January 24, 2021

Ms. Megan Kuczka
New York State Department of Environmental Conservation Region 9
270 Michigan Avenue
Buffalo, New York 14203

RE: Bern Metal Corporation: Operation, Maintenance, and Monitoring Plan Addendum
22 Bender Avenue, Buffalo, New York
NYSDEC Site Number 915135

Ms. Kuczka:

On behalf of the City of Buffalo Office of Strategic Planning Division of Environmental Affairs, LaBella Associates DPC (LaBella) has completed this addendum to update the March 2003, Revised April 2003 and May 2003, Operation, Maintenance, and Monitoring (OM&M) Plan prepared by Blasland, Bouck & Lee, Inc. for the above referenced Site. As a result of changes to sampling requirements for the Site, the New York Department of Environmental Conservation (NYSDEC) and New York State Department of Health (NYSDOH) has requested the OM&M Plan be updated to reflect current requirements. Below are the updated sections to the OM&M Plan. The March 2003, Revised April 2003 and May 2003 OM&M Plan is included as Attachment 1.

1.1 General

This document presents the post-closure OM&M Plan for the completed remedial actions implemented at the Bern Metal Corporation/Universal Iron & Metal Site located in the City of Buffalo, Erie County, New York. This OM&M Plan is applicable to the 3.0499-acre Bern Metal portion of the property, hereinafter referred to as the "Site," as depicted in Figures 1 and 2. To confirm that systems constructed during the remedial action are performing as designed, the following OM&M activities will be implemented at the Site: groundwater monitoring; routine inspections and maintenance of the final cover system, surface-water drainage system, groundwater monitoring wells, and other ancillary components (e.g., fences, warning signs); and the repair and replacement of items exhibiting deficiencies or performance below designed levels.

The activities described in this OM&M Plan will continue for a 30-year duration or until a modification or termination of any such activity is approved by the New York State Department of Environmental Conservation (NYSDEC). This OM&M Plan was prepared in accordance with Section 5 of the *Final Design Report* (FDR), prepared by Blasland, Bouck & Lee, Inc. (BBL), dated October 1998, and as required by Consent Decree No. 02-CV-0277, which was issued by the United States District Court for the Western District of New York on July 19, 2002.

BBL has prepared this OM&M Plan on behalf of the Cooperating Potentially Responsible Parties (CPRP) Group implementing the Consent Decree, to identify the OM&M activities that will be performed at the Site based on the completed remedial action activities specified in the approved FDR and Consent Decree. Documentation of the completed remedial action activities is presented in the Final Construction Engineering Report (FCER), dated January 2003 and prepared by BBL. This OM&M Plan, as well as subsequent revisions (as necessary), will be submitted to the NYSDEC for approval.

1.2 Roles and Responsibilities

The City of Buffalo or its representative will perform OM&M activities at the site and will be responsible for performing site inspections, performing, and documenting site maintenance activities, preparing periodic reports to document the site inspections and maintenance activities performed, and implementing the groundwater monitoring well sampling and analysis activities. In addition, the City of Buffalo will retain an offsite laboratory subcontractor to provide analytical services in accordance with the analytical requirements.

2.2.2 Final Cover System Maintenance

Repairs to the final cover system, in addition to those for the vegetated topsoil layer, will be necessary only when a site inspection identifies a problem requiring further corrective action. Some of the anticipated corrective action methods are as follows:

- Erosion (rills and gullies) and cracks in the protection soil layer will be filled with compacted soil before they reach a depth of 6 inches. The soil used for filling will be similar in nature to the soil cover used during construction. A slight overfill of approximately 1-inch will be used to eliminate the preferential pathway that initially caused the erosion.
- Animal burrows which disturb an area will be backfilled and hand-tamped to fill the void. The soil used for backfilling the protection soil layer will be similar in nature to the soil cover used during construction.
- Cracks or ponding are likely the result of settlement. Cracks will be filled as described above for erosion. Where ponding occurs, the vegetation and topsoil will be removed, and the depression filled with soil of the same type and compacted to the same requirements as the original protection soil layer. Once the fill material is within 6 inches of the original grade (as necessary to promote positive drainage), topsoil will be placed, seeded, and fertilized in accordance with Section MP-02212 of the Contract Documents.
- In the event that damage to the underlying geosynthetic components is identified, appropriate maintenance and repairs will be performed, as necessary, in accordance with the applicable requirements presented in the Contract Document specifications.

Should cover system repairs or future Site work disturb underlying site soil/fill materials, NYSDEC Division of Environmental Remediation (DER) Tehcnical Guidance for Site Investigation and Remediation (DER-10), the current NYSDEC Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS) Guidelines, and NYSDOH's current air monitoring procedures will be followed during on-site soill/fill management.

2.4 Facility Access Control

The City of Buffalo Police Department will provide random patrols to check the site for signs of tampering or vandalism. Access controls to the facility include fencing around the Bern Metal property and one gate located at the end of Bender Avenue that will be locked at all times. The location of the perimeter chain-link fence and access gate is shown on Figure 1.

The chain link fence, as well as the one access gate described above, will be inspected by the City of Buffalo for structural integrity and signs of vandalism and/or tampering. Repairs, if necessary, will be performed by a fencing subcontractor immediately following the inspection. The access gate will also be checked to verify that the latch assembly and lock are in place. Examples of potential site security fencing maintenance activities include:

- replacement of damaged or malfunctioning gate locks;
- repair of fencing or gates due to storm damage or vandalism; and

- removal of brush or fallen trees from fencing.

2.5 Site Monitoring Wells

Monitoring wells for the site were installed subsequent the performance of the completed remedial action. Five groundwater monitoring wells, designated RD-1, RD-2, RD-3R, RD-4, and RD-5, are located around the perimeter of the Site. The groundwater monitoring well network for the Bern Metal property consists of one upgradient well (RD-1) and four downgradient monitoring wells (RD-2, RD-3R, RD-4, and RD-5), all located off the remediated Bern Metal property. Upgradient monitoring well RD-1 is located adjacent to the perimeter fence at the south corner of the Bern Metal property. Downgradient well RD-2 is located immediately west of the former "lead-acid source area" (on the adjacent Norfolk Southern Railroad Company (NSC) right-of-way property) near the southwest corner of the former Bern Metal warehouse building. This monitoring well, in essence, replaces the former monitoring well MW-3, which was installed during the RI and produced the highest analytical concentrations of dissolved lead. Downgradient monitoring well RD-3R is located immediately north of the Bern Metal property, in the area of the former Clinton/Bender Site residential properties. Downgradient monitoring well RD-4, is located in the former Little Buffalo Creek stream channel on the NSC right-of-way property. RD-5 is located immediately east of the Bern Metal property. See attached Figure 2 for the locations of the monitoring wells.

The overall integrity of the site groundwater monitoring wells will be inspected at the same time and frequency as the final cover system inspection. In general, the City of Buffalo will note any signs of vandalism (e.g., tampered locks) and frost heaving or other damage to the protective casing and concrete apron. Groundwater monitoring wells found to be insecure (not covered or locked) will be immediately secured. Staff gauges will also be inspected for any movement or damage. The findings of the monitoring well inspection will be noted on the Post-Closure Inspection Form.

Additional groundwater monitoring well inspections will be conducted during sampling activities, as described in Section 4. During sampling activities, inspections will focus on the integrity of the well screen and function of the monitoring well (e.g., identify whether the screen is obstructed).

3.0 Installation of New Groundwater Monitoring Wells

This section is obsolete as the proposed groundwater monitoring wells have been installed at the Site. Appropriate information from this section has been incorporated into Section 2.5.

4.0 Groundwater Sampling and Analysis

4.1 General

To monitor groundwater quality conditions, five groundwater monitoring wells are used in the groundwater-monitoring program for the site, at the locations shown on Figure 2. As discussed in Section 2.5, the monitoring well network consists of one upgradient monitoring well (RD-1) and four downgradient wells (RD-2, RD-3R, RD-4, and RD-5). The primary purpose of the groundwater monitoring program is to confirm that consolidated materials beneath the final cover system on the Bern Metal property are not impacting the underlying groundwater with lead concentrations that exceed the maximum contaminant level (MCL) standard for lead, as specified in Part 703 of Title 6 of the New York Code of Rules and Regulations (6 NYCRR) for groundwater Class GA. Additional information related to the groundwater sampling and analysis activities is presented below.

4.2 Groundwater Sampling and Analysis

Groundwater quality sampling and analysis was initially performed on a semi-annual basis for the first 2 years of the OM&M program. Samples were initial analyzed for cadmium, chromium, lead,

manganese, zinc, polychlorinated biphenyls (PBCs), benzene, toluene. ethylbenzene and xylenes (BTEX). Groundwater analytical data was reviewed after 2 years, and the frequency of the groundwater quality sampling was reduced to an annual basis for the analysis of lead. The 2017 Periodic Review Report (PRR) for the site recommended to modify the groundwater quality monitoring frequency to quinquennially (every 5 years). The NYSDEC approved the modification to the groundwater monitoring frequency on November 21, 2017. The next groundwater quality monitoring event is to be conducted in 2022. Groundwater quality sampling will be discontinued with approval from the NYSDEC, if four consecutive sampling events demonstrate that the lead concentrations are below the MCL standard for lead, as specified in Part 703 of 6 NYCRR for groundwater Class GA. The groundwater samples will be analyzed by an approved laboratory for total lead using United States Environmental Protection Agency (USEPA) Method 7420.

Prior to collection of groundwater samples, groundwater elevations will be measured at each monitoring well using an electronic probe to determine the static water level. After groundwater elevations are measured, the monitoring wells will be sampled using the low-flow sampling procedures described in Appendix D. A peristaltic pump (or equivalent) will be lowered slowly into the monitoring well to a depth corresponding to the center of the saturated screen section of the well. Pumping will be initiated at approximately 200 to 500 milliliters per minute (mL/min). Ideally, the pump rate should cause little or no water-level drawdown in the monitoring well (less than 0.3 feet and the water level should stabilize). The water level will be continuously measured (or as appropriate) to minimize drawdown and to document water-level stabilization during pumping.

If the recharge rate of the monitoring well is very low, purging should be interrupted so as not to cause the drawdown within the well to advance below the pump. However, a steady flow rate will be maintained to the extent practicable. During purging of the monitoring well, field indicator parameters (turbidity, temperature, specific conductance, and pH) will be measured every 3 to 5 minutes (or as appropriate). The well is considered stabilized and ready for sample collection once all the field indicator parameter values remain within 10% for three consecutive readings. If the field indicator parameters have stabilized, but the turbidity is not less than or near to the 50 NTU goal, the pump flow rate should be decreased to no more than 100 mL/min. Measurement of the indicator parameters should continue every 3 to 5 minutes.

Sampling should commence after the appropriate purge volume of groundwater in the monitoring well has been removed and as soon as the volume in the well has recovered sufficiently to permit collection of samples. Groundwater samples will be collected directly from the pump in the appropriate sample container. Purged water will be containerized and subsequently transported to an appropriate offsite treatment facility. A detailed discussion of low-flow groundwater sampling procedures is presented in Appendix D.

During each sampling event, a duplicate sample will be collected and analyzed for lead using USEPA Method 7420. If disposable or dedicated sampling equipment is used to collect groundwater samples, the collection of a field blank sample will not be required.

5.0 Documentation and Reporting

5.1 Documentation and Reporting

Documentation of the inspection and monitoring activities performed at the site will be provided by the City of Buffalo to the NYSDEC in written Annual PRRs. Information that should be incorporated into the PRRs, at a minimum, will include:

- A description of the type and frequency of inspection, maintenance, and/or monitoring activities conducted;

- A description of significant modifications to the inspection, maintenance, and/or monitoring programs made since the submission of the preceding progress report;
- A description of conditions or problems noted during the inspection and/or monitoring period;
- A description of measures taken to correct any noted conditions or problems;
- The results of any analyses conducted as part of the groundwater sampling and analysis program, as discussed in Section 4, and an engineering evaluation of these results and all other data received or generated by the City of Buffalo in the reporting period;
- A description of measures that may need to be performed to correct conditions affecting the performance of the permanent components;
- Identification of any additional work plans, reports, or other deliverables that were completed and submitted to the NYSDEC during the reporting period; and
- A description of all actions, data collection, and implementation of work plans that are scheduled for the next reporting period, as well as other information related to the progress at the site, as necessary.

The City of Buffalo shall submit these PRRs to the NYSDEC at the end of each reporting period.

5.1 Institutional Controls

Institutional Controls (ICs) for the site consist of groundwater use restrictions and implementation of the site OM&M Plan.

Appendices

Appendix A: Operation, Maintenance, and Monitoring Health and Safety Plan (HASP) from the March 2003, Revised April 2003 and May 2003 OM&M Plan has been replaced with the HASP included in Attachment 2.

If you have any questions, please don't hesitate to contact me at (716) 768-3184.

Respectfully submitted,

LaBella Associates

Andrew Benkleman
Project Manager

CERTIFICATION STATEMENT

I Daniel P. Noll certify that I am currently a NYS registered professional engineer and that this Site Operation, Maintenance, and Monitoring Plan Addendum was prepared in general accordance with applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

_____ P.E.,

1/21/22 _____DATE

FIGURES

Path: I:\Buffalo, City of\2212554 - Multiple Sites Annual Monitoring\DIG\Maps\MXD\PRR\2021_11\Fig2_MonitoringWell_Map.mxd

Creator: JR

PROJECT # / DRAWING # / DATE:	DRAWING NAME:	PROJECT:
2212554 **Figure 2** 11/15/2021	Monitoring Well Location Map	Operation, Maintenance, and Monitoring Plan 22 Bender Street, Buffalo, New York NYSDEC Site No. C915135

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0 50 100 Feet

LaBella
Powered by partnership.

Data Source: Bing Maps; Erie County 2020; LaBella 2021.

ATTACHMENT 1

Bern Metal Operation, Maintenance, and Monitoring Plan (March 2003, Revised April and May 2003)

REPORT

Operation, Maintenance, and Monitoring Plan

Bern Metal /Universal Metal Site
Buffalo, New York

March 2003
(Revised April 2003 and May 2003)

BBL
BLASLAND, BOUCK & LEE, INC.
engineers & scientists

REPORT

Operation, Maintenance, and Monitoring Plan

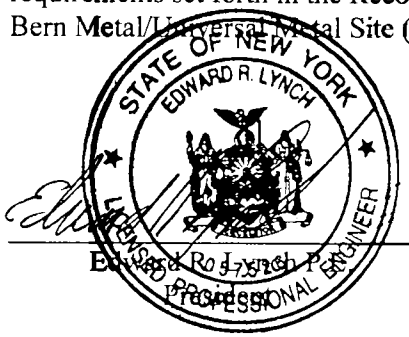
Bern Metal/Universal Metal Site
Buffalo, New York

March 2003
(Revised April 2003 and May 2003)

BBL®
BLASLAND, BOUCK & LEE, INC.
engineers & scientists

Certification Statement

To the best of my knowledge, after thorough investigation, I certify that Blasland, Bouck & Lee, Inc. has prepared this Operation, Maintenance, and Monitoring Plan in accordance with the requirements set forth in the Record of Decision and Consent Decree [02-CV-0277C (SC)] for the Bern Metal/Universal Metal Site (Site No. 915135) located in Buffalo, New York.



Edward R. Lynch, P.E.
President

2/12/03
Date

Table of Contents

1. Introduction

1.1 General

This document presents the post-closure Operation, Maintenance, and Monitoring (OMM) Plan for the recently completed remedial actions implemented at the Bern Metal Corporation/Universal Iron & Metal Site (the site) located in the City of Buffalo, Erie County, New York. To confirm that systems constructed during the remedial action are performing as designed, the following OMM activities will be implemented at the site: installation of new groundwater monitoring wells; groundwater monitoring; routine inspections and maintenance of the final cover system, surface-water drainage system, groundwater monitoring wells, and other ancillary components (e.g., fences, warning signs); and the repair and replacement of items exhibiting deficiencies or performance below designed levels.

The activities described in this OMM Plan will continue for a 30-year duration or until a modification or termination of any such activity is approved by the New York State Department of Environmental Conservation (NYSDEC). This OMM Plan was prepared in accordance with Section 5 of the *Final Design Report* (FDR), prepared by Blasland, Bouck & Lee, Inc. (BBL), dated October 1998, and as required by Consent Decree No. 02-CV-0277, which was entered by the United States District Court for the Western District of New York on July 19, 2002.

BBL has prepared this OMM Plan, on behalf of the Cooperating Potentially Responsible Parties (CPRP) Group implementing the Consent Decree, to identify the OMM activities that will be performed at the site based on the completed remedial action activities specified in the approved FDR and Consent Decree. Documentation of the completed remedial action activities is presented in the Final Construction Engineering Report (FCER), dated January 2003 and prepared by BBL.

1.2 Roles and Responsibilities

In accordance with Paragraph 7 in the Consent Decree, the City of Buffalo or its representative will perform OMM activities at the site. The CPRP Group will install four new groundwater monitoring wells and one new piezometer at the site, and the City of Buffalo or its representative will be responsible for implementing all other OMM activities at the site for the duration of the OMM program (i.e., 30 years), which will include performing site inspections; performing and documenting site maintenance activities; preparing monthly, quarterly, semi-annual, and/or annual reports to document the site inspections and maintenance activities performed; and implementing the groundwater monitoring well sampling and analysis activities. The City of Buffalo will retain an offsite laboratory subcontractor to provide analytical services in accordance with the analytical requirements.

1.3 Site Health and Safety

Field personnel implementing OMM activities at the site that may potentially or will come in contact with materials underneath the final cover system on the Bern Metal property must have completed at least 40 hours of hazardous waste operations-related training, as required by Occupational Safety and Health Administration (OSHA) Regulation 29 Code of Federal Regulations (CFR) 1910.120. Personnel who completed the 40-hour training more than 12 months prior to involvement with this project must have completed an 8-hour refresher course within the past 12 months. Yearly 8-hour hazardous waste refresher training is required for all field personnel thereafter.

In addition, the site-specific Health and Safety Plan (HASP) that was implemented during the performance of remedial action activities at the site has been revised by BBL for use in this OMM Plan (Appendix A). The site-specific OMM HASP has been prepared to develop activity-specific health and safety procedures for the OMM activities that will be performed at the site. Site-specific training for personnel performing onsite OMM activities will be accomplished through a briefing and review of the OMM HASP before work begins.

1.4 OMM Plan Format

This OMM Plan includes the following five sections:

- Section 1 - Introduction: Provides the purpose of the OMM Plan, roles and responsibilities, health and safety requirements, and the contents of the OMM Plan.
- Section 2 - Site Inspection and Maintenance: Summarizes the periodic inspection and maintenance activities to be performed at the Bern Metal property portion of the site during the performance of OMM activities.
- Section 3 - Installation of New Groundwater Monitoring Wells and Piezometer: Describes the procedures that will be implemented to install new groundwater monitoring wells and a piezometer for the site.
- Section 4 - Groundwater Sampling and Analysis: Describes the sampling and analysis activities that will be performed for onsite groundwater monitoring wells during the performance of OMM activities.
- Section 5 - Documentation and Reporting: Describes the documentation and reporting activities that will be performed during the performance of OMM activities at the site.

Also, the appendices to this OMM Plan contain additional related information and include the HASP, Post-Closure Inspection Form, monitoring well and piezometer installation specifications, and procedures for low-flow groundwater sampling. This OMM Plan and its attached supporting documents will be used as the governing document during the implementation of OMM activities at the site.

2. Site Inspection and Maintenance

2.1 General

The City of Buffalo will conduct post-closure inspections of the Bern Metal property portion of the site on a monthly basis during the first year after final cover completion and after a significant precipitation event (e.g., 5-year, 24-hour rainfall event). After the first year, the City of Buffalo will perform the post-closure inspections on a quarterly basis between years 1 through 10, and on an annual basis between years 10 through 30. The frequency of inspections will not change without the prior approval of the NYSDEC. The need for maintenance and repairs of the final cover system, side slopes, and stormwater drainage systems will be evaluated during the routine inspections. The purpose of these inspections is to confirm that the final closure measures taken to limit stormwater infiltration and to prevent the migration of contaminants are operating as intended. Along with an inspection of the overall appearance and aesthetics of the Bern Metal property, the following items on the Bern Metal property will require inspection:

- final cover system;
- stormwater drainage system;
- site access and security systems; and
- site monitoring wells.

Figure 1 presents the existing conditions of the site following completion of remedial activities and includes the above features. A Post-Closure Inspection Form (Appendix B) has been developed to aid personnel in completing the required site inspections.

2.2 Final Cover System

The overall integrity of the final cover system on the Bern Metal property will be assessed by the City of Buffalo during the inspections. The City of Buffalo will be responsible for the maintenance and repair of the final cover system, except where the maintenance or repair is due solely to a failure of design or construction of the remedy. Final cover maintenance and repair will be required if an inspection reveals any of the following conditions:

- settlement/subsidence relative to the surrounding areas;
- topsoil erosion;
- cracking of the final cover system;
- ponding of stormwater;
- vehicle ruts;
- exposed or damaged geosynthetic cover components;

- animal burrows;
- vegetative distress;
- loss of vegetation due to traffic, drought, or excessive moisture; or
- weed, brush, or tree development.

The inspections will include observation for these conditions and other conditions that could be construed to be potentially detrimental to the function of the final cover system. Repairs will be performed at areas exhibiting deficiencies or potential problems and, where applicable, repairs will be performed in accordance with the Technical Specifications included in the *Bidding and Contract Documents, Construction for Final Remedial Action, Bern Metal/Universal Metal Site* (Contract Documents, BBL, July 2002). Remedies can include additional soil cover or repair of the cover as a result of erosion, settlement, cracking, ponding, or other similarly damaging conditions. Reseeding will be performed when a loss of vegetation is noted. Bush and tree seedlings will be removed upon discovery to prevent disruption of the final cover system.

2.2.1 General Maintenance

General and routine maintenance of the vegetative cover layer of the final cover system by the City of Buffalo will include the following:

- Mowing will be performed once per year near the end of the growing season to prevent the growth of shrubs, trees, and other deep-rooted vegetation, as well as for aesthetic purposes. Mowing shall be delayed until after September 1 of each year, if such a delay will not affect the integrity of the final cover system.
- Lime and fertilizer are optional and should be applied only if the vegetation is not meeting the functional end-use requirements. The lime and fertilizer requirements are provided in the Materials and Performance Specifications Section MP-02212, of the Contract Documents.
- Weed control of the final cover system is to be kept free of vegetation that may have a deep root system. Tree seedlings and bushes are not permitted and will be removed if starting to establish. Weeds that are generally considered "lawn weeds" are permissible, as long as the desired vegetation is not being crowded out, and the cover density remains good.
- Overseeding will be done with a seed blend of perennial rye grass for damaged areas where average turf loss is less than 50%.
- Reseeding will be done for damaged areas where average turf loss is greater than 50%. The damaged area will be disked or tilled to 4 inches in depth; topsoil will be added to the low spots; and seed, lime, fertilizer, and mulch will be applied in accordance with Section MP-02212 of the Contract Documents.

2.2.2 Final Cover System Maintenance

Repairs to the final cover system by the City of Buffalo, in addition to those for the vegetated topsoil layer, will be necessary only when a site inspection identifies a problem requiring further corrective action. Some of the anticipated corrective action methods are as follows:

- Erosion (rills and gullies) and cracks in the protection soil layer will be filled with compacted soil before they reach a depth of 6 inches. The soil used for filling will be similar in nature to the soil cover used during construction. A slight overfill of approximately 1-inch will be used to eliminate the preferential pathway that initially caused the erosion.

- Animal burrows which disturb an area will be backfilled and hand-tamped to fill the void. The soil used for backfilling the protection soil layer will be similar in nature to the soil cover used during construction.

- Cracks or ponding are likely the result of settlement. Cracks will be filled as described above for erosion. Where ponding occurs, the vegetation and topsoil will be removed, and the depression filled with soil of the same type and compacted to the same requirements as the original protection soil layer. Once the fill material is within 6 inches of the original grade (as necessary to promote positive drainage), topsoil will be placed, seeded, and fertilized in accordance with Section MP-02212 of the Contract Documents.

- In the event that damage to the underlying geosynthetic components is identified, appropriate maintenance and repairs will be performed, as necessary, in accordance with the applicable requirements presented in the Contract Document specifications.

2.3 Stormwater Drainage System

The condition of the stormwater drainage system for the final cover system will be assessed by the City of Buffalo as part of the inspection and maintenance activities for the final cover system. Components of the stormwater drainage system that will be inspected include:

- mid-slope drainage swales;

- perimeter drainage ditches; and

- outlet drainage ditches.

These components will be periodically monitored to confirm that they are performing as designed. The stormwater drainage system components will be inspected for worn or degraded vegetation, settlement, ponding, channel erosion or breach, and displaced rip-rap. In areas where inspections indicate a decrease in the performance of a particular component due to erosion, steps will be taken to restore the component by increasing the thickness of the erosion protection layer (e.g., topsoil or rip-rap) to the original design depth. In areas where inspections indicate a decrease in the performance of a particular component due to a blockage, the item(s) obstructing the flow will be removed.

General/routine maintenance or repair of the stormwater drainage system may include removing sediment and/or vegetation from the drainage structures. Reconstructing and/or adding drainage features may also be

required if excessive erosion takes place. The City of Buffalo will be responsible for maintenance and repair of the stormwater drainage system, except where the maintenance or repair is due solely to a failure of design or construction of the remedy. The inspections will be performed in conjunction with and at the same frequency as the general site inspections, including after a 5-year, 24-hour storm event, if practical. Repairs will be conducted, as required, prior to the next inspection.

