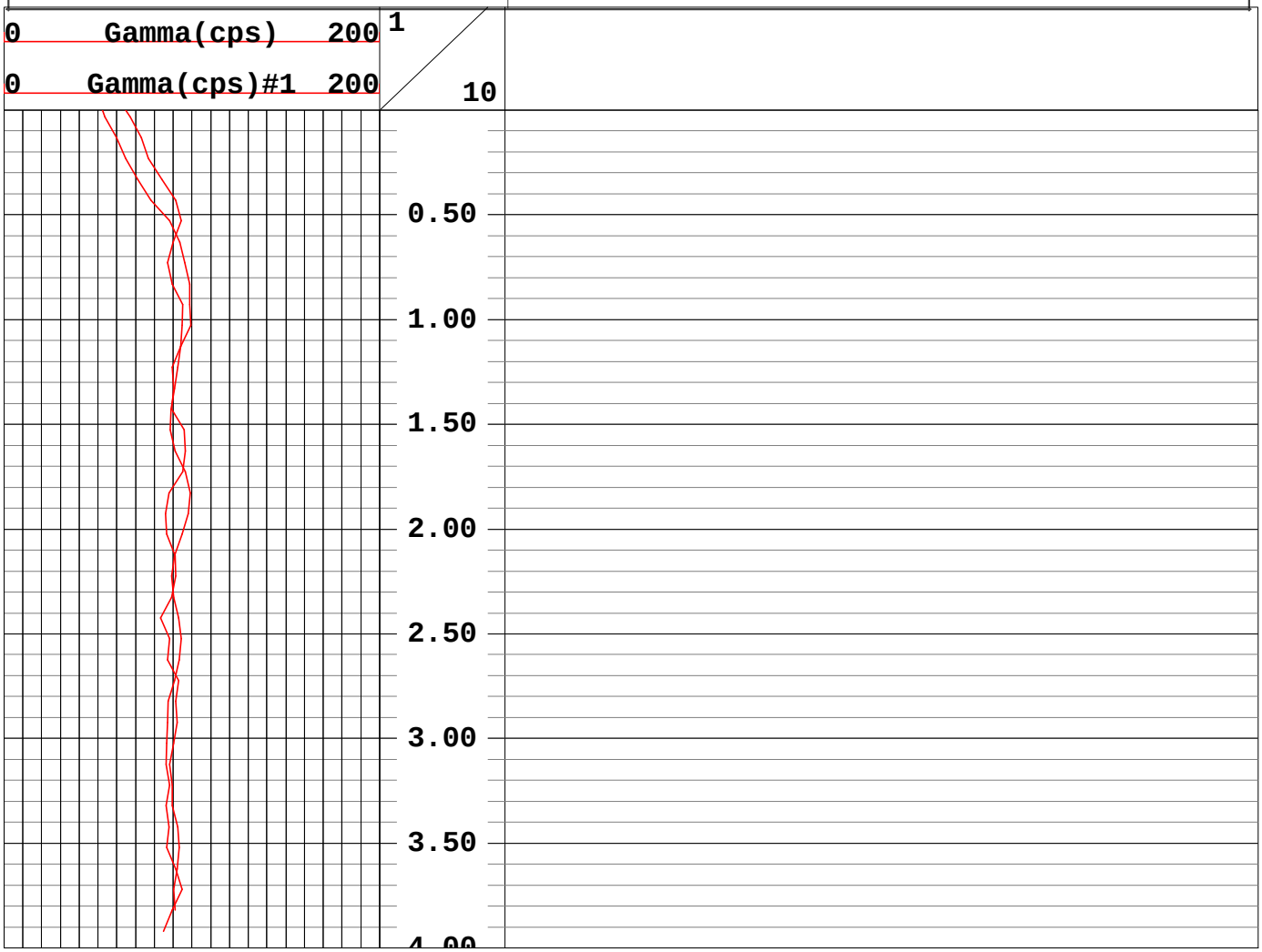
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMF3A-014	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Rick Hoover	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 30 June 2001	CASING RECORD SIZE None WGT. None



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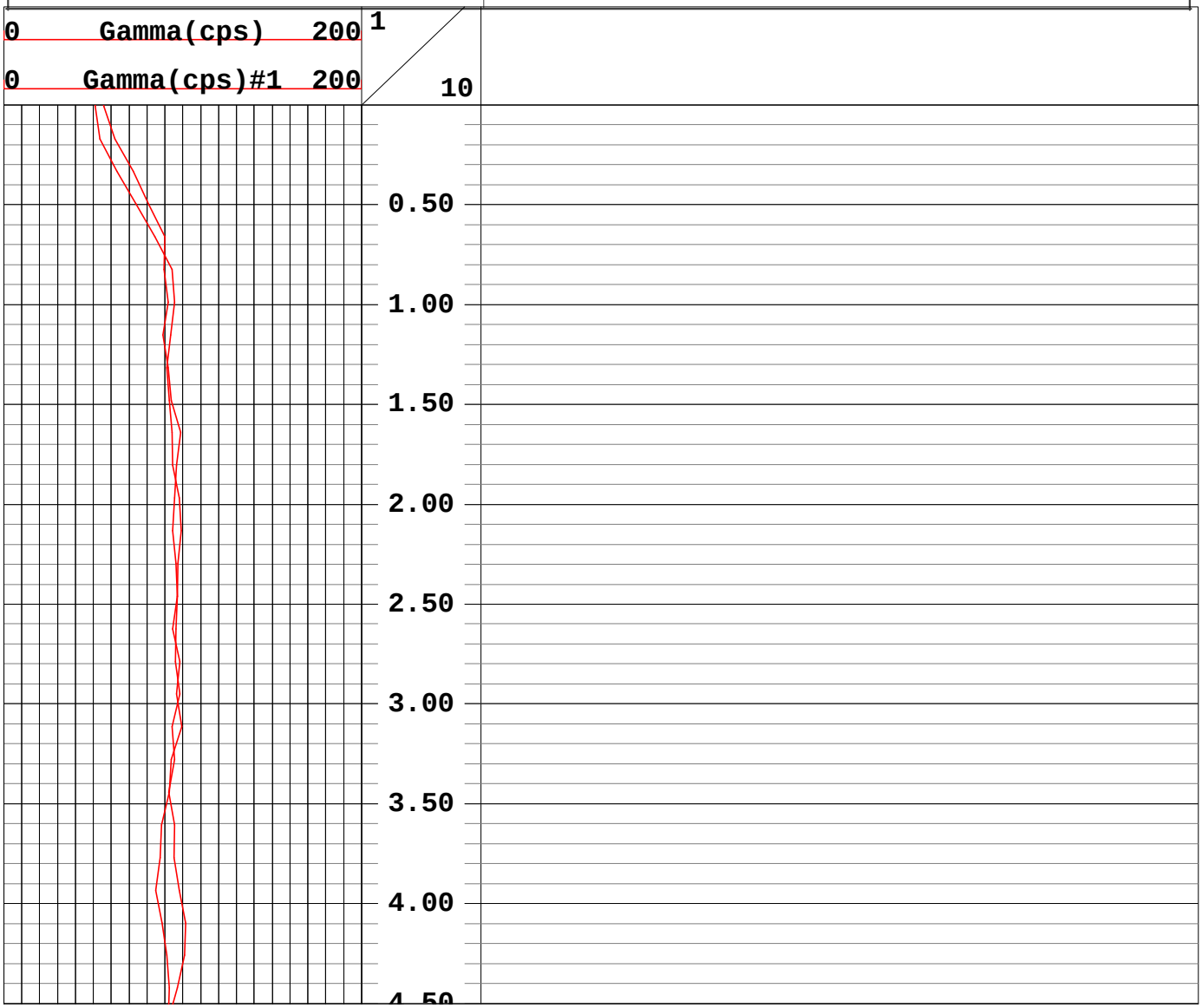
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMF3A-017	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Rick Hoover	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 1 July 2001	CASING RECORD SIZE None WGT. None



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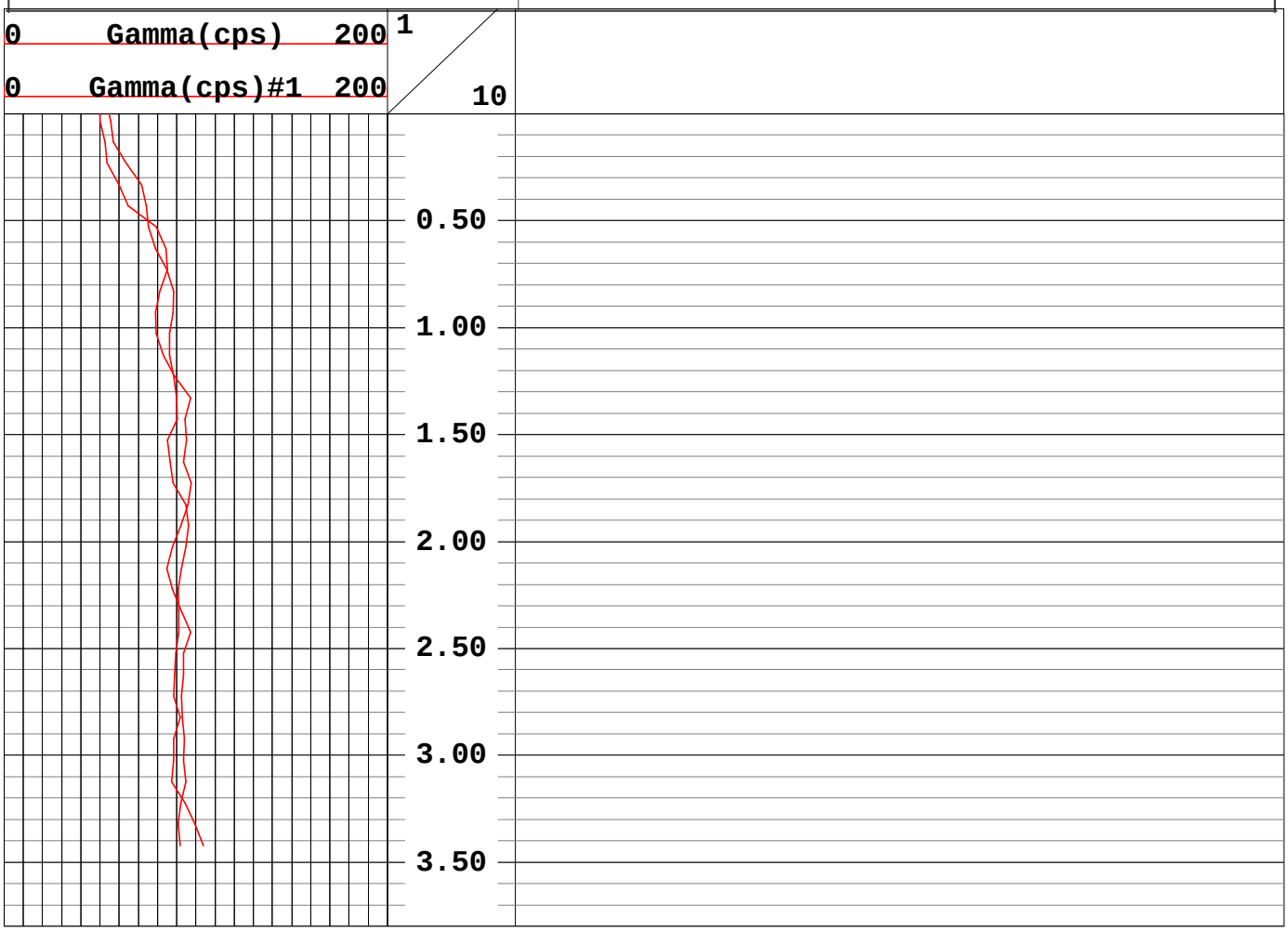
CLIENT **ACOE-Buffalo/FUSRAP**	LOG MEAS. FROM Ground Surface
WELL **TMF3A-020**	ELEVATION
SITE **Tonawanda Landfill**	BTM LOGGED INTERVAL
CITY **Tonawanda**	TOP LOGGED INTERVAL
STATE **New York**	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Rick Hoover	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 30 June 2001	CASING RECORD SIZE None WGT. None



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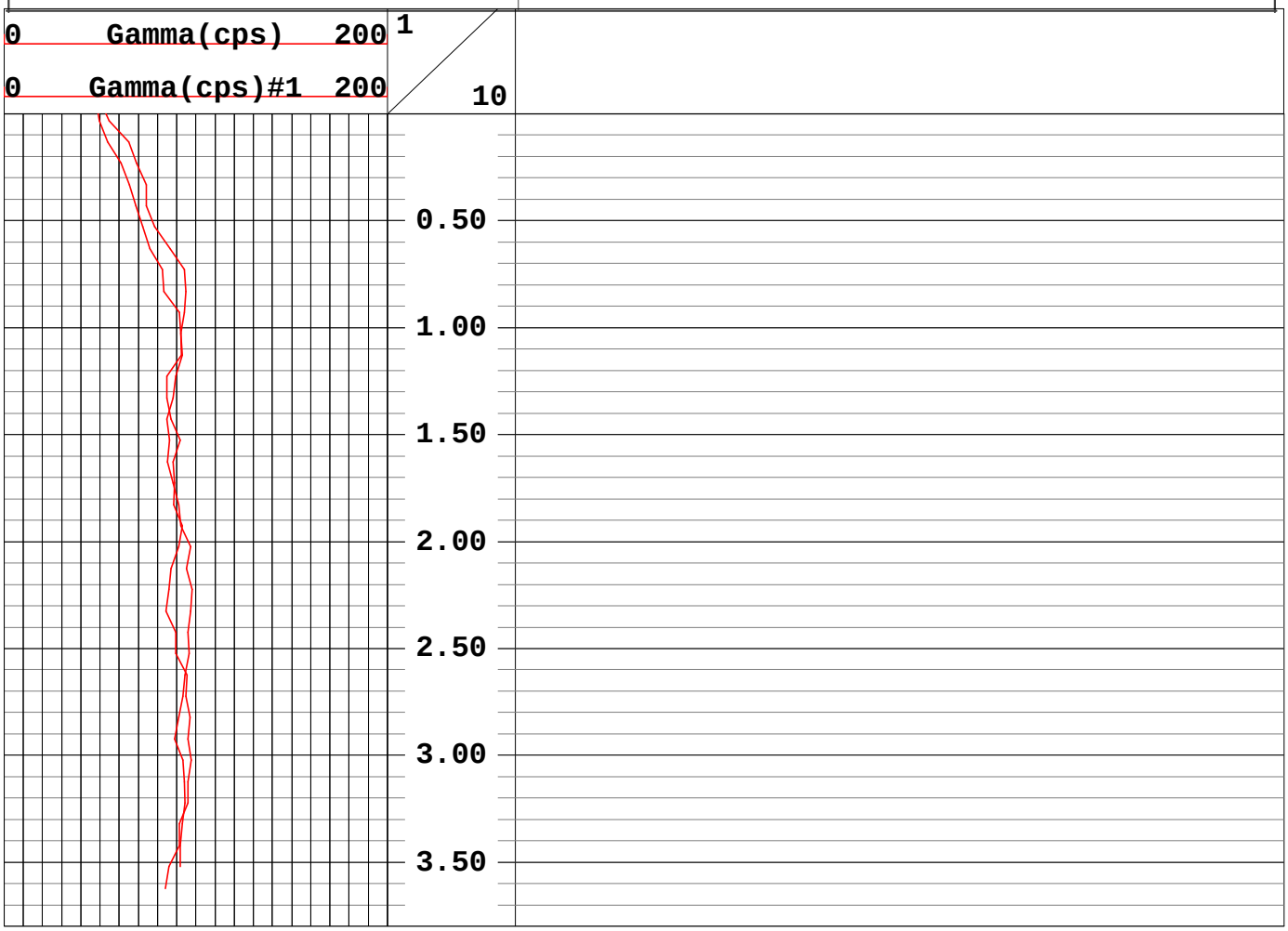
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMF3A-021	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Rick Hoover	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 30 June 2001	CASING RECORD SIZE None WGT. None



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CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMF3A-022	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Rick Hoover	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 1 July 2001	CASING RECORD SIZE None WGT. None

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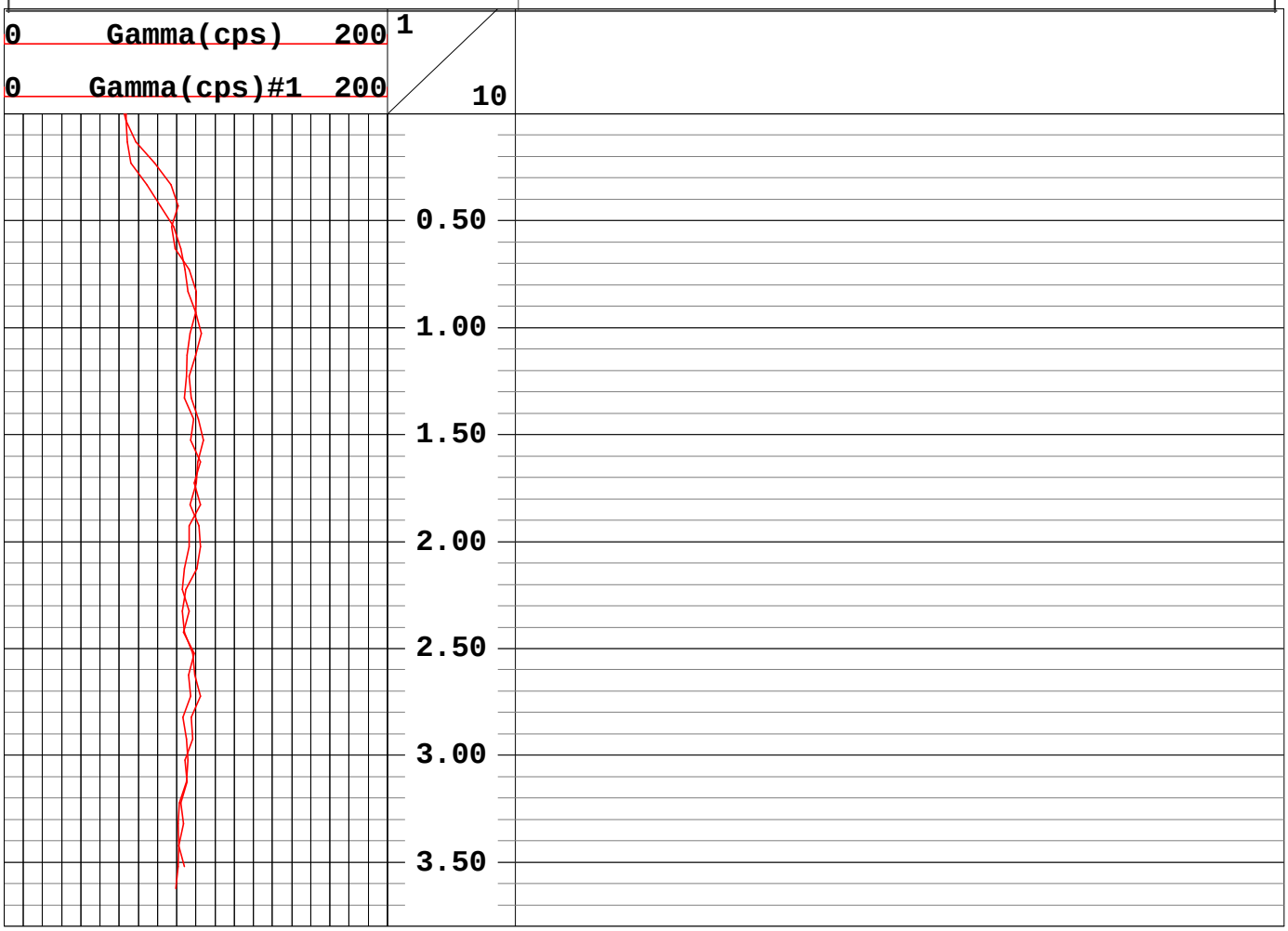
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMF3A-023	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Rick Hoover	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 30 June 2001	CASING RECORD SIZE None WGT. None



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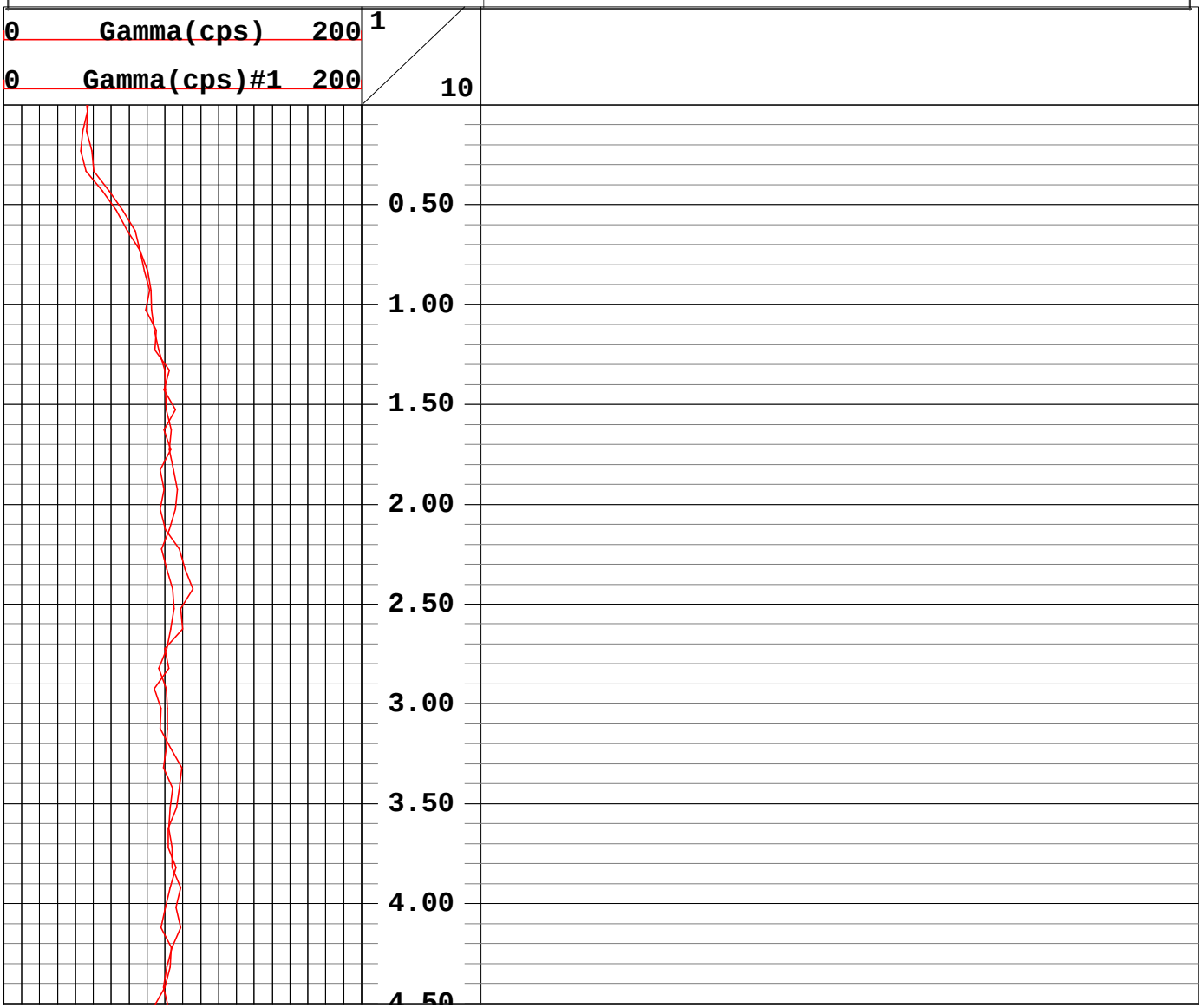
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMF3A-024	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Rick Hoover	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 1 July 2001	CASING RECORD SIZE None WGT. None



Mudflats
Class 3B Biased

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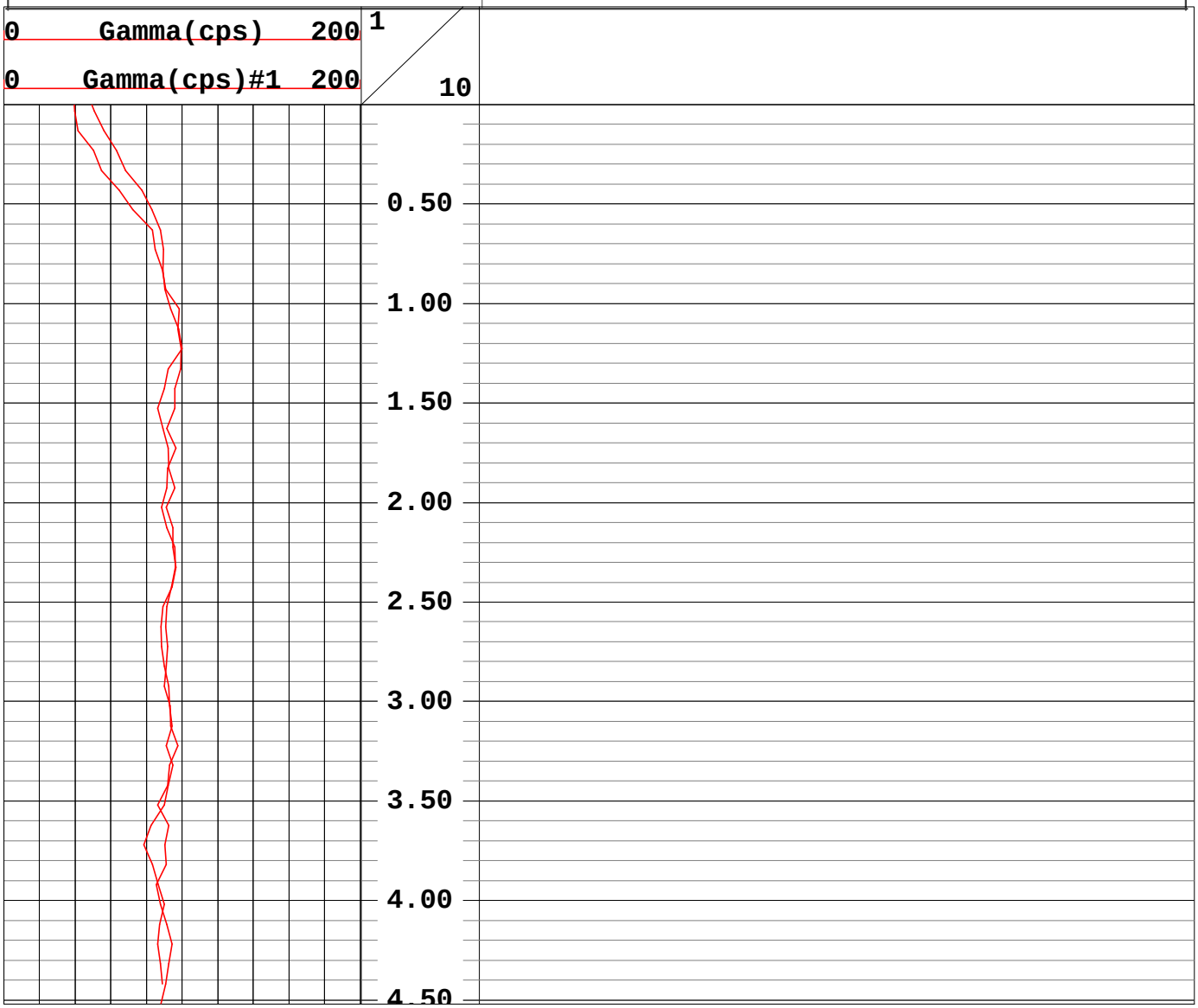
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMF3B-050	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Bruce Wapman	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 11 July 2001	CASING RECORD SIZE None WGT.



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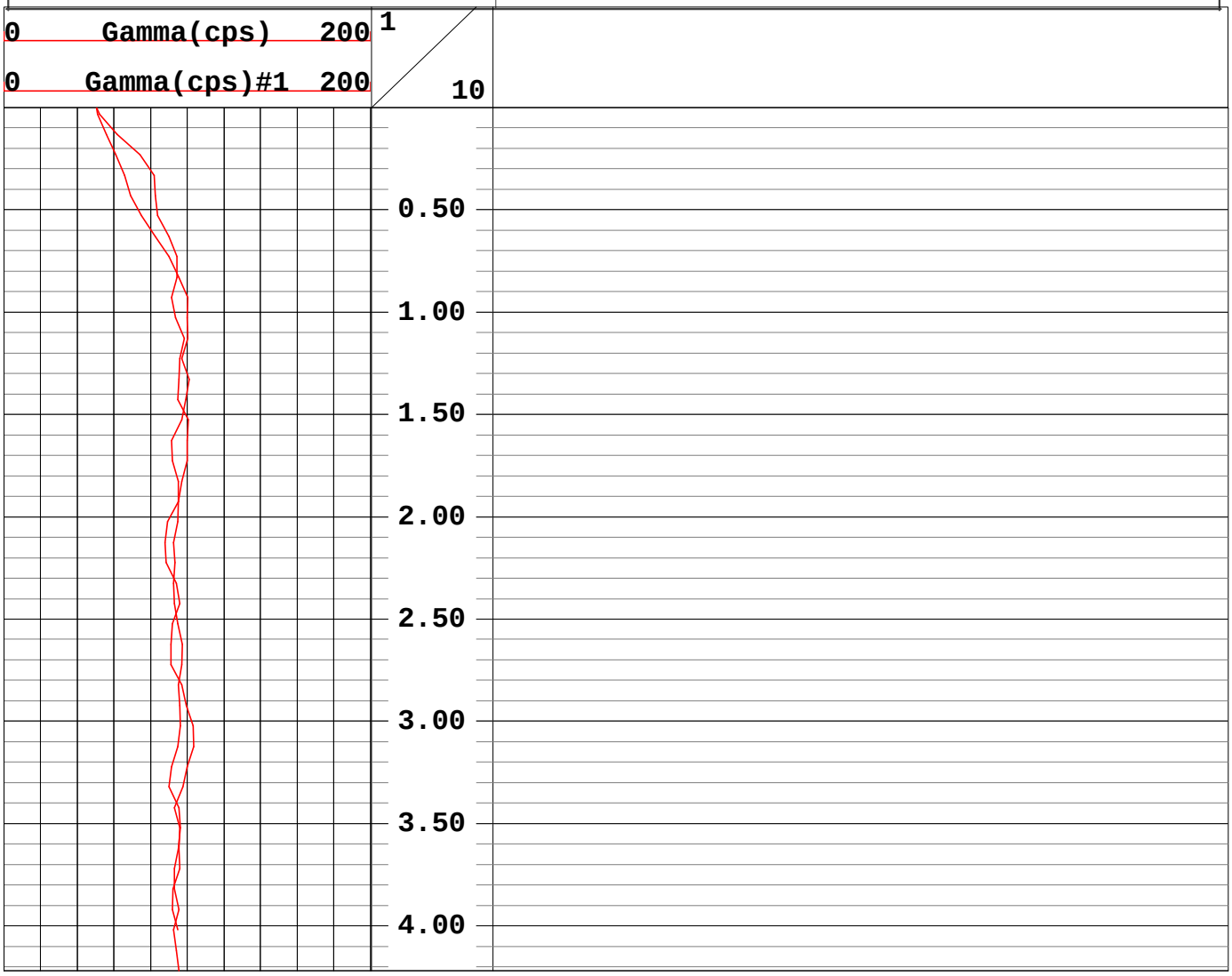
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMF3B-051	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Bruce Wapman	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 11 July 2001	CASING RECORD SIZE None WGT.



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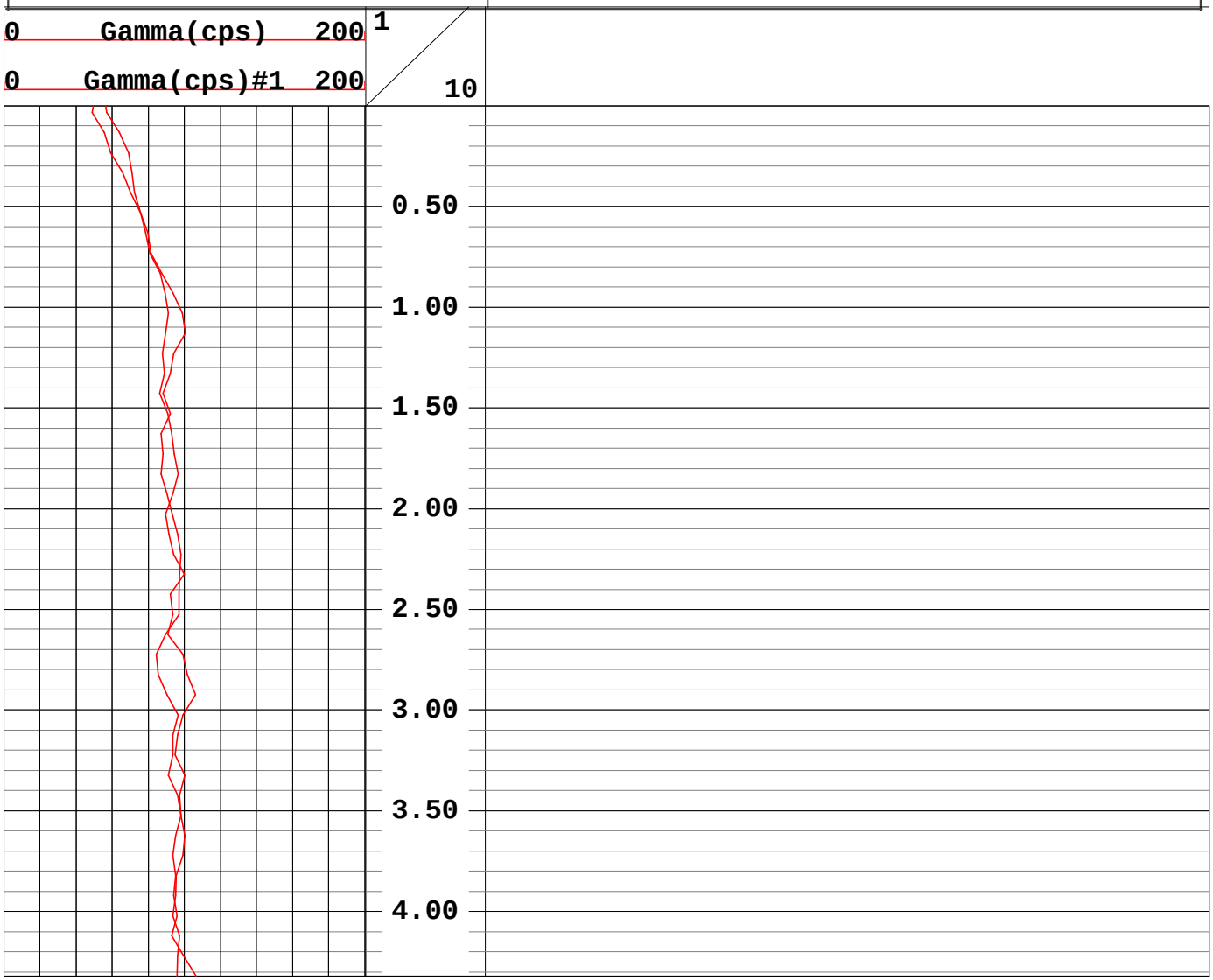
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMF3B-052	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Bruce Wapman	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 11 July 2001	CASING RECORD SIZE None WGT.



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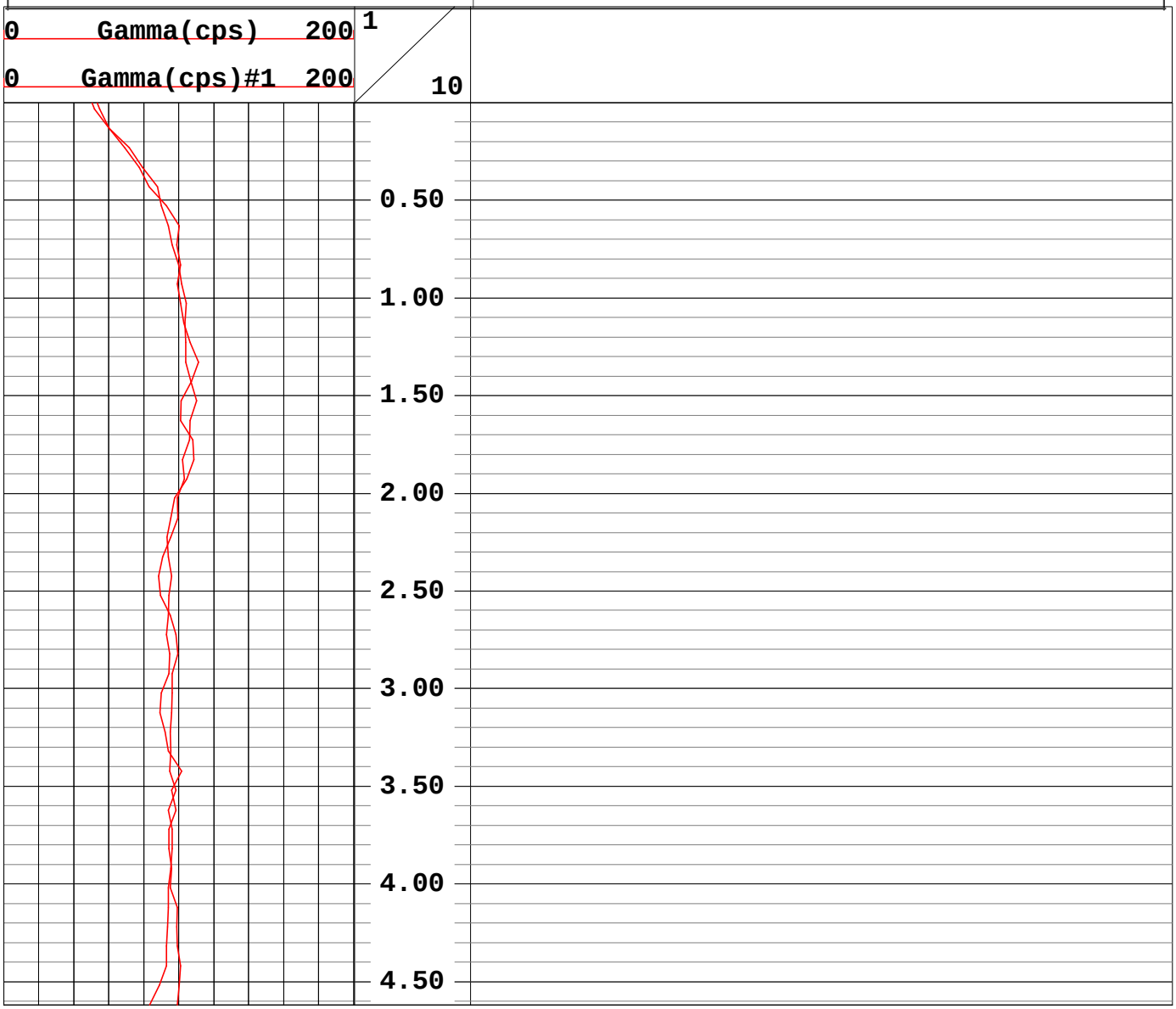
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMF3B-053	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Bruce Wapman	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 11 July 2001	CASING RECORD SIZE None WGT.



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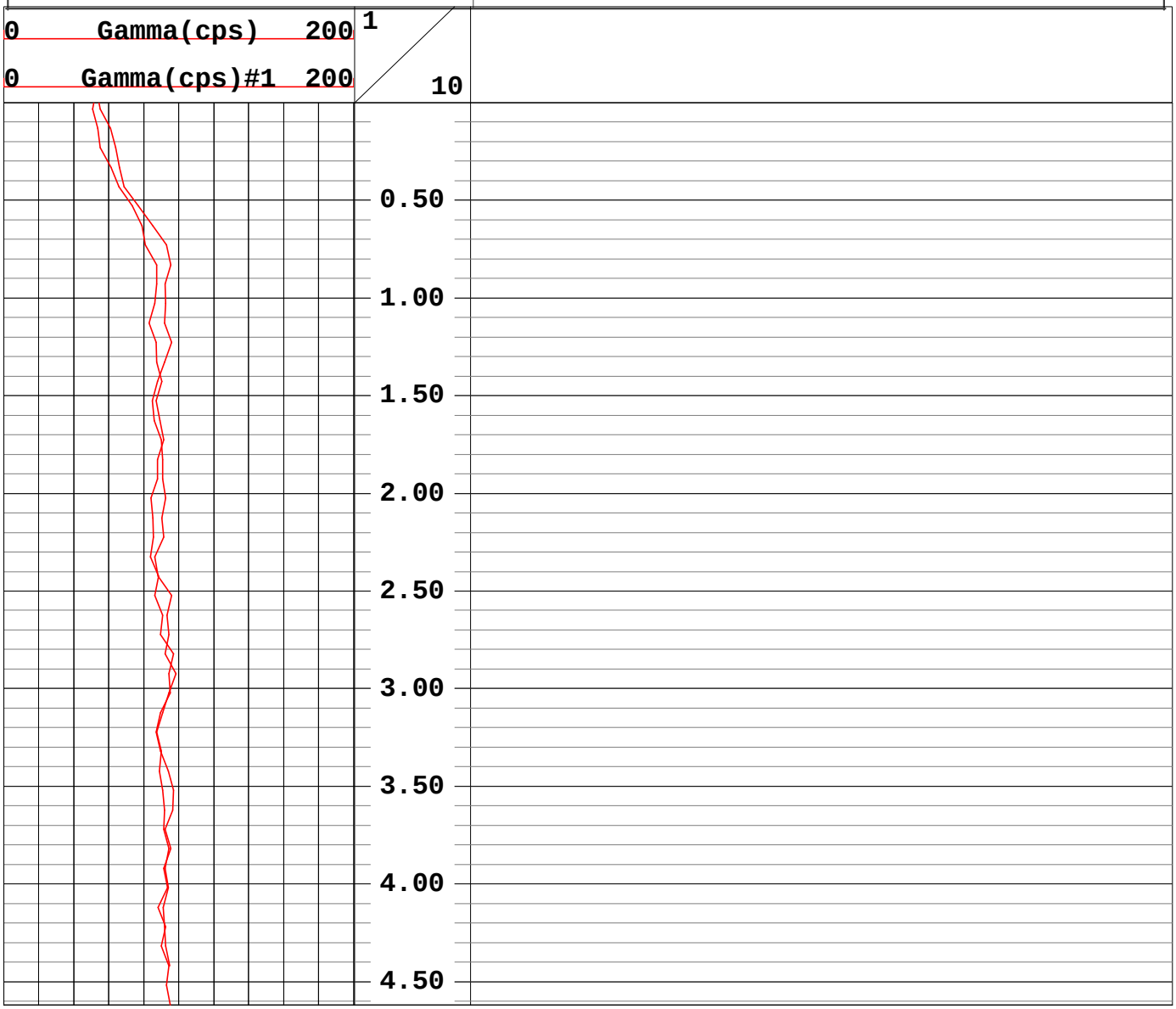
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMF3B-054	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Bruce Wapman	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 11 July 2001	CASING RECORD SIZE None WGT.



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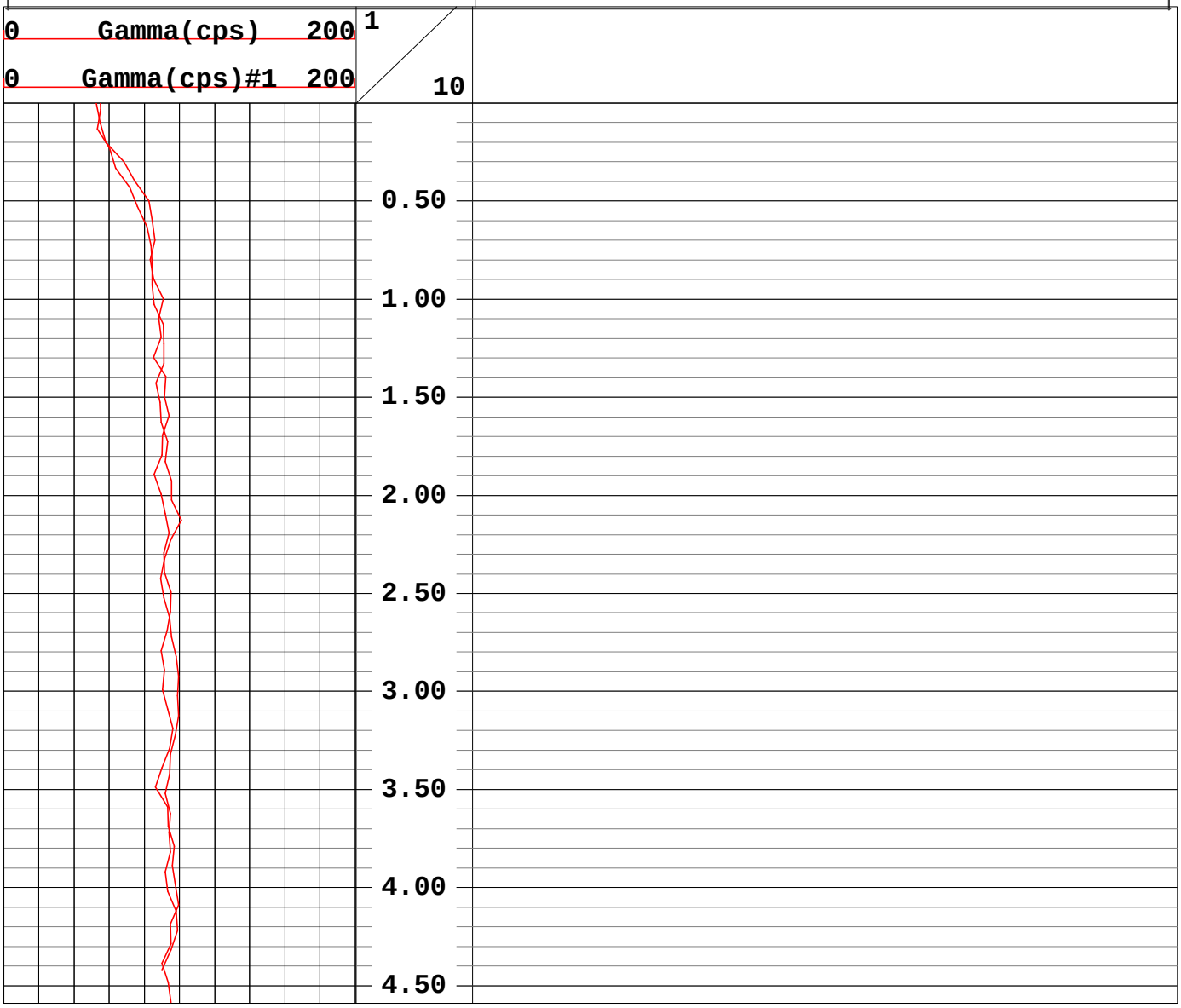
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMF3B-055	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Bruce Wapman	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 12 July 2001	CASING RECORD SIZE None WGT.



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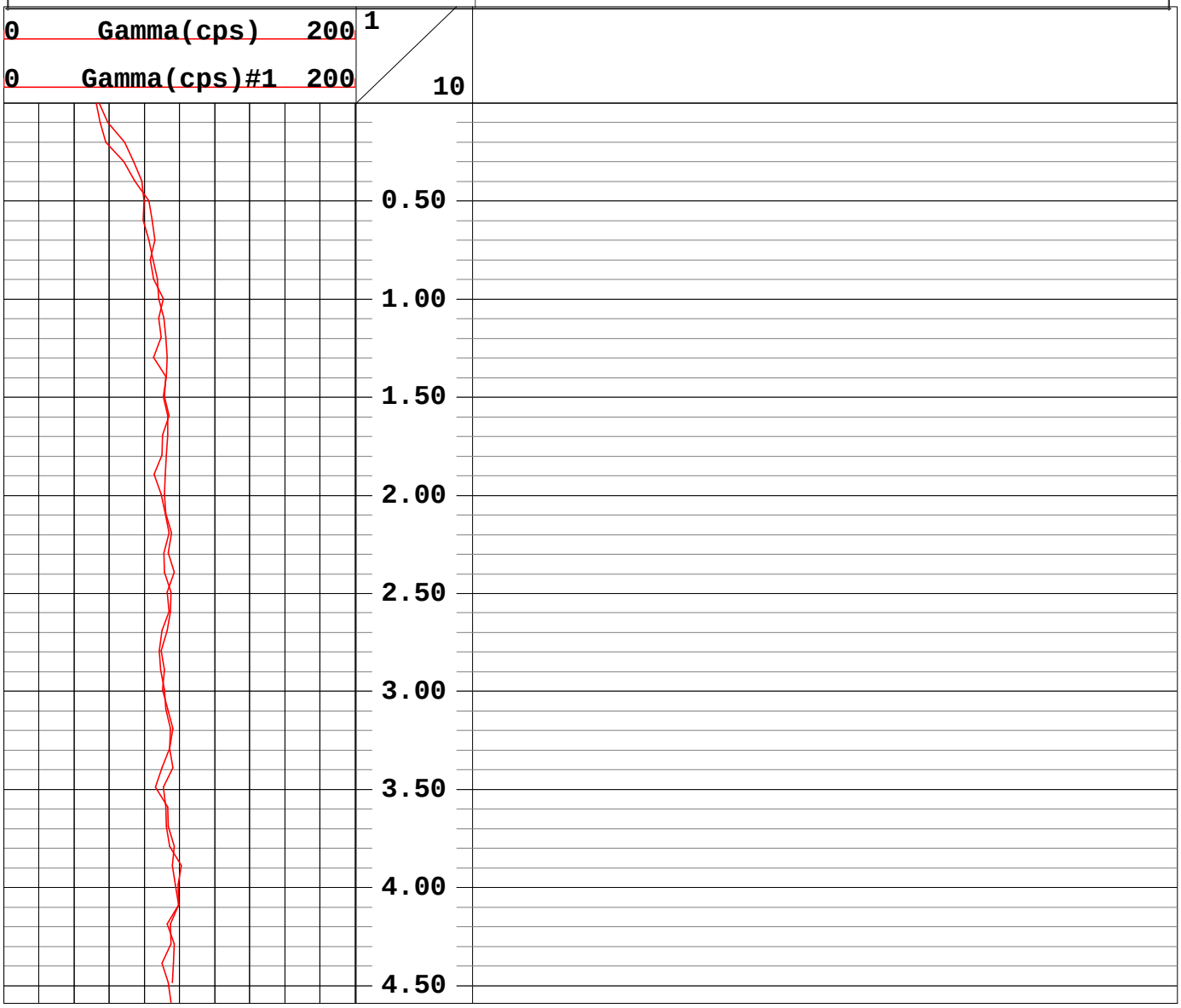
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMF3B-056	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Bruce Wapman	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 12 July 2001	CASING RECORD SIZE None WGT.



