

FORMER CRUCIBLE SPECIALTY METALS LANDFILL
ONONDAGA COUNTY
TOWN OF GEDDES, NEW YORK

SITE MANAGEMENT PLAN

NYSDEC Site Number: 734021

Prepared for:

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Revisions to Final Approved Site Management Plan:

Revision No.	Date Submitted	Summary of Revision	NYSDEC Approval Date
0	9-19-2024	Initial SMP Submittal	

SEPTEMBER 2024

CERTIFICATION STATEMENT

I, JEFFREY P. LAMBERT, certify that I am currently a NYS registered professional engineer and that this Site Management Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).



A handwritten signature in cursive script, appearing to read "Jeff Lambert", written in blue ink.

P.E.

9-19-2024

DATE

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List of Acronyms

ASP	Analytical Services Protocol
CAMP	Community Air Monitoring Plan
CFR	Code of Federal Regulation
COC	Certificate of Completion
CP	Commissioner Policy
DER	Division of Environmental Remediation
EC	Engineering Control
ECL	Environmental Conservation Law
ELAP	Environmental Laboratory Approval Program
EWP	Excavation Work Plan
GHD	GHD Consulting Services Inc.
HASP	Health and Safety Plan
IC	Institutional Control
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYCRR	New York Codes, Rules and Regulations
O&M	Operation and Maintenance
OM&M	Operation, Maintenance and Monitoring
P.E. or PE	Professional Engineer
PFAS	Per- and Polyfluoroalkyl Substances
PRR	Periodic Review Report
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
RAO	Remedial Action Objective
RP	Remedial Party
RSO	Remedial System Optimization
SCG	Standards, Criteria and Guidelines
SCO	Soil Cleanup Objective
SMP	Site Management Plan
SOP	Standard Operating Procedures
TAL	Target Analyte List
TCL	Target Compound List
USEPA	United States Environmental Protection Agency

ES EXECUTIVE SUMMARY

The following provides a brief summary of the controls implemented for the Site, as well as the inspections, monitoring, maintenance, and reporting activities required by this Site Management Plan:

Site Identification: 734021 – Former Crucible Specialty Metals Landfill, 490 Restoration Way, Town of Geddes, Onondaga County, New York

Institutional Controls (ICs):	1. The property may be used for commercial or industrial use;	
	2. The property is subjected to the following ICs: Landuse Restriction Operation and Maintenance Plan IC/EC Plan Groundwater Use Restriction Monitoring Plan	
	3. All ECs must be inspected at a frequency and in a manner defined in the SMP.	
Engineering Controls (ECs):	1. Cover system	
	2. Groundwater monitoring network	
Inspections:		Frequency
1. Cover inspection		Annually
Monitoring:		
1. Groundwater Monitoring Wells MS-104.5, MS - 106.3, MS-106.4, MS-301.3, MS-301.4, MS - 301.5, W-201R, and W-5.6		Triennially – next in 2025
Maintenance:		
1. Site stormwater controls maintenance		As needed
Reporting:		
1. Inspection Report		Annually

Site Identification:

734021 – Former Crucible Specialty Metals Landfill, 490
Restoration Way, Town of Geddes, Onondaga County,
New York

2. Groundwater Report	Triennially – next in 2025
3. Periodic Review Report	Once every five years – next in 2026

Further descriptions of the above requirements are provided in detail in the latter sections of this Site Management Plan.

1.0 INTRODUCTION

1.1 General

This Site Management Plan (SMP) is a required element of the remedial program for the Former Crucible Specialty Metals Landfill located in the Town of Geddes, Onondaga County, New York (hereinafter referred to as the “Site”). See Figure 1. The Site is currently in the New York State (NYS) Inactive Hazardous Waste Disposal Site Remedial Program, Site No. 734021, which is administered by New York State Department of Environmental Conservation (NYSDEC or Department).

EnPro Holdings, Inc., entered into an Order on Consent, with the NYSDEC to remediate the Site. Figures showing the Site location and boundaries of this Site are provided as Figure 1 and Figure 2. The boundaries of the Site are more fully described in the metes and bounds Site description that is part of the Deed Restriction provided in Appendix A.

After completion of the remedial work, some contamination was left at this Site, which is hereafter referred to as “remaining contamination”. Institutional and Engineering Controls (ICs and ECs) have been incorporated into the Site remedy to control exposure to remaining contamination to ensure protection of public health and the environment. A Deed Restriction recorded with the Onondaga County Clerk, requires compliance with this SMP and all ECs and ICs placed on the Site.

This SMP was prepared to manage remaining contamination at the Site until the Deed Restriction is extinguished in accordance with ECL Article 71, Title 36. This plan has been approved by the NYSDEC, and compliance with this plan is required by the grantor of the Deed Restriction and the grantor’s successors and assigns. This SMP may only be revised with the approval of the NYSDEC.

It is important to note that:

- This SMP details the Site-specific implementation procedures that are required by the Deed Restriction. Failure to properly implement the SMP is a violation of the Deed Restriction, which is grounds for revocation of the Certificate of Completion (COC);
- Failure to comply with this SMP is also a violation of Environmental Conservation Law, 6 NYCRR Part 375 and the [Order on Consent for the Site, and thereby subject to applicable penalties.

All reports associated with the Site can be viewed by contacting the NYSDEC or its successor agency managing environmental issues in New York State. A list of contacts for persons involved with the Site is provided in Appendix B of this SMP.

This SMP was prepared by GHD Consulting Services Inc. (GHD), on behalf of EnPro Holdings, Inc. (EnPro), in accordance with the requirements of the NYSDEC's DER-10 ("Technical Guidance for Site Investigation and Remediation"), dated May 2010, and the guidelines provided by the NYSDEC. This SMP addresses the means for implementing the ICs and/or ECs that are required by the Deed Restriction for the Site.

1.2 Revisions

Revisions to this plan will be proposed in writing to the NYSDEC's project manager. The NYSDEC can also make changes to the SMP or request revisions from the Remedial Party. Revisions will be necessary upon, but not limited to, the following occurring: a change in media monitoring requirements, upgrades to or shutdown of a remedial system, post-remedial removal of contaminated sediment or soil, or other significant change to the Site conditions. In accordance with the Deed Restriction for the Site, the NYSDEC project manager will provide a notice of any approved changes to the SMP, and append these notices to the SMP that is retained in its files.

1.3 Notifications

Notifications will be submitted by the property owner to the NYSDEC, as needed, in accordance with NYSDEC's DER – 10 for the following reasons:

1. 60-day advance notice of any proposed changes in Site use that are required under the terms of the Order on Consent, 6 NYCRR Part 375 and/or Environmental Conservation Law.
2. 7-day advance notice of any field activity associated with the remedial program.
3. 15-day advance notice of any proposed ground-intrusive activity pursuant to the Excavation Work Plan. If the ground-intrusive activity qualifies as a change of use as defined in 6 NYCRR Part 375, the above mentioned 60-day advance notice is also required.
4. Notice within 48 hours of any damage or defect to the foundation, structures or EC that reduces or has the potential to reduce the effectiveness of an EC, and likewise, any action to be taken to mitigate the damage or defect.
5. Notice within 48 hours of any non-routine maintenance activities.
6. Verbal notice by noon of the following day of any emergency, such as a fire; flood; or earthquake that reduces or has the potential to reduce the effectiveness of ECs in place at the Site, with written confirmation within 7 days that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public.
7. Follow-up status reports on actions taken to respond to any emergency event requiring ongoing responsive action submitted to the NYSDEC within 45 days describing and documenting actions taken to restore the effectiveness of the ECs.

Any change in the ownership of the Site or the responsibility for implementing this SMP will include the following notifications:

8. At least 60 days prior to the change, the NYSDEC will be notified in writing of the proposed change. This will include a certification that the prospective purchaser/Remedial Party has been provided with a copy of the Order on Consent, and all approved work plans and reports, including this SMP.

9. Within 15 days after the transfer of all or part of the Site, the new owner's name, contact representative, and contact information will be confirmed in writing to the NYSDEC.

Table 1 on the following page includes contact information for the above notifications. The information on this table will be updated as necessary to provide accurate contact information. A full listing of Site-related contact information is provided in Appendix B.

Table 1: Notifications*

<u>Name</u>	<u>Contact Information</u>	<u>Required Notification**</u>
NYSDEC Project Manager – Sarah Johnston	(518) 402-9543 Sarah.Johnston@dec.ny.gov	All Notifications
NYSDEC Project Manager's Supervisor – Jess LaClair	(518) 402-9543 Jess.LaClair@dec.ny.gov	All Notifications
NYSDOH Project Manager – Mark Sergott	(518) 402-7860 Mark.Sergott@heath.ny.gov	Notifications 1, 4, 6, 7, and 8

* Note: Notifications are subject to change and will be updated as necessary.

** Note: Numbers in this column reference the numbered bullets in the notification list in this section.

2.0 SUMMARY OF PREVIOUS INVESTIGATIONS AND REMEDIAL ACTIONS

2.1 Site Location and Description

The Site is located in the Town of Geddes, Onondaga County, New York and is identified as a portion of Section 029 Block 01 and Lot 02.0 on the Town of Geddes Tax Map (see Figure 2). The Site is an approximately 22.38-acre area and is bounded by the Onondaga County-owned Amphitheater at Lakeview to the north, with Onondaga Lake beyond, parking areas associated with the amphitheater and New York State Fair to the southeast, an amphitheater access road, with undeveloped land and Ninemile Creek beyond, to the southwest, the amphitheater entrance and recreational trails, with Onondaga Lake beyond, to the east, and undeveloped land, with an amphitheater parking area beyond, to the west (see Figure 1 – Site Layout Map). The entirety of the Site and surrounding areas, including those developed by the amphitheater and recreational trails, is underlain by the historic Solvay Process Waste Beds and is owned by Onondaga County. The boundaries of the Site are more fully described in Appendix A – Deed Restriction. The owner of the Site parcel at the time of issuance of this SMP is:

Onondaga County, New York

The operator of the Site parcel at the time of issuance of this SMP is:

EnPro Holdings, Inc.

2.2 Physical Setting

2.2.1 Land Use

The Site consists of an approximately 22.38-acre closed landfill that began operations in 1973 and was closed and capped in 1989. The Site is zoned commercial and

is currently vacant. The majority of the development associated with the amphitheater is immediately adjoining the Site to the northeast. However, several of the access roadways and walking paths are located on the Site and some Site groundwater monitoring wells are located in areas that were developed for the amphitheater.

The properties adjoining the Site and in the neighborhood surrounding the Site primarily include Onondaga County owned commercial and vacant undeveloped properties. The properties immediately south, west, and northwest of the Site include properties with access roads, parking areas, and vacant wooded areas associated with the amphitheater; and the properties immediately northeast and east of the Site include commercial properties associated with the amphitheater.

2.2.2 Geology

The Site is within the Erie-Ontario Lowlands physiographic province of New York State. Topography of the area is characterized as a low relief undulating lake plain with drumlins and drumloid features. Previous investigations have identified seven geologic units at the Site, including, in order of increasing depth from ground surface:

1. Crucible specialty metals landfill waste – generally 7 to 13-feet thick
2. Solvay Process waste – generally 60-feet thick
3. swamp/lacustrine deposits – generally 8 to 15-feet thick
4. alluvio-deltaic deposits – generally 8 to 18-feet thick
5. upper glaciolacustrine deposits – reported as a thick sequence with specifics not available
6. ablation till – generally 5 to 15-feet thick
7. bedrock.

The area of the Site was historically wetlands that were reportedly drained in 1822 as the result of activities undertaken by New York State. The Solvay Process Company started placing wastes from their soda ash production process into wastebeds in proximity

of the Site in 1903, which ultimately diverted Ninemile Creek, circa 1929, from directly below the Site to its current location west of the Site. Waste was placed in stages to allow for its dewatering and consolidation until the ultimate sequential abandonment of the wastebeds between 1939 and 1950. The top terrace of the wastebeds, upon which the Site is located, is approximately 60-feet higher than the water surface of Onondaga Lake.

Geologic cross sections are shown in Figure 3.

2.2.3 Hydrogeology

Previous groundwater investigations have identified a groundwater mound beneath the Site, which generally follows the topographic contours of the Solvay Process Wastebeds, and is attributed to the low permeability of the Solvay Process waste. The placement of a geomembrane soil cover over the former Crucible specialty metals waste precludes infiltration of stormwater through the waste, which is expected to reduce the mounding of groundwater below the Site. Groundwater flow is interpreted as occurring radially from the Site towards Ninemile Creek and Onondaga Lake, based on data historically obtained from the Site's historical groundwater monitoring well network, with the majority of the wells screened within the Solvay Process waste, and interpreted by others. Groundwater levels within the Solvay Process waste have demonstrated significant seasonal fluctuations, with highest levels occurring in the spring and lowest in the fall. The highest groundwater elevation below the Site is well below the lowest point of the Crucible Specialty Metals waste mass. Groundwater seepage rates within the Solvay Process waste have been estimated at 32 feet per year, which is reported as an average of horizontal and vertical velocities. Groundwater seepage rates within deeper geologic units have been estimated to be 6 feet per year for swamp/lacustrine deposits, 189 feet per year for alluvial deposits, and 2 feet per year for upper glaciolacustrine deposits, which again are an average of the horizontal and vertical velocities. The upper glaciolacustrine deposits are interpreted as confining layer given their correspondingly low seepage rates.

A groundwater contour map is shown in Figure 4. Groundwater elevation data is provided in Table 2. Due to their age of installation, and the work being completed by others, limited groundwater monitoring well construction logs are available (Attachment 1). As stated previously, the majority of the groundwater monitoring wells remaining at the Site are screened within the Solvay Process waste.

2.3 Investigation and Remedial History

The following narrative provides a remedial history timeline and a brief summary of the available project records to document key investigative and remedial milestones for the Site. Full titles for each of the reports referenced below are provided in Section 8.0 - References.

Crucible Specialty Metals began operations of the landfill at the Site in 1973. In 1986, the United States Environmental Protection Agency (USEPA) and the NYSDEC approved the Revised Landfill Closure Plan, dated January 1986. Landfill closure activities occurred between December 1986 and October 1990, in general accordance with the Revised Landfill Closure Plan. Closure activities were documented in the Construction Quality Assurance Documentation Report, dated March 1991.

Grading of waste within the landfill in order to create a contoured surface that would promote surface runoff following final capping of the landfill occurred between December 1986 and January 1987. Settlement plates were installed during grading, with the bottom of the plates placed at the interface of the Solvay Process waste and Crucible Specialty Metal waste. Permanent markings were placed on the riser pipes at an elevation corresponding to the landfill surface upon final closure and the marking and adjacent ground surface were surveyed. Periodic survey of the marking and ground surface occurred going forward to monitor the amount of settlement of the Crucible waste.

Through 1990 and 2015, periodic Operations, Maintenance, and Monitoring (OM&M) activities were reportedly performed at the Site, in accordance with the Revised

Landfill Closure Plan (C&S Consulting Engineers, January 1986) and subsequent NYSDEC-approved modifications, described below, by various entities under the direction of several corporate predecessors to EnPro Holdings, Inc. Findings and observations of these activities were periodically reported to the NYSDEC. In 2015 GHD was retained by EnPro Holdings Inc. to complete the required OM&M activities at the Site.

In 2005 NYSDEC approved the change in frequency for the liner testing from every five (5) years to every seven (7) as well as reducing the number of sample locations to three (3) and discontinuing the Soil Burial Resistance Test (ASTM D-3083). The NYSDEC approved a request in March 2009 from S&ME Northeast, the company responsible for OM&M prior to GHD's involvement, to reduce the frequency of groundwater monitoring, landfill monitoring, and reporting from semiannual to annual and inclinometer measurements, settlement plate surveying, and geotechnical engineer review from annual to every three years. NYSDEC approved the removal of groundwater sampling parameters related to the Solvay Process Waste - alkalinity, chlorides, specific conductance, and redox potential. Per the 2014 Annual Monitoring Report prepared by S&ME Northeast P.C. (S&ME Northeast, P.C., March 2015), liner integrity testing has been discontinued based on a letter from the NYSDEC dated April 13, 2013.

Following the implementation of the Onondaga County Lakeview Amphitheater construction in 2015, several monitoring points were modified in accordance with the Monitoring Well Work Plan, Lakeview Amphitheater Project (Gilbane Building Company, July 10, 2015), with NYSDEC approval. The modifications were completed by others under contract with Onondaga County and included: eight (8) monitoring points (steel protective casings and PVC risers) were lowered to surface elevations established during construction (MS-301.1, MS-301.2, MS-301.3, MS-301.4, MS-301.5, PZ-8.1, PZ 8.2, and W-201R); and two (2) monitoring points (steel protective casings and PVC risers) were raised to accommodate areas that were filled (W-10.1 and W-10.2). One (1) steel protective casing, PVC riser, and concrete pad were replaced due to damage during work activities (MS 104.2). The steel protective casing and PVC riser of one (1) inclinometer (INC-4) and the steel bar riser of one (1) settlement plate (PL-4) were lowered to accommodate new

surface elevations established during construction. Decommissioning of one (1) groundwater monitoring well (CM-108) occurred as it interfered with proposed development (GHD Consulting Services Inc., May 26, 2021).

Historically, the NYSDEC has periodically approved the decommissioning of groundwater monitoring wells, piezometers, inclinometers, and settlement plates at the Site. In 2017 NYSDEC approved the decommissioning of groundwater monitoring wells MS-106.5 and W-5.5 and removal of piezometers PZ-2.2, PZ-2.3, and PZ-5.3 from the monitoring program (NYSDEC, March 31, 2017). Decommissioning of groundwater monitoring well DW-101 and piezometers PZ-101.1, PZ-102.2, and PZ- 101.3 was performed in association with amphitheater construction by SJB Services Inc. in 2018 (GHD Consulting Services Inc., April 8, 2020). In 2019, groundwater monitoring well DW-103 was decommissioned by GHD (GHD Consulting Services Inc., April 8, 2020). Following NYSDEC approval (NYSDEC, May 5, 2020), GHD decommissioned groundwater monitoring well W-10.2, due to significant damage. In addition, in May of 2020, inclinometers INC-1, INC-2, INC-3, and INC-4, and forty-two (42) settlement plates, were also decommissioned, as they were no longer part of the Site's on-going monitoring program (GHD Consulting Services Inc., February 2, 2021). Decommissioning of groundwater monitoring wells W-105R (due to significant damage), MS 104.1, and MS104.2 and piezometers PZ-5.1, PZ-5.2, PZ-5.3, PZ-2.1, PZ-2.2, PZ-2.3, PZ-8.1, and PZ-8.2 was performed by GHD in 2021 (GHD Consulting Services Inc., February 14, 2022), after approval (NYSDEC June 15, 2021), as the monitoring points were also no longer part of the Site's monitoring program.

Historically, groundwater analytical results and field parameters were compared to upper and lower confidence limits (UCL and LCL), calculated from the most historical groundwater quality data available for each monitoring well, and the Class GA groundwater standards taken from TOGS 1.1.1. (NYSDEC, June 1998). Based on discussion with the NYSDEC following the 2019 monitoring event (NYSDEC, May 5, 2020), the analytical results and field parameters no longer need to be compared to the

UCL and LCL values. Instead, the analytical results and field parameters will only be compared to the applicable Class GA groundwater standards going forward.

In 2020, NYSDEC reclassified the Site from a Class 3 to a Class 4 based on the conclusion that “it no longer presents a significant threat to public health and/or the environment” (GHD Consulting Services Inc., May 26, 2021). In 2020, NYSDEC also approved EnPro Holdings Inc. request to remove groundwater monitoring wells MS-104.3, MS-104.4, MS-106.1 and MS 106.2 from the Site’s monitoring program due to observed decreasing concentrations and consistency of the analytical results in the surrounding wells. Monitoring wells MS-301.1 and MS 301.2 were also approved to be removed from the monitoring program due to their screened intervals being below the bottom of waste and the observed consistency of groundwater elevations and groundwater analytical results between MS-301.1 and MS-301.2, and the surrounding wells. However, NYSDEC noted that, at this time, MS-301.1 and MS301.2 wells would remain at the Site for groundwater elevation monitoring purposes (NYSDEC, May 5, 2020).

2.4 Remedial Action Objectives

The Remedial Action Objectives (RAOs) for the Site are as follows:

Groundwater

RAOs for Public Health Protection

- Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards.
- Prevent contact with, or inhalation of, volatiles from contaminated groundwater.

RAOs for Environmental Protection

- Restore groundwater aquifer to pre-disposal/pre-release conditions, to the extent practicable.
- Prevent the discharge of contaminants to surface water.

Soil

RAOs for Public Health Protection

- Prevent ingestion/direct contact with contaminated soil.

RAOs for Environmental Protection

- Prevent migration of contaminants that would result in groundwater or surface water contamination.
- Prevent impacts to biota from ingestion/direct contact with soil causing toxicity or impacts from bioaccumulation through the terrestrial food chain.

2.5 Remaining Contamination

2.5.1 Groundwater

Groundwater samples were taken from thirteen (13) on-Site groundwater monitoring wells in October 2019. Field parameters (i.e., pH and specific conductivity) were collected at the groundwater sampling locations and each groundwater sample was analyzed for Phenols via EPA method 420.1 and total chromium and total iron via EPA Method 200.7 with Preparation by EPA Method 3005A.

Based on data obtained during the 2019 groundwater monitoring event and historic events, it was determined relatively minor groundwater impacts resulting from the former Crucible Landfill exist across the Site. Historical field parameters and laboratory analytical results indicate improvements in groundwater quality since the landfill was closed and

capped in 1989. The groundwater contaminants of concern are SVOCs (phenols) and metals (chromium and iron).

Historical groundwater sample data is provided in Table 3, and Figure 5 and [summarizes the results of all samples of groundwater that exceeded the SCGs during the 2019 monitoring event, which represents conditions 30 years after closure of the landfill.](#)

2.5.2 Historical Waste

Wastes were historically placed at the Site and consist of Crucible Specialty Metals landfill waste between 7- and 13-feet thick, which is underlain by Solvay Process waste that is generally 60-feet thick and placed by others prior to Crucible Specialty Metals disposal. The waste placed by Crucible Specialty Metals was reportedly a combination of hazardous and non-hazardous solid waste from the Crucible Steel Mill. Disposal of hazardous waste reportedly consisted of caustic solids, acid pickling sludge, and electric arc furnace and argon-oxygen decarburization dusts. Disposal of non-hazardous waste reportedly consisted of slag, construction and refractory debris, absorbents, miscellaneous boiler house ashes, coolant swarves, mill scale, and wastewater treatment plant dewatered sludge. Specific analytical results associated with the disposed materials and disposal volume estimates are not available, but it can be assumed that any encountered historical waste has the potential to be contaminated and should be handled as such, in accordance with this SMP.

3.0 INSTITUTIONAL AND ENGINEERING CONTROL PLAN

3.1 General

Since remaining contamination exists at the Site, Institutional Controls (ICs) and Engineering Controls (ECs) are required to protect human health and the environment. This IC/EC Plan describes the procedures for the implementation and management of all IC/ECs at the Site. The IC/EC Plan is one component of the SMP and is subject to revision by the NYSDEC project manager.

This plan provides:

- A description of all IC/ECs on the Site;
- The basic implementation and intended role of each IC/EC;
- A description of the key components of the ICs set forth in the Deed Restriction;
- A description of the controls to be evaluated during each required inspection and periodic review;
- A description of plans and procedures to be followed for implementation of IC/ECs, such as the implementation of the Excavation Work Plan (EWP) (as provided in Appendix C) for the proper handling of remaining contamination that may be disturbed during maintenance or redevelopment work on the Site; and
- Any other provisions necessary to identify or establish methods for implementing the IC/ECs required by the Site remedy, as determined by the NYSDEC project manager.

3.2 Institutional Controls

A series of ICs is required to: (1) implement, maintain and monitor Engineering Control systems; (2) prevent future exposure to remaining contamination; and, (3) limit the use and development of the Site to commercial or industrial uses only. Adherence to these ICs on the Site is required by the Deed Restriction and will be implemented under this SMP. ICs identified in the Deed Restriction may not be discontinued without an

amendment to or extinguishment of the Deed Restriction. The IC boundaries are shown on Figure 6. These ICs are:

- The property may be used for commercial or industrial use;
- The owner of the Property shall prohibit the Property from ever being used for purposes other than for Commercial as described in 6 NYCRR Part 375-1.8(g)(2)(iii) and Industrial as described in 6 NYCRR Part 375-1.8(g)(2)(iv) or other allowed use without the express written waiver of such prohibition by the Department or Relevant Agency
- All ECs must be operated and maintained as specified in this SMP;
- All ECs must be inspected at a frequency and in a manner defined in the SMP;
- The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the Onondaga County Department of Health to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the Department;
- Groundwater and other environmental or public health monitoring must be performed as defined in this SMP;
- Data and information pertinent to Site management must be reported at the frequency and in a manner as defined in this SMP;
- All future activities that will disturb remaining contaminated material must be conducted in accordance with this SMP;
- Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in this SMP;
- Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical component of the remedy shall be performed as defined in this SMP;
- Access to the Site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by the Deed Restriction;
- The owner or Responsible Party of the Property shall continue in full force and effect any institutional and engineering controls required for the Remedy and maintain such controls, unless the owner first obtains permission to discontinue such controls from the Department or Relevant Agency, in compliance with the

approved SMP, which is incorporated and made enforceable hereto, subject to modifications as approved by the Department or Relevant Agency.

- The Deed Restriction is and shall be deemed a covenant that shall run with the land and shall be binding upon all future owners of the Property and shall provide that the owner and its successors and assigns consent to enforcement by the Department or Relevant Agency of the prohibitions and restrictions that the Order on Consent requires to be recorded, and hereby covenant not to contest the authority of the Department or Relevant Agency to seek enforcement.
- Any deed of conveyance of the Property, or any portion thereof, shall recite, unless the Department or Relevant Agency has consented to the termination of such covenants and restrictions, that said conveyance is subject to this Deed Restriction.
- The potential for vapor intrusion must be evaluated for any buildings developed in the area within the IC boundaries noted on Figure 6, and any potential impacts that are identified must be monitored or mitigated;
- Vegetable gardens and farming on the Site are prohibited; and
- An evaluation shall be performed to determine the need for further investigation and remediation should large scale redevelopment occur, if any of the existing structures are demolished, or if the subsurface is otherwise made accessible.

3.3 Engineering Controls

3.3.1 Soil Cover System

Exposure to remaining contamination at the Site is prevented by a cover system placed over the Site. This cover system is comprised of a minimum of 24 inches, which includes vegetative cover (18 inches) and sand (6 inches) above a 60 millimeter High Density Polyethylene (HDPE) low permeable synthetic liner. Figure 6 presents the location of the cover system and extent of Deed Restriction area. The Excavation Work Plan (EWP) provided in Appendix C outlines the procedures required to be implemented in the event the cover system is breached, penetrated or temporarily removed. Procedures for the inspection of this cover are provided in the Monitoring and Sampling Plan included in Section 4.0 of this SMP. Any work conducted pursuant to the EWP must also be conducted in accordance with the procedures defined in a Health and Safety Plan (HASP), Appendix

D, and associated Community Air Monitoring Plan (CAMP) prepared for the Site and provided in Appendix E Any disturbance of the Site's cover system must be overseen by a qualified environmental professional as defined in 6 NYCRR Part 375, a Professional Engineer (PE) who is licensed and registered in New York State, or a qualified person who directly reports to a PE who is licensed and registered in New York State.

3.3.2 Criteria for Completion of Remediation/Termination of Remedial Systems

Generally, remedial processes are considered completed when monitoring indicates that the remedy has achieved the remedial action objectives identified by the decision document. The framework for determining when remedial processes are complete is provided in Section 6.4 of NYSDEC DER-10. Unless waived by the NYSDEC, confirmation samples of applicable environmental media are required before terminating any remedial actions at the site. Confirmation samples require Category B deliverables and a Data Usability Summary Report (DUSR).

As discussed below, the NYSDEC may approve termination of a groundwater monitoring program. When a remedial party receives this approval, the remedial party will decommission all Site-related monitoring, injection and recovery wells as per the NYSDEC CP-43 policy.

The remedial party will also conduct any needed Site restoration activities, such as asphalt patching and decommissioning treatment system equipment. In addition, the remedial party will conduct any necessary restoration of vegetation coverage trees and wetlands, and will comply with NYSDEC and United States Army Corps of Engineers regulations and guidance. Also, the remedial party will ensure that no ongoing erosion is occurring on the Site.

3.3.2.1 Cover (or Cap)

The soil cover system is a permanent control and the quality and integrity of this control will be inspected at defined, regular intervals in accordance with this SMP in perpetuity.

Maintenance responsibilities associated with the cover system are outlined in Section 4.2 and Appendix F.

4.0 MONITORING AND SAMPLING PLAN

4.1 General

This Monitoring and Sampling Plan describes the measures for evaluating the overall performance and effectiveness of the remedy. This Monitoring and Sampling Plan may only be revised with the approval of the NYSDEC project manager. Details regarding the sampling procedures, data quality usability objectives, analytical methods, etc. for all samples collected as part of Site management for the Site are included in the Quality Assurance Project Plan (QAPP) provided in Appendix G.

This Monitoring and Sampling Plan describes the methods to be used for:

- Sampling and analysis of all appropriate media (e.g., groundwater);
- Assessing compliance with applicable NYSDEC standards, criteria and guidance (SCGs), particularly groundwater standards; and
- Evaluating Site information periodically to confirm that the remedy continues to be effective in protecting public health and the environment.

To adequately address these issues, this Monitoring and Sampling Plan provides information on:

- Sampling locations, protocol and frequency;
- Information on all designed monitoring systems;
- Analytical sampling program requirements;
- Inspection and maintenance requirements for monitoring wells;
- Monitoring well decommissioning procedures; and
- Annual inspection and periodic certification.

Reporting requirements are provided in Section 7.0 of this SMP.

4.2 Soil Cover Monitoring

The soil cover engineering control will be inspected annually by the Remedial Party to verify that such covers are being maintained in accordance with Table 4 and Appendix F. The soil cover will also be inspected by the Site owner following any Site work that potentially affects the soil cover and following any necessary modifications to the soil cover that arise from routine maintenance or following Site work.

Based on these periodic inspections, any corrective measures necessary will be implemented and reported to NYSDEC and NYSDOH. No soil samples of the cover material are required during the annual or non-routine inspections. During Site work or modifications to the cover system, soil sampling requirements are outlined in Appendix C (Excavation Work Plan).

If an emergency, such as a natural disaster, or if an unforeseen failure of any of the soil cover occurs, an inspection of the Site by the Remedial Party will be conducted within 5 days of the event to verify the effectiveness of the soil cover at the Site. The Remedial Party will maintain records of Site inspections and any soil cover repairs or on-Site intrusive activities for inclusion in the Periodic Review Report.

Table 4 – Soil Cover Monitoring Requirements and Schedule

Remedial System Component	Monitoring Parameter	Monitoring Schedule
Landfill Cap	Erosion Damage	Annual
	Subsidence	Annual
	Vegetative Cover	Annual
	Run-Off Control System	Annual
	Monitoring Well Condition	Annual
	Mowing of the Vegetative Cover	Annual

4.3 Site – Wide Inspection

Site-wide inspections will be performed annually. These periodic inspections must be conducted when the ground surface is visible (i.e. no snow cover). Site-wide inspections will be performed by a qualified environmental professional as defined in 6 NYCRR Part 375, a PE who is licensed and registered in New York State, or a qualified person who directly reports to a PE who is licensed and registered in New York State. Modification to the frequency or duration of the inspections will require approval from the NYSDEC project manager. Site-wide inspections will also be performed after all severe weather conditions that may affect ECs or monitoring devices. During these inspections, an inspection form will be completed as provided in Appendix H – Site Management Forms. The form will compile sufficient information to assess the following:

- Compliance with all ICs, including Site usage;
- An evaluation of the condition and continued effectiveness of ECs;
- General Site conditions at the time of the inspection;
- Whether stormwater management systems, such as basins and outfalls, are working as designed;
- The Site management activities being conducted including, where appropriate, confirmation sampling and a health and safety inspection; and
- Confirm that Site records are up to date.

Inspections of all remedial components installed at the Site will be conducted. A comprehensive Site-wide inspection will be conducted and documented according to the SMP schedule, regardless of the frequency of the Periodic Review Report. The inspections will determine and document the following:

- Whether ECs continue to perform as designed;
- If these controls continue to be protective of human health and the environment;
- Compliance with requirements of this SMP and the Deed Restriction;

- Achievement of remedial performance criteria; and
- If Site records are complete and up to date.

Reporting requirements are outlined in Section 7.0 of this plan.

Inspections will also be performed in the event of an emergency. If an emergency, such as a natural disaster or an unforeseen failure of any of the ECs occurs that reduces or has the potential to reduce the effectiveness of ECs in place at the Site, verbal notice to the NYSDEC project manager must be given by noon of the following day. In addition, an inspection of the Site will be conducted within 5 days of the event to verify the effectiveness of the IC/ECs implemented at the Site by a qualified environmental professional, as defined in 6 NYCCR Part 375. Written confirmation must be provided to the NYSDEC project manager within 7 days of the event that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public.

4.4 Groundwater Monitoring

Groundwater monitoring will be performed triennially to assess the performance of the remedy. Monitoring wells in Table 5 will be sampled until the NYSDEC determines a decrease in frequency is appropriate. The SMP will be modified to reflect future changes in sampling plans approved by NYSDEC. The groundwater samples will be analyzed for total chromium, total iron, and phenols using applicable EPA Methods. Modification to the frequency or sampling requirements will require approval from the NYSDEC project manager.

Table 5 – Groundwater Sampling Requirements and Schedule

Well Location	Analytical Parameters		Schedule
	Total Chromium and Total Iron (EPA Method 200.7 with Preparation by EPA Method 3005A)	Phenols (EPA Method 420.1)	
MS-104.5	X	X	Triennial
MS-106.3	X	X	Triennial
MS-106.4	X	X	Triennial
MS-301.3	X	X	Triennial
MS-301.4	X	X	Triennial
MS-301.5	X	X	Triennial
W-201R	X	X	Triennial
W-5.6	X	X	Triennial

The network of monitoring wells has been installed to monitor groundwater conditions at the Site.

As part of the groundwater monitoring eight (8) on-Site wells are sampled to evaluate the effectiveness of the landfill closure. The remedial party will measure depth to the water table at fifteen (15) on-Site monitoring wells in the network before sampling. Due to their age of installation, and the work being completed by others, limited boring logs and monitoring well construction logs are available.

The sampling frequency may only be modified with the approval of the NYSDEC project manager. This SMP will be modified to reflect changes in sampling plans approved by the NYSDEC project manager.

Deliverables for the groundwater monitoring program are specified below.

4.4.1 Sampling Protocol

All monitoring well sampling activities will be recorded in a field book and associated sampling log as provided in Appendix H. Other observations (e.g., groundwater

monitoring well integrity) will be noted on the well sampling log. The well sampling log will serve as the inspection form for the monitoring network. Additional detail regarding monitoring and sampling protocols are provided in the Site-specific Field Sampling Plan provided as Appendix I of this document.

The eight (8) monitoring wells to be sampled will be purged using a Proactive Stainless Steel Monsoon Pump (or similar pump) equipped with new tubing for each well. The pump will be equipped with a flow controller to regulate the flow rate in order to minimize sediment within the groundwater and drawdown of the water column in the well, to the extent practicable. During purging, field readings will be collected for pH, temperature, specific conductivity, and turbidity. After field parameters readings indicate that the groundwater quality has stabilized, groundwater samples will be collected for laboratory analyses. Stabilized groundwater quality (i.e., adequate purge) will be based on the turbidity that has either stabilized or is below 10 Nephelometric Turbidity Units (NTUs) and at least three consecutive measurements of pH remain within 0.1 standard units, specific conductance varies no more than 10 percent, and temperature is generally constant. Field readings will be documented and included in the triennial report. Purge water removed from the wells will be containerized into 55-gallon drums, labeled, and removed for appropriate off-Site disposal.

Groundwater samples must be sent to a NYS ELAP-certified laboratory for analysis following proper chain of custody procedures. The groundwater samples will be analyzed for total TAL metals (iron and chromium) and phenols using appropriate EPA Methods.

4.4.2 Monitoring Well Repairs, Replacement and Decommissioning

If biofouling or silt accumulation occurs in the on-Site monitoring wells, the wells will be physically agitated/surged and redeveloped. Additionally, monitoring wells will be properly decommissioned and replaced if an event renders the wells unusable.

Repairs and/or replacement of wells in the monitoring well network will be performed based on assessments of structural integrity and overall performance.

The NYSDEC project manager will be notified prior to any repair or decommissioning of any monitoring well for the purpose of replacement, and the repair or decommissioning and replacement process will be documented in the subsequent Periodic Review Report. Well decommissioning without replacement will be done only with the prior approval of the NYSDEC project manager. Well abandonment will be performed in accordance with NYSDEC's guidance entitled "CP-43: Groundwater Monitoring Well Decommissioning Procedures." Monitoring wells that are decommissioned because they have been rendered unusable will be replaced in kind in the nearest available location, unless otherwise approved by the NYSDEC project manager.

4.5 Monitoring Quality Assurance/Quality Control

All sampling and analyses will be performed in accordance with the requirements of the Quality Assurance Project Plan (QAPP) prepared for the Site (Appendix G). Main Components of the QAPP include:

- QA/QC objectives for data measurement;
- Sampling program:
 - Sample container will be properly washed, decontaminated, and appropriate preservative will be added (if applicable) prior to their use by the analytical laboratory. Containers with preservative will be tagged as such.
 - Sample holding times will be in accordance with the NYSDEC ASP requirements.
 - Field QC samples (e.g., trip blanks, coded field duplicated, and matrix spike/ matrix spike duplicates) will be collected as necessary.
- Sample tracking and custody; calibration procedures:

- o All field analytical equipment will be calibrated immediately prior to each day's use. Calibration procedures will conform to the manufacturer's standard instructions.
 - o The laboratory will follow all calibration procedures and schedules as specified in the USEPA SW-846 and subsequent updates that apply to the instruments used for the analytical methods.
- Analytical procedures;
- Internal QC Checks;
- QA performance and system audits;
- Preventative maintenance procedures and schedules;
- Corrective action measures.

5.0 OPERATION AND MAINTENANCE PLAN

5.1 General

The Site remedy does not rely on any mechanical systems, such as groundwater treatment systems, sub-slab depressurization systems or air sparge/soil vapor extraction systems to protect public health and the environment. Therefore, the operation and maintenance of such components is not included in this SMP. The vegetation on the soil cover engineering control will be mowed, maintained, and inspected annually in accordance with the requirements of Sections 4.2

6.0 PERIODIC ASSESSMENTS/EVALUATIONS

6.1 Climate Change Vulnerability Assessment

Increases in both the severity and frequency of storms/weather events, an increase in sea level elevations along with accompanying flooding impacts, shifting precipitation patterns and wide temperature fluctuation, resulting from global climactic change and instability, have the potential to significantly impact the performance, effectiveness and protectiveness of a given Site and associated remedial systems. Vulnerability assessments provide information so that the Site and associated remedial systems are prepared for the impacts of the increasing frequency and intensity of severe storms/weather events and associated flooding.

This section provides a summary of vulnerability assessments that will be conducted for the Site during periodic assessments, and briefly summarizes the vulnerability of the Site and/or engineering controls to severe storms/weather events and associated flooding.

The Site is generally flat with drainage swales throughout and around the perimeter and steeply drops to lower elevations to the southwest, west, north, and northeast. The Site is surrounded by low-lying areas that include Ninemile Creek to the southwest, undeveloped land to the west, St. Joseph's Health Amphitheater to the north, and Onondaga Lake to the northeast. Due to the Site's topographic variation, surrounding land, and proximity to Onondaga Lake the vulnerability is minimal. The potential vulnerability to the Site includes erosion resulting from intense and/or severe storm events. This vulnerability is minimal due to the presence of a minimum 2-foot-thick soil cover engineering control, that would need to be eroded away before remaining contamination would be exposed. The inspections of the soil cover engineering control that will be performed annually, will adequately document whether or not erosion is impacting the Site's engineering controls and will also provide a means to identify necessary repairs to maintain the soil cover integrity, if any.

Since the Site remedy only utilizes a soil cover engineering control, potential flooding of the Site due to intense or severe storms is unlikely to have a significant impact.

6.2 Green Remediation Evaluation

NYSDEC's DER-31 Green Remediation requires that green remediation concepts and techniques be considered during all stages of the remedial program including Site management, with the goal of improving the sustainability of the cleanup and summarizing the net environmental benefit of any implemented green technology. This section of the SMP provides a summary of any green remediation evaluations to be completed for the Site during Site management, and as reported in the Periodic Review Report (PRR).

The selected remedy for the Site does not include on-going operation of mechanical remedial systems, the soil cover engineering control is primarily non-vegetated surfaces that requires annual mowing, and on-going monitoring will occur at eight groundwater monitoring wells using low-flow sampling techniques. Future waste generation, energy usage, water usage, and emissions associated with the monitoring and maintenance of the remedial components of the Site will be reduced to the most practicable extent.

6.2.1 Timing of Green Remediation Evaluations

For major remedial system components, green remediation evaluations and corresponding modifications will be undertaken as part of a formal Remedial System Optimization (RSO), or at any time that the NYSDEC project manager feels appropriate, e.g. during significant maintenance events or in conjunction with storm recovery activities.

Modifications resulting from green remediation evaluations will be routinely implemented and scheduled to occur during planned/routine operation and maintenance activities. Reporting of these modifications, if any, will be presented in the PRR.

6.2.2 Frequency of System Checks, Sampling and Other Periodic Activities

Transportation to and from the Site, use of consumables in relation to visiting the Site in order to conduct periodic inspections and/or collect samples, and shipping samples to a laboratory for analyses have direct and/or inherent energy costs. The schedule and/or means of these periodic activities have been prepared so that these tasks can be accomplished in a manner that does not impact remedy protectiveness but reduces expenditure of energy or resources.

6.3 Remedial System Optimization

A Remedial Site Optimization (RSO) study will not be required as there are no active remedial systems at the Site. The only engineering control at the Site is the soil cover, which should remain protective of human health and the environment with no optimization required.

7.0. REPORTING REQUIREMENTS

7.1 Site Management Reports

All Site management inspection, maintenance and monitoring events will be recorded on the appropriate Site management forms provided in Appendix H. These forms are subject to NYSDEC revision. All Site management inspection, maintenance, and monitoring events will be conducted by a qualified environmental professional as defined in 6 NYCRR Part 375, a PE who is licensed and registered in New York State, or a qualified person who directly reports to a PE who is licensed and registered in New York State.

All applicable inspection forms and other records, including media sampling data, generated for the Site during the reporting period will be provided in electronic format to the NYSDEC in accordance with the requirements of Table 6 and summarized in the Periodic Review Report.

Table 6: Schedule of Interim Monitoring/Inspection Reports

Task/Report	Reporting Frequency*
Soil Cover Inspection Reports	Prepared annually, and to be included in the Site's Periodic Review Report, or as otherwise determined by the NYSDEC
Groundwater Monitoring Report	Triennially – next in 2025
Periodic Review Report	Once every five years – next in 2026, or as otherwise determined by the NYSDEC

* The frequency of events will be conducted as specified until otherwise approved by the NYSDEC project manager.

All interim monitoring/inspections reports will include, at a minimum:

- Date of event or reporting period;

- Name, company, and position of person(s) conducting monitoring/inspection activities;
- Description of the activities performed;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents noted (included either on the checklist/form or on an attached sheet);
- Type of samples collected (e.g., groundwater);
- Copies of all field forms completed (e.g., well sampling logs, chain-of-custody documentation);
- Sampling results in comparison to appropriate standards/criteria;
- A figure illustrating sample type and sampling locations;
- Copies of all laboratory data sheets and the required laboratory data deliverables required for all points sampled (to be submitted electronically in the NYSDEC-identified format);
- Any observations, conclusions, or recommendations; and
- A determination as to whether contaminant conditions have changed since the last reporting event.

Routine maintenance event reporting forms will include, at a minimum:

- Date of event;
- Name, company, and position of person(s) conducting maintenance activities;
- Description of maintenance activities performed;
- Any modifications to the system;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents noted (included either on the checklist/form or on an attached sheet); and
- Other documentation such as copies of invoices for maintenance work, receipts for replacement equipment, etc., (attached to the checklist/form).

Non-routine maintenance event reporting forms will include, at a minimum:

- Date of event;
- Name, company, and position of person(s) conducting non-routine maintenance/repair activities;
- Description of non-routine activities performed;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents (included either on the form or on an attached sheet); and
- Other documentation such as copies of invoices for repair work, receipts for replacement equipment, etc. (attached to the checklist/form).

Data will be reported in digital format as determined by the NYSDEC. Currently, sample data is to be supplied electronically and submitted to the NYSDEC EQUIS™ database in accordance with the requirements found at this link <http://www.dec.ny.gov/chemical/62440.html>.

7.2 Periodic Review Report

A Periodic Review Report (PRR) will be submitted to the NYSDEC project manager every fifth year, or at another frequency as may be required by the NYSDEC project manager. In the event that the Site is subdivided into separate parcels with different ownership, a single Periodic Review Report will be prepared that addresses the Site described in Appendix A – Deed Restriction. The report will be prepared in accordance with NYSDEC’s DER-10 and submitted within 30 days of the end of each certification period. Media sampling results will also be incorporated into the Periodic Review Report. The report will include:

- Identification, assessment and certification of all ECs/ICs required by the remedy for the Site.
- Results of the required annual Site inspections, fire inspections and severe condition inspections, if applicable.
- All applicable Site management forms and other records generated for the Site during the reporting period in the NYSDEC-approved electronic format, if not previously submitted.

- Identification of any wastes generated during the reporting period, along with waste characterization data, manifests, and disposal documentation.
- A summary of any discharge monitoring data and/or information generated during the reporting period, with comments and conclusions.
- Data summary tables and graphical representations of contaminants of concern by media (groundwater, soil vapor, etc.), which include a listing of all compounds analyzed, along with the applicable standards, with all exceedances highlighted. These tables and figures will include a presentation of past data as part of an evaluation of contaminant concentration trends, including but not limited to:
 - Trend monitoring graphs that present groundwater contaminant levels from before the start of the remedy implementation to the most current sampling data;
 - Trend monitoring graphs depicting system influent analytical data on a per event and cumulative basis;
 - O&M data summary tables;
 - A current plume map for Sites with remaining groundwater contamination; and
 - A groundwater elevation contour map for each gauging event.
- Results of all analyses, copies of all laboratory data sheets, and the required laboratory data deliverables for all samples collected during the reporting period will be submitted in digital format as determined by the NYSDEC. Currently, data is supplied electronically and submitted to the NYSDEC EQuIS™ database in accordance with the requirements found at this link: <http://www.dec.ny.gov/chemical/62440.html>.
- A Site evaluation, which includes the following:
 - The compliance of the remedy with the Site-specific requirements;
 - The operation and the effectiveness of all treatment units, etc., including identification of any needed repairs or modifications;
 - Any new conclusions or observations regarding Site contamination based on inspections or data generated by the Monitoring and Sampling Plan for the media being monitored;
 - Recommendations regarding any necessary changes to the remedy and/or Monitoring and Sampling Plan;

- An evaluation of trends in contaminant levels in the affected media to determine if the remedy continues to be effective in achieving Site-specific remedial goals; and
- The overall performance and effectiveness of the remedy.

7.2.1 Certification of Institutional and Engineering Controls

Following the last inspection of the reporting period, a qualified environmental professional as defined in 6 NYCRR Part 375 or Professional Engineer licensed to practice and registered in New York State will prepare, and include in the Periodic Review Report, the following certification as per the requirements of NYSDEC DER-10:

“For each institutional or engineering control identified for the Site, I certify that all of the following statements are true:

- *The inspection of the Site to confirm the effectiveness of the institutional and engineering controls required by the remedial program was performed under my direction;*
- *The institutional control and/or engineering control employed at this Site is unchanged from the date the control was put in place, or last approved by the Department;*
- *Nothing has occurred that would impair the ability of the control to protect the public health and environment;*
- *Nothing has occurred that would constitute a violation or failure to comply with any Site management plan for this control;*
- *Access to the Site will continue to be provided to the Department to evaluate the remedy, including access to evaluate the continued maintenance of this control;*
- *If a financial assurance mechanism is required under the oversight document for the Site, the mechanism remains valid and sufficient for the intended purpose under the document;*
- *Use of the Site is compliant with the Deed Restriction;*
- *The engineering control systems are performing as designed and are effective;*

- *To the best of my knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the Site remedial program and generally accepted engineering practices; and*
- *The information presented in this report is accurate and complete.*

I certify that all information and statements in this certification form are true. I understand that a false statement made herein is punishable as a Class “A” misdemeanor, pursuant to Section 210.45 of the Penal Law. I, [name], of [business address], am certifying as [Owner/Remedial Party or Owner’s/Remedial Party’s Designated Site Representative] for the Site.”

“I certify that the New York State Education Department has granted a Certificate of Authorization to provide Professional Engineering services to the firm that prepared this Periodic Review Report.”

The signed certification will be included in the Periodic Review Report.

The Periodic Review Report will be submitted, in electronic format, to the NYSDEC project manager and the NYSDOH project manager. The Periodic Review Report may also need to be submitted in hard-copy format if requested by the NYSDEC project manager.

7.3 Corrective Measures Work Plan

If any component of the remedy is found to have failed, or if the periodic certification cannot be provided due to the failure of an institutional or engineering control or failure to conduct Site management activities, a Corrective Measures Work Plan will be submitted to the NYSDEC project manager for approval. This plan will explain the failure and provide the details and schedule for performing work necessary to correct the failure. Unless an emergency condition exists, no work will be performed pursuant to the Corrective Measures Work Plan until it has been approved by the NYSDEC project manager.

8.0 REFERENCES

2014 Annual Monitoring and Observation Report, S&ME Northeast, P.C., March 2015

2016 Annual Monitoring Report, GHS Consulting Services Inc., March 13, 2017

2017 Annual Monitoring Report, GHD Consulting Services Inc., February 5, 2018

2019 Biennial Monitoring Report, GHD Consulting Services Inc., April 8, 2020.

[6 NYCRR Part 375, Environmental Remediation Programs. December 14, 2006.](#)

Crucible Landfill 2016 Annual Monitoring Report, NYSDEC, March 15, 2017

Crucible Landfill Monitoring Variance Request, NYSDEC, March 31, 2017

Crucible Landfill 2019 Annual Monitoring report, NYSDEC, May 5, 2020

Calocerinos & Spina Engineers, P.C., Construction Quality Assurance Documentation Report, Volume 1. March 1991.

Declaration of Covenants and Restrictions (Deed Restriction), July 15, 2019

Decommissioning Report- 2020 Activities, GHD Consulting Services Inc., February 2, 2021

Monitoring Well Work Plan, Gilbane Building Company, July 10, 2015

[NYSDEC DER-10 – “Technical Guidance for Site Investigation and Remediation”.](#)

[NYSDEC, 1998. Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations Division of Water Technical and Operational Guidance Series \(TOGS\) 1.1.1. June 1998 \(April 2000 addendum\).](#)

Periodic Review Report, GHD Consulting Services Inc., May 26, 2021.

Post Closure Work Plan Update, S&ME Northeast, P.C., October 2011.

Revised Landfill Closure Plan, Calocerinos & Spina Consulting Engineers, January 1986.

Revised Landfill Closure Plan, Volume 2, Calocerinos & Spina Consulting Engineers,
January 1986.

Site Management (SM) Periodic Review Report (PRR) Response Letter, NYSDEC, June
15, 2021

Well Decommissioning – 2021, GHD Consulting Services Inc., February 14, 2022

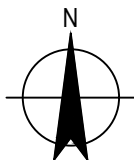
FIGURES



SITE LOCATION
43.085294° NORTH
-76.223418° WEST

CONTOUR INTERVAL: 10 FEET

MAP TAKEN FROM: USGS 7.5 MINUTE SERIES
 TOPOGRAPHIC QUADRANGLES:
 SYRACUSE WEST, NY (2019)
 (U.S. GEOLOGICAL SURVEY WEBSITE)



1	2	3
4	5	6
7	8	9

ADJOINING QUADRANGLES

- 1 Baldwinsville
- 2 Brewerton
- 3 Cicero
- 4 Camillus
- 5 Syracuse East
- 6 Marcellus
- 7 South Onondaga
- 8 Jamesville

0 1000 2000 3000 4000'
 SCALE 1"=2000' AT ORIGINAL SIZE



ENPRO HOLDINGS, INC.
 FORMER CRUCIBLE SPECIALTY METALS LANDFILL
 SITE MANAGEMENT PLAN

SITE LOCATION MAP

Project No. 8618809
 Date 03.2023

FIGURE 1

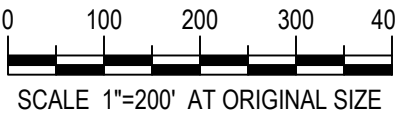
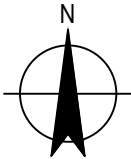


LEGEND

- MONITORING WELL
- DECOMMISSIONED SETTLEMENT PLATE
- DECOMMISSIONED INCLINOMETER
- DECOMMISSIONED WELL
- DECOMMISSIONED PIEZOMETER
- OUTFALL
- DROP INLET
- STORMWATER MANHOLE
- INSTITUTIONAL AND ENGINEERING CONTROL AREA

NOTES:

- ALL OBJECT AND STRUCTURE LOCATIONS ARE APPROXIMATE BASED ON A HAND-HELD GPS SURVEY COMPLETED BY GHD IN NOVEMBER 2020.
- AERIAL PHOTOGRAPHS ARE 2022 ONE FOOT RESOLUTION AND WERE OBTAINED FROM THE NEW YORK STATE GIS CLEARINGHOUSE.

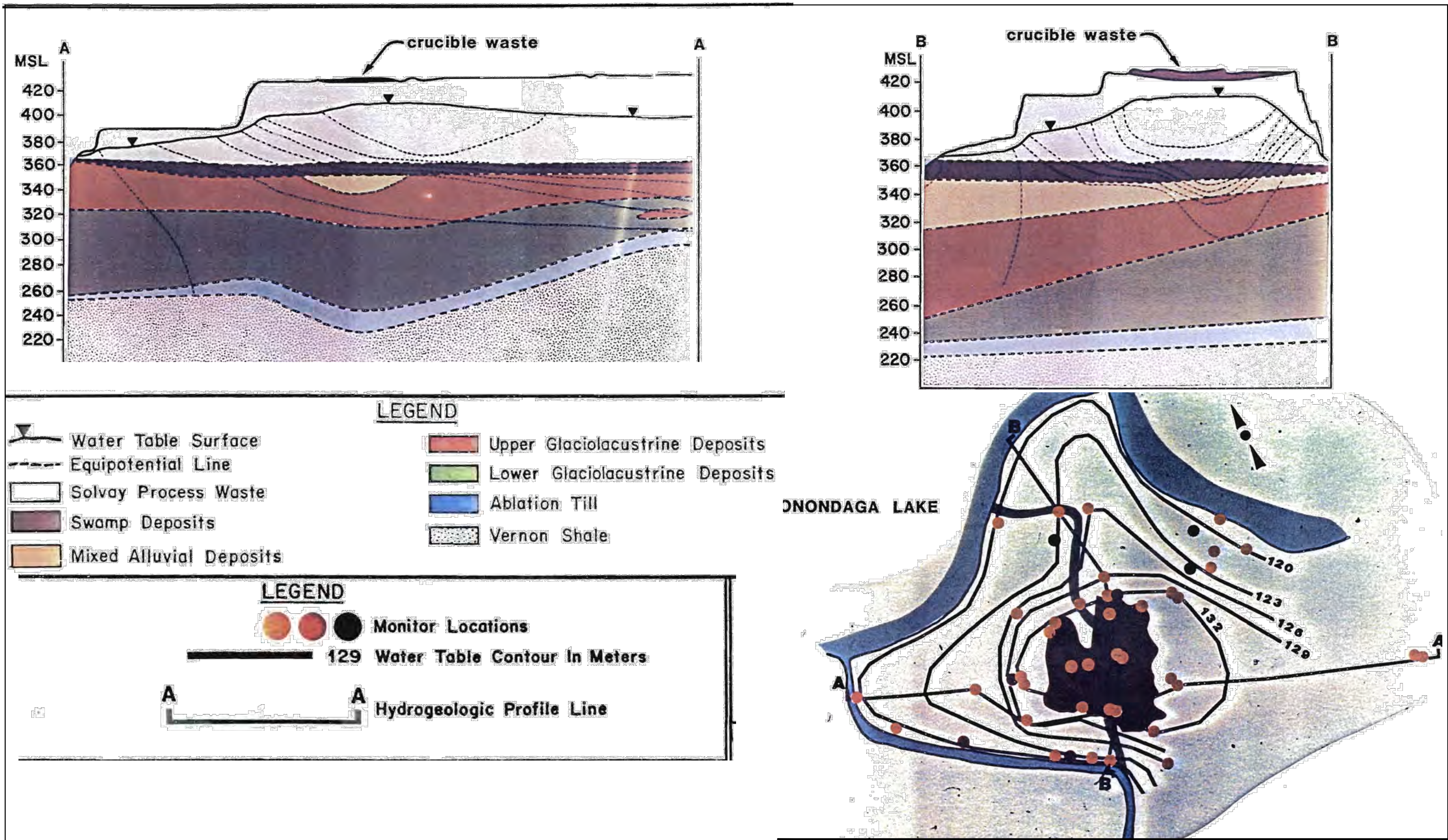


ENPRO HOLDINGS INC.
FORMER CRUCIBLE SPECIALTY METALS LANDFILL
SITE MANAGEMENT PLAN

SITE LAYOUT MAP

Project No. 8618809
Date 03.2023

FIGURE 2



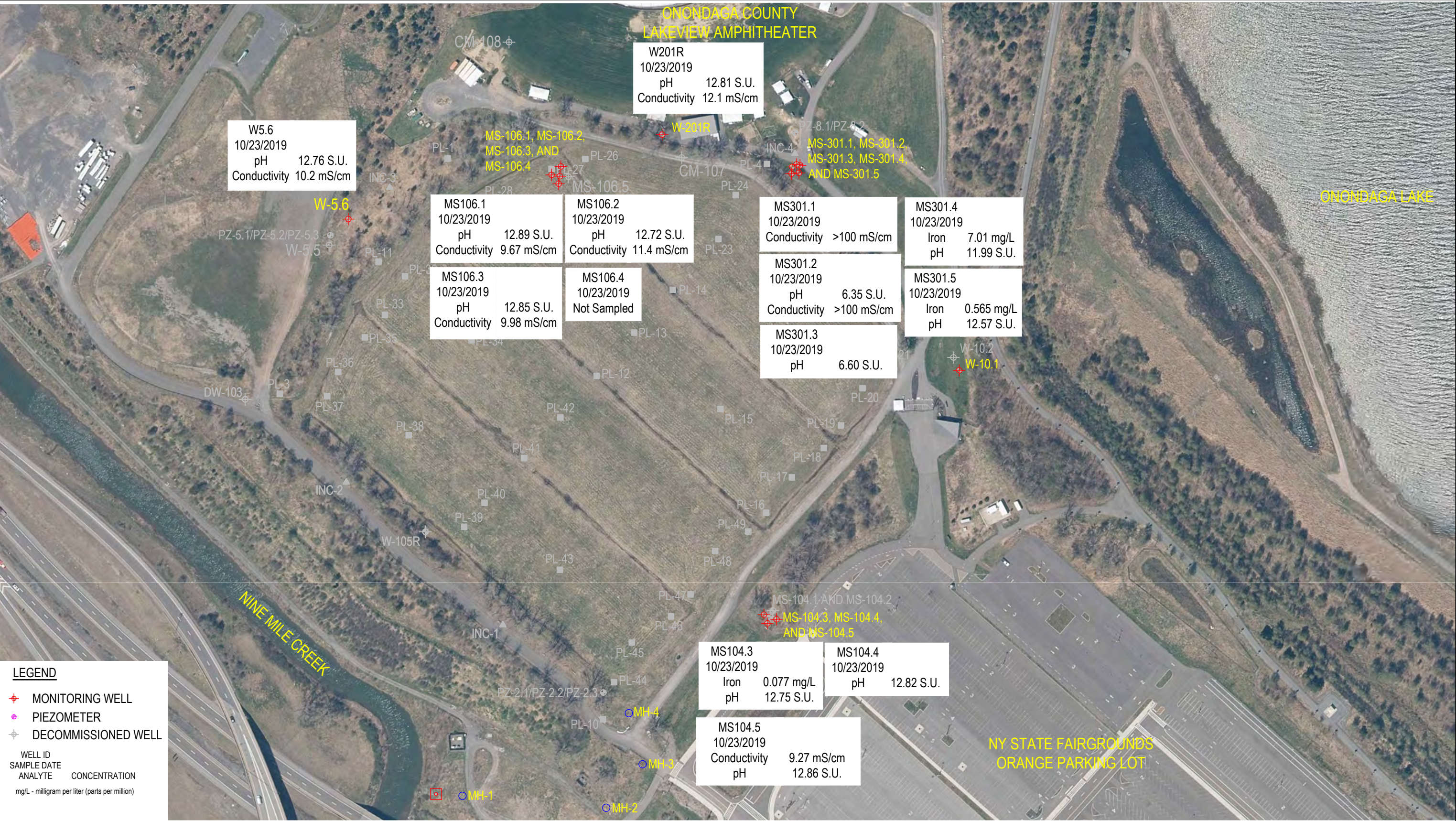
Notes:
Geologic Cross Sections from Calocerinos & Spina Consulting Engineers, P.C., Revised Landfill Closure Plan, Volume 2. January 1986.
Cross Sections are not to scale.



ENPRO HOLDINGS, INC.
FORMER CRUCIBLE SPECIALTY METALS LANDFILL
SITE MANAGEMENT PLAN
GEOLOGIC CROSS SECTION

Project No. 8618809
Date 04.2023

FIGURE 3



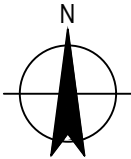
LEGEND

MONITORING WELL
PIEZOMETER
DECOMMISSIONED WELL

WELL ID
SAMPLE DATE
ANALYTE CONCENTRATION

mg/L - milligram per liter (parts per million)

- NOTES:**
- ONLY LABORATORY ANALYTICAL RESULTS THAT EXCEED THE WELL-SPECIFIC UPPER CONFIDENCE LIMIT ARE SHOWN HERE. FOR A COMPLETE SUMMARY OF ANALYTICAL RESULTS, REFER TO TABLES IN REPORT.
 - ALL OBJECT AND STRUCTURE LOCATIONS ARE APPROXIMATE AND WERE TAKEN FROM S&ME NORTHEAST, P.C. PROJECT NO. 4335-14-211NE FIGURE NO. 3 - SITE PLAN.
 - AERIAL PHOTOGRAPHS ARE 2022 ONE FOOT RESOLUTION AND WERE OBTAINED FROM THE NEW YORK STATE GIS CLEARINGHOUSE.



ENPRO HOLDINGS INC.
FORMER CRUCIBLE SPECIALTY METALS LANDFILL
SITE MANAGEMENT PLAN
GROUNDWATER SAMPLE
RESULTS - 2019

Project No. 12626034
Date 03.2023

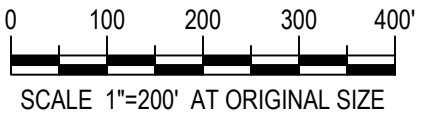
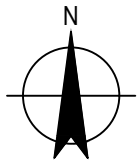
FIGURE 5



LEGEND

- OUTFALL**
- DROP INLET**
- STORMWATER MANHOLE**
- INSTITUTIONAL AND ENGINEERING CONTROL AREA**

- NOTES:**
1. ALL OBJECT AND STRUCTURE LOCATIONS ARE APPROXIMATE BASED ON A HAND-HELD GPS SURVEY COMPLETED BY GHD IN NOVEMBER 2020.
 2. AERIAL PHOTOGRAPHS ARE 2022 ONE FOOT RESOLUTION AND WERE OBTAINED FROM THE NEW YORK STATE GIS CLEARINGHOUSE.



ENPRO HOLDINGS INC.
FORMER CRUCIBLE SPECIALTY METALS LANDFILL
SITE MANAGEMENT PLAN
**INSTITUTIONAL AND ENGINEERING
CONTROL BOUNDARIES**

Project No. 8618809
Date 03.2023

FIGURE 6

TABLES



Table 2
Groundwater Elevation Measurements - 1998 to 2019

EnPro Holdings, Inc.
Former Crucible Specialty Metals Landfill
Site # 734021

Well ID	Measurement Date	Reference Elevation (feet)	Depth to Groundwater (feet)	Measured Depth of Well* (feet)	Groundwater Elevation (feet)	Comments
MS104.3	6/2/1998	428.52	29.0	54.18	399.5	
MS104.3	10/15/1998	428.52	35.7		392.8	
MS104.3	5/21/1999	428.52	30.2		398.3	
MS104.3	11/10/1999	428.52	37.5		391.0	
MS104.3	7/31/2000	428.52	28.5		400.0	
MS104.3	11/28/2000	428.52	33.2		395.3	
MS104.3	6/20/2001	428.52	32.2		396.3	
MS104.3	10/10/2001	428.52	34.8		393.7	
MS104.3	4/24/2002	428.52	27.7		400.8	
MS104.3	11/8/2002	428.52	34.9		393.6	
MS104.3	6/11/2003	428.52	28.1		400.4	
MS104.3	10/24/2003	428.52	35.0		393.5	
MS104.3	6/24/2004	428.52	26.9		401.6	
MS104.3	11/3/2004	428.52	31.2		397.3	
MS104.3	6/15/2005	428.52	30.6		397.9	
MS104.3	11/8/2005	428.52	29.4		399.1	
MS104.3	6/26/2006	428.52	30.0		398.5	
MS104.3	11/6/2006	428.52	37.1		391.4	
MS104.3	4/20/2007	428.52	23.6		404.9	
MS104.3	9/21/2007	428.52	34.6		393.9	
MS104.3	4/18/2008	428.52	26.0		402.5	
MS104.3	11/3/2008	428.52	34.6		393.9	
MS104.3	11/5/2011	428.52	29.5		399.1	
MS104.3	10/15/2012	428.52	36.6		391.9	
MS104.3	9/23/2013	428.52	31.3		397.2	
MS104.3	10/20/2014	428.52	29.8		398.7	
MS104.3	10/29/2015	428.52	28.7		399.8	
MS104.3	10/27/2016	428.52	28.8		399.7	
MS104.3	10/25/2017	428.52	32.2		396.3	
MS104.3	10/23/2019	428.52	29.2		399.3	

* - Measured depth of well during 2019 monitoring event. Constructed depths unknown.



Table 2
Groundwater Elevation Measurements - 1998 to 2019

EnPro Holdings, Inc.
Former Crucible Specialty Metals Landfill
Site # 734021

Well ID	Measurement Date	Reference Elevation (feet)	Depth to Groundwater (feet)	Measured Depth of Well* (feet)	Groundwater Elevation (feet)	Comments
MS104.4	6/2/1998	428.2	27.9	40.48	400.3	
MS104.4	10/15/1998	428.2	32.4		395.8	
MS104.4	5/21/1999	428.2	28.7		399.5	
MS104.4	11/10/1999	428.2	36.5		391.7	
MS104.4	7/31/2000	428.2	28.5		399.7	
MS104.4	11/28/2000	428.2	32.3		395.9	
MS104.4	6/20/2001	428.2	29.1		399.1	
MS104.4	10/10/2001	428.2	33.6		394.6	
MS104.4	4/24/2002	428.2	26.0		402.2	
MS104.4	11/8/2002	428.2	33.8		394.4	
MS104.4	6/11/2003	428.2	26.8		401.4	
MS104.4	10/24/2003	428.2	33.8		394.4	
MS104.4	6/24/2004	428.2	25.8		402.4	
MS104.4	11/3/2004	428.2	30.0		398.2	
MS104.4	6/15/2005	428.2	28.4		399.8	
MS104.4	11/8/2005	428.2	27.9		400.3	
MS104.4	6/26/2006	428.2	28.7		399.5	
MS104.4	11/6/2006	428.2	25.8		402.4	
MS104.4	4/20/2007	428.2	22.6		405.6	
MS104.4	9/21/2007	428.2	33.1		395.1	
MS104.4	4/18/2008	428.2	24.9		403.3	
MS104.4	11/3/2008	428.2	33.7		394.5	
MS104.4	11/5/2011	428.2	28.1		400.1	
MS104.4	10/15/2012	428.2	35.4		392.8	
MS104.4	9/23/2013	428.2	30.0		398.2	
MS104.4	10/20/2014	428.2	27.7		400.5	
MS104.4	10/29/2015	428.2	27.4		400.9	
MS104.4	10/27/2016	428.2	27.0		401.2	
MS104.4	10/25/2017	428.2	30.9		397.3	
MS104.4	10/23/2019	428.2	27.7		400.6	

* - Measured depth of well during 2019 monitoring event. Constructed depths unknown.



Table 2
Groundwater Elevation Measurements - 1998 to 2019

EnPro Holdings, Inc.
Former Crucible Specialty Metals Landfill
Site # 734021

Well ID	Measurement Date	Reference Elevation (feet)	Depth to Groundwater (feet)	Measured Depth of Well* (feet)	Groundwater Elevation (feet)	Comments
MS104.5	6/2/1998	428.58	24.8	34.58	403.8	
MS104.5	10/15/1998	428.58	32.4		396.2	
MS104.5	5/21/1999	428.58	26.1		402.5	
MS104.5	11/10/1999	428.58	-		-	DRY
MS104.5	7/31/2000	428.58	24.5		404.1	
MS104.5	11/28/2000	428.58	30.8		397.8	
MS104.5	6/20/2001	428.58	26.7		401.9	
MS104.5	10/10/2001	428.58	32.6		396.0	
MS104.5	4/24/2002	428.58	23.6		405.0	
MS104.5	11/8/2002	428.58	32.5		396.1	
MS104.5	6/11/2003	428.58	24.1		404.5	
MS104.5	10/24/2003	428.58	32.5		396.1	
MS104.5	6/24/2004	428.58	23.9		404.7	
MS104.5	11/3/2004	428.58	27.6		401.0	
MS104.5	6/15/2005	428.58	25.8		402.8	
MS104.5	11/8/2005	428.58	25.9		402.7	
MS104.5	6/26/2006	428.58	26.1		402.5	
MS104.5	11/6/2006	428.58	23.4		405.2	
MS104.5	4/20/2007	428.58	20.8		407.8	
MS104.5	9/21/2007	428.58	32.2		396.4	
MS104.5	4/18/2008	428.58	23.1		405.5	
MS104.5	11/3/2008	428.58	32.8		395.8	
MS104.5	11/5/2011	428.58	26.0		402.6	
MS104.5	10/15/2012	428.58	34.7		393.9	
MS104.5	9/23/2013	428.58	27.8		400.7	
MS104.5	10/20/2014	428.58	23.1		405.5	
MS104.5	10/29/2015	428.58	24.7		403.9	
MS104.5	10/27/2016	428.58	23.9		404.7	
MS104.5	10/25/2017	428.58	29.1		399.5	
MS104.5	10/23/2019	428.58	25.0		403.6	

* - Measured depth of well during 2019 monitoring event. Constructed depths unknown.



Table 2
Groundwater Elevation Measurements - 1998 to 2019

EnPro Holdings, Inc.
Former Crucible Specialty Metals Landfill
Site # 734021

Well ID	Measurement Date	Reference Elevation (feet)	Depth to Groundwater (feet)	Measured Depth of Well* (feet)	Groundwater Elevation (feet)	Comments
MS106.1	6/2/1998	436	55.5	82.18	380.5	
MS106.1	10/15/1998	436	60.8		375.2	
MS106.1	5/21/1999	436	57.1		378.9	
MS106.1	11/10/1999	436	63.5		372.5	
MS106.1	7/31/2000	436	55.3		380.7	
MS106.1	11/28/2000	436	60.1		375.9	
MS106.1	6/20/2001	436	57.6		378.4	
MS106.1	10/10/2001	436	61.6		374.4	
MS106.1	4/24/2002	436	55.7		380.3	
MS106.1	11/8/2002	436	61.4		374.6	
MS106.1	6/11/2003	436	54.8		381.2	
MS106.1	10/24/2003	436	61.4		374.6	
MS106.1	6/24/2004	436	54.0		382.0	
MS106.1	11/3/2004	436	58.0		378.0	
MS106.1	6/15/2005	436	57.1		378.9	
MS106.1	11/8/2005	436	59.4		376.6	
MS106.1	6/26/2006	436	59.1		376.9	
MS106.1	11/6/2006	436	54.8		381.2	
MS106.1	4/20/2007	436	51.5		384.5	
MS106.1	9/21/2007	436	61.2		374.8	
MS106.1	4/18/2008	436	52.9		383.1	
MS106.1	11/3/2008	436	60.1		375.9	
MS106.1	11/5/2011	436	57.8		378.2	
MS106.1	10/15/2012	436	62.9		373.1	
MS106.1	9/23/2013	436	60.7		375.3	
MS106.1	10/20/2014	436	63.4		372.6	
MS106.1	10/30/2015	436	60.0		376.1	
MS106.1	10/26/2016	436	60.7		375.3	
MS106.1	10/25/2017	436	61.7		374.4	
MS106.1	10/23/2019	436	60.5		375.5	

* - Measured depth of well during 2019 monitoring event. Constructed depths unknown.



Table 2
Groundwater Elevation Measurements - 1998 to 2019

EnPro Holdings, Inc.
Former Crucible Specialty Metals Landfill
Site # 734021

Well ID	Measurement Date	Reference Elevation (feet)	Depth to Groundwater (feet)	Measured Depth of Well* (feet)	Groundwater Elevation (feet)	Comments
MS106.2	6/2/1998	436.37	52.3	74.17	384.1	
MS106.2	10/15/1998	436.37	58.9		377.5	
MS106.2	5/21/1999	436.37	56.7		379.7	
MS106.2	11/10/1999	436.37	61.0		375.4	
MS106.2	7/31/2000	436.37	52.0		384.4	
MS106.2	11/28/2000	436.37	57.3		379.1	
MS106.2	6/20/2001	436.37	54.4		382.0	
MS106.2	10/10/2001	436.37	28.8		407.6	
MS106.2	4/24/2002	436.37	52.4		384.0	
MS106.2	11/8/2002	436.37	58.7		377.7	
MS106.2	6/11/2003	436.37	51.3		385.1	
MS106.2	10/24/2003	436.37	58.2		378.2	
MS106.2	6/24/2004	436.37	50.0		386.4	
MS106.2	11/3/2004	436.37	54.7		381.7	
MS106.2	6/15/2005	436.37	53.2		383.2	
MS106.2	11/8/2005	436.37	57.1		379.3	
MS106.2	6/26/2006	436.37	53.5		382.9	
MS106.2	11/6/2006	436.37	51.2		385.2	
MS106.2	4/20/2007	436.37	47.0		389.4	
MS106.2	9/21/2007	436.37	57.6		378.8	
MS106.2	4/18/2008	436.37	48.4		388.0	
MS106.2	11/3/2008	436.37	57.6		378.8	
MS106.2	11/5/2011	436.37	54.4		382.0	
MS106.2	10/15/2012	436.37	59.7		376.6	
MS106.2	9/23/2013	436.37	57.1		379.2	
MS106.2	10/20/2014	436.37	60.0		376.4	
MS106.2	10/30/2015	436.37	57.0		379.4	
MS106.2	10/26/2016	436.37	59.1		377.3	
MS106.2	10/25/2017	436.37	58.3		378.1	
MS106.2	10/23/2019	436.37	57.9		378.5	

* - Measured depth of well during 2019 monitoring event. Constructed depths unknown.



Table 2
Groundwater Elevation Measurements - 1998 to 2019

EnPro Holdings, Inc.
Former Crucible Specialty Metals Landfill
Site # 734021

Well ID	Measurement Date	Reference Elevation (feet)	Depth to Groundwater (feet)	Measured Depth of Well* (feet)	Groundwater Elevation (feet)	Comments
MS106.3	6/2/1998	433.93	41.8	61.16	392.1	
MS106.3	10/15/1998	433.93	53.3		380.6	
MS106.3	5/21/1999	433.93	45.2		388.7	
MS106.3	11/10/1999	433.93	56.5		377.4	
MS106.3	7/31/2000	433.93	40.6		393.3	
MS106.3	11/28/2000	433.93	51.5		382.4	
MS106.3	6/20/2001	433.93	46.1		387.8	
MS106.3	10/10/2001	433.93	54.1		379.8	
MS106.3	4/24/2002	433.93	40.6		393.3	
MS106.3	11/8/2002	433.93	53.7		380.2	
MS106.3	6/11/2003	433.93	40.2		393.7	
MS106.3	10/24/2003	433.93	52.7		381.2	
MS106.3	6/24/2004	433.93	39.1		394.8	
MS106.3	11/3/2004	433.93	47.7		386.2	
MS106.3	6/15/2005	433.93	43.7		390.2	
MS106.3	11/8/2005	433.93	52.5		381.4	
MS106.3	6/26/2006	433.93	44.8		389.1	
MS106.3	11/6/2006	433.93	40.6		393.3	
MS106.3	4/20/2007	433.93	35.2		398.7	
MS106.3	9/21/2007	433.93	51.2		382.7	
MS106.3	4/18/2008	433.93	37.1		396.8	
MS106.3	11/3/2008	433.93	53.0		380.9	
MS106.3	11/5/2011	433.93	47.7		386.3	
MS106.3	10/15/2012	433.93	55.4		378.6	
MS106.3	9/23/2013	433.93	50.9		383.0	
MS106.3	10/20/2014	433.93	55.3		378.7	
MS106.3	10/30/2015	433.93	51.7		382.2	
MS106.3	10/26/2016	433.93	55.4		378.6	
MS106.3	10/25/2017	433.93	53.1		380.9	
MS106.3	10/23/2019	433.93	53.4		380.6	

* - Measured depth of well during 2019 monitoring event. Constructed depths unknown.



Table 2
Groundwater Elevation Measurements - 1998 to 2019

EnPro Holdings, Inc.
Former Crucible Specialty Metals Landfill
Site # 734021

Well ID	Measurement Date	Reference Elevation (feet)	Depth to Groundwater (feet)	Measured Depth of Well* (feet)	Groundwater Elevation (feet)	Comments
MS106.4	6/2/1998	435.01	42.2	51.16	391.7	
MS106.4	10/15/1998	435.01	-		-	DRY
MS106.4	5/21/1999	435.01	44.1		389.8	
MS106.4	11/10/1999	435.01	-		-	DRY
MS106.4	7/31/2000	435.01	41.4		392.5	
MS106.4	11/28/2000	435.01	50.1		383.8	
MS106.4	6/20/2001	435.01	44.6		389.3	
MS106.4	10/10/2001	435.01	-		-	DRY
MS106.4	4/24/2002	435.01	41.4		392.5	
MS106.4	11/8/2002	435.01	51.0		382.9	
MS106.4	6/11/2003	435.01	40.9		393.0	
MS106.4	10/24/2003	435.01	50.6		383.3	
MS106.4	6/24/2004	435.01	39.7		394.2	
MS106.4	11/3/2004	435.01	45.9		388.0	
MS106.4	6/15/2005	435.01	43.3		390.6	
MS106.4	11/8/2005	435.01	50.7		383.2	
MS106.4	6/26/2006	435.01	43.9		390.0	
MS106.4	11/6/2006	435.01	40.5		393.4	
MS106.4	4/20/2007	435.01	34.8		399.1	
MS106.4	9/21/2007	435.01	49.3		384.6	
MS106.4	4/18/2008	435.01	37.1		396.8	
MS106.4	11/3/2008	435.01	49.9		384.0	
MS106.4	11/5/2011	435.01	45.3		388.6	
MS106.4	10/15/2012	435.01	-		-	DRY
MS106.4	9/23/2013	435.01	49.3		384.7	
MS106.4	10/20/2014	435.01	-		-	DRY
MS106.4	10/30/2015	435.01	50.3		383.7	
MS106.4	10/26/2016	435.01	-		-	DRY
MS106.4	10/25/2017	435.01	50.5		384.5	
MS106.4	10/23/2019	435.01	50.9		384.1	

* - Measured depth of well during 2019 monitoring event. Constructed depths unknown.



Table 2
Groundwater Elevation Measurements - 1998 to 2019

EnPro Holdings, Inc.
Former Crucible Specialty Metals Landfill
Site # 734021

Well ID	Measurement Date	Reference Elevation (feet)	Depth to Groundwater (feet)	Measured Depth of Well* (feet)	Groundwater Elevation (feet)	Comments
MS301.1	6/2/1998	424.85	57.4	168.93	367.5	
MS301.1	10/15/1998	424.85	58.2		366.7	
MS301.1	5/21/1999	424.85	58.0		366.9	
MS301.1	11/10/1999	424.85	58.3		366.6	
MS301.1	7/31/2000	424.85	57.9		367.0	
MS301.1	11/28/2000	424.85	58.1		366.8	
MS301.1	6/20/2001	424.85	58.0		366.9	
MS301.1	10/10/2001	424.85	58.6		366.3	
MS301.1	4/24/2002	424.85	57.6		367.3	
MS301.1	11/8/2002	424.85	58.1		366.8	
MS301.1	6/11/2003	424.85	57.4		367.5	
MS301.1	10/24/2003	424.85	59.0		365.9	
MS301.1	6/24/2004	424.85	57.7		367.2	
MS301.1	11/3/2004	424.85	58.1		366.8	
MS301.1	6/15/2005	424.85	58.1		366.8	
MS301.1	11/8/2005	424.85	57.8		367.1	
MS301.1	6/26/2006	424.85	58.0		366.9	
MS301.1	11/6/2006	424.85	57.6		367.3	
MS301.1	4/20/2007	424.85	56.4		368.5	
MS301.1	9/21/2007	424.85	58.8		366.1	
MS301.1	4/18/2008	424.85	57.9		367.0	
MS301.1	11/3/2008	424.85	58.4		366.5	
MS301.1	11/5/2011	424.85	58.2		366.7	
MS301.1	10/15/2012	424.85	59.0		365.9	
MS301.1	9/23/2013	424.85	58.4		366.5	
MS301.1	10/20/2014	424.85	58.6		366.2	
MS301.1	10/29/2015	424.85	56.7		368.2	
MS301.1	10/26/2016	424.85	53.8		371.0	
MS301.1	10/25/2017	424.85	57.0		367.9	
MS301.1	10/23/2019	427.6	56.2		371.4	

* - Measured depth of well during 2019 monitoring event. Constructed depths unknown.



Table 2
Groundwater Elevation Measurements - 1998 to 2019

EnPro Holdings, Inc.
Former Crucible Specialty Metals Landfill
Site # 734021

Well ID	Measurement Date	Reference Elevation (feet)	Depth to Groundwater (feet)	Measured Depth of Well* (feet)	Groundwater Elevation (feet)	Comments
MS301.2	6/2/1998	424.63	56.1	96.76	368.5	
MS301.2	10/15/1998	424.63	58.7		365.9	
MS301.2	5/21/1999	424.63	56.7		367.9	
MS301.2	11/10/1999	424.63	60.3		364.3	
MS301.2	7/31/2000	424.63	55.7		368.9	
MS301.2	11/28/2000	424.63	58.5		366.1	
MS301.2	6/20/2001	424.63	57.4		367.2	
MS301.2	10/10/2001	424.63	59.7		364.9	
MS301.2	4/24/2002	424.63	55.4		369.2	
MS301.2	11/8/2002	424.63	59.3		365.3	
MS301.2	6/11/2003	424.63	55.5		369.1	
MS301.2	10/24/2003	424.63	60.1		364.5	
MS301.2	6/24/2004	424.63	55.0		369.6	
MS301.2	11/3/2004	424.63	57.5		367.1	
MS301.2	6/15/2005	424.63	57.3		367.3	
MS301.2	11/8/2005	424.63	58.2		366.4	
MS301.2	6/26/2006	424.63	57.1		367.5	
MS301.2	11/6/2006	424.63	54.9		369.7	
MS301.2	4/20/2007	424.63	53.0		371.6	
MS301.2	9/21/2007	424.63	60.0		364.6	
MS301.2	4/18/2008	424.63	53.9		370.7	
MS301.2	11/3/2008	424.63	58.6		366.0	
MS301.2	11/5/2011	424.63	57.1		367.5	
MS301.2	10/15/2012	424.63	60.1		364.5	
MS301.2	9/23/2013	424.63	59.6		365.1	
MS301.2	10/20/2014	424.63	62.4		362.2	
MS301.2	10/29/2015	424.63	57.9		366.8	
MS301.2	10/26/2016	424.63	57.5		367.2	
MS301.2	10/25/2017	424.63	59.1		365.5	
MS301.2	10/23/2019	427.2	57.8		369.4	

* - Measured depth of well during 2019 monitoring event. Constructed depths unknown.



Table 2
Groundwater Elevation Measurements - 1998 to 2019

EnPro Holdings, Inc.
Former Crucible Specialty Metals Landfill
Site # 734021

Well ID	Measurement Date	Reference Elevation (feet)	Depth to Groundwater (feet)	Measured Depth of Well* (feet)	Groundwater Elevation (feet)	Comments
MS301.3	6/2/1998	424.92	55.6	82.94	369.3	
MS301.3	10/15/1998	424.92	58.4		366.5	
MS301.3	5/21/1999	424.92	56.6		368.3	
MS301.3	11/10/1999	424.92	60.1		364.8	
MS301.3	7/31/2000	424.92	55.3		369.6	
MS301.3	11/28/2000	424.92	58.2		366.7	
MS301.3	6/20/2001	424.92	57.0		367.9	
MS301.3	10/10/2001	424.92	59.4		365.5	
MS301.3	4/24/2002	424.92	55.0		369.9	
MS301.3	11/8/2002	424.92	58.9		366.0	
MS301.3	6/11/2003	424.92	55.1		369.8	
MS301.3	10/24/2003	424.92	59.9		365.0	
MS301.3	6/24/2004	424.92	54.4		370.5	
MS301.3	11/3/2004	424.92	57.1		367.8	
MS301.3	6/15/2005	424.92	56.8		368.1	
MS301.3	11/8/2005	424.92	57.3		367.6	
MS301.3	6/26/2006	424.92	56.5		368.4	
MS301.3	11/6/2006	424.92	54.4		370.5	
MS301.3	4/20/2007	424.92	52.0		372.9	
MS301.3	9/21/2007	424.92	59.4		365.5	
MS301.3	4/18/2008	424.92	53.0		371.9	
MS301.3	11/3/2008	424.92	58.1		366.8	
MS301.3	11/5/2011	424.92	56.2		368.7	
MS301.3	10/15/2012	424.92	59.4		365.6	
MS301.3	9/23/2013	424.92	58.8		366.2	
MS301.3	10/20/2014	424.92	61.9		363.1	
MS301.3	10/29/2015	424.92	57.2		367.8	
MS301.3	10/26/2016	424.92	54.8		370.1	
MS301.3	10/25/2017	424.92	58.4		366.5	
MS301.3	10/23/2019	427.4	57.1		370.3	

* - Measured depth of well during 2019 monitoring event. Constructed depths unknown.



Table 2
Groundwater Elevation Measurements - 1998 to 2019

EnPro Holdings, Inc.
Former Crucible Specialty Metals Landfill
Site # 734021

Well ID	Measurement Date	Reference Elevation (feet)	Depth to Groundwater (feet)	Measured Depth of Well* (feet)	Groundwater Elevation (feet)	Comments
MS301.4	6/2/1998	424.42	49.5	61.93	374.9	
MS301.4	10/15/1998	424.42	53.2		371.2	
MS301.4	5/21/1999	424.42	50.1		374.3	
MS301.4	11/10/1999	424.42	55.5		368.9	
MS301.4	7/31/2000	424.42	48.8		375.6	
MS301.4	11/28/2000	424.42	53.0		371.4	
MS301.4	6/20/2001	424.42	51.1		373.3	
MS301.4	10/10/2001	424.42	54.3		370.1	
MS301.4	4/24/2002	424.42	48.6		375.8	
MS301.4	11/8/2002	424.42	54.2		370.2	
MS301.4	6/11/2003	424.42	48.7		375.7	
MS301.4	10/24/2003	424.42	54.7		369.7	
MS301.4	6/24/2004	424.42	47.9		376.5	
MS301.4	11/3/2004	424.42	51.5		372.9	
MS301.4	6/15/2005	424.42	50.7		373.7	
MS301.4	11/8/2005	424.42	52.2		372.2	
MS301.4	6/26/2006	424.42	50.5		373.9	
MS301.4	11/6/2006	424.42	48.2		376.2	
MS301.4	4/20/2007	424.42	45.0		379.4	
MS301.4	9/21/2007	424.42	54.2		370.2	
MS301.4	4/18/2008	424.42	46.3		378.1	
MS301.4	11/3/2008	424.42	52.9		371.5	
MS301.4	11/5/2011	424.42	50.8		373.7	
MS301.4	10/15/2012	424.42	54.5		369.9	
MS301.4	9/23/2013	424.42	53.1		371.4	
MS301.4	10/20/2014	424.42	55.9		368.5	
MS301.4	10/29/2015	424.42	50.2		374.2	
MS301.4	10/26/2016	424.42	50.9		373.5	
MS301.4	10/25/2017	424.42	52.2		372.3	
MS301.4	10/23/2019	427.3	51.2		376.1	

* - Measured depth of well during 2019 monitoring event. Constructed depths unknown.