In addition to the stormwater drainage system for the final cover system on the Bern Metals property, the City of Buffalo will also inspect for run-off and erosion problems along Clinton Street on the adjacent Universal Metal property for at least 2 years. Stormwater drainage on the Universal Metal property will be inspected to confirm the drainage patterns are performing as designed. General/routine maintenance or repair efforts may include reconstructing and/or adding drainage features if excessive erosion takes place. The City of Buffalo will be responsible for maintaining and repairing stormwater drainage features, except where the maintenance or repair is due solely to a failure of design or construction of the stormwater drainage feature or is due solely to the impact of actions/activities performed by the property owner.

2.4 Facility Access Control

The City of Buffalo Police Department will provide random patrols to check the site for signs of tampering or vandalism. Access controls to the facility include fencing around the Bern Metal property and one gate located at the end of Bender Avenue that will be locked at all times. The location of the perimeter chain-link fence and access gate is shown on Figure 1.

The chain link fence, as well as the one access gate described above, will be inspected by the City of Buffalo for structural integrity and signs of vandalism and/or tampering on a monthly basis. Repairs, if necessary, will be performed by the City of Buffalo immediately following the inspection. The access gate will also be checked to verify that the latch assembly and lock are in place. Examples of potential site security fencing maintenance activities include:

- replacement of damaged or malfunctioning gate locks;
- repair of fencing or gates due to storm damage or vandalism; and
- removal of brush or fallen trees from fencing.

2.5 Site Monitoring Wells and Piezometer

Monitoring wells and the piezometer for the site were not installed during the performance of the completed remedial action. Information related to the installation of new monitoring wells and piezometer is included in Section 3. Once installed, the overall integrity of the site groundwater monitoring wells and piezometer will be inspected by the City of Buffalo at the same time and frequency as the final cover system inspection. In general, the City of Buffalo will note any signs of vandalism (e.g., tampered locks) and frost heaving or other damage to the protective casing and concrete apron. Groundwater monitoring wells or piezometer found to be insecure (not covered or locked) will be immediately secured. Staff gauges will also be inspected for any movement or damage. The findings of the monitoring well and piezometer inspection will be noted on the Post-Closure Inspection Form.

Additional groundwater monitoring well and piezometer inspections will be conducted during sampling activities, as described in Section 4. During sampling activities, inspections will focus on the integrity of the well screen and function of the monitoring well (e.g., identify whether the screen is obstructed).

3. Installation of New Groundwater Monitoring Wells and Piezometer

3.1 General

This section describes the proposed groundwater monitoring wells and piezometer that will be constructed for the site that will be used during the implementation of groundwater measuring, and sampling and analysis activities (Section 4) to monitor groundwater quality conditions at the Bern Metal property. Groundwater flow across the Bern Metal property was determined to be in a generally northerly direction from groundwater data collected at the site during the Remedial Investigation (RI). The proposed groundwater monitoring well network for the Bern Metal property will consist of one upgradient monitoring well (RD-1), three downgradient monitoring wells (i.e., RD-2, RD-3, and RD-4), and one piezometer (PZ-1), all located off the remediated Bern Metal property. All monitoring wells that were previously present at the site were either destroyed by others prior to commencing remedial action activities at the site or were decommissioned during the performance of remedial action activities in accordance with the FDR.

Upgradient monitoring well RD-1 will be located in the Norfolk Southern Railroad Company (NSC) right-of-way adjacent to the perimeter fence at the south corner of the Bern Metal property. Downgradient well RD-2 will be located immediately west of the former "lead-acid source area" (on the adjacent NSC right-of-way property) near the southwest corner of the former Bern Metal warehouse building. This monitoring well will, in essence, replace the former monitoring well MW-3, which was installed during the RI and produced the highest analytical concentrations of dissolved lead. Downgradient monitoring well RD-3 will be located immediately north of the Bern Metal property, in the area of the former Clinton/Bender Site residential properties. Downgradient monitoring well RD-4 will be installed to replace the former monitoring well MW-7, which was destroyed prior to commencing remedial action activities at the site. Monitoring well RD-4 will be located in the former Little Buffalo Creek stream channel on the NSC right-of-way property. Piezometer PZ-1 will be located between the Bern Metal property and the Laub building. Piezometer PZ-1 will be used to obtain groundwater level measurements along the east side of the Bern Metal property only, and will not be used to collect groundwater samples for analysis. However, if groundwater level measurements from this piezometer indicate that the groundwater flow patterns have changed and identify that this is a downgradient location, this piezometer will need to be converted to a monitoring well and sampled in the future. The approximate locations of the proposed monitoring wells and piezometer are identified on Figure 1.

3.2 Monitoring Well Installation

As discussed previously in Section 1.2, the CPRP Group will install the four new groundwater monitoring wells (i.e., RD-1, RD-2, RD-3, and RD-4), under the supervision of an experienced geologist. The monitoring wells will be installed at the offsite locations using 4¼-inch inside-diameter (I.D.) hollow-stem augers. Continuous split-spoon sampling will be performed to identify the top of clay surface at each monitoring well location. The depth to the top-of-clay unit may be very shallow (less than 5 feet); therefore, the length of well screen, sand pack thickness, bentonite thickness, and surface seal completion will be determined in the field by the supervising geologist.

The monitoring wells will be constructed using 2-inch diameter, flush thread, Schedule 40 Polyvinyl Chloride (PVC) riser pipe with a five-foot length of 0.010-inch slot well screen. Sandpack (00N Grade Morie), compatible with the well screen, will be placed from approximately six inches below the bottom of the well

screen to a minimum of two feet above the well screen. A minimum of two feet of hydrated bentonite will be placed above the sandpack followed by cement/bentonite grout to approximately two feet below the ground surface. Monitoring wells will be completed as a stickup placed in a tapered concrete surface pad to promote drainage away from the well. The PVC riser will be fitted with a J-plug, and the well will be secured with keyed-alike locks.

3.3 Piezometer Installation

As discussed previously in Section 1.2, the CPRP Group will install one new piezometer (i.e., PZ-1), under the supervision of an experienced geologist. The piezometer will be installed at the offsite location using 2¼-inch inside-diameter (I.D.) hollow-stem augers. Continuous split-spoon sampling will be performed to identify the top of clay surface at the piezometer location. The depth to the top-of-clay unit may be very shallow (less than 5 feet); therefore, the length of well screen, sand pack thickness, bentonite thickness, and surface seal completion will be determined in the field by the supervising geologist.

The piezometer will be constructed using 1-inch diameter, flush thread, Schedule 40 Polyvinyl Chloride (PVC) riser pipe with a five-foot length of 0.010-inch slot well screen. Sandpack (00N Grade Morie), compatible with the well screen, will be placed from approximately six inches below the bottom of the well screen to a minimum of two feet above the well screen. A minimum of two feet of hydrated bentonite will be placed above the sandpack followed by cement/bentonite grout to approximately two feet below the ground surface. The piezometer will be completed as a stickup placed in a tapered concrete surface pad to promote drainage away from the piezometer. The PVC riser will be fitted with a slip cap, and the piezometer will be secured with keyed-alike locks.

3.4 Monitoring Well and Piezometer Development

Upon completion of the monitoring wells and piezometer installation and after a period of at least 24 hours, the monitoring wells and piezometer will be developed to provide a hydraulic connection between the screened interval of the monitoring wells/piezometer and the shallow aquifer. The monitoring wells and piezometer will be surged with a minimum of 10 well volumes being removed. Care will be taken during development to surge the screen and sand pack in an attempt to reach a turbidity of less than 50 nephelometric turbidity units (NTU). Development will proceed until field parameters of turbidity, pH, conductivity, and temperature stabilize and the monitoring wells and piezometer yields relatively sediment-free water. Development water will be containerized and stored temporarily at the site prior to appropriate off-site disposition.

A field survey will be performed for the monitoring wells and piezometer to establish reference elevations for future use in measuring the groundwater level. The elevation of the top of the PVC, top of outside protective casing, and the ground surface will be measured relative to the existing permanent survey control monuments at the site. Horizontal coordinates will also be established for reference purposes. The location and survey control data for the two survey monuments that were installed during remedial action activities are shown on Figure 1.

Additional technical specifications related to the installation and development of the new monitoring wells and piezometer are included in Appendix C. In addition, specific information related to measuring groundwater elevations and sampling and analysis procedures for the new monitoring wells and piezometer is included in Section 4.

4. Groundwater Measuring and Sampling and Analysis

4.1 General

To monitor groundwater quality conditions, four new groundwater monitoring wells and one piezometer will be used in the groundwater-monitoring program for the site, at the locations shown on Figure 1. As discussed in Section 3, the proposed monitoring well network will consist of one upgradient monitoring well (RD-1), three downgradient wells (RD-2, RD-3, and RD-4), and one piezometer (PZ-1). The primary purpose of the groundwater monitoring program is to confirm that consolidated materials beneath the final cover system on the Bern Metal property are not impacting the underlying groundwater with lead concentrations that exceed the maximum contaminant level (MCL) standard for lead, as specified in Part 703 of Title 6 of the New York Code of Rules and Regulations (6 NYCRR) for groundwater Class GA. Additional information related to groundwater measuring and sampling and analysis activities is presented below.

4.2 Groundwater Measuring and Sampling and Analysis

Groundwater quality sampling and analysis will be performed by the City of Buffalo for monitoring wells RD-1, RD-2, RD-3, and RD-4 on a semi-annual basis for the first 2 years of the OMM program, which is scheduled for a 30-year duration. For the first two rounds of groundwater sampling for monitoring wells RD-1, RD-2, RD-3, and RD-4, the groundwater samples will be analyzed for cadmium, chromium, lead, manganese, zinc, polychlorinated biphenyls (PCBs), and benzene, toluene, ethylbenzene, and xylenes (BTEX). After a review of two rounds of groundwater sampling data and as approved by the NYSDEC, the testing parameters may be reduced to lead analysis only.

Groundwater analytical data will be reviewed after 2 years to determine if a downward trend exists in the total lead concentrations at each monitoring well. If the additional site-specific parameters identified above are still being analyzed after 2 years, the groundwater analytical data for these parameters will also be reviewed to determine if a downward trend exists for these parameters. Should these downward trends be present, the groundwater quality sampling will be performed on an annual basis for the remainder of the OMM program, as approved by the NYSDEC.

Prior to collection of groundwater samples, groundwater elevations will be measured at each monitoring well (i.e., RD-1, RD-2, RD-3, and RD-4) and piezometer (PZ-1) using an electronic probe to determine the static water level. After groundwater elevations are measured, the monitoring wells (i.e., RD-1, RD-2, RD-3, and RD-4) will be sampled using the low-flow sampling procedures described in Appendix D. A peristaltic pump (or equivalent) will be lowered slowly into the monitoring well to a depth corresponding to the center of the saturated screen section of the well. Pumping will be initiated at approximately 200 to 500 milliliters per minute (mL/min). Ideally, the pump rate should cause little or no water-level drawdown in the monitoring well (less than 0.3 feet and the water level should stabilize). The water level will be continuously measured (or as appropriate) to minimize drawdown and to document water-level stabilization during pumping.

If the recharge rate of the monitoring well is very low, purging should be interrupted so as not to cause the drawdown within the well to advance below the pump. However, a steady flow rate will be maintained to the extent practicable. During purging of the monitoring well, field indicator parameters (turbidity, temperature, specific conductance, and pH) will be measured every 3 to 5 minutes (or as appropriate). The well is considered

stabilized and ready for sample collection once all the field indicator parameter values remain within 10% for three consecutive readings. If the field indicator parameters have stabilized, but the turbidity is not less than or near to the 50 NTU goal, the pump flow rate should be decreased to no more than 100 mL/min. Measurement of the indicator parameters should continue every 3 to 5 minutes.

Sampling should commence after the appropriate purge volume of groundwater in the monitoring well has been removed and as soon as the volume in the well has recovered sufficiently to permit collection of samples. Groundwater samples will be collected directly from the pump in the appropriate sample container. Purged water will be containerized and subsequently transported to an appropriate offsite treatment facility. A detailed discussion of low-flow groundwater sampling procedures is presented in Appendix D.

During each sampling event, a duplicate sample will be collected and analyzed for the same parameters as the original sample. If disposable or dedicated sampling equipment is used to collect groundwater samples, the collection of a field blank sample will not be required.

5. Documentation and Reporting

5.1 Documentation and Reporting

Documentation of the inspection and monitoring activities performed at the site, except the initial monitoring well and piezometer installation, will be provided by the City of Buffalo to the NYSDEC in written Annual Progress Reports. A separate report related to the initial monitoring well and piezometer installation will be provided by the CPRPs to the NYSDEC. Information that should be incorporated into the Annual Progress Reports, at a minimum, will include:

- A description of the type and frequency of inspection, maintenance, and/or monitoring activities conducted;
- A description of significant modifications to the inspection, maintenance, and/or monitoring programs made since the submission of the preceding progress report;
- A description of conditions or problems noted during the inspection and/or monitoring period;
- A description of measures taken to correct any noted conditions or problems;
- The results of any analyses conducted as part of the groundwater sampling and analysis program, as discussed in Section 4, and an engineering evaluation of these results and all other data received or generated by the City of Buffalo in the reporting period;
- A description of measures that may need to be performed to correct conditions affecting the performance of the permanent components;
- Identification of any additional work plans, reports, or other deliverables that were completed and submitted to the NYSDEC during the reporting period; and
- A description of all actions, data collection, and implementation of work plans that are scheduled for the next reporting period, as well as other information related to the progress at the site, as necessary.

The City of Buffalo shall submit these Annual Progress Reports to the NYSDEC by January 15th of each year, commencing after the NYSDEC approves the FCER and this OMM Plan submitted by the CPRP Group.

In addition, the City of Buffalo will submit a letter to the NYSDEC after the completion of quarterly and semi-annual inspection/sampling events to summarize the activities performed. These letters will summarize the activities performed and summarize analytical data in a tabular format. Hard copies of laboratory reports for analytical data will be included in the annual reports.

5.2 Institutional Controls

As required by the Consent Decree, once the CPRP Group has filed the appropriate deed restrictions for the site, the City of Buffalo will be responsible for implementing the institutional controls.

Figures

CONTROL MONUMENTS

* PERMANENT SITE CONTROL MONUMENTS ARE 42 INCH BERNTSEN MAGNETIC PIPE MONUMENTS SET TO NYSDOT SECTION 626 STANDARD SPECIFICATIONS.

BM-1: ALUMINUM DISK IN CONC.
N 1048738.84
E 1080331.65
ELEV.: 590.33

STAMPED:
"SURVEY MARKER"
"SURVEY MARKER"
"MON BM-1"
△
"11/02"
"DO NOT DISTURB"

BM-2: ALUMINUM DISK IN CONC.
N 1048694.45
E 1080414.61
ELEV.: 591.79

STAMPED:
"SURVEY MARKER"
"MON BM-2"
△
"11/02"
"DO NOT DISTURB"

LEGEND:

- CATCH BASIN
- GW — GUY WIRE
- MANHOLE
- RD-1 — PROPOSED MONITORING WELL LOCATION
- VENT PIPE
- CONTROL MONUMENT
- HYDRANT
- LIGHT POLE
- POWER POLE
- WATER VALVE
- PZ-1 — PROPOSED PIEZOMETER LOCATION

BIT = BITUMINOUS MACADAM
BLDG. = BUILDING
CONC. = CONCRETE
FNC. = GENCE
H.P. = HIGH POINT
INV. = INVERT
O/H = OVERHEAD
RCMP = ROUND CORRUGATED METAL PIPE
R.R. = RAILROAD
(TYP.) = TYPICAL
WHS = WATER HOUSE SERVICE

+ = SPOT ELEVATION

N XXXXXXX = NORTH COORDINATE

E XXXXXXX = EAST COORDINATE

- MAJOR CONTOUR (5' INTERVAL)
- MINOR CONTOUR (1' INTERVAL)
- CHAIN LINK FENCE
- "W" BEAM GUIDERAIL
- TOE OF SLOPE
- APPROXIMATE PROPERTY LINE
- RAILROAD
- ROUND CORRIGATED METAL PIPE

0 50' 100'
GRAPHIC SCALE

GENERAL NOTES:

1. ELEVATIONS AND FEATURES ARE FROM FIELD DATA GATHERED BY WENDEL DUCHSCHERER FROM AUGUST TO NOVEMBER 2002.
2. HORIZONTAL CONTROL IS REFERENCED TO THE NORTH AMERICAN DATUM OF 1983 (NAD83). GROUND COORDINATES, U.S. SURVEY FEET (COMBINED SEA LEVEL AND SCALE FACTOR IS 0.99991847).
3. VERTICAL DATUM IS REFERENCED TO THE NATIONAL GEODETIC VERTICAL DATUM OF 1929 (NGVD 29).
4. PROPERTY LINES ARE SHOWN FROM DATA PROVIDED BY OTHERS AND HAVE NOT BEEN CONFIRMED BY WENDEL DUCHSCHERER.
5. UNDERGOUND UTILITIES HAVE NOT BEEN SURVEYED OR SHOWN ON MAP.
6. THE INFORMATION SHOWN ON THIS DRAWING WAS TAKEN FROM A DRAWING TITLED "FINAL SITE CONDITIONS" DRAWING NO. 7, AS PREPARED BY WENDEL DUCHSCHERER DATED JANUARY 2003, AS INCLUDED IN THE FINAL CONSTRUCTION ENGINEERING REPORT IN THE BERN METAL/UNIVERSAL METAL SITE PREPARED BY BLASLAND, BOUCK & LEE, INC. DATED JANUARY 2003.
7. LOCATION OF PROPOSED PIEZOMETERS ARE APPROXIMATE.

X: NONE
L: ON=*, OFF=REF
P: PAGESET/PLT-DL
4/15/03 SYR-54-LJP ROC-85+SLM
77811005/77811009.DWG

BERN METAL/UNIVERSAL METAL
BUFFALO, NEW YORK

OPERATION, MAINTENANCE AND MONITORING PLAN

EXISITNG SITE CONDITIONS

BBL®
BLASLAND, BOUCK & LEE, INC.
engineers & scientists

FIGURE
1

Appendices

Appendix A

Operation, Maintenance, and Monitoring Health and Safety Plan

BBL®
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engineers & scientists

REPORT

Health and Safety Plan

Bern Metal/Universal Metal Site
Buffalo, New York

February 2003

BBL®
BLASLAND, BOUCK & LEE, INC.
engineers & scientists

Table of Contents

Tables

Attachments

1. Introduction

1.1 Objective

The objective of this site-specific Health and Safety Plan (HASP) is to provide a mechanism for establishing safe working conditions at the Bern Metal/Universal Metal Site (the site) located in Buffalo, New York during the performance of post-closure Operations, Maintenance, and Monitoring (OMM) activities, as specified in the site OMM Plan prepared by Blasland, Bouck & Lee, Inc. (BBL, January 2003). The site activities that are expected to be implemented by the City of Buffalo during the post-closure period, as detailed in the OMM Plan, include at a minimum the following components:

- Periodic Site Inspections;
- General Site Maintenance Activities;
- Final Cover and Drainage System Maintenance Activities;
- Groundwater Monitoring Well Installation;
- Groundwater Sampling; and
- Equipment Cleaning/Demobilization.

The objective of this HASP is to provide general health and safety information regarding conditions and activities at the site to allow contractors to develop individual site-specific HASPs. Each contractor's site-specific HASP should be specific to the site and the task(s) that the contractor will be conducting. The general safety procedures and protective equipment presented in this general HASP have been established based on an analysis of potential physical, chemical, and biological hazards. The hazard control methodologies presented are intended to minimize the potential of accident or injury.

1.2 Site and Facility Description

The site is located off Clinton Street at the end of Bender Avenue in the City of Buffalo, Erie County, New York, as shown on Figure 1 in the OMM Plan. The 5.2-acre site is composed of two separate units: the Bern Metal property (approximately 3.7 acres) and the Universal Metal property (approximately 1.5 acres). Due to the close proximity of these two properties, the New York State Department of Environmental Conservation (NYSDEC) has listed these two units in New York's Registry of Inactive Hazardous Waste Disposal Sites under one site number, identified as Site Number 9-15-135. The site is bound on the south and west by railroad lines owned by Norfolk Southern Railroad Company (NSC) and CSX Transportation (CSX; formerly Consolidated Rail Corporation), on the east by the Laub property, and on the north by residential properties. The Bern Metal property lies at the end of Bender Avenue, and the Universal Metal property lies immediately west of Bender Avenue on Clinton Street.

The Bern Metal property was primarily used to reclaim lead from automotive batteries and to reprocess and recycle metal powders and scrap metal. The Universal Metal property was primarily used to recycle scrap metal. Operations occurred on the Bern Metal property primarily from 1938 to 1983 and on the Universal Metal property from 1938 to 1988. The current Universal Metal property owner was using the property for the storage

and salvage of scrap automobiles immediately prior to the initiation of remedial action (RA) activities. The future use of the Universal Metal site by the owner is unknown.

The RA activities were performed at the site between August 2002 and December 2002 in accordance with the June 13, 2002 Consent Decree (effective July 2, 2002) and the NYSDEC-approved *Final Design Report* (BBL, October 1998). Documentation of the completed RA activities is provided in the *Final Construction Engineering Report* (FCER) prepared by BBL dated January 2003.

1.3 Policy Statement

Work activities at this site will be carried out in a manner that protects the safety and health of contractor employees and City of Buffalo employees. The basic provisions of this plan are mandatory for all personnel and contractors assigned to the project. The City of Buffalo and its contractors must prepare their own site-specific HASPs that present the specific means and methods that will be employed to meet the basic requirements of this HASP. All visitors to work areas at the site must abide by the requirements of this plan.

1.4 References

This HASP complies with applicable Occupational Safety and Health Administration (OSHA) regulations, United States Environmental Protection Agency (USEPA) regulations, and BBL health and safety policies and procedures. This plan follows the guidelines established in the following:

- *Standard Operating Safety Guides*, USEPA (Publication 9285.1-03, June 1992).
- *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*, National Institute for Occupational Safety and Health (NIOSH), OSHA, United States Coast Guard (USCG), and USEPA (86116, October 1985).
- *Title 29 of the Code of Federal Regulations* (CFR), Part 1910.
- *Title 29 of the Code of Federal Regulations* (CFR), Part 1926.
- *Pocket Guide to Chemical Hazards*, Department of Health and Human Services (DHHS), Centers for Disease Control (CDC), NIOSH (1997).
- *Threshold Limit Values*, American Conference of Governmental Industrial Hygienists (ACGIH) (2002).
- *Guide to Occupational Exposure Values*, ACGIH (2002).
- *Quick Selection Guide to Chemical Protective Clothing*, Forsberg, K. and S.Z. Mansdorf, 2nd Ed. (1993).

1.5 Definitions

The following definitions (listed alphabetically) are applicable to this HASP:

- *Contamination Reduction Zone (CRZ)* - Area between the exclusion zone and support zone that provides a transition between contaminated and clean areas. Decontamination stations are located in this zone.
- *Exclusion Zone (EZ)* - Any portions of the site where hazardous substances are, or are reasonably suspected to be, present and pose an exposure hazard to onsite personnel.
- *Incident* - All losses, including first aid cases, injuries, illnesses, near misses, spills/leaks, equipment and property damage, motor vehicle accidents, regulatory violations, fires, and business interruptions.
- *Near Miss* - An incident in which no injury; illness; motor vehicle accident; equipment, property, or other damage occurred, but that could have occurred under slightly different circumstances.
- *Onsite Personnel* - All contractor and subcontractor field personnel involved with the project.
- *Project* - All onsite work performed under the scope of work.
- *Site* - The area described in Section 1.2, Site and Facility Description, where the work is to be performed.
- *Subcontractor* - Includes personnel hired by a direct contractor of the City of Buffalo.
- *Support Zone (SZ)* - All areas of the site, except the EZ and CRZ. The SZ surrounds the CRZ and EZ. Support equipment and break areas are located in this zone.
- *Visitor* - All other personnel, except the onsite personnel.
- *Work Area* - The portion of the site where work activities are actively being performed. This area may change daily as work progresses and includes the SZ, CRZ, and EZ. If the work area is located in an area onsite that is not contaminated, or suspected of being contaminated, the entire work area may be a SZ.

1.6 Acronyms

The following acronyms (listed alphabetically) are applicable to this HASP:

- *ACGIH* - American Conference of Governmental Industrial Hygienists
- *ANSI* – American National Standards Institute
- *CDC* – Centers for Disease Control
- *CFR* – Code of Federal Regulations
- *COC* - Constituent(s) of Concern
- *CPR* - Cardiovascular Resuscitation
- *CRZ* - Contamination Reduction Zone

- *DHHS* - Department of Health and Human Services
- *DOT* - Department of Transportation
- *EMS* - Emergency Medical Services
- *EZ* - Exclusion Zone
- *GFCI* - Ground Fault Circuit Interrupter
- *HASP* - Health and Safety Plan
- *HEPA* - High-Efficiency Particulate Air
- *HSO* - Health and Safety Officer
- *HSS* - Health and Safety Supervisor
- *II* - Incident Investigation
- *JSA* - Job Safety Analysis
- *LEL* - Lower Explosive Limit
- *LOTO* - Lockout/Tagout
- *MSDS* - Material Safety Data Sheet
- *NEC* - National Electrical Code
- *NESC* - National Electrical Safety Code
- *NIOSH* - National Institute for Occupational Safety and Health
- *NRR* – Noise Reduction Rating
- *NYSDEC* - New York State Department of Environmental Conservation
- *OSHA* - Occupational Safety and Health Administration
- *PEL* - Permissible Exposure Limit
- *PID* - Photoionization Detector
- *PM* - Project Manager
- *PO* - Project Officer
- *PPE* - Personal Protective Equipment

- *RMSF*— Rocky Mountain Spotted Fever
- *PVC* - Polyvinyl Chloride
- *SPSA* - Safe Performance Self-Assessment
- *SS* - Site Supervisor
- *SZ* - Support Zone
- *TLV* - Threshold Limit Value
- *TSA* - Task Safety Analysis
- *UL* - Underwriters Laboratories
- *USCG* - United States Coast Guard
- *USEPA* - United States Environmental Protection Agency
- *VOC* - Volatile Organic Compound

2. Roles and Responsibilities

2.1 All Personnel

All personnel must adhere to the procedures outlined in this HASP during the performance of their work. Each person is responsible for completing tasks safely, and reporting any unsafe acts or conditions to his/her supervisor. No person may work in a manner that conflicts with these procedures.