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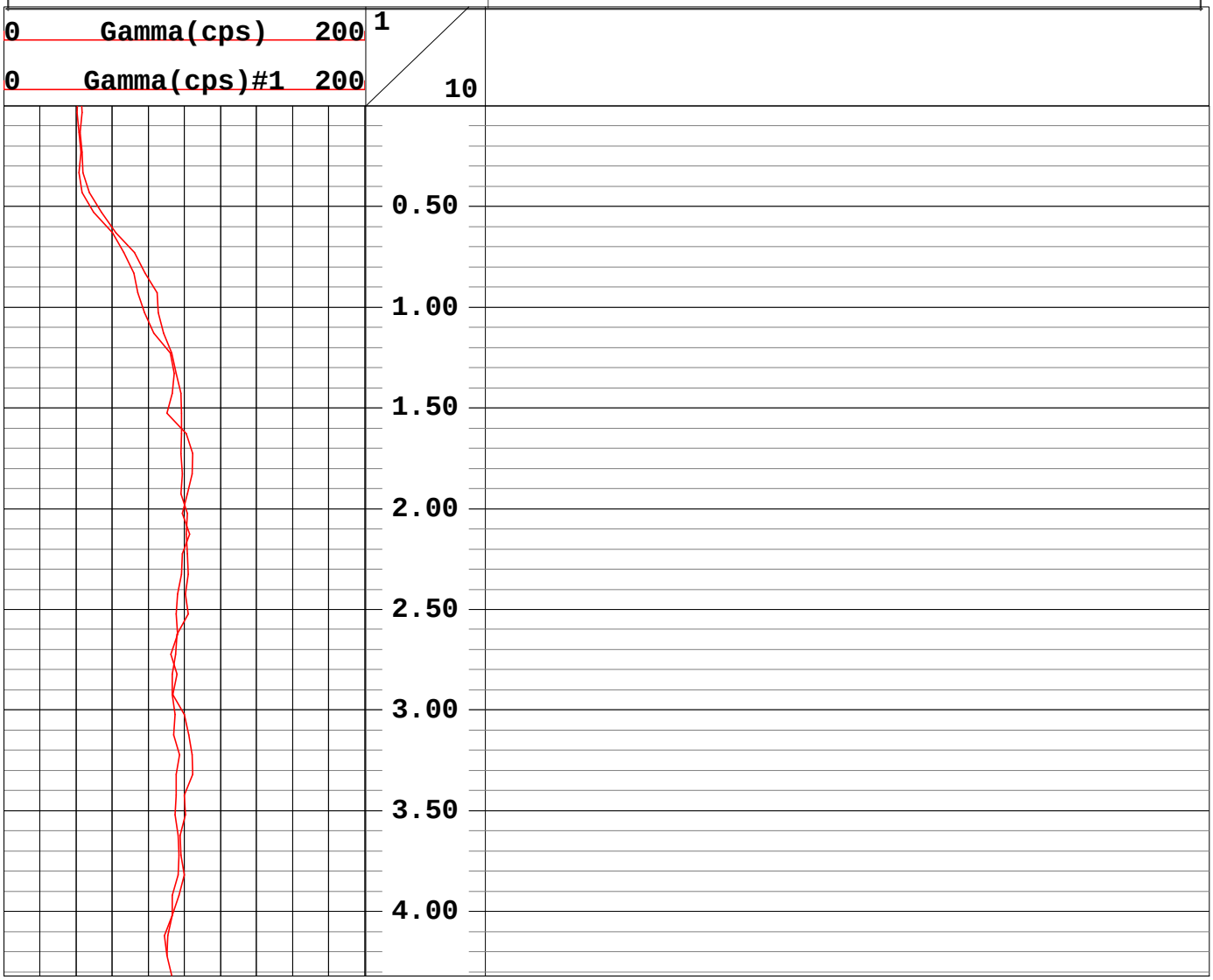
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMF3B-057	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Bruce Wapman	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 12 July 2001	CASING RECORD SIZE None WGT.



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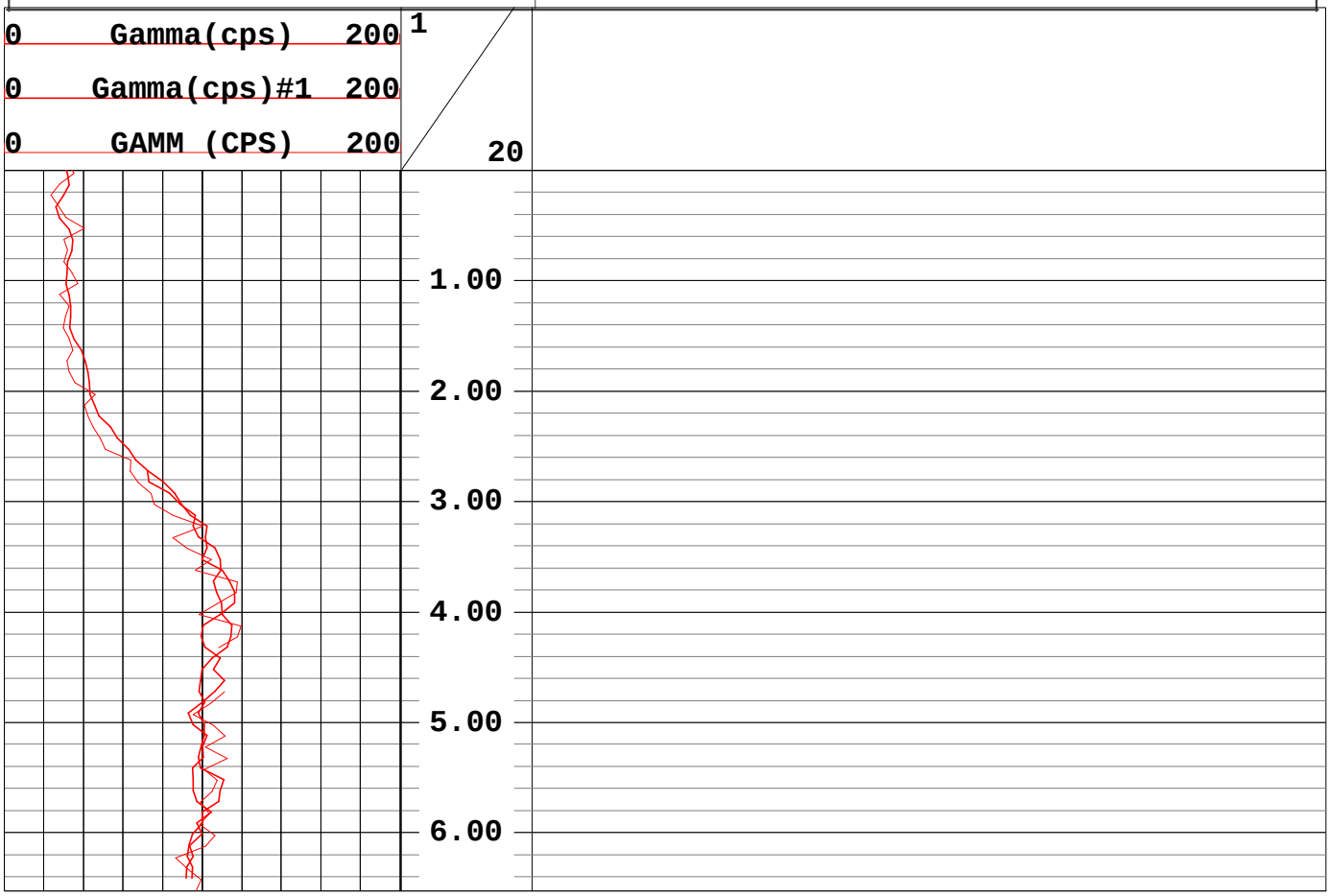
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMF3B-058	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Bruce Wapman	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 11 July 2001	CASING RECORD SIZE 3-inch WGT. Steel



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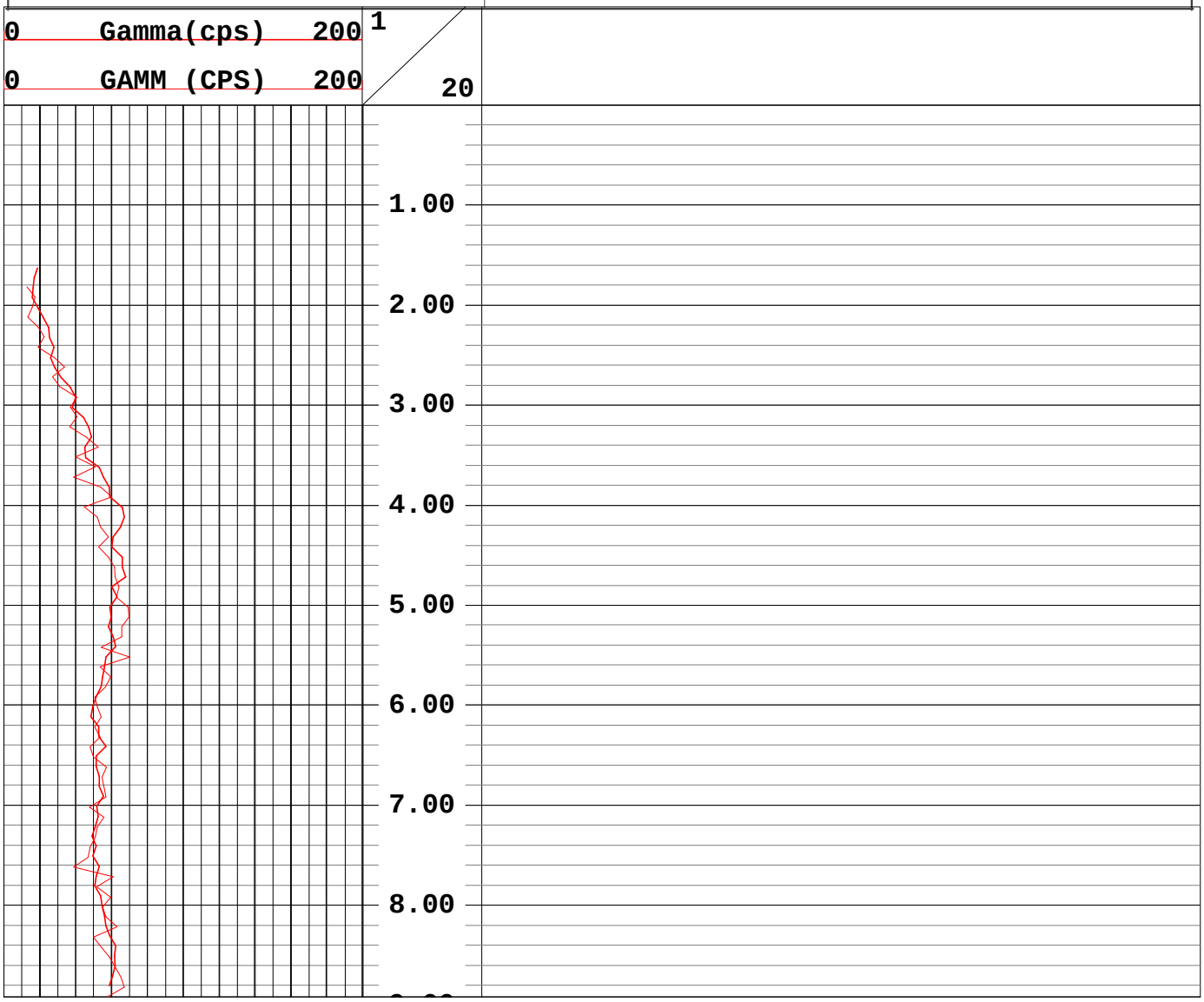
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMF3B-060	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Bruce Wapman	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 11 July 2001	CASING RECORD SIZE 3-inch WGT. Steel



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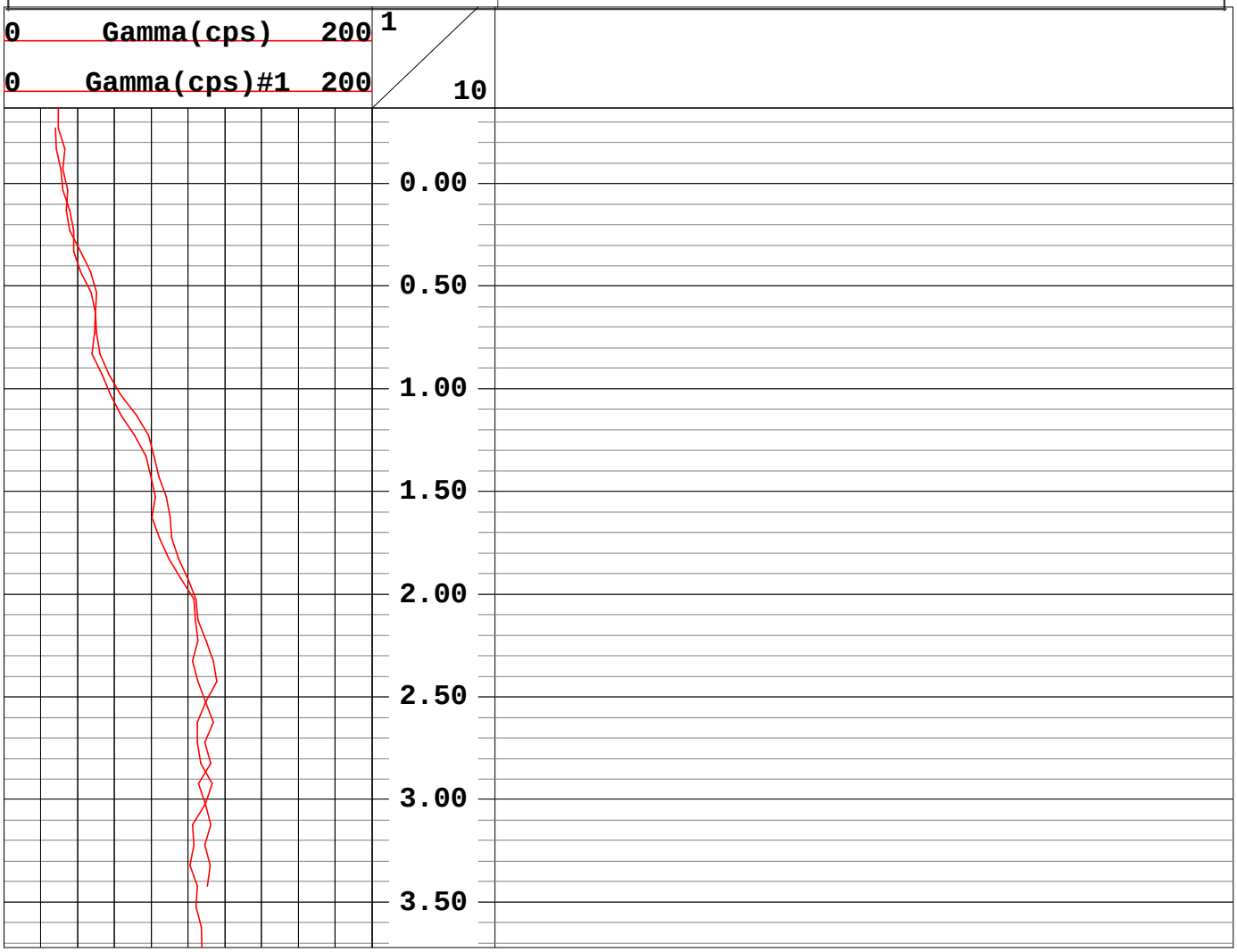
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMF3B-061	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Bruce Wapman	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 11 July 2001	CASING RECORD SIZE None WGT.



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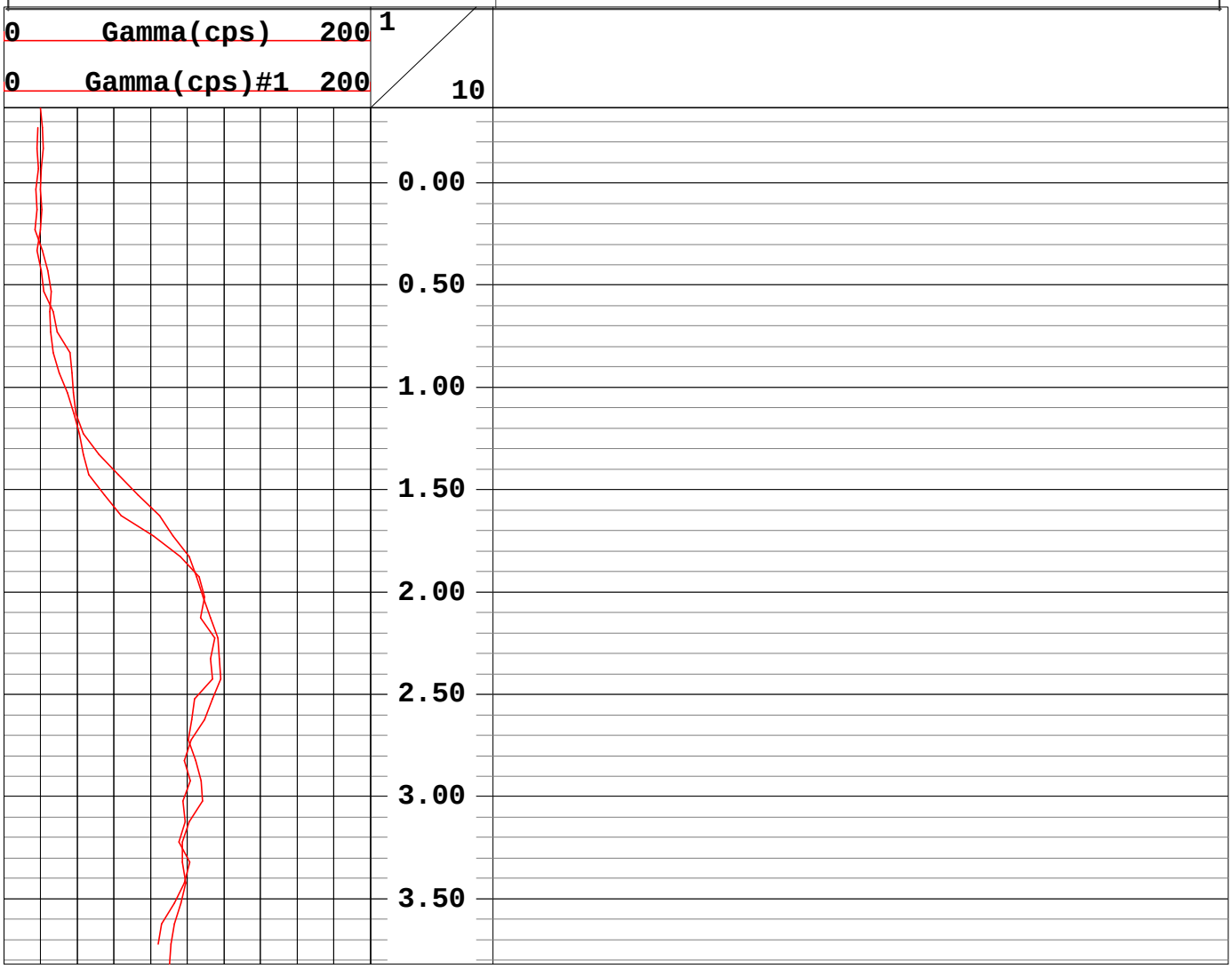
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMF3B-062	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Bruce Wapman	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 11 July 2001	CASING RECORD SIZE None WGT.



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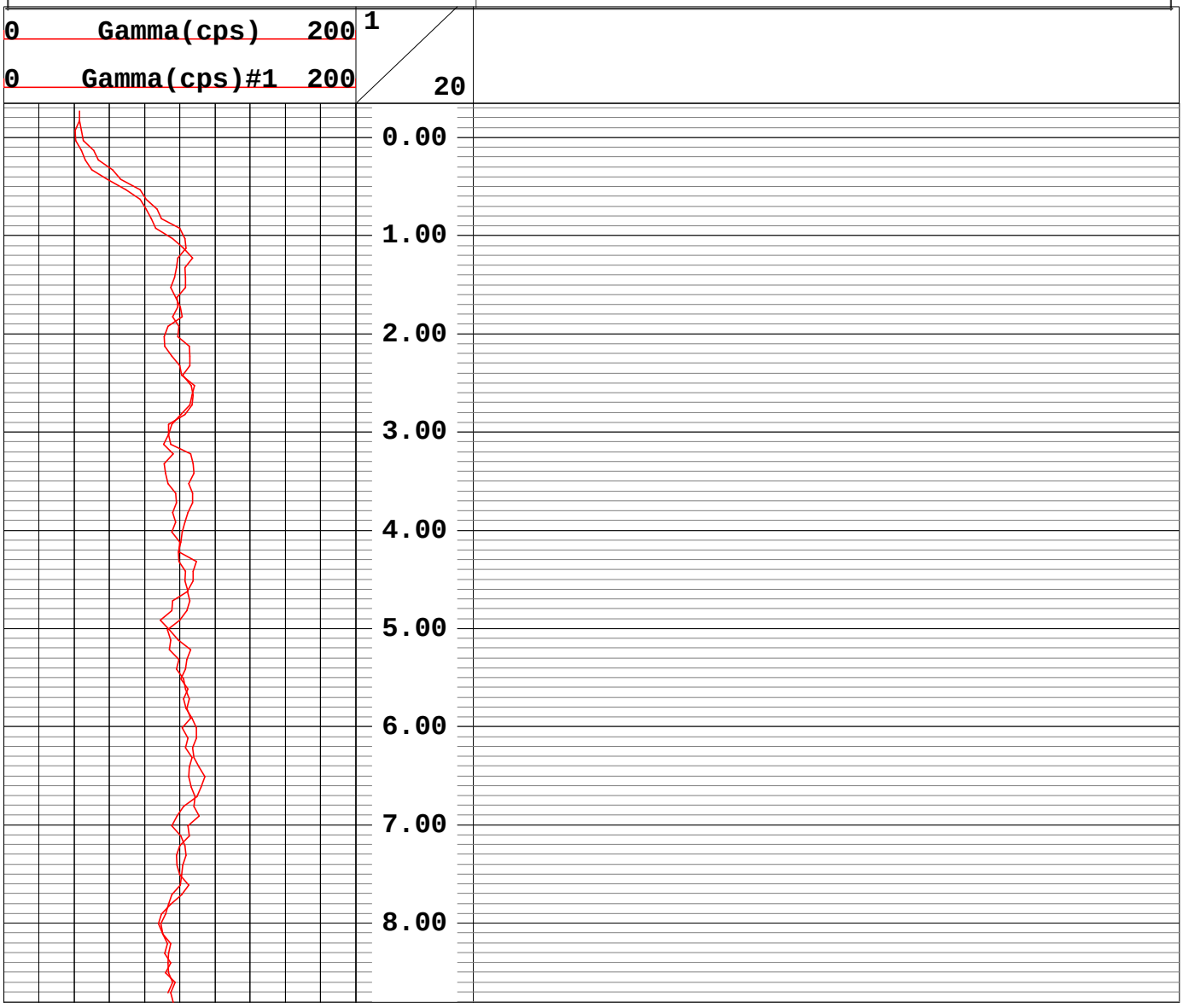
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMF3B-063	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Bruce Wapman	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 11 July 2001	CASING RECORD SIZE None WGT.



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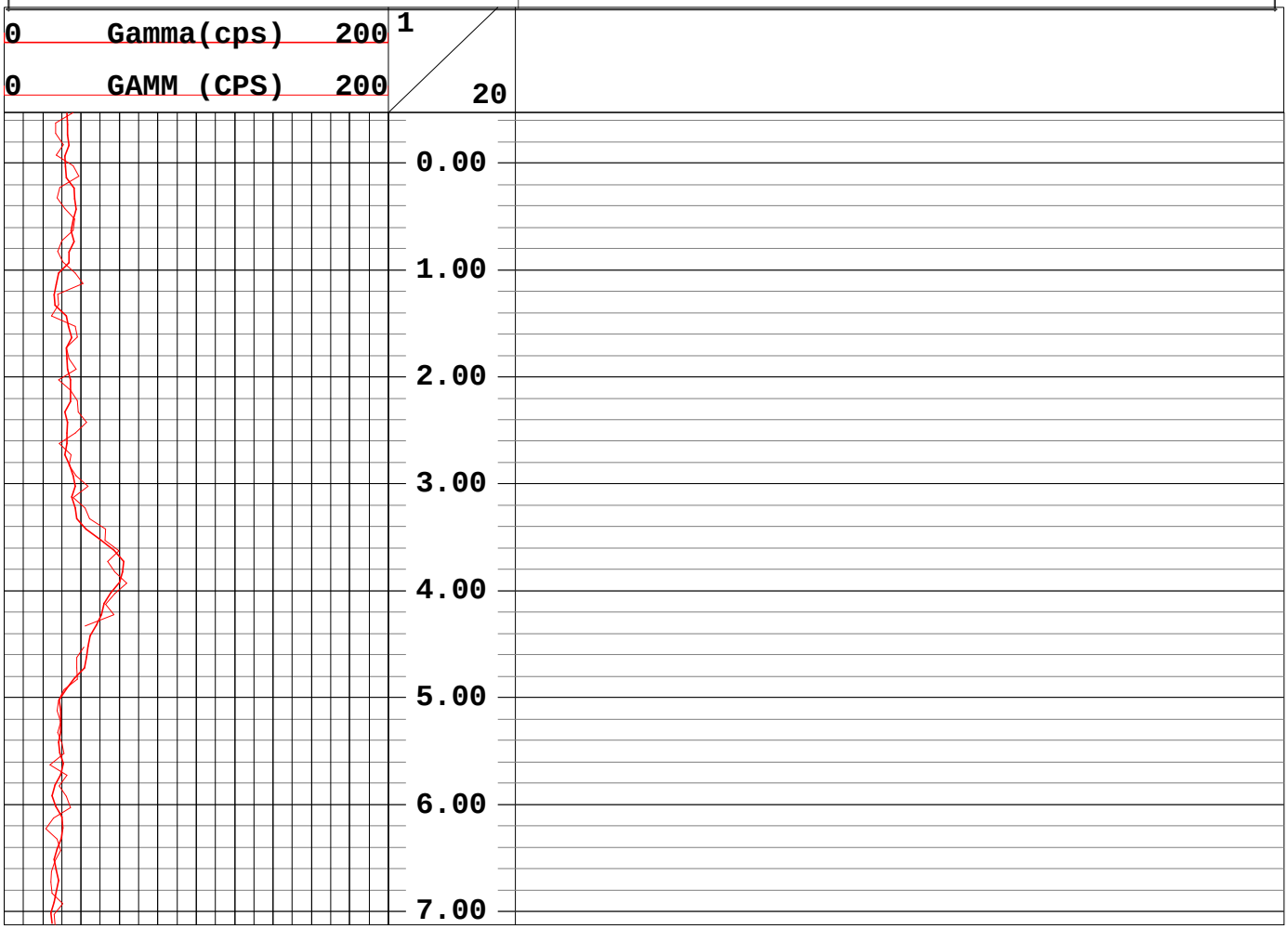
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMF3B-064	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Bruce Wapman	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 12 July 2001	CASING RECORD SIZE 3-inch WGT. Steel



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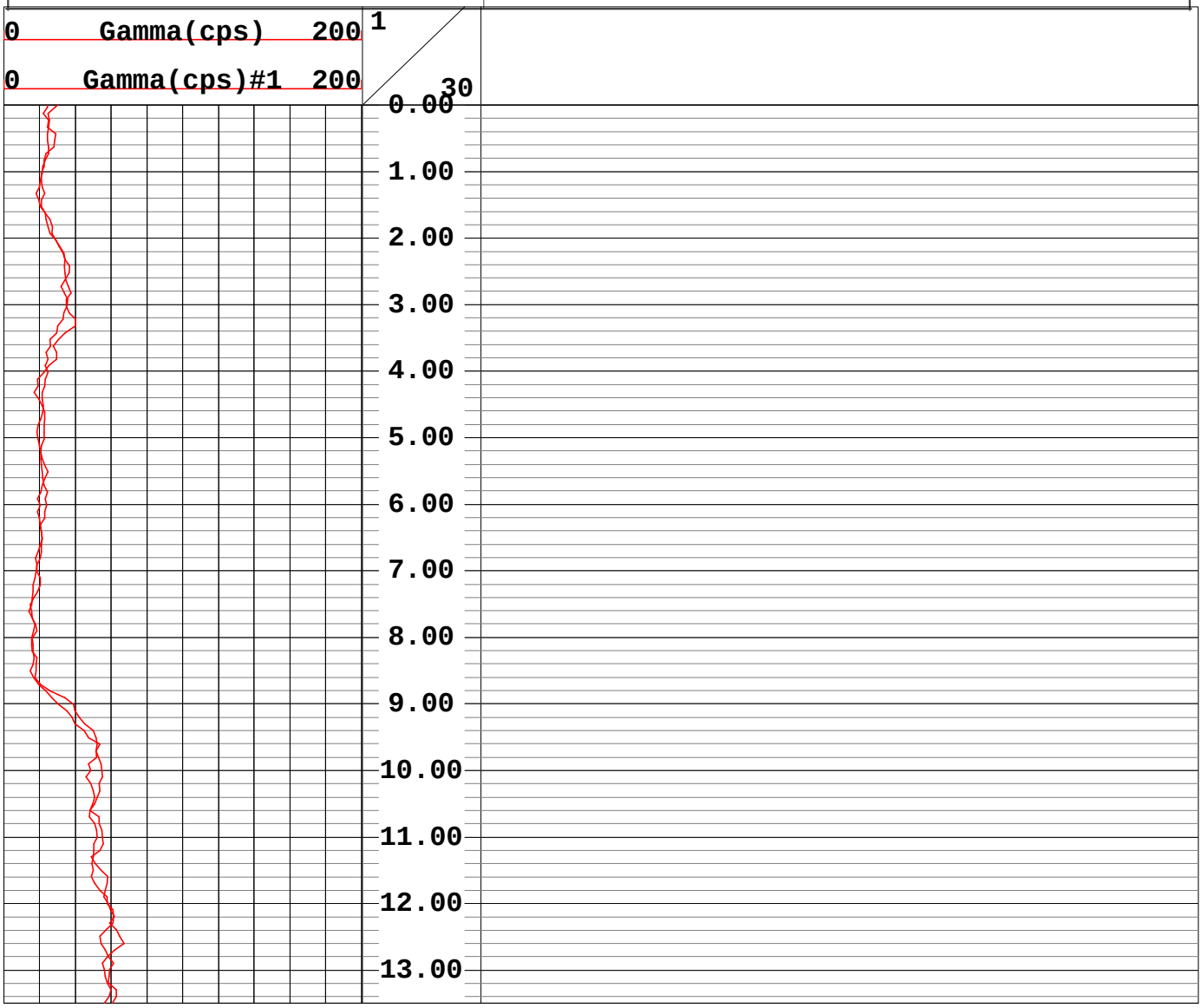
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMF3B-065	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Bruce Wapman	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 12 July 2001	CASING RECORD SIZE 3-inch WGT. Steel



Mudflats
Class 3B Random

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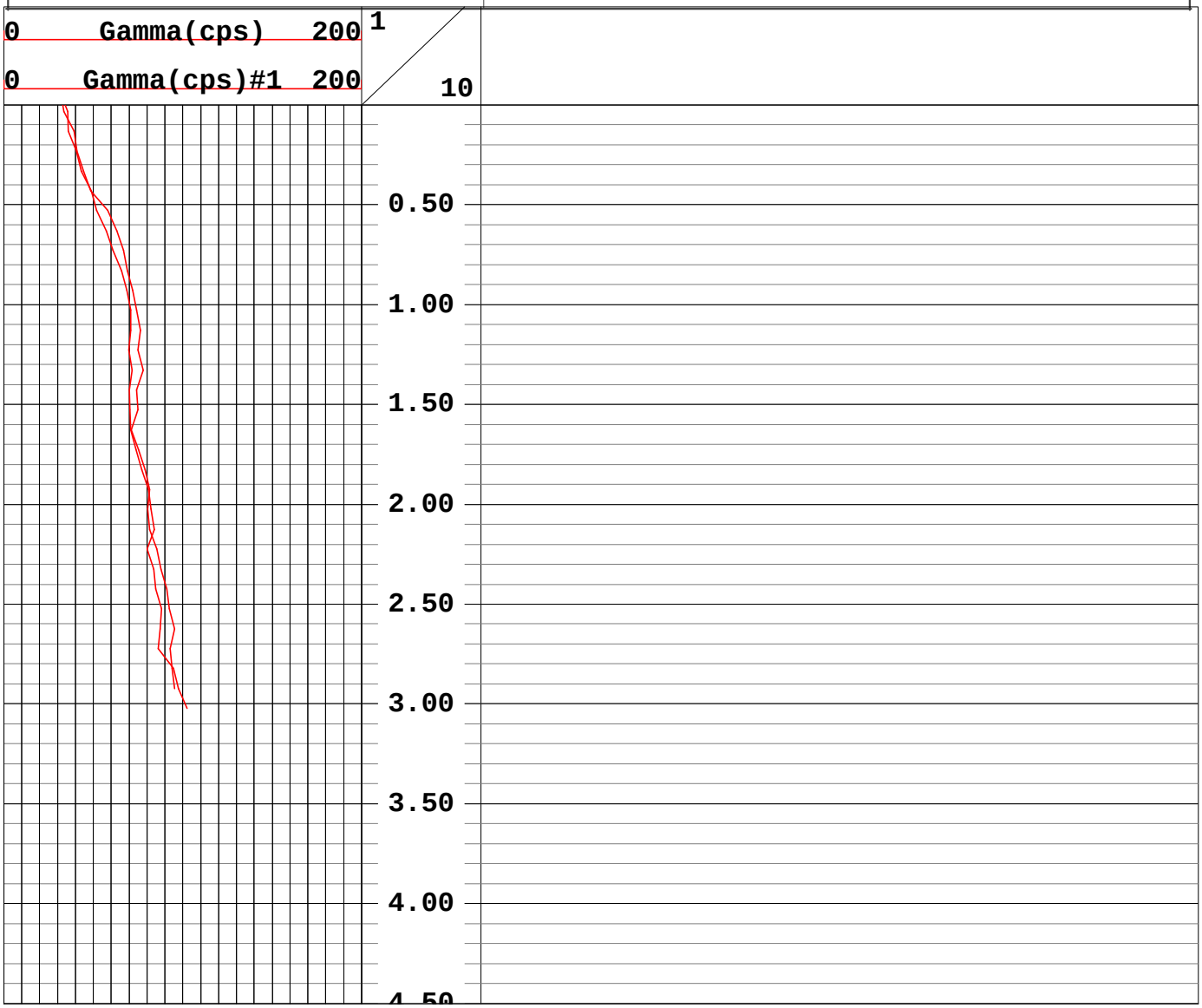
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMF3B-003	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Rick Hoover	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 2 July 2001	CASING RECORD SIZE None WGT. None



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CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMF3B-004	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Rick Hoover	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 2 July 2001	CASING RECORD SIZE None WGT. None

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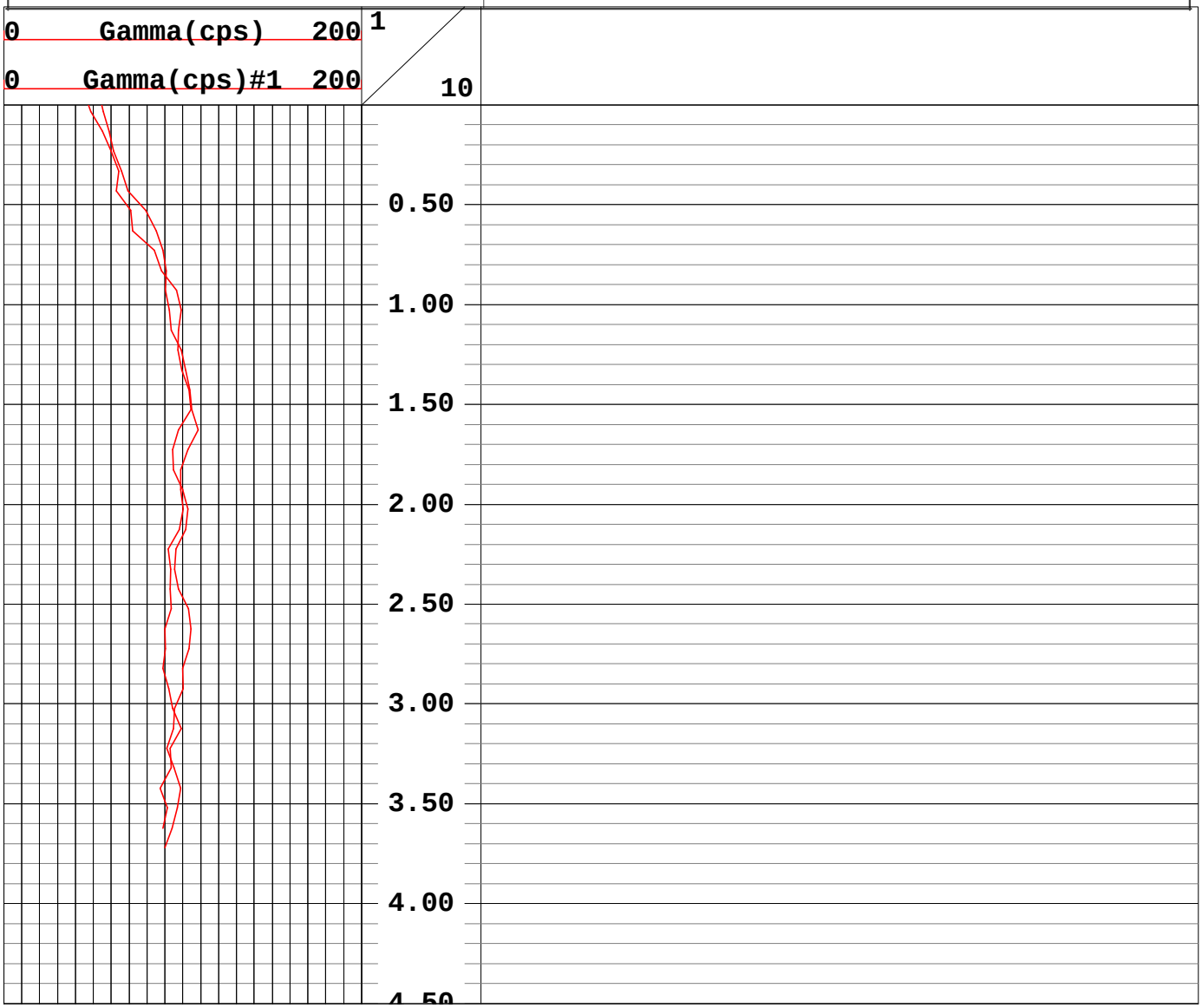
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMF3B-006	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Rick Hoover	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY Bruce Wappman	
DATE 10 July 2001	CASING RECORD SIZE None WGT. None



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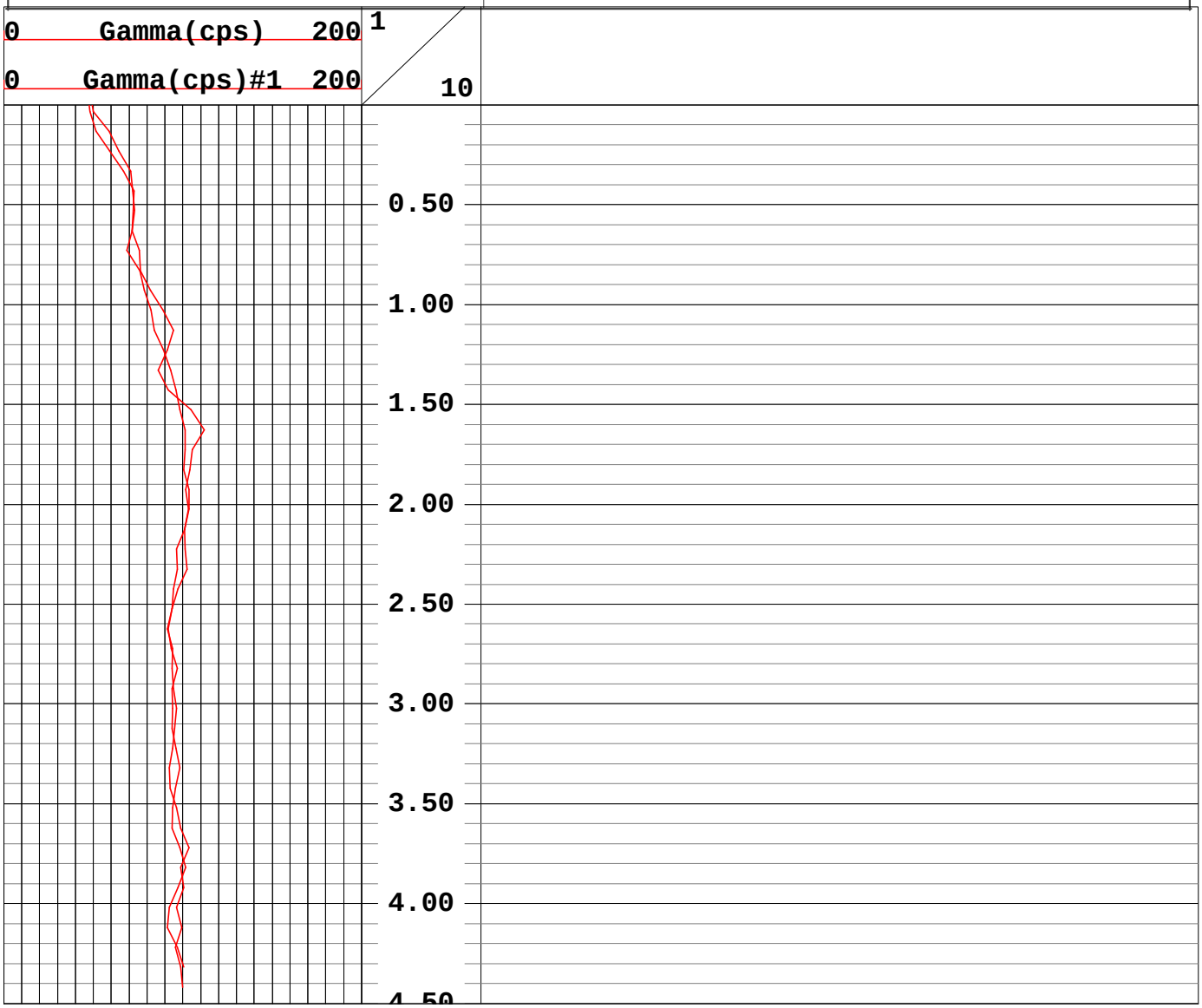
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMF3B-008	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Rick Hoover	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY Bruce Wappman	
DATE 10 July 2001	CASING RECORD SIZE None WGT. None



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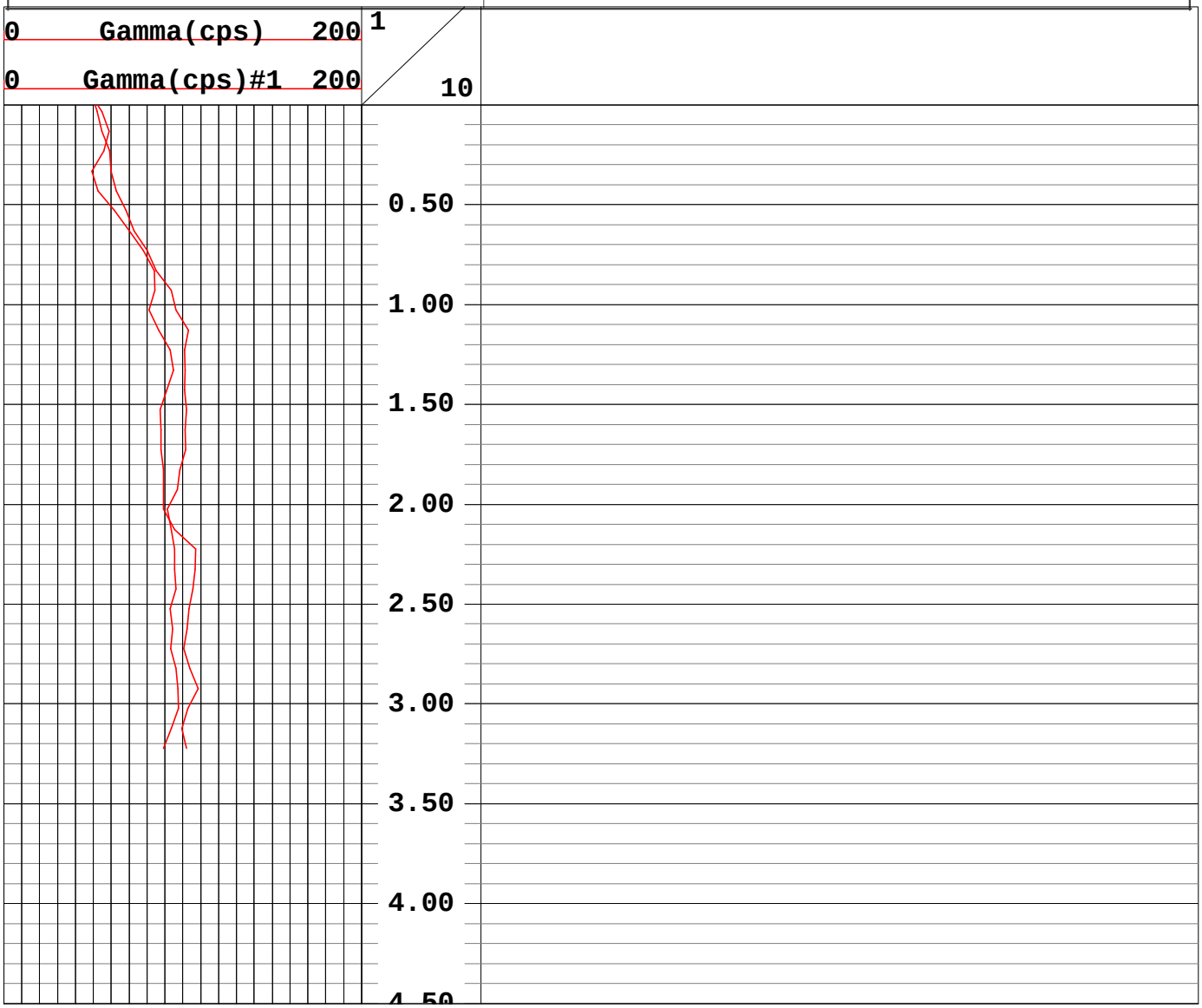
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMF3B-009	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Rick Hoover	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 2 July 2001	CASING RECORD SIZE None WGT. None



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CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMF3B-011	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Rick Hoover	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 2 July 2001	CASING RECORD SIZE None WGT. None

