Revitalizing Auto Communities
Environmental Response Trust

December 17, 2015

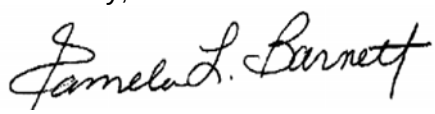
Ohio Environmental Protection Agency
P.O. Box 1049
Columbus, Ohio 43216-1049
Director of Ohio EPA
Attention Erik Hagen, DERR

Dear Mr. Hagen

As required under Ohio Administrative Code 3745-55-18(D), the attached Amendment to Post Closure Care Plan for the closed landfill in Elyria, Ohio is being submitted for Ohio EPA review and approval. This plan has been updated based on discussions with Ohio EPA staff in the Northeast district office. The plan consolidates the maintenance requirements of the approved Amended Post Closure Plan (October 2008) and approved Revised Post Closure Groundwater Monitoring Plan (April 2007) into a single document. In addition, as described in the plan, the plan proposes adjustments to the frequency of sampling and inspections.

If you have any questions, please contact Pam Barnett on (937) 751-8635.

Sincerely,



Pamela L. Barnett, PG
Assembly Region Cleanup Manager (DE, LA, MA, OH, PA, VA)
RACER Trust

ec: Bill Lutz, Northeast District, Ohio EPA
Lloyd S. Ross, Haley & Aldrich, Inc.

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AMENDMENT TO

POST-CLOSURE PLAN FOR RACER ELYRIA

by
Haley & Aldrich, Inc.
Cleveland, Ohio

for
RACER Trust
Detroit, Michigan

File No. 41753-001
December 2015

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1. Introduction

The Approved Amended Post Closure Plan (last amended in October 2008) and associated Revised Post Closure Groundwater Monitoring Plan (April 2007) for the hazardous waste management unit at the Revitalizing Automotive Communities Environmental Response (RACER) Trust facility in Elyria, Ohio (Site) are compiled and amended by this document. This Amendment to the Approved Amended Post Closure Plan (October 2008) and associated Revised Post Closure Groundwater Monitoring Plan (April 2007) is proposed in accordance with OAC Rules 3745-55-12, 3745-55-13, 3745-55-18, and 3745-50-51.

This amendment consolidates the original Post Closure Care Plan included in Section F2 of the Closure Plan (May 2014) and the Revised Post Closure Groundwater Monitoring Plan (April 2007) into a single document. The changes to the Post Closure Care Plan include:

- Reduction in frequency of groundwater monitoring from annual to biennial; and
- Changes to the inspection and security frequency.

The following is a summary of the landfill operation and maintenance and groundwater monitoring program described herein:

ELYRIA POST CLOSURE PROGRAM FOR CLOSED HAZARDOUS WASTE LANDFILL

O&M and Groundwater Monitoring Activities

Landfill Cover Inspections	Twice a month or within 5-days of 2.2 inch 24-hour storm event or snow pack of 10-inch melt within 24-hours
Security	Twice a Month Fence Inspection
Grass Mowing	Four events (April-October)
Cover Maintenance	As needed
Leachate Removal	Sump Levels Monitored Twice a Month Extraction monthly or as needed*
Groundwater Monitoring	Biennial (Every other year with first event 2016)
Reporting	Biennial (by March 1 the year following groundwater monitoring sampling)

*Action level for more frequent removal defined in Section 4.5 and on the inspection form (Appendix B).

The post-closure period for the facility was extended to 2038 as requested in the letter *Petition for Post Closure Plan Amendment* dated August 28, 2014.

1.1 GENERAL SITE DESCRIPTION

The RACER Trust facility is located in Lorain County, Ohio, at 1400 Lowell Street, in the City of Elyria. The plant operated during the time period of 1952 to 1988. Operations at the Site ceased in July 1988. The Location of the facility is presented in Figure 1.

During the course of conducting Site closure activities, the Site's RCRA treatment, storage, and disposal units were closed in accordance with Ohio Environmental Protection Agency (EPA) and or U.S. EPA approved plans and specifications. These closed units included three sludge dewatering surface impoundment units. In 1988, closure of the surface impoundment units was accomplished by removing all hazardous wastes and contaminated soil in accordance with the approved closure plan and disposing of those materials in an onsite landfill disposal unit. This landfill disposal unit was designed and constructed in accordance with RCRA standards and in accordance with Ohio EPA and U.S. EPA-approved closure plans. Following receipt of all surface impoundment closure wastes, the landfill was capped and closed. The landfill disposal unit is located on an approximate 95-acre parcel of land that is owned by the RACER Trust. Figure 2 depicts the location of the landfill unit with respect to the 95-acre land parcel.

1.2 LOCATION INFORMATION

The Site is located in an industrial, commercial, and agricultural area approximately 25 miles southwest of Cleveland, Ohio. The landfill is bounded to the west by the former General Motors Inland Fisher Guide Division Plant, which is currently used for commercial/industrial purposes. Vacant industrial and agricultural properties bound the landfill to the southwest, south, and east. A railway right-of-way separates the Site from additional commercial and industrial properties farther to the north.

1.3 GROUNDWATER MONITORING PLANS

Groundwater detection monitoring was performed at the Site under an approved Groundwater Monitoring Plan (September 1993) consistent with 40 CFR 270.14(c), 40 CFR 265 Subpart F, and OAC Chapter 3745-65 for an Interim Status facility. The Groundwater Monitoring Plan (September 1993) was approved by the Ohio EPA on January 6, 1994. A modified post-closure plan was requested by the Director of the Ohio EPA in 2001, which would conform to the post-closure requirement for groundwater monitoring and cap maintenance under OAC Chapters 3745-54 and 3745-55. The goal of the request was to meet Government Performance and Results Act (GPRA) Post closure requirements for the Site by having "an approved control in place." The Revised Post Closure Groundwater Monitoring Plan (2001) was revised to include:

- Installation of new background monitoring wells;
- A revised list of Site-specific monitoring parameters;
- Statistical analysis consistent with OAC 3745-54-98 (Detection Monitoring Program); and
- OAC 3745-54-97 (General Ground Water Monitoring Requirements), which consisted of inter-well comparisons of down-gradient to up-gradient wells.

After mapping groundwater elevations from June 2002 until February 2004, it was determined that groundwater flow directions from these elevations were inconsistent. Therefore, the 2001 statistical evaluation was inappropriate due to the difficulty in determining up-gradient conditions at the Site. A proposed Revised Post Closure Groundwater Monitoring Plan (March 2004) introduced several changes based on a review of Site data. The Ohio EPA requested that the proposed Post Closure Groundwater Monitoring Plan (March 2004) be revised to include a reduction in monitoring frequency to once per

year; evaluation of the Site-specific monitoring parameters that currently have Maximum Contaminant Levels (MCLs); and no other evaluation of any analytical data including statistical comparison and comparison to Alternate Concentration Limits (ACLs).

The Revised Post Closure Groundwater Monitoring Plan (April 2007) was approved by Ohio EPA on 10 October 2008 and Ohio EPA's clarified approval was provided on 3 December 2008.

2. Landfill Background

The following information is based on details from the approved Closure Plan.

2.1 GENERAL

The Site landfill was constructed in 1988 as part of the closure of three surface impoundments previously used for the handling of sludge from the former General Motors Inland Fisher Guide Division Plant wastewater treatment system, which operated in the western area of the Site. The sludge was originally generated from copper, nickel, and chrome electroplating operations.

The landfill disposal unit was designed and constructed for the sole purpose of achieving effective closure of the surface impoundment units at the facility. The only hazardous waste placed in any of the surface impoundments was the F006 electroplating sludge as described above. Therefore, the wastes placed in the landfill unit consists of CKD-stabilized sludge and contaminated impoundment-bottom soils containing waste constituents of the sludge, and the impoundment dewatering system components.

Based on analytical sample results of the un-stabilized sludge, the sludge was classified as an F006 hazardous waste, but was not characteristically hazardous with regard to pH, flashpoint, corrosivity, or reactivity. Analytical results for the sludge are presented in the Post-Closure Groundwater Monitoring Plan (September 1993). The analytical results documented detectable concentrations of chromium, copper, nickel, and zinc in the in the un-stabilized sludge. Leachable concentrations of chromium, nickel, and silver were also reported. In addition, detectable concentrations of carbon disulfide, methylene chloride, and trichloroethene were also detected in the sludge.

Each of three surface impoundments contained approximately 13,000 cubic yards of sludge, for a total sludge volume of approximately 40,000 cubic yards. To stabilize and solidify the sludge, approximately 8,800 tons of cement kiln dust (CKD) was added. The landfill was also utilized for the disposal of approximately 1,200 cubic yards of underlying contaminated soils. Thus, the total estimated volume of materials placed in the landfill unit is approximately 50,000 cubic yards. The landfill unit is closed and will not receive any additional wastes.

2.2 LINER SYSTEM DESCRIPTION

The landfill disposal unit was constructed within the limits of sludge impoundment Nos. 1 and 2. The landfill disposal cell was designed with an integrated primary and secondary liner system. Construction of the landfill components was performed under a rigorous construction quality assurance (CQA) program that verified compliance with design performance and material specifications. Specifically, the primary and secondary liner system consists of the following components listed in ascending order from the cell foundation:

2.2.1 Secondary Liner

- A 36-inch thick, low permeability($1x10^{-7}$ cm/sec) recompacted clay layer;
- A 40-mil HDPE membrane liner; and
- An HDPE "geonet" synthetic drainage layer.

2.2.2 Primary Liner

- A 40-mil HDPE membrane liner;

- An HDPE "geonet" synthetic drainage layer; and
- A geotextile filter fabric layer.

This liner system extends throughout the entire bottom and sidewalls of the cell and is keyed into the multi-layered top cover system to eliminate any infiltration of precipitation or runoff. A cross section of the bottom liner system is presented on Sheet 4 of the 1988 as-built construction drawings.

2.2.3 Liner Systems Foundation Description

Prior to installation of the re-compacted soil and synthetic liner components, the cell foundation was constructed. The existing natural soils beneath the excavated impoundments were graded and roller-compacted to form an even working surface as well as to provide the design specified bottom slopes for the cell.

A sub-base layer was installed following initial grading and compaction of the foundation. This sub-base was constructed by compacting sandy clay obtained from the offsite borrow area. It was proof-rolled with a drum roller to detect any soft or undesirable areas before placement of the first clay liner lift. The 8-inch sub-base was constructed to provide a stable and uniform surface beneath the 36-inch compacted clay component of the secondary liner system.

2.2.4 Leachate Collection/Detection System Operation and Design

Primary and secondary leachate detection/collection systems were installed in the sludge disposal cell. The primary system collects leachate present above the primary HDPE liner, and the secondary system will detect and collect leachate present above the secondary HDPE liner, in the event that there is leakage or failure of the primary liner system.

Both systems utilize four collection sumps located at the perimeter base of the cell. Conveyance of leachate to the sumps is accomplished by the slope of the bottom of the cell towards each sump and by the high transmissivity of the synthetic geonet layer.

The four primary collection sumps are 42-inch diameter, precast concrete, vertical risers that extend from the cell floor above the primary liner, through the stabilized waste and cover system, to the surface of the landfill. From the surface, leachate conveyance pipes connect the risers to the temporary storage tanks located at grade, adjacent to the disposal cell. The four secondary leachate collection sumps are located beneath the primary sumps. Transfer of leachate from these sumps, if detected, will occur through risers installed along the clay sidewall liner.

Automatic, level-actuated, submersible sump pumps were installed in the four primary sumps to detect leachate and then to remove it should the sump liquid levels exceed a predetermined set point of 12 inches. Electrical schematics for this system are presented on Sheet 6 of the 1988 as-built drawings. A portable, manually-operated peristaltic-type lift pump will be utilized in the event that leachate removal from the secondary sump system is necessary.

Two, 1,000-gallon tanks located at grade adjacent to the north and south sides of the cell were installed to serve as short-term storage units (less than 90 days) for collected leachates. Each tank is constructed of double-walled fiberglass reinforced plastic (FRP) that is designed for the storage of liquid containing heavy metals contamination. These above-ground tanks are provided with a secondary containment system that includes a continuously bermed 12 inch, reinforced concrete pad underlain by a 6 mil polyethylene liner.

At present, these tanks are not in use for the collection or storage of leachate. Leachate removal takes place via a direct transfer of the leachate from each primary collection sump to a tank truck that travels on an access road constructed for this purpose. Leachate will be pumped from each primary collection sump to the tank truck and then taken to an acceptable offsite treatment or disposal facility. In addition, if leachate is accumulating in the secondary, leachate will be pumped and to the tank truck and then taken to an acceptable offsite treatment or disposal facility. As such, no on-site storage or management of the leachate is required.

2.2.5 Run-on Control System

Primary run-on control for the landfill area is currently provided by the above-grade construction of the landfill unit. The landfill grades are approximately 12 to 15 feet above surrounding grades. Surrounding areas are adequately drained by existing drainage patterns.

During the active period of the landfill, the cell was surrounded by berms in order to prevent run-on. Rainwater that fell directly on the decontaminated excavation prior to waste placement was, managed as stormwater. Rainwater that accumulated in the containment cell after waste placement was collected and managed as a hazardous waste by pumping from the leachate collection system directly to the plant wastewater treatment facility for treatment.

2.2.6 Runoff Control System

Runoff from the landfill during active operations was collected within the cell and managed as leachate. Following closure of the landfill cell, runoff is managed by uniform sheet flow across the vegetated cover system and conveyed to perimeter drainage swales. Perimeter drainage swales direct runoff to existing onsite drainage swales.

Due to a higher than expected volume of leachate generation, post-closure maintenance was performed on the perimeter drainage swales and letdowns in 2008-2009 to reduce stormwater infiltration into the landfill. The leachate generation of the landfill decreased by over 90% after completion of the maintenance on the stormwater system.

2.2.7 Control of Wind Dispersal

The moisture content of sludges was utilized as a primary means to control wind dispersal during active landfill operations. During the post closure period wind dispersal will not occur since no waste will be exposed by maintaining the existing cover.

3. Geologic and Hydrogeologic Conditions Summary

This section describes the Geology and Hydrogeology as summarized in the Approved Closure Plan.

3.1 REGIONAL STRATIGRAPHY

Lorain County is located on the eastern fringe of the till plain of the Great Central Lowlands. The topography within the vicinity is relatively flat to gently rolling. The landfill has an approximate elevation of 750 feet above mean sea level. The general area was subject to Wisconsinan glaciation, leaving a thin layer of drift material known as the Hiram Till over the southern two-thirds of Lorain County and lacustrine silty clay across the northern one-third of the county. The drift material consists of clay-rich soil up to 25 feet in thickness. Elyria lies on glaciated, lake plain deposits and beach ridges of Old Lake Whittlesey, Lake Maumee, and Lake Warren (Stout et al., 1943). The area is located near the eastern boundary of the till plain area of the Central Lowland physiographic province.

The bedrock underlying Lorain County consists of relatively flat-lying sedimentary strata and includes the upper Devonian and lower Mississippian Cleveland Shale, Bedford Shale, Berea Sandstone, and Cuyahoga Shale. Bedrock dips slightly to the south or southeast. The most important bedrock aquifer in Lorain County is the Berea Sandstone, which typically yields 3 to 10 gallons per minute under long term withdrawal (Barber, 1988).

3.2 SITE STRATIGRAPHY

There are three main stratigraphic units at the Site: proceeding from the surface downwards are drift deposits (clay till), Berea Sandstone, and Bedford Shale. All three stratigraphic units are laterally continuous beneath the landfill. The till unit is comprised of soft, silty clay till that varies from light brown to greenish gray and ranges in thickness from 8 to 15 feet. The Berea Sandstone, referred to as the bedrock unit, is comprised of a hard, fine-grained sandstone with occasional thin interbedded shale units. The top of the Berea Sandstone is encountered at an approximate depth of 8 to 15 feet below ground surface (bgs). The Berea Sandstone is thickest (23 feet thick) in the northwestern portion of the Site. The Bedford Shale is comprised of a silty shale with some thin sand horizons and varies in color from gray to reddish gray. No borings penetrated the full thickness of the Bedford Shale beneath the Site, but the Bedford Shale is estimated to be 50 to 90 feet thick in the vicinity of the Site based on background literature. The Bedford Shale has a lower permeability overall than the Berea Sandstone aquifer and is considered a confining unit for the Berea Sandstone aquifer. Onsite borings that partially penetrate the Bedford Shale indicate that no map-able sandy horizons exist within the shale for at least 10 feet below the Berea Sandstone (Simon Hydro-Search, 1992). Boring logs are presented in Appendix A.

3.3 GROUNDWATER FLOW DIRECTION

Based upon the groundwater elevation data provided in a hydrogeologic investigation conducted by CRA in 2001, it is likely that a hydraulic connection exists between the till unit and the underlying bedrock aquifer unit. The two monitoring units for the landfill are the 1) Till Unit and the 2) Bedrock Unit. For the purposes of monitoring, the Till Unit and the Bedrock Unit are considered two distinct units in this and the previously approved plan.

Representative groundwater elevations from April 2015 and contours for the Till Unit and Bedrock Unit are presented on Figure 3 and Figure 4, respectively. Based on groundwater measurements made during monitoring of the landfill and the remedial investigation, groundwater flow beneath the landfill within the till and bedrock units are predominantly to the northeast.

The hydraulic conductivity of the Bedrock Unit is estimated to be 0.2 feet/day (Weston, 1993). Based on the estimates of hydraulic conductivity for the Bedrock Unit, the flow velocity is estimated to be 12 feet/year.

3.4 GROUNDWATER USE WITHIN THE VICINTY OF THE SITE

Ten offsite wells have been identified within one-mile of the Site based on a search of Ohio Department of Natural Resources (ODNR) well logs. The closest well is approximately 0.6-mile to the northwest of the Site.

Areas within the City of Elyria have access to the public water supply including the area within the vicinity of the Site. The City of Elyria obtains its water from Lake Erie. Installation of private potable water supply wells is discouraged by the permitting and approvals process, and associated costs of installing, operating, and maintaining a private water supply well. Some locations within Lorain County may also experience issues regarding taste and odor, which also discourages private water well installation.

3.5 PRECIPITATION

The Site is approximately 25 miles southwest of Cleveland, Ohio. Elyria experiences a continental climate with strong modifying influences due to the presence of Lake Erie. Summers are moderately warm and humid. Winters are cold and cloudy with the average temperatures in December, January, and February below freezing. Consistent with a continental climate, precipitation can vary widely, however it is normally abundant and well distributed over the year.

3.6 SURFACE WATER

There is no known groundwater discharge to surface water in the immediate vicinity of the Site. However, groundwater flow north of the landfill may be influenced by storm sewers. Intermittent flow has been observed in the Site drainage ditches after precipitation events. The flow is insufficient for any surface water usage by humans.

The nearest surface water body is the Black River located less than one mile to the east of the Site.

4. Post-Closure Plan

4.1 POST-CLOSURE CONTACT

The contact for questions regarding the facility during the post-closure period is:

Ms. Pamela L. Barnett
RACER Trust
500 Woodward Ave.
Suite 1510
Detroit, Michigan 48226
Phone: 1-855-RACER-411
Cell: 937-751-8635

4.2 POST-CLOSURE SECURITY

Post-Closure security and Site access control will be provided by a seven-foot industrial mesh fence surrounding the property area. Access to the property area is provided by authorized entry through a locked personnel and equipment access gate. Railcar access through the Site is obtained via two railroad gates. In the event that access to the Site is required by authorized personnel, the post-closure contact should be notified and appropriate access arrangements will be made by RACER Trust.