All personnel will receive training in accordance with applicable regulations and be familiar with the requirements and procedures contained in this HASP prior to initiating site activities. In addition, all personnel will attend an initial hazard briefing prior to beginning work at the site.

The roles of site personnel are outlined in the following sections. Key project personnel and contacts are to be determined and will be subsequently summarized in Table 2-1.

2.2 Site Personnel

2.2.1 Health and Safety Officer (HSO)

Each contractor must designate an HSO to assume overall responsibility for the technical health and safety aspects of the project, including review and approval of the contractor's HASP. Inquiries regarding health and safety procedures, project procedures, and other technical or regulatory issues should be addressed to this individual. The HSO or his designee must approve changes or addenda to this HASP.

2.2.2 Project Manager (PM)

Each contractor must designate a PM to be responsible for verifying that project activities are completed in accordance with the requirements of this HASP. The PM is responsible for confirming that the Site Supervisor (SS) has the equipment, materials, and qualified personnel to fully implement the safety requirements of this HASP, and/or that contractors and subcontractors assigned to this project meet the requirements established in this HASP. It is also the responsibility of the PM to:

- Consult with the HSO onsite health and safety issues;
- Verify that subcontractors meet health and safety requirements prior to commencing work;
- Verify that all incidents are thoroughly investigated;
- Approve, in writing, addenda or modifications to this HASP; and
- Suspend work or modify work practices, as necessary, for personal safety, protection of property, and regulatory compliance.

2.2.3 Health and Safety Supervisor (HSS)

Each contractor must designate an HSS to be responsible for field health and safety issues, including the execution of this HASP. Questions in the field regarding health and safety procedures, project procedures, and other technical or regulatory issues should be addressed to this individual. The HSS will advise the PM on health and safety issues and will establish and coordinate the project air monitoring program if one is deemed necessary. Each contractor's HSS is the primary site contact for that organization on health and safety matters. It is the responsibility of the HSS to:

- Provide onsite technical assistance, if necessary;
- Participate in all incident investigations (IIs) and confirm that they are reported to the HSO and PM within 24 hours;
- Coordinate site and personal air monitoring, as required, including equipment maintenance and calibration;
- Conduct site safety orientation training and safety meetings;
- Verify that site personnel have received the required physical examinations and medical certifications;
- Review site activities with respect to compliance with this HASP;
- Maintain required health and safety documents and records; and
- Assist the SS in instructing field personnel on project hazards and protective procedures.

2.2.4 Site Supervisor (SS)

Each contractor must designate an SS to be responsible for implementing this HASP, including communicating requirements to onsite personnel. The SS will be responsible for informing the PM of changes in the OMM Plan, procedures, or site conditions so that those changes may be addressed in this HASP. Other responsibilities are to:

- Consult with the HSS onsite health and safety issues;
- Stop work, as necessary, for personal safety, protection of property, and regulatory compliance;
- Obtain a site map and determine and post emergency telephone numbers and routes to medical facilities;
- Notify local public emergency representatives (as appropriate) of the nature of the site operations, and post their telephone numbers (e.g., local fire department personnel who would respond for a confined space rescue);
- Observe onsite project personnel for signs of ill health effects;
- Investigate and report any incidents to the HSS;

- Verify that all onsite personnel have had applicable training;
- Verify that onsite personnel are informed of the physical, chemical, and biological hazards associated with the site activities, and the procedures and protective equipment necessary to control those hazards; and
- Issue/obtain any required work permits (e.g., hot work, confined space).

2.3 All Onsite Personnel

All onsite personnel must read and acknowledge their understanding of this HASP before commencing work, and abide by the requirements of the plan. All onsite personnel shall sign the HASP Acknowledgement Form following their review of this HASP.

All personnel will receive training in accordance with applicable regulations and be familiar with the requirements and procedures contained in this HASP prior to initiating site activities. In addition, all onsite personnel will attend an initial hazard briefing prior to beginning work at the site, as well as the daily safety meetings.

Onsite personnel will immediately report the following to the SS or HSS:

- Personal injuries and illnesses no matter how minor;
- Unexpected or uncontrolled release of chemical substances;
- Symptoms of chemical exposure;
- Unsafe or hazardous situations;
- Unsafe or malfunctioning equipment;
- Changes in site conditions that may affect the health and safety of project personnel;
- Damage to equipment or property;
- Situations or activities for which they are not properly trained; and
- Near misses.

2.4 Visitors

All visitors to work areas must check in with the SS. Visitors will be cautioned to avoid skin contact with surfaces, soils, groundwater, or other materials that may impacted or be suspected to be impacted by constituents of concern (COC).

Visitors requesting to observe work at the site must don appropriate personal protective equipment (PPE) prior to entry to the work area and must have the appropriate training and medical clearances to do so. If respiratory

protective devices are necessary, visitors who wish to enter the work area must have been respirator-trained and fit-tested for a respirator within the past 12 months.

TABLE 2-1
KEY PERSONNEL

Key Site Personnel		
Role	**Name/Title**	**Address/Telephone No.**
Health and Safety Office	TBD	TBD
Project Manager	TBD	TBD
Health and Safety Supervisor	TBD	TBD
Site Supervisor	TBD	TBD
Key Agency Personnel		
Name	**Name/Title**	**Address/Telephone No.**
NYSDEC	Martin L. Doster, P.E. Regional Hazardous Waste Remediation Engineer	Division of Environmental Remediation NYSDEC 270 Michigan Avenue Buffalo, New York 14203-2999 (716) 851-7220
NYSDOH	Richard Tuers Sanitary Engineer	Bureau of Environmental Exposure Investigation NYSDOH 11 University Place, Room 205 Albany, New York 12203 (518) 458-6309

3. Project Hazards and Control Measures

3.1 Scope of Work

The scope of work, as detailed in the OMM Plan, includes at a minimum the following field activities:

- Periodic Site Inspections;
- General Site Maintenance Activities;
- Final Cover and Drainage System Maintenance Activities;
- Groundwater Monitoring Well Installation;
- Groundwater Sampling; and
- Equipment Cleaning/Demobilization.

The contractor's HSS and SS must continually monitor all operations to provide compliance with the requirements of this HASP. Many or most of the field tasks will be conducted individually; however, there may be times that individuals are working on various tasks simultaneously. In all cases, operations will be conducted under the direction of the contractor's HSS and/or SS in compliance with the requirements of this plan. The hazards, COCs, and control techniques for the various tasks that will be performed at the site are presented in the following sections.

3.2 Job Hazard Assessment

The following job hazard assessment identifies potential safety, health, and environmental hazards associated with each type of field activity that may be performed at the site. Because of the complex and changing nature of field projects, supervisors must continually inspect the site to identify hazards that may affect onsite personnel, the community, or the environment. Contractor SSs must be aware of these changing conditions and discuss them with the appropriate PM whenever these changes impact employee health, safety, the environment, or performance of the project. The contractor SSs will keep onsite personnel informed of the changing conditions, the HSO and PM will write and/or approve addenda or revisions to this HASP, as necessary.

3.2.1 Excavation and Backfilling Activities

Minor excavation and backfilling activities may be necessary during maintenance work for the final cover system on the Bern Metal property, and may involve a potential for exposure to physical and health hazards. No excavations greater than 1.5 feet in depth are anticipated. Excavation activities will be conducted in accordance with this section and all applicable OSHA regulations. Hazards may be associated with the site and environmental conditions.

The physical hazards involved in the excavation of soils are related to the excavation itself and the operation of heavy equipment. The presence of overhead utilities such as power lines requires careful positioning of the

excavating equipment in order to maintain a safe distance between the lines and the closest part of the equipment. The presence of underground utilities such as gas lines, power lines, water lines, and sewer pipes must be determined prior to beginning the excavation.

Excavations pose significant hazards to employees if they are not carefully controlled. There exists a chance for the excavation to collapse if it is not dug properly, sloped, benched, or shored as required by 29 CFR 1926 Subpart P. Protective systems, as required by 29 CFR 1926 Subpart P, must be utilized if the potential for hazardous cave-ins exists. The excavation also is a fall hazard, and employees must pay careful attention to what they are doing or they risk a fall into the excavation. Fall protection, as required by 29 CFR 1926 Subpart M, will be required.

Slippery work surfaces can increase the likelihood of back injuries, overexertion injuries, and slips and falls. All personnel should frequently inspect working surfaces and keep working surface clear of debris.

The most common type of accident that occurs in material handling operations is the "caught between" situation when a load is being handled and a finger or toe gets caught between two objects. Extreme care must be taken when loading and unloading material. Proper lifting technique must be employee

Heavy equipment operation frequently results in noise levels exceeding 85 dBA, requiring the use of hearing protection.

At the end of each work day, open test-pit excavations will be backfilled or covered and guarded, and equipment will be moved to a location away from high-voltage electrical equipment and away from routes necessary to access high-voltage electrical equipment.

Airborne concentrations of COCs in the site soil and the dust from the excavation procedure pose the potential for inhalation exposure. PPE for this phase is described in Section 5, Personal Protective Equipment. Airborne particulate generation will be controlled during site excavations. Dry, dusty soil will be wetted with a water spray from a potable water source to control the generation of dust. Soil will not be wetted to a degree that will cause runoff or erosion.

Before excavation activities commence, the existence and location of underground pipe, electrical equipment, and gas lines shall be determined. This will be done, if possible, by contacting the appropriate client representative and having him/her mark the location of the lines. If the client's knowledge of the area is incomplete, an appropriate device, such as a magnetometer, will be used to locate the line. An Underground/Overhead Utility Checklist (Attachment A) shall be used to document that nearby utilities have been marked on the ground and that the excavation areas have been cleared. The completed checklist will be in the possession of the SS prior to commencement of any intrusive investigation.

All excavation activities shall be conducted in accordance with 29 CFR 1926 Subpart P. If excavation operations are located near underground installations, the exact location of the installations must be determined by safe and acceptable means. While the excavation is open, underground installations must be protected, supported, or removed, as necessary, to safeguard employees.

3.2.1.1 Overhead Electrical Clearances

If excavation activities are conducted in the vicinity of overhead power lines, the power to the lines must be de-energized, tested de-energized, marked up/guaranteed, and grounded, or the equipment must be positioned such that no part, including excavation boom, can come within the minimum clearances as follows:

Nominal System Voltage	Minimum Required Clearance
0-50kV	10 feet
51-100kV	12 feet
101-200kV	15 feet
201-300kV	20 feet
301-500kV	25 feet
501-750kV	35 feet
751-1,000kV	45 feet

If the above minimum clearances cannot be maintained, the following controls shall be instituted at the site to protect against live electrical conductors:

- Portable rubber protective equipment (e.g., blankets, hose, hoods) and/or barriers of approved material shall be placed to completely eliminate any possibility of contact with exposed live parts.

- When placing and removing protective equipment, and until and unless such complete protection is provided, workers shall wear the necessary PPE, including approved insulating gloves with arm gauntlets, hard hat, and body protection.

3.2.2 Heavy Equipment Materials Handling

To protect all on-site personnel against hazards associated with materials handling, and to prevent injury due to unsafe heavy equipment operation, only properly trained and authorized operators will be allowed to operate heavy equipment. All materials handling equipment will be maintained in safe operating condition and inspected daily prior to use.

3.2.2.1 Audible Alarms

Every vehicle used to haul soil, rock, concrete, or other construction material shall be equipped with a warning device that operates automatically while the vehicle is backing. The warning sound shall be of such magnitude that it will normally be audible from a distance of 200 feet and will sound immediately on backing. In congested areas or areas with high ambient noise that obscures the audible alarms, a signaler, in clear view of the operator, shall direct the backing operation. Other vehicles, if operating in areas where their backward movement would constitute a hazard to employees working in the area on foot, and where the operator's vision is obstructed to the rear of the vehicle shall be equipped with an effective device or method to safeguard employees such as:

(1) An automatic back-up audible alarm which would sound immediately on backing, or

(2) An automatic braking device at the rear of the vehicle that will apply the service brake immediately on contact with any obstruction to the rear, or

(3) In lieu of 1 or 2 above, administrative controls shall be established such as:

- A spotter or flagger in clear view of the operator who shall direct the backing operation;

- Other procedures that will require the operator to dismount and circle the vehicle immediately prior to starting a back-up operation; or

- Prohibiting all foot traffic in the work area.

(4) Other means shall be provided that will furnish safety equivalent to the foregoing for personnel working in the area.

The operator of all vehicles shall not leave the controls of the vehicle while it is moving under its own engine power. Hauling or earth moving operations shall be controlled in such a manner that equipment or vehicle operators know of the presence of laborers, spotters, lab technicians, surveyors, or other workers on foot in the areas of their operations.

3.2.2.2 Equipment Inspection and Maintenance

All vehicles in use shall be checked at the beginning of each shift to confirm that the following parts, equipment, and accessories are in safe operating condition and free of apparent damage that could cause failure while in use: service brakes, including trailer brake connections; parking system (hand brake); emergency stopping system (brake); tires; horn; steering mechanism; coupling devices; seat belts; operating controls; and safety devices. All defects affecting safe operation shall be corrected before the vehicle is placed in service. These requirements also apply to equipment such as lights, reflectors, windshield wipers, defrosters, and fire extinguishers, where such equipment is necessary.

Vehicle engines shall not be allowed to run in closed garages or other enclosed places, unless vents are provided that effectively remove the exhaust gases from the building.

Except for emergency field repairs, a safety tire rack, cage, or equivalent protection shall be used when inflating truck or equipment tires after mounting on a rim, if such tires depend upon a locking ring or similar device to hold them on the rim.

No repairs shall be attempted on power equipment until arrangements are made to eliminate possibility of injury, caused by sudden movements or operation of the equipment or its parts. When the equipment being repaired is a bulldozer, carryall, ripper, or other machine having sharp or heavy moving parts such as blades, beds, or gates, such parts shall be lowered to the ground or securely and positively blocked in an inoperative position.

All controls shall be in a neutral position, with the engine(s) stopped and brakes set, unless work being performed requires otherwise. Trucks with dump bodies shall be equipped with positive means of support, permanently attached, and capable of being locked in position to prevent accidental lowering of the body while maintenance or inspection work is being done. In all cases where the body is raised for any work, the locking device shall be used.

3.2.2.3 Equipment Fueling

No internal combustion engine fuel tank shall be refilled with a flammable liquid while the engine is running. Fueling shall be done in such a manner that the likelihood of spillage is minimal. If a spill occurs, it shall be contained and cleaned, or equivalent action taken to control vapors before restarting the engine. Fuel tank caps shall be replaced before starting the engine.

A good metal-to-metal contact shall be kept between fuel supply tank or nozzle of supply hose and the fuel tank. No open lights, welding, or sparking equipment shall be used near internal combustion equipment being fueled or near storage tanks. No smoking shall be permitted at or near equipment being fueled. A fire extinguisher rated 20:BC or larger shall be in a location accessible to the fueling area.

3.2.2.4 Flaggers

Flaggers shall be utilized at locations on a construction site where barricades and warning signs cannot control the moving traffic. When flaggers are required, they shall be placed in relation to the equipment or operation so as to give effective warning. Placement of warning signs shall be according to the State Department of Transportation (DOT). Flaggers shall wear orange warning garments such as vests, jackets, or shirts. Rainwear, when worn, shall be orange, but may be another color only if an orange outer warning garment is worn. During the hours of darkness, flaggers' stations shall be illuminated such that the flagger will be clearly visible to approaching traffic, and flaggers shall be outfitted with reflectorized garments. The retro reflective material shall be either orange, white (including silver-coated reflecting coatings or elements that reflect white light), yellow, fluorescent red-orange, or fluorescent yellow-orange.

Flaggers shall be trained in the proper fundamentals of flagging moving traffic before being assigned as flaggers. Signaling directions used by flaggers shall conform to the DOT standards.

3.2.2.5 Additional Safety Requirements

Additional general heavy equipment safety requirements include, but are not limited to:

- Prior to operating any heavy equipment, the authorized operator must conduct a pre-operation inspection to determine that the heavy equipment is in safe operating condition prior to each work shift;
- All mobile equipment will be equipped with an audible back-up alarm;
- Personnel will not be allowed to stand or pass under the elevated portion of any heavy equipment, whether loaded or empty;
- Personnel will not place arms or legs between pinch or scissors points of the equipment or outside the operator enclosure;
- A safe distance will be maintained from the edge of excavations, ditches, ramps, or platforms;
- Operators will maintain sufficient headroom under objects such as overhead utilities; installations, lights, pipes, and sprinkler systems;
- Heavy equipment must never be used for lifting or transporting personnel unless specifically designed for that purpose;
- The operator is required to look in the direction of, and maintain a clear view of the path of travel;

- Heavy equipment will not be operated without an overhead guard and roll-over protection to protect the operator against falling objects and roll-over;
- Heavy equipment must not be driven up to anyone standing in front of any object;
- Stunt driving and horseplay are strictly prohibited;
- Operators will yield the right-of-way to other site vehicles;
- Other heavy equipment traveling in the same direction must not be passed at intersections, blind spots, or other dangerous locations;
- A safe distance will be maintained from other heavy equipment, and the equipment must be kept under control at all times;
- Heavy equipment operators must slow down for wet and slippery conditions. Under all travel conditions the equipment will be operated at a speed that will permit it to be brought to a stop in a safe manner;
- Operators will avoid running over loose objects on operating surfaces;
- Grades or ramps must be ascended or descended slowly;
- On all grades, the load will be tilted back, and raised only as far as necessary to clear the operating surface;
- The operator will slow down and sound the horn at intersections, when entering buildings, and at other locations where vision may be obstructed;
- If the load being carried obstructs forward view, the operator will travel with the load trailing;
- While negotiating turns, operators will reduce speed to a safe level, and turn in a smooth, sweeping motion to avoid abrupt turns and potential upset; and
- Authorized operators will handle only stable or safely arranged loads and loads within the rated capacity of the heavy equipment and will not affect the stability of the heavy equipment.

When a piece of heavy equipment is left unattended, hydraulics will be fully lowered, controls will be neutralized, power will be shut off, and brakes set. Wheels will be blocked or chocked if the heavy equipment is parked on an incline. When internal combustion engine-powered heavy equipment is utilized indoors, near confined spaces, or near excavations, carbon monoxide levels shall be monitored to prevent personnel exposure.

3.2.3 Equipment Decontamination

All equipment will be decontaminated before it is removed from the site; visual inspections will be conducted to verify that any accumulated soil has been removed. In addition, all operations that have the potential to generate or release hazardous material will be conducted in a controlled area using the appropriate engineering controls. Specific decontamination techniques will be established based onsite conditions. Decontamination procedures

will be reviewed with all onsite personnel. A decontamination pad, if necessary, should be constructed on a suitable surface (concrete or paved area) with polyethylene sheeting or other appropriate containment system. Pressure washing with manual scrub brushing, as needed, will be used to decontaminate equipment, and will be determined "clean" through visual inspection of all equipment.

The decontamination facility will be inspected on a daily basis for evidence of leaks or loss of integrity to the containment system. If any deficiencies are noted, they will be corrected immediately and documented on a Daily Health and Safety Checklist (Attachment B). All wastewater that is generated onsite will be contained in the decontamination system for characterization and determination of disposal options.

Personnel involved in decontamination activities may be exposed to skin contact with contaminated materials and chemicals brought to the site as part of the project work. All personnel will review the operating procedures and PPE prior to decontamination.

3.2.4 Engineering Observation

Engineering observation activities may involve a potential for exposure to physical and health hazards. Hazards may be associated with the site, the equipment being used, and environmental conditions.

There exists a potential for incidents involving personnel being struck by or struck against equipment or objects, which could result in fractures, lacerations, punctures, or abrasions. Walking and working surfaces during activities may involve slip, trip, or fall hazards. Slippery walking/working surfaces can increase the possibility of back injuries, overexertion injuries, and slips and falls. Material-handling operations may result in "caught between" situation when a load is being handled, and a finger or toe gets caught between two objects. Material handling also exposes employees to sprains/strains if proper lifting techniques are not used. Noise may also present a hazard. Heavy equipment operation frequently results in high noise levels.

Environmental hazards include plants such as poison ivy and poison oak; aggressive fauna such as ticks, fleas, mosquitoes, wasps, spiders, and snakes; weather such as sunburn, lightning, rain, and heat-related illnesses; and pathogens such as rabies, Lyme disease, and blood-borne pathogens.

Prior to the start of any field activity, the site conditions will be discussed with all affected employees. Hazards will be identified, and protective measures will be explained. Control procedures for these hazards are discussed in Section 4, General Safety Practices, and in task-specific sections of this HASP. Decisions regarding PPE will be based on the potential chemical and physical hazards onsite, and measurements and observations made prior to and during work activities. A minimum of Level D protection will be worn by personnel conducting observation activities. See Section 5, Personal Protective Equipment, for a description of PPE requirements. Personnel conducting observation activities will do so from a safe distance.

3.2.5 Confined Space Entry

This section contains general requirements and procedures for working with confined spaces. In addition to the general information provided herein, all personnel must comply with the requirements of the BBL Policy and Procedure Memo #1.02.08, Confined Space Entry (Attachment C). This procedure may be used as a guide for all non-BBL personnel, although it is the responsibility of the individual employer to confirm employee compliance with the applicable OSHA standards.

A confined space is defined as a space large enough and so configured that an employee can bodily enter and perform assigned work, and the space has limited means for entry or exit and is not designed for continuous employee occupancy. Some confined space work may pose additional hazards such as air contamination, flammable or explosive atmosphere, and oxygen deficiency. Confined space entry may pose the possibility of engulfment. Personnel must be properly trained in order to supervise and participate in confined space entry procedures or serve as standby attendants.

All confined spaces are initially considered permit-required and procedures for entry must be consistent with the requirements of BBL Policy and Procedure Memo #1.02.08, Confined Space Entry.

3.2.5.1 Confined Space Identification and Designation

The SS/HSS is responsible for identifying all confined spaces into which employees or contractors will enter. Entry is considered to have occurred as soon as any part of the entrant's body breaks the plane of an opening into the space. The client is responsible to identify and provide information on the contents, expected atmosphere, and rescue procedures for all confined spaces on his/her property. If a space is not considered permit-required by the client but meets the criteria of this procedure, it shall be considered permit-required for entry. If a space does not meet the criteria in this procedure but is considered permit-required by the client, it will be considered a permit-required confined space.

3.2.6 Final Cover Maintenance Activities

Site maintenance activities for the final cover system may include the following:

- Periodic Inspection;
- Inspection and Maintenance of Fence;
- Vegetation Mowing/Seeding;
- Weed/Foliage Control;
- Drainage Ditch Inspection and Repair; and
- Topsoil and/or Protection Soil Layer Repair.

These activities may involve a potential for exposure to numerous physical and health hazards. The hazards are primarily associated with the equipment used and the debris being removed. Other related hazards not listed below may exist during excavation and backfill activities and during heavy equipment use as presented above. The physical hazards involved with cap maintenance activities relate to work done with heavy equipment, hand tools, and the environment itself. There exists a potential for incidents involving personnel struck by or struck against powered equipment, timber, or materials, resulting in fractures, cuts, punctures, or abrasions. Walking and working surfaces during construction activities may involve slip, trip, and fall hazards. Working at elevations may create a fall hazard. Confined Spaces may present a hazard.

Overgrown areas present hazards of uneven walking surfaces, soft terrain, and biological hazards such as insects and snakes.

Uneven terrain and slippery work surfaces can increase the likelihood of back injuries, overexertion injuries, and slips and falls. All personnel should frequently inspect the area in which they are working, and keep the area as clear as possible.

Site workers are exposed to serious hazards during clearing when using powered equipment. Workers may be struck by blades or by material thrown by powered equipment.

The most common type of accident that occurs in material handling operations is the "caught between" situation when a load is being handled and a finger or toe gets caught between two objects. Extreme care must be taken when loading and unloading material. Proper lifting technique must be employed, and mechanical means must be used to lift objects whenever possible.

Due to the type of work involved in cap maintenance activities, the primary health hazards involve repetitive motion disorders, lifting, and other ergonomic stressors. Noise may also present a hazard. Operation of heavy equipment, power equipment, power actuated and pneumatic hand tools frequently results in high noise levels.

Prior to initiating cap maintenance activities, the operation will be explained to all employees. Hazards will be identified and protective measures will be explained. Equipment will be inspected and in proper working condition. Employees should receive training to address the equipment, its operations, and care. Personnel should be scheduled in a manner to reduce the likelihood of performing repetitive tasks for prolonged periods. Mechanical assistance should be provided for large lifting tasks. Hearing protection is required for use when exposed to noise levels exceeding 85 dBA, or a level that commonly results in difficult conversation.

3.2.7 Monitoring Well Installation

This task includes the installation of groundwater monitoring wells at specified locations for operations and maintenance activities. Prior to monitoring well installation, soil borings will be drilled using the hollow-stem auger drilling technique. After the wells are completed, the wells will be developed using the standard operating procedures.