Table 2
Groundwater Elevation Measurements - 1998 to 2019

EnPro Holdings, Inc.
Former Crucible Specialty Metals Landfill
Site # 734021

Well ID	Measurement Date	Reference Elevation (feet)	Depth to Groundwater (feet)	Measured Depth of Well* (feet)	Groundwater Elevation (feet)	Comments
MS301.5	6/2/1998	424.87	38.9	50.89	386.0	
MS301.5	10/15/1998	424.87	45.5		379.4	
MS301.5	5/21/1999	424.87	39.9		385.0	
MS301.5	11/10/1999	424.87	46.4		378.5	
MS301.5	7/31/2000	424.87	38.3		386.6	
MS301.5	11/28/2000	424.87	44.7		380.2	
MS301.5	6/20/2001	424.87	41.2		383.7	
MS301.5	10/10/2001	424.87	45.3		379.6	
MS301.5	4/24/2002	424.87	36.5		388.4	
MS301.5	11/8/2002	424.87	45.1		379.8	
MS301.5	6/11/2003	424.87	37.2		387.7	
MS301.5	10/24/2003	424.87	45.3		379.6	
MS301.5	6/24/2004	424.87	37.4		387.5	
MS301.5	11/3/2004	424.87	41.9		383.0	
MS301.5	6/15/2005	424.87	40.5		384.4	
MS301.5	11/8/2005	424.87	43.4		381.5	
MS301.5	6/26/2006	424.87	40.4		384.5	
MS301.5	11/6/2006	424.87	36.8		388.1	
MS301.5	4/20/2007	424.87	31.7		393.2	
MS301.5	9/21/2007	424.87	44.7		380.2	
MS301.5	4/18/2008	424.87	35.2		389.7	
MS301.5	11/3/2008	424.87	43.1		381.8	
MS301.5	11/5/2011	424.87	40.5		384.4	
MS301.5	10/15/2012	424.87	46.0		378.9	
MS301.5	9/23/2013	424.87	43.2		381.7	
MS301.5	10/20/2014	424.87	45.5		379.3	
MS301.5	10/29/2015	424.87	39.6		385.3	
MS301.5	10/26/2016	424.87	39.6		385.2	
MS301.5	10/25/2017	424.87	41.7		383.2	
MS301.5	10/23/2019	427.3	40.7		386.6	

* - Measured depth of well during 2019 monitoring event. Constructed depths unknown.



Table 2
Groundwater Elevation Measurements - 1998 to 2019

EnPro Holdings, Inc.
Former Crucible Specialty Metals Landfill
Site # 734021

Well ID	Measurement Date	Reference Elevation (feet)	Depth to Groundwater (feet)	Measured Depth of Well* (feet)	Groundwater Elevation (feet)	Comments
PZ2.1	6/2/1998	428.55	51.2	44.40	377.4	
PZ2.1	10/15/1998	428.55	51.4		377.2	
PZ2.1	5/21/1999	428.55	51.7		376.9	
PZ2.1	11/10/1999	428.55	54.1		374.5	
PZ2.1	7/31/2000	428.55	46.8		381.8	
PZ2.1	11/28/2000	428.55	50.1		378.5	
PZ2.1	6/20/2001	428.55	47.0		381.6	
PZ2.1	10/10/2001	428.55	50.3		378.3	
PZ2.1	4/24/2002	428.55	47.2		381.4	
PZ2.1	11/8/2002	428.55	50.3		378.3	
PZ2.1	6/11/2003	428.55	45.5		383.1	
PZ2.1	10/24/2003	428.55	50.3		378.3	
PZ2.1	6/24/2004	428.55	43.8		384.8	
PZ2.1	11/3/2004	428.55	47.9		380.7	
PZ2.1	6/15/2005	428.55	46.3		382.3	
PZ2.1	11/8/2005	428.55	48.3		380.3	
PZ2.1	6/26/2006	428.55	47.2		381.4	
PZ2.1	11/6/2006	428.55	46.4		382.2	
PZ2.1	4/20/2007	428.55	41.3		387.3	
PZ2.1	9/21/2007	428.55	49.6		379.0	
PZ2.1	4/18/2008	428.55	43.2		385.4	
PZ2.1	11/3/2008	428.55	50.1		378.5	
PZ2.1	11/5/2011	428.55	-		-	DRY
PZ2.1	10/15/2012	428.55	50.9		377.6	
PZ2.1	9/23/2013	428.55	49.0		379.6	
PZ2.1	10/20/2014	428.55	49.9		378.7	
PZ2.1	10/29/2015	428.55	48.0		380.6	
PZ2.1	10/27/2016	428.55	49.6		379.0	
PZ2.1	10/25/2017	428.55	49.4		379.1	
PZ2.1	10/23/2019	428.55	-		-	DRY

* - Measured depth of well during 2019 monitoring event. Constructed depths unknown.



Table 2
Groundwater Elevation Measurements - 1998 to 2019

EnPro Holdings, Inc.
Former Crucible Specialty Metals Landfill
Site # 734021

Well ID	Measurement Date	Reference Elevation (feet)	Depth to Groundwater (feet)	Measured Depth of Well* (feet)	Groundwater Elevation (feet)	Comments
PZ5.1	6/2/1998	426.5	44.7	64.00	381.8	
PZ5.1	10/15/1998	426.5	49.6		376.9	
PZ5.1	5/21/1999	426.5	45.5		381.0	
PZ5.1	11/10/1999	426.5	52.5		374.0	
PZ5.1	7/31/2000	426.5	45.5		381.0	
PZ5.1	11/28/2000	426.5	48.8		377.7	
PZ5.1	6/20/2001	426.5	46.3		380.2	
PZ5.1	10/10/2001	426.5	50.6		375.9	
PZ5.1	4/24/2002	426.5	44.9		381.6	
PZ5.1	11/8/2002	426.5	50.6		375.9	
PZ5.1	6/11/2003	426.5	44.1		382.4	
PZ5.1	10/24/2003	426.5	50.1		376.4	
PZ5.1	6/24/2004	426.5	43.0		383.5	
PZ5.1	11/3/2004	426.5	46.5		380.0	
PZ5.1	6/15/2005	426.5	45.6		380.9	
PZ5.1	11/8/2005	426.5	48.0		378.5	
PZ5.1	6/26/2006	426.5	45.9		380.6	
PZ5.1	11/6/2006	426.5	44.4		382.1	
PZ5.1	4/20/2007	426.5	40.3		386.2	
PZ5.1	9/21/2007	426.5	50.3		376.2	
PZ5.1	4/18/2008	426.5	41.9		384.6	
PZ5.1	11/3/2008	426.5	48.6		377.9	
PZ5.1	11/5/2011	426.5	-		-	Obstructed
PZ5.1	10/15/2012	426.5	52.3		374.2	
PZ5.1	9/23/2013	426.5	49.0		377.5	
PZ5.1	10/20/2014	426.5	51.8		374.7	
PZ5.1	10/29/2015	426.5	47.8		378.7	
PZ5.1	10/26/2016	426.5	48.8		377.7	
PZ5.1	10/25/2017	426.5	49.9		376.6	
PZ5.1	10/23/2019	426.5	48.3		378.3	

* - Measured depth of well during 2019 monitoring event. Constructed depths unknown.



Table 2
Groundwater Elevation Measurements - 1998 to 2019

EnPro Holdings, Inc.
Former Crucible Specialty Metals Landfill
Site # 734021

Well ID	Measurement Date	Reference Elevation (feet)	Depth to Groundwater (feet)	Measured Depth of Well* (feet)	Groundwater Elevation (feet)	Comments
PZ5.2	6/2/1998	426.5	40.7	57.86	385.8	
PZ5.2	10/15/1998	426.5	47.4		379.1	
PZ5.2	5/21/1999	426.5	41.6		384.9	
PZ5.2	11/10/1999	426.5	51.1		375.4	
PZ5.2	7/31/2000	426.5	41.9		384.6	
PZ5.2	11/28/2000	426.5	46.3		380.2	
PZ5.2	6/20/2001	426.5	42.9		383.6	
PZ5.2	10/10/2001	426.5	48.3		378.2	
PZ5.2	4/24/2002	426.5	41.2		385.3	
PZ5.2	11/8/2002	426.5	48.4		378.1	
PZ5.2	6/11/2003	426.5	39.8		386.7	
PZ5.2	10/24/2003	426.5	47.5		379.0	
PZ5.2	6/24/2004	426.5	38.6		387.9	
PZ5.2	11/3/2004	426.5	43.2		383.3	
PZ5.2	6/15/2005	426.5	41.2		385.3	
PZ5.2	11/8/2005	426.5	45.6		380.9	
PZ5.2	6/26/2006	426.5	41.8		384.7	
PZ5.2	11/6/2006	426.5	40.7		385.8	
PZ5.2	4/20/2007	426.5	35.1		391.4	
PZ5.2	9/21/2007	426.5	47.5		379.0	
PZ5.2	4/18/2008	426.5	37.3		389.2	
PZ5.2	11/3/2008	426.5	46.1		380.4	
PZ5.2	11/5/2011	426.5	-		-	Obstructed
PZ5.2	10/15/2012	426.5	50.7		375.8	
PZ5.2	9/23/2013	426.5	45.8		380.7	
PZ5.2	10/20/2014	426.5	49.6		376.9	
PZ5.2	10/29/2015	426.5	45.2		381.4	
PZ5.2	10/26/2016	426.5	46.6		379.9	
PZ5.2	10/25/2017	426.5	46.9		379.6	
PZ5.2	10/23/2019	426.5	45.2		381.3	

* - Measured depth of well during 2019 monitoring event. Constructed depths unknown.



Table 2
Groundwater Elevation Measurements - 1998 to 2019

EnPro Holdings, Inc.
Former Crucible Specialty Metals Landfill
Site # 734021

Well ID	Measurement Date	Reference Elevation (feet)	Depth to Groundwater (feet)	Measured Depth of Well* (feet)	Groundwater Elevation (feet)	Comments
PZ8.1	6/2/1998	426.39	50.2	55.17	376.2	
PZ8.1	10/15/1998	426.39	52.5		373.9	
PZ8.1	5/21/1999	426.39	51.0		375.4	
PZ8.1	11/10/1999	426.39	53.5		372.9	
PZ8.1	7/31/2000	426.39	46.8		379.6	
PZ8.1	11/28/2000	426.39	51.4		375.0	
PZ8.1	6/20/2001	426.39	50.2		376.2	
PZ8.1	10/10/2001	426.39	53.2		373.2	
PZ8.1	4/24/2002	426.39	45.3		381.1	
PZ8.1	11/8/2002	426.39	52.6		373.8	
PZ8.1	6/11/2003	426.39	47.8		378.6	
PZ8.1	10/24/2003	426.39	53.0		373.4	
PZ8.1	6/24/2004	426.39	47.2		379.2	
PZ8.1	11/3/2004	426.39	50.1		376.3	
PZ8.1	6/15/2005	426.39	51.5		374.9	
PZ8.1	11/8/2005	426.39	51.1		375.3	
PZ8.1	6/26/2006	426.39	50.0		376.4	
PZ8.1	11/6/2006	426.39	46.6		379.8	
PZ8.1	4/20/2007	426.39	43.6		382.8	
PZ8.1	9/21/2007	426.39	53.2		373.2	
PZ8.1	4/18/2008	426.39	45.5		380.9	
PZ8.1	11/3/2008	426.39	51.0		375.4	
PZ8.1	11/5/2011	426.39	48.8		377.6	
PZ8.1	10/15/2012	426.39	53.9		372.5	
PZ8.1	9/23/2013	426.39	52.2		374.2	
PZ8.1	10/20/2014	426.39	47.8		378.6	
PZ8.1	10/29/2015	426.39	49.4		377.0	
PZ8.1	10/26/2016	426.39	49.6		376.8	
PZ8.1	10/25/2017	426.39	46.7		379.7	
PZ8.1	10/23/2019	427.3	50.3		377.0	

* - Measured depth of well during 2019 monitoring event. Constructed depths unknown.



Table 2
Groundwater Elevation Measurements - 1998 to 2019

EnPro Holdings, Inc.
Former Crucible Specialty Metals Landfill
Site # 734021

Well ID	Measurement Date	Reference Elevation (feet)	Depth to Groundwater (feet)	Measured Depth of Well* (feet)	Groundwater Elevation (feet)	Comments
PZ8.2	6/2/1998	426.36	40.9	46.11	385.5	
PZ8.2	10/15/1998	426.36	46.4		380.0	
PZ8.2	5/21/1999	426.36	42.1		384.3	
PZ8.2	11/10/1999	426.36	48.6		377.8	
PZ8.2	7/31/2000	426.36	40.8		385.6	
PZ8.2	11/28/2000	426.36	44.7		381.7	
PZ8.2	6/20/2001	426.36	41.8		384.6	
PZ8.2	10/10/2001	426.36	47.1		379.3	
PZ8.2	4/24/2002	426.36	39.5		386.9	
PZ8.2	11/8/2002	426.36	46.8		379.6	
PZ8.2	6/11/2003	426.36	36.8		389.6	
PZ8.2	10/24/2003	426.36	46.7		379.7	
PZ8.2	6/24/2004	426.36	36.9		389.5	
PZ8.2	11/3/2004	426.36	42.6		383.8	
PZ8.2	6/15/2005	426.36	43.4		383.0	
PZ8.2	11/8/2005	426.36	46.4		380.0	
PZ8.2	6/26/2006	426.36	41.1		385.3	
PZ8.2	11/6/2006	426.36	42.6		383.8	
PZ8.2	4/20/2007	426.36	30.0		396.4	
PZ8.2	9/21/2007	426.36	47.1		379.3	
PZ8.2	4/18/2008	426.36	34.9		391.5	
PZ8.2	11/3/2008	426.36	43.3		383.1	
PZ8.2	11/5/2011	426.36	40.3		386.0	
PZ8.2	10/15/2012	426.36	48.6		377.8	
PZ8.2	9/23/2013	426.36	44.7		381.7	
PZ8.2	10/20/2014	426.36	54.0		372.4	
PZ8.2	10/29/2015	426.36	41.0		385.4	
PZ8.2	10/26/2016	426.36	39.5		386.9	
PZ8.2	10/25/2017	426.36	52.9		373.4	
PZ8.2	10/23/2019	427.4	42.8		384.6	

* - Measured depth of well during 2019 monitoring event. Constructed depths unknown.



Table 2
Groundwater Elevation Measurements - 1998 to 2019

EnPro Holdings, Inc.
Former Crucible Specialty Metals Landfill
Site # 734021

Well ID	Measurement Date	Reference Elevation (feet)	Depth to Groundwater (feet)	Measured Depth of Well* (feet)	Groundwater Elevation (feet)	Comments
W10.1	6/2/1998	424	33.5	63.05	390.5	
W10.1	10/15/1998	424	39.9		384.1	
W10.1	5/21/1999	424	34.7		389.3	
W10.1	11/10/1999	424	42.2		381.8	
W10.1	7/31/2000	424	34.5		389.5	
W10.1	11/28/2000	424	38.7		385.3	
W10.1	6/20/2001	424	35.9		388.1	
W10.1	10/10/2001	424	40.4		383.6	
W10.1	4/24/2002	424	32.5		391.5	
W10.1	11/8/2002	424	40.9		383.1	
W10.1	6/11/2003	424	32.6		391.4	
W10.1	10/24/2003	424	40.4		383.6	
W10.1	6/24/2004	424	32.3		391.7	
W10.1	11/3/2004	424	36.6		387.4	
W10.1	6/15/2005	424	35.7		388.3	
W10.1	11/8/2005	424	37.9		386.1	
W10.1	6/26/2006	424	35.6		388.4	
W10.1	11/6/2006	424	31.8		392.2	
W10.1	4/20/2007	424	26.8		397.2	
W10.1	9/21/2007	424	40.8		383.2	
W10.1	4/18/2008	424	30.2		393.8	
W10.1	11/3/2008	424	39.1		384.9	
W10.1	11/5/2011	424	34.9		389.1	
W10.1	10/15/2012	424	42.4		381.7	
W10.1	9/23/2013	424	38.4		385.6	
W10.1	10/20/2014	424	40.5		383.5	
W10.1	10/29/2015	424	36.4		387.6	
W10.1	10/27/2016	424	35.7		388.4	
W10.1	10/25/2017	424	40.4		383.6	
W10.1	10/23/2019	424.3	36.9		387.4	Broken Cover (3.5")

* - Measured depth of well during 2019 monitoring event. Constructed depths unknown.



Table 2
Groundwater Elevation Measurements - 1998 to 2019

EnPro Holdings, Inc.
Former Crucible Specialty Metals Landfill
Site # 734021

Well ID	Measurement Date	Reference Elevation (feet)	Depth to Groundwater (feet)	Measured Depth of Well* (feet)	Groundwater Elevation (feet)	Comments
W10.2	6/2/1998	424.38	25.4	31.33	399.0	
W10.2	10/15/1998	424.38	31.5		392.9	
W10.2	5/21/1999	424.38	26.3		398.1	
W10.2	11/10/1999	424.38	34.5		389.9	
W10.2	7/31/2000	424.38	26.4		398.0	
W10.2	11/28/2000	424.38	30.1		394.3	
W10.2	6/20/2001	424.38	27.5		396.9	
W10.2	10/10/2001	424.38	32.1		392.3	
W10.2	4/24/2002	424.38	24.7		399.7	
W10.2	11/8/2002	424.38	36.2		388.2	
W10.2	6/11/2003	424.38	24.5		399.9	
W10.2	10/24/2003	424.38	31.8		392.6	
W10.2	6/24/2004	424.38	24.5		399.9	
W10.2	11/3/2004	424.38	27.9		396.5	
W10.2	6/15/2005	424.38	27.3		397.1	
W10.2	11/8/2005	424.38	29.9		394.5	
W10.2	6/26/2006	424.38	27.2		397.2	
W10.2	11/6/2006	424.38	24.0		400.4	
W10.2	4/20/2007	424.38	19.0		405.4	
W10.2	9/21/2007	424.38	32.4		392.0	
W10.2	4/18/2008	424.38	22.5		401.9	
W10.2	11/3/2008	424.38	39.1		385.3	
W10.2	11/5/2011	424.38	26.0		398.4	
W10.2	10/15/2012	424.38	34.2		390.1	
W10.2	9/23/2013	424.38	29.6		394.8	
W10.2	10/20/2014	424.38	31.3		393.1	
W10.2	10/29/2015	424.38	27.6		396.7	
W10.2	10/27/2016	424.38	27.3		397.0	
W10.2	10/25/2017	424.38	31.3		393.1	
W10.2	10/23/2019	424	27.1		396.9	No stick up or pad. Top of PVC looks broken

* - Measured depth of well during 2019 monitoring event. Constructed depths unknown.



Table 2
Groundwater Elevation Measurements - 1998 to 2019

EnPro Holdings, Inc.
Former Crucible Specialty Metals Landfill
Site # 734021

Well ID	Measurement Date	Reference Elevation (feet)	Depth to Groundwater (feet)	Measured Depth of Well* (feet)	Groundwater Elevation (feet)	Comments
W105R	11/10/1999	428.19	49.3	49.26	378.9	
W105R	7/31/2000	428.19	40.0		388.2	
W105R	11/28/2000	428.19	45.9		382.3	
W105R	6/20/2001	428.19	40.4		387.8	
W105R	10/10/2001	428.19	46.4		381.8	
W105R	4/24/2002	428.19	40.7		387.5	
W105R	11/8/2002	428.19	47.6		380.6	
W105R	6/11/2003	428.19	38.3		389.9	
W105R	10/24/2003	428.19	46.6		381.6	
W105R	11/3/2004	428.19	42.3		385.9	
W105R	11/8/2005	428.19	43.9		384.3	
W105R	6/26/2006	428.19	40.6		387.6	
W105R	11/6/2006	428.19	39.4		388.8	
W105R	4/20/2007	428.19	29.8		398.4	
W105R	9/21/2007	428.19	43.3		384.9	
W105R	4/18/2008	428.19	32.9		395.3	
W105R	11/3/2008	428.19	46.0		382.2	
W105R	11/5/2011	428.19	-		-	DRY
W105R	10/15/2012	428.19	47.3		380.9	
W105R	9/23/2013	428.19	43.9		384.3	
W105R	10/20/2014	428.19	44.7		383.5	
W105R	10/30/2015	428.19	44.1		384.1	
W105R	10/27/2016	428.19	47.3		380.9	
W105R	10/25/2017	428.19	44.0		384.2	
W105R	10/23/2019	428.19	45.0		383.2	

* - Measured depth of well during 2019 monitoring event. Constructed depths unknown.



Table 2
Groundwater Elevation Measurements - 1998 to 2019

EnPro Holdings, Inc.
Former Crucible Specialty Metals Landfill
Site # 734021

Well ID	Measurement Date	Reference Elevation (feet)	Depth to Groundwater (feet)	Measured Depth of Well* (feet)	Groundwater Elevation (feet)	Comments
W201R	6/2/1998	426.49	36.8	59.62	389.7	
W201R	10/15/1998	426.49	44.2		382.3	
W201R	5/21/1999	426.49	37.7		388.8	
W201R	11/10/1999	426.49	45.9		380.6	
W201R	7/31/2000	426.49	35.7		390.8	
W201R	11/28/2000	426.49	42.3		384.2	
W201R	6/20/2001	426.49	38.9		387.6	
W201R	10/10/2001	426.49	43.7		382.8	
W201R	4/24/2002	426.49	35.6		390.9	
W201R	11/8/2002	426.49	44.1		382.4	
W201R	6/11/2003	426.49	36.0		390.5	
W201R	10/24/2003	426.49	43.3		383.2	
W201R	6/24/2004	426.49	35.0		391.5	
W201R	11/3/2004	426.49	39.5		387.0	
W201R	6/15/2005	426.49	35.9		390.6	
W201R	11/8/2005	426.49	43.4		383.1	
W201R	6/26/2006	426.49	37.9		388.6	
W201R	11/6/2006	426.49	35.6		390.9	
W201R	4/20/2007	426.49	31.6		394.9	
W201R	9/21/2007	426.49	43.0		383.5	
W201R	4/18/2008	426.49	33.4		393.1	
W201R	11/3/2008	426.49	42.9		383.6	
W201R	11/5/2011	426.49	38.8		387.7	
W201R	10/15/2012	426.49	44.8		381.7	
W201R	9/23/2013	426.49	41.9		384.6	
W201R	10/20/2014	426.49	44.4		382.1	
W201R	10/26/2016	426.49	45.3		381.2	
W201R	10/25/2017	426.49	43.0		383.5	
W201R	10/23/2019	426.49	43.2		383.3	

* - Measured depth of well during 2019 monitoring event. Constructed depths unknown.



Table 2
Groundwater Elevation Measurements - 1998 to 2019

EnPro Holdings, Inc.
Former Crucible Specialty Metals Landfill
Site # 734021

Well ID	Measurement Date	Reference Elevation (feet)	Depth to Groundwater (feet)	Measured Depth of Well* (feet)	Groundwater Elevation (feet)	Comments
W5.6	6/2/1998	426.33	43.5	63.08	382.8	
W5.6	10/15/1998	426.33	48.4		377.9	
W5.6	5/21/1999	426.33	44.5		381.8	
W5.6	11/10/1999	426.33	53.0		373.3	
W5.6	7/31/2000	426.33	43.4		382.9	
W5.6	11/28/2000	426.33	47.5		378.8	
W5.6	6/20/2001	426.33	45.0		381.3	
W5.6	10/10/2001	426.33	49.9		376.4	
W5.6	4/24/2002	426.33	43.9		382.4	
W5.6	11/8/2002	426.33	49.8		376.5	
W5.6	6/11/2003	426.33	42.5		383.8	
W5.6	10/24/2003	426.33	48.9		377.4	
W5.6	6/24/2004	426.33	41.6		384.7	
W5.6	11/3/2004	426.33	45.4		380.9	
W5.6	6/15/2005	426.33	44.3		382.0	
W5.6	11/8/2005	426.33	46.7		379.6	
W5.6	6/26/2006	426.33	44.6		381.7	
W5.6	11/6/2006	426.33	42.3		384.0	
W5.6	4/20/2007	426.33	32.2		394.1	
W5.6	9/21/2007	426.33	49.1		377.2	
W5.6	4/18/2008	426.33	41.5		384.8	
W5.6	11/3/2008	426.33	47.3		379.0	
W5.6	11/5/2011	426.33	44.7		381.7	
W5.6	10/15/2012	426.33	51.3		375.1	
W5.6	9/23/2013	426.33	47.7		378.6	
W5.6	10/20/2014	426.33	50.7		375.7	
W5.6	10/29/2015	426.33	46.4		380.0	
W5.6	10/26/2016	426.33	47.5		378.9	
W5.6	10/25/2017	426.33	48.3		378.1	
W5.6	10/23/2019	426.33	46.9		379.4	

* - Measured depth of well during 2019 monitoring event. Constructed depths unknown.



Table 3
Historical Groundwater Sample Results

EnPro Holdings , Inc.
Former Crucible specialty Metals Landfill
Site # 734021

				Alkalinity	Chloride	Phenols	Total Metals	
				Alkalinity (total) mg/L	Chloride mg/L	Phenols mg/L	Chromium (III+VI) mg/L	Iron mg/L
Regulatory Standard				250	0.001	0.05	0.3	
Sample ID	Date Sampled	LocCode	Sample Type					
MS104.3	2/4/1987	MS104.3		1,530	24,800	0.74	<0.05 U	<0.05 U
MS104.3	5/19/1987	MS104.3		1,660	25,800	0.61	<0.05 U	0.05
MS104.3	8/11/1987	MS104.3		1,100	22,200	0.55	<0.05 U	0.06
MS104.3	11/17/1987	MS104.3		2,540	25,700	0.74	<0.05 U	<0.05 U
MS104.3	2/16/1988	MS104.3		1,650	10,000	0.095	<0.05 U	<0.05 U
MS104.3	5/24/1988	MS104.3		1,900	9,000	0.13	<0.05 U	<0.05 U
MS104.3	8/16/1988	MS104.3		1,200	21,000	0.56	<0.05 U	<0.05 U
MS104.3	11/16/1988	MS104.3		1,800	31,000	0.65	<0.05 U	<0.05 U
MS104.3	2/14/1989	MS104.3		1,840	20,000	0.497	<0.05 U	<0.05 U
MS104.3	5/9/1989	MS104.3		1,740	8,000	0.145	<0.05 U	<0.05 U
MS104.3	8/8/1989	MS104.3		970	22,000	0.273	<0.05 U	<0.05 U
MS104.3	6/26/1990	MS104.3		2,188	1,350	0.278	<0.05 U	<0.05 U
MS104.3	12/19/1990	MS104.3		1,740	7,340	0.153	<0.05 U	<0.05 U
MS104.3	6/26/1991	MS104.3		1,740	8,740	0.252	<0.05 U	<0.05 U
MS104.3	11/20/1991	MS104.3		1,580	13,746	0.232	<0.05 U	0.056
MS104.3	12/15/1992	MS104.3		1,690	16,500	0.425	<0.05 U	0.08
MS104.3	8/24/1993	MS104.3		1,600	11,596	0.315	<0.05 U	0.079
MS104.3	9/30/1993	MS104.3		1,636	11,496	0.344	<0.05 U	0.05
MS104.3	6/27/1994	MS104.3		1,540	9,497	0.24	<0.05 U	0.146
MS104.3	11/2/1994	MS104.3		1,724	6,498	0.19	<0.05 U	<0.05 U
MS104.3	5/4/1995	MS104.3		1,732	7,000	0.25	<0.05 U	0.052
MS104.3	10/25/1995	MS104.3		1,647	4,300	0.211	<0.05 U	0.81
MS104.3	5/24/1996	MS104.3		1,620	13,000	0.222	<0.05 U	0.059
MS104.3	10/29/1996	MS104.3		1,700	6,700	0.17	<0.05 U	<0.05 U
MS104.3	7/1/1997	MS104.3		1,825	6,198	0.146	<0.05 U	0.23
MS104.3	10/30/1997	MS104.3		1,607	6,398	0.144	<0.05 U	0.05
MS104.3	6/29/1998	MS104.3		1,557	6,198	0.158	<0.05 U	0.05
MS104.3	11/15/1998	MS104.3		1,696	4,499	0.105	<0.05 U	0.96
MS104.3	5/27/1999	MS104.3		1,740	5,400	0.139	<0.05 U	0.05
MS104.3	10/13/1999	MS104.3		1,730	4,150	0.089	<0.05 U	0.05
MS104.3	6/30/2000	MS104.3		1,475	7,450	0.166	<0.05 U	0.05
MS104.3	10/26/2000	MS104.3		1,593	4,399	0.138	<0.05 U	0.099
MS104.3	6/20/2001	MS104.3		1,590	4,898	0.099	<0.05 U	<0.05 U
MS104.3	10/11/2001	MS104.3		1,640	3,522	0.074	<0.05 U	<0.05 U
MS104.3	4/24/2002	MS104.3		1,690	4,901	0.112	<0.05 U	0.093
MS104.3	10/22/2002	MS104.3		2,120	1,799	0.098	<0.05 U	0.086
MS104.3	6/17/2003	MS104.3		1,770	4,249	0.083	<0.05 U	0.132
MS104.3	10/28/2003	MS104.3		1,720	3,921	0.085	<0.05 U	0.104
MS104.3	5/25/2004	MS104.3		1,670	3,399	0.075	<0.05 U	<0.05 U
MS104.3	10/26/2004	MS104.3		1,753	3,375	0.043	<0.05 U	<0.05 U
MS104.3	5/4/2005	MS104.3		1,765	3,497	0.062	<0.05 U	<0.05 U
MS104.3	11/16/2005	MS104.3		1,810	2,978	0.069	<0.05 U	<0.05 U
MS104.3	4/25/2006	MS104.3		1,840	2,999	0.063	<0.05 U	<0.05 U
MS104.3	10/17/2006	MS104.3		1,820	2,878	0.059	<0.05 U	<0.05 U
MS104.3	5/8/2007	MS104.3		1,890	2,869	0.056	<0.05 U	<0.02 U
MS104.3	10/10/2007	MS104.3		1,910	2,350	0.051	<0.05 U	<0.02 U
MS104.3	6/3/2008	MS104.3		1,880	2,316	0.066	<0.05 U	<0.05 U
MS104.3	10/7/2008	MS104.3		2,060	2,428	0.036	<0.05 U	<0.05 U
MS104.3	11/8/2011	MS104.3		-	-	0.074	<0.00556 U	<0.0556 U
MS104.3	10/18/2012	MS104.3		-	-	0.089	<0.005 U	0.0982
MS104.3	9/25/2013	MS104.3		-	-	0.09	<0.05 U	<0.5 U
MS104.3	10/22/2014	MS104.3		-	-	<0.005 U	<0.01 U	0.15
MS104.3	10/29/2015	MS104.3		-	-	0.062	0.0082 J	0.046 J
MS104.3	10/27/2016	MS104.3		-	-	<0.03 U	<0.01 U	0.029 J
MS104.3	10/25/2017	MS104.3		-	-	0.037	0.006 J	0.066
MS104.3	10/23/2019	MS104.3		-	-	0.036	0.002 J	0.077



Table 3
Historical Groundwater Sample Results

EnPro Holdings, Inc.
Former Crucible specialty Metals Landfill
Site # 734021

				Alkalinity	Chloride	Phenols	Total Metals	
				Alkalinity (total) mg/L	Chloride mg/L	Phenols mg/L	Chromium (III+VI) mg/L	Iron mg/L
Regulatory Standard				250	0.001	0.05	0.3	
Sample ID	Date Sampled	LocCode	Sample Type					
MS104.4	2/4/1987	MS104.4		1,150	2,750	0.039	<0.05 U	<0.05 U
MS104.4	5/19/1987	MS104.4		1,750	5,100	0.038	<0.05 U	<0.05 U
MS104.4	8/11/1987	MS104.4		1,100	2,780	0.038	<0.05 U	<0.05 U
MS104.4	11/17/1987	MS104.4		2,060	2,250	0.055	<0.05 U	<0.05 U
MS104.4	2/16/1988	MS104.4		1,570	2,100	0.041	<0.05 U	<0.05 U
MS104.4	5/24/1988	MS104.4		2,300	3,700	0.049	<0.05 U	<0.05 U
MS104.4	8/16/1988	MS104.4		1,400	2,000	0.039	<0.05 U	<0.05 U
MS104.4	11/16/1988	MS104.4		1,900	2,100	0.018	<0.05 U	<0.05 U
MS104.4	2/14/1989	MS104.4		2,080	2,300	0.036	<0.05 U	<0.05 U
MS104.4	5/9/1989	MS104.4		1,360	4,000	0.025	<0.05 U	<0.05 U
MS104.4	8/8/1989	MS104.4		1,040	7,000	0.025	<0.05 U	<0.05 U
MS104.4	6/26/1990	MS104.4		2,013	3,150	0.034	<0.05 U	<0.05 U
MS104.4	12/19/1990	MS104.4		2,000	1,760	0.045	<0.05 U	<0.05 U
MS104.4	6/26/1991	MS104.4		1,740	2,250	0.062	<0.05 U	<0.05 U
MS104.4	11/20/1991	MS104.4		1,940	2,499	0.032	<0.05 U	<0.05 U
MS104.4	12/15/1992	MS104.4		1,880	1,650	0.056	<0.05 U	0.049
MS104.4	8/24/1993	MS104.4		1,928	1,475	0.047	<0.05 U	<0.05 U
MS104.4	9/30/1993	MS104.4		1,904	1,500	0.05	<0.05 U	0.05
MS104.4	6/27/1994	MS104.4		1,916	1,263	0.029	<0.05 U	0.2
MS104.4	11/2/1994	MS104.4		2,015	1,000	0.035	<0.05 U	<0.05 U
MS104.4	5/4/1995	MS104.4		2,132	1,300	0.053	<0.05 U	0.05
MS104.4	10/25/1995	MS104.4		2,032	1,700	0.063	<0.05 U	0.073
MS104.4	5/24/1996	MS104.4		1,960	2,000	0.04	<0.05 U	<0.05 U
MS104.4	10/29/1996	MS104.4		2,100	1,300	0.036	<0.05 U	0.058
MS104.4	7/1/1997	MS104.4		2,103	1,600	0.055	<0.05 U	<0.05 U
MS104.4	10/30/1997	MS104.4		1,934	1,500	0.023	<0.05 U	<0.05 U
MS104.4	6/29/1998	MS104.4		2,083	1,050	0.038	<0.05 U	0.488
MS104.4	11/15/1998	MS104.4		2,034	1,150	0.036	<0.05 U	0.45
MS104.4	5/27/1999	MS104.4		2,010	1,050	0.064	<0.05 U	<0.05 U
MS104.4	10/13/1999	MS104.4		2,120	1,450	0.032	<0.05 U	<0.05 U
MS104.4	6/30/2000	MS104.4		1,725	1,400	0.043	<0.05 U	<0.05 U
MS104.4	10/26/2000	MS104.4		1,940	1,075	0.068	<0.05 U	0.071
MS104.4	6/20/2001	MS104.4		2,090	1,225	0.022	<0.05 U	<0.05 U
MS104.4	10/11/2001	MS104.4		2,040	817	0.039	<0.05 U	<0.05 U
MS104.4	4/24/2002	MS104.4		2,090	970	0.043	<0.05 U	0.05
MS104.4	10/22/2002	MS104.4		2,090	1,150	0.038	<0.05 U	<0.05 U
MS104.4	6/17/2003	MS104.4		2,010	1,075	0.038	<0.05 U	<0.05 U
MS104.4	10/28/2003	MS104.4		2,030	1,042	0.043	<0.05 U	<0.05 U
MS104.4	5/25/2004	MS104.4		2,020	900	0.042	<0.05 U	<0.05 U
MS104.4	10/26/2004	MS104.4		2,073	1,012	0.01	<0.05 U	<0.05 U
MS104.4	5/4/2005	MS104.4		2,070	996	0.031	<0.05 U	<0.05 U
MS104.4	11/16/2005	MS104.4		2,090	1,092	0.045	<0.05 U	<0.05 U
MS104.4	4/25/2006	MS104.4		2,200	1,250	0.036	<0.05 U	<0.05 U
MS104.4	10/17/2006	MS104.4		2,170	1,340	0.032	<0.05 U	<0.05 U
MS104.4	5/8/2007	MS104.4		2,170	982	0.022	<0.05 U	<0.002 U
MS104.4	10/10/2007	MS104.4		2,210	925	0.026	<0.05 U	<0.002 U
MS104.4	6/3/2008	MS104.4		2,250	956	0.059	<0.05 U	<0.05 U
MS104.4	10/7/2008	MS104.4		2,329	947	0.025	<0.05 U	<0.05 U
MS104.4	11/8/2011	MS104.4		-	-	<0.05 U	<0.00556 U	0.137
MS104.4	9/25/2013	MS104.4		-	-	0.11	<0.05 U	<0.5 U
MS104.4	10/22/2014	MS104.4		-	-	0.0249	0.013	0.29
MS104.4	10/29/2015	MS104.4		-	-	0.084	0.0036 J	0.09
MS104.4	10/27/2016	MS104.4		-	-	<0.03 U	<0.01 U	<0.05 U
MS104.4	10/25/2017	MS104.4		-	-	0.031	<0.002 U	0.015 J
MS104.4	10/23/2019	MS104.4		-	-	0.035	<0.002 U	0.011 J



Table 3
Historical Groundwater Sample Results

EnPro Holdings , Inc.
Former Crucible specialty Metals Landfill
Site # 734021

				Alkalinity	Chloride	Phenols	Total Metals	
				Alkalinity (total)	Chloride	Phenols	Chromium (III+VI)	Iron
				mg/L	mg/L	mg/L	mg/L	mg/L
Regulatory Standard					250	0.001	0.05	0.3
Sample ID	Date Sampled	LocCode	Sample Type					
MS104.5	2/4/1987	MS104.5		1,100	1,130	0.013	<0.05 U	<0.05 U
MS104.5	5/19/1987	MS104.5		1,940	1,250	0.105	<0.05 U	<0.05 U
MS104.5	8/11/1987	MS104.5		1,140	1,400	0.012	<0.05 U	<0.05 U
MS104.5	11/17/1987	MS104.5		2,030	1,050	0.02	<0.05 U	<0.05 U
MS104.5	2/16/1988	MS104.5		1,770	1,250	0.016	<0.05 U	<0.05 U
MS104.5	5/24/1988	MS104.5		2,200	1,800	0.015	<0.05 U	<0.05 U
MS104.5	8/16/1988	MS104.5		1,500	1,000	<0.02 U	<0.05 U	<0.05 U
MS104.5	11/16/1988	MS104.5		2,050	1,150	0.02	<0.05 U	<0.05 U
MS104.5	2/14/1989	MS104.5		1,800	1,400	0.013	<0.05 U	<0.05 U
MS104.5	5/9/1989	MS104.5		1,920	1,600	0.014	<0.05 U	<0.05 U
MS104.5	8/8/1989	MS104.5		1,180	1,100	0.012	<0.05 U	<0.05 U
MS104.5	6/26/1990	MS104.5		2,061	950	0.015	<0.05 U	<0.05 U
MS104.5	12/19/1990	MS104.5		1,985	1,080	0.013	<0.05 U	<0.05 U
MS104.5	6/26/1991	MS104.5		1,880	993	0.086	<0.05 U	<0.05 U
MS104.5	12/15/1992	MS104.5		1,960	1,100	0.02	<0.05 U	0.089
MS104.5	8/24/1993	MS104.5		2,045	925	0.035	<0.05 U	<0.05 U
MS104.5	9/30/1993	MS104.5		2,048	975	0.046	<0.05 U	0.05
MS104.5	6/27/1994	MS104.5		1,980	775	0.041	<0.05 U	<0.05 U
MS104.5	11/2/1994	MS104.5		2,047	750	0.039	<0.05 U	<0.05 U
MS104.5	5/4/1995	MS104.5		2,205	550	0.048	<0.05 U	<0.05 U
MS104.5	10/25/1995	MS104.5		1,972	1,050	0.046	<0.05 U	0.12
MS104.5	5/24/1996	MS104.5		2,360	1,100	0.033	<0.05 U	0.055
MS104.5	10/29/1996	MS104.5		2,000	950	0.105	<0.05 U	<0.05 U
MS104.5	7/1/1997	MS104.5		2,103	750	0.035	<0.05 U	0.14
MS104.5	10/30/1997	MS104.5		1,999	1,050	0.033	<0.05 U	<0.05 U
MS104.5	6/29/1998	MS104.5		2,093	675	0.031	<0.05 U	<0.05 U
MS104.5	11/15/1998	MS104.5		1,924	1,100	0.033	<0.05 U	0.36
MS104.5	5/27/1999	MS104.5		2,030	1,130	0.032	<0.05 U	<0.05 U
MS104.5	6/30/2000	MS104.5		2,185	1,910	0.025	<0.05 U	<0.05 U
MS104.5	10/26/2000	MS104.5		1,933	800	0.065	<0.05 U	0.084
MS104.5	6/20/2001	MS104.5		2,030	1,050	0.022	<0.05 U	<0.05 U
MS104.5	10/11/2001	MS104.5		1,950	893	0.039	<0.05 U	<0.05 U
MS104.5	4/24/2002	MS104.5		2,030	642	0.039	<0.05 U	<0.05 U
MS104.5	10/22/2002	MS104.5		2,070	1,025	0.031	<0.05 U	<0.05 U
MS104.5	6/17/2003	MS104.5		2,060	675	<0.01 U	<0.05 U	0.052
MS104.5	10/28/2003	MS104.5		2,040	946	0.032	<0.05 U	0.53
MS104.5	5/25/2004	MS104.5		1,000	1,562	0.032	<0.05 U	0.342
MS104.5	10/26/2004	MS104.5		2,047	699	0.012	<0.05 U	<0.05 U
MS104.5	5/4/2005	MS104.5		1,940	607	0.01	<0.05 U	0.11
MS104.5	11/16/2005	MS104.5		2,130	794	0.051	<0.05 U	<0.05 U
MS104.5	4/25/2006	MS104.5		1,990	500	0.026	<0.05 U	<0.05 U
MS104.5	10/17/2006	MS104.5		2,220	1,224	0.028	<0.05 U	<0.05 U
MS104.5	5/8/2007	MS104.5		2,130	638	0.018	<0.05 U	<0.02 U
MS104.5	10/10/2007	MS104.5		2,230	900	0.023	<0.05 U	<0.02 U
MS104.5	6/3/2008	MS104.5		2,210	654	0.053	<0.05 U	<0.05 U
MS104.5	10/7/2008	MS104.5		2,300	680	<0.01 U	<0.05 U	<0.05 U
MS104.5	11/8/2011	MS104.5		-	-	<0.05 U	<0.00556 U	<0.0556 U
MS104.5	9/25/2013	MS104.5		-	-	0.07	<0.05 U	<0.5 U
MS104.5	10/22/2014	MS104.5		-	-	0.025	<0.01 U	<0.1 U
MS104.5	10/29/2015	MS104.5		-	-	0.02 J	0.0046 J	0.03 J
MS104.5	10/27/2016	MS104.5		-	-	<0.03 U	0.005 J	0.039 J
MS104.5	10/25/2017	MS104.5		-	-	0.02 J	0.003 J	0.031 J
MS104.5	10/23/2019	MS104.5		-	-	0.026 J	0.006 J	0.027 J



Table 3
Historical Groundwater Sample Results

EnPro Holdings, Inc.
Former Crucible specialty Metals Landfill
Site # 734021

				Alkalinity	Chloride	Phenols	Total Metals	
				Alkalinity (total) mg/L	Chloride mg/L	Phenols mg/L	Chromium (III+VI) mg/L	Iron mg/L
Regulatory Standard					250	0.001	0.05	0.3
Sample ID	Date Sampled	LocCode	Sample Type					
MS106.1	6/26/1990	MS106.1		1,870	1,100	0.025	<0.05 U	<0.05 U
MS106.1	12/19/1990	MS106.1		1,930	1,090	0.02	<0.05 U	<0.05 U
MS106.1	6/26/1991	MS106.1		1,820	2,280	-	<0.05 U	<0.05 U
MS106.1	11/20/1991	MS106.1		1,810	3,099	0.088	<0.05 U	<0.05 U
MS106.1	12/15/1992	MS106.1		1,720	1,200	0.02	<0.05 U	0.067
MS106.1	8/24/1993	MS106.1		1,902	2,349	0.016	<0.05 U	<0.05 U
MS106.1	9/30/1993	MS106.1		1,792	2,399	0.011	<0.05 U	0.286
MS106.1	6/27/1994	MS106.1		1,872	1,250	0.041	<0.05 U	0.228
MS106.1	11/2/1994	MS106.1		2,035	2,949	0.097	<0.05 U	<0.05 U
MS106.1	5/4/1995	MS106.1		1,983	2,400	0.11	<0.05 U	<0.05 U
MS106.1	10/25/1995	MS106.1		1,972	5,500	0.156	<0.05 U	<0.05 U
MS106.1	5/24/1996	MS106.1		2,140	1,100	0.022	<0.05 U	<0.05 U
MS106.1	10/29/1996	MS106.1		1,900	3,000	0.078	<0.05 U	<0.05 U
MS106.1	7/1/1997	MS106.1		2,301	1,600	0.038	<0.05 U	0.19
MS106.1	10/30/1997	MS106.1		1,880	3,349	0.075	<0.05 U	0.074
MS106.1	6/29/1998	MS106.1		2,083	900	0.01	<0.05 U	<0.05 U
MS106.1	11/15/1998	MS106.1		1,895	2,449	0.191	<0.05 U	0.13
MS106.1	5/27/1999	MS106.1		1,880	1,320	0.05	<0.05 U	<0.05 U
MS106.1	10/13/1999	MS106.1		2,030	3,700	0.103	<0.05 U	<0.05 U
MS106.1	6/30/2000	MS106.1		1,940	2,020	<0.01 U	<0.05 U	<0.05 U
MS106.1	10/26/2000	MS106.1		1,873	1,550	<0.068 U	<0.05 U	0.094
MS106.1	6/20/2001	MS106.1		1,940	1,150	0.025	<0.05 U	<0.05 U
MS106.1	10/11/2001	MS106.1		2,010	2,629	0.074	<0.05 U	<0.05 U
MS106.1	4/24/2002	MS106.1		2,180	779	0.011	<0.05 U	0.052
MS106.1	10/22/2002	MS106.1		2,060	1,749	0.042	<0.05 U	<0.05 U
MS106.1	6/17/2003	MS106.1		2,040	875	0.035	<0.05 U	<0.05 U
MS106.1	10/28/2003	MS106.1		1,930	1,936	0.043	<0.05 U	0.12
MS106.1	5/25/2004	MS106.1		2,055	650	<0.01 U	<0.05 U	<0.05 U
MS106.1	10/26/2004	MS106.1		1,960	964	0.025	<0.05 U	<0.05 U
MS106.1	5/4/2005	MS106.1		2,190	583	<0.01 U	<0.05 U	<0.05 U
MS106.1	11/16/2005	MS106.1		2,020	1,340	0.045	<0.05 U	0.08
MS106.1	4/25/2006	MS106.1		2,190	500	<0.01 U	<0.05 U	<0.05 U
MS106.1	10/17/2006	MS106.1		2,140	968	0.018	<0.05 U	0.32
MS106.1	5/8/2007	MS106.1		1,810	671	0.01	<0.05 U	<0.02 U
MS106.1	10/10/2007	MS106.1		2,210	800	0.012	<0.05 U	<0.02 U
MS106.1	6/3/2008	MS106.1		2,150	654	0.018	<0.05 U	<0.05 U
MS106.1	10/7/2008	MS106.1		2,410	874	<0.01 U	<0.05 U	<0.05 U
MS106.1	11/8/2011	MS106.1		-	-	<0.05 U	<0.005 U	<0.05 U
MS106.1	10/18/2012	MS106.1		-	-	<0.05 U	<0.005 U	0.0939
MS106.1	9/25/2013	MS106.1		-	-	<0.5 U	<0.05 U	<0.5 U
MS106.1	10/22/2014	MS106.1		-	-	<0.005 U	<0.01 U	<0.1 U
MS106.1	10/30/2015	MS106.1		-	-	0.01 J	0.01	0.27
MS106.1	10/26/2016	MS106.1		-	-	<0.03 U	<0.01 U	0.034 J
MS106.1	10/25/2017	MS106.1		-	-	0.019 J	<0.002 U	0.018 J
MS106.1	10/23/2019	MS106.1		-	-	0.019 J	0.002 J	0.615



Table 3
Historical Groundwater Sample Results

EnPro Holdings , Inc.
Former Crucible specialty Metals Landfill
Site # 734021

				Alkalinity	Chloride	Phenols	Total Metals	
				Alkalinity (total) mg/L	Chloride mg/L	Phenols mg/L	Chromium (III+VI) mg/L	Iron mg/L
Regulatory Standard					250	0.001	0.05	0.3
Sample ID	Date Sampled	LocCode	Sample Type					
MS106.2	6/26/1990	MS106.2		1,490	11,000	0.275	<0.05 U	<0.05 U
MS106.2	12/19/1990	MS106.2		1,690	9,380	0.255	<0.05 U	<0.05 U
MS106.2	6/26/1991	MS106.2		1,630	10,650	-	<0.05 U	<0.05 U
MS106.2	11/20/1991	MS106.2		2,080	11,246	0.346	<0.05 U	<0.05 U
MS106.2	12/15/1992	MS106.2		1,660	8,400	0.4	<0.05 U	0.085
MS106.2	8/24/1993	MS106.2		1,720	9,047	0.231	<0.05 U	<0.05 U
MS106.2	9/30/1993	MS106.2		1,572	9,397	0.248	<0.05 U	0.25
MS106.2	6/27/1994	MS106.2		1,520	6,348	0.208	<0.05 U	0.24
MS106.2	11/2/1994	MS106.2		1,740	6,748	0.224	<0.05 U	0.051
MS106.2	5/4/1995	MS106.2		1,773	7,300	0.24	<0.05 U	<0.05 U
MS106.2	10/25/1995	MS106.2		1,762	6,500	0.227	<0.05 U	<0.05 U
MS106.2	5/24/1996	MS106.2		1,800	12,000	0.239	<0.05 U	<0.05 U
MS106.2	10/29/1996	MS106.2		1,800	8,100	0.19	<0.05 U	<0.05 U
MS106.2	7/1/1997	MS106.2		1,825	7,298	0.181	<0.05 U	0.1
MS106.2	10/30/1997	MS106.2		1,672	7,198	0.178	<0.05 U	<0.05 U
MS106.2	6/29/1998	MS106.2		1,905	5,998	0.147	<0.05 U	0.405
MS106.2	11/15/1998	MS106.2		1,468	5,998	0.143	<0.05 U	0.12
MS106.2	5/27/1999	MS106.2		1,660	6,800	0.139	<0.05 U	<0.05 U
MS106.2	10/13/1999	MS106.2		1,740	6,050	0.134	<0.05 U	<0.05 U
MS106.2	6/30/2000	MS106.2		1,900	5,400	0.103	<0.05 U	<0.05 U
MS106.2	10/26/2000	MS106.2		1,653	5,098	0.169	<0.05 U	0.2
MS106.2	6/20/2001	MS106.2		1,820	5,498	0.136	<0.05 U	<0.05 U
MS106.2	10/11/2001	MS106.2		1,790	5,003	0.127	<0.05 U	<0.05 U
MS106.2	4/24/2002	MS106.2		1,990	5,513	0.133	<0.05 U	0.12
MS106.2	10/22/2002	MS106.2		1,860	5,098	0.126	<0.05 U	0.065
MS106.2	6/17/2003	MS106.2		1,790	4,799	0.087	<0.05 U	0.117
MS106.2	10/28/2003	MS106.2		1,750	4,467	0.102	<0.05 U	0.31
MS106.2	5/25/2004	MS106.2		1,770	3,999	0.092	<0.05 U	<0.05 U
MS106.2	10/26/2004	MS106.2		1,773	376	0.107	<0.05 U	0.12
MS106.2	5/4/2005	MS106.2		1,880	3,982	0.073	<0.05 U	<0.05 U
MS106.2	11/16/2005	MS106.2		1,850	4,268	0.086	<0.05 U	<0.05 U
MS106.2	4/25/2006	MS106.2		1,860	3,599	0.069	<0.05 U	<0.05 U
MS106.2	10/17/2006	MS106.2		1,940	3,722	0.066	<0.05 U	<0.05 U
MS106.2	5/8/2007	MS106.2		1,930	2,769	0.048	<0.05 U	<0.02 U
MS106.2	10/10/2007	MS106.2		1,920	3,500	0.061	<0.05 U	<0.02 U
MS106.2	6/3/2008	MS106.2		1,970	3,171	0.059	<0.05 U	<0.05 U
MS106.2	10/7/2008	MS106.2		2,080	2,283	0.036	<0.05 U	<0.05 U
MS106.2	11/8/2011	MS106.2		-	-	0.095	<0.005 U	0.127
MS106.2	10/18/2012	MS106.2		-	-	<0.05 U	<0.005 U	<0.05 U
MS106.2	9/25/2013	MS106.2		-	-	<0.05 U	<0.05 U	<0.5 U
MS106.2	10/22/2014	MS106.2		-	-	0.055	<0.01 U	0.13
MS106.2	10/30/2015	MS106.2		-	-	0.035	0.0043 J	0.05
MS106.2	10/26/2016	MS106.2		-	-	0.029 J	0.002 J	0.04 J
MS106.2	10/25/2017	MS106.2		-	-	0.017 J	0.003 J	0.043 J
MS106.2	10/23/2019	MS106.2		-	-	0.035	0.004 J	0.098



Table 3
Historical Groundwater Sample Results

EnPro Holdings, Inc.
Former Crucible specialty Metals Landfill
Site # 734021

				Alkalinity	Chloride	Phenols	Total Metals	
				Alkalinity (total) mg/L	Chloride mg/L	Phenols mg/L	Chromium (III+VI) mg/L	Iron mg/L
Regulatory Standard					250	0.001	0.05	0.3
Sample ID	Date Sampled	LocCode	Sample Type					
MS106.3	6/26/1990	MS106.3		1,980	1,350	0.02	<0.05 U	<0.05 U
MS106.3	12/19/1990	MS106.3		1,840	2,280	0.024	<0.05 U	<0.05 U
MS106.3	6/26/1991	MS106.3		1,740	2,880	-	<0.05 U	<0.05 U
MS106.3	11/20/1991	MS106.3		1,850	2,949	0.076	<0.05 U	<0.05 U
MS106.3	12/15/1992	MS106.3		1,990	2,150	0.056	<0.05 U	0.094
MS106.3	8/24/1993	MS106.3		1,860	2,699	0.16	<0.05 U	0.164
MS106.3	9/30/1993	MS106.3		1,768	2,349	0.059	<0.05 U	0.05
MS106.3	6/27/1994	MS106.3		1,808	1,300	0.009	<0.05 U	0.054
MS106.3	11/2/1994	MS106.3		1,995	1,500	0.076	<0.05 U	<0.05 U
MS106.3	5/4/1995	MS106.3		1,999	1,800	0.072	<0.05 U	<0.05 U
MS106.3	10/25/1995	MS106.3		2,040	1,900	0.063	<0.05 U	0.055
MS106.3	5/24/1996	MS106.3		2,130	1,300	0.037	<0.05 U	<0.05 U
MS106.3	10/29/1996	MS106.3		2,000	1,900	0.04	<0.05 U	<0.05 U
MS106.3	7/1/1997	MS106.3		2,063	1,999	0.038	<0.05 U	0.15
MS106.3	10/30/1997	MS106.3		1,929	1,550	0.016	<0.05 U	<0.05 U
MS106.3	6/29/1998	MS106.3		2,044	1,055	<0.01 U	<0.05 U	<0.05 U
MS106.3	11/15/1998	MS106.3		1,944	1,649	0.035	<0.05 U	1.6
MS106.3	5/27/1999	MS106.3		1,900	1,300	0.061	<0.05 U	<0.05 U
MS106.3	10/13/1999	MS106.3		2,220	1,350	0.023	<0.05 U	<0.05 U
MS106.3	6/30/2000	MS106.3		1,115	1,200	<0.01 U	<0.05 U	<0.05 U
MS106.3	10/26/2000	MS106.3		1,927	1,450	<0.065 U	<0.05 U	0.15
MS106.3	6/20/2001	MS106.3		2,000	1,200	0.025	<0.05 U	<0.05 U
MS106.3	10/11/2001	MS106.3		2,060	1,404	0.039	<0.05 U	<0.05 U
MS106.3	4/24/2002	MS106.3		1,930	855	0.015	<0.05 U	<0.05 U
MS106.3	10/22/2002	MS106.3		2,130	1,150	0.021	<0.05 U	<0.05 U
MS106.3	6/17/2003	MS106.3		2,005	950	0.028	<0.05 U	<0.05 U
MS106.3	10/28/2003	MS106.3		1,970	1,241	0.025	<0.05 U	<0.05 U
MS106.3	5/25/2004	MS106.3		2,020	725	0.012	<0.05 U	0.204
MS106.3	10/26/2004	MS106.3		1,947	1,157	0.015	<0.05 U	<0.05 U
MS106.3	5/4/2005	MS106.3		2,190	631	<0.01 U	<0.05 U	<0.05 U
MS106.3	11/16/2005	MS106.3		2,085	1,042	0.031	<0.05 U	<0.05 U
MS106.3	4/25/2006	MS106.3		2,110	600	<0.01 U	<0.05 U	<0.05 U
MS106.3	10/17/2006	MS106.3		2,090	1,166	0.018	<0.05 U	<0.5 U
MS106.3	5/8/2007	MS106.3		2,280	579	<0.01 U	<0.05 U	<0.02 U
MS106.3	10/10/2007	MS106.3		2,250	1,000	<0.01 U	<0.05 U	<0.02 U
MS106.3	6/3/2008	MS106.3		2,230	755	<0.01 U	<0.05 U	<0.05 U
MS106.3	10/7/2008	MS106.3		2,360	996	<0.01 U	<0.05 U	<0.05 U
MS106.3	11/8/2011	MS106.3		-	-	<0.05 U	<0.005 U	<0.0524 U
MS106.3	10/18/2012	MS106.3		-	-	<0.05 U	<0.005 U	0.179
MS106.3	9/25/2013	MS106.3		-	-	<0.5 U	<0.05 U	<0.5 U
MS106.3	10/22/2014	MS106.3		-	-	0.0076	<0.01 U	0.19
MS106.3	10/30/2015	MS106.3		-	-	0.007 J	0.002	0.02
MS106.3	10/26/2016	MS106.3		-	-	<0.03 U	0.007 J	0.683
MS106.3	10/25/2017	MS106.3		-	-	0.008 J	<0.002 U	0.018 J
MS106.3	10/23/2019	MS106.3		-	-	0.023 J	<0.002 U	0.052



Table 3
Historical Groundwater Sample Results

EnPro Holdings , Inc.
Former Crucible specialty Metals Landfill
Site # 734021

				Alkalinity	Chloride	Phenols	Total Metals	
				Alkalinity (total)	Chloride	Phenols	Chromium (II+VI)	Iron
				mg/L	mg/L	mg/L	mg/L	mg/L
Regulatory Standard					250	0.001	0.05	0.3
Sample ID	Date Sampled	LocCode	Sample Type					
MS106.4	6/26/1990	MS106.4		1,960	1,250	0.015	<0.05 U	<0.05 U
MS106.4	12/19/1990	MS106.4		1,950	1,140	0.015	<0.05 U	<0.05 U
MS106.4	6/26/1991	MS106.4		1,840	1,730	-	<0.05 U	<0.05 U
MS106.4	12/15/1992	MS106.4		1,830	950	0.02	<0.05 U	0.006
MS106.4	8/24/1993	MS106.4		2,033	1,600	0.16	<0.05 U	<0.05 U
MS106.4	9/30/1993	MS106.4		1,848	1,425	0.078	<0.05 U	0.05
MS106.4	6/27/1994	MS106.4		1,944	1,450	0.041	<0.05 U	0.072
MS106.4	5/4/1995	MS106.4		2,063	950	0.039	<0.05 U	<0.05 U
MS106.4	5/24/1996	MS106.4		2,170	1,200	0.019	<0.05 U	0.16
MS106.4	7/1/1997	MS106.4		2,103	1,499	0.194	<0.05 U	<0.05 U
MS106.4	6/29/1998	MS106.4		2,044	850	0.013	<0.05 U	<0.05 U
MS106.4	5/27/1999	MS106.4		1,960	1,120	0.032	<0.05 U	<0.05 U
MS106.4	6/30/2000	MS106.4		1,945	1,350	0.01	<0.05 U	0.11
MS106.4	10/26/2000	MS106.4		1,913	1,025	0.051	<0.05 U	<0.05 U
MS106.4	6/20/2001	MS106.4		1,900	1,125	0.025	<0.05 U	<0.05 U
MS106.4	4/24/2002	MS106.4		2,200	842	0.015	<0.05 U	<0.05 U
MS106.4	6/17/2003	MS106.4		2,020	925	<0.01 U	<0.05 U	<0.05 U
MS106.4	5/25/2004	MS106.4		2,025	625	<0.01 U	<0.05 U	<0.05 U
MS106.4	10/26/2004	MS106.4		2,047	1,036	0.018	<0.05 U	<0.05 U
MS106.4	5/4/2005	MS106.4		2,150	728	<0.01 U	<0.05 U	<0.05 U
MS106.4	4/25/2006	MS106.4		2,080	600	<0.01 U	<0.05 U	<0.05 U
MS106.4	10/17/2006	MS106.4		2,140	1,067	<0.01 U	<0.05 U	0.1
MS106.4	5/8/2007	MS106.4		2,330	629	0.025	<0.05 U	<0.02 U
MS106.4	6/3/2008	MS106.4		2,220	680	0.015	<0.05 U	<0.05 U
MS106.4	10/7/2008	MS106.4		2,230	1,068	<0.01 U	<0.05 U	<0.05 U
MS106.4	11/8/2011	MS106.4		-	-	<0.05 U	<0.005 U	0.0688



Table 3
Historical Groundwater Sample Results

EnPro Holdings, Inc.
Former Crucible specialty Metals Landfill
Site # 734021

				Alkalinity	Chloride	Phenols	Total Metals	
				Alkalinity (total) mg/L	Chloride mg/L	Phenols mg/L	Chromium (III+VI) mg/L	Iron mg/L
Regulatory Standard					250	0.001	0.05	0.3
Sample ID	Date Sampled	LocCode	Sample Type					
MS301.1	6/26/1990	MS301.1		23	45,000	<0.01 U	<0.05 U	80
MS301.1	12/19/1990	MS301.1		23	28,300	0.01	<0.05 U	84
MS301.1	6/26/1991	MS301.1		22	54,800	-	<0.05 U	79.2
MS301.1	11/20/1991	MS301.1		20	64,480	<0.01 U	<0.05 U	116.9
MS301.1	12/15/1992	MS301.1		128	1,900	<0.01 U	<0.05 U	114
MS301.1	8/24/1993	MS301.1		3	51,859	0.17	<0.05 U	192
MS301.1	9/30/1993	MS301.1		10	55,358	0.545	<0.05 U	115
MS301.1	6/27/1994	MS301.1		12	46,785	1.19	<0.05 U	142
MS301.1	11/2/1994	MS301.1		21	53,000	0.025	<0.05 U	72
MS301.1	5/4/1995	MS301.1		29	37,500	<0.02 U	<0.05 U	47
MS301.1	10/25/1995	MS301.1		25	53,000	0.068	<0.05 U	110
MS301.1	5/24/1996	MS301.1		26	60,000	0.015	<0.05 U	134
MS301.1	10/29/1996	MS301.1		18	60,000	0.016	<0.05 U	99
MS301.1	7/1/1997	MS301.1		18	54,000	<0.01 U	<0.05 U	158
MS301.1	10/30/1997	MS301.1		26	61,981	0.01	<0.05 U	105.5
MS301.1	6/29/1998	MS301.1		32	48,985	<0.01 U	<0.05 U	73.6
MS301.1	11/15/1998	MS301.1		30	54,983	0.029	<0.05 U	130
MS301.1	5/27/1999	MS301.1		38	58,980	0.032	<0.05 U	101
MS301.1	10/13/1999	MS301.1		50	55,480	0.015	<0.05 U	97
MS301.1	6/30/2000	MS301.1		35	60,980	0.01	<0.05 U	16
MS301.1	10/26/2000	MS301.1		29	53,000	0.04	<0.05 U	66.7
MS301.1	6/20/2001	MS301.1		24	51,984	0.029	<0.05 U	53.2
MS301.1	10/11/2001	MS301.1		33	50,027	0.039	<0.05 U	69.6
MS301.1	4/24/2002	MS301.1		32	58,195	0.015	<0.05 U	105
MS301.1	10/22/2002	MS301.1		29	57,482	0.014	<0.05 U	99
MS301.1	6/17/2003	MS301.1		37	47,985	0.015	<0.05 U	136
MS301.1	10/28/2003	MS301.1		46	54,593	0.025	<0.05 U	106
MS301.1	5/25/2004	MS301.1		19	51,651	0.012	<0.05 U	209
MS301.1	10/26/2004	MS301.1		44	48,212	0.012	<0.05 U	89.5
MS301.1	5/4/2005	MS301.1		45	53,426	<0.01 U	<0.05 U	120
MS301.1	11/16/2005	MS301.1		35	53,600	0.014	<0.05 U	94.8
MS301.1	4/25/2006	MS301.1		40	57,982	<0.01 U	<0.05 U	95.9
MS301.1	10/17/2006	MS301.1		37	53,600	0.011	<0.05 U	104
MS301.1	5/8/2007	MS301.1		36	54,366	<0.01 U	<0.05 U	99.4
MS301.1	10/10/2007	MS301.1		41	70,000	<0.01 U	<0.05 U	86.6
MS301.1	6/3/2008	MS301.1		45	55,373	0.023	<0.05 U	83.1
MS301.1	10/7/2008	MS301.1		37	50,995	<0.01 U	<0.05 U	94
MS301.1	11/8/2011	MS301.1		-	-	<0.05 U	<0.00556 U	127
MS301.1	10/18/2012	MS301.1		-	-	<0.05 U	0.00822	87.9
MS301.1	9/25/2013	MS301.1		-	-	<0.05 U	<0.1 U	103
MS301.1	10/22/2014	MS301.1		-	-	0.0212	<0.01 U	98
MS301.1	10/29/2015	MS301.1		-	-	0.004	0.01	77
MS301.1	10/26/2016	MS301.1		-	-	0.02 J	0.013	70.1
MS301.1	10/25/2017	MS301.1		-	-	0.011 J	<0.002 U	81.8
MS301.1	10/23/2019	MS301.1		-	-	<0.01 U	<0.002 U	84.4



Table 3
Historical Groundwater Sample Results

EnPro Holdings, Inc.
Former Crucible specialty Metals Landfill
Site # 734021

					Alkalinity	Chloride	Phenols	Total Metals	
					Alkalinity (total) mg/L	Chloride mg/L	Phenols mg/L	Chromium (III+VI) mg/L	Iron mg/L
Regulatory Standard						250	0.001	0.05	0.3
Sample ID	Date Sampled	LocCode	Sample Type						
MS301.2	6/26/1990	MS301.2		102		69,000	3.3	<0.05 U	77
MS301.2	12/19/1990	MS301.2		98		71,950	4	<0.05 U	48
MS301.2	6/26/1991	MS301.2		102		80,000	-	<0.05 U	47.3
MS301.2	11/20/1991	MS301.2		136		90,972	5.42	<0.05 U	85.1
MS301.2	12/15/1992	MS301.2		148		73,000	5.29	<0.05 U	77.8
MS301.2	8/24/1993	MS301.2		71		82,725	5.11	<0.05 U	63.9
MS301.2	9/30/1993	MS301.2		88		86,474	7.98	<0.05 U	91.1
MS301.2	6/27/1994	MS301.2		90		70,878	7.38	<0.05 U	100
MS301.2	11/2/1994	MS301.2		127		65,000	4.35	<0.05 U	42.4
MS301.2	5/4/1995	MS301.2		133		77,000	4.71	<0.05 U	33.2
MS301.2	10/25/1995	MS301.2		162		82,000	4.34	<0.05 U	83
MS301.2	5/24/1996	MS301.2		94		88,000	3.92	<0.05 U	88.6
MS301.2	10/29/1996	MS301.2		127		300,000	4.18	<0.05 U	58.2
MS301.2	7/1/1997	MS301.2		125		80,000	3.86	<0.05 U	68
MS301.2	10/30/1997	MS301.2		123		80,975	3.82	<0.05 U	88.8
MS301.2	6/29/1998	MS301.2		-		-	4.04	<0.05 U	44.8
MS301.2	11/15/1998	MS301.2		143		79,975	4.07	<0.05 U	64
MS301.2	5/27/1999	MS301.2		118		77,000	4.29	<0.05 U	74.3
MS301.2	10/13/1999	MS301.2		164		55,980	3.8	<0.05 U	66
MS301.2	6/30/2000	MS301.2		140		97,970	3.89	<0.05 U	33.6
MS301.2	10/26/2000	MS301.2		136		76,000	4.13	<0.05 U	60.1
MS301.2	6/20/2001	MS301.2		150		73,977	3.8	<0.05 U	41.6
MS301.2	10/11/2001	MS301.2		144		80,146	3.91	<0.05 U	71.6
MS301.2	4/24/2002	MS301.2		126		86,782	3.77	<0.05 U	84
MS301.2	10/22/2002	MS301.2		118		82,474	3.79	<0.05 U	74.4
MS301.2	6/17/2003	MS301.2		130		77,476	3.89	<0.05 U	107
MS301.2	10/28/2003	MS301.2		146		72,791	4.05	<0.05 U	80.5
MS301.2	5/25/2004	MS301.2		123		68,312	3.77	<0.05 U	179
MS301.2	10/26/2004	MS301.2		144		64,122	1.51	<0.05 U	76.5
MS301.2	5/4/2005	MS301.2		147		74,792	3.55	<0.05 U	89.8
MS301.2	11/16/2005	MS301.2		130		73,542	3.88	<0.05 U	71.6
MS301.2	4/25/2006	MS301.2		145		78,976	3.67	<0.05 U	88.9
MS301.2	10/17/2006	MS301.2		137		68,489	3.72	<0.05 U	93.4
MS301.2	5/8/2007	MS301.2		133		72,153	3.78	<0.05 U	74.8
MS301.2	10/10/2007	MS301.2		140		75,000	3.77	<0.05 U	74.8
MS301.2	6/3/2008	MS301.2		140		80,542	3.83	<0.05 U	86
MS301.2	10/7/2008	MS301.2		112		75,278	3.76	<0.05 U	80
MS301.2	11/8/2011	MS301.2		-		-	-	<0.00556 U	113
MS301.2	10/18/2012	MS301.2		-		-	<0.05 U	0.00609	84.4
MS301.2	9/25/2013	MS301.2		-		-	4.9	<0.25 U	97.4
MS301.2	10/22/2014	MS301.2		-		-	2.32	<0.01 U	77
MS301.2	10/29/2015	MS301.2		-		-	3.9	0.01	88
MS301.2	10/26/2016	MS301.2		-		-	0.047	0.014	76.4
MS301.2	10/25/2017	MS301.2		-		-	0.006 J	0.007 J	80.3
MS301.2	10/23/2019	MS301.2		-		-	<0.01 U	0.021	96.3



Table 3
Historical Groundwater Sample Results

EnPro Holdings , Inc.
Former Crucible specialty Metals Landfill
Site # 734021

				Alkalinity	Chloride	Phenols	Total Metals	
				Alkalinity (total)	Chloride	Phenols	Chromium (III+VI)	Iron
				mg/L	mg/L	mg/L	mg/L	mg/L
Regulatory Standard					250	0.001	0.05	0.3
Sample ID	Date Sampled	LocCode	Sample Type					
MS301.3	6/26/1990	MS301.3		127	59,000	4.39	<0.05 U	23
MS301.3	12/19/1990	MS301.3		155	35,200	3.46	<0.05 U	25
MS301.3	6/26/1991	MS301.3		134	65,800	-	<0.05 U	25.4
MS301.3	11/20/1991	MS301.3		162	86,473	4.9	<0.05 U	39.7
MS301.3	12/15/1992	MS301.3		152	13,000	4.43	<0.05 U	41.1
MS301.3	8/24/1993	MS301.3		124	56,732	2.65	<0.05 U	52.3
MS301.3	9/30/1993	MS301.3		172	66,854	3.61	<0.05 U	36
MS301.3	6/27/1994	MS301.3		176	66,380	2.34	<0.05 U	49
MS301.3	11/2/1994	MS301.3		222	47,500	2.63	<0.05 U	35.4
MS301.3	5/4/1995	MS301.3		180	59,000	2.89	<0.05 U	17.6
MS301.3	10/25/1995	MS301.3		202	61,000	2.63	<0.05 U	35.4
MS301.3	5/24/1996	MS301.3		218	67,000	2.57	<0.05 U	29.7
MS301.3	10/29/1996	MS301.3		202	65,000	2.16	<0.05 U	28.7
MS301.3	7/1/1997	MS301.3		214	64,000	2.88	<0.05 U	102
MS301.3	10/30/1997	MS301.3		169	68,979	3.33	<0.05 U	36.2
MS301.3	6/29/1998	MS301.3		210	55,983	3.13	<0.05 U	19
MS301.3	11/15/1998	MS301.3		230	56,982	4.14	<0.05 U	48.6
MS301.3	5/27/1999	MS301.3		180	63,980	3.58	<0.05 U	31
MS301.3	10/13/1999	MS301.3		200	59,480	3.28	<0.05 U	26
MS301.3	6/30/2000	MS301.3		195	74,980	3.89	<0.05 U	1.36
MS301.3	10/26/2000	MS301.3		189	55,000	3.4	<0.05 U	26.6
MS301.3	6/20/2001	MS301.3		194	54,983	3.24	<0.05 U	11.6
MS301.3	10/11/2001	MS301.3		196	56,153	3.56	<0.05 U	36.4
MS301.3	4/24/2002	MS301.3		174	53,153	3.77	<0.05 U	32
MS301.3	10/22/2002	MS301.3		168	55,983	3.47	<0.05 U	23.9
MS301.3	6/17/2003	MS301.3		175	53,317	3.93	<0.05 U	38.6
MS301.3	10/28/2003	MS301.3		190	54,593	3.53	<0.05 U	44.8
MS301.3	5/25/2004	MS301.3		148	48,318	3.64	<0.05 U	41.9
MS301.3	10/26/2004	MS301.3		186	50,140	3.37	<0.05 U	30.3
MS301.3	5/4/2005	MS301.3		160	45,653	3.5	<0.05 U	30
MS301.3	11/16/2005	MS301.3		175	54,593	3.47	<0.05 U	34.9
MS301.3	4/25/2006	MS301.3		172	26,655	3.27	<0.05 U	28.9
MS301.3	10/17/2006	MS301.3		180	50,623	3.38	<0.05 U	34.6
MS301.3	5/8/2007	MS301.3		170	47,319	3.13	<0.05 U	39.3
MS301.3	10/10/2007	MS301.3		174	42,200	3.24	<0.05 U	30.2
MS301.3	6/3/2008	MS301.3		172	54,115	3.46	<0.05 U	29.7
MS301.3	10/7/2008	MS301.3		156	55,366	3.08	<0.05 U	30
MS301.3	11/8/2011	MS301.3		-	-	3.9	<0.00556 U	41.7
MS301.3	10/18/2012	MS301.3		-	-	<5 U	0.00506	21.1
MS301.3	9/25/2013	MS301.3		-	-	5.4	<0.1 U	29.5
MS301.3	10/22/2014	MS301.3		-	-	2.06	<0.01 U	31
MS301.3	10/29/2015	MS301.3		-	-	4	0.0083 J	29
DUPLICATE	10/29/2015	MS301.3	DUP	-	-	4.1	0.0049 J	28
MS301.3	10/26/2016	MS301.3		-	-	<0.03 U	0.015	18.8
MS301.3	10/25/2017	MS301.3		-	-	4	0.004 J	19.6
DUPLICATE	10/25/2017	MS301.3	DUP	-	-	4.1	0.004 J	18.8
MS301.3	10/23/2019	MS301.3		-	-	<0.01 U	<0.002 U	14.9
DUPLICATE	10/23/2019	MS301.3	DUP	-	-	<0.01 U	<0.002 U	15.7



Table 3
Historical Groundwater Sample Results

EnPro Holdings, Inc.
Former Crucible specialty Metals Landfill
Site # 734021

					Alkalinity	Chloride	Phenols	Total Metals	
					Alkalinity (total) mg/L	Chloride mg/L	Phenols mg/L	Chromium (III+VI) mg/L	Iron mg/L
Regulatory Standard						250	0.001	0.05	0.3
Sample ID	Date Sampled	LocCode	Sample Type						
MS301.4	6/26/1990	MS301.4		150	48,500	3.68	<0.05 U	0.16	
MS301.4	12/19/1990	MS301.4		209	50,100	3.12	<0.05 U	<0.05 U	
MS301.4	6/26/1991	MS301.4		412	52,200	-	<0.05 U	<0.05 U	
MS301.4	11/20/1991	MS301.4		262	60,481	3.48	<0.05 U	0.186	
MS301.4	12/15/1992	MS301.4		393	50,000	4	<0.05 U	0.105	
MS301.4	8/24/1993	MS301.4		408	53,359	2.03	<0.05 U	0.161	
MS301.4	9/30/1993	MS301.4		204	49,360	2.98	<0.05 U	0.261	
MS301.4	6/27/1994	MS301.4		184	44,086	2.66	<0.05 U	0.105	
MS301.4	11/2/1994	MS301.4		262	32,500	2.67	<0.05 U	<0.05 U	
MS301.4	5/4/1995	MS301.4		232	46,000	3.33	<0.05 U	0.14	
MS301.4	10/25/1995	MS301.4		254	40,000	2.67	<0.05 U	0.14	
MS301.4	5/24/1996	MS301.4		158	50,000	2.98	<0.05 U	0.27	
MS301.4	10/29/1996	MS301.4		377	43,000	2.43	<0.05 U	0.066	
MS301.4	7/1/1997	MS301.4		218	40,000	2.62	<0.05 U	51.5	
MS301.4	10/30/1997	MS301.4		262	50,484	2.51	<0.05 U	0.064	
MS301.4	6/29/1998	MS301.4		274	34,989	2.14	<0.05 U	0.057	
MS301.4	11/15/1998	MS301.4		341	37,988	2.29	<0.05 U	0.12	
MS301.4	5/27/1999	MS301.4		260	40,990	2.43	<0.05 U	0.097	
MS301.4	10/13/1999	MS301.4		235	36,990	2.3	<0.05 U	<0.05 U	
MS301.4	6/30/2000	MS301.4		185	39,490	2.26	<0.05 U	<0.05 U	
MS301.4	10/26/2000	MS301.4		216	32,000	2.35	<0.05 U	17.5	
MS301.4	6/20/2001	MS301.4		226	32,990	2.21	<0.05 U	0.27	
MS301.4	10/11/2001	MS301.4		323	22,461	1.87	<0.05 U	0.062	
MS301.4	4/24/2002	MS301.4		340	33,692	1.72	<0.05 U	0.47	
MS301.4	10/22/2002	MS301.4		342	31,990	1.79	<0.05 U	0.313	
MS301.4	6/17/2003	MS301.4		246	28,991	1.91	<0.05 U	0.538	
MS301.4	10/28/2003	MS301.4		310	30,771	1.75	<0.05 U	<0.05 U	
MS301.4	5/25/2004	MS301.4		240	32,490	1.59	<0.05 U	0.105	
MS301.4	10/26/2004	MS301.4		298	26,034	1.49	<0.05 U	0.05	
MS301.4	5/4/2005	MS301.4		312	27,197	1.39	<0.05 U	<0.05 U	
MS301.4	11/16/2005	MS301.4		200	25,808	1.65	<0.05 U	<0.05 U	
MS301.4	4/25/2006	MS301.4		294	24,992	1.25	<0.05 U	<0.05 U	
MS301.4	10/17/2006	MS301.4		268	25,311	2.07	<0.05 U	<0.05 U	
MS301.4	5/8/2007	MS301.4		384	22,653	0.998	<0.05 U	<0.02 U	
MS301.4	10/10/2007	MS301.4		283	21,100	0.9	<0.05 U	<0.02 U	
MS301.4	6/3/2008	MS301.4		250	23,156	1.22	<0.05 U	<0.05 U	
MS301.4	10/7/2008	MS301.4		280	23,312	0.98	<0.05 U	<0.05 U	
MS301.4	11/8/2011	MS301.4		-	-	0.67	<0.00556 U	0.19	
MS301.4	10/18/2012	MS301.4		-	-	<0.05 U	0.0115	23.6	
MS301.4	9/25/2013	MS301.4		-	-	0.8	<1.1 U	3.11	
MS301.4	10/22/2014	MS301.4		-	-	0.79	0.034	1.8	
MS301.4	10/29/2015	MS301.4		-	-	0.56	0.006 J	2.7	
MS301.4	10/26/2016	MS301.4		-	-	0.44	0.02	4.66	
DUPLICATE	10/26/2016	MS301.4	DUP	-	-	0.56	0.011	3.32	
MS301.4	10/25/2017	MS301.4		-	-	0.5	0.003 J	2.68	
MS301.4	10/23/2019	MS301.4		-	-	0.23	0.013	7.01	



Table 3
Historical Groundwater Sample Results

EnPro Holdings, Inc.
Former Crucible specialty Metals Landfill
Site # 734021

				Alkalinity	Chloride	Phenols	Total Metals	
				Alkalinity (total) mg/L	Chloride mg/L	Phenols mg/L	Chromium (III+VI) mg/L	Iron mg/L
Regulatory Standard					250	0.001	0.05	0.3
Sample ID	Date Sampled	LocCode	Sample Type					
MS301.5	6/26/1990	MS301.5		1,790	11,500	0.38	<0.05 U	0.05
MS301.5	12/19/1990	MS301.5		1,650	13,400	0.34	<0.05 U	0.05
MS301.5	6/26/1991	MS301.5		1,630	12,900	-	<0.05 U	<0.05 U
MS301.5	11/20/1991	MS301.5		2,056	11,197	0.225	<0.05 U	0.122
MS301.5	12/15/1992	MS301.5		1,730	8,450	0.314	<0.05 U	0.249
MS301.5	8/24/1993	MS301.5		1,673	9,747	0.231	<0.05 U	0.106
MS301.5	9/30/1993	MS301.5		1,652	9,272	0.304	<0.05 U	0.059
MS301.5	6/27/1994	MS301.5		1,644	8,739	0.234	<0.05 U	0.063
MS301.5	11/2/1994	MS301.5		1,789	6,748	0.264	<0.05 U	<0.05 U
MS301.5	5/4/1995	MS301.5		1,890	9,000	0.24	<0.05 U	0.079
MS301.5	10/25/1995	MS301.5		1,809	3,900	0.186	<0.05 U	<0.05 U
MS301.5	5/24/1996	MS301.5		1,930	5,000	0.193	<0.05 U	<0.05 U
MS301.5	10/29/1996	MS301.5		1,800	6,900	0.163	<0.05 U	<0.05 U
MS301.5	7/1/1997	MS301.5		2,262	6,198	0.146	<0.05 U	<0.05 U
MS301.5	10/30/1997	MS301.5		1,721	5,598	0.12	<0.05 U	<0.05 U
MS301.5	6/29/1998	MS301.5		1,716	5,698	0.108	<0.05 U	<0.05 U
MS301.5	11/15/1998	MS301.5		1,796	5,498	0.112	<0.05 U	<0.05 U
MS301.5	5/27/1999	MS301.5		1,710	5,300	0.132	<0.05 U	<0.05 U
MS301.5	10/13/1999	MS301.5		1,800	5,100	0.105	<0.05 U	<0.05 U
MS301.5	6/30/2000	MS301.5		1,740	5,300	0.11	<0.05 U	<0.05 U
MS301.5	10/26/2000	MS301.5		1,787	4,097	0.11	<0.05 U	<0.05 U
MS301.5	6/20/2001	MS301.5		1,790	4,199	0.995	<0.05 U	0.077
MS301.5	10/11/2001	MS301.5		1,740	3,931	0.193	<0.05 U	<0.05 U
MS301.5	4/24/2002	MS301.5		1,750	4,799	0.106	<0.05 U	0.13
MS301.5	10/22/2002	MS301.5		1,835	3,499	0.091	<0.05 U	0.059
MS301.5	6/17/2003	MS301.5		1,825	3,849	0.087	<0.05 U	0.118
MS301.5	10/28/2003	MS301.5		1,750	3,573	0.078	<0.05 U	0.641
MS301.5	5/25/2004	MS301.5		1,785	3,349	0.075	<0.05 U	<0.05 U
MS301.5	10/26/2004	MS301.5		1,860	3,471	0.076	<0.05 U	<0.05 U
MS301.5	5/4/2005	MS301.5		1,900	3,400	0.048	<0.05 U	<0.05 U
MS301.5	11/16/2005	MS301.5		1,840	2,978	0.065	<0.05 U	0.2
MS301.5	4/25/2006	MS301.5		1,855	3,199	0.069	<0.05 U	<0.05 U
MS301.5	10/17/2006	MS301.5		1,960	2,630	0.055	<0.05 U	<0.05 U
MS301.5	5/8/2007	MS301.5		1,980	3,524	0.049	<0.05 U	<0.02 U
MS301.5	10/10/2007	MS301.5		2,020	2,581	0.038	<0.05 U	<0.02 U
MS301.5	6/3/2008	MS301.5		2,030	2,718	0.056	<0.05 U	<0.05 U
MS301.5	10/7/2008	MS301.5		2,160	2,720	0.032	<0.05 U	<0.05 U
MS301.5	11/8/2011	MS301.5		-	-	<0.05 U	<0.00556 U	0.159
MS301.5	10/18/2012	MS301.5		-	-	0.054	<0.005 U	<0.05 U
MS301.5	9/25/2013	MS301.5		-	-	0.086	<0.1 U	<1 U
MS301.5	10/22/2014	MS301.5		-	-	0.094	<0.01 U	0.2
MS301.5	10/29/2015	MS301.5		-	-	0.031	0.01	0.61
MS301.5	10/26/2016	MS301.5		-	-	0.011 J	0.003 J	0.064
MS301.5	10/25/2017	MS301.5		-	-	0.033	<0.002 U	0.186
MS301.5	10/23/2019	MS301.5		-	-	0.044	0.004 J	0.565



Table 3
Historical Groundwater Sample Results

EnPro Holdings, Inc.
Former Crucible specialty Metals Landfill
Site # 734021

				Alkalinity	Chloride	Phenols	Total Metals	
				Alkalinity (total) mg/L	Chloride mg/L	Phenols mg/L	Chromium (III+VI) mg/L	Iron mg/L
Regulatory Standard					250	0.001	0.05	0.3
Sample ID	Date Sampled	LocCode	Sample Type					
W201R	6/27/1994	W201R		1,652	4,549	0.119	<0.05 U	0.231
W201R	11/2/1994	W201R		1,845	3,749	0.149	<0.05 U	<0.05 U
W201R	5/4/1995	W201R		1,821	3,700	0.12	<0.05 U	0.064
W201R	10/25/1995	W201R		1,897	5,500	0.156	<0.05 U	0.06
W201R	5/24/1996	W201R		1,940	4,700	0.108	<0.05 U	<0.05 U
W201R	10/29/1996	W201R		1,900	4,200	0.081	<0.05 U	<0.05 U
W201R	7/1/1997	W201R		1,984	3,799	0.076	<0.05 U	0.1
W201R	10/30/1997	W201R		1,771	4,499	0.082	<0.05 U	<0.05 U
W201R	6/29/1998	W201R		1,835	2,399	0.041	<0.05 U	<0.05 U
W201R	11/15/1998	W201R		1,875	3,899	0.108	<0.05 U	1
W201R	5/27/1999	W201R		1,710	2,900	0.057	<0.05 U	<0.05 U
W201R	10/13/1999	W201R		1,800	4,000	0.081	<0.05 U	<0.05 U
W201R	6/30/2000	W201R		1,845	3,450	0.064	<0.05 U	<0.05 U
W201R	10/26/2000	W201R		1,847	2,349	0.085	<0.05 U	<0.05 U
W201R	6/20/2001	W201R		1,880	2,249	0.062	<0.05 U	<0.05 U
W201R	10/11/2001	W201R		1,960	2,910	0.074	<0.05 U	<0.05 U
W201R	4/24/2002	W201R		1,950	2,297	0.043	<0.05 U	0.058
W201R	10/22/2002	W201R		1,960	3,049	0.059	<0.05 U	<0.05 U
W201R	6/17/2003	W201R		1,925	2,149	0.035	<0.05 U	0.078
W201R	10/28/2003	W201R		1,910	3,077	0.064	<0.05 U	<0.05 U
W201R	5/25/2004	W201R		1,615	2,299	0.022	<0.05 U	0.107
W201R	10/26/2004	W201R		1,947	1,736	0.029	<0.05 U	0.09
W201R	5/4/2005	W201R		2,010	2,088	0.021	<0.05 U	0.05
W201R	11/16/2005	W201R		1,930	2,730	0.051	<0.05 U	0.05
W201R	4/25/2006	W201R		1,960	2,049	0.036	<0.05 U	<0.05 U
W201R	10/17/2006	W201R		1,990	2,035	0.035	<0.05 U	<0.05 U
W201R	5/8/2007	W201R		2,100	1,762	0.025	<0.05 U	<0.02 U
W201R	10/10/2007	W201R		2,090	2,900	0.04	<0.05 U	<0.02 U
W201R	6/3/2008	W201R		2,070	1,863	0.029	<0.05 U	<0.05 U
W201R	10/7/2008	W201R		2,270	1,651	0.029	<0.05 U	<0.05 U
W201R	11/8/2011	W201R		-	-	<0.05 U	<0.005 U	<0.05 U
W201R	10/18/2012	W201R		-	-	<0.05 U	<0.005 U	<0.05 U
W201R	9/25/2013	W201R		-	-	<0.05 U	<0.05 U	<0.5 U
W201R	10/22/2014	W201R		-	-	0.0217	<0.01 U	<0.1 U
W201R	10/26/2016	W201R		-	-	0.023 J	<0.01 U	0.028 J
W201R	10/25/2017	W201R		-	-	0.029 J	<0.002 U	0.018 J
W201R	10/23/2019	W201R		-	-	0.042	0.003 J	0.046 J



Table 3
Historical Groundwater Sample Results

EnPro Holdings, Inc.
Former Crucible specialty Metals Landfill
Site # 734021

				Alkalinity	Chloride	Phenols	Total Metals	
				Alkalinity (total) mg/L	Chloride mg/L	Phenols mg/L	Chromium (III+VI) mg/L	Iron mg/L
Regulatory Standard					250	0.001	0.05	0.3
Sample ID	Date Sampled	LocCode	Sample Type					
W5.6	6/26/1990	W5.6		1,940	1,600	0.013	<0.05 U	<0.05 U
W5.6	12/19/1990	W5.6		1,830	1,490	<0.01 U	<0.05 U	<0.05 U
W5.6	6/26/1991	W5.6		1,590	2,360	-	<0.05 U	<0.05 U
W5.6	11/20/1991	W5.6		1,520	3,699	0.094	<0.05 U	<0.05 U
W5.6	12/15/1992	W5.6		1,590	2,600	0.049	<0.05 U	0.076
W5.6	8/24/1993	W5.6		1,620	5,673	0.114	<0.05 U	<0.05 U
W5.6	9/30/1993	W5.6		1,732	6,373	0.178	<0.05 U	0.099
W5.6	6/27/1994	W5.6		1,584	4,062	0.093	<0.05 U	<0.05 U
W5.6	11/2/1994	W5.6		1,809	6,248	0.207	<0.05 U	<0.05 U
W5.6	5/4/1995	W5.6		1,942	3,900	0.11	<0.05 U	<0.05 U
W5.6	10/25/1995	W5.6		1,829	9,900	0.227	<0.05 U	0.074
W5.6	5/24/1996	W5.6		1,870	3,700	0.079	<0.05 U	<0.05 U
W5.6	10/29/1996	W5.6		1,800	9,500	0.185	<0.05 U	<0.05 U
W5.6	7/1/1997	W5.6		1,825	6,998	0.153	<0.05 U	0.12
W5.6	10/30/1997	W5.6		1,721	10,196	0.223	<0.05 U	<0.05 U
W5.6	6/29/1998	W5.6		1,944	2,399	0.045	<0.05 U	<0.05 U
W5.6	11/15/1998	W5.6		1,538	8,497	0.163	<0.05 U	0.62
W5.6	5/27/1999	W5.6		1,860	2,700	0.05	<0.05 U	<0.05 U
W5.6	10/13/1999	W5.6		1,720	7,200	0.149	<0.05 U	<0.05 U
W5.6	6/30/2000	W5.6		1,620	1,320	0.014	<0.05 U	<0.05 U
W5.6	10/26/2000	W5.6		1,640	7,000	0.186	<0.05 U	<0.05 U
W5.6	6/20/2001	W5.6		1,580	4,599	0.099	<0.05 U	<0.05 U
W5.6	10/11/2001	W5.6		1,760	7,963	0.176	<0.05 U	<0.05 U
W5.6	4/24/2002	W5.6		1,880	970	0.015	<0.05 U	0.052
W5.6	10/22/2002	W5.6		1,650	5,198	0.102	<0.05 U	0.068
W5.6	6/17/2003	W5.6		1,900	1,649	0.017	<0.05 U	<0.05 U
W5.6	10/28/2003	W5.6		1,670	5,360	0.112	<0.05 U	<0.05 U
W5.6	5/25/2004	W5.6		1,605	925	0.012	<0.05 U	0.219
W5.6	10/26/2004	W5.6		1,633	3,519	0.086	<0.05 U	<0.05 U
W5.6	5/4/2005	W5.6		2,130	935	<0.01 U	<0.05 U	0.05
W5.6	11/16/2005	W5.6		1,680	3,176	0.069	<0.05 U	0.13
W5.6	4/25/2006	W5.6		2,070	1,150	0.017	<0.05 U	<0.05 U
W5.6	10/17/2006	W5.6		1,760	4,020	0.055	<0.05 U	0.27
W5.6	5/8/2007	W5.6		2,210	856	<0.01 U	<0.05 U	<0.02 U
W5.6	10/10/2007	W5.6		1,830	3,900	0.061	<0.05 U	<0.02 U
W5.6	6/3/2008	W5.6		1,990	2,014	0.032	<0.05 U	<0.05 U
W5.6	10/7/2008	W5.6		2,090	4,371	0.06	<0.05 U	0.23
W5.6	11/8/2011	W5.6		-	-	<0.05 U	<0.005 U	<0.106 U
W5.6	10/18/2012	W5.6		-	-	0.051	<0.005 U	<0.05 U
W5.6	9/25/2013	W5.6		-	-	<0.5 U	<0.05 U	<0.5 U
W5.6	10/22/2014	W5.6		-	-	0.0604	<0.01 U	<0.1 U
W5.6	10/29/2015	W5.6		-	-	0.016 J	0.0068 J	0.99
W5.6	10/26/2016	W5.6		-	-	0.023 J	<0.01 U	0.013 J
W5.6	10/25/2017	W5.6		-	-	0.04	<0.002 U	0.022 J
W5.6	10/23/2019	W5.6		-	-	0.037	<0.002 U	0.038 J

Regulatory Standard - Class GA Groundwater Quality Standard or Guidance Value from NYSDEC Division of Water TOGS 1.1.1 (June 1998)

Bold and highlighted cells indicate analytical result exceeds the Regulatory Standard

(-) - Indicates analyte was not analyzed for during this monitoring round

U - Analyzed for but not detected above laboratory detection limit identified

J - Indicates an estimated value

APPENDIX A
DEED RESTRICTION

Lisa Dell, County Clerk
401 Montgomery Street
Room 200
Syracuse, NY 13202
(315) 435-2229

Onondaga County Clerk Recording Cover Sheet

Received From :
ONONDAGA COUNTY LAW DEPARTMENT
421 MONTGOMERY ST 10TH FLOOR
SYRACUSE, NY 13202

Return To :
ONONDAGA COUNTY LAW DEPARTMENT
421 MONTGOMERY ST 10TH FLOOR
SYRACUSE, NY 13202

First PARTY 1

ONONDAGA COUNTY

First PARTY 2

COLTEC INDUSTRIES INC

Index Type : Land Records

Instr Number : 2019-00025547

Book : **Page :**

Type of Instrument : Restrictive Covenant

Type of Transaction : Deed Misc Wo Tp584

Recording Fee: \$0.00

Recording Pages : 7

The Property affected by this instrument is situated in Geddes, in the
County of Onondaga, New York

Recorded Information

State of New York

County of Onondaga

I hereby certify that the within and foregoing was
recorded in the Clerk's office for Onondaga
County, New York

On (Recorded Date) : 07/18/2019

At (Recorded Time) : 8:44:04 AM



Doc ID - 036221980007

Lisa Dell

Lisa Dell, County Clerk



This sheet constitutes the Clerks endorsement required by Section 319 of Real Property Law of the State of New York

Entered By: RSWEENIE Printed On : 07/18/2019 At : 8:44:52AM

DECLARATION of COVENANTS and RESTRICTIONS

THIS COVENANT is made the 15 day of July, 2019, by Onondaga County, a municipality of the State of New York and having an office for the transaction of business at 421 Montgomery Street, Syracuse, New York 13202.