In addition, inspections of the Site and fence will be conducted at least twice a month to identify any trespassing or damage to the fence as described in Section 4.4.

This post-closure security system is anticipated to provide adequate access control. Further, since all wastes are encapsulated by the multi-layered landfill liner and cover systems, unknowing access to the area or trespassing is not believed to pose a hazard to human health.

4.3 SYSTEM DESIGN DESCRIPTION

4.3.1 Leachate Collection/Detection System

This subsection presents an overview of the system design components to assist the reviewer in understanding the inspection and maintenance requirements associated with the system.

The leachate collection/detection system is comprised of eight in-cell sumps; appurtenant sump pumps, risers, and leachate transfer piping, and two, 1,000-gallon, above-ground storage tanks. The four primary and four secondary sumps are located in pairs along the bottom perimeter of the sloped containment cell. The primary sumps collect leachate present above the first synthetic bottom liner, and the secondary sumps collect leachate present above the second synthetic liner. The primary sumps are equipped with level-actuated submersible pumps that can automatically remove accumulated leachate to one of the 1,000-gallon short-term (<90 day) storage tanks. However, at this time, the submersible pumps and storage tanks are not being used and are in permanent standby mode. See Section 2.3.4 for a more detailed description of leachate removal activities.

The secondary sumps can remove leachate, if any is present, by utilizing a portable submersible pump inserted into the bottom of the sump sideslope riser

4.3.2 Gas Venting System

The design and installation of the landfill disposal unit does not have a gas venting system. The primary wastes placed within the cell are inorganic and therefore are not expected to produce decomposition gases that would necessitate a gas venting system.

4.4 INSPECTION PLAN

The following inspection program will be implemented by RACER Trust to ensure continued integrity and effective performance of the landfill disposal unit containment systems and appurtenances throughout the post-closure period. Detailed inspection sheets to be utilized in implementing this inspection plan are presented in Appendix B. In general and unless otherwise stated the following will be inspected twice a month:

- Security control devices;
- Erosion damage;
- Cover settlement, subsidence and displacement;
- Vegetative cover condition;
- Integrity of run-on and run-off control measures;
- Cover drainage system functioning;
- Leachate collection/detection and removal system;
- Well condition; and
- Benchmark integrity.

RACER Trust will contract with qualified personnel to conduct these inspections and transmit appropriate documentation and accurate assessments to the RACER Trust post-closure contact.

4.4.1 Landfill Cover System Inspection

The cover system for the closed landfill disposal unit will be inspected to detect signs of:

- Excessive or differential settlement and subsidence;
- Soil erosion;
- Inadequate, sparse, or stressed vegetative cover; and
- Impact to cover system integrity by burrowing animals or deep-rooted vegetation.

4.4.2 Stormwater Management System Inspection

The landfill disposal unit run-on and runoff control structures will be inspected to detect:

- Conditions which may cause erosion or piping of cover soils; and
- Blockage or excessive sedimentation of drainage structure which may induce backup or pending of stormwaters.

4.4.3 Groundwater Monitoring System Inspection

The groundwater monitoring well network at the facility will be inspected to detect for:

- Well protective casing lock function;
- Protective casing and well apron integrity; and

- Well conditions during post-closure sampling.

4.4.4 Leachate Detection/Collection System Inspection

The leachate detection/collection system will be inspected to:

- Detect changes in primary sump liquid levels;
- Detect any damage to or leakage around the risers piping, pipe support tanks, and valves currently in standby mode;
- Detect any damage or leakage associated with the tank secondary containment structures currently in standby mode; and
- Ensure that the submersible leachate pumps are available if needed.

4.4.5 Security System/Benchmarks

The security system at the Site will be inspected to determine:

- Perimeter fence condition; and
- Gate and lock condition.

In addition, surveyed benchmarks will be inspected to verify their integrity.

Copies of completed inspection sheets will be maintained in the office of the post-closure contact. These inspection log sheets will be maintained chronologically. All inspection records will be kept until the completion of the post-closure care period.

4.5 LEACHATE DETECTION/COLLECTION SYSTEM MONITORING AND LEACHATE REMOVAL

Monitoring leachate generation volumes collected by the primary sump system will be utilized as a means for detecting potential cover system failure. In this manner, any unusual changes in leachate volumes collected will be evaluated as an indicator of possible cover system failure.

The secondary leachate detection/collection system has been designed as a system to provide early warning of potential failure of the primary landfill liner system. Therefore, RACER Trust will provide routine monitoring of this secondary leachate detection system throughout the post-closure period.

The four secondary sumps are situated between the primary and secondary synthetic liners. Therefore, the sumps are designed to collect leachate that is intercepted by the secondary liner. A water level meter will be used to determine if liquid is present in the secondary sump. If liquid is detected in the secondary sump the liquid level will be recorded on the Inspection Log.

Each of the primary sumps in the leachate detection/collection system will be monitored for the presence of leachate at least twice a month during routine inspections. Leachate removal from the primary sumps will be conducted at a minimum of once a month. In addition, based on an evaluation of the construction drawings in the *Closure Certification Report* (Weston Services, Inc., September 1988), the position of the primary liner/drainage in each of the primary sumps was estimated. If water levels exceed this level during a bimonthly inspection then additional leachate removal will conducted within 48-hours. The actions levels are include on the inspection form and are:

Sump	Depth to Water (ft)	Approximate Water Thickness in Sump (ft)
Northwest	13.2	4.2
Northeast	13.4	5.0
Southwest	13.7	2.6
Southeast	12.4	4.0

4.6 MAINTENANCE PLAN

This subsection describes preventative and corrective maintenance procedures, anticipated equipment requirements and material needs during the post-closure period. RACER Trust anticipates that the inspection described in Section 4.4, can result in any determinations for a particular item:

1. Acceptable condition;
2. Unacceptable condition nonemergency (preventative) maintenance; and
3. Unacceptable condition emergency (corrective) maintenance.

The "acceptable condition" status requires no repair before the next inspection. "Unacceptable condition-nonemergency maintenance" indicates that repair is needed to avoid further damage and perhaps, to avoid the need for emergency repairs. In this case, maintenance will be performed as soon as possible. Any item that qualifies as· "unacceptable condition - emergency maintenance" will receive immediate attention. The inspector will notify the RACER Trust post closure contact or other designated person of any repair requirements; RACER Trust will then initiate the appropriate corrective maintenance or repair.

Specific approaches to maintenance of the landfill system components are outlined below.

4.6.1 Landfill Cover System Maintenance

Timely action will be taken by RACER Trust upon detection of any cover system maintenance needs. RACER Trust anticipates that maintenance activities may include, but not be limited to:

- Routine, periodic mowing of vegetative cover;
- Placement of additional cover soils to correct areas of erosion or settlement; and
- Re-vegetation and mulching to re-establish adequate vegetative growth.

The vegetative cover will be mowed up to four times annually during the growing season (April - October) to prevent the growth of woody or deep-rooted vegetation. The final cover of the landfill unit will be maintained at the approximate slopes and grades specified in the closure plan.

4.6.2 Stormwater Management System Maintenance

The runoff control structures for the landfill disposal unit, including perimeter stormwater diversion channels and swales will be maintained to ensure intended performance. Maintenance activities that may be required for stormwater management structures include, but may not be limited to:

- Removal of excess sediments or other blockage of drainage channels;
- Replacement of channel linings as necessary; and
- Re-vegetation and mulching to re-establish vegetative growth within the drainage channels.

The vegetative growth within the drainage channels and swales, which are not lined with rip-rap, will be mowed at least annually to facilitate flow and reduce the occurrence of siltation, while maintaining resistance to erosion and excessive flow velocities.

4.6.3 Groundwater Monitoring System Maintenance

During each sampling event, monitoring wells will be inspected to ensure integrity of the monitoring system. Monitoring well inspection will include:

- Check for the presence and condition of the lock;
- Check the condition of the protective casing (heavily rusted, dented, etc.);
- Inspect the integrity of the concrete runoff diversion apron; and
- Sound the bottom of the well to determine the accumulated thickness of sediment within the well.

A monitoring well inspection log will be maintained documenting the condition of the wells. If it is determined that corrective measures are necessary, the following maintenance activities may be required

- Painting of protective casings to reduce rust damage;
- Replacement of locks, protective casing or runoff diversion aprons;
- Redevelopment of silty wells; and
- Replacement of damaged or nonfunctioning wells

Criteria for implementing the first two corrective measures will be primarily based on visual observations and good judgment. The decision to redevelop a monitoring well will be based on the quantity of sediment accumulation. A well will be redeveloped if the accumulated sediment thickness exceeds one-third of the length of the screen or is equal to and/or exceeds the height of the water column in the well. Redevelopment procedures will be in accordance with accepted protocols outlined in the Ohio EPA Technical Guidance Manual for Hydrogeologic Investigations and Ground Water Monitoring (February 1995). A monitoring well will be abandoned and completely replaced if the structural integrity of the well casing has been damaged to the point of inhibiting sample collection or compromising sample integrity, or if redevelopment of silted wells does not improve the yield of the well, thereby inhibiting sample collection.

4.6.4 Leachate Detection/Collection System Maintenance

Components of the primary and secondary leachate detection/collection system have been placed in permanent standby mode. Therefore, RACER Trust anticipates that only limited maintenance requirements for this system may include:

- Weather proofing, sealing and/or painting structures exposed to weather;
- Maintaining above grade concrete structures associated with the primary sumps; and
- Maintaining above grade piping associated with the secondary sumps

Specific maintenance work orders will be conducted based upon notifications presented on the inspection logs maintained for the system.

4.6.5 Security system/Benchmark Maintenance

The security system will be maintained by repairing or replacing damaged fencing, gates or locks as needed to ensure the integrity of the system. Surveyed benchmarks will be maintained to prevent damage or disturbance.

4.7 PERSONNEL TRAINING

It is anticipated that RACER Trust will contract with outside firms to implement specific post-closure activities related to inspection, monitoring, and maintenance of the landfill disposal unit. Contractors responsible for conducting these activities will report directly to the RACER Trust post-closure contact. Contractors and RACER Trust personnel who may be associated with post-closure activities at the Site will be trained in accordance with the training plan outlined herein. Contractor personnel will maintain proficient knowledge of this training program content as a stipulation of their contracted work scope. Monitoring requirements, including sampling, analysis and reporting are anticipated to be conducted by an independent contractor or analytical laboratory. Further, well redevelopment and/or replacement, if required, will be conducted by a qualified contractor under the direction of RACER Trust.

Post-Closure leachate management (removal, transport, and off-site treatment) will be accomplished through an appropriately qualified and licensed transport and disposal contractor.

4.7.1 Purpose of Training Program

The purpose of this training program is to define the operating principles and regulatory framework under which the post-closure activities at the facility are to be accomplished. The objectives of the training program include:

- Identify and familiarize contractor and RACER Trust personnel with specific requirements pertaining to the closed waste management unit.
- Develop and maintain the proficiency of contractor and RACER Trust personnel carrying out tasks related to post-closure inspection and maintenance.

The training program will provide varying degrees of training for individuals based on their scope of work, function, and responsibilities. The training program will be modified, as deemed necessary, when changes in facility operation occur, or when required by local, state, or federal regulations.

4.7.2 Implementation of Training Program

All designated contractor and RACER Trust personnel will complete the training program prior to participating in work scope activities associated with the Site post-closure tasks. Contractor personnel will participate in an initial training and annual refresher training, pertinent to their post-closure scope of work. Refresher training may be in the form of written guidance or standard operating procedures issued to contractor personnel.

4.7.3 Content of Training Program

The following outline will be followed in RACER Trust's administration of the contractor training program.

I.) General Site Location/Background Information
  a) Site conditions/location

b) Site access
c) Hazardous wastes disposed at the Site

II.) Regulatory Requirements
a) General post-closure inspection, monitoring, and maintenance
b) Impact to contractor work scope

III.) Documentation and Reporting
a) Use of inspection sheets.
b) Communications with RACER Trust post-closure contact.
c) Frequency/schedule for inspection and reporting

IV.) Recognizing Maintenance Needs
a) Emergency vs. Non-emergency.
b) Interpretation of Site conditions.
c) RACER Trust authorization for maintenance work.

4.8 NOTICE TO LOCAL LAND AUTHORITY

A survey plat, indicating the location and dimension of the closed landfill disposal unit, has been submitted to the local zoning authority concurrent with the submittal of the previous post-closure permit application. This survey plat was prepared with respect to permanent benchmarks and has been certified by a licensed professional land surveyor.

4.9 NOTICE IN DEED

A notice has been filed in the deed to the facility property, that will, in perpetuity notify any potential purchaser of the property that (1) the land has been used to manage hazardous wastes; (2) its use is restricted; and (3) the survey plat and record of the type, location, and quantity of hazardous wastes disposed of has been filed with the local zoning authority or the authority with jurisdiction over local land use and with the U.S. EPA and the Ohio EPA.

4.10 POST CLOSURE ESTIMATE

A part of the settlement of the General Motors Corporation bankruptcy, a remediation cost estimate was estimated and agreed upon by both lead agency (Ohio EPA) and support agency (US EPA). On March 31, 2011, this agreed upon amount of $2,634,063 was set aside specifically for the facility. This estimate included cost associated with post closure care and monitoring of the landfill through 2038. It also included funds associated with RCRA Corrective Action for the remainder SWMUs located on the RACER Trust parcel.

5. Post-Closure Groundwater Monitoring Plan

This section represents the amended monitoring locations, analytical methods, sampling frequency, and other pertinent information for the Site groundwater monitoring program.

5.1 MONITORING WELL NETWORK

The Revised Groundwater Monitoring Plan (April 2007) identified 18 monitoring wells to be sampled annually. These wells are divided into two groups according to geographic unit:

- Till Unit wells: P-02T, P-03T, P-08T, P-12TR, P-14T, P-15T, P-16T, P-18T, and P-21; and
- Bedrock Unit wells: P-02, P-03R, P-08R, P-12, P-14, P-15, P-16, P-18, and P-21.

In addition, the following locations are considered piezometers in the monitoring network:

- Four piezometers in the Till Unit (P-1T, P-11, and P-13T); and
- Six piezometers in the Bedrock Unit (P-1, P-13, P-17, P-19, and P-20).

The following locations are also included in the monitoring program:

- Four primary sumps (northeast, northwest, southeast, and southwest); an
- Four secondary sumps (northeast, northwest, southeast, and southwest).

The monitoring well network for groundwater monitoring will include the following monitoring wells:

- West side (up-gradient): monitoring wells
    1. P-12TR (till)
    2. P-12 (bedrock)
    3. P-14T (till);
    4. P-14 (bedrock);
    5. P-15T (till),
    6. P-15 (bedrock);

- Northeast corner (down-gradient): monitoring wells
    7. P-08T (till);
    8. P-08R (bedrock);
    9. P-21T(till);
    10. P-16T (till);
    11. P-16 (bedrock);
    12. P-21 (bedrock)

- Southeast corner (down/side-gradient): monitoring wells
    13. P-03T (till);
    14. P-03R (bedrock);
    15. P-02T (till);
    16. P-02 (bedrock),
    17. P-18T (till) and
    18. P-18 (bedrock).

These monitoring wells will be used to monitor groundwater quality and groundwater elevations.

In addition, the following locations are considered piezometers in the monitoring network and will be used to monitor water elevations:

- Seven locations in the Till Unit (P-1T, P-11 and P-13T,); and
- Eight piezometers in the Bedrock Unit (P-1, P-13, P-17, P-19, and P-20).

5.2 SITE –SPECIFIC PARAMETERS.

Consistent with the current groundwater monitoring plan, the site-specific groundwater monitoring parameters for the Site are:

- Barium (waste-indicator parameter);
- Select additional metals (calcium, chromium, iron, magnesium, manganese, nickel, potassium and sodium);
- Total cyanide; and
- Chloride and sulfate.

5.3 MONITORING FREQUENCY

Over the past 11 years of monitoring (2004-2014), no parameter concentrations above groundwater quality criteria (MCLs) were observed in any of the monitoring wells at the Site. This indicates that a long-term in-compliance situation exists regarding groundwater quality surrounding the RCRA landfill. A variety of decreasing trends over time were observed for certain parameters at certain wells. A lower number of increasing trends were also observed, most of which occur at monitoring well nest P-02T/P-02. Most of the data sets considered did not exhibit any trend in parameter concentrations over time.

Due to these trend findings and the maturity of the monitoring program, it is appropriate to reduce the frequency of groundwater sampling at the Site to biennial sampling from annual

5.4 MONITORING PROGRAM SUMMARY

The table below summarizes the groundwater monitoring program. The monitoring well, piezometer, and sump locations are presented on Figure 2. A full round of groundwater elevations for the monitoring wells, piezometers, and sumps will also be measured on a biennial basis. Following five sampling events, the water level monitoring program will be evaluated to determine if any revisions to the water level program are appropriate.

Biennial Groundwater Monitoring Plan Summary

Location	**Analyte List**
Monitoring Wells	Barium, calcium, chromium, iron, magnesium, manganese, nickel, potassium, sodium, total cyanide, chloride, and sulfate
Till Contact Unit	
P-02T, P-03T, P-14T, P-15T, P-16T, P-21T, P-08T, P-18T and P-12TR	
Bedrock Aquifer Unit	
P-02, P-03R, P-12, P-08R, P-14, P-15, P-16, P-18 and P-21	
Piezometers	Water levels only
Till Contact Unit	
P-1T, P-11, and P-13T	
Bedrock Aquifer Unit	
P-1, P-13, P-17, P-19, and P-20	

5.5 FIELD AND ANALYTICAL METHODS

This section presents field methods for water level measurements, well depth measurements, well inspection, well evacuation, sample collection, sample preservation, sample shipment, documentation requirements, quality assurance/ quality control (QA/QC) procedures, data review, and data validation. These methods are designed to achieve the program objectives without introducing artifacts into the process from monitoring well cross contamination or contamination from non-well sources. A summary of the sampling and analysis plan is summarized in Table 1.

5.5.1 Water Level and Well Depth Measurements

Prior to purging and sampling, depths to groundwater and to the bottom of monitoring well will be measured in each well. The depth to liquid in the primary sumps and secondary sumps will also be measured. The reference point for a monitoring well, piezometer, or sump is the marked location of the highest point of the riser. The elevations of the reference points on the risers and wet wells have been determined by a registered surveyor.

5.5.2 Water Level Measurements

Water levels measurements will be collected from piezometers, monitoring wells, and sumps on a biennial basis as proposed in this amendment. The depth to groundwater will be measured and recorded for the Site monitoring network (wells and piezometers) and sumps (primary and secondary sumps). Water levels at the Site will be measured, if possible, within a 24-hour period. Water level measurements will be made from the reference point on the top of the riser or top of the sump (primary sump wet wells or secondary sump riser pipe) to the static water level. Depth to water to the nearest one hundredth of a foot (0.01) will be determined using a wetted tape, mechanical sounding device, or electrical water level probe following the manufacturer's recommended procedure. The probe cable and tip will be rinsed with a soapy (Alconox) water wash and distilled water, as the equipment is withdrawn from each well. Care will be taken to minimize disturbance to the water column in the wells. Immiscible layers have not been reported at the Site to date. If encountered, the presence of immiscible layers will be identified and noted in the field notes.

Representative examples of maintenance and calibrations logs for the depth measurement instruments are presented in Appendix B. Water level data will be recorded with the well number, date, and time in the field logs.