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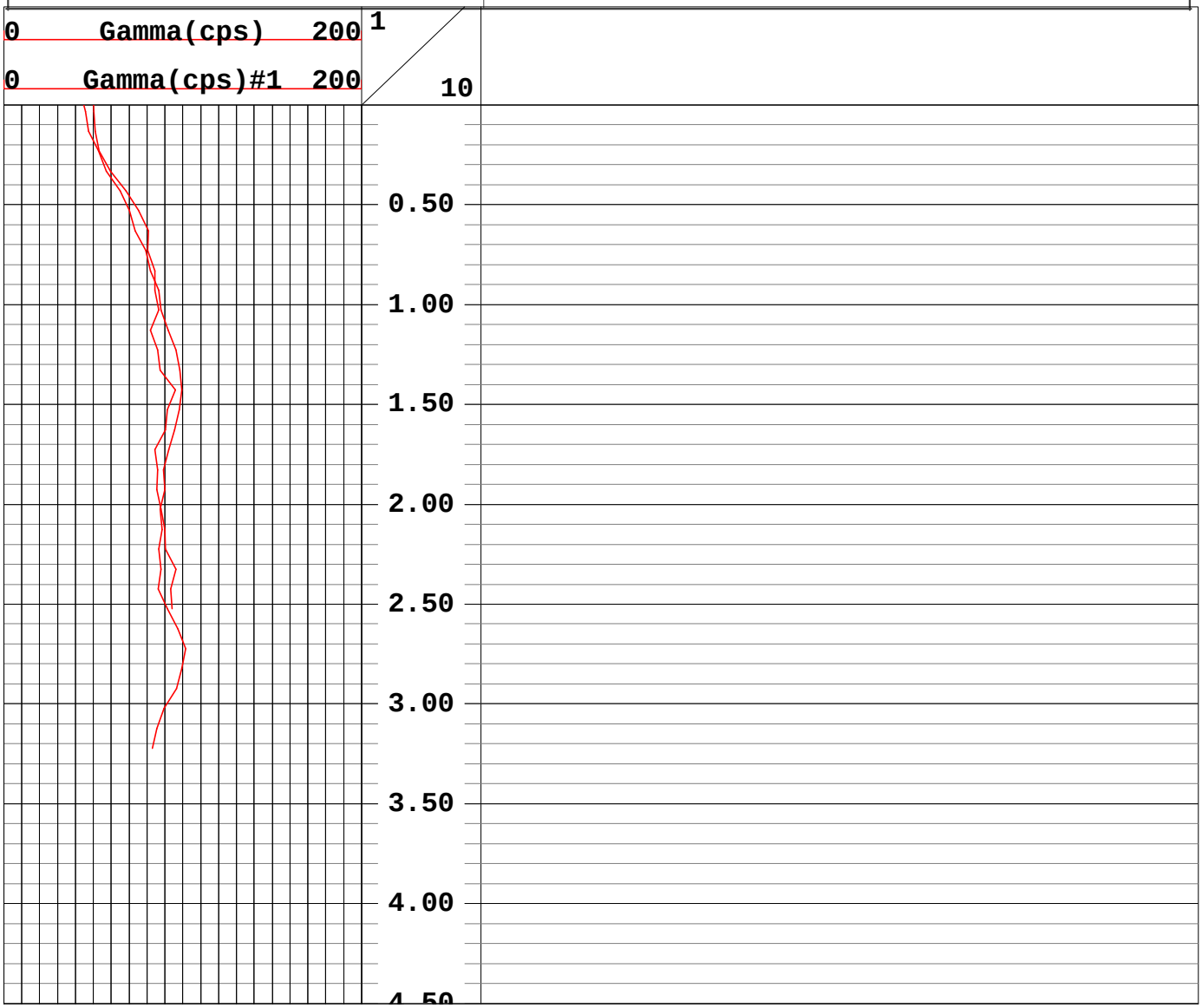
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMF3B-012	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Rick Hoover	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY Bruce Wappman	
DATE 10 July 2001	CASING RECORD SIZE None WGT. None



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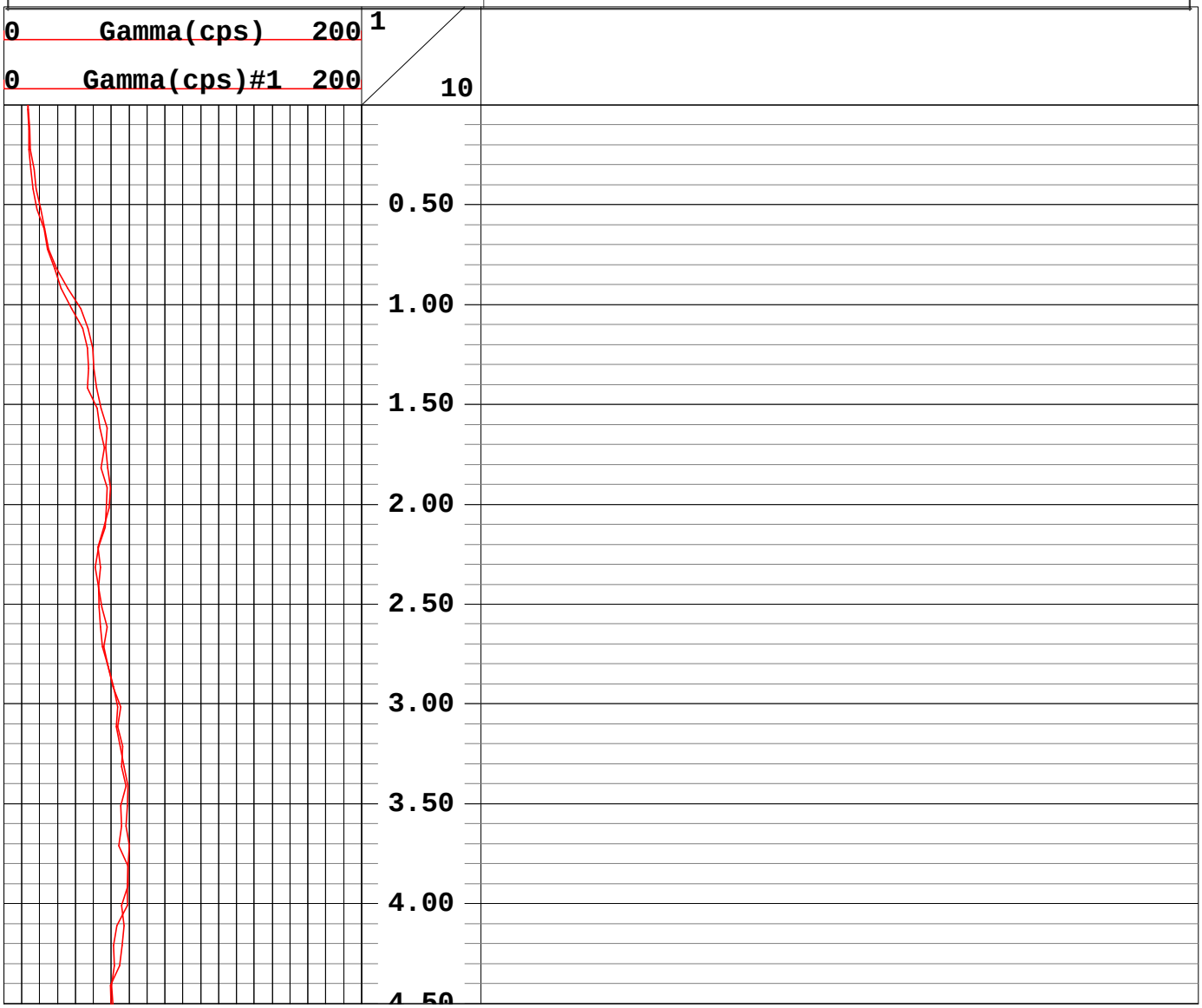
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMF3B-013	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Rick Hoover	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 2 July 2001	CASING RECORD SIZE 3-inch WGT. STEEL



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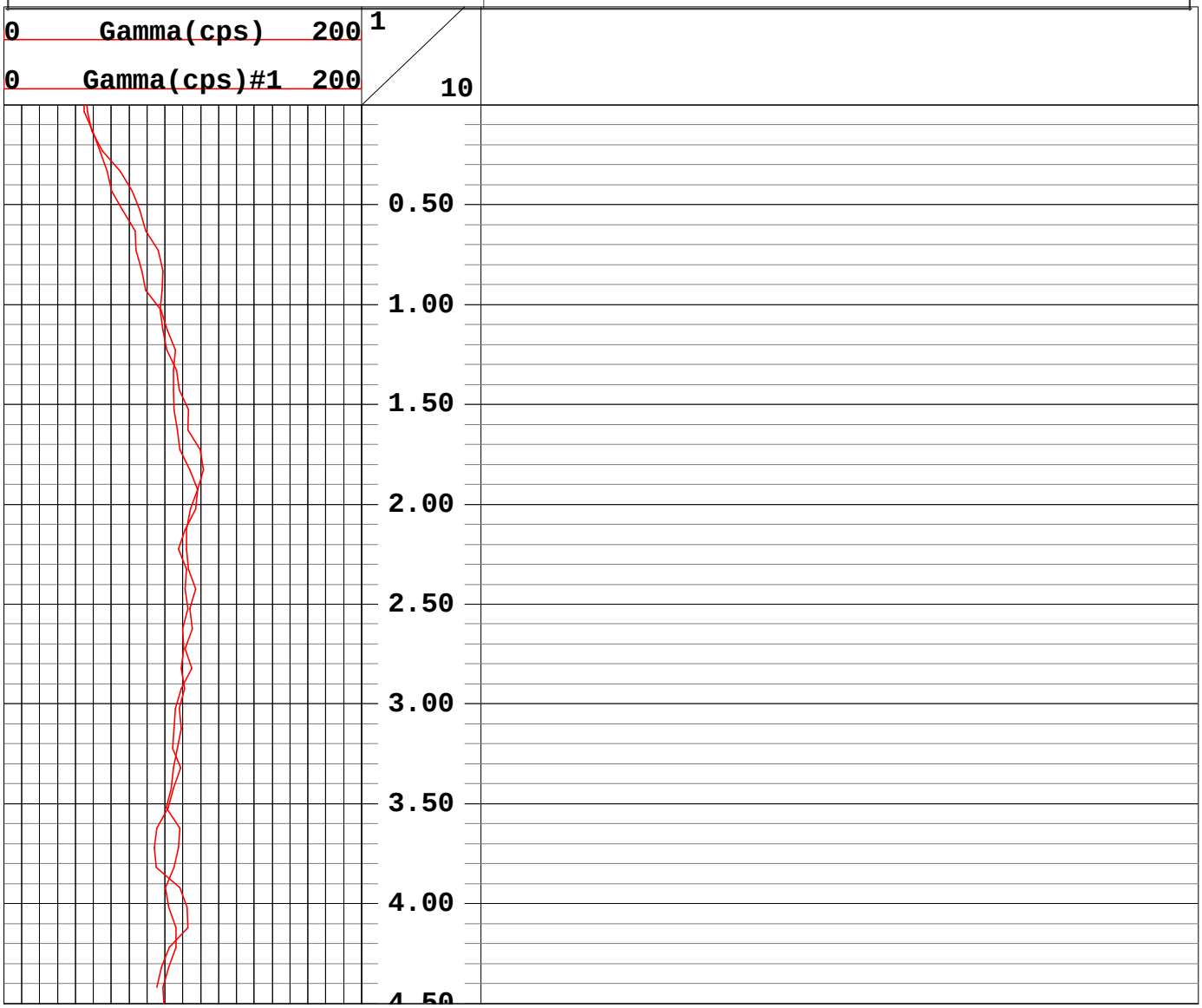
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMF3B-015	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Rick Hoover	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 2 July 2001	CASING RECORD SIZE None WGT. None



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CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMF3B-016	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Rick Hoover	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 2 July 2001	CASING RECORD SIZE None WGT. None

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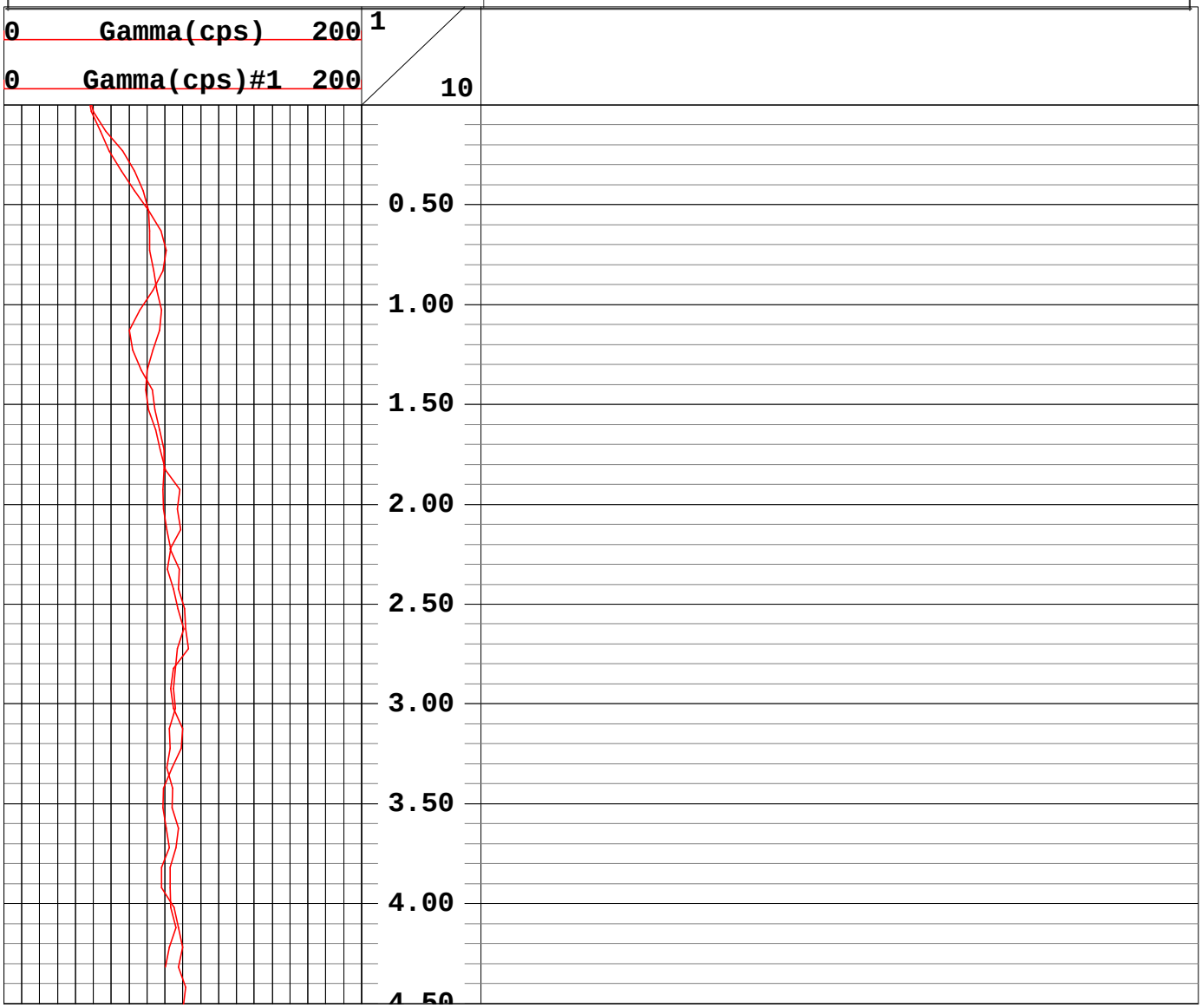
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMF3B-017	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Rick Hoover	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 2 July 2001	CASING RECORD SIZE None WGT. None



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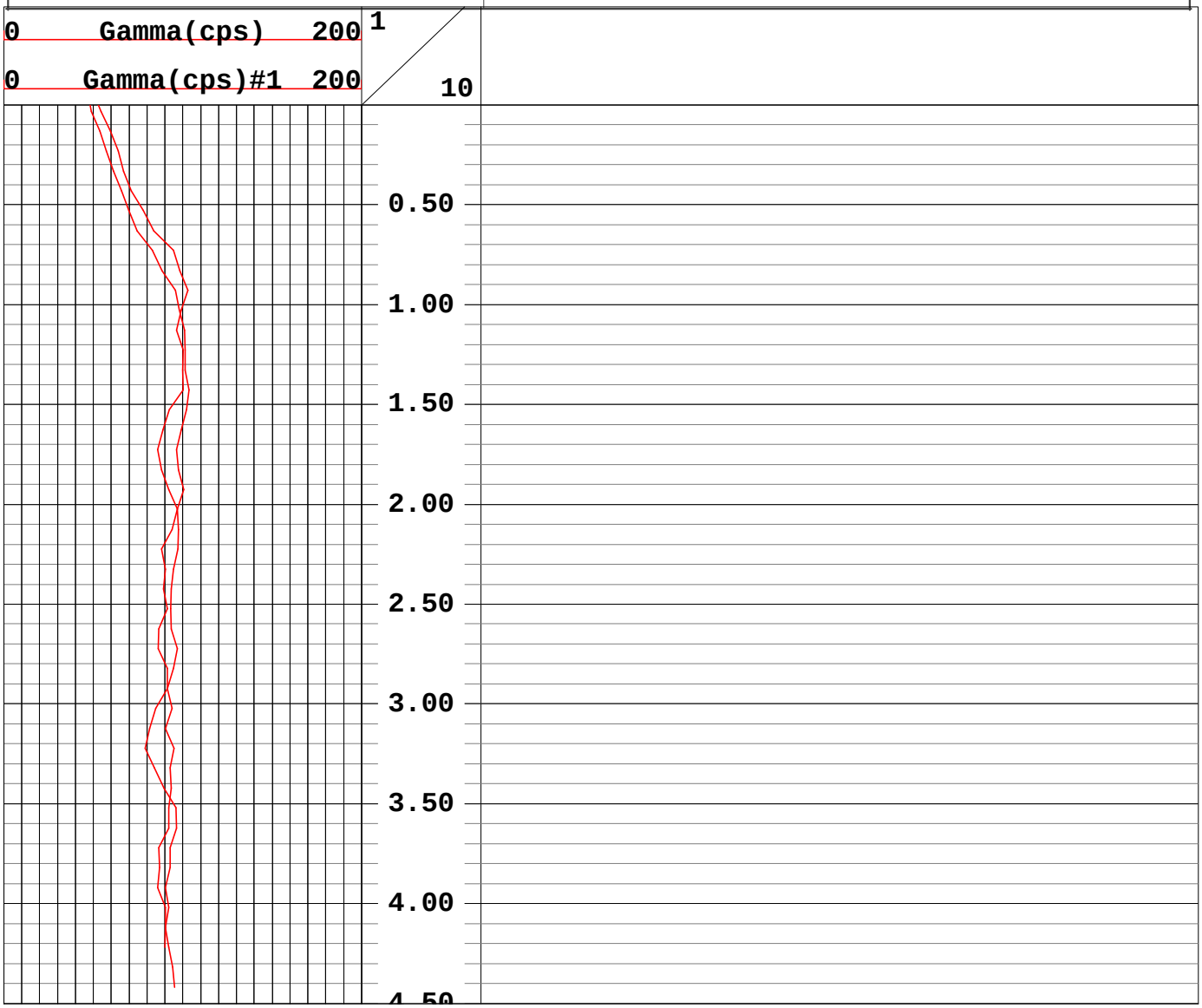
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMF3B-018	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Rick Hoover	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY Bruce Wappman	
DATE 10 July 2001	CASING RECORD SIZE None WGT. None



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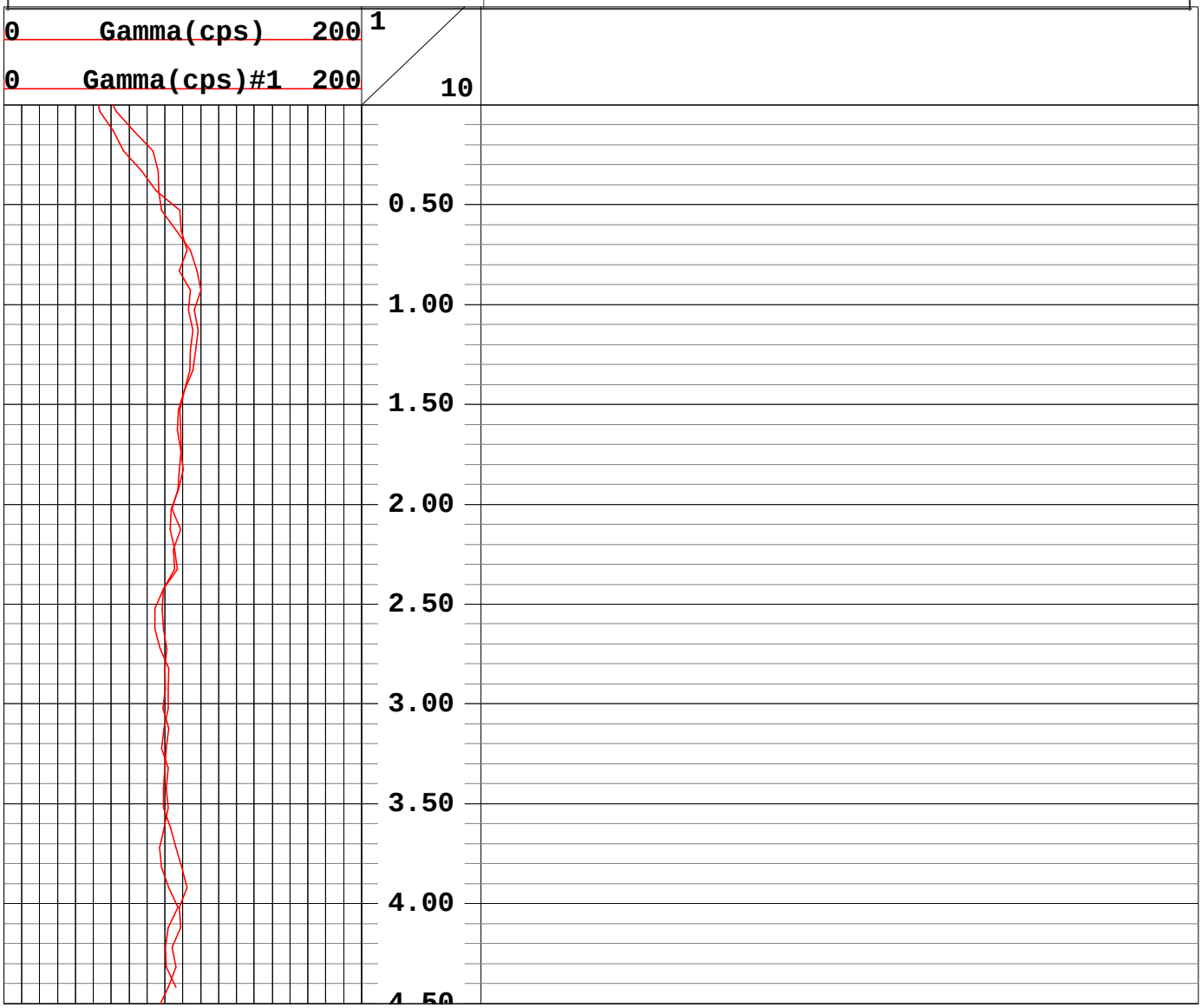
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMF3B-019	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Rick Hoover	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY Bruce Wappman	
DATE 10 July 2001	CASING RECORD SIZE None WGT. None



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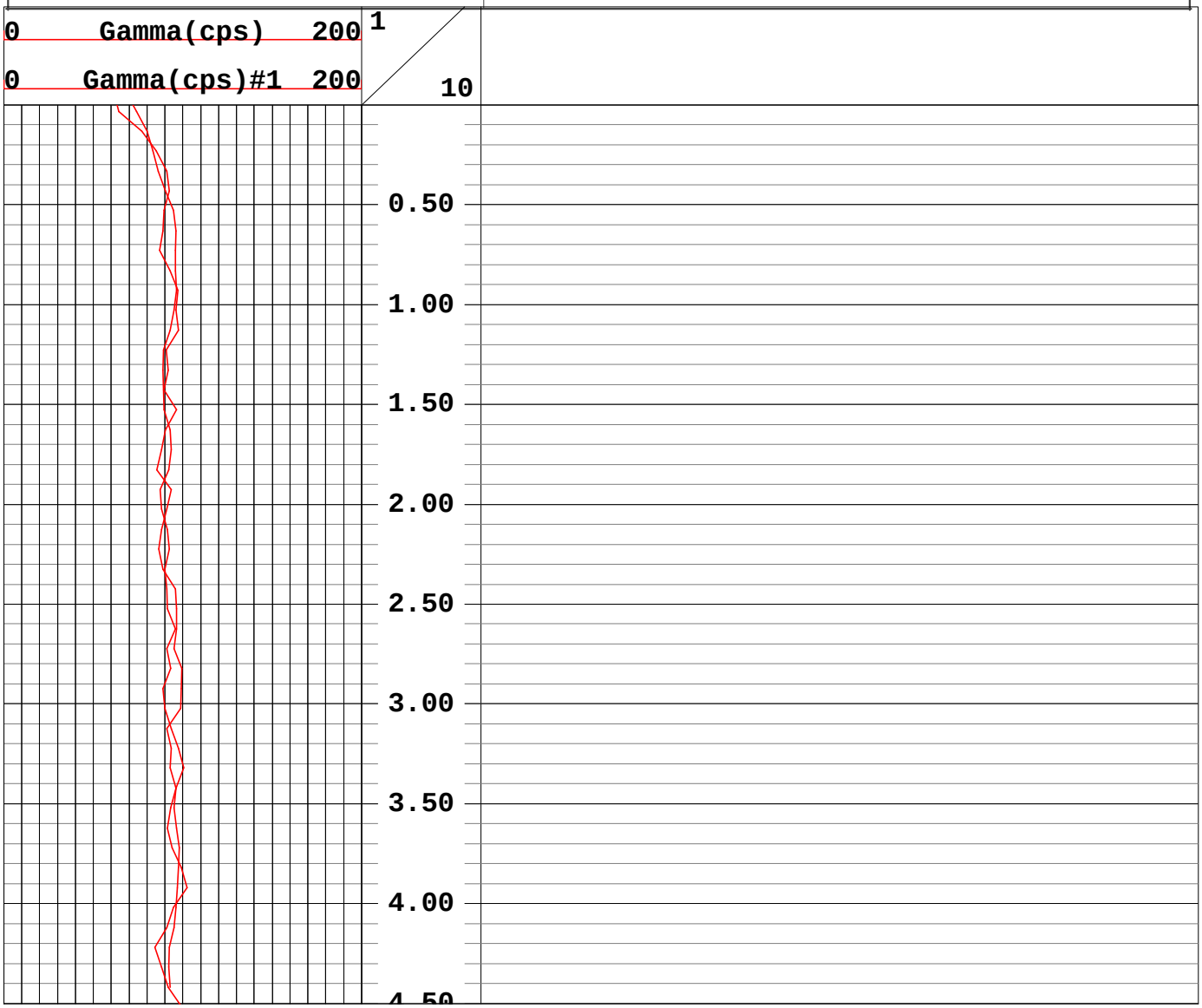
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMF3B-020	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Rick Hoover	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY Bruce Wappman	
DATE 10 July 2001	CASING RECORD SIZE None WGT. None



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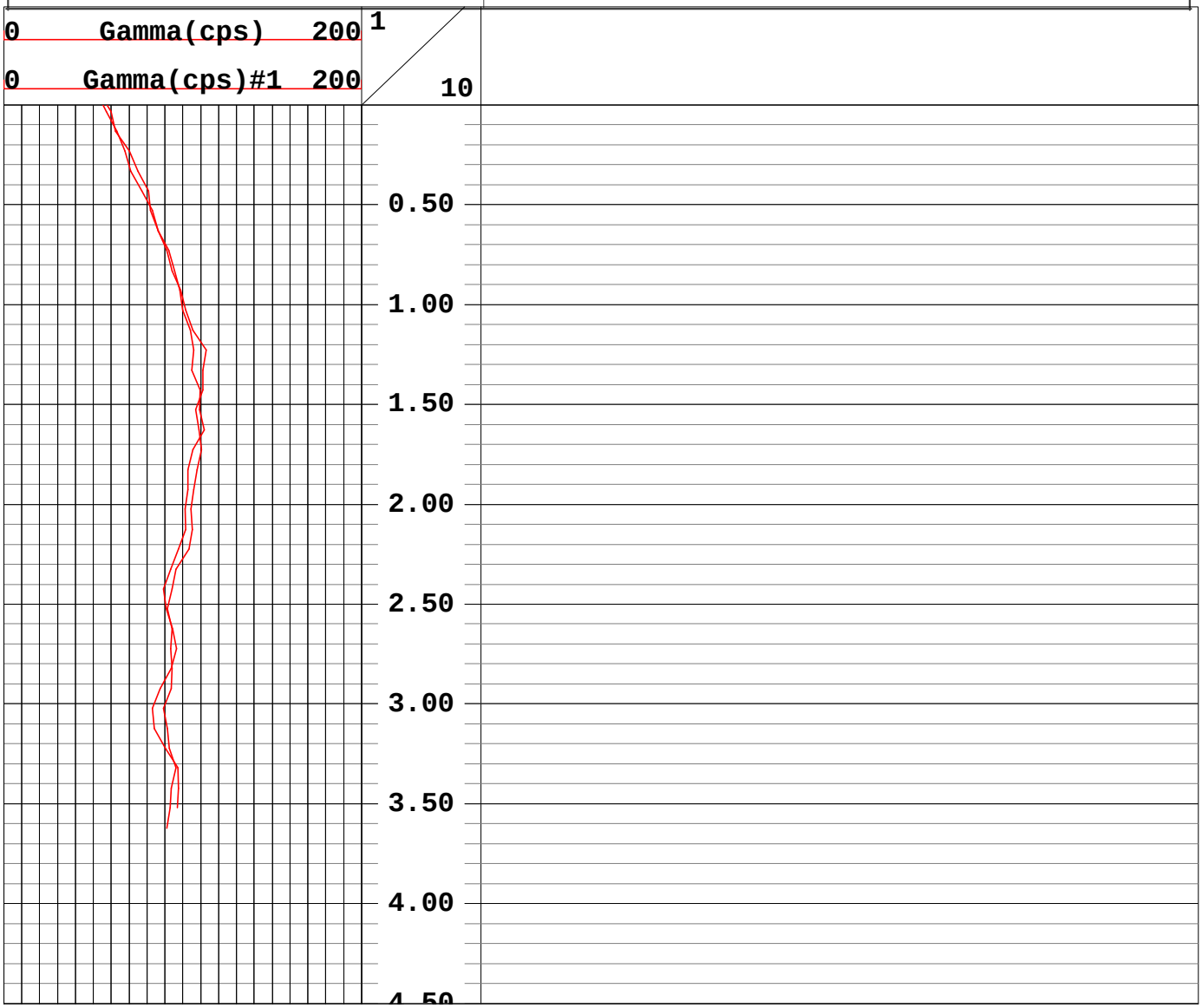
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMF3B-022	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Rick Hoover	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY Bruce Wappman	
DATE 10 July 2001	CASING RECORD SIZE None WGT. None



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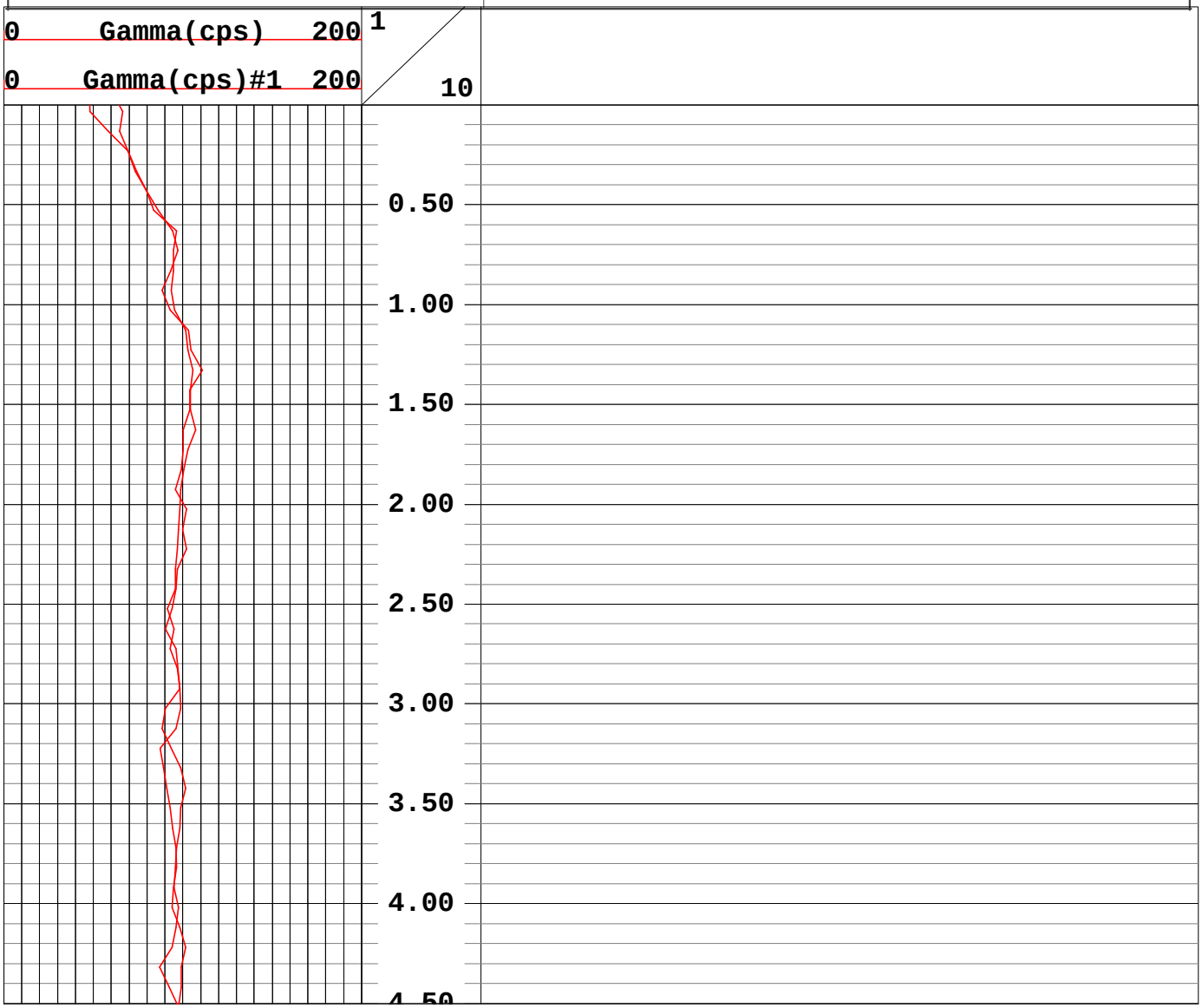
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMF3B-023	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Rick Hoover	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 2 July 2001	CASING RECORD SIZE None WGT. None



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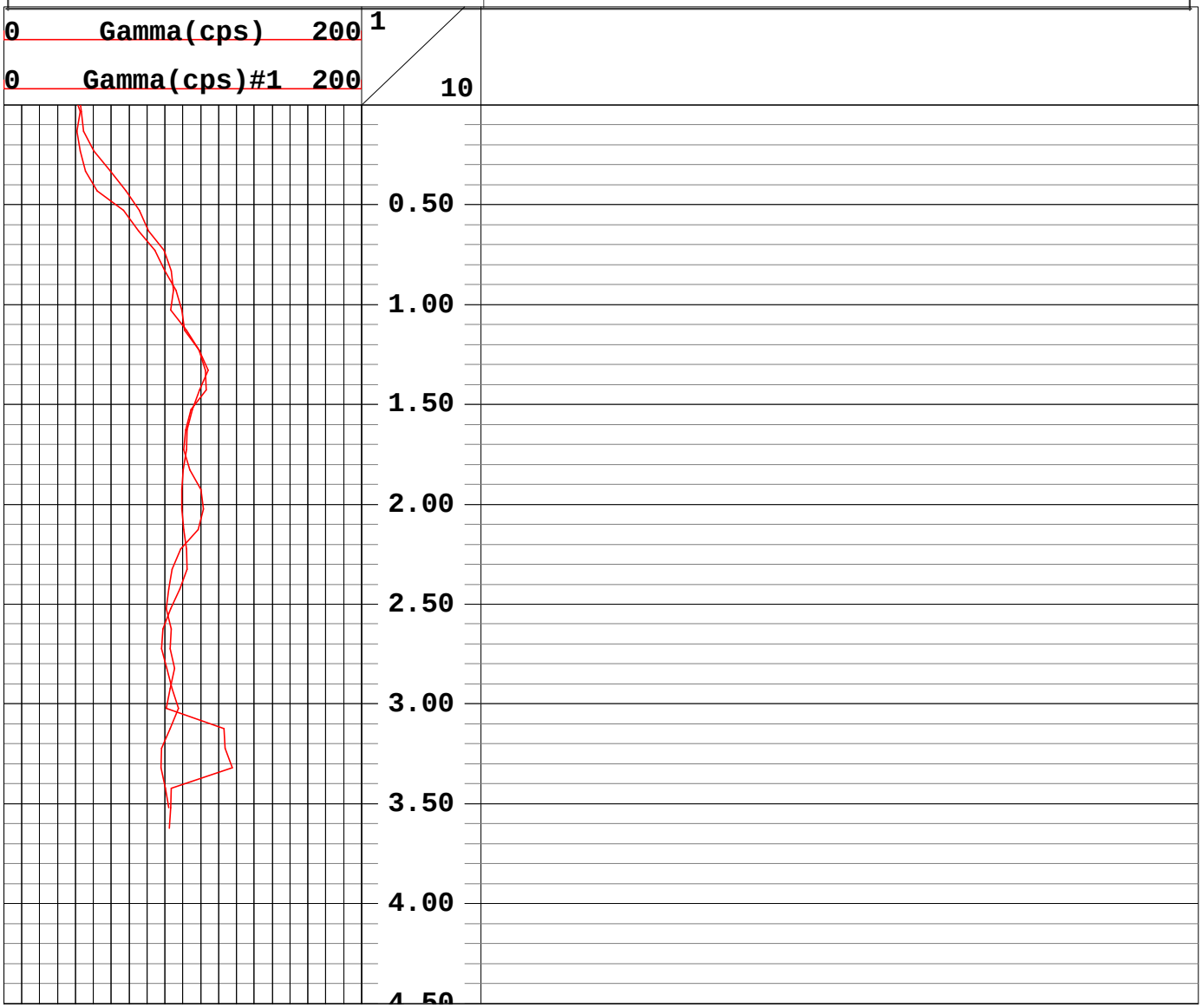
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMF3B-024	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Rick Hoover	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 2 July 2001	CASING RECORD SIZE None WGT. None



Mudflats
Reference Area

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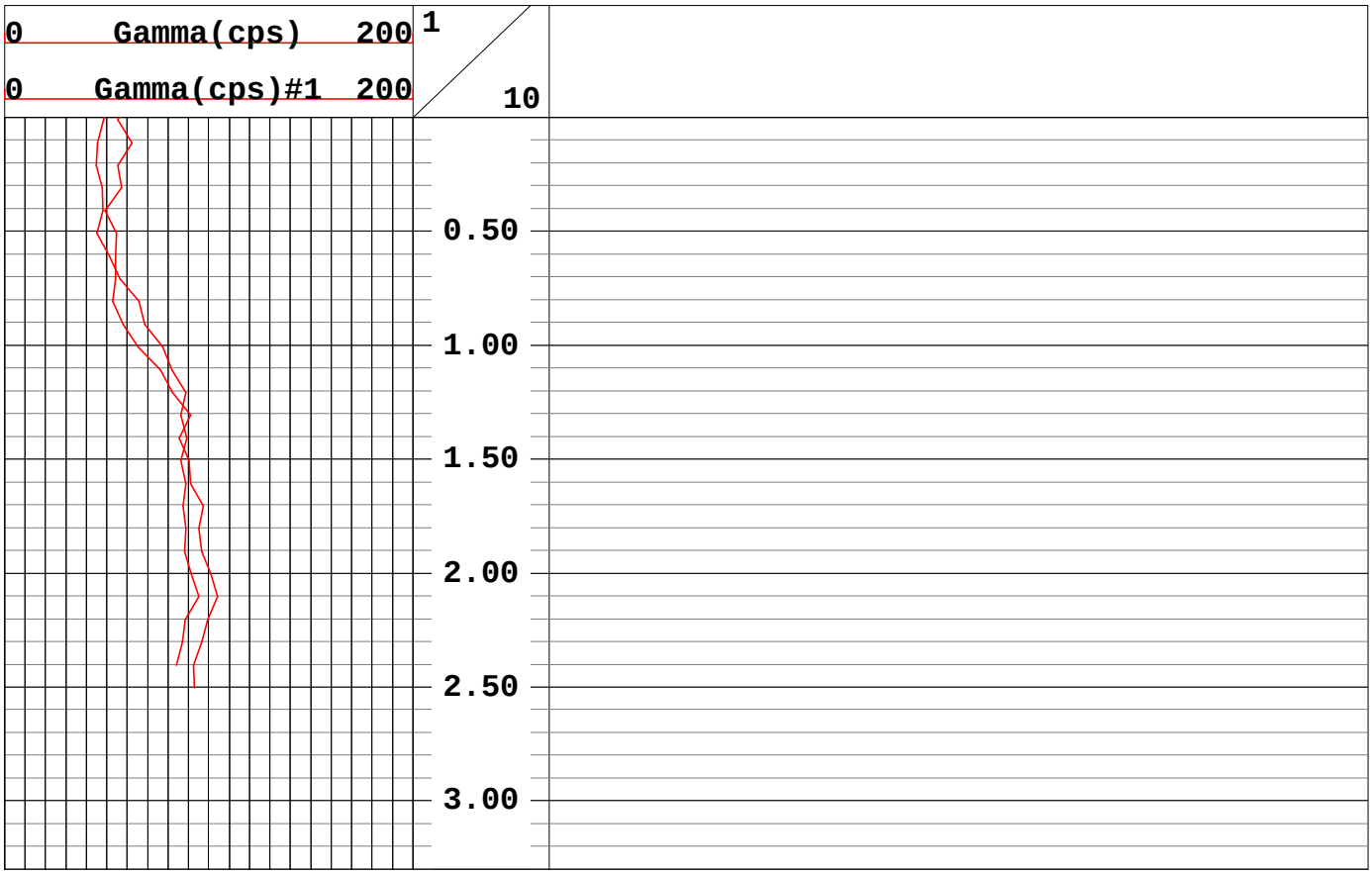
CLIENT **ACOE-Buffalo/FUSRAP**	LOG MEAS. FROM Ground Surface
WELL **TMFR1001**	ELEVATION
SITE **Tonawanda Landfill**	BTM LOGGED INTERVAL
CITY **Buffalo CoOunty**	TOP LOGGED INTERVAL
STATE **New York**	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Rick Hoover	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 27 June 2001	CASING RECORD SIZE None WGT. None



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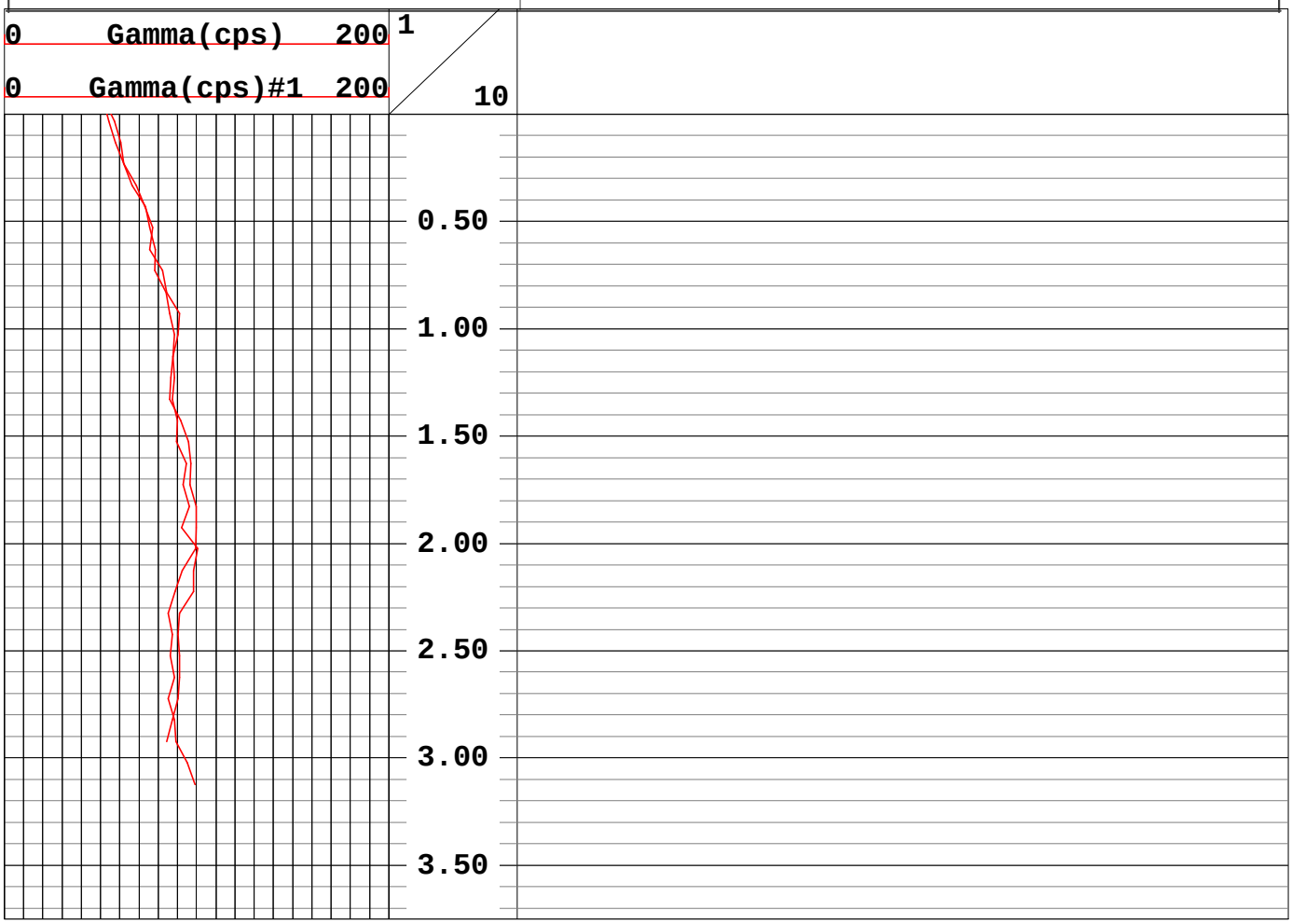
CLIENT	ACOE-Buffalo/FUSRAP	LOG MEAS. FROM	Ground Surface
WELL	TMFR1-002	ELEVATION	
SITE	Tonawanda Landfill	BTM LOGGED INTERVAL	
CITY	Tonawanda	TOP LOGGED INTERVAL	
STATE	New York	TYPE FLUID IN HOLE	Air
		LEVEL	
RECORDED BY	Rick Hoover	BOREHOLE RECORD BIT	Geoprobe
WITNESSED BY			
DATE	29 June 2001	CASING RECORD	SIZE None WGT. None