WHEREAS, Crucible Landfill (Site #734021) is the subject of an Order on Consent executed by Coltec Industries, Inc. as part of the New York State Department of Environmental Conservation's (the "Department's") Resource Conservation and Recovery Act ("RCRA") Program, namely that parcel of real property located at the address of State Fair Boulevard in the Town of Geddes, County of Onondaga, State of New York, being the same as (or part of) that property conveyed to Onondaga County by the People of the State of New York by deed(s) dated June 6, 1984 and recorded on December 20, 1984 in the Onondaga County Clerk's Office in Liber and Page 3142/245, and being more particularly described in Schedule "A," attached to this declaration and made a part hereof, and hereinafter referred to as "the Property"; and

WHEREAS, the Department approved a remedy to eliminate or mitigate all significant threats to the environment presented by the contamination disposed at the Property and such remedy requires that the Property be subject to restrictive covenants.

NOW, THEREFORE, Onondaga County, for itself and its successors and/or assigns, covenants that:

First, the Property subject to this Declaration of Covenants and Restrictions is as shown on a map attached to this declaration as Schedule "B" and made a part hereof.

Second, unless prior written approval by the Department or, if the Department shall no longer exist, any New York State agency or agencies subsequently created to protect the environment of the State and the health of the State's citizens, hereinafter referred to as "the Relevant Agency," is first obtained, where contamination remains at the Property subject to the provisions of the Post Closure Maintenance and Monitoring Program ("Site Management Plan" or "SMP") there shall be no construction, use or occupancy of the Property that results in the disturbance or excavation of the Property which threatens the integrity of the engineering controls or which results in unacceptable human exposure to contaminated soils. The SMP may be obtained from the New York State Department of Environmental Conservation, Division of Environmental Remediation, Site Control Section, 625 Broadway, Albany, NY 12233.

Third, the owner of the Property shall not disturb, remove, or otherwise interfere with the installation, use, operation, and maintenance of engineering controls required for the Remedy,

which are described in the SMP, unless in each instance the owner first obtains a written waiver of such prohibition from the Department or Relevant Agency.

Fourth, the owner of the Property shall prohibit the Property from ever being used for purposes other than for **Commercial as described in 6 NYCRR Part 375-1.8(g)(2)(iii) and Industrial as described in 6 NYCRR Part 375-1.8(g)(2)(iv) or other allowed use** without the express written waiver of such prohibition by the Department or Relevant Agency.

Fifth, the use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the Onondaga County Department of Health to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the Department.

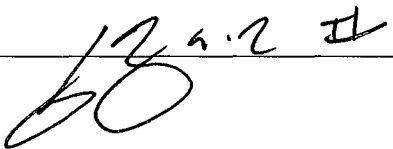
Sixth, the owner or Responsible Party of the Property shall provide a periodic certification, prepared and submitted by a professional engineer or environmental professional acceptable to the Department or Relevant Agency, which will certify that the institutional and engineering controls put in place are unchanged from the previous certification, comply with the SMP, and have not been impaired.

Seventh, the owner or Responsible Party of the Property shall continue in full force and effect any institutional and engineering controls required for the Remedy and maintain such controls, unless the owner first obtains permission to discontinue such controls from the Department or Relevant Agency, in compliance with the approved SMP, which is incorporated and made enforceable hereto, subject to modifications as approved by the Department or Relevant Agency.

Eighth, this Declaration is and shall be deemed a covenant that shall run with the land and shall be binding upon all future owners of the Property, and shall provide that the owner and its successors and assigns consent to enforcement by the Department or Relevant Agency of the prohibitions and restrictions that the Order on Consent requires to be recorded, and hereby covenant not to contest the authority of the Department or Relevant Agency to seek enforcement.

Ninth, any deed of conveyance of the Property, or any portion thereof, shall recite, unless the Department or Relevant Agency has consented to the termination of such covenants and restrictions, that said conveyance is subject to this Declaration of Covenants and Restrictions.

IN WITNESS WHEREOF, the undersigned has executed this instrument the day written below.

By: 

Print Name: J. Ryan McMahon, II.

Title: Onondaga County Executive Date: 7/15/19

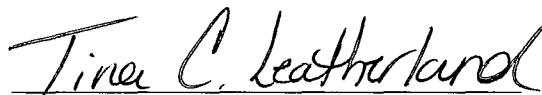
Grantor's Acknowledgment

STATE OF NEW YORK)

) s.s.:

COUNTY OF)

On the 15th day of July, in the year 2019, before me, the undersigned, personally appeared J. Ryan McMahon, II., personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.



Notary Public State of New York

TINA C. LEATHERLAND
Notary Public, State of New York
No. 01LE6123933
Qualified in Onondaga County
Commission Expires Mar. 14, 2021

SCHEDULE "A"

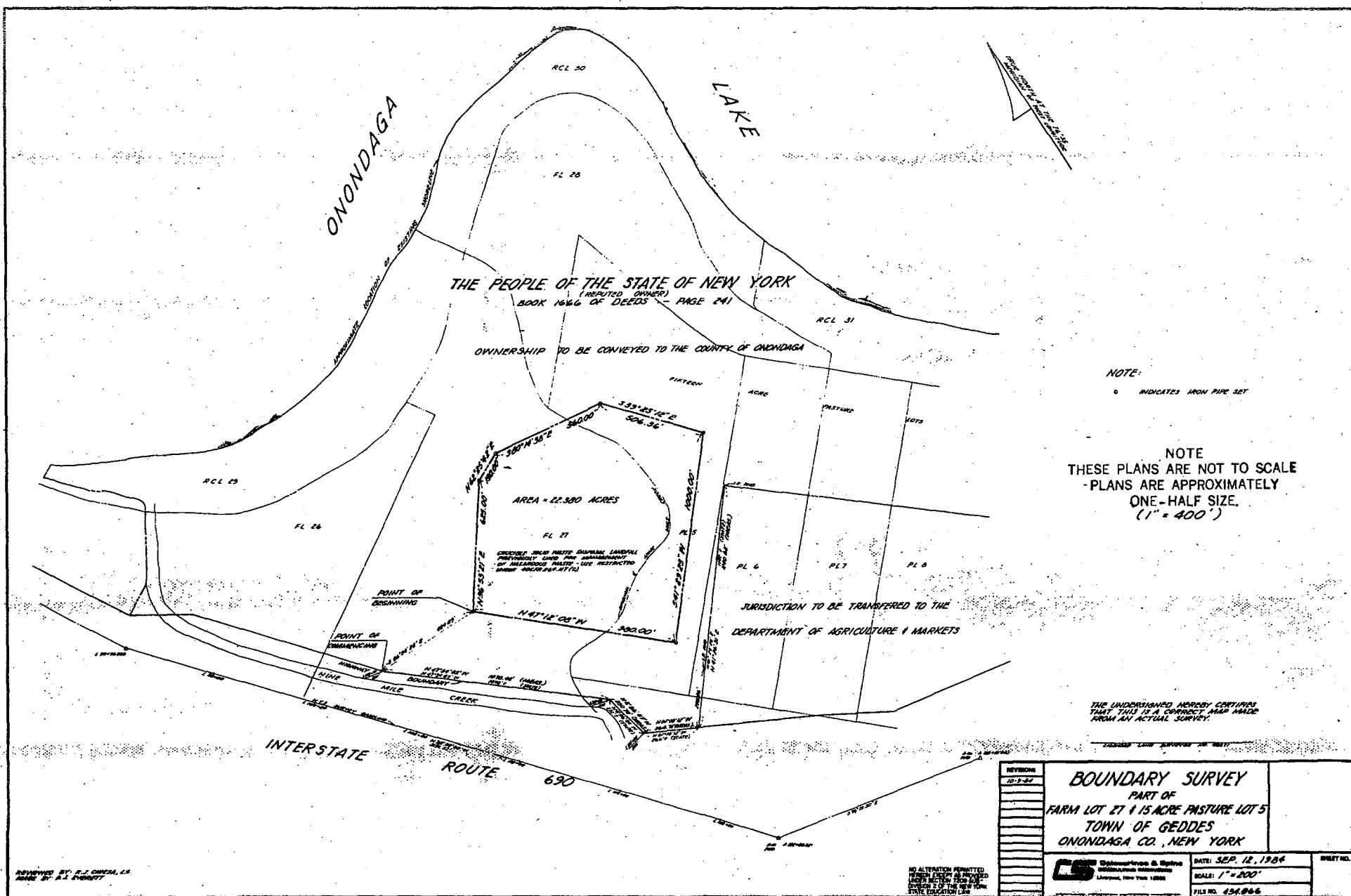
All that tract of land situated in the Town of Geddes, County of Onondaga and State of New York, being part of Farm Lot 27 and, being part of Fifteen Acre Pasture Lot 5 of said Town, being part of lands conveyed by Allied Chemical and Dye Corporation to the People of the State of New York, by deed dated December 20, 1953 and recorded in the Onondaga County Clerks Office December 30, 1953 in Book 1666 of deeds at page 241 and being more particularly described as follows:

Commencing at an angle on the northeasterly boundary of land acquired by the People of the State of New York for Interstate Route Connection 570, Northwest Arterial Connection S.H. 54-5, said point being 230 feet distant northeasterly, measured at right angles, from station "L" 102+70 of a baseline for the reconstruction of said Route Connection 570, Northwest Arterial Connection, S.H. 54-5; thence S86° 54' 28" E, through said land conveyed to the People of the State of New York, a distance of 484.09 feet to the most westerly corner of the limits of the Crucible landfill; running thence along the boundary of said proposed Landfill permit limits, the Following six (6) courses and distances:

- 1) N36° 53' 21" E, a distance of 625.00 feet to an angle point;
- 2) N62° 25' 42" E, a distance of 150.00 feet to an angle point;
- 3) 880° 14' 38" E, a distance of 560.00 feet to an angle point;
- 4) 839° 25' 12" E, a distance of 506.36 feet to an angle point;
- 5) 841° 29' 23" w, a distance of 1000.00 feet to an angle point;
- 6) N47° 12' 08" w' a distance of 980.00 feet to the point of beginning, containing 22.380 acres,

All bearings referred to True north at the 76° 35' meridian of West Longitude.

SCHEDULE "B"



APPENDIX B
LIST OF SITE CONTACTS

Name	Phone/Email Address
Remedial Party – EnPro Holdings Inc. – Fern Paterson	(704) 526-3851 Fern.Paterson@Enpro.com
Remedial Engineer – GHD Consulting Services Inc. – Dyson Sprouse, PE	(315) 802-0336 dyson.sprouse@ghd.com
NYSDEC DER Project Manager – Sarah Johnston	(518) 402-3854 Sarah.Johnston@dec.ny.gov
NYSDEC DER Project Manager’s Supervisor – Jess LaClair	(518) 402-9543 Jess.LaClair@dec.ny.gov
NYSDOH Project Manager – Mark Sergott	(518) 402-7860 Mark.Sergott@heath.ny.gov
Site Owner – Onondaga County	(315) 451-7275
On and off-Site Access Contacts – Onondaga County Office of Environment Onondaga County Parks Office	(315) 435-2647 (315) 451-7275
Remedial Party Attorney – Amy Reichhart, Esq.	(585) 967-9113 Areichhart@lippes.com

APPENDIX C
EXCAVATION WORK PLAN (EWP)

C-1 NOTIFICATION

At least 15 days prior to the start of any activity that is anticipated to encounter remaining contamination or breach or alter the Site's cover system, the Site owner or their representative will notify the NYSDEC contacts listed in the table below. Table C-1 includes contact information for the above notification. The information on this table will be updated as necessary to provide accurate contact information. A full listing of Site-related contact information is provided in Appendix B.

Table C-1: Notifications*

NYSDEC DER Project Manager – Sarah Johnston	(518) 402-9543 Sarah.Johnston@dec.ny.gov
NYSDEC Project Manager's Supervisor – Jess LaClair	(518) 402-9543 Jess.LaClair@dec.ny.gov
NYSDOH Project Manager – Mark Sergott	(518) 402-7860 Mark.Sergott@heath.ny.gov

* Note: Notifications are subject to change and will be updated as necessary.

This notification will include:

- A detailed description of the work to be performed, including the location and areal extent of excavation, plans/drawings for Site re-grading, intrusive elements or utilities to be installed below the soil cover, estimated volumes of contaminated soil to be excavated, any modifications of truck routes, and any work that may impact an engineering control;
- A summary of environmental conditions anticipated to be encountered in the work areas, including the nature and concentration levels of contaminants of

concern, potential presence of grossly contaminated media, and plans for any pre-construction sampling;

- A schedule for the work, detailing the start and completion of all intrusive work;
- A summary of the applicable components of this EWP;
- A statement that the work will be performed in compliance with this EWP, 29 CFR 1910.120 and 29 CFR 1926 Subpart P;
- A copy of the contractor's health and safety plan (HASP), in electronic format, if it differs from the HASP provided in **Appendix D** of this SMP;
- Identification of disposal facilities for potential waste streams; and
- Identification of sources of any anticipated backfill, along with the required request to import form and all supporting documentation including, but not limited to, chemical testing results.

The NYSDEC project manager will review the notification and may impose additional requirements for the excavation that are not listed in this EWP.

C-2 SOIL SCREENING METHODS

Visual, olfactory and instrument-based (e.g. photoionization detector) soil screening will be performed during all excavations into known or potentially contaminated material (remaining contamination) or a breach of the cover system. A qualified environmental professional as defined in 6 NYCRR Part 375, a PE who is licensed and registered in New York State, or a qualified person who directly reports to a PE who is licensed and registered in New York State will perform the screening. Soil screening will be performed when invasive work is done and will include all excavation and invasive work performed during development, such as excavations for foundations and utility work, after issuance of the COC.

Soils will be segregated based on previous environmental data and screening results into material that requires off-Site disposal and material that requires testing to determine if the material can be reused on-Site as soil beneath a cover or if the material can be used

as cover soil. Further discussion of off-Site disposal of materials and on-Site reuse is provided in Section C-6 and C-7 of this Appendix.

C-3 SOIL STAGING METHODS

Soil stockpiles will be continuously encircled with a berm and/or silt fence. Hay bales will be used as needed near catch basins, surface waters and other discharge points.

Stockpiles will be kept covered at all times with appropriately anchored tarps. Stockpiles will be routinely inspected and damaged tarp covers will be promptly replaced.

Stockpiles will be inspected at a minimum once each week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the Site and available for inspection by the NYSDEC.

C-4 MATERIALS EXCAVATION AND LOAD-OUT

A qualified environmental professional as defined in 6 NYCRR Part 375, a PE who is licensed and registered in New York State, or a qualified person who directly reports to a PE who is licensed and registered in New York State will oversee all invasive work and the excavation and load-out of all excavated material.

The owner of the property and remedial party (if applicable) and its contractors are responsible for safe execution of all invasive and other work performed under this Plan.

The presence of utilities and easements on the Site will be investigated by the qualified environmental professional. It will be determined whether a risk or impediment to the planned work under this SMP is posed by utilities or easements on the Site. A Site utility stakeout will be completed for all utilities prior to any ground intrusive activities at the Site.

Loaded vehicles leaving the Site will be appropriately lined, tarped, securely covered, manifested, and placarded in accordance with appropriate Federal, State, local, and NYSDOT requirements (and all other applicable transportation requirements).

A truck wash will be operated on-Site, as appropriate. The qualified environmental professional will be responsible for documenting that outbound trucks will be washed at the truck wash before leaving the Site until the activities performed under this section are complete. Truck wash waters will be collected and disposed of off-Site in an appropriate manner.

Locations where vehicles enter or exit the Site shall be inspected daily for evidence of off-Site soil tracking.

The remedial contractor will be responsible for ensuring that all egress points for truck and equipment transport from the Site are clean of dirt and other materials derived from the Site during intrusive excavation activities. Cleaning of the adjacent streets will be performed as needed to maintain a clean condition with respect to Site-derived materials. Material accumulated from the street cleaning and egress cleaning activities will be disposed off-Site at a permitted landfill facility in accordance with all applicable local, State, and Federal regulations.

C-5 MATERIALS TRANSPORT OFF-SITE

All transport of materials will be performed by licensed haulers in accordance with appropriate local, State, and Federal regulations, including 6 NYCRR Part 364. Haulers will be appropriately licensed and trucks properly placarded.

Material transported by trucks exiting the Site will be secured with tight-fitting covers. Loose-fitting canvas-type truck covers will be prohibited. If loads contain wet material capable of producing free liquid, truck liners will be used.

Truck transport routes are as follows: travel south east from the Site to Restoration Way and turn either west or south to access Interstate 690. All trucks loaded with Site materials will exit the vicinity of the Site using only these approved truck routes. This is the most appropriate route and takes into account: (a) limiting transport through residential areas and past sensitive Sites; (b) use of city mapped truck routes; (c) prohibiting off-Site queuing of trucks entering the facility; (d) limiting total distance to major highways; (e) promoting safety in access to highways; and (f) overall safety in transport.

Trucks will be prohibited from stopping and idling in the neighborhood outside the project Site.

Egress points for truck and equipment transport from the Site will be kept clean of dirt and other materials during Site remediation and development.

Queuing of trucks will be performed on-Site in order to minimize off-Site disturbance. Off-Site queuing will be prohibited.

C-6 MATERIALS DISPOSAL OFF-SITE

All material excavated and removed from the Site will be treated as contaminated and regulated material and will be transported and disposed off-Site in a permitted facility in accordance with all local, State and Federal regulations. If disposal of material from this Site is proposed for unregulated off-Site disposal (i.e. clean soil removed for development purposes), a formal request with an associated plan will be made to the NYSDEC project manager. Unregulated off-Site management of materials from this Site will not occur without formal NYSDEC project manager approval.

Off-Site disposal locations for excavated soils will be identified in the pre-excavation notification. This will include estimated quantities and a breakdown by class of disposal facility if appropriate, (e.g. hazardous waste disposal facility, solid waste landfill, petroleum treatment facility, C&D debris recovery facility) Actual disposal quantities and

associated documentation will be reported to the NYSDEC in the Periodic Review Report. This documentation will include, but will not be limited to: waste profiles, test results, facility acceptance letters, manifests, bills of lading and facility receipts.

Non-hazardous historic fill and contaminated soils taken off-Site will be handled consistent with 6 NYCRR Parts 360, 361, 362, 363, 364 and 365. Material that does not meet Unrestricted SCOs is prohibited from being taken to a New York State C&D debris recovery facility (6 NYCRR Subpart 360-15 registered or permitted facility).

C-7 MATERIALS REUSE ON-SITE

The qualified environmental professional as defined in 6 NYCRR part 375 will ensure that procedures defined for materials reuse in this SMP are followed and that unacceptable material (i.e. contaminated) does not remain on-Site. Contaminated on-Site material, including historic fill and contaminated soil, that is acceptable for reuse on-Site will be placed below the demarcation layer or impervious surface, and will not be reused within a cover soil layer, within landscaping berms, or as backfill for subsurface utility lines.

Proposed materials for reuse on-Site must be sampled for full suite analytical parameters including per- and polyfluoroalkyl substances (PFAS) and 1,4-dioxane. The sampling frequency will be in accordance with DER-10 Table 5.4(e)¹⁰ unless prior approval is obtained from the NYSDEC project manager for modification of the sampling frequency. The analytical results of soil/fill material testing must meet the Site use criteria presented in NYSDEC DER-10 Appendix 5 – Allowable Constituent Levels for Imported Fill or Soil (October 2020 or date of current version) for all constituents listed, and the NYSDEC Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (January 2021 or date of current version) guidance values. Approvals for modifications to the analytical parameters must be obtained from the NYSDEC project manager prior to the sampling event.

Soil/fill material for reuse on-Site will be segregated and staged as described in Sections C-2 and C-3 of this EWP. The anticipated size and location of stockpiles will be provided in the 15-day notification to the NYSDEC project manager. Stockpile locations will be based on the location of Site excavation activities and proximity to nearby Site features. Material reuse on-Site will comply with requirements of NYSDEC DER-10 Section 5.4(e)4. Any modifications to the requirements of DER-10 Section 5.4(e)4 must be approved by the NYSDEC project manager.

Any demolition material proposed for reuse on-Site will be sampled for asbestos and the results will be reported to the NYSDEC for acceptance. Concrete crushing or processing on-Site will not be performed without prior NYSDEC approval. Organic matter (wood, roots, stumps, etc.) or other solid waste derived from clearing and grubbing of the Site will not be reused on-Site.

C-8 FLUIDS MANAGEMENT

All liquids to be removed from the Site, including but not limited to, excavation dewatering, decontamination waters and groundwater monitoring well purge and development waters, will be handled, transported and disposed off-Site at a permitted facility in accordance with applicable local, State, and Federal regulations. Dewatering, purge and development fluids will not be recharged back to the land surface or subsurface of the Site, and will be managed off-Site, unless prior approval is obtained from NYSDEC.

Discharge of water generated during large-scale construction activities to surface waters (i.e. a local pond, stream or river) will be performed under a SPDES permit.

C-9 COVER SYSTEM RESTORATION

After the completion of soil removal and any other invasive activities the cover system will be restored in a manner that complies with the SMP. The existing cover system is comprised of a minimum thickness of 24 inches, which includes vegetative cover (18 inches) and sand (6 inches). The landfill liner, consisting of 60 millimeter High Density

Polyethylene (HDPE) will be replaced to provide a visual reference to the top of the remaining contamination zone, the zone that requires adherence to special conditions for disturbance of remaining contaminated soils defined in this SMP. If the type of cover system changes from that which exists prior to the excavation (i.e., a soil cover is replaced by asphalt), this will constitute a modification of the cover element of the remedy and the upper surface of the remaining contamination. A figure showing the modified surface will be included in the subsequent Periodic Review Report and in an updated SMP.

C-10 BACKFILL FROM OFF-SITE SOURCES

All materials proposed for import onto the Site will be approved by NYSDEC, as defined in 6 NYCRR Part 375, and will be in compliance with provisions in this SMP prior to receipt at the Site. A Request to Import/Reuse Fill or Soil form, which can be found at <http://www.dec.ny.gov/regulations/67386.html>, will be prepared and submitted to the NYSDEC project manager allowing a minimum of 5 business days for review. A copy of the form is presented in Appendix J of the SMP.

Material from industrial Sites, spill Sites, other environmental remediation Sites, or potentially contaminated Sites will not be imported to the Site.

All imported soils will meet the backfill and cover soil quality standards established in 6 NYCRR 375-6.7(d) and DER-10 Appendix 5 for commercial use. Based on an evaluation of the land use, protection of groundwater and protection of ecological resources criteria, the resulting soil quality standards are listed in Table C-2. Soils that meet ‘general’ fill requirements under 6 NYCRR Part 360.13, but do not meet backfill or cover soil objectives for this Site, will not be imported onto the Site without prior approval by NYSDEC project manager. Soil material will be sampled for the full suite of analytical parameters, including PFAS and 1, 4-dioxane. Solid waste will not be imported onto the Site.

Trucks entering the Site with imported soils will be securely covered with tight fitting covers. Imported soils will be stockpiled separately from excavated materials and covered to prevent dust releases.

C-11 STORMWATER POLLUTION PREVENTION

Barriers and hay bale checks will be installed and inspected once a week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the Site and available for inspection by the NYSDEC. All necessary repairs shall be made immediately.

Accumulated sediments will be removed as required to keep the barrier and hay bale check functional.

All undercutting or erosion of the silt fence toe anchor shall be repaired immediately with appropriate backfill materials.

Manufacturer's recommendations will be followed for replacing silt fencing damaged due to weathering.

Erosion and sediment control measures identified in the SMP shall be observed to ensure that they are operating correctly. Where discharge locations or points are accessible, they shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters.

Silt fencing or hay bales will be installed around the entire perimeter of the construction area.

C-12 EXCAVATION CONTINGENCY PLAN

If underground tanks or other previously unidentified contaminant sources are found during post-remedial subsurface excavations or development related construction, excavation activities will be suspended until sufficient equipment is mobilized to address the condition. The NYSDEC project manager will be promptly notified of the discovery.

Sampling will be performed on product, sediment and surrounding soils, etc. as necessary to determine the nature of the material and proper disposal method. Chemical analysis will be performed for a full list of analytes [TAL metals, TCL volatiles and semi-volatiles (including 1,4-dioxane), TCL pesticides and PCBs, and PFAS], unless the Site history and previous sampling results provide sufficient justification to limit the list of analytes. In this case, a reduced list of analytes will be proposed to the NYSDEC project manager for approval prior to sampling. Any tanks will be closed as per NYSDEC regulations and guidance.

Identification of unknown or unexpected contaminated media identified by screening during invasive Site work will be promptly communicated by phone within two hours to NYSDEC's Project Manager. Reportable quantities of petroleum product will also be reported to the NYSDEC spills hotline. These findings will be also included in the Periodic Review Report.

C-13 COMMUNITY AIR MONITORING PLAN

Air monitoring will be conducted during Site work, in accordance with a Community Air Monitoring Plan (CAMP), as required by Appendix A-1 of NYSDEC's DER-10. A CAMP is included in Appendix E of the SMP as an example. The objective of the CAMP is to provide a measure of protection for the downwind community from potential airborne contaminant releases that might arise as a result of work conducted on-Site. The CAMP must include monitoring for volatile organic compounds (VOCs) and particulate matter (i.e., airborne "dust").

The CAMP must also specify methods that are to be used to conduct air monitoring, and the specific instruments to be used, as well as action levels for VOCs and particulate matter.

A figure showing the location of air sampling stations should be based on generally prevailing wind conditions at the Site during work activities. These locations will be adjusted on a daily or more frequent basis based on actual wind directions to provide an upwind and at least two downwind monitoring stations.

Exceedances of action levels listed in the CAMP will be reported to NYSDEC and NYSDOH Project Managers.

C-14 ODOR CONTROL PLAN

This odor control plan is capable of controlling emissions of nuisance odors off-Site. If nuisance odors are identified at the Site boundary, or if odor complaints are received, work will be halted and the source of odors will be identified and corrected. Work will not resume until all nuisance odors have been abated. NYSDEC and NYSDOH will be notified of all odor events and of any other complaints about the project. Implementation of all odor controls, including the halt of work, is the responsibility of the remedial party's Remediation Engineer, and any measures that are implemented will be discussed in the Periodic Review Report.

All necessary means will be employed to prevent on- and off-Site nuisances. At a minimum, these measures will include: (a) limiting the area of open excavations and size of soil stockpiles; (b) shrouding open excavations with tarps and other covers; and (c) using foams to cover exposed odorous soils. If odors develop and cannot be otherwise controlled, additional means to eliminate odor nuisances will include: (d) direct load-out of soils to trucks for off-Site disposal; (e) use of chemical odorants in spray or misting systems; and, (f) use of staff to monitor odors in surrounding neighborhoods.

If nuisance odors develop during intrusive work that cannot be corrected, or where the control of nuisance odors cannot otherwise be achieved due to on-Site conditions or close proximity to sensitive receptors, odor control will be achieved by sheltering the excavation and handling areas in a temporary containment structure equipped with appropriate air venting/filtering systems.

C-15 DUST CONTROL PLAN

Particulate monitoring must be conducted according to the Community Air Monitoring Plan (CAMP) provided in Section C-13. If particulate levels at the Site exceed the thresholds listed in the CAMP or if airborne dust is observed on the Site or leaving the Site, the dust suppression techniques listed below will be employed. The remedial party will also take measures listed below to prevent dust production on the Site.

A dust suppression plan that addresses dust management during invasive on-Site work will include, at a minimum, the items listed below:

- Dust suppression will be achieved using a dedicated on-Site water truck for road wetting. The truck will be equipped with a water cannon capable of spraying water directly onto off-road areas including excavations and stockpiles.
- Clearing and grubbing of larger Sites will be done in stages to limit the area of exposed, unvegetated soils vulnerable to dust production.
- Gravel will be used on roadways to provide a clean and dust-free road surface.
- On-Site roads will be limited in total area to minimize the area required for water truck sprinkling.

C-16 OTHER NUISANCES

A plan for rodent control will be developed and utilized by the contractor prior to and during Site clearing and Site grubbing, and during all remedial work.

A plan will be developed and utilized by the contractor for all remedial work to ensure compliance with local noise control ordinances.

Table C-2 – Soil Cleanup Objectives for On-Site Soil Re-Use and Imported Fill

ANALYTE	SOIL CLEANUP OBJECTIVES
	Lower of Unrestricted Use and Protection of Groundwater
VOCs	
1,1,1-Trichloroethane	0.68
1,1-Dichloroethane	0.27
1,1-Dichloroethene	0.33
1,2,4-Trimethylbenzene	3.6
1,2-Dichlorobenzene	1.1
1,2-Dichloroethane	0.02
1,3,5-Trimethylbenzene	8.4
1,3-Dichlorobenzene	2.4
1,4-Dichlorobenzene	1.8
1,4-Dioxane	0.1
Methyl Ethyl Ketone	0.12
Acetone	0.05
Benzene	0.06
Carbon tetrachloride	0.76
Chlorobenzene	1.1
Chloroform	0.37
cis-1,2-Dichloroethene	0.25
Ethylbenzene	1
Methyl tert-butyl ether	0.93
Methylene Chloride	0.05
Butylbenzene	12
Propylbenzene, n	3.9
sec-Butylbenzene	11
Tetrachloroethene	1.3
Toluene	0.7
trans-1,2-Dichloroethene	0.19
Trichloroethene	0.47
Vinyl chloride	0.02
Xylene (mixed)	0.26

ANALYTE	SOIL CLEANUP OBJECTIVES
	Lower of Unrestricted Use and Protection of Groundwater
tert-Butylbenzene	5.9
SVOCs	
Acenaphthene	20
Acenaphthylene	100
Anthracene	100
Benzo(a)anthracene	1
Benzo(a)pyrene	1
Benzo(b)fluoranthene	1
Benzo(g,h,i)perylene	100
Benzo(k)fluoranthene	0.8
Chrysene	1
Dibenz(a,h)anthracene	0.33
Dibenzofuran	7
Fluoranthene	100
Fluorene	30
Hexachlorobenzene	0.33
Indeno(1,2,3-cd)pyrene	0.5
m-Cresol	0.33
Naphthalene	12
o-Cresol	0.33
p-Cresol	0.33
Pentachlorophenol	0.8
Phenanthrene	100
Phenol	0.33
Pyrene	100
Metals	
Arsenic	13
Barium	350
Beryllium	7.2
Cadmium	2.5
Chromium - Hexavalent	1
Chromium - Trivalent	30
Copper	50

ANALYTE	SOIL CLEANUP OBJECTIVES
	Lower of Unrestricted Use and Protection of Groundwater
Cyanide	27
Lead	63
Manganese	1,600
Nickel	30
Selenium	3.9
Silver	2
Zinc	109
Mercury	
Mercury	0.18
PCBs	
PCB-1016	
PCB-1221	
PCB-1232	
PCB-1242	
PCB-1248	
PCB-1254	
PCB-1260	
PCB-1262	
PCB-1268	
Total PCBs	0.1
Pesticides / Herbicides	
4,4'-DDD	0.0033
4,4'-DDE	0.0033
4,4'-DDT	0.0033
Aldrin	0.005
alpha-BHC	0.02
beta-BHC	0.036
alpha-Chlordane	0.094
delta-BHC	0.04
Dieldrin	0.005
Endosulfan I	2.4
Endosulfan II	2.4

ANALYTE	SOIL CLEANUP OBJECTIVES
	Lower of Unrestricted Use and Protection of Groundwater
Endosulfan sulfate	2.4
Endrin	0.014
Heptachlor	0.042
Lindane	0.1
2,4,5-TP (Silvex)	3.8

Soil Cleanup Objectives from 6 NYCRR Part 375-6.8(b)
(December 2006) and Supplemental Soil Cleanup
Objectives (October 2010)

Table C-3 – Soil Guidance Values for On-Site Soil Re-Use and Imported Fill

ANALYTE	GUIDANCE VALUE (NYSDEC, APRIL 2023 GUIDANCE)
	Commercial Use
Perfluorooctanoic acid (PFOA)	500 ug/kg
Perfluorooctanesulfonic acid (PFOS)	440 ug/kg

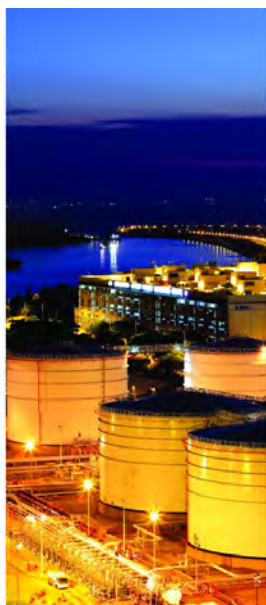
Guidance Values from Sampling, Analysis, and Assessment of per- and polyfluoroalkyl substances (PFAS) Under NYSDEC's Part 375 Remedial Programs (NYSDEC, April 2023)

Reporting limits for PFOA and PFOS in solid samples should not exceed 0.5 µg/kg (micrograms per kilogram)

If PFOA or PFOS is detected in any sample at or above the guidance values then the source of backfill should be rejected, unless a site-specific exemption is provided by DER based on Synthetic Precipitation Leaching Procedure (SPLP) testing, for example.

If the concentrations of PFOA and PFOS in leachate are at or above 10 ppt (the Maximum Contaminant Levels established for drinking water by the New York State Department of Health), then the soil is not acceptable.

APPENDIX D
HEALTH AND SAFETY PLAN



Site-Specific Health and Safety Plan

Former Crucible Specialty Metals Landfill Site

EnPro Holdings, Inc.

March 15 2023
8618809|---|---
Approval Date: 10-18-2019

HEALTH AND SAFETY PLAN

Signature page

This HASP was electronically signed by the Project Manager and Safety Group within the HASP Builder Software.
Fully approved HASP is printed without a DRAFT watermark.

Project Name: Former Crucible Specialty Metals Landfill Site

Project Manager Approval Date: Damian Vanetti, 10-18-2019

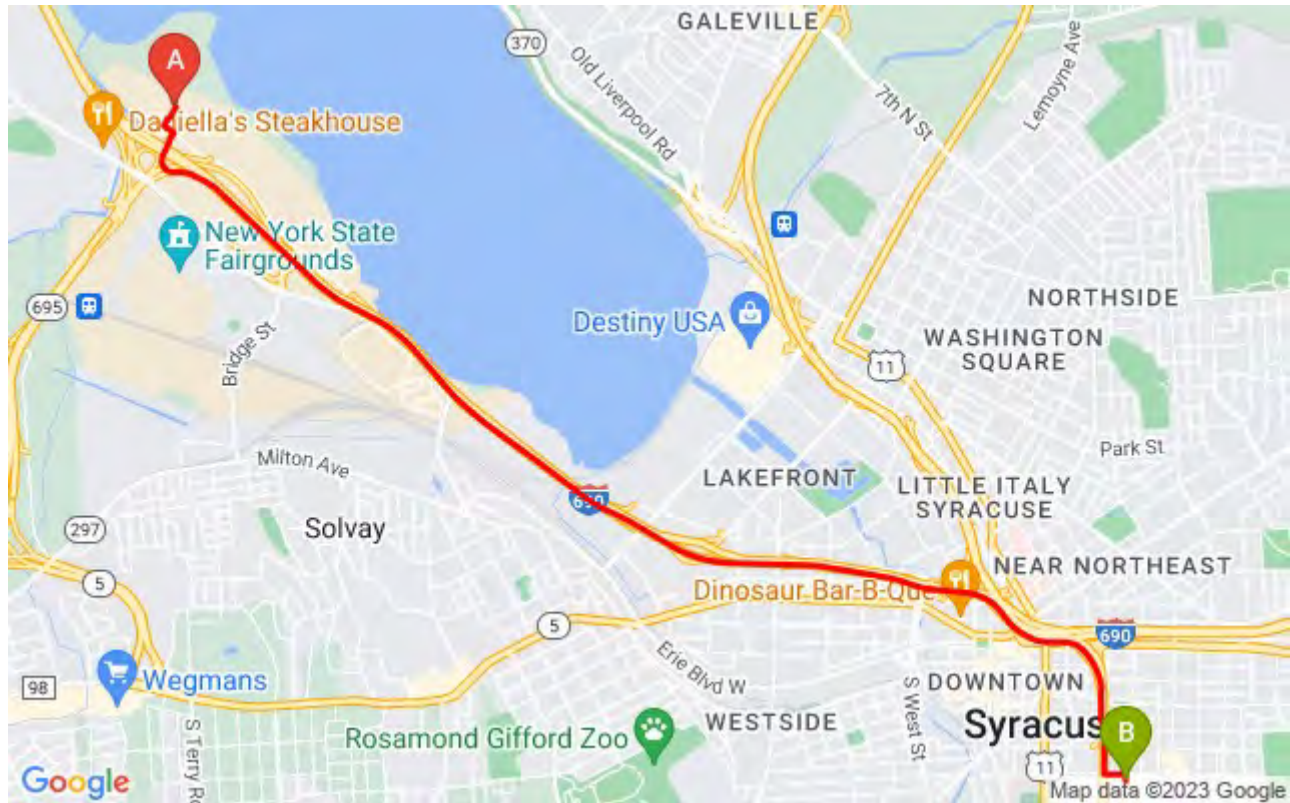
Safety Group Approval Date: John Maurer, 10-18-2019

Project Number: 8618809

Emergency Information

Contact	Phone Number	
Local Police Solvay Police Department 507 Charles Avenue Solvay, New York United States 13209	315.468.2521 911	Hospital Directions Directions: 1. Head southwest 2. Turn left 3. Turn right to merge onto I-690 E 4. Take the exit onto I-81 S toward Binghamton 5. Take exit 18 toward Adams St 6. Turn right onto Almond St 7. Turn left onto E Adams St 8. Turn right Destination will be on the left Driving Time: 9 mins Driving Distance: 5.7 mi
Fire Department Solvay Fire Department 1925 Milton Avenue Solvay, New York United States 13209	315.468.1710 911	
Ambulance WAVES Ambulance 202 Bennett Road Camillus, New York United States 13031	315.487.1212 911	
Local Hospital Upstate Medical University 750 East Adams Street Syracuse, New York United States 13210	315.464.5540	
National Poison Center	888.222.1212	GHD - HSE Help Line Please call (866) 529-4886 and provide: • Name and location of caller • Description of incident • Name of injured person(s) • Description of injuries • Phone number for return call
Project Manager Dyson Sprouse	Work: 315.802.0336 Cell: 607.423.7156	
Site Supervisor David Tyran	Work: 716.297.6150 Cell: 716.570.4787	
GHD Regional S&H Manager John Maurer	Work: 716-297-6150 Cell: 716-545-0112	
Client Contact Fern Patterson	704.526.3851	
Client Site Contact		
Other Contact		
Site Health Officer	Phone:	
Person to verify hospital route:	Signature:	

Hospital Driving Directions



1. Head **southwest**
2. Turn **left**
3. Turn **right** to merge onto **I-690 E**
4. Take the exit onto **I-81 S** toward **Binghamton**
5. Take exit **18** toward **Adams St**
6. Turn **right** onto **Almond St**
7. Turn **left** onto **E Adams St**
8. Turn **right**
Destination will be on the left

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Appendix

Chemical Table

Appendix A - GHD Mandatory Documents

Table 2 - Chemical Action Levels
 Tailgate Safety Meeting - Large
 HASP Acknowledgement Sheet
 Tailgate Safety Meeting - Small
 GHD - Field STEP Form
 GHD - Driving STEP Form
 GHD - Unsafe Act/Unsafe Condition/Stop Work Authority Form
 GHD - Near Miss Reporting Form
 GHD - Incident Reporting Form
 QSF-006 - Management of Change
 QSF-019 Underground Utilities Checklist
 HASP Amendment Form
 Figure 2 - Site Layout.pdf

Appendix B - JSAs

Environmental-Decontamination of Sampling Equipment and Personnel

(PPE Level D)
O_M-Derived Waste Drum Moving and Handling
Motor Vehicle - Driving
Mobilization-Demobilization
Environmental- Monitoring Well Sampling
Environmental-Site Recon and Walkthrough

Appendix C - Safety Data Sheets (SDS)

Alconox SDS

Appendix D - Training Records

Record of Training Form

1. Introduction

1.1 GHD Values and Integrity Management Policy

At GHD, we commit to safe, ethical and respectful business behaviour in regard to both the internal conduct of our business and our engagement with external stakeholders and the public. The core values of Safety, Teamwork, Respect and Integrity will guide all of our activities. We will only seek work and participate in business transactions under high standards of corporate ethics and with complete integrity. Our projects will be undertaken in a manner that places safety as the top priority, with each of our employees empowered with Stop Work Authority throughout the execution of project work. GHD expects that all of its projects will be undertaken in an environment of teamwork and mutual respect, free from discrimination, harassment, bullying or other inappropriate behavior. We foster an open environment in which our people can report any improper practices or behaviour without fear of reprisal. All reported incidents will be investigated promptly with appropriate and equitable follow-up. GHD's integrity management policy and guidelines are available at <http://www.ghdcanada.com/global/about-us/integrity-management>.

1.2 Purpose

The purpose of this site specific health and safety plan (HASP) is to provide guidelines and establish procedures for reducing and controlling hazard exposure to the public, property, and personnel. The HASP is a living document and must continually evolve as site conditions and knowledge of the site activities develop.

This document has been developed to meet or exceed the requirements set forth by federal, state, and provincial legislation. If any procedure outlined in this plan conflicts with federal, state/provincial, and/or municipal law, prescribed standards, or client requirements, then the most stringent set of standards applies.

1.3 Stop Work Authority

All employees are empowered and expected to stop the work of coworkers, subcontractors, client employees, or other contractors if any person's safety or the environment are at risk. No repercussions will result from this action. Reporting of unsafe acts/condition (UA or UC) or Stop Work Authority (SWA) is completed with BWISE and/or the GHD HSE app. Unsafe acts, conditions, stop work authority are now reported via the GHD HSE app.

The discovery of any condition that would suggest the existence of a situation more hazardous than anticipated results in the removal of site personnel from that area and re-evaluation of the hazard and the levels of protection.

1.4 Short Service Employee

The Employee is considered a Short Service Employee (SSE) if he/she has less than 6 months experience with his/her present employer, or in his/her present role. The individual is required to wear a fluorescent orange hardhat, as an obvious indicator of SSE status. Training and mentoring allows them to gain knowledge and experience in procedures and methods. In order for a new employee to work in the field, the following minimum training requirements must be met:

1. GHD New Employee Safety & Health Orientation training (on-line).
2. GHD HAZCOM (US)/WHIMIS (Canada)(on-line).
3. On-boarding completed with Human Resources.
4. Compliance training defined on the QSF-20 as it applies to field work to be conducted.
5. Client specific safety training.

A SSE's primary mentor is their direct Supervisor. GHD Supervisors are responsible for ensuring that a SSE completes the safety, field method, and quality training as appropriate to the work they are assigned. A SSE requires an On-site Mentor for all fieldwork. The On-site Mentor must have experience in the work they are mentoring and they are responsible for the close monitoring of the SSE.

Project team SSE make-up requirements are:

- A one-person project team cannot be a SSE.
- A two-person to four-person project team can have only one SSE.
- A five-person or more project team cannot have more than 20 percent SSE without a written variance from the GHD Corporate Manager of Safety & Health.

New hire employees that can provide sufficient documentation supporting previous experience in working under HSE program(s) similar to GHD's may be exempt from GHD's SSE program. These exemptions are handled on a case-by-case basis and must be authorized by one of the following staff: the Corporate Manager of Safety & Health or a Senior Regional Safety & Health Manager. Details of the exemptions are covered in the full SSE Policy.

Clients may define specific SSE requirements for work at their facility or on their project. It is the responsibility of the Project Manager to communicate a client's specific requirements to the appropriate staff within GHD and project subcontractors. Client-specific SSE standards shall be posted on the Safety & Health Portal SSE Folder.

1.5 Project Management And Safety Organization

Project Manager – GHD – Dyson Sprouse

The GHD Project Manager (PM) is responsible for the overall implementation, review, and approval of the HASP, and for ensuring that all safety and health (S&H) responsibilities are carried out. The PM will also ensure that appropriate resources are provided to support the project.

Site Supervisor – GHD – David Tyran

The Site Supervisor (SS) is responsible for:

- Ensuring that the HASP is reviewed, approved, and implemented.
- Communicating site requirements to site project personnel and subcontractors through site orientation.
- Consulting with the client/site representative regarding appropriate changes to the HASP.

- Conducting a daily pre-start/tailgate safety meeting that communicates the site specific hazards. This meeting must be documented on the HSE097 Pre-Start/Tailgate Safety Meeting form in the appendix.
- Ensuring that all necessary cleanup and maintenance of safety equipment is conducted by project personnel.
- Verifying emergency phone numbers and services, including hospital and clinic locations.
- Completing, filing, and correctly submitting the forms attached to the HASP, including daily pre-start/tailgate meetings, job safety analysis, and daily inspection checklists.
- Implementing risk-based safety procedures on all activities and enforcing safe work practices for project employees
- Observing ill effects on any crew member, especially those symptoms caused by cold/heat stress or chemical exposure.
- Overseeing the safety of visitors who enter the site.
- Maintaining communication with the client/site representative(s) and/or government inspectors/agencies.
- Providing and enforcing the use of safety equipment, personal protective equipment (PPE), and other items necessary for employee or community safety.
- Conducting job site inspections as a part of quality assurance for safety and health.
- Ordering the immediate shutdown of site activities in case of a medical emergency, unsafe condition, or unsafe practice.
- Reporting safety and health concerns to site and/or project management as necessary.

Regional HSE Manager GHD – John Maurer

The Regional HSE Manager is a full time GHD employee who is trained as a safety and health professional and serves in a consulting role to the PM and SS regarding potential safety and health issues. The HSE Manager or trained designee must review, coordinate required changes with PM and provide the final approval of the HASP prior to work beginning on site.

Site personnel

All employees have a role in GHD's HSE program and a responsibility to implement the program. GHD personnel are responsible for:

- Engaging in all aspects of their tasks and jobs when they are prepared to do the job safely, well rested, and mentally prepared for work.
- Utilizing the STAR process before initiating work.
- Implementing Stop Work Authority for any operations that may cause injury, illness, or unsafe conditions to employees, subcontractors, or others.
- Assisting in the development and revision of Job Safety Analysis (JSA) forms that are appropriate to their current scope of work.
- Use, inspect and maintain PPE as required by JSA and site conditions.
- Preparing, submitting and reviewing safety observations using the GHD HSE app or appropriate forms
- Inspecting tools and other equipment before each use or as manufacturer dictates and documenting any defects.
- Correcting job site hazards when possible without endangering life or health.
- Reporting safety and health concerns to the SS, PM, HSE Manager, or SHO (if appointed).

Subcontractors

Subcontractors are responsible for:

- Developing and implementing their own HASP and complying with its contents.
- Attending an initial site orientation and subsequent safety meetings.
- Ensuring that their employees adhere to all site personnel requirements.
- Submitting required documentation to the SS regarding federal, state, or provincial requirements before beginning any work.

- Obtaining approval for the use of GHD's equipment.
- Observing and obeying all GHD/client requirements as well as any specific direction given by GHD's management team.
- Wearing any personal protective equipment required by their HASP and GHD at all times.
- Meeting all governing legislation/regulation/industry standards for equipment used on GHD projects.
- Verifying that all subcontractor employees have required training, medical clearance, and substance abuse testing as required by project.
- Not being in possession or under the influence of alcohol, incapacitating drugs, or medications.

In the event of conflicting safety procedures or requirements, personnel must implement those safety practices that afford the highest level of safety and protection. In addition, noncompliance with safety and health policies and procedures may subject the subcontractor to disciplinary action up to and including termination of their contract with GHD.

Equipment Operators

All equipment operators must meet all the requirements of site personnel listed above and are responsible for the safe operation of heavy equipment. Operators are responsible for conducting documented daily inspections on their equipment to ensure safe performance. Brakes, hydraulic lines, backup alarms, and fire extinguishers must be inspected routinely throughout the project. Equipment will be taken out of service if an unsafe condition occurs. Daily inspections must be provided to the GHD site supervisor prior to the equipment being used.

Authorized Visitors

Authorized visitors, as approved by **Dyson Sprouse** are provided with all relevant information regarding site operations and hazards as applicable to the purpose of their visit. Visitors may be required to be accompanied by authorized personnel.

1.6 Site Safety And Health Officer

The site safety and health officer (SHO) is responsible for assisting in the communication of site requirements to site project personnel and subcontractors and for carrying out the health and safety responsibilities include the ones listed under the site supervisor. The SHO has prior experience in working at similar sites. The SHO operates under the supervision of the PM, SS, and HSE Manager.

1.7 Recordkeeping

The SS shall establish and maintain records of all necessary and prudent monitoring activities as described below:

- Name and job classification of the employees involved on specific tasks.
- Air monitoring/sampling results and instrument calibration logs.
- Records of training acknowledgment forms (site specific training, toolbox meetings, etc.).
- Documentation of site inspections, results of inspections, and corrective actions implemented.
- Emergency reports describing any incidents or accidents.

1.8 Site HASP Amendments

Any change to the scope of work must be evaluated for its impact on the overall health and safety of the project and associated personnel. A minor change is one that adjusts already-documented hazards within the HASP and does not expose site personnel to chemicals above exposure limits, such as the introduction of a new JSA, or PPE that does not involve a change in respiratory protection. Amendments must be documented on the Site Health and Safety Plan Amendment Form located in Appendix, in addition to notifications to key personnel.

Significant changes to the scope of work require a rewrite by the PM and review/approval of the HASP by a HSE Manager.

1.9 Training Requirements

All personnel conducting work at this site shall have completed the appropriate safety and health training, as applicable to their job/task duties as it relates to the GHD Tiered Training System. The required training is referenced throughout the HASP and identified on each JSA form

1.10 Site Specific Training

An initial site specific training session or briefing shall be conducted by the PM or SS prior to commencement of work activities. During this initial training session, employees shall be instructed on the following topics:

- Personnel responsibilities
- Content and implementation of the HASP
- Site hazards and controls
- Site specific hazardous procedures (e.g., drilling, excavations, etc.)
- Training requirements
- PPE requirements
- Emergency information, including local emergency response team phone numbers, route to nearest hospital, incident reporting procedures, and emergency response procedures
- Instruction in the completion of required inspections and forms
- Location of safety equipment, such as portable eyewash, first aid kit, fire extinguishers, etc.

The various components of the project HASP will be presented, followed by an opportunity to ask questions to ensure that each attendee understands the HASP. Personnel will not be permitted to enter or work in potentially contaminated areas of the site until they have completed the site specific training session. Personnel successfully completing the training session shall sign the HASP Acknowledgement Form, which is presented as an Appendix.

In addition to the initial site briefing conducted at the commencement of the project, supplemental brief safety meetings shall be conducted by the SS to discuss potential safety and health hazards associated with upcoming tasks and necessary precautions to be taken.

1.11 Safety Meeting/ HASP Review

"Pre-Start/Tailgate Safety Meetings" will take place each day prior to beginning the day's work. All site personnel will attend these safety meetings conducted by the SS. The safety meetings will cover specific safety and health issues, including the appropriate JSAs, site activities, changes in site conditions, and a review of topics covered in the site specific pre-entry briefing. The safety meetings will be documented each day with written sign in sheets containing a list of topics discussed. To assist with the compliance of documentation of the tailgate safety meetings, there is a HSE097 Pre-Start/Tailgate Safety Meeting form located in the Appendix.

1.12 Fatigue Management

GHD employees and subcontractors are responsible for ensuring they are both physically and mentally fit to perform their job functions safely as part of GHD's Fatigue Management Program. GHD will use the following control measures to minimize fatigue during the project:

- Alter the work schedule to reduce the overall time a worker will perform physically demanding work.
- Monitoring employee behaviors for signs of fatigue.
- Eliminate or reduce where practicable the need to work extended hours, night shifts, or overtime.
- Use work-rest patterns during repetitive tasks to control fatigue and increase mental fitness.

GHD's work/rest balance requirements are referenced based on weight of the vehicle. Less than 10,000 lbs/4536 kg (passenger cars, pickup trucks, SUV) will follow the following guidelines:

- Maximum working time and/or driving and working time within one work day: 14 hours (extendable up to 16 hours if drive time < 4 hours and/or airplane travel is involved; this approach can be taken three times in a 7 day period)
- Maximum continuous drive time: 3 hours followed by a 15 minute break
- Maximum drive time per day: 9 hours (extendable up to 10 hours twice in 7 day period)

Employees that drive vehicles greater than 10,000 lbs/4,536 kg must meet the requirements of the transportation agency for which they work and travel.

Management, as represented by an employee's manager, Project Manager or any Principal, may grant a documented variance to the standard work/rest balance for specific employees for a period covering no longer than one week. Additional variances can be issued after for each week. For further information see Fatigue Management Program on the portal.

1.13 Management Of Change

Safety incidents are known to occur when key changes are not communicated to all stakeholders related to a project. Management of Change is covered by the GHD Quality Manual Section 7.3.7 Control of Project Changes and is documented using QSF-006 Management of Change Form (see Appendix).

The types of changes that are to be documented and communicated are:

- Project management/Resources (key personnel)
- Equipment
- Safety – this would not include daily changes to JSA when dirtied in the field.
- Field Operations/SOP

Form QSF-006 is the tool to document and communicate the change. The completed QSF-006 is to be filed in the GHD field folder of the project file.

1.14 Field Notes

All activities undertaken in the field must be correctly and completely recorded in bound field books, Quality System Field Data Record forms (QSF 200, QSF 400 , and QSF 500 Series D), or in some other GHD approved format (i.e., electronically, loose paper). All records will be kept in the GHD approved format specified for the activities undertaken. The formats have been established to ensure completeness and to provide consistency amongst the field staff regardless of which office they are from. Refer to Section 7 - Control of Monitoring and Measuring Equipment of the GHD Quality System Manual and Section 3.4.1 – Field Notes of the GHD Field Training Manual for more information regarding field note content requirements.

These field notes may be called as evidence in a court of law.

In addition to the formal field notes, field personnel are expected to keep running tables that summarize the field activities so that when questioned at any time during the project, a detailed status of the work completed and that yet to be done can be provided. These lists also serve as checklists to confirm that the correct number and sequence of samples, wells, boreholes, etc. have been collected or completed.

Upon completion of each project, all of the field documentation is brought back and suitably stored at the GHD office in which the field staff who performed the field work are located.

GHD demands that all field note entries are factual and accurate. Everyone recognizes that errors and omissions will be made on occasion. While GHD does not condone a level of effort that is incomplete or inaccurate, it is recognized that it may happen and most of our clients will understand these situations. However, anyone who is caught falsifying any record, no matter how small, will be immediately dismissed.

2. History & Scope

2.1 Site History/Background

The Site is a closed landfill formerly operated by Crucible Specialty Metals. According to historic documents, the landfill began receiving waste, generally consisting of hazardous and non-hazardous solid waste from the Crucible steel mill, in 1973. Disposal of hazardous waste, which reportedly consisted of caustic solids, acid pickling sludge, and electric arc furnace and argon-oxygen decarburization dusts, reportedly ceased in March 1982. Disposal of non-hazardous waste, which reportedly consisted of slag, construction and refractory debris, absorbents, miscellaneous boiler house ashes, coolant swarves, mill scale, and wastewater treatment plant dewatered sludge, reportedly ceased in 1986 when landfill closure began. Landfill closure, which consisted of grading and consolidating the waste and capping with a geomembrane and clean soil, was reportedly completed in 1989.

Previous reports indicated that the landfill site is located on top of the abandoned Solvay Process Waste Beds, which are generally composed of highly alkaline waste material from the production of soda ash. The top terrace of the waste beds, where the landfill is located, is reportedly approximately 60 feet higher in elevation than Onondaga Lake.

2.2 Scope of Work Tasks

The current post-closure landfill monitoring program is intended to document groundwater quality and contaminant concentrations following landfill closure, document observations of the landfill cover system integrity, and document landfill settlement.

Groundwater monitoring is conducted biennially with groundwater elevations recorded at thirty-one (31) groundwater monitoring wells and piezometers and groundwater samples taken from fifteen (15) groundwater monitoring well locations, including MS-104.3; MS-104.4; MS-104.5; MS-106.1; MS-106.2; MS-106.3; MS-106.4; MS-106.5; MS-301.1; MS-301.2; MS-301.3; MS-301.4; MS-301.5; W-201R; and W-5.6.

The assessment of the landfill cover system integrity is completed annually by visual inspection of the cover surface material for erosion and/or subsidence, observation of the stormwater management features for general function, and annual maintenance of the cover system by mowing to preclude woody growth.

This HASP covers the specific site activities that will be conducted by GHD personnel and their subcontractors. These activities listed here, and in the attached JSAs cover the tasks being performed onsite.

Driving, Site Reconnaissance and Walk through Activities, Mob/Demob of personnel, material, and equipment, Monitoring Well Sampling, Decontamination of Sampling Equipment and Personnel, Derived Waste Drum Moving and Handling

If site operations are altered or if additional tasks are assigned, an addendum to this HASP shall be developed to address the specific hazards associated with these changes.

All addendums will be required to be developed in conjunction with project management and a GHD safety professional.

3. Chemical Hazards

3.1 Introduction To Chemical Hazards

This section identifies and evaluates the potential chemical hazards that may be encountered during the completion of this project. These hazards and the anticipated initial exposure levels are based on client data, historical data, etc.

Chemical exposures occur via four major routes of entry: absorption, inhalation, ingestion, and injection. A listing of the chemical contaminants of concern is found in the **Chemical Table** (Table 1) and The **Safety Data Sheets (SDSs)**, for chemical products used on site, are also included in the Appendices. Both the Chemical Table and SDSs include exposure limits, signs and symptoms of exposure, chemical properties, and physical characteristics.

3.2 Control Measures

Before the proper control(s) can be selected, GHD personnel conduct a hazard evaluation of the process, activity, or material. A hazard evaluation may include reviewing information from a chemical container label, SDS, manufacturer, National Institute for Occupational Safety and Health (NIOSH) website, and other resources as needed; identifying route(s) of exposure; and evaluating the process/activity to determine if an exposure evaluation is needed. If necessary, a HSE Manager conducts and documents exposure evaluations.

Exposure to potential on site contaminants/chemicals, such as those listed in Table 1.0 and SDSs, include the following methods:

- Engineering controls such as wetting methods, ventilation, elimination, or substitution.
- Administrative controls such as work rotation, training, or proper hygiene practices (washing facilities).
- Monitoring air concentrations with appropriate equipment in the breathing zone.
- Selecting and using personal protective equipment (PPE) such as gloves or respiratory protection.

JSAs are developed and revised to list the associated hazard controls on a task-specific basis.

3.3 Safety Data Sheets

SDSs are documents created by the chemical manufacturer that describe the substance. Some information found on an SDS includes: hazardous and physical characteristics, handling requirements, storage and disposal information, and signs and symptoms of exposure.

When working with hazardous chemicals, readily available and up-to-date SDSs are required for each chemical. GHD personnel and its subcontractors are responsible for obtaining and maintaining SDSs for their controlled products and for products that they are bringing onto site. All projects maintain an inventory of SDS and are made readily available to all employees and visitors.

3.4 Container Labels

All hazardous materials, hazardous waste, chemical containers, and chemical storage areas are appropriately labeled indicating the chemical identity, hazards present, and any relevant regulatory requirements. Labeling of all chemical containers assists emergency personnel and others in identifying hazards if a spill occurs or emergency situation arises.

Chemical container labeling is the responsibility of the individual who fills and/or uses the chemicals. All containers into which chemicals are transferred are legibly labeled in the language that can be understood by the employees who work with or in proximity (English, French, Spanish, etc.) and include the name of the chemical and appropriate hazard warnings.

3.5 Workers Training

All employees who may work in proximity to controlled products has and maintains current applicable training as appropriate to client, state, provincial or federal requirements, which may include: HAZCOM, WHMIS, TDG, or DOT. Records of training are readily available upon request.

4. Physical Hazards

4.1 Introduction To Physical Hazards

Physical Hazards are factors within the environment that can harm the body without necessarily touching it. Vibration and noise are examples of physical hazards. Physical hazards for this site have been identified in the following section. If the hazards change due to site conditions or additions to the scope of work, a Stop Work must be implemented and the conditions identified to the PM and RHSM.

In addition, personnel must be aware that the protective equipment identified in the JSA may limit dexterity and visibility and may increase the difficulty of performing some tasks.

4.2 Utility Clearances - OSHA

Extreme caution is needed when working around electrical power lines. Electricity flows through metal, wood, and many other conducting materials, including human beings. Elevated equipment such as drill rigs, backhoes, scaffolding, ladders, etc must remain the required distance away according to the local/state/provincial regulations.

These minimum requirements are:

Occupational safety and health act 1926.550(a)(15)

Operating voltage of overhead power	Operating voltage of overhead power safe limit of approach distance for persons and equipment
<50 kv	10 feet
>50 kv	20 feet

For lines rated over 50 kv, minimum clearance between the lines and any part of the crane or load shall be 10 feet plus 0.4 inch for each 1 kv, over 50 kv, or twice the length of the line insulator, but never less than 10 feet.

- If any part of a machine may encroach these parameters, SWA is implemented, a review of the SOW is conducted with the PM and RHSM, and a spotter is used.
- If the client has requirements that exceed the above minimums, then the client requirements are used.

Underground Utilities

Underground utilities, if present, are to be clearly marked and identified prior to commencement of work. Follow applicable regulations and client requirements with regards to utility-locating requirements (e.g., One Call).

Personnel involved in intrusive work will:

- Confirm proposed excavation(s) and heavy truck routes are not in the area of subsurface utilities. This meeting is to be documented.
- Review and adhere to GHD's Subsurface Utility Clearance Protocol SOP at a minimum. Use air knifing or vacuum truck digging techniques inside 5 feet of the outside edge of an underground facility.
- Pre-clear holes to 120% of the drill diameter to a minimum depth of 5 feet below ground surface. Consider pre-clearing to greater depths in close proximity to process piping such as loading racks
- Locate boreholes a minimum distances of 5 feet perpendicular from utility mark-out lines
- **Complete the Property Access/Utility Clearance Data Sheet (QSF 019) prior to initiating excavation activities.**
- On private property, request that the owner of the service, locate and mark the service.
- If a service may pose a hazard and cannot be shut off or disconnected, request that the owner of the service supervise the uncovering of the service during the work.
- Identify the work that can be conducted with the assistance of the locator line service, coordinate document/drawing review, and inspect the site for manholes, catch basins, valve boxes, etc. that may indicate the direction/depth of underground installations. Marking indicates only the approximate location of buried lines.

The following are the Uniform Color Codes for utility locates

white proposed excavation

pink temporary survey marking

red electrical power lines,cables, conduit and lighting cables

yellow gas,oil, steam,petroleum or gaseous material

orange communication, alarm or signal lines,cables or conduit

blue potable water

purple reclaimed water, irrigation and slurry lines

green sewers and drain lines

4.3 Material Handling

Material handling and storage practices are conducted at the project site. Proper lifting reduces the hazard out of moving objects. No one person should handle, lift, or move 50 pounds or more by themselves. Even if the object weighs less than 50 pounds, the configuration or shape of the object should be evaluated to see if two people should be used to lift the object.

Manual Lifting

Consider the following prior to a lift.

- Establish that you can lift the load safely.
- Inspect route to be travelled, confirming sufficient clearance.
- Look for any obstructions or spills.
- Inspect the object to determine how it should be grasped.
- Select and use containers with handles where practical.
- Look for any sharp edges, slivers, or other things that may cause personal injury.
- Do not move any object that will obstruct your field of vision when transporting the load.
- When lifting objects, use proper lifting techniques. Position the body so that the weight of the body is centered over the feet, which provides a more powerful line of thrust and ensures better balance. Start the lift with a thrust of the rear foot. Do not twist.

General Storage Practices

Storage of materials and supplies must not create a hazard. General storage area practices include the following:

- Bags, containers, bundles, etc. stored in tiers must be stacked, blocked, interlocked, and limited in height so that they are stable and secure against sliding or collapse.
- All stacked materials, cargo, etc. must be examined for sharp edges, protrusions, signs of damage, or other factors likely to cause injury to persons handling these objects. Defects are to be corrected as they are detected.
- Storage areas must be kept free from accumulation of materials that constitute hazards from tripping, fire, explosion, or pest haborage.
- Storage areas have provisions to minimize manual lifting and carrying. Aisles and passageways provide for the movement of mechanical lifting and conveyance devices.
- Stored materials do not block or obstruct access to emergency exits, fire extinguishers, alarm boxes, first aid equipment, lights, electrical control panels, or other control boxes.
- Hazardous materials are stored in accordance with the details outlined in the MSDS, or accepted guidelines from reputable agencies. Guidelines include details about the materials reactivity, corrosivity, flammability, etc., as well as appropriate signage.

4.4 Noise

Hearing protection is required for project activities when working in close proximity to machinery, drilling operations, or impact/power tools where noise levels may exceed the decibel range of 85 dBA.

When hearing a coworker at normal conversation distance is difficult or the noise level is approaching or exceeding 85 dBA, hearing protection such as earplugs or muffs must be available/worn by all site personnel and visitors that may be exposed to elevated levels of noise.

Individuals who wear hearing protection are to be adequately trained in the safe use and handling of hearing PPE.

GHD employees who have the potential to be exposed to noise exceeding 85dba in the work environment will be enrolled in the GHD Hearing Conservation Program.

4.5 Heat Stress

Heat stress is one of the most common illnesses faced by project personnel when working in elevated temperatures and/or humidity.

Prevention

The following procedures will be carried out to reduce heat stress:

- Heat stress monitoring.
- Acclimatization.
- Sun exposures.
- Work/rest regimes (schedule of breaks) in accordance with Occupational Health Clinics for Ontario Workers (OHCOW).
- Humidex Heat Stress Response Plan – mandatory breaks scheduled in summer months or during high risk activities for heat stress (based on ACGIH)
- Heat stress safety PPE (e.g., cool vests, bandanas)
- Cool potable water available
- Use of buddy system
- Seek shade - Shade is a good source of protection, but keep in mind that shade structures (e.g., trees, umbrellas, canopies) do not offer complete sun protection.

OHCOW Humidex Heat Stress Response Plan		
°F	°C	Response
77-84°F	25-29°C	•supply water to workers on an "as needed" basis
86-91°F	30-33°C	•post "heat stress alert" notice •encourage workers to drink extra water •start recording hourly temperature and relative humidity
93-98°F	34-37°C	•post "heat stress warning" notice •notify workers that they are drinking extra water •ensure workers are trained to recognize symptoms
100-102°F	38-39°C	•provide 15 minutes relief per hour •provide adequate cool (10-15°C) water, at least 1 cup (240 ml) of water every 20 minutes •workers with symptoms should seek medical attention
104-107°F	40-42°C	•provide 30 minutes relief per hour in addition to the provisions listed previously
109-111°F	43-44°C	•if feasible provide 45 minutes relief per hour in addition to the provisions listed above •if a 75% relief period is not feasible then stop work until the humidex is 42°C or less
113°F	45°C or over	•stop work until the humidex is 44°C or less
Note: Humidex plan is a simplified way of protecting workers from heat stress which is based on the 2007 ACGIH heat stress TLV® (threshold limit value®) which uses wet bulb globe temperatures (WBGT) to estimate heat strain. These WBGT's were translated into humidex		

Sun Exposure

Overexposure to sunlight is a common concern when field activities occur during warm weather conditions. Overexposure can occur on clear, sunny days, as well as on overcast and cloudy days. The following steps should be taken to protect against overexposure to sunlight:

- Always use sunscreen on exposed body parts.
- Cover up.
- Wear safety rated sunglasses.
- Limit time in the midday sun.

4.6 Cold Stress

Cold stress is similar to heat stress in that it is caused by a number of interacting factors including environmental conditions, clothing, and workload, as well as the physical and conditioning characteristics of the individual.

Prevention

A variety of measures can be implemented to prevent or reduce the likelihood of employees developing cold related ailments and disorders.

- Acclimatization.
- Fluid and electrolyte replenishment.
- Eat a well-balanced diet.
- Wear warm clothing.
- Follow work/rest regimes.

The parts of the body most important to keep warm are the feet, hands, head, and face. As much as 40 percent of body heat can be lost when the head is exposed.

TLVs Work/Warm Up Schedule for 4 Hour Shift

THRESHOLD LIMIT VALUES WORK/WARM-UP SCHEDULE FOR FOUR-HOUR SHIFT*																							
Air Temperature Sunny Sky		No Noticeable Wind		5 mph Wind		10 mph Wind		15 mph Wind		20 mph Wind													
° C (approx)	° F (approx)	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks												
-26° to -28°	-15° to -19°	(Norm breaks) 1		(Norm breaks) 1		75 min.	2	55 min.	3	40 min.	4												
-29° to -31°	-20° to -24°	(Norm breaks) 1		75 min.	2	55 min.	3	40 min.	4	30 min.	5												
-32° to -34°	-25° to -29°	75 min.	2	55 min.	3	40 min.	4	30 min.	5	Non-emergency work should cease ↓													
-35° to -37°	-30° to -34°	55 min.	3	40 min.	4	30 min.	5	Non-emergency work should cease ↓															
-38° to -39°	-35° to -39°	40 min.	4	30 min.	5	Non-emergency work should cease ↓																	
-40° to -42°	-40° to -44°	30 min.	5	Non-emergency work should cease ↓																			
-43° to below	-45° & below	Non-emergency work should cease																					

*2014 TLVs and BEIs - Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices. Cincinnati: American Conference of Governmental Industrial Hygienists (ACGIH), 2014

4.7 Hand And Power Tools

Hand Tools

- Hand tools must meet the manufacturer's safety standards.
- Hand tools are not to be altered in any way.
- At a minimum, appropriate eye and face protection that meets current applicable standards (ANSI/CSA) must be used.
- Wrenches, including adjustable, pipe, end, and socket wrenches, are not used when jaws are sprung to the point that slippage occurs.
- Impact tools such as drift pins, wedges, and chisels are kept free of mushroom heads.
- Wooden handles are free of splinters or cracks and secured tightly to the tool.
- Any damaged or defective tools are immediately removed from service and tagged for destruction.

Power Tools

- All power tools must be inspected regularly and used in accordance with the manufacturer's instructions and the tool's capabilities.
- Electric tools are not used in areas subject to fire or explosion hazards, unless they are approved for that purpose.
- Corded portable electric tools are connected to a ground fault circuit interrupter (GFCI) when working in wet areas.
- Coiled cords/extension cords are uncoiled when plugged in to allow for dissipation of heat.
- Cords/extension cords rated appropriately for the temperature are used.
- Appropriate eye and face protection that meets current applicable standards (ANSI/CSA) are used.
- Personnel are trained in the proper use of the tool.
- Any damaged or defective power tools must be immediately tagged and removed from service.
- Repairs to hand or power tools are only made by qualified individuals and in accordance with the manufacturer's standards.
- Field or shop modifications to tools or equipment are only made by qualified individuals and in accordance with either manufacturer or engineer-approved specifications.

4.8 Slip, Trip, Hit, Fall

Slip/trip/hit/fall injuries are the most frequent of all injuries to workers. They occur for a wide variety of reasons, but can be minimized by the following prudent practices:

- Spot-check the work area to identify hazards and communicate hazards to on site personnel.
- Update/dirty the JSA to reflect changes.
- Keep work areas clean and free of clutter, especially in storage areas and walkways.
- Secure all loose clothing and ties, and remove jewelry that may pose an entanglement hazard.
- Establish, maintain, and utilize walkways that are free of slip and trip hazards.
- Utilize/install appropriate lighting for walking paths and working areas.
- Beware of slip/trip hazards such as wet floors, slippery floors, and uneven surfaces or terrain.
- Carry only loads you can see over (Refer to Material Handling for additional information).
- Refrain from the use of portable communication devices (cell phones, two-way radios) while traversing the site.
- Keep a safe buffer zone between workers using equipment and tools.

4.9 Aggressive Or Menacing Behavior

When confronted by an individual whose behavior becomes aggressive or menacing, remain as calm as possible. Avoid arguing with or physically confronting the individual. Attempt to distance yourself from the individual. Advise others in the area to leave the scene and request police assistance by having someone call the emergency number listed on the Emergency Contact Sheet. Use the team approach. A staff member who is physically unable to break away from an attacker should shout for help.

The use of physical force is justified when a person believes that such force is necessary to protect himself or herself against the use or imminent use of unlawful physical force by another person.

Should an aggressor only be interested in the taking or damaging of property, do not interfere.

Obtain a description of the individual to provide to local authorities, including height, weight, race, sex, clothing, accent, unusual markings such as tattoos, piercings, scars, hair color, and weapon, if any.

Contact the HSE Help Line and file an incident report with your immediate supervisor as soon as it's safe to do so.

4.10 Adverse Weather Conditions

Adverse weather is the existence of or impending weather conditions such as heavy rain, freezing rain, sleet, snow, high winds (50km/30mph), dust storms, tornadoes, hurricanes, lightning, or any combination of weather that is either not reasonable or not safe for employee exposure. Stop Work Authority (SWA) is executed prior to these conditions as reasonably possible. The site is evacuated according to the emergency plan developed and listed in this Health and Safety Plan.

Based on their expertise and knowledge of manufacturer's recommendations for the equipment being operated, heavy equipment operators such as crane and drill rigs are responsible for advising the site supervisor whether it is safe to continue operations.

The site supervisor decides on the continuation or discontinuation of work based on current and pending weather conditions, the equipment manufacturer recommendations, and the equipment operator's recommendations.

4.11 Special Conditions

GHD may be asked to conduct work that requires special precautions/considerations. Potential exposure factors are identified on the left, with associated mandatory conditions identified on the right.

- Remote work locations
 - Working alone is not permitted. Submit a Journey Management Plan. Use call-in procedure to include use of satellite phone if no cell or direct line access.
- Project site is in an area known for high crime or violence activity
 - Working alone is not permitted. A police or security escort is required.
- Entry into abandoned buildings
 - Working alone is not permitted. Use call-in procedure.
- Entry into wooded areas during hunting season
 - Working alone is not permitted. Use a reflective vest. Submit a Journey Management Plan. Use call-in procedure.
- Project work involving single employees (lone worker)
 - Use call-in procedure.

If these situations are possible, please consult with your RSHM to develop a plan prior to your project's start date.

5. Biological Hazards

5.1 Infection Control

Infection Control

During an infectious outbreak (e.g., epidemic, or pandemic virus), all persons experiencing flu-like symptoms must stay home and away from the workplace to protect themselves, co-workers and the community. Persons, who believe they have been exposed to another illustrating symptoms or developed symptoms themselves, must notify their Supervisor, Project Manager, People Team or HSE Team member for advice and completion of a risk assessment when applicable.

In the event of an infectious outbreak in the community the GHD Standard Operating Procedure HSE Infection Control HSE339 will be initiated along with the activation of the local Crisis Management Team. Should the above occur, both office and field employees will be required to:

- Know the symptoms
- Adhere to local government Public Health and GHD protocols
- Complete personal health screening (including GHD vendors and/or visitors) as required
- Not attend work if they exhibit any of the symptoms
- Sneeze and cough into their sleeve or a tissue which is then disposed of
- If air borne transmission is confirmed, wear appropriate respiratory protection (surgical style or cloth mask)
- Carry and use infection control cleaning/disinfection supplies and PPE (e.g. nitrile gloves, etc.)
- Wash their hands with soap and water for at least 20 seconds followed by alcohol-based hand sanitizer that contains > 60% alcohol
- Maintain physical distancing of 2 meter/6 feet at all times from others
- Discontinue face-to-face meetings
- Avoid close contact exposure defined as:
 - Greater than 15 minutes face to face less than 2meter/6 feet apart without the use of face mask/covering
 - Sharing of a closed space with suspected/confirmed case(s)

Note: This is not the exhaustive list. Further protective measures will be included in the HASP should Public Health Authorities provide additional guidance specific to the biological hazard.

5.2 Introduction To Biological Hazards

GHD employees conduct numerous project activities where they may encounter biological hazards such as listed in the following table. This section identifies the problems associated with these biological hazards and the precautions to be taken if these hazards are encountered.