3.2.7.1 Drilling Hazards

The primary physical hazards for this activity are associated with the use of drilling equipment. Rig accidents can occur as a result of improperly placing the rig on uneven or unstable terrain, or failing to adequately secure the rig prior to the start of operations. Underground and overhead utility lines can create hazardous conditions if contacted by drilling equipment. Tools and equipment, such as elevators, cat lines, and wire rope, have the potential for striking, pinning, or cutting personnel.

- Worn or frayed wire rope presents a laceration hazard if loose wires protrude from the main bundle.
- Cat lines are used on drilling rigs to hoist material. Accidents that occur during cat line operations may injure the employee doing the rigging, as well as injure the operator. Minimal hoisting control causes sudden and erratic load movements, which may result in hand and foot injuries.
- Slippery work surfaces can increase the likelihood of back injuries, overexertion injuries, and slips and falls.

- The most common type of accident that occurs in material handling operations is the "caught between" situation when a load is being handled and a finger or toe gets caught between two objects. Rolling stock can shift and/or fall from a pipe rack or truck bed.

3.2.7.2 Drilling Safety Procedures

All drillers must possess required state or local licenses to perform such work. All members of the drill crew shall receive site-specific training prior to beginning work.

The driller is responsible for the safe operation of the drill rig, as well as the crew's adherence to the requirements of this HASP. The driller must confirm that all safety equipment is in proper condition and is properly used. The members of the crew must follow all instructions of the driller, wear all PPE, and be aware of all hazards and control procedures. The drill crews must participate in the Daily Safety Meetings and be aware of all emergency procedures.

Each day, prior to the start of work, the drill rig and associated equipment must be inspected by the driller and/or drill crew. The following items must be inspected:

- vehicle condition;
- proper storage of equipment;
- condition of all wire rope and hydraulic lines;
- fire extinguisher; and
- first aid kit.

The drill rig must be properly blocked and leveled prior to raising the derrick. The wheels, which remain on the ground, must be chocked. The leveling jacks shall not be raised until the derrick is lowered. The rig shall be moved only after the derrick has been lowered.

Before drilling, the existence and location of underground pipe, electrical equipment, and gas lines will be determined. This will be done, if possible, by contacting the appropriate client representative to mark the location of the lines. If the client's knowledge of the area is incomplete, an appropriate device, such as a magnetometer, will be used to locate the line. The Underground/Overhead Utility Checklist shall be used to document that nearby utilities have been marked on the ground, and that the drill site has been cleared. The checklist shall be in the possession of the SS prior to commencement of the intrusive investigation at that point of the site (Attachment A).

Combustible gas readings of the general work area will be made regularly.

Operations must be suspended and corrective action taken if the airborne flammable concentration reaches 10 percent of LEL in the immediate area (a one-foot radius) of the point of drilling, or near any other ignition sources.

Under no circumstances will personnel be permitted to ride the traveling block or elevators, nor will the cat line be used as a personnel carrier.

If drilling is conducted in the vicinity of overhead power lines, the power to the lines must be shut off or the equipment must be positioned and blocked such that no part, including cables, can come within the minimum clearances identified previously in Section 3.2.1.1

When the drill rig is in transit, with the boom lowered and no load, the equipment clearance must be at least 4 feet for voltages less than 50kV, 10 feet for voltages of 50kV to 345kV, and 16 feet for voltages above 345kV.

All well sites will be inspected by the driller, prior to the location of the rig, to verify a stable surface exists. This is especially important in areas where soft, unstable terrain is common.

All rigs will be properly blocked and leveled prior to raising the derrick. Blocking provides a more stable drilling structure by evenly distributing the weight of the rig. Proper blocking prevents differential settling of the rig.

When the ground surface is soft or otherwise unstable, wooden blocks, at least 24 inches by 24 inches and 4 inches to 8 inches thick, shall be placed between the jack swivels and the ground. The emergency brake shall be engaged, and the wheels that are on the ground shall be chocked.

When using hoisting equipment, the following procedures should be implemented:

- Drillers should never engage the rotary clutch without watching the rotary table, and ensuring it is clear of personnel and equipment.
- Unless the drawworks is equipped with an automatic feed control, the brake should not be left unattended without first being tied down.
- Auger strings or casing should be picked up slowly.
- During instances of unusual loading of the derrick or mast, such as when making an unusually hard pull, only the driller should be on the rig floor and no one else should be on the rig or derrick.
- The brakes on the drawworks of the drill rig should be tested by the driller each day. The brakes should be thoroughly inspected by a competent individual each week.
- A hoisting line with a load imposed should not be permitted to be in direct contact with any derrick member or stationary equipment, unless it has been specifically designed for line contact.
- Workers should never stand near the borehole whenever any wire line device is being run.
- Hoisting control stations should be kept clean and controls labeled as to their functions.

Only experienced workers will be allowed to operate the cathead controls. The kill switch must be clearly labeled and operational prior to operation of the cat line. The cathead area must be kept free of obstructions and entanglements.

The operator should not use more wraps than necessary to pick up the load. More than one layer of wrapping is not permitted.

Personnel should not stand near, step over, or go under a cable or cat line that is under tension.

Employees rigging loads on cat lines shall:

- keep out from under the load;
- keep fingers and feet where they will not be crushed;
- be sure to signal clearly when the load is being picked up;
- use standard visual signals only and not depend on shouting to co-workers; and
- make sure the load is properly rigged, since a sudden jerk in the cat line will shift or drop the load.

When two wires are broken or rust or corrosion is found adjacent to a socket or end fitting, the wire rope shall be removed from service or resocketed. Special attention shall be given to the inspection of end fittings on boom support, pendants, and guy ropes.

- Wire rope removed from service due to defects shall be cut up or plainly marked as being unfit for further use as rigging.
- Wire rope clips attached with U-bolts shall have the U-bolts on the dead or short end of the rope; the clip nuts shall be re-tightened immediately after initial load carrying use and at frequent intervals thereafter.
- When a wedge socket fastening is used, the dead or short end of the wire rope shall have a clip attached to it or looped back and secured by a clip; the clip shall not be attached directly to the live end.
- Protruding ends of strands in splices on slings and bridles shall be covered or blunted.
- Except for eye splices in the ends of wires and for endless wire rope slings, wire rope used in hoisting, lowering, or pulling loads, shall consist of one continuous piece without knot or splice.
- An eye splice made in any wire rope shall have not less that five full tucks.
- Wire rope shall not be secured by knots. Wire rope clips shall not be used to splice rope.
- Eyes in wire rope bridles, slings, or bull wires shall not be formed by wire clips or knots.

Auger sections shall be transported by cart or carried by two persons. Individuals should not carry auger sections without assistance.

Workers should not be permitted on top of the load during loading, unloading, or transferring of rolling stock. When equipment is being hoisted, personnel should not stand where the bottom end of the equipment could whip and strike them.

Augers stored in racks, catwalks, or on flatbed trucks should be secured to prevent rolling.

3.2.8 Groundwater Sampling Activities

The groundwater sampling program will involve uncapping, purging (pumping water out of the well), and sampling existing monitoring wells. A mechanical pump may be utilized to purge the wells and can be hand, gas, or electric-operated. Water samples taken from the wells are then placed in containers and shipped to an analytical laboratory for analysis.

During the course of this project, several different sampling methodologies may be utilized based on equipment accessibility and the types of materials to be sampled. These sampling methods may include hand or mechanical bailing. The primary hazards associated with these specific sampling methods are not potentially serious; however, other operations in the area, or the conditions under which samples must be collected, may present chemical and physical hazards. The hazards of these types of sampling methods are generally limited to strains/sprains resulting from hand bailing and potential eye hazards resulting from water sampling activities.

In addition to the safety hazards specific to sampling operations, hazards associated with sample preservatives will be a concern. The work area presents slip, trip, and fall hazards from scattered debris and irregular walking surfaces. Freezing-weather hazards include frozen, slick and irregular walking surfaces. Rainy weather may cause wet, muddy, slick walking surfaces, and unstable soil.

Exposure to impacted water is possible. Organic vapors will be monitored and, in accordance with Section 5, decisions on PPE for the chemical hazards will be based on measurements made before and during work activities. Control procedures for environmental and general hazards are discussed in Section 4.0.

3.3 Chemical Hazards

The chemical hazards associated with site operations are related to inhalation, ingestion, and skin exposure to soil, sediment, and groundwater containing site COCs. Site COCs include chromium, lead, copper, and mercury.

Airborne concentrations of site COCs may be measurable during certain tasks, and will require air monitoring of potentially toxic atmospheres during such operations.

The potential for inhalation of COCs during intrusive excavation, drilling, and sampling is moderate. The potential for dermal contact during intrusive excavation, drilling, and sampling activities is moderate.

A summary of the chemical hazard information for the COCs is presented in Table 3-1and the Material Safety Data Sheets (MSDSs) for site COCs are included in Attachment D.

TABLE 3-1
CHEMICAL HAZARD INFORMATION

Substance [CAS]	IP[a] (eV)	Odor Threshold (ppm)	Route[b]	Symptoms of Exposure	Treatment	TWA[c]	STEL[d]	Source[e]	IDLH (NIOSH)[f]
Chromic acid and chromates (as CrO_3) (Chrome VI) [7738-94-5]	NA	NA	Inh Ing Con	Respiratory system irritation, nasal septum perforation; liver and kidney damage; leukocytosis, leukopenia, monocytosis, eosinophilia; eye injury and conjunctivitis; skin ulceration and dermal sensitization. Carcinogenic.	Eye: Irrigate immediately Skin:Soap flush immediately Breath: Respiratory support Swallow: Immediate medical attention	0.05 mg/m^3* 0.001 mg/m^3* *as Cr	C0.1 mg/m^3* *as CrO_3	PEL TLV REL	Ca [30 mg/m^3]
Chromium metal (as Cr) [7440-47-3]	NA	NA	Inh Ing	Histologic fibrosis of lungs.	Eye: Irrigate immediately Skin: Soap wash immediately Breath: Respiratory support Swallow: Immediate medical attention	1 mg/m^3 0.5 mg/m^3 0.5 mg/m^3		PEL TLV REL	NE
Copper dusts and mists (metal) (copper sulfate) [7440-50-8]	NA	NA	Inh Ing Con	Irritated pharynx and nasal mucous membrane; nasal perforation; eye irritation; metallic taste; dermatitis; in animals: lung, kidney, and liver damage; anemia.	Eye: Irrigate immediately Skin: Soap wash immediately Breath: Respiratory support Swallow: Immediate medical attention	1 mg/m^3 1 mg/m^3 1 mg/m^3		PEL TLV REL	NE
Mercury vapor [7439-97-6]	NA	NA	Inh Abs Con	Coughing, chest pain, dyspnea, bronchial pneumonitis; tremors, insomnia; irritability, indecision; headache, fatigue, weakness stomatitis, salivation; gastrointestinal disturbance, anorexia, low weight; proteinuria, irritated eyes, and skin.	Eye: Irrigate immediately Skin: Soap wash promptly Breath: Respiratory support Swallow: Immediately medical attentio	0.05 mg/m^3 (skin) 0.05 mg/m^3 (skin) 0.05 mg/m^3 (skin)		PEL TLV REL	28 mg/m^3
Lead inorganic dusts & fumes (as Pb) [7439-92-1]	NA	NA	Inh Ing Con	Weakness, lassitude, insomnia; facial pallor, eye pallor, anorexia, low body weight, malnutrition; constipation, abdominal pain, colic; anemia; gingival lead line; tremors; wrist and ankle paralysis; brain damage; kidney damage; irritated eyes; hypotension.	Eye: Irrigate immediately Skin: Soap flush promptly Breath: Respiratory support Swallow: Immediate medical attention	0.05 mg/m^3 0.15 mg/m^3 <0.1 mg/m^3 See 29 CFR 1910.1025 Blood lead <0.060 mg/100 g whole blood		PEL TLV REL	700 mg/m^3

Refer to footnotes at end of table.

TABLE 3-1 (CONT'D)
CHEMICAL HAZARD INFORMATION

[a]IP = Ionization potential (electron volts).
[b]Route = Inh, Inhalation; Abs, Skin absorption; Ing, Ingestion; Con, Skin and/or eye contact.
[c]TWA = Time-weighted average. The TWA concentration for a normal work day (usually 8 or 10 hours) and a 40-hour work week, to which nearly all workers may be repeatedly exposed, day after day without adverse effect.
[d]STEL = Short-term exposure limit. A 15-minute TWA exposure that should not be exceeded at any time during a workday, even if the TWA is not exceeded.
[e]PEL = Occupational Safety and Health Administration (OSHA) permissible exposure limit (29 CFR 1910.1000, Table Z).
TLV = American Conference of Governmental Industrial Hygiene (ACGIH) threshold limit value—TWA.
REL = National Institute for Occupational Safety and Health (NIOSH) recommended exposure limit.
[f]IDLH (NIOSH)—Immediately dangerous to life or health (NIOSH). Represents the maximum concentration from which, in the event of respirator failure, one could escape within 30 minutes without a respirator and without experiencing any escape-impairing or irreversible health effects.
NE = No evidence could be found for the existence of an IDLH (NIOSH Pocket Guide to Chemical Hazards, Pub. No. 90-117, 1990).
C = Ceiling limit value which should not be exceeded at any time.
Ca = Carcinogen.
NA = Not applicable.
? = Unknown.
LEL = Lower explosive limits.
LC_{50} = Lethal concentration for 50 percent of population tested.
LD_{50} = Lethal dose for 50 percent of population tested.
NIC = Notice of intended change (ACGIH).

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Refer to footnotes at end of table.

4. General Safety Practices

4.1 General Safety Rules

At least one copy of this HASP must be in a location at the site that is readily available to personnel, and all project personnel shall review the plan prior to starting work. General safety rules for site activities include, but are not limited to, the following:

- Consume or use food, beverages, chewing gum, and tobacco products only in the SZ or other designated area outside the EZ and CRZ. Cosmetics shall not be applied in the EZ or CRZ.
- Wash hands before eating, drinking, smoking, or using toilet facilities.
- Wear all PPE as required, and stop work and replace damaged PPE immediately.
- Secure disposable coveralls, boots, and gloves at the wrists and legs and confirm closure of the suit around the neck.
- Upon skin contact with materials that may be impacted by COCs, remove contaminated clothing and wash the affected area immediately. Contaminated clothing must be changed. Any skin contact with materials potentially impacted by COCs must be reported to the SS or HSS immediately. If necessary, seek medical attention.
- Practice contamination avoidance. Avoid contact with surfaces either suspected or known to be impacted by COCs, such as standing water, mud, or discolored soil. Store equipment on elevated or protected surfaces to reduce the potential for incidental contamination.
- Remove PPE as required in the CRZ to limit the spread of COC-containing materials.
- At the end of each shift or as required, dispose of all single-use coveralls, soiled gloves, and respirator cartridges in designated receptacles designated for this purpose.
- Do not remove soil containing site COCs from protective clothing or equipment with compressed air, shaking, or any other means that disperses contaminants into the air.
- Inspect all nondisposable PPE for contamination in the CRZ. Decontaminate and dispose of properly any PPE found to be contaminated.
- Recognize emergency signals (e.g., for evacuation, injury, fire).
- Report all injuries, illnesses, near misses, and unsafe conditions or work practices to the SS or HSS.
- Use the "buddy system" during all operations requiring Level C PPE and, when appropriate, during Modified Level D operations.
- Obey all warning signs, tags, and barriers. Do not remove any warnings unless authorized to do so.

- Use, adjust, alter, and repair equipment only if trained and authorized to do so, and in accordance with the manufacturer's directions.

- Perform only tasks for which you have been properly trained; advise your supervisor if you have been assigned a task for which you are not trained.

- Do not take prescription or over-the-counter drugs when assigned to tasks with the potential for absorption, inhalation, or ingestion of hazardous substances, unless given written approval by an appropriate health care professional. The presence or consumption of alcoholic beverages or illicit drugs during the work day, including breaks, is strictly prohibited.

- Remain upwind during site activities whenever possible.

4.1.1 Incident Investigation (II)

An incident is any of the following events: first aid cases, injuries, illnesses, near misses, spills/leaks, equipment and property damage, motor vehicle accidents, regulatory violations, fires, and business interruptions. All incidents shall be investigated within 24 hours and reported to the PM and the HSO.

- The purpose of an II is to prevent the recurrence of a similar hazardous event. All incidents are investigated in the same manner. The information gathered during an II will be used to create appropriate measures to protect personnel from the hazard in question. The II Form is included in Attachment E.

4.2 Buddy System

Onsite personnel must use the buddy system required by operations. Use of the buddy system is required during all operations requiring Level C to Level A PPE and, when appropriate, during Level D operations. Crewmembers must observe each other for signs of chemical exposure and heat or cold stress. Indications of adverse effects include, but are not limited to:

- Changes in complexion and skin coloration;

- Changes in coordination;

- Changes in demeanor;

- Excessive salivation and pupillary response; and

- Changes in speech pattern.

Crew members must also be aware of unsafe acts, non-compliance with safety procedures, and the potential exposure to possible safety hazards.

Field personnel must inform their partners or fellow crewmembers of non-visible effects of exposure to toxic materials that they may be experiencing. The symptoms of such exposure may include, but are not limited to:

- Headaches;
- Dizziness;
- Nausea;
- Blurred vision;
- Cramps; and
- 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.

4.3 Heat Stress

Heat stress 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. Since heat stress is one of the most common illnesses associated with heavy outdoor work conducted with direct solar load and, in particular, because wearing PPE can increase the risk of developing heat stress, workers must be capable of recognizing the signs and symptoms of heat-related illnesses. Personnel must be aware of the types and causes of heat-related illnesses and be able to recognize the signs and symptoms of these illnesses in both themselves and their co-workers.

Heat rashes are one of the most common problems in hot work environments. Commonly known as prickly heat, a heat rash is manifested as red papules and usually appears in areas where the clothing is restrictive. As sweating increases, these papules give rise to a prickling sensation. Prickly heat occurs in skin that is persistently wetted by unevaporated sweat, and heat rash papules may become infected if they are not treated. In most cases, heat rashes will disappear when the affected individual returns to a cool environment.

Heat cramps are usually caused by performing hard physical labor in a hot environment. These cramps have been attributed to an electrolyte imbalance caused by sweating. It is important to understand that cramps can be caused both by too much or too little salt.

Cramps appear to be caused by the lack of water replenishment. Because sweat is a hypotonic solution (plus or minus 0.3% NaCl), excess salt can build up in the body if the water lost through sweating is not replaced. Thirst cannot be relied on as a guide to the need for water; instead, water must be taken every 15 to 20 minutes in hot environments.

Under extreme conditions, such as working for 6 to 8 hours in heavy protective gear, a loss of sodium may occur. Drinking commercially available carbohydrate electrolyte replacement liquids is effective in minimizing physiological disturbances during recovery.

Heat exhaustion occurs from increased stress on various body organs due to inadequate blood circulation, cardiovascular insufficiency, or dehydration. Signs and symptoms include pale, cool, moist skin; heavy sweating; dizziness; nausea; headache, vertigo, weakness, thirst, and giddiness. Fortunately, this condition responds readily to prompt treatment.

Heat exhaustion should not be dismissed lightly, however, for several reasons. One is that the fainting associated with heat exhaustion can be dangerous because the victim may be operating machinery or controlling an operation that should not be left unattended; moreover, the victim may be injured when he or she faints. Also, the signs and symptoms seen in heat exhaustion are similar to those of heat stroke, which is a medical emergency.

Workers suffering from heat exhaustion should be removed from the hot environment, be given fluid replacement, and be encouraged to get adequate rest.

Heat stroke is the most serious form of heat stress. Heat stroke occurs when the body's system of temperature regulation fails and the body's temperature rises to critical levels. This condition is caused by a combination of highly variable factors, and its occurrence is difficult to predict.

Heat stroke is a medical emergency. The primary signs and symptoms of heat stroke are confusion; irrational behavior; loss of consciousness; convulsions; a lack of sweating (usually); hot, dry skin; and an abnormally high body temperature (e.g., a rectal temperature of 41°C [105.8°F]). If body temperature is too high, it causes death. The elevated metabolic temperatures caused by a combination of workload and environmental heat load, both of which contribute to heat stroke, are also highly variable and difficult to predict.

If a worker shows signs of possible heat stroke, professional medical treatment should be obtained immediately. The worker should be placed in a shady area, and the outer clothing should be removed. The worker's skin should be moistened, and air movement around the worker should be increased to improve evaporative cooling until professional methods of cooling are initiated, and the seriousness of the condition can be assessed. Fluids should be replaced as soon as possible. The medical outcome of an episode of heat stroke depends on the victim's physical fitness and the timing and effectiveness of first aid treatment.

Regardless of the worker's protestations, no employee suspected of being ill from heat stroke should be sent home or left unattended unless a physician has specifically approved such an order.

Proper training and preventive measures will help avert serious illness and loss of work productivity. Preventing heat stress is particularly important because, once someone suffers from heat stroke or exhaustion, that person may be predisposed to additional heat injuries.

Heat Stress Safety Precautions

Heat stress monitoring and work/rest cycle implementation should commence when the ambient adjusted temperature exceeds 72°F. A minimum work/rest regimen and procedures for calculating ambient adjusted temperature are described in Table 4-1.

TABLE 4-1
WORK/REST SCHEDULE

Adjusted Temperature[b]	Work/Rest Regimen Normal Work Ensemble[c]	Work/Rest Regimen Impermeable Ensemble
90°F (32.2°C) or above	After each 45 minutes of work	After each 15 minutes of work
87.5° - 90°F (30.8°-32.2°C)	After each 60 minutes of work	After each 30 minutes of work
82.5° - 87.5°F (28.1° - 30.8°C)	After each 90 minutes of work	After each 60 minutes of work
77.5° - 82.5°F (25.3° - 28.1°C)	After each 120 minutes of work	After each 90 minutes of work
72.5° - 77.5°F (30.8° - 32.2°C)	After each 150 minutes of work	After each 120 minutes of work

a. For work levels of 250 kilocalories/hour (Light-Moderate Type of Work).

b. Calculate the adjusted air temperature (ta adj) by using this equation: ta adj °F = ta °F + (13 x % sunshine). Measure air temperature (ta) with a standard mercury-in-glass thermometer, with the bulb shielded from radiant heat. Estimate percent sunshine by judging what percent time the sun is not covered by clouds that are thick enough to produce a shadow. (100 percent sunshine = no cloud cover and a sharp, distinct shadow; 0 percent sunshine = no shadows.)
c. A normal work ensemble consists of cotton coveralls or other cotton clothing with long sleeves and pants.
d. The information presented above was generated using the information provided in the ACGIH Threshold Limit Values (TLV) Handbook.

In order to determine whether the work rest cycles are adequate for the personnel and specific site conditions, additional monitoring of individual heart rates will be conducted during the rest cycle. To check the heart rate, count the radial pulse for 30 seconds at the beginning of the rest period; multiply by 2. If the heart rate exceeds 110 beats per minute, shorten the next work period by one third and maintain the same rest period.

Additionally, one or more of the following control measures can be used to help control heat stress and are mandatory if any site worker has a heart rate (measured immediately prior to rest period) exceeding 115 beats per minute:

- Site workers will be encouraged to drink plenty of water and electrolyte replacement fluids throughout the day.
- Onsite drinking water will be kept cool (50 to 60°F).
- A work regimen that will provide adequate rest periods for cooling down will be established, as required.
- All personnel will be advised of the dangers and symptoms of heat stroke, heat exhaustion, and heat cramps.
- Cooling devices, such as vortex tubes or cooling vests, should be used when personnel must wear impermeable clothing in conditions of extreme heat.
- Employees should be instructed to monitor themselves and co-workers for signs of heat stress and to take additional breaks, as necessary.
- A shaded rest area must be provided. All breaks should take place in the shaded rest area.
- Employees must not be assigned to other tasks during breaks.
- Employees must remove impermeable garments during rest periods. This includes white Tyvek®-type garments.

All employees must be informed of the importance of adequate rest, acclimation, and proper diet in the prevention of heat stress disorders.

4.4 Cold Stress

Cold stress normally occurs in temperatures at or below freezing or, under certain circumstances, in temperatures of 40°F. Extreme cold for a short time may cause severe injury to exposed body surfaces or result in profound generalized cooling, causing death. Areas of the body that have high surface-area-to-volume ratio,

such as fingers, toes, and ears, are the most susceptible. Two factors influence the development of a cold weather injury: ambient temperature and the velocity of the wind. For instance, 10°F with a wind of 15 miles per hour (mph) is equivalent in chilling effect to still air at -18°F. An equivalent chill temperature chart relating the actual dry bulb temperature and wind velocity is presented in Table 4-2.

TABLE 4-2
CHILL TEMPERATURE CHART

Estimated Wind Speed (in mph)	Actual Temperature Reading (°F)											
	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
	Equivalent Chill Temperature (°F)											
Calm	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57	-68
10	40	28	16	4	-9	-24	-33	-46	-58	-70	-83	-95
15	36	22	9	-5	-18	-32	-45	-58	-72	-85	-99	-112
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110	-121
25	30	16	0	-15	-29	-44	-59	-74	-88	-104	-118	-133
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-140
35	27	11	-4	-20	-35	-51	-67	-82	-98	-113	-129	-145
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132	-148
(Wind speeds greater than 40 mph have little additional effect.)	LITTLE DANGER Maximum danger of false sense of security.				INCREASING DANGER Danger from freezing of exposed flesh within one minute.			GREAT DANGER Flesh may freeze within 30 seconds.				
	Trench foot and immersion foot may occur at any point on this chart.											