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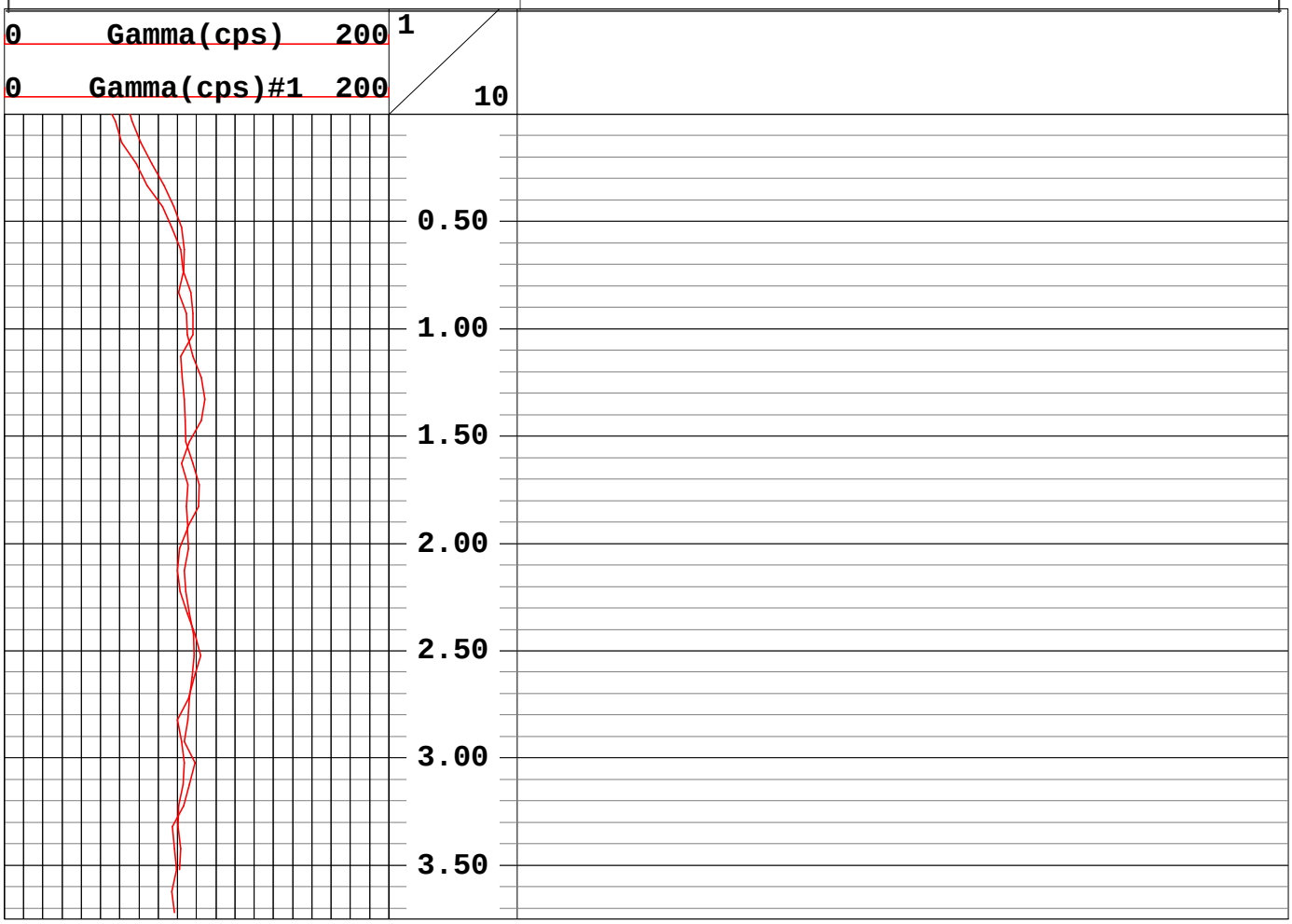
CLIENT	ACOE-Buffalo/FUSRAP	LOG MEAS. FROM	Ground Surface
WELL	TMFR1-003	ELEVATION	
SITE	Tonawanda Landfill	BTM LOGGED INTERVAL	
CITY	Tonawanda	TOP LOGGED INTERVAL	
STATE	New York	TYPE FLUID IN HOLE	Air
		LEVEL	
RECORDED BY	Rick Hoover	BOREHOLE RECORD BIT	Geoprobe
WITNESSED BY			
DATE	29 June 2001	CASING RECORD	SIZE None WGT. None



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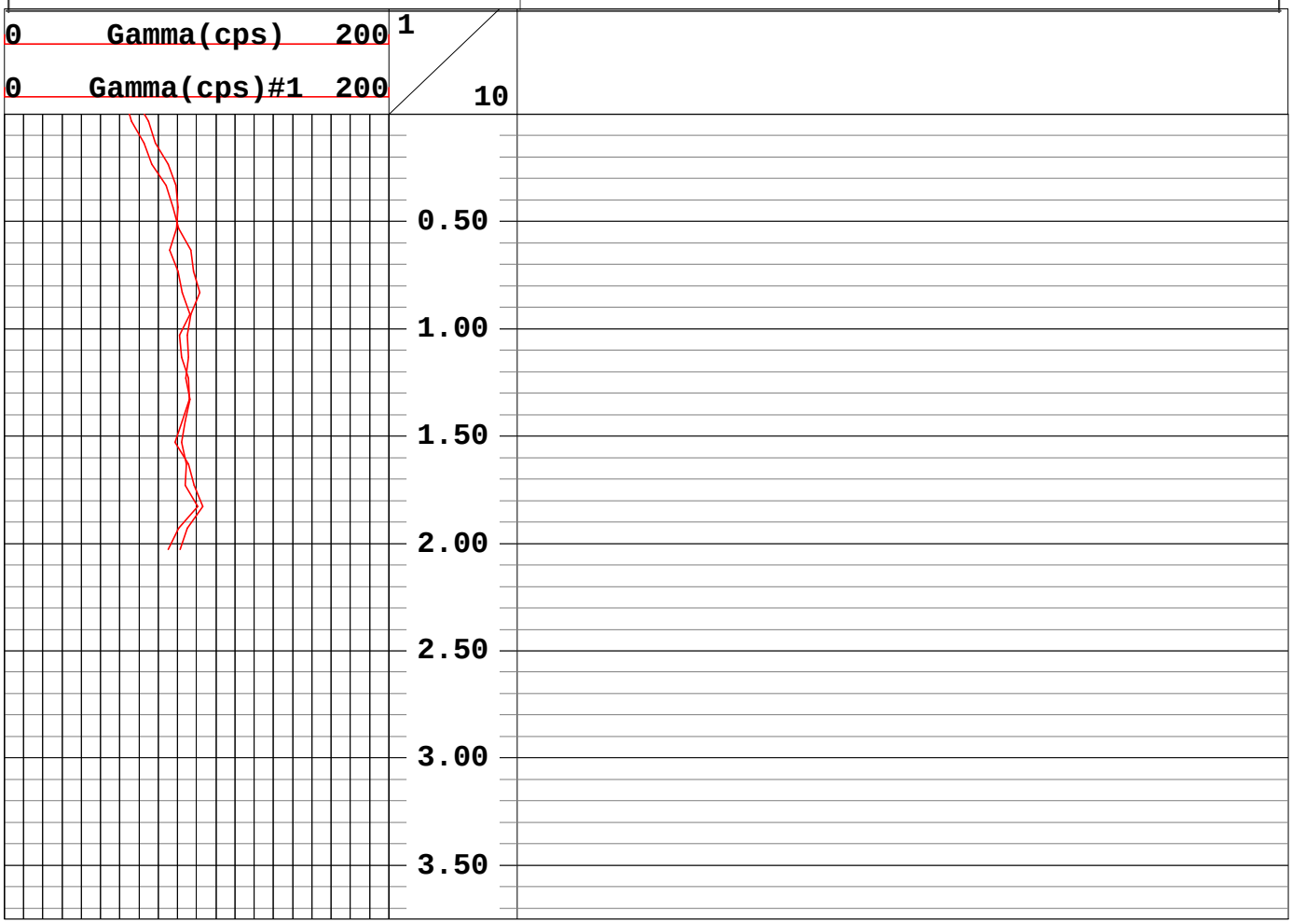
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMFR1-004	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Rick Hoover	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 29 June 2001	CASING RECORD SIZE None WGT. None



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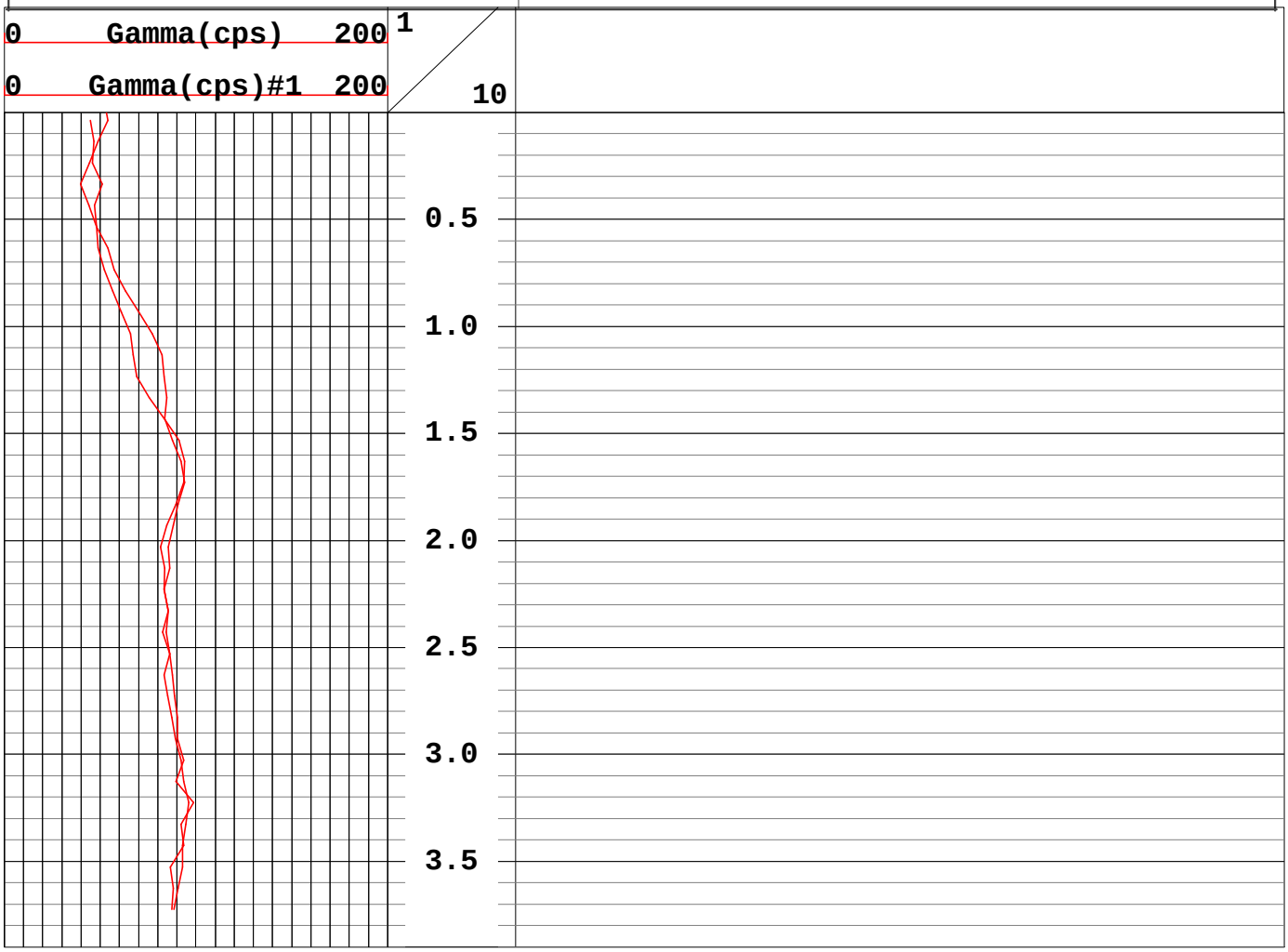
CLIENT	ACOE-Buffalo/FUSRAP	LOG MEAS. FROM	Ground Surface
WELL	TMFR1-005	ELEVATION	
SITE	Tonawanda Landfill	BTM LOGGED INTERVAL	
CITY	Tonawanda	TOP LOGGED INTERVAL	
STATE	New York	TYPE FLUID IN HOLE	Air
		LEVEL	
RECORDED BY	Rick Hoover	BOREHOLE RECORD BIT	Geoprobe
WITNESSED BY			
DATE	27 June 2001	CASING RECORD	SIZE None WGT. None



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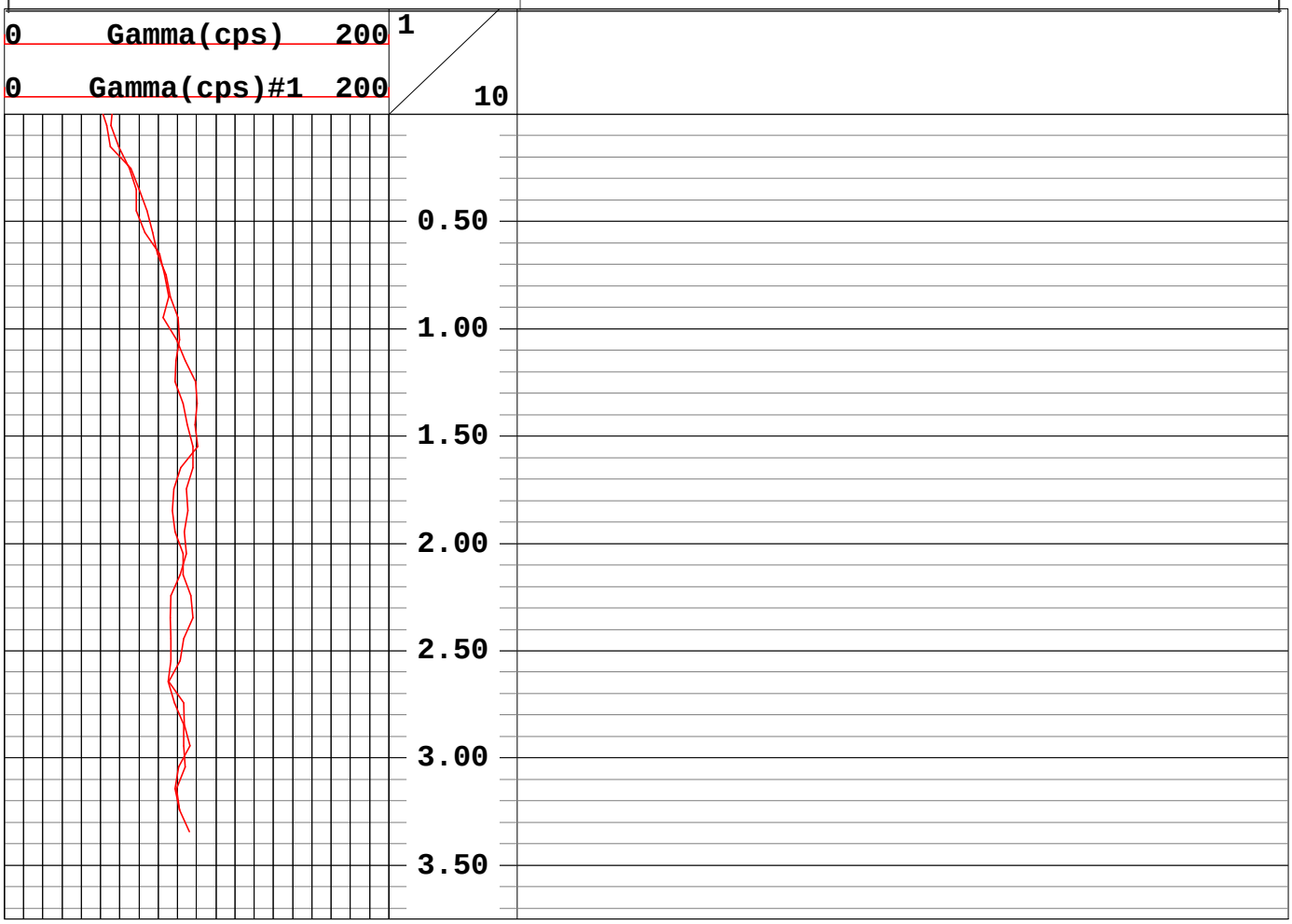
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMFR1-006	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Rick Hoover	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE	CASING RECORD SIZE None WGT. None



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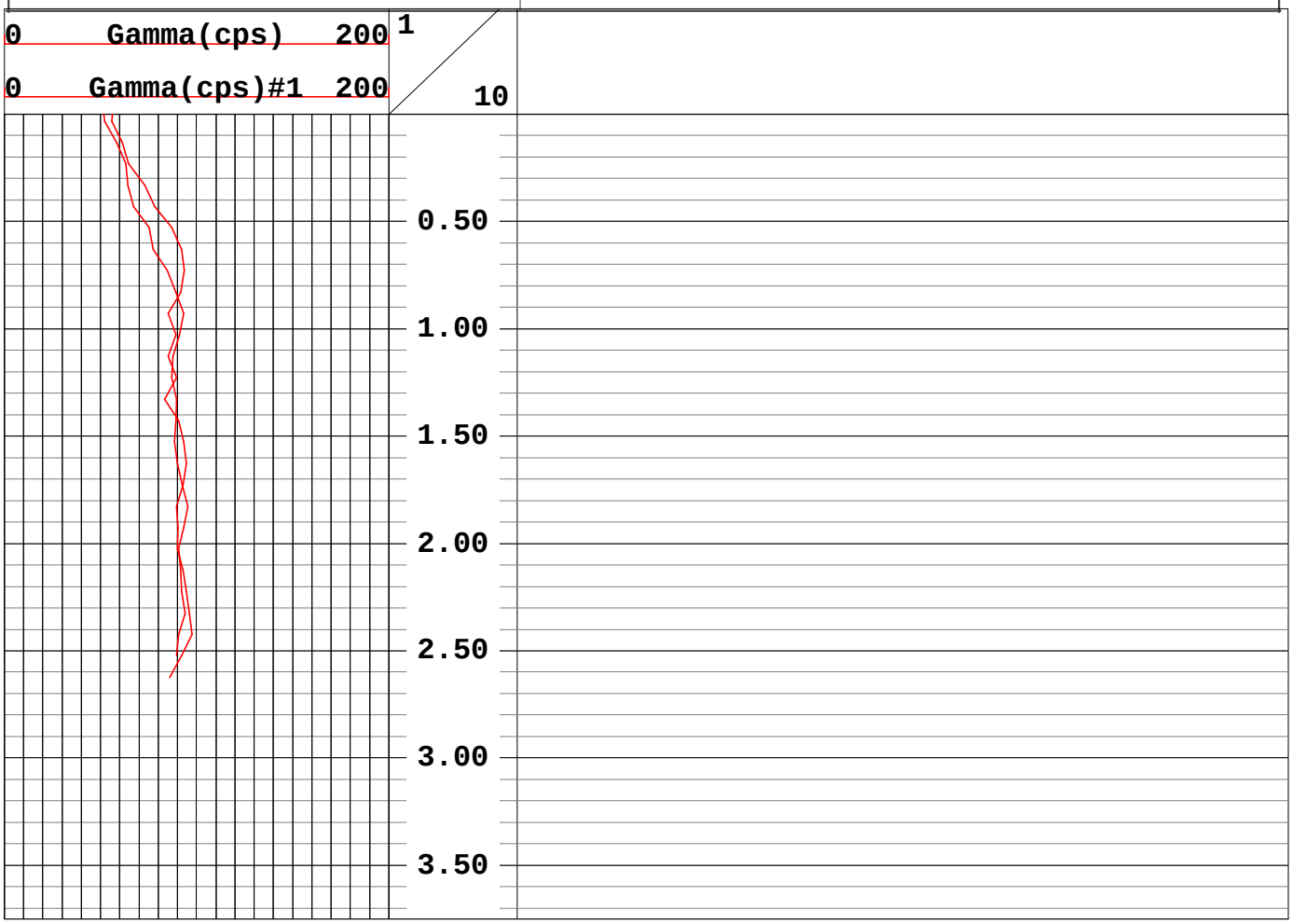
CLIENT	ACOE-Buffalo/FUSRAP	LOG MEAS. FROM	Ground Surface
WELL	TMFR1-007	ELEVATION	
SITE	Tonawanda Landfill	BTM LOGGED INTERVAL	
CITY	Tonawanda	TOP LOGGED INTERVAL	
STATE	New York	TYPE FLUID IN HOLE	Air
		LEVEL	
RECORDED BY	Rick Hoover	BOREHOLE RECORD BIT	Geoprobe
WITNESSED BY			
DATE	29 June 2001	CASING RECORD SIZE None	WGT. None



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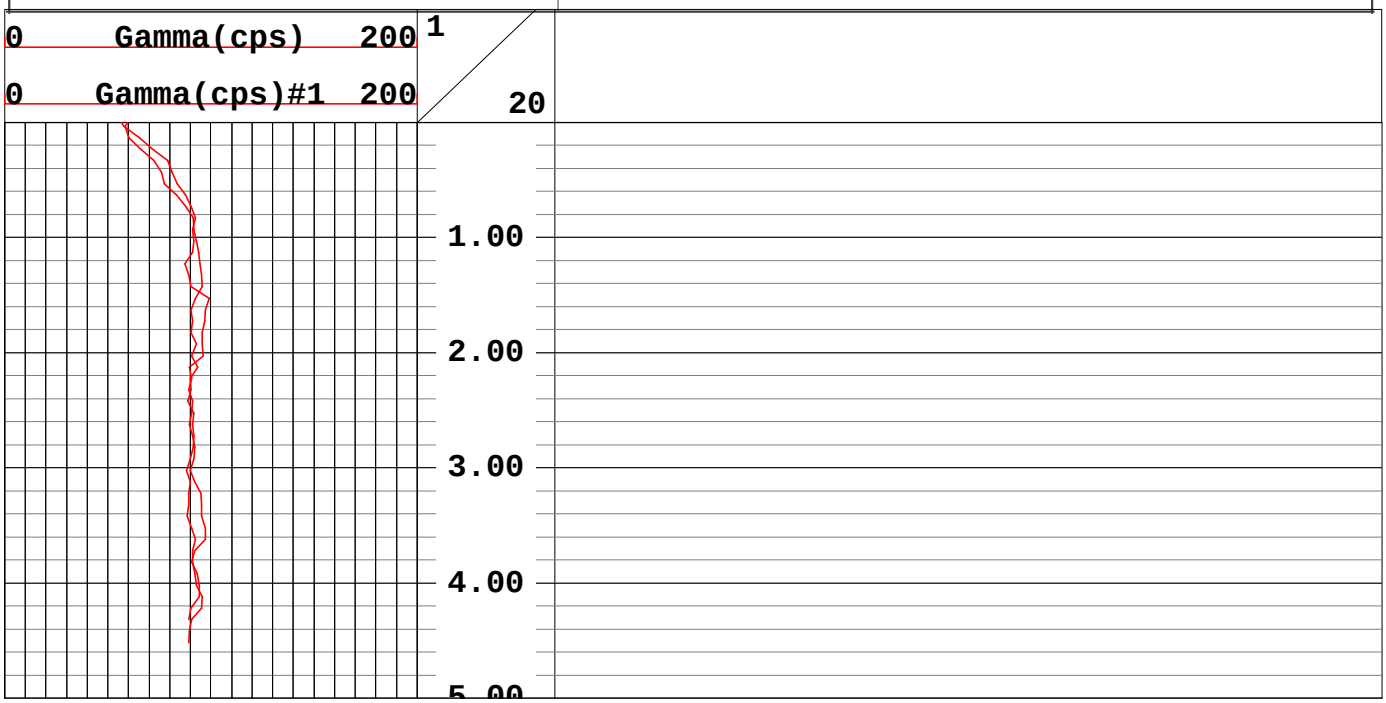
CLIENT	**ACOE-Buffalo/FUSRAP**	LOG MEAS. FROM	Ground Surface
WELL	**TMFR1-008**	ELEVATION	
SITE	**Tonawanda Landfill**	BTM LOGGED INTERVAL	
CITY	**Tonawanda**	TOP LOGGED INTERVAL	
STATE	**New York**	TYPE FLUID IN HOLE	Air
		LEVEL	
RECORDED BY	Rick Hoover	BOREHOLE RECORD BIT	Geoprobe
WITNESSED BY			
DATE	29 June 2001	CASING RECORD SIZE None	WGT. None



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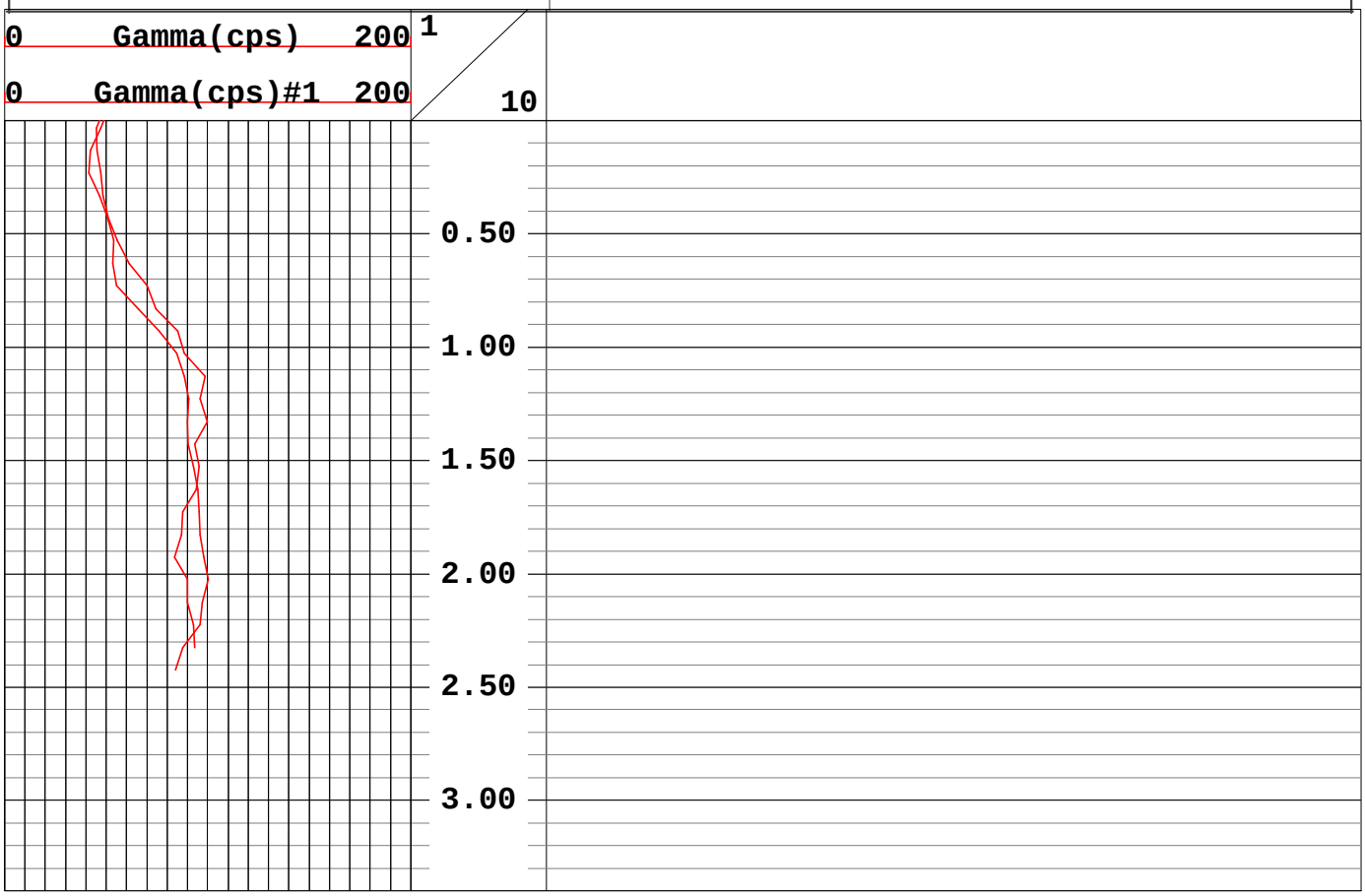
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMFR1-009	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE NY	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Rick Hoover	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 27 June 2001	CASING RECORD SIZE None WGT. None



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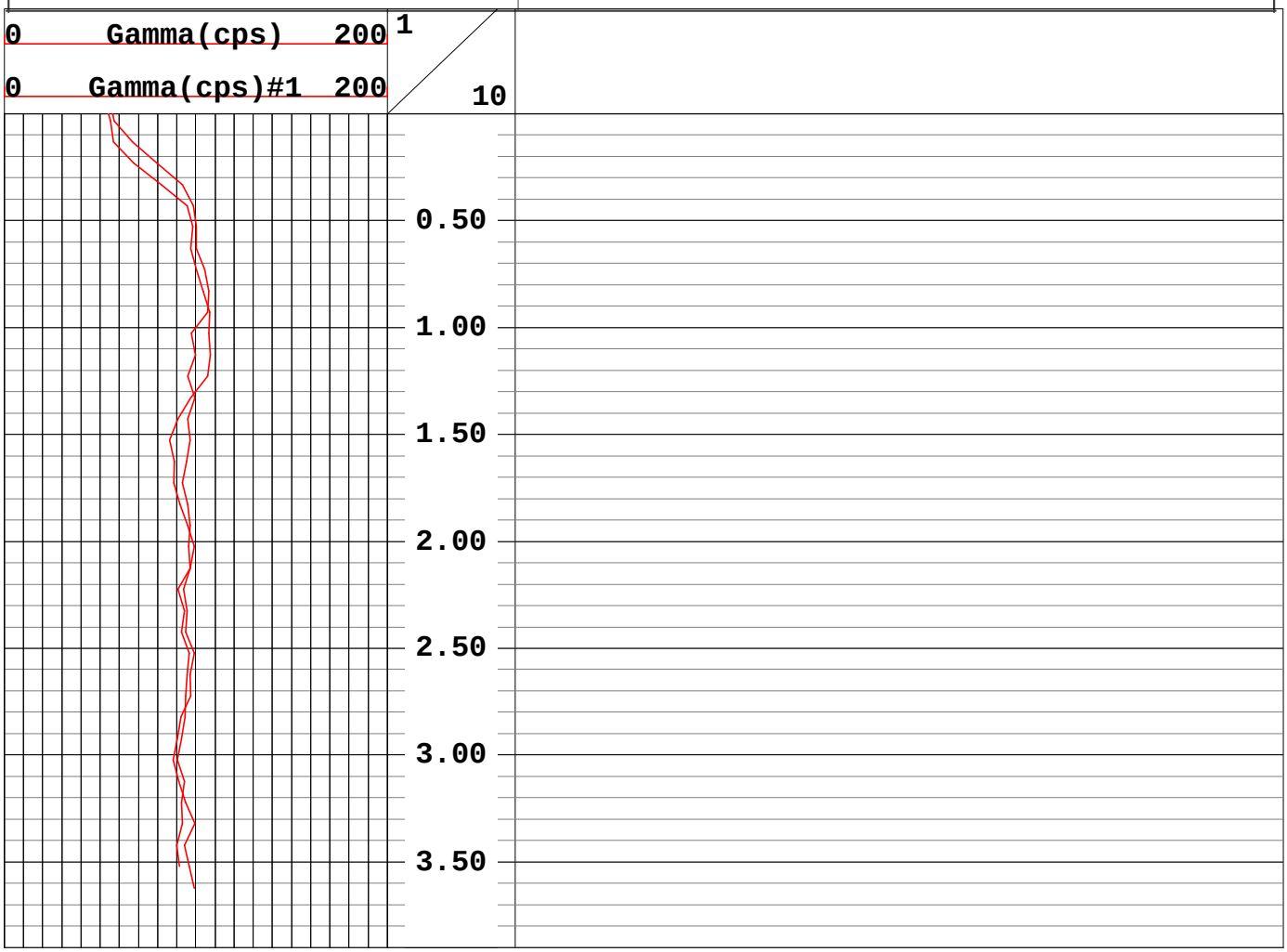
CLIENT	ACOE-Buffalo/FUSRAP	LOG MEAS. FROM	Ground Surface
WELL	TMFR1-010	ELEVATION	
SITE	Tonawanda Landfill	BTM LOGGED INTERVAL	
CITY	Tonawanda	TOP LOGGED INTERVAL	
STATE	New York	TYPE FLUID IN HOLE	Air
		LEVEL	
RECORDED BY	Rick Hoover	BOREHOLE RECORD BIT	Geoprobe
WITNESSED BY			
DATE	27 June 2001	CASING RECORD SIZE None	WGT. None



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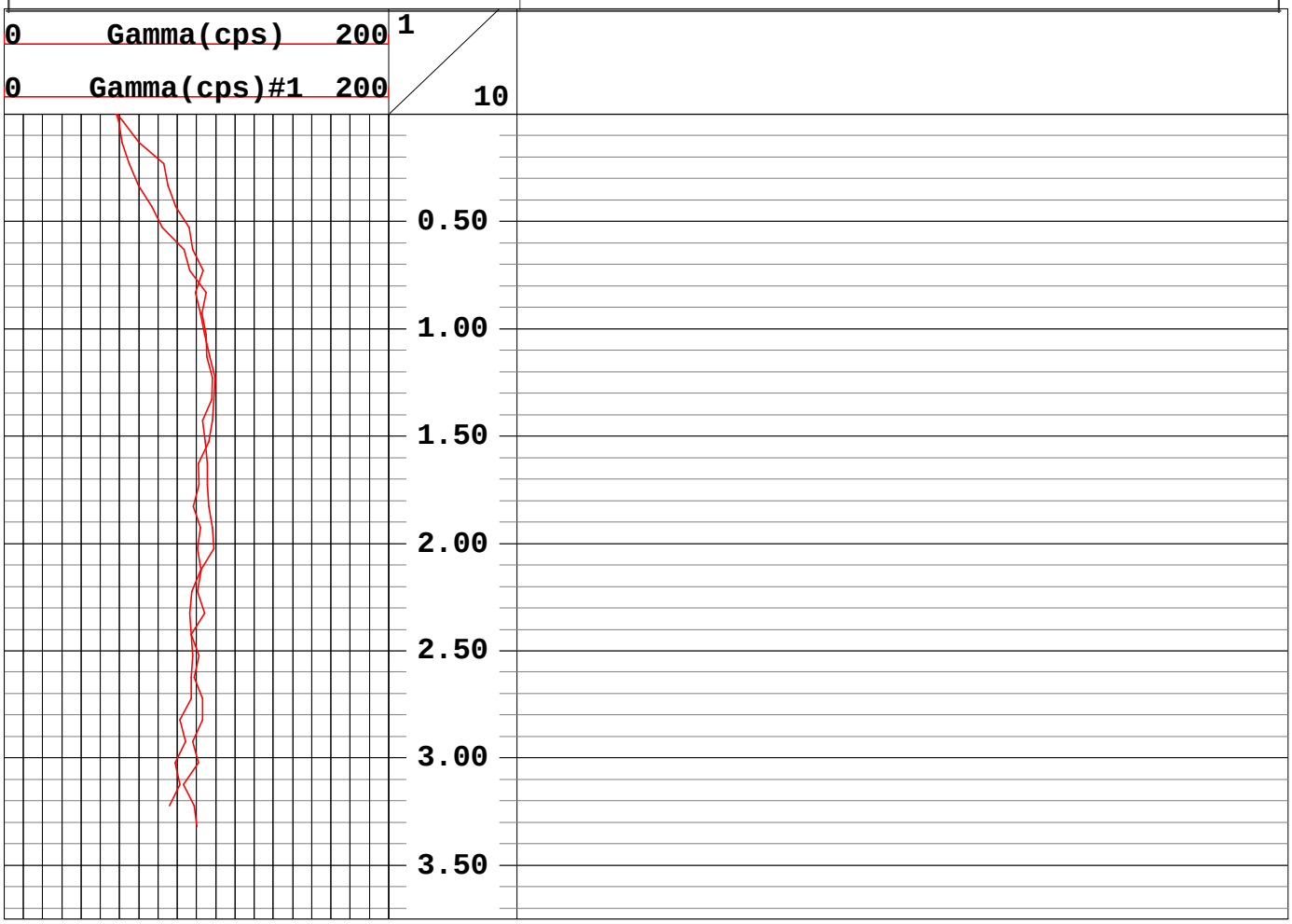
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMFR1-011	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Rick Hoover	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 29 June 2001	CASING RECORD SIZE None WGT. None



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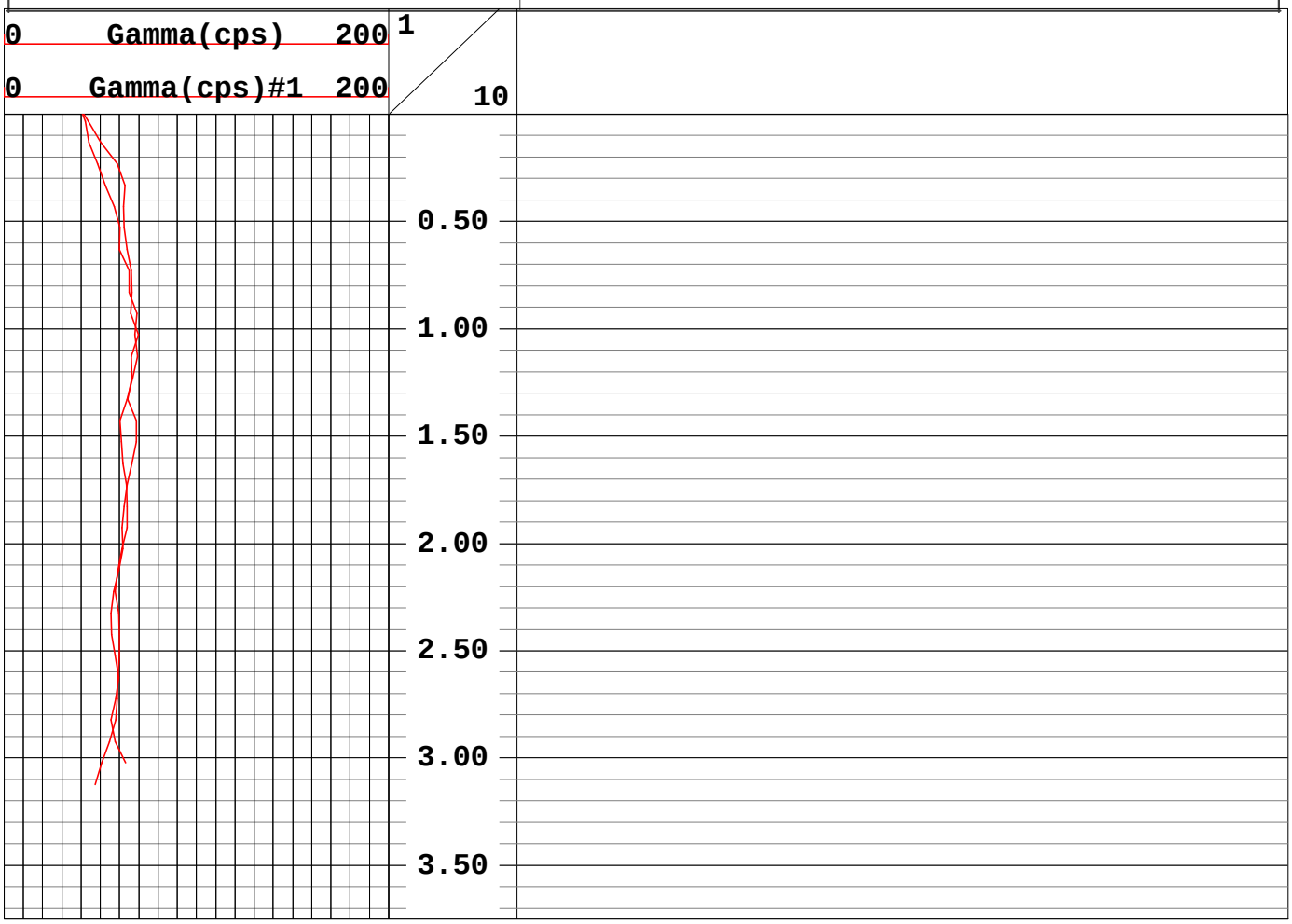
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMFR1-011	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Rick Hoover	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 29 June 2001	CASING RECORD SIZE 3-inch WGT. Steel



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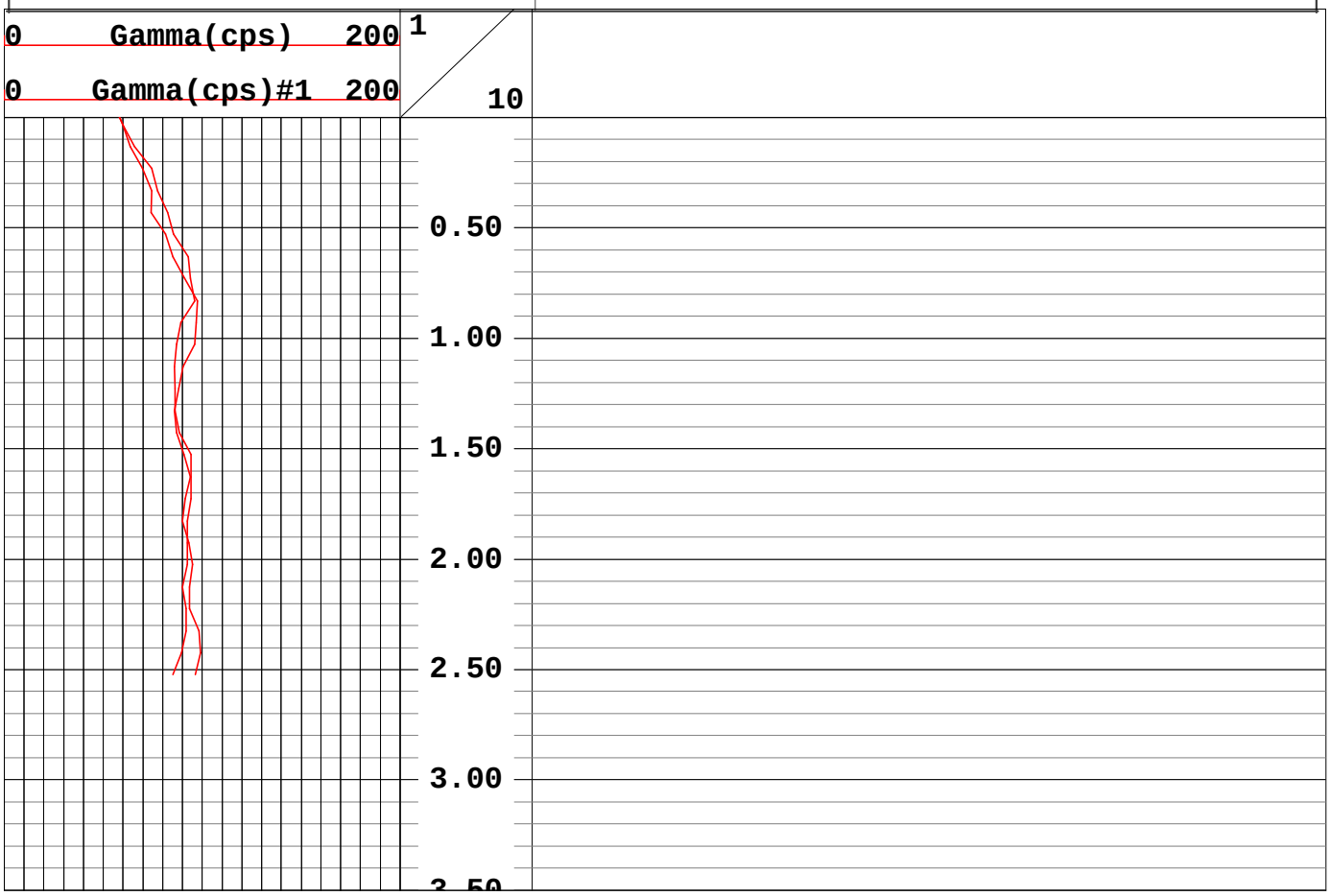
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMFR1-012	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Rick Hoover	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 29 June 2001	CASING RECORD SIZE None WGT. None



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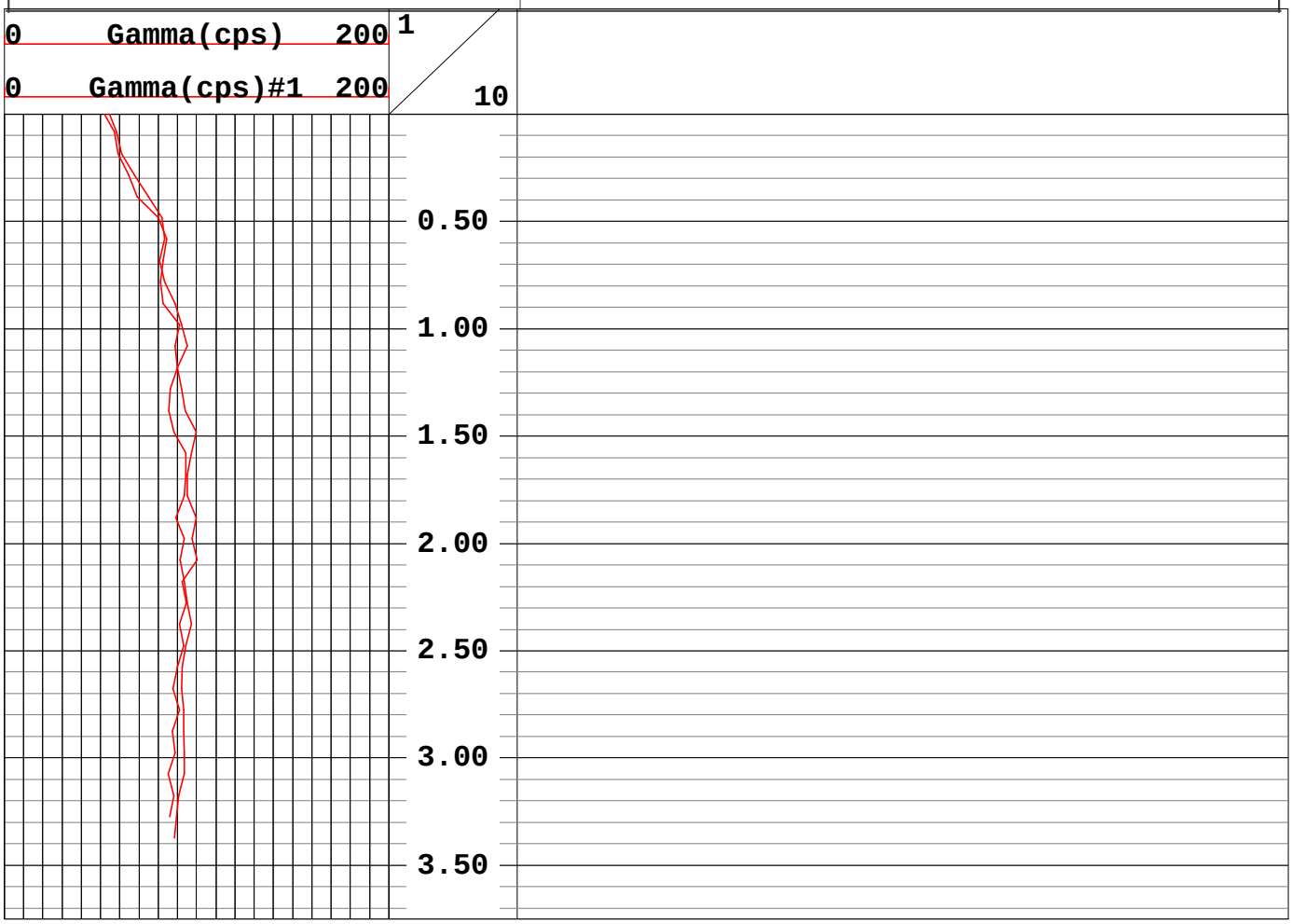
CLIENT	ACOE-Buffalo/FUSRAP	LOG MEAS. FROM	Ground Surface
WELL	TMFR1-013	ELEVATION	
SITE	Tonawanda Landfill	BTM LOGGED INTERVAL	
CITY	Tonawanda	TOP LOGGED INTERVAL	
STATE	New York	TYPE FLUID IN HOLE	Air
		LEVEL	
RECORDED BY	Rick Hoover	BOREHOLE RECORD BIT	Geoprobe
WITNESSED BY			
DATE	28 June 2001	CASING RECORD	SIZE None WGT. None



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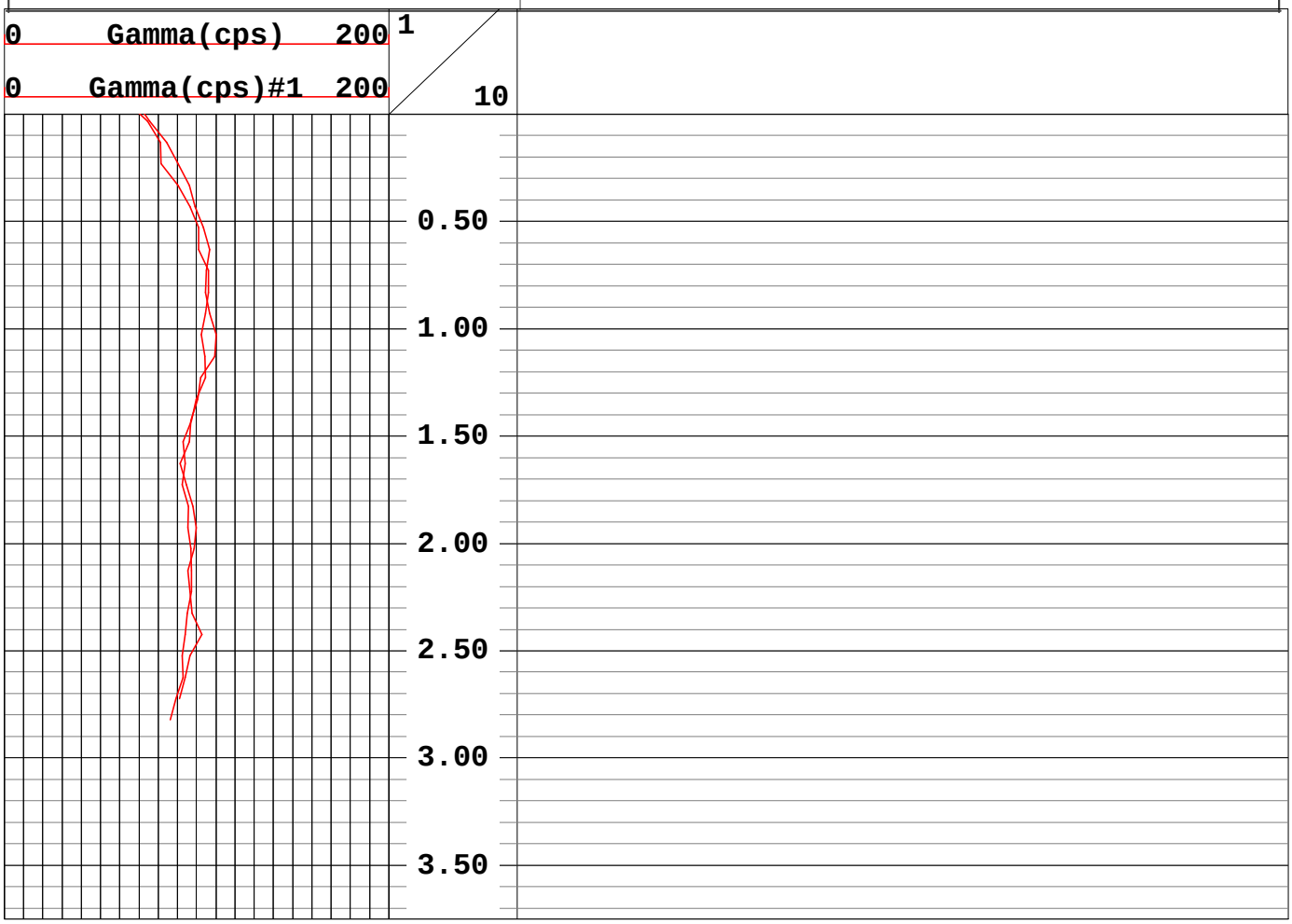
CLIENT	ACOE-Buffalo/FUSRAP	LOG MEAS. FROM	Ground Surface
WELL	TMFR1-014	ELEVATION	
SITE	Tonawanda Landfill	BTM LOGGED INTERVAL	
CITY	Tonawanda	TOP LOGGED INTERVAL	
STATE	New York	TYPE FLUID IN HOLE	Air
		LEVEL	
RECORDED BY	Rick Hoover	BOREHOLE RECORD BIT	Geoprobe
WITNESSED BY			
DATE	28 June 2001	CASING RECORD	SIZE None WGT. None