The biological hazards identified are applicable to this site. If you are bitten, stung, or attacked by any of the listed hazards, contact the GHD HSE Help Line at 1-866-529-4886

5.3 Wildlife

Tick and Chiggers	•Wear light colored clothing •Keep clothing buttoned or zipped •Keep socks tucked in •Apply repellent containing DEET or Permethrin to clothing and exposed skin •Check hair and clothing periodically using buddy system	•Remove tick with tweezers or fingers and tissue •Grab tick as close as possible to attachment site and pull firmly •Inspect tick to ensure that no parts remain in attachment site •Apply AfterBite containing antiseptic to affected areas •Call GHD HSE Help Line
Flying, Stinging, Biting Insects: Bees, Wasps	•Avoid wearing perfume, hairspray, cologne, and scented deodorant while working outside •If eating outside, keep all food and drinks covered; sweet foods and strong scents attract stinging insects •Never swat or swing at the insect; wait for it to leave, softly blow it away, or gently brush it aside •Inspect areas carefully as bees, wasps, and hornets can nest both in the ground and above ground •If the nests pose a threat, have them professionally removed	•Apply AfterBite containing antiseptic to affected areas or place an ice cube or ice pack over the sting to reduce pain •Remove the stinger with tweezers or scratch with a credit card (catch barbs with card and pull out) •Seek medical attention when the reaction to a sting includes swelling, itching, dizziness, and shortness of breath •Call GHD HSE Help Line
Mosquitoes	•Wear light colored clothing •Keep your body covered as much as possible; wear a hat or mosquito screen •Apply repellent containing DEET or Permethrin to clothing and exposed skin	•Apply AfterBite containing antiseptic to affected areas •If moderate to extreme itchiness is experienced, use over the counter antihistamines

Rodents/Rats	•Inspect work area for rodent droppings •For low amounts of droppings, use Level C with N95 disposable respiratory protection •For heavy accumulation, use Level C Full Face PAPR with P100 cartridge or, in severe cases, Level B •Soak dead mice, nests, and droppings thoroughly with a 1:10 solution of sodium hypochlorite (household bleach); bleach kills the virus and reduces the chance of further transmission •Place contaminated material in a plastic bag and seal for disposal •Disinfect by wet wiping all reusable respirator surfaces, gloves, rubber boots, and goggles with bleach solution •Place all disposable protective clothing, gloves, and respirators in plastic bags and seal for disposal •Thoroughly wash hands with soap and water after removing gloves	•If bitten by a rodent, clean with antiseptic •Cover the wound •Retain specimen if possible and seek medical attention •Notify Supervisor/PM •Call GHD HSE Help Line
Canadian Geese	•Easily recognized by black head and grey breasts •Weigh up to 13 lbs and territorial and aggressive •Be aware of nesting areas •Bird and dropping carry several diseases that affect humans	•Remain calm and do not act aggressive or afraid •Gradually back away while keeping eye contact •Wear appropriate PPE when handling nests or dead animals •Wash hands with soap and warm running water •Disinfect hands with sanitizer •If attacked and injured, call GHD HSE Help Line

5.4 Biological

Histoplasmosis	Look for evidence of bird or bat colonies. • Before you work in or dig soil that's likely to harbor the fungus that causes histoplasmosis, spray it thoroughly with water. • Wear appropriate PPE for the task. • Clean footwear before leaving the site to prevent spore dissemination in cars, the office, at home, and elsewhere	• Wash hands with soap and warm water after removing your gloves. • If you have persistent flu like symptoms, see your doctor. Tell them if you have been around a bird or bat colony. • Call GHD HSE Help Line
Hantavirus	• Inspect work area for rodent droppings • For low amounts of droppings, use Level C with N95 disposable respiratory protection • For heavy accumulation, use Level C Full Face PAPR with P100 cartridge or, in severe cases, Level B • Soak dead mice, nests, and droppings thoroughly with a 1:10 solution of sodium hypochlorite (household bleach); bleach kills the virus and reduces the chance of further transmission • Place contaminated material in a plastic bag and seal for disposal • Disinfect all equipment	• Wash gloved hands with soap and water or spray a disinfectant or bleach solution on gloves before taking them off. • Wash hands with soap and warm water after removing your gloves. • If you have been around rodents and have symptoms of fever, deep muscle aches, and severe shortness of breath, see your doctor immediately • Call GHD HSE Help Line
Blood-borne Pathogens	• Exposure comes through work activities such as landfill, sewage treatment, sewers, contaminated medical waste • Virus, Bacteria, Fungus, and Parasites are considered blood-borne • Proper hygiene is extremely important to prevent ingestion • Wear proper PPE in known areas (gloves, long sleeves, long pants, safety glasses)	• All human blood and human body fluids treated as infectious • Cover all nicks and cuts to prevent cross-contamination. • Disinfect hands with sanitizer • Proper hygiene extremely important to prevent ingestion and eye contact • More information review GHD blood-borne policy • Call GHD HSE Help Line if exposed.
Psitticosis - Bird Droppings	• Breathing in the organism when the urine, respiratory secretion, or dried feces • Other sources of exposure include mouth-to-beak contact, a bite from an infected bird. • Bacteria starts an infection that varies in severity from a mild flu-like illness to severe pneumonia • PPE may include gloves, protective clothing, boots, and where appropriate, a respirator	• Adequate ventilation systems including the use of high efficiency particulate air (HEPA) filters to reduce the spread of contaminated air. • Disinfectants area with ammonium compounds, isopropyl alcohol, 70% ethanol, household bleach (diluted to 1%) • Wetting the wastes before removal decreases aerosolization • Call GHD HSE Help Line if exposed

Legionella	•Minimize water misting, stagnant water, and dead zones •Manage water temperature •Implement a preventative maintenance and inspection program to monitor equipment •Conduct Legionella testing of water systems and equipment	•If you are suffering a respiratory ailment, notify your supervisor and contact the GHD HSE Help Line

5.5 Poisonous Plants

Poison Ivy/Poison Oak	•Learn to identify poison ivy and poison oak (leaves of three, let them be) •Urushiol oil is in the wood portion of the plant and is active all year long •Wear proper PPE in known areas (gloves, long sleeves, long pants, safety glasses) •Proper hygiene extremely important to prevent ingestion and eye contact	•You may only have 30 minutes to get the oil off skin before it absorbs, and less time in hotter climates •Rinse with cold water, as hot water will open your pores •Apply alcohol to dissolve oils •Watch for an itchy red skin rash, which is the most common reaction; over time, large blisters may form •Use topical cream to assist with the itching (consult your pharmacy) •In severe cases, contact your doctor •Call GHD HSE Help Line
Vegetation Overgrowth	•common weeds and tall grasses •increase in trip hazard, and entanglement •risk of fire during summer season •wear proper PPE, long pants, eye protection •increase in rodent, snake, stinging insect hazards	•discuss clearing area with management to reduce risks •use extra caution when walking due to unseen holes or trip hazards •watch for grass cuts on arms, contact GHD HSE Help Line if reaction occurs

6. Personal Protective Equipment

6.1 Introduction To PPE

Controlling a hazard at the source is the best way to protect employees. When engineering, work practice, and administrative controls are not able to protect our employees, GHD provides personal protective equipment (PPE) to its employees and ensures that the PPE is used appropriately. PPE is equipment worn as a barrier to minimize exposure to a variety of hazards.

This section covers applicable PPE requirements, which include eye, face, hand, head, foot, and respiratory protection.

6.2 Types of Personal Protective Equipment (PPE)

The type of PPE required for work varies based on the task being performed. The specific PPE required for each individual task is documented in the appropriate task-specific JSA. The recommended minimum PPE for GHD site work is as follows:

- Shirts with a minimum 6-inch sleeve.
- Long pants made from suitable sturdy material .
- Grade 1 protective footwear meeting CSA Z195 M92 (Canada)/ ANSI Z41.1 (US), green patched (triangle), steel-toed/puncture-resistant and electric shock-resistant sole with a 6-inch cuff, fully laced and secured, in material appropriate for weather and task.
- Safety glasses or goggles (based on the type of hazard – dust, splash, etc.), meeting CSA Z94.3 (Canada) or ANSI Z87.1 (US) standards.
- Hand protection such as gloves meeting standards EN 388 and ANSI 105-2000 as appropriate for the task as per JSA, with selection based on the hazards (abrasion, blade cut, tearing, puncture, and impact) associated with the task being performed.
- Reflective garment meeting CSA Z96 02 or ANSI 107 (as required).
- Type 1 Class E hardhat, meeting either CSA Z94.1 05, Z94.1 92, ANSI Z89.1, or Z89.1.
- Hearing protection meeting CSA/ANSI approved NRR of at least 20 dBA if noise levels exceed 85 dBA.

Additional minimum requirements for PPE include:

- All PPE are maintained in good condition with no rips, tears, or damage that compromise integrity.
- PPE is not loose fitting as to avoid entanglement issues.
- All PPE is disposed of and/or decontaminated at the conclusion of each workday. The most contaminated PPE is decontaminated first.
- All disposable equipment is removed before meal breaks and at the conclusion of the workday, and replaced with new equipment prior to commencing work.
- Reusable equipment (safety glasses, hard hats, goggles, etc.) is cleaned and sanitized according to GHD and/or manufacturer guidelines.
- Eating, drinking, chewing gum or tobacco, and smoking are prohibited while working in areas where the potential for chemical and/or explosive hazards may be present. Personnel must wash thoroughly before initiating any of the aforementioned activities.

6.3 Types Of Protective Material

No universal protective material exists. All materials will decompose, be permeated, or otherwise fail to protect under certain circumstances. Protective clothing can be constructed from a variety of materials for protection against exposure to specific physical, chemical, or biological hazards.

Fortunately, most manufacturers list guidelines for the use of their products. These guidelines usually concern gloves or coveralls and generally only measure rate of degradation, which is failure to maintain structure. A protective material may not necessarily degrade, but may allow a particular chemical to permeate its surface. For this reason, guidelines must be used with caution. When permeation tables are available, they are used in conjunction with degradation tables.

To obtain optimum usage from PPE, the following procedures are followed by all site personnel using PPE:

- When using disposable coveralls, don a clean, new garment after each rest break or at the beginning of each shift
- Inspect all clothing, gloves, and boots both prior to and during use for:
 - ◊ Imperfect seams
 - ◊ Non uniform coatings
 - ◊ Tears
 - ◊ Poorly functioning closures
- Inspect reusable garments, boots, and gloves both prior to and during use for:
 - ◊ Visible signs of chemical permeation
 - ◊ Swelling
 - ◊ Discoloration
 - ◊ Stiffness
 - ◊ Brittleness
 - ◊ Cracks
 - ◊ Any sign of puncture
 - ◊ Any sign of abrasion

Reusable gloves, boots, or coveralls exhibiting any of the characteristics listed above are discarded. PPE used in areas known or suspected to exhibit elevated concentrations of chemicals are not reused.

6.4 Respiratory Protection

Respiratory protection is sometimes required for personnel during project activities when action levels exceed the occupational exposure levels. When respirators are required, personnel identify and select the appropriate air purifying respirator and supporting cartridge medium, and follow the procedures and guidelines in their respective written Respiratory Protection program.

At a minimum, all personnel required to use this equipment are:

- Instructed in how to properly fit a respirator to achieve the required face piece to face seal for respiratory protective purposes.
- Medically cleared for the use of respiratory protection.
- Appropriately fitted for the selected respirator through established recognized fit testing methods (quantitative/qualitative), and documentation of fit is readily available.
- Free of beards, sideburns, eyeglasses, and upper or lower dentures that could affect the face seal.

Further regulations for the use of respiratory protection include:

- Cartridges are changed prior to breakthrough, daily, or when personnel begin to experience increased inhalation resistance or breakthrough of a chemical warning property.
- Respiratory equipment and other non disposable equipment are fully decontaminated.
- Appropriate action levels are established and documented based on the applicable occupational exposure limits.

NOTE: This HASP is not intended for the use of supplied air operations. For supplied air operations, the project manager and a GHD safety professional conduct a review of the scope of work.

GHD identifies the type of respirator and cartridge and documents on the applicable JSA for the affected tasks and on Table 2.

6.5 Respirator Cleaning

Respirator decontamination is conducted once daily at a minimum. Face pieces are disassembled, the cartridges are thrown away, and all other parts are placed in a cleansing solution. After an appropriate amount of time in the solution, the parts are removed and re seated with tap water.

Face pieces are allowed to air dry before being placed in sanitized bags and stored in a clean area.

6.6 Levels Of Protection

Protection levels provided by PPE selection are upgraded or downgraded based upon a change in site conditions or the review of the results of air monitoring or the initial exposure assessment monitoring program, if one was conducted.

When a significant change occurs, the hazards are reassessed. Some indicators of the need for reassessment are:

- Commencement of a new work phase.
- Change in job tasks during a work phase.
- Change of season/weather.
- Temperature extremes or individual medical considerations limiting the effectiveness of PPE.
- Chemicals other than those expected to be encountered are identified.
- Change in ambient levels of chemicals.
- Change in work scope that affects the degree of contact with areas of potentially elevated chemical presence MUST be re-evaluated.

All proposed changes to protection levels and PPE requirements are reviewed and approved prior to implementation by the SS.

7. Site Control

7.1 Introduction To Site Control

The purpose of site control is to minimize potential contamination of workers and protect the public from hazards found on site. Site control also includes site security for the protection of GHD employee and subcontractor when working in public areas. Site Control is especially important in emergency situations.

Site control, work area demarcation, and site security will be achieved through posting of signage and placement of barricades and or personnel. All controlled areas will have the appropriate signage posted. Barricades and warning signs will be placed to warn personnel of potential hazards. A standby person (spotter) may be utilized in place of barricades, where appropriate. The following materials may be used to barricade the work area and protect both public and GHD:

- Traffic Cones

Approved pedestrian and vehicle traffic paths will be determined during Pre-Start/Tailgate Safety Meetings based upon current site conditions and work locations. When applicable, one pathway should be established for heavy equipment and one for personnel decontamination.

The majority of site operations, as well as access to the site, could be controlled from the support zone. The support zone will provide for team communications, emergency response, and sanitary facilities. Appropriate safety and support equipment also will be located in this zone.

The support zone will be located upwind of site operations if possible, and would be used as a potential evacuation point if appropriate. No potentially contaminated personnel or materials are allowed in this zone.

7.2 Work Zone Demarcation Level 1

Task such as:

- Monitoring Well Sampling
- Inspection of Equipment
- Tasks that Distract Attention from Vehicle Traffic

These task require the use traffic cones, high visibility tape or temporary barricades such as sawhorses.

7.3 Two-Person Crew/Buddy System

A Two-Person Crew or Buddy System shall be implemented to protect the employees and public when conducting high risk activities such as:

- Working near traffic
- Working ON or NEAR water
- Excessive noise to which hearing traffic or communication is difficult
- Confined or restricted spaces
- In an isolated area such as landfills or wooded areas
- Areas with high crime rates

When using the buddy system, visual contact must be maintained between crew members at all times, and crew members must observe each other for signs of chemical exposure, heat, or cold stress. Indications of adverse effects include, but are not limited to:

- Changes in complexion and skin coloration
- Changes in coordination
- Excessive salivation and pupillary response
- Changes in speech pattern.

Project personnel must also be aware of potential exposure to possible safety hazards, unsafe acts, or noncompliance with safety procedures. Individuals must inform their partners or fellow team members of non visible effects of exposure to toxic materials. The symptoms of such exposure may include:

- Headaches
- Dizziness
- Nausea
- Blurred vision
- Cramps
- Irritation of eyes, skin, or respiratory tract.

If protective equipment or noise levels impair communications, prearranged hand signals must be used for communication. Personnel must stay within line of sight of another team member.

7.4 Communication

Each member of the project team will be able to communicate with other team members at all times. Communications will be by way of:

- Cell Phones/Smart Phones

The primary means for external communication are telephones and radio. If telephone lines are not installed at a site, all team members should:

- Know the location of the nearest telephone
- Have the necessary telephone numbers readily available

Note: The authorized use of cellular phones must be cleared by the client prior to entering site.

The following procedures will be followed by all site workers when using a cell phone on site:

- No cell phone use while driving or operating equipment.
- No cell phone use while in the Exclusion Zone.
- If using a cell phone on site, find a location where you can safely use the phone. Do not walk around the site while using a cell phone.

Understanding of the following standard hand signals will be mandatory for all employees, regardless of other means of communication:

- Hand gripping throat — Cannot breathe
- Hands on top of head — Need assistance
- Thumbs up — OK, I'm alright, I understand
- Thumbs down — No, negative
- Gripping partner's wrist, or gripping both of your own hands on wrist (if partner is out of reach) – Leave area immediately

7.5 Decontamination And Hygiene

Decontamination

In general, everything that enters the site must either be decontaminated or properly discarded upon exit from the site. Prior to demobilization, potentially contaminated equipment will be decontaminated on a wash pad (decontamination pad), drum, or containment pad which then will be placed into appropriate container and labeled as hazardous waste and will be stored in a designated area until disposal arrangements are made.

The type of decontamination solution to be used is dependent on the type of chemical hazards.

The decontamination solution for heavy equipment and for any reusable PPE is Alconox/Liqui nox soap. The MSDSs for Alconox/Liquinox will be located in the Appendix.

Personnel Decontamination Procedures

Personnel decontamination will be completed in accordance with the GHD Safety and Health Program for personnel decontamination. Wash water and sediments will be collected and stored with any runoff water collected for subsequent treatment/disposal. PPE, trash, etc. will be sent off-Site for disposal. It will be kept separate from trash generated in clean areas of the Site.

All disposable equipment shall be doffed before meal breaks and at the conclusion of the workday and replaced with new equipment prior to commencing work.

Procedures for decontamination must be followed to prevent the spread of contamination and to eliminate the potential for chemical exposure.

Personnel - Decontamination will take place prior to exiting the contaminated work area.

Decontamination procedures are as follows:

Step 1 Remove all visible contamination and loose debris by washing with clean water.

Step 2 Remove all outer clothing that came in contact with the contamination (i.e., boot covers and outer gloves) and either dispose of in disposable container or wash in detergent solution and rinse.

Step 3 Remove protective clothing; dispose of in disposable container.

Step 4 Remove respirator, sanitize prior to reuse.

Step 5 Remove inner gloves, dispose of in disposable container.

Step 6 Wash and rinse hands.

General Safety and Personnel Hygiene

1. Eating at the site is prohibited, except in specifically designated areas. Designation of eating areas will be identified to each employee. The location of these areas may change over the duration of the project to maintain adequate separation from the active work area(s).
2. Smoking at the site is prohibited.
3. Individuals getting wet to the skin with effluent from the washing operation must wash the affected area immediately. If clothes in contact with skin are wet, then these must be changed.
4. Hands, face, neck, and other exposed areas must be washed with soap and water before eating, drinking, smoking, before using toilets, and before leaving the site.
5. All disposable coveralls and soiled gloves will be placed in covered containers at the end of every shift or sooner, if deemed necessary by the SHO. Wastes will be stored until proper disposal arrangements have been made.
6. Personnel working on site will not be permitted to wear facial hair that interferes with the mask to face seal on air purifying respirators.
7. All personnel performing or supervising work within the EZ must wear appropriate PPE, observe, and adhere to the personal hygiene related provisions of this section.
8. Personnel found to be disregarding the personal hygiene related provisions of this HASP will, at the discretion of the SHO, be barred from the site.

7.6 Social Protection

Security Measures

A site assessment should be made prior to performing work in high risk areas for violent crime. Additionally, it may be important to gather as much information as possible from the client, describing the location and social conditions of the area where work will be performed.

In the event it has been determined that this work will occur in an area of high risk, consideration shall be given to providing on site security for the protection of the employee. This option may

include services from a security agency, local law enforcement (if available), or the services of an off duty law enforcement officer. The Project Manager and/or Project Coordinator shall be contacted and provide authorization prior to making these arrangements.

Anti-social behavior means different things to different people – noisy neighbors who ruin the lives of those around them, 'crack houses' run by drug dealers, loitering by drunkards, people begging by cash points, abandoned cars, litter and graffiti, young people using airguns to threaten and intimidate or people using fireworks as weapons.

When in this situation, there is no single strategy that always works. Remember these tips when faced with work conditions in volatile neighborhoods:

Street Precautions

When walking to and from your vehicle, or in and around the work site:

- Be alert to your surroundings and the people around you, especially if you are alone or it is dark
- Whenever possible, travel with a colleague
- Stay in well lighted areas as much as possible
- Walk close to the curb; avoid doorways, bushes, and alleys where someone could hide
- Walk confidently, and at a steady pace; make eye contact with people when walking
- Do not respond to conversation from strangers on the street, continue walking

Harm Reduction

Do as much as you can to avoid a confrontation "anticipation and avoidance" are the key words.

- If you get caught up in a situation, try to talk to an aggressor without provoking them.
- Practice relaxation, as appearing fearful or stressed can actually provoke an attack.
- Remember that body language is important in aggressive situations, so maintain a comfortable distance between you and the aggressor.
- It may be more advisable to submit than to resist and risk severe injury or death. You will have to make this decision based on the circumstances. Be especially careful, if your attacker has a weapon.
- Avoid arguing with or physically confronting the individual. Attempt to distance yourself from the individual. Advise others in the area to leave the scene and request police assistance by having someone call the emergency number listed on the Emergency Contact Sheet. Use the team approach. A staff member who is physically unable to break away from an attacker should shout for help.
- Steady yourself if danger threatens. Panic can disable you, so again it's useful to learn how to keep control in a difficult situation.
- If you must fight back, adopt what police term the "bash and dash" approach. Primary targets are the eyes, nose, mouth, ears, throat, groin, knees, or shins; choose whichever is easiest to get to.
- Be aware that your attacker might be stronger than you, or may take what you are using in self defense and use it against you. It is often better just to shout loudly and run away.
- When confronted by an individual whose behavior becomes aggressive or menacing, remain as calm as possible. Avoid arguing with or physically confronting the individual. Attempt to distance yourself from the individual. Advise others in the area to leave the scene and request police assistance by having someone call the emergency number listed on the Emergency Contact Sheet. Use the team approach. If you are physically unable to break away from an attacker, shout for help.
- The use of physical force is justified when a person believes that such force is necessary to protect him or herself against the use or imminent use of unlawful physical force by another person. The use of physical force is also justified in the defense of another party, such as a co worker, who is being subjected to unlawful physical force. You can use any technique of legal self defense in order to halt or distract an attacker until law officers arrive on the scene.
- Should an aggressor only be interested in taking or damaging property, do not interfere. Obtain a

description of the individual to provide to local authorities, including height, weight, race, sex, clothing, accent, unusual markings such as tattoos, facial piercing, scars, hair color, and weapon, if any.

- Shout 'fire' rather than 'help' – it can get more results.
- Stay alert and observant so that you can better describe your attacker and the assault to the police.
- Report the incident to the GHD Help Line and BWISE and work with your PM and HSE Manager to complete the investigation

Drug Activity

The safe retrieval and disposal of used hypodermic needles and syringes:

- GHD employees must not handle or remove any hypodermic needles or syringes. You should contact the local Police Department, Fire Department, or Health Department for removal from the job site.
- If you are injured by a discarded needle you can receive a vaccination against Hepatitis B within 48 hours of the incident. Notify the GHD Help Line and seek medical attention, call 911 if necessary.
- If an accident occurs where a needle or other sharp object has punctured the skin, then the injured person should:
 - ◊ Encourage the wound to bleed gently
 - ◊ Wash well with soap under cold running water
 - ◊ Cover the wound with a waterproof dressing
 - ◊ Seek medical attention as soon as possible
 - ◊ Inform the SS and/or PM
 - ◊ Complete a GHD Incident Reporting Form

Car Jacking

You can help prevent yourself being a victim of car jacking by:

- Keeping your doors locked in built up areas, and trying to keep the windows wound up, especially at traffic lights
- Being aware of what people are doing around you
- Using the middle lane, if there is one, when waiting at junctions or lights, so that your car is harder to get to from the pavement
- Not stopping to help someone who has broken down (if you really want to help, pull over at the next garage or police station and call for help)
- Driving to the next garage or police station and reporting them if someone tries to pull you over for no reason

A car jacker may 'accidentally' bump into your car, aiming to get you out of the car so they can steal it. If this happens, you may choose not to get out of the car – especially if you do not think it is a genuine accident. Wind the window down a little bit to talk to them if you want to.

Aggressive or Menacing Behavior

Report to the GHD HSE Help Line, BWISE and work with your PM and HSE Manager to complete the investigation.

7.7 Site Security

Site security is necessary to prevent the exposure of unauthorized, unprotected people to site hazards and to avoid interference with safe working procedures. Security shall be maintained outside of the actual work area(s) so as to prevent unauthorized entry into the work area(s). Members of the general public are to be protected from site hazards.

7.8 7.8 HAZWOPER Addendum

1.1.1 General Safety Practices

1.1.1.1 Duration of Work Tasks

The duration of activities involving the usage of PPE will be established by the SS or SHO based upon ambient temperature and weather conditions, the capacity of personnel to work in the designated level of PPE and limitations of the protective equipment (i.e., ensemble permeation rates, life expectancy of the APR cartridges, etc.) As a minimum, rest breaks will be observed at the following intervals:

- i) 15 minutes midway between shift start-up and lunch
- ii) One-half to one hour for lunch
- iii) 15 minutes in the afternoon, between lunch and shift end

All rest breaks will be taken in the clean area (Support Zone [SZ]) after full decontamination and PPE removal. Additional rest breaks will be observed based upon the heat stress monitoring guidelines presented in Section 4.2.

1.1.2 Personal Protective Equipment

1.1.2.1 Buddy System

All project personnel must use the buddy system. Visual contact must be maintained between crew members at all times, and crew members must observe each other for signs of chemical exposure, heat, or cold stress. Indications of adverse effects include, but are not limited to:

- i) Changes in complexion and skin coloration
- ii) Changes in coordination
- iii) Excessive salivation and pupillary response
- iv) Changes in speech pattern.

Project personnel must also be aware of potential exposure to possible safety hazards, unsafe acts, or noncompliance with safety procedures. Individuals must inform their partners or fellow team members of non-visible effects of exposure to toxic materials. The symptoms of such exposure may include:

- i) Headaches
- ii) Dizziness
- iii) Nausea
- iv) Blurred vision
- v) Cramps

vi) Irritation of eyes, skin, or respiratory tract.

If protective equipment or noise levels impair communications, prearranged hand signals must be used for communication. Personnel must stay within line of sight of another team member.

1.1.3 Site Control

1.1.3.1 Authorization to Enter

All personnel working in Exclusion Zones (EZs) must have completed hazardous waste operations initial training as defined under OSHA Regulation 29 CFR 1926.65; have completed their training or refresher training within the past 12 months, and have been certified by a physician as fit for hazardous waste operations in order to enter a site area designated as an EZ or Contaminant Reduction Zone (CRZ).

Personnel without such training or medical certification may enter the designated Support Zone (SZ) only. The SS or SHO will maintain a list of authorized persons; only personnel on the authorized list will be allowed within the EZ or CRZ.

1.1.3.2 Site Orientation and Hazard Briefing

No person will be allowed in the general work area during project operations without first being given a Site orientation and hazard briefing. This orientation will be presented by the SS or SHO, and will consist of a review of this HASP. This review must cover the chemical, physical, and biological hazards, protective equipment, safe work procedures, and emergency procedures for the project. A Training Acknowledgement Form is provided in Appendix A for documentation purposes. In addition to this meeting, Daily Safety Meetings will be held each day before work begins. All individuals on the Site, including visitors, must document their attendance to the initial briefing as well as attending the Daily Safety Meetings. Appendix A also presents the forms that will be used for documenting the Daily Safety Meeting.

1.1.3.3 Certification Documents

The PM, SS and SHO are responsible for ensuring that all personnel working at the Site meet the training and medical surveillance requirements. Subcontractor personnel must provide their training and medical documentation to the SHO prior to the start of fieldwork.

1.1.3.4 Entry Requirements

In addition to the authorization, hazard briefing and certification requirements listed above, no person will be allowed to enter the Site unless he or she is wearing the minimum support zone PPE as described in Section 4.0. Personnel entering the EZ or CRZ must wear the required PPE for those locations.

1.1.3.5 Emergency Entry and Exit

Individuals who must enter the Site on an emergency basis will be briefed of the hazards by the SS or SHO. All hazardous activities will cease in the event of an emergency and any sources of emissions will be controlled, if possible.

People exiting the Site because of an emergency will gather in a safe area for a head count. The SS

or SHO is responsible for ensuring that all people who entered the work area have exited in the event of an emergency.

1.1.3.6 Contamination Control Zones

Contamination control zones are maintained to prevent the spread of contamination and to prevent unauthorized people from entering hazardous areas.

Exclusion Zone (EZ)

The EZ consists of the specific work area, or may be the entire area of suspected contamination. All personnel entering the EZ must use the required PPE, and must have the appropriate training and medical clearance for hazardous waste work. The EZ is the defined area where there is a possible respiratory and/or contact health hazard. Cones, caution tape, or other appropriate means will identify the location of each EZ.

Contamination Reduction Zone (CRZ)

The CRZ or transition area will be established, if necessary, to perform decontamination of personnel and equipment. All personnel entering or leaving the EZ will pass through this area to prevent any cross- contamination. Tools, equipment, and machinery will be decontaminated in a specific location. The decontamination of all personnel will be performed on-Site adjacent to the EZ. Personal protective outer garments and respiratory protection will be removed in the CRZ and prepared for cleaning or disposal.

This zone is the only appropriate corridor between the EZ and the SZ.

Support Zone (SZ)

The SZ is a clean area outside the CRZ located to prevent personnel from exposure to hazardous substances. Eating and drinking will be permitted in the support area only after proper decontamination. Smoking may be permitted in the SZ, subject to Site requirements.

1.1.4 Personnel Training

1.1.4.1 General

Required project personnel as discussed in Section 1.0 must have completed hazardous waste operations-related training, as required by the OSHA Standard 29 CFR 1926.65. Field personnel must also receive a minimum of 3 days of actual field experience under the direct supervision of a trained, experienced supervisor. Personnel who completed their training more than 12 months prior to the start of the project must have, if required, completed an 8-hour refresher course within the past 12 months. The SS must also have completed an additional 8 hours of training that is required by OSHA for supervisors.

1.1.4.2 Basic 40-Hour Course

The following is a list of the topics typically covered in a 40-hour training course:

- i) General safety procedures
- ii) Physical hazards (fall protection, noise, and heat stress, cold stress)

- iii) Names and job descriptions of key personnel responsible for Site health and safety
- iv) Safety, health, and other hazards typically present at hazardous waste sites
- v) Use, application, and limitations of PPE
- vi) Work practices by which individuals can minimize risks from hazards
- vii) Safe use of engineering controls and equipment onsite
- viii) Medical surveillance requirements
- ix) Recognition of symptoms and signs, which might indicate overexposure to hazards
- x) Worker right-to-know (Hazard Communication OSHA1926.59/1910.1200)
- xi) Routes of exposure to contaminants
- xii) Engineering controls and safe work practices
- xiii) Components of a Site HASP
- xiv) Decontamination practices for personnel and equipment
- xv) Confined space entry procedures
- xvi) General emergency response procedures

1.1.4.3 Supervisor Course

Management and supervisors receive an additional 8 hours of training which typically includes:

- i) General Site safety and health procedures
- ii) Emergency procedures
- iii) PPE programs
- iv) Air monitoring techniques

1.1.5 Medical Surveillance Program

1.1.5.1 Medical Examination

All required personnel who will enter a Site EZ or CRZ must have successfully completed a replacement and/or annual physical examination prior to entering one of these work zones. This medical surveillance program must comply with OSHA 29 CFR 1926.65(f).

1.1.5.2 Pre-Placement Medical Examination

All on-Site project personnel who will enter an EZ or CRZ must have completed a comprehensive medical examination within the past 12 months that meets the requirements of applicable OSHA Regulations. The annual medical examination typically includes the following elements:

- i) Medical and occupational history questionnaire
- ii) Physical examination
- iii) Complete blood count, with differential
- iv) Liver enzyme profile
- v) Chest X-ray, once every 3 years, for non-asbestos workers
- vi) Pulmonary function test
- vii) Audiogram
- viii) Electrocardiogram for persons older than 45 years of age, or if indicated during the physical examination
- ix) Drug and alcohol screening, as required by job assignment
- x) Visual acuity
- xi) Follow-up examinations, at the discretion of the examining physician or the corporate medical director

The examining physician provides the individual and employer with a report summarizing the findings confirming the worker's fitness for work and ability to wear a respirator. Documentation of medical clearance will be available for project personnel during all project work. Subcontractors will certify that all of their personnel have successfully completed a physical examination by a qualified physician. The physical examination must meet the requirements of 29 CFR 1926.65 and 29 CFR 1910.134 as described above. Subcontractors will supply copies of the medical examination certificate for each of their on-Site workers.

1.1.5.3 Other Medical Examination

In addition to pre-employment, annual, and exit physicals, personnel may be examined:

- i) At any individual request after known or suspected exposure to toxic or hazardous materials
- ii) At the discretion of the client, SS, SHO, or occupational physician in anticipation of, or after known or suspected exposure to toxic or hazardous materials
- iii) At the discretion of the occupational physician

1.1.5.4 Periodic Exam

Following the placement examination, all personnel must undergo a periodic examination, similar in scope to the placement examination. For individuals potentially exposed over 30 days per year, the frequency of periodic examinations will be annual. For personnel potentially exposed less than 30 days per year, the frequency for periodic examinations may be 24 months or as determined by the physician.

1.1.5.5 Medical Restriction

When the examining physician identifies a need to restrict work activity, the individual's supervisor must communicate the restriction to the individual, the individual's supervisor, and the SHO. The terms of the restriction will be discussed with the individual and his/her supervisor. Every attempt should be made to keep the individual working, while not violating the terms of the medical restriction.

8. Emergency Procedures

8.1 Introduction Emergency Procedures

Emergencies can range from minor to serious conditions. Various procedures for responding to site emergencies are listed in this section. The PM or SS is responsible for contacting local emergency services, if necessary, for specific emergency situations. Various individual site characteristics will determine preliminary action to ensure that these entry procedures are successfully implemented in the event of an emergency. The project team will address necessary facility/client emergency protocols to ensure compatibility between this document and facility/client programs and expectations.

Field employees will identify the primary (on site) and secondary (off site) evacuation routes to muster locations prior to initiating work. A site map is provided in the Appendix.

At client facilities, site emergencies may be indicated by a fog horn or other loud audible sound. If an adjacent facility's alarm is activated, work will stop immediately, equipment will be de-energized and/or secured as necessary for safety reasons and personnel will go immediately to the secondary evacuation location as indicated in pre-start/tailgate meetings.

Emergency evacuation drills will be conducted as deemed necessary by the SS, and documentation of the drills will be maintained by the SS in project file.

An Emergency Information Sheet containing the hospital location, directions, government agency phone numbers, emergency phone numbers, and a map with directions to the hospital is located in the Appendix.

8.2 Incident, Injury, Illness Reporting And Investigation

Any work related incident, injury, illness, exposure, vehicle accident, property loss and or security issues must be reported to your supervisor, the SS immediately. Stop Work Authority will be implemented. Provide care for any injured persons and secure the scene.

GHD will call the GHD PM and the GHD HSE Help Line. Personnel on site should maintain the work area as it was at the time of the incident until further directions are given by the GHD PM, a GHD Safety Professional. No GHD person on site has the authority to call a regulatory agency (environmental or OSHA); this shall be completed by GHD Leadership Team in conjunction with the client. Emergency medical care or support of fire departments is not a restricted call if immediately necessary to protect life and property.

The GHD PM and HSE Manager will coordinate with on site personnel to gather critical information. The GHD PM is responsible (or their designee) to enter the information into B Wise within a 24 period from time of incident. The GHD PM is also responsible to contact the client, which a positive verbal contact is required. The GHD staff listed above will coordinate the completion of the investigation and placement of information into B Wise. This same group of GHD staff will manage further communications with the client.

The report must be filed for the following circumstances:

- Incident, injury, illness, or exposure of an employee.
- Injury of a subcontractor.
- Damage, loss, or theft of property.
- Any motor vehicle accident, regardless of fault, which involves a company vehicle, rental vehicle, or personal vehicle while the employee is acting in the course of employment.
- Any sting, involving a puncture of the skin must immediately be reported to Work Care and follow all GHD reporting requirements
- Security Issues
- Environmental releases or loss of containment.

Occupational incidents resulting in employee injury or illness will be investigated by the SS. This investigation will focus on determining the cause of the incident and modifying future work activities to eliminate the hazard.

All employees have the right and obligation to report unsafe work conditions, previously unrecognized safety hazards, or safety violations of others. If you wish to make such a report, it may be made orally to your supervisor or other member of management, or you may submit your concern in writing, either signed or anonymously.

8.3 Emergency Equipment/First Aid

Safety equipment will be available for use by site personnel, located within 30 feet of the work area(s), and maintained at the site.

- First Aid kit(s), compliant with local jurisdictional requirements according to number of workers present
- Automated External Defibrillators (AEDs) are optional first aid response equipment for conditions related to heart stoppage. If a unit is on site, designated personnel must be trained in the specific AED unit in addition to First Aid and CPR certification, conduct monthly inspections, and contact listed AED Unit coordinator.
- Emergency eyewash bottles and/or an eyewash station lasting 15 minutes.
- Emergency alarms as a means to alert all personnel instantaneously for an emergency.
- Fire extinguisher (at a minimum, a 2A/10BC will be on site).

8.4 Emergency Procedures For Contaminated Personnel

Whenever possible, personnel should be decontaminated in the contamination reduction zone before administering first aid, without causing further harm to the patient.

- Skin Contact: Remove contaminated clothing, wash immediately with water, and use soap, if available.
- Inhalation: Remove victim from contaminated atmosphere. Remove any respiratory protection equipment. Initiate artificial respiration, if necessary. Transport to the hospital.
- Ingestion: Remove from contaminated atmosphere. Do not induce vomiting if victim is unconscious. Never induce vomiting when acids, alkalis, or petroleum products are suspected. Transport to the hospital, if necessary.

Any person transporting an injured/exposed person to a clinic or hospital for treatment should take with them directions to the hospital and a listing of the contaminants of concern to which they may have been exposed.

Any vehicle used to transport contaminated personnel will be cleaned or decontaminated, as necessary.

8.5 Site Evacuations

In the event of an emergency situation such as fire, explosion, or significant release of toxic gases, project personnel in the field will be notified by established communications to evacuate the area.

In the event of an emergency, GHD personnel will gather at their primary mustering point for a head count. The SS will determine a primary and secondary muster point to be used as an assembly area in the event of an emergency. The secondary muster point will be located at least 90 degrees from the primary. These locations will be communicated to the work crew(s) during the Pre-Start/Tailgate Safety Meeting as part of the site specific training prior to commencement of work activities, weekly thereafter, and prior to the advent of potentially threatening weather. Muster points will be identified in the site map attached to the HASP.

8.6 Spill And Release Contingencies

If a spill has occurred, the first step is personal safety, then controlling the spread of contamination, if possible. GHD personnel will immediately contact site management to inform them of the spill and activate emergency spill procedures.

9. Environmental Control Program

9.1 Introduction

This section of the HASP outlines measures to be implemented at the site to prevent hazards associated with environmental conditions.

9.2 Weather Monitoring

The SS will be responsible for checking weather forecasts for the next day and week of work to provide advance notification of any severe weather conditions. Severe weather conditions (e.g., heavy rains) may cause unsafe conditions at the site and in some situations work may have to be stopped.

9.3 Tornado Safety Policy And Procedures

Tornadoes occur most frequently between April and October from 3:00 to 7:00 p.m. but can occur any time. In most cases, tornadoes move from a west/southwest direction. A typical tornado is a swirling storm of short duration with winds up to 300 miles per hour and a near vacuum at its center. It appears as a rotating funnel shaped cloud, from gray to black in color, extending towards the ground from the base of a thundercloud.

Tornadoes usually only cover a limited geographical area and give off a roaring sound. A tornado is the most concentrated and destructive potential weather event at the Site. Tornadoes are usually the result of the interaction of a warm, moist air mass with a cool or cold air mass. Secondary effects of tornadoes include flash flooding, electric power outages, transportation system and communication system disruption, and fires.

Whenever weather conditions develop that indicate tornadoes are expected, the National Weather Service will issue a tornado watch to alert people in a designated area for a specific time period (normally 6 hours) to remain alert for approaching storms. The tornado watch is upgraded to a tornado warning when a funnel cloud (tornado) is actually sighted or indicated by weather radar.

When a tornado is approaching, Site personnel will only have a short time to react. Therefore, Site personnel must be prepared to react during periods of severe weather. Memorize the following tornado danger signs:

- i) Approaching clouds of debris can mark the location of a tornado even if a funnel cloud is not visible
- ii) Before a tornado hits, the wind may die down and the air can become very still/calm
- iii) It is not uncommon to see clear, sunlit skies behind a tornado as they usually occur at/near the trailing edge of thunderstorms.

Tornado Evacuation Procedures

GHD and contractor personnel monitor weather related information provided by National Weather Service. If the National Weather Service issues a tornado warning, Site supervisor will activate the emergency response plan.

The "take shelter" warning signal is a "slow wail" of the alarm system. GHD Site personnel will evacuate the work zone(s) when a tornado watch has been issued by the National Weather Service. Personnel will contact the Project Management team to inform them they are leaving the site and provide them a location of the muster point (shelter) they are going. The Site Supervisor are responsible for work areas, they will check remote areas of the work zone(s) to ensure personnel have reacted to the alert. Personnel must proceed to the Site mustering point (shelter) and wait for further instructions. If a tornado watch is upgraded to a tornado warning, personnel will proceed to the designated tornado shelters. Once inside the shelter, conduct a head count to ensure that personnel are accounted for. In general, stay away from all windows and doors that lead to the outside. Remain in the shelter until the "all clear" signal is given by the Site Supervisor.

The tornado shelter most accessible to GHD personnel should be noted on the site map attached to this HASP

Directions to the shelter are to be communicated to Site personnel during initial Site safety orientation and throughout the tornado season during subsequent safety meetings.

If unable to reach the designated shelter, the best protection in a tornado is usually an underground area. If an underground area is not available, consider small interior rooms on the lowest floor without windows, hallways on the lowest floor away from doors and windows, rooms constructed with reinforced concrete/brick/block with a heavy concrete floor and roof, and protected areas away from doors and windows.

9.4 Rain And Snow

Excessive amounts of precipitation may cause potential safety hazards for work tasks. The hazards that would be most commonly associated are slipping, tripping, or falling due to slippery surfaces.

Severe weather conditions will result in work stoppage and the implementation of further emergency measures.

9.5 Temperature

Site activities are expected to be conducted year round. Temperature extremes may be experienced which require measures to be implemented to prevent health and safety hazards from occurring. Potential hazards arising from temperature extremes are heat stress and cold exposure.

9.6 Wind

High winds may be encountered at the site and these can cause hazards that may affect site personnel health and safety. Preventative measures that will be implemented if necessary are as follows:

- i) Restrict site activities.
- ii) Batten down light equipment or building materials.
- iii) Partially enclose work areas.
- iv) Reduce or Stop Work activities.

9.7 Lightning & Thunder

Light travels at a faster speed than sound, you can see a lightning bolt before the sound of thunder reaches you.

To judge how close lightning is, count the seconds between the flash and the thunder clap. Each second represents about 328 yards/300 meters. If you can count less than 30 seconds between the lightning strike and the thunder, the storm is less than 6.2 miles/10 km away and there is an 80 percent chance the next strike will happen within that 6.2 miles/10 kilometers.

Lightning may strike several miles/kilometers away from the parent cloud and therefore precautions should be taken even if the thunderstorm is not directly overhead.

If you hear thunder or see lightning, stop work immediately and seek safe shelter.

Remain sheltered for 30 minutes after hearing the last thunder before returning to work.

9.8 Outdoor Precautions During Severe Weather

- Keep a safe distance from tall objects, such as trees, hilltops, and telephone poles.
- Avoid projecting above the surrounding landscape. Seek shelter in low lying areas such as valleys, ditches, and depressions, but also be aware of flooding.
- Stay away from water. Don't go boating if a storm threatens. Move to land as quickly as possible if you are on the water. Lightning can strike the water and travel some distance from its point of contact. Don't stand in puddles even if you are wearing rubber boots.
- Stay away from objects that conduct electricity, such as tractors, metal fences, motorcycles, lawnmowers, and tall metal objects.
- Avoid being the highest point in an open area. Holding a conductive tool, holding an umbrella, can make you the tallest object and a target for lightning.
- You are safe inside a car during lightning, but don't park near or under trees or other tall objects, which may topple over during a storm. Be aware of downed power lines, which may be touching your car.
- In a forest, seek shelter in a low lying area under a thick growth of small trees or bushes.
- Be alert for flash floods, which are sometimes caused by heavy rainfall, if seeking shelter in a ditch or low lying area.
- If caught in a level field far from shelter and you feel your hair stand on end, lightning may be about to hit you. Kneel on the ground immediately, with feet together, place your hands on your knees and bend forward. Don't lie flat.
- If you are in a group in the open, spread out, keeping people several yards/meters apart.

9.9 Indoor Precautions During Severe Weather

- Before the storm hits, disconnect electrical appliances including radios and television sets. Do not touch them during the storm.
- Don't go outside unless absolutely necessary.
- Stay away from doors, windows, fireplaces, and anything that will conduct electricity, such as radiators, stoves, sinks, and metal pipes. Keep as many walls as possible between you and the outside.
- Don't handle electrical equipment or telephones. Use battery operated appliances only.

9.10 Flash Flooding

Floods are one of the most common hazards in low lying areas, however not all floods are alike. Some floods develop slowly, while others such as flash floods, can develop in just a few minutes and without visible signs of rain. Additionally, floods can be local, impacting a neighborhood or community, or very large, affecting entire river basins and multiple states.

Flash floods can occur within a few minutes or hours of excessive rainfall, a dam or levee failure, or a sudden release of water held by an ice jam. Flash floods often have a dangerous wall of roaring water carrying rocks, mud and other debris.

Be aware of flood hazards no matter where you live or work, but especially if you are in low-lying areas, near water, behind a levee or downstream from a dam. Even very small streams, gullies, creeks, culverts, dry streambeds or low-lying ground that appear harmless in dry weather can flood.

During the flood

- If any possibility of a flash flood, move immediately to higher ground. Do not wait for instructions to move.
- Be aware of stream, drainage channels, canyons and other areas known to flood suddenly.

If you must prepare to evacuate, you should do the following:

- Do not walk through moving water. Six inches of moving water can make you fall.
- If you have to walk in water, walk where the water is not moving. Use a stick to check the firmness or depth of the ground in front of you.
- Do not drive into flooded areas. If floodwaters rise around your car, abandon the car and move to higher ground if you can do so safely.
- Observe weather in the distance, rain in the hills can cause flooding in the valleys..Do not park your vehicle along streams, rivers or creeks, particularly during threatening conditions.

APPENDIX DOCUMENTS

Chemical Table

Chemical/CAS #	Chemical Name (Synonyms)	Exposure Limits	Routes Of Entry	Symptoms/Health Effects	Chemical Properties	Physical Characteristics	Concentration at Site
Chromium (metal) CAS- 7440-47-3	Chromium (metal) Chrome CAS-7440-47-3	TLV: 0.5 mg/m ³ PEL: 1 mg/m ³ STEL: NE IDLH: 250 mg/m ³	Inhalation Ingestion Skin contact Eye contact	ACUTE: Irritation to eyes, skin and lungs. CHRONIC: Skin sensitization, fibrosis (histologic)	(FP) NA (VP) NA (IP) NA (UEL) NA (LEL) NA	Blue-white to steel gray, lustrous, brittle, hard, odorless solid.	0.007 mg/L
Iron CAS-1309- 37-1	Iron Iron Oxide CAS-1309-37-1	TLV: 5 mg/m ³ (R) PEL: 5 mg/m ³ [R] 15 mg/m ³ (total) STEL: NE IDLH: NE	Absorption Inhalation Ingestion	ACUTE: Dust irritates eyes and respiratory tract CHRONIC:	(FP) NE (VP) NE (IP) NE (UEL) NE (LEL) NE	Grey crystalline powder	81.8 mg/L
Phenol CAS- 108-95-2	Phenol Hydroxybenzene Carbolic acid CAS-108-95-2	TLV: 5 ppm [skin] PEL: 5 ppm [skin] STEL: NE IDLH: 250 ppm	Inhalation Absorption Ingestion	ACUTE: CORROSIVE to eyes, skin and respiratory tract. May cause lung edema, affects CNS, heart, and kidneys, resulting in convulsions, coma, cardiac disorders and respiratory failure. CHRONIC: Dermatitis. May damage liver and kidneys.	(FP) 175°F (VP) 0.4 mm (IP) 8.50 eV (UEL) 8.6% (LEL) 1.8%	Colorless to yellow or light pink, crystalline solid with a sweet, acrid odor.	4.1 mg/L

Table 2

**On-Site Air Monitoring Program Action Levels
Health and Safety Plan
Former Crucible Specialty Metals Landfill Site
Geddes, New York**

<i>Monitoring Device</i>	<i>Action Level</i>	<i>Action</i>
Photoionization Detector (PID)		
10.6 or greater eV lamp	<1.0 ppm or Background	Full-Face Respirator Available
To be used to investigate any odor	≥1.0 ppm and ≤5 ppm	Full-face air purifying respirator Level C PPE MSA GME P100 Cartridge
	≥5 ppm	Shut down activities. Notify SHO. Implement additional engineering controls
Dust/Particulate - (Impacted Soils/Sludges/Sediments)	<2.0 mg/m ³ or Background	Full-Face Respirator Available
	≥2.0 mg/m ³ and <50 mg/m ³	Wear Full-Face Respirator - Level C PPE
	>50 mg/m ³	Shut down activities. Notify SHO.
Carbon Monoxide	>35 ppm	Shut down activities. Notify SHO. Implement additional engineering controls
Combustible Gas Indicator	>10 Percent LEL	Cease operations and move to a safe place. Notify SHO. Do not continue working until conditions are constantly below 10 percent LEL
Oxygen Meter	<19.5 Percent or >23.5 Percent When oxygen levels are outside this range, percent LEL readings are not reliable	Cease operations and move to a safe place. Notify SHO. Do not continue working until oxygen levels are between 19.5 and 23.5 percent

Notes:

SHO Safety and Health Officer
LEL Lower Explosive Limit
PPE Personnel Protective Equipment
ppm parts per million



Tailgate Safety Meeting Form

Large Group Format - Single Day

Date:		Time:		Project No.:	
Presenter:			Project Name:		

Safety topics/items discussed:

Emergency preparedness:

First Aid Provider(s):		Muster Point:	
		Method of Communication:	
AED Responder:		Fire Extinguisher Location:	
First Aid Kit Location:		Eye Wash Location:	

Site personnel in attendance:

Print Name:	Signature:	Company:

HASP Acknowledgment Sheet

Project Name: _____

Project Number: _____

This is to certify that I have received a pre-entry briefing regarding this HASP, and I understand its contents. My failure to follow and comply with the requirements contained in this plan may result in disciplinary action and/or termination.

[illegible]



Tailgate Safety Meeting Form

Small Group Format - Multiple Days

Date:		Time:		Project No.:	
Presenter:		Project Name:			

Safety topics/items discussed:

Emergency preparedness:

First Aid Provider(s):		Muster Point:	
		Method of Communication:	
AED Responder:		Fire Extinguisher Location:	
First Aid Kit Location:		Eye Wash Location:	

Print Name	Signature	Company

Date:		Time:		Project No.:	
Presenter:		Project Name:			

Safety topics/items discussed:

Emergency preparedness:

First Aid Provider(s):		Muster Point:	
		Emergency Communication:	
AED Responder:		Fire Extinguisher Location:	
First Aid Kit Location:		Eye Wash Location:	

Print Name	Signature	Company



Field Safe Task Evaluation Process (F-STEP)

Report status: (insert date)					
	Initial report	Updated report	Final report	Verification/validation	Report input to SMART database

Observer's name:	Date:	Time:
Client:	Project name: :	
Observer's office:	Site location:	
Observer's supervisor:	Project no. (if applicable):	
Subcontractor: ☐ Yes ☐ No	Subcontractor company name:	

Feedback conducted by:	Date:
Observee's supervisor:	Time:

Check task being observed (if not listed here, go to columns at right)		If checking this column, write in the specific task	
☐ Air knifing	☐ Mob/demob	☐ Agricultural services	
☐ Clearing	☐ Project oversight	☐ Construction	
☐ Demolition	☐ Soil sampling	☐ Landfill	
☐ Drilling	☐ Stack testing	☐ Office operations	
☐ Electrical work	☐ Surveys & audits	☐ O&M	
☐ Excavation	☐ Traffic control	☐ Pipeline	
☐ General site cleaning	☐ UST removal	☐ Refinery	
☐ Heavy equipment operations	☐ Water sampling	☐ Treatment plants	
☐ IH sampling	☐ Well management	☐ Other	
☐ Manual lifting			

Background information (give a brief description of task being performed and your surroundings)

Observer's positive comments
1. 2. 3.

Feedback session conclusion: If no questionable items: brief recap of positive actions/comments. If questionable items: brief recap of positive actions/comments and why did the questionable item(s) occur.



Personal protective equipment	Meets work standards	???	N/A	Evaluation comments
1. Hearing protection (e.g., ear plugs)			☐	
2. Head protection (e.g., hard hat)			☐	
3. Eye protection (e.g., safety glasses/goggles)			☐	
4. Hand protection (e.g., gloves)			☐	
5. Foot protection (e.g., steel-toe boots)			☐	
6. Respiratory protection			☐	
7. Fall protection (e.g., lanyard/harness)			☐	
8. High visibility clothing (e.g., work vest)			☐	
9. First aid kit/fire extinguisher			☐	
10. Other (be specific)			☐	
Body position	Meets work standards	???	N/A	Evaluation comments
11. Proper body positioning when exerting force (lifting/pushing/pulling)			☐	
12. Pinch points/moving equipment - hands/body placement			☐	
13. 3-points of contact			☐	
14. Other (be specific)			☐	
Work environment	Meets work standards	???	N/A	Evaluation comments
15. Work/walk surface clear (free and clear pathway)			☐	
16. Housekeeping/equipment storage			☐	
17. Controlled work zone (e.g., warning devices, barricades, cones, flags)			☐	
18. Emergency stop/safety switches			☐	
19. Materials labeled correctly			☐	
20. Storage/disposal of waste			☐	
21. Other (be specific)			☐	
Operating procedures	Meets work standards	???	N/A	Evaluation comments
22. Start performed/job planning			☐	
23. Stop work authority process – understood and considered			☐	
24. JSA/JLA/risk assessment reviewed and followed			☐	
25. Daily site inspection			☐	
26. High risk task specific (hot work, confined space, LOTO, excavation/trenching)			☐	
27. Inspect work zone for hazards			☐	
28. Coordinate/communicate with site rep and/or others on site			☐	
29. Spotters used appropriately			☐	
30. Underground/overhead utilities identified			☐	
31. Other (be specific)			☐	
Tools/equipment	Meets work standards	???	N/A	Evaluation comments
32. Hand/power tool - selection, condition, and use			☐	
33. Field/test equipment - selection, condition, and use			☐	
34. Heavy equipment - selection, condition, and use			☐	
35. Other (be specific)			☐	
Observation total occurrences			☐	
% observations to meet work standards			☐	
Item specific to work task	Meets work standards	???	N/A	Evaluation comments
Insert task/JSA/SOP Step			☐	
Insert task/JSA/SOP Step			☐	
Insert task/JSA/SOP Step			☐	

Causative factors and corrective actions						Verification (Did we do what we said we would do?) and Validation (Is it working?)		
Item No.	CF	Corrective actions (must match causative factor)	Responsible party	Date due	Date completed	Verified by/ Validated by	Date	Details
						Verified by:		
						Validated by:		
						Verified by:		
						Validated by :		
						Verified by:		
						Validated by:		
						Verified by:		
						Validated by:		

Causative factors

Personal factors		Company factors		External factors	
1	Insufficient training for task	5	Incomplete or no procedures	10	Exposure to conditions
2	Hurrying to complete the task	6	Procedures not known or enforced		
3	Easier if proper process not followed	7	Improper PPE		
4	Took shortcuts without prior incident	8	Improper tools		
		9	Improper workplace layout		



Driving Safe Task Evaluation Process (D-STEP)

Report status: (insert date)					
	Initial report	Updated report	Final report	Verification/validation	Report input to SMART database

Observer's name:	Date:	Time:
Client:	Project name:	
Observer's office:	Site location:	
Observer's supervisor:	Project no. (if applicable):	
Subcontractor: ☐ Yes ☐ No	Subcontractor company name:	

Feedback conducted by:	Date:
Observee's supervisor:	Time:

Driving conditions			
☐ Freeway/interstate	☐ Wet	☐ Day	☐ Raining
☐ Surfaced street	☐ Dry	☐ Night	☐ Windy
☐ Dirt road	☐ Snow/ice		☐ Snowing
	☐ Mud		☐ Fog

Vehicle condition			
☐ Car	☐ Truck	☐ Van	☐ Pulling trailer
☐ Company owned	☐ Rental	☐ Personal	

Background information (Give a brief description of where you are driving from and to and your surroundings)

Observer's positive comments
1. 2. 3.

Feedback session conclusion:
If no questionable items: brief recap of positive actions/comments
If questionable items: brief recap of positive actions/comments and why did the questionable item(s) occur?



Pre-driving	Meets work standards	???	N/A	Evaluation comments
1. JMP/JSA/Risk Assessment developed and/or reviewed			☐	
2. STAR performed/job planning			☐	
3. Stop Work Authority – understood and considered			☐	
4. Registration/insurance/last maintenance report			☐	
5. Tire inflation and tread			☐	
6. Wipers and washer fluid/clean windows/mirrors			☐	
7. Horn/lights operation/instrument panel			☐	
8. Body damage/overall vehicle appearance			☐	
9. Under-vehicle check for leaks/obstructions			☐	
10. Secure loose items			☐	
11. Check fluid levels			☐	
12. Fire extinguisher/triangles/first aid kit/jack/spare			☐	
13. Verifies area is clear before moving vehicle			☐	
Body positioning	Meets work standards	???	N/A	Evaluation comments
14. Adjust seat			☐	
15. Adjust head rest			☐	
16. Adjust mirrors to minimize blind spots			☐	
17. Seat belts (driver/passengers)			☐	
18. Locks doors			☐	
Operating procedures	Meets work standards	???	N/A	Evaluation comments
19. Yields right-of-way and allows other vehicles to merge, change lanes, turn			☐	
20. Respects pedestrians, cyclists, other drivers			☐	
21. Is courteous/tolerant of others' poor driving			☐	
22. Two hands on wheel no higher than 9 and 3			☐	
23. Skill in handling distractions			☐	
24. Adjusts to traffic conditions (speed / traffic)			☐	
25. Uses turn signals (for turns and lane changes)			☐	
26. Following distance is appropriate (4-second rule)			☐	
27. Avoids sudden acceleration and deceleration			☐	
28. Before backing up, looks behind vehicle/checks for traffic, pedestrians, parked vehicles, uses spotter			☐	
29. Scans the road ahead (15-second eye lead or 2-3 blocks-1/4 mile) and anticipates actions of others to avoid sudden swerves, stops, lane changes			☐	
30. Checks mirrors every 5-8 seconds			☐	
31. Checks for hazards on the road (e.g., animals, debris, road conditions)			☐	
32. Reads and obeys traffic signals			☐	
33. Makes complete stops at signals, at a safe distance			☐	
34. Scans intersection left and right/anticipates intent of other vehicles before reaching "point of no return"			☐	
35. Covers brakes safely and adjusts speed			☐	
36. Does not use cell phone during operation of vehicle			☐	
37. Other (be specific)			☐	
Operating procedures - parking	Meets work standards	???	N/A	Evaluation comments
38. Looks for pull through parking before backing in			☐	
39. Uses signals, leaves adequate space before pulling back into lane			☐	
40. Obeys signs and uses signals in parking lot			☐	
41. Maintains proper speed inside the lot			☐	
42. Ensures vehicle is legally/properly parked			☐	
43. Sets parking brake and secures vehicle			☐	
44. Other (be specific)			☐	
Observation total occurrences			☐	
% Observations to meet work standards			☐	
Item specific to work task				
Insert Task/JSA/SOP Step			☐	
Insert Task/JSA/SOP Step			☐	

Causative factors and corrective actions						Verification (Did we do what we said we would do?) and Validation (Is it working?)		
Item No.	CF	Corrective actions (must match causative factor)	Responsible party	Date due	Date completed	Verified by/ Validated by	Date	Details
						Verified by:		
						Validated by:		
						Verified by:		
						Validated by:		
						Verified by:		
						Validated by:		
						Verified by:		
						Validated by:		

Causative factors

Personal factors		Company factors		External factors	
1	Insufficient training for task	5	Incomplete or no procedures	10	Exposure to conditions
2	Hurrying to complete the task	6	Procedures not known or enforced		
3	Easier if proper process not followed	7	Improper PPE		
4	Took shortcuts without prior incident	8	Improper tools		
		9	Improper workplace layout		



Unsafe Act/Unsafe Condition/ Stop Work Authority (SWA) Report

Reported by:	Employee's office:	
RSHM:	Date:	Time:
Employee's supervisor:	Employee's principal:	
Project related: ☐ No ☐ Yes	If yes, name of client:	
Client contact (if applicable):	Project no (if applicable):	

Re: (check all that apply) ☐ **Unsafe act** ☐ **Unsafe condition** ☐ **Stop work authority (SWA)**

Location: (check one) ☐ Driving ☐ Field ☐ Office

Date reported to supervisor/PM:	Date corrected:
Time reported to supervisor/PM:	Time corrected:

Describe the unsafe act, unsafe condition or SWA situation

List corrective action(s) implemented

Did the corrective action(s) mitigate the unsafe act/unsafe condition?

For SMART administrators use only:

Category:	Chevron category:	Causative factor:	Energy source:
☐ PPE Personal Protective Equipment	☐ A Person or People	☐ 1 Insufficient training for task	☐ G Gravity
☐ BP Body Positioning	☐ B Equipment	☐ 2 Hurrying to complete the task	☐ M Motion
☐ WE Work Environment	☐ C Environmental	☐ 3 Easier if proper process not followed	☐ ME Mechanical
☐ OP Operating Procedures	☐ D Procedures/ Processes/ JSA-review/revise	☐ 4 Took shortcuts without prior incident	☐ E Electrical
☐ TE Tools and Equipment	☐ E Visitors	☐ 5 Incomplete or no procedures	☐ P Pressure
☐ CU Computer Usage		☐ 6 Procedures not known or enforced	☐ T Temperature
☐ PD Pre-Driving		☐ 7 Improper PPE	☐ B Biological
☐ OPP Operating Procedures – Parking		☐ 8 Improper tools	☐ C Chemical
		☐ 9 Improper workplace layout	☐ R Radiation
		☐ 10 Exposure to conditions	☐ S Sound

Are additional actions required? ☐ No ☐ Yes If yes, what?



Near Miss Reporting Form

Note: A Significant Near Miss must be called into the HSE Help Line: 1-866-529-4886

- Instructions:
- 1) Employee completes the Near Miss Report and submits to Supervisor.
 - 2) Supervisor reviews and makes other comments.
 - 3) Employee discusses Near Miss with Project Manager.
 - 4) Submit to applicable SMART Reporting submission address.

Report status: (insert date)					
	Initial report	Updated report	Final report	Verification/validation	Report input to SMART database

Section 1

A. Employee Identification				☐ GHD Employee	☐ Temporary Employee	☐ Subcontractor
Employee No.	Last Name		First Name		Employee's Company - if Subcontractor	
Date of Hire	Position/Title		Supervisor		Home Office Location - if GHD Employee	
B. General Information						
Where did the Near Miss occur?			Type of Near Miss (Check all that apply)			
☐ Office ☐ Project Site ☐ Other _____			☐ Employee Injury/Illness ☐ Vehicle Accident ☐ Property Damage ☐ Environmental			
☐ Canada ☐ United States ☐ UK						
Address of Near Miss (City, State/Province/County, Postal/Zip Code)				Specific Location of Near Miss (e.g., where on site)		
Date and Hour of Near Miss		Date and Hour Reported to GHD		Time Employee Began Work		
Month	Day	Year	Month	Day	Year	
/	/		/	/		
		a.m.			a.m.	
		p.m.			p.m.	
Witnesses?		Witness Name and Telephone Number				
☐ Yes ☐ No						
C. Project Information (Project Related Near Miss Only): Project Related: () Yes () No						
Project #	Project Name		GHD Project Manager	Client		Client Contact
Was the Client Advised of the Near Miss?		Name		Date and Time		
☐ Yes ☐ No ☐ N/A				Month	Day	Year
				/	/	Time

Section 2

A. Details of the Near Miss	
1. What job/task was being performed when the Near Miss occurred? (Example: collecting groundwater samples).	
2. Provide a detailed description of the employee's specific activities at the time of the Near Miss. Include details of equipment/materials being used, including the size and weights of objects being handled, and weather conditions at time of the Near Loss. If necessary, attach additional pages to the report.	



Section 2 (continued)

B. Near Miss Investigation		
Conduct a 5-Why Root Cause Analysis Investigation. In addition, if there was the potential for a significant injury or loss, report the Near Miss to the Incident Help Line (this will determine if a Tap Root Cause Analysis is necessary).		
HASP prepared? ☐ Yes ☐ No ☐ N/A Submit a PDF of HASP to Investigation Team. If yes, was the HASP on site? ☐ Yes ☐ No	Did the safety plan identify and provide safety procedures for the specific tasks being performed when the Near Miss occurred? ☐ Yes ☐ No If no, why not? (Explain) _____ Did the employee utilize the STAR process before initiating the task? ☐ Yes ☐ No If no, why not? (Explain) _____	

5-Why Root Cause:	Additional information: Attach photos, witness statement(s), affected employee statement, as applicable, to the end of this document.
1. Why did "above" happen?	
2. Why did "1" happen?	
3. Why did "2" happen?	
4. Why did "3" happen?	See Section 3 Below: Corrective Actions/ Verification and Validation
5. Why did "4" happen?	
6. Why did "5" happen?	

C. Accountability		
Initial Report Date Month Day Year ____ / ____ / ____	Initial Report Prepared by: (please print)	Initial Report Prepared by: (signature)
Investigation Team	Company	Position/Title
Final Report Date Month Day Year ____ / ____ / ____	Final Report Prepared by: (please print)	Final Report Prepared by: (signature)

D. Stewardship		
Will a Near Miss Summary be Prepared? ☐ Yes ☐ No If yes, by: _____		
Quality Review By:	Date:	Findings:

Section 3

Corrective Action					Validation & Verification		
CF	Corrective actions (must match causative factor)	Responsible party	Due date	Date completed	Verified by/ Validated by	Date	Details
					Verified by:		
					Validated by:		
					Verified by:		
					Validated by:		
					Verified by:		
					Validated by:		

Causative factors

Personal factors		Company factors		External factors	
1	Insufficient training for task	5	Incomplete or no procedures	10	Exposure to conditions
2	Hurrying to complete the task	6	Procedures not known or enforced		
3	Easier if proper process not followed	7	Improper PPE		
4	Took shortcuts without prior incident	8	Improper tools		
		9	Improper workplace layout		



Incident Reporting Form

Note: Incidents must be called into the HSE Help Line: 1-866-529-4886

- Instructions: 1) For Personal Injuries, Occupational Illnesses, and Property Damage, complete Sections 1 and 2
2) For Motor Vehicle Accidents, complete Sections 1, 2, and 4
3) **Initial report must be submitted within 24 hours**

Report status: (insert date)	Initial report	Updated report	Final report	Verification/validation	Report input to SMART database

Section 1

A. Employee Identification ☐ GHD Employee ☐ Temporary Employee ☐ Subcontractor				
Employee No.	Last Name	First Name	Middle Name/Initial	☐ Male ☐ Female
Area Code ()	Telephone Number	Employee Home Address (Street, City, State/Province/County, Postal/Zip Code)		
Date of Hire Month Day Year / /	Position/Title	Supervisor	Employee's Company/Home Office Location	
B. General Information				
Where did the Incident occur and which country? ☐ Office ☐ Project Site ☐ Other _____ ☐ Canada ☐ United States		Type of incident (Check all that apply) ☐ Employee Injury/Illness ☐ Vehicle Accident ☐ Property Damage Only		
Address of Incident (City, State/Province/County, Postal/Zip Code)			Specific Location of incident (e.g., where on site)	
Date and Hour of Incident Month Day Year / / a.m. p.m.	Date and Hour Reported to Employer Month Day Year / / a.m. p.m.	Date and Hour Last Worked Month Day Year / / a.m. p.m.	Time Employee Began Work a.m. p.m.	
Normal Work Hours From: To:		Witnesses? ☐ Yes ☐ No	Witness Name and Telephone Number	
C. Project Information (Project Related Incident Only) Project Related? ☐ Yes ☐ No				
Project #	Project Name	Project Manager	Site Telephone Number ()	Project Manager Cell Number ()
Client Name	Was the Client Advised of the Incident? ☐ Yes ☐ No	Name of Person Contacted	Date and Time Contacted	

Section 2

A. Details of the Incident
1. What job/task was being performed when the incident occurred? (Example: collecting groundwater samples).
2. Provide a detailed description of the employee's specific activities at the time of the incident. Include details of equipment/materials being used, including the size and weight of objects being handled, and weather conditions at time of the incident. If necessary, attach additional pages to the report.



3. For injuries, identify the specific part of body injured, and specify left or right side. For illnesses, identify and describe the affected area/body part.
4. Identify the object or substance that directly injured the employee and how. Include size, weight, and shape of object, quantity of substance, etc.
5. Identify property damaged and how it was damaged (include owner of property, nature and source of damage, and model and serial number, if appropriate).

B. Health Care/Medical Treatment

Employee received health care? ☐ Yes ☐ No	Identify the type of health care provided and where it was performed. (Check all that apply). ☐ First Aid ☐ Medical treatment other than first aid (sutures, etc.) ☐ Hospitalized ☐ Clinic ☐ Hospital emergency room ☐ On location by self or GHD employee ☐ On site by EMT

Name of Health Care Provider, Physician Name, Phone Number, Address
(Street, City, Province/State/County, and Postal/Zip Code)

C. Incident Investigation

- ☐ **5 Why Root Cause Analysis Investigation [Non-OSHA Recordable, <\$5,000/£3,000 damage]**
☐ **Tap Root Cause Analysis [OSHA Recordable, and/or >\$5,000/£3,000 damages]**

HASP prepared? ☐ Yes ☐ No ☐ N/A Submit a PDF of HASP and relevant JSA(s)/Risk Assessment to Investigation Team. If yes, was the HASP on site? ☐ Yes ☐ No	Did the safety plan identify and provide safety procedures for the specific tasks the employee was conducting when injured? ☐ Yes ☐ No If no, why not? (Explain) _____ Did the employee utilize the STAR process before initiating the task? ☐ Yes ☐ No If no, why not? (Explain) _____ Was the employee drug & alcohol tested post incident? ☐ Yes ☐ No

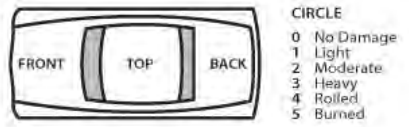
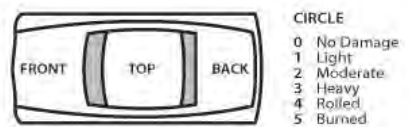
5-Why Root Cause: Incident Statement	
1. Why did "above" happen?	Additional information: Attach photos, witness statement(s), affected employee statement, accident diagrams, as applicable, to the end of this document.
2. Why did "1" happen?	
3. Why did "2" happen?	
4. Why did "3" happen?	
5. Why did "4" happen?	
6. Why did "5" happen?	See <i>Corrective Actions/Verification and Validation</i> Section (Page 4).

D. Accountability		
Initial Report Date Month Day Year / /	Initial Report Prepared by: (please print)	Initial Report Prepared by: (signature)
Investigation Team	Company	Position/Title
Final Report Date Month Day Year / /	Final Report Prepared by: (please print)	Final Report Prepared by: (signature)
E. Stewardship		
Will an Incident Summary be Prepared? ☐ Yes ☐ No		
By:		
Quality Review By:	Date:	Findings:

Section 3

A. Agency Reporting and Recording Information (to be completed by an HSE Team Member)			
CANADA			
Provincial Regulatory Agency Reporting Required? ☐ Yes ☐ Not required	Employee Injury Information (Injury met the following criteria): ☐ First Aid ☐ Medical Treatment ☐ Critical Injury ☐ Modified Duty ☐ Lost Time Injury If medical treatment, what?		
Joint Safety and Health Committee Notified? ☐ Yes ☐ No	Total days of modified duty If exceeds 7 days, report to WSIB	Total days of lost time (if any)	Date employee returned to work Month Day Year / /
UNITED STATES			
OSHA Recordable Injury? ☐ Yes ☐ No  OSHA Recordable.pdf	Employee Injury Information (Injury met the following OSHA 300 Log criteria) ☐ First Aid ☐ Medical Treatment ☐ Restricted Duty ☐ Lost Time Injury If medical treatment, what?		
Total days of restricted duty:	Total days of lost time (if any)	Date employee returned to work Month Day Year / /	

Section 4

A. Vehicle GHD Employee was Operating					
☐ Personal ☐ GHD-Owned ☐ Rental - Rental Company:					
License Plate No.	State/Province/County	Police Department			
		City	State/Province/County		
Vehicle Year/Make/Model	Odometer Reading at Time of Accident	Police Report Number	Weather Conditions		
Name of Person Operating Vehicle		"X" in area of vehicle damage 			
Address					
City	State/Province/County				Postal/Zip Code
Telephone: Area Code ()					
Description of Vehicle Damage:					
B. Other Vehicles Involved					
Name of Owner	Address	City/State/Prov./County/Postal/Zip	Area Code and Telephone Number ()		
Operator's Name (if different from above)	Address	City/State/Prov./County/Postal/Zip	Area Code and Telephone Number ()		
Year/Make/Model	Description of Property Damage	"X" in area of vehicle damage 			
Insurance Co. Name & Telephone					
License Plate No./State/Province					
C. Injured Persons					
Name	Address Street, City, State/Prov./ County/Postal/Zip Code	Telephone Number	Nature of Injury	Indicate if Injured was a Vehicle Driver/Passenger, GHD Employee, Other, or Pedestrian	
1.		()			
2.		()			
3.		()			
D. Witnesses					
Name	Address Street, City, State/Prov./County/Postal/Zip Code		Telephone Number		
1.			()		
2.			()		

E. Description of Accident		
PLEASE COMPLETE OR ATTACH SEPARATE DIAGRAM Indicate location of vehicle(s) when accident / incident occurred.		
	Was Ticket Issued? Reason: _____ ☐ Other Operator _____ ☐ GHD Operator _____	
Report Date Month Day Year / /	Report Prepared by: (please print)	Report Prepared by: (signature)

Note: If additional space is required to complete this report, use separate sheet of paper and attach.

Causative factors and corrective actions						Verification (Did we do what we said we would do?) and Validation (Is it working?)		
Item No.	CF	Corrective actions (must match causative factor)	Responsible party	Date due	Date completed	Verified by/ Validated by	Date	Details
						Verified by:		
						Validated by:		
						Verified by:		
						Validated by:		
						Verified by:		
						Validated by:		
						Verified by:		
						Validated by:		

Causative factors

Personal factors		Company factors		External factors	
1	Insufficient training for task	5	Incomplete or no procedures	10	Exposure to conditions
2	Hurrying to complete the task	6	Procedures not known or enforced		
3	Easier if proper process not followed	7	Improper PPE		
4	Took shortcuts without prior incident	8	Improper tools		
		9	Improper workplace layout		

Management of Change Form

(QSF-006)

Page 1 of 2

Form initiated by: _____		Date initiated: _____	
Initiator's role/responsibility: _____		Project number: _____	
Affected location(s): _____			
Client's management of change documentation attached, if required or applicable: ☐ Yes ☐ N/A			
Type of change:		Duration of change:	
☐ Field operations/SOPs		☐ Permanent	
☐ Equipment		☐ Temporary (specify how long change will be in place):	
☐ Safety			
☐ Project management/resources		☐ Emergency	

Describe the change:

Describe the procedure/task(s) required to complete the change:

Who needs to know about the change and how will you communicate this to them?

Is additional training for GHD people required as a result of this change? ☐ Yes ☐ No

If yes, please describe training needs and those who require it:

Coordination with Business School Learning Centre underway: ☐ Yes ☐ No

Identify any associated risks/hazards/impacts as a result of this change:

Management of Change Form

(QSF-006)

Page 2 of 2

Does the change need to be approved by a client? ☐ Yes ☐ No		
If Yes, state client's name: _____		
Client role/responsibility: _____		
Date authorized by client: _____ (mm/dd/yyyy)		
Change approved by project manager: _____ (please print)		
_____ (signature)		_____ (approval date – mm/dd/yyyy)
Summary:		
Item	Completion date	Confirmed by
1. Task(s) to execute change have been completed	_____	_____
2. Those who need to know have been notified	_____	_____
3. Additional training has been completed	_____	_____
4. Risk(s) have been mitigated	_____	_____
5. Change has been approved by all required parties	_____	_____

Notes:

- Scope: GHD may use the Management of Change Form (QSF-006) to identify and record project additions, revisions, changes, or updates regarding field operations, field SOPs, equipment, safety, resources, or project management.
- Detail: The level of detail to a documented project change is ultimately determined by the project manager and/or any client expectations.
- File location: Correspondence folder of the project file.

(QSF-019)

Project number:	Project name:
Date:	Project location:
Public utility locator:	Public utility locator phone number:
Date of public utility locator request:	Public locator call reference number:
Private utility locator (If applicable):	Private utility locator phone number:

Instructions: This checklist is to be completed by GHD personnel prior to initiation of field activities as a safety measure, to ensure that all underground utility lines, other underground structures, and above-ground power lines are clearly marked in the area selected for boring or excavation.

This completed form is a quality record

Underground Utilities Checklist for GHD Personnel

Pre-Drilling/Excavation Checklist and Utility Clearance Log

Drilling or excavation work may not proceed if any of the questions answered below are answered "No." Implement stop work authority and contact the GHD project manager to discuss and resolve any concerns or issues. Document the reason for a "No" answer in the comments section below.

Yes	No	N/A	
Pre-Mobilization			
☐	☐	☐	1. Has a utility locator request been completed within the last 30 days (verify time limit with state or provincial law)? If no, stop work and comment below.
☐	☐	☐	2. Is a scaled site plan, map or drawing showing the proposed borehole locations attached to this form?
☐	☐	☐	3. Does each borehole and excavation location allow for clear entry and exit, adequate workspace, and a clear path for raising the mast (or boom) and operating the drill rig and all support equipment? Ensure that the minimum OSHA/state/provincial utility clearance requirements between the mast or boom and the power line(s) are met. For instance, OSHA requires a minimum approach distance of 10 feet for systems below 50 kV and an increase of 4" for every 10 kV over 50 kV. Confirm if additional permits are required if the boom or mast will be working 5 meters (15 feet) or less from the electrical lines.
☐	☐	☐	4. Are all of the proposed borehole and excavation locations at least 1.0 meters (3 feet) from any subsurface or above-ground utilities shown on client's building plans? Check here ☐ if plans not provided by client (therefore not applicable to this job).
☐	☐	☐	5. Are all of the proposed borehole and excavation locations at least 1.0 meters (3 feet) from any subsurface or above-ground utilities shown on public right-of-way street improvement or other public property plan or site map?
☐	☐	☐	6. Has the site representative, familiar with the site, indicated no knowledge of any subsurface or above-ground utilities within 3 metres (10 feet) of the proposed borehole and excavation locations? (Review locations with site representative)
☐	☐	☐	7. Are all of the proposed borehole and excavation locations at least 1.0 meters (3 feet) from any subsurface utilities identified during a geophysical survey? Check here ☐ if no geophysical survey has been completed (therefore not applicable to this job).
☐	☐	☐	8. Have all utility locating service providers, notified by the public line locator, marked out their facilities in the vicinity of the borehole and excavation locations or otherwise notified us that they do not have any facilities near the proposed locations? (Attached confirmation and utility locate sheets from public locator)
☐	☐	☐	9. Are all proposed borehole and excavation locations at least 1.5 meters (5 feet) from a visual line connecting two similar looking manhole covers?
☐	☐	☐	10. Are all proposed borehole and excavation locations at least 1.5 meters (5 feet) from a visual line perpendicular to the street from the water, gas, and electrical meters?
☐	☐	☐	11. Are all proposed boring and excavation locations clear of pavement joints, curbs, crash posts, or other engineered structures?
☐	☐	☐	12. Does the ground surface/pavement lack signs of previous excavation (e.g., no pavement subsidence, no differences in pavement texture or relief, no pavement patching)?
Pre-Drilling and Excavation			
☐	☐	☐	13. Has it been verified that the proposed drilling or excavation work will not affect any work currently in progress?
☐	☐	☐	14. Has the drill rig or heavy equipment been inspected prior to use and documented? (See Drill Rig Inspection Checklist or Mobile Equipment Safety Inspection Checklist)
☐	☐	☐	15. Have barricades been erected to prevent unauthorized access, where applicable?
☐	☐	☐	16. Have all known live electrical or product lines within 3 meters (10 feet) of the dig path been visually verified? If no, comment below.
☐	☐	☐	17. For boreholes that have not been cleared or are within 3 meters of a utility:
☐	☐	☐	a. Before drilling have you cleared a hole to 2.4 meters (8 feet) below grade using an air-knife, or equivalent, before drilling and is the diameter of this hole greater than the final outside diameter of the boring? If not required comment below.
☐	☐	☐	b. Does the soil you encountered in the hand-dug hole appear to be native material (i.e., free of clean gravel, clean sand, aggregate base [gravelly sand ~ 10% fines] or other non-native looking material)? If not required comment below.

Have the above concerns been discussed with the GHD project manager?

☐ Yes

☐ No

☐ Not Applicable

Has the start of subsurface work been communicated to the GHD project manager?

☐ Yes

☐ No

☐ Not Applicable

Have the above concerns been discussed with the client?

☐ Yes

☐ No

☐ Not Applicable

Has the scope of work been approved by the client?

☐ Yes

☐ No

☐ Not Applicable

Comments: _____

GHD field representative name: _____

Date: _____



Site Health and Safety Plan Amendment Form

This document is to be completed for ANY changes that occur within the Site Health and Safety Plan (HASP). This document is to be sent to the Regional Safety & Health Manager (RSHM) for review, verification and sign off of the HASP.

Amendment #	
Site Name/Project ID	
Date	
Client Contact (same/change)	
Reason for Amendment (SOW change, JSA addition, Chemical, etc.)	
Alternate or Additional Safeguard Procedures	
Required changes in PPE	
Additional Comments:	

Project Manager Notified	☐
RSHM Notified	☐
Client PM Notified (if necessary)	☐

Site HSE Officer (sign above)	Date

The Project Manager is ultimately responsible for the accuracy of the information on this amendment and ensuring any changes to the original HASP is discussed with all affected site personnel prior to commencing work

This original form must be placed in the project file and a copy needs to be attached to the Site Health and Safety Plan (HASP).



LEGEND

- MONITORING WELL
- PIEZOMETER
- SETTLEMENT PLATE
- INCLINOMETER
- DECOMMISSIONED WELL
- OUTFALL
- DROP INLET

0 150' 300' 450'

SCALE 1"=300' AT ORIGINAL SIZE

N

NOTES:

- ALL OBJECT AND STRUCTURE LOCATIONS ARE APPROXIMATE AND WERE TAKEN FROM S&ME NORTHEAST, P.C. PROJECT NO. 4335-14-211NE FIGURE NO. 3 - SITE PLAN.
- AERIAL PHOTOGRAPHS ARE 2018 ONE FOOT RESOLUTION AND WERE OBTAINED FROM THE NEW YORK STATE GIS CLEARINGHOUSE.



EnPro Holdings, Inc.
Former Crucible Specialty Metals Landfill Site
2018 Annual Site Inspection

Site Layout Map

Job Number 86-18809
Revision A
Date 10.18.2018

Figure 2



Job Safety Analysis (JSA)

Insert Name : Environmental-
Decontamination of Sampling
Equipment and Personnel
(PPE Level D)

Field staff must review job specific work plan and coordinate with project manager to verify that all up front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. GHD personnel have the authority and responsibility to use **Stop Work Authority (SWA)**. Review this JHA initially and in the field prior to initiating the job, using the P66 RM "Go Card" to assist in identifying specific site hazards. Document by "dirtying" this JHA.

Date Issued/Revised:	10/17/2019 16:40:01	Client:	EnPro Holdings, Inc.		
Project Number:	8618809	Created By:	cralemcnamara	SIM OPS? YES/NO	SSE on site? YES/NO
Project Address:					
Key Equipment:	Alconox/Liquinox, brushes				
Task-specific Training:	Decontamination/Site Control; Quality Control/Sampling Plan				

Hard Hat	Gloves (ANSI/EN 388)	Eye Protection	Fall Protection	APR	Vest	PPE Clothing
☐ Type 1 (Top Impact)	☒ Chemical Protective (ie.Nitrile)	☒ ANSI/CSA Safety Glasses	☐ Harness	☐ Full Face Mask	☒ Class II (standard)	☐ Coveralls
☐ Type 2 (Side Impact)	☐ Level 1 - Light Duty	☐ Goggles/Spoggles	☐ Shock Absorbing Lanyard	☐ Half Face Mask	☐ Class III (Night or Highway Traffic)	☐ Fire Retardent Clothing (FRC)
☒ Class E (standard)	☐ Level 2 - Light Duty with Protection	☐ Face Shields	☐ Lifeline		☐ Anti-Static	☐ High Viz Clothing
☐ Class G	☐ Level 3 - Medium Duty	☐ Other*		Cartridges	☐ FRC	☒ Long Pants
	☐ Level 4 - Heavy Duty			☐ N95	☐ PFD	☒ Long Sleeve Shirts
Foot Protection	☐ High Viz	Hearing Protection	Arc Flash/Shock Protection	☐ P100		☐ Paper Tyvek (disposable)

Hard Hat	Gloves (ANSI/EN 388)	Eye Protection	Fall Protection	APR	Vest	PPE Clothing
☒ Industrial Grade Safety Boot	☐ Other*	☒ NOT Required for this task	☐ Hazard Category 2	☐ P95		☐ Polyethylene Tyvek
☐ Rubber Boots (industrial grade)		☐ Required	☐ Hazard Category 4	☐ R95		☐ Other*
☐ Hip Waders				☐ Organic Vapour		
	* see key equipment			☐ Speciality*		

Project Development Team		Modified by	Reviewed by	Date
Name	Signature			
Dyson Sprouse				

Job steps ⁽¹⁾	Task activity	Potential hazard(s) ⁽²⁾	Corrective measure(s) ⁽³⁾	Person responsible (Print first and last names)
1	Decontamination of sampling equipment (including pumps, bailers, tubing, etc.)	- Contaminant exposure - Pinch points - Slip/trip/hit/fall hazards - Lifting hazards - Back injury - Manual material handling	- Set up decon station to capture any spills to avoid cross contamination and manage wastes - Wear appropriate PPE - Scrub equipment clean then rinse and verify it is clean and free of contamination - Avoid putting hands in or near pinch points - Maintain good housekeeping and be aware of surroundings - Size up the load; if the object is too large or odd shaped OR is in excess of 50 pounds (23 kg) then assistance (mechanical means, such as a dolly, cart, or a buddy lift) will be required - Lift with the legs (bend at the knees and use the leg muscles) to protect the lower back and keep lower back in a neutral position - Refer to the HASP for additional lifting techniques	Sampling Personnel
2	Decontamination of personnel	- Contaminant exposure - Slip/trip/hit/fall hazards	- Refer to the HASP for specific procedures but in general start with most contaminated article and remove until inner gloves are the last item left - Dispose of used PPE in accordance with site requirements - Wash hands and face before eating, drinking, or using tobacco products - Take care when removing PPE (boots, gloves, etc.); sit down to remove/change boots as necessary	Sampling personnel
3	Management of waste derived from decontamination activities	- Contaminant exposure - Lifting hazards - Back injury - Manual material handling	- Containerize decon waste (e.g., water, used PPE) as required - Properly dispose of decon fluids (e.g., sediments) - Refer to step 1 and the HASP for additional lifting information	Sampling personnel

- Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.
- A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".
- Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

Site Personnel Participating in JSA Review:

I have participated in the review and discussion of the Job Safety Analysis (JSA) listed on this document and understand the duties I am responsible to fulfill. As part of my work, I know I have the responsibility and obligation to STOP work with a Stop Work Authority (SWA) if conditions change and/or potential hazards have been identified.

Name/Company	Sign	Date

**SSE(s) on job:** _____**Assigned mentor:** _____

Presenter Signature: _____

Date/Time: _____

My signature below indicates that all conditions and requirements listed above have been verified, met, and reviewed with all affected personnel prior to start of work.

Supervisor Signature: _____

Date/Time: _____

Location of Mustering Point: _____

Wind direction (current): _____

GHD Emergency contact (Name and verified phone number): _____

Supervisor Signature documenting Daily Debrief has been completed: _____



Job Safety Analysis (JSA)

Insert Name : O_M-Derived Waste Drum Moving and Handling

Field staff must review job specific work plan and coordinate with project manager to verify that all up front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. GHD personnel have the authority and responsibility to use **Stop Work Authority (SWA)**. Review this JHA initially and in the field prior to initiating the job, using the P66 RM "Go Card" to assist in identifying specific site hazards. Document by "dirtying" this JHA.