5.5.3 Well Depth Measurements

On a biennial basis, the depth to the bottom of the well or piezometer will be measured for the Site monitoring network. The depth to the bottom of the well or piezometer will be measured after depth to water has been determined. Measurements will be made from the same reference point on the top of the riser that was used for the depth to water measurement. Depth to the bottom will be determined using a plopper or similar devices to the nearest one hundredth of a foot (0.01). The equipment and cable will be rinsed with a soapy (Alconox) water wash and distilled water, as the equipment is withdrawn from each well. Care will be taken to minimize disturbance to the water column of the wells.

Well depth measurements will be recorded with the well number, date, and time in the field logs.

5.5.4 Well Evacuations

After water level and well depth measurements have been completed, the wells will be purged of standing water within the well riser. The monitoring wells will be purged in order from least contaminated to most contaminated. In addition, the monitoring wells will be purged in an order that will allow for the collection of samples as soon as feasible following purging taking into consideration wells that may potentially be purged dry and require recharge.

Purging will be completed using a peristaltic pump with dedicated tubing. The tubing will be positioned in the well at the desired sample intake (the midpoint of the wetted interval of the screen). Replacement tubing will be installed if necessary, after depth to water and depth to the bottom of the well measurements have been taken. New replacement polyethylene tubing, if required, will be used at each well. Purging will be performed in a manner to minimize agitation of any sediment in the well.

Wells will be pumped to dryness or until a minimum of three well volumes to a maximum of five well volumes of groundwater are removed. A well volume (V) is defined by the equation

$$V = HA$$

Where:
V = Well Volume;
H = Height of standing water in the riser (difference between the depth to groundwater and the depth to the bottom of the well); and
A = Horizontal, cross-sectional area of the well riser.

A generator, if used, will be placed so that the exhaust from the engine is downwind of the working area. The well will be pumped at a flow rate that should approximate the natural flow gradient, if possible, but at a maximum rate of 500 milliliters/minute (mL/min). The water level in the well will be monitored and the purge rate will be incrementally adjusted to maintain a drawdown of 0.3 foot or less to the extent possible. The purge rate will be reduced to the minimum capabilities of the pump to avoid pumping the well dry and/ or to facilitate stabilization of parameters. Care will be taken not to cause pump suction to be broken. If the recharge rate of the well is very low, purging will be interrupted so as not to cause the drawdown within the well to advance below the pump intake. However, a steady flow rate will be maintained to the extent practicable. Purge rates will be recorded.

During well purging, field parameters (temperature, specific conductivity, turbidity, and pH) will be monitored at a minimum at the start of purging and after every well volume. Measurement of the field parameters will be taken using a clean container such as a plastic beaker or from a flow-through cell. The well is considered stabilized when three consecutive readings for each field parameter are within the following limits:

- Temperature — ±3 percent of the average value of the three readings
- Specific conductivity — ±0.005 milliSiemen per centimeter (mS/cm) of the average value of the three readings for specific conductivity <1mS/cm; or ±0.01mS/cm of the average value of the three readings for specific conductivity >1mS/cm
- Turbidity — ±10 percent of the average value of the three readings
- pH — ±0.1 pH units of the average value of the three readings.

An additional sample may be collected, filtered in the field, and analyzed for dissolved metals in addition to total metals, particularly if stabilized turbidity results for the monitoring well is greater than 5 NTUs. Both the total and dissolved analytical results will be evaluated.

No immiscible layers have been encountered at the Site, but if any immiscible layers are identified, the layers will be sampled separately on a one-time basis. Any immiscible layers will be sampled prior to well evacuation using a disposable, bottom loading bailer for light immiscible layers or a disposable, dual-check valve bailer for denser immiscible layers. Sampling of immiscible layers will be performed in a manner to minimize mixing of any immiscible layers. The volume of water purged from the well and other pertinent information (such as observation of a separated phase liquid, odor, color, relative turbidity, temperature, specific conductivity, turbidity, pH, etc.) will be recorded in the field log. The completed field log will be kept on file for review. Any potential problems in complying with the well evacuation procedures will be noted in the appropriate reports. Representative examples of the maintenance logs and field log forms are presented in Appendix C.

The purge water from the monitoring wells will be poured on the ground at least 30 feet away from the monitoring location after completion of sampling at the well. If the well is known to contain contaminants at levels exceeding primary MCLs, the purge water will be containerized and handled appropriately based on contaminant concentration.

5.5.5 Sample Collection

Each well will be sampled as soon as feasible after purging, depending on the rate of recharge to the well. Groundwater sample storage and perseveration procedures are summarized in Table 2. Laboratory-supplied containers that have been pre-cleaned by the laboratory or supplier will be used. All sample containers will be filled directly from the sampling equipment (dedicated polyethylene tubing used with a peristaltic pump) to the sample containers. Care will be taken to minimize agitation and aeration during sample collection. The sample containers will be filled following standard SW-846 sampling protocol. Sample containers will be filled in the order of metals (barium, calcium, iron, magnesium, manganese, and sodium) and inorganics (chloride and sulfate). In applicable, samples for dissolved metals will be filtered using a new, disposable, 0.45-micron filter. Samples will be preserved with the appropriate preservative for the particular parameter.

Samples from the primary sumps and secondary sumps will be grab samples collected using a peristaltic pump and polyethylene tubing. Measurements of temperature, specific conductivity, turbidity, and pH from the same sample aliquot will be recorded after the samples are collected.

Quality assurance/ quality control (QA/QC) samples will be included in each monitoring event, as specified in Section 5.6, and will be used to validate the analytical results. A minimum of one field duplicate sample will be included in the analysis along with the SW-846 standard laboratory blanks reported for each analytical run. The field duplicate will be prepared as a split sample of one of the monitoring wells and will be submitted blind to the laboratory to avoid laboratory bias of field QA/QC samples. The sample will be split by alternately filling the investigative and duplicate sample bottles for the same parameters from the pump tubing to ensure that the samples represent water from the same interval of the well. Each sample container will be labeled with the following information using a waterproof marker:

- Sample number (cross-referenced in the field log to the groundwater monitoring well location);
- Time and date of sampling;
- Initials of sampler;
- Analyses required (e.g., nickel, cyanide, etc.); and

- Type of preservative added.

This same information will be reported on the chain-of-custody record as detailed below. A representative example of the chain-of-custody record is presented in Appendix B.

5.5.6 Decontamination

Measuring equipment, including the pH meter, conductivity meter, turbidity meter and temperature meter, that contacts the groundwater will be decontaminated using a soapy (Alconox) water wash and distilled water rinse between wells.

Dedicated tubing and new filters will be used at each well location, as required. The peristaltic pump will not come in direct contact with the groundwater and will not require decontamination.

5.5.7 Sample Preservation Chain-of-Custody and Shipment

Sample preservation is specific to the analysis performed, which are included in Table 2. The transport container provided by the laboratory will be used for storage of the collected samples and transportation of the samples to the analytical laboratory. The samples will be kept in the transport container, which will be cooled to approximately 4 °C from the time of sample collection to the time of delivery to the laboratory. The transport container will be packed with the samples, wet ice, and packing material to ensure that the appropriate sample temperature is maintained and that the sample containers are not broken in transit.

The appropriate chain-of-custody record will be signed and included in each of the transport containers, and the transport containers will be sealed with packing tape and custody seals. The transport containers will be delivered to the analytical laboratory by overnight courier service. Laboratory personnel will inspect the transport containers upon receipt and notify the project personnel of any difficulties with sample integrity, sample temperature, or holding time. Samples are tracked internally by the laboratory throughout all phases of analysis, with access restricted to authorized personnel. Completion of the field forms, sample key, and chain-of-custody forms will help to prevent misidentification of samples and to track the samples. A representative example of a chain-of-custody form is included in Appendix B.

5.6 ANALYTICAL QA/QC PROCEDURES

The selected analytical laboratory will perform all analyses in accordance with accepted industry methods. The samples will be analyzed using US EPA-approved methods contained in US EPA publication SW-846, *Test Methods for Evaluating Solid Waste Physical/Chemical Methods,* Third Edition, November 1986 with promulgated Updates. A complete list of parameters, US EPA test method numbers, and quantitation limits are provided in Table 3.

5.6.1 Level of QA/QC Effort

To assess samples of data resulting from the field sampling program, field duplicate samples, field blank samples (equipment rinse), and matrix spike samples will be collected and submitted to the analytical laboratory. The QA/QC samples will be collected and assessed following Ohio EPA's Data Validation Plan Review Form Tier 1, Version 4.0, February 19, 2009.

Field duplicate samples will be collected at a frequency of one per ten or fewer investigative samples per parameter set, with a minimum of one field duplicate sample submitted per sampling event. For the

inorganic analyses, one matrix spike and laboratory duplicate (MS/DUP) or MS/MSD will be analyzed at a minimum frequency of one per twenty or fewer investigative samples.

Field duplicate samples will be analyzed to check for sampling and analytical reproducibility. Field duplicate samples are to be used as a measure or precision throughout the sampling event. Comparison of field duplicate samples will be based upon the target analytes, both non-detected and detected, and the relative percent differences (RPD) of each analyte's concentrations.

The sampling and analysis program is summarized in Table 1, which lists the specific parameters to be measured and the number and frequency of sampling. The level of QA effort required for each matrix is also summarized in this table. The QA/QC samples will be used to qualify the data in accordance with standard data validation procedures and not to correct the data.

5.6.2 Data Review and Validation

Upon receipt of the data packages from the project laboratory, the data will be reviewed and validated. The data review will evaluate the finished data sheets, field blank data, field duplicate data, and recover and RPD data for surrogate spikes, MS/MSD samples and MS/DUP samples. Validation of the data will consist of evaluating the QA/QC data based on the applicable review criteria specified in "US EPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review," dated February 1994.

Assessment of analytical data will include checks for data consistency by looking for comparability of duplicate analysis, potential sample contamination as indicated by results of rinseate sample analyses, laboratory QA procedures, and adherence to accuracy and precision criteria, transmittal errors, and anomalously high or low parameter values. The results of these data validation will be presented in a data quality assessment and validation that is included with the data submittals.

5.6.3 Comparison to MCLs

Validated analytical results will be compared to the current MCL. If any of the validated analytical results exceed their respective MCL, confirmation samples will be collected from the location within 30-days of the determination of the initial exceedance. The Ohio EPA will be notified in writing of the potential exceedance of the MCL within 7 days of the initial sample or subsequent confirmation sample exceedance. The notification will include a request to meet with representatives of the Northeast District Office of the Ohio EPA to discuss any additional actions, including confirmation sampling, if necessary.

6. Biennial Reporting

Post Closure and groundwater monitoring results will be submitted biennially before March 1 on the calendar year following groundwater sampling. The first biennial sampling event will be 2016; therefore the first report will be submitted no later than March 1, 2017. The reports will include the following information:

- Groundwater elevation figures for the Till Unit and Bedrock Unit with generalized flow direction arrows;
- Field sampling and inspection forms;
- Chain-of-custody documentation;
- Data validation memorandum;
- Determination of groundwater flow rate and direction in the Bedrock Unit;
- Evaluation of the monitoring program including well locations, parameters, and sampling frequency; and
- Summary of the monitoring results for the sampling period.

The report will be submitted no later than March 1 of the reporting year using the forms supplied by the Ohio EPA and the datafile formats specified by the Ohio EPA for the biennial reports.

Inspection records, field forms and laboratory analytical reports will be maintained for 3 years from the date of the activity. Field logs and reports will be kept and maintained at the RACER Project Manager's office through the Post-Closure period. The Groundwater Monitoring Plan documentation will be available for inspection at reasonable times.

7. References

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Conestoga-Rover & Associates, Report on Hydrogeologic Investigation, Sandusky, Ohio, 24 May 2001.

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USGS, 2002, Statistical Methods in Water Resources. By D.R. Helsel and R.M. Hirsch. Chapter A3 of Book 4, Hydrologic Analysis and Interpretation *in* Techniques of Water-Resources Investigations of the United States Geological Survey. [Available at http://pubs.usgs.gov/twri/twri4a3/].

Weston Services, Inc., Closure Certification Report, Elyria, Ohio Plant. 16 September 1988.

Weston Services, Inc., Post Closure Groundwater Monitoring Plan. 2 September 1993.

TABLES

Table 1
Sampling and Analysis Plan
RACER Trust Landfill
Elyria, Ohio

					QC Samples				
Task	***Sampling Locations***	***Field Parameters***	***Laboratory Parameters***	***Investigative Samples***	***Equipment Blank***	***Field Duplicate***	***MS [2]***	***MSD***	***Total Samples***
Groundwater Monitoring	P-02T, P-03T, P-03R, P-08T, P-12, P-12TR, P-14T, P-15T, P-16T, P-21T, P-02, P-08R, P-14, P-15, P-16, P-18, P-18T and P-21	Temperature, specific conductivity, turbidity, pH, water levels	Metals[1] (barium, calcium, chromium, iron, magnesium, manganese, nickel, potassium, and sodium), total cyanide and chloride and sulfate	18	1	2	1	1	23
Water Levels	P-1, P-1T, P-11,P-13, P-13T, P-17, P-19, and P-20	Water levels	NA	--	-	--	--	--	--

NOTES:

1- Metal analyses to be performed on unfiltered sample. Samples for dissolved metals may also be collected, field filtered, preserved, and analyzed.

2 - Matrix spike/matrix spike duplicate (MS/MSD) or matrix spike/laboratory duplicate (MS/DUP) analyses are required for analyses.
Samples designated for MS/MSD analyses will be collected at a minimum frequency of one in twenty investigative samples or one per sample round.

Table 2
Groundwater Sample Storage and Preservation Procedures
RACER Trust Landfill
Elyria, Ohio

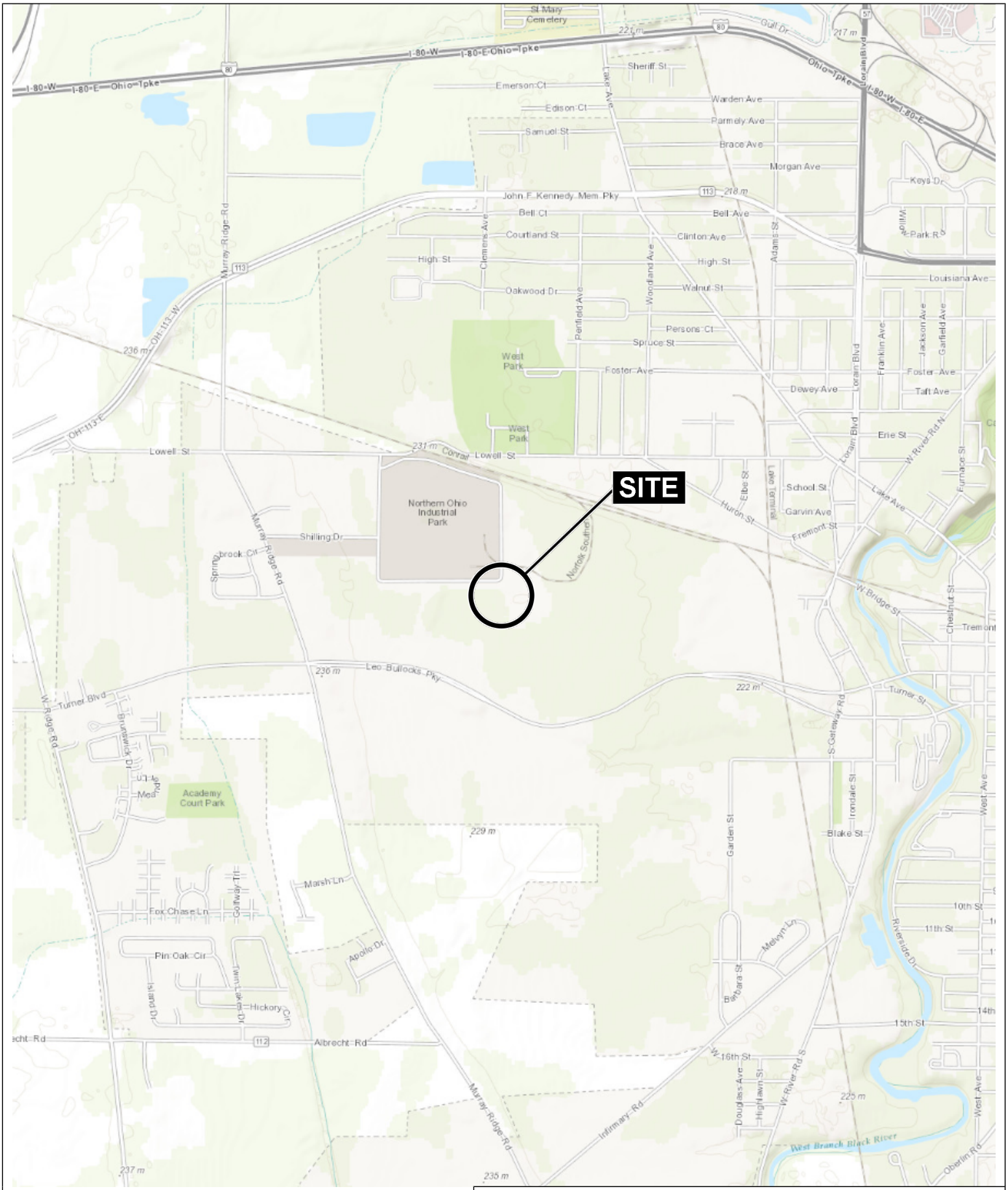
Analyses	Sample Containers	Preservation	Maximum Holding Time after Sample Collection	Sample Filling	Shipping	Packaging
Barium, calcium, chromium, iron, magnesium, manganese, nickel, potassium and sodium	One 1-liter glass or plastic bottle	HNO_3 to pH <2, Iced, </= 4° C	180 days for analysis	Fill to neck of bottle	Overnight or hand deliver	Bubble Pack or Foam Chips
Total cyanide	One 500-mL plastic bottle	NaOH to pH >12, Iced, </= 4°C	14 days to analysis	Fill to neck of bottle	Overnight or hand deliver	Bubble Pack or Foam Chips
Chloride and sulfate	One 250-mL plastic bottle	Iced, </= 4°C	28 days for analysis	Fill to neck of bottle	Overnight or hand deliver	Bubble Pack or Foam Chips

Table 3
Analytical Methods and Targeted Quantitation Limits for Groundwater Analyses
RACER Trust Landfill
Elyria, Ohio

Parameter	Parameters and Analytical Methods	Analytical Technique	Targeted Quantitation Limits (mg/L)
Barium	Metals by SW-846[1] Method 6010B	Inductively Coupled Plasma Spectroscopy	0.025
Calcium			5.0
Chromium			0.07
Iron			0.1
Magnesium			5.0
Manganese			0.015
Nickel			0.05
Potassium			5.0
Sodium			5.0
Total cyanide	EPA-WW 335.2	Spectrophorometric	0.040
Chloride	EPA-WW[2] 300.0	Ion Chromatography	1.0
Sulfate			5.0

Notes
1 - SW-846: "Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods," SW-846, Third Edition, November 1986 with promulgated updates
2 - EPA-WW: "Methods for Chemical Analysis of Water and Wastes," EPA-600/4-79-020, Revised March 1982 and subsequent revisions

FIGURES



MAP SOURCE: ESRI

SITE COORDINATES: 41°22'11"N, 82°8'8"W

HALEY ALDRICH

RACER TRUST LANDFILL
1400 LOWELL STREET
ELRYRIA, OHIO

PROJECT LOCUS

APPROXIMATE SCALE: 1 IN = 2000 FT
JUNE 2015

FIGURE 1

41753-001_1_LOCUS.PDF

GIS FILE PATH: G:\41753_RacerElyria\Global\GIS\RECOVERED 06.30.15\Groundwater Contours\41753-001-0002-SITE_MAP_d2.mxd — USER: dquasfisi — LAST SAVED: 12/2/2015 10:17:07 AM

LEGEND

- BIENNIAL MONITORING WELLS
- PIEZOMETER FOR POST CLOSURE CARE WATER ELEVATION MONITORING
- PRIMARY SUMP
- SECONDARY SUMP
- SITE BOUNDARY

NOTES

1. AERIAL IMAGE PROVIDED AS PART OF ESRI BASEMAP WORLD IMAGERY.
2. ALL LOCATIONS AND ELEVATIONS BASED UPON A PRE-EXISTING SURVEY.