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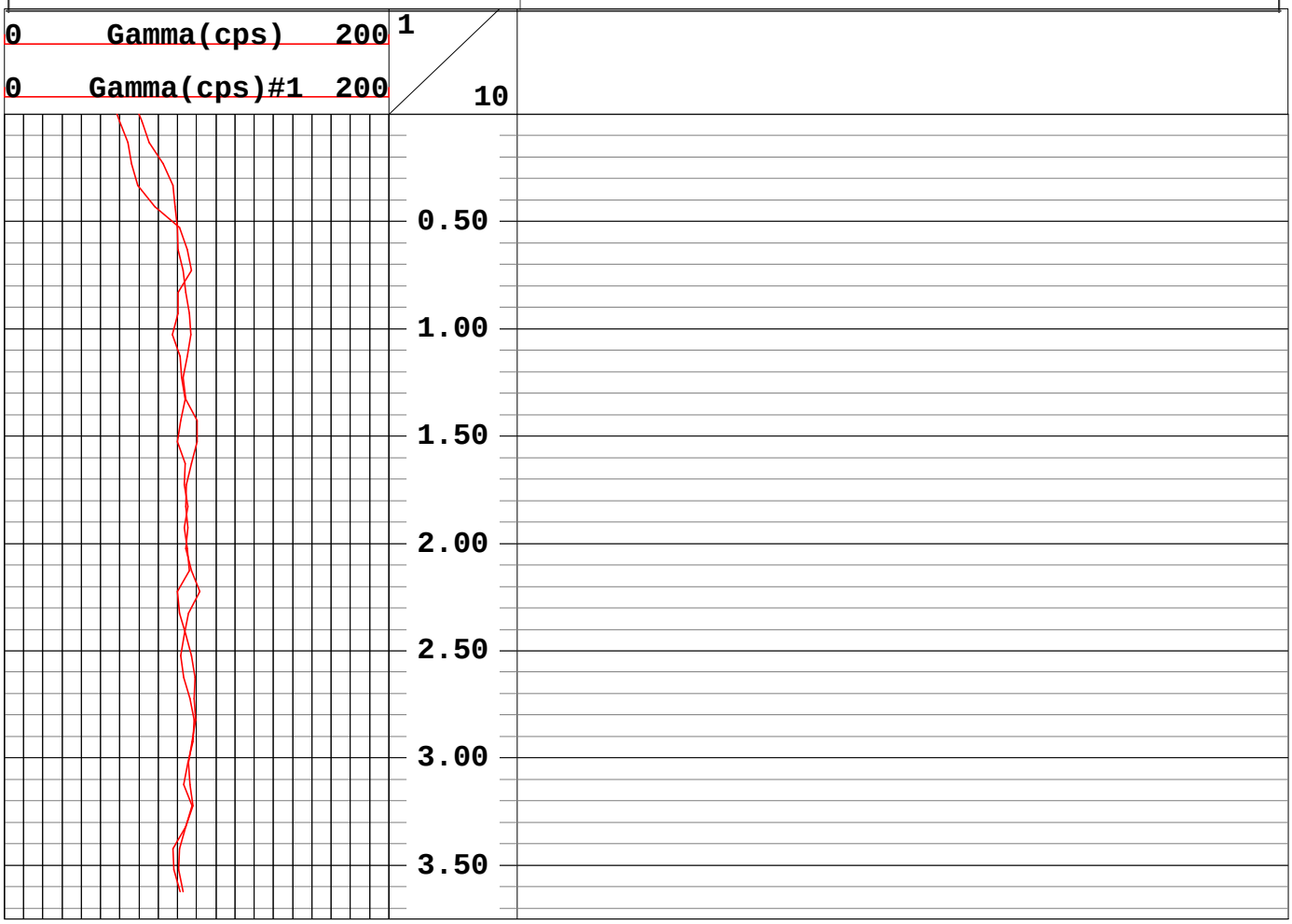
CLIENT	ACOE-Buffalo/FUSRAP	LOG MEAS. FROM	Ground Surface
WELL	TMFR1-015	ELEVATION	
SITE	Tonawanda Landfill	BTM LOGGED INTERVAL	
CITY	Tonawanda	TOP LOGGED INTERVAL	
STATE	New York	TYPE FLUID IN HOLE	Air
		LEVEL	
RECORDED BY	Rick Hoover	BOREHOLE RECORD BIT	Geoprobe
WITNESSED BY			
DATE	28 June 2001	CASING RECORD	SIZE None WGT. None



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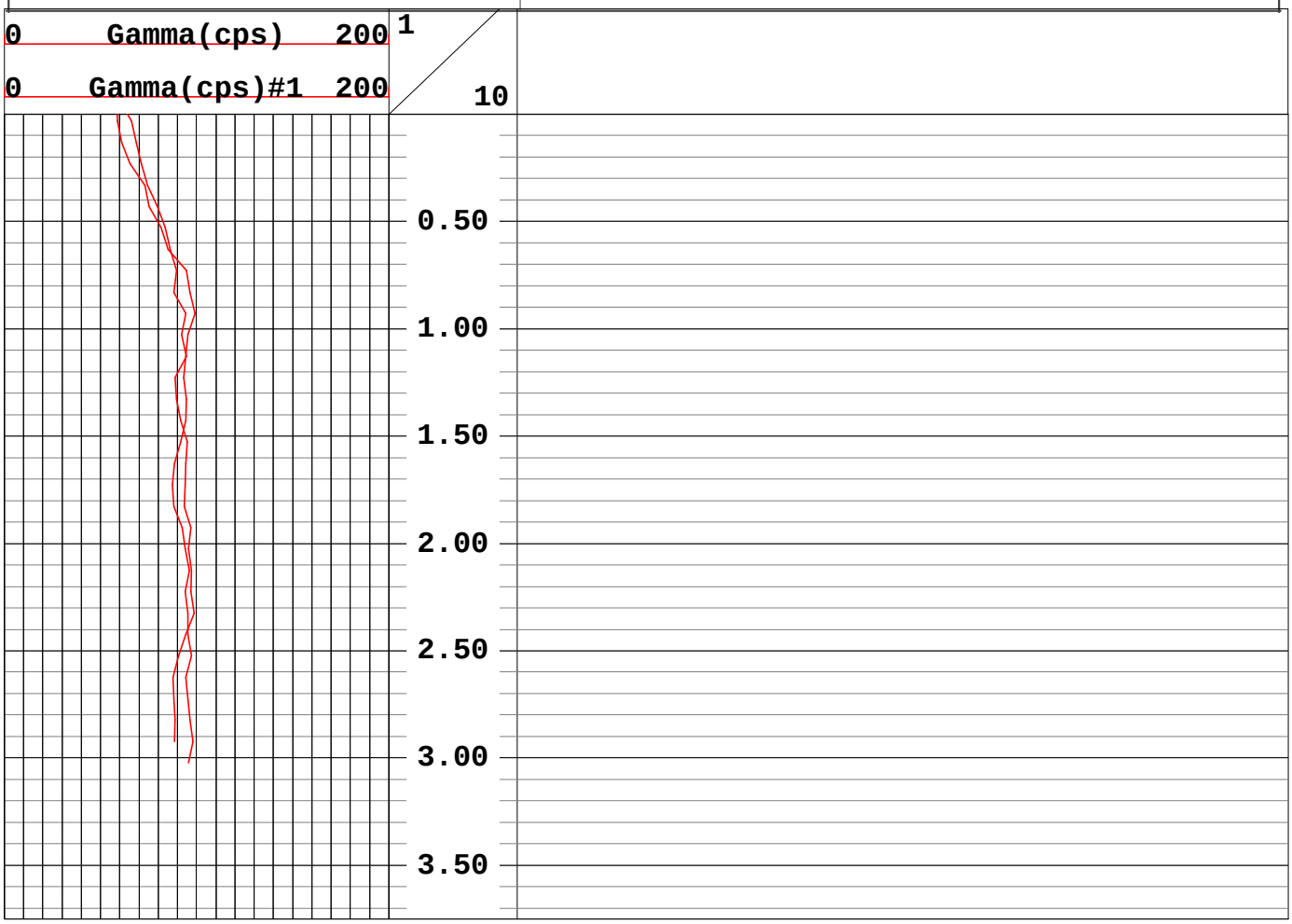
CLIENT **ACOE-Buffalo/FUSRAP**	LOG MEAS. FROM Ground Surface
WELL **TMFR1-016**	ELEVATION
SITE **Tonawanda Landfill**	BTM LOGGED INTERVAL
CITY **Tonawanda**	TOP LOGGED INTERVAL
STATE **New York**	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Rick Hoover	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 28 June 2001	CASING RECORD SIZE None WGT. None



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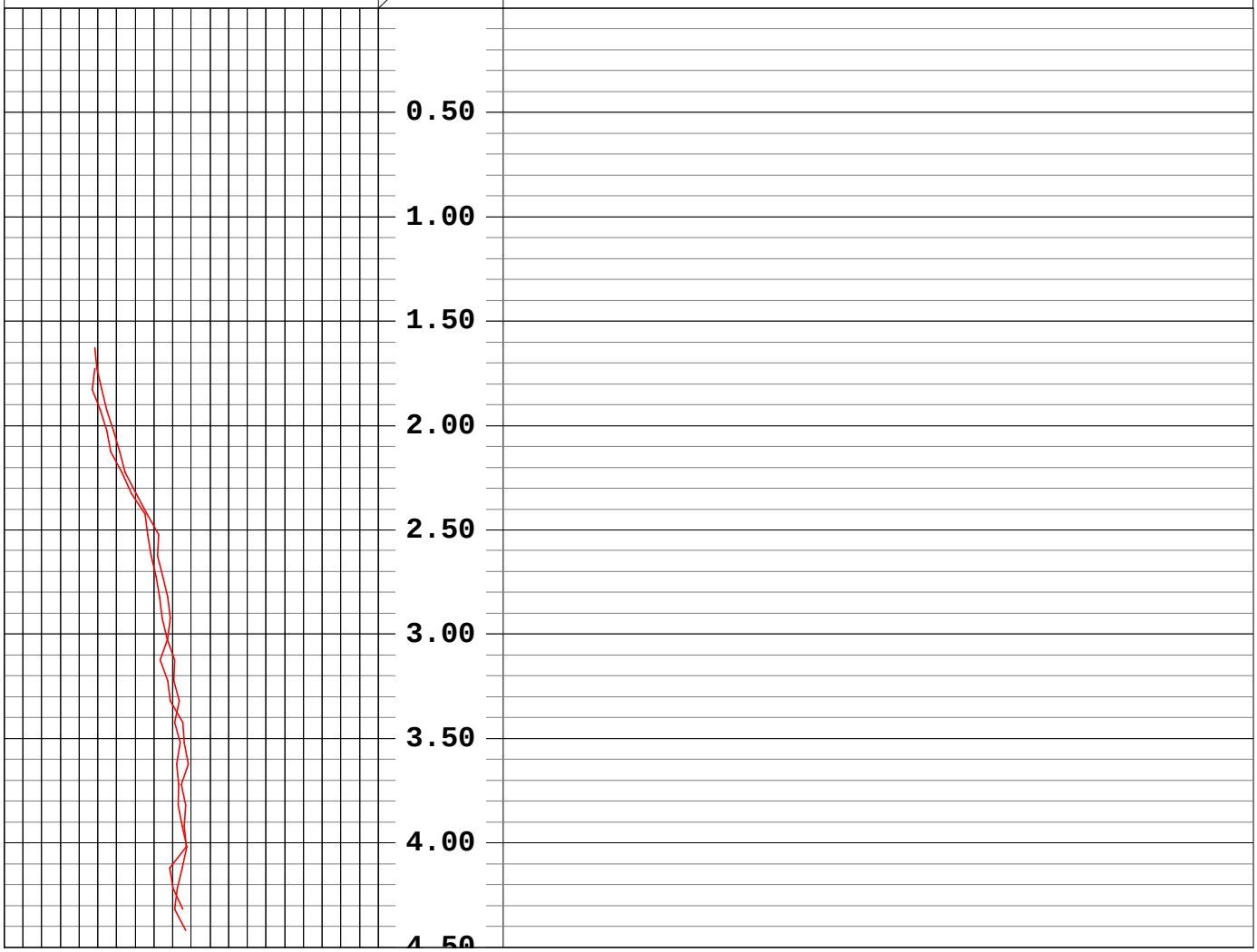
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMFR1-017	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Rick Hoover	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 28 June 2001	CASING RECORD SIZE None WGT. None

0 Gamma(cps) 200 1

0 Gamma(cps)#1 200 10



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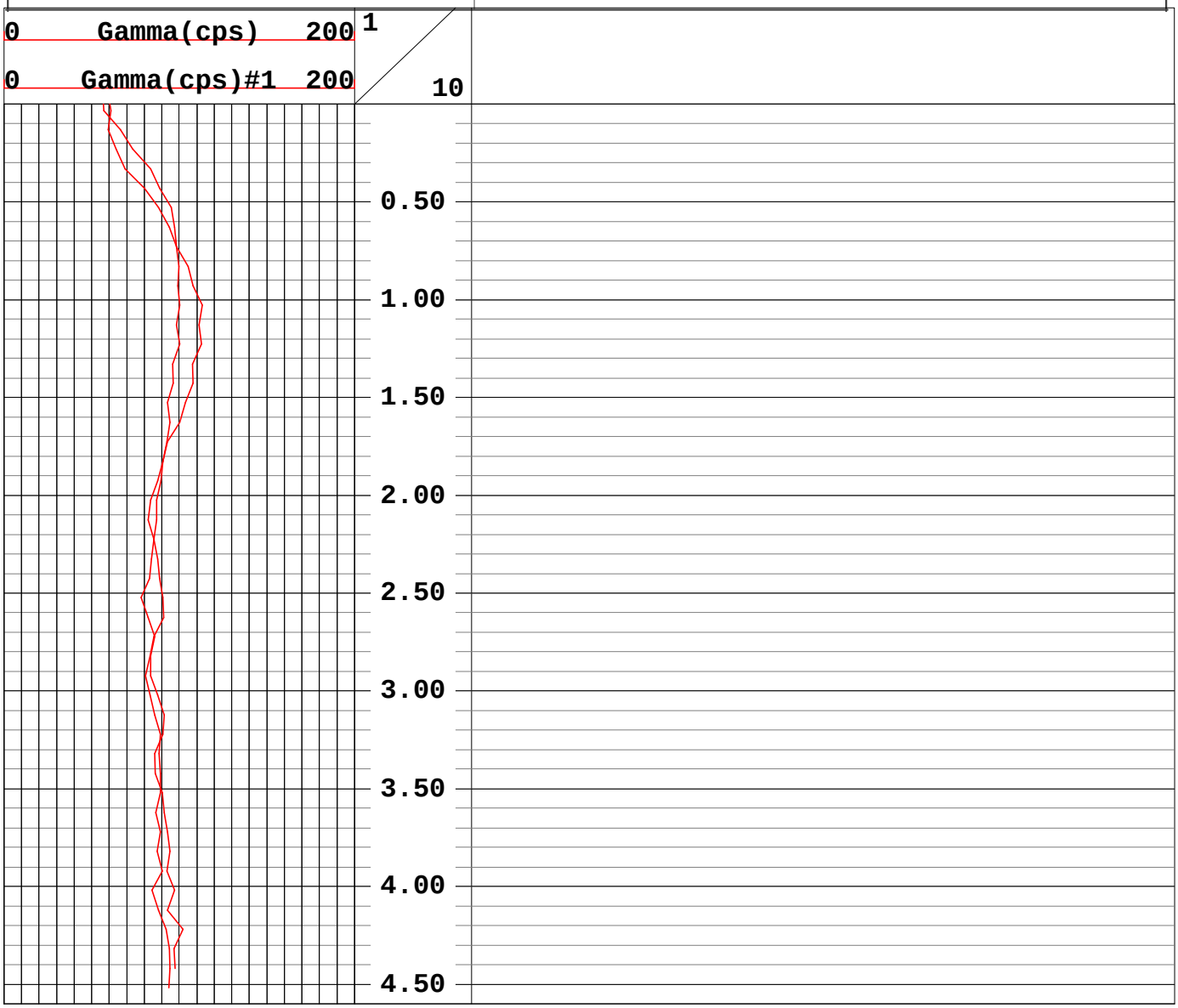
CLIENT	ACOE-Buffalo/FUSRAP	LOG MEAS. FROM	Ground Surface
WELL	TMFR1-018	ELEVATION	
SITE	Tonawanda Landfill	BTM LOGGED INTERVAL	
CITY	Tonawanda	TOP LOGGED INTERVAL	
STATE	New York	TYPE FLUID IN HOLE	Air
		LEVEL	
RECORDED BY	Rick Hoover	BOREHOLE RECORD BIT	Geoprobe
WITNESSED BY			
DATE	28 June 2001	CASING RECORD	SIZE None WGT. None



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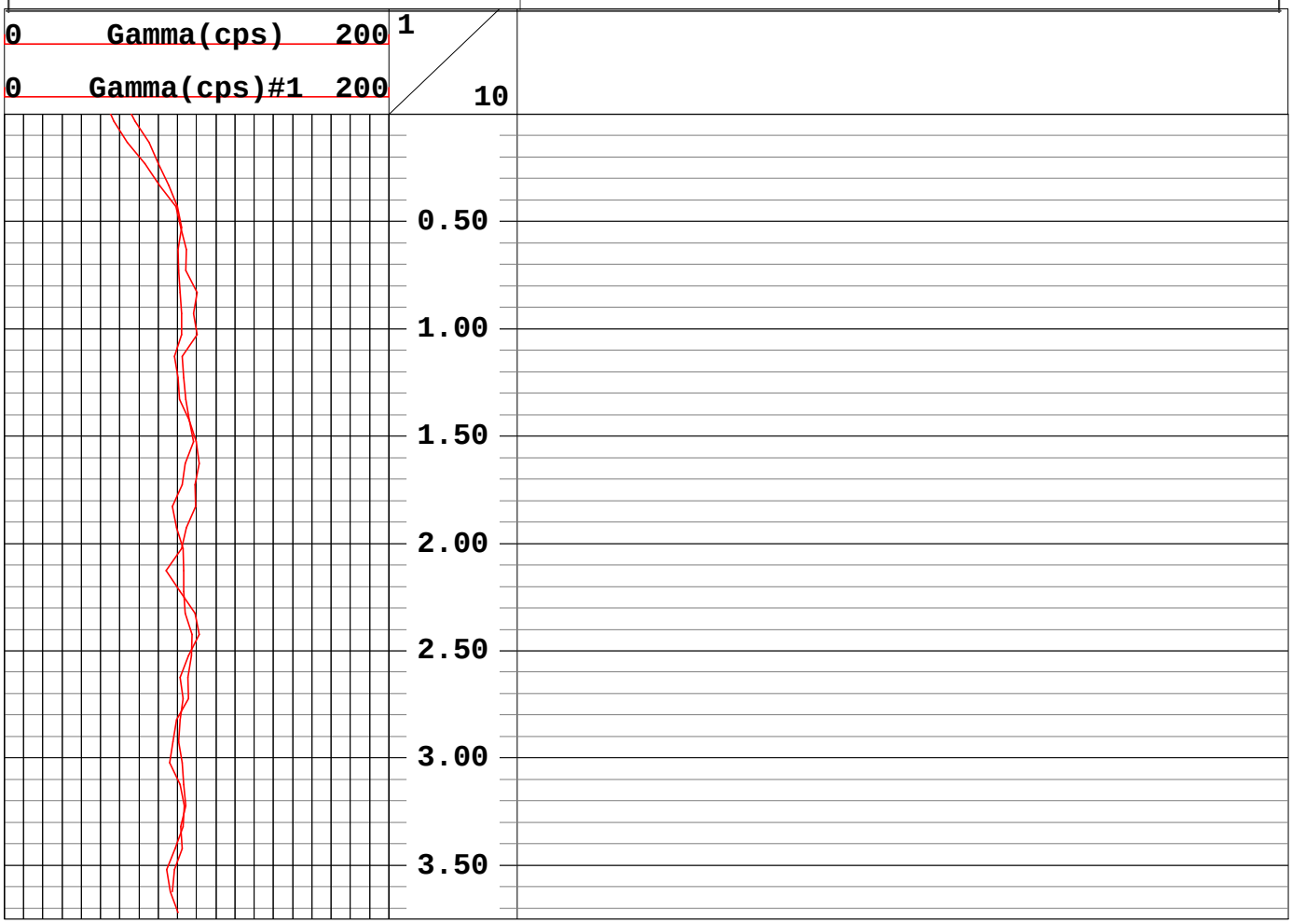
CLIENT	ACOE-Buffalo/FUSRAP	LOG MEAS. FROM	Ground Surface
WELL	TMFR1-019	ELEVATION	
SITE	Tonawanda Landfill	BTM LOGGED INTERVAL	
CITY	Tonawanda	TOP LOGGED INTERVAL	
STATE	New York	TYPE FLUID IN HOLE	Air
		LEVEL	
RECORDED BY	Rick Hoover	BOREHOLE RECORD BIT	Geoprobe
WITNESSED BY			
DATE	28 June 2001	CASING RECORD	SIZE None WGT. None



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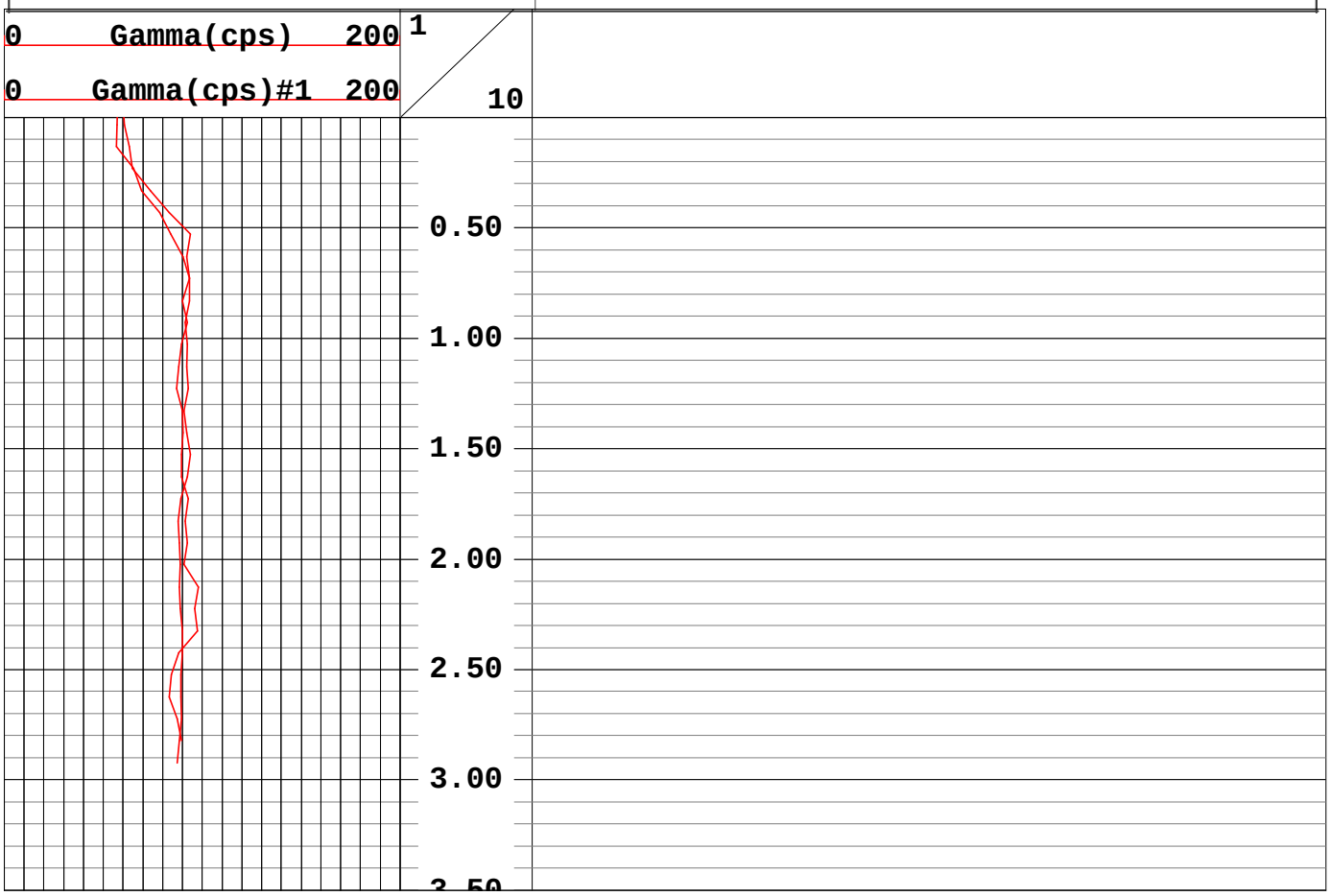
CLIENT ACOE-Buffalo/FUSRAP	LOG MEAS. FROM Ground Surface
WELL TMFR1-020	ELEVATION
SITE Tonawanda Landfill	BTM LOGGED INTERVAL
CITY Tonawanda	TOP LOGGED INTERVAL
STATE New York	TYPE FLUID IN HOLE Air
	LEVEL
RECORDED BY Rick Hoover	BOREHOLE RECORD BIT Geoprobe
WITNESSED BY	
DATE 29 June 2001	CASING RECORD SIZE None WGT. None



ATTACHMENT F

Geotechnical Analysis Lab Reports

GENERAL ENGINEERING LABORATORIES

August 6, 2001

Mr. Frank Stevenson
Science Applications International Corporation
101 East Grove Street
Middleboro, MA 02346

Dear Mr. Stevenson:

Enclosed is the data package for the sample received from the Tonawanda Landfill Site. The samples were analyzed for geotechnical parameters.

General Engineering Laboratories appreciates this opportunity to provide you with analytical results, and trusts that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (803) 556-8171.

Yours very truly,

Valerie S. Davis
Project Manager

enclosure

P O Box 30712 Charleston, SC 29417 2040 Savage Road 29407
(843) 556-8171 Fax (843) 766-1178

Meeting Today's Needs
with a
Vision for Tomorrow

SCIENCE APPLICATIONS
INTERNATIONAL CORPORATION
TONAWANDA LANDFILL SITE
SDG# 46041

GENERAL ENGINEERING LABORATORIES, INC.

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Chain Of Custody **6**

Cooler Receipt Checklist **8**

Geotechnical **10**

CASE NARRATIVE

GENERAL ENGINEERING LABORATORIES

CASE NARRATIVE
for
Science Applications International Corporation
Tonawanda Landfill
SDG# 46041

August 6, 2000

Laboratory Identification:

General Engineering Laboratories, Inc. (GEL)

Mailing Address:

P.O. Box 30712
Charleston, SC 29417

Express Mail Delivery and Shipping Address:

2040 Savage Rd
Charleston, SC 29414

Telephone Number:

(843) 556-8171

Summary:

Sample receipt

The samples arrived at General Engineering Laboratories, Inc., Charleston, SC on July 17, 2001, for environmental analyses. All sample containers arrived without any visible signs of tampering or breakage. The samples were delivered with chain of custody documentation and signatures.

The following samples were received by the laboratory:

Laboratory Identification	Sample Description
46041001	TMF 0244A
46041002	TMF 0245A

Case Narrative

Sample analyses were conducted using methodology as outlined in General Engineering Laboratories Standard Operating Procedures. Any technical or administrative problems during analysis, data review, and reduction are listed below by analytical parameter.

Internal Chain of Custody:

Custody was maintained for all samples.

Data Package:

The enclosed data package contains the following sections: Case Narrative, Qualifier Flag Definitions, Chain of Custody, Cooler Receipt Checklist, and Geotechnical Analysis.

This data package, to the best of my knowledge, is in compliance with technical and administrative requirements.

Valerie S. Davis
Project Manager

P.O. Box 30712 · Charleston, SC 29417 · 2040 [illegible]
(843) 556-8171 · Fax (843) [illegible]

DATA REVIEW QUALIFIER FLAG DEFINITION SHEET

General Engineering Laboratories, Inc.

DATA QUALIFIERS FOR INORGANIC ANALYSES

Data Qualifiers used on Form 1s or Certificates of Analysis (C Of A) follow the specifications set forth in the technical specifications of the most current CLP Statement of Work and are defined as follows.

Section	Explanation	Location
E	The qualifier that is used when the percent difference between the parent sample and its serial dilution's concentrations exceeds 10%. The sample's concentration must be greater than 50 times the IDL/MDL for ICP (6010B/ILMO 3.0) or 100 times the absolute value of the preparation blank's concentration (6020). However, if analyzing ILMO 4.0 (ICP-MS), the parent sample's concentration must be 20 times the CRDL before the "E" flag is applied.	Form 1, and EDD
*	The qualifier that is used to indicate that the duplicate sample analysis for an analyte is out of control.	Form 1, and EDD
÷	Correlation coefficient the Method of Standard Addition (MSA) is less than 0.095.	Form 2, and EDD
B	The qualifier is used to indicate that the reported result fell above the IDL/MDL but below the CRDL.	Form 1, and EDD
M	The qualifier is used to indicate that the replicate injection readings of the GFAA sample analysis do not agree within 20% relative standard deviation (RSD) or coefficient of variation (CV).	Form 1, and EDD
N	This qualifier is used to indicate that the matrix or pre-digested spike sample recovery for an analyte is not within the specified control limit.	Form 1, and EDD
S	The reported value was determined by the Method of Standard Addition (MSA).	Form 1, and EDD
U	The analyte's result was less than the IDL/MDL.	C of A, Form 1, and EDD
W	Post-digestion spike for GFAA analysis is out of control limits (85%-115%), while sample results are less than 50% of the spike absorbance.	EDD, and Form 5, part 2
X	Other reporting flag as defined in report narrative.	Form 1, and EDD
**	This qualifier is used to indicate that the Laboratory Control Sample (LCS) recovery for an analyte is outside of the specified limits.	QC Summary Report

All surrogate recoveries and acceptance ranges are reported at the bottom of Form 2 or C of A.
Any recoveries falling outside the acceptance range will be flagged with a **.
All flags do not apply to QC Summary and Certificate of Analysis packages.

CHAIN OF CUSTODY

General Engineering Laboratories, Inc.
2040 Savage Road
Charleston, South Carolina 29407
P.O. Box 30712
Charleston, South Carolina 29417
(843) 556-8171

CHAIN OF CUSTODY RECORD

Page 1 of 1

46041

Client Name/Facility Name: SAIC / Tyndall AFB Landfill

Collected by/Company: MDH / SAIC

SAMPLE ID	DATE	TIME	WELL	SOIL	COMP	GRAB	# OF CONTAINERS	Grain Size	Atterberg Limits	Moisture Content	Remarks
~~TMF 6203~~ MDH	—	—									Contract# N6B-
~~TMF 620~~ MDH	—	—									DAHA-90-94-D-0057
TMF 0244A	7/15/01	15:20		✓	✓		1	X	X	X	DN05
TMF 0245A	7/15/01	15:20		✓	✓		1	X	X	X	

SAMPLE ANALYSIS REQUIRED (x) - use remarks area to specify specific compounds or methods

Use F or P in the boxes to indicate whether sample was filtered and/or preserved

Relinquished by:	Date:	Time:	Received by:	Relinquished by:	Date:	Time:	Received by:
[signature]	7/16/01	17:15					

Relinquished by:	Date:	Time:	Received by lab by:	Date:	Time:	Remarks:
			[signature]	7/17/01	0950	

White = sample collector Yellow = file Pink = with report

20010718857

COOLER RECEIPT CHECKLIST

COOLER RECEIPT CHECKLIST

LIMS number _____ Number of coolers 1

Project: TONAWANDA LANDFILL Date received: 7-17-01

A. Preliminary Examination Phase Date cooler(s) opened: 7-17-01

by (print) mike Kinslow (signature) Mike Kinslow

Circle response below as appropriate

1. Did cooler(s) come with a shipping slip (airbill, etc.)? ..... (Yes) No NA

If YES, enter courier name & airbill number here: FED EX

2. Were custody seals on outside of cooler(s)? ..... (Yes) No NA

How many & where: FRONT Seal date: _____ Seal name: _____

3. Were custody seals unbroken and intact at the date and time of arrival? ..... (Yes) No NA

4. Did you screen samples for radioactivity using a Geiger Counter? ..... (Yes) No NA

5. Were custody papers sealed in a plastic bag & taped inside the cooler lid? ..... (Yes) No NA

6. Were custody papers filled out properly (ink, signed, etc.)? ..... (Yes) No NA

7. ~~Did you sign custody papers in the appropriate place for acceptance of custody?~~ ..... (Yes) No NA

8. Was project identifiable from custody papers? ..... (Yes) No NA

9. If required, was enough ice present in the cooler(s)? ..... (Yes) No NA

Identify type of ice used in cooler(s): BAGGED ICE 4°

10. Initial and date this form to acknowledge receipt of cooler(s): (initial) MK (date) 7-17-01

B. Log-In Phase Date samples were logged-in: _____

by (print) _____ (signature) _____

11. Describe type of packing in cooler(s): BAGGED ICE

12. Were all bottles sealed in separate plastic bags? ..... (Yes) No NA

13. Did all bottles arrive unbroken & were labels in good condition? ..... (Yes) No NA

14. Was all required bottle label information complete? ..... (Yes) No NA

15. Did all bottle labels agree with custody papers? ..... (Yes) No NA

16. Were correct containers used for the analyses indicated? ..... (Yes) No NA

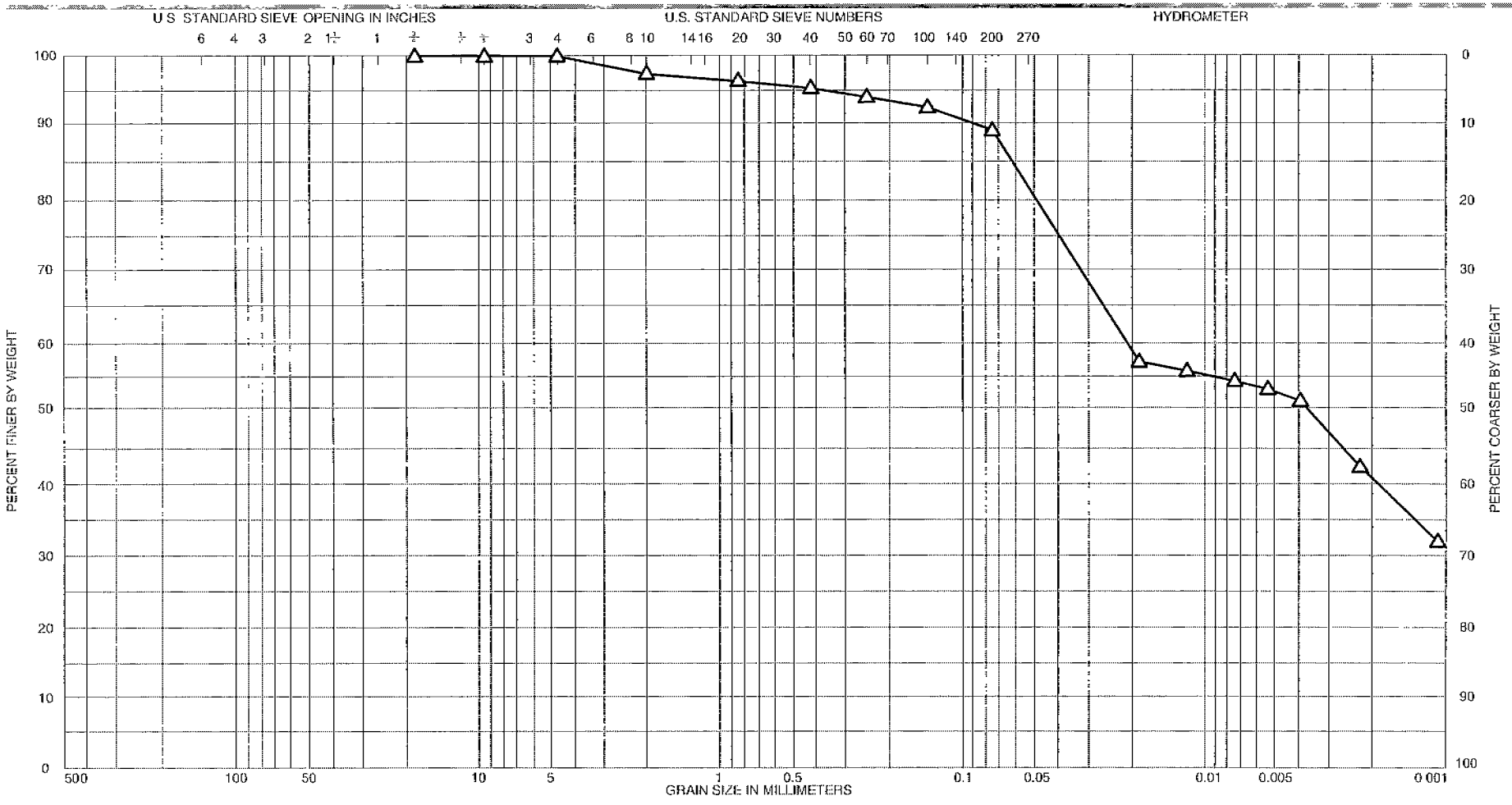
17. Were correct preservatives placed into the sample containers? ..... (Yes) No NA

18. Was a sufficient amount of sample sent for the analyses required? ..... (Yes) No NA

19. Were bubbles absent in VOA vials? ..... (Yes) No NA

If no, list by sample number

GEOTECHNICAL



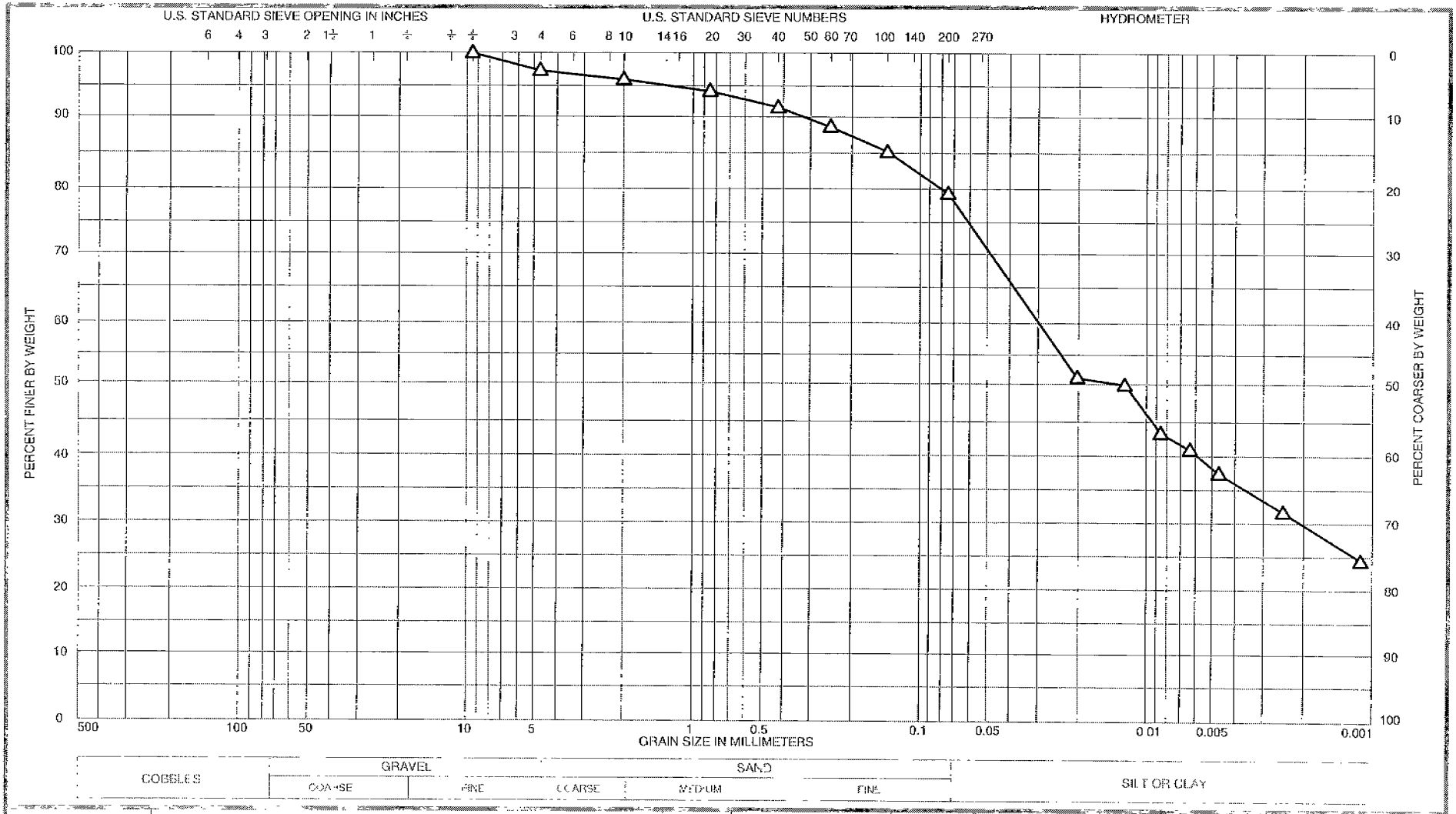
COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Sample No	Specific Gravity	Classification	Nat w %	LL %	PL %	PI %
46041002	--	CL	15.7	35.0	19.3	15.7
		% SAND = 10.9				
		% SILT = 36.4				
		% CLAY = 52.7				

GRADATION CURVES

GENERAL ENGINEERING
A Division of General Engineering Laboratories Inc

Project Code SAIC00101C
Project Name Tonawanda
Boring No. TMF0244A
Date July 31, 2001



Sample No	Specific Gravity	Classification	Nat w %	LL %	PL %	PI %
46756001	--	OH with sand	18.2	63.8	45.3	18.5
		% SAND = 20.5				
		% SILT = 41.2				
		% CLAY = 38.3				

GRADATION CURVES

GENERAL ENGINEERING
A Division of General Engineering Laboratories, Inc

Project Code SAIC00101C

Project Name Tonawanda

Boring No

Date August 16, 2001

GENERAL ENGINEERING LABORATORIES

August 17, 2001

Mr. Frank Stevenson
Science Applications International Corporation
101 East Grove Street
Middleboro, MA 02346

Dear Mr. Stevenson:

Enclosed is the data package for the sample received from the Tonawanda Landfill Site. The samples were analyzed for geotechnical parameters.

General Engineering Laboratories appreciates this opportunity to provide you with analytical results, and trusts that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (803) 556-8171.

Yours very truly,

Valerie S. Davis
Project Manager

enclosure

P O Box 30712 · Charleston, SC 29417 · 2040 Savage Road · 29407
(843) 556-8171 · Fax (843) 766-1178

Meeting Today's Needs
with a
Vision for Tomorrow

SCIENCE APPLICATIONS
INTERNATIONAL CORPORATION
TONAWANDA LANDFILL SITE
SDG# 46756

GENERAL ENGINEERING LABORATORIES, INC.

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Chain of Custody **4**

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Geotechnical **8**

CASE NARRATIVE

GENERAL ENGINEERING LABORATORIES

Meeting today's needs with a vision for tomorrow.

CASE NARRATIVE
for
Science Applications International Corporation
Tonawanda Landfill
SDG# 46756

August 17, 2000

Laboratory Identification:

General Engineering Laboratories, Inc. (GEL)

Mailing Address:

P.O. Box 30712
Charleston, SC 29417

Express Mail Delivery and Shipping Address:

2040 Savage Rd
Charleston, SC 29414

Telephone Number:

(843) 556-8171

Summary:

Sample receipt

The samples arrived at General Engineering Laboratories, Inc., Charleston, SC on August 2, 2001, for environmental analyses. All sample containers arrived without any visible signs of tampering or breakage. The samples were delivered with chain of custody documentation and signatures.

The following samples were received by the laboratory:

Laboratory Identification	Sample Description
46756001	TLF-0600
46756002	TLF-0670
46756003	TLF-0677

Case Narrative

Sample analyses were conducted using methodology as outlined in General Engineering Laboratories Standard Operating Procedures. Any technical or administrative problems during analysis, data review, and reduction are listed below by analytical parameter.

Internal Chain of Custody:

Custody was maintained for all samples.

Data Package:

The enclosed data package contains the following sections: Case Narrative, Qualifier Flag Definitions, Chain of Custody, Cooler Receipt Checklist, and Geotechnical Analysis.

This data package, to the best of my knowledge, is in compliance with technical and administrative requirements.