Date Issued/Revised:	10/17/2019 16:40:01	Client:	EnPro Holdings, Inc.		
Project Number:	8618809	Created By:	cra\iemcnamara	SIM OPS? YES/NO	SSE on site? YES/NO
Project Address:					
Key Equipment:	Empty drums, spill kit, dolly, ratchet set, or box end wrench for loosening and tightening drum band, bung cap tool Additional PPE: Leather work gloves must be worn				
Task-specific Training:	40 Hour HAZWOPER or 8 Hour Refresher, HAZComm, PPE, Hand and Power Tools				

Hard Hat	Gloves (ANSI/EN 388)	Eye Protection	Fall Protection	APR	Vest	PPE Clothing
☐ Type 1 (Top Impact)	☐ Chemical Protective (ie.Nitrile)	☒ ANSI/CSA Safety Glasses	☐ Harness	☐ Full Face Mask	☒ Class II (standard)	☐ Coveralls
☐ Type 2 (Side Impact)	☒ Level 1 - Light Duty	☐ Goggles/Spoggles	☐ Shock Absorbing Lanyard	☐ Half Face Mask	☐ Class III (Night or Highway Traffic)	☐ Fire Retardent Clothing (FRC)
☒ Class E (standard)	☐ Level 2 - Light Duty with Protection	☐ Face Shields	☐ Lifeline		☐ Anti-Static	☐ High Viz Clothing
☐ Class G	☐ Level 3 - Medium Duty	☐ Other*		Cartridges	☐ FRC	☐ Long Pants
	☐ Level 4 - Heavy Duty			☐ N95	☐ PFD	☐ Long Sleeve Shirts
Foot Protection	☐ High Viz	Hearing Protection	Arc Flash/Shock Protection	☐ P100		☐ Paper Tyvek (disposable)
☒ Industrial Grade Safety Boot	☐ Other*	☐ NOT Required for this task	☐ Hazard Category 2	☐ P95		☐ Polyethylene Tyvek

Hard Hat	Gloves (ANSI/EN 388)	Eye Protection	Fall Protection	APR	Vest	PPE Clothing
☐ Rubber Boots (industrial grade)		☐ Required	☐ Hazard Category 4	☐ R95		☐ Other*
☐ Hip Waders				☐ Organic Vapour		
	* see key equipment			☐ Speciality*		

Project Development Team		Modified by	Reviewed by	Date
Name	Signature			
Dyson Sprouse				

Job steps ⁽¹⁾	Task activity	Potential hazard(s) ⁽²⁾	Corrective measure(s) ⁽³⁾	Person responsible (Print first and last names)
1	Walk the path to and from the drum storage area	Slip/trip/fall hazards	- Review HASP and client requirements and implement - Use the STAR process to identify and correct any obvious hazards - Remove trip hazards in the area around the drums before moving hazards	Project personnel on site
2	Set up staging area	- Slip/trip/fall hazards - Traffic hazards - Spills	- Remove trip hazards in the area around the drums before moving hazards - Select and demarcate area if necessary to prevent unauthorized personnel and vehicle entry - Ensure emergency spill materials are readily available	Project personnel on site
3	Inspect all equipment and hand tools before use	- Hand injuries - Back Injuries - Lacerations	- Inspect dolly to ensure that it is operating properly (wheels turning freely, proper air pressure in wheels, no cracks in welds, sharp edges or burrs) - Select and inspect ratchet and socket or box end wrench - Do not use adjustable wrench or screw driver to loosen or tighten band - Ensure bung caps on drums are in place and secure if provided	Project personnel on site
4	Remove drum lid	- Contaminant exposure - Pinch points - Hand injury	- Select and inspect ratchet and socket or box end wrench - Do not use adjustable wrench or screw driver to loosen or tighten band - Wear appropriate gloves as identified in PPE section	Project personnel on site
5	Fill with derived waste material (i.e., soil cuttings, waste absorbent material, PPE Tyvek suits, etc.)	- Contaminant exposure - Pinch points - Hand injury - Lifting hazards	- Reduce risk of contaminant exposure by wearing proper PPE when handling waste materials (i.e., safety glasses, leather gloves, Tyvek suit, respirator, and appropriate gloves as identified in PPE section) - Lift with the legs (bend at the knees and use the leg muscles) to protect the lower back and keep lower back in a neutral position - If an object is too large or odd shaped OR is in excess of 50 pounds (23 kg) then assistance (mechanical or a buddy lift) will be required - Fill drums ONLY to 75% capacity with soil and 85% capacity with water. DO NOT fill drums to full capacity.	Project personnel on site
6	Properly seal the drum prior to moving	- Contaminant exposure - Pinch points - Hand injury	- Select and inspect ratchet and socket or box end wrench - Do not use adjustable wrench or screw driver to loosen or tighten band - Wear appropriate gloves as identified in PPE section - Ensure band is placed and secured properly to prevent lid from opening	CRA Project personnel on site

Job steps ⁽¹⁾	Task activity	Potential hazard(s) ⁽²⁾	Corrective measure(s) ⁽³⁾	Person responsible (Print first and last names)
7	Attach drums to dolly and move filled containers to designated staging area.	● Pinch points ● Hand injury ● Slip/trip/fall hazards ● Lifting hazards ● Manual material handling ● Back injury	● Ensure that drums are sealed properly before maneuvering ● Reduce travel distance when there is a need to carry/lift materials ● Ensure that drum is properly fastened to dolly prior to moving ● Make sure grip is adequate; wear leather/cotton gloves ● Use moving/lifting device (drum dolly) to move 55 gallon drums; if an object is too large or odd shaped OR is in excess of 50 pounds (23 kg) then assistance (mechanical or a buddy lift) will be required ● Lift with the legs (bend at the knees and use the leg muscles) to protect the lower back and keep lower back in a neutral position ● Avoid one handed carrying if possible; maintain awareness of footing ● Should the drums be excessively heavy, personnel may need to consider alternative lifting/moving device ● Place drum in drum storage/staging area in careful, controlled manner ● Keep hands and feet out of pinch points and crush points	Project personnel on site
8	Managing waste drums (55 gallon drums)	● Mislabeling waste	● Label waste appropriately (generator, contact number, identification of contents, and site location); specify type of contents; arrange for disposal	Project personnel on site

1. Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.
2. A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".
3. Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

Site Personnel Participating in JSA Review:

I have participated in the review and discussion of the Job Safety Analysis (JSA) listed on this document and understand the duties I am responsible to fulfill. As part of my work, I know I have the responsibility and obligation to STOP work with a Stop Work Authority (SWA) if conditions change and/or potential hazards have been identified.

Name/Company	Sign	Date

**SSE(s) on job:** _____**Assigned mentor:** _____

Presenter Signature: _____

Date/Time: _____

My signature below indicates that all conditions and requirements listed above have been verified, met, and reviewed with all affected personnel prior to start of work.

Supervisor Signature: _____

Date/Time: _____

Location of Mustering Point: _____

Wind direction (current): _____

GHD Emergency contact (Name and verified phone number): _____

Supervisor Signature documenting Daily Debrief has been completed: _____



Job Safety Analysis (JSA)

Insert Name : Motor Vehicle - Driving

Field staff must review job specific work plan and coordinate with project manager to verify that all up front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. GHD personnel have the authority and responsibility to use **Stop Work Authority (SWA)**. Review this JHA initially and in the field prior to initiating the job, using the P66 RM "Go Card" to assist in identifying specific site hazards. Document by "dirtying" this JHA.

Date Issued/Revised:	10/17/2019 16:40:02	Client:	EnPro Holdings, Inc.		
Project Number:	8618809	Created By:	cra\iemcnamara	SIM OPS? YES/NO	SSE on site? YES/NO
Project Address:					
Key Equipment:	Vehicle, valid driver's license, 360-degree topper; seatbelt				
Task-specific Training:	Defensive Driving				

Hard Hat	Gloves (ANSI/EN 388)	Eye Protection	Fall Protection	APR	Vest	PPE Clothing
☐ Type 1 (Top Impact)	☐ Chemical Protective (ie.Nitrile)	☐ ANSI/CSA Safety Glasses	☐ Harness	☐ Full Face Mask	☐ Class II (standard)	☐ Coveralls
☐ Type 2 (Side Impact)	☐ Level 1 - Light Duty	☐ Goggles/Spoggles	☐ Shock Absorbing Lanyard	☐ Half Face Mask	☐ Class III (Night or Highway Traffic)	☐ Fire Retardent Clothing (FRC)
☐ Class E (standard)	☐ Level 2 - Light Duty with Protection	☐ Face Shields	☐ Lifeline		☐ Anti-Static	☐ High Viz Clothing
☐ Class G	☐ Level 3 - Medium Duty	☐ Other*		Cartridges	☐ FRC	☐ Long Pants
	☐ Level 4 - Heavy Duty			☐ N95	☐ PFD	☐ Long Sleeve Shirts
Foot Protection	☐ High Viz	Hearing Protection	Arc Flash/Shock Protection	☐ P100		☐ Paper Tyvek (disposable)
☐ Industrial Grade Safety Boot	☐ Other*	☐ NOT Required for this task	☐ Hazard Category 2	☐ P95		☐ Polyethylene Tyvek
☐ Rubber Boots (industrial grade)		☐ Required	☐ Hazard Category 4	☐ R95		☐ Other*

Hard Hat	Gloves (ANSI/EN 388)	Eye Protection	Fall Protection	APR	Vest	PPE Clothing
☐ Hip Waders				☐ Organic Vapour		
	* see key equipment			☐ Speciality*		

Project Development Team		Modified by	Reviewed by	Date
Name	Signature			
Dyson Sprouse				

Job steps ⁽¹⁾	Task activity	Potential hazard(s) ⁽²⁾	Corrective measure(s) ⁽³⁾	Person responsible (Print first and last names)
1	Discuss STAR and SWA	Site personnel not aware of STAR and SWA	• Project team (GHD) discusses importance of and documentation procedures for SWA during pre-job safety meeting • Discuss route, concerns, and alternate routes with passenger and drivers of other vehicles • Use SWA to stop any work that is unsafe • Ensure proper vehicle selected for travel (use a truck if going to construction site or area with rough conditions that would damage a small vehicle?)	Driver and passenger
2	Check weather	• Unexpected storm • Fog; rain; snow; lightning/thunder • Heat/cold stress	• Check local weather forecast • Discuss weather issues and precautions to take while driving and on site during the pre-job safety meeting • If weather conditions (e.g., fog, rain, snow, etc.) impair the ability/vision of the driver, exit at nearest safe location and assess the situation • While on site, at first sign of lightning/thunder utilize SWA and assess weather conditions • In extreme temperatures, ensure all personnel have proper clothing, hydration, and heat/cold protection (e.g., canopy, fan, glove warmers)	Driver or Passenger

Job steps ⁽¹⁾	Task activity	Potential hazard(s) ⁽²⁾	Corrective measure(s) ⁽³⁾	Person responsible (Print first and last names)
3	Complete GHD Daily Operator Vehicle Checklist	• Damaged vehicle lights, tires, windows, mirrors, horn • Inadequate vehicle documents and/or safety items	• Check for fluid leaks under vehicle • Test operation of headlights, front/rear turn signals, backup lights, brake lights, and emergency flashers • Visually check the pressure/wear of tires • Ensure the vehicle has a properly inflated spare tire and associated tools to install • Assure windshield and window glass is clean and free from obstructions • Assure all fluids are topped off (e.g., windshield wiper fluid) and scheduled routine maintenance has occurred (e.g., oil changes). • Test the windshield wipers and horn • Verify vehicle registration, insurance card, and inspection sticker is present and valid • If the vehicle contains a first aid kit, fire extinguisher, and road hazard kit, verify that all items with expiration dates are current and that fire extinguisher has had documented monthly check • Do not use vehicle if any safety device is found not functioning	Driver or Passenger
4	Check and adjust seat, steering wheel, headrest, and mirrors	• Back/body strain • Blind spot • Impaired vision	• Adjust seat, headrest, and steering wheel height so body is fully supported/comfortable and pedals are within easy reach • Ensure mirrors are properly adjusted	Driver or Passenger
5	Fasten seat belt(s) and ensure passengers' seat belts are fastened	• Serious injury, ejection, or death from collision and/or traffic citation	Verify driver and passenger(s) seat belts are in good condition and properly latched	Driver or Passenger

Job steps ⁽¹⁾	Task activity	Potential hazard(s) ⁽²⁾	Corrective measure(s) ⁽³⁾	Person responsible (Print first and last names)
6	Ensure vehicle doors are locked	• Serious injury, ejection, or death from collision • Unwanted intrusion • Lost equipment	Manually lock all doors to vehicle prior to starting the vehicle	Driver
7	Start engine and check gauges and warning lights	• Vehicle breakdown	Verify sufficient fuel and other hazard lamps (e.g., battery, oil, and temperature) are not lit	Driver
8	Driving – Use defensive driving techniques and stay alert	• Arriving late • Collision • Blind spots of other vehicles • Injury or death to occupants or other parties	• Acknowledge and comply with all traffic regulations, laws, and ordinances • Do not use two-way communicating devices or perform other distracting activities while vehicle is in motion • Constantly scan intersections, move eyes, check mirrors, and assess traffic lights (fresh vs. stale) • Recognize other vehicle's blind spots and minimize time spent within these zones • Maintain safety cushion around vehicle (front, sides, and rear) and 4-second following distance (add an extra second for each hazardous condition, triple following distance in poor weather conditions) • Signal well in advance before changing lanes or turning • Utilize all driving defensive techniques	Driver
9	Arrive at site	• Pedestrian injury • Collision	• Maintain awareness of pedestrian/vehicular traffic when entering site and traveling to work zone	Driver

Job steps ⁽¹⁾	Task activity	Potential hazard(s) ⁽²⁾	Corrective measure(s) ⁽³⁾	Person responsible (Print first and last names)
10	Park vehicle – assign a spotter if necessary (when in doubt use a spotter)	• Pedestrian injury • Collision • Property damage	• Maintain awareness of pedestrian/vehicular traffic • Park vehicle in pull-through parking space or facing the exit • Parking in a parking space that is not a designated parking space will require the placement of the 360-degree topper on the hood of the vehicle • Use a spotter when backing up a vehicle • If no spotter available when backing up a vehicle, complete a 360-degree walk around vehicle. Ensure there are no hidden obstacles (e.g. pot holes, rocks, stumps, broken tree branches hidden by vegetation/foilage, etc.) that could be struck – look up and down. Stop, park and exit vehicle to check rear clearance as necessary when backing up to ensure travel pathway remains clear • Use caution and mirrors/spotter when backing vehicle • Set parking brake	Driver
11	Demobilization – conduct a vehicle walk around inspection paying particular attention to path(s) of travel	• Collision • Injury or death to occupants or other parties	• Perform perimeter vehicle check • Maintain awareness of pedestrian/vehicular traffic when exiting site • Utilize defensive driving techniques • Complete post-departure checklist and report vehicle problems to company vehicle maintenance manager or rental car agency	Driver or Passenger
12	Report maintenance or mechanical problems upon returning vehicle	• Conditions worsen leading to mechanical failure resulting in collision and injury	• Report vehicle problems immediately to company representative or rental car agency • Schedule and/or perform repairs as soon as possible	Driver

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2. A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".
3. Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

Site Personnel Participating in JSA Review:

I have participated in the review and discussion of the Job Safety Analysis (JSA) listed on this document and understand the duties I am responsible to fulfill. As part of my work, I know I have the responsibility and obligation to STOP work with a Stop Work Authority (SWA) if conditions change and/or potential hazards have been identified.

Name/Company	Sign	Date

**SSE(s) on job:** _____**Assigned mentor:** _____

Presenter Signature: _____

Date/Time: _____

My signature below indicates that all conditions and requirements listed above have been verified, met, and reviewed with all affected personnel prior to start of work.

Supervisor Signature: _____

Date/Time: _____

Location of Mustering Point: _____

Wind direction (current): _____

GHD Emergency contact (Name and verified phone number): _____

Supervisor Signature documenting Daily Debrief has been completed: _____



Job Safety Analysis (JSA)

Insert Name : Mobilization-Demobilization

Field staff must review job specific work plan and coordinate with project manager to verify that all up front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. GHD personnel have the authority and responsibility to use **Stop Work Authority (SWA)**. Review this JHA initially and in the field prior to initiating the job, using the P66 RM "Go Card" to assist in identifying specific site hazards. Document by "dirtying" this JHA.

Date Issued/Revised:	10/17/2019 16:40:02	Client:	EnPro Holdings, Inc.		
Project Number:	8618809	Created By:	cra\iemcnamara	SIM OPS? YES/NO	SSE on site? YES/NO
Project Address:					
Key Equipment:	#360 degree topper				
Task-specific Training:	#				

Hard Hat	Gloves (ANSI/EN 388)	Eye Protection	Fall Protection	APR	Vest	PPE Clothing
☐ Type 1 (Top Impact)	☐ Chemical Protective (ie.Nitrile)	☐ ANSI/CSA Safety Glasses	☐ Harness	☐ Full Face Mask	☐ Class II (standard)	☐ Coveralls
☐ Type 2 (Side Impact)	☒ Level 1 - Light Duty	☐ Goggles/Spoggles	☐ Shock Absorbing Lanyard	☐ Half Face Mask	☐ Class III (Night or Highway Traffic)	☐ Fire Retardent Clothing (FRC)
☐ Class E (standard)	☐ Level 2 - Light Duty with Protection	☐ Face Shields	☐ Lifeline		☐ Anti-Static	☐ High Viz Clothing
☐ Class G	☐ Level 3 - Medium Duty	☐ Other*		Cartridges	☐ FRC	☐ Long Pants
	☐ Level 4 - Heavy Duty			☐ N95	☐ PFD	☐ Long Sleeve Shirts
Foot Protection	☐ High Viz	Hearing Protection	Arc Flash/Shock Protection	☐ P100		☐ Paper Tyvek (disposable)
☒ Industrial Grade Safety Boot	☐ Other*	☐ NOT Required for this task	☐ Hazard Category 2	☐ P95		☐ Polyethylene Tyvek
☐ Rubber Boots (industrial grade)		☐ Required	☐ Hazard Category 4	☐ R95		☐ Other*

Hard Hat	Gloves (ANSI/EN 388)	Eye Protection	Fall Protection	APR	Vest	PPE Clothing
☐ Hip Waders				☐ Organic Vapour		
	* see key equipment			☐ Speciality*		

Project Development Team		Modified by	Reviewed by	Date
Name	Signature			
Dyson Sprouse				

Job steps ⁽¹⁾	Task activity	Potential hazard(s) ⁽²⁾	Corrective measure(s) ⁽³⁾	Person responsible (Print first and last names)
1	Discuss STAR and SWA	Site personnel not aware of STAR and SWA	- Project team (GHD) discusses importance of and documentation procedures for SWA during pre job safety meeting - Use SWA to stop any work that is unsafe	
2	Check weather	- Unexpected storm - Fog, rain, snow; lightening/thunder - Heat/cold stress	- Check local weather forecast - If adverse weather conditions are likely, prepare a contingency plan for lodging, etc. with project manager - Discuss weather issues and precautions to take while driving and on site during the pre job safety meeting - If weather conditions (e.g., fog, rain, snow, etc.) impair the ability/vision of the driver, exit at nearest safe location and assess the situation - While on site, at first sign of lightening/thunder utilize SWA and assess weather conditions - In extreme temperatures, ensure all personnel have proper clothing, hydration, and heat/cold protection (e.g., canopy, fan, glove warmers)	
3	Load equipment into vehicle	- Lifting hazards - Manual material handling - Back injury - Cuts - Pinch points - Hand/foot injury - Forgotten or damaged equipment	- Reduce travel distance when there is a need to carry/lift materials - Make sure grip is adequate; wear leather/cotton gloves - Size up the load; if the object is too large or odd shaped OR is in excess of 50 pounds (23 kg) then assistance (mechanical or a buddy lift) will be required - Maintain neutral back posture - Lift with the legs (bend at the knees and use the leg muscles) to protect the lower back and make sure to shift with the feet rather than twisting at the back - Maintain neutral wrist posture when lifting, carrying, pushing or pulling. The wrist is the strongest and most stable when it is straight. - Avoid one handed carrying if possible; maintain awareness of footing - Avoid placing hands/fingers in pinch point locations - Wear safety toed boots - Verify requested equipment against warehouse form - Load equipment in an organized manner to prevent shifting during transport or use cargo netting	

Job steps ⁽¹⁾	Task activity	Potential hazard(s) ⁽²⁾	Corrective measure(s) ⁽³⁾	Person responsible (Print first and last names)
4	Complete GHD Daily Operator Vehicle Checklist	• Damaged vehicle lights, tires, windows, mirrors, horn • Inadequate vehicle documents and/or safety items	• Check for fluid leaks under vehicle • Test operation of headlights, front/rear turn signals, backup lights, brake lights, and emergency flashers • Visually check the pressure/wear of tires • Ensure the vehicle has a spare tire • Assure windshield and window glass is clean and free from obstructions • Test the windshield wipers and horn • Verify vehicle registration, insurance card, and inspection sticker is present and valid • Ensure the vehicle contains a first aid kit, fire extinguisher, and road hazard kit • Check immediate vehicle perimeter and initial path of travel for obstructions	
5	Check and adjust seat, steering wheel, headrest, and mirrors	• Back/body strain • Blind spot • Impaired vision	• Adjust seat, headrest, and steering wheel height so body is fully supported/comfortable and pedals are within easy reach • Ensure mirrors are properly adjusted	
6	Fasten seat belt(s) and ensure passenger(s) seat belts are fastened	• Serious injury, ejection, or death from collision and/or traffic citation	• Verify driver and passenger(s) seat belts are in good condition and properly latched	
7	Ensure vehicle doors are locked	• Serious injury, ejection, or death from collision • Unwanted intrusion • Lost equipment	• Manually lock all doors to vehicle	
8	Start engine and check gauges and warning lights	• Vehicle breakdown	• Verify sufficient fuel and other hazard lamps (e.g., battery, oil, and temperature) are not lit	
9	Mobilize to site	• Arriving late • Collision • Injury or death to occupants or other parties	• Do not use cell phones or perform other distracting activities while vehicle is in motion • Constantly scan intersections, move eyes, check mirrors, and assess traffic lights (fresh vs. stale) • Maintain safety cushion around vehicle (front, sides, and rear) and 4 second following distance • Utilize all driving defensive techniques	
10	Arrive at site	• Pedestrian injury • Collision	• Maintain awareness of pedestrian/vehicular traffic when entering site and traveling to work zone	

Job steps ⁽¹⁾	Task activity	Potential hazard(s) ⁽²⁾	Corrective measure(s) ⁽³⁾	Person responsible (Print first and last names)
11	Park vehicle	• Pedestrian injury • Collision • Property damage	• Maintain awareness of pedestrian/vehicular traffic • Park vehicle in pull through parking space or facing the exit • Parking in a parking space that is not a designated parking space will require the placement of the 360 degree topper on the hood of the vehicle • Use caution and mirrors/spotter when backing vehicle • Set parking brake	
12	Demobilization	• Collision • Injury or death to occupants or other parties	• Check immediate vehicle perimeter and initial path of travel for obstructions • Maintain awareness of pedestrian/vehicular traffic when exiting site • Utilize defensive driving techniques	

1. Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.
2. A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".
3. Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

Site Personnel Participating in JSA Review:

I have participated in the review and discussion of the Job Safety Analysis (JSA) listed on this document and understand the duties I am responsible to fulfill. As part of my work, I know I have the responsibility and obligation to STOP work with a Stop Work Authority (SWA) if conditions change and/or potential hazards have been identified.

Name/Company	Sign	Date

**SSE(s) on job:** _____**Assigned mentor:** _____

Presenter Signature: _____

Date/Time: _____

My signature below indicates that all conditions and requirements listed above have been verified, met, and reviewed with all affected personnel prior to start of work.

Supervisor Signature: _____

Date/Time: _____

Location of Mustering Point: _____

Wind direction (current): _____

GHD Emergency contact (Name and verified phone number): _____

Supervisor Signature documenting Daily Debrief has been completed: _____



Job Safety Analysis (JSA)

Insert Name : Environmental- Monitoring Well Sampling

Field staff must review job specific work plan and coordinate with project manager to verify that all up front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. GHD personnel have the authority and responsibility to use **Stop Work Authority (SWA)**. Review this JHA initially and in the field prior to initiating the job, using the P66 RM "Go Card" to assist in identifying specific site hazards. Document by "dirtying" this JHA.

Date Issued/Revised:	10/17/2019 16:40:03	Client:	EnPro Holdings, Inc.		
Project Number:	8618809	Created By:	cra\iemcnamara	SIM OPS? YES/NO	SSE on site? YES/NO
Project Address:					
Key Equipment:					
Task-specific Training:					

Hard Hat	Gloves (ANSI/EN 388)	Eye Protection	Fall Protection	APR	Vest	PPE Clothing
☐ Type 1 (Top Impact)	☒ Chemical Protective (ie.Nitrile)	☐ ANSI/CSA Safety Glasses	☐ Harness	☐ Full Face Mask	☐ Class II (standard)	☐ Coveralls
☐ Type 2 (Side Impact)	☐ Level 1 - Light Duty	☐ Goggles/Spoggles	☐ Shock Absorbing Lanyard	☐ Half Face Mask	☐ Class III (Night or Highway Traffic)	☐ Fire Retardent Clothing (FRC)
☐ Class E (standard)	☐ Level 2 - Light Duty with Protection	☐ Face Shields	☐ Lifeline		☐ Anti-Static	☐ High Viz Clothing
☐ Class G	☐ Level 3 - Medium Duty	☐ Other*		Cartridges	☐ FRC	☐ Long Pants
	☐ Level 4 - Heavy Duty			☐ N95	☐ PFD	☐ Long Sleeve Shirts
Foot Protection	☐ High Viz	Hearing Protection	Arc Flash/Shock Protection	☐ P100		☐ Paper Tyvek (disposable)
☐ Industrial Grade Safety Boot	☐ Other*	☐ NOT Required for this task	☐ Hazard Category 2	☐ P95		☐ Polyethylene Tyvek
☐ Rubber Boots (industrial grade)		☐ Required	☐ Hazard Category 4	☐ R95		☐ Other*
☐ Hip Waders				☐ Organic Vapour		
	* see key equipment			☐ Speciality*		

Project Development Team		Modified by		Reviewed by	Date
Name	Signature				
Dyson Sprouse					

Job steps ⁽¹⁾	Task activity	Potential hazard(s) ⁽²⁾	Corrective measure(s) ⁽³⁾	Person responsible (Print first and last names)
1	Coordinate site access	Delays or added work	- Notify Station Manager of schedule - Notify other required personnel if applicable (city, regulators, private property owners, etc.)	
2	Mobilize with proper equipment/ supplies for sampling	- Delay or improper/unsafe performance of work due to improper equipment on site - Cross contamination of wells	- Review work plan to determine equipment/supply needs - Make sure all sampling/gauging equipment is decontaminated - Bring ice for sample storage - Review THE HASP and gather necessary PPE	
3	Notify other personnel on site	- Unknown traffic or other work hazards - Lack of communication between all interested parties	Meet with station attendant or other site personnel and explain planned activities	
4	Determine sampling order	Cross contamination of samples and wells due to incomplete decontamination of sampling equipment	Review prior analytical results and set sampling order from lowest to highest concentration wells	
5	Perform STAR and tailgate safety meeting upon arrival at site	Consider worst case scenario (including weather conditions)	- Review HASP with co workers - Highlight aspects identified by HASP and, if necessary, add to HASP - Get signature of all co workers on HASP	
6	Set up exclusion zone(s)	- Injury or exposure to public or other on site personnel - Slip/trip/fall hazards	- Implement exclusion zone setup instructions of THE HASP (barricades, caution tape, cones, etc.) - Set up work area free of trip hazards	
7	Gauge water levels and product thickness (where applicable) in wells	- Back strain - Inhalation or dermal exposure to chemical hazards	- Don any additional PPE and initiate air quality monitoring in accordance with the HASP - Maintain safe distance from well head - Bend at knees, not waist	

Job steps ⁽¹⁾	Task activity	Potential hazard(s) ⁽²⁾	Corrective measure(s) ⁽³⁾	Person responsible (Print first and last names)
8	Purge well(s) and collect purge water	• Cross contamination • Lifting hazards • Back injury • Manual material handling • Inhalation or dermal exposure to chemicals • Slip/trip/fall hazards • Spilling contaminated water	• Decontaminate purging equipment between each sampling location • Reduce travel distance when there is a need to carry/lift materials • Make sure grip is adequate; wear leather/cotton gloves • Size up the load; if the object is too large or odd shaped OR is in excess of 50 pounds (23 kg) then assistance (mechanical or a buddy lift) will be required • Lift with the legs (bend at the knees and use the leg muscles) to protect the lower back and keep lower back in a neutral position • Avoid one handed carrying if possible; maintain awareness of footing • Use PPE and monitoring in accordance with the HASP • Keep work area clear of tripping or slipping hazards • Store purge water in appropriate containers	
9	Collect samples in accordance with sampling plan	• Cross contamination • Lifting hazards • Back injury • Manual material handling • Inhalation or dermal exposure to chemical hazards • Slip/trip/fall hazards • Improper labeling or storage • Injury due to acid burn (unsealed or leaking sample bottle) • Injury from broken sample bottle (cuts or acid burn)	• Use PPE in accordance with the HASP • Use PPE whenever handling or labeling samples • Decontaminate sampling equipment between each well (unless disposable) • Refer to step 9 and the HASP for additional lifting methods • Label samples in accordance with sampling plan • Keep samples stored in proper containers, at correct temperature, and away from work area • Wear nitrile gloves when handling bottles • Handle bottles carefully	
10	Dispose or store purge water onsite	• Lifting hazards • Back injury • Manual material handling • Exposure to chemicals • If disposing through on site treatment system, damage or injury from improper use of equipment • Improper storage or disposal	• Use proper equipment to transport water (pumps, drum dollies, etc.) • Refer to step 9 and the HASP for additional lifting methods • Wear PPE in accordance with the HASP • Review any necessary instructions for use of on site treatment systems • Label storage containers properly and locate in isolated area away from traffic and other site functions • Coordinate off site disposal (where applicable)	
11	Clean site/demobilize	• Traffic • Nuisance or safety hazard left on site • Back strain	• Use buddy system as necessary to remove traffic control • Leave site clean of refuse and debris • Notify station personnel of departure, and note any purge water left on site • Exercise caution when lifting coolers out of the trunk of a car; use the buddy system if justified	

Job steps ⁽¹⁾	Task activity	Potential hazard(s) ⁽²⁾	Corrective measure(s) ⁽³⁾	Person responsible (Print first and last names)
12	Package and deliver samples to lab	• Bottle breakage • Improper temperature • Exceeding hold times • Improper completion of Chain of Custody (COC)	• Pack samples in ice, use bubble wrap/bags for sample bottles • Use standard COC forms and labels • Submit samples to lab as soon as possible (no more than 3 days, but check sampling plan for any special requirements such as rush turnaround or special hold time restrictions)	

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3. Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

Site Personnel Participating in JSA Review:

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Name/Company	Sign	Date

**SSE(s) on job:** _____**Assigned mentor:** _____

Presenter Signature: _____

Date/Time: _____

My signature below indicates that all conditions and requirements listed above have been verified, met, and reviewed with all affected personnel prior to start of work.

Supervisor Signature: _____

Date/Time: _____

Location of Mustering Point: _____

Wind direction (current): _____

GHD Emergency contact (Name and verified phone number): _____

Supervisor Signature documenting Daily Debrief has been completed: _____



Job Safety Analysis (JSA)

Insert Name : Environmental-Site Recon and Walkthrough

Field staff must review job specific work plan and coordinate with project manager to verify that all up front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. GHD personnel have the authority and responsibility to use **Stop Work Authority (SWA)**. Review this JHA initially and in the field prior to initiating the job, using the P66 RM "Go Card" to assist in identifying specific site hazards. Document by "dirtying" this JHA.

Date Issued/Revised:	10/17/2019 16:40:03	Client:	EnPro Holdings, Inc.		
Project Number:	8618809	Created By:	cra\iemcnamara	SIM OPS? YES/NO	SSE on site? YES/NO
Project Address:					
Key Equipment:	Basic PPE, hand/power tools based on site condition, site inspection checklist or notebook, JSA forms, pens, flashlight. Additional PPE: Insect repellant. Coveralls may be necessary based on type of brush/plants/insects in work area(s) being inspected. Leather gloves if overgrown vegetation or rundown buildings.				
Task-specific Training:	SMART Safety training (STAR), JSA development, Poison Plant Identification				

Hard Hat	Gloves (ANSI/EN 388)	Eye Protection	Fall Protection	APR	Vest	PPE Clothing
☐ Type 1 (Top Impact)	☐ Chemical Protective (ie.Nitrile)	☒ ANSI/CSA Safety Glasses	☐ Harness	☐ Full Face Mask	☒ Class II (standard)	☒ Coveralls
☐ Type 2 (Side Impact)	☒ Level 1 - Light Duty	☐ Goggles/Spoggles	☐ Shock Absorbing Lanyard	☐ Half Face Mask	☐ Class III (Night or Highway Traffic)	☐ Fire Retardent Clothing (FRC)
☒ Class E (standard)	☐ Level 2 - Light Duty with Protection	☐ Face Shields	☐ Lifeline		☐ Anti-Static	☐ High Viz Clothing
☐ Class G	☐ Level 3 - Medium Duty	☐ Other*		Cartridges	☐ FRC	☐ Long Pants
	☐ Level 4 - Heavy Duty			☐ N95	☐ PFD	☐ Long Sleeve Shirts
Foot Protection	☐ High Viz	Hearing Protection	Arc Flash/Shock Protection	☐ P100		☐ Paper Tyvek (disposable)

Hard Hat	Gloves (ANSI/EN 388)	Eye Protection	Fall Protection	APR	Vest	PPE Clothing
☒ Industrial Grade Safety Boot	☐ Other*	☒ NOT Required for this task	☐ Hazard Category 2	☐ P95		☐ Polyethylene Tyvek
☐ Rubber Boots (industrial grade)		☐ Required	☐ Hazard Category 4	☐ R95		☒ Other*
☐ Hip Waders				☐ Organic Vapour		
	* see key equipment			☐ Speciality*		

Project Development Team		Modified by	Reviewed by	Date
Name	Signature			
Dyson Sprouse				

Job steps ⁽¹⁾	Task activity	Potential hazard(s) ⁽²⁾	Corrective measure(s) ⁽³⁾	Person responsible (Print first and last names)
1	Discuss STAR and SWA	Site personnel not aware of STAR and SWA	- Project team discusses importance of and documentation procedures for SWA during pre-job safety meeting - Use SWA to stop any work that is unsafe	All persons on project team
2	Check weather	- Unexpected storm, fog; rain; snow; lightening, thunder - Heat/cold stress, including frostbite and sunburn	- Check local weather forecast - Discuss weather issues and precautions to take while driving and on site during the pre job safety meeting - If weather conditions (e.g., fog, rain, snow) impair the ability/vision of the driver, exit at nearest safe location and assess the situation - While on site, at first sign of lightning/thunder utilize SWA and assess weather conditions - In extreme temperatures, ensure all personnel have proper clothing, which includes either a helmet liner or hat/mask that will cover exposed skin on one's face and ears, hydration, and heat/cold protection (e.g., canopy, fan, glove warmers) - Implement the "Buddy System." The site supervisor shall also keep close tabs on all project personnel working in extreme temperatures.	Assessor
3	Sign in	Site Manager and Operator not aware of GHD staff presence in facility or on grounds	- Sign in at front desk - Ask to speak to Site Manager or alternate designate	
4	Don necessary GHD and client required PPE	Contact with recyclable material or equipment	Wear all required PPE (hard hat, vest, boots, and glasses) at all times while in the facility	
5	Unload equipment from vehicle	- Lifting hazards - Back injury - Manual material handling - Cuts - Pinch points - Hand/foot injury - Forgotten equipment - Damaged equipment	- Reduce travel distance when there is a need to carry/lift materials - Make sure grip is adequate; wear leather/cotton gloves - Size up the load; if the object is too large or odd shaped OR is in excess of 50 pounds (23 kg) then assistance (mechanical or a buddy lift) will be required - Lift with the legs (bend at the knees and use the leg muscles) to protect the lower back and keep lower back in a neutral position - Avoid one handed carrying if possible; maintain awareness of footing - Wear leather/cotton gloves and avoid placing hands/fingers in pinch point locations - Wear steel toed boots - Verify requested equipment against warehouse form - Load equipment in an organized manner to prevent shifting during transport or use cargo netting	Assessor

Job steps ⁽¹⁾	Task activity	Potential hazard(s) ⁽²⁾	Corrective measure(s) ⁽³⁾	Person responsible (Print first and last names)
6	Complete site inspection and walkover of the property and work areas – Note any hazards that will impact site personnel and/or their operations	• Slip/trip/fall hazards • Insects/reptiles • Pedestrian injury • Poison plants	• Check in with site personnel and sign appropriate visitor or safety log (may require watching safety video [i.e., plant]) • Check with site contact to determine safely accessible areas and areas where PPE are required • Wear PPE as directed by site personnel or dependent upon your evaluation of conditions • If building(s) looks dilapidated or in poor condition, do not enter • Watch for vehicles or other mobile equipment moving around • Make sure areas are well lit and you are accompanied by a site representative (if applicable) • Watch where you step on pavement (potholes, dips, or obstructions) and in vegetated/wooded areas (dips, holes, branches, vines, etc.) • Do not take photographs while walking • Do not talk on cell phone while walking • If in vegetated or wooded areas, watch for beehives, wear insect repellent (if area and season dictate) as needed, be mindful of gopher holes/tunnels, small animal dens, snakes, stray dogs/cats, transient/homeless individuals, poison ivy/oak/sumac, etc.	Assessor
7	Sign out	• Site Manager and Operator not aware that GHD staff have left facility	• Sign out at front desk • Ask to speak to Site Manager or alternate designate	
8	Demobilization	• Collision • Injury or death to vehicle occupants or other parties	• Perform perimeter vehicle check • Maintain awareness of pedestrian/vehicular traffic when exiting the site • Utilize defensive driving techniques • Complete post departure checklist and report vehicle problems to company vehicle maintenance manager or rental car agency	Assessor

1. Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.
2. A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".
3. Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

Site Personnel Participating in JSA Review:

I have participated in the review and discussion of the Job Safety Analysis (JSA) listed on this document and understand the duties I am responsible to fulfill. As part of my work, I know I have the responsibility and obligation to STOP work with a Stop Work Authority (SWA) if conditions change and/or potential hazards have been identified.

Name/Company	Sign	Date

**SSE(s) on job:** _____**Assigned mentor:** _____

Presenter Signature: _____

Date/Time: _____

My signature below indicates that all conditions and requirements listed above have been verified, met, and reviewed with all affected personnel prior to start of work.

Supervisor Signature: _____

Date/Time: _____

Location of Mustering Point: _____

Wind direction (current): _____

GHD Emergency contact (Name and verified phone number): _____

Supervisor Signature documenting Daily Debrief has been completed: _____

SAFETY DATA SHEET

Version 5.5

Revision Date 03/31/2016

Print Date 11/14/2016

1. PRODUCT AND COMPANY IDENTIFICATION

Product name : Alconox® detergent

Product Number : 242985

Brand : Aldrich

Product Use : For laboratory research purposes.

Supplier : Sigma-Aldrich Canada Co.
2149 Winston Park Drive
OAKVILLE ON L6H 6J8
CANADA

Manufacturer : Sigma-Aldrich Corporation
3050 Spruce St.
St. Louis, Missouri 63103
USA

Telephone : +1 9058299500

Fax : +1 9058299292

Emergency Phone # (For both supplier and manufacturer) : +1-703-527-3887 (CHEMTREC)

Preparation Information : Sigma-Aldrich Corporation
Product Safety - Americas Region
1-800-521-8956

2. HAZARDS IDENTIFICATION

Emergency Overview

WHMIS Classification

D1B	Toxic Material Causing Immediate and Serious Toxic Effects	Toxic by ingestion
D2B	Toxic Material Causing Other Toxic Effects	Moderate skin irritant Severe eye irritant

GHS Classification

Acute toxicity, Oral (Category 4)
Skin corrosion/irritation (Category 2)
Serious eye damage/eye irritation (Category 1)
Acute aquatic toxicity (Category 2)

GHS Label elements, including precautionary statements

Pictogram



Signal word : Danger

Hazard statement(s)

H302	Harmful if swallowed.
H315	Causes skin irritation.
H318	Causes serious eye damage.
H401	Toxic to aquatic life.

Precautionary statement(s)

P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P273	Avoid release to the environment.
P280	Wear protective gloves/ eye protection/ face protection.
P301 + P312 + P330	IF SWALLOWED: Call a POISON CENTER/doctor if you feel unwell. Rinse mouth.
P302 + P352	IF ON SKIN: Wash with plenty of water.

P305 + P351 + P338 +
P310
P332 + P313
P362 + P364
P501

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/doctor.
If skin irritation occurs: Get medical advice/ attention.
Take off contaminated clothing and wash it before reuse.
Dispose of contents/ container to an approved waste disposal plant.

HMIS Classification

Health hazard: 2
Flammability: 0
Physical hazards: 0

Potential Health Effects

Inhalation May be harmful if inhaled. Causes respiratory tract irritation.
Skin May be harmful if absorbed through skin. Causes skin irritation.
Eyes Causes eye irritation.
Ingestion Toxic if swallowed.

3. COMPOSITION/INFORMATION ON INGREDIENTS

CAS-No.	EC-No.	Index-No.	Concentration
Tetrasodium pyrophosphate			
7722-88-5	231-767-1	-	>= 10 . <= 30 %
Sodium dodecylbenzenesulfonate			
25155-30-0	246-680-4	-	>= 10 . <= 30 %
Sodium carbonate			
497-19-8	207-838-8	011-005-00-2	>= 7 . <= 13 %
Pentasodium triphosphate			
7758-29-4	231-838-7	-	>= 10 . <= 30 %

4. FIRST AID MEASURES

General advice

Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

If inhaled

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact

Wash off with soap and plenty of water. Consult a physician.

In case of eye contact

Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed

Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIREFIGHTING MEASURES

Suitable extinguishing media

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Special protective equipment for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

Hazardous combustion products

Explosion data - sensitivity to mechanical impact

No data available

Explosion data - sensitivity to static discharge

No data available

6. ACCIDENTAL RELEASE MEASURES

Personal precautions

Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.

Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

Methods and materials for containment and cleaning up

Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE**Precautions for safe handling**

Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed.

Conditions for safe storage

Keep container tightly closed in a dry and well-ventilated place.

Keep in a dry place.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION**Components with workplace control parameters**

Components	CAS-No.	Value	Control parameters	Basis
Tetrasodium pyrophosphate	7722-88-5	TWA	5.000000 mg/m3	Canada. British Columbia OEL
		TWAEV	5.000000 mg/m3	Canada. Ontario OELs
		TWA	5.000000 mg/m3	Canada. Alberta, Occupational Health and Safety Code (table 2: OEL)
Remarks	Occupational exposure limit is based on irritation effects and its adjustment to compensate for unusual work schedules is not required			
		TWAEV	5.000000 mg/m3	Québec. Regulation respecting occupational health and safety, Schedule 1, Part 1: Permissible exposure values for airborne contaminants
		TWA	5.000000 mg/m3	Ontario Table of Occupational Exposure Limits made under the Occupational Health and Safety Act.
		TWA	5 mg/m3	Ontario Table of Occupational Exposure Limits made under the Occupational Health and Safety Act.

Personal protective equipment**Respiratory protection**

Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact

Material: Nitrile rubber

Minimum layer thickness: 0.11 mm

Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Eye protection

Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin and body protection

Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Hygiene measures

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Specific engineering controls

Use mechanical exhaust or laboratory fumehood to avoid exposure.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Form	granular, powder
Colour	white

Safety data

pH	9.5 at 10 g/l
Melting point/freezing point	No data available
Boiling point	No data available
Flash point	No data available
Ignition temperature	No data available
Auto-ignition temperature	No data available
Lower explosion limit	No data available
Upper explosion limit	No data available
Vapour pressure	No data available
Density	No data available
Water solubility	soluble
Partition coefficient: n-octanol/water	No data available
Relative vapour density	No data available
Odour	odourless
Odour Threshold	No data available
Evaporation rate	No data available

10. STABILITY AND REACTIVITY

Chemical stability

Stable under recommended storage conditions.

Possibility of hazardous reactions

No data available

Conditions to avoid

No data available

Materials to avoid

No data available

Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Carbon oxides, Sulphur oxides, Oxides of phosphorus, Sodium oxides

Other decomposition products - No data available

11. TOXICOLOGICAL INFORMATION

Acute toxicity

Oral LD50

No data available

Inhalation LC50

No data available

Dermal LD50

No data available

Other information on acute toxicity

No data available

Skin corrosion/irritation

No data available

Serious eye damage/eye irritation

Eyes: No data available

Respiratory or skin sensitisation

No data available

Germ cell mutagenicity

No data available

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

Reproductive toxicity

No data available

Teratogenicity

No data available

Specific target organ toxicity - single exposure (Globally Harmonized System)

No data available

Specific target organ toxicity - repeated exposure (Globally Harmonized System)

No data available

Aspiration hazard

No data available

Potential health effects

Inhalation	May be harmful if inhaled. Causes respiratory tract irritation.
Ingestion	Toxic if swallowed.
Skin	May be harmful if absorbed through skin. Causes skin irritation.
Eyes	Causes eye irritation.

Signs and Symptoms of Exposure

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Synergistic effects

No data available

Additional Information

RTECS: Not available

12. ECOLOGICAL INFORMATION**Toxicity**

No data available

Persistence and degradability

No data available

Bioaccumulative potential

No data available

Mobility in soil

No data available

PBT and vPvB assessment

No data available

Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Toxic to aquatic life.

13. DISPOSAL CONSIDERATIONS**Product**

Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging

Dispose of as unused product.

14. TRANSPORT INFORMATION**DOT (US)**

Not dangerous goods

IMDG

Not dangerous goods

IATA

Not dangerous goods

15. REGULATORY INFORMATION**WHMIS Classification**

D1B	Toxic Material Causing Immediate and Serious Toxic Effects	Toxic by ingestion

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all the information required by the Controlled Products Regulations.

16. OTHER INFORMATION

Text of H-code(s) and R-phrase(s) mentioned in Section 3

Further information

Copyright 2016 Sigma-Aldrich Co. LLC. License granted to make unlimited paper copies for internal use only. The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.



Records of Training

Date: _____ Project Name: _____ Project Number: _____

Project Location: _____

Project Description _____

The Project Manager is ultimately responsible for the accuracy of the information on this Record of Training and ensuring GHD Employees and Subcontractors are familiar with the site and have the required training to do the task

Employee's Name:	Confined Space Entry	Excavation Safety	Fall Protection	GHS (HazCom/WHMS)	Lock Out Tag Out (LOTO)	Motor Vehicle Safety	Aerial Lift	Other -	Other -	Other -	Other -	
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APPENDIX E
EXAMPLE COMMUNITY AIR MONITORING PLAN



Community Air Monitoring Plan (CAMP)

**Former Crucible Specialty Metals Landfill
Site**

EnPro Holdings Inc.

25 April 2023

→ The Power of Commitment



Project name	Former Crucible Specialty Metals Landfill Site						
Document title	Community Air Monitoring Plan (CAMP) Former Crucible Specialty Metals Landfill Site						
Project number	8618809						
File name	8618809-SMP-CAMP-APPE.docx						
Status Code	Revision	Author	Reviewer		Approved for issue		
			Name	Signature	Name	Signature	Date
[Status code]							
[Status code]							
[Status code]							
[Status code]							
[Status code]							

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1. Site Background

The Site is located in the Town of Geddes, Onondaga County, New York and consists of an approximately 22.38-acre closed landfill that began operations in 1973 and was closed and capped in 1989. The Site is zoned commercial and is currently vacant. The Site is bounded by the St. Joseph's Health Amphitheater at Lakeview to the north, with Onondaga Lake beyond, parking areas associated with the amphitheater and New York State Fair to the southeast, an amphitheater access road, with undeveloped land and Ninemile Creek beyond, to the southwest, the amphitheater entrance and recreational trails, with Onondaga Lake beyond, to the east, and undeveloped land, with an amphitheater parking area beyond, to the west. Several of the access roadways and walking paths are located on the Site and some Site groundwater monitoring wells are located in areas that were developed for the amphitheater. The entirety of the Site and surrounding areas, including those developed by the amphitheater and recreational trails, is underlain by the historic Solvay Process Waste Beds and is owned by Onondaga County.

The remedial action implemented at the Site included closing and grading of waste within the landfill to promote surface runoff following final capping of the landfill in 1989 and placing a minimum 2-foot thick soil cover across the entirety of the Site. Since remaining contamination is present on-Site, if historic fill material is disturbed during future activities this Community Air Monitoring Plan (CAMP) will be implemented. This CAMP describes the measures that will be undertaken to conduct real-time monitoring of ambient air at the downwind Site perimeter, if necessary. This CAMP generally complies with the New York State Department of Health (NYSDOH) Generic Community Air Monitoring Plan (December 2009).

2. Objectives

The objective of this CAMP is to provide a measure of protection for the downwind community from potential airborne contaminant releases that might arise as a result of intrusive activities. The CAMP specifies monitoring requirements, action levels, and corrective actions to abate emissions, which may include work shut down where appropriate. The data collected during the implementation of the CAMP will document that work activities did not spread potential contaminants off the Site via the air.

3. Methods

The CAMP will include real-time air monitoring for VOCs and particulate matter (e.g. airborne "dust"). Continuous monitoring will be required for all ground intrusive activities. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells. Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil samples. "Periodic" monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while overturning soil, and taking a reading prior to leaving a sample location. The air monitoring data will be available for State (New York State Department of Environmental Conservation

[NYSDEC] and NYSDOH) personnel to review, as requested, and will be included in the corresponding report documenting the activity completed.

3.1 VOC Monitoring

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions, particularly if wind direction changes. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below

- If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15- minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.
- If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.
- If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.
- All 15 minute readings must be recorded and be available for State (NYSDEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

3.2 Particulate Monitoring

Particulate (e.g. “dust”) emissions will be measured continuously at the upwind and downwind property boundaries, or directly downwind of the work area, as Site conditions warrant. Particulate monitoring may be suspended if weather and surface conditions (i.e. precipitation or wet work surfaces) are such that airborne dust generation is not likely. Real time monitoring equipment (e.g. DustTrak or equivalent), capable of measuring particulate matter less than 10 micrometers (PM-10) in size, calculating 15-minute running average concentrations, and equipped with an audible or visual alarm will be used. Readings will be recorded at 1-minute intervals for the duration of work activities, stored on the equipment, and downloaded for documentation.

Based on the measured concentrations the following actions will be taken:

- If the downwind particulate level is 100 micrograms per cubic meter (ug/m3) greater than background (upwind) for a 15-minute period, or if visible dust is observed leaving the work area, then dust suppression techniques will be employed. Work will continue with dust suppression measures in place provided that downwind particulate levels do not exceed 150 ug/m3 above upwind levels and provided that no visible dust is migrating from the work area.

- If, after dust suppression techniques are in place, downwind particulate levels are greater than 150 ug/m³ above upwind levels, work will be stopped and a re-evaluation of activities will be initiated. Work will resume provided that dust suppression measures and other controls are successful in reducing downwind particulate concentrations to within 150 ug/m³ of the upwind level and in preventing visible dust migration.
- All readings must be recorded and be available for State (NYSDEC and NYSDOH) and Onondaga County Health personnel to review.

APPENDIX F
RESPONSIBILITIES of
OWNER and REMEDIAL PARTY

Responsibilities

The responsibilities for implementing the Site Management Plan (“SMP”) for the Former Crucible Specialty Metals Landfill Site (the “Site”), number 734021, are divided between the Site owner(s) and a Remedial Party, as defined below. The owner is currently listed as:

Onondaga County, New York (the “owner”).
(315) 451-7275

Solely for the purposes of this document and based upon the facts related to a particular Site and the remedial program being carried out, the term Remedial Party (“RP”) refers to any of the following: certificate of completion holder, volunteer, applicant, responsible party, and, in the event the New York State Department of Environmental Conservation (“NYSDEC”) is carrying out remediation or Site management, the NYSDEC and/or an agent acting on its behalf. The RP is:

EnPro Holdings, Inc.
Fern Paterson
5605 Carnegie Boulevard Suite 500
Charlotte, North Carolina, 28209
Fern.Paterson@enpro.com
(704) 526-3851

Nothing on this page shall supersede the provisions of a Deed Restriction, Consent Order, Consent Decree, agreement, or other legally binding document that affects rights and obligations relating to the Site.

Site Owner's Responsibilities:

- 1) The owner shall follow the provisions of the SMP as they relate to future construction and excavation at the Site.
- 2) In accordance with a periodic time frame determined by the NYSDEC, the owner shall periodically certify, in writing, that all Institutional Controls set forth in a Deed Restriction remain in place and continue to be complied with. The owner shall provide a written certification to the RP, upon the RP's request, in order to allow the RP to include the certification in the Site's Periodic Review Report (PRR) certification to the NYSDEC.
- 3) In the event the Site is delisted, the owner remains bound by the Deed Restriction and shall submit, upon request by the NYSDEC, a written certification that the Deed Restriction is still in place and has been complied with.
- 4) The owner shall grant access to the Site to the RP and the NYSDEC and its agents for the purposes of performing activities required under the SMP and assuring compliance with the SMP.
- 5) The owner is responsible for assuring the security of the remedial components located on its property to the best of its ability. If damage to the remedial components or vandalism is evident, the owner shall notify the Site's RP and the NYSDEC in accordance with the timeframes indicated in Section 1, Table 1 Notifications.
- 6) If some action or inaction by the owner adversely impacts the Site, the owner must notify the Site's RP and the NYSDEC in accordance with the time frame indicated in Appendix C, Table C-1 Notifications. and coordinate the performance of necessary corrective actions with the RP.
- 7) The owner must notify the RP and the NYSDEC of any change in ownership of the Site property (identifying the tax map numbers in any correspondence) and provide contact information for the new owner of the Site property. 6 NYCRR Part contains notification requirements applicable to any construction or activity changes and changes in ownership. Among the notification requirements is the following: Sixty days prior written notification must be made to the NYSDEC. Notification is to be submitted to the NYSDEC Division of Environmental Remediation's Site Control Section. Notification requirements for a change in use are detailed in Section 1.3 of the SMP. A change of use includes, but is not limited to, any activity that may increase direct human or environmental exposure (e.g., day care, school or park). A 60-Day Advance Notification Form and Instructions are found at <http://www.dec.ny.gov/chemical/76250.html>.

Remedial Party Responsibilities

- 1) The RP must follow the SMP provisions regarding any construction and/or excavation it undertakes at the Site.
- 2) The RP shall report to the NYSDEC all activities required for remediation, operation, maintenance, monitoring, and reporting. Such reporting includes, but is not limited to, periodic review reports and certifications, electronic data deliverables, corrective action work plans and reports, and updated SMPs.
- 3) Before accessing the Site property to undertake a specific activity, the RP shall provide the owner advance notification that shall include an explanation of the work expected to be completed. The RP shall provide to (i) the owner, upon the owner's request, (ii) the NYSDEC, and (iii) other entities, if required by the SMP, a copy of any data generated during the Site visit and/or any final report produced.
- 4) If the NYSDEC determines that an update of the SMP is necessary, the RP shall update the SMP and obtain final approval from the NYSDEC. Within 5 business days after NYSDEC approval, the RP shall submit a copy of the approved SMP to the owner(s).
- 5) The RP shall notify the NYSDEC and the owner of any changes in RP ownership and/or control and of any changes in the party/entity responsible for the operation, maintenance, and monitoring of and reporting with respect to any remedial system (Engineering Controls). The RP shall provide contact information for the new party/entity. Such activity constitutes a Change of Use pursuant to 375-1.11(d) and requires 60-days prior notice to the NYSDEC. A 60-Day Advance Notification Form and Instructions are found at <http://www.dec.ny.gov/chemical/76250.html>.
- 6) The RP shall notify the NYSDEC of any damage to or modification of the systems as required under **Table 1 – Notifications of the SMP**.
- 7) Prior to a change in use that impacts the remedial system or requirements and/or responsibilities for implementing the SMP, the RP shall submit to the NYSDEC for approval an amended SMP.
- 8) Any change in use, change in ownership, change in Site classification (*e.g.*, delisting), reduction or expansion of remediation, and other significant changes related to the Site may result in a change in responsibilities and, therefore, necessitate an update to the SMP and/or updated legal documents. The RP shall contact the NYSDEC project manager to discuss the need to update such documents.

Change in RP ownership and/or control and/or Site ownership does not affect the RP's obligations with respect to the Site unless a legally binding document executed by the NYSDEC releases the RP of its obligations.

Future Site owners and RPs and their successors and assigns are required to carry out the activities set forth above.

APPENDIX G
QUALITY ASSURANCE PROJECT PLAN



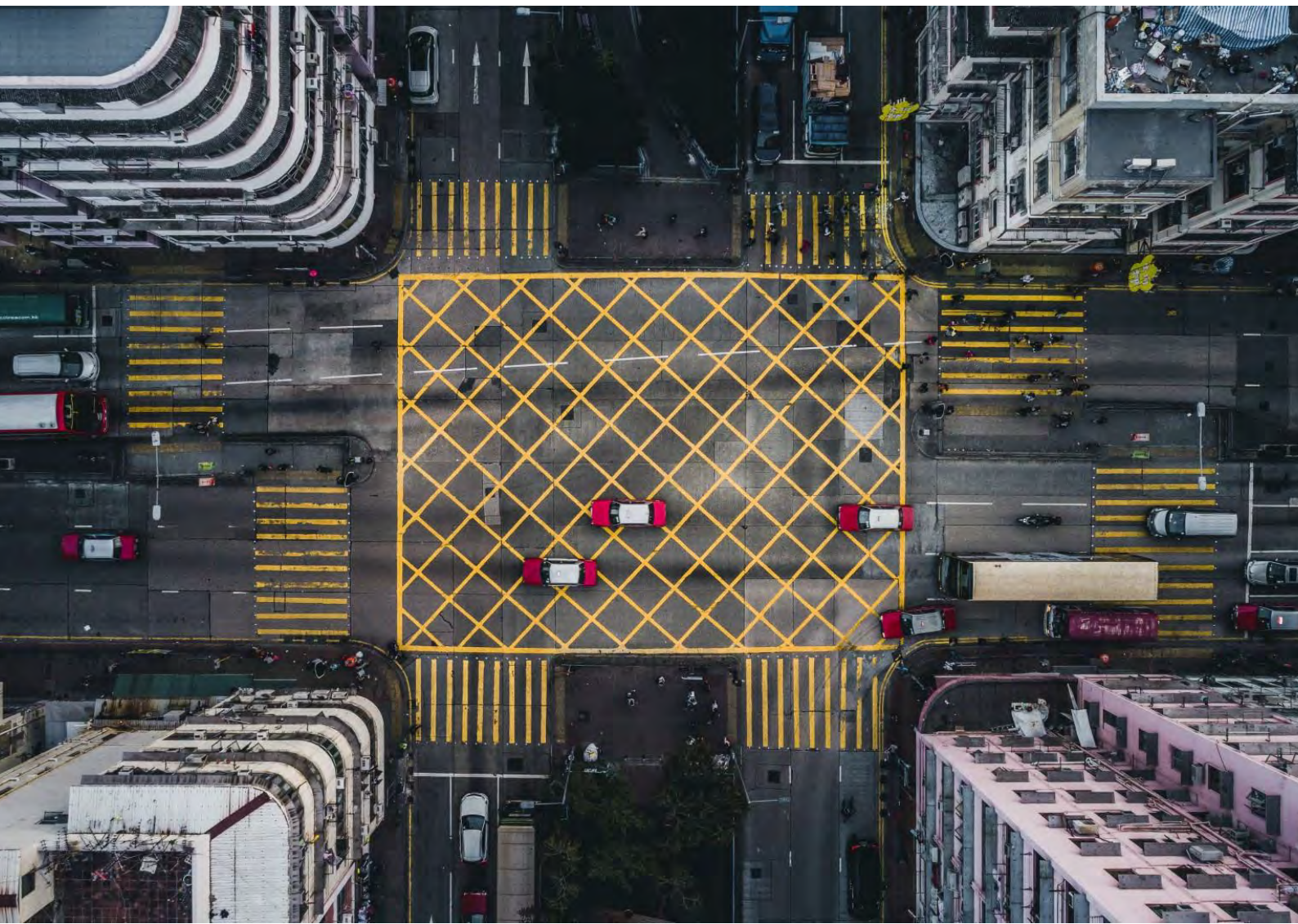
Quality Assurance Project Plan (QAPP)

Former Crucible Specialty Metals Landfill Site

EnPro Holdings, Inc.

27 March 2023

→ The Power of Commitment



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1. Introduction

GHD Consulting Services Inc. (GHD) has prepared this Quality Assurance Project Plan (QAPP) for the Former Crucible Specialty Metals Landfill Site (the Site) located in the Town of Geddes, Onondaga County, New York. The Site is zoned as commercial and is currently owned by Onondaga County and is an approximately 22.38-acre portion of the County's approximately 252-acre parcel. This QAPP is part of the Site Management Plan (SMP) and should be used in conjunction with the SMP.

Please refer to Section 2 of the SMP for a detailed description of the Site history and project background. The following QAPP describes quality assurance objectives and the methods that will be followed during the implementation of sample data collection.

2. Project Organization

The organization of the project management team and areas of responsibility are presented below

Project Role	Project Personnel	Responsibilities
Project Principal	As Designated	Provide technical and administrative oversight and guidance throughout the project, assist in securing company resources, participate in technical review of deliverables, and attend key meetings as needed.
Principal Engineer	As Designated	Provide technical guidance and review of reports and analytical data. Will have key involvement in screening and development of on-going monitoring requirements.
Project Manager	As Designated	Responsible for maintaining the day-to-day schedule for completing the fieldwork and deliverables according to schedule and for using proper field procedures.
Field Team Leader	As Designated	Responsible for coordinating and directing field efforts of staff and subcontractors and successful collection of accurate and representative data.
Quality Assurance Officer	As Designated	The Quality Assurance Officer (QAO) provides review of sampling procedures and certifies that data was collected and analyzed appropriately. The QAO reports directly to the Project Principal. For this project, the role of the QAO will be provided by the Project Manager.

3. Data Quality Objectives for Data Measurement

GHD will obtain measurement data from submittal of samples to a New York State Department of Health Environmental Laboratory Approval Program (NYSDOH ELAP) certified laboratory in general accordance with the NYSDEC Analytical Services Protocol (ASP) dated July 2005, USEPA SW-846 Test Methods for Evaluating Solid Waste, Physical and Chemical, dated December 1996, and the Site Management Plan, dated June 2023.

The quality assurance/quality control (QA/QC) objectives for all measurement data include precision, accuracy, representativeness, completeness, and comparability (PARCC). Laboratory analysis will be performed on samples of the Site groundwater and the samples will be analyzed for phenols, total chromium, and total iron during each monitoring event.

3.1 Precision

Precision is the degree of agreement among repeated measurements of the same characteristic. More specifically, it is a quantitative measurement of the variability of a group of measurements compared to their average value (USEPA, 1987). Precision is typically measured by calculating the standard deviation between duplicate samples collected at the same time and from the same location; however it is also common to estimate precision by relative percent difference (RPD). GHD will estimate the precision of field sampling by collecting and analyzing duplicate field samples. One duplicate sample of groundwater will be collected for every twenty samples obtained, with a minimum of one duplicate sample collected and analyzed per sampling event. In addition, analytical precision will be estimated by the chosen laboratory for the project by preparing and analyzing internal lab control duplicates, matrix spike (MS) samples, and matrix spike duplicate (MSD) samples at the frequencies required by the EPA Methods.

For this project, precision will be estimated by calculating the RPD for the results of the analyses. The following equation will be used to calculate RPD:

$$RPD = \frac{|V_1 - V_2|}{(V_1 + V_2)/2} \times 100$$

Where:

RPD = Relative percent difference.

V1, V2 = The two values to be compared.

$|V_1 - V_2|$ = The absolute value of the difference between the two values.

$(V_1 + V_2)/2$ = The average of the difference between the two values.

An RPD of less than 20% indicates an acceptable level of precision between sample results.

3.2 Accuracy

Accuracy measures how close a result is from a known or expected value. Accuracy is typically determined by the laboratory by analysis of matrix spike compounds and recoveries of surrogate compounds that are added to the analyses. Laboratory accuracy can be influenced by the sample matrix, method of analysis, and range of the analytical equipment.

GHD will estimate field accuracy by the collection of field blanks and trip blanks collected for each sample set. One trip blank and one field blank will be collected for each sampled matrix during each sampling event.

Accuracy will be determined by calculating the percent recovery (%R) from either a matrix spike or blank spike. The following equation will be used to calculate %R:

$$\%R = \frac{SSR - SR}{SA} \times 100$$

Where:

%R = Percent recovery.

SSR = Concentration of the spiked sample.

SR = Concentration of the original analyzed sample.

SA = Known concentration of the spiked analyte.

The accuracy of lab control samples will be considered acceptable if it falls within the acceptable ranges specified by the EPA Methods.

3.3 Representativeness

Representativeness is the degree to which measurements represent the true population, parameter variations at a sampling point, a process, or environmental condition at the time of sampling. GHD will, to the extent practical, make efforts to obtain field samples and analytical data that represent the in-situ conditions on site at the time of sampling.

Representativeness of field samples will be accomplished by making efforts to reduce sample contamination introduced through handling, equipment, containers, and analysis. Non-dedicated sampling devices will be cleaned between sampling points by washing and rinsing with biodegradable phosphate free detergent and potable water, followed by a thorough rinse with deionized/distilled water. Specific cleaning techniques are described in the Field Sampling Plan. Trip blank samples will be prepared by the laboratory, will remain sealed for the duration of the sampling event, and will accompany the samples to the field and back to the laboratory. The trip blank will be analyzed for phenols, total chromium, and total iron along with the groundwater samples to ensure that contamination with these compounds has not occurred during the bottle preparation, shipment, or sampling phase of the project. A rinse blank will also be provided to the laboratory and analyzed for phenols, total chromium, and total iron to ensure no contamination was carried over between samples from non-dedicated sampling equipment.

The analytical results obtained from the determination of identical parameters in field duplicate samples can be used to further assess the representativeness of the sample data.

3.4 Completeness

Completeness of the analyses will be assessed by comparing the number of parameters intended to be analyzed with the number of parameters successfully determined and reported.

3.5 Comparability

Comparability is the extent to which data can be compared between sample locations, periods of time, and/or project phases. Consistency in the acquisition, preparation, handling, and analysis of samples is necessary in order for the results to be compared. Additionally, the results obtained from analyses of the samples will be compared with the results obtained in previous studies, if available.

To ensure the comparability of analytical results with those obtained in previous or future testing, all samples will be analyzed by NYSDEC-approved EPA Methods. The NYSDEC-ASP mandated holding times for various analyses will be strictly adhered to.

4. Sampling Program

The following sections detail the project's sampling program as it pertains to quality control (QC) including sample preparation and preservation; sample holding times; and field QC samples. Please refer to the SMP and the Field Sampling Plan for specific sample procedures, locations, and numbers. QAPP Table 1 presents a summary of the sample matrices, analytical methods, containers, preservation requirements, duplicates, MS/MSDs, and holding times for the sampling program.

4.1 Sample Preservation and Shipment

Since all bottles will be provided by the designated analytical laboratory and will contain the necessary preservatives as shown in QAPP Table 1, they need only be filled. The bottles will be sent from the laboratory in coolers which will be organized on a per site basis.

Following sample collection, sampling personnel will prepare the samples for shipment to the designated laboratory. Preparation for transport includes:

- Placement of the sample containers in their respective laboratory provided coolers;
- Coolers are to be prepacked with ice prior to sample collection such that the samples will be cooled to 4°C;
- Chain-of-Custody is to be completed and kept with the samples and their respective coolers;
- Shipment or transport of coolers is to be performed as soon as practical following daily sample collection; and
- If samples are shipped via commercial courier service, then shipments will be made for next day morning delivery.

4.2 Sample Holding Times

Laboratories will adhere to the sample hold times for the respective analysis to be performed (QAPP Table 1). Hold time exceedances encountered by the laboratory will be promptly reported to the Project Manager.

4.3 Sampling Procedure

Prior to sampling, depth to groundwater and total depth of well measurements will be taken at each well. The wells will be purged with down-well pumps and well-dedicated poly tubing until stable field parameters are reached. Once stable parameters are reached, the samples will be collected directly from the dedicated tubing into containers provided by the laboratory. Non-dedicated sampling equipment will be cleaned between each well. Sampling procedures are summarized in QAPP Table 2.

In addition to water samples collected from the monitoring wells, two types of "blanks" will be collected and submitted to the chemical laboratory for analyses.

Trip Blank. A trip blank will be prepared before the sample bottles are sent by the laboratory. It consists of a sample of distilled, de-ionized water which accompanies the other sample bottles into the field and back to the laboratory. A trip blank will be included with each shipment of samples where sampling and analysis for phenols, total chromium, and total iron is planned (water matrix only). The trip blank will be analyzed for phenols, total chromium, and total iron along with the groundwater samples, as a measure of the potential for inadvertent contamination of the samples during sampling and shipment and as a measure of the internal laboratory procedures and their effect on the results.

Field (rinse) Blanks. Field (rinse) blanks are analyzed to check the effectiveness of decontamination of non-dedicated sampling equipment. Each sample consists of distilled de-ionized water (prepared by the laboratory) poured through a decontaminated down-well pump or other sampling apparatus. It is usually collected as a last step in the decontamination procedure prior to sampling of a monitoring well. The field (rinse) blank will be analyzed for all of the compounds which the subsequent monitoring well sample is scheduled for.

5. Sample Tracking and Custody

The program for sample custody and sample transfer is in compliance with the NYSDEC-ASP, as periodically updated. If samples may be needed for legal purposes, chain-of-custody procedures, as defined by NEIC Policies and Procedures (USEPA-330/9-78-001-R, Revised June 1988) will be used. Sample chain-of-custody is initiated by the laboratory with selection and preparation of the sample containers. To reduce the chance for error, the number of personnel handling the samples should be minimized.

5.1 Field Sample Custody

A chain-of-custody record accompanies the sample from initial sample container selection and preparation at the laboratory, shipment to the field for sample containment and preservation, and return to the laboratory. Two copies of this record follow the samples to the laboratory. The laboratory maintains one file copy and the completed original is returned to the Project Manager. Individual sample containers provided by the laboratory are used for shipping samples. The shipping containers are insulated and ice water is used to maintain samples at approximately 4°C (39.4° F) until samples are returned and in the custody of the laboratory. All sample bottles within each shipping container are individually labeled and controlled. Samples are to be shipped to the laboratory within 24 hours of the day of collection. Each sample shipping container is closed and sealed. This seal must be broken to open the container. Tampering is possible if the seal is broken before receipt at the laboratory. The laboratory will contact the Project Manager and the sample will not be analyzed if tampering is apparent.

5.2 Laboratory Sample Custody

The site investigation team leader or Project Quality Assurance Officer notifies the laboratory of upcoming field sampling activities and the subsequent transfer of samples to the laboratory. This notification will include information concerning the number and type of samples to be shipped as well as the anticipated date of arrival.

The laboratory sample program meets the following criteria:

1. The laboratory has designated a sample custodian who is responsible for maintaining custody of the samples and for maintaining all associated records documenting that custody.
2. Upon receipt of the samples, the custodian will check the original chain-of-custody documents and compare them with the labeled contents of each sample container for correctness and traceability. The sample custodian signs the chain-of-custody record and records the date and time received.
3. Care is exercised to annotate any labeling or descriptive errors. In the event of a discrepancy in the documentation, the laboratory will immediately contact the site investigation team leader as part of the corrective action process. A qualitative assessment of each sample container is performed to note any anomalies, such as broken or leaking bottles. This assessment is recorded as part of the incoming chain-of-custody procedure.
4. The samples are stored in a secured area at a temperature of approximately 4°C (39.4° F) until analyses are to commence.
5. A laboratory chain-of-custody record accompanies the sample or sample fraction through final analysis for control.
6. A copy of the chain-of-custody form will accompany the laboratory report and will become a permanent part of the project records.

5.3 Final Evidence Files

Final evidence files include all originals of laboratory reports and are maintained under documented control in a secure area.

A sample or an evidence file is under custody if:

- It is in your possession; it is in your view, after being in your possession.
- It was in your possession and you placed it in a secure area
- It is in a designated secure area.

6. Calibration Procedures

Instruments and equipment used to gather, generate, or measure environmental data will be calibrated with sufficient frequency and in such a manner that accuracy and reproducibility of results are consistent with the

appropriate manufacturer's specifications or project specific requirements. The procedures for instrument calibration, calibration verification, and the frequency of calibrations are described in the NYSDEC-CLP.

Calibration of other instruments required for measurements associated with these analyses will be in accordance with the manufacturer's recommendations and the standard operating procedures of the laboratory.

7. Data Reduction, Validation, and Reporting

Analytical procedures shall conform to the most recent revision of the NYSDEC-ASP and are summarized on Table 3. In the absence of USEPA or NYSDEC guidelines, appropriate procedures shall be submitted for approval by NYSDEC prior to use.

The procedures for the sample preparation and analysis for organic compounds are as specified in the NYSDEC-ASP. Analytical clean ups are mandatory where matrix interferences are noted. No sample shall be diluted any more than 1 to 5. The sample shall be either extracted again, sonicated again, stream distilled again, etc. or be subjected to another analytical clean up noted in SW846 or a combination thereof. The analytical laboratory shall expend such effort and discretion to demonstrate good laboratory practice and demonstrate an attempt to best achieve the method detection limit.

7.1 Semi-Volatile Organic Compounds

The extraction and analytical procedures used for preparation of water samples for the analysis of the TCL semi-volatile organic compounds are described in NYSDEC-ASP Volume I, Section D-III.

Instrument calibration, compound identification, and quantitation are performed as described in Section 6 of this document and in the NYSDEC-ASP.

7.2 Metals

Water samples will be analyzed for the metals listed in QAPP Table 3. The detection limits for these metals are as specified in the NYSDEC-ASP, Section D-V. The instrument detection limits will be determined using calibration standards and procedures specified in the NYSDEC-ASP. The detection limits for individual samples may be higher due to the sample matrix. The procedures for these analyses will be as described in the NYSDEC-ASP.

The analyses for metals will be performed by atomic absorption spectroscopy (AAS), inductively coupled plasma emission spectroscopy (ICP-ES), or inductively coupled plasma mass spectrometry (ICP-MS), as specified in the ASP with regard to AAS flame, ICP-ES, or ICPMS analysis.

8. Internal Quality Control

It will be the laboratory's responsibility to analyze calibration standards, method blanks matrix spikes, matrix spike duplicates, and quality control check samples at the same time as project sample analyses if required by its respective protocol. It's GHD's responsibility to assign and designate the appropriate matrix spike and matrix spike duplicates for analyses. If matrix spike and matrix spike duplicates have not been assigned or received by the laboratory, then the laboratory should contact GHD for the appropriate corrective action.

It is the laboratory's responsibility to use the appropriate calibration standards and surrogates for their respective equipment. Concentrations of the solutions should be checked for accuracy and replaced in accordance with the manufacture's specifications.

Organic and matrix spike blanks will be used to check if contaminants have been introduced into the sample matrix or if the analysis method detected "false positives". Trip and field (rinse) blanks will be used to check if atmospheric contamination has occurred or contaminants were introduced during sample preparation.

8.1 Quality Assurance Batching

Each set of samples will be analyzed concurrently with blanks, matrix spikes, surrogate spikes, and replicate at the frequency described in the NYSDEC-ASP.

8.2 Organic Standards and Surrogates

All standard and surrogate compounds are checked by the method of mass spectrometry for correct identification and gas chromatography for degree of purity and concentration. When the compounds pass the identity and purity tests, they are certified for use in standard and surrogate solutions. Concentrations of the solutions are checked for accuracy before release for laboratory use. Standard solutions are replaced monthly or earlier based upon indications of deterioration.

8.3 Organic Blanks, Spiked Blank, and Matrix Spike

Analysis of blank samples verifies that the analytical method does not introduce contaminants. The blank water can be generated by reverse osmosis and Super-Q filtration systems, or distillation of water containing KMnO₄. The spiked blank is generated by addition of standard solutions to the blank water. The matrix spike is generated by addition of surrogate standard to each sample.

8.4 Trip and Field (Rinse) Blanks

Trip blanks and field (rinse) blanks will be utilized in accordance with the specifications in Section 4 of this QAPP. These blanks will be analyzed to provide a check on sample bottle preparation and to evaluate the possibility of atmospheric or cross contamination of the samples.

9. Quality Assurance Audits

The Project Manager may elect to perform periodic quality assurance audits during the course of the project. The audits may be used to evaluate field personnel, subcontractors, items, activities, and/or documentation. If discrepancies are encountered, it's the Project Manager's responsibility to document the discrepancy in writing and to establish the necessary corrective actions to resolve the audit's findings.

9.1 Preventative Maintenance Procedures and Schedules

Each piece of equipment utilized during the course of the project will be required to be serviced in accordance with its respective manufacture's specifications and schedule. Records documenting maintenance will be traceable back to specific equipment and filed and maintained with their respective owners.

9.2 Corrective Action

If during the course of the project items such as malfunctions, deficiencies, deviations, or errors are encountered, it is critical that these items are promptly documented, investigated, and corrected. It is the project personnel's responsibility to identify and report noncompliance issues to the Project Manager immediately. It is the Project Manager's responsibility to provide corrective action solutions for the issue. The Project Manager will also document in writing the noncompliance issue and what steps were necessary to correct the issue.

Tables

Table1 **Sample Containerization**

Analysis	EPA Method	Bottle Type	No. of Containers	Preservative	Holding Time
Total Chromium	200.7	500 mL plastic bottle	1	HNO ₃	6 months
Total Iron	200.7	500 mL plastic bottle	1	HNO ₃	6 months
Phenols	420.1	1-liter amber glass bottle	1	H ₂ SO ₄	28 days
Duplicate	One duplicate and one MS/MSD shall be collected for each parameter at a frequency of 1 per 20 samples (or a minimum of 1 per sampling event). MS/MSD shall be labelled with the well number, location, date, and time of collection and sampled at a frequency of 1 per 20 samples (or a minimum of 1 per sampling event).. Duplicate shall be identified only as “Duplicate” to be “blind” to the laboratory.				
MS/MSD					
Trip Blank	1 trip blank will be prepared, accompany samples throughout project, and analyzed by the laboratory for the same analytes as the normal samples.				
Field (Rinse) Blank	1 field (rinse) blank sample will be prepared during each sampling event and analyzed by the laboratory for the same analytes as the normal samples.				

All containers must be labelled with the sample number, location, date, and time collected.

All samples must be chilled to 4°C (39.4°F).

Table 2 *Sampling Procedures for Monitoring Wells*

1. Initial static water level recorded with an electronic contact probe accurate to the nearest 0.01 foot.
2. Well pump and electronic contact probe decontaminated.
 - a. Non-dedicated well sampling equipment rinsed with Alconox and potable water solution and rinsing with potable water between use.
 - b. Rinse waste collected into 55-gallon drum.
3. Well pump lowered into well.
 - a. Monitoring well purged using a Proactive Stainless Steel Monsoon Pump (or equivalent) equipped with new well-dedicated polyethylene tubing.
 - b. Field parameters collected approximately every 5 minutes.
 - c. Well purged until field parameters stabilized.
 - d. Purge water collected in 5 gallon bucket and later containerized in 55 gallon drum for disposal at later date.
4. Sample taken.
 - a. Sample bottles filled directly from well-dedicated tubing.
 - b. Duplicate sample and other QA/QC samples collected when appropriate.
5. Samples are capped, labelled, and placed in laboratory provided coolers packed with ice.
6. All non-dedicated sampling equipment rinsed with Alconox and potable water solution and rinsing with potable water.
 - a. Rinse waste collected in 55-gallon drum.
7. Equipment/wash blank collected at end of sampling event.
8. Chain-of-custody forms completed in triplicate
 - a. Original and carbon copy placed into zip-lock bag and placed into the cooler.
 - b. Second carbon copy kept on file.
9. Cooler cover is sealed with strapping tape to assure integrity and to prevent tampering of sample.
10. 55-gallon drums containing purge and rinse water will be labelled and removed within 90 days for off-Site disposal.

Table 3 *Proposed Method Detection Limits*

Semi-Volatiles	Proposed Method Detection Limits (ug/L)
Phenols	1.0
Metals	Proposed Method Detection Limits (ug/L)
Total Chromium	2.1
Total Iron	9.0



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APPENDIX H
SITE MANAGEMENT FORMS

Summary of Green Remediation Metrics for Site Management

Site Name: _____ Site Code: _____
Address: _____ City: _____
State: _____ Zip Code: _____ County: _____

Initial Report Period (Start Date of period covered by the Initial Report submittal)

Start Date: _____

Current Reporting Period

Reporting Period From: _____ To: _____

Contact Information

Preparer's Name: _____ Phone No.: _____

Preparer's Affiliation: _____

I. Energy Usage: Quantify the amount of energy used directly on-Site and the portion of that derived from renewable energy sources.

	Current Reporting Period	Total to Date
Fuel Type 1 (e.g. natural gas (cf))		
Fuel Type 2 (e.g. fuel oil, propane (gals))		
Electricity (kWh)		
Of that Electric usage, provide quantity:		
Derived from renewable sources (e.g. solar, wind)		
Other energy sources (e.g. geothermal, solar thermal (Btu))		

Provide a description of all energy usage reduction programs for the Site in the space provided on Page 3.

II. Solid Waste Generation: Quantify the management of solid waste generated on-Site.

	Current Reporting Period (tons)	Total to Date (tons)
Total waste generated on-Site		
OM&M generated waste		
Of that total amount, provide quantity:		
Transported off-Site to landfills		
Transported off-Site to other disposal facilities		
Transported off-Site for recycling/reuse		
Reused on-Site		

Provide a description of any implemented waste reduction programs for the Site in the space provided on Page 3.

III. Transportation/Shipping: Quantify the distances travelled for delivery of supplies, shipping of laboratory samples, and the removal of waste.

	Current Reporting Period (miles)	Total to Date (miles)
Standby Engineer/Contractor		
Laboratory Courier/Delivery Service		
Waste Removal/Hauling		

Provide a description of all mileage reduction programs for the Site in the space provided on Page 3. Include specifically any local vendor/services utilized that are within 50 miles of the Site.

IV. Water Usage: Quantify the volume of water used on-Site from various sources.

	Current Reporting Period (gallons)	Total to Date (gallons)
Total quantity of water used on-Site		
Of that total amount, provide quantity:		
Public potable water supply usage		
Surface water usage		
On-Site groundwater usage		
Collected or diverted storm water usage		

Provide a description of any implemented water consumption reduction programs for the Site in the space provided on Page 3.

V. Land Use and Ecosystems: Quantify the amount of land and/or ecosystems disturbed and the area of land and/or ecosystems restored to a pre-development condition (i.e. Green Infrastructure).

	Current Reporting Period (acres)	Total to Date (acres)
Land disturbed		
Land restored		

Provide a description of any implemented land restoration/green infrastructure programs for the Site in the space provided on Page 3.

Description of green remediation programs reported above (Attach additional sheets if needed)
Energy Usage:
Waste Generation:
Transportation/Shipping:
Water usage:
Land Use and Ecosystems:
Other:

CERTIFICATION BY CONTRACTOR
I, _____ (Name) do hereby certify that I am _____ (Title) of the Company/Corporation herein referenced and contractor for the work described in the foregoing application for payment. According to my knowledge and belief, all items and amounts shown on the face of this application for payment are correct, all work has been performed and/or materials supplied, the foregoing is a true and correct statement of the contract account up to and including that last day of the period covered by this application.
_____ _____ Date Contractor

POST-CLOSURE OBSERVATION FORM
FORMER CRUCIBLE SPECIALTY METALS LANDFILL – GEDDES, NY

DATE: _____

PERSONNEL: _____

OBSERVATION CHECKLIST:

1. Is there evidence of erosion:

On the landfill cap? _____

On top of the landfill? _____

On side slopes? _____

In drainage ditches? _____

On the surrounding Solvay Waste Beds? _____

2. If erosion has occurred, is it severe enough to warrant:

Immediate action? _____

Action prior to next scheduled observation? _____

3. Is there evidence of settlement and subsidence:

On the landfill? _____

On the surrounding Solvay Waste Beds? _____

Adjacent to the groundwater monitoring well? _____

4. If settlement and subsidence have occurred, is it severe enough to warrant:

Immediate action? _____

Action prior to next scheduled observation? _____

5. Is the vegetative cover in good condition?

6. If not in good condition, describe condition, possible causes, and possible remedies.

7. Are there dead or brown spots in the vegetative cover?

8. Does the cover appear to be periodically mowed? _____

9. Are trees or bushes growing on site with roots that could penetrate the synthetic liner in the cap?

10. Does the vegetative cover appear to have adequate water?

11. Is there evidence of decomposition gases forming on the site?

12. Is there evidence of vectors, dust, or odors present?

13. Is the landfill security system (access fence to Fair Grounds parking lot) intact?

14. Was the landfill entrance gate locked upon arrival?

15. Is there evidence of trespassing or vandalism on the site?

16. Does the drainage system appear to be functioning properly?

17. Are the following clear of dirt and debris?

Drainage ditches? _____

Catch basin grates? _____

Catch basin sumps? _____

Storm sewer pipes? _____

Storm water outfall? _____

18. With regard to monitoring wells on site, do any have damage?

19. What is the condition of the four manholes?

20. Is there indication of possible rupture, puncture, or other damage that might puncture the synthetic liner in the cap?

21. Do the above items appear to need immediate attention?

22. Additional comments and observations.

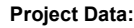


WELL OBSERVATION FORM
FORMER CRUCIBLE SPECIALTY METALS LANDFILL - GEDDES, NY

DATE: _____

Well ID	Depth to Water (feet)	Depth of Well (feet)	Condition - well cap, casing, well cover, pad, etc.	Actions
MS-104.3				
MS-104.4				
MS-104.5				
MS-106.1				
MS-106.2				
MS-106.3				
MS-106.4				
MS-301.1				
MS-301.2				
MS-301.3				
MS-301.4				
MS-301.5				
W-10.1				
W-201R				
W-5.6				

All depths recorded from top of PVC well casing.



Date: _____
Personnel: _____

Saturated Screen Length (m/ft): _____

Depth to Pump Intake (m/ft)⁽¹⁾: _____

Well Diameter, D (cm/in): _____

Well Screen Volume, V_s (L)⁽²⁾: _____

Initial Depth to Water (m/ft): _____

Initial Depth to Water (m/ft): _____

Sample ID: _____

Sample Time: _____

Notes:

- GHD Form SP-09 – Revision 02 – August 8, 2017

APPENDIX I
FIELD SAMPLING PLAN



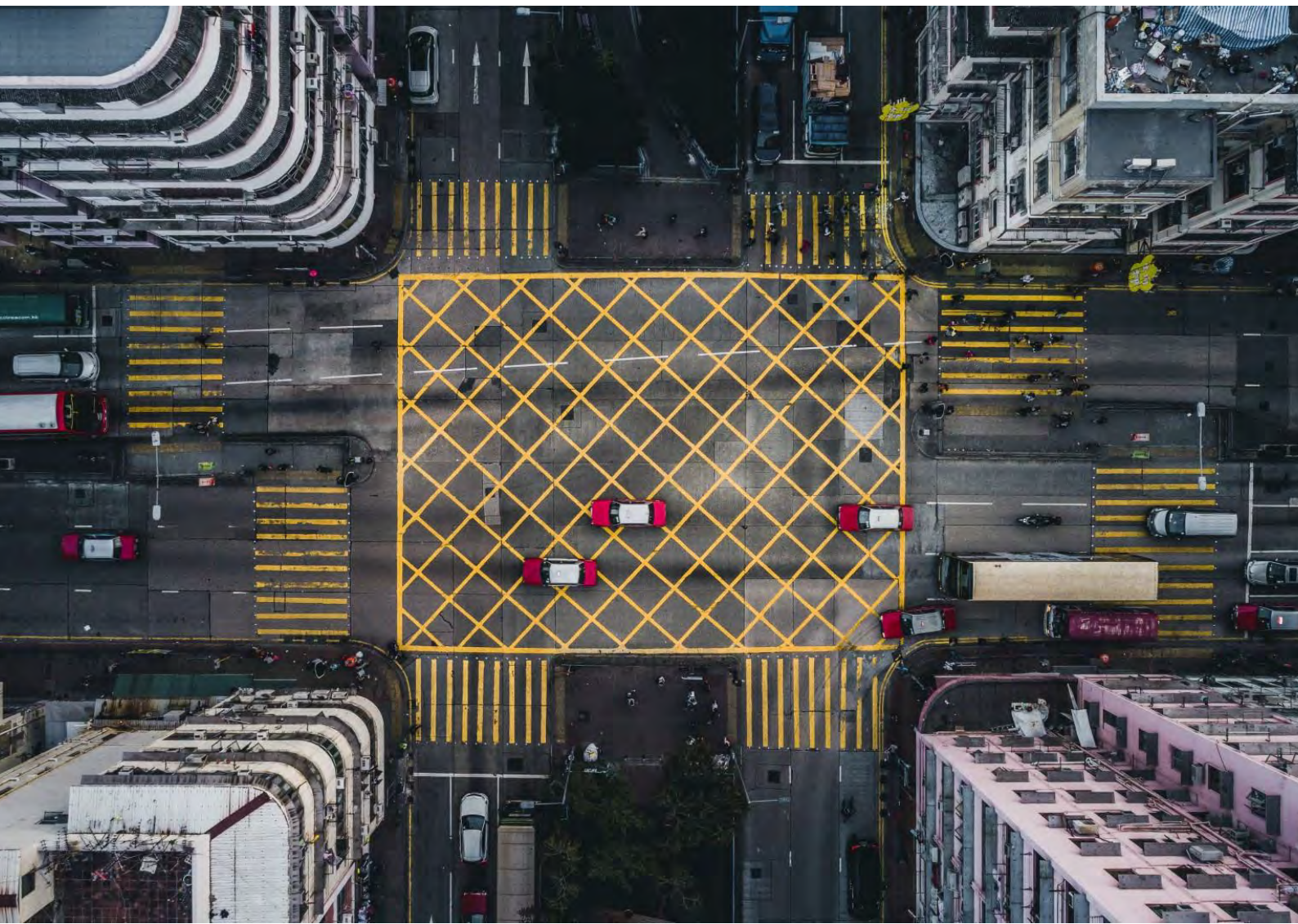
Field Sampling Plan

Former Crucible Specialty Metals Landfill Site

EnPro Holdings Inc.