N

0 80 160 240 320

SCALE IN FEET

HALEY ALDRICH

RACER ELYRIA
ELYRIA, OHIO

SITE LAYOUT MAP

DECEMBER 2015

FIGURE 2

LEGEND

- SEWER INVERTS
- TILL MONITORING WELLS
- INFERRED POTENTIOMETRIC SURFACE
- POTENTIOMETRIC SURFACE
- SITE BOUNDARY

NOTES

1. AERIAL IMAGE PROVIDED AS PART OF ESRI BASEMAP WORLD IMAGERY.
2. GROUNDWATER POTENTIOMETRIC SURFACE BASED UPON WATER LEVELS COLLECTED DURING THE APRIL 27, 2015 GAUGING EVENT.
3. ALL LOCATIONS AND ELEVATIONS BASED UPON A PRE-EXISTING SURVEY.
4. SEWER SURVEY INFORMATION UPDATED ON MAY 4, 2015.

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0 80 160 240 320

SCALE IN FEET

HALEY ALDRICH

RACER ELYRIA
ELYRIA, OHIO

TILL LAYER POTENTIOMETRIC CONTOURS APRIL 2015

JUNE 2015

FIGURE 3

\\CLEcommon\Projects\41753_RacerElyria\Global\GIS\Groundwater Contours\41753-001-0003-TIL_GROUNDWATER.mxd — USER: jleroy — LAST SAVED: 6/18/2015 11:11:22 AM

\\CLEcommon\Projects\41753_RacerElyria\Global\GIS\Groundwater Contours\41753-001-0002-BEDROCK_GROUNDWATER.mxd — USER: jleroy — LAST SAVED: 6/18/2015 11:16:17 AM

LEGEND

- SEWER INVERTS
- BEDROCK MONITORING WELLS
- INFERRED POTENTIOMETRIC SURFACE
- POTENTIOMETRIC SURFACE
- SITE BOUNDARY

NOTES

1. AERIAL IMAGE PROVIDED AS PART OF ESRI BASEMAP WORLD IMAGERY.
2. GROUNDWATER POTENTIOMETRIC SURFACE BASED UPON WATER LEVELS COLLECTED DURING THE APRIL 27, 2015 GAUGING EVENT.
3. ALL LOCATIONS AND ELEVATIONS BASED UPON A PRE-EXISTING SURVEY.
4. SEWER SURVEY INFORMATION UPDATED ON MAY 4, 2015.

N

0 80 160 240 320
SCALE IN FEET

HALEY ALDRICH

RACER ELYRIA
ELYRIA, OHIO

BEDROCK POTENTIOMETRIC CONTOURS APRIL 2015

JUNE 2015

FIGURE 4

APPENDIX A

Boring Logs

SOIL BORING LOGS

Boring Number	Interval (ft)	Description
P-1	0-3	Gray brown silty clay
	3-10	Light brown silty sand and gravel
	10-12	Weathered redish brown sandstone
	12-19	Very hard find grained greenish gray sandstone, very thin shale interbeds
	19-29	Gray shale
P-2	0-8	Brown silty clay trace sand
	8-11	Gray silty clay trace sand
	11-13.5	Gray shale sandy interbeds
	13.5-22	Sandstone, medium fine gravel, thin shale interbeds
	22-23	Gray shale, some silt
P-3	0-9	Gray brown silty clay trace sand
	9-12	Weathered shale, gray
	12-14	Gray shale
	14-19	Fine grained sandstone, light gray with shale streaks
	19-23	Gray silty shale
P-4	0-4	Silty clay - fill?
	14-13	Brown to gray brown silty clay trace sand
	13-25	Very hard greenish gray sandstone
	27-28	Red shale

Confidential under FOIA
John Messinger
Arcadis
Jun 17, 2009 17:46

SOIL BORING LOGS

Boring Number	Interval (ft)	Description
P-5	0-3	Brown silty clay, trace sand
	8-23	Weathered light gray sandstone
	23-29	Light gray sandstone, medium fine grain
P-6	0-10	Brown silty clay, trace sand
	10-15	Weathered light gray sandstone
	15-18.5	Weathered red shale

Confidential under FOIA
John Messinger
Arcadis
Jun 17, 2009 17:46

FILE NO.

CDM

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Fisher Body (GM) FIELD ENG/GEO Ross Overby DATE 5/14/81
PROJECT NO. 1211 CHECKED BY Ross Overby DATE 5/14/81
BORING NO. P-1 COORDINATES
PIEZOMETER NO. P-1 DATE OF INSTALLATION 5/14/81

BOREHOLE DRILLING

DRILLING METHOD Auger/Rotary
DRILLING FLUID(S) USED:
FLUID Water FROM TO
FLUID FROM TO

TYPE OF BIT Roller/ Tricone
CASING SIZE(S) USED: None
SIZE FROM TO
SIZE FROM TO

PIEZOMETER DESCRIPTION

TYPE PVC
DIAMETER OF PERFORATED SECTION 2" ID
PERFORATION TYPE:
SLOTS [X] HOLES [ ] SCREEN [ ]
AVERAGE SIZE OF PERFORATIONS
TOTAL PERFORATED AREA

RISER PIPE MATERIAL PVC
RISER PIPE DIAMETERS 2" ID
O.D. I.D.
LENGTH OF PIPE SECTIONS
JOINING METHOD GLUE ASTM 2564

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 3'
PROTECTIVE PIPE O.D.

OTHER PROTECTION

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (Ft)		ELEVATION (Ft)	
TOP OF RISER PIPE	1.1		105.9 (749.8)	
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE				
BOREHOLE FILL MATERIALS				
GROUT/SLURRY	TOP 0	BOTTOM 13	TOP 104.8	BOTTOM 91.8
BENTONITE	TOP 0	BOTTOM 13	TOP 104.8	BOTTOM 91.8
SAND	TOP 13	BOTTOM 14	TOP 91.8	BOTTOM 90.8
GRAVEL	TOP 14	BOTTOM 20	TOP 90.8	BOTTOM 84.8
PERFORATED SECTION	TOP 15	BOTTOM 20	TOP 89.8	BOTTOM 84.8
PIEZOMETER TIP	20		84.8	
BOTTOM OF BOREHOLE				
GWL AFTER INSTALLATION	10.5		95.4	

WAS THE HOLE FLUSHED BEFORE INSTALLATION? YES [X] NO [ ]
WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES [X] NO [ ]
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES [ ] NO [X]

REMARKS

FILE NO. _____

CDM

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Fisher Body (GM) FIELD ENG/GEO Ross Overby DATE 5/15/81
PROJECT NO. 1211 CHECKED BY Ross Overby DATE 5/15/81
BORING NO. P-2 COORDINATES _____
PIEZOMETER NO. P-2 DATE OF INSTALLATION 5/15/81

BOREHOLE DRILLING

DRILLING METHOD Rotary/Auger
DRILLING FLUID(S) USED: Water
FLUID _____ FROM _____ TO _____
FLUID _____ FROM _____ TO _____

TYPE OF BIT Roller/Tricone
CASING SIZE(S) USED:
SIZE _____ FROM _____ TO _____
SIZE _____ FROM _____ TO _____

PIEZOMETER DESCRIPTION

TYPE PVC
DIAMETER OF PERFORATED SECTION 2" ID
PERFORATION TYPE:
SLOTS ☒ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS _____
TOTAL PERFORATED AREA _____

RISER PIPE MATERIAL PVC
RISER PIPE DIAMETERS 2" ID
O.D. _____ I.D. _____
LENGTH OF PIPE SECTIONS _____
JOINING METHOD Glue ASTM 2564

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 3'
PROTECTIVE PIPE O.D. _____

OTHER PROTECTION _____

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION (ft)	
TOP OF RISER PIPE	1.8		105.0 (748.90)	
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE				
BOREHOLE FILL MATERIALS				
GROUT/SLURRY	TOP 0	BOTTOM 14	TOP 103.2	BOTTOM 89.2
BENTONITE	TOP 0	BOTTOM 14	TOP 103.2	BOTTOM 89.2
SAND	TOP 14	BOTTOM 15	TOP 89.2	BOTTOM 88.2
GRAVEL	TOP 15	BOTTOM 22	TOP 88.2	BOTTOM 81.2
PERFORATED SECTION	TOP 17	BOTTOM 22	TOP 86.2	BOTTOM 81.2
PIEZOMETER TIP	22		81.2	
BOTTOM OF BOREHOLE				
GWL AFTER INSTALLATION	4.0		101.0	

WAS THE HOLE FLUSHED BEFORE INSTALLATION? YES ☒ NO ☐
WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☐ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒

REMARKS _____

FILE NO. _____

CDM.

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Fisher Body (GM) FIELD ENG/GEO Ross Overby DATE 5/18/81
PROJECT NO. 1211 CHECKED BY Ross Overby DATE 5/18/81
BORING NO. P-3 COORDINATES _____
PIEZOMETER NO. P-3 DATE OF INSTALLATION 5/18/81

BOREHOLE DRILLING

DRILLING METHOD Auger/Rotary
DRILLING FLUID(S) USED. Water
FLUID _____ FROM _____ TO _____
FLUID _____ FROM _____ TO _____

TYPE OF BIT Roller/Tricone
CASING SIZE(S) USED:
SIZE _____ FROM _____ TO _____
SIZE _____ FROM _____ TO _____

PIEZOMETER DESCRIPTION

TYPE PVC
DIAMETER OF PERFORATED SECTION 2" ID
PERFORATION TYPE:
SLOTS ☒ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS _____
TOTAL PERFORATED AREA _____

RISER PIPE MATERIAL PVC
RISER PIPE DIAMETERS 2" ID
O.D. _____ I.D. _____
LENGTH OF PIPE SECTIONS _____
JOINING METHOD Glue ASTM 2564

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 3'
PROTECTIVE PIPE O.D. _____

OTHER PROTECTION _____

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION (ft)	
TOP OF RISER PIPE	2.0		105.4 (749.30)	
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE				
BOREHOLE FILL MATERIALS				
GROUT/SLURRY	TOP 0	BOTTOM 12	TOP 103.4	BOTTOM 91.4
BENTONITE	TOP 0	BOTTOM 12	TOP 103.4	BOTTOM 91.4
SAND	TOP 12	BOTTOM 14	TOP 91.4	BOTTOM 89.4
GRAVEL	TOP 14	BOTTOM 18	TOP 89.4	BOTTOM 85.4
PERFORATED SECTION	TOP 13	BOTTOM 18	TOP 90.4	BOTTOM 85.4
PIEZOMETER TIP	18		85.4	
BOTTOM OF BOREHOLE				
GWL AFTER INSTALLATION	5.0		100.4	

WAS THE HOLE FLUSHED BEFORE INSTALLATION? YES ☒ NO ☐
WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☒ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE INSTALLATION? YES ☐ NO ☒

REMARKS _____

FILE NO. _____

CDM

PIEZOMETER INSTALLATION SHEET Abandond

PROJECT NAME Fisher Body (GM) FIELD ENG/GEO Ross Overby DATE 5/19/81
PROJECT NO. 1211 CHECKED BY Ross Overby DATE 5/19/21
BORING NO. P-4 COORDINATES _____
PIEZOMETER NO. P-4 DATE OF INSTALLATION 5/19/81

BOREHOLE DRILLING

DRILLING METHOD Auger/Rotary
DRILLING FLUID(S) USED. Water
FLUID _____ FROM _____ TO _____
FLUID _____ FROM _____ TO _____

TYPE OF BIT Roller/Tricone
CASING SIZE(S) USED:
SIZE _____ FROM _____ TO _____
SIZE _____ FROM _____ TO _____

PIEZOMETER DESCRIPTION

TYPE PVC
DIAMETER OF PERFORATED SECTION 2" ID
PEREORATION TYPE:
SLOTS ☒ HOLES ☐ SCREEN ☐
AVERAGE SIZE OF PERFORATIONS _____
TOTAL PERFORATED AREA _____

RISER PIPE MATERIAL PVC
RISER PIPE DIAMETERS 2" ID
O.D. _____ I.D. _____
LENGTH OF PIPE SECTIONS _____
JOINING METHOD Glue ASTM 2564

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 3'
PROTECTIVE PIPE O.D. _____

OTHER PROTECTION _____

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION (ft)	
TOP OF RISER PIPE	1.3		110.3 (754.2)	
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE				
BOREHOLE FILL MATERIALS				
GROUT/SLURRY	TOP 0	BOTTOM 18	TOP 109.0	BOTTOM 91.0
BENTONITE	TOP 0	BOTTOM 18	TOP 109.0	BOTTOM 91.0
SAND	TOP 18	BOTTOM 19	TOP 91.0	BOTTOM 90.0
GRAVEL	TOP 19	BOTTOM 26	TOP 90.0	BOTTOM 83.0
PERFORATED SECTION	TOP 21	BOTTOM 26	TOP 88.0	BOTTOM 83.0
PIEZOMETER TIP	26		83.0	
BOTTOM OF BOREHOLE				
GWL AFTER INSTALLATION	7.0		103.3	

WAS THE HOLE FLUSHED BEFORE INSTALLATION? YES ☒ NO ☐
WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☒ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒

REMARKS _____

FILE NO. _____

CDM

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Fisher Body (GM) FIELD ENG/GEO Ross Overby DATE 7-28-81
PROJECT NO. 1211 CHECKED BY Ross Overby DATE 7-28-81
BORING NO. P-5 COORDINATES _____
PIEZOMETER NO. P-5 DATE OF INSTALLATION 7-28-81

BOREHOLE DRILLING

DRILLING METHOD Auger/Rotary TYPE OF BIT Roller/Tricone
DRILLING FLUID(S) USED. CASING SIZE(S) USED:
FLUID Water FROM _____ TO _____ SIZE _____ FROM _____ TO _____
FLUID _____ FROM _____ TO _____ SIZE _____ FROM _____ TO _____

PIEZOMETER DESCRIPTION

TYPE PVC RISER PIPE MATERIAL PVC
DIAMETER OF PERFORATED SECTION 4" OD RISER PIPE DIAMETERS 4" OD
PERFORATION TYPE: O.D. _____ I.D. _____
SLOTS ☒ HOLES ☐ SCREEN ☐ LENGTH OF PIPE SECTIONS _____
AVERAGE SIZE OF PERFORATIONS _____ JOINING METHOD GLUE ASTM 2564
TOTAL PERFORATED AREA _____

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 3' OTHER PROTECTION _____
PROTECTIVE PIPE O.D. _____

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION ( )	
TOP OF RISER PIPE	1.4		108.3 (752.2)	
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE				
BOREHOLE FILL MATERIALS				
GROUT/SLURRY	TOP -0	BOTTOM 18	TOP 106.9	BOTTOM 90.3
BENTONITE	TOP 18	BOTTOM 21	TOP 90.3	BOTTOM 87.3
SAND	TOP 21	BOTTOM 23	TOP 87.3	BOTTOM 85.3
GRAVEL	TOP 23	BOTTOM 29	TOP 85.3	BOTTOM 79.3
PERFORATED SECTION	TOP 24	BOTTOM 29	TOP 84.3	BOTTOM 79.3
PIEZOMETER TIP	29'		79.3	
BOTTOM OF BOREHOLE				
GWL AFTER INSTALLATION	9.2'		99.1	

WAS THE HOLE FLUSHED BEFORE INSTALLATION? YES ☒ NO ☐
WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES ☒ NO ☐
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES ☐ NO ☒

REMARKS _____

FILE NO. _____

CDM

PIEZOMETER INSTALLATION SHEET

PROJECT NAME Fisher Body (GM) FIELD ENG/GEO. Ross Overby DATE 7-29-81
PROJECT NO. 1211 CHECKED BY Ross Overby DATE 7-29-81
BORING NO. P-6 COORDINATES _____
PIEZOMETER NO. P-6 DATE OF INSTALLATION 7-29-81

BOREHOLE DRILLING

DRILLING METHOD Auger TYPE OF BIT Auger
DRILLING FLUID(S) USED.
FLUID _____ FROM _____ TO _____
FLUID _____ FROM _____ TO _____
CASING SIZE(S) USED:
SIZE _____ FROM _____ TO _____
SIZE _____ FROM _____ TO _____

PIEZOMETER DESCRIPTION

TYPE PVC RISER PIPE MATERIAL PVC
DIAMETER OF PERFORATED SECTION 4" OD RISER PIPE DIAMETERS 4" OD
PERFORATION TYPE: O.D. _____ I.D. _____
SLOTS [X] HOLES [ ] SCREEN [ ] LENGTH OF PIPE SECTIONS _____
AVERAGE SIZE OF PERFORATIONS _____ JOINING METHOD GLUE ASTM 2564
TOTAL PERFORATED AREA _____

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 3' OTHER PROTECTION _____
PROTECTIVE PIPE O.D. _____

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION (ft)	
TOP OF RISER PIPE	1.5		109.9 (753.8)	
GROUND SURFACE	0.0			
BOTTOM OF PROTECTIVE PIPE				
BOREHOLE FILL MATERIALS				
GROUT/SLURRY	TOP 0	BOTTOM 7	TOP 109.9	BOTTOM 102.9
BENTONITE	TOP 7	BOTTOM 8	TOP 102.9	BOTTOM 101.9
SAND	TOP 8	BOTTOM 10	TOP 101.9	BOTTOM 99.9
GRAVEL	TOP 10	BOTTOM 15	TOP 99.9	BOTTOM 94.9
PERFORATED SECTION	TOP 10	BOTTOM 15	TOP 99.9	BOTTOM 94.9
PIEZOMETER TIP	15		94.9	
BOTTOM OF BOREHOLE				
GWL AFTER INSTALLATION	9.0		100.9	

WAS THE HOLE FLUSHED BEFORE INSTALLATION? YES [ ] NO [X]
WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES [ ] NO [X]
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES [ ] NO [X]

REMARKS _____

WESTON

GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION: GMC FISHER GUIDE, Elyria, OH.