Valerie S. Davis
Project Manager

P O Box 30712 · Charleston, SC 29417 · 2040 Savage Road 29407

(843) 556-8171 · Fax (843) 766-1178

CHAIN OF CUSTODY

DAHA-90-94-D-0007 DN05

Page 1 of 2

CHAIN OF CUSTODY RECORD

General Engineering Laboratories, Inc.
2040 Savage Road
Charleston, South Carolina 29407
P.O. Box 30712
Charleston, South Carolina 29417
(843) 556-8171

46756%

Client Name/Facility Name: SAIC/Tonawanda Landfill

Collected by/Company: S McInall/SAIC

SAMPLE ANALYSIS REQUIRED (X) - use remarks area to specify specific compounds or methods

Use F or P in the boxes to indicate whether sample was filtered and/or preserved

	SAMPLE ID	DATE	TIME	WELL	SOIL	COMP	GRAB	# OF CONTAINERS	Grain Size	Atterberg	Moisture Content	Remarks
1	TLF-0600	7/26/01	1640		X			1	✓	✓	✓	ASTM Methods
2	TLF-0670	7/30/01	1355		X			1	✓	✓	✓	"
3	TLF-0677	7/30/01	1805		X			1	✓	✓	✓	"

Relinquished by:	Date:	Time:	Received by:	Relinquished by:	Date:	Time:	Received by:
[signature]	8/1/01	1105					

Relinquished by:	Date:	Time:	Received by lab by:	Date:	Time:	Remarks:
			[signature]	8/2/01	0900	

White = sample collector Yellow = file Pink = with report

5

COOLER RECEIPT CHECKLIST

Table 5-1. Example of a Cooler Receipt Checklist

COOLER RECEIPT CHECKLIST

LIMS number _____ Chain-of-Custody No. _____

Project: Tonawanda Date received: 8-2-01

A. Preliminary Examination Phase Date cooler(s) opened: 8-2-01

by (print) Gustavus Chandler (signature) Gustavus Chandler

Circle response below as appropriate

1. Did cooler(s) come with a shipping slip (airbill, etc.)? ..... (Yes) No NA

If YES, enter courier name & airbill number here: _____

2. Were custody seals on outside of cooler(s)? ..... (Yes) No NA

How many & where: _____ Seal date: _____ Seal name: _____

3. Were custody seals unbroken and intact at the date and time of arrival? ..... (Yes) No NA

4. Did you screen samples for radioactivity using a Geiger Counter? ..... (Yes) No NA

5. Were custody papers sealed in a plastic bag & taped inside the cooler lid? ..... (Yes) No NA

6. Were custody papers filled out properly (ink, signed, etc.)? ..... (Yes) No NA

7. Did you sign custody papers in the appropriate place for acceptance of custody? ..... (Yes) No NA

8. Was project identifiable from custody papers? ..... (Yes) No NA

9. If required, was enough ice present in the cooler(s)? ..... Yes No (NA)

Identify type of ice used in cooler and temperature reading upon receipt: 19

Source of temperature reading (check one): Temperature Vial ( ) Sample Material ( )

10. Initial and date this form to acknowledge receipt of cooler(s): (initial) GCC (date) 8-2-01

B. Log-In-Phase Date samples were logged in: 8-2-01

by (print) Gustavus Chandler (signature) Gustavus Chandler

11. Describe type of packing in cooler(s): styrofoam peanuts, plastic bag

12. Were all bottles sealed in separate plastic bags? ..... Yes No (NA)

13. Did all bottles arrive unbroken & were labels in good condition? ..... (Yes) No NA

14. Was all required bottle label information complete? ..... (Yes) No NA

15. Did all bottle labels agree with custody papers? ..... (Yes) No NA

16. Were correct containers used for the analyses indicated: ..... (Yes) No NA

17. Were correct preservatives placed into the sample containers? ..... (Yes) No NA

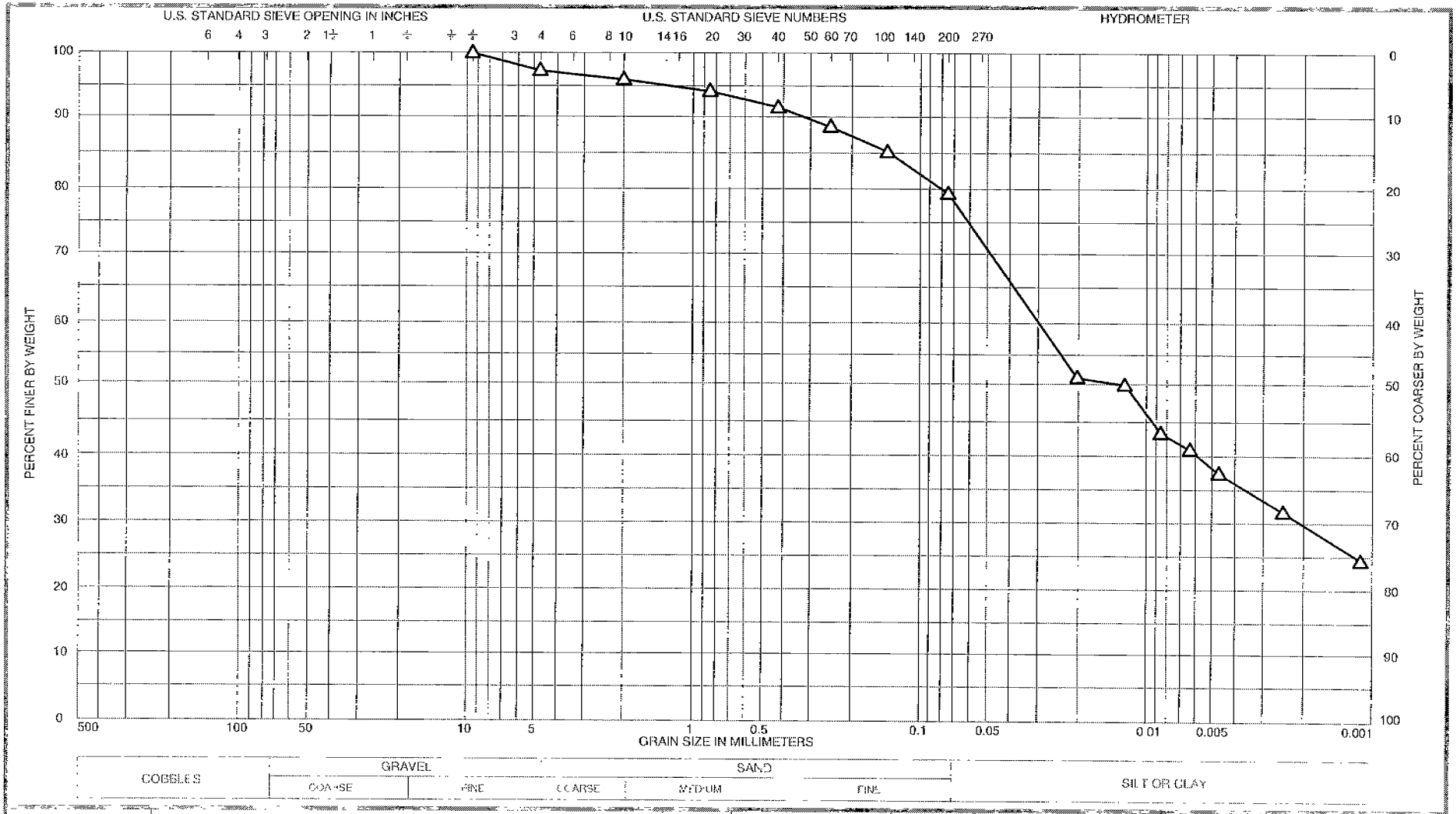
18. Was a sufficient amount of sample sent for the analyses required? ..... (Yes) No NA

19. Were bubbles absent in VOA vials? ..... Yes No (NA)

If no, list by sample number: _____

20. Has a copy of this Cooler Receipt Checklist been faxed to the SAIC Laboratory Coordinator? ..... Yes No NA

GEOTECHNICAL



Sample No	Specific Gravity	Classification	Nat w %	LL %	PL %	PI %
46756001	--	OH with sand	18.2	63.8	45.3	18.5
		% SAND = 20.5				
		% SILT = 41.2				
		% CLAY = 38.3				

GRADATION CURVES

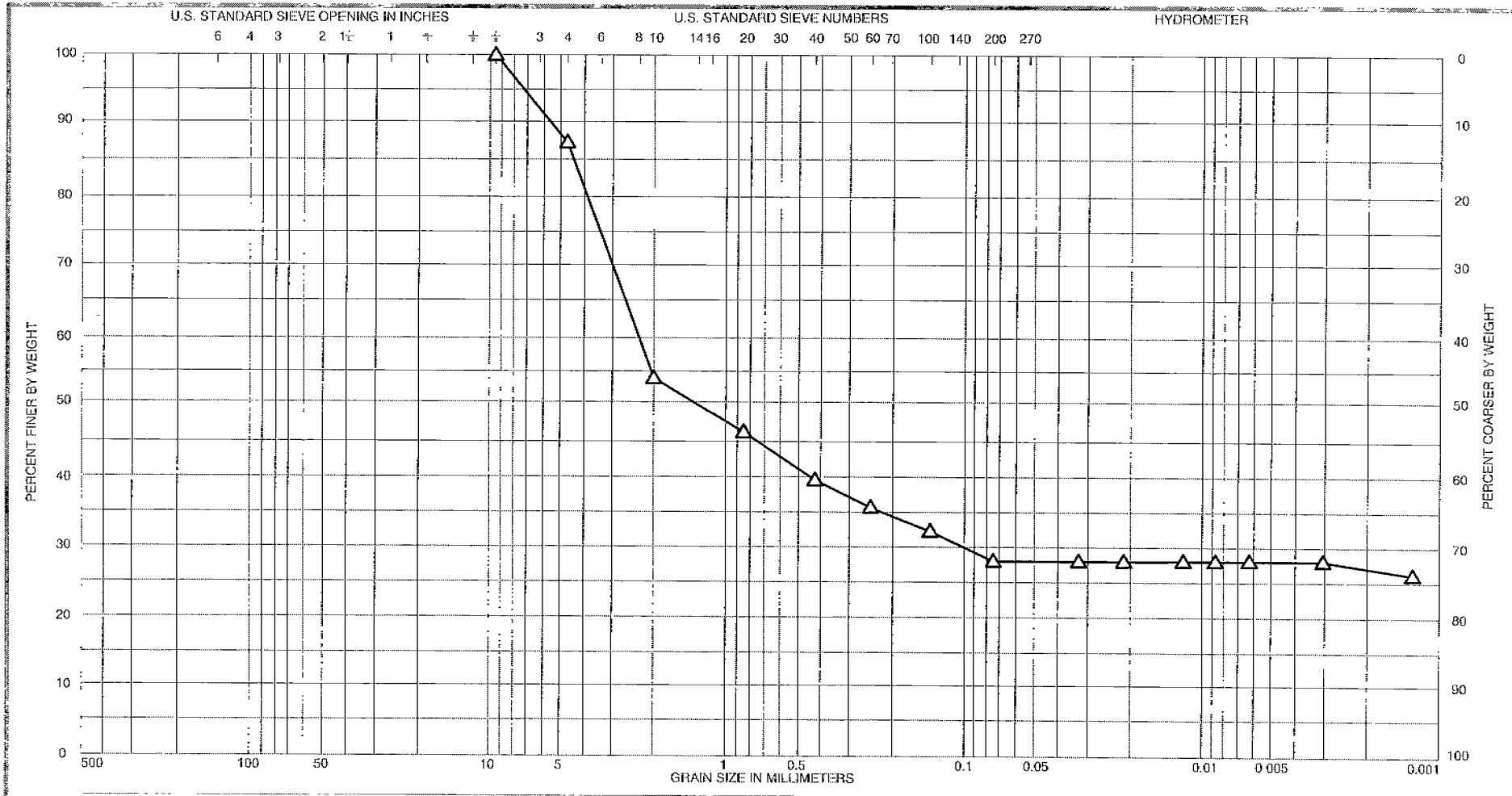
GENERAL ENGINEERING
A Division of General Engineering Laboratories, Inc

Project Code SAIC00101C

Project Name Tonawanda

Boring No

Date August 16, 2001



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Sample No	Specific Gravity	Classification	Nat w %	LL %	PL %	PI %
46756002	--	SC *	45.7	60.8	54.7	6.1

*The sample contained a significant amount of organic material.

% SAND = 71.9

% SILT = 0.0

% CLAY = 28.1

GRADATION CURVES

GENERAL ENGINEERING

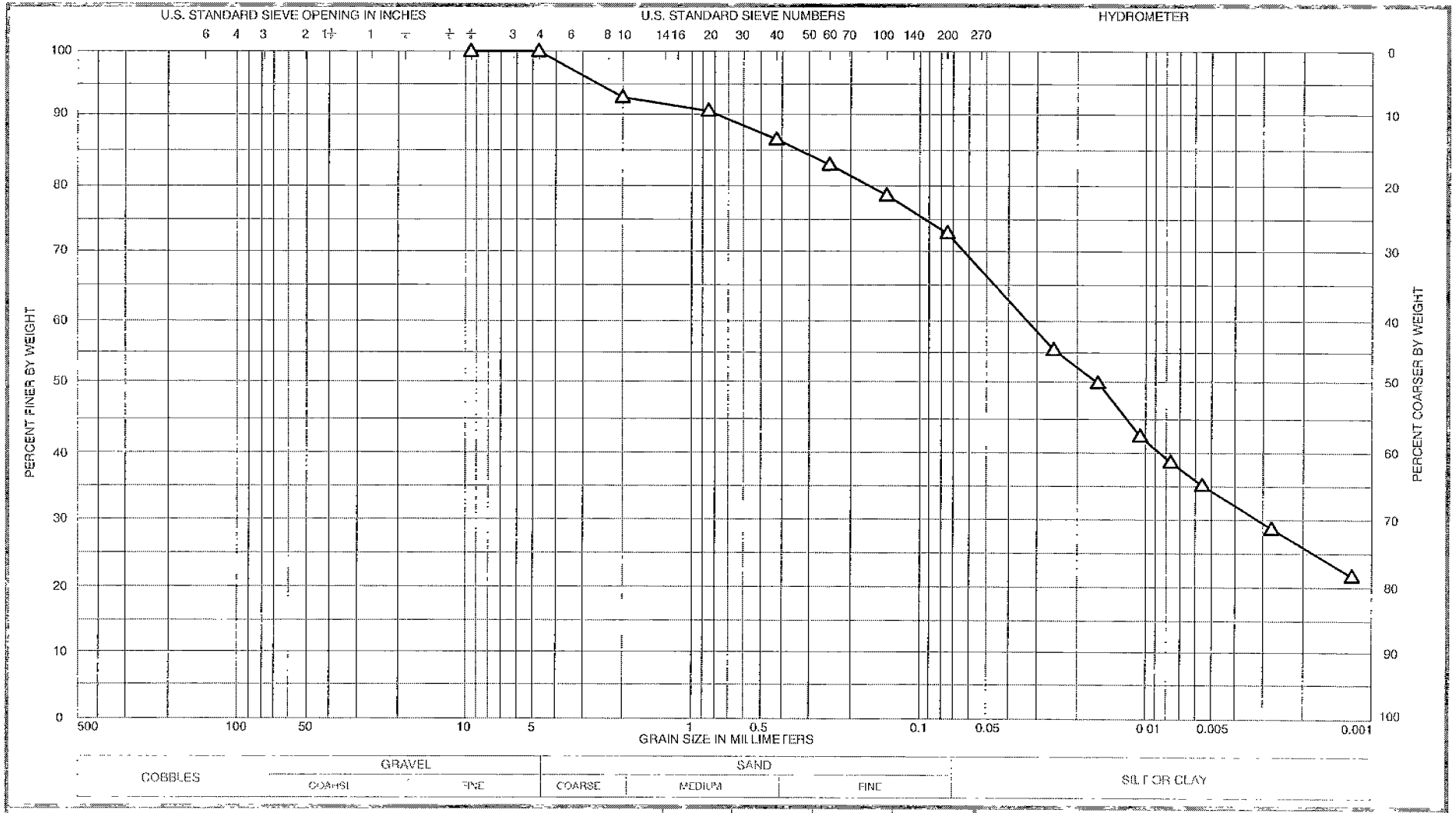
A Division of General Engineering Laboratories, Inc

Project Code SAIC00101C

Project Name Tonawanda

Boring No

Date August 16, 2001



Sample No	[illegible]	Classification	Nat w %	LL %	PL %	PI %
46756003	--	OH-MH with sand	39.5	58.2	39.5	18.7
		% SAND = 27.1				
		% SILT = 33.3				
		% CLAY = 39.6				

GRADATION CURVES

GENERAL ENGINEERING
A Division of General Engineering Laboratories, Inc

Project Code SAIC00101C
Project Name Tonawanda
Boring No
Date August 16, 2001

ATTACHMENT G

Malcom Pirnie, October 2, 2001, Field Data Report, Town of Tonawanda Landfill

FIELD DATA REPORT

TOWN OF TONAWANDA LANDFILL

Prepared for:

SCIENCE APPLICATIONS INTERNATIONAL CORPORATION

OCTOBER 2001

MALCOLM PIRNIE, INC.

P. O. Box 1938
Buffalo, New York 14219

4361-001-200

TABLE OF CONTENTS

TOWN OF TONAWANDA LANDFILL
GROUNDWATER SAMPLING EVENT
FIELD DATA REPORT

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1.0	INTRODUCTION	1
2.0	MONITORING NETWORK	1
3.0	SAMPLING/MONITORING METHODS	2
	3.1 Sampling Procedures	2
	3.2 QA/QC Procedures	2
4.0	REFERENCES	3

LIST OF TABLES

Table No.	Description	Following Page
1	Summary of Groundwater Sample Designations for September Sampling Event	1
2	Summary of Field Measurements	2

LIST OF FIGURES

Figure No.	Description	Following Page
A6-1	Groundwater Monitoring Well Locations Sampled September 2001	1

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LIST OF ATTACHMENTS

Attachment	Description
A	Field Data Sheets and Post-Closure Inspection Report
B	Well Construction Diagrams

1.0 INTRODUCTION

Malcolm Pirnie completed the field activities described in our June 15, 2001 proposal for sampling services at the Town of Tonawanda Landfill site. Field activities were conducted during the period of time from September 19 - 21, 2001. This document presents a compilation of the field data collected that includes:

- Well Purging and Sampling Data Sheets
- Historical well construction diagrams

A brief description of the field activities completed during the sampling event is presented in the following sections.

2.0 MONITORING NETWORK

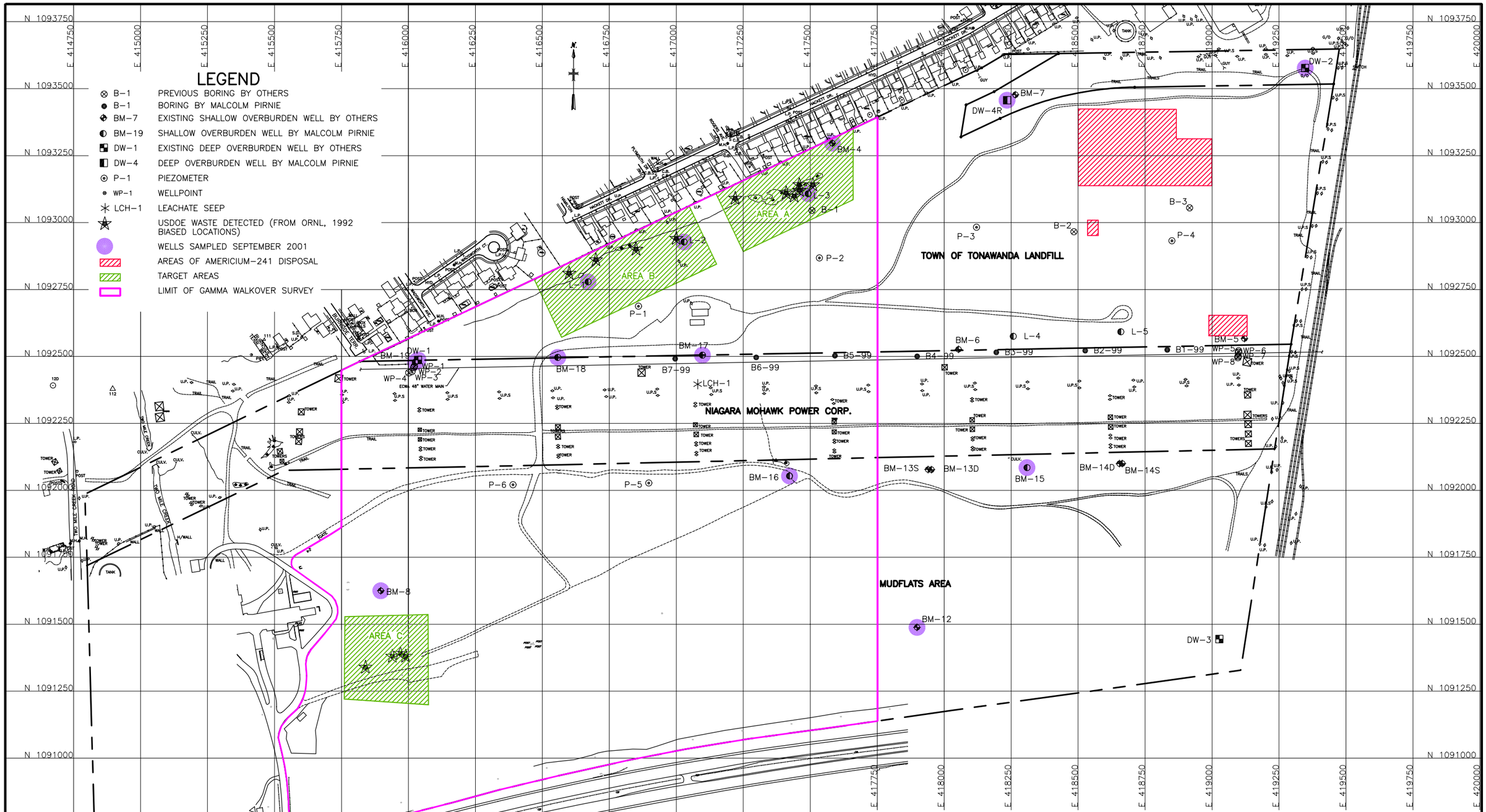
For purposes of this investigation, the groundwater monitoring network at the Town of Tonawanda Landfill consisted of fourteen (14)-monitoring wells designated as follows:

BM-4	BM-17	DW-4R
BM-8	BM-18	L-1
BM-12	BM-19	L-2
BM-15	DW-1	L-3
BM-16	DW-2	

The sampling program included the collection of groundwater samples from all wells identified above. Figure A6-1 illustrates the Tonawanda Landfill sampling network.

3.0 SAMPLING/MONITORING METHODS

During the sampling event, field personnel collected groundwater samples from each monitoring well location identified in Section 2.0. Groundwater samples were



NOTE: THIS DRAWING IS BASED ON PLANS "TONAWANDA LANDFILL SITE PLAN" BY MALCOLM PIRNIE, INC. DATED JUNE 1999 AND "TOWN OF TONAWANDA LANDFILL TEST SITES", BY ENGINEER'S OFFICE, TOWN OF TONAWANDA, N.Y., REV. 1, DATED 9-19-83.

0 175 350 700

SCALE IN FEET

SAIC
An Employee-Owned Company
SAIC ENGINEERING, INC.
10 Main Street
Lakeville, Massachusetts
02347
Office:(508)923-5100
Fax:(508)923-5101

DRAWING TITLE
GROUNDWATER MONITORING WELL LOCATIONS, SAMPLED SEPTEMBER 2001

PROJECT
FUSRAP
TOWN OF TONAWANDA LANDFILL
TONAWANDA, NEW YORK

CLIENT
USACE – BUFFALO DISTRICT

SCALE 1"=350'
DATE 3-19-02
DRAWN BY VAL
FIGURE NO. A6-1
PROJECT NO. 01-0801-08-1165-220

TTLRIFSA6-1.DWG

designated and identified in accordance with the S.A.I.C guidance document presented as Table 1.

3.1 Sampling Procedures

Prior to purging, static water level elevations were measured in all the on-site monitoring wells. The monitoring wells were then purged in accordance with the procedures specified in the Post-Closure Maintenance and Monitoring Plan (Reference 1). All wells exhibited slow or moderate recovery after purging and were allowed to recharge prior to sampling.

Groundwater samples were collected at all sampling locations except BM-8 using dedicated plastic bailers in accordance with the protocols identified in Reference 1. A peristaltic purge pump was used for sample collection at monitoring well BM-8 due to a damaged well riser. Dissolved samples were filtered in the field using a 0.45 micron filter. Samples for laboratory analysis were stored in the field in the appropriate plastic bottles, pre-preserved by the lab. The samples were subsequently transferred under chain-of -custody to S.A.I.C personnel.

Field samples were collected during purging or prior to sampling from all monitoring locations and immediately analyzed for the field parameters summarized in Table 2. The field data sheets and water sampling field data sheets are presented in Attachment A. Well construction diagrams for sampled wells are presented in Attachment B.

3.2 QA/QC Procedures

Quality Assurance and Quality Control (QA/QC) measures taken to verify the reliability of the generated data were as follows:

- One blind duplicate sample collected from monitoring well BM-4. This sample was submitted for the parameters identified in Table 1.
- Two field equipment blanks identified as EQ-10 and EQ-11 were collected from the purging (pump/tubing) and sampling equipment (bailer).

TABLE 1
TOWN OF TONAWANDA LANDFILL - GROUNDWATER SAMPLES
SEPTEMBER, 2001

Sample Number	Well Number	Total	Dissolved	Duplicate	Date Sampled
TLW-0150 (1)	L-3	X			09/19/2001
TLW-0151	L-3		X		09/19/2001
TLW-0152 (1)	BM-15	X			09/19/2001
TLW-0153	BM-15		X		09/21/2001
TLW-0154	BM-16	X			09/19/2001
TLW-0155	BM-16		X		09/20/2001
TLW-0156 (1)	BM-19	X			09/20/2001
TLW-0157	BM-19		X		09/20/2001
TLW-0158	DW-1	X			09/20/2001
TLW-0159	DW-1		X		09/20/2001
TLW-0160	BM-12	X			09/20/2001
TLW-0161	BM-12		X		09/21/2001
TLW-0162 (1)	BM-8	X			09/20/2001
TLW-0163	BM-8		X		09/20/2001
TLW-0164 (1)	BM-18	X			09/20/2001
TLW-0165	BM-18		X		09/20/2001
TLW-0166 (1)	BM-17	X			09/20/2001
TLW-0167	BM-17		X		09/20/2001
TLW-0168	DW-4R	X			09/20/2001
TLW-0169	DW-4R		X		09/20/2001
TLW-0170	DW-2	X			09/20/2001
TLW-0171	DW-2		X		09/20/2001
TLW-0172 (1)	BM-4	X			09/20/2001
TLW-0173	BM-4		X		09/20/2001
TLW-0174	L-1	X			09/21/2001
TLW-0175	L-1		X		09/21/2001
TLW-0176	L-2	X			09/21/2001
TLW-0177	L-2		X		09/21/2001
TLW-9178	L-3 Duplicate Sample	X		X	09/19/2001
TLW-9179	BM-4	X		X	09/20/2001
TLW-9180	L-3 Duplicate Sample		X	X	09/19/2001
TLW-9181	BM-4		X	X	09/20/2001
EQ-10	equipment blank - bailer	X			09/20/2001
EQ-11	equipment blank - pump/tubing	X			09/20/2001

Notes:

(1) Duplicate sample taken by NYSDEC on-site representative.

MALCOLM PIRNIE

TABLE 2

TOWN OF TONAWANDA LANDFILL

GROUNDWATER SAMPLING - SEPTEMBER 19 - 21, 2001

SUMMARY OF GROUNDWATER FIELD MEASUREMENTS[1]

MONITORING LOCATION	SAMPLING DATE	pH (units)	TEMP. (°C)	SPECIFIC CONDUCTANCE[2] (umhos/cm)	Eh (mV)	TURBIDITY[3] (NTU)	SAMPLE APPEARANCE[3]
BM-4	09/20/01	7.0	19.0	1659	-50	7	Clear
BM-8	09/20/01	7.5	21.8	1124	12	40	Sl. Cloudy
BM-12	09/21/01	8.3	16.8	1175	-45	27	Clear
BM-15	09/21/01	6.9	17.3	1554	-12	19	Clear
BM-16	09/20/01	6.9	20.0	1574	23	75	Sl. Cloudy
BM-17	09/20/01	6.9	19.2	1720	32	13	Clear
BM-18	09/20/01	6.7	18.7	2465	2	23	Clear
BM-19	09/20/01	8.3	15.1	1910	24	13	Clear
DW-1	09/20/01	8.8	15.7	2071	52	22	Clear
DW-2	09/20/01	8.1	16.5	560	-191	35	Clear
DW-4R	09/20/01	7.6	21.3	827	-30	10	Clear
L-1	09/21/01	8.7	21.9	3625	-63	24	Brown tint
L-2	09/21/01	8.1	25.3	3335	-52	47	Brown tint
L-3	09/19/01	9.4	19.7	3700	-51	35	Brown tint

Notes:

(1) Unless otherwise stated, all field measurements are average values of readings obtained from first and last bailer grabs.

(2) Conductance corrected to 25° C.

(3) Turbidity and Sample Appearance are based on first bailer measurements only (i.e., undisturbed groundwater).

- Two duplicate samples were collected from sampling location L-3, one for total (unfiltered) and one for dissolved (filtered) analysis.

4.0 REFERENCES

1. Town of Tonawanda Landfill Closure Investigation Report. Malcolm Pirnie, Inc. (July 1995, Revised February 1999).

ATTACHMENT A

FIELD DATA SHEETS

MALCOLM PIRNIE

WELL PURGING AND SAMPLING LOG

PROJECT TITLE: TONAWANDA LANDFILL GROUNDWATER MONITORING

PROJECT NO. : 1039-105-100

STAFF: B.Walker

DATE: 09/17/01

WELL NO.: **BM-4**

(1) TOTAL CASING AND SCREEN LENGTH (ft.): 25.9

(3) WATER LEVEL BELOW TOP OF CASING (ft.): 9.40

(4) VOLUME OF WATER IN CASING (gal.): 2.8

(2) CASING INTERNAL DIAMETER (in.): 2

(Vol = 0.0408 [$(2)^2$ x { (1) - (3) }])

WELL I.D.	VOL. GAL/FOOT
1"	0.04
2"	0.17
3"	0.38
4"	0.66
5"	1.04
6"	1.50
8"	2.60

PARAMETERS	ACCUMULATED VOLUME PURGED (GALLONS)										
	Initial	4.0	6.0	10.0	14.0						
Time	1508	1511	1515	1517	1520						
pH	6.74	6.75	6.75	6.74	6.73						
TEMP. (°C)	20.2	19.1	18.2	17.0	16.5						
eH (mV)	-64	-70	-65	-63	-59						
CONDUCTIVITY	1549	1657	1691	1688	1668						
TURBIDITY (NTU)	271	672	213	146	>1100						
APPEARANCE	Sl. cldy Tan										

SAMPLING DATA: Date: 9/18/01 Time: Start: 1310 Finish: 1320 Method: Bailer

Present water level (BTOC): 10.59

PHYSICAL AND CHEMICAL DATA:

Appearance: Clear____ Turbid Sl Color:____

Contains Sediment____ Odor:____ Other:____

PARAMETER	Measurement *Initial*	Measurement *Final*
pH	6.85	6.84
Specific Conductivity (umhos/cm)	1656	1726
Temperature (°C)	21.8	22.0
Turbidity (NTU)	9.79	364
Eh (mV)	-144	-62

COMMENTS: Purged w/ submersible pump. Dry at 14.0 gal, Sampled MS/MSD

MALCOLM PIRNIE

WATER SAMPLING FIELD DATA SHEETS

PROJECT: TONAWANDA LANDFILL
TYPE OF SAMPLE: GROUNDWATER
CLIENT: S.A.I.C.
LOCATION NO.: BM-4
JOB NO.: 1039
LAB SAMPLE NO.: TLW - 0172
TLW - 0173

WELL DATA: DATE: _____ TIME: _____

Casing Diameter (inches): 2
Casing Material: PVC
Screened interval (ft. BGS): 9.5 - 24.5
Screen Material: PVC
Static Water Level Below TOR (ft.): _____
Bottom Depth (ft.): 25.90
Elevation Top of Well Riser: 621.60
Datum Ground Surface: _____
Elevation Top of Screen: _____

PURGING DATA: DATE: 9/17/01

Method: centrifugal pump
TIME: Start: _____ Finish: _____
Well Volumes Purged: _____
Pumping Rate (gal/min): _____
Standing Volume (Gal.) _____
Was well purged dry? Yes _____ No _____
Volume Purged (Gal.) _____
Was well purged below sand pack? Yes _____ No _____

See previous Sheet

Is purging equipment dedicated to sample location?
NO X

Well I.D. (inches)	Volume (gal/ft)
2	0.17
4	0.66
6	1.50

Field Personnel: _____

SAMPLING DATA: DATE: 9/20/01
TIME: Start: 1445 Finish: 155
Method: Disposable polyethylene bailer
Sampler: B. Walker & S. Dickinson
Present Water Level (ft.): 9.65
Air Temperature (°F): _____
Depth of Sample (ft.): _____
Weather Conditions: _____
Is sampling equipment dedicated to sample location? : Yes X No _____
Source and type of water used in field for QC purposes:

PHYSICAL AND CHEMICAL DATA:

Appearance: Clear ✓ Turbid _____ Color: _____
Contains Sediment N/A Odor: _____ Other: _____

PARAMETER	Measurement	
pH	6.88	7.19
Specific Conductivity (umhos/cm)	1650	1668
Temperature (°C)	20.8	17.2
Turbidity (NTU)	6.72	7.07
Eh (mV)	-67	-33

REMARKS: Key# 3725

MALCOLM PIRNIE

WELL DEVELOPMENT / PURGING LOG

PROJECT TITLE: S.A.I.C GROUNDWATER RAD SAMPLING @ TOWN OF TONAWANDA LANDFILL

PROJECT NO. : 1039

STAFF: B. WALKER / S. DICKINSON

DATE: SEPT. 19 - 21, 2001

WELL NO. : BM-8

(1) TOTAL CASING AND SCREEN LENGTH (ft.): 29.70

(2) CASING INTERNAL DIAMETER (in.): 2

(3) WATER LEVEL BELOW TOP OF CASING (ft.): 9.40

(4) VOLUME OF WATER IN CASING (gal.): 3.5

WELL I.D.	VOL. GAL / FOOT
1"	0.04
2"	0.17
3"	0.38
4"	0.66
5"	1.04
6"	1.50
8"	2.60

$V = 0.0408 [(2)^2 \times \{ (1) - (3) \}] =$ _____ GAL.

PARAMETERS	0947	0949	0950 ACCUMULATED VOLUME PURGED (GALLONS)									
	Initial	3.5	7.0									
pH	6.75	6.72	6.83									
Eh	74	-7	-63									
CONDUCTIVITY	1070 ~~74~~	1130	1140									
TEMPERATURE	18.6	17.0	16.1									
TURBIDITY	75.6	93.3	62.8									
APPEARANCE	sl. cldy											

COMMENTS: No lock on well. Purged w/ centrifugal pump. Well has been bent, Unable to get bailer into well. Pumped dry at ~8.0 gal.

MALCOLM PIRNIE

WATER SAMPLING FIELD DATA SHEETS

PROJECT: TONAWANDA LANDFILL
CLIENT: S.A.I.C.
JOB NO.: 1039

TYPE OF SAMPLE: GROUNDWATER
LOCATION NO.: BM-8
LAB SAMPLE NO.: TLCW-C162 Total
TLCW-C163 dissolved

WELL DATA: DATE: _____ TIME: _____

Casing Diameter (inches): 2
Casing Material: PVC
Screened interval (ft. BGS):
Screen Material: PVC
Static Water Level Below TOR (ft.):
Bottom Depth (ft.):
Elevation Top of Well Riser: 600.54
Datum Ground Surface:
Elevation Top of Screen:

PURGING DATA: DATE: 9/19/01

Method: ~~Disposable polyethylene bailer~~ Centrifugal Pump
TIME: Start: _____ Finish: _____
Well Volumes Purged:
Pumping Rate (gal/min):
Standing Volume (Gal.)
Was well purged dry? Yes _____ No _____
Volume Purged (Gal.) See previous Sheet
Was well purged below sand pack? Yes _____ No _____

Is purging equipment dedicated to sample location?
YES X

Well I.D. (inches)	Volume (gal/ft)
2	0.17
4	0.66
6	1.50

Field Personnel:

SAMPLING DATA: DATE: 9/20/01 TIME: Start: 1110 Finish: 1210

Method: ~~Disposable polyethylene bailer~~ Peristaltic Pump
Sampler:
Present Water Level (ft.): 21.40
Air Temperature (°F):
Depth of Sample (ft.):
Weather Conditions:
Is sampling equipment dedicated to sample location? : Yes X No _____
Source and type of water used in field for QC purposes:

PHYSICAL AND CHEMICAL DATA:

Appearance: Clear _____ Turbid 51 Color: Brn
Contains Sediment _____ Odor: _____ Other: _____

PARAMETER	Measurement	
pH	7.49	7.56
Specific Conductivity (umhos/cm)	1127	1121
Temperature (°C)	21.4	22.2
Turbidity (NTU)	39.7	456
Eh (mV)	19	4

REMARKS:

MALCOLM PIRNIE

WELL DEVELOPMENT / PURGING LOG

PROJECT TITLE: S.A.I.C GROUNDWATER RAD SAMPLING @ TOWN OF TONAWANDA LANDFILL

PROJECT NO. : 1039

STAFF: B. WALKER / S. DICKINSON

DATE: SEPT. 19 - 21, 2001

WELL NO.: BM-12

(1) TOTAL CASING AND SCREEN LENGTH (ft.): 32.66

(2) CASING INTERNAL DIAMETER (in.): 2

(3) WATER LEVEL BELOW TOP OF CASING (ft.): 16.38

(4) VOLUME OF WATER IN CASING (gal.): 2.6

WELL I.D.	VOL. GAL / FOOT
1"	0.04
2"	0.17
3"	0.38
4"	0.66
5"	1.04
6"	1.50
8"	2.60

$V = 0.0408 [(2)^2 \times \{ (1) - (3) \}] =$ _____ GAL.

PARAMETERS	ACCUMULATED VOLUME PURGED (GALLONS)										
	1029 Initial	1033 2.5	1034 5.0	1038 6.0	1049 8.0						
pH	6.90	6.95	7.02	7.07	7.26						
Eh	-110	-147	-144	-155	-163						
CONDUCTIVITY	907	1144	1163	1135	1175						
TEMPERATURE	18.5	17.8	16.6	16.6	17.0						
TURBIDITY	30.3	14.8	24.3	43.2	8.96						
APPEARANCE	Yellow w/ Black Floaters	Clear	Clear	Clear	Clear						

COMMENTS: No Cap or lock on well. Purged w/ submersible pump. Dry at 6.0 gal., 8.0 gal

MALCOLM PIRNIE

WATER SAMPLING FIELD DATA SHEETS

PROJECT: TONAWANDA LANDFILL
CLIENT: S.A.I.C.
JOB NO.: 1039

TYPE OF SAMPLE: GROUNDWATER
LOCATION NO.: BM-12
LAB SAMPLE NO.: TLW-0160 Total
TLW-0161 Dissolved

WELL DATA: DATE: _____ TIME: _____

Casing Diameter (inches): 2
Casing Material: PVC
Screened interval (ft. BGS):
Screen Material: PVC
Static Water Level Below TOR (ft.):
Bottom Depth (ft.):
Elevation Top of Well Riser: 603.24
Datum Ground Surface:
Elevation Top of Screen:

PURGING DATA: DATE: 9/19/01

Method: Disposable polyethylene bailer
TIME: Start: _____ Finish: _____
Well Volumes Purged:
Pumping Rate (gal/min):
Standing Volume (Gal.)
Was well purged dry? Yes _____ No _____
Volume Purged (Gal.) _____ See previous page
Was well purged below sand pack? Yes _____ No _____

Is purging equipment dedicated to sample location?
YES X

Well I.D. (inches)	Volume (gal/ft)
2	0.17
4	0.66
6	1.50

Field Personnel:

SAMPLING DATA: DATE: 9/20/01
TIME: Start: 1015 Finish: 9/21/01
Method: Disposable polyethylene bailer
Sampler: B. Walker & S. Dickinson
Present Water Level (ft.): 25.20
Air Temperature (°F):
Depth of Sample (ft.):
Weather Conditions:
Is sampling equipment dedicated to sample location? : Yes X No _____
Source and type of water used in field for QC purposes:

PHYSICAL AND CHEMICAL DATA:

Appearance: Clear _____ Turbid sl.
Contains Sediment
Color:
Odor:
Other:

PARAMETER	Measurement	
pH	8.32	
Specific Conductivity (umhos/cm)	1175	
Temperature (°C)	16.8	
Turbidity (NTU)	26.9	
Eh (mV)	-45	

REMARKS: Poor Recharge, unable to meet required sample volume

MALCOLM PIRNIE

WELL PURGING AND SAMPLING LOG

PROJECT TITLE: TONAWANDA LANDFILL GROUNDWATER MONITORING

PROJECT NO. : 1039-105-100

STAFF: B.Walker

DATE: 9/17/01

WELL NO.: BM-15

(1) TOTAL CASING AND SCREEN LENGTH (ft.): 31.48

(3) WATER LEVEL BELOW TOP OF CASING (ft.): 20.49

(4) VOLUME OF WATER IN CASING (gal.): 1.9

(2) CASING INTERNAL DIAMETER (in.): 2

(Vol = 0.0408 [$(2)^2$ x { (1) - (3) }])

WELL I.D.	VOL. GAL/FOOT
1"	0.04
2"	0.17
3"	0.38
4"	0.66
5"	1.04
6"	1.50
8"	2.60

PARAMETERS	ACCUMULATED VOLUME PURGED (GALLONS)										
	Initial	2.0	3.0	3.5							
Time	0949	0957	1002	1014							
pH	6.69	6.53	6.49	6.49							
TEMP. (°C)	15.6	16.8	15.5	15.2							
eH (mV)	-18	-30	-28	-23							
CONDUCTIVITY	1400	1452	1462	1463							
TURBIDITY (NTU)	6.89	105.2	36.7	22.1							
APPEARANCE	Clear	Sl. Cldy	~~Sl. Cldy~~ Clear	Clear							

SAMPLING DATA: Date: 9/18/01 Time: Start: 1050 Finish: 1100 Method: Bailer

Present water level (BTOC): 22.52

PHYSICAL AND CHEMICAL DATA:

Appearance: Clear____ Turbid sl Color:____

Contains Sediment____ Odor:____ Other:____

PARAMETER	Measurement *Initial*	Measurement *Final*
pH	6.42	6.41
Specific Conductivity (umhos/cm)	1482	1470
Temperature (°C)	18.2	16.8
Turbidity (NTU)	11.7	99.2
Eh (mV)	134	112

COMMENTS:

Pumped with submersible pump.
Dry at 2.5gal, 3.0, 3.5gal

MALCOLM PIRNIE

WATER SAMPLING FIELD DATA SHEETS

PROJECT: TONAWANDA LANDFILL
CLIENT: S.A.I.C.
JOB NO.: 1039

TYPE OF SAMPLE: GROUNDWATER
LOCATION NO.: BM-15
LAB SAMPLE NO.: TLW-0152 + 0153

WELL DATA: DATE: _____ TIME: _____

Casing Diameter (inches): 2
Casing Material: PVC
Screened interval (ft. BGS): 19.5 - 29.5
Screen Material: PVC
Static Water Level Below TOR (ft.): _____
Bottom Depth (ft.): 31.48**
Elevation Top of Well Riser: 606.20
Datum Ground Surface: _____
Elevation Top of Screen: _____

PURGING DATA: DATE: 9/17/01

Method: Disposable polyethylene bailer
TIME: Start: _____ Finish: _____
Well Volumes Purged: _____
Pumping Rate (gal/min): _____
Standing Volume (Gal.) _____
Was well purged dry? Yes _____ No _____
Volume Purged (Gal.) _____ See Previous Page
Was well purged below sand pack? Yes _____ No _____

Is purging equipment dedicated to sample location?
YES X NO _____

Well I.D. (inches)	Volume (gal/ft)
2	0.17
4	0.66
6	1.50

Field Personnel: _____

SAMPLING DATA: DATE: 9/19/01
TIME: Start: 9/19/01 1508 Finish: 9/21/01 0910
Method: Disposable polyethylene bailer
Sampler: B. Walker + S. Dickinson
Present Water Level (ft.): 25.0
Air Temperature (°F): _____
Depth of Sample (ft.): _____
Weather Conditions: _____
Is sampling equipment dedicated to sample location? : Yes X No _____
Source and type of water used in field for QC purposes:

PHYSICAL AND CHEMICAL DATA:

Appearance: Clear _____ Turbid yes
Contains Sediment _____
Color: Brn
Odor: _____
Other: _____

PARAMETER	Measurement	
pH	6.80	6.97
Specific Conductivity (umhos/cm)	1680	1728
Temperature (°C)	17.2	17.3
Turbidity (NTU)	19.4	344
Eh (mV)	24	47

REMARKS:
Started sampling 9/19. Total fraction filled on 9/19.
DEC ~~took one~~ split Total fraction.