28 April 2023

→ The Power of Commitment



Project name		Former Crucible Specialty Metals Landfill Site					
Document title		Field Sampling Plan Former Crucible Specialty Metals Landfill Site					
Project number		8618809					
File name		8618809-SMP-Field Sampling Plan-APPI-REV01.docx					
Status Code	Revision	Author	Reviewer		Approved for issue		
			Name	Signature	Name	Signature	Date
[Status code]							
[Status code]							
[Status code]							
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- 1 - Groundwater Sampling Requirements and Schedule

1. Introduction

This Field Sampling Plan (FSP) includes identification of sampling locations and media, method of collection, handling, preservation, and the protocols used for sample analysis. Environmental media to be sampled include groundwater as indicated in the Site Management Plan dated June 2023, of which this FSP is a part. The data will be utilized to monitor indicators of contamination at the former Crucible Specialty Metals Landfill.

The number of groundwater samples to be collected and the laboratory analysis required for the former Crucible Specialty Metals Landfill Site are provided in Table 1 below.

2. Field Sampling Plan

2.1 Sampling Procedures

The following provide information related to sampling procedures for groundwater sampling.

2.1.1 Preparation for Sampling

The sample collection technique correlates to the integrity of the collected sample. The following techniques include provisions so that:

- a representative sample is obtained;
- potential contamination of the sample is minimized;
- the sample is properly preserved; and
- an acceptable Chain-of-Custody record is maintained.

Laboratory analytical quality assurance/quality control (QA/QC) is presented in the Quality Assurance Project Plan (QAPP) attached in Appendix G of the Site Management Plan. The QA/QC Sampling Component of the Plan addresses or includes:

- incorporating accepted sampling techniques referenced in this Field Sampling Plan;
- procedures for documenting field actions contrary to the QA/QC Plan;
- documenting preliminary activities such as equipment check-out, calibrations, and container storage and preparation;
- documenting field measurement quality control data (quality control procedures for such measurements shall be equivalent to corresponding QC procedures);
- documenting field activities;
- documenting post-field activities including sample shipment and receipt; and
- generating quality control samples including duplicate samples, field blanks, equipment blanks, and trip blanks

The personnel responsible for sample collection will be familiar with standard sampling procedures and follow the appropriate protocol. Auditable files, including the appropriate data sheets, sampling schedules, and custody forms, for every sampling event at each location will be available upon completion for review. Field records will be maintained in site log books, or similar, to document daily instrument calibration, locations sampled, field observations, and weather conditions. Prior to sampling, all equipment must be procured and sample container delivery must be made. The following is a list of general equipment that might be on hand for sampling events. Special equipment for each sampling event is presented in the section describing that specific sampling event.

- field data sheets
- Chain-of-Custody forms

- bio-degradable phosphate free detergent
- coolers (with ice)
- nitrile gloves
- sample bottles
- 5-gallon buckets
- 55-gallon drums
- distilled or deionized water

2.1.2 Groundwater Sampling

The wells in Figure 1 will be purged and sampled using a down well submersible pump (Proactive Environmental Stainless Steel Monsoon Pump with flow controls, or similar). Prior to groundwater sample collection, field readings will be collected for pH, temperature, specific conductivity, and turbidity to indicate when the groundwater has stabilized. Stabilized groundwater quality (i.e., adequate purge) will be based on the turbidity that has either stabilized or is below 10 Nephelometric Turbidity Units (NTUs) and at least three consecutive measurements of pH remain within 0.1 standard units, specific conductance varies no more than 10 percent, and temperature is generally constant. After field parameters readings indicate that the groundwater quality has stabilized, groundwater samples will be collected for laboratory analyses.

All non-dedicated sampling equipment will be properly decontaminated in the field. The following equipment will be required for sampling of monitoring wells in addition to the general sampling equipment list:

- Well Data Sheets
- Teflon or Polyethylene Tubing
- Down well pump with controller and battery
- Sample preservatives
- Electronic water level indicator
- Multi-parameter water quality meter (capable of recording temperature, pH, conductivity, and turbidity at a minimum)
- Calibration standards

The following activities will be completed before mobilizing for the start of sampling:

1. Fill out appropriate section on well data sheet for the wells to be sampled;
2. Calibrate the water quality meter in accordance with the manufacturer's recommendations and record calibration on calibration sheet (Appendix H of SMP). Calibration to occur prior to each day of sampling activities.
3. Determine the amount of sampling to be done and obtain cooler(s) containing the pre-labeled, certified clean, prepared sample bottles;

The following steps describe the procedures for groundwater sample collection:

1. Unlock and remove the well cap;
2. Obtain a water level measurement using an electronic water indicator;
3. Rinse probes and sample cups carefully with distilled water before and after use;
4. Attach the well-dedicated tubing to the submersible pump.
5. Purge the well; lower submersible pump slowly into the well until it is just below the water surface. The development waters generated from the monitoring wells will be collected in drums for later off-site disposal;
6. Turn on the pump with flow controller at "0" then slowly increase flow rate until water discharges from the tubing above the ground surface.
7. Purging: Periodically (once every 5-minutes at a minimum) rinse and fill the multi-parameter water quality meter's sample cup with purged water. Read the initial pH, conductivity, turbidity, and temperature and record each measurement in the field logbook. The well is ready to sample when the above parameters have stabilized for three successive measurements or the well goes dry, whichever is first. Record the amount of

water purged, the final pH, conductivity, turbidity, and temperature readings in the field logbook and on the well data sheet.

8. Fill the appropriate sample bottles at each well in the collection order of phenols and then metals. While filling the sample bottles, record the well number, sample ID, date, and time of sample collection on the Monitoring Well Record for Low Flow Purging form.
9. The preservatives for the various sampling parameters will be added to the clean sample bottles by the laboratory prior to use in the field.
10. Collect the duplicates, matrix spike/matrix spike duplicates (MS/MSD), trip blanks, and rinse water samples (if applicable). Take samples according to the sampling schedule presented in Table 1 below. Trip blanks, field blanks, duplicates, and MS/MSD samples shall be collected at least once with each field batch, with a minimum of one for every twenty samples.
11. Place samples in coolers on ice.
12. Record all pertinent information in the field logbook and on the Well Data Sheet (include color, odor, sediment content of sample, etc.). Any situations at the site that have the potential to interfere with the analytical results should also be recorded here.
13. Remove down-well pump, reinsert dedicated well tubing (as applicable), lock well, inspect well site, and note any maintenance required.
14. Dispose of potentially contaminated materials as municipal solid waste.

The samples will be sent to a New York State Department of Health Environmental Laboratory Approval Program (NYSDOH ELAP) certified laboratory in general accordance with the NYSDEC Analytical Services Protocol (ASP) dated July 2005, USEPA SW-846 Test Methods for Evaluating Solid Waste, Physical and Chemical, dated December 1996, and the Site Management Plan, dated June 2023. The samples shall be analyzed for phenols (EPA Method 420.1), total chromium (EPA Method 200.7), and total iron (EPA Method 200.7).

2.1.3 QA/QC

QA/QC protocols are discussed in detail in the QAPP attached in Appendix G of the Site Management Plan.

Field Duplicates

Duplicate samples will be obtained from a representative number of sampling points to assess the reproducibility of the sampling procedures.

Matrix Spike and Matrix Spike Duplicates

- Additional sample volume will be collected in order to allow the laboratory to prepare and analyze a matrix spike (MS) and matrix spike duplicate (MSD), which will provide a level of assurance related to the laboratory's analytical accuracy.

Trip Blanks

Separate trip blanks will be carried into the field on each of the sampling days for groundwater. The trip blank vials will be prepared by the contracted laboratory and handled in the field similar to the other sampling containers with the exception that the vials will not be opened. The sample vials will be returned to the laboratory and analyzed with the groundwater samples to ensure cross-contamination did not occur during sampling and transport.

Rinse Water Samples/Equipment Blank

In cases where sampling equipment is field cleaned, a rinse water sample will be collected for analysis. The rinse sample will consist of laboratory provided de-ionized water pumped through or poured through the sampling equipment and prior to sample collection. In this case, a rinse blank sample will be collected through the down-well pumps and analyzed for the same parameters as the groundwater samples.

2.2 Field Measurement Techniques

Field measurements at sample locations are detailed below.

2.2.1 Water Level Measurement

Depth to water measurements will be taken on all monitoring wells at the site prior to purging and sampling. All measurements will be taken within a 24-hour period to obtain consistent elevations and recorded on well data sheets. The procedure for measuring water levels in the monitoring wells and piezometers is:

- Unlock and remove well cap;
- Measure depth to water to nearest 0.01 foot from the top of well casing with a water level indicator (electronic).
- Water level indicators will be decontaminated before moving to the next well.

2.2.2 pH, Temperature, Specific Conductivity, and Turbidity Measurement

Field parameters will be recorded using a multi-parameter water quality meter. Upon completion of measurements, the probes will be washed and rinsed between wells and re-calibrated at the beginning of each field day. If measurements are noted to be erratic, the field meters will be recalibrated more often.

2.3 General Decontamination and Waste Handling

The following steps will be employed to decontaminate reusable equipment:

- rinse equipment of foreign material with potable water;
- immerse and scrub equipment with bio-degradable phosphate-free detergent and potable water;
- immerse and scrub in a potable water rinse without detergent;
- immerse and scrub in deionized/distilled water; and
- air dry.

The following steps will be employed to decontaminate disposable equipment and manage disposable wastes:

- remove all standing liquid from the piece of equipment;
- dispose of the equipment as municipal solid waste;
- sample containers – upon filling and capping sample bottles, the outside of the bottle will be wiped off with a clean paper towel, which will be disposed of as municipal solid waste;
- protective gloves will be disposed of as municipal solid waste;
- boots will be rinsed off with water to remove mud, clay, or any other contaminants; and
- personnel will be required to follow additional procedures outlined in the Health and Safety Plan prior to lunch breaks or demobilizing from the site, at a minimum.

2.4 Sample Management Plan

2.4.1 Sample Management

The sample management plan provides procedures to document and track samples and results obtained during this work effort. A series of pre-printed forms with the appropriate information serves as a vehicle for documentation and tracking. In order to accomplish this task, the documentation materials will include sample labels, sample characterization and chain-of-custody sheets, daily field reports, and a Monitoring Well Record for Low Flow Purging.

2.4.1.1 Sample Label

A sample label will be completed for each sample obtained and will be affixed/written to/on the sample container. Samples are to be labeled with non-smearing ink. Information on the label includes, at a minimum, the following:

- client name

- sample ID
- sample date
- Sample time

2.4.1.2 Chain-of-Custody Sheet

Pertinent field information will be entered onto the sample characterization and chain-of custody sheets including:

- client name
- sample identification;
- sample description;
- location of sample;
- sampling method;
- number of containers;
- container type;
- analysis required; and
- preservation

The chain-of custody section of the form will document the sample's pathway of sample shipment that will include names of persons delivering/receiving, dates, and times. Copies of the completed forms will be retained by the sampling personnel and the analytical laboratory. The chain-of-custody sheets will be submitted in the Triennial Monitoring Report (due every three years) along with the laboratory results.

2.4.1.3 Monitoring Well Record for Low Flow Purging

The Monitoring Well Record for Low Flow Purging will be utilized to track each individual sample obtained at the site. The upper portion, "Field Identification" will be completed the day the sample is taken.

2.4.2 Sample Destination

Each sample will have a unique sample code that will indicate the sample media and the sample location. The code nomenclature will follow the following format: WG-Project Number-Date-Samplers ID-Sample number. The type of sample (ex. field duplicate, matrix spike, trip blank, etc.) will be specified on the field sample key and chain of custody sheet sent to the laboratory, where applicable.

2.4.3 Sample Handling

Each collected sample will be dispensed into the appropriate sample containers, for the type of analysis to be performed. Appropriate sample preservatives will be added to the sample containers by the contracted analytical laboratory prior to the delivery into the field. All samples that require cool storage will be immediately placed in coolers with appropriate packaging materials as to prevent breakage of sample containers during shipment. The sample coolers will be filled with cubed ice (no "Blue Ice") prior to leaving the sample collection location. In the instance that a local analytical laboratory is contracted, the samples will be hand delivered to the laboratory each sampling day. The chain-of-custody forms will be signed by the laboratory personnel picking up the samples and placed within the coolers. In the instance that an analytical laboratory is contracted which is not based locally and a common carrier is used for sample shipment, the chain of custody forms will be signed by the sampler and placed inside of the coolers. Careful packaging techniques will be used to prevent sample containers from breakage during shipment. All samples will be shipped or delivered to the contracted analytical laboratory on the day they were collected and will be received by the laboratory within 24 hours of sample collection. The contract laboratory will sign the chain of custody upon receiving and logging in the samples.

Tables

Table 1- Groundwater Sampling Requirements and Schedule

Well Location	Analytical Parameters		Schedule	Sample Frequency
	Total Chromium and Total Iron (EPA Method 200.7 with Preparation by EPA Method 3005A)	Phenols (EPA Method 420.1)		
MS-104.5	X	X	Triennial	Once
MS-106.3	X	X	Triennial	Once
MS-106.4	X	X	Triennial	Once
MS-301.3	X	X	Triennial	Once
MS-301.4	X	X	Triennial	Once
MS-301.5	X	X	Triennial	Once
W-201R	X	X	Triennial	Once
W-5.6	X	X	Triennial	Once
Field Duplicate	X	X	Triennial	Once
Matrix Spike (MS)	X	X	Triennial	One in Twenty
Matrix Spike Duplicate (MSD)	X	X	Triennial	One in Twenty
Trip Blank	X	X	Triennial	Once
Equipment Blank	X	X	Triennial	Once



LEGEND

- MONITORING WELL
- DECOMMISSIONED SETTLEMENT PLATE
- DECOMMISSIONED INCLINOMETER
- DECOMMISSIONED WELL
- DECOMMISSIONED PIEZOMETER
- OUTFALL
- DROP INLET
- STORMWATER MANHOLE

NOTES:

- ALL OBJECT AND STRUCTURE LOCATIONS ARE APPROXIMATE BASED ON A HAND-HELD GPS SURVEY COMPLETED BY GHD IN NOVEMBER 2020.
- AERIAL PHOTOGRAPHS ARE 2018 ONE FOOT RESOLUTION AND WERE OBTAINED FROM THE NEW YORK STATE GIS CLEARINGHOUSE.

N

0 100 200 300 400'

SCALE 1"=200' AT ORIGINAL SIZE

GHD

ENPRO HOLDINGS INC.
FORMER CRUCIBLE SPECIALTY METALS LANDFILL
FIELD SAMPLING PLAN

SITE LAYOUT MAP

Project No. 8618809
Date 03.2023

FIGURE 1

Data Source



ghd.com

→ **The Power of Commitment**

APPENDIX J
REQUEST TO IMPORT/REUSE FILL MATERIAL FORM



**NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION**



Request to Import/Reuse Fill or Soil

This form is based on the information required by DER-10, Section 5.4(e) and 6NYCRR Part 360.13. Use of this form is not a substitute for reading the applicable regulations and Technical Guidance document.

SECTION 1 – SITE BACKGROUND

The allowable site use is:

Have Ecological Resources been identified?

Is this soil originating from the site?

How many cubic yards of soil will be imported/reused?

If greater than 1000 cubic yards will be imported, enter volume to be imported:

SECTION 2 – MATERIAL OTHER THAN SOIL

Is the material to be imported gravel, rock or stone?

Does it contain less than 10%, by weight, material that passes a size 100 sieve?

Is this virgin material from a permitted mine or quarry?

Is this material recycled concrete or brick from a DEC registered processing facility?

SECTION 3 - SAMPLING

Provide a brief description of the number and type of samples collected in the space below:

Example Text: 5 discrete samples were collected and analyzed for VOCs. 2 composite samples were collected and analyzed for SVOCs, Inorganics & PCBs/Pesticides.

If the material meets requirements of DER-10 section 5.4(e)5 (other material), no chemical testing needed.

SECTION 3 CONT'D - SAMPLING

Provide a brief written summary of the sampling results or attach evaluation tables (compare to DER-10, Appendix 5):

Example Text: Arsenic was detected up to 17 ppm in 1 (of 5) samples; the allowable level is 16 ppm.

If Ecological Resources have been identified use the "If Ecological Resources are Present" column in Appendix 5.

SECTION 4 – SOURCE OF FILL

Name of person providing fill and relationship to the source:

Location where fill was obtained:

Identification of any state or local approvals as a fill source:

If no approvals are available, provide a brief history of the use of the property that is the fill source:

Provide a list of supporting documentation included with this request:

The information provided on this form is accurate and complete.

Signature

Date

Print Name

Firm

ATTACHMENT 1
AVAILABLE GROUNDWATER MONITORING WELL BORING AND
CONSTRUCTION LOGS

DEPTH	ELEVATION	SAMPLES	SAMPLE NO.	CHEM. SMPL	RECOVERY	N	SOIL or ROCK CLASSIFICATION	UNIFIED SOIL CLASSIF.	DENSITY (PCF)	WATER CONTENT (Percent)	PERMEABILITY (cm/sec)	MONITOR, PIEZOMETER CONSTRUCTION DETAILS				WATER PROBE READINGS				NOTES
																Temp. (°C)	Cond. (µmho cm)	Eh (mV)	pH	
1	2	3	4	5	6	7	8	9	10	11	12	13	14			15	16	17	18	19

The figures in the Column 1 defines the scale of the Subsurface Log.

The associated elevation is shown in the second column.

The third column graphically shows the exact depth range from which a soil sample or rock core was recovered.

See Table 1 for a description of the symbols used to signify the various types of samples.

The Sample or Run No. is used for Identification on sample containers and/or Laboratory Test Reports.

The Chemical Sample column graphically shows the depth range from which a sample was removed for chemical analysis.

The recovery column shows the recovery in inches for a soil sample. Rock core recovery is shown in percent.

N shows the number of blows required to drive a split spoon sampler into the soil. Unless otherwise stated, the results are for a "Standard Penetration Test", driving a two-inch diameter spoon 12 inches with a 140 pound hammer dropped 30 inches. RQD is the Rock Quality Designation for rock core. This equals the sum of the length of pieces greater than 4 inches divided by the length of the core run.

All recovered soil samples are reviewed in the laboratory. The visual descriptions are made on basis of the sample as recovered and in accordance with the Unified Classification System shown on Table VI. The Unified group symbol is shown in Column 9.

Guidellines for the terms used in descriptions are presented in Tables II and III. The description of the relative soil compactness or consistency is based upon the penetration records as defined in Table IV. The description of the soil moisture is based upon the condition of the sample as recovered. The moisture condition is described as dry, damp, moist or wet. Water used to advance the boring may have affected the in-situ moisture content of the sample. Special terms are used as required to describe materials in greater detail; several such terms are listed in Table V. When sampling gravelly soils with a standard two-inch diameter split spoon, the true percentage of gravel is often not recovered due to the relatively small sampler diameter. The presence of boulders and large gravel is sometimes, but not necessarily, detected by an evaluation of the casing and sampler blows or through the "action" of the drill rig as reported by the driller.

The results from nuclear field tests or laboratory tests for soil density and moisture are shown in Columns 11 and 12.

Soil or rock permeability, the testing method, and the depth range tested are shown in Column 12.

Column 13 is a graphic description of the monitor or piezometer installation. A Key to the description is presented on Table VII. Details of materials are noted in the NOTES column. The static water level (SWL) and date measured are noted in the adjacent column.

Columns 15 to 18 indicate the results of field tests at the depth tested. The date of the test is noted below the readings.

TABLE I

	Split Spoon Sample
	Shelby Tube Sample
	Auger or Pit Sample
	Rock Core

TABLE II

Identification of soil type is made on basis of an estimate of particle sizes, and in the case of fine grained soils also on basis of plasticity.		
Soil Type	Soil Particle Size	
Boulder	>12"	
Cobble	3"-12"	
Gravel-Coarse	3"-3/4"	
-Fine	#4-#10	
Sand-Coarse	#10-#40	
-Medium	#40-#200	
-Fine		
Silt-Non Plastic (Granular)	<#200	
Clay-Plastic (Cohesive)		
	Coarse Grained (Granular)	
	Fine Grained	

TABLE III

The following terms are used in classifying soils consisting of mixtures of two or more soil types. The estimate is based on weight of total sample.	
Term	Percent of Total Sample
and	35-50
some	20-35
little	10-20
trace	less than 10
(When sampling gravelly soils with a standard split spoon, the true percentage of gravel is often not recovered due to the relatively small sampler diameter.)	

TABLE IV

The relative compactness or consistency is described in accordance with the following terms:			
Granular Soils		Cohesive Soils	
Term	Blows per Foot, N	Term	Blows per Foot, N
Loose	<10	Very Soft	<2
Firm	11-30	Soft	3-5
Compact	31-50	Medium	6-15
Very Compact	>51	Stiff	16-25
		Hard	>25
(Large particles in the soils will often significantly influence the blows per foot recorded during the Penetration Test.)			

TABLE V

Varved	Alternating layers, seams, and partings of soils.
Layer	Soil deposit more than 6" thick.
Seam	Soil deposit less than 6" thick.
Parting	Soil deposit less than 1/8" thick.
Uniform	All grains are of about the same diameter

TABLE VI

UNIFIED SOIL CLASSIFICATION			
Major Division	Group Symbol	Soil Description	
Coarse-grained (over 50% by weight coarser than No. 200 sieve)	Gravelly soils (over half of coarse fraction larger than No. 4)	GW	Well-graded gravels, sandy gravels. Little or no fines.
		GP	Gap-graded or uniform gravel, sandy gravels. Little or no fines.
		GM	Silty gravels, silty sandy gravels.
		GC	Clayey gravels, clayey sandy gravels.
	Sandy soils (over half of coarse fraction finer than No. 4)	SW	Well-graded sand, gravelly sands. Little or no fines.
		SP	Gap-graded or uniform sands, gravelly sands. Little or no fines.
Fine-grained (over 50% by weight finer than No. 200 sieve)		SM	Silty sands, silty gravelly sands.
		SC	Clayey sands, clayey gravelly sands.
	Low compressibility (liquid limit less than 50)	ML	Silts, very fine sands, silty or clayey fine sands, rock floor.
		CL	Low plasticity clays, sandy or silty clays.
		OL	Low plasticity organic silts and clays.
	High compressibility (liquid limit more than 50)	MH	Micaceous or diatomaceous silts.
Organic Soils		CH	Highly plastic clays and sandy clays.
		OH	Organic silts and highly plastic clays.

TABLE VII

	Curb Box
	Riser
	Well Screen
	Point Piezometer
	Sand Pack
	Bentonite Seal
	Concrete Seal
	Granular Fill

DEPTH	ELEVATION	SAMPLES	SAMPLE NO.	CHEM. SEMPL RECOVERY [Inches]	N	SOIL or ROCK CLASSIFICATION	UNIFIED SOIL CLASSIF.	DENSITY [PCF]	WATER CONTENT [Percent]	PERMEABILITY [cm/sec]	MONITOR/PIEZOMETER CONSTRUCTION DETAILS						NOTES		
											DW-101		PZ-101.1		PZ-101.2			PZ-101.3	
											swl		swl		swl			swl	
0			1			Black CRUCIBLE WASTE, Silt, Sand, Cinders, Fibrous Organics, grades brown													
			2																
			3			5.0'													
5			4		11	White SOLVAY WASTE, silt-like (Moist-Loose)													
			5		4	2" seam of grey FLY ASH													
	421.0		6		3														
			7		2														
			8		3														
15			9		2	Similar, several seams of grey FLY ASH													
			10		5														
	411.0		11		4														
			12		3														
			13		3														
25			14		5														
			15		10	Similar, occasional cemented seams, firm													
	401.0		16		9														
			17		8														
			18		11	Similar, occasional cemented seams, firm													
35			19		3														
			20		2														
	391.0		21		1														
			22		2														
			23		2														
45			24		2														
			25		6														
50	381.0				4														

NOTE:
See reverse side
for key and
explanation to
log.

RUN NO.

RECOVERY
[Percent]

RQD

Surface Elevation 431.0
Date Started 3/9/82
Date Completed 3/15/82
Number of Installations in Boring 1
Method of installation separate borings
for each monitor

Project No. GTA-81-11A
Project Title Crucible Steel
Location Geddes, New York
Classified By smc Checked mr-l

HYDROGEOLOGIC LOG

THOMSEN ASSOCIATES

MONITOR NO.
DW-101
Sheet 1 of 3

DEPTH	ELEVATION	SAMPLES	SAMPLE NO.	CHEM. SMPL RECOVERY [inches]	N	SOIL or ROCK CLASSIFICATION	UNIFIED SOIL CLASSIF.	DENSITY [PCF]	WATER CONTENT [Percent]	PERMEABILITY [cm/sec]	MONITOR/PIEZOMETER CONSTRUCTION DETAILS			WATER PROBE READINGS				NOTES														
											DW-101		PZ-101.1		PZ-101.2		Temp. [°C]		Cond. [µmho/cm]	Eh [mV]	pH											
											swl		swl		swl																	
50	371.0		26		2	Orange partings and seams, odor change Grey partings of FLY ASH from 60'																										
			27		10																											
			28		1																											
55			29		2																											
			30		4																											
60					1																											
					3																											
65					3																											
					7																											
			35		4																											
70	361.0				69.5'	BLACK PEAT Light Grey SILT & MARL, pockets black organics, shells (Moist-Firm)	PT OL																									
					11																											
					15																											
75					-																											
					9																											
					40																											
80		351.0			40													Dark grey SILT (Wet to Saturated-Compact) -Grading grey at 79'	ML													
																															14	
																															16	
85																															12	
					12																											
					45																											
90	341.0				13	-Grades to grey SILT, little fine sand (Saturated-Firm)	ML																									
																																58
																																78
95																																40
					71																											
					50																											
100		331.0			56													Grey SILT, Some fine Sand, little gravel (Saturated-Very Compact) -Grading to no gravel, trace coarse sand -Grading to trace gravel, little coarse sand	ML													
																																71
																		95.5'	SM SM													
					71																											
					95.5'	SM SM																										
				71																												
					95.5'	SM SM																										
				71																												
					95.5'	SM SM																										
				71																												
					95.5'	SM SM																										
				71																												
					95.5'	SM SM																										
				71																												
					95.5'	SM SM																										
				71																												
					95.5'	SM SM																										
				71																												
					95.5'	SM SM																										
				71																												
					95.5'	SM SM																										
				71																												
					95.5'	SM SM																										
				71																												
					95.5'	SM SM																										
				71																												
					95.5'	SM SM																										
				71																												
					95.5'	SM SM																										
				71																												
					95.5'	SM SM																										
				71																												
					95.5'	SM SM																										
				71																												
					95.5'	SM SM																										
				71																												
					95.5'	SM SM																										
				71																												
					95.5'	SM SM																										
				71																												
					95.5'	SM SM																										
				71																												
					95.5'	SM SM																										
				71																												
					95.5'	SM SM																										
				71																												
					95.5'	SM SM																										
				71																												
					95.5'	SM SM																										
				71																												
					95.5'	SM SM																										
				71																												
					95.5'	SM SM																										
				71																												
					95.5'	SM SM																										
				71																												
					95.5'	SM SM																										
				71																												
					95.5'	SM SM																										
				71																												
					95.5'	SM SM																										
				71																												
					95.5'	SM SM																										
				71																												
					95.5'	SM SM																										
				71																												
					95.5'	SM SM																										
				71																												
					95.5'	SM SM																										
				71																												
					95.5'	SM SM																										
				71																												
					95.5'	SM SM																										
				71																												
					95.5'	SM SM																										
				71																												
					95.5'	SM SM																										
				71																												
					95.5'	SM SM																										
				71																												
					95.5'	SM SM																										
				71																												
					95.5'	SM SM																										

DEPTH	ELEVATION	SAMPLES	SAMPLE NO.	CHEM. SMPL RECOVERY (Inches)	N	SOIL or ROCK CLASSIFICATION	UNIFIED SOIL CLASSIF.	DENSITY (PCF)	WATER CONTENT (Percent)	PERMEABILITY (cm/sec)	MONITOR/PIEZOMETER CONSTRUCTION DETAILS				WATER PROBE READINGS				NOTES		
											DW-101				Temp. (°C)	Cond. (µmho/cm)	Eh (mV)	pH			
100	321.0		51		48	Grades to Gray, parting of brown	ML														
			52		50	-Grades to brown at ±103' 104.0'															
105			53		9	Brown SILT, little to trace fine sand															
			54		10	(Saturated-Loose)															
			55			-Grades to firm															
110			56		14																
			57		1	-Grades to loose 112.5'															
			58		10	Gray-reddish brown fine SAND		SM													
115			59		31	Some Silt (Saturated-Firm)															
			60		37	-Grading to compact															
120	311.0		61		37		SP-SM			3x10 ⁻⁴								Slug Test			
			62		26	Dark Gray medium-fine SAND, little silt, coarse sand and fine gravel															
			63		30	(Saturated-Firm) 124.0'															
125			64		27	Gray coarse-fine SAND and GRAVEL, little silt (Wet-Firm)															
	301.0		65		29		SP-SM														
130					39																
						131.5'															
						Gray fine ROCK FRAGMENTS															
135	297.0					Boring Terminated at 134.0'															
NOTE: See reverse side for key and explanation to log.						RUN NO.		RECOVERY (Percent)	RQD	Surface Elevation 431.0 Date Started 3/9/82 Date Completed 3/15/82 Number of Installations in Boring 1 Method of installation separate borings for each monitor				Project No. GTA-81-11A Project Title Crucible Steel Location Geddes, New York Classified By SMC Checked MR-L				HYDROGEOLOGIC LOG THOMSEN ASSOCIATES MONITOR NO. DW-101 Sheet 3 of 3			

DEPTH	ELEVATION	SAMPLES	SAMPLE NO.	CHEM. SMPL	RECOVERY (Inches)	N	SOIL or ROCK CLASSIFICATION	UNIFIED SOIL CLASSIF.	DENSITY (PCF)	WATER CONTENT (Percent)	PERMEABILITY (cm/sec)	MONITOR/PIEZOMETER CONSTRUCTION DETAILS				WATER PROBE READINGS				NOTES
												DW-102		Temp. [°C]	Cond. [µmho/cm]	Eh [mV]	pH			
												swl								
0																				
5																				
10	400																			
15																				
20	390																			
25							NO SAMPLES FROM 0 - 50'													
30	380																			
35																				
40	370																			
45																				
50																				
NOTE: See reverse side for key and explanation to log.		RUN NO.	RECOVERY (Percent)	RQD	Surface Elevation <u>410.0</u> Date Started _____ Date Completed <u>3/82</u> Number of Installations in Boring <u>1</u> Method of installation _____			Project No. <u>GTA-81-11A</u> Project Title <u>Crucible Steel</u> Location <u>Geddes, New York</u> Classified By <u>SMC</u> Checked <u>MR-L</u>				HYDROGEOLOGIC LOG THOMSEN ASSOCIATES MONITOR NO. <u>DW-102</u> Sheet <u>1</u> of <u>3</u>								

DEPTH	ELEVATION	SAMPLES	SAMPLE NO.	CHEM. SMPL	RECOVERY (Inches)	Z	SOIL or ROCK CLASSIFICATION	UNIFIED SOIL CLASSIF.	DENSITY (PCF)	WATER CONTENT (Percent)	PERMEABILITY (cm/sec)	MONITOR/PIEZOMETER CONSTRUCTION DETAILS					WATER PROBE READINGS				NOTES	
												DW-102					Temp. (°C)	Cond. (µmho/cm)	Eh (mV)	pH		
												swl										
55	350		1			6	Brown SILT and MARL; many shells alternating with layers and seams of gray fine SAND, SILT and MARL, little shells, and gray ORGANIC SILT, little clay (Wet-Loose) -grades to saturated with a layer of Brown SILT and MARL, many shells from 35'-57.5' (Wet-Loose)	ML-OL														
			2			8																
			3						3													
			4						8													
			5						9													
			6						16													
			7						23													
			8						23													
			9						22													
			10						26													
70	340		11			18	Gray, coarse-fine SAND, Some Silt, little fine gravel (Wet-Firm)	63.0' SM														
			12			25																
			13			22																
			14			25																
			15			25																
			16			15																
			17			13																
			18			22																
			19			19																
			20																			
85	330		21			90.0'	Layer of Brown Silt from 85.5' to 87.0'	ML														
			22			12																
			23			22																
			24			12																
			25			20																
			26			21																
90	320		21			90.0'	Gray SILT, Some fine Sand, traces fibrous organic, occasional seams of SILT and fine SAND, saturated	ML														
			22			12																
			23			22																
			24			12																
			25			20																
			26			21																
100	310																					

NOTE:
See reverse side for key and explanation to log.

Project No. GRA-81-11A
Project Title Crucible Steel
Location Geddes, New York
Classified By SMC Checked MR-L

HYDROGEOLOGIC LOG

THOMSEN ASSOCIATES

MONITOR NO. DW-102
Sheet 2 of 3

DEPTH	ELEVATION	SAMPLES	SAMPLE NO.	CHEM. SMPL RECOVERY (Inches)	N	SOIL or ROCK CLASSIFICATION	UNIFIED SOIL CLASSIF.	DENSITY (PCF)	WATER CONTENT (Percent)	PERMEABILITY (cm/sec)	MONITOR/PIEZOMETER CONSTRUCTION DETAILS				WATER PROBE READINGS				NOTES
											DW-103				Temp. (°C)	Cond. (µmho/cm)	Eh (mV)	pH	
											swl								
0					WOH	White SOLVAY WASTE with seams and partings of gray ash, silt-like (Moist-Soft)													
5			2		3														
10	414.9		3		5	Grading to clay-like with seams gray CHEMICAL WASTE (Wet-Soft)													
15			4		2														
20	404.9		5		2														
25			6		2														
30	394.9		7		2														
35			8		2	1" cemented seams													
40	384.9		9		4														
45			10		2														
	374.9																		
NOTE: See reverse side for key and explanation to log.		RUN NO.	RECOVERY (Percent)	ROD	Surface Elevation 424.9 Date Started 2/22/82 Date Completed 3/82 Number of Installations in Boring 1 Method of installation		Project No. GTA-81-11A Project Title Crucible Steel Location Geddes, New York Classified By SJR Checked MR-L				HYDROGEOLOGIC LOG				THOMSEN ASSOCIATES		MONITOR NO. DW-103 Sheet 1 of 4		

DEPTH	ELEVATION	SAMPLES	SAMPLE NO.	CHEM. SMPL	RECOVERY [Inches]	N	SOIL or ROCK CLASSIFICATION	UNIFIED SOIL CLASSIF.	DENSITY [PCF]	WATER CONTENT [Percent]	PERMEABILITY [cm/sec]	MONITOR/PIEZOMETER CONSTRUCTION DETAILS				WATER PROBE READINGS				NOTES	
												DW-103		Temp. [°C]	Cond. [µmho/cm]	Eh [mV]	pH				
												SW1									
55	364.9		11			3															
			12		0"	7	Firmer 1" seams, moist														
			13			2	Cemented seams grade out														
60			14			2	Grading to moist-wet														
			15			7	Grading to wet														
65			16			0	65.5'														
	354.9		17			7	2" ORGANIC seam Black organic CLAY and SILT (Moist)	OL													
			18			6	Light gray SILT and MARL, many gastropod shells, some fine-	OL													
70			19			0.3	medium sand, trace clay (Wet-Medium)														
			20			9	Black organic CLAY and SILT, few gastropod shells	OL													
75			21			13	Light gray MARL, many gastropod shells, trace fine sand, trace	CL													
			22			28	silt (Wet-Medium) 75.5'														
	344.9		22A			40	Dark gray CLAY (Wet-Medium)	CL													
80			23			48	Gray-brown SILT and very fine SAND (Wet-Firm)	ML													
			24			28															
85			25			26	2" seam of varved black Silt														
			26			6	Gray CLAY (Wet-Soft)	CL													
			27			7															
90	334.9		28			5															
			29			4															
95			30			7															
			31			9															
			32			11															
100																					

NOTE:
See reverse side
for key and
explanation to
log.

Project No. GTA-81-11A
Project Title Crucible Steel
Location Geddes, New York
Classified By SJR Checked MR-L

HYDROGEOLOGIC LOG



MONITOR NO.
DW-103
Sheet 2 of 4

DEPTH	ELEVATION	SAMPLES	SAMPLE NO.	CHEM. SMPL RECOVERY [Inches]	N	SOIL or ROCK CLASSIFICATION	UNIFIED SOIL CLASSIF.	DENSITY (PCF)	WATER CONTENT (Percent)	PERMEABILITY (cm/sec)	MONITOR/PIEZOMETER CONSTRUCTION DETAILS				WATER PROBE READINGS				NOTES	
											DW-103				Temp. (°C)	Cond. (µmho/cm)	Eh (mV)	pH		
105	314.9		33		5	Grading to CLAY and SILT, seams and partings of gray-brown SILT	ML-CL													
			34		16															
			35		2															
			36		7															
110			37		7				Grading to Brown-gray SILT, seams of Brown-gray CLAY 111.5'	ML										
		38		21																
115	304.9		39		31	Brown, very fine SAND, trace-little silt, layers of brown SILT with Some very fine Sand (Wet- Compact)	SM													
			40		31															
			41		38															
120			42		45															
			43		18															
125	294.9		44		48	Grading to fine SAND and SILT, thin seams of gray SILT														
			45		18															
			46		39															
130			47		31			Silt grades out												
			48		38				-Grading to trace-little silt											
135	284.9		49		34															
			50		29															
			51		51															
140			52		48															
			53		46															
145	274.9		54		43															
150																				
NOTE: See reverse side for key and explanation to log.		RUN NO.	RECOVERY (Percent)	RQD	Surface Elevation <u>424.9</u> Date Started <u>2/22/82</u> Date Completed <u>3/82</u> Number of Installations in Boring <u>1</u> Method of installation _____		Project No. <u>GTA-81-11A</u> Project Title <u>Crucible Steel</u> Location <u>Geddes, New York</u> Classified By <u>SJR</u> Checked <u>MR-L</u>				HYDROGEOLOGIC LOG THOMSEN ASSOCIATES MONITOR NO. <u>DW-103</u> Sheet <u>3</u> of <u>4</u>									

DEPTH	ELEVATION	SAMPLES	SAMPLE NO.	CHEM. SMPL RECOVERY [Inches]	N	SOIL or ROCK CLASSIFICATION	UNIFIED SOIL CLASSIF.	DENSITY [PCF]	WATER CONTENT [Percent]	PERMEABILITY [cm/sec]	MONITOR/PIEZOMETER CONSTRUCTION DETAILS			MONITOR/PIEZOMETER CONSTRUCTION DETAILS			NOTES	
											MS-104.1	MS-104.2	MS-104.3	MS-104.4	MS-104.5			
											swl	swl	swl	swl	swl			
			1		8	TOPSOIL												
			2		51	Brown SILT, little fine sand, trace fibrous organics (Wet-Loose)												
5			3		14	Brown SILT, SAND and GRAVEL, little cinders, asphalt 5.0'												
	416.8		4		4	White SOLVAY WASTE, silt-like (Moist-Loose)												
			5			Sample 3-seams of light gray FLYASH												
10			6		3	1" seam gray FLY ASH at 10.0'												
			7		2													
			8		2													
15			9		2	Several 1-2" seams of gray FLY ASH from 14'-16'												
			10		1	Light gray FLY ASH seam, cemented, at 17.3'												
20	406.8		11		1	Seams of gray FLY ASH from 18'-20'												
			12		0	Layer with Some Fly Ash from 20'-21'												
			13		2													
25			14		2													
			15		1													
30	396.8		16		7					2x10 ⁻⁵								Slug Test
			17		2													
			18		2	Seam with Some Fly Ash at 33.3'												
35			19		5	Cemented seam												
			20		4													
40	386.8		21		3	Wet to moist												Slug Test
			22		3													
			23		3													
45			24		2													
			25		4													
50	376.8				3	Wet from 49'-50.5'				3x10 ⁻⁵								Slug Test

NOTE:
See reverse side
for key and
explanation to
log.

Project No. GTA-81-11A
Project Title Crucible Steel
Location Geddes, New York
Classified By SMC Checked MR-L

HYDROGEOLOGIC LOG

THOMSEN ASSOCIATES

MONITOR NO.
MS-104

Sheet 1 of 2

DEPTH	ELEVATION	SAMPLES	SAMPLE NO.	CHEM. SMPL	RECOVERY (Inches)	N	SOIL or ROCK CLASSIFICATION	UNIFIED SOIL CLASSIF.	DENSITY (PCF)	WATER CONTENT (Percent)	PERMEABILITY (cm/sec)	MONITOR/PIEZOMETER CONSTRUCTION DETAILS			WATER PROBE READINGS				NOTES			
												MS-104.1		MS-104.2		MS-104.3		Temp. (°C)		Cond. (µmho/cm)	Eh (mV)	pH
												swl		swl		swl						
			26				Cemented seams															
			27			4																
			28			10																
55			29			0	Light grey seams with Some Fly Ash from 54'-66.5'															
	366.8		30			1																
60			31			1																
			32			3	Several orange-brown parting & seam from 62'-66.5', strong odor															
			33			3																
65			34			6	Dark Brown PEAT (Moist)	PT														
	356.8		35			20	Black ORGANIC SILT, trace fibrous organics (Moist-Firm to Compact)	OL														
70			36			32	Light grey MARL, and SILT many shells (Moist-Compact)	ML-OL														
			37			31																
			38			37	Dark brown ORGANIC CLAY & SILT, 6" seam of black Peat	ML-OL														
75			39			36	Grey SILT, trace fine sand (Moist-Compact)	ML														
	346.8		40			37	Brown SILT, little fine sand, trace fine sand and fibrous organics (Moist-Compact) 78.0'	ML														
80			41U			6	Grey-brown varved CLAY & SILT (Wet-Medium)	CL														
	344.8						Boring Terminated at 82.0'															
85																						

NOTE: See reverse side for key and explanation to log.	RUN NO.	RECOVERY (Percent)	RQD	Surface Elevation <u>426.8</u>	Project No. <u>GTA-81-11A</u>	HYDROGEOLOGIC LOG
				Date Started <u>3-18-82</u>	Project Title <u>Crucible Steel</u>	
				Date Completed <u>3-82</u>	Location <u>Geddes, New York</u>	
				Number of Installations in Boring <u>1</u>	Classified By <u>SMC</u> Checked <u>MR-L</u>	
				Method of installation <u>separate boring for each monitor</u>		
						THOMSEN ASSOCIATES
						MONITOR NO. MS-104
						Sheet <u>2</u> of <u>2</u>

DEPTH	ELEVATION	SAMPLES	SAMPLE NO.	CHEM. SMPL RECOVERY (Inches)	N	SOIL or ROCK CLASSIFICATION	UNIFIED SOIL CLASSIF.	DENSITY (PCF)	WATER CONTENT (Percent)	PERMEABILITY (cm/sec)	MONITOR/PIEZOMETER CONSTRUCTION DETAILS			MONITOR/PIEZOMETER CONSTRUCTION DETAILS			NOTES									
											MS-105.1			MS-105.2				MS-105.3			MS-105.4			MS-105.5		
											swl			swl				swl			swl			swl		
0			1			Brown CRUCIBLE WASTE, gravel, cinders, sand, metal, silt (Saturated) 2.5'																				
			2		4	White SOLVAY WASTE, silt-like																				
5			3		1																					
			4		2																					
	415.8		5		5	Cemented seams with Some Fly Ash																				
10			6		1	light grey FLY ASH seams from 10'-11' and 12'-13.5'																				
			7		2																					
15			8		1																					
			9		4	Cemented seam																				
	405.8		10		4																					
20			11		1																					
			12		2	Light grey FLY ASH seam																				
25			13		2	Light grey seams with Some Fly Ash and brown parting at 23.5'																				
			14		2	Cemented seam																				
	395.8		15		3					6x10 ⁻⁵									Slug Test							
30			16		2																					
			17		3																					
			18		2																					
35			19		1																					
			20		5					7x10 ⁻⁵									Slug Test							
40	385.8		21		3	Cemented seam with trace fly ash																				
			22		1	Saturated from 41'-43.5'				7x10 ⁻⁶									Laboratory Test							
45			23		1																					
			24		2	Brown seam at 45.0'																				
			25		1					5x10 ⁻⁵									Slug Test							
50	375.8				1	Cemented seams with little fly ash																				

NOTE: See reverse side for key and explanation to log.

Project No. GTA-81-11A
Project Title Crucible Steel
Location Geddes, New York
Classified By SMC Checked MR-L

HYDROGEOLOGIC LOG

THOMSEN ASSOCIATES

MONITOR NO. MS-105
Sheet 1 of 2

DEPTH	ELEVATION	SAMPLES	SAMPLE NO.	CHEM. SMPL RECOVERY [Inches]	N	SOIL or ROCK CLASSIFICATION	UNIFIED SOIL CLASSIF.	DENSITY [PCF]	WATER CONTENT [Percent]	PERMEABILITY [cm/sec]	MONITOR/PIEZOMETER CONSTRUCTION DETAILS			WATER PROBE READINGS				NOTES			
											MS-105.1		MS-105.2		MS-105.3		Temp. [°C]		Cond. [µmho/cm]	Eh [mV]	pH
											swl		swl		swl						
55	365.8		26		1	Wet from 51'-53'				5×10^{-6}								Laboratory Test			
			27		6	Grey FLY ASH seam at 53.0'															
			28		4	Cemented seam															
			29		5	Set from 58'-59'															
			30		6																
			31		11	Light grey cemented seam with Some Fly Ash from 61'-62'															
			32		11	Wet from 62'-65'															
			33		14	64.5'															
			34		31	Grey ORGANIC SILT and CLAY, trace fibrous organics (Moist to Wet-Medium) soft wet zones from 66'-67' and 68'-69'	OL, CL, ML				7×10^{-8} (a)										
			35		30	Dark brown ORGANIC SILT, little peat, trace fine sand & shells, decomposed wood seam	OL				8×10^{-6} (b)										
70	355.8		36		15													(a) Laboratory Test (b) Slug Test			
			37		25	Grey medium-fine SAND seam alternating with brown ORGANIC SILT, WOOD, black PEAT, and grey SILT and MARL seams (Wet-Firm) 76.0'	OL														
			38		17																
			39		27	Grey coarse-fine SAND and fine GRAVEL, Some Silt (Saturated to Moist-Firm)	SM														
80	345.8		40		19	Boring Terminated at 80.0'															

NOTE: See reverse side for key and explanation to log.

Project No. GTA-81-11A
Project Title Crucible Steel
Location Geddes, New York
Classified By SMC Checked MR-L

HYDROGEOLOGIC LOG

THOMSEN ASSOCIATES

MONITOR NO. MS-105
Sheet 2 of 2

DEPTH	ELEVATION	SAMPLES	SAMPLE NO.	CHEM. SMPL RECOVERY [inches]	N	SOIL or ROCK CLASSIFICATION	UNIFIED SOIL CLASSIF.	DENSITY (PCF)	WATER CONTENT (Percent)	PERMEABILITY (cm/sec)	MONITOR/PIEZOMETER CONSTRUCTION DETAILS			MONITOR/PIEZOMETER CONSTRUCTION DETAILS			NOTES	
											MS-106.1	MS-106.2	MS-106.3	MS-106.4	MS-106.5			
											swl	swl	swl	swl	swl			
0	416.8		1		6	CRUCIBLE WASTE, cinders, sand, gravel (Saturated-Loose)												
-5			2		3	White SOLVAY WASTE, silt-like (Moist-Loose) 4.5'												
			3		2													
			4		5	Seams of light grey FLY ASH from 10'-14.5', soft and cemented												
			5		1													
			6		1													
			7		1													
			8		1	Cemented seams with trace fly ash												
			9		4	Cemented seams												
-20		406.8		10		5	Light grey FLY ASH layer from 20'-22' and seams, and pockets of light grey FLY ASH from 22.2'-22.5' (Wet to Moist)											
			11		4													
			12		3													
-25			13		3	Light grey FLY ASH from 26'-27', wet												
			14		6													
-30	396.9		15		4	Cemented seams with Some Fly Ash from 29'-30'											Slug Test	
			16		9													
			17		5													
-35			18		2	Light grey FLY ASH seams from 34'-40'												
			19		7													
-40	386.8		20		5	Cemented seams with little fly ash											Slug Test	
			21		3	Light grey FLY ASH seam from 41.6'-42' cemented seams												
			22		4													
-45			23		5													
			24		2													
50	376.8				2	Grey FLY ASH seam at 49' with Some Fly Ash from 49'-51'												
NOTE: See reverse side for key and explanation to log.		RUN NO.	RECOVERY (Percent)	RQD	Surface Elevation <u>426.8</u> Date Started <u>3-2-82</u> Date Completed <u>3-82</u> Number of Installations in Boring <u>1</u> Method of installation <u>separate boring</u> <u>for each monitor</u>		Project No. <u>GTA-81-11A</u> Project Title <u>Crucible Steel</u> Location <u>Geddes, New York</u> Classified By <u>SMC</u> Checked <u>MR-L</u>					HYDROGEOLOGIC LOG			THOMSEN ASSOCIATES		MONITOR NO. MS-106 Sheet <u>1</u> of <u>2</u>	

DEPTH	ELEVATION	SAMPLES	SAMPLE NO.	CHEM. SMPL RECOVERY [Inches]	N	SOIL or ROCK CLASSIFICATION	UNIFIED SOIL CLASSIF.	DENSITY [PCF]	WATER CONTENT [Percent]	PERMEABILITY [cm/sec]	MONITOR/PIEZOMETER CONSTRUCTION DETAILS			WATER PROBE READINGS				NOTES			
											MS-106.1		MS-106.2		MS-106.3		Temp. [°C]		Cond. [µmho/cm]	Eh [mV]	pH
											swl		swl		swl						
55	366.8		25		2	Brown seams at 53' & 53.5'	PT-OL			6×10^{-5}								Slug Test			
			26		3																
			27		2	Cemented seams with trace fly ash															
			28		1																
			29		1	Light grey FLY ASH seam at 59.5'															
			30		3																
			31		3	63.5'															
			32		14	Black ORGANIC SILT, little fibrous organics, trace clay, and peat, 1/2" seam of grey CLAY (Moist)															
			33		12																
			34		14	Grades to Grey MARL and fine SAND, Some Silt and Shells at 65.5'					OL-ML		3×10^{-5}								
60		35		2	Grading to Brown ORGANIC SILT																
		36		6	Grading to grey slightly varved SILT & CLAY at 70'																
		37		4	Dark grey SILT and fine SAND, SILT seams with little fine sand and embedded fibrous organics & twigs (Saturated to Wet-Loose)77.0'																
		38		12																	
		39		13	Grey coarse-fine SAND & fine GRAVEL, Some Silt (Saturated-Firm)	SM															
					Boring Terminated at 80.0'																
NOTE: See reverse side for key and explanation to log.		RUN NO.	RECOVERY [Percent]	RQD	Surface Elevation <u>426.8</u> Date Started <u>3-2-82</u> Date Completed <u>3-82</u> Number of Installations in Boring <u>1</u> Method of installation <u>separate boring</u> <u>for each monitor</u>			Project No. <u>GTA-81-11A</u> Project Title <u>Crucible Steel</u> Location <u>Geddes, New York</u> Classified By <u>SMC</u> Checked <u>MR-L</u>					HYDROGEOLOGIC LOG THOMSEN ASSOCIATES MONITOR NO. <u>MS-106</u> Sheet <u>2</u> of <u>2</u>								

DEPTH	ELEVATION	SAMPLES	SAMPLE NO.	CHEM. SMPL RECOVERY (Inches)	N	SOIL or ROCK CLASSIFICATION	UNIFIED SOIL CLASSIF.	DENSITY (PCF)	WATER CONTENT (Percent)	PERMEABILITY (cm/sec)	MONITOR/PIEZOMETER CONSTRUCTION DETAILS				WATER PROBE READINGS				NOTES	
											CM-107				Temp. (°C)	Cond. (µmho/cm)	Eh (mV)	pH		
											sw1									
55	364.2		26																	
			27																	
			28			3	Cemented partings with Fly Ash													
			29			1	Orange brown seam at 55.5'													
			30			2	Cemented seams with Some Fly Ash													
60	364.2		31		5	Light grey FLY ASH partings and cemented seams														
			32		2															
65	360.2				27	62.5' Black ORGANIC SILT, trace fibrous organics, grading to greenish Brown CLAY (Moist-Firm) Boring Terminated @ 64'	OL-ML-CL													
NOTE: See reverse side for key and explanation to log.		RUN NO.	RECOVERY (Percent)	RQD	Surface Elevation <u>424.2</u> Date Started _____ Date Completed <u>3/82</u> Number of Installations in Boring <u>1</u> Method of installation _____			Project No. <u>GTA-81-11A</u> Project Title <u>Crucible Steel</u> Location <u>Geddes, New York</u> Classified By <u>SMC</u> Checked <u>MR-L</u>				HYDROGEOLOGIC LOG THOMSEN ASSOCIATES MONITOR NO. <u>CM-107</u> Sheet <u>2</u> of <u>2</u>								

DEPTH	ELEVATION	SAMPLES	SAMPLE NO.	CHEM. SMPL	RECOVERY (Inches)	N	SOIL or ROCK CLASSIFICATION	UNIFIED SOIL CLASSIF.	DENSITY (PCF)	WATER CONTENT (Percent)	PERMEABILITY (cm/sec)	MONITOR/PIEZOMETER CONSTRUCTION DETAILS				WATER PROBE READINGS				NOTES	
												CM-108 swl				Temp. (°C)	Cond. (µmho/cm)	Eh (mV)	pH		
0			1			11	White SOLVAY WASTE, silt-like (Moist-Firm)														
			2			51															
5			3			4	1" Light brown cemented seam (poor recovery)														
			4			4															
	415.4		5			5	Several partings and seams of Grey Fly Ash from 8.5-10.0'														
10			6			4	Light brown-Grey, cemented seam (poor recovery)														
			7			7	No Recovery														
15			8			1															
			9			7	Cemented seams														
20	405.4		10			14															
			11			3															
			12			4	Cemented seams with little fly ash														
25			13			20	Cemented seams														
			14			26															
30	395.4		15			23	Cemented seams with Some Fly Ash														
			16			-	Cemented seams with Some Fly Ash														
			17			4	Highly cemented FLY ASH seams at 32' & 35'														
35			18			11	Wet to moist 36'-37'														
			19			11															
40	385.4		20			19	Cemented seams with little fly ash														
			21			9	Cemented seams														
			22			9															
45			23			1															
			24			1															
50	375.4		25			2	Light grey Fly Ash seam at ±49.5'														

NOTE:
See reverse side
for key and
explanation to
log.

RUN NO.

RECOVERY
(Percent)

RQD

Surface Elevation 425.4

Date Started _____

Date Completed 3/82

Number of Installations in Boring 1

Method of installation _____

Project No. GTA-81-11A

Project Title Crucible Steel

Location Geddes, New York

Classified By SMC Checked MR-L

HYDROGEOLOGIC LOG

THOMSEN ASSOCIATES

MONITOR NO.
CM-108

Sheet 1 of 2

[illegible]

DEPTH	ELEVATION	SAMPLES	SAMPLE NO.	CHEM. SMPL RECOVERY (Inches)	N	SOIL or ROCK CLASSIFICATION	UNIFIED SOIL CLASSIF.	DENSITY (PCF)	WATER CONTENT (Percent)	PERMEABILITY (cm/sec)	MONITOR/PIEZOMETER CONSTRUCTION DETAILS				WATER PROBE READINGS				NOTES	
															Temp. (°C)	Cond. (µmho/cm)	Eh (mV)	pH		
0	417.1		1		30	Dark brown CRUCIBLE WASTE, sand, gravel, cinders, silt (Moist-Firm)						CM-109								
			2		16															
5			3		1	White SOLVAY WASTE, silt-like, traces of fly ash throughout (Moist-Loose)														
			4		0	Few Brown SILT-like parting from 6-8'														
10			5		3	Grey FLY ASH partings & seams up to ½" with a few 1"-2" cemented seams														
			6		1															
			7		3															
15			8		3	Cemented seam and trace fly ash														
			9		2	Cemented seam with few fly ash seams and partings														
20		407.1	10		5	Cemented seams														
		11		3																
		12		8	Several cemented seams; wet															
25		13		4	Moist															
		14		7	Cemented seams															
30	397.1	15		7	Brown SILT-little parting at 31.5'															
		16		4																
		17		13																
35		18		5																
		19		3	1" Grey FLY ASH seam															
40	387.1	20		8																
		21		0	1" Grey FLY ASH seam at 39'															
		22		5																
45		23		5																
		24		5	1" Grey FLY ASH seam															
50	377.1	25		7																
NOTE: See reverse side for key and explanation to log.		RUN NO.	RECOVERY (Percent)	RCD	Surface Elevation <u>427.1</u> Date Started <u>3/23/82</u> Date Completed <u>3/23/82</u> Number of Installations in Boring <u>1</u> Method of installation _____		Project No. <u>GTA-81-11A</u> Project Title <u>Crucible Steel</u> Location <u>Geddes, New York</u> Classified By <u>SMC</u> Checked <u>MR-L</u>					HYDROGEOLOGIC LOG THOMSEN ASSOCIATES				MONITOR NO. <u>CM-109</u> Sheet <u>1</u> of <u>2</u>				

DEPTH	ELEVATION	SAMPLES	SAMPLE NO.	CHEM. SMPL RECOVERY (Inches)	N	SOIL or ROCK CLASSIFICATION	UNIFIED SOIL CLASSIF.	DENSITY (PCF)	WATER CONTENT (Percent)	PERMEABILITY (cm/sec)	MONITOR/PIEZOMETER CONSTRUCTION DETAILS				WATER PROBE READINGS				NOTES
											CM-109				Temp. (°C)	Cond. (µmho/cm)	Eh (mV)	pH	
			26		2														
			27		4														
			28		3														
55			29		5														
	367.1		30		10	Partings and seams of grey cemented FLY ASH, wet													
			31		1														
			32		31	Light grey FLY ASH seam 64.5'													
60			33		33	Dark brown-black ORGANIC SILT, traces of grey sand, fibrous organics, seam of brown-grey CLAY & SILT	OL, ML, CL												
65	361.1					Boring Terminated at 66.0'													
70																			

NOTE:
See reverse side for key and explanation to log.

RUN NO.

RECOVERY (Percent)

RQD

Surface Elevation 427.1

Date Started 3/23/82

Date Completed 3/23/82

Number of Installations in Boring 1

Method of installation

Project No. GTA-81-11A

Project Title Crucible Steel

Location Geddes, New York

Classified By SMC

Checked MR-L

HYDROGEOLOGIC LOG

THOMSEN ASSOCIATES

MONITOR NO. CM-109

Sheet 2 of 2

DEPTH	ELEVATION	SAMPLES	SAMPLE NO.	CHEM. SMPL RECOVERY (Inches)	N	SOIL or ROCK CLASSIFICATION	UNIFIED SOIL CLASSIF.	DENSITY (PCF)	WATER CONTENT (Percent)	PERMEABILITY (cm/sec)	MONITOR/PIEZOMETER CONSTRUCTION DETAILS				WATER PROBE READINGS				NOTES		
											CM-201				Temp. (°C)	Cond. (µmho/cm)	Eh (mV)	pH			
											swl										
0	418.2		1		14	Brown CRUCIBLE WASTE															
			2		1	Brown SILT, sand (FILL)															
5			3		0	Greenish SOLVAY WASTE with CHROME & MANGNESE, silt-like, from 4-5'															
			4		4	Grades white															
10			5		10	Seams of greenish SOLVAY WASTE from 8'-10'															
			6		1	Grades White, with partings of grey Fly Ash from 11.5'-12.0'															
			7		3																
15			8		8	Cemented seams with seams of Grey Fly Ash from 14'-14.5'															
			9		2	Wet from 16'-17'															
20		408.2		10		8	Cemented seams Grey FLY ASH seams at 18.5' and 18.7'														
			11		0	Wet from 20'-21.5' with brown seam															
			12		6																
25			13		5	Very cemented light grey seam at 24.5'															
			14		5																
			15		11	Wet from 30'-32'															
30	398.2			16		14															
				17		23	Cemented zone from 33'-34'														
				18		4															
35				19		4															
			20		7	Orange-brown parting at 48.8'															
40		388.2		21		2	Grey parting of Dust @ 43.5'														
				22		4															
				23		2	Wet														
45				24		5															
				25		20	Brown parting at 49.5' with light grey cemented zone to 50'														
50	378.2																				

NOTE: See reverse side for key and explanation to log.

Project No. GTA-81-11A
Project Title Crucible Steel
Location Geddes, New York
Classified By SMC Checked MR-L

HYDROGEOLOGIC LOG

THOMSEN ASSOCIATES

MONITOR NO. CM-201
Sheet 1 of 2

DEPTH	ELEVATION	SAMPLES	SAMPLE NO.	CHEM. SMPL RECOVERY (Inches)	N	SOIL or ROCK CLASSIFICATION	UNIFIED SOIL CLASSIF.	DENSITY (PCF)	WATER CONTENT (Percent)	PERMEABILITY (cm/sec)	MONITOR/PIEZOMETER CONSTRUCTION DETAILS				WATER PROBE READINGS				NOTES	
											CM-201 swl				Temp. (°C)	Cond. (µmho/cm)	Eh (mV)	pH		
55	368.2		26		4															
			27		7	Cemented seams														
			28		1	Cemented seams														
			29		1															
			30		3															
60			31		3	Very cemented seams from 60'-66', turning light grey at 65'														
			32		10															
65			33		7															
			34		4	Sample No. 34-wet														
70	358.2		35		26	Brown PEAT & ORGANIC SILT (Old TOPSOIL)	OL													
						Greenish brown CLAY & SILT, traces of fibrous organics (Moist-Hard)	OL-ML													
						Boring terminated @ 70.0'														

NOTE:
See reverse side for key and explanation to log.

Surface Elevation 428.2
Date Started _____
Date Completed 4/82
Number of Installations in Boring 1
Method of installation separate borings for each monitor

Project No. GTA-81-11A
Project Title Crucible Steel
Location Geddes, New York
Classified By SMC Checked MR-L

HYDROGEOLOGIC LOG

THOMSEN ASSOCIATES

MONITOR NO. CM-201
Sheet 2 of 2

DEPTH	ELEVATION	SAMPLES	SAMPLE NO.	CHEM. SMPL	RECOVERY (Inches)	N	SOIL or ROCK CLASSIFICATION	UNIFIED SOIL CLASSIF.	DENSITY (PCF)	WATER CONTENT (Percent)	PERMEABILITY (cm/sec)	MONITOR/PIEZOMETER CONSTRUCTION DETAILS				MONITOR/PIEZOMETER CONSTRUCTION DETAILS				NOTES	
												PZ-201.1	PZ-201.2	PZ-201.3	PZ-201.4						
0							Brown CRUCIBLE WASTE					swl		swl		swl		swl			
							3.0'														
							Brown SILT (FILL) 4.0'														
							White-grey SOLVAY WASTE														
10	418.0																				
20	408.0						NO SAMPLES TAKEN														
30	398.0																				
40	388.0																				
50	378.0																				

NOTE:
See reverse side
for key and
explanation to
log.

Project No. GTA-81-11A
Project Title Crucible Steel
Location Geddes, New York
Classified By SMC Checked MR-L

HYDROGEOLOGIC LOG

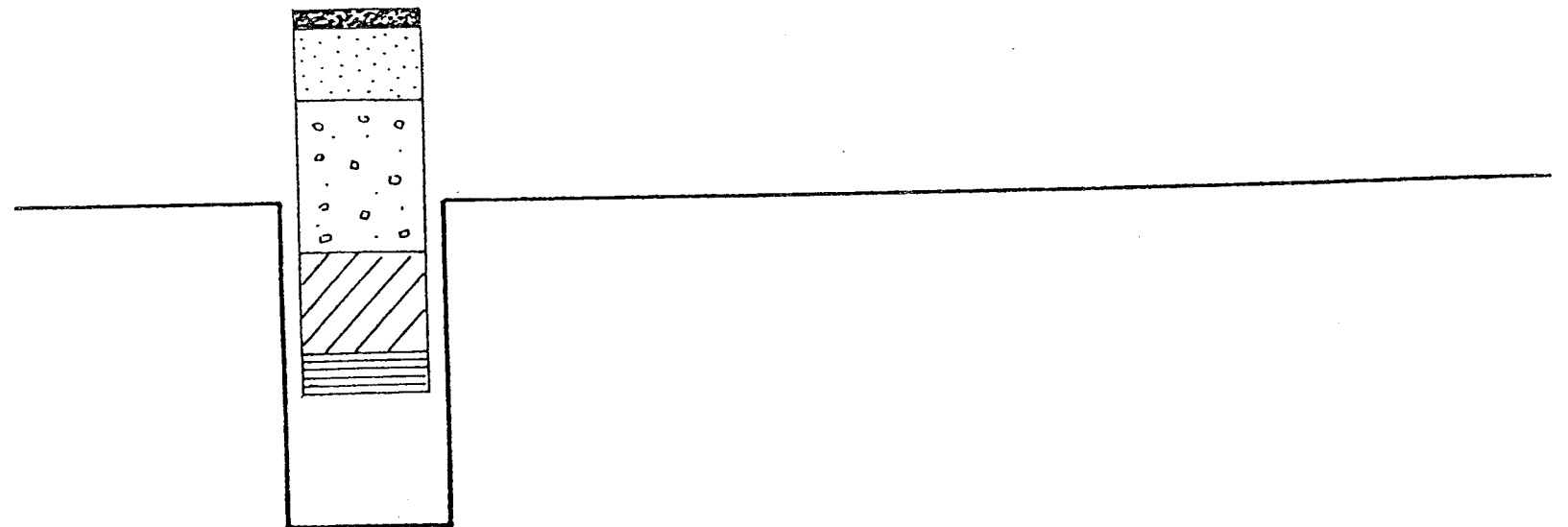
THOMSEN ASSOCIATES

MONITOR NO.
PZ-201.1-PZ-201.4

Sheet 1 of 2

[illegible]

SUBSURFACE LOGS



GENERAL INFORMATION & KEY TO SUBSURFACE LOGS

The Subsurface Logs attached to this report present the observations and mechanical data collected by the driller while at the site, supplemented by classification of the materials removed from the borings as determined through visual identification by technicians in the laboratory. It is cautioned that the materials removed from the borings represent only a fraction of the total volume of the deposits at the site and may not necessarily be representative of the subsurface conditions between adjacent borings or between the sampled intervals. The data presented on the Subsurface Logs together with the recovered samples will provide a basis for evaluating the character of the subsurface conditions relative to the proposed construction. The evaluation must consider all the recorded details and their significance relative to each other. Often analyses of standard boring data indicate the need for additional testing and sampling procedures to more accurately evaluate the subsurface conditions. Any evolutions of the contents of this report and the recovered samples must be performed by Professionals having experience in Soil Mechanics and Foundation Engineering. The information presented in the following defines some of the procedures and terms used on the Subsurface Logs to describe the conditions encountered.

- ① The figures in the Depth column defines the scale of the Subsurface Log.
- ② The Sample column shows, graphically, the exact depth range from which a sample was recovered. See Table I for a description of the symbols used to signify the various types of samples.
- ③ The Sample No. is used for identification on sample containers and/or Laboratory Test Reports.
- ④ Blows on Sampler—shows the results of the "Penetration Test", recording the number of blows required to drive a split spoon sampler into the soil beneath the casing. The number of blows required for each six inches penetration is recorded. The total number of blows required for the last 12 inches of penetration are summarized in the "N" column. The outside diameter of the sampler, the hammer weight and the length of drop are noted at the bottom of the Subsurface Log.
- ⑤ Blows on Casing— shows the number of blows required to advance the casing a distance of 12 inches. The casing size, the hammer weight and the length of drop are noted at the bottom of the Subsurface Log. If the casing is advanced by means other than driving, the method of advancement will be indicated in the Notes column or under Method of Investigation at the bottom of the Subsurface Log.
- ⑥ All recovered soil samples are reviewed in the laboratory by technicians. The visual descriptions are made on basis of the sample as recovered and in accordance with the Unified Classification System. Guide Lines for the terms used in descriptions are presented in Tables II and III. The description of the relative soil compactness or consistency is based upon the penetration records as defined in Table IV. The description of the soil moisture is based upon the condition of the sample as recovered. The moisture condition is described as dry, damp, moist or wet. Water used to advance the boring may have affected the in-situ moisture content of the sample. Special terms are used as required to describe materials in greater detail; several such terms are listed in Table V. When sampling gravelly soils with a standard two-inch diameter split spoon, the true percentage of gravel is often not recovered due to the relatively small sampler diameter. The presence of boulders and large gravel is sometimes, but not necessarily, detected by an evaluation of the casing and sampler blows or through the "action" of the drill rig as reported by the driller.
- ⑦ The description of rock shown is based upon the recovered rock core. Terms frequently used in the description are included in Table VI.
- ⑧ Miscellaneous observation and procedures noted by the driller are shown in this column, including water level observations. It is important to realize that the reliability of the water level observations depend upon the soil type (water does not readily stabilize in a hole through fine grained soils), and that drill water used to advance the borings may have influenced the observations. The ground water level typically will fluctuate seasonally. One or more perched or trapped water levels may exist in the ground seasonally. All the available readings should be evaluated. If definite conclusions cannot be made, it is often prudent to examine the conditions more thoroughly through test pit excavations or water observation installations.
- ⑨ The length of core run is defined as length of penetration between retrievals of the core barrel from the bore hole, expressed in feet and tenths of feet. The core recovery expresses the length of core recovered from the core barrel per core run, in percent. The size core barrel used is also noted. The more commonly used sizes of core barrels are denoted "AX" and "NX". The "NX" core, being larger in diameter than "AX" core, often produces better recovery, and is frequently utilized where accurate information regarding the geologic conditions and engineering properties is needed. The "NX" core barrel requires the use of four inch diameter casing.

DATE
STARTED 5-1-70
FINISHED 5-1-70
SHEET 1 OF 1

EMPIRE
SOILS INVESTIGATIONS, INC.

SUBSURFACE LOG

HOLE NO. B-175
SURF. ELEV. 325.6
C. W. DEPTH See Note #1

PROJECT XXXLOCATION YYY

DEPTH-FT.	SAMPLES	SAMPLE NO.	BLOWS ON SAMPLER				BLOW ON CASING C	CROSS SECTION	SOIL OR ROCK CLASSIFICATION	NOTES
			0-6	6-12	12-18	N				
0		1	2	2	3	5	10		TOPSOIL 3"	Note #1 G.W. at 2.0' completion G.W. at 2.2' 24 hrs. after completion
							15		Brown SILT, some Sand, trace clay (Moist - Loose)	
							50/5'		Gray SHALE, medium hard weathered, thin bedded some fractures	Cored 2.5'-5.0', Run #1 95 % Recovery AX Core
5										

①

②

③

④

⑤

⑥

⑦

⑧

⑨

TABLE I

	Split Spoon Sample
	Shelby Tube Sample
	Auger or Pit Sample
	Rock Core

TABLE II

Identification of soil type is made on basis of an estimate of particle sizes, and in the case of fine grained soils also on basis of plasticity.		
Soil Type	Soil Particle Size	
Boulder	>12"	Coarse Grained (Granular)
Cobble	3"-12"	
Gravel - Coarse	3/4"-3/4"	
- Fine	3/4"-#4	
Sand - Coarse	#4 - #10	Fine Grained
- Medium	#10 - #40	
- Fine	#40 - #200	
Silt - Non Plastic (Granular)	<#200	Fine Grained
Clay - Plastic (Cohesive)	<#200	

TABLE III

The following terms are used in classifying soils consisting of mixtures of two or more soil types. The estimate is based on weight of total sample.	
Term	Percent of Total Sample
"and"	35 - 50
"some"	20 - 35
"little"	10 - 20
"trace"	less than 10
(When sampling gravelly soils with a standard split spoon, the true percentage of gravel is often not recovered due to the relatively small sampler diameter.)	

TABLE IV

The relative compactness or consistency is described in accord with the following terms.			
Granular Soils		Cohesive Soils	
Term	Blows per Foot, N	Term	Blows per Foot, N
Loose	< 10	Very Soft	< 2
Firm	11 - 30	Soft	3 - 5
Compact	31 - 50	Medium	6 - 15
Very Compact	> 51	Stiff	16 - 25
		Hard	> 26
(Large particles in the soils will often significantly influence the blows per foot recorded during the Penetration Test.)			

TABLE V

Varved -	Alternating layers, seams, and partings of soils.
Layer -	Soil deposit more than 6" thick.
Seam -	Soil deposit less than 6" thick.
Parting -	Soil deposit less than 1/8" thick.
Uniform -	All grains are of about the same diameter.

TABLE VI

Rock Classification Terms		Meaning
Hardness	Soft Medium Hard Hard Very Hard	Scratched by fingernail Scratched easily by penknife Scratched with difficulty by penknife Cannot be scratched by penknife
Weathering	Very Weathered Weathered Sound	Judged from the relative amounts of disintegrating iron staining, core recovery, clay seams, etc.
Bedding	Laminated Thin bedded Bedded Thick bedded Massive	Natural breaks in Rock Layers { <1" } { 1" - 4" } { 4" - 12" } { 12" - 36" } { >36" }
(Fracturing refers to natural breaks in the rock oriented at some angle to the rock layers.)		

DATE STARTED 4/2/81 FINISHED 4/6/81 SHEET 1 OF 2			EMPIRE SOILS INVESTIGATIONS, INC.		HOLE NO. B-1C SURF. ELEV. 425.8 G. W. DEPTH 43' at completion	
PROJECT Crucible Steel Solid Waste Management Facility			LOCATION Tn of Geddes, N. Y. File GTA 81-11		SUBSURFACE LOG	
DEPTH-FT	SAMPLES	SAMPLE NO	BLOWS ON SAMPLER	BLOW ON CASING C	SOIL OR ROCK CLASSIFICATION	NOTES
			0 6 12 18- N			
0						FILL: SLAG, BRICK, etc.
						2.8'
5						SILT, SAND, organic matter, waste
						4.8'
			1 1			White CHEMICAL WASTE, occasional gray moist seams (Moist-very soft)
			1 1= 12"			
10						
			2 1 1	2		
			1			
15						
			3 1 1	2		
			1 1			
			4 1 1			
20			1 2	3		
			5 1 1			
			1 2	4		
			6 2 1			
			1 1	3		
25			7 2 1			
			UD-1			Pushed 3" tube from 25.0' to 27.0'; 2.0' recovery
30						
			1 1	2		
			8 1 1			
35						
			UD-2			Pushed 3" tube from 35.0' to 37.0'; 2.0' recovery. Harder push final 1.2'.
40						
N = No. blows to drive 2 "spoon 12 "with 140 lb. pin wt. falling 30 "per blow. CLASSIFICATION Visual by C = No. blows to drive "casing "with lb. weight falling "per blow. driller and geologist METHOD OF INVESTIGATION: 3.25" I.D. Hollow Stem Auger Casing; Standard Penetration Tests						

DATE STARTED 4/2/81 FINISHED 4/6/81 SHEET 2 OF 2			EMPIRE SOILS INVESTIGATIONS, INC.		HOLE NO. B-1C SURF. ELEV. 425.8 G. W. DEPTH 43' at completion	
PROJECT Crucible Steel Solid Waste Management Facility			LOCATION Tn of Geddes, N. Y. File GTA 81-11		SUBSURFACE LOG	
DEPTH-FT	SAMPLES	SAMPLE NO	BLOWS ON SAMPLER	BLOW ON CASING C	SOIL OR ROCK CLASSIFICATION	NOTES
			0 6 12 18- N			
40			1 1	3		White CHEMICAL WASTE (Moist-soft)
			9 2 2			
45						Pushed 3" tube from 45.0' to 47.0'; 1.0' recovery (soft & wet: flowed out of tube)
			UD-3			
50						Pushed 3" tube from 47.0' to 49.0'; 2.0' recovery
			W H= 12"			WH denotes weight of 140 lb. hammer
			10 1 2			
55						
			UD-4			Pushed 3" tube from 55.0' to 57.0'; 2.0' recovery
60			11 W O R= 36"			
			W H= 12"			Pushed 3" tube from 62.0' to 64.0'; 2.0' recovery
			12 1 2			Pushed 3" tube from 64.0' to 65.2'; 1.1' recovery
			UD-5			63.8'
65			UD-6			SILT, CLAY, trace organic matter
						65.2'
						Boring terminated at 65.2'
70						
N = No. blows to drive 2 "spoon 12 "with 140 lb. pin wt. falling 30 "per blow. CLASSIFICATION Visual by C = No. blows to drive "casing "with lb. weight falling "per blow. driller and geologist METHOD OF INVESTIGATION: 3.25" I.D. Hollow Stem Auger Casing; Standard Penetration Tests						

DATE STARTED 3/25/81 FINISHED 3/26/81 SHEET 1 OF 2		 EMPIRE SOILS INVESTIGATIONS, INC.		HOLE NO. B-2 SURF. ELEV. 426.5 G. W. DEPTH 42.3' at completion		
PROJECT Crucible Steel Solid Waste Management Facility		LOCATION Tn of Geddes, N. Y. File GTA 81-11		SUBSURFACE LOG		
DEPTH-FT	SAMPLES	SAMPLE NO	BLOWS ON SAMPLER	BLOW ON CASING C	SOIL OR ROCK CLASSIFICATION	NOTES
0			0 6 12 18 N			
		1	6 12	25		FILL: Brown SILT, SAND, GRAVEL, SLAG, etc. (Damp-firm) 2.5'
5		2	1= 12"		White CHEMICAL WASTE (Moist-very soft)	OW-21 60.0-64.0' OW-22 28.0'-57.0' OW-23 10.0'-26.0'
10		3	1 1	2	Moist to wet, loose gray waste seams common below 10'	
15		4	1= 12"			
		5	1= 12"			
20		6	1= 12"			
		7	1 1	3		
25		8	1 1	4	Drier, relatively harder waste seams 23'-25'	
		9	1 1	5	Occasional partings loose brown granular waste 25'-40'	
30		10	1 3	6		
35		11	1 1	3		
40						

N = No. blows to drive 2 "spoon 12 "with 140 lb. pin wt. falling 30 "per blow.
C = No. blows to drive "casing "with lb. weight falling "per blow.
METHOD OF INVESTIGATION: 3.25" I.D. Hollow Stem Auger Casing; Standard Penetration Tests

CLASSIFICATION Visual by
driller and geologist

DATE STARTED 3/25/81 FINISHED 3/26/81 SHEET 2 OF 2		 EMPIRE SOILS INVESTIGATIONS, INC.		HOLE NO. B-2 SURF. ELEV. 426.5' G. W. DEPTH 42.3' at completion		
PROJECT Crucible Steel Solid Waste Management Facility		LOCATION Tn of Geddes, N. Y. File GTA 81-11		SUBSURFACE LOG		
DEPTH-FT	SAMPLES	SAMPLE NO	BLOWS ON SAMPLER	BLOW ON CASING C	SOIL OR ROCK CLASSIFICATION	NOTES
40			0 6 12 18 N			
		1	1 1	4	White CHEMICAL WASTE (Moist/wet-soft)	
		12	3 42			
45						
		1	4	11	Grades at 46'± to well-layered, interbedded soft white wet waste and hard cemented gray granular waste; bedding interval 1"-2".	Encountered free water at 43.4'
		13	7 19			
50						
		13	7	11		
		14	4 4			
55						
		15	3 4	19		
		15	15 8			
		16	12 22	56		
60		17	34 35		Very compact cemented granular gray waste	
		18	15 44	104/.2		
		18	200/.2			
		5	6	10	Grades wet & soft at 61'	
		19	4 6			
65		6	10	28		
		20	18 24		65.0' Black ORGANIC CLAY 66.0' Boring terminated at 66.0'	
70						

N = No. blows to drive 2 "spoon 12 "with 140 lb. pin wt. falling 30 "per blow.
C = No. blows to drive "casing "with lb. weight falling "per blow.
METHOD OF INVESTIGATION: 3.25" I.D. Hollow Stem Auger Casing; Standard Penetration Tests

CLASSIFICATION Visual by
driller and geologist

DATE STARTED 3/23/81 FINISHED 3/24/81 SHEET 1 OF 3		 EMPIRE SOILS INVESTIGATIONS, INC. SUBSURFACE LOG		HOLE NO. B-4 SURF. ELEV. 426.0 G. W. DEPTH See Note			
PROJECT Crucible Steel Solid Waste Management Facility		LOCATION Tn of Geddes, N. Y. File GTA 81-11					
DEPTH-FT	SAMPLE NO	BLOWS ON SAMPLER			BLOW ON CASING C	SOIL OR ROCK CLASSIFICATION	NOTES
		0	6	12	18	N	
0			6	13		31	
	1		18	17			
							FILL: Black ASH, COAL, METAL, cinders, crushed stone, etc. (Damp-compact) 2.5'
5							
			3	1=18"			
	2						
							FILL: Brown fine SAND, little silt, metal, rags, etc. 5.6'
							White to gray CHEMICAL WASTE (Moist-very soft)
10			1	1=12"			
	3			2			
15							
			2	2		4	
	4		2	1			
			1	1=12"			Similar; wet, soft gray seams noted to 19'±
	5			1			
20			1	1=12"			
	6			1			
			1	2		3	
	7		1	3			Similar; occasional gray cemented granular waste seams
25			1	8		11	
	8		3	1			Sample 8 wet/saturated
			WH	1		3	
	9		2	1			
30							
			4	1		2	
	10		1	1			
							Cemented waste first 0.5' of sample
35							
			1	1=12"			
	11			1			
40							
							WH denotes weight of sampling hammer (140 lbs)
							OW-41 67.0'-84.5' OW-42 56.5'-65.0' OW-43 20.0'-54.5'
							Note: Water level 41.3' with borehole advanced to 63.0'
							Note: Installed Piezometers:
							CLASSIFICATION Visual by driller and geologist
							METHOD OF INVESTIGATION: 3.25" I.D. Hollow Stem Auger Casing; Standard Penetration Tests

☞ = No. blows to drive 2 "spoon 12" with 140 lb. pin wt. falling 30" per blow.
☞ = No. blows to drive "casing" with lb. weight falling "per blow.

DATE STARTED 3/23/81 FINISHED 3/24/81 SHEET 2 OF 3		 EMPIRE SOILS INVESTIGATIONS, INC. SUBSURFACE LOG		HOLE NO. B-4 SURF. ELEV. 426.0 G. W. DEPTH See Note			
PROJECT Crucible Steel Solid Waste Management Facility		LOCATION Tn of Geddes, N. Y. File GTA 81-11					
DEPTH-FT	SAMPLE NO	BLOWS ON SAMPLER			BLOW ON CASING C	SOIL OR ROCK CLASSIFICATION	NOTES
		0	6	12	18	N	
40			1=	18"			
	12			1			
							White to gray CHEMICAL WASTE (Moist-very soft)
45							
			WH	1=12"			
	13			1			
							Hard layer 48.2'-48.6'
50			1	1		2	
	14		1	1			
							Similar; wet Plastic (bag?) recovered in sample 14
55							
			W	H=18"			
	15			1			
			2	7		15	
	16		8	7			
			1=	12"			
60			17	3		4	
			1=	12"			
	18		1=	12"			
							62.3'
	UD-1						
							TOPSOIL 63.8'
	19	26	52				
							Brown SILT, trace clay (possible weathered shale fill) 65.0'
							Brown-gray fine SAND & MARL (Moist-firm)
			18	15		29	
	21		14	13			
			3	5		9	
70			22	4		5	
			4	3		8	
	23		5	5			
			3	4		8	
75			24	4		5	
			2	2		6	
	25		4	5			
			7	12		25	
							77.2'
	26	13	11				
		5	6			11	
80							
							Gray fine to medium SAND, little silt, trace organic & gravel 77.8'
							Gray fine to medium GRAVEL & fine to medium SAND, little silt
							Sample 26, wet Grading saturated & firm at 77.8'
							CLASSIFICATION Visual by driller and geologist
							METHOD OF INVESTIGATION: 3.25" I.D. Hollow Stem Auger Casing; Standard Penetration Tests

☞ = No. blows to drive 2 "spoon 12" with 140 lb. pin wt. falling 30" per blow.
☞ = No. blows to drive "casing" with lb. weight falling "per blow.