[This chart was developed by the U.S. Army Research Institute of Environmental Medicine, Natick, MA (Source: ACGIH Threshold Limit Values for Chemical Substances and Physical Agents)].

Local injury resulting from cold is included in the generic term *frostbite*. There are several degrees of tissue damage associated with frostbite. Frostbite of the extremities can be categorized into:

- *Frost Nip or Incipient Frostbite* - characterized by sudden blanching or whitening of skin;
- *Superficial Frostbite* - skin has a waxy or white appearance and is firm to the touch, but tissue beneath is resilient; and
- *Deep Frostbite* - tissues are cold, pale, and solid; extremely serious injury.

Systemic hypothermia is caused by exposure to freezing or rapidly dropping temperature. It can be fatal. Its symptoms are usually exhibited in five stages: 1) shivering; 2) apathy, listlessness, sleepiness, and (sometimes) rapid cooling of the body to less than 95°F; 3) unconsciousness, glassy stare, slow pulse, and slow respiratory rate; 4) freezing of the extremities; and 5) death. Trauma sustained in freezing or sub-zero conditions requires special attention because an injured worker is predisposed to secondary cold injury. Special provisions must be made to prevent hypothermia and secondary freezing of damaged tissues in addition to providing for first aid treatment. To avoid cold stress, site personnel must wear protective clothing appropriate for the level of cold and physical activity. In addition to protective clothing, preventive safe work practices, additional training, and warming regimens may be utilized to prevent cold stress.

Safety Precautions for Cold Stress Prevention

For air temperature of 0°F or less, mittens should be used to protect the hands. For exposed skin, continuous exposure should not be permitted when air speed and temperature results in a wind chill temperature of -25°F.

At air temperatures of 36°F or less, field personnel who become immersed in water or whose clothing becomes wet must be immediately provided with a change of clothing and be treated for hypothermia.

If work is done at normal temperature or in a hot environment before entering the cold, field personnel must confirm that their clothing is not wet as a consequence of sweating. If clothing is wet, field personnel must change into dry clothes prior to entering the cold area.

If the available clothing does not give adequate protection to prevent hypothermia or frostbite, work must be modified or suspended until adequate clothing is made available or until weather conditions improve.

Field personnel handling evaporative liquid (e.g., gasoline, alcohol, or cleaning fluids) at air temperatures below 40°F must take special precaution to avoid soaking clothing or gloves with the liquids because of the added danger of cold injury due to evaporative cooling.

Safe Work Practices

Direct contact between bare skin and cold surfaces (< 20°F) should be avoided. Metal tool handles and/or equipment controls should be covered by thermal insulating material.

For work performed in a wind chill temperature at or below 10°F, workers should be under constant protective observation (buddy system). The work rate should be established to prevent heavy sweating that will result in wet clothing. For heavy work, rest periods must be taken in heated shelters, and workers should be provided with an opportunity to change into dry clothing, if needed.

Field personnel should be provided the opportunity to become accustomed to cold-weather working conditions and required protective clothing.

Work should be arranged in such a way that sitting or standing still for long periods is minimized.

During the warming regimen (rest period), field personnel should be encouraged to remove outer clothing to permit sweat evaporation or to change into dry work clothing. Dehydration, or loss of body fluids, occurs insidiously in the cold environment and may increase susceptibility to cold injury due to a significant change in blood flow to the extremities. Fluid replacement with warm, sweet drinks and soups is recommended. The intake of coffee should be limited because of diuretic and circulatory effects.

4.5 Biological Hazards

Biological hazards may include poison ivy, snakes, thorny bushes and trees, bees, mosquitoes, and other pests.

4.5.1 Tick-Borne Diseases

Lyme Disease - This disease commonly occurs in summer and is transmitted by the bite of infected ticks. "Hot spots" in the United States include New York, New Jersey, Pennsylvania, Massachusetts, Connecticut, Rhode Island, Minnesota, and Wisconsin.

Erlichiosis - This disease also commonly occurs in summer and is transmitted by the bite of infected ticks. "Hot spots" in the United States include New York, Massachusetts, Connecticut, Rhode Island, Minnesota, and Wisconsin.

These diseases are transmitted primarily by the deer tick, which is smaller and redder than the common wood tick. The disease may be transmitted by immature ticks, which are small and hard to see. The tick may be as small as a period on this page.

Symptoms of Lyme disease include a rash or a peculiar red spot, like a bull's eye, which expands outward in a circular manner. The victim may have headache, weakness, fever, a stiff neck, and swelling and pain in the joints, and eventually, arthritis. Symptoms of erlichiosis include muscle and joint aches, and flu-like symptoms, but there is typically no skin rash.

Rocky Mountain Spotted Fever (RMSF) - This disease is transmitted via the bite of an infected tick. The tick must be attached 4 to 6 hours before the disease-causing organism (*Rickettsia rickettsii*) becomes reactivated and can infect humans. The primary symptom of RMSF is the sudden appearance of a moderate-to-high fever. The fever may persist for 2 to 3 weeks. The victim may also have a headache, deep muscle pain, and chills. A rash appears on the hands and feet on about the third day and eventually spreads to all parts of the body. For this reason, RMSF may be confused with measles or meningitis. The disease may cause death, if untreated, but, if identified and treated promptly, death is uncommon.

Control - Tick repellant containing diethyltoluamide (DEET) should be used when personnel are working in tick-infested areas, and pant legs should be tucked into boots. In addition, workers should search the entire body every 3 or 4 hours for attached ticks. Ticks should be removed promptly and carefully without crushing, since crushing can squeeze the disease-causing organism into the skin. A gentle and steady pulling action should be used to avoid leaving the head or mouth parts in the skin. Hands should be protected with surgical gloves when removing ticks.

4.5.2 Poisonous Plants

Poisonous plants may be present in the work area. Personnel should be alerted to their presence and instructed on methods to prevent exposure.

Control - The main control is to avoid contact with the plant, cover arms and hands, and frequently wash potentially exposed skin. Particular attention must be given to avoiding skin contact with objects or protective clothing that have touched the plants. Treat every surface that may have touched the plant as contaminated, and practice contamination avoidance. If skin contact is made, the area should be washed immediately with soap and water, and observed for signs of reddening.

4.5.3 Snakes

The possibility of encountering snakes exists, specifically for personnel working in wooded/vegetated areas. Snake venoms are complex and include proteins, some of which have enzymatic activity. The effects produced by venoms include neurotoxic effects with sensory, motor, cardiac, and respiratory difficulties; cytotoxic effects on red blood cells, blood vessels, heart muscle, kidneys, and lungs; defects in coagulation; and effects from local release of substances by enzymatic actions. Other noticeable effects of venomous snakebites include swelling, edema, and pain around the bite, and the development of ecchymosis (the escape of blood into tissues from ruptured blood vessels).

Control - To minimize the threat of snakebites, all personnel walking through vegetated areas must be aware of the potential for encountering snakes and the need to avoid actions potentiating encounters, such as turning over logs. If a snakebite occurs, an attempt should be made to safely kill the snake for identification. The victim must

be transported to the nearest hospital within 30 minutes. First aid consists of applying a constriction band and washing the area around the wound to remove any unabsorbed venom.

4.5.4 Spiders

The possibility of personnel encountering spiders exists during work activities.

Two spiders are of concern: the black widow and the brown recluse. Both prefer dark, sheltered areas such as basements, equipment sheds and enclosures, and around woodpiles or other scattered debris. The black widow is shiny black, approximately 1 inch long, and found throughout the United States. There is a distinctive red hourglass marking on the underside of the black widow's body. The bite of a black widow is seldom fatal to healthy adults, but effects include respiratory distress, nausea, vomiting, and muscle spasms. The brown recluse is smaller than the black widow and gets its name from its brown coloring and behavior. The brown recluse is more prevalent in the southern United States. It has a distinctive violin shape on the top of its body. The bite of the brown recluse is painful, and the bite site ulcerates and takes many weeks to heal completely.

Control - To minimize the threat of spider bites, all personnel walking through vegetated areas must be aware of the potential for encountering these arachnids. Personnel need to avoid actions that may result in encounters, such as turning over logs and placing hands in dark places such as behind equipment or in corners of equipment sheds or enclosures. If a spider bite occurs, the victim must be transported to the nearest hospital as soon as possible. First aid consists of applying ice packs and washing the area around the wound to remove any unabsorbed venom.

4.6 Noise

Exposure to noise over the OSHA action level can cause temporary impairment of hearing; prolonged and repeated exposure can cause permanent damage to hearing. The risk and severity of hearing loss increases with the intensity and duration of exposure to noise. In addition to damaging hearing, noise can impair voice communication, thereby increasing the risk of accidents onsite.

Control - All personnel must wear hearing protection, with a Noise Reduction Rating (NRR) of at least 20, when noise levels exceed 85 dBA. When it is difficult to hear a co-worker at normal conversation distance, the noise level is approaching or exceeding 85 dBA, and hearing protection is necessary. All site personnel who may be exposed to noise must also receive baseline and annual audiograms and training as to the causes and prevention of hearing loss. Noise monitoring is discussed in Section 6.2, Noise Monitoring.
Whenever possible, equipment that does not generate excessive noise levels will be selected for this project. If the use of noisy equipment is unavoidable, barriers or increased distance will be used to minimize worker exposure to noise, if feasible.

4.7 Spill Control

All personnel must take every precaution to minimize the potential for spills during site operations. All onsite personnel shall immediately report any discharge, no matter how small, to the SS.

Spill control equipment and materials will be located onsite at locations that present the potential for discharge. All sorbent materials used for the cleanup of spills will be containerized and labeled appropriately. In the event

of a spill, the SS will follow the provisions in Section 9, Emergency Procedures, to contain and control released materials and to prevent their spread to offsite areas.

4.8 Sanitation

Site sanitation will be maintained according to OSHA requirements, as outlined in the following sections.

4.8.1 Break Area

Breaks must be taken in the SZ, away from the active work area, after site personnel go through decontamination procedures. There will be no smoking, eating, drinking, or chewing gum or tobacco in any area other than the SZ.

4.8.2 Potable Water

The following rules apply to all field operations:

- An adequate supply of potable water will be provided at each project site. Potable water must be kept away from hazardous materials or media, and contaminated clothing or equipment.
- Portable containers used to dispense drinking water must be capable of being tightly closed, and must be equipped with a tap dispenser. Water must not be consumed directly from the container (drinking from the tap is prohibited), nor may it be removed from the container by dipping.
- Containers used for drinking water must be clearly marked and shall not be used for any other purpose.
- Disposable drinking cups must be provided. A sanitary container for dispensing cups and a receptacle for disposing of used cups is required.

4.8.3 Sanitary Facilities

Access to facilities for washing before eating, drinking, or smoking, or alternate methods such as waterless hand-cleaner and paper towels, will be provided.

4.8.4 Lavatory

If permanent toilet facilities are not available, an appropriate number of portable chemical toilets will be provided. This requirement does not apply to mobile crews or to normally unattended site locations so long as employees at these locations have transportation immediately available to nearby toilet facilities.

4.9 Emergency Equipment

Adequate emergency equipment for the activities being conducted onsite and as required by applicable sections of 29 CFR 1910 and 29 CFR 1926 will be onsite prior to the commencement of project activities. Personnel will be provided with access to emergency equipment, including, but not limited to, the following:

- Fire extinguishers of adequate size, class, number, and location as required by applicable sections of 29 CFR 1910 and 1926;
- Industrial first aid kits of adequate size for the number of personnel onsite; and
- Emergency eyewash and/or shower if required by operations being conducted onsite.

4.10 Lockout/Tagout (LOTO) Procedures

Only fully qualified and trained personnel will perform maintenance procedures. Before maintenance begins, lockout/tagout procedures per OSHA 29 CFR 1910.147 will be followed.

Lockout is the placement of a device that uses a positive means, such as lock, to hold an energy- or material-isolating device such that the equipment cannot be operated until the lockout device is removed. If a device cannot be locked out, a tagout system shall be used. Tagout is the placement of a warning tag on an energy- or material-isolating device indicating that the equipment controls may not be operated until the tag is removed by the personnel who attached the tag.

4.11 Electrical Safety

Electricity may pose a particular hazard to site workers due to the use of portable electrical equipment. If wiring or other electrical work is needed, a qualified electrician must perform it.

General electrical safety requirements include:

- All electrical wiring and equipment must be a type listed by Underwriters Laboratories (UL), Factory Mutual Engineering Corporation (FM), or other recognized testing or listing agency.
- All installations must comply with the National Electrical Safety Code (NESC), the National Electrical Code (NEC), or USCG regulations.
- Portable and semi-portable tools and equipment must be grounded by a multi-conductor cord having an identified grounding conductor and a multi-contact polarized plug-in receptacle.
- Tools protected by an approved system of double insulation, or its equivalent, need not be grounded. Double-insulated tools must be distinctly marked and listed by UL or FM.
- Live parts of wiring or equipment must be guarded to prevent persons or objects from touching them.

- Electric wire or flexible cord passing through work areas must be covered or elevated to protect it from damage by foot traffic, vehicles, sharp corners, projections, or pinching.
- All circuits must be protected from overload.
- Temporary power lines, switchboxes, receptacle boxes, metal cabinets, and enclosures around equipment must be marked to indicate the maximum operating voltage.
- Plugs and receptacles must be kept out of water unless they are of an approved submersible construction.
- All extension cord outlets must be equipped with ground fault circuit interrupters (GFCI).
- Attachment plugs or other connectors must be equipped with a cord grip and be constructed to endure rough treatment.
- Extension cords or cables must be inspected prior to each use and replaced if worn or damaged. Cords and cables must not be fastened with staples, hung from nails, or suspended by bare wire.
- Flexible cords must be used only in continuous lengths without splice, with the exception of molded or vulcanized splices made by a qualified electrician.

4.12 Lifting Safety

Using proper lifting techniques may prevent back strain or injury. The fundamentals of proper lifting include:

- Consider the size, shape, and weight of the object to be lifted. A mechanical lifting device or additional persons must be used to lift an object if it cannot be lifted safely alone.
- The hands and the object should be free of dirt or grease that could prevent a firm grip.
- Gloves must be used, and the object inspected for metal slivers, jagged edges, burrs, or rough or slippery surfaces.
- Fingers must be kept away from points that could crush or pinch them, especially when putting an object down.
- Feet must be placed far enough apart for balance. The footing should be solid, and the intended pathway should be clear.
- The load should be kept as low as possible, close to the body with the knees bent.
- To lift the load, grip firmly and lift with the legs, keeping the back as straight as possible.
- A worker should not carry a load that he or she cannot see around or over.
- When putting an object down, the stance and position are identical to that for lifting: the legs are bent at the knees, and the back is straight as the object is lowered.

4.13 Traffic Safety

Exposure to vehicular traffic is likely during certain operations. Traffic may also be encountered as vehicles enter and exit the area. To minimize the likelihood of project personnel and activities being affected by traffic, the following procedures will be implemented:

- Cones must be placed along the shoulder of the roadway starting 100 feet from the work area to alert passing motorists to the presence of personnel and equipment. A "Slow" or "Men Working" sign must be placed at the first cone. Barricades with flashing lights should be placed between the roadway and the work area.

- During activities along a roadway, equipment will be aligned parallel to the roadway to the extent feasible, facing into the oncoming traffic so as to place a barrier between the work crew and the oncoming traffic. All crewmembers must remain behind the equipment and the traffic barrier.

- All site personnel who are potentially exposed to vehicular traffic must wear an outer layer of orange warning garments, such as vests, jackets, or shirts. If work is performed in hours of dusk or darkness, workers will be outfitted with reflective garments, either orange, white (including silver-coated reflective coatings or elements that reflect white light), yellow, fluorescent red-orange, or fluorescent yellow-orange.

- The flow of traffic must be assessed, and precautions taken to warn motorists of the presence of workers and equipment. Where possible, vehicles should be aligned to provide physical protection of people and equipment.

4.14 Ladders

When portable ladders are used for access to an upper landing surface, the ladder side rails shall extend at least 3 feet (0.9 m) above the upper landing surface to which the ladder is used to gain access; or, when such an extension is not possible because of the ladder's length, the ladder shall be secured at its top to a rigid support that will not deflect, and a grasping device, such as a grab rail, shall be provided to assist employees in mounting and dismounting the ladder. In no case shall the extension be such that ladder deflection under a load would, by itself, cause the ladder to slip off its support.

Ladders shall be maintained free of oil, grease, and other slipping hazards.

Ladders shall not be loaded beyond the maximum intended load for which they were built, nor beyond their manufacturer's rated capacity.

Ladders shall be used only for the purpose for which they were designed.

Non-self-supporting ladders shall be used at an angle such that the horizontal distance from the top support to the foot of the ladder is approximately one-quarter of the working length of the ladder (the distance along the ladder between the foot and the top support).

Wood job-made ladders with spliced side rails shall be used at an angle such that the horizontal distance is one-eighth the working length of the ladder.

Fixed ladders shall be used at a pitch no greater than 90 degrees from the horizontal, as measured to the back side of the ladder.

Ladders shall be used only on stable and level surfaces unless secured to prevent accidental displacement.

Ladders shall not be used on slippery surfaces unless secured or provided with slip-resistant feet to prevent accidental displacement. Slip-resistant feet shall not be used as a substitute for care in placing, lashing, or holding a ladder that is used upon slippery surfaces, including, but not limited to, flat metal or concrete surfaces that are constructed so that they cannot be prevented from becoming slippery.

Ladders placed in any location where they can be displaced by workplace activities or traffic, such as in passageways, doorways, or driveways, shall be secured to prevent accidental displacement, or a barricade shall be used to keep the activities or traffic away from the ladder.

The area around the top and bottom of each ladder shall be kept clear.

The top of a non-self-supporting ladder shall be placed with the two rails supported equally unless it is equipped with a single support attachment.

Ladders shall not be moved, shifted, or extended while occupied.

Ladders shall have non-conductive side rails if they are used where the employee or the ladder could contact exposed energized electrical equipment.

Personnel using a stepladder shall not stand or sit on the top, top step, or any step labeled that it or any step above it not be used as a step.

Cross-bracing on the rear section of stepladders shall not be used for climbing unless the ladders are designed and provided with steps for climbing on both front and rear sections.

Ladders shall be inspected by the HSS for visible defects on a daily basis and after any occurrence that could affect their safe use.

Portable ladders with structural defects, such as, but not limited to, broken or missing rungs, cleats, or steps; broken or split rails; corroded components; or other faulty or defective components shall either be immediately marked in a manner that readily identifies them as defective, or be tagged with "Do Not Use" or similar language, and shall be withdrawn from service.

Fixed ladders with structural defects, such as, but not limited to, broken or missing rungs, cleats, or steps; broken or split rails; or corroded components, shall be withdrawn from service.

Ladder repairs shall restore the ladder to a condition meeting its original design criteria before the ladder is returned to use.
Single-rail ladders shall not be used.

When ascending or descending a ladder, the user shall face the ladder.
Each employee shall use at least one hand to grasp the ladder when progressing up and/or down the ladder.

An employee shall not carry any object or load onto or off a ladder that could cause the employee to lose balance and fall.

5. Personal Protective Equipment

5.1 Levels of Protection

PPE is required to safeguard site personnel from various hazards. Varying levels of protection may be required, depending on the levels of COCs and the degree of physical hazard. This section presents the various levels of protection and defines the conditions of use for each level. A summary of the levels is presented in Table 5-1 in this section.

5.1.1 Level D Protection

The minimum level of protection that will be required of site personnel will be Level D, which will be worn when conditions or air monitoring indicates that no inhalation hazard exists. The following equipment will be used:

- Work clothing, as prescribed by weather;
- Steel-toe work boots, meeting ANSI Z41;
- Safety glasses or goggles, meeting ANSI Z87;
- Hard hat, meeting ANSI Z89, when falling object hazards are present; and
- Hearing protection. If noise levels exceed 85 dBA, then hearing protection with a USEPA NRR of at least 20 dBA must be used.

5.1.2 Modified Level D Protection

Modified Level D will be used when airborne contaminants are not present at levels of concern, but site activities present an increased potential for skin contact with contaminated materials. Modified Level D consists of Level D plus any of the following:

- Tyvek® coveralls (polyethylene-coated Tyvek® suits for handling liquids) when skin contact with COC-impacted media is anticipated;
- Latex/ polyvinyl chloride (PVC) overboots when contact with COC-impacted media is anticipated;
- Face shield in addition to safety glasses or goggles when projectiles or splash hazards exist; or
- Nitrile gloves worn over nitrile surgical gloves.

5.1.3 Level C Protection

Level C protection will be required when the airborne concentration of COC reaches one-half of the OSHA Permissible Exposure Limit (PEL) or the ACGIH TLV. The following equipment will be used for Level C protection:

- Full-face, air-purifying respirator with high-efficiency particulate air (HEPA) cartridges;
- Polyethylene-coated Tyvek® suit, with ankles and cuffs taped to boots and gloves;
- Nitrile gloves worn over nitrile surgical gloves;
- Steel-toe work boots, meeting ANSI Z41;
- Chemical resistant boots with steel toes, or latex/PVC overboots over steel-toe boots;
- Hard hat, meeting ANSI Z89; and
- Hearing protection. If noise levels exceed 85 dBA, then hearing protection with a USEPA NRR of at least 20 dBA must be used.

5.2 Selection of PPE

Equipment for personal protection will be selected based on the potential for contact, site conditions, ambient air quality, and the judgment of supervising contractor personnel and contractor health and safety professionals. The PPE used will be chosen to be effective against the COCs present onsite.

5.3 Site Respiratory Protection Program

Respiratory protection is an integral part of employee health and safety at the site due to potentially hazardous concentrations of airborne COCs. The contractor's site respiratory protection program will meet the following minimum requirements:

- All onsite personnel who may use respiratory protection will have an assigned respirator.
- All onsite personnel who may use respiratory protection will have been fit-tested and trained in the use of the respirator to be used within the past 12 months.
- All onsite personnel who may use respiratory protection must, within the past year, have been medically certified as being capable of wearing a respirator. Documentation of the medical certification must be provided to the HSS, prior to commencement of site work.
- Only cleaned, maintained, NIOSH-approved respirators will be used.
- If respirators are used, the respirator cartridge is to be properly disposed of at the end of each work shift, or when load-up or breakthrough occurs.

- Contact lenses are not to be worn when a respirator is worn.
- All onsite personnel who may use respiratory protection must be clean-shaven. Mustaches and sideburns are permitted, but they must not touch the sealing surface of the respirator.
- Respirators will be inspected, and a negative pressure test will be performed prior to each use.
- After each use, the respirator will be wiped with a disinfectant, cleansing wipe. When used, the respirator will be thoroughly cleaned at the end of the work shift. The respirator will be stored in a clean plastic bag, away from direct sunlight in a clean, dry location, in a manner that will not distort the face piece.

5.4 Using PPE

Depending upon the level of protection selected, specific donning and doffing procedures may be required. The procedures presented in this section are mandatory if Modified Level D or Level C PPE is used. All personnel entering the EZ must put on the required PPE in accordance with the requirements of this HASP. When leaving the EZ, PPE will be removed in accordance with the procedures listed, to minimize the spread of COCs.

5.4.1 Donning Procedures

These procedures are mandatory only if Modified Level D or Level C PPE is used on the site:

- Remove bulky outerwear. Remove street clothes and store in clean location.
- Put on work clothes or coveralls.
- Put on the required chemical protective coveralls.
- Put on the required chemical protective boots or boot covers.
- Tape the legs of the coveralls to the boots with duct tape.
- Put on the required chemical protective gloves.
- Tape the wrists of the protective coveralls to the gloves.
- Don the required respirator and perform appropriate fit check (Level C).
- Put hood or head covering over head and respirator straps and tape hood to facepiece (Level C).
- Don remaining PPE, such as safety glasses or goggles and hard hat.

When these procedures are instituted, one person must remain outside the work area to confirm that each person entering has the proper protective equipment.

5.4.2 Doffing Procedures

The following procedures are mandatory only if Modified Level D or Level C PPE is required for the site. Whenever a person leaves the work area, the following decontamination sequence will be followed:

- Upon entering the CRZ, rinse contaminated materials from the boots or remove contaminated boot covers.
- Clean reusable protective equipment.
- Remove protective garments, equipment, and respirator (Level C). All disposable clothing must be placed in plastic bags that are labeled with "contaminated waste" labels.
- Wash hands, face, and neck (or shower, if necessary).
- Proceed to clean area and dress in clean clothing.
- Clean and disinfect respirator (Level C) for next use.

All disposable equipment, garments, and PPE must be bagged in plastic bags and labeled for disposal. See Section 7, Decontamination, for detailed information on decontamination stations.

5.5 Selection Matrix

The level of personal protection selected will be based upon real-time air monitoring of the work environment and an assessment by the SS/HSS of the potential for skin contact with impacted materials. The PPE selection matrix is given in Table 5-1. This matrix is based on information available at the time this plan was written. Airborne constituent levels should be used to determine the need for upgrade and downgrade of PPE.

TABLE 5-1
PPE SELECTION MATRIX

Task	Anticipated Minimum Level of Protection for Task Initiation
Support zone work	Level D
Mobilization / Demobilization	Level D: Support Zone Modified Level D: Exclusion Zone
Site Inspection and observation activities	Level D with boots and gloves, as necessary
Groundwater Monitoring Well Installation	Modified Level D
Final Cover Maintenance Activities	Level D with boots and gloves, as necessary
Confined Space Entry Activities (if required)	Modified Level D
Groundwater Sampling/Elevation Measurement Activities	Modified Level D
Equipment Cleaning/Decontamination	Modified Level D

6. Air Monitoring

6.1 Air Monitoring

Dust suppression measures will be instituted to keep airborne dust to a minimum. If materials are encountered during construction activities, this HASP will be amended to address the COCs detected, and an air monitoring program will be established.