PAGE NO.: 1 of 1 | HOLE NO.: P-1T

START	FINISH	DRILLER	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH
10/26/88	10/26/88	BOWSER	HSA	6"	2"	12.50'

LOGGER	TOP of CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED
G. KINSALL			'/'

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	NOTES
1	SS	18	6 6 7		5					Mottled, orange, light to dark brown, gray, stiff to hard, CLAY, some silt, some root hairs, moist	
2	SS	14	7 10 15							Mottled, orange, light brown, gray, hard, SILTY CLAY, trace medium to coarse sand, moist	
3	SS	12	11 16 38		10					Medium brown, stiff, CLAY, some silt, some weathered fine sandstone, moist	
4	SS		28 40 100/4"							Light brown, fine sandstone, moist	
										End of boring @ 12.5 feet	

*ASTM D1586
SS = SPLIT SPOON
D = DENNISON
ST = SHELBY TUBE
C = CORE
CT = CUTTINGS
CS = CONTINUOUS SAMPLER
OT = OTHER

GMC FISHER GUIDE Elyria, OH.
PAGE NO. 1 of 1 | HOLE NO. P-1T

WESTON

GEOLOGIC DRILL LOG		PROJECT NAME AND LOCATION GMC FISHER GUIDE, Elyria, OH.				PAGE NO. 1 of 1	HOLE NO. P-2T
START 10/26/88	FINISH 10/26/88	DRILLER BOWSER	DRILL METHOD HSA	BOREHOLE DIAMETER 6"	WELL DIAMETER 2"	TOTAL DEPTH 13.50'	
LOGGER G. KINSALL		TOP of CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED ' /			

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	NOTES
1	SS	6	4 5 6		5					Light brown, soft, plastic SILTY CLAY, trace fine sand, root hairs, moist to wet.	
2	SS	18	8 12 22							Mottled, orange, light brown, gray, stiff to hard, slightly plastic, CLAY, some silt, trace fine to medium pebbles, moist.	
3	SS		11 12 18		10					Gray, stiff, non-plastic, SILTY CLAY, a little coarse sand, moist.	
4	SS		18 29 39							A/A with small zones of sandstone and weathered sandstone, moist.	
										End of boring @ 13.5 feet	

*ASTM D1586
SS = SPLIT SPOON ST = SHELBY TUBE
D = DENNISON C = CORE CS = CONTINUOUS SAMPLER
CT = CUTTINGS OT = OTHER

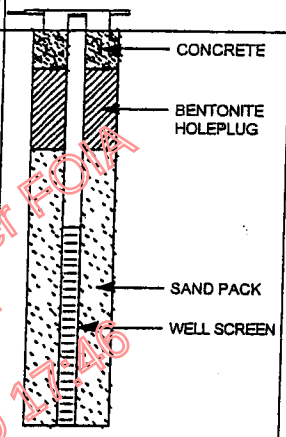
STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: REALM LANDFILL
PROJECT NUMBER: 12616-31
CLIENT: REALM
LOCATION: ELYRIA, OH

HOLE DESIGNATION: P-3T
DATE COMPLETED: May 23, 2002
DRILLING METHOD: HSA
FIELD PERSONNEL: D. NEWTON

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS
0	CL-CLAY, silty, low plasticity, stiff, brown with orange and gray mottling, dry	
4	CL-CLAY, firm, low plasticity, light brown with orange and gray streaking, dry, gravel fragments mixed	4.00
8	CL-CLAY, stiff, compact, brown, dry, gravel fragments mixed with whitish, gray sandstone at 8' BGS	8.00
10	- Bedrock at 9.0ft BGS END OF BOREHOLE @ 10.0ft BGS	10.00

MONITOR INSTALLATION



WELL DETAILS
Screened interval:
5.00 to 10.00ft BGS
Length: 5ft
Diameter: 2in
Slot Size: #10
Sand Pack:
3.00 to 10.00ft BGS
Material: SILICA SAND

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
1			12	0
2			10	0
3			12	0
4			11	0
5			69	0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 12616.GPJ CRA_CORP.GDT 8/22/02

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: REALM LANDFILL
PROJECT NUMBER: 12616-31
CLIENT: REALM
LOCATION: ELYRIA, OH

HOLE DESIGNATION: P-3R
DATE COMPLETED: June 3, 2002
DRILLING METHOD: HSA
FIELD PERSONNEL: B. WILLIAMS

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS
	TOPSOIL, sands, fien to medium, with vegetation	0.30
	CL-SILTY CLAY, trace fien sands, trace rootlets, trace subangular gravel, fine, compact, low plasticity, gray/brown mottling, dry to moist	
	- slight increase in fine subangular gravel content at 5.0ft BGS	
	- increase in density, dry to moist at 5.5ft BGS	
	- decrease in gray mottling, dry at 7.0ft BGS	
	- becoming darker gray, dry at 7.8ft BGS	
	SM-SILTY SANDS, medium grained, compact, gray, moist	8.75
	SANDSTONE, weathered	9.00
	END OF BOREHOLE @ 19.0ft BGS	19.00

MONITOR INSTALLATION: CONCRETE; BENTONITE CHIPS; SAND PACK; WELL SCREEN

WELL DETAILS
Screened interval:
14.00 to 19.00ft BGS
Length: 5ft
Diameter: 2in
Slot Size: #10
Sand Pack
12.00 to 19.00ft BGS
Material: SILICA SAND

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
1			5	0.0
2			7	0.0
3			11	0.0
4			32	0.0
5			>100	0.0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 12616.GPJ CRA_CORP.GDT 8/22/02

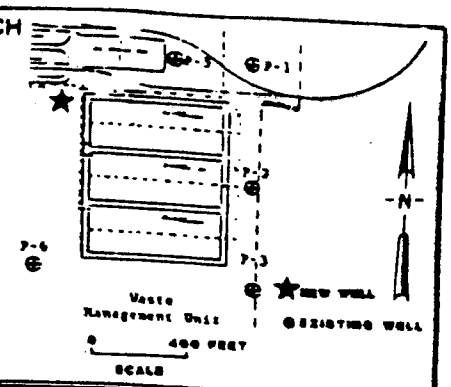
WESTON

DRILLING LOG

WELL NUMBER: W-4R
LOCATION: Near NW corner of impoundment. Wooded area
SURFACE ELEVATION: _____
DRILLING COMPANY: Bowser Morner
DRILLER: Rick Gerald
LOG BY: G. Kinsall

OWNER: GMC Fisher Guide
ADDRESS: Elyria, Ohio
TOTAL DEPTH _____
WATER LEVEL: 7'
DRILLING METHOD: HSA/Rotary
DATE DRILLED: 8/26/87
HELPER: Dave Wright

SKETCH



NOTES: Bedford Shale plugged so screen can be set in Berea Sandstone.

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0		1	STP	4 8 11 15	top 4" hummus top soil (PT)
					4"-2 ft. Very stiff, brown to orange brown, SITLY CLAY, dry,
					trace of medium grain sand (CL)
		2		7 7 9 9	2-4 ft. Very stiff, light brown - brown, SILTY CLAY intermixed
					with CLAY at 2.5 ft., very wet, (MH/CH)
		3		6 9 11 15	4-6 ft. Very stiff, light brown - brown, SILTY CLAY intermixed with CLAY at 2.5 ft., very wet (MH/CH)
		4		4 8 10 15	6-8 ft. Very stiff, brown grading to medium gray, CLAY, wet,
					trace of orgainc material and green-gray shale fiags
		5		7 11 29 55	8-10 Hard, brownish gray-grades to gray, CLAY, mosit (CH)
10					At 9 ft contact of greenish-gray, soft, dry shale or
					siltstone (Orangeville)
					Berea Sandstone at 14 ft.
15					
					Top of Bedford Shale at 24 ft.

Well W-4R

Well Construction Summary

Location or Coords: _____ Elevation: Ground Level _____

Top of Casing _____

Project GMC - Fisher Guide
Phase 2 Groundwater Quality Assessment

Location Elyria, Ohio

Personnel Greg Kinsall

Drilling Summary:

Total Depth 21'

Borehole Diameter 8" to 14'
4" to 21'

Driller Rick Gerald
Asst. Dave Wright

Rig Mobile 13-61

Bit(s) HSA, 3 7/8 rollar bit

Drilling Fluid Water

Surface Casing 4" Drive Casing

Well Design:

Basis: Geologic Log X Geophysical Log _____

Casing String(s): C = Casing S = Screen

21'	-	16'	S		
16'	-	+2	C_1		
-3	-	+2	C_2		

Casing: C1 #304 Sch 5 stainless Steel
2" diameter

C2 6" Protective Steel Casing

Screen: S1 #304 Sch 5 Stainless Steel
0.010" slot

S2 _____

Centralizers _____

Filter Material #4 coarse sand washed and graded 22' - 15'

Cement Portland type I 2 bags cement to 151b. bentonite

Other Bentonite slurry

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling:	1987			
HSA	8/26	0800	8/26	0915
Rotary Wash	8/27	0805	8/27	0930
Geophys Logging:				
Casing:				
C_1	8/27	1120	8/27	1125
C_2	8/27	1345	8/27	1355
Filter Placement:	8/27	1130	8/27	1135
Cementing:	8/27	1330	8/27	1340
Development:				
Other:				
Bentonite Pellets	8/27	1145	8/27	1155

Well Development:

First atempt to develop on 8/30/87
Well goes dry and is ledt to recharge

Comments:

Drilled into bedford shale at 24'. 2' bentonite plug is place to seal it off. 1' of sand is placed over that to set well in at 21'. Very slow recharger. Water is extreamly turbid.

Well W-5S

Well Construction Summary

Location or Coords: _____ Elevation: Ground Level _____

Top of Casing _____

Location Elyria, Ohio
Personnel Greg Kinsall

Project Site - Parcel Outline
Phase 2 Groundwater Quality Assessment

Drilling Summary:

Total Depth 20'
Borehole Diameter 8" to 11'
4" to 20'
Driller Rick Gerald
Asst. Dave Wright
Rig Mobile 13-61
Bit(s) HSA and 3 7/8" roller bit
Drilling Fluid Water
Surface Casing 4" Drive Casing

Well Design:

Basis: Geologic Log X Geophysical Log ____

Casing String(s): C = Casing S = Screen

20'	-	15'	S		-		
15'	-	+2	C_1		-		
-3	-	+2	C_2		-		
	-				-		
	-				-		
	-				-		
	-				-		
	-				-		

Casing: C1 #304 Sch 5 Stainless Steel
2" diameter
C2 6" Protective Steel Casing

Screen: S1 #304 Sch 5 Stainless Steel
0.010" slot
S2 _____

Centralizers _____

Filter Material #4 Coarse sand washed and graded 20' to 13'
Cement Portland Type I
2 bags cement to 15lb. bentonite
Other Bentonite Pellets 13' to 10'

Construction Time Log:

Task	Start Date 1987	Start Time	Finish Date 1987	Finish Time
Drilling:				
HSA	8/28	0840	8/28	0920
Rotary Wash	8/28	0930	8/28	1025
Geophys. Logging:				
Casing:				
C_1	8/28	1030	8/28	1035
C_2	8/28	1425	8/28	1430
Filter Placement:	8/28	1040	8/28	1045
Cementing:	8/28	1410	8/28	1420
Development:				
Other:				
Bentonite Pellets	8/28	1045	8/28	1055

Well Development:

Well developed 8/30/87
5 volumes removed. Ph, cond. and temp checked after 1 vol., 3 vol., and 5 vol. stable each time

Comments:

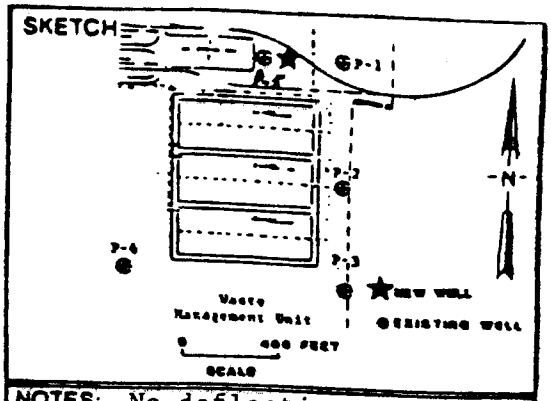
Well is fairly good recharger.

WESTON

DRILLING LOG

WELL NUMBER: W-5S
LOCATION: About 15' East of W-5
OWNER: GMC Fisher Guide
ADDRESS: Elyria, OH
TOTAL DEPTH: 20'
SURFACE ELEVATION: _____
WATER LEVEL: 8.5'
DRILLING COMPANY: Bowser MOrner
DRILLING METHOD: HSA/Rotary
DATE DRILLED: 8/28/87
DRILLER: Rick Gerald
HELPER: Dave Wright
LOG BY: Greg Kinsall

SKETCH



NOTES: No deflection on Hnu TOX and VOC taken at 10-11' intervals

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS/6"	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0		1	SPT	push 2 2	0-2ft Soft, light brown, CLAY, dry to slightly moist, look as if material is disturbed (CL)
		2		2 2 2 2	2-4ft Soft, mottled black-green-red, CLAY, dry to moist, traces of cardboard and brick. (Still disturbed) (CL/OL)
		3		2 2 2 2	4-6ft. Soft, black, CLAY, moist. (OL)
		4		3 5 8 9	6-8ft. Stiff, mottled gray and black, CLAY, moist (CL/OL)
		5		6 10 15 20	8-10ft Very stiff, light brown, CLAY, wet, trace of sand grains, (CH)
10		6		15 38	10-11ft Very stiff to hard, light brown grading to gray, CLAY with weathered sandstone, wet (CH)
					Berea Sandstone topped at 11ft.
15					

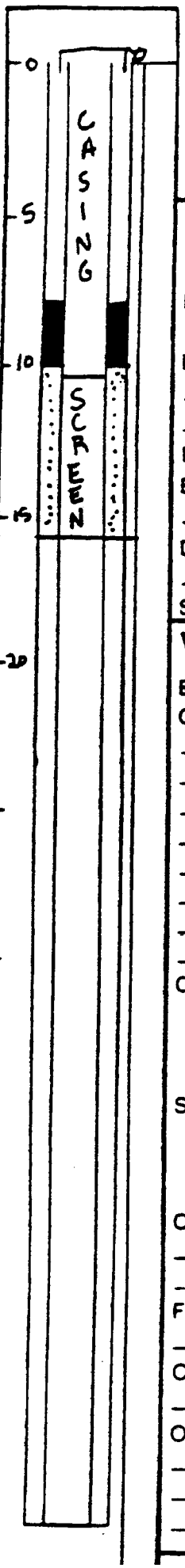
Well P6 Mw 7

Well Construction Summary

Location or Coords West of P6

Elevation Ground Level 754.35

Top of Casing 756.84



Location Elyria, Ohio
Personnel E.M.U.
Project GM

Drilling Summary:

Total Depth 16.5'
Borehole Diameter 4.25" ID
Driller Herron
Rig GME 75
Bit(s) H.S.A. 4.25" ID
Drilling Fluid Water (washed out hole)
Surface Casing Steel Protective/locked

Well Design:

Basis: Geologic Log X Geophysical Log ___

Casing String(s): C = Casing S = Screen

16	11	S			
11	0	C			
0	2	S.U.			

Casing C1 PVC 2"

C2 ___

Screen: S1 PVC 2"
.010 inch slot

S2 ___

Centralizers ___

Filter Material Medium sand (16 - 10')

Cement Cement/Bentonite
(8 - 0')

Other Bentonite pelle
(10 - 8')

Construction Time Log:

Task	Start Date 1987	Start Time	Finish Date 1987	Finish Time
Drilling X	2/13	3p	2/13	5p
Geophys. Logging				
Casing	2/14	9a	2/14	11:3(
Filter Placement	2/14	9a	2/14	11:3(
Cementing	2/14	9a	2/14	11:3(
Development:	2/19		2/19	
Other	2/20		2/20	

Well Development:

Well Development went slowly - pumped dry and would let well recover repeated procedure Removed 15 gallons totally, still silty

Comments:

2 bags sand
1 bucket pellets
grout 8'

WESTON

DRILLING LOG

MW 7 P8

WELL NUMBER ~~P8~~ MW 7 P8 | OWNER GM

LOCATION West of P6 | ADDRESS Lowell St

Elyria, Ohio

TOTAL DEPTH 18.5

SURFACE ELEVATION | WATER LEVEL:

DRILLING COMPANY Herron Testing | DRILLING METHOD HSA 4.25" ID | DATE DRILLED 2/13/87

DRILLER | HELPER:

LOG BY: E.M.U.

SKETCH MAP

NOTES
Water in augers at 15'4" - 2-14-87

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0		01	ss	1 2 2	SOFT, Dark brown to black silty clay, organic rich, veg. roots (clay)
		02	ss	12 5 8	STIFF, Yellowish brown, sandy silty clay, trace fine sand, some silt, trace gravel chips
5		03	ss	9 14 22	HARD
		04	ss	9 14 25	HARD, Gray clayey silt, some gravel size chips
10		05	ss	32 33 14	DENSE (14 blows - bent spoon) SS05 - top 7", white to gray fine sand, hit cobble - top of Berea Sandstone. - Lower 7", reddish to mauve silt (rods wet)
		05	ss	22 23 25	DENSE, Appears to be interbedded sandstones and shales
15		07	ss	19 22 27	HARD, Reddish to mauve, silt, contains shale chips, Bedford shale
		08	ss	18 27 28	
20					

WESTON

GEOLOGIC DRILL LOG	PROJECT NAME AND LOCATION	PAGE NO.	HOLE NO.
	GMC FISHER GUIDE, Elyria, OH.	1 of 1	P-7T

START	FINISH	DRILLER	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH
10/25/88	10/25/88	BOWSER	HSA	6"	2"	17.50'

LOGGER	TOP of CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED
G. KINSALL			'/'

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION SAMPLE INTERVAL	DESCRIPTION	NOTES
1	SS	10	11 13 16		5				Light to medium brown, hard, non-plastic CLAYEY SILT, trace coarse sand to fine gravel, moist	
2	SS	10	10 19 29						A/A Gray, firm to hard, CLAYEY SILT, trace of coarse gravel, moist	
3	SS	8	8 27 29		10				A/A	
4	SS	8	17 37 28						Gray, fine, SILTY SAND, some pieces of sandstone, dry to moist A/A with some large (1-1.5") pieces of fine, gray sandstone, moist.	
5	SS	8	11 17 23		15				Dark brown to dark reddish brown, hard, CLAYEY SILT, starting to get shale texture, moist	
6	SS	12	11 24 44						Dark reddish brown, fissile SHALE, moist to damp	
									End of boring @ 17.5 feet	

*ASTM D1586
SS = SPLIT SPOON ST = SHELBY TUBE
D = DENNISON C = CORE CS = CONTINUOUS SAMPLER
CT = CUTTINGS OT = OTHER

WESTON

GEOLOGIC DRILL LOG	PROJECT NAME AND LOCATION: GMC FISHER GUIDE, Elyria, OH.	PAGE NO.: 1 of 1	HOLE NO.: P-8T

START	FINISH	DRILLER	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH
10/26/88	10/26/88	BOWSER	HSA	6"	2"	10.00'

LOGGER	TOP of CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED
G. KINSALL			'/'

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	NOTES
1	SS	10	3 4 5		5					Gray, slightly sticky, non-plastic CLAYEY SILT, trace of root hairs and organic material, wet.	
2	SS	8	4 6 11							Mottled light brown, orange, gray, hard, slightly plastic SILTY CLAY, a little fine sand, trace angular pebbles, moist.	
3	SS	1	100/3		10					Light brown, fine SANDSTONE, wet.	
										End of boring @ 10.0 feet	

*ASTM D1586
SS = SPLIT SPOON ST = SHELBY TUBE
D = DENNISON C = CORE CS = CONTINUOUS SAMPLER
CT = CUTTINGS OT = OTHER

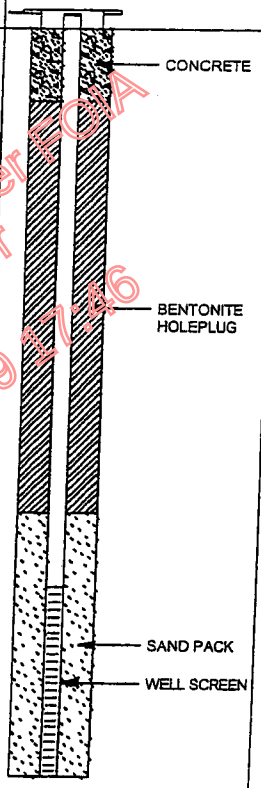
STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: REALM LANDFILL
PROJECT NUMBER: 12616-31
CLIENT: REALM
LOCATION: ELYRIA, OH