DS-4

DATE STARTED <u>3/23/81</u> FINISHED <u>3/24/81</u> SHEET <u>3</u> OF <u>3</u>	 EMPIRE SOILS INVESTIGATIONS, INC.	HOLE NO. <u>B-4</u> SURF. ELEV. <u>426.0</u> C. W. DEPTH <u>See Note</u>
SUBSURFACE LOG		

PROJECT <u>Crucible Steel</u> <u>Solid Waste Management Facility</u>	LOCATION <u>Tn of Geddes, N. Y.</u> <u>File GTA 81-11</u>

DEPTH-FT	SAMPLES	SAMPLE NO	BLOWS ON SAMPLER				BLOW UN CASING C	SOIL OR ROCK CLASSIFICATION	NOTES
			0	6	12	18-			
80		27	5	6				Gray fine to medium SAND, some fine to medium gravel, some silt (Wet-firm)	
			7	7		19			
		28	12	12					
			8	7		15		85.0'	
85		29	8	10					
								Boring terminated at 85.0'	

N = No. blows to drive 2 "spoon 12 "with 140 lb. pin wt. falling 30 "per blow.
C = No blows to drive "casing "with lb. weight falling "per blow.
METHOD OF INVESTIGATION: 3.25" I.D. Hollow Stem Auger Casing; Standard Penetration Tests

CLASSIFICATION Visual by
driller and geologist

DATE STARTED <u>3/19/81</u> FINISHED <u>3/20/81</u> SHEET <u>1</u> OF <u>2</u>		EMPIRE SOILS INVESTIGATIONS, INC. SUBSURFACE LOG		HOLE NO. <u>B-5</u> SURF. ELEV. <u>424.5</u> G. W. DEPTH <u>See Note</u>	
PROJECT <u>Crucible Steel</u> <u>Solid Waste Management Facility</u>		LOCATION <u>Tn of Geddes, N. Y.</u> <u>File GTA 81-11</u>			

DEPTH-FT	SAMPLE NO	BLOWS ON SAMPLER					BLOW ON CASING C	SOIL OR ROCK CLASSIFICATION	NOTES
		0-6	6-12	12-18	18-24	N			
0	1	1	2			7		White to gray CHEMICAL WASTE (Moist-soft to medium)	Note: With borehole advanced to 24' 1200 hours 3/19, no water in casing; with borehole advanced to 65' 1700 hours 3/19, no water in casing; no water in casing 0900 hours 3/20. Free water in sample 3 Similar; grading wet Similar; grading moist Relatively hard gray cemented layers in sample 4 Possible thin wet zone in sample 5 Free water in sample 7 Note: Installed Piezometers: OW-51 59.0'-63.0' OW-52 23.0'-57.0' OW-53 12.0'-22.0' Installed sampling wells in separate holes: S-55 17.0'-26.0' S-56 53.0'-61.0'
1	5	7							
5	2	1	1			3			
2	2	2							
10	3	2	1			5			
3	4	4							
15	4	3	1			2			
4	1	1							
50	13					29			
5	16	16							
20	6	3	5			12			
7	7	7							
5	8	8				15			
7	7	6							
3	5					10			
8	5	7							
3	2					4			
9	2	4							
30	10	2	3			6			
3	3	4							
35	11	2	1			4			
3	3	2							
40									

N = No. blows to drive 2 "spoon 12 "with 140 lb pin wt. falling 30 "per blow.
 C = No. blows to drive 3.25 "casing 3.25 "with 140 lb weight falling 30 "per blow.
 METHOD OF INVESTIGATION: 3.25" I.D. Hollow Stem Auger Casing; Standard Penetration Tests

CLASSIFICATION Visual by
 driller and geologist

DATE STARTED <u>3/19/81</u> FINISHED <u>3/20/81</u> SHEET <u>2</u> OF <u>2</u>		EMPIRE SOILS INVESTIGATIONS, INC. SUBSURFACE LOG		HOLE NO. <u>B-5</u> SURF. ELEV. <u>424.5</u> G. W. DEPTH <u>See Note</u>	
PROJECT <u>Crucible Steel</u> <u>Solid Waste Management Facility</u>		LOCATION <u>Tn of Geddes, N. Y.</u> <u>File GTA 81-11</u>			

DEPTH-FT	SAMPLE NO	BLOWS ON SAMPLER					BLOW ON CASING C	SOIL OR ROCK CLASSIFICATION	NOTES
		0-6	6-12	12-18	18-24	N			
40	12	2	3			6		White to gray CHEMICAL WASTE (Moist-very soft to soft)	WH denotes weight of sampling hammer (140 lbs) Occasional partings gray granular waste 55'-64'
45	13	1	1			2			
50	14	W	H=18"						
55	15	1	1			2			
60	16	1	1			2			
17	1	2							
1	2					5			
3	3								
5	6					14			
8	10								
5	6					12			
6	7								
64.0'								Black ORGANIC CLAY	Petroleum impregnation to samples below 64'±
64.5'								Black CINDERS (?)	
65.0'								Black PEAT & ORGANIC SILT	
66.0'								Gray fine SAND & SILT (Moist)	
67.0'								Boring terminated at 67.0'	
70									

N = No. blows to drive 2 "spoon 12 "with 140 lb pin wt. falling 30 "per blow.
 C = No. blows to drive 3.25 "casing 3.25 "with 140 lb weight falling 30 "per blow.
 METHOD OF INVESTIGATION: 3.25" I.D. Hollow Stem Auger Casing; Standard Penetration Tests

CLASSIFICATION Visual by
 driller and geologist

DATE STARTED <u>3/9/81</u> FINISHED <u>3/10/81</u> SHEET <u>1</u> OF <u>1</u>		 EMPIRE SOILS INVESTIGATIONS, INC. SUBSURFACE LOG		HOLE NO. <u>B-6</u> SURF. ELEV. <u>387.4</u> G. W. DEPTH. <u>See Note</u>	
PROJECT <u>Crucible Steel</u> <u>Solid Waste Management Facility</u>			LOCATION <u>Tn of Geddes, N.Y.</u> <u>File GTA 81-11</u>		

DEPTH-FT	SAMPLE NO	BLOWS ON SAMPLER				BLOW ON CASING C	SOIL OR ROCK CLASSIFICATION	NOTES
		0-6	6-12	12-18	18-N			
0							TOPSOIL 0.1'	Note: First free water noted in sample 7; with borehole advanced to 38', water level 16.5'; water level 14.5' in casing at completion. Note: Installed Piezometers: OW-61 32.0'-40.0' OW-62 10.0'-28.0'
1	W	H=24"					White to gray CHEMICAL WASTE (Wet-very soft to soft) Similar; moist	
2	WH	1						
3	WH	1			2			
4	1	1						
5	WH	1						
6	1	1						
7	1	1						
8	WH	12"						
9	1	WH/12"						
10	5	1	WH				Similar; moist/wet	Note: Installed Piezometers: OW-61 32.0'-40.0' OW-62 10.0'-28.0'
11	6	1						
12	7	W	H=24"				Wet at 13'.	
13	WH	1						
14	8	WH	12"				Little embedded hard (dried) waste in sample 8	
15	9	WH	1					
16	10	WH	12"					
17	11	1	1					
18	12	2	2		4			
19	13	2	3		5		Grading moist at 22'	
20	14	2	2					WH denotes weight of sampling hammer (140 lbs)
21	15	2	1		3			
22	16	2	1					
23	17	2	1					
24	18	2	1					
25	19	2	1					
26	20	2	1					
27	21	2	1					
28	22	2	1					
29	23	2	1					
30	15	2	2				Gray-white MARL with peat partings & organic silt laminations; sea-shells, trace gravel (Moist/wet-very soft) No recovery, 32'-34'	Boring terminated at 40.0'
31	16	2	1		3			
32	17	2	1					
33	18	2	1					
34	19	2	1					
35	20	2	1					
36	21	2	1					
37	22	2	1					
38	23	2	1					
39	24	2	1					
40	17	W	H=24"				Grading at 37' to gray SILT & fine SAND, trace embedded seashells (Saturated - firm)	
41	18	W	H=24"					
42	5	5			10			
43	19	5	6					

N = No. blows to drive 2 "spoon 12" with 140 lb. pin wt. falling 30" per blow.
 C = No. blows to drive _____ "casing" with _____ lb. weight falling _____ "per blow.
 METHOD OF INVESTIGATION: 3.25" I.D. Hollow Stem Auger Casing; Standard Penetration Tests

CLASSIFICATION Visual by
driller and geologist

DATE STARTED <u>3-30-81</u> FINISHED <u>3-31-81</u> SHEET <u>1</u> OF <u>3</u>		 EMPIRE SOILS INVESTIGATIONS, INC. SUBSURFACE LOG		HOLE NO. <u>B-7</u> SURF. ELEV. <u>427.9</u> G. W. DEPTH. <u>see note</u>	
PROJECT <u>Crucible Steel</u> <u>Solid Waste Management Facility</u>			LOCATION <u>Tn of Geddes, N. Y.</u> <u>File GTA 81-11</u>		

DEPTH-FT	SAMPLE NO	BLOWS ON SAMPLER				BLOW ON CASING C	SOIL OR ROCK CLASSIFICATION	NOTES
		0-6	6-12	12-18	18-N			
0							FILL: Brown/black ASH, CINDERS, silt, sand, gravel, brick, slag, etc. (Damp-firm)	Note: With borehole advanced to 69', water level 42.3'. Trapped water noted 4'-6'. Note: Installed Piezometers: OW-71 68.0'-87.0' OW-72 58.0'-64.0' OW-73 20.0'-56.0'
1	1	5	7					
2	2	1			3		FILL: Brown SILT & fine SAND, little fine gravel, roots, wood (Wet-soft)	
3	3	1	1			2		
4	4	1	1				White CHEMICAL WASTE (Moist-very soft)	
5	5	2	3					
6	6	1	1					
7	7	1	1					
8	8	1	1					
9	9	2	1					
10								Occasional moist soft gray seams noted.
11	1	1	12"					
12	1	2			4			
13	1	2	3					
14	1	1						
15	1	1						
16	1	1						
17	1	1						
18	1	1						
19	1	1						
20								Thin wet zone noted below 25'
21	1	1						
22	1	1						
23	1	1						
24	1	1						
25	1	1						
26	1	1						
27	1	1						
28	1	1						
29	1	1						
30	10	1	1		2			Occasional hard cemented granular waste seams noted below 35'
31	1							
32								
33								
34								
35								
36								
37								
38								
39								
40								Free water in sample 11
41								
42								
43								
44								
45								
46								
47								
48								
49								

N = No. blows to drive 2 "spoon 12" with 140 lb. pin wt. falling 30" per blow.
 C = No. blows to drive _____ "casing" with _____ lb. weight falling _____ "per blow.
 METHOD OF INVESTIGATION: 3.25" I.D. Hollow Stem Auger Casing; Standard Penetration Test

CLASSIFICATION Visual by
driller and geologist

DATE STARTED 3-30-81 FINISHED 3-31-81 SHEET 2 OF 3		 EMPIRE SOILS INVESTIGATIONS, INC.		HOLE NO. B-7 SURF. ELEV. 427.9 G. W. DEPTH see note		
SUBSURFACE LOG						
PROJECT Crucible Steel Solid Waste Management Facility		LOCATION Tn of Geddes, N. Y. File GTA 81-11				
DEPTH-FT	SAMPLES	SAMPLE NO	BLOWS ON SAMPLER	BLOW ON CASING C	SOIL OR ROCK CLASSIFICATION	NOTES
			0 6 12 18- N			
40	/	12	3 2	5	White CHEMICAL WASTE (Moist-soft)	
			1			
45	/		1			
		13	1 2	3		
			1			
50	/		1			
		14	1 2	3		
			3			
55	/		1 1			
		15	1= 12"		Harder cemented seams and wet zones noted below 55'	
			1 2	3		
		16	1 1			
60	/		1 1	3		
		17	2 2			
			1 1			
		18	1= 12"			
65	/		1 2	4		
		19	2 3		Sample 19 saturated Moist 65'-66'	
			1 2	6		
		20	4 8			
			12 12	25		
		21	13 14		Gray-black ORGANIC SILT with embedded seashells & wood (Moist-stiff)	Petroleum (?) odor pronounced below 63'±
70	/		7 8	16		
		22	8 10			
			7 12	27		Sample 23 recovered 1.3' wood
		23	15 13			
			6 7	15		
75	/	24	8 7			
			8 5	11		
		25	6 8			
			5 6	12		
80	/	26	6 5			
			3 5	11	Interbedded fine SAND & ORGANIC SILT with embedded wood (Wet-medium)	
N = No. blows to drive 2 "spoon 12" with 140 lb. pin wt. falling 30" per blow.		CLASSIFICATION Visual by				
C = No. blows to drive "casing" with lb. weight falling "per blow.		driller and geologist				
METHOD OF INVESTIGATION: 3.25" I.D. Hollow Stem Auger Casing; Standard Penetration Tests						

DATE STARTED 3-30-81 FINISHED 3-31-81 SHEET 3 OF 3		 EMPIRE SOILS INVESTIGATIONS, INC.		HOLE NO. B-7 SURF. ELEV. 427.9 G. W. DEPTH see note		
SUBSURFACE LOG						
PROJECT Crucible Steel Solid Waste Management Facility		LOCATION Tn of Geddes, N. Y. File GTA 81-11				
DEPTH-FT	SAMPLES	SAMPLE NO	BLOWS ON SAMPLER	BLOW ON CASING C	SOIL OR ROCK CLASSIFICATION	NOTES
			0 6 12 18- N			
80	/	27	6 6		Interbedded fine SAND & ORGANIC SILT with wood & seashells (Wet-medium)	82.0'
			7 7	17		
		28	10 11			
			12 12	24		
85	/	29	12 12		Gray fine to medium SAND, fine to medium GRAVEL & SILT (Saturated - firm)	84.0'
			8 10	18		
		30	8 9		Gray fine SAND, some silt (Saturated - firm)	87.0'
90	/				Boring terminated at 87.0'	
N = No. blows to drive 2 "spoon 12" with 140 lb. pin wt. falling 30" per blow.		CLASSIFICATION Visual by				
C = No. blows to drive "casing" with lb. weight falling "per blow.		driller and geologist				
METHOD OF INVESTIGATION: 3.25" I.D. Hollow Stem Auger Casing; Standard Penetration Tests						

DATE STARTED 3/16/81 FINISHED 3/17/81 SHEET 1 OF 2	 EMPIRE SOILS INVESTIGATIONS, INC. SUBSURFACE LOG	HOLE NO. B-8 SURF. ELEV. 425.2 G. W. DEPTH. See Note
PROJECT Crucible Steel Solid Waste Management Facility		LOCATION Tn of Geddes, N. Y. File GTA 81-11

DEPTH-FT	SAMPLE NO.	BLOWS ON SAMPLER				BLOW ON CASING C	SOIL OR ROCK CLASSIFICATION	NOTES
		0-6	6-12	12-18	N			
0								
1	1	1	2		3		White to gray CHEMICAL WASTE with 1/2"-1" hard gray granular waste seams (Moist-soft)	Note: First free water noted in sample 12; with borehole advanced to 34' 1615 hours 3/16, no water in casing; no water in casing 0800 hours 3/17; with borehole completed at 60' 1200 hours 3/17, no water in casing.
2	2	5	8		9			
3	3	4	3		5			
4	4	2	1		2			
5	5	2	3		15		Hard granular seam 9.5'-10'	
6	6	3	4		5			
7	7	2	2		4			
8	8	1	1		2			Note: Installed Piezometers:
9	9	2	9		31		Hard cemented granular waste layer 17.0'-17.5'	OW-81 57.0'-62.0' OW-82 20.0'-55.0'
10	10	2	2		4			
11	11	2	3		6		4" hard granular seam in sample 11	
12	12	4	3		6			
13	13	2	2		4			
14	14	1	2		3		Wet at 24' Loose granular waste seams in samples 13 & 14	
15	15	2	2		4			
16	16	3	3		7			
17	17	4	3		2		Thin cemented waste seams in sample 16.	
18	18	2	2		4			
19	19	3	3		8		Occasional dried waste layers noted below 30'	
20	20	5	5		5		Wet zone ± 34'-35'	
21	21	3	3					
22	22	2	3				Sample 20 saturated.	Free water in jar sample 20.

N = No. blows to drive 2 "spoon 12" with 140 lb. pin wt. falling 30 "per blow.
 C = No. blows to drive "casing" with lb. weight falling "per blow.
 METHOD OF INVESTIGATION: 3.25" I.D. Hollow Stem Auger Casing; Standard Penetration Tests
 CLASSIFICATION Visual by driller and geologist

DATE STARTED 3/16/81 FINISHED 3/17/81 SHEET 2 OF 2	 EMPIRE SOILS INVESTIGATIONS, INC. SUBSURFACE LOG	HOLE NO. B-8 SURF. ELEV. 425.2 G. W. DEPTH. See Note
PROJECT Crucible Steel Solid Waste Management Facility		LOCATION Tn of Geddes, N. Y. File GTA 81-11

DEPTH-FT	SAMPLE NO.	BLOWS ON SAMPLER				BLOW ON CASING C	SOIL OR ROCK CLASSIFICATION	NOTES
		0-6	6-12	12-18	N			
40								
41	21	2	3		6		White CHEMICAL WASTE (Moist-medium)	
42	22	4	5		15			
43	23	10	10					
44	24	5	4		8		Hard granular waste seams noted 42'-48'.	
45	25	4	5		12			
46	26	6	7		9			
47	27	4	4		6			
48	28	5	4		11			
49	29	3	3		7			
50	30	4	4		9		Cemented waste seam in sample 30	
51	31	4	5		10			
52	32	5	4				Sample 32: topsoil texture with possible petroleum impregnation.	
53	33	12	14				Black SILT, some clay, trace embedded decaying plant matter (Moist-stiff) 61.8'	
54							63.0'	
55							Boring terminated at 63.0'	

N = No. blows to drive 2 "spoon 12" with 140 lb. pin wt. falling 30 "per blow.
 C = No. blows to drive "casing" with lb. weight falling "per blow.
 METHOD OF INVESTIGATION: 3.25" I.D. Hollow Stem Auger Casing; Standard Penetration Tests
 CLASSIFICATION Visual by driller and geologist

DATE STARTED 3/11/81 FINISHED 3/12/81 SHEET 1 OF 2		 EMPIRE SOILS INVESTIGATIONS, INC.		HOLE NO. B-9 SURF. ELEV. 410.0 G. W. DEPTH. See Note					
SUBSURFACE LOG									
PROJECT Crucible Steel Solid Waste Management Facility		LOCATION Tn of Geddes, N. Y. File GTA 81-11							
DEPTH-FT	SAMPLE NO	BLOWS ON SAMPLER				BLOW ON CASING C	SOIL OR ROCK CLASSIFICATION	NOTES	
		0	6	12	18	N			
0	1	W	H=24"					White CHEMICAL WASTE (Moist-very soft to medium)	Note: First free water noted in sample 14; with borehole advanced to 24', no water in casing 1600 hours 3/11; no water in casing 0830 hours 3/12; with borehole advanced to 48' 1200 hours 3/12, no water in casing; no water in casing at completion 1645 hours 3/12; no water in casing 0830 hours 3/13.
	2	1	1			2		Similar; damp	
5	3	1	WH					Well layered 0'-10'	
	4	1	2			3			
	5	2	2			5		Grading wet at 10'	
	6	3	3			6		Similar; moist	
	7	2	2			4			
15	8	3	4			7			
	9	3	3					Grades at 18' to CHEMICAL WASTE with (relatively) harder moist layers, interbedded with softer wet seams & occasional dried granular waste layers/lenses. Layering discernible to approximately 34' depth; bedding interval less than 1'.	
20	10	2	2			5			
	11	2	2			4			
	12	2	1			3			
25	13	3	4			7			WH denotes weight of sampling hammer (140 lbs)
	14	2	3			5			
	15	2	3			6			Note: Installed Piezometers:
30	16	1	2			2			OW-91 53.0'-71.5'
	17	1	1						OW-92 23.0'-49.0'
35	18	3	2			5			
	19	5	31			8		Wet/saturated CHEMICAL WASTE with thin seams of hard dried waste; 1/2" seams cemented gray sand (granular waste?) in samples 19 & 20.	
40	20	3	3						

N = No. blows to drive 2 "spoon 12 "with 140 lb. pin wt. falling 30 "per blow.
C = No. blows to drive "casing "with lb. weight falling "per blow.
METHOD OF INVESTIGATION: 3.25" I.D. Hollow Stem Auger Casing; Standard Penetration Tests

CLASSIFICATION Visual by
driller and geologist

DATE STARTED 3/11/81 FINISHED 3/12/81 SHEET 2 OF 2		 EMPIRE SOILS INVESTIGATIONS, INC.		HOLE NO. B-9 SURF. ELEV. 410.0 G. W. DEPTH. See Note					
SUBSURFACE LOG									
PROJECT Crucible Steel Solid Waste Management Facility		LOCATION Tn of Geddes, N. Y. File GTA 81-11							
DEPTH-FT	SAMPLE NO	BLOWS ON SAMPLER				BLOW ON CASING C	SOIL OR ROCK CLASSIFICATION	NOTES	
		0	6	12	18	N			
40	21	2	3			5		Wet/saturated CHEMICAL WASTE with thin seams of hard dried waste	
	22	3	3			6			
45	23	3	4			5			Free water in jar samples 22, 23, 24
	24	3	3			6		Partings hard dried waste in sample 24 48.7'	
50	25	5	4					Black ORGANIC SILT 49.5'	
	26	7	7			14		Brown varved SILT & CLAY, occasional organic silt partings, sea-shells (Moist-medium) 52.0'	
	27	5	6			10		White-gray MARL, occasional embedded wood & seashells (Saturated-medium) 54.0'	
55	28	6	6					Gray fine SAND & MARL, occasional peat partings & 2"-4" seams moist brown varved silt & clay (Saturated) 55.0'	WH denotes weight of sampling hammer (140 lbs)
	29	7	7			11		Gray SILT, little clay, trace roots & decaying plant matter (Wet) 56.0'	
60	30	8	12			16		Gray SILT & fine SAND with thin sand lenses, trace decaying organic matter, seashells (Saturated-firm) 62.0'	
	31	W	H=24"					Gray fine to medium SAND & fine to medium GRAVEL, trace to little silt (Saturated - firm) 71.5'	
	32	8	10			16			
65	33	8	9			17			
	34	11	11						
	35	8	11	11		22			
70	36	10	10	11		21			
								Boring terminated at 71.5'	

N = No. blows to drive 2 "spoon 12 "with 140 lb. pin wt. falling 30 "per blow.
C = No. blows to drive "casing "with lb. weight falling "per blow.
METHOD OF INVESTIGATION: 3.25" I.D. Hollow Stem Auger Casing; Standard Penetration Tests

CLASSIFICATION Visual by
driller and geologist

DATE				EMPIRE SOILS INVESTIGATIONS, INC.		HOLE NO. <u>B-10</u>	
STARTED <u>3/24/81</u>						SURF. ELEV. <u>421.9</u>	
FINISHED <u>3/24/81</u>						G. W. DEPTH <u>See Note</u>	
SHEET <u>2</u> OF <u>2</u>				SUBSURFACE LOG			
PROJECT <u>Crucible Steel</u>				LOCATION <u>Tn of Geddes, N. Y.</u>			
<u>Solid Waste Management Facility</u>				<u>File GTA 81-11</u>			

DEPTH-FT	SAMPLES	SAMPLE NO	BLOWS ON SAMPLER					BLOW ON CASING C	SOIL OR ROCK CLASSIFICATION	NOTES
			0-6	6-12	12-18	18-24	N			
40			2	10			21		White CHEMICAL WASTE	40.5'
		12	11	100			1.3		Hard, gray, cemented granular CHEMICAL WASTE with layers moist soft white waste (Damp-very compact)	
45			14	10			24			
		13	14	45						
										48.0'
50			2	2			5		White, laminated CHEMICAL WASTE with partings wet gray fine-grained waste	
		14	3	3						
55			1	1			3			
		15	2	2						
			3	3			7			
		16	4	4						
60			WH	1			3		Traces embedded organic matter	
		17	2	1					61'-62.7'	
			2	5			11			62.7'
		18	6	5						
			5	8			16		Black ORGANIC SILT (Moist-stiff)	
65		19	8	10						65.0'
									Boring terminated at 65.0'	

N = No. blows to drive 2 "spoon 12 "with 140 lb. pin wt. falling 30 "per blow.

C = No. blows to drive 3.25 "casing 3.25 "with 140 lb. weight falling 30 "per blow.

METHOD OF INVESTIGATION: I.D. Hollow Stem Auger Casing; Standard Penetration Tests

CLASSIFICATION: Visual by

driller and geologist

DATE

STARTED 3/24/81

FINISHED 3/24/81

SHEET 1 OF 2

ESI

EMPIRE SOILS INVESTIGATIONS, INC.

SUBSURFACE LOG

HOLE NO. B-10

SURF. ELEV. 421.9

G. W. DEPTH See Note

PROJECT Crucible Steel

Solid Waste Management Facility

LOCATION Tn of Geddes, N. Y.

File GTA 81-11

DEPTH-FT	SAMPLE NO	BLOWS ON SAMPLER				BLOW ON CASING C	SOIL OR ROCK CLASSIFICATION	NOTES
		0-6	6-12	12-18	18-24			
0								
	1	WH	1				White to gray CHEMICAL WASTE (Moist-very soft)	Note: With borehole advanced to 40', no water in casing; no water in casing at completion WH denotes weight of sampling hammer (140 lbs) Note: Installed Sampling Wells: S-101 54.0-61.0' S-102 38.5'-46.0'
		W	H=	12"				
5								
	2	1			2		Similar; occasional gray granular waste seams	
		1	1					
10								
	3	1	WH				Gray, wet, fine-grained waste seams noted 10' to 25'±	
		1	WH					
15								
	4	2	1		2			
		1	1					
	5	1	1		2			
20		1	WH					
	6	1	1					
		2	1		2			
	7	1	2					
		1	1					
25	8	WH	1					
		1	1		2			
	9	1	1					
30								
	10	1	1		2			
		1	1					
35								
	11	1	1		3			
		2	2					
40								

N = No. blows to drive

2

"spoon

12

"with

140

lb. pin wt. falling

30

"per blow.

C = No. blows to drive

"casing

"with

lb. weight falling

"per blow.

METHOD OF INVESTIGATION:

3.25" I.D. Hollow Stem Auger Casing; Standard Penetration Tests

CLASSIFICATION

Visual by

DATE STARTED 4/8/81 FINISHED 4/8/81 SHEET 1 OF 1		 EMPIRE SOILS INVESTIGATIONS, INC.		HOLE NO. B-11 SURF. ELEV. 378.2 G. W. DEPTH 5.0'				
SUBSURFACE LOG								
PROJECT Crucible Steel Solid Waste Management Facility		LOCATION Tn of Geddes, N. Y. File GTA 81-11						
DEPTH-FT	SAMPLE NO	BLOWS ON SAMPLER				BLOW ON CASING C	SOIL OR ROCK CLASSIFICATION	NOTES
		0	6	12	18	N		
0		1	1			2		White CHEMICAL WASTE (Moist-soft)
1	1	1	1					
2	2	1	1			2		
3	3	1	1			2		
4	4	1	1			2		
5	5	1	1			2		
6	6	1	1			2		
7	7	1	1			2		
8	8	1	1			2		
9	9	1	1			2		
10	10	3	4			7		
11	11	1	1			2		
12	12	1	1			2		
13	13	1	1			2		
14	14							
15	15							
16	16							
17	17							
18	18							
19	19							
20	20							
21	21							
22	22							
23	23							
24	24							
25	25							
26	26							
27	27							
28	28							
29	29							
30	30							
31	31							
32	32							
33	33							
34	34							
35	35							
36	36							
37	37							
38	38							
39	39							
40	40							

NOTE: Installed Sampling Well, S-111 open ended @ 21.5' casing left in place Sand to 30.0'.
Installed peizometer OW-112 13'-17.5'

Petroleum odor noted from 10' to 18'

No recovery, sample 8 Saturated at 16'

PEAT 17.8'

MARL 19.5'

Gray fine SAND & SAND with MARL, seashells (Saturated - loose) 21.0'

Brown, fine SAND, Some Silt (Saturated-Loose) 24.0'

No recovery for Samples No. 14 & 15.

Boring Terminated @ 30.0'

CLASSIFICATION Visual by driller and geologist

METHOD OF INVESTIGATION: 2" Pipe Casing

DATE STARTED 5-1-81 FINISHED 5-1-81 SHEET 1 OF 1		 EMPIRE SOILS INVESTIGATIONS, INC.		HOLE NO. B-13A SURF. ELEV. 373.8 G. W. DEPTH 3				
SUBSURFACE LOG								
PROJECT Crucible Steel Solid Waste Management Facility		LOCATION Tn of Geddes, N.Y. File GTA 81-11						
DEPTH-FT	SAMPLE NO	BLOWS ON SAMPLER				BLOW ON CASING C	SOIL OR ROCK CLASSIFICATION	NOTES
		0	6	12	18	N		
0								White CHEMICAL WASTE (Wet, 1 ft. hard crusted surface changing to soft)
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
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28								
29								
30								
31								
32								
33								
34								
35								
36								
37								
38								
39								
40								

NOTE: Installed sampling well. S-131, 1.0'-6.0'.

Boring Terminated @ 6.0'

Encountered original ground at 6.0'

CLASSIFICATION Visual by Driller & Geotechnical Engineer

METHOD OF INVESTIGATION: Hand Auger

DS-4

DATE		EMPIRE SOILS INVESTIGATIONS, INC.		HOLE NO. B-17				
STARTED 5-1-81				SURF. ELEV. 368.2				
FINISHED 5-1-81				G. W. DEPTH				
SHEET 1 OF 1		SUBSURFACE LOG						
PROJECT Crucible Steel Solid Waste Management Facility				LOCATION Tn of Geddes, N.Y. File GTA 81-11				
DEPTH-FT	SAMPLE NO.	BLOWS ON SAMPLER					SOIL OR ROCK CLASSIFICATION	NOTES
		0-6	6-12	12-18	18-24	N		
0								Well Point Riser extends 1.2' above ground surface.
5								
10								
15								
20								
25								
								Well Point Driven to 20.8'

N = No. blows to drive "spoon" "with" lb. pin wt. falling "per blow. CLASSIFICATION

C = No. blows to drive "casing" "with" lb. weight falling "per blow.

METHOD OF INVESTIGATION: 1 1/2" Driven Steel Pipe with 2' Slotted Screen at Bottom

LEGEND

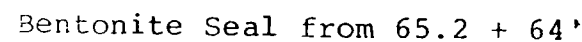
Description of Each Category

- A - Depth to Groundwater below existing grade
- B - P. V. C. Pipe Length below existing grade
- C - P. V. C. Pipe total length
- D - Depth of boring below existing grade
- E - 3" Steel Pipe above existing grade
- F - Elevation-top of 3" Steel Pipe
- G - Elevation-existing grade
- H - Bentonite Seal depth range below existing grade

PHASE I WELL DETAILS



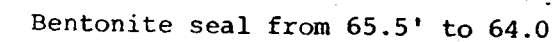
OBSERVATION WELL DETAILS



AN EQUAL OPPORTUNITY EMPLOYER



OBSERVATION WELL DETAILS



AN EQUAL OPPORTUNITY EMPLOYER



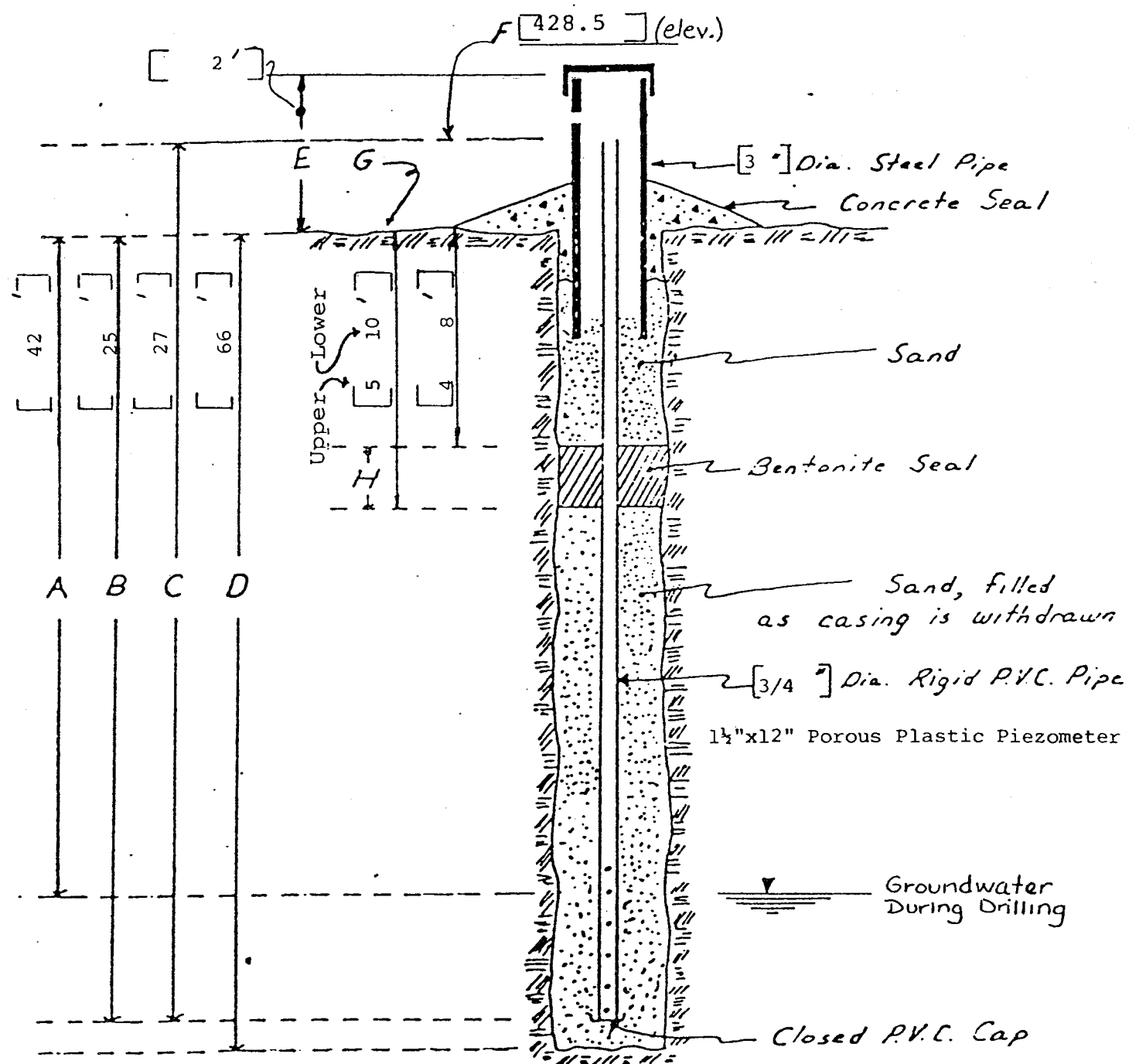
EMPIRE SOILS INVESTIGATIONS, INC.



EMPIRE SOILS INVESTIGATIONS, INC.

PROJECT Crucible Steel BORING NO. B-2
LOCATION Tn of Geddes OBSERVATION WELL NO. OW-23
TOP GROUND ELEV "G" 426.5
NO. OF WELLS IN BORING 3

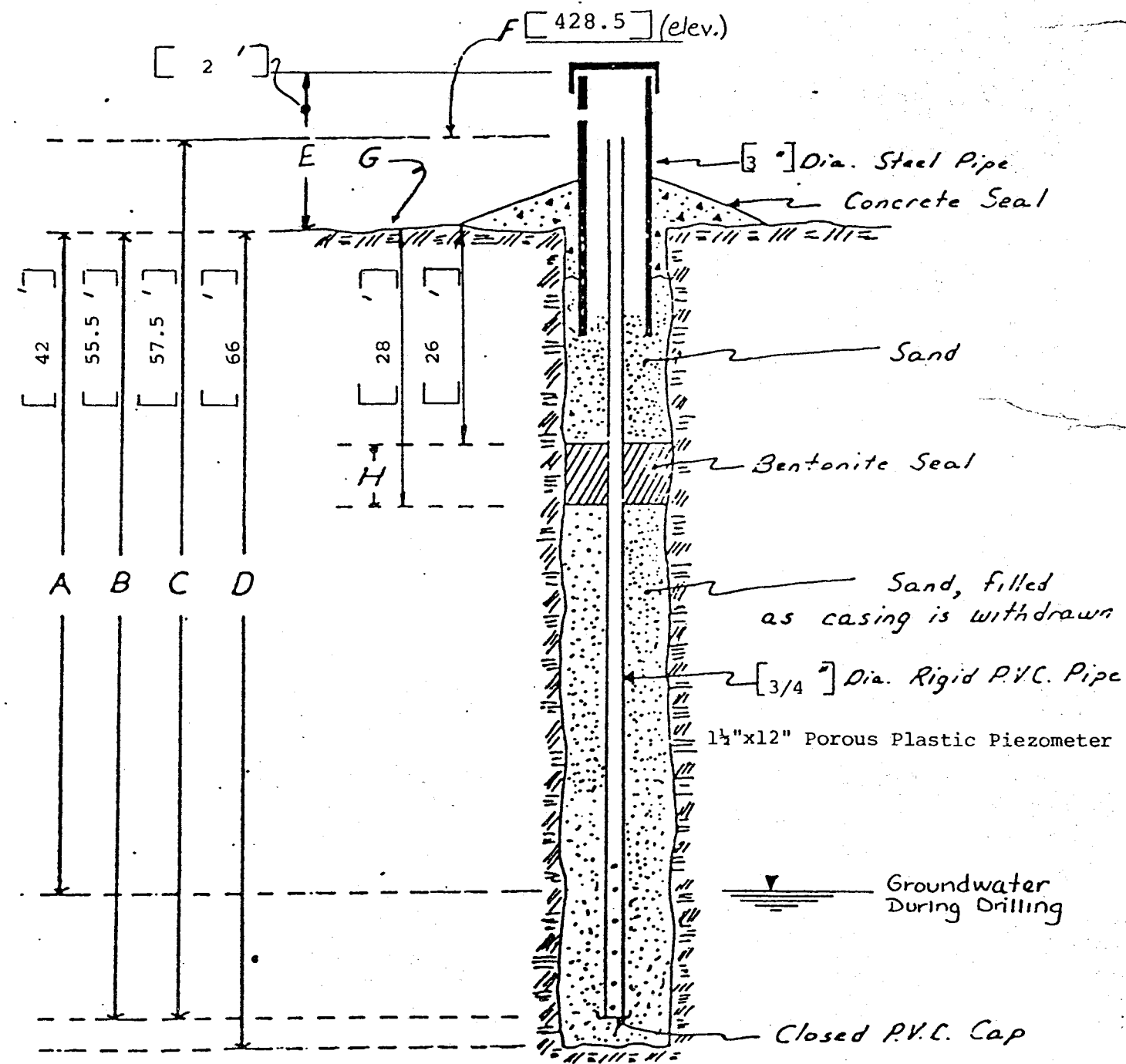
OBSERVATION WELL DETAILS



Lower Bentonite Seal See OW-22 Detail

PROJECT Crucible Steel BORING NO. B-2
LOCATION Tn of Geddes OBSERVATION WELL NO. OW-22
TOP GROUND ELEV "G" 426.5
NO. OF WELLS IN BORING 3

OBSERVATION WELL DETAILS



Lower Bentonite Seal see OW-21 Detail



OBSERVATION WELL DETAILS



OBSERVATION WELL DETAILS

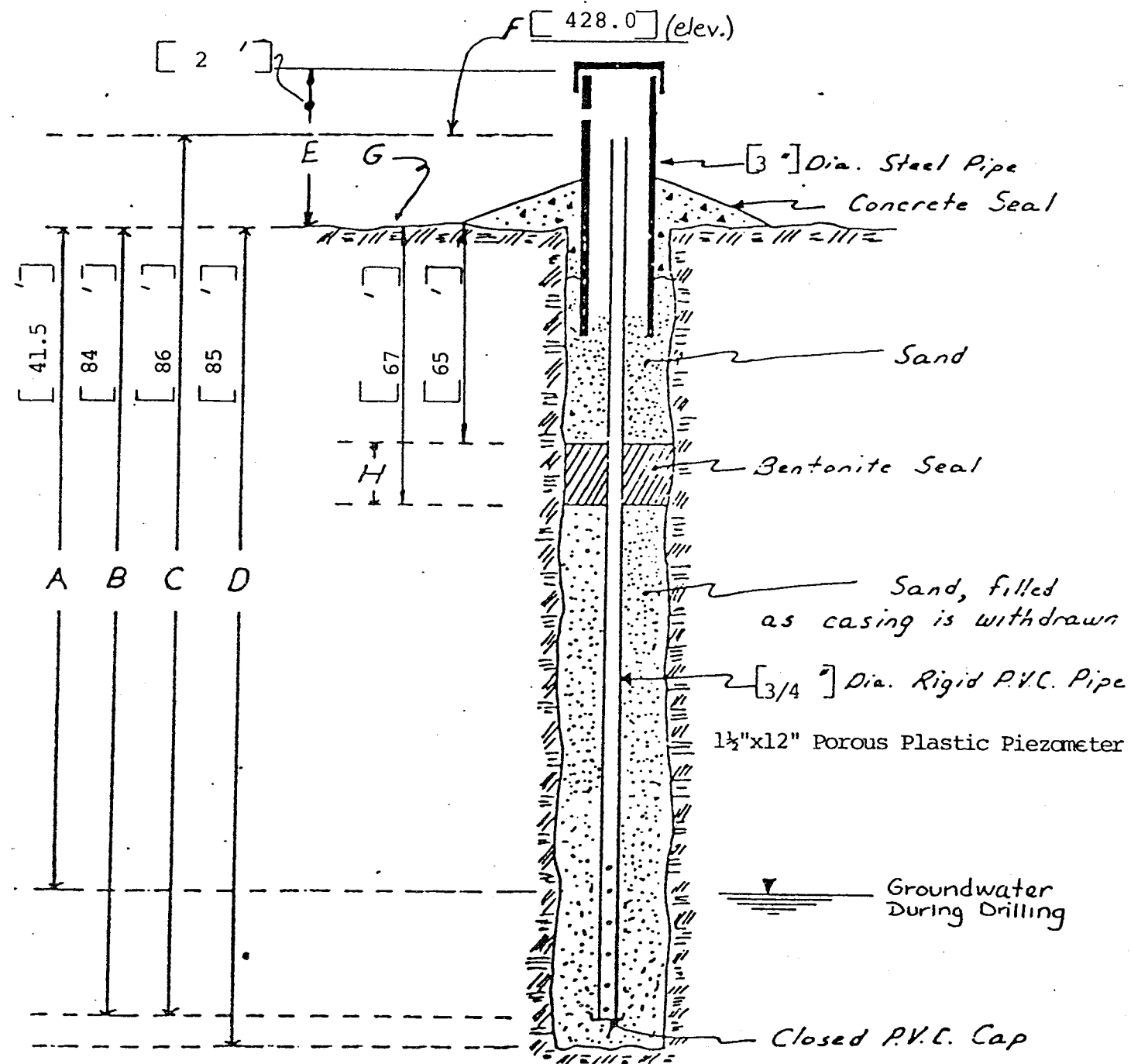




EMPIRE SOILS INVESTIGATIONS, INC.

PROJECT Crucible Steel BORING NO. B-4
 LOCATION Tn of Geddes OBSERVATION WELL NO. OW-41
 TOP GROUND ELEV "G" 426.0
 NO. OF WELLS IN BORING 3

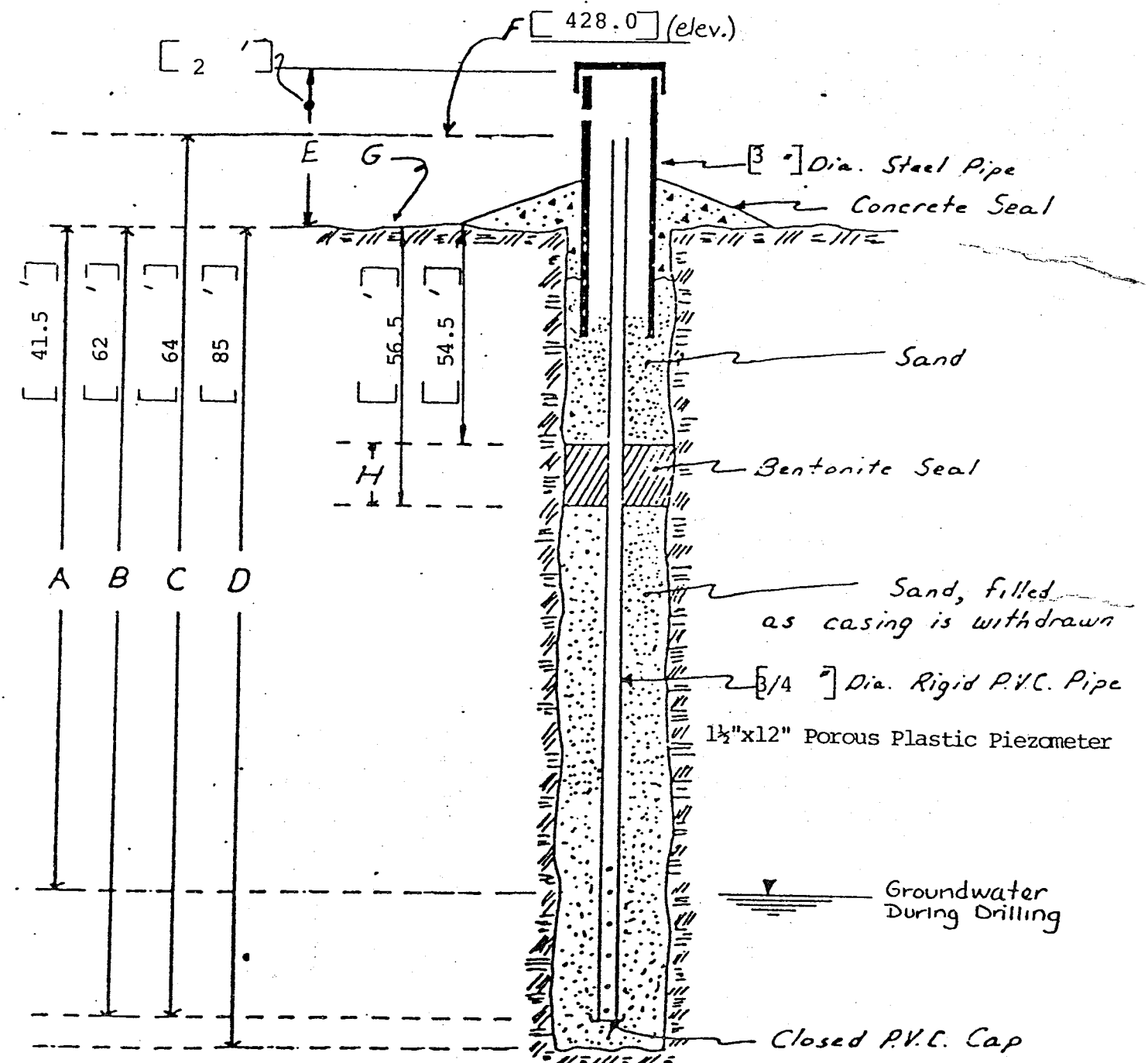
OBSERVATION WELL DETAILS



EMPIRE SOILS INVESTIGATIONS, INC.

PROJECT Crucible Steel BORING NO. B-4
 LOCATION Tn of Geddes OBSERVATION WELL NO. OW-42
 TOP GROUND ELEV "G" 426.0
 NO. OF WELLS IN BORING 3

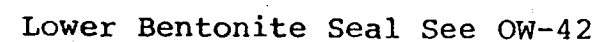
OBSERVATION WELL DETAILS



Lower Bentonite Seal See OW-41



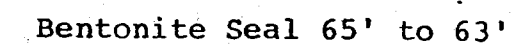
OBSERVATION WELL DETAILS



AN EQUAL OPPORTUNITY EMPLOYER



OBSERVATION WELL DETAILS



AN EQUAL OPPORTUNITY EMPLOYER

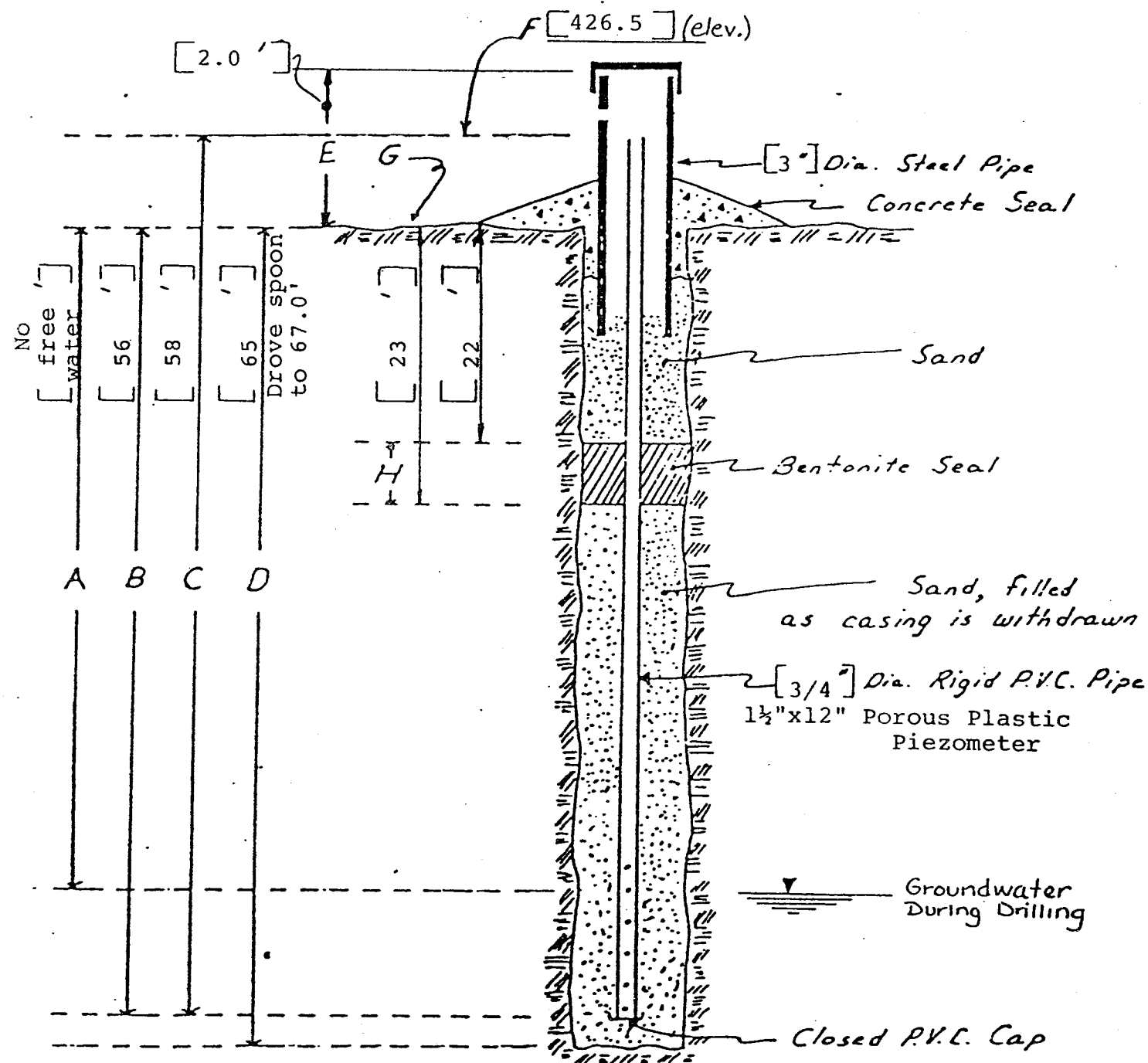
SUBSURFACE EXPLORATION • SOIL AND CONCRETE TESTING • MEMBER • AMERICAN SOCIETY FOR TESTING & MATERIALS



EMPIRE SOILS INVESTIGATIONS, INC.

PROJECT Crucible Steel BORING NO. B-5
 LOCATION Town of Geddes OBSERVATION WELL NO. OW-52
 TOP GROUND ELEV "6" 424.5
 NO. OF WELLS IN BORING 3

OBSERVATION WELL DETAILS



Lower Bentonite Seal See OW-51

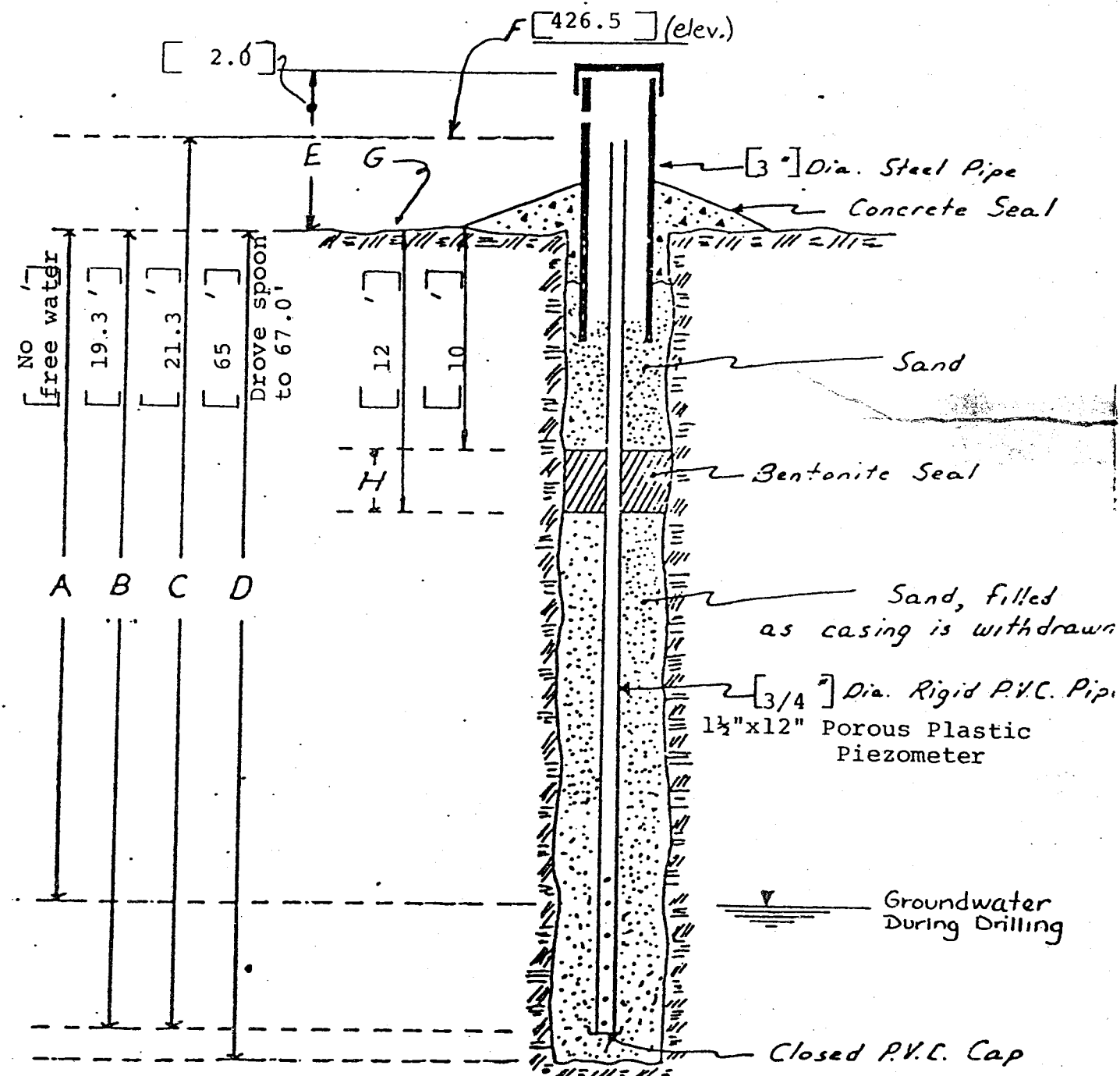
AN EQUAL OPPORTUNITY EMPLOYER



EMPIRE SOILS INVESTIGATIONS, INC.

PROJECT Crucible Steel BORING NO. B-5
 LOCATION Town of Geddes OBSERVATION WELL NO. OW-53
 TOP GROUND ELEV "6" 424.5
 NO. OF WELLS IN BORING 3

OBSERVATION WELL DETAILS



Lower Bentonite Seal See OW-52

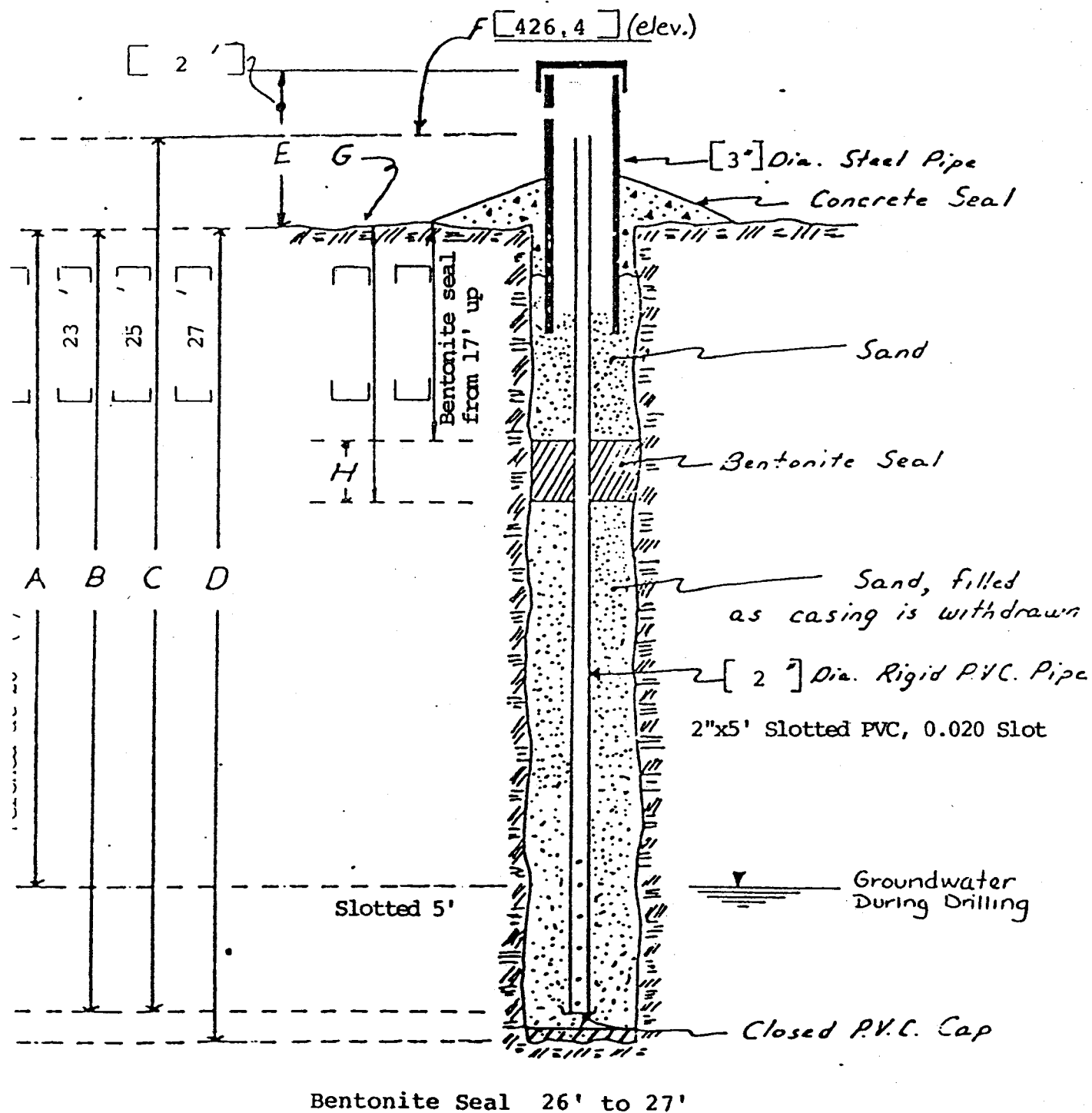
AN EQUAL OPPORTUNITY EMPLOYER



EMPIRE SOILS INVESTIGATIONS, INC.

PROJECT Crucible Steel BORING NO. 5S
 LOCATION Town of Geddes OBSERVATION WELL NO. S-55
 TOP GROUND ELEV "6" 424.4
 NO. OF WELLS IN BORING 5

OBSERVATION WELL DETAILS



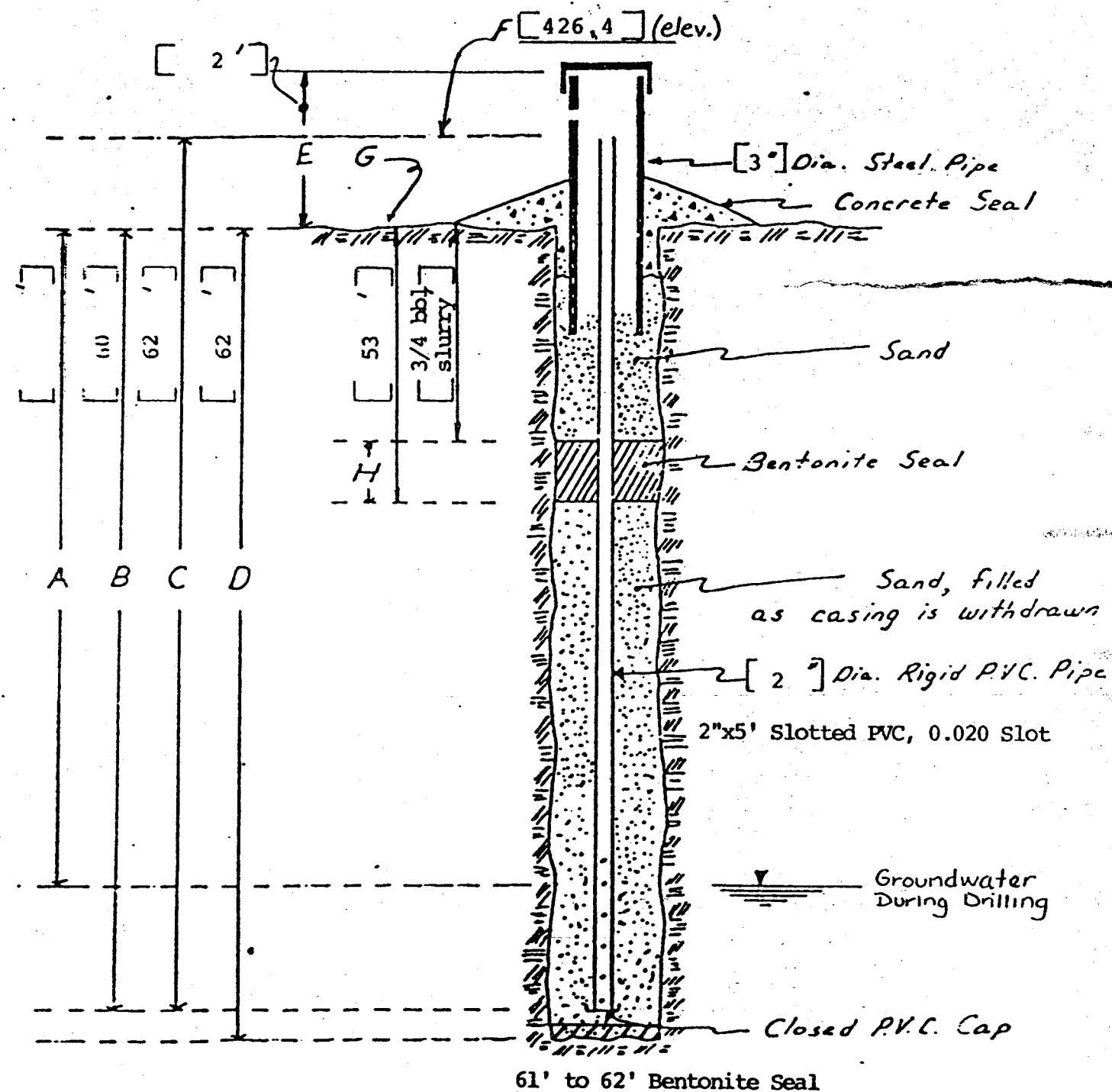
AN EQUAL OPPORTUNITY EMPLOYER



EMPIRE SOILS INVESTIGATIONS, INC.

PROJECT Crucible Steel BORING NO. B-5
 LOCATION Town of Geddes OBSERVATION WELL NO. S-56
 TOP GROUND ELEV "6" 424.4
 NO. OF WELLS IN BORING _____

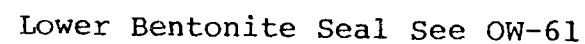
OBSERVATION WELL DETAILS



AN EQUAL OPPORTUNITY EMPLOYER



OBSERVATION WELL DETAILS



AN EQUAL OPPORTUNITY EMPLOYER

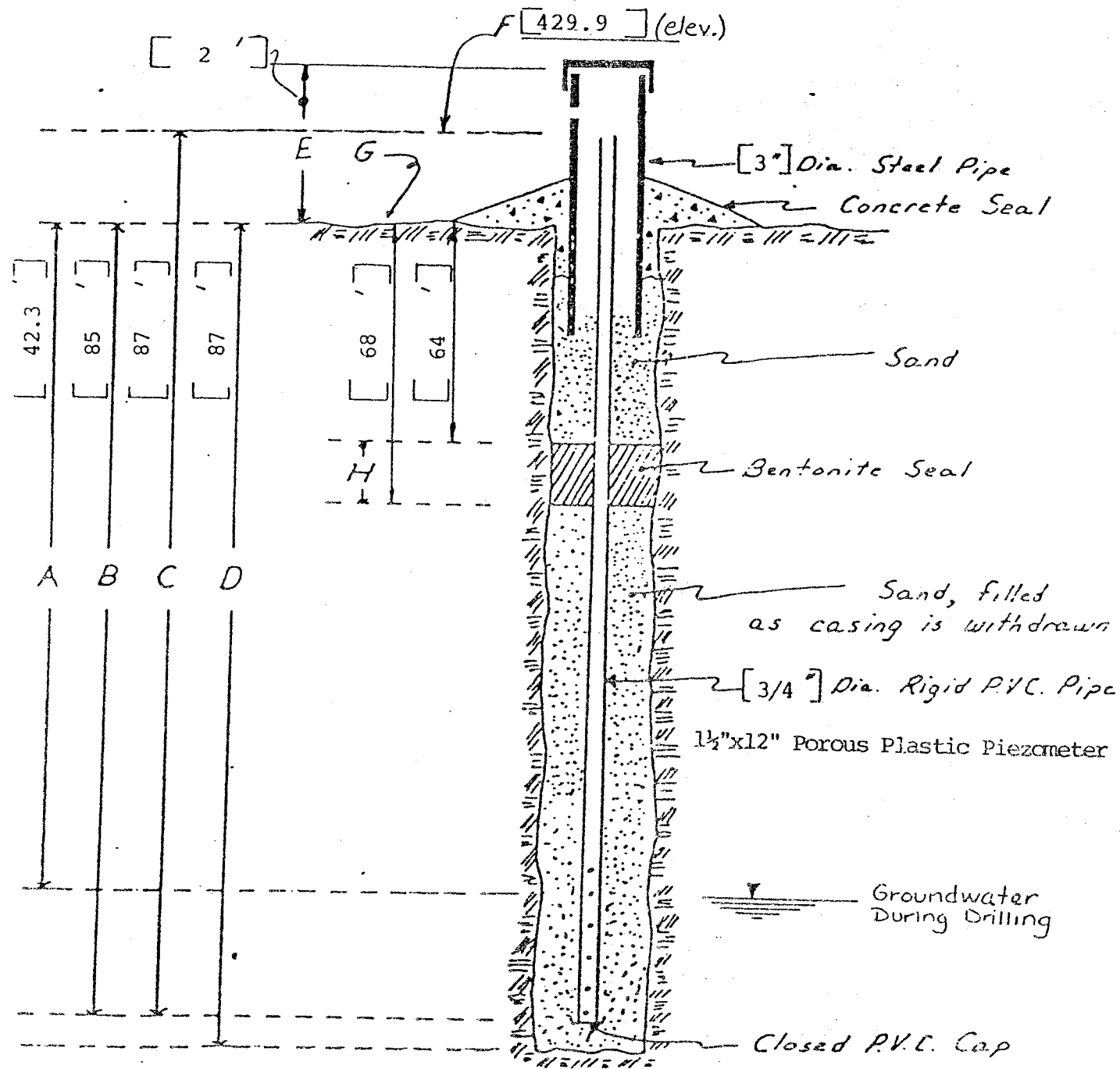


OBSERVATION WELL DETAILS



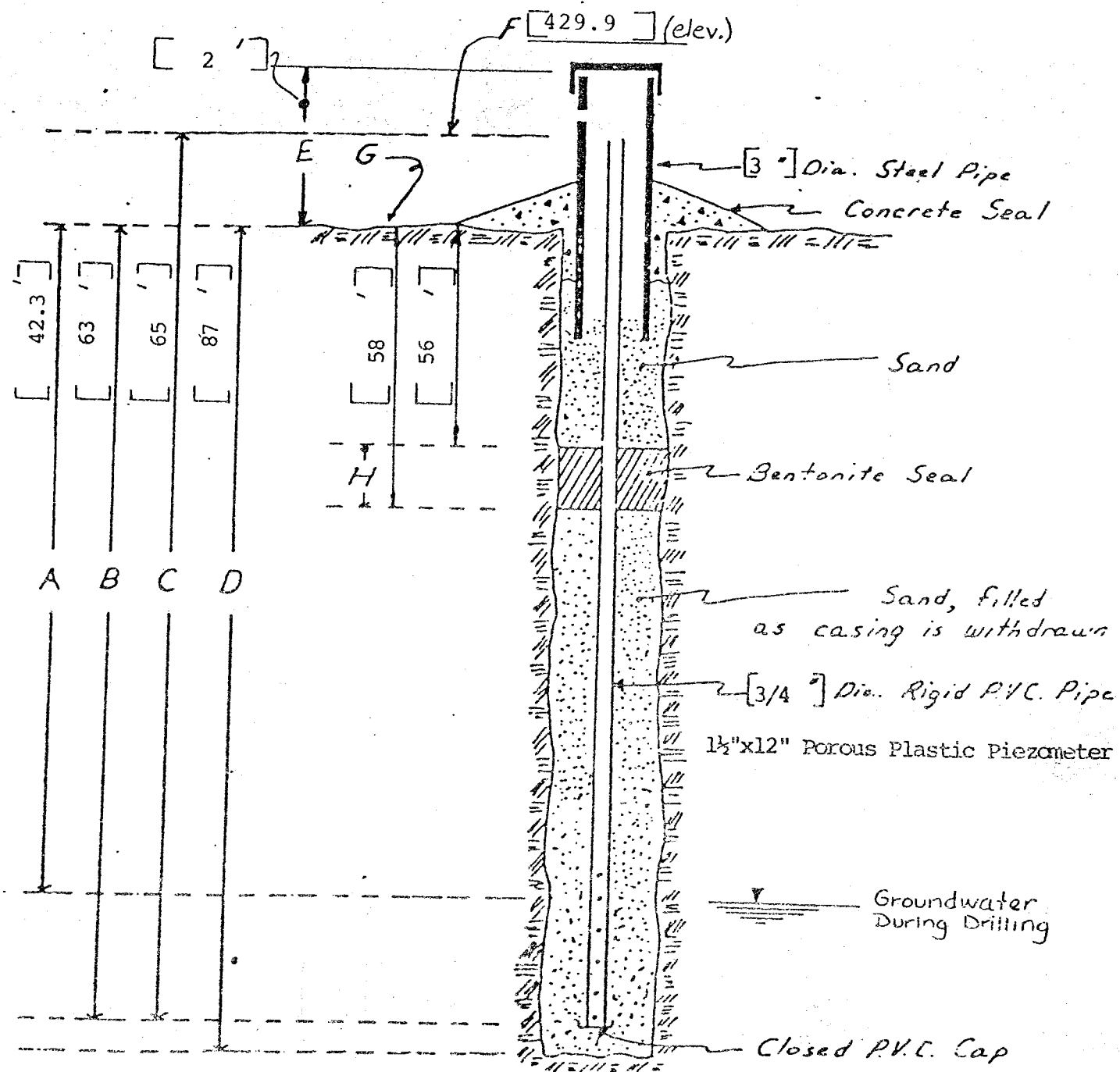
PROJECT Crucible Steel BORING NO. 7
 LOCATION Town of Geddes OBSERVATION WELL NO. OW-71
 TOP GROUND ELEV "6" 427.9
 NO. OF WELLS IN BORING 3

OBSERVATION WELL DETAILS



PROJECT Crucible Steel BORING NO. 7
 LOCATION Town of Geddes OBSERVATION WELL NO. OW-72
 TOP GROUND ELEV "6" 427.9
 NO. OF WELLS IN BORING 3

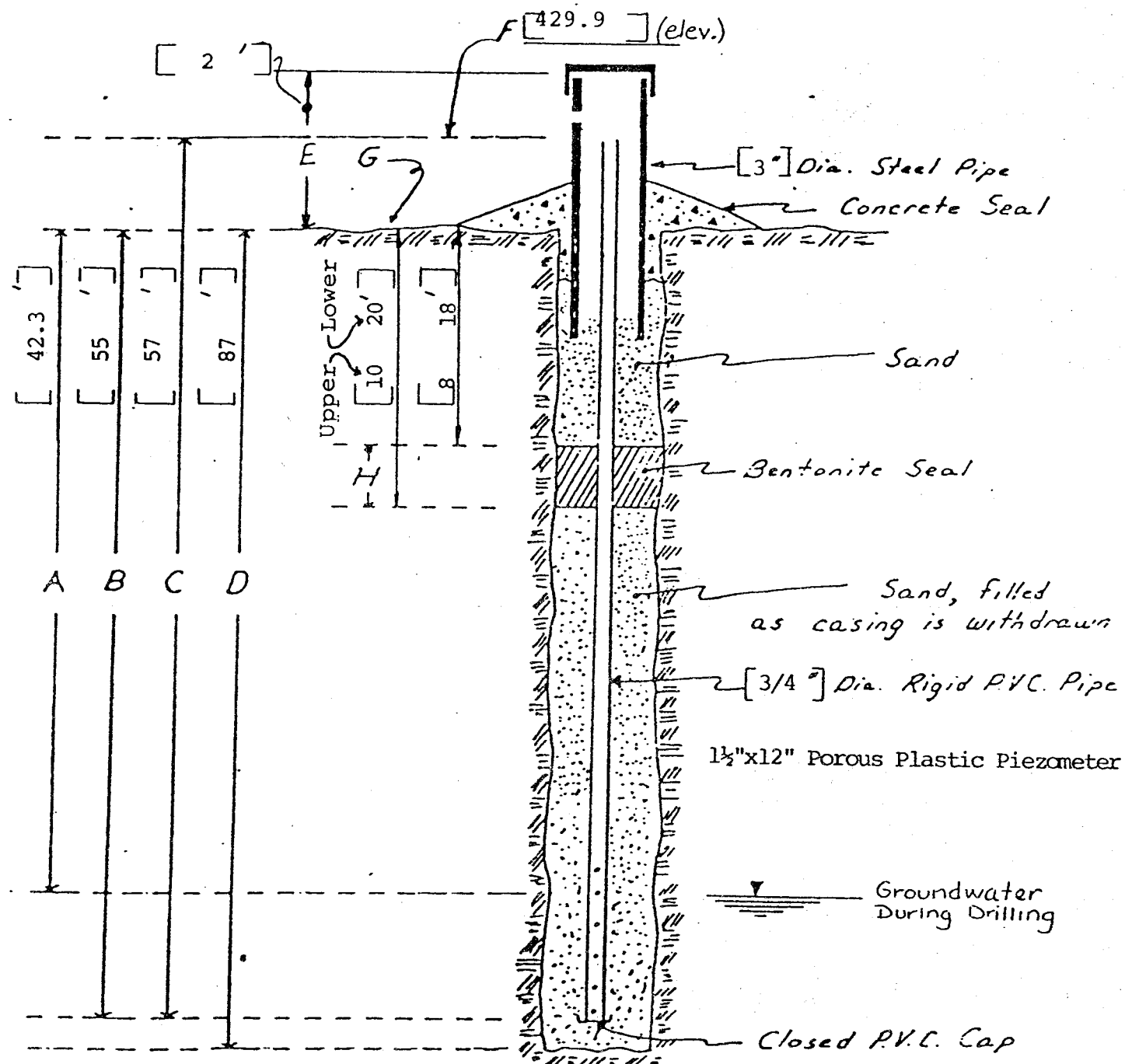
OBSERVATION WELL DETAILS



Lower Bentonite Seal See OW-71

PROJECT Crucible Steel BORING NO. 7
 LOCATION Town of Geddes OBSERVATION WELL NO. OW-73
 TOP GROUND ELEV "6" 427.9
 NO. OF WELLS IN BORING 3

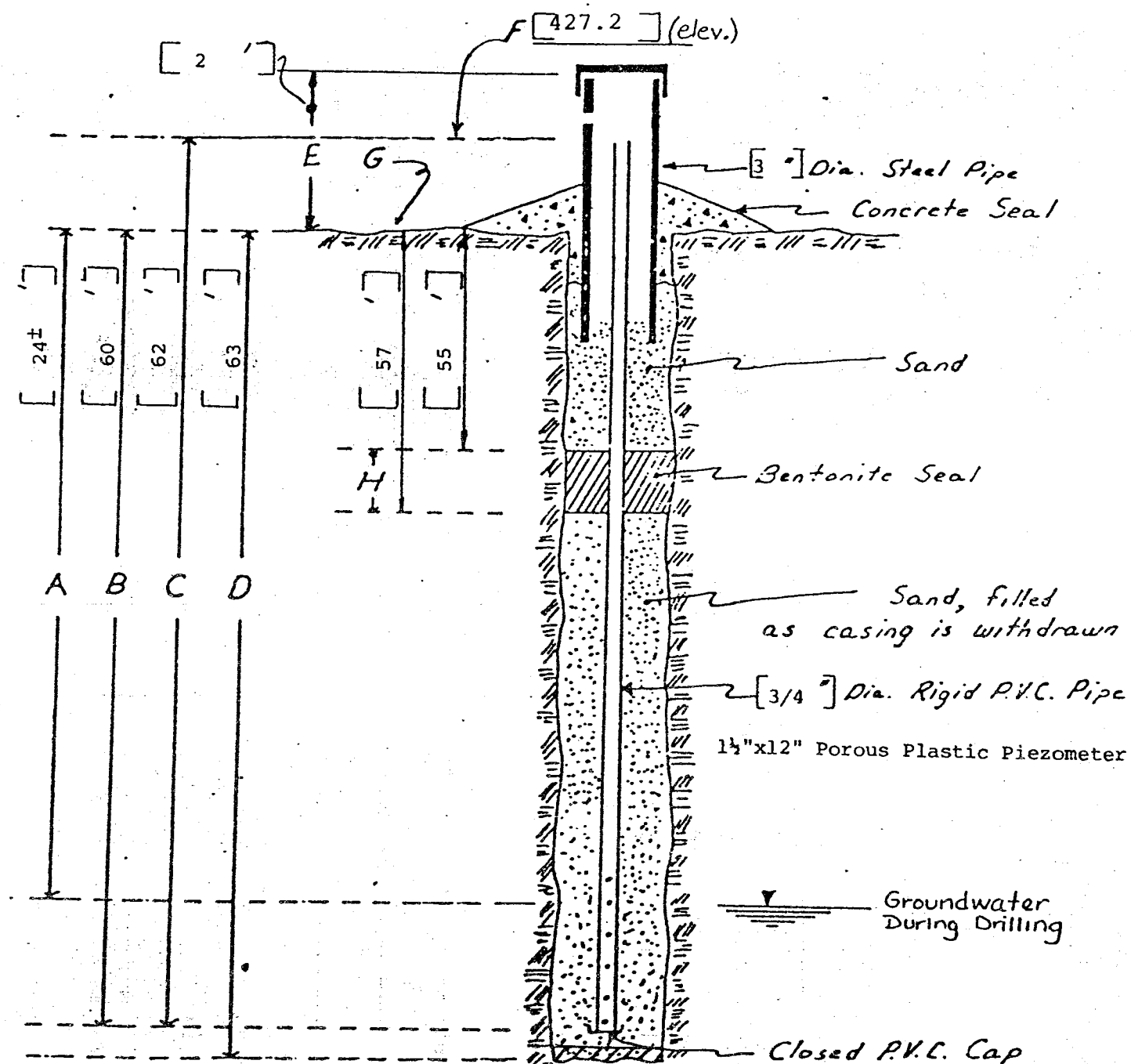
OBSERVATION WELL DETAILS



Lower Bentonite Seal See OW-72

PROJECT Crucible Steel BORING NO. B-8
 LOCATION Tn of Geddes OBSERVATION WELL NO. OW-81
 TOP GROUND ELEV "6" 425.2
 NO. OF WELLS IN BORING 2

OBSERVATION WELL DETAILS

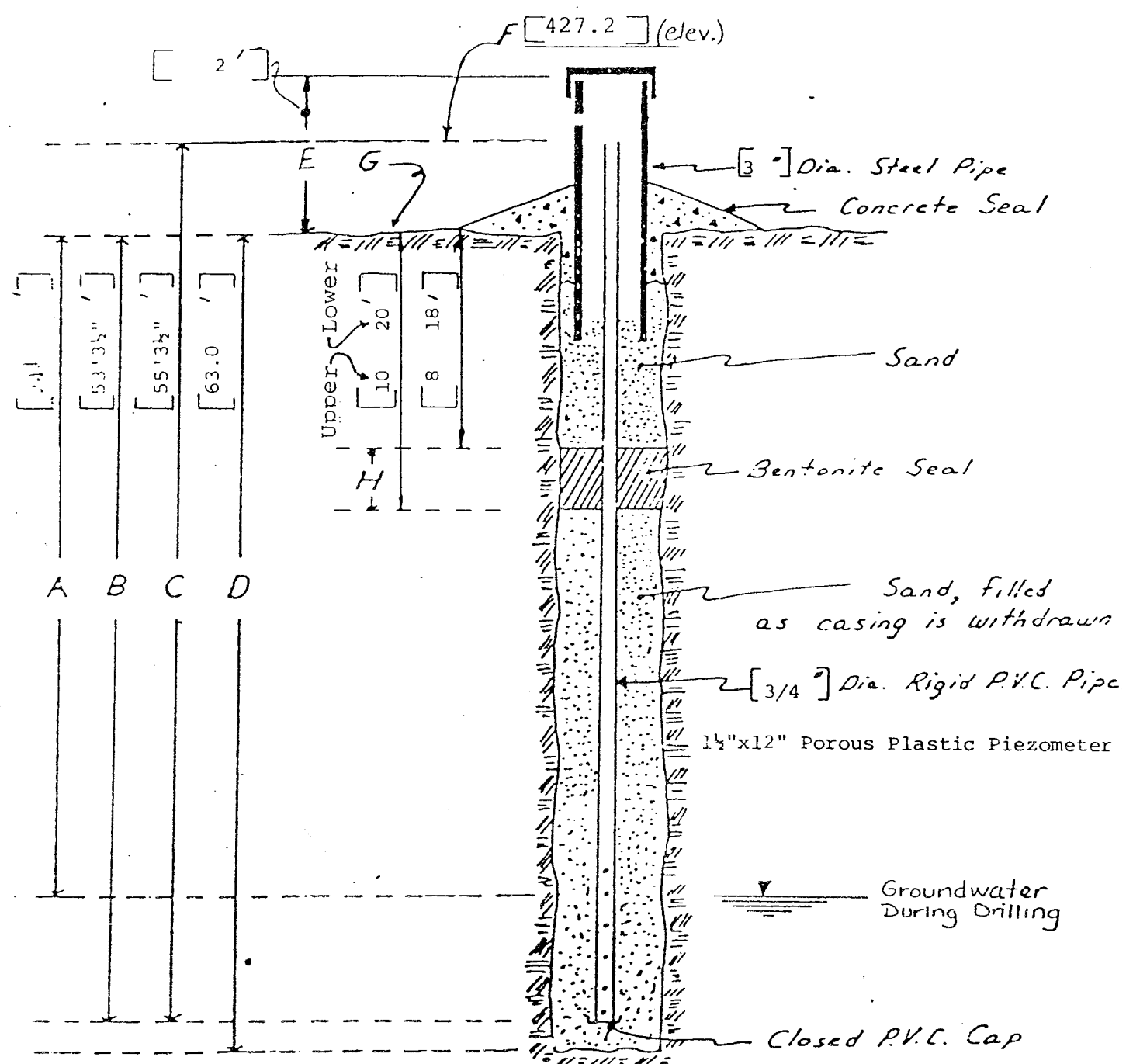


Bentonite Seal 63' to 62'



ROCK	Crucible Steel	BORING NO.	B-8
LOCATION	Tn. of Geddes	OBSERVATION WELL NO.	OW-82
		TOP GROUND ELEV "	6" 425.2
		NO. OF WELLS IN BORING	2

OBSERVATION WELL DETAILS

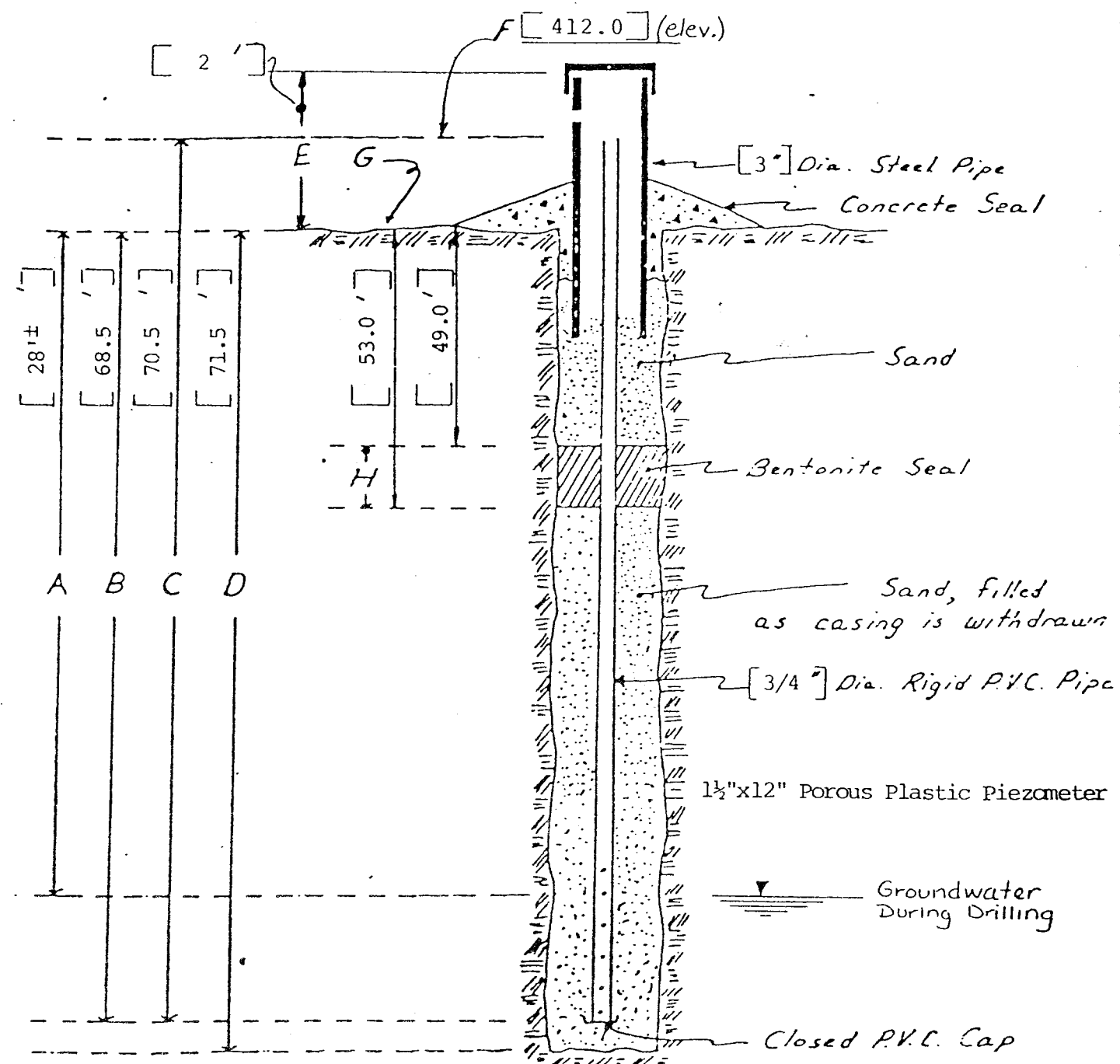


Lower Bentonite Seal See OW-81



PROJECT Crucible Steel BORING NO. B-9
LOCATION Town of Geddes OBSERVATION WELL NO. OW - 91
TOP GROUND ELEV. "6" 410.0
NO. OF WELLS IN BORING 2

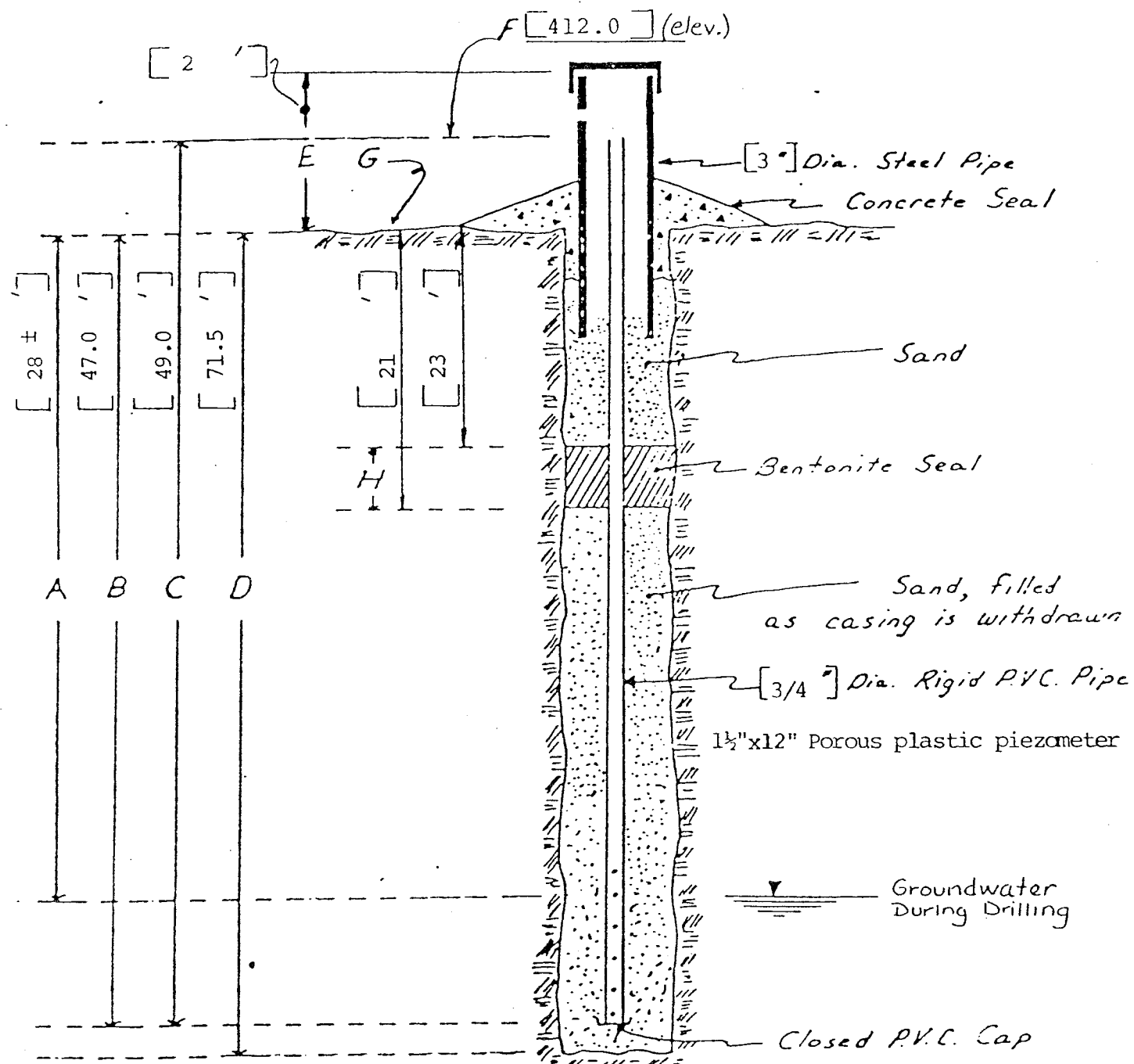
OBSERVATION WELL DETAILS



AN EQUAL OPPORTUNITY EMPLOYER

PROJECT Crucible Steel BORING NO. B-9
 LOCATION Town of Geddes OBSERVATION WELL NO. OW-92
 TOP GROUND ELEV "6" 410.0
 NO. OF WELLS IN BORING 2