7. Work Zones and Decontamination

7.1 Work Zones

7.1.1 Authorization to Enter

Only personnel with the appropriate training and medical certifications (if respirators are required) will be allowed to work at the project site. The SS will maintain a list of authorized persons; only personnel on the authorized persons list will be allowed to enter the site work areas.

7.1.2 Site Orientation and Hazard Briefing

No person will be allowed in the work area during site operations without first being given a site orientation and hazard briefing. This orientation will be presented by the contractor's SS or HSS 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. Following this initial meeting, daily safety meetings will be held each day before work begins.

All people entering the site work areas, including visitors, must document their attendance at this briefing, as well as the daily safety meetings, on the forms included with this plan.

7.1.3 Certification Documents

A training and medical file may be established for the project and kept onsite during all site operations. Specialty training, such as first aid/cardiopulmonary resuscitation (CPR) certificates, as well as current medical clearances for all project field personnel required to wear respirators, will be maintained within that file. All personnel must provide their training and medical documentation to the HSS prior to starting work.

7.1.4 Entry Log

A log-in/log-out sheet will be maintained at the site by the contractor's SS. Personnel must sign in and out on this log sheet as they enter and leave the work area, and the SS may document entry and exit in the field notebook.

7.1.5 Entry Requirements

In addition to complying with the authorization, hazard briefing, and certification requirements listed above, no person will be allowed in any work area unless they are wearing the minimum PPE as described in Section 5, Personal Protective Equipment.

7.1.6 Emergency Entry and Exit

All personnel who must enter the work area on an emergency basis will be briefed of the hazards by the contractor's SS. All activities will cease in the event of an emergency. People exiting the work area because of an emergency will gather in a safe area for a head count. The SS is responsible for confirming that all people who entered the work area have exited in the event of an emergency.

7.1.7 Contamination Control Zones

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

7.1.7.1 Exclusion Zone

The EZ is the defined area where there is a possible respiratory and/or contact health hazard. An EZ may consist of a specific work area or may be the entire area of potential contamination. All employees entering an EZ must use the required PPE and must have the appropriate training and medical clearance for hazardous waste work. Cones, caution tape, or a site diagram will identify the location of each EZ.

7.1.7.2 Contamination Reduction Zone

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 the CRZ to prevent any cross-contamination. Tools, equipment, and machinery will be decontaminated in a specific location. The decontamination of all personnel will be performed onsite 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.

7.1.7.3 Support Zone

The SZ is a clean area outside the CRZ located to prevent employee 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.

7.1.8 Posting

Work areas will be prominently marked and delineated using cones, caution tape, or a site diagram.

7.1.9 Site Inspections

Each contractor's SS will conduct a daily inspection of site activities, equipment, and procedures to verify that the required elements are in place. The Daily Health and Safety Checklist in Attachment B may be used as a guide for daily inspections.

7.2 Decontamination

7.2.1 Personnel Decontamination

All personnel wearing Modified Level D or Level C protective equipment in the EZ must undergo personal decontamination prior to entering the SZ. The personnel decontamination area will consist of the following stations at a minimum:

- *Station 1*: Personnel leaving the contaminated zone will remove the gross contamination from their outer clothing and boots.

- *Station 2*: Personnel will remove their outer garment and gloves and dispose of them in properly labeled containers. Personnel will then decontaminate their hard hats and boots with an aqueous solution of detergent or other appropriate cleaning solution. These items are then hand-carried to the next station.

- *Station 3*: Personnel will thoroughly wash their hands and face before leaving the CRZ. Respirators will be sanitized and then placed in a clean plastic bag.

7.2.2 Equipment Decontamination

All vehicles that have entered the EZ will be decontaminated at the decontamination pad prior to leaving the zone. If the level of vehicle contamination is low, decontamination may be limited to the rinsing of tires and wheel wells with water. If the vehicle is significantly contaminated, steam cleaning or pressure washing of vehicles and equipment may be required.

7.2.3 Personal Protective Equipment Decontamination

Where- and whenever possible, single-use, external protective clothing must be used for work within the EZ or CRZ. This protective clothing must be disposed of in properly labeled containers. Reusable protective clothing will be rinsed at the site with detergent and water. The rinsate will be collected for disposal.

When removed from the CRZ, the respirator will be thoroughly cleaned with soap and water. The respirator face piece, straps, valves, and covers must be thoroughly cleaned at the end of each work shift, and be ready for use prior to the next shift. Respirator parts may be disinfected with a solution of bleach and water, or by using a spray disinfectant.

8. Training and Medical Surveillance

8.1 Training

8.1.1 General

All onsite personnel who work in areas where they may be exposed to site contaminants must be trained as required by OSHA Regulation 29 CFR 1910.120 (HAZWOPER). Field employees also must receive a minimum of 3 days of actual field experience under the direct supervision of a trained, experienced supervisor. Personnel who completed their initial training more than 12 months prior to the start of the project must have completed an 8-hour refresher course within the past 12 months. Each contractor's SS must have completed an additional 8 hours of supervisory training, and must have a current first aid/CPR certificate.

8.1.2 Basic 40-Hour Course

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

- General safety procedures;
- Physical hazards (fall protection, noise, heat stress, cold stress);
- Names and job descriptions of key personnel responsible for site health and safety;
- Safety, health, and other hazards typically present at hazardous waste sites;
- Use, application, and limitations of PPE;
- Work practices by which employees can minimize risks from hazards;
- Safe use of engineering controls and equipment onsite;
- Medical surveillance requirements;
- Recognition of symptoms and signs that might indicate overexposure to hazards;
- Worker right-to-know information (Hazard Communication OSHA 1910.1200);
- Routes of exposure to contaminants;
- Engineering controls and safe work practices;
- Components of a health and safety program and a site-specific HASP;
- Decontamination practices for personnel and equipment;
- Confined-space entry procedures; and

- General emergency response procedures.

8.1.3 Supervisor Course

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

- General site safety and health procedures;
- PPE programs; and
- Air monitoring techniques.

8.1.4 Site-Specific Training

Site-specific training will be performed by each contractor. Possible methods of training include having onsite personnel read this HASP, or conducting a thorough site briefing by the PM, SS, or HSS on the contents of this HASP before work begins. The review must include a discussion of the chemical, physical, and biological hazards; the protective equipment and safety procedures; and emergency procedures.

8.1.5 Daily Safety Meetings

Daily safety meetings will be held to cover the work to be accomplished, the hazards anticipated, the PPE and procedures required to minimize site hazards, and emergency procedures. Each contractor's SS or HSS should present these meetings prior to beginning the day's fieldwork. No work will be performed in an EZ before the daily safety meeting has been held. The daily safety meeting must also be held prior to new tasks and repeated if new hazards are encountered. The meeting should be documented; an example Daily Safety Meeting Log is included in Attachment F.

8.1.6 First Aid and CPR

At least one employee currently certified in first aid/CPR will be assigned to each contractor's work crew and will be onsite during operations. Refresher training in first aid (triennially) and CPR (annually) is required to keep the certificate current. These individuals must also receive training regarding the precautions and protective equipment necessary to protect against exposure to blood-borne pathogens.

8.2 Medical Surveillance

8.2.1 Medical Examination

All personnel who are potentially exposed to site contaminants must participate in a medical surveillance program as defined by OSHA at 29 CFR 1910.120 (f).

8.2.4 Periodic Exam

Following the placement examination, all employees must undergo a periodic examination, similar in scope to the placement examination. For employees potentially exposed over 30 days per year, the frequency of periodic examinations will be annual. For employees potentially exposed less than 30 days per year, the frequency for periodic examinations will be 18 months.

8.2.5 Medical Restriction

When the examining physician identifies a need to restrict work activity, the employee's supervisor must communicate the restriction to the employee and the HSS. The terms of the restriction will be discussed with the employee and the supervisor.

9. Emergency Procedures

9.1 General

Prior to the start of operations, the work area will be evaluated for the potential for fire, contaminant release, or other catastrophic event. Unusual conditions or events, activities, chemicals, and conditions will be reported to the contractor's SS/HSS immediately.

The contractor's SS/HSS will be familiar with evacuation routes and assembly areas for the site. All personnel entering the site will be informed of this route and the assembly area.

9.2 Emergency Response

If an incident occurs, the following steps will be taken:

- The contractor's SS/HSS will evaluate the incident and assess the need for assistance and/or evacuation.
- The contractor's SS/HSS will call for outside assistance, as needed.
- The contractor's SS/HSS will confirm that the PM is notified promptly of the incident.
- The contractor's SS/HSS will take appropriate measures to stabilize the incident scene.

9.2.1 Fire

In the case of a fire at the site, the contractor's SS/HSS will assess the situation and direct fire-fighting activities. The contractor's SS/HSS will confirm that the PM is immediately notified of any fires. Site personnel will attempt to extinguish the fire with available extinguishers, if safe to do so. In the event of a fire that site personnel are unable to safely extinguish with one fire extinguisher, the local fire department will be summoned.

9.2.2 Contaminant Release

In the event of a contaminant release, the following steps will be taken:

- Notify contractor's SS/HSS immediately;
- Evacuate immediate area of release;
- Conduct air monitoring to determine necessary level of PPE; and
- Don required level of PPE and prepare to implement control procedures.

ambulance/paramedics should be summoned. If there is any doubt as to the injured worker's condition, it is best to let the local paramedic or ambulance service examine and transport the worker.

9.4.1 First Aid - Inhalation

Any employee complaining of symptoms of chemical overexposure as described in Section 4, General Site Safety Procedures, will be removed from the work area and transported to the designated medical facility for examination and treatment.

9.4.2 First Aid - Ingestion

Call EMS and consult a poison control center for advice. Refer to the MSDS (if available) for treatment information. If the victim is unconscious, keep him/her on his/her side and clear the airway if vomiting occurs.

9.4.3 First Aid - Skin Contact

Project personnel who have had skin contact with contaminants will, unless the contact is severe, proceed through the CRZ, to the wash area. Personnel will remove any contaminated clothing and then flush the affected area with water for at least 15 minutes. The worker should be transported to the designated medical facility if he/she shows any sign of skin reddening, irritation, or if he/she requests a medical examination.

9.4.4 First Aid - Eye Contact

Project personnel who have had contaminants splashed in their eyes or who have experienced eye irritation while in the EZ must immediately proceed to the eyewash station in the CRZ. Do not decontaminate prior to using the eyewash. Remove whatever protective clothing is necessary to use the eyewash. Flush the eye with clean, running water for at least 15 minutes. Arrange prompt transport to the designated medical facility.

9.5 Reporting Injuries, Illnesses, and Near Miss Incidents

Injuries and illnesses, however minor, will be reported to the contractor's SS immediately. The contractor's SS will complete an injury report and submit it to the City of Buffalo within 24 hours.

Near-miss incidents are situations during which no injury or property damage occurred, but during which, under slightly different circumstances, an injury or property damage could have occurred. Near misses are caused by the same factors as injuries; therefore, they must be reported and investigated in the same manner. A Safe Performance Self-Assessment (SPSA) must be conducted immediately after an injury, illness, near miss, or other incident to determine whether it is safe to proceed with the work.

9.6 Emergency Information

The means to summon local public response agencies such as police, fire, and ambulance will be reviewed in the daily safety meeting. These agencies are identified in Table 9-1.

TABLE 9-1
EMERGENCY CONTACTS

	Phone Number	Location
1. Local Emergency Contacts		
Emergency City of Buffalo		
- Police Department	911 or 716-851-4411	
- Fire Department	911 or 716-856-5111	
Emergency Erie County		
- Sheriffs Department	716-662-5554	
- Health Department	716-858-7690 (business hours)	Orchard Park, New York
	716-898-4225 (after 5 p.m.)	Buffalo, New York
Emergency New York State		
- State Police	716-759-6831	Clarence, New York
- Health Department	716-847-4500	Buffalo, New York
- NYSDEC Region 9 Office Division of Environmental Remediation	716-851-7220	Region 9, New York
2. Medical Emergency Contacts		
Sheehan Memorial Hospital	716-842-2200	Emergency
Buffalo General Hospital	716-845-2210	
Ambulance Services (24-hour)	911 or 716-882-8400	LaSalle Ambulance Service
	716-881-1717	Gold Cross Ambulance Service, Inc.
3. National Organizations		
USEPA Region II, Health and Safety	908-321-6789	New Jersey (business hours)
	908-548-8730	(after business hours)
USEPA, Emergency Response Team	201-321-6660	New Jersey
USEPA, Superfund/RCRA	800-424-9346	
	202-382-3000	
USEPA, TSCA	800-424-9065	
	202-554-1404	
USEPA, Occupational Health and Safety	202-382-3648	
NIOSH, Health Hazard Evaluation	513-684-4382	
OSHA, Technical Data Center	202-523-9700	
OSHA, Health Response Team	801-524-5896	
OSHA	716-684-3891	Buffalo, New York
U.S. Coast Guard	800-424-8802	Washington, D.C.
National Response Team	202-267-2675	
CHEMTREC, Chem. Emergencies	800-424-9300	
Emergency Response		
National Foam Center	215-363-1400	Pennsylvania

Note: See Table 2-1 of this HASP for telephone numbers of key personnel associated with this project.

Attachments

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Attachment A

Underground/Overhead Utilities Checklist

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BBL

Underground/Overhead Utility Checklist

Project Name:	**Date:**
Project Number:	**Location:**
Prepared By:	**Project Manager:**

This checklist must be completed for any intrusive subsurface work such as excavation or drilling. It documents that overhead and underground utilities in the work are identified and located. The Project Manager shall request utility markouts before the start of field operations to allow the client and utility companies sufficient time to provide them. If complete information is not available, a magnetometer or other survey shall be performed to locate obstacles prior to intrusive subsurface activities.

Procedure: A diagram of the work area depicting the proposed location of intrusive subsurface work sites (i.e., boring locations, excavation locations) must be attached to this form. The diagram must clearly indicate the areas checked for underground structures/utilities, and overhead power lines. This form and the diagram must be signed by the BBL Project Manager (if present), the BBL Site Supervisor, and the client representative.

Type of Structure	Present	Not Present	Method of Markout
Electric Power Line			
Natural Gas Line			
Telephone Line			
Water Line			
[illegible]uct Line			
Sewer Line			
Steam Line			
Drain Line			
Underground Tank			
Underground Cable			
Overhead Power Line			
Overhead Product Line			
Other (Specify)			

Reviewed By		
Name	Job Title	Date
	Client Representative	
	BBL Project Manager	
	BBL Site Supervisor	

Attachment B

Daily Health and Safety Checklist

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Daily/Periodic Excavation Inspection Checklist

Project Name:	**Date/Time:**
Project Number:	**Location:**
Prepared By:	**Project Manager:**

This checklist must be completed for all excavations. It documents that daily and post event/periodic inspections are conducted.

Soil Classified As: Stable Rock Type A Type B Type C

Soil Classified On: By:

Type of Protective System in Use: Sloping Shoring Other _____

Description:

Inspection Item	YES	NO	Comments
Is the underground/overhead utilities checklist completed?			
Are underground installations protected from damage?			
Adequate means of entry/exit available in the excavation?			
If exposed to traffic, are personnel wearing reflective vests?			
Barriers to prevent equipment rolling into excavation?			
Air monitoring conducted prior and during excavation entry?			
Stability of adjacent structures reviewed by registered P.E.?			
Are spoil piles at least 2 feet from the excavation edge?			
Fall protection in use near excavations deeper that 6'.			
Are work tasks completed remotely if feasible?			
Protective system in place and in good repair?			
Emergency rescue (lifeline/body harness) equipment utilized due to potential atmospheric hazard?			
Is excavation exposed to vibration?			
Are employees protected from falling/elevated material			
Is soil classification adequate for current environmental/weather conditions?			
Portable ladders extend at least 4' above excavation?			
Portable ladders or ramps secured in place?			
All personnel have attended safety meeting on excavation hazards?			
Support systems for adjacent structures are in place?			
Is excavation free from standing water?			
Water control and diversion of surface runoff is adequate?			
Are employees wearing required protective equipment?			
BBL Excavation Competent Person:			**Date/Time:**

Attachment C

BBL Confined Space Entry Policy and Procedure Memo

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BBL	TOPIC: CONFINED SPACE ENTRY	PPM#: HS 2.05
Policy & Procedure Memo	SECTION: Health & Safety	COMPANY LOCATIONS AFFECTED: All

STATEMENT OF POLICY:

The Firm is committed to operate in a manner that will protect the health and safety of its employees. Employees of the Firm will abide by applicable local, state, and federal regulations while conducting activities for the Firm. Entry into enclosed or confined areas presents unique hazards to employees of the Firm. To reduce the potential for injury, personnel will avoid entering confined spaces whenever feasible. If entry is required into a confined space, the safety and engineering controls outlined in this procedure must be implemented by authorized personnel prior to entry.

To effectively mitigate or eliminate the hazards presented by entry into confined spaces, this procedure sets forth the accepted practice for confined space entry and establishes the requirement for a Confined Space Entry Permit protocol. This procedure, protocol, and Confined Space Entry Permit and Checklist applies to all employees of the Firm. Only trained and authorized personnel are permitted to enter confined spaces, supervise confined space activities, and perform rescue from confined spaces.

DESCRIPTION OF PROCEDURE:

1. **DEFINITIONS**

A. **Attendant** means a trained authorized individual stationed outside the confined space who's sole duty is to monitor authorized entrants inside the confined space.

B. **Confined space** means any enclosed space which is large enough and so configured that an employee can bodily enter and perform work, has limited or restricted means for entry or exit, and is not intended for continuous employee occupancy. Confined spaces include, **but are not limited to**, storage tanks, vessels, pits, boilers, flues, manholes, ventilation system duct work, sewers, vaults, pipelines, silos, storage hoppers, and diked areas.

1) **Permit-required confined space (permit space)** means a confined space that has one or more of the following characteristics:

a) Contains or has a known potential to contain a hazardous atmosphere;

b) Contains a material with the potential for engulfment of an entrant ;

c) Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls, or a floor which slopes downward and tapers to a smaller cross-section; and/or

d) Contains any recognized safety or health hazard capable of causing injury or death.

2) **A Non-permit confined space** means a confined space that does not contain or have the potential to contain any hazards capable of causing death or serious physical harm.

C. **Entry** means the act by which a employee intentionally passes through an opening into a permit-required confined space. Entry is considered to have occurred as soon as any part of the employee's body breaks the plane of the opening into the space.

D. **Entry Permit** means the document which defines the conditions of confined space entry, the reasons for

entering the confined space, the anticipated hazards of the entry, a listing of atmospheric monitoring equipment and acceptable atmospheric conditions. The entry permit identifies the rescue and other contacts which must be summoned in the case of an emergency, provides a listing of authorized attendants and entrants, the date of entry to the confined space, and the expiration of the entry permit. For the purposes of this PPM, the Confined Space Entry Permit consists of both the Confined Space Entry Permit and the Confined Space Entry Checklist and/or the Confined Space Entry Permit and the Sewer System Manhole Entry Checklist **{Copies of the Confined Space Entry Permit and Checklist follow this procedure}.**

E. **Entry Supervisor** means the trained, authorized employee responsible for determining if acceptable entry conditions are present at a permit space where entry is planned, for authorizing entry and overseeing entry operations, and for terminating entry. The entry supervisor may also serve as an authorized attendant.

F. **Entrant** means an employee who is trained and authorized to enter a confined space.

G. **Hazardous atmosphere** means an atmosphere which exposes employees to a risk of death, incapacitation, injury or acute illness from one or more of the following:

1) An atmospheric concentration of any substance in excess of 50% of its established permissible exposure limit (PEL), or in absence of a PEL, its assigned threshold limit value (TLV), or other value listed on the Material Safety Data Sheet (MSDS) for the chemical constituent;

2) A flammable gas, vapor, or mist in excess of 10 percent (%) of its lower explosive limit (LEL);

3) An airborne combustible dust at a concentration that obscures vision a t a distance of 5 feet or less;

4) An atmospheric oxygen concentration below 19.5% (oxygen deficient atmosphere) or above 23.5% (oxygen enriched atmosphere); and/or

5) An atmosphere which is immediately dangerous to life and health.

H. **Immediately dangerous to life and health (IDLH)** means any condition which poses an immediate threat to loss of life; may result in irreversible or immediate-severe health effects; may result in eye damage, irritation or other conditions which could impair escape from the confined space.

I. **Isolation** means removing equipment/systems in and around the space from service. This includes lockout and tagout, double blanking and bleeding, disconnecting, and securing or restraining equipment.

2. **RESPONSIBILITIES**

A. Officers/Division Heads/Project Managers have the following responsibilities:

1) Verify that all confined spaces and entry protocols are properly identified and addressed within the project work plan, project health & safety plan, and/or other project related documents.

2) Verify that their Divisional employees have received the proper confined space training provided by Corporate Health & Safety prior to conducting confined space entry activities.

3) Verify that the proper confined space entry equipment, including personal protective equipment, atmospheric testing equipment, and safety equipment, is available for use by their Divisional employees.

B. Corporate Health & Safety has the following responsibilities:

1) Provide the initial confined space entry training and retraining, as needed, to all entry supervisors, entrants and attendants;

2) Provide technical assistance regarding confined space entry protocol, atmospheric testing equipment, personal protective equipment, hazard assessment, and research information on unusual hazards;

3) Audit project specific confined space entry for compliance with this PPM;

4) Retain a file of cancelled Confined Space Entry Permits for annual review; and

5) Conduct annual review of this PPM and all cancelled permits.

C. The Divisional Health & Safety Coordinators (HSC) have the following responsibilities:

1) Review this PPM with all trained entrants and attendants on a project specific basis;

2) Verify that all entry supervisors, entrants and attendants have received the t raining offered by Corporate Health & Safety prior to conducting confined space entry activities;

3) Review completed entry permits and verify that the project specific entry supervisor fulfills his/her responsibilities (listed in D below) and properly completes the Entry Permit; and

4) Verify that copies of the completed and canceled Confined Space Entry Permit are properly disseminated and retained with the project files as specified in Section 13- Posting and Recordkeeping.

D. Entry supervisors (also see Training and Duties of Entry Supervisor) have the following responsibilities:

1) Interface with the client representative to identify hazards associated with the client's confined space;

2) Review existing confined space data (if any) recorded by the client;

3) Review the client's confined space procedure;

4) Review the lock-out/tag-out and isolation measures implemented by the client;

5) Immediately report any unusual or unforeseen confined space entry hazard to both the Divisional HSC, Regional Health and Safety Coordinator, or Corporate Industrial Hygiene/Environmental Safety Associate prior to authorizing entry;

6) Verify that all tests and precautionary measures identified on the permit have been performed prior to authorizing the entry permit;

7) Issue, authorize, and post the Entry Permit prior to any confined space entry; and

8) Upon completion of the entry covered by the permit, and after all entrants have exited the permit space, cancel the Entry Permit.

E. Employees of the Firm have the following responsibilities:

1) Receive the initial training provided by Corporate Health & Safety;

2) Participate in entry operations only if trained and authorized to do so;

3) Never enter a confined space without an authorized attendant, entry supervisor, and an Entry Permit;

4) Never attempt entry rescue within a confined space, unless trained in entry rescue; and

5) If unexpected conditions arise during entry, immediately evacuate the space and inform the entry supervisor.

3. CONFINED SPACE ENTRY PERMIT

A. Prior to entry into any identified confined space, the entry supervisor must complete and sign the Entry Permit as defined above.

B. A separate Entry Permit must be generated for each confined space.

C. A single Entry Permit may be generated for entry into multiple sewer system manholes in a continuous sewer system.

The Confined Space Checklist and/or the Sewer System Manhole Entry Checklist must be completed, signed, and attached as part of the entry permit. As example, for entry into several separate manholes for the purpose of collecting effluent samples, recording water depth, flow, etc., one Entry Permit may be generated for entry into all project specific manholes. The permit must, however, be accompanied by the Sewer System Manhole Entry Checklist which will facilitate entry into as many as 20 manholes per checklist.

D. The completed and signed Entry Permit and Checklist is valid for one shift only. A new completed and signed Entry Permit must be issued for each new crew of entrants and attendants.

E. All entrants must be evacuated and the Entry Permit must be revoked whenever conditions in the space are no longer acceptable as indicated by the direct reading instruments being used to monitor atmospheric conditions in the confined space or some other circumstance either within or outside the confined space.

4. ENTRY PERMIT PROGRAM

A. Prior to authorizing the Entry Permit, the entry supervisor must verify that the confined space has been properly isolated, ventilated, and tested, and that the Confined Space Checklist or Sewer System Manhole Entry Checklist is completed. In completing the appropriate Checklist, the following items are required:

1) All mechanical apparatus (such as agitators) within or connected to the confined space must be de-energized, locked-out, and tagged. This specific activity may be performed by the client, therefore the entry supervisor must review the lock-out procedure with the client and place a separate lock(s) on all multiple lock-out devices. The entry supervisor must retain possession of the key(s) during the entire confined space entry.

2) All lines connected to the confined space where the nature of the service could present a hazard, such as nitrogen, steam, solvent, acid, or hot water, must be isolated from the confined space. Acceptable isolation methods include removing a valve, spool piece, or expansion joint, and blanking or capping the opened end; inserting a suitable full-pressure blank in the piping between connecting flanges; and/or closing and locking at least two valves in the pipeline and locking open to atmosphere a chain valve between the two closed and locked valves. As in #1 above, this activity may be performed by the client. The entry supervisor must review the isolation/blanking and lock-out procedure with the client. The entry supervisor must attach separate lock(s) to any lock-out device installed. The entry supervisor must retain possession of the key(s) during the entire confined space entry.