MALCOLM PIRNIE

WELL PURGING AND SAMPLING LOG

PROJECT TITLE: TONAWANDA LANDFILL GROUNDWATER MONITORING

PROJECT NO. : 1039-105-100

STAFF: B.Walker

DATE: 09/12/01

WELL NO.: BM-16

(1) TOTAL CASING AND SCREEN LENGTH (ft.): 42.25

(3) WATER LEVEL BELOW TOP OF CASING (ft.): 14.12

(4) VOLUME OF WATER IN CASING (gal.): 27.8

(2) CASING INTERNAL DIAMETER (in.): 2

(Vol = 0.0408 [$(2)^2$ x { (1) - (3) }])

WELL I.D.	VOL. GAL/FOOT
1"	0.04
2"	0.17
3"	0.38
4"	0.66
5"	1.04
6"	1.50
8"	2.60

PARAMETERS	ACCUMULATED VOLUME PURGED (GALLONS)										
	Initial	2.8	3.0								
Time	1100	1110	1120								
pH	7.09	7.16	7.21								
TEMP. (°C)	20.5	20.2	18.2								
eH (mV)	-126	-117	-107								
CONDUCTIVITY	1504	1526	1529								
TURBIDITY (NTU)	21.7	>1100	>1100								
APPEARANCE	Clear	V. Cldy Brn →									

SAMPLING DATA: Date: 9/13/01 Time: Start: 1130 Finish: 1145 Method: Bailer

Present water level (BTOC): 15.54

PHYSICAL AND CHEMICAL DATA:

Appearance: Clear _____ Turbid Yes Color: Brn

Contains Sediment _____ Odor: _____ Other: _____

PARAMETER	Measurement *Initial*	Measurement *Final*
pH	6.64	6.47
Specific Conductivity (umhos/cm)	1530	1553
Temperature (°C)	18.3	17.5
Turbidity (NTU)	555	87.6
Eh (mV)	29	-5

COMMENTS:

Pumped w/ submersible pump.
Dry at ~~2.5 gal~~, 2.8 gal, 3.0. Bailed dry @ 4.0 gal

MALCOLM PIRNIE

WATER SAMPLING FIELD DATA SHEETS

PROJECT: TONAWANDA LANDFILL
TYPE OF SAMPLE: GROUNDWATER
CLIENT: S.A.I.C.
LOCATION NO.: BM-16
JOB NO.: 1039
LAB SAMPLE NO.: TLW-0154 Total
TLW-0155 dissolved

WELL DATA: DATE: _____ TIME: _____

Casing Diameter (inches): 2
Casing Material: STEEL
Screened interval (ft. BGS): 28.0 - 38.0
Screen Material: STEEL
Static Water Level Below TOR (ft.): _____
Bottom Depth (ft.): 42.25**
Elevation Top of Well Riser: 613.86
Datum Ground Surface: _____
Elevation Top of Screen: _____

PURGING DATA: DATE: 9/17/01

Method: Disposable polyethylene bailer
TIME: Start: _____ Finish: _____
Well Volumes Purged: _____
Pumping Rate (gal/min): _____
Standing Volume (Gal.) _____
Was well purged dry? Yes _____ No _____
Volume Purged (Gal.) _____ See Previous Page
Was well purged below sand pack? Yes _____ No _____

Is purging equipment dedicated to sample location?
YES X NO _____

Well I.D. (inches)	Volume (gal/ft)
2	0.17
4	0.66
6	1.50

Field Personnel: _____

SAMPLING DATA: DATE: 9/19/01 & 9/20/01
TIME: Start: 9/19/01 1540 Finish: 1100 9/20/01
Method: Disposable polyethylene bailer
Sampler: B. Wilkins + S. Dickinson
Present Water Level (ft.): 15.60
Air Temperature (°F): _____
Depth of Sample (ft.): _____
Weather Conditions: _____
Is sampling equipment dedicated to sample location? : Yes X No _____
Source and type of water used in field for QC purposes:

PHYSICAL AND CHEMICAL DATA:

Appearance: Clear _____ Turbid sl
Color: Lt. Brn
Contains Sediment _____
Odor: _____
Other: _____

PARAMETER	Measurement	
pH	6.50	7.30
Specific Conductivity (umhos/cm)	1611	1536
Temperature (°C)	20.4	19.5
Turbidity (NTU)	75.[illegible]	290
Eh (mV)	53	-8

REMARKS: ** Obstruction at 19.37'

MALCOLM PIRNIE

WELL PURGING AND SAMPLING LOG

PROJECT TITLE: TONAWANDA LANDFILL GROUNDWATER MONITORING

PROJECT NO. : 1039-105-100

STAFF: B.Walker

DATE: 9/17/01

WELL NO.: BM-17

(1) TOTAL CASING AND SCREEN LENGTH (ft.): 27.00

(3) WATER LEVEL BELOW TOP OF CASING (ft.): 11.45

(4) VOLUME OF WATER IN CASING (gal.): 2.6

(2) CASING INTERNAL DIAMETER (in.): 2

(Vol = 0.0408 [$(2)^2$ x { (1) - (3) }])

WELL I.D.	VOL. GAL/FOOT
1"	0.04
2"	0.17
3"	0.38
4"	0.66
5"	1.04
6"	1.50
8"	2.60

PARAMETERS	ACCUMULATED VOLUME PURGED (GALLONS)										
	Initial	2.5	4.0	5.5	6.5						
Time	1202	1206	1210	1220	1226						
pH	6.89	6.85	6.93	6.94	6.92						
TEMP. (°C)	19.2	18.1	16.2	18.0	17.7						
eH (mV)	-85	-55	-49	-36	-26						
CONDUCTIVITY	1913	1809	1642	1548	1526						
TURBIDITY (NTU)	19.0	70.0	27.5	15.2	34.6						
APPEARANCE	Clear	Sl. Cldy Tan	Clear	Clear	Clear						

SAMPLING DATA: Date: 9/18/01 Time: Start: 1200 Finish: 1210 Method: Bailer

Present water level (BTOC): 13.04

PHYSICAL AND CHEMICAL DATA:

Appearance: Clear ✓ Turbid____ Color:____

Contains Sediment____ Odor:____ Other:____

PARAMETER	Measurement *Initial*	Measurement *Final*
pH	6.29	6.36
Specific Conductivity (umhos/cm)	1705	1693
Temperature (°C)	22.2	20.1
Turbidity (NTU)	10.66	23.6
Eh (mV)	-2	2

COMMENTS: Purged w/ submersible pump. Dry at 4.0 gal, 5.5 gal

MALCOLM PIRNIE

WATER SAMPLING FIELD DATA SHEETS

PROJECT: TONAWANDA LANDFILL
CLIENT: S.A.I.C.
JOB NO.: 1039

TYPE OF SAMPLE: GROUNDWATER
LOCATION NO.: BM-17
LAB SAMPLE NO.: TLW-0166 Total
TLW-0168 C167 dissolved

WELL DATA: DATE: _____ TIME: _____

Casing Diameter (inches): 2
Casing Material: STEEL
Screened interval (ft. BGS): 14.5 - 24.5
Screen Material: STEEL
Static Water Level Below TOR (ft.): _____
Bottom Depth (ft.): 27.00
Elevation Top of Well Riser: 621.60
Datum Ground Surface: _____
Elevation Top of Screen: _____

PURGING DATA: DATE: 9/17/01

Method: Disposable polyethylene bailer
TIME: Start. _____ Finish: _____
Well Volumes Purged: _____
Pumping Rate (gal/min): _____
Standing Volume (Gal.) _____
Was well purged dry? Yes _____ No _____
Volume Purged (Gal.) _____ See Previous Page
Was well purged below sand pack? Yes _____ No _____

Is purging equipment dedicated to sample location?
YES X NO _____

Well I.D. (inches)	Volume (gal/ft)
2	0.17
4	0.66
6	1.50

Field Personnel: _____

SAMPLING DATA: DATE: 9/20/01
TIME: Start: 1240 Finish: 1300
Method: Disposable polyethylene bailer
Sampler: B. Walker, S. Dickinson
Present Water Level (ft.): 12.20
Air Temperature (°F): _____
Depth of Sample (ft.): _____
Weather Conditions: _____
Is sampling equipment dedicated to sample location? : Yes X No _____
Source and type of water used in field for QC purposes:

PHYSICAL AND CHEMICAL DATA:

Appearance: Clear _____ Turbid Sl
Contains Sediment _____
Color: Brn
Odor: _____
Other: _____

PARAMETER	Measurement	
pH	6.84	6.94
Specific Conductivity (umhos/cm)	1732	1708
Temperature (°C)	20.7	17.6
Turbidity (NTU)	13.2	86.7
Eh (mV)	35	28

REMARKS: Key# 3679

MALCOLM PIRNIE

WELL PURGING AND SAMPLING LOG

PROJECT TITLE: TONAWANDA LANDFILL GROUNDWATER MONITORING

PROJECT NO. : 1039-105-100

STAFF: B.Walker

DATE: 9/17/01

WELL NO.: BM-18

(1) TOTAL CASING AND SCREEN LENGTH (ft.): 28.5

(3) WATER LEVEL BELOW TOP OF CASING (ft.): 9.21

(4) VOLUME OF WATER IN CASING (gal.): 3.3

(2) CASING INTERNAL DIAMETER (in.): 2

(Vol = 0.0408 [$(2)^2$ x { (1) - (3) }])

WELL I.D.	VOL. GAL/FOOT
1"	0.04
2"	0.17
3"	0.38
4"	0.66
5"	1.04
6"	1.50
8"	2.60

PARAMETERS	ACCUMULATED VOLUME PURGED (GALLONS)										
	Initial	3.5	5								
Time	1136	1145	1155								
pH	6.77	6.63	6.66								
TEMP. (°C)	22.6	20.2	17.9								
eH (mV)	-116	-108	-100								
CONDUCTIVITY	2360	2520	2600								
TURBIDITY (NTU)	164	170	116								
APPEARANCE	Clear	Sl. Cldy	Sl. Cldy								

SAMPLING DATA: Date: 9/18/01 Time: Start: 1145 Finish: 1200 Method: Bailer

Present water level (BTOC): 9.50

PHYSICAL AND CHEMICAL DATA:

Appearance: Clear____ Turbid Sl Color:____

Contains Sediment____ Odor:____ Other:____

PARAMETER	Measurement *Initial*	Measurement *Final*
pH	6.18	6.07
Specific Conductivity (umhos/cm)	2380	2420
Temperature (°C)	23.2	23.3
Turbidity (NTU)	31.3	90.7
Eh (mV)	-54	-64

COMMENTS:

Purged w/ submersible pump.
Pumped dry at 3.5 gal, & 5.0 gal
Concrete Pad Cracked

MALCOLM PIRNIE

WATER SAMPLING FIELD DATA SHEETS

PROJECT: TONAWANDA LANDFILL
CLIENT: S.A.I.C.
JOB NO.: 1039

TYPE OF SAMPLE: GROUNDWATER
LOCATION NO.: BM-18
LAB SAMPLE NO.: TLW-C164 Total
TLW-C165 Dissolved

WELL DATA: DATE: _____ TIME: _____

Casing Diameter (inches): 2
Casing Material: STEEL
Screened interval (ft. BGS): 14.5 - 24.5
Screen Material: STEEL
Static Water Level Below TOR (ft.): _____
Bottom Depth (ft.): 28.50
Elevation Top of Well Riser: 621.60
Datum Ground Surface: _____
Elevation Top of Screen: _____

PURGING DATA: DATE: 9/17/01

Method: Disposable polyethylene bailer
TIME: Start: _____ Finish: _____
Well Volumes Purged: _____
Pumping Rate (gal/min): _____
Standing Volume (Gal.) _____
Was well purged dry? Yes _____ No _____
Volume Purged (Gal.) _____ See Previous Page
Was well purged below sand pack? Yes _____ No _____

Is purging equipment dedicated to sample location?
YES X NO _____

Well I.D. (inches)	Volume (gal/ft)
2	0.17
4	0.66
6	1.50

Field Personnel: _____

SAMPLING DATA: DATE: 9/20/01
TIME: Start: 1220 Finish: 1235
Method: Disposable polyethylene bailer
Sampler: B. Walker & S. Dickinson
Present Water Level (ft.): 5.20
Air Temperature (°F): _____
Depth of Sample (ft.): _____
Weather Conditions: _____
Is sampling equipment dedicated to sample location? : Yes X No _____
Source and type of water used in field for QC purposes:

PHYSICAL AND CHEMICAL DATA:

Appearance: Clear _____ Turbid Sl
Color: Brn
Contains Sediment _____
Odor: _____
Other: _____

PARAMETER	Measurement	
pH	6.65	6.78
Specific Conductivity (umhos/cm)	2430	2500
Temperature (°C)	19.1	18.3
Turbidity (NTU)	22.9	1022
Eh (mV)	30	-26

REMARKS: Key# 3679

MALCOLM PIRNIE

WELL PURGING AND SAMPLING LOG

PROJECT TITLE: TONAWANDA LANDFILL GROUNDWATER MONITORING

PROJECT NO. : 1039-105-100

STAFF: B.Walker

DATE: 09/18/01

WELL NO.: BM-19

(1) TOTAL CASING AND SCREEN LENGTH (ft.): 26.77

(3) WATER LEVEL BELOW TOP OF CASING (ft.): 11.05

(4) VOLUME OF WATER IN CASING (gal.): 2.7

(2) CASING INTERNAL DIAMETER (in.): 2

(Vol = 0.0408 [$(2)^2$ x { (1) - (3) }])

WELL I.D.	VOL. GAL/FOOT
1"	0.04
2"	0.17
3"	0.38
4"	0.66
5"	1.04
6"	1.50
8"	2.60

PARAMETERS	ACCUMULATED VOLUME PURGED (GALLONS)										
	Initial	3.0	6.0	7.5							
Time	1553	1600	1610	1620							
pH	6.91	6.85	6.81	6.83							
TEMP. (°C)	17.7	17.5	16.1	17.4							
eH (mV)	-132	-111	-104	-84							
CONDUCTIVITY	1740	1860	1844	1838							
TURBIDITY (NTU)	4.72	93.61	73.7	236							
APPEARANCE											

SAMPLING DATA: Date: 9/18/01 Time: Start: 1410 Finish: 1420 Method: Bailer

Present water level (BTOC): 21.0

PHYSICAL AND CHEMICAL DATA:

Appearance: Clear____ Turbid____ Color:____

Contains Sediment____ Odor:____ Other: ____

PARAMETER	Measurement *Initial*	Measurement *Final*
pH	7.01	6.77
Specific Conductivity (umhos/cm)	1661	1764
Temperature (°C)	17.3	17.3
Turbidity (NTU)	17.6	84.1
Eh (mV)	-85	-47

COMMENTS: Purged w/ bailer

MALCOLM PIRNIE

WATER SAMPLING FIELD DATA SHEETS

PROJECT: TONAWANDA LANDFILL
CLIENT: S.A.I.C.
JOB NO.: 1039

TYPE OF SAMPLE: GROUNDWATER
LOCATION NO.: BM-19
LAB SAMPLE NO.: TLW - 0156 - Total
TLW - 0157 - Dissolved

WELL DATA: DATE: _____ TIME: _____

Casing Diameter (inches): 2
Casing Material: STEEL
Screened interval (ft. BGS): 14.5 - 24.5
Screen Material: STEEL
Static Water Level Below TOR (ft.): _____
Bottom Depth (ft.): 26.77
Elevation Top of Well Riser: 621.60
Datum Ground Surface: _____
Elevation Top of Screen: _____

PURGING DATA: DATE: 9/17/01

Method: Disposable polyethylene bailer
TIME: Start: _____ Finish: _____
Well Volumes Purged: _____
Pumping Rate (gal/min): _____
Standing Volume (Gal.) _____
Was well purged dry? Yes _____ No _____
Volume Purged (Gal.) _____ See Previous Page
Was well purged below sand pack? Yes _____ No _____

Is purging equipment dedicated to sample location?
YES X NO _____

Well I.D. (inches)	Volume (gal/ft)
2	0.17
4	0.66
6	1.50

Field Personnel: _____

SAMPLING DATA: DATE: 9/20/01
TIME: Start: 0850 Finish: 0930
Method: Disposable polyethylene bailer
Sampler: B. Walker & S. Dickinson
Present Water Level (ft.): 20.25'
Air Temperature (°F): _____
Depth of Sample (ft.): _____
Weather Conditions: _____
Is sampling equipment dedicated to sample location? : Yes X No _____
Source and type of water used in field for QC purposes:

PHYSICAL AND CHEMICAL DATA:

Appearance: Clear _____ Turbid 31
Color: Brn
Contains Sediment _____
Odor: _____
Other: _____

PARAMETER	Measurement	
pH	8.28	8.35
Specific Conductivity (umhos/cm)	1730	2090
Temperature (°C)	15.6	14.5
Turbidity (NTU)	13.2	905
Eh (mV)	111	-63

REMARKS: Key# 3679

MALCOLM PIRNIE

WELL PURGING AND SAMPLING LOG

PROJECT TITLE: TONAWANDA LANDFILL GROUNDWATER MONITORING

PROJECT NO. : 1039-105-100

STAFF: B.Walker

DATE: 09/17/01

WELL NO.: DW-1

(1) TOTAL CASING AND SCREEN LENGTH (ft.): 93.45

(3) WATER LEVEL BELOW TOP OF CASING (ft.): 4.69

(4) VOLUME OF WATER IN CASING (gal.): 8.8

(2) CASING INTERNAL DIAMETER (in.): 2

(Vol = 0.0408 [$(2)^2$ x { (1) - (3) }])

WELL I.D.	VOL. GAL/FOOT
1"	0.04
2"	0.17
3"	0.38
4"	0.66
5"	1.04
6"	1.50
8"	2.60

PARAMETERS	ACCUMULATED VOLUME PURGED (GALLONS)										
	Initial	9.0	20.0	32.0							
Time	1534	1545	1554	1605							
pH	8.14	7.45	6.99	6.96							
TEMP. (°C)	15.0	16.1	17.7	16.1							
eH (mV)	-123	-142	-117	-104							
CONDUCTIVITY	878	1646	2060	2090							
TURBIDITY (NTU)	19.9	196	20.0	16.0							
APPEARANCE											

SAMPLING DATA: Date: 9/18/01 Time: Start: 1400 Finish: 1410 Method: Bailer

Present water level (BTOC): 4.70

PHYSICAL AND CHEMICAL DATA:

Appearance: Clear____ Turbid____ Color:____

Contains Sediment____ Odor:____ Other: ____

PARAMETER	Measurement *Initial*	Measurement *Final*
pH	8.42	8.02
Specific Conductivity (umhos/cm)	967	1279
Temperature (°C)	20.9	18.5
Turbidity (NTU)	73.2	99.0
Eh (mV)	-44	-72

COMMENTS: Purged w/ submersible pump

MALCOLM PIRNIE

WATER SAMPLING FIELD DATA SHEETS

PROJECT: TONAWANDA LANDFILL
CLIENT: S.A.I.C.
JOB NO.: 1039

TYPE OF SAMPLE: GROUNDWATER
LOCATION NO.: DW-1
LAB SAMPLE NO.: TLW-0158 - Total
TLW-0159 - Dissolved

WELL DATA: DATE: _____ TIME: _____

Casing Diameter (inches): 2
Casing Material: PVC
Screened interval (ft. BGS): 89.5 - 94.5
Screen Material: PVC
Static Water Level Below TOR (ft.): _____
Bottom Depth (ft.): 93.45
Elevation Top of Well Riser: 621.60
Datum Ground Surface: _____
Elevation Top of Screen: _____

PURGING DATA: DATE: 9/17/01

Method: GRUNFOS Pump
TIME: Start: _____ Finish: _____
Well Volumes Purged: _____
Pumping Rate (gal/min): _____
Standing Volume (Gal.) _____
Was well purged dry? Yes _____ No _____
Volume Purged (Gal.) _____ See Previous Page
Was well purged below sand pack? Yes _____ No _____

Is purging equipment dedicated to sample location?
NO X

Well I.D. (inches)	Volume (gal/ft)
2	0.17
4	0.66
6	1.50

Field Personnel: _____

SAMPLING DATA: DATE: 9/20/01
TIME: Start: 0900 Finish: 0950
Method: Disposable polyethylene bailer
Sampler: B. Walker & S. Dicklason
Present Water Level (ft.): 41.60
Air Temperature (°F): _____
Depth of Sample (ft.): _____
Weather Conditions: _____
Is sampling equipment dedicated to sample location? : Yes X No _____
Source and type of water used in field for QC purposes:

PHYSICAL AND CHEMICAL DATA:

Appearance: Clear ✓ Turbid _____ Color: _____
Contains Sediment _____ Odor: _____ Other: _____

PARAMETER	Measurement	
pH	8.59	8.95
Specific Conductivity (umhos/cm)	1981	2160
Temperature (°C)	15.9	15.5
Turbidity (NTU)	22.1	46.9
Eh (mV)	160	-56

REMARKS: Key# 3725

MALCOLM PIRNIE

WELL PURGING AND SAMPLING LOG

PROJECT TITLE: TONAWANDA LANDFILL GROUNDWATER MONITORING

PROJECT NO. : 1039-105-100

STAFF: B.Walker

DATE: 9/17/01

WELL NO.: DW-2

(1) TOTAL CASING AND SCREEN LENGTH (ft.): 55.65

(3) WATER LEVEL BELOW TOP OF CASING (ft.): 39.63

(4) VOLUME OF WATER IN CASING (gal.): 2.7

(2) CASING INTERNAL DIAMETER (in.): 2

(Vol = 0.0408 [$(2)^2$ x { (1) - (3) }])

WELL I.D.	VOL. GAL/FOOT
1"	0.04
2"	0.17
3"	0.38
4"	0.66
5"	1.04
6"	1.50
8"	2.60

PARAMETERS	ACCUMULATED VOLUME PURGED (GALLONS)										
	Initial	3.0	6.0	10.0	15.0						
Time	1435	1439	1443	1449	1455						
pH	8.38	7.70	7.52	7.45	7.36						
TEMP. (°C)	20.9	14.9	13.5	13.9	13.6						
eH (mV)	-178	-209	-217	-209	-206						
CONDUCTIVITY	415	613	687	765	860						
TURBIDITY (NTU)	10.7	8.79	4.90	4.28	4.35						
APPEARANCE	Clear	Clear	Sl. odor								

SAMPLING DATA: Date: 9/18/01 Time: Start: 1250 Finish: 1300 Method: Bailer

Present water level (BTOC): 39.52

PHYSICAL AND CHEMICAL DATA:

Appearance: Clear ✗ Turbid Sl. Color:

Contains Sediment Odor: Other:

PARAMETER	Measurement *Initial*	Measurement *Final*
pH	8.68	8.30
Specific Conductivity (umhos/cm)	466	495
Temperature (°C)	17.7	16.5
Turbidity (NTU)	10.40	99.1
Eh (mV)	-100	-180

COMMENTS: Concrete Pad heaved
~~Estimate~~ Sampled Blind Dup.

MALCOLM PIRNIE

WATER SAMPLING FIELD DATA SHEETS

PROJECT: TONAWANDA LANDFILL
TYPE OF SAMPLE: GROUNDWATER
CLIENT: S.A.I.C.
LOCATION NO.: DW-2
JOB NO.: 1039
LAB SAMPLE NO.: TLW -0170 Total
TLW -0171 dissolved

WELL DATA: DATE: _____ TIME: _____

Casing Diameter (inches): 2
Casing Material: PVC
Screened interval (ft. BGS): 49.5 - 54.5
Screen Material: PVC
Static Water Level Below TOR (ft.): _____
Bottom Depth (ft.): 55.65
Elevation Top of Well Riser: 621.60
Datum Ground Surface: _____
Elevation Top of Screen: _____

PURGING DATA: DATE: 9/17/01

Method: GRUNFOS Pump
TIME: Start: _____ Finish: _____
Well Volumes Purged: _____
Pumping Rate (gal/min): _____
Standing Volume (Gal.) _____ See Previous Page
Was well purged dry? Yes _____ No _____
Volume Purged (Gal.) _____
Was well purged below sand pack? Yes _____ No _____

Is purging equipment dedicated to sample location?
NO X

Well I.D. (inches)	Volume (gal/ft)
2	0.17
4	0.66
6	1.50

Field Personnel: _____

SAMPLING DATA: DATE: 9/20/01
TIME: Start: 1415 Finish: _____
Method: Disposable polyethylene bailer
Sampler: B. Walker + S. Dicklason
Present Water Level (ft.): 39.54
Air Temperature (°F): _____
Depth of Sample (ft.): _____
Weather Conditions: _____
Is sampling equipment dedicated to sample location? : Yes X No _____
Source and type of water used in field for QC purposes:

PHYSICAL AND CHEMICAL DATA:

Appearance: Clear _____ Turbid SI
Color: Gry
Contains Sediment _____
Odor: _____
Other: _____

PARAMETER	Measurement	
pH	8.44	7.84
Specific Conductivity (umhos/cm)	553	567
Temperature (°C)	17.1	15.9
Turbidity (NTU)	34.7	264
Eh (mV)	-192	-189

REMARKS: _____

MALCOLM PIRNIE

WELL PURGING AND SAMPLING LOG

PROJECT TITLE: TONAWANDA LANDFILL GROUNDWATER MONITORING

PROJECT NO. : 1039-105-100

STAFF: B.Walker

DATE: 09/17/01

WELL NO.: DW-4R

(1) TOTAL CASING AND SCREEN LENGTH (ft.): 74.77

(3) WATER LEVEL BELOW TOP OF CASING (ft.): 52.72

(4) VOLUME OF WATER IN CASING (gal.): 3.7

(2) CASING INTERNAL DIAMETER (in.): 2

(Vol = 0.0408 [$(2)^2$ x { (1) - (3) }])

WELL I.D.	VOL. GAL/FOOT
1"	0.04
2"	0.17
3"	0.38
4"	0.66
5"	1.04
6"	1.50
8"	2.60

PARAMETERS	ACCUMULATED VOLUME PURGED (GALLONS)										
	Initial	4.0	8.0	12.0							
Time	1315	1322	1330	1412							
pH	8.16	8.13	7.68	7.34							
TEMP. (°C)	18.3	16.4	16.1	15.2							
eH (mV)	-1	1	-30	-61							
CONDUCTIVITY	~~464~~	499	667	767							
TURBIDITY (NTU)	31.3	>1100	>1100	>1100							
APPEARANCE	Clear	Cldy Brn	Cldy Brn →								

SAMPLING DATA: Date: 9/18/01 Time: Start: 1215 Finish: _____ Method: Bailer

Present water level (BTOC): 53.70

PHYSICAL AND CHEMICAL DATA:

Appearance: Clear _____ Turbid sl. Color: _____

Contains Sediment _____ Odor: _____ Other: _____

PARAMETER	Measurement *Initial*	Measurement *Final*
pH	7.00	6.96
Specific Conductivity (umhos/cm)	846	841
Temperature (°C)	17.2	16.3
Turbidity (NTU)	27.3	296
Eh (mV)	49	19

COMMENTS: Purged w/ bailer.

MALCOLM PIRNIE

WATER SAMPLING FIELD DATA SHEETS

PROJECT: TONAWANDA LANDFILL
TYPE OF SAMPLE: GROUNDWATER
CLIENT: S.A.I.C.
LOCATION NO.: DW-4R
JOB NO.: 1039
LAB SAMPLE NO.: TLW-0168 Total
TLW-0169 Dissolved

WELL DATA: DATE: _____ TIME: _____

Casing Diameter (inches): 2
Casing Material: STEEL
Screened interval (ft. BGS): 62.8 - 72.8
Screen Material: STEEL
Static Water Level Below TOR (ft.): _____
Bottom Depth (ft.): 74.77
Elevation Top of Well Riser: 621.60
Datum Ground Surface: _____
Elevation Top of Screen: _____

PURGING DATA: DATE: 9/17/01

Method: Bailer
TIME: Start: _____ Finish: _____
Well Volumes Purged: _____
Pumping Rate (gal/min): _____
Standing Volume (Gal.) _____
Was well purged dry? Yes _____ No _____
Volume Purged (Gal.) See Previous Page
Was well purged below sand pack? Yes _____ No _____

Is purging equipment dedicated to sample location?
NO X

Well I.D. (inches)	Volume (gal/ft)
2	0.17
4	0.66
6	1.50

Field Personnel: _____

SAMPLING DATA: DATE: 9/20/01
TIME: Start: 1340 Finish: 1400
Method: Disposable polyethylene bailer
Sampler: B. Walker & S. Dickinson
Present Water Level (ft.): 53.54
Air Temperature (°F): _____
Depth of Sample (ft.): _____
Weather Conditions: _____
Is sampling equipment dedicated to sample location? : Yes X No _____
Source and type of water used in field for QC purposes:

PHYSICAL AND CHEMICAL DATA:

Appearance: Clear _____ Turbid Yes
Color: Brn
Contains Sediment _____
Odor: _____
Other: _____

PARAMETER	Measurement	
pH	7.60	7.62
Specific Conductivity (umhos/cm)	809	845
Temperature (°C)	20.5	22.0
Turbidity (NTU)	110	>1100
Eh (mV)	-8	-52

REMARKS: Key# 3725

MALCOLM PIRNIE

WELL DEVELOPMENT / PURGING LOG

PROJECT TITLE: S.A.I.C GROUNDWATER RAD SAMPLING @ TOWN OF TONAWANDA LANDFILL

PROJECT NO. : 1039

STAFF: B. WALKER / S. DICKINSON

DATE: SEPT. 19 - 21, 2001

WELL NO. : L-1

(1) TOTAL CASING AND SCREEN LENGTH (ft.): 16.10

(2) CASING INTERNAL DIAMETER (in.): 2

(3) WATER LEVEL BELOW TOP OF CASING (ft.): 7.68

(4) VOLUME OF WATER IN CASING (gal.): 1.4

WELL I.D.	VOL. GAL / FOOT
1"	0.04
2"	0.17
3"	0.38
4"	0.66
5"	1.04
6"	1.50
8"	2.60

$V = 0.0408 [(2)^2 \times \{ (1) - (3) \}] =$ _____ GAL.

PARAMETERS	ACCUMULATED VOLUME PURGED (GALLONS)										
	1108 Ini. Hal	1112 1.5	1114 3.0	1116 4.5	1120 7.0	1122 8.5	1125 10.0				
pH	8.31	8.56	8.30	7.90	8.64	8.51	8.40				
Eh	-110	-162	-202	-223	-241	-203	-186				
CONDUCTIVITY	3360	3580	3580	3070	3440	3480	3410				
TEMPERATURE	21.7	19.9	18.8	17.5	17.7	17.9	17.6				
TURBIDITY	27.1	200	>1100	>1100	>1100	>1100	>1100				
APPEARANCE	Brn	Brn	Gry Cldy	→	Brn Cldy	Brn Cldy	Brn Cldy				

COMMENTS: Purged dry ~ 6.0 gal, 9.0 gal, 11.0 gal

MALCOLM PIRNIE

WATER SAMPLING FIELD DATA SHEETS

PROJECT: TONAWANDA LANDFILL
CLIENT: S.A.I.C.
JOB NO.: 1039

TYPE OF SAMPLE: GROUNDWATER
LOCATION NO.: L-1
LAB SAMPLE NO.: TLW-0174 Total
TLW-0175 dissolved

WELL DATA: DATE: _____ TIME: _____

Casing Diameter (inches): 2
Casing Material: PVC
Screened interval (ft. BGS): 4.0 - 14.0
Screen Material: PVC
Static Water Level Below TOR (ft.): _____
Bottom Depth (ft.): 16.1
Elevation Top of Well Riser: 616.12
Datum Ground Surface: _____
Elevation Top of Screen: _____

PURGING DATA: DATE: 9/19/01

Method: centrifugal pump/ bailer
TIME: Start: _____ Finish: _____
Well Volumes Purged: _____
Pumping Rate (gal/min): _____
Standing Volume (Gal.) _____
Was well purged dry? Yes _____ No _____
Volume Purged (Gal.) _____
Was well purged below sand pack? Yes _____ No _____

Is purging equipment dedicated to sample location?
NO X

Well I.D. (inches)	Volume (gal/ft)
2	0.17
4	0.66
6	1.50

Field Personnel: _____

SAMPLING DATA: DATE: 9/21/01
TIME: Start: 0920 Finish: 0945
Method: Disposable polyethylene bailer
Sampler: B. Walker & S. Dickinson
Present Water Level (ft.): 7.68
Air Temperature (°F): _____
Depth of Sample (ft.): _____
Weather Conditions: _____
Is sampling equipment dedicated to sample location? : Yes X No _____
Source and type of water used in field for QC purposes:

PHYSICAL AND CHEMICAL DATA:

Appearance: Clear X Turbid _____
Contains Sediment _____
Color: Brn
Odor: _____
Other: _____

PARAMETER	Measurement	
pH	8.72	8.61
Specific Conductivity (umhos/cm)	3510	3740
Temperature (°C)	21.7	22.0
Turbidity (NTU)	23.8	139
Eh (mV)	-37	-89

REMARKS: Key# 3725

MALCOLM PIRNIE

WELL DEVELOPMENT / PURGING LOG

PROJECT TITLE: S.A.I.C GROUNDWATER RAD SAMPLING @ TOWN OF TONAWANDA LANDFILL

PROJECT NO. : 1039

STAFF: B. WALKER / S. DICKINSON

DATE: SEPT. 19 - 21, 2001

WELL NO. : L-2

(1) TOTAL CASING AND SCREEN LENGTH (ft.): 21.70

(2) CASING INTERNAL DIAMETER (in.): 2

(3) WATER LEVEL BELOW TOP OF CASING (ft.): 4.30

(4) VOLUME OF WATER IN CASING (gal.): 3.0

WELL I.D.	VOL. GAL / FOOT
1"	0.04
2"	0.17
3"	0.38
4"	0.66
5"	1.04
6"	1.50
8"	2.60

$V = 0.0408 [(2)^2 \times \{ (1) - (3) \}] =$ _____ GAL.

PARAMETERS	ACCUMULATED VOLUME PURGED (GALLONS)										
	1140 Initial	1141 3.0	1142 6.0	1145 9.0	1146 12.0	1150 15.0	1152 18.0	1153 21.0	1155 24.0		
pH	9.03	8.62	8.78	8.85	8.92	8.92	9.11	8.99	9.02		
Eh	-55	-130	-202	-226	-246	-240	-233	-234	-242		
CONDUCTIVITY	2790	3450	3640	3740	3780	3810	4090	4000	3940		
TEMPERATURE	22.5	19.7	16.9	15.9	15.5	15.4	15.3	15.2	15.2		
TURBIDITY	>1100	45.6	25.4	27.0	20.6	15.9	36.1	23.9	16.1		
APPEARANCE	Brn cldy	Yellow	Yellow	Yellow	Yellow	Yellow	Lt Brn cldy	Yellow Brn	Yellow Brn		

COMMENTS: Purged with submersible pump.

MALCOLM PIRNIE

WATER SAMPLING FIELD DATA SHEETS

PROJECT: TONAWANDA LANDFILL
CLIENT: S.A.I.C.
JOB NO.: 1039

TYPE OF SAMPLE: GROUNDWATER
LOCATION NO.: L-2
LAB SAMPLE NO.: TLW-0176
TLW-0177

WELL DATA: DATE: _____ TIME: _____

Casing Diameter (inches): 2
Casing Material: PVC
Screened interval (ft. BGS): 9.0 - 19.0
Screen Material: PVC
Static Water Level Below TOR (ft.): _____
Bottom Depth (ft.): 19.0
Elevation Top of Well Riser: 622.03
Datum Ground Surface: _____
Elevation Top of Screen: _____

PURGING DATA: DATE: 9/19/01

Method: centrifugal pump/ bailer
TIME: Start: _____ Finish: _____
Well Volumes Purged: _____
Pumping Rate (gal/min): _____
Standing Volume (Gal.) _____
Was well purged dry? Yes _____ No _____
Volume Purged (Gal.) _____
Was well purged below sand pack? Yes _____ No _____

Is purging equipment dedicated to sample location?
NO X

Well I.D. (inches)	Volume (gal/ft)
2	0.17
4	0.66
6	1.50

Field Personnel: _____

SAMPLING DATA: DATE: 9/21/01
TIME: Start: 0950 Finish: 1010
Method: Disposable polyethylene bailer
Sampler: B. Walker + S. Dickinson
Present Water Level (ft.): 4.38
Air Temperature (°F): _____
Depth of Sample (ft.): _____
Weather Conditions: _____
Is sampling equipment dedicated to sample location? : Yes X No _____
Source and type of water used in field for QC purposes:

PHYSICAL AND CHEMICAL DATA:

Appearance: Clear _____ Turbid SI
Contains Sediment _____
Color: Brn
Odor: _____
Other: _____

PARAMETER	Measurement	
pH	7.66	8.46
Specific Conductivity (umhos/cm)	3000	3670
Temperature (°C)	25.6	24.4
Turbidity (NTU)	47.0	305
Eh (mV)	-42	-61

REMARKS: Key# 3725

MALCOLM PIRNIE

WELL DEVELOPMENT / PURGING LOG

PROJECT TITLE: S.A.I.C GROUNDWATER RAD SAMPLING @ TOWN OF TONAWANDA LANDFILL

PROJECT NO. : 1039

STAFF: B. WALKER / S. DICKINSON

DATE: SEPT. 19 - 21, 2001

WELL NO. : L-3

(1) TOTAL CASING AND SCREEN LENGTH (ft.): 21.35

(2) CASING INTERNAL DIAMETER (in.): 2

(3) WATER LEVEL BELOW TOP OF CASING (ft.): 3.64

(4) VOLUME OF WATER IN CASING (gal.): 3.0

WELL I.D.	VOL. GAL / FOOT
1"	0.04
2"	0.17
3"	0.38
4"	0.66
5"	1.04
6"	1.50
8"	2.60

$V = 0.0408 [(2)^2 \times \{ (1) - (3) \}] =$ _____ GAL.

PARAMETERS	1248 Initial	1250 3.0	1252 6.0	1253 9.0	1255 12.0	1256 15.0	1258 18.0				
	ACCUMULATED VOLUME PURGED (GALLONS)										
pH	9.80	9.86	9.83	9.80	9.78	9.78	9.75				
Eh	-86	-100	-100	-101	-103	-107	-111				
CONDUCTIVITY	4570	4520	4430	4410	4390	4220	4150				
TEMPERATURE	16.3	15.3	14.7	14.5	14.1	14.0	13.9				
TURBIDITY	143	216	127	59.5	43.3	30.3	21.5				
APPEARANCE	Brn	→									

COMMENTS: Purged w/ submersible pump.

MALCOLM PIRNIE

WATER SAMPLING FIELD DATA SHEETS

PROJECT: TONAWANDA LANDFILL
CLIENT: S.A.I.C.
JOB NO.: 1039

TYPE OF SAMPLE: GROUNDWATER
LOCATION NO.: L-3
LAB SAMPLE NO.: TLW-0150, 0151
9178, 9180 MS/MSD

WELL DATA: DATE: _____ TIME: _____

Casing Diameter (inches): 2
Casing Material: PVC
Screened interval (ft. BGS): 9.0 - 19.0
Screen Material: PVC
Static Water Level Below TOR (ft.): _____
Bottom Depth (ft.): 19.0
Elevation Top of Well Riser: 621.34
Datum Ground Surface: _____
Elevation Top of Screen: _____

PURGING DATA: DATE: 9/19/01

Method: centrifugal pump/ bailer
TIME: Start: ~~1325~~ Finish: _____
Well Volumes Purged: _____
Pumping Rate (gal/min): _____
Standing Volume (Gal.) _____
Was well purged dry? Yes _____ No _____
Volume Purged (Gal.) _____
Was well purged below sand pack? Yes _____ No _____

Is purging equipment dedicated to sample location?
NO X

Well I.D. (inches)	Volume (gal/ft)
2	0.17
4	0.66
6	1.50

Field Personnel: _____

SAMPLING DATA: DATE: 9/19/01
TIME: Start: ~~1325~~ 1330 Finish: 1455
Method: Disposable polyethylene bailer
Sampler: B. Walker / S. Dicklason
Present Water Level (ft.): 3.66
Air Temperature (°F): 60°F
Depth of Sample (ft.): _____
Weather Conditions: Cloudy
Is sampling equipment dedicated to sample location? : Yes X No _____
Source and type of water used in field for QC purposes:

PHYSICAL AND CHEMICAL DATA:

Appearance: Clear X Turbid _____
Contains Sediment _____
Color: Brn
Odor: _____
Other: _____

PARAMETER	Measurement	
pH	9.41	9.43
Specific Conductivity (umhos/cm)	3500	3900
Temperature (°C)	21.1	18.3
Turbidity (NTU)	35.1	109.9
Eh (mV)	-54	-48

REMARKS: Key# 3725
Sampled MS/MSD @ 1400

ATTACHMENT B

WELL CONSTRUCTION DATA

DEPTH	ELEVATION	SAMPLES	SAMPLE NO.	CHEM SMPL	RECOVERY (inches)	N	SOIL or ROCK CLASSIFICATION	UNIFIED SOIL CLASSIF.	DENSITY (PCF)	WATER CONTENT (Percent)	PERMEABILITY (cm/sec)	MONITOR/PIEZOMETER CONSTRUCTION DETAILS	WATER PROBE READINGS Temp (C)	Cond (µmhos/cm)	Eh (mv)	pH	NOTES
			1		18	14	Red-Brown SILT & CLAY, little-some sand, trace-little gravel (Moist-Medium)					BM-4 *W.L.					
5			2		18	40	Same (Moist-Hard)										*Water level measured on 7-15-83
10			3		18	47	Same										
15			4		18	33	Same										Well Materials: Well Screen-0.01" Slotted 2" I.D. PVC Riser Pipe-2" PVC Stick up: 2.0' Borehole Diameter: 7.5"
20			5		18	30	Same										
25			6		18	19	Same (Moist-Stiff)										
30			7		18	16	Same										
35			8		18	14	Same (Moist-Medium Silty fine SAND seam @ 35.5' 39.0'										
40			9		18	138	Red-Brown fine SAND & SILT (Wet-Very Compact) Boring Terminated @ 40.0'										Change at 39.0'
45																	

BM-4

NOTE: See reverse side for key and explanation to log

RUN NO.	RECOVERY (Percent)	RQD

Surface Elevation 619.88
Date Started 4-8-83
Date Completed 4-11-83
Number of Installations in Boring 1
Method of Installation

Project No GTA-83-18
Project Title Town of Tonawanda
Location Tonawanda, New York
Classified By MR-L Checked

HYDROGEOLOGIC LOG

THOMSEN ASSOCIATES

MONITOR NO. BM-4

Sheet 1 of 1

DEPTH	ELEVATION	SAMPLE	SAMPLE NO	CHEM SAMPLE RECOVERY (Inches)	z	SOIL or ROCK CLASSIFICATION	UNIFIED SOIL CLASSIF	DENSITY (PCF)	WATER CONTENT (Percent)	PERMEABILITY (cm/sec)	MONITOR/PIEZOMETER CONSTRUCTION DETAILS	WATER PROBE READINGS Temp (°C)	Cond (µmhos/cm)	Eh (mV)	pH	NOTES
			1	18	17	Red-Brown SILT & CLAY, little-some Sand, trace-little gravel (Dry-Stiff)					BM-8 *W.L.					
			2	18	26											*Water level measured on 7-15-83
10			3	18	20	grades to Some Sand										Moist
15			4	18	15											Well Materials: Screen-0.01" slotted 2" I.D. PVC Riser Pipe-2" I.D. PVC Stick up: 2.0' Bore hole diameter: 7.5"
20			5	18	9	grades to CLAY & SILT, trace sand, trace gravel (Wet-Medium)										
25			6	18	7		CL									
30			7	18	7											
35			8	18	6											
40			9	18	6											
						Boring Terminated @ 41.5'										
45																

BM-8

NOTE
See reverse side for key and explanation to log

RUN NO | RECOVERY (Inches) | ROD

Surface Elevation 598.50
Date Started 4-6-83
Date Completed 4-6-83
Number of Installations in Boring 1
Method of Installation Hollow Stem Auger

Project No GTL-83-18
Project Title Town of Tonawanda
Location Tonawanda, New York
Classified By MR-L Checked

HYDROGEOLOGIC LOG

THOMSEN ASSOCIATES

MONITOR NO BM-8

Sheet 1 of 1

DEPTH	ELEVATION	SAMPLES	SAMPLE NO.	CHEM SMPL	RECOVERY (inches)	N	SOIL or ROCK CLASSIFICATION	UNIFIED SOIL CLASSIF.	DENSITY (PCF)	WATER CONTENT (Percent)	PERMEABILITY (cm/sec)	MONITOR/PIEZOMETER CONSTRUCTION DETAILS	WATER PROBE READINGS Temp (°C)	Cond (µmhos/cm)	Eh (mV)	pH	NOTES
			1		18	10	Red-Brown SILT & CLAY, little-Some Sand, trace fine gravel (Moist-Medium)					BM-12 *W.L.					
5			2		18	15											
10			3		18	7	grades to trace sand (Moist-Medium)										
15			4		18	8											
20			5		18	8	grades to little gravel										
25			6		18	8	grades to trace gravel										
30			7		18	6											
35			8		18	13	grades to little gravel										
40			9		18	20											
							Boring Terminated @ 41.5'										
45																	

*Water Level Measured on 7-15-83

Well Materials:
Well Screen-0.01" Slotte
2" I.D. PVC
Riser Pipe-2" I.D. PVC
Stick up: 1.9'
Borehole Diameter: 7.5"

Boring Dry at completion

BM-12

NOTE
See reverse side for key and explanation to log

RUN NO | RECOVERY (Percent) | RQD

Surface Elevation 601.27
Date Started 4-6-83
Date Completed 4-6-83
Number of Installations in Boring 1
Method of Installation Hollow Stem Auger

Project No GTA-83-18
Project Title Town of Tonawanda
Location Tonawanda, New York
Classified By MR-L Checked

HYDROGEOLOGIC LOG

THOMSEN ASSOCIATES

MONITOR NO. BM-12
Sheet 1 of 1

MALCOLM PIRNIE

MONITORING WELL SHEET

WELL NO. BM-15

PROJECT Supplemental Closure Invl. START DATE 7/28/94 END DATE 8/2/94

PROJECT NO. 1039-09-1 FIELD GEOLOGIST J.P. Hilton

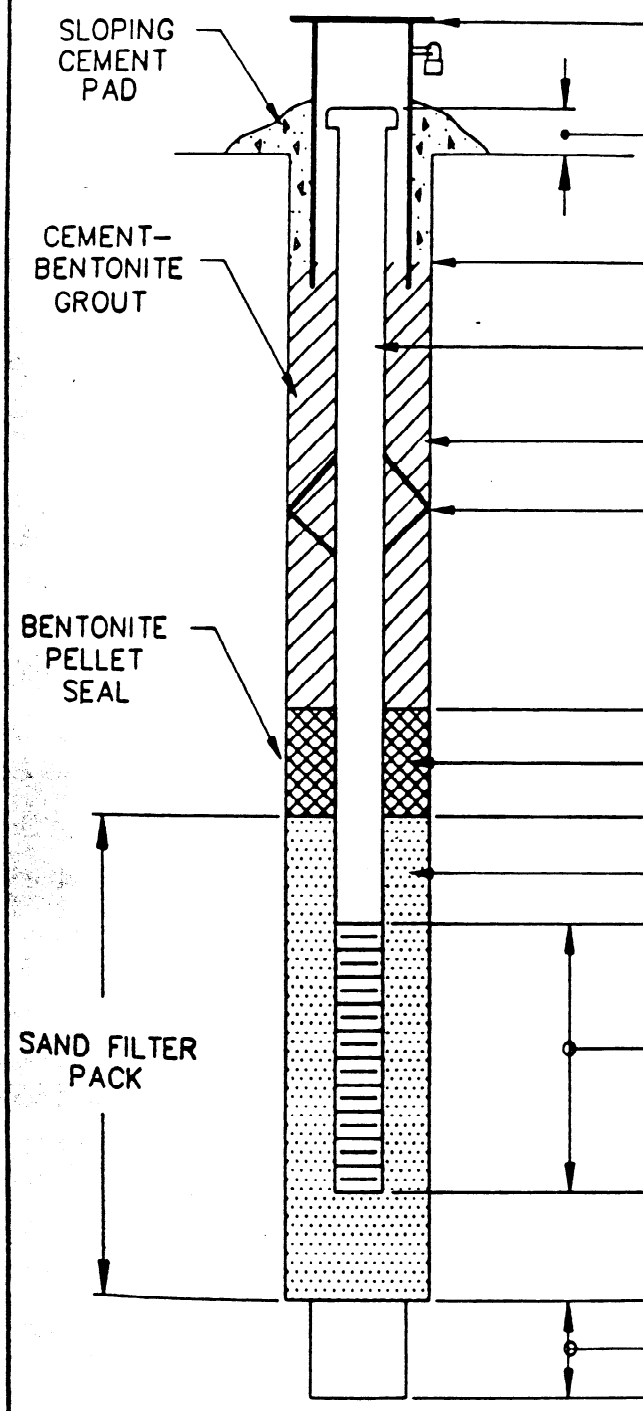
LOCATION Tonawanda Landfill

DRILLING CO. BRlo Drlg

DRILLER(S) L. Schroeder

DRILLING METHOD(S) 6¼" HSA

DEVELOPMENT METHOD(S)



SIZE AND LENGTH OF LOCKABLE PROTECTIVE STEEL CASING 6" x 5.0'

LOCKED? X YES ___ NO

STICK-UP 2.0

DEPTH TO TOP OF GROUT/ BOTTOM OF CEMENT 2.5'

RISER DIAMETER 2" AND MATERIAL Stainless Steel

BOREHOLE DIAMETER 12"

DEPTH TO CENTRALIZERS NA

DEPTH 14.5

PELLET SIZE 3/8"

DEPTH 17.5

SAND SIZE #1

DEPTH 19.5

SCREEN DIAMETER, 2" SLOT SIZE, .006 AND MATERIAL Stainless Steel

DEPTH 29.5

DEPTH 30.0

BACKFILL MATERIAL NA

BOTTOM OF BOREHOLE 30.0

NOTE: DEPTHS ARE FEET BELOW GRADE

OWWSHEET.DWG 9-20-90

MALCOLM PIRNIE

MONITORING WELL SHEET

WELL NO. BM1-16

PROJECT Supplemental Closure INV. START DATE 7/28/94 END DATE 8/1/94

PROJECT NO. 1039-09-1 FIELD GEOLOGIST J.P. Hilton

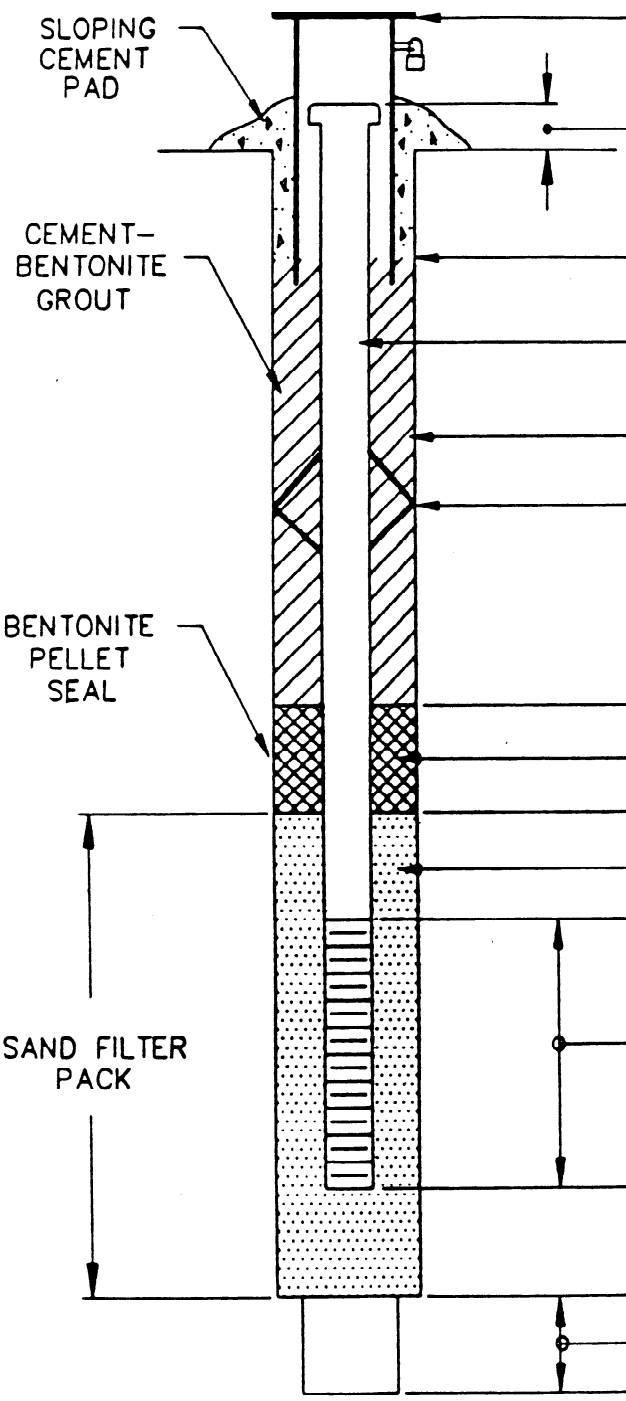
LOCATION Tonawanda Landfill

DRILLING CO. BAlo Drlg

DRILLER(S) L. Schroeder

DRILLING METHOD(S) 6 1/4" HSA

DEVELOPMENT METHOD(S)



SIZE AND LENGTH OF LOCKABLE PROTECTIVE STEEL CASING 6" x 5.0'

LOCKED? X YES ___ NO

STICK-UP 2.0'

DEPTH TO TOP OF GROUT/ BOTTOM OF CEMENT 2.5

RISER DIAMETER 2" AND MATERIAL Stainless Steel

BOREHOLE DIAMETER 12"