OBSERVATION WELL DETAILS

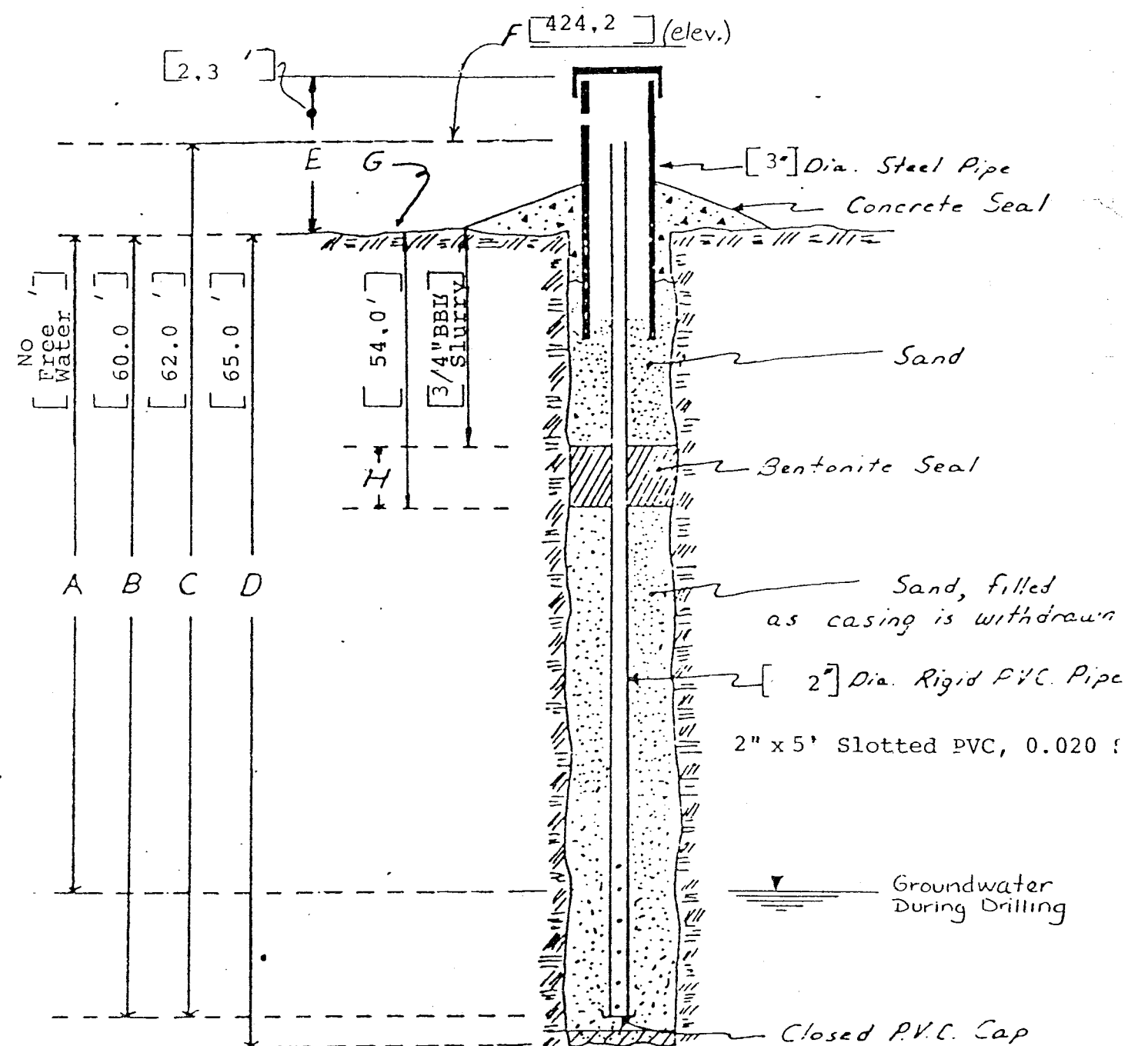


Lower Bentonite Seal See OW-91



PROJECT Crucible Steel BORING NO. B-10
 LOCATION Town of Geddes OBSERVATION WELL NO. S-101
 TOP GROUND ELEV 421.9
 NO. OF WELLS IN BORING 2

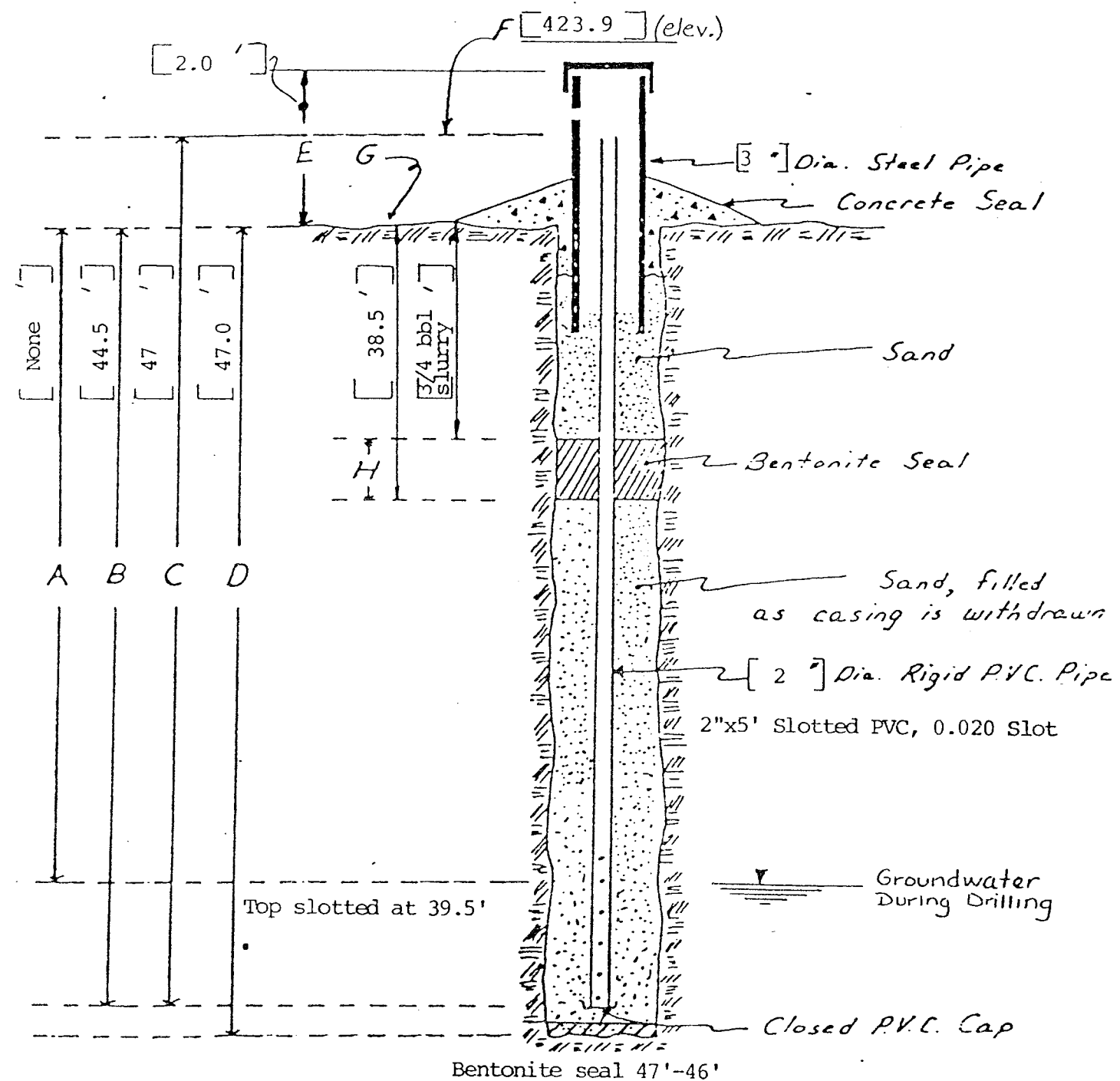
OBSERVATION WELL DETAILS



Bentonite Seal 61' to 62'



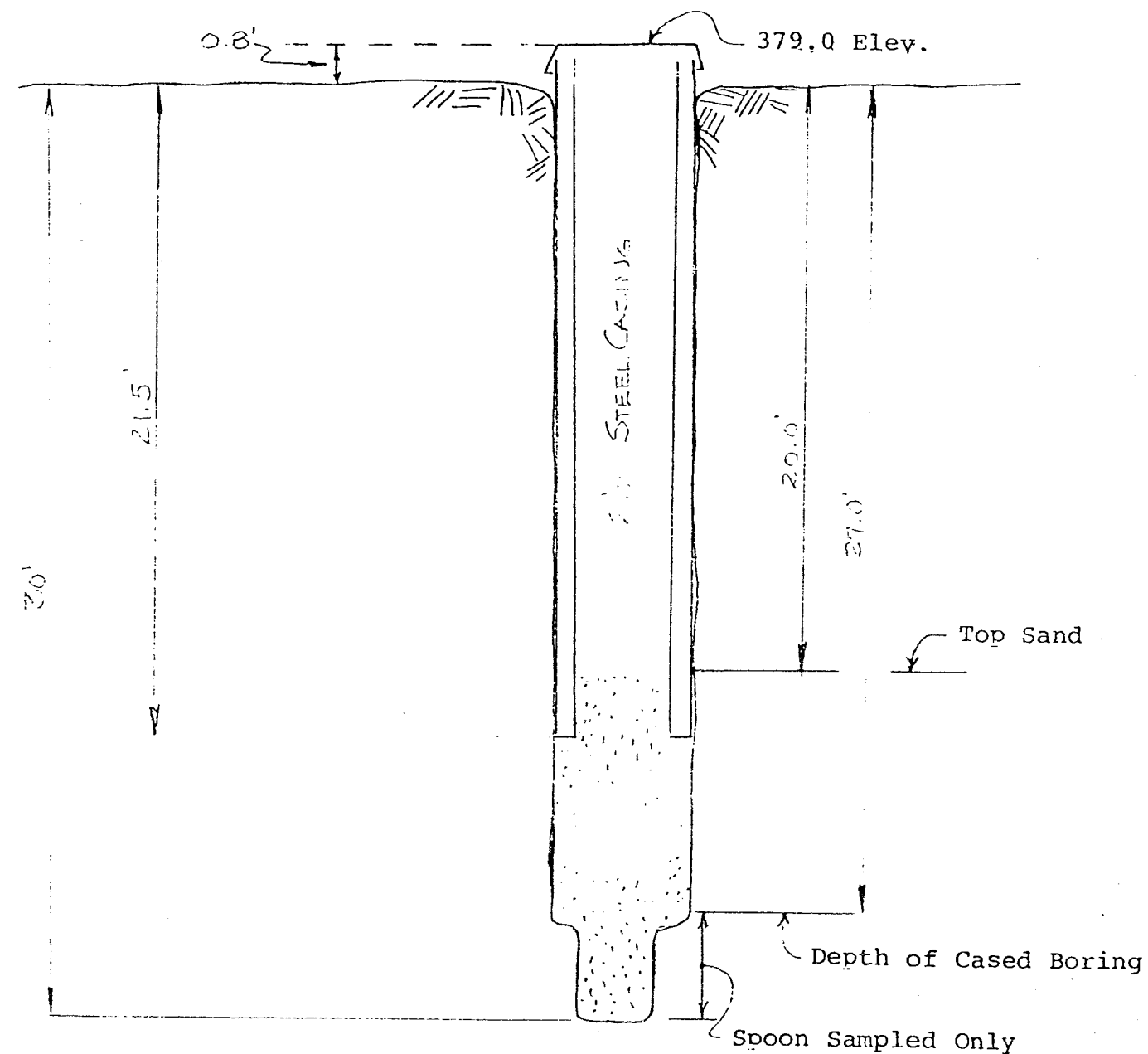
OBSERVATION WELL DETAILS



Bentonite seal 47'-46'

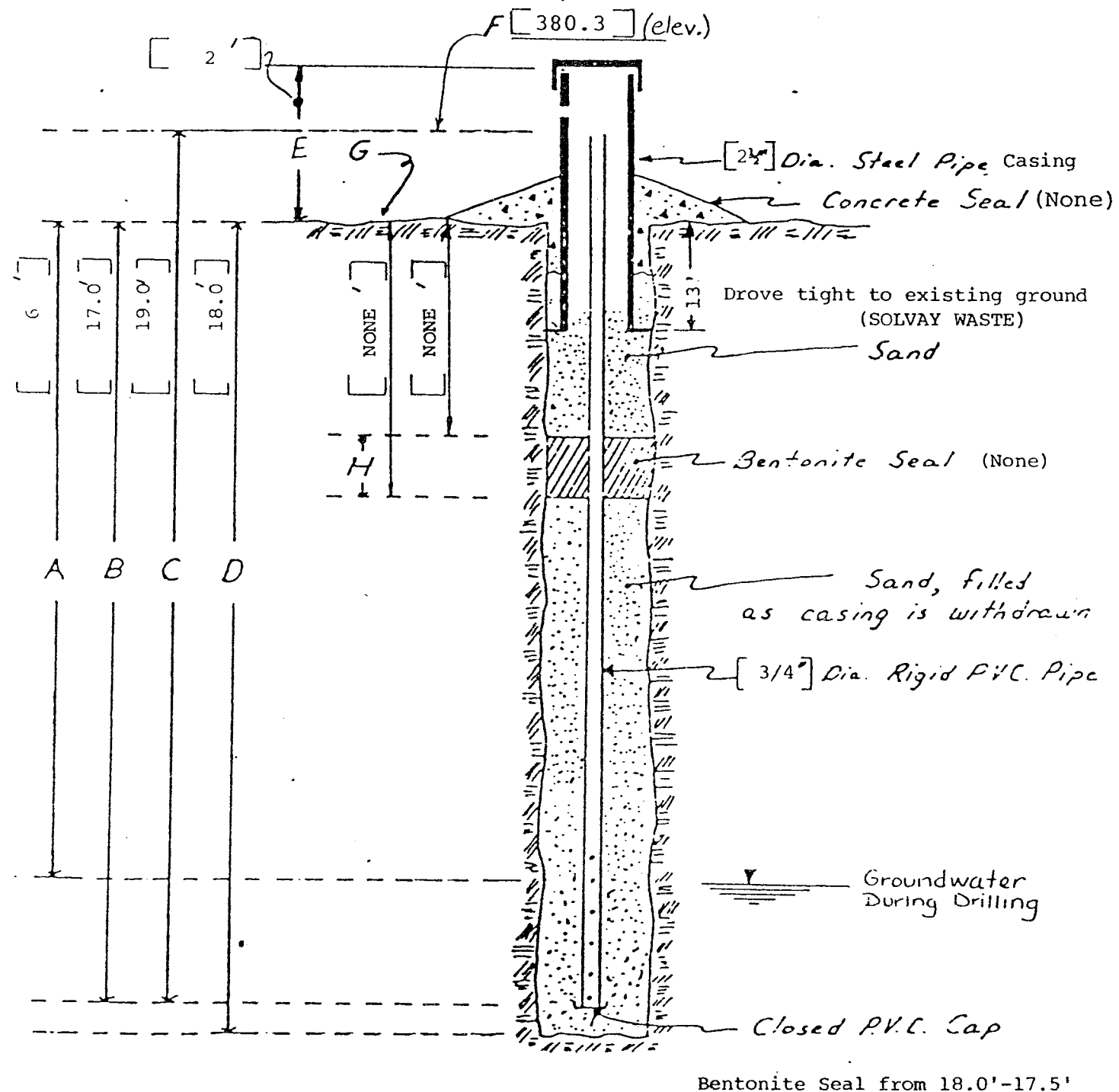


OBSERVATION WELL DETAILS



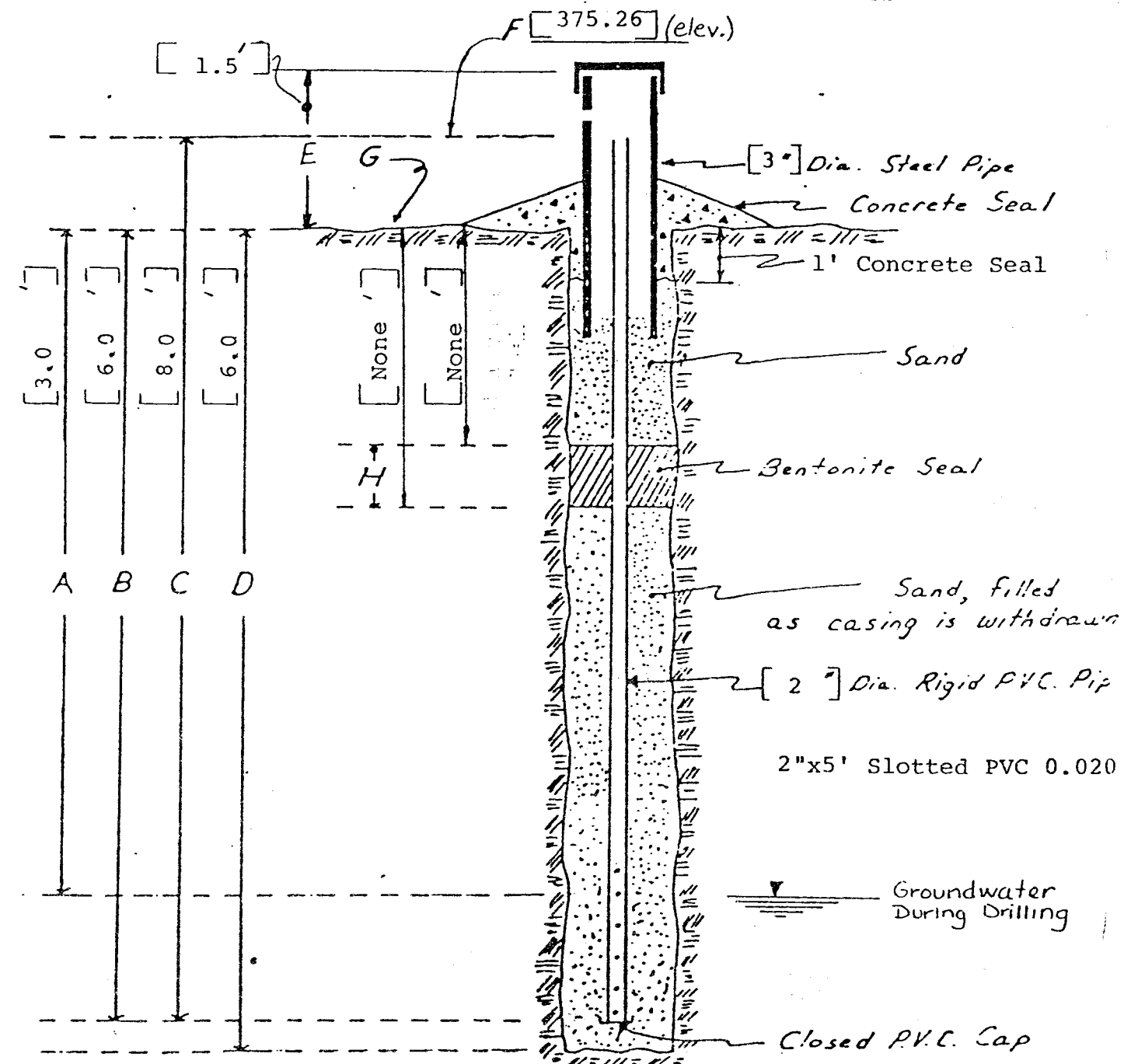
PROJECT Crucible Steel BORING NO. B-11
 LOCATION Town of Geddes OBSERVATION WELL NO. OW-112
 TOP GROUND ELEV. 378.3
 NO. OF WELLS IN BORING 2

SPECIAL CASING BORING
OBSERVATION WELL DETAILS



PROJECT Crucible Steel BORING NO. B-13A
 LOCATION Town of Geddes OBSERVATION WELL NO. OW-131
 TOP GROUND ELEV. 373.8
 NO. OF WELLS IN BORING 1

OBSERVATION WELL DETAILS





EMPIRE SOILS INVESTIGATIONS, INC.

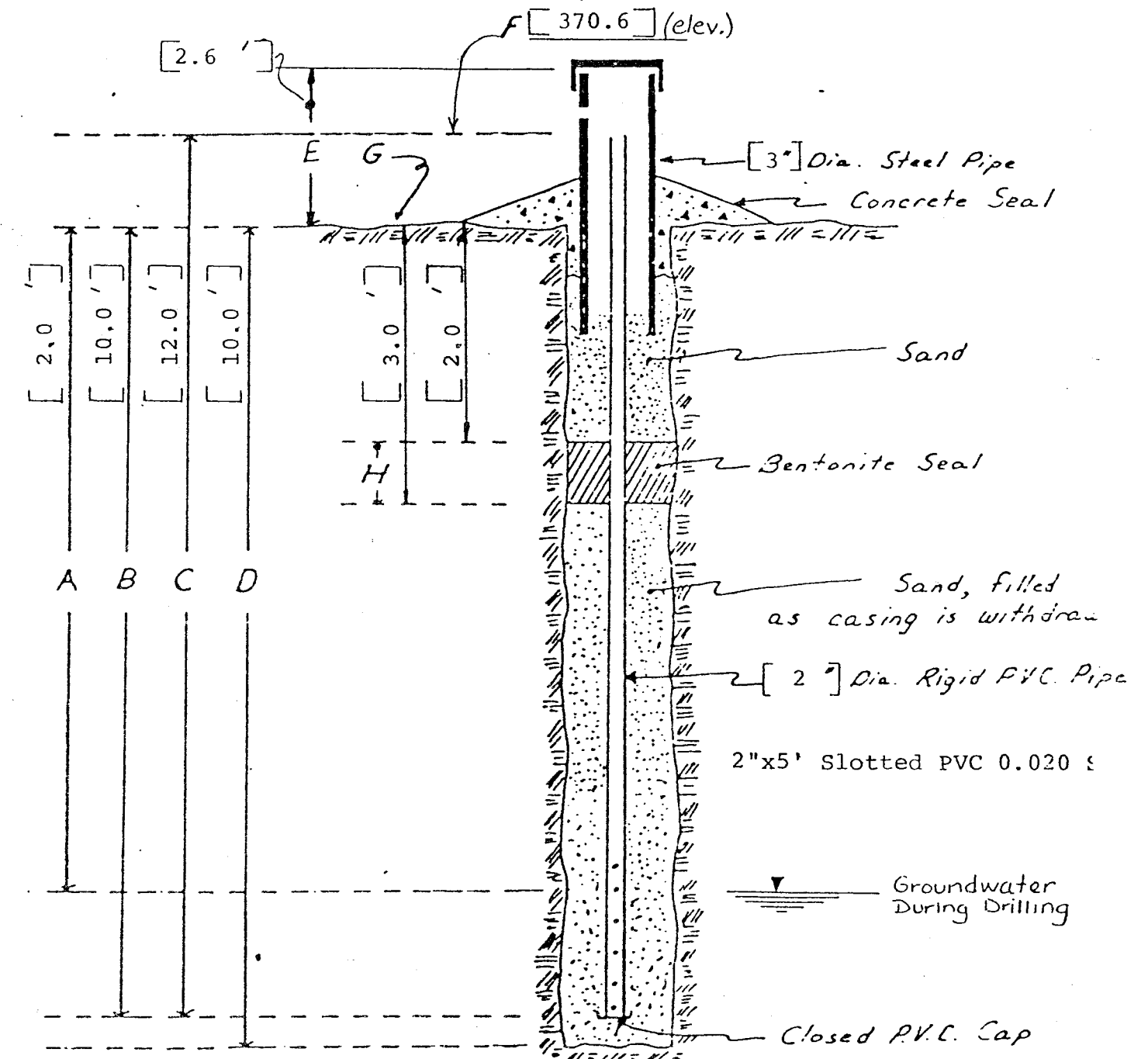
PROJECT Crucible Steel BORING NO. B-13B
LOCATION Town of Geddes OBSERVATION WELL NO. S-132
TOP GROUND ELEV 368.0
NO. OF WELLS IN BORING 1

OBSERVATION WELL DETAILS

LEGEND:

Description of Each Category

- A - Depth to Groundwater below existing grade
- B - P. V. C. Pipe Length below existing grade
- C - P. V. C. Pipe total length
- D - Depth of boring below existing grade
- E - 3" Steel Pipe above existing grade
- F - Elevation-top of 3" Steel Pipe
- G - Elevation-existing grade
- H - Bentonite Seal depth range below existing grade



GENERAL INFORMATION & KEY TO SUBSURFACE LOGS

The subsurface Logs attached to this report present the observations and mechanical data collected by the driller while at the site, supplemented by classification of the materials removed from the logs as determined through visual identification by technicians in the laboratory. It is cautioned that materials removed from the borings represent only a fraction of the total volume of the deposits at the site and may not necessarily be representative of the subsurface conditions between adjacent borings or between the sampled intervals. The data presented on the Subsurface Logs together with the recovered samples will provide a basis for evaluating the character of the subsurface conditions relative to the proposed construction. The evaluation must consider all the recorded details and their significance relative to each other. Often analyses of standard boring data indicate the need for additional testing and sampling procedures to more accurately evaluate the subsurface conditions. Any evaluations of the contents of this report and the recovered samples must be performed by Professionals having experience in Soil Mechanics and Foundation Engineering. The information presented in the following defines some of the procedures and terms used on the Subsurface Logs to describe the conditions encountered.

- ① The figures in the Depth column defines the scale of the Subsurface Log.
- ② The Sample column shows, graphically, the exact depth range from which a sample was recovered. See Table I for a description of the symbols used to signify the various types of samples.
- ③ The Sample No. is used for identification on sample containers and/or Laboratory Test Reports.
- ④ Blows on Sampler—shows the results of the "Penetration Test", recording the number of blows required to drive a split spoon sampler into the soil beneath the casing. The number of blows required for each six inches penetration is recorded. The total number of blows required for the last 12 inches of penetration are summarized in the "N" column. The outside diameter of the sampler, the hammer weight and the length of drop are noted at the bottom of the Subsurface Log.
- ⑤ Blows on Casing—shows the number of blows required to advance the casing a distance of 12 inches. The casing size, the hammer weight and the length of drop are noted at the bottom of the Subsurface Log. If the casing is advanced by means other than driving, the method of advancement will be indicated in the Notes column or under Method of Investigation at the bottom of the Subsurface Log.
- ⑥ All recovered soil samples are reviewed in the laboratory by technicians. The visual descriptions are made on basis of the sample as recovered and in accordance with the Unified Classification System. Guide Lines for the terms used in descriptions are presented in Tables II and III. The description of the relative soil compactness or consistency is based upon the penetration records as defined in Table IV. The description of the soil moisture is based upon the condition of the sample as recovered. The moisture condition is described as dry, damp, moist or wet. Water used to advance the boring may have affected the in-situ moisture content of the sample. Special terms are used as required to describe materials in greater detail; several such terms are listed in Table V. When sampling gravelly soils with a standard two-inch diameter split spoon, the true percentage of gravel is often not recovered due to the relatively small sampler diameter. The presence of boulders and large gravel is sometimes, but not necessarily, detected by an evaluation of the casing and sampler blows or through the "action" of the drill rig as reported by the driller.
- ⑦ The description of rock shown is based upon the recovered rock core. Terms frequently used in the description are included in Table VI.
- ⑧ Miscellaneous observation and procedures noted by the driller are shown in this column, including water level observations. It is important to realize that the reliability of the water level observations depend upon the soil type (water does not readily stabilize in a hole through fine grained soils), and that drill water used to advance the borings may have influenced the observations. The ground water level typically will fluctuate seasonally. One or more perched or trapped water levels may exist in the ground seasonally. All the available readings should be evaluated. If definite conclusions cannot be made, it is often prudent to examine the conditions more thoroughly through test pit excavations or water observation installations.
- ⑨ The length of core run is defined as length of penetration between retrievals of the core barrel from the bore hole, expressed in feet and tenths of feet. The core recovery expresses the length of core recovered from the core barrel per core run, in percent. The size core barrel used is also noted. The more commonly used sizes of core barrels are denoted "AX" and "NX". The "NX" core, being larger in diameter than "AX" core, often produces better recovery, and is frequently utilized where accurate information regarding the geologic conditions and engineering properties is needed. The "NX" core barrel requires the use of four inch diameter casing.

DATE		Onondaga Soil Testing		HOLE NO. B-175			
STARTED 5-1-70				SURF. ELEV. 325.6			
FINISHED 5-1-70				G. W. DEPTH See Note #1			
SHEET 1 OF 1		SUBSURFACE LOG					
PROJECT XXX				LOCATION YYY			
DEPTH-FT.	SAMPLES	BLOWS ON SAMPLER		BLOW ON CASING C	CROSS SECTION	SOIL OR ROCK CLASSIFICATION	NOTES
0		0	6	12	18	N	
	1	2	2	3	5	10	
						15	
						50/5'	
5							

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

TOPSOIL 3"
Brown SILT, some Sand, trace clay
(Moist - Loose)
Gray SHALE, medium hard weathered,
thin bedded some fractures

Note #1
G.W. at 2.0' completion
G.W. at 2.2' 24 hrs. after completion
Cored 2.5'-5.0', Run #1
95 % Recovery
AX Core

TABLE I

	Split Spoon Sample
	Shelby Tube Sample
	Auger or Pit Sample
	Rock Core

TABLE II

Identification of soil type is made on basis of an estimate of particle sizes, and in the case of fine grained soils also on basis of plasticity.		
Soil Type	Soil Particle Size	
Boulder	>12"	
Cobble	3"-12"	
Gravel - Coarse	3"-3/4"	
- Fine	3/4"-#4	
Sand - Coarse	#4 - #10	
- Medium	#10 - #40	
- Fine	#40 - #200	
Silt - Non Plastic (Granular)	<#200	Fine Grained
Clay - Plastic (Cohesive)		

TABLE III

The following terms are used in classifying soils consisting of mixtures of two or more soil types. The estimate is based on weight of total sample.	
Term	Percent of Total Sample
"and"	35 - 50
"some"	20 - 35
"little"	10 - 20
"trace"	less than 10
(When sampling gravelly soils with a standard split spoon, the true percentage of gravel is often not recovered due to the relatively small sampler diameter.)	

TABLE IV

The relative compactness or consistency is described in accord with the following terms.			
Granular Soils		Cohesive Soils	
Term	Blows per Foot, N	Term	Blows per Foot, N
Loose	< 10	Very Soft	< 2
Firm	11 - 30	Soft	3 - 5
Compact	31 - 50	Medium	6 - 15
Very Compact	> 51	Stiff	16 - 25
		Hard	> 26
(Large particles in the soils will often significantly influence the blows per foot recorded during the Penetration Test.)			

TABLE V

Varved -	Alternating layers, seams, and partings of soils.
Layer -	Soil deposit more than 6" thick.
Seam -	Soil deposit less than 6" thick.
Parting -	Soil deposit less than 1/8" thick.
Uniform -	All grains are of about the same diameter.

TABLE VI

Rock Classification Terms		Meaning
Term		
Hardness	Soft Medium Hard Hard Very Hard	Scratched by fingernail Scratched easily by penknife Scratched with difficulty by penknife Cannot be scratched by penknife
Weathering	Very Weathered Weathered Sound	Judged from the relative amounts of disintegrating iron staining, core recovery, clay seams, etc.
Bedding	Laminated Thin bedded Bedded Thick bedded Massive	Natural breaks in Rock Layers { < 1" } { 1" - 4" } { 4" - 12" } { 12" - 36" } { > 36" }
(Fracturing refers to natural breaks in the rock oriented at some angle to the rock layers.)		

STARTED <u>5/8/79</u> FINISHED <u>5/10/79</u> SHEET <u>1</u> OF <u>4</u>		Onondaga Soil Testing SUBSURFACE LOG		HOLE NO. <u>B-1</u> SURF. ELEV. <u>434.4'</u> C. W. DEPTH. <u>See note</u>	
PROJECT <u>Resource Recovery Unit</u>		LOCATION <u>Town of Geddes, NY</u>			
OSD-79-31					
DEPTH	SAMPLE NO.	BLOWS ON SAMPLER	BLOW ON CASING C	SOIL OR ROCK CLASSIFICATION	NOTES
0				TOPSOIL	
1	1	170	1.5'	CHEMICAL WASTE (White, damp)	Note: Groundwater readings: First encountered water @ 43.0'; water level 37.3' inside casing @ completion; water level 37.3' with casing pulled to 50'; water level 37.3' with casing removed.
2	2	180	1.5'	(Same)	
3	3	110	1.5'	(Same)	
12.5'				CHEMICAL WASTE (White, moist)	361.1' lake level
19.0'				CHEMICAL WASTE (white, damp)	
21.5'				CHEMICAL WASTE (White, moist)	
25	4	3	2		
30	5	3	5		
35	6	1	2		
40					

N = No. blows to drive 2 "spoon 12" with 140 lb. pin wt. falling 30" per blow
 C = No. blows to drive "casing" with _____ lb. weight falling _____" per blow
 _____ 2.5" I.D. Hollow Stem Auger

CLASSIFICATION Visual by
driller

DATE <u>5/8/79</u> STARTED <u>5/8/79</u> FINISHED <u>5/10/79</u> SHEET <u>2</u> OF <u>4</u>		Onondaga Soil Testing SUBSURFACE LOG		HOLE NO. <u>B-1</u> SURF. ELEV. <u>434.4'</u> C. W. DEPTH. <u>4.3'</u>	
PROJECT <u>Resource Recovery Unit</u>		LOCATION <u>Town of Geddes, NY</u>			
OSD-79-31					
DEPTH	SAMPLE NO.	BLOWS ON SAMPLER	BLOW ON CASING C	SOIL OR ROCK CLASSIFICATION	NOTES
40	9	1	1	CHEMICAL WASTE (White, moist)	361.1' lake level
45	10	1	2	(Same, saturated)	
50	11	2	2	(Same)	
55	12	2	2	(Same)	
60	13	2	3	(Same)	
65	14	3	3	(Same)	
70	15	2	3	(Same)	
75	16	3	4	(Same)	
77.5'				SILT, trace fine sand (Gray, saturated)	
80					

N = No. blows to drive 2 "spoon 12" with 140 lb. pin wt. falling 30" per blow
 C = No. blows to drive "casing" with _____ lb. weight falling _____" per blow
 _____ 2.5" I.D. Hollow Stem Auger

CLASSIFICATION Visual by
driller

DATE		Onondaga Soil Testing		HOLE NO. <u>B-1</u>						
STARTED <u>5/8/79</u>		OST		SURF ELEV. <u>434.4'</u>						
FINISHED <u>5/10/79</u>				G.W. DEPTH _____						
SHEET <u>3</u> OF <u>4</u>		SUBSURFACE LOG								
PROJECT <u>Resource Recovery Unit</u>			LOCATION <u>Town of Geddes, NY</u>							
<u>OSD-79-31</u>										
DEPTH FEET	SAMPLE NO.	BLOWS ON SAMPLER						BLOW ON CASING C	SOIL OR ROCK CLASSIFICATION	NOTES
		0-5	6-10	11-15	16-20	21-25	Σ			
80	17	7	6	4	10				SILT, trace fine sand (Gray, saturated)	361.1' lake level.
85	18	2	3	4	7				(Same)	
90	19	3	4	3	7				(Same)	
95	20	3	4	4	8				(Same; little more sand)	
100	21	4	5	4	9				(Same)	
105	22	5	9	11	20				105.5' Fine to medium SAND, little silt (Brown, wet)	
110	23	10	14	16	30				(Same)	
115	24	7	11	13	24				(Same; trace silt)	
120										

N = No blows to drive _____ 2" spoon _____ 12" with _____ lb. pin wt falling _____ 30" per blow.

C = No blows to drive _____ " casing _____ " with _____ lb. weight falling _____ " per blow.

TESTING EQUIPMENT _____ 2.5" I.D. Hollow Stem Auger

CLASSIFICATION _____ Visual by _____

driller _____

[illegible]

DATE STARTED <u>5/10/79</u> FINISHED <u>5/10/79</u> SHEET <u>2</u> OF <u>4</u>		Onondaga Soil Testing SUBSURFACE LOG		HOLE NO. <u>B-2</u> SURF. ELEV. <u>436.6±</u> C. W. DEPTH <u>See note</u>	
PROJECT <u>Resource Recovery Unit</u> <u>OSD-79-31</u>			LOCATION <u>Town of Geddes, NY</u>		
DEPTH (ft)	SAMPLE NO.	BLOWS ON SAMPLER	BLOW ON CASING (C)	SOIL OR ROCK CLASSIFICATION	NOTES
40	9	2 2 2 4		CHEMICAL WASTE (White, moist)	361.1' lake level
45	10	2 1 2 3		(Same)	
50	11	1 1 2 3		(Same)	
55	12	1 2 2 4		(Same)	
60	13	3 4 6 10		(Same)	
65	14	3 3 4 7		(Same)	
70	15	2 3 4 7		(Same)	
75	16	1 3 3 6		(Same)	
30					79.0'

N = No blows to drive 2" spoon 12" with 140 lb. pin wt. falling 30" per blow
 C = No blows to drive casing with _____ lb. weight falling _____ per blow
 _____ 2.5" I.D. Hollow Stem Auger

CLASSIFICATION Visual by
driller

DATE STARTED <u>5/10/79</u> FINISHED <u>5/10/79</u> SHEET <u>1</u> OF <u>4</u>		Onondaga Soil Testing SUBSURFACE LOG		HOLE NO. <u>B-2</u> SURF. ELEV. <u>436.6±</u> C. W. DEPTH <u>See note</u>	
PROJECT <u>Resource Recovery Unit</u> <u>OSD-79-31</u>			LOCATION <u>Town of Geddes, NY</u>		
DEPTH (ft)	SAMPLE NO.	BLOWS ON SAMPLER	BLOW ON CASING (C)	SOIL OR ROCK CLASSIFICATION	NOTES
0				WASTE MATERIAL (Brown, dry) 1.0'	Note: Grounwater readings: First encountered water at 32.0'; water level 30.8' inside casing @ completion; water level 30.8' with casing pulled to 50'; water level 30.8' with casing removed. 361.1' lake level.
1	1	0 1 1		CHEMICAL WASTE (White, moist)	
5	2	4 4 5 9		(Same)	
10	3	38 27 52 79		(Same)	
15	4	4 3 3 6		(Same)	
20	5	4 6 19 25		(Same)	
25	6	9 11 11 22		(Same)	
30	7	4 3 3 6		(Same)	
35	8	2 3 3 6		(Same)	
40					

N = No blows to drive 2" spoon 12" with 140 lb. pin wt. falling 30" per blow
 C = No blows to drive casing with _____ lb. weight falling _____ per blow
 _____ 2.5" I.D. Hollow Stem Auger

CLASSIFICATION Visual by
driller

Onondaga Soil Testing, Inc.

SUBSURFACE INVESTIGATIONS AND MATERIAL TESTING

6309 GIRDEN RD., EAST SYRACUSE, N.Y. 13057 - 315-656-7211

JOB NO. S-5989

HOLE NO. TH-101

75-357

TITLE WEST SIDE PUMP STATION MODIFICATION, TOWN OF GEDDES, N.Y.

CLIENT O'BRIEN & GERE ENGINEERS, INC., SYRACUSE, NEW YORK

ELEV. AT GROUND SURFACE TECHNICIAN DAVID ROWE

DATE STARTED FEBRUARY 6, 1975 COMPLETED FEBRUARY 7, 1975

GROUND WATER 15'0" BELOW SURFACE AT COMPLETION WITH AUGERS IN GROUND

PAGE 2 of 3

DEPTH BELOW SURFACE	C	BLOWS ON SAMPLER		SAMPLE NO.	DEPTH OF SAMPLE	CLASSIFICATION & REMARKS
		0-6"	6"-18" N			
40'		2	4	6	35'-36'6"	(REDDISH BROWN, GRAY, SATURATED, NON PLASTIC) SM (MAY RUN WHEN DISTURBED) GRADUAL CHANGE TO: LOOSE TO COMPACT FINE SAND, TRACE SILT
		2	11	7	40'-41'6"	(REDDISH GRAY, SATURATED, NON PLASTIC) SP (MAY RUN WHEN DISTURBED)
		3	6	8	45'-46'6"	(REDDISH GRAY, SATURATED, NON PLASTIC) SP (MAY RUN WHEN DISTURBED)
50'						48'0"
		2	4	9	50'-51'6"	SOFT VARVED SILT AND CLAY (REDDISH BROWN, SATURATED, NON PLASTIC TO SLIGHTLY PLASTIC) ML (MAY RUN WHEN DISTURBED) GRADUAL CHANGE TO: COMPACT FINE TO MEDIUM SAND, TRACE SILT (REDDISH BROWN, SATURATED, NON PLASTIC) SP (MAY RUN WHEN DISTURBED)
		5	13	10	55'-56'6"	
60'		4	14	11	60'-61'6"	(REDDISH BROWN, SATURATED, NON PLASTIC) SP (MAY RUN WHEN DISTURBED)
						62'0"
		12	18	12	65'-66'6"	COMPACT BLOWING FINE TO COARSE SAND, LITTLE FINE GRAVEL, TRACE SILT (REDDISH BROWN, SATURATED, NON PLASTIC) SP (MAY RUN WHEN DISTURBED)
70'						

NOTE: N = NO. BLOWS TO DRIVE 2" SPOON 12" WITH 140 LB. WT. 30" PER BLOW

Onondaga Soil Testing, Inc.

SUBSURFACE INVESTIGATIONS AND MATERIAL TESTING

6309 GIRDEN RD., EAST SYRACUSE, N.Y. 13057 - 315-656-7211

JOB NO. S-5989

HOLE NO. TH-101

75-357

TITLE WEST SIDE PUMP STATION MODIFICATION, TOWN OF GEDDES, N.Y.

CLIENT O'BRIEN & GERE ENGINEERS, INC., SYRACUSE, NEW YORK

ELEV. AT GROUND SURFACE TECHNICIAN DAVID ROWE

DATE STARTED FEBRUARY 6, 1975 COMPLETED FEBRUARY 7, 1975

GROUND WATER 15'0" BELOW SURFACE AT COMPLETION WITH AUGERS IN GRO

PAGE 3 of 3

DEPTH BELOW SURFACE	C	BLOWS ON SAMPLER		SAMPLE NO.	DEPTH OF SAMPLE	CLASSIFICATION & REMARKS
		0-6"	6"-18" N			
75'		15	30	13	70'-71'6"	COMPACT BLOWING FINE TO COARSE SAND, LITTLE FINE GRAVEL, TRACE SILT (REDDISH BROWN, SATURATED, NON PLASTIC) SP (MAY RUN WHEN DISTURBED)
		20	25	14	75'-76'6"	75'10" 76' SEE NOTE "A" POSSIBLE BEDROCK OR LARGE BOULDER VERY DENSE WEATHERED GRAY, GREEN SHALE (VERNON FORMATION)
			130=6"	15	80'-80'6"	80'10" BORING TERMINATED AT 80'6"
						NOTE "A": DENSE FINE TO COARSE GRAVEL, LITTLE FINE TO COARSE SAND, TRACE (REDDISH BROWN, SATURATED, NON PLASTIC) GP
						NOTE: ADVANCED TEST HOLE FROM 0'0" 50'0" USING HOLLOW STEM AUGERS; FI 50'0" TO 80'6" BY ROTARY DRILLING
						NOTE: DRILLING WATER USED FROM 50'0" TO 80'6" ALLEVIATE HYDROSTATIC CONDITIC
						NOTE: FIRST ATTEMPT TO REACH SPECIFIED DEPTH TERMINATED FOLLOWING REFUSAL AT DEPTH OF TWO (2) FEET BELOW SURFACE: POSSIBLE BOULDER. MOVED TEST HOLE 2 1/2' NORTH WEST FOR 2ND ATTEMPT

NOTE: N = NO. BLOWS TO DRIVE 2" SPOON 12" WITH 140 LB. WT. 30" PER BLOW

Onondaga Soil Testing, Inc.

SUBSURFACE INVESTIGATIONS AND MATERIAL TESTING

6309 GIRDEN RD., EAST SYRACUSE, N.Y. 13057 - 315-656-7211

JOB NO. S-5989

HOLE NO. TH-100
75-356

TITLE WEST SIDE PUMP STATION MODIFICATION, TOWN OF GEDDES, N.Y.

CLIENT O'BRIEN & GERE ENGINEERS, INC., SYRACUSE, NEW YORK

ELEV. AT GROUND SURFACE TECHNICIAN RONALD BUSH

DATE STARTED FEBRUARY 3, 1975 COMPLETED FEBRUARY 5, 1975

GROUND WATER SEE NOTE

PAGE 1 of 3

DEPTH BELOW SURFACE	C	BLOWS ON SAMPLER		SAMPLE NO.	DEPTH OF SAMPLE	CLASSIFICATION & REMARKS
		0-6"	6"-18" N			
5'		16	64	1	1'0"-2'6"	LOOSE TO VERY DENSE MISCELLANEOUS FILL CONSISTING OF: CONCRETE & ROCK FRAG- MENTS, BOULDERS, COBBLES, SAND, GRAVEL, BRICK, METAL, ETC. (GRAY, BLACK, BROWN, DRY, NON PLASTIC) (GRAY, BLACK, BROWN, DRY, NON PLASTIC)
		3	7	2	5'0"-6'6"	
10'						
		21	55	3	10'0"-11'6"	(GRAY, BLACK, BROWN, WET, NON PLASTIC)
15'						13'0"
		1	2	4	15'0"-16'6"	VERY SOFT CHEMICAL RESIDUE AND ORGANIC MATERIAL (SEASHELLS), LITTLE FINE TO MEDIUM SAND, SILT AND FINE GRAVEL (WHITE, GRAY, SATURATED, NON PLASTIC) (MAY RUN WHEN DISTURBED)
20'						
		1	1	5	20'0"-21'6"	(WHITE, GRAY, SATURATED, NON PLASTIC) (MAY RUN WHEN DISTURBED)
25'						
		1	3	6A 6B	25'0"-26'6"	(WHITE, GRAY, SATURATED, NON PLASTIC) (MAY RUN WHEN DISTURBED) 26'6"
30'						SOFT SILT, TRACE VARVED CLAY (GRAY, REDDISH BROWN, SLIGHTLY PLASTIC) ML
		3	5	7	30'0"-31'6"	GRADUAL CHANGE TO: LOOSE VERY FINE SAND & SILT (REDDISH GRAY, SATURATED, NON PLASTIC) ML (MAY RUN WHEN DISTURBED)
35'						

NOTE: N = NO. BLOWS TO DRIVE 2" SPOON 12" WITH 140 LB. WT. 30" PER BLOW

Onondaga Soil Testing, Inc.

SUBSURFACE INVESTIGATIONS AND MATERIAL TESTING

6309 GIRDEN RD., EAST SYRACUSE, N.Y. 13057 - 315-656-7211

JOB NO. S-5989

HOLE NO. TH-100
75-356

TITLE WEST SIDE PUMP STATION MODIFICATION, TOWN OF GEDDES, N.Y.

CLIENT O'BRIEN & GERE ENGINEERS, INC., SYRACUSE, NEW YORK

ELEV. AT GROUND SURFACE TECHNICIAN RONALD BUSH

DATE STARTED FEBRUARY 3, 1975 COMPLETED FEBRUARY 5, 1975

GROUND WATER SEE NOTE

PAGE 2 of 3

DEPTH BELOW SURFACE	C	BLOWS ON SAMPLER		SAMPLE NO.	DEPTH OF SAMPLE	CLASSIFICATION & REMARKS
		0-6"	6"-18" N			
40'		3	4	8	35'0"-36'6"	LOOSE FINE SAND, SOME SILT (REDDISH BROWN, SATURATED, NON PLAS SM (MAY RUN WHEN DISTURBED) GRADUAL CHANGE TO: LOOSE FINE SAND, TRACE SILT (REDDISH BROWN, SATURATED, NON PLASTIC) SP (MAY RUN WHEN DISTURBED)
		5	8	9	40'0"-41'6"	
45'						
		4	9	10	45'0"-46'6"	(REDDISH BROWN, SATURATED, NON PLASTIC) SP (MAY RUN WHEN DISTURBED)
50'						49'0"
		3	6	11	50'0"-51'6"	LOOSE FINE SAND, SOME SILT, FEW SOFT CLAYEY VARVES NOTED (REDDISH BROWN, SATURATED, NON PLASTIC) SM (MAY RUN WHEN DISTURBED) GRADUAL CHANGE TO: LOOSE FINE TO MEDIUM SAND, TRACE SI
55'						(REDDISH BROWN, SATURATED, NON PLAS SP (MAY RUN WHEN DISTURBED)
		4	8	12	55'0"-56'6"	
60'						
		5	10	13	60'0"-61'6"	(REDDISH BROWN, SATURATED, NON PLASTIC) SP (MAY RUN WHEN DISTURBED)
65'						64'0"
		5	10	14	65'0"-66'6"	COMPACT TO MEDIUM DENSE FINE TO MEDIUM SAND, TRACE SILT (GRAY, SATURATED, NON PLASTIC) SP (MAY RUN WHEN DISTURBED)
70'						

NOTE: N = NO. BLOWS TO DRIVE 2" SPOON 12" WITH 140 LB. WT. 30" PER BLOW

Onondaga Soil Testing, Inc.



SUBSURFACE INVESTIGATIONS AND MATERIAL TESTING

6309 GIRDEN RD., EAST SYRACUSE, N.Y. 13057 - 315-656-7211

JOB NO. S-5989

HOLE NO. TH-100

TITLE WEST SIDE PUMP STATION MODIFICATION, TOWN OF GEDDES, N.Y.

CLIENT O'BRIEN & GERE ENGINEERS, INC., SYRACUSE, NEW YORK

ELEV. AT GROUND SURFACE TECHNICIAN RONALD BUSH

DATE STARTED FEBRUARY 3, 1975 COMPLETED FEBRUARY 5, 1975

GROUND WATER SEE NOTE

PAGE 3 of 3

DEPTH BELOW SURFACE	C	BLOWS ON SAMPLER		SAMPLE NO.	DEPTH OF SAMPLE	CLASSIFICATION & REMARKS
		0-6"	6"-18" N			
75'		8	20	15	70'-71'6"	LITTLE FINE GRAVEL NOTED (GRAY, SATURATED, NON PLASTIC) SP (MAY RUN WHEN DISTURBED)
		19	42	16	75'-76'6"	(GRAY, SATURATED, NON PLASTIC) SP (MAY RUN WHEN DISTURBED)
80'			150=2"	17	80'-80'2"	POSSIBLE BEDROCK OR LARGE BOULDER - VERY DENSE WEATHERED GRAY, GREEN SHALE (VERNON FORMATION) BORING TERMINATED AT 80'2"
						NOTE: GROUND WATER READING: 14'0" BELOW SURFACE AT COMPLETION WITH AUGERS IN GROUND; 9'7" BELOW SURFACE 24 HOURS AFTER COMPLETION NOTE: ADVANCED TEST HOLE FROM 0'0" TO 60'0" USING HOLLOW STEM AUGERS; AD- VANCED TEST HOLE FROM 60'0" TO 80'2" BY ROTARY DRILLING NOTE: DRILLING WATER USED FROM 60'0" TO 80'2" TO ALLEVIATE HYDROSTATIC CONDITION

NOTE: N = NO. BLOWS TO DRIVE 2" SPOON 12" WITH 140 LB. WT. 30" PER BLOW

Onondaga Soil Testing, Inc.



SUBSURFACE INVESTIGATIONS AND MATERIAL TESTING

6309 GIRDEN RD., EAST SYRACUSE, N.Y. 13057 - 315-656-7211

JOB NO. S-5989

HOLE NO. TH-101

TITLE WEST SIDE PUMP STATION MODIFICATION, TOWN OF GEDDES, N.Y.

CLIENT O'BRIEN & GERE ENGINEERS, INC., SYRACUSE, NEW YORK

ELEV. AT GROUND SURFACE TECHNICIAN RONALD BUSH

DATE STARTED FEBRUARY 6, 1975 COMPLETED FEBRUARY 7, 1975

GROUND WATER 15'0" BELOW SURFACE AT COMPLETION WITH AUGERS IN GROUND

PAGE 1 of 3

DEPTH BELOW SURFACE	C	BLOWS ON SAMPLER		SAMPLE NO.	DEPTH OF SAMPLE	CLASSIFICATION & REMARKS
		0-6"	6"-18" N			
5'		25	55	1	1'0"-2'6"	COMPACT TO VERY DENSE MISCELLANEOUS CONSISTING OF: BOULDERS, CONCRETE AND ROCK FRAGMENTS, BRICK, CRUSHED STONE, SAND, GRAVEL (BROWN, DAMP, NON PLASTIC)
		18	24	2	5'0"-6'6"	(BROWN, MOIST, NON PLASTIC)
10'		12	18	3	10'-11'6"	(BROWN, WET, NON PLASTIC)
						VERY SOFT CHEMICAL RESIDUE AND ORGANIC MATERIAL (SEASHELLS), LITTLE FINE TO MEDIUM SAND, SILT AND FINE GRAVEL (WH. GRAY, SATURATED, NON PLASTIC)
15'		1	2		15'-16'6"	NO RECOVERY (MAY RUN WHEN DISTURBED)
		0	0		16'-18'0"	NO RECOVERY
20'		1	2		20'-21'6"	NO RECOVERY
		0	0		21'-23'0"	NO RECOVERY
25'		1	2	4	25'-26'6"	(WHITE, GRAY, SATURATED, NON PLASTIC (MAY RUN WHEN DISTURBED)
						LOOSE FINE SAND VARVED WITH SILT & CLAY
30'		1	3	5	30'-31'6"	(REDDISH BROWN, GRAY, SATURATED, NON PLASTIC) SM (MAY RUN WHEN DISTURBED)
35'						

NOTE: N = NO. BLOWS TO DRIVE 2" SPOON 12" WITH 140 LB. WT. 30" PER BLOW

SUBSURFACE INVESTIGATIONS AND MATERIAL TESTING

JOB NO. OSD-78-011

HOLE NO. TH-1

CLIENT INDUSTRIAL EXHIBIT AUTHORITY, STATE OF NEW YORK

DATE STARTED APRIL 12, 1978 COMPLETED APRIL 13 1978

GROUND WATER. SEE NOTE

DEPTH BELOW SURFACE	C	BLOWS ON SAMPLER		SAMPLE NO.	DEPTH OF SAMPLE	CLASSIFICATION & REMARKS
		0-6"	6"-18" N			
5'			10		0'0"-2'0"	TOPSOIL 0'9"
			6	1		SEE NOTE "A" 1'0"
						FILL:ASHES & CINDERS
						(BLACK,MOIST,NON PLASTIC) 5'0"
10'			6		5'0"-7'0"	FIRM SILT,LITTLE CLAY,TRACE DECOMPOSING
			15	2		ORGANIC MATTER
						(GRAY,MOIST,SLIGHTLY PLASTIC)ML 8'0"
						FIRM SILT,TRACE FINE SAND,THIN CLAY
15'			18		10'-12'0"	VARVED
			19	3		(BROWN,WET,NON PLASTIC)ML
						13'6"
						SOFT VARVED SILT,FINE SAND & CLAY
20'			3		15'-17'0"	(GRAY,SATURATED,NON PLASTIC/PLASTIC)
			2	4		ML/MH
						18'0"
						VERY DENSE FINE TO MEDIUM GRAVEL,SOME
25'			36		20'-22'0"	SILT,LITTLE FINE TO MEDIUM SAND,COBBLES
			113	5		(REWORKED GLACIAL TILL)
						(RED,BROWN,MOIST,NON PLASTIC)GM
30'			42		25'-27'0"	(RED,BROWN,WET/SATURATED,NON PLASTIC)GM
			190	6		
35'			265	7	30'-31'0"	
						34'0"

NOTE: N = NO. BLOWS TO DRIVE 2" SPOON 12" WITH 140 LB. WT. 30" PER BLOW

SUBSURFACE INVESTIGATIONS AND MATERIAL TESTING

JOB NO. OSD-78-011

HOLE NO. TH-1

CLIENT INDUSTRIAL EXHIBIT AUTHORITY, STATE OF NEW YORK

ELEV. AT GROUND SURFACE TECHNICIAN RONALD BUSH

DATE STARTED APRIL 12, 1978 COMPLETED APRIL 13, 1978

GROUND WATER_____SEE NOTE

[illegible]

NOTE: N = NO. BLOWS TO DRIVE 2" SPOON 12" WITH 140 LB. WT. 30" PER BLOW

2 = NO FLOW TO BEYOND 1/2" COILING 12" WITH 450 LB WT 21" AIR FLOW

SUBSURFACE INVESTIGATIONS AND MATERIAL TESTING

Building #8

09 GIRDEN RD., P.O. BOX 178, EAST SYRACUSE, N.Y. 13057—315-656-7211

JOB NO. OSD-78-011

HOLE NO. TH-2

TITLE PRELIMINARY STADIUM SITE EVALUATION, NYS FAIRGROUNDS, SYR., N.Y.

CLIENT INDUSTRIAL EXHIBIT AUTHORITY, STATE OF NEW YORK

ELEV. AT GROUND SURFACE TECHNICIAN C. FRICKE

DATE STARTED APRIL 13, 1978 COMPLETED APRIL 13, 1978

GROUND WATER 13'1" BELOW SURFACE 1 HOUR AFTER COMPLETION

PAGE 1 of 2

DEPTH BELOW SURFACE	C	BLOWS ON SAMPLER		SAMPLE NO.	DEPTH OF SAMPLE	CLASSIFICATION & REMARKS
		0-6"	6"-18" N			
5'		4	15	1	1'0"-2'6"	TOPSOIL FILL: COAL, ASH, BRICK (BLACK, DAMP, NON PLASTIC)
						0'6"
10'		4	7	2	5'0"-6'6"	
						6'0"
						SOFT SILT, LITTLE CLAY, TRACE FINE SAND (BROWN, MOIST, PLASTIC) MH
15'		4	10	3	10'-11'6"	
						14'0"
						SOFT VARVED SILT, FINE SAND & CLAY (GRAY, SATURATED, NON PLASTIC/PLASTIC) ML/MH
20'		4	10	4	15'-16'6"	
25'		1	8	5	20'-21'6"	
						23'6"
						COMPACT FINE SAND, LITTLE SILT (RED, BROWN, SATURATED, NON PLASTIC) SM
30'		5	12	6	25'-26'6"	
35'		3	11	7	30'-31'6"	
						31'3"
						COMPACT TO DENSE FINE TO MEDIUM GRAVEL, SOME SILT, LITTLE FINE TO COARSE SAND (REWORKED GLACIAL TILL) (RED, BROWN, WET/SATURATED, NON PLASTIC) GM

NOTE: N = NO. BLOWS TO DRIVE 1" SPOON 12" WITH 140 LB. WT. 30" PER BLOW
 S = NO. BLOWS TO DRIVE 1 1/4" CASE 12" WITH 240 LB. WT. 24" PER BLOW

Onondaga Soil Testing

SUBSURFACE INVESTIGATIONS AND MATERIAL TESTING

6309 GIRDEN RD., P.O. BOX 178, EAST SYRACUSE, N.Y. 13057—315-656-7211

Building #8

JOB NO. OSD-78-011

HOLE NO. TH-2

TITLE PRELIMINARY STADIUM SITE EVALUATION, NYS FAIRGROUNDS, SYR.

CLIENT INDUSTRIAL EXHIBIT AUTHORITY, STATE OF NEW YORK

ELEV. _____ AT GROUND SURFACE _____ TECHNICIAN C. FRICKE

DATE STARTED APRIL 13, 1978 COMPLETED APRIL 13, 1978

GROUND WATER 13'1" BELOW SURFACE 1 HOUR AFTER COMPLETION

PAGE 2 of 2

[illegible]

NOTE: N = NO. BLOWS TO DRIVE 2" SPOON 12" WITH 140 LB. WT. 30" PER BLOW
C = NO. BLOWS TO DRIVE 2 1/4" CASING 12" WITH 250 LB. WT. 24" PER BLOW

19 GIRDEN RD., P.O. BOX 178, EAST SYRACUSE, N.Y. 13057—315-656-7211 (EAST SIDE, MAIN GATE)
 JOB NO. OSD-78-021 HOLE NO. TH-1

CLIENT NYS URBAN DEVELOPMENT CORPORATION, NEW YORK, NEW YORK

ELEV. AT GROUND SURFACE TECHNICIAN RONALD BUSH

DATE STARTED MAY 3, 1978 COMPLETED MAY 3, 1978

GROUND WATER 2' 3" BELOW SURFACE AT COMPLETION

DEPTH BELOW SURFACE	C	BLOWS ON SAMPLER		SAMPLE NO.	DEPTH OF SAMPLE	CLASSIFICATION & REMARKS
		0-6"	6"-18" N			
5'		3	4	1	1'0"-2'6"	BLACKTOP 0'6"
						CONCRETE 1'0"
						FILL: ASHES, CINDERS, GRAVEL (BLACK, BROWN, WET, NON PLASTIC) 4'0"
		1	3	2	5'0"-6'6"	SOFT SILT & FINE SAND VARVED WITH RED-BROWN CLAY (BROWN, WET, NON PLASTIC) 7'6"
10'						
		2	4	3	10'-11'6"	SOFT SILT, TRACE FINE SAND (BROWN, SATURATED, NON PLASTIC)
15'						
		1	11	4	15'-16'6"	15'6"
20'						
		36	36	5	20'-21'6"	COMPACT FINE TO MEDIUM SAND, LITTLE SILT & FINE GRAVEL (BROWN, SATURATED, NON PLASTIC) 19'6"
25'						
		14	42	6	25'-26'6"	DENSE FINE TO MEDIUM GRAVEL & FINE TO COARSE SAND, TRACE SILT (BROWN, SATURATED, NON PLASTIC) 23'6"
30'						
		23	55	7	30'-31'6"	GLACIAL TILL: FINE TO MEDIUM GRAVEL, SILT & FINE TO COARSE SAND (RED, BROWN, WET, NON PLASTIC)
35'						

Onondaga Soil Testing



6309 GIRDEN RD., P.O. BOX 178, EAST SYRACUSE, N.Y. 13057—315-656-7211 (EAST SIDE, MAIN GATE)
JOB NO. OSD-78-021 TH-1

CLIENT NYS URBAN DEVELOPMENT CORPORATION, NEW YORK, NEW YORK

ELEV. AT GROUND SURFACE TECHNICIAN RONALD BUSH

DATE STARTED MAY 3, 1978 COMPLETED MAY 3, 1978

GROUND WATER 2' 3" BELOW SURFACE AT COMPLETION

[illegible]

NOTE: N = NO. BLOWS TO DRIVE 2" SPOON 12" WITH 140 LB. WT. 30" PER BLOW

Onondaga Soil Testing



Division of EMPIRE SOILS INVESTIGATIONS, INC.

(KEANE VILLAGE)

6309 GIRDEN RD., P.O. BOX 178, EAST SYRACUSE, N.Y. 13057—315-656-7211

JOB NO. OSD-78-021

HOLE NO. TH-3

TITLE PROPOSED REDEVELOPMENT, NYS FAIRGROUNDS, SYRACUSE, NEW YORK

CLIENT NYS URBAN DEVELOPMENT CORPORATION, NEW YORK, NEW YORK

ELEV. AT GROUND SURFACE TECHNICIAN RONALD BUSH

DATE STARTED MAY 4, 1978 COMPLETED MAY 4, 1978

GROUND WATER 4'7" BELOW SURFACE AT COMPLETION

DEPTH BELOW SURFACE	C	BLOWS ON SAMPLER		SAMPLE NO.	DEPTH OF SAMPLE	CLASSIFICATION & REMARKS
		0-6"	6"-18" N			
5'		5	6	1	1'0"-2'6"	TOPSOIL 0'7" FILL: ASHES, CINDERS, COAL, SAND, GRAVEL (BLACK, BROWN, DAMP, NON PLASTIC) 2'6"
		2	2	2	5'0"-6'6"	SOFT SILT VARVED WITH CLAY & FINE SAND (BROWN, WET, NON PLASTIC)
		2	9	3	10'-11'6"	11'0"
10'						COMPACT FINE TO MEDIUM SAND, LITTLE SILT (BROWN, SATURATED, NON PLASTIC)
15'		3	10	4	15'-16'6"	18'0"
20'		5	19	5	20'-21'6"	GLACIAL TILL, UPPER PORTIONS REWORKED: FINE TO MEDIUM GRAVEL, FINE TO MEDIUM SAND, SILT (RED, BROWN, WET, NON PLASTIC)
25'		18	43	6	25'-26'6"	
30'		24	63	7	30'-31'6"	31'6"
						BORING TERMINATED AT 31'6"

NOTE: N = NO. BLOWS TO DRIVE 2" SPOON 12" WITH 140 LB. WT. 30" PER BLOW

DEPTH	ELEVATION	SAMPLES	SAMPLE NO.	CHEM. SMPL	RECOVERY (Inches)	N	SOIL or ROCK CLASSIFICATION	UNIFIED SOIL CLASSIF.	DENSITY (PCF)	WATER CONTENT (Percent)	PERMEABILITY (cm/sec)	MONITOR/PIEZOMETER CONSTRUCTION DETAILS					NOTES
												301.1	301.2	301.3	301.4	301.5	
5			1		7	1	CRUSHED STONE 0.5'										Well Data; All wells are 2 inch diameter PVC Pipe with a 3 foot stick-up. Each has a 3 inch diameter steel guard pipe w/locking cap. <i>all threads wrapped</i> <i>w/teflon tape</i> Water Data (Before Well Development) 301.1 49.8' 301.2 52.7' 301.3 54.5' 301.4 49.5' 301.5 40.2' 10-10-83 20.0' 10-11-83
			2		21	11	White SOLVAY WASTE w/few cemented seams (Moist-Firm & Loose)										
			3		18	5											
			4		9	2											
			10		21	2	similar with seams of grey Flyash from 8' to 12'										
15			6		22	2	similar										
			7		21	12	Sample no. 7 - Wet										
			8		18	2	similar with cemented seams										
			9		20	2											
			10		20	1	similar with cemented seams										
20			11		24	1											
			12		24	6											
			13		24	1											
			14		24	6											
			15		24	4											
30			16		24	4											
			17		24	8											
			18		24	3	similar with cemented seams										
			19		24	7											
			20		24	7											
40			21		24	1	similar with cemented seams										
			22		24	5											
			23		24	5	similar with cemented seams from 44' to 61'										
			24		24	4											
			25		24	6											

NOTE:
See reverse side
for key and
explanation to
log.

Surface Elevation _____
 Date Started 10-10-83
 Date Completed 10-24-83
 Number of Installations in Boring 1
 Method of installation Separate borings
 for each monitor

Project No. GD-83-68
 Project Title Monitoring Well Cluster
 Location Crucible Specialty Metals Landfill
Solvay, NY
 Classified By SC Checked _____

HYDROGEOLOGIC LOG

THOMSEN ASSOCIATES

MONITOR NO.
301.1

Sheet 1 of 4

DEPTH	ELEVATION	SAMPLES	SAMPLE NO.	CHEM. SMPLE RECOVERY [Inches]	N	SOIL or ROCK CLASSIFICATION	UNIFIED SOIL CLASSIF.	DENSITY [PCF]	WATER CONTENT [Percent]	PERMEABILITY [cm/sec]	MONITOR/PIEZOMETER CONSTRUCTION DETAILS					NOTES		
											301.1	301.2	301.3	301.4	301.5			
55		/	26	24	4	White SOLVAY WASTE with cemented seams (Moist-Firm & Loose)												10-11-83 --- 50.0' 10-12-83
		/	27	24	7													
		/	28	24	7													
		/	29	24	9													
		/	30	24	10													
60		/	31	24	7	Black Organic SILT with fibrous organics seam grading to Brown & Grey SILT & CLAY with fibrous organics (Moist-Hard)												
		/	32	20	44	light Grey & Brown SILT & CLAY with shells with a seam containing fine Sand & Black organic Silt (Wet-Hard)												
65		/	33	21	34	brownish Grey Clayey SILT (Wet-Medium) similar with little to Some fine Sand (Wet)												10-12-83 --- 65.0' 10-13-83
		/	34	20	8													
		/	35	21	11													
70		/	36	20	8													
		/	37	21	9													
75		/	38	22	12	Grey fine SAND, Some Silt, fibrous organics (Wet-Firm)												
		/	39	19	11													
		/	40	20	18	Grey medium-fine SAND, little silt & fine gravel (Wet-Firm)												
80		/	41	12	19	small seam of Brown Clayey SILT grading to Grey fine SAND, little silt (Saturated-Very Compact)												
		/	42	18	84	- Moist												
85		/	43	6	66	- Firm												
		/	44	14	74													
		/	45	14	13													
90		/	46	16	25													
		/	47	19	17													
		/	48	12	14													
95		/	49	13	12													
		/	50	13	11													

NOTE:
See reverse side for key and explanation to log.

RUN NO.

RECOVERY [Percent]

RQD

Surface Elevation _____
Date Started 10-10-83
Date Completed 10-24-83
Number of Installations in Boring 1
Method of Installation Separate boring for each monitor

Project No. GD-83-68
Project Title Monitoring Well Cluster
Location Crucible Specialty Metals Landfill
Solvay, NY
Classified By SC Checked _____

HYDROGEOLOGIC LOG

THOMSEN ASSOCIATES

MONITOR NO.
301.1
Sheet 2 of 4

DEPTH	ELEVATION	SAMPLES	SAMPLE NO.	CHEM. SMPL RECOVERY (Inches)	N	SOIL or ROCK CLASSIFICATION	UNIFIED SOIL CLASSIF.	DENSITY (PCF)	WATER CONTENT (Percent)	PERMEABILITY (cm/sec)	MONITOR/PIEZOMETER CONSTRUCTION DETAILS						NOTES
											301.1	301.2	301.3	301.4	301.5		
-105		/	51	17	11	Grey SILT with seams containing clayey Silt and fine Sand (Saturated-Firm)											10-13-83 10-14-83 100.0'
		/	52	16	13												
		/	53	13	9												
		/	54	12	11	Brownish Grey fine SAND, little to Some Silt (Saturated-Firm)											
		/	55	12	11												
-110		/	56	13	13												
		/	57	20	21												
-115		/	58	10	11												
		/	59	11	13												
		/	60	12	11												
-120		/	61	11	11	brownish Grey laminated fine SAND, little silt, Clayey SILT and black Organic CLAY (Wet-Firm)											10-14-83 10-17-83 124.0'
		/	62	10	12												
-125		/	63	12	13												Water Data: On 10-17-83, AM, with 124' of casing in ground, water level at 46.3'
		/	64	13	17												
-130		/	65	14	13	brownish Grey CLAY & SILT with varved seams (Wet-Medium)											
		/	66	18	11												
		/	67	20	16												
-135		/	68	20	15												
		/	69	14	18	brownish Grey SILT, trace fine sand with seams containing clayey Silt (Wet-Firm)											
-140		/	70	21	19	brownish Grey laminated varved Silty CLAY and SILT(Wet-Firm)											
		/	71	21	18												
		/	72	23	17												
-145		/	73	21	27	brownish Grey varved Silty Clay with seams of fine Sand (Saturated-Firm & Compact)											With 144' of casing in ground, water level 50.2'.
		/	74	17	31												
		/	75	21	28												

NOTE:
See reverse side for key and explanation to log.

Project No. GD-83-68
 Project Title Monitoring Well Cluster
 Location Crucible Specialty Metals Landfill
 Classified By SC Checked _____

HYDROGEOLOGIC LOG

MONITOR NO.
301.1
Sheet 3 of 4

[illegible]

DEPTH	ELEVATION	SAMPLES	SAMPLE NO.	CHEM. SMPL RECOVERY (Inches)	N	SOIL or ROCK CLASSIFICATION	UNIFIED SOIL CLASSIF.	DENSITY (PCF)	WATER CONTENT (Percent)	PERMEABILITY (cm/sec)	MONITOR/PIEZOMETER CONSTRUCTION DETAILS						WATER PROBE READINGS				NOTES
																	Temp. (°C)	Cond. (µmho/cm)	Eh (mV)	pH	
5						NO SAMPLES TAKEN White SOLVAY WASTE															
10																					
15																					
20																					
25																					
30																					
35																					
40																					
45																					
NOTE: See reverse side for key and explanation to log.		RUN NO.	RECOVERY (Percent)	RQD	Surface Elevation _____ Date Started <u>10-20-83</u> Date Completed <u>10-24-83</u> Number of Installations in Boring <u>1</u> Method of installation <u>Separate boring</u> for each monitor					Project No. <u>GD-83-68</u> Project Title <u>Monitoring Well Cluster</u> Location <u>Crucible Specialty Metals Landfill</u> Classified By <u>R. Bush</u> (Driller) Checked _____						HYDROGEOLOGIC LOG THOMSEN ASSOCIATES MONITOR NO. <u>301,2</u> Sheet <u>1</u> of <u>2</u>					

DEPTH	ELEVATION	SAMPLES	SAMPLE NO.	CHEM. SMPL RECOVERY [Inches]	N	SOIL or ROCK CLASSIFICATION	UNIFIED SOIL CLASSIF.	DENSITY [PCF]	WATER CONTENT [Percent]	PERMEABILITY [cm/sec]	MONITOR/PIEZOMETER CONSTRUCTION DETAILS						WATER PROBE READINGS				NOTES
																	Temp. [°C]	Cond. [µmho/cm]	Eh [mV]	pH	
-55																				10-20-83 50.0'	
-60						Brown SILT, little fine sand (Wet) 61.0'														10-21-83	
-65																					
-70																					
-75																					
-80						Brown SILT, little clay & fine sand (Saturated) 82.5'															
-85						Brown medium-fine SAND, little silt (Saturated)															
-90																					
-95			1	13	17	Grey fine SAND, little silt, fibrous organics (Saturated-Firm)															
			2	12	16															10-21-83 98.0'	
						Boring Terminated @ 100.0'														10-24-83	
NOTE: See reverse side for key and explanation to log.												PROJECT INFORMATION Project No. GD-83-68 Project Title Monitoring Well Cluster Location Crucible Specialty Metals Landfill Solvay, NY Classified By R. Bush & Checked SC				HYDROGEOLOGIC LOG THOMSEN ASSOCIATES MONITOR NO. 301,2 Sheet 2 of 2					
		RUN NO.	RECOVERY [Percent]		RQD	Surface Elevation Date Started 10-20-83 Date Completed 10-24-83 Number of Installations in Boring 1 Method of Installation Separate boring for each monitor															

DEPTH	ELEVATION	SAMPLES	SAMPLE NO.	CHEM. SMPL RECOVERY (Inches)	N	SOIL or ROCK CLASSIFICATION	UNIFIED SOIL CLASSIF.	DENSITY (PCF)	WATER CONTENT (Percent)	PERMEABILITY (cm/sec)	MONITOR/PIEZOMETER CONSTRUCTION DETAILS						WATER PROBE READINGS				NOTES
																	Temp. (°C)	Cond. (µmho/cm)	Eh (mV)	pH	
5						NO SAMPLES TAKEN															
10						White SOLVAY WASTE															
15																					
20																					
25																					
30																					
35																					
40																					
45																					
NOTE: See reverse side for key and explanation to log.		RUN NO.	RECOVERY (Percent)	RQD	Surface Elevation _____ Date Started <u>10-25-83</u> Date Completed <u>10-26-83</u> Number of Installations in Boring <u>1</u> Method of Installation <u>Separate boring</u> for each monitor _____					Project No. <u>GD-83-68</u> Project Title <u>Monitoring Well Cluster</u> Location <u>Crucible Specialty Metals Landfill</u> <u>Solvay, NY</u> Classified By <u>R. Bush</u> Checked _____ (Driller)						HYDROGEOLOGIC LOG THOMSEN ASSOCIATES MONITOR NO. <u>301.3</u> Sheet <u>1</u> of <u>2</u>					

DEPTH	ELEVATION	SAMPLES	SAMPLE NO.	CHEM. SMPL RECOVERY (Inches)	N	SOIL or ROCK CLASSIFICATION	UNIFIED SOIL CLASSIF.	DENSITY (PCF)	WATER CONTENT (Percent)	PERMEABILITY (cm/sec)	MONITOR/PIEZOMETER CONSTRUCTION DETAILS						WATER PROBE READINGS				NOTES
																	Temp. (°C)	Cond. (µmho/cm)	Eh (mV)	pH	
55																					
60																					
61.0'						Brown SILT, little clay with seams of fine Sand (Saturated)															
65																					
70																					
75																					
80			1	21	14	Grey fine SAND, Some fine Gravel, little silt with seam of black Peat (Wet-Firm)															
81.0'			2	19	18	laminated Grey fine SAND and Brown Silty CLAY (Wet-Firm)															
85						Boring Terminated @ 83.0'															
NOTE: See reverse side for key and explanation to log.		RUN NO.	RECOVERY (Percent)	RQD	Surface Elevation _____ Date Started <u>10-25-83</u> Date Completed <u>10-26-83</u> Number of Installations in Boring <u>1</u> Method of installation <u>Separate boring</u> for each monitor			Project No. <u>GD-83-68</u> Project Title <u>Monitoring Well Cluster</u> Location <u>Crucible Specialty Metals Landfill</u> <u>Solvay, NY</u> Classified By <u>Driller</u> Checked _____ <u>SC</u>						HYDROGEOLOGIC LOG THOMSEN ASSOCIATES MONITOR NO. <u>301,3</u> Sheet <u>2</u> of <u>2</u>							

DEPTH	ELEVATION	SAMPLES	SAMPLE NO.	CHEM. SMPL RECOVERY [Inches]	N	SOIL or ROCK CLASSIFICATION	UNIFIED SOIL CLASSIF.	DENSITY [pcf]	WATER CONTENT [Percent]	PERMEABILITY [cm/sec]	MONITOR/PIEZOMETER CONSTRUCTION DETAILS						WATER PROBE READINGS				NOTES						
																	Temp. [°C]	Cond. [µmho/cm]	Eh [mV]	pH							
5						NO SAMPLES TAKEN White SOLVAY WASTE																					
10																											
15																											
20																											
25																											
30																											
35																											
40																											
45																											
NOTE: See reverse side for key and explanation to log.							RUN NO.	RECOVERY [Percent]	RQD	Surface Elevation _____ Date Started <u>10-26-83</u> Date Completed <u>10-27-83</u> Number of Installations in Boring <u>1</u> Method of installation <u>Separate borings</u> for each monitor								Project No. <u>GD-83-68</u> Project Title <u>Monitor Well Cluster</u> Location <u>Crucible Specialty Metals Landfill</u> <u>Solvay, NY</u> Classified By <u>R. Bush</u> Checked _____ (Driller)						HYDROGEOLOGIC LOG THOMSEN ASSOCIATES MONITOR NO. <u>301.4</u> Sheet <u>1</u> of <u>2</u>			

DEPTH	ELEVATION	SAMPLES	SAMPLE NO.	CHEM. SMPL RECOVERY (inches)	N	SOIL or ROCK CLASSIFICATION	UNIFIED SOIL CLASSIF.	DENSITY (PCF)	WATER CONTENT (Percent)	PERMEABILITY (cm/sec)	MONITOR/PIEZOMETER CONSTRUCTION DETAILS						WATER PROBE READINGS				NOTES	
																	Temp. (°C)	Cond. (µmho/cm)	Eh (mV)	pH		
55																						
60																						
65																						
			1	24	14	brownish Grey Silty CLAY, fibrous organics with seams of fine Sand (Wet-Medium)																
			2	23	15																	
70																						
						Boring Terminated @ 72.0'																
75																						
NOTE: See reverse side for key and explanation to log.		RUN NO.	RECOVERY (Percent)	RQD	Surface Elevation _____ Date Started <u>10-26-83</u> Date Completed <u>10-27-83</u> Number of Installations in Boring <u>1</u> Method of Installation <u>Separate borings</u> for each monitor			Project No. <u>GD-83-68</u> Project Title <u>Monitoring Well Cluster</u> Location <u>Crucible Specialty Metals Landfill</u> <u>Solvay, NY</u> Classified By <u>Driller</u> Checked _____ <u>SC</u>						HYDROGEOLOGIC LOG				MONITOR NO. 301.4 Sheet <u>2</u> of <u>2</u>				
																						

DEPTH	ELEVATION	SAMPLES	SAMPLE NO.	CHEM. SMPL RECOVERY [Inches]	N	SOIL or ROCK CLASSIFICATION	UNIFIED SOIL CLASSIF.	DENSITY [PCF]	WATER CONTENT [Percent]	PERMEABILITY [cm/sec]	MONITOR/PIEZOMETER CONSTRUCTION DETAILS						WATER PROBE READINGS				NOTES	
																	Temp. [°C]	Cond. [µmho/cm]	Eh [mV]	pH		
5						White SOLVAY WASTE																
10																						
15																						
20																						
25																						
30																						
35																						
40																						
45																						
			1	24	4	Moist-Loose																
						Boring Terminated @ 51.0'																
NOTE: See reverse side for key and explanation to log.			RUN NO.	RECOVERY [Percent]	RQD	Surface Elevation _____ Date Started <u>10-28-83</u> Date Completed <u>10-28-83</u> Number of Installations in Boring <u>1</u> Method of installation <u>Separate borings</u> <u>for each monitor</u>					Project No. <u>GD-83-68</u> Project Title <u>Monitoring Well Cluster</u> Location <u>Crucible Specialty Metals Landfill</u> <u>Solvay, NY</u> Classified By <u>Driller</u> Checked _____ <u>SC</u>						HYDROGEOLOGIC LOG THOMSEN ASSOCIATES MONITOR NO. <u>301.5</u> Sheet <u>1</u> of <u>1</u>					

DEPTH	ELEVATION	SAMPLES	SAMPLE NO.	CHEM. SMPL	RECOVERY	N	SOIL or ROCK CLASSIFICATION	UNIFIED SOIL CLASSIF.	DENSITY (PCF)	WATER CONTENT (Percent)	PERMEABILITY (cm/sec)	MONITOR, PIEZOMETER CONSTRUCTION DETAILS				WATER PROBE READINGS				NOTES		
																		Temp. (°C)	Cond. (µmho cm)		Eh (mV)	pH
1	2	3	4	5	6	7	8	9	10	11	12	13	14					15	16	17	18	19

The figures in the Column 1 defines the scale of the Subsurface Log.

The associated elevation is shown in the second column.

The third column graphically shows the exact depth range from which a soil sample or rock core was recovered.

See Table 1 for a description of the symbols used to signify the various types of samples.

The Sample or Run No. is used for identification on sample containers and/or Laboratory Test Reports.

The Chemical Sample column graphically shows the depth range from which a sample was removed for chemical analysis.

The recovery column shows the recovery in inches for a soil sample. Rock core recovery is shown in percent.

N shows the number of blows required to drive a split spoon sampler into the soil. Unless otherwise stated, the results are for a "Standard Penetration Test", driving a two-inch diameter spoon 12 inches with a 140 pound hammer dropped 30 inches. RQD is the Rock Quality Designation for rock core. This equals the sum of the length of pieces greater than 4 inches divided by the length of the core run.

All recovered soil samples are reviewed in the laboratory. The visual descriptions are made on basis of the sample as recovered and in accordance with the Unified Classification System shown on Table VI. The Unified group symbol is shown in Column 9.

Guidelines for the terms used in descriptions are presented in Tables II and III. The description of the relative soil compactness or consistency is based upon the penetration records as defined in Table IV. The description of the soil moisture is based upon the condition of the sample as recovered. The moisture condition is described as dry, damp, moist or wet. Water used to advance the boring may have affected the in-situ moisture content of the sample. Special terms are used as required to describe materials in greater detail; several such terms are listed in Table V. When sampling gravelly soils with a standard two-inch diameter split spoon, the true percentage of gravel is often not recovered due to the relatively small sampler diameter. The presence of boulders and large gravel is sometimes, but not necessarily, detected by an evaluation of the casing and sampler blows or through the "action" of the drill rig as reported by the driller.

The results from nuclear field tests or laboratory tests for soil density and moisture are shown in Columns 11 and 12.

Soil or rock permeability, the testing method, and the depth range tested are shown in Column 12.

Column 13 is a graphic description of the monitor or piezometer installation. A Key to the description is presented on Table VII. Details of materials are noted in the NOTES column. The static water level (SWL) and date measured are noted in the adjacent column.

Columns 15 to 18 indicate the results of field tests at the depth tested. The date of the test is noted below the readings.

TABLE I

	Split Spoon Sample
	Shelby Tube Sample
	Auger or Pit Sample
	Rock Core

TABLE II

Identification of soil type is made on basis of an estimate of particle sizes, and in the case of fine grained soils also on basis of plasticity.	
Soil Type	Soil Particle Size
Boulder	>12"
Cobble	3"-12"
Gravel-Coarse	3"-3/4"
-Fine	#4-#10
Sand-Coarse	#10-#40
-Medium	#40-#200
-Fine	
Silt-Non Plastic (Granular)	<#200
Clay-Plastic (Cohesive)	Fine Grained

TABLE III

The following terms are used in classifying soils consisting of mixtures of two or more soil types. The estimate is based on weight of total sample.	
Term	Percent of Total Sample
and	35-50
some	20-35
little	10-20
trace	less than 10
(When sampling gravelly soils with a standard split spoon, the true percentage of gravel is often not recovered due to the relatively small sampler diameter.)	

TABLE IV

The relative compactness or consistency is described in accordance with the following terms:			
Granular Soils		Cohesive Soils	
Term	Blows per Foot, N	Term	Blows per Foot, N
Loose	<10	Very Soft	<2
Firm	11-30	Soft	3-5
Compact	31-50	Medium	6-15
Very Compact	>51	Stiff	16-25
		Hard	>25
(Large particles in the soils will often significantly influence the blows per foot recorded during the Penetration Test.)			

TABLE V

Varved	Alternating layers, seams, and partings of soils.
Layer	Soil deposit more than 6" thick.
Seam	Soil deposit less than 6" thick.
Parting	Soil deposit less than 1/8" thick.
Uniform	All grains are of about the same diameter

TABLE VI

UNIFIED SOIL CLASSIFICATION			
Major Division	Group Symbol	Soil Description	
Coarse-grained (over 50% by weight coarser than No. 200 sieve)	GW	Gravelly soils (over half of coarse fraction larger than No. 4)	Well-graded gravels, sandy gravels. Little or no fines.
	GP		Gap-graded or uniform gravel, sandy gravels. Little or no fines.
	GM		Silty gravels, silty sandy gravels.
	GC		Clayey gravels, clayey sandy gravels.
Sandy soils (over half of coarse fraction finer than No. 4)	SW		Well-graded sand, gravelly sands. Little or no fines.
	SP		Gap-graded or uniform sands, gravelly sands. Little or no fines.
	SM		Silty sands, silty gravelly sands.
	SC		Clayey sands, clayey gravelly sands.
Fine-grained (over 50% by weight finer than No. 200 sieve)	ML	Low compressibility (liquid limit less than 50)	Silts, very fine sands, silty or clayey fine sands, rock floor.
	CL		Low plasticity clays, sandy or silty clays.
	OL		Low plasticity organic silts and clays.
	MH	High compressibility (liquid limit more than 50)	Micaceous or diatomaceous silts.
Organic Soils	CH		Highly plastic clays and sandy clays.
	OH		Organic silts and highly plastic clays.

TABLE VII

	Curb Box
	Riser
	Well Screen
	Point Piezometer
	Sand Pack
	Bentonite Seal
	Concrete Seal
	Granular Fill