3) All electrical equipment around and in the confined space must be deenergized and locked out.

4) For confined spaces which have contained a known hazardous chemical, eg., vessels, storage tanks, etc., the client must verify that the vessel has been thoroughly cleaned by appropriate means, eg., overflowing with water, steaming, etc.

5) For confined spaces containing known atmospheric hazards, mechanical ventilation may be utilized to maintain atmospheric hazards within permit parameters. Section 11 - Mechanical

Ventilation lists the procedure for confined space ventilation.

6) The atmosphere of the confined space must be initially checked to verify that it contains an acceptable level of oxygen (19.5 to 23.5%) and is free of combustible or toxic gases or vapors. Section 10-Atmospheric Testing of this procedure lists the air quality specifications which must be met. These specifications are also listed on the Entry Permit. Continuous air monitoring may be required, depending on the nature of the confined space as well as the activity(ies) to be conducted within the confined space.

7) Verify that all necessary entry equipment, eg., retrieval lines, personal protective equipment, respiratory protective equipment, etc., are available, in good condition, and functional.

8) Verify that all entrants and attendants have received the appropriate confined space entry training.

9) Verify that all rescue arrangements are in-place as per Section 9- Outside Rescue Assistance, and that an adequate means of communicating with outside assistance is immediately available to the attendant.

B. The Entry Permit must be canceled and all entrants ordered to evacuate the confined space when any one of the following conditions arises:

1) A change in initial atmospheric conditions which may jeopardize the continued safety and health of entrants is detected;

2) The attendant must leave the work station;

3) The attendant is called on to perform duties which do not allow him/her to fulfill his/her duties as an attendant;

4) Whenever ordered by the attendant due to factors external to the confined space which may jeopardize the continued safety and health of entrants;

5) At the end of the work shift and/or whenever a different group of entrants and attendants will take charge of the confined space;

6) Whenever entrants self-perceive danger and self-initiate evacuation;

7) At the termination of confined space entry; and

8) At the end of the workshift in which the entry occurs.

5. **TRAINING AND DUTIES OF ENTRY SUPERVISOR**

A. 29 CFR 1910.146-Permit Required Confined Spaces assigns specific responsibilities to the client (client or owner of the confined space). These responsibilities include communicating pertinent information regarding the hazards associated with their identified confined space(s) to contractor employees who will enter those spaces. In order to verify that the required information regarding the confined space is properly communicated to employees of the Firm, the entry supervisor must:

1) Investigate the clients' permit entry protocol, ensuring that any identified hazards and previous experience with the confined space is properly communicated;

2) Coordinate rescue assistance with either the client's in-house rescue team and/or the off-site rescue assistance specified by the client. The off-site rescue assistance specified by the client must have direct experience in rescue in the clients' identified confined space; or be provided an opportunity to examine the space and practice a rescue.

3) Verify that the client takes the necessary precautions in notifying their employees that our employees will be entering the confined space;

4) Coordinate entry operations with the employees of the client when both client and employees of the Firm will be working in or near a permit space; and,

5) Inform the client of this permit space program and any additional precautions that will be taken by employees of the Firm during the entry procedure.

B. In addition to acting as the liaison with the client representative, the entry supervisor has the following assigned duties:

1) Recognize the hazards involved with the entry as well as the signs and symptoms of exposure to the hazards;

2) Verify the that both the entry permit and checklist are completed and required equipment is in use prior to entry; and,

3) Monitor entry operations and verify that they remain consistent with the terms of the entry permit and that acceptable entry conditions are maintained.

C. The entry supervisor may also function as either the attendant and/or as an entrant, therefore, the entry supervisor must have the training specified for an attendant and/or an entrant, and will assume the duties listed below for either the attendant and/or the entrant.

6. TRAINING AND DUTIES OF AUTHORIZED ENTRANTS

A. Entrants must have training and instruction in their duties and responsibilities regarding confined space entry. The following are assigned duties:

1) Recognize the hazards which may be faced during entry, as well as the signs and symptoms of exposure to the hazard(s);

2) Maintain visual contact and/or verbal communications with the attendant at all times;

3) Use the personal protective equipment (PPE) provided;

4) Maintain an awareness of all external barriers required to protect from external hazards , eg., blanking, blocking, lockout, etc., and the proper use of those barriers; and

5) Obey evacuation orders given by either the attendant, entry supervisor, automatic alarm activation, or when self-perceived.

7. TRAINING AND DUTIES OF ATTENDANTS

A. An attendant must be stationed and remain stationed outside the permit space at all times during entry operations. The attendant may have no other duties besides those listed in this section.

B. All attendants must have training and instruction in their duties and responsibilities regarding confined space entry. The following are assigned duties:

1) Maintain an accurate count of all entrants in the confined space;

2) Monitor activities both inside and outside the confined space to verify the continued safety of entrants;

3) Maintain visual contact or verbal communications with all entrants in the confined space at all times;

4) Order evacuation of the confined space if an uncontrolled hazard develops, either within or outside the confined space, or upon observing a behavioral effect of hazard exposure among entrants;

5) Warn unauthorized persons away from the confined space;

6) Participate in non-entry rescue; and

7) Summon rescue and other emergency services.

D. Attendants must maintain current certification in basic first aid and cardiopulmonary resuscitation (CPR).

E. **Under no circumstances should the attendant attempt rescue of entrants by entering the confined space.**

8. TRAINING CERTIFICATION

A. Training provided to the entry supervisor, attendant, and entrant must be certified by the Firm. Such training certification will be provided by Corporate Health & Safety.

B. Documentation of training certification received by attendance at an outside training course must be provided to Corporate Health & Safety.

9. OUTSIDE RESCUE ASSISTANCE

A. For any project involving a confined space entry, the entry supervisor must address rescue coordination efforts. Such rescue assistance must be coordinated with either the client's designated confined space rescue team and/or with a local emergency response team.

B. Confined space entry shall progress only after proper notification of outside rescue assistance prior to the actual entry activity.

C. An adequate means of communication., eg., cellular telep hone for contacting off-site emergency assistance, air horn or two-way radio for summoning a client's rescue team, etc., must be immediately available to the attendant.

10. ATMOSPHERIC TESTING

A. All confined spaces will be tested for atmospheric hazards as follows:

1) Each confined space will initially be tested prior to the entry supervisor authorizing entry.

2) Each confined space will also be tested continuously or at intervals as specified by the entry supervisor.

B. The Entry Supervisor will select continuous or interval monitoring, and specify length of the interval to be implemented during entry. Selection of continuous or interval monitoring will be based on the nature of the confined space hazards present in the permit space, activity during entry, and potential for hazards developing in the confined space.

C. All confined spaces must be tested for atmospheric hazards prior to each entry, and as entry proceeds. **The following are the testing sequence and acceptable air quality criteria:**

1) Oxygen content for all confined space entry must be 19.5 to 23.5%;

2) Combustible gas or vapor must not exceed 10% of its lower explosive limit (LEL);

3) Toxic gas or vapor must not exceed 50% of the Permissible Exposure Limit (PEL) or other published exposure guideline;

4) Carbon monoxide must not exceed 20 ppm; and

5) Hydrogen sulfide must not exceed 5 ppm.

D. **If** it is necessary to enter a confined space where any of the following atmospheric conditions exists, all **entrants** must wear either a self-contained breathing apparatus (SCBA) of at least 60-minute duration or **an** air line respirator with emergency SCBA:

1) Initial atmospheric testing indicates conditions outside the parameters listed on the Entry Permit;

2) Initial atmospheric testing indicates conditions within permit parameters but where the quality of the atmosphere remains questionable; and/or

3) Despite initial atmospheric testing results, activities to be performed while in the confined space would endanger entrants by a creating a sudden change in atmospheric conditions within the space.

4) Mechanical ventilation will not maintain atmospheric hazards within permit limits.

E. **Under** no circumstances is entry into a confined space having an IDLH condition (less than 19.5% **oxygen** or > 10% LEL) permitted by any employee of the Firm.

F. **Results** of all atmospheric testing must be recorded on the Confined Space Entry Permit.

11. MECHANICAL VENTILATION

A. **Mechanical** ventilation may be utilized to maintain confined space atmospheric hazards wi thin entry **limits**.

B. **Ventilation** can be used to force clean air into a confined space or to remove contaminated air from the **confined** space.

C. **Ventilation** systems must be set up to adequately ventilate all areas of the confined space.

D. **Ventilation** systems must be locked in the "on" position. The confined space must have evacuated if the **system** fails.

E. **Continuous air monitoring** must be implemented when ventilation is utilized to maintain atmospheric **hazards** within entry permit limits.

F. **Air** intake must be positioned to prevent the introduction of air contamination into the confined space (**i.e.** away from vehicle exhaust, tank vents, etc.).

12. WORK PRACTICES

A. All entrants must wear a retrieval line secured on one end to the entrant by a full- body harness, or parachute harness, and the end secured outside the space for vertical-entry confined spaces, the lifeline must be secured to a lifting or other mechanical retrieval device. **Reliance on manually lifting an entrant from a vertical confined space is prohibited.** If more than one entrant is entering the space, each line shall be clearly marked to identify the entrant and the mechanical retrieve system must be rated for multiple entrant use.

B. Where mechanical ventilation will be relied upon for eliminating an actual or potential hazardous atmosphere, the atmosphere of the space must be continually monitored to verify that the continuous forced air ventilation is preventing the generation or accumulation of a hazardous atmosphere.

C. Whenever a ladder is required for confined space entry, the ladder must be secured and not withdrawn while anyone remains within the confined space except as necessary to permit extraction during rescue.

D. Adequate illumination must be provided for all confined space entry. An approved type (explosion-proof) lighting device must be used.

E. All electrical equipment used within a confined space must be explosion-proof and must be inspected prior to use to verify good working condition. The equipment must utilize a ground fault interrupt and/or be properly grounded.

F. Whenever the confined space is structured such that visual contact can not be maintained between entrants and the attendant, intrinsically-safe two-way radios must be utilized to maintain continuous contact between entrants and attendants.

G. All confined spaces must be isolated prior to entry.

H. Prior to opening or removing lids, covers, access doors, or hatches of a confined space, precautions must be taken to determine if it is safe to do so.

I. Whenever entering manholes or other confined spaces with permanent ladders, all rungs must be inspected to verify they are in safe and useable condition.

J. When working in a vertical confined space, precautions must be taken to prevent equipment and personnel from falling into the confined space opening. Tools should be lowered and removed from the space using a basket or sling to prevent falls and falling objects.

13. **POSTING AND RECORDKEEPING**

A. The Entry Permit(s), must be initially posted at the entrance to the confined space, and remain posted for the duration of the entry. **All permits must be weather protected to maintain integrity.**

B. The original, canceled Entry Permit(s) must be retained within the project file.

C. Copies of the canceled Confined Space Entry Permit(s) must be forwarded to the Divisional HSC and Corporate Safety Division for quality assurance checks and record retention.

- END OF PROCEDURE -

Executive Authorization:

Date: 3/00

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Confined Space Entry Permit

Project Name:	**Date/Time:**
Project Number:	**Location:**
Prepared By:	**Project Manager:**

Location and Description of Confined Space:

Rescue Contact and Phone Number:

Entry Objectives:

Equipment/Materials required for Entry:

Time of Entry:	Expiration of Entry:

Required Respirator for Entry:

Required Protective Clothing for Entry:

Monitoring Interval: **Continuous** **5 minutes** **10 minutes** **15 minutes** **30 minutes**

Air Monitoring Requirements

Monitor For	Monitoring Equipment	Calibrated	
		Date/Time	By
% O_2			
% of LEL			
H_2S			
CO			
Other:			
Other:			

Entrants and Attendants

Number of Entrants:	Number of Attendants:
Names of Entrants	**Names of Attendants**

Entry Supervisor Authorizing Confined Space Entry Permit

Print:	Date:	Time:
Signature:	Date:	Time:

Entry Supervisor Canceling Confined Space Entry Permit

Print:	Date:	Time:
Signature:	Date:	Time:

Attachment D

Material Safety Data Sheets

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Attachment E

Incident Investigation Report

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Incident Near-Miss Investigation Report

☐ OSHA Recordable ☐ First Aid Injury ☐ Fire Date of Incident:

☐ Lost Workday Injury ☐ Vehicle Accident ☐ Spill/Leak

☐ Restricted Duty Injury ☐ Equipment Damage ☐ Near Miss Incident Number:

Every employee injury, accident, and near miss must be reported within twenty-four hours of the injury. If the incident results in hospitalization, an immediate report must be made by telephone to the Project Manager and the Health and Safety Officer.

Project Information

Project Name:	Project #
Location of Incident:	

Employee

Name:	Employee Number:
Employment Status: ☐ Regular ☐ Part Time	How long in present job?

Injury or Illness Info

Where did incident / near miss occur? (number, street, city, state, zip):

Employee's specific activity at the time of the incident / near miss:

Equipment, materials, or chemicals the employee was using when the incident / near miss occurred (e.g., the equipment employee struck against or which struck employee; the vapor inhaled or material swallowed; what the employee was lifting, pulling, etc.):

Describe the specific injury or illness (e.g., cut, strain, fracture, etc.):

Body part(s) affected (e.g., back, left wrist, right eye, etc.):

Name and address of treatment provider (e.g., physician or clinic):	Phone No.:
If hospitalized, name and address of hospital:	Phone No.:

Date of injury or onset of illness / /	Time of event or exposure: ☐ AM ☐ PM

Did employee miss at least one full shift's work? ☐ No ☐ Yes, 1st date absent (MM/DD/YYYY) / /

Has employee returned to work? ☐ Regular work ☐ Restricted work ☐ No

☐ Yes, date returned (MM/DD/YYYY) / /

To whom reported:	Other workers injured/made ill in this event? ☐ Yes ☐ No

Description of Incident / Near Miss: (Describe what happened and how it happened.)

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Incident Near-Miss Investigation Report

Motor Vehicle Accident (MVA)									
				Company Vehicle?	☐ Yes ☐ No				
Accident Location (street, city, state)									
Vehicle Towed?	☐ Yes ☐ No	Other Vehicle?	☐ Yes ☐ No	# Vehicles Towed		# of Injuries			

Spill

Material Spilled	Quantity	Source

Agency Notifications	
Cost of Incident $	

Third Party Incidents

Name of Owner		Address	Telephone
Description of Damage:			
Witness Name		Address	Telephone
Witness Name		Address	Telephone

#	Root Cause and Contributing Factors: Conclusion (Describe in Detail Why Incident / Near Miss Occurred)
1	
2	
3	
4	

Root Cause(s) Analysis (RCA):

1. Lack of skill or knowledge
2. Lack of or inadequate operational procedures or work standards
3. Inadequate communication of expectations regarding procedures or work standards
4. Inadequate tools or equipment
5. Correct way takes more time and/or requires more effort
6. Short-cutting standard procedures is positively reinforced or tolerated
7. Person thinks there is no personal benefit to always doing the job according to standards
8. Uncontrollable

#	RCA #	Solution(s): How to Prevent Incident / Near Miss From Reoccurring	Person Responsible	Due Date	Closure Date

Investigation Team Members

Name	Job Title	Date

Results of **Solution Verification** and Validation

Reviewed By

Name	Job Title	Date
	Project Manager	
	Health and Safety Reviewer	

Attachment F

Daily Safety Meeting Logs

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Safety Meeting Log

Project:	Location:
Date/Time:	Activity:

1. Work Summary

2. Physical Chemical Hazards

3. Protective Equipment/Procedures

4. Emergency Procedures

5. Signatures of Attendees

Appendix B

Post-Closure Inspection Form

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Post-Closure Inspection Form for Operation, Maintenance, and Monitoring
Bern Metal/Universal Metal Site
Buffalo, New York

Date: _____ Inspector(s): _____

Weather: _____ _____

_____ _____

Inspection Items	Acceptable Yes	Acceptable No	Comments/Conditions
1. General Site Conditions			
Gates Locked and Secure			
Perimeter Fence/ Warning Signs			
Perimeter Vegetation			
Trash or Litter			
Survey Control Monuments			
2. Maintenance Road Condition			
Surface			
Accessability			
3. Final Cover Vegetation			
General Grass Growth			
Stressed Vegetation			
Animal Burrows			
Tree or Bush Growth			
Protruding Objects/Settlement			
Ponding Water			
Erosion			
4. Storm Water Drainage System			
Mid-Slope Drainage Swales			
Perimeter Drainage Ditch			
Outlet Drainage Ditch			
Catch Basins			
5. Groundwater Monitoring Wells			
Casings Secure and Locked			
6. Other Items			
_____			

Sketch

Appendix C

Monitoring Well Installation Specifications

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MATERIALS AND PERFORMANCE - SECTION 02620

MONITORING WELL INSTALLATION

PART 1 - GENERAL

1.01 DESCRIPTION

A. The Contractor shall furnish all labor, materials, equipment, tools, and appurtenances required to complete and maintain the work of installing groundwater monitoring wells to create permanent access for collection of samples to assess groundwater quality and the hydrogeologic properties of the aquifer in which contaminants may exist.

B. The most commonly used drilling method is hollow-stem auger.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section MP-01010 - Summary of Work

1.03 REFERENCES

A. ASTM D1586-84, Split Barrel Sampling

PART 2 - PRODUCTS

2.01 MATERIALS

A. Hollow-stem Augers

1. Outside diameters generally range from 6 ¼ inches to 22 inches with corresponding inner diameters ranging from 2 ¼ inches to 13 inches.

2. Auger lengths are usually 5 feet, which allows for easy handling. However, lengths of 10 or 20 feet may be used for deeper holes drilled with machines capable of handling extended lengths.

B. Sample Collection

1. The most common techniques for retrieving samples in unconsolidated formations are the following:

a. Split spoon sampling, carried out continuously or at discrete intervals during drilling, as summarized in ASTM Method D1586-84, Split Barrel Sampling.

b. Shelby tube sampling when an undisturbed sample is required from clayey or silty soils, especially for geotechnical evaluation or chemical analysis.

MATERIALS AND PERFORMANCE - SECTION 02620

MONITORING WELL INSTALLATION

2.02 SAMPLING EQUIPMENT

A. Depth Sounder
B. Water Level Indicator
C. All Required Health and Safety Equipment
D. Sample Collection Jars
E. Trowels
F. Field Logbook, Well Logs, Description Aids (color charts, grain size charts, etc.)

PART 3 - EXECUTION

3.01 PROCEDURES

A. Preparation

1. All drilling and well installation programs must be planned and supervised by a professional geologist/hydrogeologist.

2. The planning, selection and implementation of any monitor well installation program include the following:

a. Assessment of the site to determine potential access problems for drill rig, locate water supply sources, establish equipment storage area, and observe outcrops.

b. Perform utilities check, note location of underground utilities and of overhead electrical wires.

c. Preparation of a site specific Health and Safety Plan.

d. Select drilling and well development methods. These methods will be approved by the Group's Representative prior to drilling.

e. Drill cuttings and fluids will be containerized and stored temporarily at the site prior to appropriate off-site disposition.

f. Preparation of work plan including all of the above.

B. Field Preparation

1. Prior to mobilization, the drill rig and all associated equipment should be thoroughly decontaminated by a steam/pressure washer to remove all oil, grease, mud, etc.

2. Before drilling each boring, all the drill equipment should be steam cleaned and rinsed with potable water to minimize cross-contamination. Special attention should be given to the threaded section of the casings, and to the drill rods.

MATERIALS AND PERFORMANCE - SECTION 02620

MONITORING WELL INSTALLATION

3. All drilling equipment should be steam-cleaned to completion of the project to ensure that no contamination is transported to or from the sampling site.

3.02 WELL CONSTRUCTION

A. The well casing material should not interact with the groundwater. Well casings for environmental projects will be constructed of polyvinyl chloride (PVC).

B. Overburden Well Construction

1. One upgradient monitoring well RD-1, will be installed in the Norfolk Southern Railroad Company (NSC) right-of-way adjacent to the perimeter fence at the south corner of the Berm Metal property.

2. Downgradient well RD-2 will be located immediately west of the former "lead-acid source area" (on the adjacent NSC right-of-way property) near the southwest corner of the former Bern Metal warehouse building.

3. Downgradient monitoring well RD-3 will be located immediately north of the Bern Metal property, in the area of the former Clinton/Bender Site.

4. Monitoring well RD-4 will be located in the former Little Buffalo Creek stream channel on the NSC right-of-way property, which will be installed to replace the former monitoring well MW-7.

5. Hollow-stem augers will be advanced to construct the overburden wells because the well can be constructed inside of the augers. Figure 1 shows typical construction details for an Overburden Well.

6. Casing sections will be flush-threaded. Screw-threaded bottom plugs will be used. Each piece of PVC pipe, screen, and the bottom plug will be steam-cleaned before lowering into the borehole. The site hydrogeologist is responsible for the supervision of all steam cleaning procedures.

7. The annular space between the well screen and the borehole wall will be filled with a uniform sand pack to serve as a filter media.

8. Additional sand shall be added to bring the top of the sand pack to approximately 2 feet above the top of the well screen.

9. A hydrated bentonite seal of a minimum 2-foot vertical thickness will be placed in the annular space above the sand pack to separate the sand pack from the cement/bentonite grout. The non coated hydrated bentonite pellets will be placed directly into the annular space.

10. Cement / bentonite grout is placed from the top of the hydrated bentonite seal to the

ground surface.

The following mix is acceptable:

a. Neat cement, a maximum of 6 gallons of water per 94 pound bag of cement.

b. Granular bentonite, 1.5 pounds of bentonite per 1 gallon of water.

c. Cement-bentonite, 5 pounds of pure bentonite per 94 pound bag of cement with 7-8 gallons of water.

d. Cement-bentonite, 7 to 8 pounds of pure bentonite per 94 pound bag of cement with 6-7 gallons of water, if water mixed.

11. Grout is pumped through a tremie pipe (normally a 1.25-inch PVC or steel pipe) to the bottom of the annulus until undiluted grout flows from the annulus at the ground surface.

12. The protective casing will consist of a 5 foot minimum length of black iron or galvanized pipe extending about 1.5 to 3 feet above the ground surface, and set in concrete or cement grout. The protective casing diameter should be 4 inches greater than the well casing. A 0.5 inch drain hole may be installed near ground level.

13. A protective steel cap, secured to the protective casing by a padlock, will be installed.

14. All monitor wells should be labeled.

3.03 WELL DEVELOPMENT

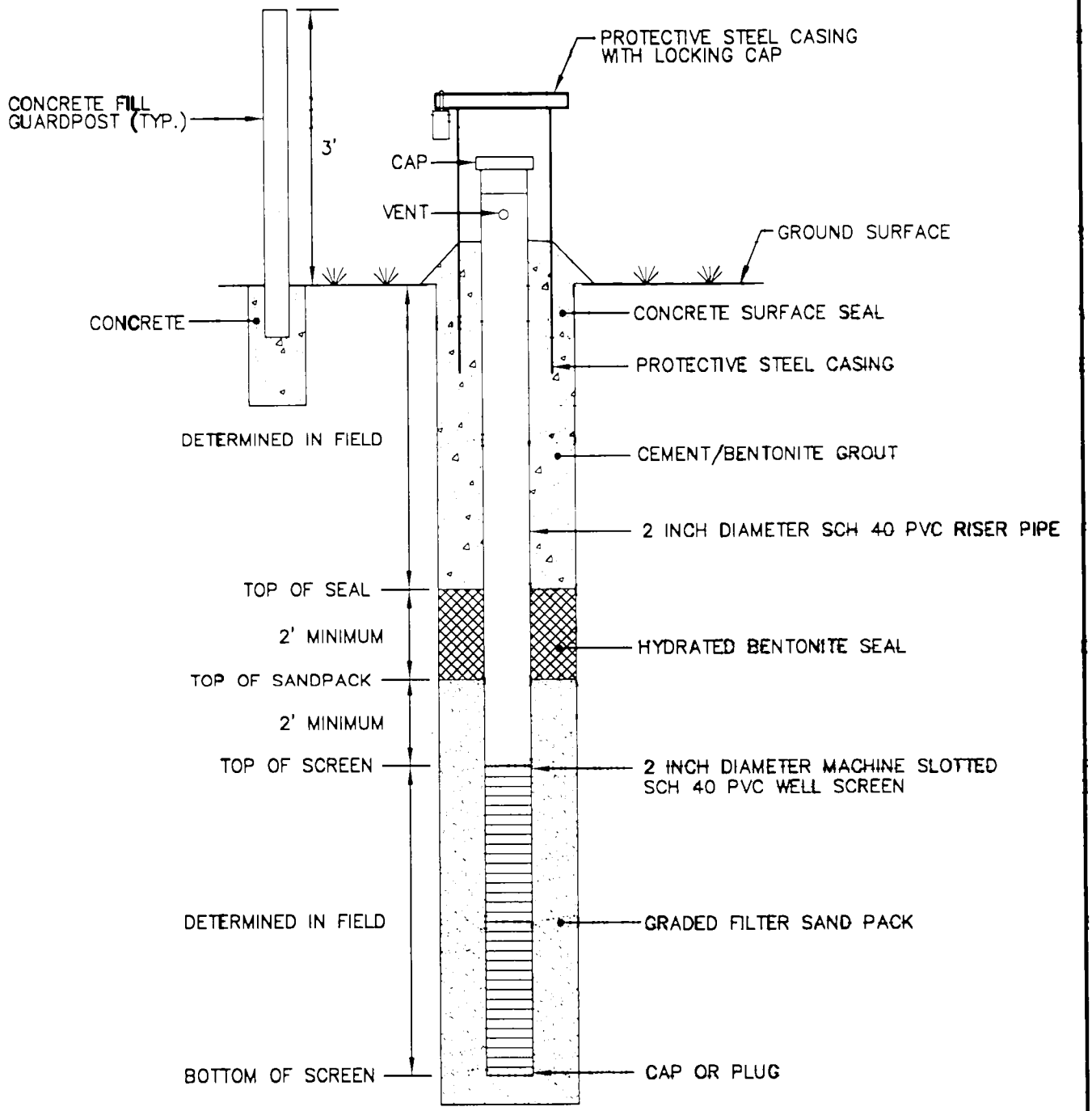
A. Well development is the process by which the aquifer's hydraulic conductivity is restored by removing drilling fluids, and fine-grained formation material from newly installed wells. The method of well development that is commonly used is surging and purging. A well is considered developed when the pH, conductivity, temperature of the groundwater stabilizes and the measured turbidity is <50 nephlometric turbidity units (NTUs).