HOLE DESIGNATION: P-8R
DATE COMPLETED: May 29, 2002
DRILLING METHOD: HSA
FIELD PERSONNEL: D. NEWTON

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS
	SILTY CLAY, dark brown, moist, roots	
2	CL-SILTY CLAY, soft, dark brown, moist, sticky	2.00
4	CL-SILTY CLAY, medium plasticity, friable, light brown, orange and gray mottling, slightly moist	4.00
6	CL-CLAY, firm, light brown, orange mottling, sticky, dry - 4" sand lense, damp at 6.5ft BGS	6.00
8	CL-CLAY, silty, very soft, friable, light brown, damp - weathered gray sandstone, damp at 9.0ft BGS	8.00
10	CL-CLAY, mixed with gray weathered sandstone, competent, light brown, wet	10.00
12		
14		
16		
18		
20	END OF BOREHOLE @ 20.0ft BGS	20.00
22		
24		
26		
28		
30		
32		
34		

MONITOR INSTALLATION



WELL DETAILS
Screened interval:
15.00 to 20.00ft BGS
Length: 5ft
Diameter: 2in
Slot Size: .010
Sand Pack:
13.00 to 20.00ft BGS
Material: SILICA SAND

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
1			7	0
2			5	0
3			8	0
4			11	0
5			46	0
6				0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 12616.GPJ CRA_CORP.GDT 9/17/02

Well W-9

Well Construction Summary

Location or Coords: _____ Elevation: Ground Level _____

Top of Casing _____

Location Elyria, Ohio
Personnel Skip Ricketts - RFW

Project Phase 2 Groundwater Quality Assessment

Drilling Summary:

Total Depth 21'
Borehole Diameter 8" to 8.5', 4" to 15'
Driller Rich Gerald
Asst. Dave Wright
Rig 13-61 Mobile
Bit(s) 4 1/4 HSA, 3 7/8" roller bit Mill tooth
Drilling Fluid Water
Surface Casing 4" Drive Casing

Well Design:

Basis: Geologic Log ___ Geophysical Log ___
Casing String(s): C = Casing S = Screen

21'	- 16'	S		-	
16'	- +2	C_1		-	
-3	- +2	C_2		-	
	-			-	
	-			-	
	-			-	
	-			-	
	-			-	

Casing: C_1 #304 Sch 5 2" diameter Stainless Steel riser
C_2 6" diameter Protective Steel Casing
Screen: S_1 #304 Sch 5 2" diameter Stainless Steel.
S_2 0.010" slot
Centralizers
Filter Material #4 Quartz Sand - Coarse washed and graded 21'-13'
Cement Portland Type I Cement 2 bags cement with 15lb. Bentonite
Other Bentonite Pellets 13'-10'

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling:	1987		1987	
HSA	9/1	0850	9/1	0915
Rotary Wash	9/1	0915	9/1	1115
Geophys. Logging:				
Casing:				
C_1	9/1	1117	9/1	1120
C_2	9/1	1155	9/1	1200
Filter Placement:	9/1	1120	9/1	1125
Cementing:	9/1	1135	9/1	1150
Development:	9/2	1245	9/2	1315
Other:				
Bentonite Pellets	9/1	1125	9/1	1127

Well Development:

5 Volumes equals approximatly 10.6 gallons. Removed 11.1 gallons Water was initially clear becomming strongly turbid - reddish brown at 3 gallons removed. Continued development yielded mildly turbid light gray water at 8 gallons removed.

Comments:

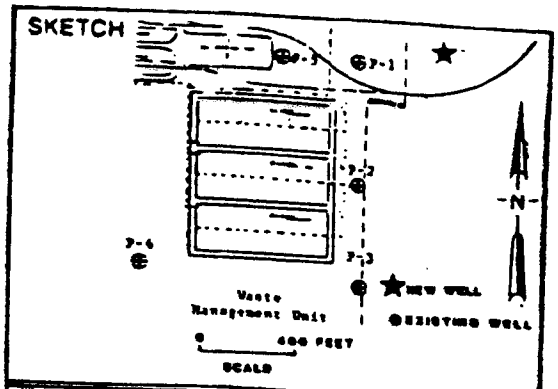
Drill HSA to 8.5' at Berea Sandstone
WOB-500 PSI
Ran out of drill water at 19' - 10:40 hrs. Resume drilling at 11:05hr

WESTON

DRILLING LOG

WELL NUMBER: W-9
LOCATION: East of P-1
OWNER: GMC Fisher Guide
ADDRESS: Elyria, OH
TOTAL DEPTH 21 ft.
SURFACE ELEVATION:
WATER LEVEL:
DRILLING COMPANY: Bowser Morner
DRILLING METHOD: HSA
DATE DRILLED: 9/1/87
DRILLER: Rick Gerald
HELPER: Dave Wright
LOG BY: Ricketts

SKETCH



NOTES:
No deflection on Hnu

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS/6"	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0		1	SPT	3 6 9 11	0-2ft. Slightly stiff, dark brown - medium gray with orange brown mottling, organic CLAY grading to CLAY, plastic, moist, abndt. root hairs (CH/CH)
		2		8 12 12 12	2-4ft. As above, however: stiff, less moist
		3		3 6 9 13	4-6ft. Slighty stiff, orange brown mottled with gray, CLAY plastic, moist, abndt. root hairs, traces of gravel-pebbles (CH)
		4		14 21 25 43	6-8ft. Very stiff, orange brown SILTY CLAY, slightly moist, trace of pebbles (CL). Shale at 7.5ft. fissile, brittle, gray-black cleavage faces oxidised.
10		5	cut-ting		8.5ft. Sandstone, tan, occ. brown bands, fine grain, friable moist, moderately hard
		6			Drill break at 12ft. 8.5-12ft. Sandstone, tan grading to light gray, fine-med. grain, fining down to gray shaly sand Shale in sanstone probably accounts for drill break
5					12-18ft. Sandstone, light gray, very fine grain, occ. thin shale interbeds
					Berea Sandstone to 21ft. Top of bedford shale at 21ft. Black, fissile mod hard

Well W-10

Well Construction Summary

Location or Coords: _____ Elevation: Ground Level _____

Top of Casing _____

Location Elyria, Ohio
Personnel Skip Ricketts - RFW

Phase 2 Groundwater Quality Assessment

Drilling Summary:

Total Depth 15'
Borehole Diameter 8" to 7 1/2'
4" to 15'
Driller Rick Gerald
Asst. Dave Wright
Rig Mobile 13-61
Bit(s) HSA, 3 7/8" roller bit
Drilling Fluid Water
Surface Casing 4" Drive Casing

Well Design:

Basis: Geologic Log X Geophysical Log _____
Casing String(s): C = Casing S = Screen

15	-	10	S		
10	-	+2	C_1		
-3	-	+2	C_2		

Casing: C1 #304 Sch. 5 Stainless Steel 2" diameter
C2 6" Protectibe Steel Casing

Screen: S1 #304 Sch 5 Stainless Steel 0.010" slot
S2 _____

Centralizers _____

Filter Material #4 coarse sand washed and graded 15 - 8'
Cement Portland Type 1 Cement 2 bags cement with 15lb. bentonite
Other Bentonite Pellets 8 - 6 1/2'

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling:	1987			
HSA	9/1	1545	9/1	1610
Rotary Wash	9/1	1645	9/1	1715
Geophys. Logging:				
Casing:				
C_1	9/1	1715	9/1	1725
C_2				
Filter Placement:	9/1	1725	9/1	1730
Cementing:	9/1	1745	9/1	1815
Development:	9/2	1400	9/2	1420
Other:				
Bentonite Pellets	9/1	1730	9/1	1733

Well Development:

5 volumes equals approximately 9 gallons Well dry after removing 3.5 gallons Well water was stronly turbid and red-brown colored.

Comments:

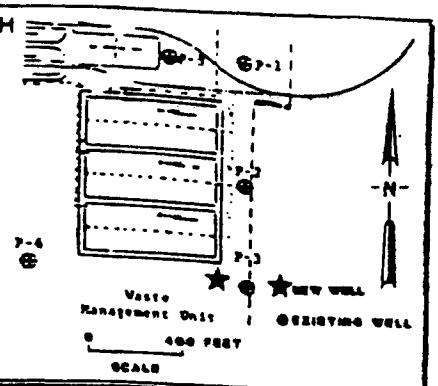
HSA drilling to 7 1/2'
Rotary wash drilling - 7 1/2 to 15'
Extremely hard drilling 7 1/2' -8½'

WESTON

DRILLING LOG

WELL NUMBER: W-10 OWNER: GMC Fisher Guide
LOCATION: Wooded area South of P-3 ADDRESS: Elyria, OH
TOTAL DEPTH 15'
SURFACE ELEVATION: WATER LEVEL:
DRILLING COMPANY: Bowser Morner DRILLING METHOD: HSA/Rotary DATE DRILLED: 9/1/87
DRILLER: Rick Gerald HELPER: Daves Wright
LOG BY: Ricketts

SKETCH



NOTES:
No readings on Hnu.

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0		1	SPT	3 8 10 11	0-2' Firm to hard, medium gray-brown CLAY with orange mottling, abundant root hair, moist-slightly moist (OH/CH)
		2		9 13 18 21	2-4' hard, orange brown mottled with gray, CLAY, non-plastic, occ. sm shale frags and pebbles, moist to dry (CH)
		3		6 9 18 41	4-6' Hard, mottled orange brown-gray CLAY, nonplastic, abndt. shale frags and root hairs, moist to dry (CH/CL)
		4		21 40 60/3	6-7.5' No Recovery
					7.0' top of Berea sandstone
10					
15					

WESTON

GEOLOGIC DRILL LOG	PROJECT NAME AND LOCATION	PAGE NO.	HOLE NO.
	GMC FISHER GUIDE, Elyria, OH.	1 of 1	P-11

START	FINISH	DRILLER	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH
10/27/88	10/27/88	BOWSER	HSA	6"	2"	13.00'

LOGGER	TOP of CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED
G. KINSALL			'/'

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	NOTES
1	SS	24	4 6 9		5					Mottled orange, light brown and gray, stiff to hard, slightly plastic CLAY, some silt, trace fine to medium pebbles, moist.	
2	SS	24	10 19 29							A/A	
3	SS	6	100/6		10					Light orangish brown, fine grained, weathered SANDSTONE, moist.	
										End of boring @ 13.0 feet	

*ASTM D1586
SS = SPLIT SPOON ST = SHELBY TUBE
D = DENNISON C = CORE CS = CONTINUOUS SAMPLER
CT = CUTTINGS OT = OTHER

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

(DL-01)
Page 1 of 1

PROJECT NAME: ELYRIA HYDRO INV.
PROJECT NUMBER: 12616-02
CLIENT: REALM
LOCATION: ELYRIA, OHIO

HOLE DESIGNATION: P-12
DATE COMPLETED: FEBRUARY 3, 2000
DRILLING METHOD: HSA/ TRICONE ROLLER
CRA SUPERVISOR: D. NEWTON

DEPTH ft. BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft.	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE STATE	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
0	TOPSOIL, trace roots		CONCRETE	1SS		4	0.0
2.5	SC-SAND, silty, light brown clay with orange mottling, trace roots, some black organic streaking, dry			2SS		7	0.0
	CL-SILTY CLAY, low plasticity, firm, light brown with some orange mottling, dry to moist						
5.0	- some black shale pieces mixed, moist to wet		BENTONITE SLURRY	3SS		8	0.0
7.5			2"Ø PVC CASING	4SS		15	0.0
	CL-CLAY, coarse shale cobbles mixed, hard, dark brown, dry, gray shale layer at 9.3' to 9.5', then dark brown clay with trace gray shale fines		8"Ø BOREHOLE	5SS		22	0.0
10.0	CL-SILTY CLAY, plastic, light brown, moist						
12.5	CL-CLAY, with black shale pieces, trace gray shale fines mixed, dark brown, dry		BENTONITE CHIPS	6SS		47	0.0
	- shale layer at 11.5' bgs, dark brownish-gray with red mottling						
15.0	SHALE, dry, gray						
	- weathered shale						
17.5	- orange, reddish shale		2"Ø PVC SCREEN				
20.0	- gray, weathered shale						
	- rustic orange, reddish shaled mixed with brownish, red shale		SANDPACK				
22.5	- brown shale						
25.0	END OF HOLE @ 24.5ft BGS						
27.5							
30.0							
32.5							

<u>SCREEN DETAILS</u>
Screened interval:
15.0 to 20.0ft BGS
Length: 10.0ft
Diameter: 2"
Slot Size: #10
Material: PVC
Sand Pack:
13.0 to 23.5ft BGS
Material: Sand

<u>NOTES:</u> MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▼ STATIC WATER LEVEL ▼

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

(OL-02)
Page 1 of 1

PROJECT NAME: ELYRIA HYDRO INV.
PROJECT NUMBER: 12616-02
CLIENT: REALM
LOCATION: ELYRIA, OHIO

HOLE DESIGNATION: P-12T
DATE COMPLETED: FEBRUARY 3, 2000
DRILLING METHOD: 4¼" HSA
CRA SUPERVISOR: D. NEWTON

DEPTH ft. BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft.	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE STATE	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
0	TOPSOIL, roots, grass		CONCRETE	1SS		14	0.0
	SC-SILTY SAND, clay sand mixture, trace roots, non-plastic, light brown, dry		BENTONITE				
2.5	CL-CLAY, some silty sand, fine, brown with some gray mottling, moist		2"Ø PVC CASING	2SS		7	0.0
	- some silty, trace sand, light brown, wet		8"Ø BOREHOLE	3SS		11	0.0
5.0	- some coarse black shale pieces, pieces of gray, fine sandstone, smooth, hard, light brown with reddish, brown mottling, dry		2"Ø PVC SCREEN	4SS		22	0.0
7.5			SANDPACK				
	CL-CLAY, trace pebbles, shale chips, hard, brownish gray, rock formation at 9.1, dry to moist			5SS		58	0.0
10.0	END OF HOLE @ 9.1ft BGS						
12.5							
15.0							
17.5							
20.0							
22.5							
25.0							
27.5							
30.0							
32.5							

SCREEN DETAILS
Screened interval:
4.1 to 9.1ft BGS
Length: 5.0ft
Diameter: 2"
Slot Size: #10
Material: PVC
Sand Pack:
3.1 to 9.1ft BGS
Material: Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▼ STATIC WATER LEVEL ▼

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

(DL-12)
Page 1 of 1

PROJECT NAME: HYDROGEOLOGIC INVESTIGATION
PROJECT NUMBER: 12618-02
CLIENT: REALM
LOCATION: ELYRIA, OHIO

HOLE DESIGNATION: P-13
DATE COMPLETED: MARCH 9, 2000
DRILLING METHOD: 4¼" HSA/AIR ROTARY
CRA SUPERVISOR: D. NEWTON

DEPTH ft. BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft.	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE STATE	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
0	CH-CLAY, topsoil, plastic, brown, damp		CONCRETE	1SS		38	0.0
2.5	CL-SILTY CLAY, some shale cobbles and friable sandstone cobbles, brown, dry - very stiff, light brown with orange-gray mottling, dry		BENTONITE CHIPS	2SS		9	0.0
5.0	- moist		2"Ø PVC CASING	3SS		21	0.0
7.5			8"Ø BOREHOLE	4SS		25	0.0
10.0	SANDSTONE, coarse shale and sandstne gravels, friable, tan/gray, wet - competent sandstone			5SS		--	0.0
12.5	(collect core sample from air rotary at 9-17ft BGS)						
15.0			2"Ø PVC SCREEN				
17.5	END OF HOLE @ 17.0ft BGS		SANDPACK				
20.0							
22.5							
25.0							
27.5							
30.0							
32.5							

SCREEN DETAILS
Screened interval:
12 to 17ft BGS
Length: 5.0ft
Diameter: 2"
Slot Size: #10
Material: PVC
Sand Pack:
10 to 17ft BGS
Material: Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ STATIC WATER LEVEL ▼

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

(DL-13)
Page 1 of 1

PROJECT NAME: HYDROGEOLOGIC INVESTIGATION
PROJECT NUMBER: 12616-02
CLIENT: REALM
LOCATION: ELYRIA, OHIO

HOLE DESIGNATION: P-13T
DATE COMPLETED: MARCH 9, 2000
DRILLING METHOD: 4¼" HSA
CRA SUPERVISOR: D. NEWTON

DEPTH ft. BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft.	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE STATE	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
0	CH-CLAY, topsoil, dark brown, moist		CONCRETE	1SS		33	0.0
2.5	- light brown sandstone, friable cobbles, dry		BENTONITE CHIPS	2SS		19	0.0
	- brown, wet		2"Ø PVC CASING	3SS		18	0.0
5.0	SANDSTONE, friable, tan, dry		8"Ø BOREHOLE	4SS		22	0.0
	CL-CLAY, some small sandstone fine gravels, very stiff, dark brown with gray mottling, dry		2"Ø PVC SCREEN	5SS		--	0.0
7.5			SANDPACK				
	BEDROCK, competent						
8.17	END OF HOLE @ 8.17ft BGS						
10.0			SCREEN DETAILS Screened interval: 3 to 8ft BGS Length: 5.0ft Diameter: 2" Slot Size: #10 Material: PVC Sand Pack: 2.5 to 8.17ft BGS Material: Sand				
12.5							
15.0							
17.5							
20.0							
22.5							
25.0							
27.5							
30.0							
32.5							

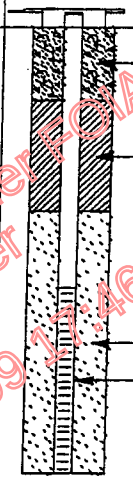
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▼ STATIC WATER LEVEL ▼

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: REALM LANDFILL
PROJECT NUMBER: 12616-31
CLIENT: REALM
LOCATION: ELYRIA, OH

HOLE DESIGNATION: P-14T
DATE COMPLETED: May 24, 2002
DRILLING METHOD: HSA
FIELD PERSONNEL: D. NEWTON

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS
	CL-CLAY, silty, compact, stiff, medium plasticity, friable, dark brown, dry, gravel fragments	
2	CL-CLAY, silty, firm, medium plasticity, gray clay with brown and orange streaking, gravel fragments, dry	2.00
4	CL-CLAY, medium plasticity, sticky, light brown with orange and gray mottling, slightly moist	4.00
6	CL-CLAY, silty, medium plasticity, brown, stick, gravel fragments, smooth, wet	6.00
8	CL-CLAY, silty, high plasticity, wet, sandstone (weathered), gray sandstone layer at 9.5'	8.00
10	- gray clay at 9.8ft BGS	
12	- wet, brown, silty clay mixed with gray weathered shale, sandy, hard, compact at 11.5ft BGS	12.00
	END OF BOREHOLE @ 12.0ft BGS	
14		
16		
18		
20		
22		
24		
26		
28		
30		
32		
34		



WELL DETAILS
Screened interval:
7.00 to 12.00ft BGS
Length: 5ft
Diameter: 2in
Slot Size: #10
Sand Pack:
5.00 to 12.00ft BGS
Material: SILICA SAND

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
1			15	0
2			14	0
3			3	0
4			20	0
5			44	0
6			33	0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 12616.GPJ CRA_CORP.GDT 8/22/02

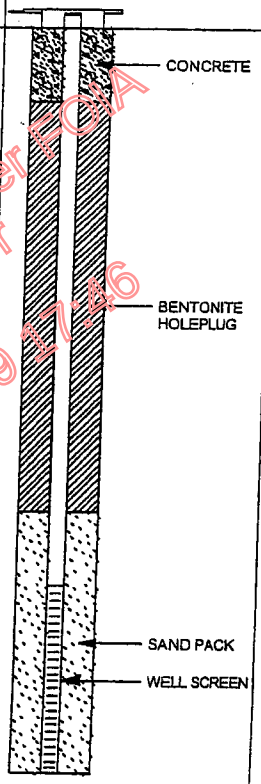
STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: REALM LANDFILL
PROJECT NUMBER: 12616-31
CLIENT: REALM
LOCATION: ELYRIA, OH