DEPTH TO CENTRALIZERS NA

DEPTH 23.0

PELLET SIZE 3/8" .0

DEPTH 26.0

SAND SIZE #1 silica

DEPTH 28.0

SCREEN DIAMETER, 2" SLOT SIZE, .006 AND MATERIAL Stainless Steel

DEPTH 38.0

DEPTH 38.5

BACKFILL MATERIAL #1 SAND

BOTTOM OF BOREHOLE 38.5

NOTE: DEPTHS ARE FEET BELOW GRADE

OMWSHEET.DWG 9-20-90

MALCOLM PIRNIE

MONITORING WELL SHEET

WELL NO. BM-17

PROJECT Supplemental Closure INV

START DATE 12/6/94 END DATE 12/6/94

PROJECT NO. 1039-09-1

FIELD GEOLOGIST J.P. Hilton

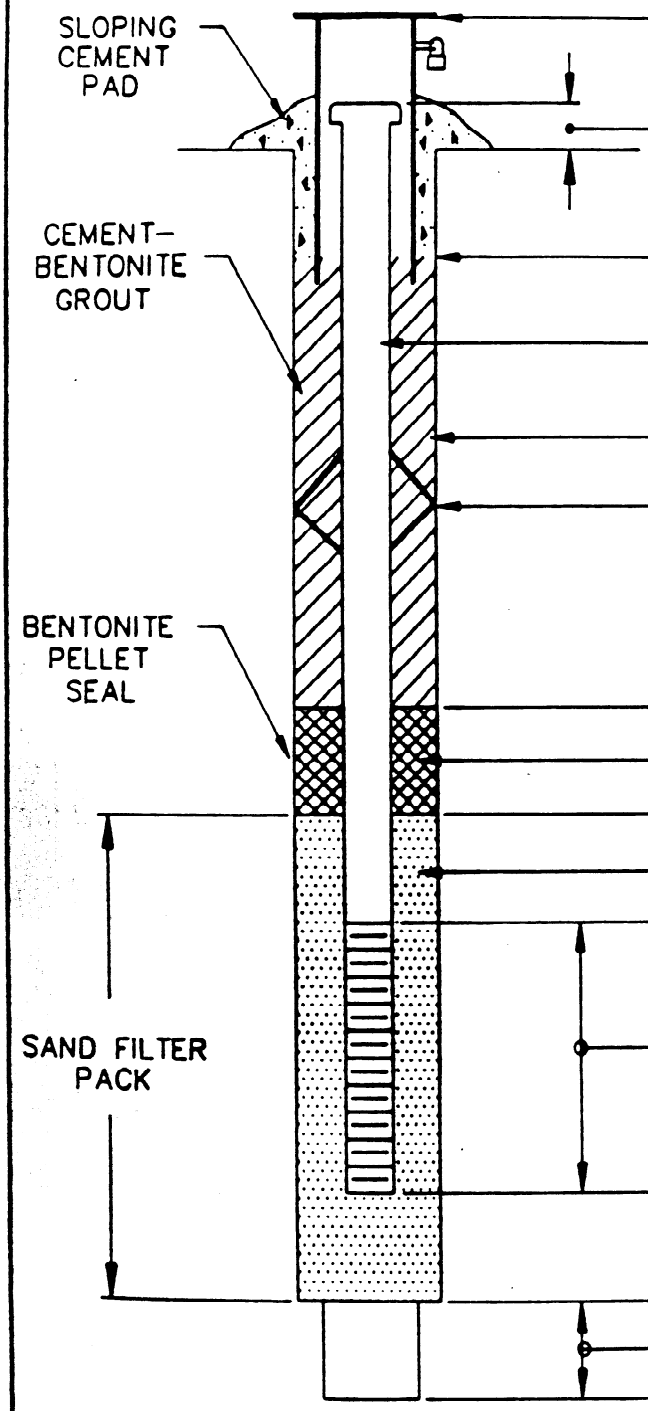
LOCATION Lowanwanda Landfill

DRILLING CO. Buffalo Drilling

DRILLER(S) L. Schroeder

DRILLING METHOD(S) 6¼" HSA 0-25'

DEVELOPMENT METHOD(S)



SIZE AND LENGTH OF LOCKABLE PROTECTIVE STEEL CASING 6" x 5.0'

LOCKED? X YES ___ NO

STICK-UP 2.5

DEPTH TO TOP OF GROUT/ BOTTOM OF CEMENT 2.5

RISER DIAMETER 2" AND MATERIAL Stainless Steel

BOREHOLE DIAMETER 10.5"

DEPTH TO CENTRALIZERS NA

DEPTH 9.8

PELLET SIZE 3/8" dia

DEPTH 12.9

SAND SIZE #0/#1 equivalent

DEPTH 14.5

SCREEN DIAMETER, 2" SLOT SIZE, .006 AND MATERIAL Stainless Steel

DEPTH 24.5

DEPTH 25.0

BACKFILL MATERIAL NATIVE soil

BOTTOM OF BOREHOLE 25.0

NOTE: DEPTHS ARE FEET BELOW GRADE

OMWSHEET.DWG 9-20-90

"PIRNIE"

MONITORING WELL SHEET

WELL NO. BM-1 BM-1E

PROJECT Supplemental Closure Inv. START DATE 12/7/94 END DATE 12/7/94

PROJECT NO. 1039-09-1 FIELD GEOLOGIST J.P. Hilton

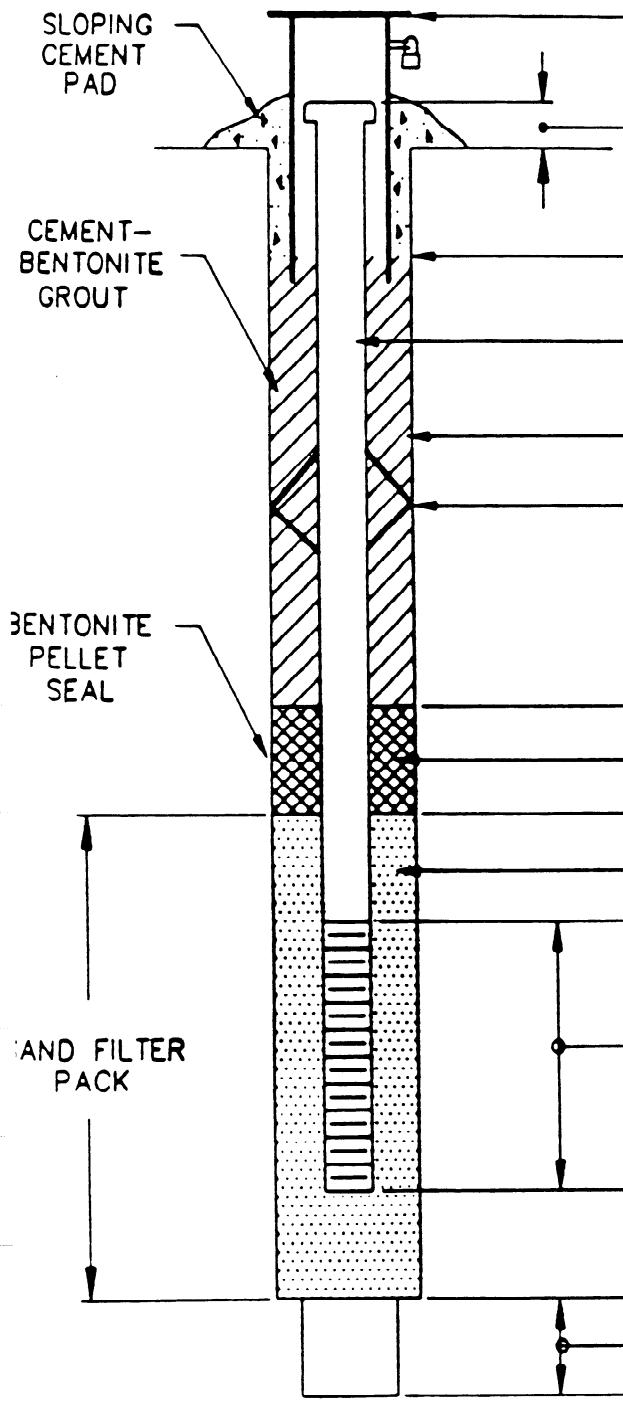
LOCATION Tonawanda Landfill

DRILLING CO. Buffalo Drilling

DRILLER(S) L. Schroeder

DRILLING METHOD(S) 6¼" HSA 0-25'

DEVELOPMENT METHOD(S)



SIZE AND LENGTH OF LOCKABLE PROTECTIVE STEEL CASING 6" x 5'

LOCKED? X YES ___ NO

STICK-UP 2.3

DEPTH TO TOP OF GROUT/BOTTOM OF CEMENT 2.5

RISER DIAMETER AND MATERIAL 2" Stainless Steel

BOREHOLE DIAMETER 10.5"

DEPTH TO CENTRALIZERS NA

DEPTH 9.5

PELLET SIZE 3/8"

DEPTH 12.5

SAND SIZE #0/#1 equivalent

DEPTH 14.5

SCREEN DIAMETER, SLOT SIZE, AND MATERIAL 2" .006 Stainless Steel

DEPTH 24.5

DEPTH 25.0

BACKFILL MATERIAL Native Cuttings

BOTTOM OF BOREHOLE 26

NOTE: DEPTHS ARE FEET BELOW GRADE

WILLIAM PIRNIE

MONITORING WELL SHEET

WELL NO. BM-19

PROJECT Supplemental Closure Inv. START DATE 7/27/94 END DATE 8/1/94

PROJECT NO. 1039-09-1 FIELD GEOLOGIST J.P. Hilton

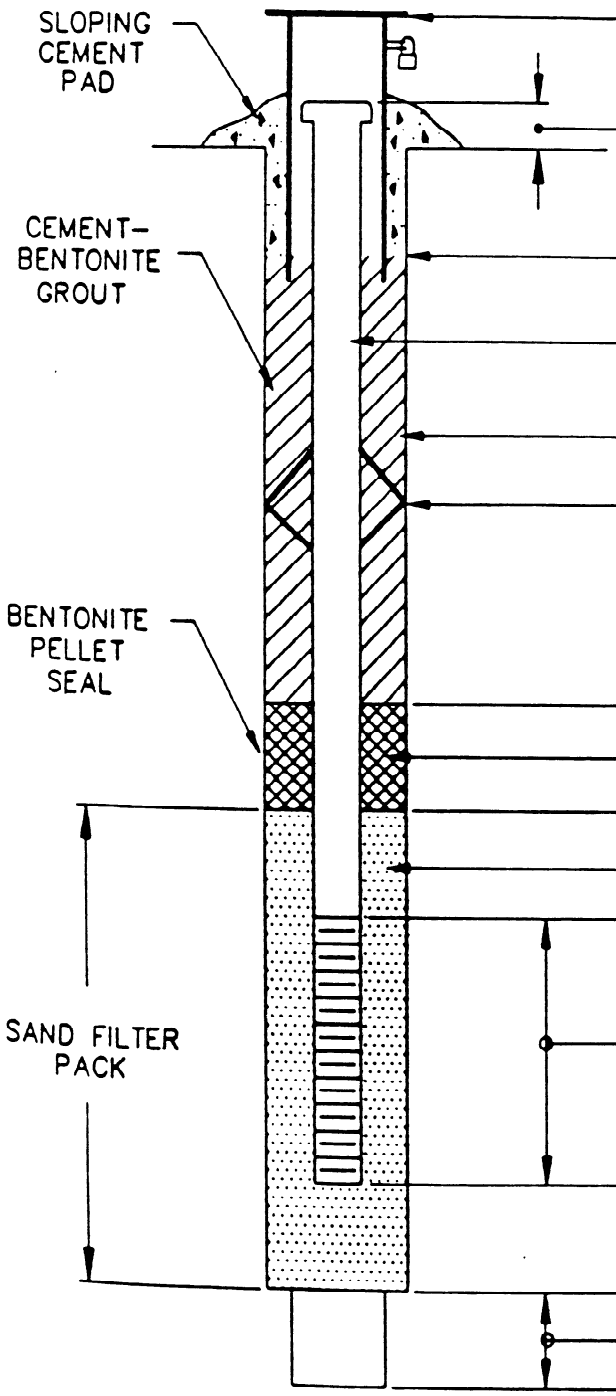
LOCATION Tonawanda Landfill

DRILLING CO. Bflo Dele

DRILLER(S) L. Schroeder

DRILLING METHOD(S) 6¼" HSA

DEVELOPMENT METHOD(S)



SIZE AND LENGTH OF LOCKABLE PROTECTIVE STEEL CASING 6" x 5.0'

LOCKED? X YES ___ NO

STICK-UP 2.0

DEPTH TO TOP OF GROUT/ BOTTOM OF CEMENT 2.5

RISER DIAMETER 2" AND MATERIAL Stainless Steel

BOREHOLE DIAMETER 12"

DEPTH TO CENTRALIZERS NA

DEPTH 9.5

PELLET SIZE 3/8"

DEPTH 12.5

SAND SIZE #1 silica

DEPTH 14.5

SCREEN DIAMETER, 2"
SLOT SIZE, .006
AND MATERIAL Stainless Steel

DEPTH 24.5

DEPTH 25.0

BACKFILL MATERIAL NA

BOTTOM OF BOREHOLE 25.0

NOTE: DEPTHS ARE FEET BELOW GRADE

OMWSHEET.DWG 9-20-90

DEPTH	ELEVATION	SAMPLES	SAMPLE NO	CHEM SMPL	RECOVERY (inches)	N	SOIL or ROCK CLASSIFICATION	UNIFIED SOIL CLASSIF.	DENSITY (PCF)	WATER CONTENT (Percent)	PERMEABILITY (cm/sec)	MONITOR/PIEZOMETER CONSTRUCTION DETAILS DW-1 *W.L.	WATER PROBE READINGS Temp (°C)	Cond (µmho/cm)	Eh (mV)	pH	NOTES
							Brown SILT, SAND & CONCRETE BLOCKS (FILL)										
5			1		24	25	Red-Brown SILT & CLAY, little-Some Sand, trace fine gravel (Dry-Hard)										
			2		24	74											
			3		24	28											
0			4		24	37	grades to little gravel										
			5		24	55											
5			6		24	27	grades to little sand, little gravel										Moist
			7		24	64											
			8		24	17											
0			9		24	23											
			10		24	32											
5			11		24	18											
			12		24	25											
			13		18	10											
0			13U		24		grades to trace gravel	CL									*Water level measured on 7-15-83
			14		24	10											
5			15		24	16											
			16		24	22											
			17		24	15	grades to trace sand, trace gravel										
0			18		24	15											
5			19		24	5											

DW-1

NOTE: See reverse side for key and explanation to log.

RUN NO.	RECOVERY (Percent)	RQD

Surface Elevation 608.39
Date Started 3-31-83
Date Completed 4-5-83
Number of Installations in Boring 1
Method of Installation Hollow Stem Auger

Project No. GTA-83-18
Project Title Town of Tonawanda
Location Tonawanda, NY
Classified By JD Checked MR-L

HYDROGEOLOGIC LOG

THOMSEN ASSOCIATES

MONITOR NO. DW-1

Sheet [illegible]

DEPTH	ELEVATION	SAMPLES	SAMPLE NO	CHEM SMPL	RECOVERY (inches)	N	SOIL or ROCK CLASSIFICATION	UNIFIED SOIL CLASSIF.	DENSITY (PCF)	WATER CONTENT (Percent)	PERMEABILITY (cm/sec)	MONITOR/PIEZOMETER CONSTRUCTION DETAILS	WATER PROBE READINGS: Temp (°C)	Cond (µmho/cm)	Eh (mv)	pH	NOTES
			20		24	6	Red-Brown SILT & CLAY, little sand, trace fine gravel (Wet-Medium)					DW-1					
55			21		24	6	grades to trace sand, trace gravel										
60			21U		24		Gray CLAY, Some Silt, trace sand, trace fine gravel (Wet-Medium)	CL									
			22		24	7											
65			23		24	6											
70			24		24	12											
75			25		24	8											
80			26		24	11	≈83' bgs										
85			27		18	60	Brown fine-coarse SAND, Some Clay and Silt, trace fine gravel (Wet-Very Compact)										
90			28		18	103											
95			29		6	70	SHALE FRAGMENTS										
							Boring Terminated @ 95.5'										

Well Materials:
Screen-0.01" slotted 2"
PVC, Riser Pipe-2" I.D. P
Stick up: 2.0'
Bore hole diameter: 7.5"

Auger and spoon refusal at 95.5'

DW-1

NOTE: See reverse side for key and explanation to log

RUN NO		RECOVERY (Percent)	RQD

Surface Elevation 608.39
Date Started 3-31-83
Date Completed 4-5-83
Number of Installations in Boring 1
Method of Installation Hollow Stem Auger

Project No GTA-83-18
Project Title Town of Tonawanda
Location Tonawanda, NY
Classified By JD Checked MR-1

HYDROGEOLOGIC LOG

THOMSEN ASSOCIATES

MONITOR NO. DW-1

Sheet 2 of 2

DEPTH	ELEVATION	SAMPLES	SAMPLE NO	CHEM SMPL	RECOVERY (inches)	N	SOIL or ROCK CLASSIFICATION	UNIFIED SOIL CLASSIF.	DENSITY (PCF)	WATER CONTENT (Percent)	PERMEABILITY (cm/sec)	MONITOR/PIEZOMETER CONSTRUCTION DETAILS	WATER PROBE READINGS Temp (°C)	Cond. (µmho/cm)	Eh (mV)	pH	NOTES
			1		24	18	Brown SILT, Some Sand and Roots (TOPSOIL) (Dry-Stiff)					DW-2 *W.L.					
			2		24	36	Red-Brown SILT & CLAY, little-Some Sand, trace fine gravel (Dry-Hard)										
5			3		24	44											
			4		24	91											
			5		24	34											
10			6		24	34											
			7		24	62											
15			8		24	18											Moist
			9		24	22											
			10		24	11											
20			11		24	8	grades to little sand										
			12		24	14											
			13		24			CL									
25			14		24	7											
			15		24	6											
30			16		24	9											*Water level measured on 7-15-83
			17		24	15											
35			18		24	18											
			19		24	17											
			20		24	8											
40			21		24	15											
45			22		24	86	Gray SILT, Some Sand and Gravel (Wet-Hard)										

DW-2

NOTE
See reverse side for key and explanation to log

RUN NO	RECOVERY (Percent)	RQD

Surface Elevation 606.03
Date Started 3-28-83
Date Completed 3-30-83
Number of Installations in Boring 1
Method of Installation Hollow Stem Auger

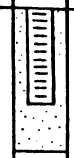
Project No. CTA-83-18
Project Title Town of Tonawanda
Location Tonawanda, NY
Classified By JD Checked MR-L

HYDROGEOLOGIC LOG

THOMSEN ASSOCIATES

MONITOR NO. DW-2
Sheet 1 of 2

DEPTH	ELEVATION	SAMPLES	SAMPLE NO	CHEM SMPL	RECOVERY (Inches)	N	SOIL or ROCK CLASSIFICATION	UNIFIED SOIL CLASSIF	DENSITY (PCF)	WATER CONTENT (Percent)	PERMEABILITY (cm/sec)	MONITOR/PIEZOMETER CONSTRUCTION DETAILS DW-2	WATER PROBE READINGS Temp (°C)	Cond (µmho/cm)	Eh (mV)	pH	NOTES
			23		24	24	Gray SAND & GRAVEL, [illegible] Silt, trace clay (Wet-Firm										
55			24		18	113	Gray [redacted] weathered with [redacted]										
							Boring Terminated @ [redacted].5'										
60																	



Well Materials:
Screen-0.01" slotted 2"I.
PVC, Riser Pipe-2" I.D. PV
Stick up: 2.0'
Bore hole diameter: 10"

DW-2

NOTE: See reverse side for key and explanation to log

RUN NO	RECOVERY (Percent)	RQD

Surface Elevation 606.03
Date Started 3-28-83
Date Completed 3-30-83
Number of Installations in Boring 1
Method of Installation Hollow Stem Auger

Project No GTA-83-18
Project Title Town of Tonawanda
Location Tonawanda, NY
Classified By JD Checked MR-L

HYDROGEOLOGIC LOG

THOMSEN ASSOCIATES

MONITOR NO DW-2

Sheet 2 of 2

PIRNIE MONITORING WELL SHEET

WELL NO. DW-4R

PROJECT Supplemental Closure Inv. START DATE 12/9/94 END DATE 12/13/94

PROJECT NO. 1039-09-1 FIELD GEOLOGIST J.D. Hilton

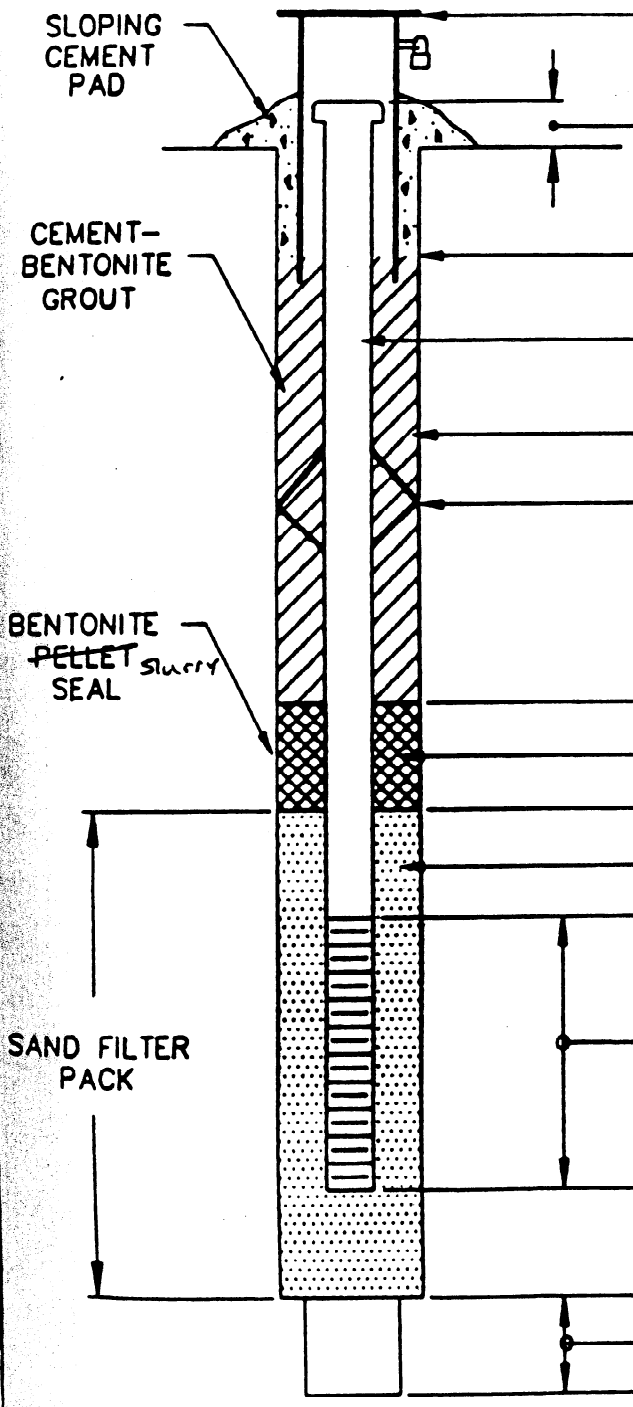
LOCATION Tonawanda LF

DRILLING CO. Buffalo Drlg

DRILLER(S) L. Schroeder

DRILLING METHOD(S) 6¼" HSA

DEVELOPMENT METHOD(S)



SIZE AND LENGTH OF LOCKABLE PROTECTIVE, STEEL CASING 6" x 5'

LOCKED? X YES ___ NO

STICK-UP 1.8

DEPTH TO TOP OF GROUT/ BOTTOM OF CEMENT 3.0'

RISER DIAMETER 2" AND MATERIAL Stainless Steel

BOREHOLE DIAMETER 10.5"

DEPTH TO CENTRALIZERS NA

DEPTH ≈ 30'

PELLET SIZE Bentonite Slurry

DEPTH 61.2

SAND SIZE #2 Equivalent

DEPTH 62.8

SCREEN DIAMETER, 2"
SLOT SIZE, .010
AND MATERIAL Stainless Steel

DEPTH 72.8

DEPTH 73.0

BACKFILL MATERIAL bentonite & cuttings

BOTTOM OF BOREHOLE 75.5

NOTE: DEPTHS ARE FEET BELOW GRADE

MALCOLM PIRNIE

WELL NO. L-1

OVERBURDEN MONITORING WELL SHEET

PROJECT Supplemental Closure Investigation

START DATE 5/11/99 END DATE 5/11/99

PROJECT NO. 1039-097

FIELD GEOLOGIST J.P. Hilton

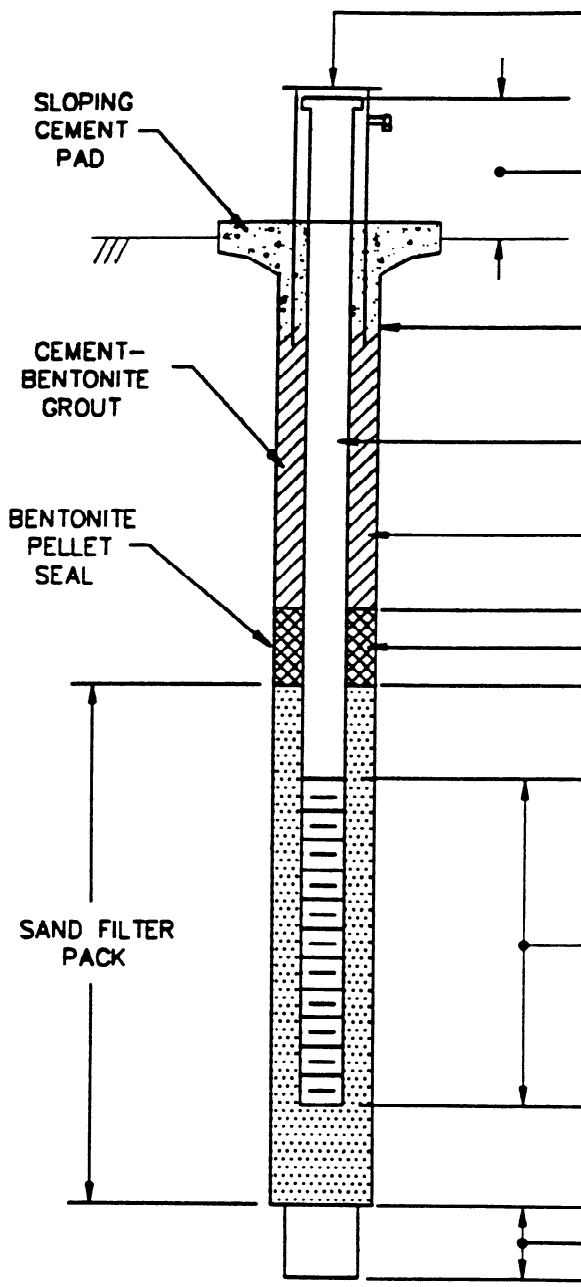
LOCATION Tonawanda Landfill

DRILLING CO. Maxim Tech

DRILLER (S) R. Brown

DRILLING METHOD (S) 4¼" HSA

DEVELOPMENT METHOD (S)



SIZE AND LENGTH OF LOCKABLE PROTECTIVE STEEL CASING 4" x 5'

LOCKED? X YES ___ NO

STICK-UP 2.0'

DEPTH TO TOP OF GROUT/ BOTTOM OF CEMENT ___

RISER DIAMETER AND MATERIAL 2" Sch 40 PVC

BOREHOLE DIAMETER 8½"

DEPTH 2.5

PELLET SIZE Med Chips

DEPTH 3.5

DEPTH 4.0

SCREEN DIAMETER, SLOT SIZE, AND MATERIAL 2" .010 Sch 40 PVC

DEPTH 14.0'

DEPTH 14.0'

BACKFILL MATERIAL NA

BOTTOM OF BOREHOLE 14.0'

NOTE: DEPTHS ARE FEET BELOW GRADE

MALCOLM PIRNIE

WELL NO. L-2

OVERBURDEN MONITORING WELL SHEET

PROJECT Supplemental Closure Investigation START DATE 5/11/99 END DATE 5/11/99

PROJECT NO. 1039-097 FIELD GEOLOGIST J.P. Hatch

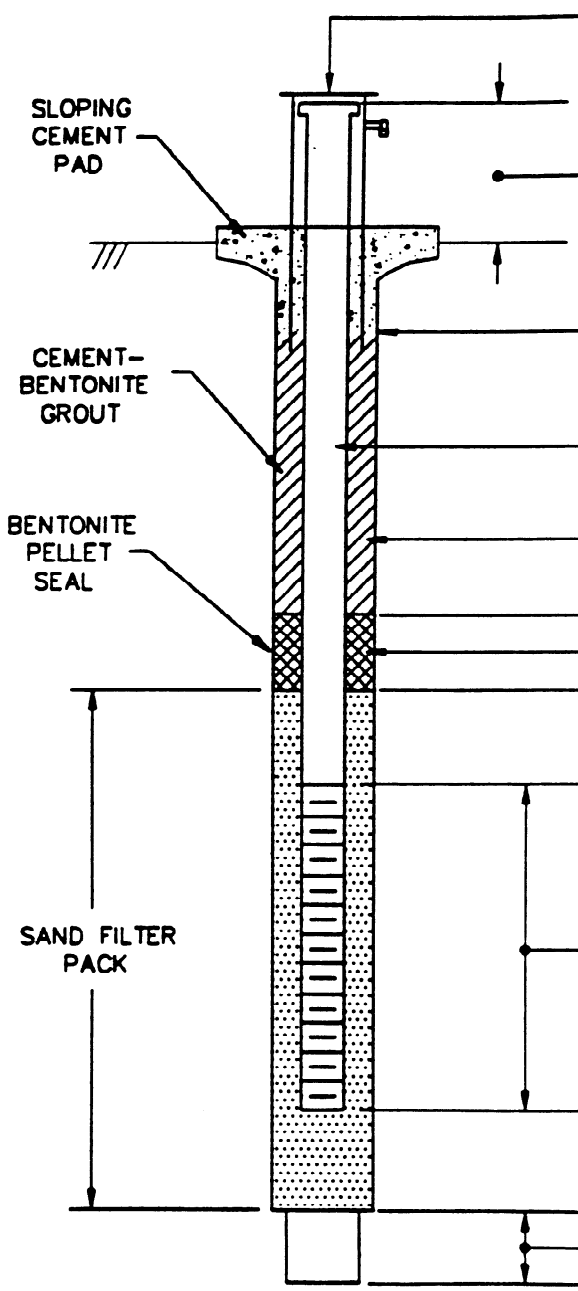
LOCATION Tonawanda Landfill

DRILLING CO. Maxim Tech

DRILLER (S) R. Brown

DRILLING METHOD (S) 4¼" HSA

DEVELOPMENT METHOD (S)



SIZE AND LENGTH OF LOCKABLE PROTECTIVE STEEL CASING 4" x 5'

LOCKED? X YES ___ NO

STICK-UP 2.0'

DEPTH TO TOP OF GROUT/ BOTTOM OF CEMENT @ GRADE

RISER DIAMETER AND MATERIAL 2" Sch 40 PVC

BOREHOLE DIAMETER 8½"

DEPTH 5.0

PELLET SIZE Med Chips

DEPTH 7.0

DEPTH 9.0'

SCREEN DIAMETER, SLOT SIZE, AND MATERIAL 2" .010 Sch 40 PVC

DEPTH 19.0'

DEPTH 20.0'

BACKFILL MATERIAL #0 SAND

BOTTOM OF BOREHOLE 22.0

NOTE: DEPTHS ARE FEET BELOW GRADE

MALCOLM PIRNIE

WELL NO. L-3

OVERBURDEN MONITORING WELL SHEET

PROJECT Supplemental Closure Investigation START DATE 5/12/99 END DATE 5/12/99

PROJECT NO. 1039-097 FIELD GEOLOGIST J.P. H. How

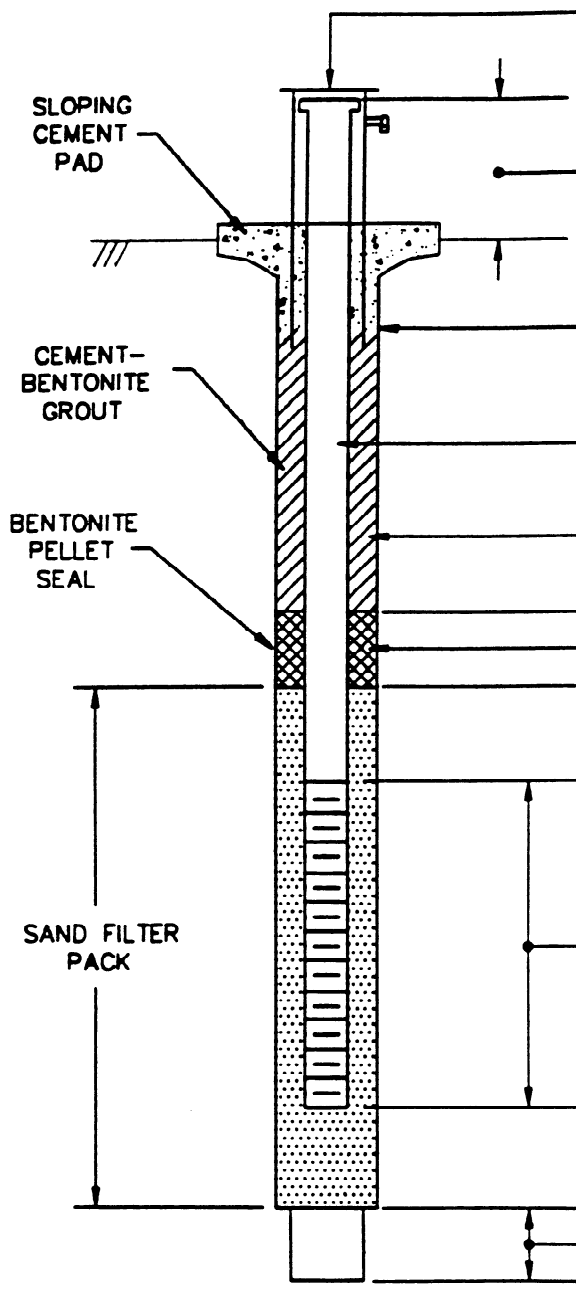
LOCATION Tonawanda Landfill

DRILLING CO. Maxim Tech

DRILLER (S) R. Brown

DRILLING METHOD (S) 4¼" HSA

DEVELOPMENT METHOD (S)



SIZE AND LENGTH OF LOCKABLE PROTECTIVE STEEL CASING 4" XS-1

LOCKED? X YES ___ NO

STICK-UP 2.0'

DEPTH TO TOP OF GROUT/ BOTTOM OF CEMENT @ GRADE

RISER DIAMETER AND MATERIAL 2" Sch 40 PVC

BOREHOLE DIAMETER 8½"

DEPTH 5.0'

PELLET SIZE MED Chips

DEPTH 7.0'

DEPTH 9.0'

SCREEN DIAMETER, SLOT SIZE, AND MATERIAL 2" .010 Sch 40 PVC

DEPTH 19.0'

DEPTH 20.0'

BACKFILL MATERIAL #1 SAND

BOTTOM OF BOREHOLE 22.0

NOTE: DEPTHS ARE FEET BELOW GRADE

ATTACHMENT H

Survey Data

TONAWANDA LANDFILL, LANDFILL AREA
GEOPROBE SAMPLE LOCATION TABLE

POINT NO.	NORTHING	EASTING	ELEVATION (ft MSL)	DESCRIPTION
1243	1092621.87	417360.13	624.67	TLF3-001
1239	1092551.03	417276.20	620.37	TLF3-003
1238	1092765.11	417163.51	628.23	TLF3-004
1247	1093045.19	417698.19	627.78	TLF3-005
1244	1092780.67	417367.14	626.16	TLF3-006
1250	1093293.80	417699.60	621.16	TLF3-007
1433	1092693.14	417549.08	626.95	TLF3-008
1249	1092947.49	417705.71	627.94	TLF3-009
1231	1092573.29	416193.68	610.14	TLF3-012
1233	1092648.13	416207.16	607.34	TLF3-013
1237	1092612.38	417159.35	620.39	TLF3-015
1291	1092595.97	416781.41	619.68	TLF3-016
1434	1092725.53	417747.46	630.72	TLF3-017
1246	1092862.88	417456.05	625.74	TLF3-019
1232	1092543.04	416090.60	608.13	TLF3-021
1235	1092531.52	416915.93	618.71	TLF3-022
1230	1092528.44	416245.10	612.60	TLF3-023
1234	1092518.41	416707.50	618.09	TLF3-024
1298	1092778.44	416456.68	609.92	TLF3-050
1296	1092685.70	416494.88	614.53	TLF3-051
1295	1092610.80	416530.35	622.12	TLF3-052
1290	1092631.70	416736.88	619.70	TLF3-053
1432	1092705.44	416906.50	620.89	TLF3-054
1314	1092788.01	417067.32	622.11	TLF3-055
1271	1092901.06	417141.74	622.78	TLF3-056
1272	1092977.50	417105.12	618.30	TLF3-057
1273	1093056.84	417065.74	615.77	TLF3-058
1274	1093083.50	417141.60	617.08	TLF3-059
1270	1092924.24	417223.29	622.67	TLF3-060
1431	1092953.50	417412.64	622.70	TLF3-061
1430	1093037.86	417580.83	625.74	TLF3-062
1253	1093132.93	417683.65	619.69	TLF3-063
1287	1093321.92	417681.47	620.83	TLF3-064
1420	1093114.13	417454.49	619.33	TLFA1-002
1421	1093111.23	417441.09	618.91	TLFA1-003
1426	1093146.55	417448.39	618.87	TLFA1-004
1418	1093123.90	417476.02	618.71	TLFA1-006
1429	1093151.41	417465.04	618.73	TLFA1-008
1422	1093094.49	417420.20	620.79	TLFA1-010
1423	1093089.30	417411.84	620.45	TLFA1-011
1424	1093126.33	417408.27	618.43	TLFA1-012
1259	1093094.85	417508.89	619.53	TLFA1-013
1258	1093086.09	417498.18	619.81	TLFA1-014
1260	1093091.73	417517.09	619.48	TLFA1-015
1261	1093107.83	417498.23	619.08	TLFA1-016
1263	1093071.10	417454.48	619.95	TLFA1-017
1262	1093063.35	417461.16	620.58	TLFA1-018
1264	1093075.27	417440.02	619.03	TLFA1-019
1265	1093081.48	417459.01	619.95	TLFA1-020
1284	1093160.43	417478.31	619.04	TLFA1-007

TONAWANDA LANDFILL, LANDFILL AREA
GEOPROBE SAMPLE LOCATION TABLE

POINT NO.	NORTHING	EASTING	ELEVATION (ft MSL)	DESCRIPTION
1428	1093140.36	417462.71	618.31	TLFA1-S1
1419	1093127.17	417469.39	618.25	TLFA1-S2
1425	1093119.24	417418.65	618.06	TLFA1-S3
N/A	1092720.26	416550.89	N/A	TLFA1-S4
1275	1093105.36	417163.75	617.12	TLFA2-001
1277	1093019.74	417208.06	619.65	TLFA2-002
1269	1092904.16	417262.25	623.15	TLFA2-003
1279	1093137.76	417238.02	617.88	TLFA2-004
1278	1093047.02	417273.37	619.31	TLFA2-005
1268	1092935.08	417332.67	622.50	TLFA2-006
1280	1093181.30	417327.02	619.01	TLFA2-007
1266	1093062.64	417354.32	618.35	TLFA2-008
1267	1092983.07	417420.54	622.09	TLFA2-009
1282	1093225.84	417433.51	619.38	TLFA2-010
1281	1093183.66	417456.45	619.35	TLFA2-011
1257	1093074.30	417508.95	620.33	TLFA2-012
1256	1093036.85	417530.60	622.22	TLFA2-013
1285	1093268.01	417505.73	619.12	TLFA2-014
1417	1093179.90	417554.50	618.62	TLFA2-015
1254	1093069.55	417600.62	621.29	TLFA2-016
1286	1093316.95	417605.76	620.17	TLFA2-017
1416	1093216.75	417653.00	619.59	TLFA2-018
1276	1093090.94	417218.99	618.01	TLFA2-020
1309	1092929.77	417001.58	618.01	TLFB1A-001
1310	1092903.01	416849.55	614.25	TLFB1A-005
1299	1092829.62	416589.41	611.49	TLFB1B-001
1302	1092870.28	416684.80	611.79	TLFB1B-005
1412	1092856.78	416719.95	612.74	TLFB1B-009
1300	1092830.32	416576.75	611.56	TLFB2-001
1293	1092701.41	416639.68	616.10	TLFB2-002
1294	1092652.98	416656.69	617.88	TLFB2-003
1301	1092877.14	416674.22	613.51	TLFB2-004
1413	1092739.17	416725.97	615.69	TLFB2-005
1292	1092695.70	416746.17	617.27	TLFB2-006
1303	1092910.97	416749.91	613.75	TLFB2-007
1311	1092824.75	416782.27	617.07	TLFB2-008
1411	1092728.44	416820.85	619.34	TLFB2-009
1304	1092944.92	416833.22	612.90	TLFB2-010
1312	1092823.89	416898.44	621.92	TLFB2-011
1317	1092774.91	416919.51	623.78	TLFB2-012
1305	1092984.30	416901.76	614.15	TLFB2-013
1313	1092846.17	416964.07	624.74	TLFB2-014
1316	1092810.60	416995.36	624.30	TLFB2-015
1306	1093033.07	417000.65	615.59	TLFB2-016
1308	1092953.47	417042.24	617.31	TLFB2-017
1315	1092846.96	417088.99	622.48	TLFB2-018
1183	1092563.65	417485.70	627.60	TLFR3-001
1182	1092599.29	417483.53	628.95	TLFR3-002
1180	1092666.72	417485.17	626.34	TLFR3-004
1176	1092564.99	417516.46	627.62	TLFR3-005

TONAWANDA LANDFILL, LANDFILL AREA
GEOPROBE SAMPLE LOCATION TABLE

POINT NO.	NORTHING	EASTING	ELEVATION (ft MSL)	DESCRIPTION
1177	1092596.31	417519.45	629.54	TLFR3-006
1178	1092632.19	417516.36	629.40	TLFR3-007
1179	1092663.77	417517.82	627.95	TLFR3-008
1241	1092598.03	417549.89	629.27	TLFR3-010
1240	1092630.54	417551.30	629.43	TLFR3-011
1172	1092662.58	417551.36	627.36	TLFR3-012
1168	1092562.35	417583.53	625.95	TLFR3-013
1169	1092595.88	417584.58	628.61	TLFR3-014
1170	1092630.70	417585.79	628.91	TLFR3-015
1171	1092664.09	417583.31	628.51	TLFR3-016
1167	1092564.52	417615.73	626.26	TLFR3-017
1166	1092600.86	417614.76	628.66	TLFR3-018
1165	1092629.45	417607.89	628.89	TLFR3-019
1164	1092663.48	417618.41	629.15	TLFR3-020

Notes:
ft MSL - Feet Above Mean Sea Level
Survey was conducted by TVGA Engineering, Surveying, P.C.
N/A - Sediment sampling location TLFA1-S4 was not surveyed.
However, the location was located by GPS and converted to northing and easting positions.

TONAWANDA LANDFILL, MUDFLATS AREA
GEOPROBE SAMPLE LOCATION TABLE

POINT NO.	NORTHING	EASTING	ELEVATION (ft MSL)	DESCRIPTION
1026	1091890.14	417329.54	599.97	TMF3A-001
1028	1091832.73	417707.61	599.72	TMF3A-002
1038	1091689.35	416226.59	597.60	TMF3A-003
1022	1091573.65	416907.10	598.40	TMF3A-004
1035	1091535.58	415817.81	598.09	TMF3A-006
1039	1091531.48	417487.50	599.96	TMF3A-007
1034	1091785.59	415803.12	601.93	TMF3A-008
1031	1091951.48	416555.88	615.10	TMF3A-009
1037	1091951.30	416028.86	614.66	TMF3A-010
1030	1092063.23	417304.50	613.61	TMF3A-011
1027	1091748.83	417484.63	598.95	TMF3A-012
1025	1091807.74	417104.81	598.70	TMF3A-014
1033	1091603.28	415969.15	598.62	TMF3A-017
1032	1091974.09	416350.95	619.52	TMF3A-020
1029	1092009.43	417592.02	602.20	TMF3A-021
1023	1091792.71	416640.92	614.15	TMF3A-022
1041	1091591.68	417689.56	600.56	TMF3A-023
1036	1091619.21	415726.19	596.84	TMF3A-024
1049	1091000.60	415715.15	603.18	TMF3B-001
1047	1091257.64	416275.42	610.09	TMF3B-003
1046	1091462.89	416654.02	599.87	TMF3B-004
1050	1090872.84	415789.02	603.03	TMF3B-006
1056	1091175.58	417378.77	612.37	TMF3B-008
1045	1091404.62	416502.06	601.28	TMF3B-009
1044	1091276.14	417108.02	611.13	TMF3B-011
1042	1091424.37	417712.00	602.85	TMF3B-012
1058	1091112.71	415635.20	600.27	TMF3B-013
1052	1091195.49	416793.44	610.32	TMF3B-015
1051	1091079.17	416401.04	608.07	TMF3B-016
1024	1091452.31	416971.33	600.95	TMF3B-017
1053	1091085.43	416798.97	610.57	TMF3B-018
1054	1090904.72	416061.26	604.68	TMF3B-019
1055	1091148.00	417150.92	610.36	TMF3B-020
1057	1091283.32	416637.33	609.12	TMF3B-022
1043	1091325.34	417190.39	610.83	TMF3B-023
1048	1091170.34	415933.48	604.02	TMF3B-024
1200	1091537.36	416055.89	599.98	TMF3B-050
1201	1091537.21	416009.40	600.21	TMF3B-051
1202	1091549.87	415954.01	599.50	TMF3B-052
1203	1091573.97	415890.76	598.87	TMF3B-053
1208	1091481.98	415731.17	596.78	TMF3B-054
1209	1091425.61	415712.70	596.38	TMF3B-055
1210	1091343.87	415694.92	597.88	TMF3B-056
1211	1091280.67	415725.86	600.22	TMF3B-057
1213	1091181.65	415845.10	604.95	TMF3B-058
1214	1091179.75	415987.53	605.71	TMF3B-060
1216	1091185.24	416045.54	606.17	TMF3B-061
1189	1091319.01	416076.92	609.25	TMF3B-062
1192	1091389.44	416079.20	610.75	TMF3B-063
1194	1091443.65	416080.99	607.88	TMF3B-064

TONAWANDA LANDFILL, MUDFLATS AREA
GEOPROBE SAMPLE LOCATION TABLE

POINT NO.	NORTHING	EASTING	ELEVATION (ft MSL)	DESCRIPTION
1196	1091496.41	416083.55	608.62	TMF3B-065
1187	1091384.03	415976.92	606.67	TMFC1-001
1226	1091399.99	415967.13	606.55	TMFC1-002
1227	1091411.98	415967.55	606.65	TMFC1-003
1228	1091423.07	415966.87	607.04	TMFC1-004
1186	1091389.56	415966.54	606.70	TMFC1-005
1185	1091378.83	415936.47	606.54	TMFC1-009
1184	1091340.59	415837.40	605.76	TMFC1-013
1212	1091251.88	415795.39	602.22	TMFC2-001
1218	1091281.20	415795.88	602.15	TMFC2-002
1219	1091333.22	415796.78	604.94	TMFC2-003
1220	1091422.66	415845.24	600.60	TMFC2-004
1206	1091481.19	415795.80	598.80	TMFC2-005
1207	1091512.82	415794.66	598.01	TMFC2-006
1217	1091287.55	415897.63	604.95	TMFC2-008
1205	1091480.04	415894.28	606.36	TMFC2-009
1204	1091516.41	415892.92	605.61	TMFC2-010
1188	1091260.78	415999.65	607.54	TMFC2-011
1221	1091284.72	415996.92	607.80	TMFC2-012
1197	1091482.95	415991.71	607.55	TMFC2-013
1198	1091515.02	415991.48	606.39	TMFC2-014
1190	1091347.84	416055.62	608.09	TMFC2-015
1191	1091382.07	416059.12	608.85	TMFC2-016
1193	1091428.53	416054.19	607.65	TMFC2-017
1195	1091481.35	416056.84	608.26	TMFC2-018
1199	1091521.22	416055.86	600.40	TMFC2-019
1002	1091497.52	417031.43	599.14	TMFR1-001
1003	1091552.12	417033.00	599.29	TMFR1-002
1004	1091597.88	417032.18	598.18	TMFR1-003
1005	1091655.65	417030.50	598.18	TMFR1-004
1009	1091504.27	417059.26	599.41	TMFR1-005
1008	1091556.02	417089.33	598.78	TMFR1-006
1007	1091600.54	417086.21	598.60	TMFR1-007
1006	1091652.08	417083.75	598.38	TMFR1-008
1010	1091496.39	417141.18	600.01	TMFR1-009
1011	1091560.07	417143.59	599.21	TMFR1-010
1012	1091602.72	417141.31	600.34	TMFR1-011
1013	1091655.20	417137.51	598.43	TMFR1-012
1017	1091497.64	417196.07	600.09	TMFR1-013
1016	1091561.61	417191.86	599.67	TMFR1-014
1015	1091604.73	417192.28	598.56	TMFR1-015
1014	1091656.73	417195.21	598.37	TMFR1-016
1018	1091500.89	417248.91	599.88	TMFR1-017
1019	1091562.85	417243.82	599.86	TMFR1-018
1020	1091605.29	417248.02	599.05	TMFR1-019
1021	1091650.20	417251.67	598.61	TMFR1-020

Notes:
ft MSL - Feet Above Mean Sea Level
Survey was conducted by TVGA Engineering, Surveying, P.C.