HOLE DESIGNATION: P-14
DATE COMPLETED: June 5, 2002
DRILLING METHOD: HSA
FIELD PERSONNEL: D. NEWTON

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS
	TOPSOIL	0.30
	CL-CLAY, poorly graded sands, light brown, moist to dry	
	- becoming dark-brown, rootlets, silty, dry at 0.8ft BGS	
	- becoming gray with orange mottling, some broken gravel fragments, medium plasticity, silty clay, dry at 2.0ft BGS	
	- decrease in sands at 4.0ft BGS	
	- light brown silty clay, dry, increase in gravel pieces, dry to moist at 6.0ft BGS	
	- increase in fine grained sands, moist to wet at 7.5ft BGS	
	- becoming hard, light brown, dry, friable at 8.5ft BGS	
	- light brown weathered sandstone at 9.8ft BGS	
	- shale layer, moist at 13.0ft BGS	13.20
	SANDSTONE, grey, wet	
	END OF BOREHOLE @ 20.0ft BGS	20.00

MONITOR INSTALLATION



WELL DETAILS
Screened interval:
15.00 to 20.00ft BGS
Length: 5ft
Diameter: 2in
Slot Size: #10
Sand Pack:
13.00 to 20.00ft BGS
Material: SILICA SAND

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
1			12	0
2			17	0
3			3	0
4			12	0
5			35	0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 12616.GPJ CRA_CORP.GDT 8/22/02

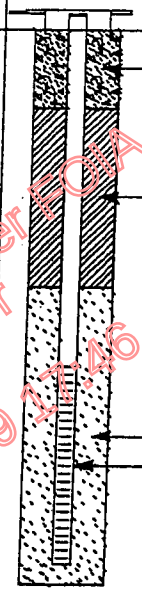
STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: REALM LANDFILL
PROJECT NUMBER: 12616-31
CLIENT: REALM
LOCATION: ELYRIA, OH

HOLE DESIGNATION: P-15T
DATE COMPLETED: May 23, 2002
DRILLING METHOD: HSA
FIELD PERSONNEL: D. NEWTON

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS
	TOPSOIL	0.30
	CL-CLAY, silty, medium plasticity, trace roots, some gravel fragments, firm, brown, orange mottling, dry	
	- grayish silty clay, moist at 3.0ft BGS - brown clay at 3.5ft BGS - damp at 4.0ft BGS	
	- light brown sand lense, wet at 7.0ft BGS	
	- brown sandstone, weathered fragments at 8.0ft BGS	
	- becoming firm, brown clay, dense, dry, some sand and gravel, poorly graded, mixed sand lense, wet, fine at 8.4ft BGS	
	- becoming compact, low plasicity, dry at 10.0ft BGS	
	CL-CLAY, some graded sands, firm, silty - weathered gray broken sandstone, hard, gray, moist, competant bedrock at 13.0ft BGS	12.00
	END OF BOREHOLE @ 14.0ft BGS	14.00

MONITOR INSTALLATION



WELL DETAILS
Screened interval:
8.50 to 13.50ft BGS
Length: 5ft
Diameter: 2in
Slot Size: #10
Sand Pack:
6.50 to 14.00ft BGS
Material: SILICA SAND

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
1			9	0
2			17	0
3			8	0
4			16	0
5			53	0
6			25	0
7			32	0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 12616.GPJ CRA_CORP.GDT 10/8/02

STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

PROJECT NAME: REALM LANDFILL
PROJECT NUMBER: 12616-31
CLIENT: REALM
LOCATION: ELYRIA, OH

HOLE DESIGNATION: P-15
DATE COMPLETED: May 30, 2002
DRILLING METHOD: HSA
FIELD PERSONNEL: D. NEWTON

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS
0	SW-SAND (FILL), well graded, trace vegetation, fine to coarse sands, dark brown, moist	0.30
	SP-FILL, poorly graded medium sands, black, moist	0.40
2	CL-SILTY CLAY, trace medium sands, trace subrounded gravel, very low plasticity, compact, orange/brown mottling throughout, moist	
4	- becoming gray at 2.2ft BGS - decrease in silts, increase in fine sands at 3.0ft BGS	
6	- becoming olive gray at 3.5ft BGS - some well graded gravels, fine, subangular to rounded brown/gray mottling, brown, moist at 5.2ft BGS	
8	- decrease in gravels and sands, moist at 6.3ft BGS - orange/brown mottling, moist at 6.8ft BGS - some well graded gravels, fine, subangular to subrounded at 7.0ft BGS - becoming brown, increase in density, dense, dry at 7.4ft BGS	8.00
10		
12	CL-SILTY CLAY (NATIVE), trace subangular fine gravel, compact, low plasticity, brittle, competent, gray, dry	12.00
14	Sandstone/shale, weathered, streaked, gray, saturated	
16		
18		
20		
22	END OF BOREHOLE @ 22.0ft BGS	22.00
24		
26		
28		
30		
32		
34		

MONITOR INSTALLATION

- CONCRETE
- BENTONITE HOLEPLUG
- SAND PACK
- WELL SCREEN

WELL DETAILS
Screened interval:
17.00 to 22.00ft BGS
Length: 5ft
Diameter: 2in
Slot Size: #10
Sand Pack:
15.00 to 22.00ft BGS
Material: SILICA SAND

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
1			9	0.0
2			24	0.0
3			8	0.0
4			14	0.0
5			55	0.0
6			12	0.0
7				0.0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 12616.GPJ CRA_CORP.GDT 8/22/02

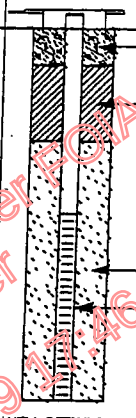
STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: REALM LANDFILL
PROJECT NUMBER: 12616-31
CLIENT: REALM
LOCATION: ELYRIA, OH

HOLE DESIGNATION: P-16T
DATE COMPLETED: May 24, 2002
DRILLING METHOD: HSA
FIELD PERSONNEL: D. NEWTON

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS
0	TOPSOIL, trace vegetation, well graded, fill sands, moist	0.40
2	CL-CLAY, silty, stiff, medium plasticity, brown, orange mottling throughout, dry	
4	- some gravel fragments mixed, compact clay at 4.5ft BGS	
6	- slightly moist, becoming friable, some well graded sands at 6.0ft BGS	
8	- gray sandstone, weathered, broken fragments, moist at 7.0ft BGS	
10	- competent gray sandstone, wet at 9.5ft BGS	10.00
12	END OF BOREHOLE @ 10.0ft BGS	
14		
16		
18		
20		
22		
24		
26		
28		
30		
32		
34		

MONITOR INSTALLATION



WELL DETAILS
Screened interval:
5.00 to 10.00ft BGS
Length: 5ft
Diameter: 2in
Slot Size: #10
Sand Pack:
3.00 to 10.00ft BGS
Material: SILICA SAND

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
1			9	0
2			10	0
3			18	0
4			44	0
5			>60	0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 12616.GPJ CRA_CORP.GDT 8/22/02

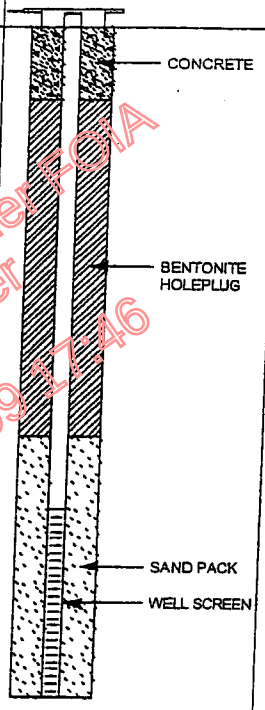
STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: REALM LANDFILL
PROJECT NUMBER: 12616-31
CLIENT: REALM
LOCATION: ELYRIA, OH

HOLE DESIGNATION: P-16
DATE COMPLETED: June 5, 2002
DRILLING METHOD: HSA
FIELD PERSONNEL: D. NEWTON

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS
	TOPSOIL, some sandy fill, trace vegetation, moist	0.30
	CL-CLAY, silty, medium plasticity, stiff, brown, orange mottling, dry	
	- becoming more firm, some brown angular gravel fragments at 4.8ft BGS	
	- becoming moist, friable, more sandy, gray mottling at 6.0ft BGS	
	- weathered gray sandstone, broken fragments, poorly graded fine sands mixed, moist at 7.5ft BGS	
	SANDSTONE, competent, gray, wet	9.20
	- Bedrock fracture. Sandstone bedrock pieces mixed between coarse flakes to fine beds to large chunks from the fracture, at 14.5ft BGS	
	END OF BOREHOLE @ 18.0ft BGS	18.00

MONITOR INSTALLATION



WELL DETAILS
Screened interval:
13.00 to 18.00ft BGS
Length: 5ft
Diameter: 2in
Slot Size: #10
Sand Pack
11.00 to 18.00ft BGS
Material: SILICA SAND

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
1			10	0
2			11	0
3			16	0
4			37	0
5			53	0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 12616.GPJ CRA_CORP.GDT 8/22/02

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Bedrock Investigation
PROJECT NUMBER: 012616-60
CLIENT: REALM
LOCATION: Realm Landfill, Elyria, Ohio

HOLE DESIGNATION: P-17
DATE COMPLETED: 26 June 2003
DRILLING METHOD: 6¼" HSA/NX Coring/4 7/8" Reaming
FIELD PERSONNEL: Brad Trytten

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Borehole	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID
	GROUND SURFACE	752.16						
0	CL - CLAY (Till), silty, trace sand, firm, fine to coarse sand, moderate plasticity, poorly graded, medium brown, damp		Concrete	1		58	7	0.0
2	SC/CH - SAND and CLAY (Till), silty, trace fine gravel, firm to stiff, fine to coarse sand, high plasticity, slight dilatency, poorly graded, medium brown, wet	750.66		2		67	10	0.0
4			8 1/4 inch Ø Borehole	3		92	8	0.0
6	SM - SAND (Till), silty, clayey, trace fine gravel, firm, fine to coarse sand, non-plastic, slight dilatency, poorly graded, dark brown, wet	746.66	6 inch Ø PVC Casing					
8	ML - SILT (Till), clayey, with sand, trace fine gravel, stiff to very stiff, fine to coarse sand, moderate plasticity, slight dilatency, poorly graded, dark brown, wet - becomes gray brown, very stiff, damp	745.66	2 inch Ø PVC Riser	4		75	10	0.0
10			Bentonite Gravel	5		92	22	0.0
12	Bedrock - Sandstone (Berea Formation),medium gray, silty, very fine sandstone, laminated to thin bedded, moderately cemented, low angle cross-bedded/laminated, dark gray to black mica flakes on laminations, numerous near-horizontal fractures (primarily mechanical), approximately 1/2 to 1 gpm water entering corehole, poor recovery END OF OVERBURDEN HOLE @ 12.0ft BGS	740.66	Bentonite Gravel	6		58	26	0.0
14								
16								
18								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 12616 - ELYRIA.GPJ CRA_CORP.GDT 2/3/04

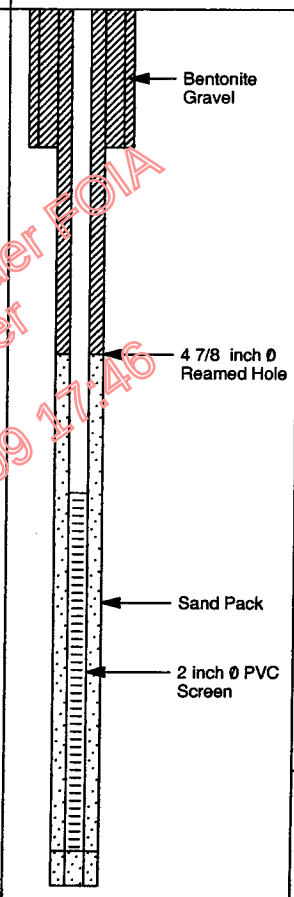
STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: Bedrock Investigation
PROJECT NUMBER: 012616-60
CLIENT: REALM
LOCATION: Realm Landfill, Elyria, Ohio

HOLE DESIGNATION: P-17
DATE COMPLETED: 26 June 2003
DRILLING METHOD: 6¼" HSA/NX Coring/4 7/8" Reaming
FIELD PERSONNEL: Brad Trytten

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL
12	Bedrock - Sandstone (Berea Formation),medium gray, silty, very fine sandstone, laminated to thin bedded, moderately cemented, low angle cross-bedded/laminated, dark gray to black mica flakes on laminations, numerous near-horizontal fractures (primarily mechanical), approximately 1/2 to 1 gpm water entering corehole, poor recovery	740.66
14	Poor core recovery, fractures (primarily mechanical), spaced 1 to 1 1/2", numerous drilling and air compressor problems	737.16
16	Hole reamed out to 4 7/8" diameter to 16'2 ft BGS	
	Poor core recovery	735.99
18	Poor core recovery	733.91
20		
	Hole reamed out to 4 7/8" diameter	731.16
22	END OF BOREHOLE @ 22.7ft BGS	729.49
24	Bedrock material difficult to core. Temporary 6-inch diameter PVC casing installed, could not remove. RQD = 0 due to poor core recovery	
26		
28		

Borehole



WELL DETAILS
Screened interval:
735.16 to 730.16ft AMSL
17.00 to 22.00ft BGS
Length: 5ft
Diameter: 2in
Slot Size: 10
Material: PVC
Seal:
750.16 to 737.16ft AMSL
2.00 to 15.00ft BGS
Material: Bentonite Gravel
Sand Pack:
737.16 to 729.49ft AMSL
15.00 to 22.67ft BGS
Material: #5, #7 Sand

RUN NUMBER	CORE RECOVERY %	RQD %
1	58	0
2	36	0
3	28	0
4	18	0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

BEDROCK LOG 12616 - ELYRIA.GPJ CRA_CORP.GDT 2/3/04

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Bedrock Investigation
PROJECT NUMBER: 012616-60
CLIENT: REALM
LOCATION: Realm Landfill, Elyria, Ohio

HOLE DESIGNATION: P-18
DATE COMPLETED: 30 June 2003
DRILLING METHOD: 6¼" HSA/NX Coring/4 7/8" Reaming
FIELD PERSONNEL: Brad Trytten

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL
	GROUND SURFACE	748.47
0	CH - CLAY (Till), silty, with sand, firm to stiff, fine to coarse sand, moderate plasticity, poorly graded, medium brown to medium orange brown, moist, occasional pebble	
2	- sandstone cobble	
4	- 12" of gray, silty till, wet	
6	- becomes dark brown, mottled with gray	
8		
10	- becomes dark gray, moist to wet, occasional sandstone fragments, coarse gravel to cobble size	
	Sandstone Boulder (misidentified as bedrock)	736.97
12	- Hole reamed out to 12.3 ft, collapsed to 11.67 ft	
	CL - CLAY, silty, trace sand, trace gravel, hard, fine to coarse sand, fine gravel, low plasticity, poorly graded, dark brown, moist to wet, occasional thin sandy zones	734.97
14		
16		
	END OF OVERBURDEN HOLE @ 17.0ft BGS	
18		

Monitoring Well: Concrete; 8 1/4 inch Ø Borehole; 2 inch Ø PVC Riser; 6 inch Ø PVC Casing; Bentonite Gravel; Bentonite Gravel; 4 7/8 inch Ø Reamed Hole

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID
1		75	12	0.0
2		58	13	0.0
3		67	9	0.0
4		75	24	0.0
5		75	33	0.0
6		33	50/4"	0.0
7		83	79	0.0
8		83	68	0.0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 12616 - ELYRIA.GPJ CRA_CORP.GDT 2/3/04

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: Bedrock Investigation
PROJECT NUMBER: 012616-60
CLIENT: REALM
LOCATION: Realm Landfill, Elyria, Ohio

HOLE DESIGNATION: P-18
DATE COMPLETED: 30 June 2003
DRILLING METHOD: 6¼" HSA/NX Coring/4 7/8" Reaming
FIELD PERSONNEL: Brad Trytten

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	RUN NUMBER	CORE RECOVERY %	RQD %
18	BEDROCK, shale, dark gray-green, highly weathered to clay, laminated, with fragments of less weathered shale - Collected Split Spoon from 17.5' to 18.5', (100% Recovery, N>85) - becomes dark red-brown, gradational color change - 10" shale fragements recovered by coring from 18.5 to 24 ft BGS, few fragments dark gray-green, most dark red-brown	731.47				
20				1	10"	
22						
24	- alternating thin layers of gray-green and red-brown shale, collected with Split Spoon Sampler from 24' to 24.5' (67% Recovery, N>100) - borehole reamed out, dry red-brown shale cuttings in air return		Sand Pack			
26	- red-brown shale fragments recovered by coring, hole reamed out, Split Spoon Sampler Driven from 25.5' to 26' (2" Recovery, N>100) - core 25.5 to 28 ft BGS, recover 10 inches of red-brown weathered shale fragments, to 1.5 inch long axis		2 inch Ø PVC Screen	2	10"	
28	END OF BOREHOLE @ 28.3ft BGS	720.14				
30						
32						
34						

WELL DETAILS
Screened interval:
725.30 to 720.14ft AMSL
23.17 to 28.33ft BGS
Length: 5.16ft
Diameter: 2in
Slot Size: 10
Material: PVC
Seal:
746.47 to 727.47ft AMSL
2.00 to 21.00ft BGS
Material: Bentonite Gravel
Sand Pack:
727.47 to 720.14ft AMSL
21.00 to 28.33ft BGS
Material: #5, #7 Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

BEDROCK LOG 12616 - ELYRIA.GPJ CRA_CORP.GDT 2/3/04

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Bedrock Investigation
PROJECT NUMBER: 012616-60
CLIENT: REALM
LOCATION: Realm Landfill, Elyria, Ohio

HOLE DESIGNATION: P-19
DATE COMPLETED: 27 June 2003
DRILLING METHOD: 6¼" HSA/NX Coring/4 7/8" Reaming
FIELD PERSONNEL: Brad Trytten

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID
	GROUND SURFACE	747.59						
0	CH - CLAY (Till), silty, with sand, firm to very stiff, fine to coarse sand, moderate plasticity, poorly graded, orange brown, mottled gray, moist, occasional pebbles - near-vertical fracture, mottled gray, rootlets		Concrete	1		92	7	0.0
2				2		75	1	0.0
4			6 inch ∅ PVC Casing 8 1/4 inch ∅ Borehole	3		96	18	0.0
6	- near-vertical fracture, mottled gray, becomes trace fine gravel		2 inch ∅ PVC Riser Bentonite Gravel	4		100	31	0.0
8		739.09		5		0	>50	0.0
10	BEDROCK - Sandstone (Berea Formation), silty, very fine to fine sand, orange-brown, thin bedded, some fragments light gray - Hole reamed out to 10 ft BGS END OF OVERBURDEN HOLE @ 10.0ft BGS		Bentonite Gravel					
12								
14								
16								
18								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 12616 - ELYRIA.GPJ CRA_CORP.GDT 2/3/04

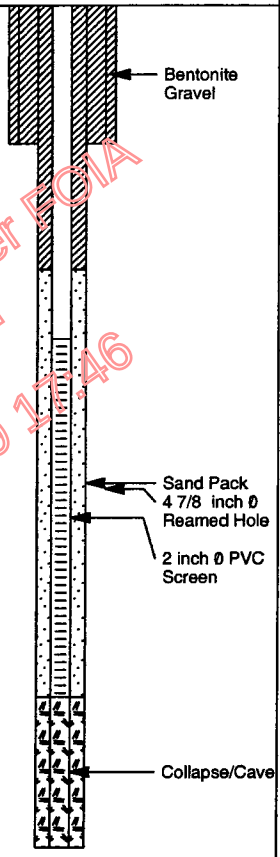
STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: Bedrock Investigation
PROJECT NUMBER: 012616-60
CLIENT: REALM
LOCATION: Realm Landfill, Elyria, Ohio

HOLE DESIGNATION: P-19
DATE COMPLETED: 27 June 2003
DRILLING METHOD: 6¼" HSA/NX Coring/4 7/8" Reaming
FIELD PERSONNEL: Brad Trytten

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL
	BEDROCK - Sandstone (Berea Formation), silty, very fine to fine sand, orange-brown, thin bedded, some fragments light gray	739.09
10	- Hole reamed out to 10 ft BGS	
	- becomes silty, very fine sand, medium gray no core recover from 10.5' to 15', drove very hard boulder into bedrock	
12		
14	sample collected with split Spoon Sampler from 14' to 15.5' (89% Recovery, N=134), dark gray shale, highly weathered to clay, with shale fragments, dark gray	733.59
	light gray, silty, very fine sandstone, moderately cemented	733.42
	dark gray weathered shale	733.09
	light gray, silty, very fine sandstone	732.92
	dark gray weathered shale	732.67
16	sample collected with Split Spoon Sampler from 16' to 17.5' (89% Recovery, N>140), interbedded highly weathered shale, dark gray with siltstone, medium gray-brown, and silty very fine sandstone, light gray, borehole reamed out to 17.5'	732.26
	light gray-green, silty very fine sandstone, colected with Split Spoon Sampler (17% Recovery, N>100), hole reamed out to 18' 3"	730.09
18	- Hole reamed out, collapsed to 18'	729.09
20	END OF BOREHOLE @ 20.2ft BGS	727.42
22		
24		
26		

Monitoring Well



WELL DETAILS
Screened interval:
734.76 to 729.59ft AMSL
12.83 to 18.00ft BGS
Length: 5.17ft
Diameter: 2in
Slot Size: 10
Material: PVC
Seal:
745.59 to 735.76ft AMSL
2.00 to 11.83ft BGS
Material: Bentonite Gravel
Sand Pack:
735.76 to 729.59ft AMSL
11.83 to 18.00ft BGS
Material: #5, #7 Sand

RUN NUMBER	CORE RECOVERY %	RQD %
1	3%	0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

BEDROCK LOG 12616 - ELYRIA.GPJ CRA_CORP.GDT 2/3/04

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Bedrock Investigation
PROJECT NUMBER: 012616-60
CLIENT: REALM
LOCATION: Realm Landfill, Elyria, Ohio

HOLE DESIGNATION: P-20
DATE COMPLETED: 1 July 2003
DRILLING METHOD: 6¼" HSA/NX Coring/4 7/8" Reaming
FIELD PERSONNEL: Brad Trytten

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID
	GROUND SURFACE	745.98						
	Topsoil	745.81	Concrete	1		58	16	0.0
	SP - SAND, trace silt, loose, fine to coarse sand, poorly graded, medium gray brown, wet	745.48						
2	CH - CLAY (Till), silty, with sand, firm to stiff, moderate plasticity, poorly graded, orange brown, mottled dark gray, moist, occasional pebble			2		67	15	0.0
4	- becomes olive brown - 3" layer of CH - Clay, soft, dark gray green, wet		6 inch Ø PVC Casing 8 1/4 inch Ø Borehole	3		67	12	0.0
6			Bentonite Gravel 2 inch Ø PVC Riser	4		67	16	0.0
	BEDROCK - Sandstone, very fine to fine sand, light orange to gray	738.98						
8	- Hole reamed out to 9'							
10	- becomes medium gray-green sandstone, fine to coarse grained, well cemented, unfractured, cross-bedded, occasional dark gray streaks, (possibly plant material), occasional pyrite nodules 1 to 4mm END OF OVERBURDEN HOLE @ 9.0ft BGS							
12								
14								
16								
18								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 12616 - ELYRIA.GPJ CRA_CORP.GDT 2/3/04

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: Bedrock Investigation
PROJECT NUMBER: 012616-60
CLIENT: REALM
LOCATION: Realm Landfill, Elyria, Ohio

HOLE DESIGNATION: P-20
DATE COMPLETED: 1 July 2003
DRILLING METHOD: 6¼" HSA/NX Coring/4 7/8" Reaming
FIELD PERSONNEL: Brad Trytten

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	RUN NUMBER	CORE RECOVERY %	RQD %
10	- becomes medium gray-green sandstone, fine to coarse grained, well cemented, unfractured, cross-bedded, occasional dark gray streaks, (possibly plant material), occasional pyrite nodules 1 to 4mm - probable fracture, orientation unknown Shale, red-brown, laminated, weathered to clay, trace silt, damp to moist, with fragments of less weathered shale	735.98	Bentonite Gravel	1	20	0
12						
14	- Collected Split Spoon Sample from 14' to 15' (100% Recovery, N>110)		Sand Pack 4 7/8 inch ∅ Reamed Hole			
16	- Collected Split Spoon Sample from 16.5' to 17.5' (100% Recovery, N>105)		2 inch ∅ PVC Screen			
18		727.81				
	END OF BOREHOLE @ 18.5ft BGS					
20						
22						
24						
26						

WELL DETAILS
Screened interval:
732.98 to 727.81ft AMSL
13.00 to 18.17ft BGS
Length: 5.17ft
Diameter: 2in
Slot Size: 10
Material: PVC
Seal:
743.98 to 734.90ft AMSL
2.00 to 11.08ft BGS
Sand Pack:
734.90 to 727.81ft AMSL
11.08 to 18.17ft BGS
Material: #5, #7 Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

BEDROCK LOG 12616 - ELYRIA.GPJ CRA_CORP.GDT 2/3/04

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Bedrock Investigation
PROJECT NUMBER: 012616-60
CLIENT: REALM
LOCATION: Realm Landfill, Elyria, Ohio

HOLE DESIGNATION: P-21
DATE COMPLETED: 2 July 2003
DRILLING METHOD: 6¼" HSA/NX Coring/4 7/8" Reaming
FIELD PERSONNEL: Brad Trytten

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL
	GROUND SURFACE	748.40
0	CLAY (FILL), silty, with sand, trace gravel, hard, fine to coarse sand, fine gravel, moderate plasticity, poorly graded, medium brown, to medium gray-brown, damp, crumbly	
2	- Sandstone cobble	
4	CH - CLAY (TILL), silty, with sand, trace gravel, very stiff to hard, fine to coarse sand, fine gravel, moderate plasticity, poorly graded, orange brown, mottled gray, moist	744.40
6		
8	- becomes medium gray, wet	
	- Sandstone cobble	
10	SM - SAND (Till), silty, clayey, with gravel, hard, very fine to fine sand, fine to coarse gravel, slight plasticity, slight dilatency, poorly graded, dark gray, wet	738.40
12	BEDROCK - weathered sandstone, very fine to fine sand, clayey, (auger flight samples), dark gray, wet	736.40
14	END OF OVERBURDEN HOLE @ 14.0ft BGS	
16		
18		

Monitoring Well: Concrete; 8 1/4 inch Ø Borehole; 2 inch Ø PVC Riser; 6 inch Ø PVC Casing; Bentonite Gravel; Bentonite Gravel

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID
1		95	31	0.0
2		16	56	0.0
3		95	32	0.0
4		100	22	0.0
5		90	37	0.0
6		100	66	0.0
7		0	>50	NA

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 12616 - ELYRIA.GPJ CRA_CORP.GDT 2/3/04

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: Bedrock Investigation
PROJECT NUMBER: 012616-60
CLIENT: REALM
LOCATION: Realm Landfill, Elyria, Ohio

HOLE DESIGNATION: P-21
DATE COMPLETED: 2 July 2003
DRILLING METHOD: 6¼" HSA/NX Coring/4 7/8" Reaming
FIELD PERSONNEL: Brad Trytten

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	Monitoring Well	RUN NUMBER	CORE RECOVERY %	RQD %
14	BEDROCK - weathered sandstone, very fine to fine sand, clayey, (auger flight samples), dark gray, wet	736.40				
16	- sandstone, medium gray-green, very fine to fine sand, silty, massive to laminated, cross-bedded where laminated, occasional black specks and streaks, mechanical fractures 1 1/" - 2" spacing		4 7/8 inch Ø Reamed Hole	1	39	0
18	BEDROCK - Shale, green, weathered to clay with less weathered shale fragments, laminated, dry to damp, collected with Split Spoon Sampler from 18' to 20' (83% Recovery, N=85)	730.40	Sand Pack			
20	- red-brown, near vertical fracture - Collected Split Spoon Sample from 20' to 21' (50% Recovery, N>50)		2 inch Ø PVC Screen			
22	END OF BOREHOLE @ 22.0ft BGS	726.40				
24						
26						
28						
30						

WELL DETAILS
Screened interval:
732.40 to 727.23ft AMSL
16.00 to 21.17ft BGS
Length: 5.17ft
Diameter: 2in
Slot Size: 10
Material: PVC
Seal:
746.40 to 733.90ft AMSL
2.00 to 14.50ft BGS
Material: Bentonite Gravel
Sand Pack:
733.90 to 726.40ft AMSL
14.50 to 22.00ft BGS
Material: #5, #7 Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

BEDROCK LOG 12616 - ELYRIA.GPJ CRA_CORP.GDT 2/3/04

APPENDIX B

INSPECTION FORM

Semi-Monthly Inspection Form

Inspector Name:_____
Company:_____
Date:_____

ALL FAILURES ARE TO BE ADDRESSED WITH PROPER NOTIFICATION OF AUTHORITIES AND CORRECTIVE ACTION.

LANDFILL INSPECTION GUIDE CLOSED LANDFILL ELYRIA, OHIO

CAP & BERM

Inspect for deep root penetration, burrowing animals, soil erosion and slope failures.
Inspect the landfill cap and berm for water ponding and washouts.
OBSERVATION_____
_____
CORRECTIVE ACTION _____
_____Date_____

SPILL CONTROL

Inspect for presence of drums, sandbags, shovels at each leachate tank storage location.
OBSERVATION_____
_____ CORRECTIVE
ACTION_____
_____Date_____

VEGETATION

Inspect for proper vegetation height (max. 6") and solid growth.
OBSERVATION_____
_____
CORRECTIVE ACTION_____
_____Date_____

ACCESS ROADS

Inspect for sufficient gravel and proper drainage.
OBSERVATION_____
_____ CORRECTIVE
ACTION_____
_____Date_____

MONITOR WELLS

Inspect for secure guard casings, locking caps, proper vegetation height around well (4' radius), corrosion of guard casing, visible ID number.
OBSERVATION_____
_____ CORRECTIVE
ACTION_____
_____Date_____

SITE PRIMARY FENCE

Inspect all perimeter fencing and gates for damage or unauthorized entry and proper warning signs.
OBSERVATION_____
_____ CORRECTION
ACTION_____
_____

SECONDARY CONTAINMENT

Inspect for rainwater accumulation in the containment surrounding the leachate storage tanks, inspect for cracks or other structure failures.

OBSERVATION_____
_____ CORRECTIVE ACTION_____
_____Date_____

SURVEY BENCHMARKS

Inspect for signs of disturbance.

OBSERVATION_____
_____

CORRECTIVE ACTION_____
_____Date_____

ELECTRICAL SUPPLY

Inspect for operating electrical current.

OBSERVATION_____
_____ CORRECTIVE ACTION_____
_____Date_____

PRIMARY SUMP

Measure liquid level in each primary sump:

Sump	Depth to Water	Action Level*
NW Primary Sump	_____ ft	< 13.2 ft
NE Primary Sump	_____ ft	< 13.4 ft
SW Primary Sump	_____ ft	< 13.7 ft
SE Primary Sump	_____ ft	< 12.4 ft

*Remove leachate within 48 hours if depth to water is less than action level.

CORRECTIVE ACTION_____
_____Date_____

SECONDARY SUMP

Inspect for liquid content by visual identification or by pumping for removal.

OBSERVATION_____
_____

CORRECTIVE ACTION_____
_____Date_____

STORAGE TANKS

Inspect the tank and valves for damage.

OBSERVATION_____
_____

CORRECTIVE ACTION_____
_____Date_____

APPENDIX C

FIELD SAMPLING / LOGGING FORMS

>>> Select a Laboratory <<<

#N/A
#N/A
#N/A
#N/A

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Regulatory Program: ☐ DW ☐ NPDES ☐ RCRA ☐ Other:

TestAmerica Laboratories, Inc.

Client Contact	**Project Manager:**	**Site Contact:**	**Date:**	COC No:
Your Company Name here	**Tel/Fax:**	**Lab Contact:**	**Carrier:**	_____ of _____ COCs
Address	**Analysis Turnaround Time**			Sampler:
City/State/Zip	☐ CALENDAR DAYS ☐ WORKING DAYS			**For Lab Use Only:**
(xxx) xxx-xxxx Phone	TAT if different from Below _____			Walk-in Client:
(xxx) xxx-xxxx FAX	☐ 2 weeks			Lab Sampling:
Project Name:	☐ 1 week			
Site:	☐ 2 days			Job / SDG No.:
P O #	☐ 1 day			

Sample Identification	**Sample Date**	**Sample Time**	**Sample Type (C=Comp, G=Grab)**	**Matrix**	**# of Cont.**	**Filtered Sample (Y / N)**	**Perform MS / MSD (Y / N)**															Sample Specific Notes:

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other _____

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)

☐ Return to Client ☐ Disposal by Lab ☐ Archive for_____ Months

Special Instructions/QC Requirements & Comments:

Custody Seals Intact: ☐ Yes ☐ No	Custody Seal No.:	Cooler Temp. (°C): Obs'd:_____ Corr'd:_____ Therm ID No.:_____

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:

HALEY & ALDRICH

LOW-FLOW SAMPLING FIELD FORM

Monitoring Well I.D.:	Date:	Time Started:	File Number:
Weather Conditions:		Time Ended:	Field Personnel:

Initial Readings

Measured Well Bottom (TOR-ft)	Riser Pipe Diameter (in.)
Measured Water Level (TOR-ft)	PID background (ppm)
Notes:	PID headspace (ppm)

Well Condition

Well Riser Type (place an X in one box)		Stainless Steel		Carbon Steel		PVC

Casing Condition:	OK		Repair Required:
Cap Condition:	OK		Repair Required:
Paint Condition:	OK		Repair Required:
Lock Condition:	OK		Repair Required:
Inner Casing Condition:	OK		Repair Required:
Surface Seal Condition:	OK		Repair Required:
Other:	OK		Repair Required:

Purge Information

Purging Method:		Peristaltic Pump		Bladder Pump		Grundfos Pump		Other:

Purge Start Time:	
Water Level Prior to Purging (TOR ft.)	Water Level After Purging (TOR ft.)
Amount Purged:	Flow Rate (mL per minute):
Comments:	

Time Elapsed (min)	Temperature (deg C)	pH	Conductivity (mS/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)	Redox (ORP)	Water Level (TOR ft)	Comments

Sampling Information

Date:	Time Sampled:	Field Personnel:

Measured Water Level (TOR ft):										
Sampling Method: (place X in box)		Stainless Steel Bailer		Peristaltic Pump		Grundfos Pump		Teflon Bailer
		Polyethylene Bailer		Bladder Pump		Other:		

Analysis:	
Sample ID:	
Odor:	Appearance:
QA/QC Samples Taken:	
Comments:	

Sampler (Print)	Sampler (signature):	Date:

HALEY& ALDRICH

EQUIPMENT CALIBRATION LOG

Project Name: _____
Location: _____
Model Name: _____
Model Number: _____

Employee Signature: _____
Employee Name: _____
Cal. Standards: _____
Serial Number: _____

Date	Time	GW Monitoring Standard						Calibration/Check Results						PID Standard	Calibration/ Check Result	Calibra-tion?	Check?
		pH	Temp.	Cond.	ORP	DO	Turb.	pH	Temp.	Cond.	ORP	DO	Turb.				

Other Comments: _____

HALEY & ALDRICH

DAILY FIELD REPORT

Page of

Project		**Report No.**	
Location		**Date**	
Client		**Page**	of
Contractor		**File No.**	
Weather		**Temperature**	

Field Representative(s)	**Time on site**	**Report/Travel/Other**	**Total hours**

Distribution:

Haley & Aldrich, Inc.

HALEY & ALDRICH

GROUNDWATER MONITORING REPORT

OW/PZ NUMBER

Page ______ **of** ______

PROJECT ________________________________ **H&A FILE NO.** ______________

LOCATION ________________________________ **PROJECT MGR.** ______________

CLIENT ________________________________ **FIELD REP.** ______________

CONTRACTOR ________________________________ **DATE** ______________

ELEVATION OF REFERENCE POINT ______________ **REFERENCE POINT: Ground Surface** ☐ **PVC** ☐ **Other** ☐

Date	Time	Elapsed Time (days)	Depth of Water from Reference Point	Elevation of Water	Remarks	Read By

HALEY & ALDRICH

GROUNDWATER SAMPLING RECORD

Page of

PROJECT		**H&A FILE NO.**	
LOCATION		**PROJECT MGR.**	
CLIENT		**FIELD REP**	
CONTRACTOR		**DATE**	

GROUNDWATER SAMPLING INFORMATION

Well No.							
Water Depth (ft)							
Time							
Product							
Depth Of Well (ft)							
Inside Diameter (in)							
Standing Water Depth (ft) (1)							
Volume Of Water In Well (gal)							
Purging Device							
Volume of Bailer/Pump Capacity							
Cleaning Procedure							
Bails Removed/ Volume Removed							
Time Purging Started							
Time Purging Stopped							
Sampling Device							
Cleaning Procedure							
TIME SAMPLES TAKEN	VOA						
	ABN						
	Metals						
PARAMETERS	Color						
	Odor						
	pH						
	Conductivity						
	Turbidity						
	Dissolved Oxygen						
	Temp, ^{0} C						
	Salinity						

Remarks: (ie: field filtrations, persons communicated with at site, etc.)

1. Standing Water Depth = Depth of Well - Water Depth

LOW-FLOW GROUNDWATER SAMPLING RECORD

Page of

PROJECT		**H&A FILE NO.**	
LOCATION		**PROJECT MGR.**	
CLIENT		**FIELD REP**	
CONTRACTOR		**DATE**	

GROUNDWATER SAMPLING INFORMATION

Well ID		
Depth Of Well (ft.) per Log		
Reference Mark		
Depth to Water from Reference Mark (ft.)		
Time		
Depth to Product (ft.)		
Field Measured Depth Of Well (ft.)		
Inside Diameter (in.)		
Standing Water Depth (ft.)		
Volume Of Water In Well (gallons/liters)		
Purging Device		
Volume of Bailer/Pump Capacity		
Cleaning Procedure		
Bails Removed/ Volume Removed		
Time Purging Started		
Time Purging Stopped		
Instrument Used to Monitor Field Parameters		
Sampling Device		
Cleaning Procedure		
Color		
Odor		

TIME SAMPLES TAKEN	VOA		
	ABN		
	Metals		

PARAMETERS	Time													
	Temp, C													
	Conductivity (umhos/cm)													
	Dissolved Oxygen (mg/L)													
	pH													
	ORP													
	Drawdown Ft													
	Volume purged/Gals													
	Turbidity (NTU)													

Remarks: (ie: field filtrations, persons communicated with at site, etc.)