B. Surging and bailing will be performed as follows:

1. Measure the total depth (TD) of the well and depth to water (DTW).

2. Using an appropriately sized surge block, surge 2-foot sections of well screen. Periodically remove the surge block and bail accumulated sediment from the well, as required.

-END OF SECTION -



NOT TO SCALE

APPENDIX C – MONITORING WELL INSTALLATION SPECIFICATIONS

TYPICAL OVERBURDEN WELL CONSTRUCTION

BBL® BLASLAND, BOUCK & LEE, INC. engineers & scientists

FIGURE 1

X: NONE
L: REF*=OFF, *=ON
P: PAGESET/PLT-AP
1/21/03 SYR-54-RC8 ROC-54-SLM
36469001/36469801.DWG

MATERIALS AND PERFORMANCE - SECTION 02621

PIEZOMETER INSTALLATION

PART 1 - GENERAL

1.01 DESCRIPTION

A. The Contractor shall furnish all labor, materials, equipment, tools, and appurtenances required to complete and maintain the work of installing a new piezometer to assess the hydrogeologic properties of the aquifer along the east side of the Bern Metal property.

B. The most commonly used drilling method is hollow-stem auger.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section MP-01010 - Summary of Work

1.03 REFERENCES

A. ASTM D1586-84, Split Barrel Sampling

PART 2 - PRODUCTS

2.01 MATERIALS

A. Hollow-stem Augers

1. Outside diameters generally range from 6 ¼ inches to 22 inches with corresponding inner diameters ranging from 2 ¼ inches to 13 inches.

2. Auger lengths are usually 5 feet, which allows for easy handling. However, lengths of 10 or 20 feet may be used for deeper holes drilled with machines capable of handling extended lengths.

B. Sample Collection

1. The most common techniques for retrieving samples in unconsolidated formations are the following:

a. Split spoon sampling, carried out continuously or at discrete intervals during drilling, as summarized in ASTM Method D1586-84, Split Barrel Sampling.

b. Shelby tube sampling when an undisturbed sample is required from clayey or silty soils, especially for geotechnical evaluation or chemical analysis.

2.02 SAMPLING EQUIPMENT

A. Depth Sounder
B. Water Level Indicator

MATERIALS AND PERFORMANCE - SECTION 02621

PIEZOMETER INSTALLATION

C. All Required Health and Safety Equipment
D. Sample Collection Jars
E. Trowels
F. Field Logbook, Well Logs, Description Aids (color charts, grain size charts, etc.)

PART 3 - EXECUTION

3.01 PROCEDURES

A. Preparation

1. All drilling and piezometer installation programs must be planned and supervised by a professional geologist/hydrogeologist.

2. The planning, selection and implementation of any piezometer installation program include the following:

a. Assessment of the site to determine potential access problems for drill rig, locate water supply sources, establish equipment storage area, and observe outcrops.

b. Perform utilities check, note location of underground utilities and of overhead electrical wires.

c. Preparation of a site specific Health and Safety Plan.

d. Select drilling and piezometer development methods. These methods will be approved by the Group's Representative prior to drilling.

e. Drill cuttings and fluids will be containerized and stored temporarily at the site prior to appropriate off-site disposition.

f. Preparation of work plan including all of the above.

B. Field Preparation

1. Prior to mobilization, the drill rig and all associated equipment should be thoroughly decontaminated by a steam/pressure washer to remove all oil, grease, mud, etc.

2. Before drilling a boring, all the drill equipment should be steam cleaned and rinsed with potable water to minimize cross-contamination. Special attention should be given to the threaded section of the casings and to the drill rods.

3. All drilling equipment should be steam-cleaned to completion of the project to ensure that no contamination is transported to or from the sampling site.

MATERIALS AND PERFORMANCE - SECTION 02621

PIEZOMETER INSTALLATION

3.02 PIEZOMETER CONSTRUCTION

A. The piezometer casing material should not interact with the groundwater. The piezometer casing will be constructed of 1-inch diameter polyvinyl chloride (PVC).

B. Piezometer Construction

1. Downgradient piezometer PZ-1 will be located immediately east of the Bern Metal property and west of the Laub property.

2. Hollow-stem augers will be advanced to construct the piezometer because the piezometer can be constructed inside of the augers. Figure 2 shows typical construction details for a Piezometer.

3. Casing sections will be flush-threaded. Screw-threaded bottom plugs will be used. Each piece of PVC pipe, screen, and the bottom plug will be steam-cleaned before lowering into the borehole. The site hydrogeologist is responsible for the supervision of all steam cleaning procedures.

4. The annular space between the piezometer screen and the borehole wall will be filled with a uniform sand pack to serve as a filter media.

5. Additional sand shall be added to bring the top of the sand pack to approximately 2 feet above the top of the piezometer screen.

6. A hydrated bentonite seal of a minimum 2-foot vertical thickness will be placed in the annular space above the sand pack to separate the sand pack from the cement/bentonite grout. The non coated hydrated bentonite pellets will be placed directly into the annular space.

7. Cement / bentonite grout is placed from the top of the hydrated bentonite seal to the ground surface.

   The following mix is acceptable:

   a. Neat cement, a maximum of 6 gallons of water per 94 pound bag of cement.

   b. Granular bentonite, 1.5 pounds of bentonite per 1 gallon of water.

   c. Cement-bentonite, 5 pounds of pure bentonite per 94 pound bag of cement with 7-8 gallons of water.

   d. Cement-bentonite, 7 to 8 pounds of pure bentonite per 94 pound bag of cement with 6-7 gallons of water, if water mixed.

8. Grout is pumped through a tremie pipe (normally a 1.25-inch PVC or steel pipe) to

the bottom of the annulus until undiluted grout flows from the annulus at the ground surface.

9. The protective casing will consist of a 5 foot minimum length of black iron or galvanized pipe extending about 1.5 to 3 feet above the ground surface, and set in concrete or cement grout. The protective casing diameter should be 4 inches greater than the piezometer casing. A 0.5 inch drain hole may be installed near ground level.

10. A protective steel cap, secured to the protective casing by a padlock, will be installed.

11. The piezometer should be labeled.

3.03 PIEZOMETER DEVELOPMENT

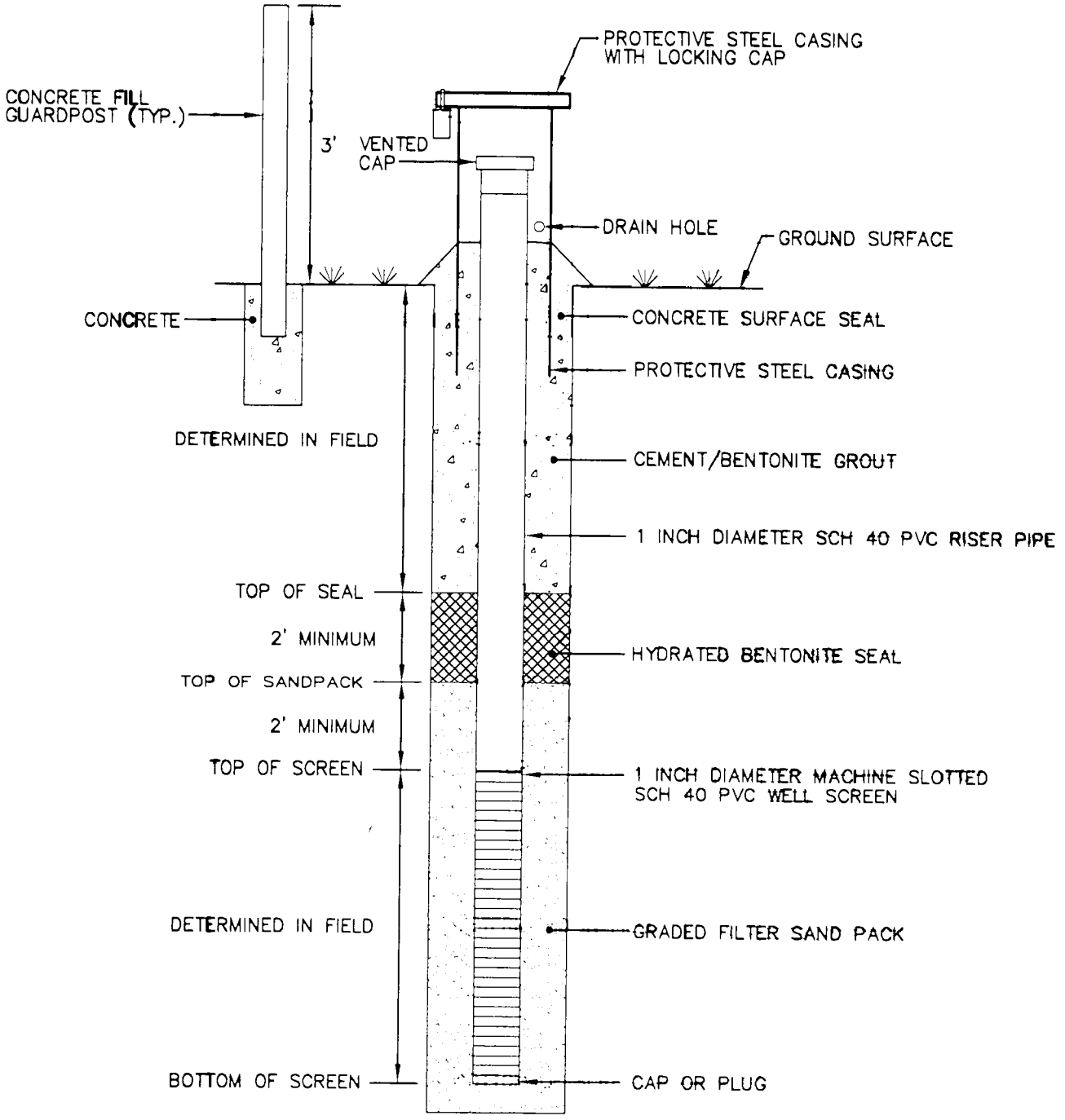
A. Piezometer development is the process by which the aquifer's hydraulic conductivity is restored by removing drilling fluids and fine-grained formation material from the newly installed piezometer. The method of piezometer development that is commonly used is surging and purging. A piezometer is considered developed when the pH, conductivity, temperature of the groundwater stabilizes and the measured turbidity is <50 nephlometric turbidity units (NTUs).

B. Surging and bailing will be performed as follows:

1. Measure the total depth (TD) of the piezometer and depth to water (DTW).

2. Using an appropriately sized surge block, surge 2-foot sections of piezometer screen. Periodically remove the surge block and bail accumulated sediment from the piezometer, as required.

-END OF SECTION -



NOT TO SCALE

APPENDIX C – PIEZOMETER INSTALLATION SPECIFICATIONS

TYPICAL PIEZOMETER CONSTRUCTION

BLASLAND, BOUCK & LEE, INC.
engineers & scientists

FIGURE 2

X: NONE
L: REF*=OFF, *=ON
P: PAGESET/PLT-AP
4/16/03 SYR-54-ROB ROC-54-SUM
36469001/36469B02.DWG

Appendix D

Low-Flow Groundwater Sampling Procedures

BBL®
BLASLAND, BOUCK & LEE, INC.
engineers & scientists

Appendix D - Low-Flow Groundwater Sampling Procedures

D.1 Scope and Application

The objective of this standard operating procedure (SOP) is to provide general reference information on the sampling of groundwater monitoring wells. This SOP has been prepared from the United States Environmental Protection Agency's (USEPA's) SOP for Groundwater Sampling Procedure Low-Stress (low-flow) Purging and Sampling, dated March 16, 1998, to provide guidance for performing the activities specified in the Operations, Maintenance, and Monitoring (OMM) Plan for the Bern Metal/Universal Metal Site (the site) in Buffalo, New York. This SOP is primarily concerned with the collection of water samples from the saturated zone of the subsurface. Every effort must be made to determine that the sample is representative of the particular zone of water being sampled.

This standard (i.e., typically applicable) operating procedures may be varied or changed, as required, dependent upon site conditions, equipment limitations or limitations imposed by the procedure.

D.2 Method Summary

Monitoring well sampling will include using the "micro-purging" or "low-flow" technique. Low-flow purging and sampling results in collection of groundwater samples from monitoring wells that are representative of groundwater conditions in the geological formation. This is accomplished by minimizing stress on the geological formation and minimizing disturbance of sediment that has collected in the well by setting the intake velocity of the sampling pump to a flow rate that limits drawdown inside the well casing.

Sampling at the prescribed (low) flow rate has three primary benefits. First, it minimizes disturbance of sediment in the bottom of the well, thereby producing a sample with low turbidity (i.e., low concentration of suspended particles). Typically, this saves time and analytical costs by eliminating the need for collecting and analyzing an additional filtered sample from the same well. Second, this procedure minimizes aeration of groundwater during sample collection, which improves the sample quality for volatile organic compound (VOC) analysis. Third, in most cases, the procedure significantly reduces the volume of groundwater purged from a well and the costs associated with its proper treatment and disposal.

During purging of the well, monitor and record the following field indicator parameters approximately every 5 minutes: turbidity, temperature, specific conductance, pH, oxidation-reduction potential (ORP/Eh), and dissolved oxygen. The well is considered stabilized and ready for sample collection when the indicator parameters have stabilized for three consecutive readings. Equipment will be decontaminated prior to use and between wells. Once purging is completed and the correct laboratory-cleaned sample containers have been prepared, sampling may proceed. Groundwater sample collection will be performed by utilizing a submersible pump according to the USEPA's SOP for Groundwater Sampling Procedure Low Stress Purging. Sampling should occur in a progression from the least to most contaminated well, if this information is known. Equipment will be decontaminated prior to use and between groundwater monitoring wells.

D.3 Sample Preservation, Containers, Handling, and Storage

The type of analysis for which a sample is being collected determines the type of bottle, preservative, holding time, and filtering requirements. Samples should be collected directly from the sampling device into appropriate

laboratory-cleaned containers. Check that a Teflon® liner is present in the cap, if required. Attach a sample identification label. Complete a field data sheet, a chain-of-custody form, and record all pertinent data in the site logbook.

Samples shall be appropriately preserved, labeled, logged, and placed in a cooler to be maintained at 4 degrees Celsius (°C). Samples must be shipped well before the holding time is up and ideally should be shipped within 24 hours of sample collection. It is imperative that samples be shipped or delivered daily to the analytical laboratory in order to maximize the time available for the laboratory to perform the analyses. The bottles should be shipped with adequate packing and cooling to ensure that they arrive intact.

Holding time for volatiles analysis is 7 days. It is imperative that the sample be shipped or delivered daily to the analytical laboratory. The bottles must be shipped on their sides to aid in maintaining the airtight seal during shipment and with adequate packing and cooling to ensure that they arrive intact.

For collection of volatile organic samples, ensure that 40-milliliter glass sample vials with Teflon®-lined septa are ordered and in sufficient numbers. Check sampling supplies, preservatives, foam sleeves, and coolers. Due to the extreme trace levels at which volatile organics are detectable, cross-contamination and introduction of contaminants must be avoided. Trip blanks are incorporated into the shipment package to provide a check against cross-contamination.

D.4 Interferences and Potential Problems

The primary goal in performing groundwater sampling is to obtain a representative sample of the groundwater. Analysis can be compromised by field personnel in two primary ways: (1) taking an unrepresentative sample, or (2) by incorrect handling of the sample.

In a nonpumping well, there will be little or no vertical mixing of the water, and stratification will occur. The water in the screened section will mix with the groundwater due to normal flow patterns, but the water above the screened section will remain isolated, become stagnant, and may lack the contaminants representative of the groundwater. To safeguard against collecting nonrepresentative stagnant water, the following guidelines and techniques will be adhered to during sampling:

1. All groundwater monitoring wells will be pumped prior to sampling. Purge water will be collected and placed in 55-gallon drums staged onsite;

2. When purging with a pump, the pump should be set approximately 2 feet above the bottom of the monitoring well;

3. The monitoring well should be sampled as soon as possible after purging; and

4. For monitoring wells that can be pumped to dryness with the equipment being used, the monitoring well should be evacuated and allowed to recover prior to collecting a sample. If the recovery rate is fairly rapid and time allows, evacuation of more than one volume of water is preferred. If recovery is slow, sample the well upon recovery after one evacuation.

Materials of construction for samplers and evacuation equipment should be limited to stainless steel and/or Teflon® in areas where concentrations are expected to be at or near the detection limit.

D.5 Equipment and Apparatus

At a minimum, the following equipment should be available during the sampling program:

- electronic water-level indicator;
- appropriate keys for well cap locks;
- Photoionization detector (PID) or organic vapor analyzer (OVA) (whichever is most appropriate);
- Horiba U-22 with a flow-through cell or equivalent;
- logbook;
- calculator;
- field data sheets and sample labels;
- chain-of-custody records and seals;
- sample containers;
- engineer's rule;
- duct tape and clear tape;
- sharp knife (locking blade);
- tool box (to include at least: screwdrivers, pliers, hacksaw, hammer, flashlight, adjustable wrench, pipe wrenches, wire strippers, electrical tape, hose connectors, and Teflon® tape);
- appropriate health and safety equipment;
- 5-gallon pail and 55-gallon drum;
- plastic sheeting;
- shipping containers;
- packing materials;
- bolt cutters;
- Ziploc plastic bags;
- containers for evacuation liquids;

- decontamination solutions;
- tap water;
- nonphosphate soap;
- several scrub brushes;
- pails or tubs;
- aluminum foil;
- garden sprayer;
- preservatives;
- distilled or deionized water;
- ice;
- pump(s), submersible or peristaltic;
- control box for submersible pump (if necessary);
- Generator (110, 120, or 240 volt) or 12-volt battery if inaccessible to field vehicle. Also, an amp meter is useful;
- discharge line, enough to dedicate to each well;
- hose clamps;
- safety cable;
- tool box supplement;
- gasoline for generator and gas can; and
- 1-inch-diameter nipples and various plumbing (i.e., pipe connectors).

D.6 Sampling Procedures

Initial Preparation

Obtain necessary sampling and monitoring equipment, including the appropriate laboratory glassware for analysis of the type of contaminants being investigated. Check sampling supplies, preservatives, foam sleeves, and coolers. Trip blanks are incorporated into the shipment package to provide a check against cross-contamination and proper preservation. In addition, perform the following activities:

- Decontaminate or preclean sampling equipment, and confirm that it is in working order;

- Prepare scheduling and coordinate with staff, clients, and regulatory agency, if appropriate; and
- Perform a general site survey prior to site entry in accordance with the Health and Safety Plan (HASP).

Field Preparation

1. Start at the least contaminated monitoring well, if known.
2. Lay plastic sheeting around the monitoring well to minimize the likelihood of contamination of equipment from soil adjacent to the well.
3. Remove locking well cap, note location, time of day, and date in field notebook or appropriate log form.
4. Remove well casing cap, screen headspace of well with a photoionization detector (PID) to determine the presence of VOCs, and record in logbook.
5. Lower the water-level measuring device into well until water surface is encountered.
6. Measure distance from water surface to reference measuring point on well casing or protective barrier post and record in logbook. Alternatively, if no reference point, note that water-level measurement is from top of steel casing, top of polyvinyl chloride (PVC) riser pipe, from ground surface, or some other position on the well head.
7. Measure total depth of monitoring well (at least twice to confirm measurement) and record in logbook or on field data sheet.
8. Calculate the volume of water in the monitoring well and the volume to be purged.
9. Select the appropriate purging and sampling equipment.

Pre-Sampling Activities and Sampling Procedures

The following pre-sampling activities shall be performed:

1. Start at the monitoring well known or believed to have the least contaminated groundwater and proceed systematically to the well with the most contaminated groundwater. Check the monitoring well, the lock, and the locking cap for damage or evidence of tampering, and record observations.
2. Lay out sheet of polyethylene for placement of monitoring and sampling equipment.
3. Measure VOCs at the rim of the unopened well with the PID instrument and record the reading in the field log book.
4. Remove monitoring well cap.
5. Measure VOCs at the rim of the opened well with a PID instrument and record the reading in the field log book.

6. If the well casing does not have a reference point (usually a V-cut or indelible mark in the well casing), make one. Note that the reference point should be surveyed for correction of groundwater elevations to the mean geodesic datum (MSL).

7. Measure and record the depth to water (to 0.01 feet) in all wells to be sampled prior to purging. Care should be taken to minimize disturbance in the water column and dislodging of any particulate matter attached to the sides or settled at the bottom of the well.

8. If desired, measure and record the depth of any nonaqueous phase liquids (NAPLs) using an interface probe. Care should be taken to minimize disturbance of any sediment that has accumulated at the bottom of the well. Record the observations in the log book. If light nonaqueous phase liquids (LNAPLs) and/or dense nonaqueous phase liquids (DNAPLs) are detected, install the pump at this time, as described in Step 9 below. Allow the well to sit for several days between the measurement or sampling of any DNAPLs and the low-stress purging and sampling of the groundwater.

The following sampling activities shall be performed:

9. Slowly lower the pump, safety cable, tubing, and electrical lines into the monitoring well. The pump intake must be kept at least 2 feet above the bottom of the monitoring well to prevent disturbance and resuspension of any sediment or NAPL present in the bottom of the well. Record the depth to which the pump is lowered.

10. Before starting the pump, measure the water level again with the pump in the well. Leave the water-level measuring device in the well.

11. Start pumping the well at 200 to 500 milliliters per minute (mL/min). The water level should be monitored approximately every 5 minutes. Ideally, a steady flow rate should be maintained that results in a stabilized water level (drawdown of 0.3 feet or less). Pumping rates should, if needed, be reduced to the minimum capabilities of the pump to ensure stabilization of the water level. As noted above, care should be taken to maintain pump suction and to avoid entrainment of air in the tubing. Record each adjustment made to the pumping rate and the water level measured immediately after each adjustment.

12. During purging of the monitoring well, monitor and record the field indicator parameters (turbidity, temperature, specific conductance, pH, ORP/Eh, and dissolved oxygen [DO]) approximately every 5 minutes. The monitoring well is considered stabilized and ready for sample collection when the indicator parameters have stabilized for three consecutive readings as follows (Puls and Barcelona, 1996):

    - $\pm$ 0.1 for pH;
    - $\pm$ 3% for specific conductance (conductivity);
    - $\pm$ 10 mv for ORP; and
    - $\pm$ 10% for DO and turbidity.

    DO and turbidity usually require the longest time to achieve stabilization. The pump must not be removed from the well between purging and sampling.

13. Collect samples at a flow rate between 100 and 250 mL/min, and such that drawdown of the water level within the well does not exceed the maximum allowable drawdown of 0.3 feet. VOC samples must be collected first and directly into sample containers. All sample containers should be filled with minimal turbulence by allowing the groundwater to flow from the tubing gently down the inside of the container.

14. After collection of the samples, the tubing, unless permanently installed, must be properly discarded or dedicated to the well for resampling by hanging the tubing inside the monitoring well.

15. Measure and record the depth of the monitoring well.

16. Close and lock the monitoring well.

Submersible Pumps

Submersible pumps will be used to purge groundwater from the appropriate monitoring wells at the site. Proper decontamination procedures of the pump will be performed to avoid cross-contamination between wells. Operation of a submersible involves the following steps:

1. Determine the volume of water to be purged as described in D.9.

2. Lay plastic sheeting around the monitoring well to prevent contamination of pumps, hoses, or lines with foreign materials.

3. Assemble pump, hoses, and safety cable, and lower the pump into the well. Make sure the pump is deep enough so all the water is not evacuated.

4. Use a ground fault circuit interrupter (GFCI) or ground the generator to avoid possible electric shock.

5. Attach power supply, and purge the monitoring well until the specified volume of water has been evacuated. Do not allow the pump to run dry. If the pumping rate exceeds the well recharge rate, lower the pump further into the monitoring well and continue pumping.

6. Collect and containerize purge waters in 55-gallon drums for characterization and disposal.

D.7 Post-Operation

After all samples are collected and preserved, the sampling equipment should be decontaminated prior to sampling another monitoring well to prevent cross-contamination of equipment and monitoring wells between locations. Upon the completion of sampling activities for a given day, the following should be performed:

1. Decontaminate all equipment.

2. Replace sampling equipment in storage containers.

3. Prepare and transport groundwater samples to the offsite laboratory. Check sample documentation and make sure samples are properly packed for shipment.

D.8 Special Consideration for VOC Sampling

The proper collection of a sample for VOCs requires minimal disturbance of the sample to limit volatilization and, therefore, a loss of volatiles from the sample. Groundwater samples to be analyzed for VOCs require pH adjustment. The appropriate USEPA Program Guidance should be consulted to determine whether pH adjustment is necessary. If pH adjustment is necessary for VOC samples preservation, the amount of acid to be added to each sample vial prior to sampling should be determined, drop by drop, on a separate and equal volume of water (e.g., 40 mL). Groundwater purged from the monitoring well prior to sampling can be used for this purpose.

The following procedures will be followed:

1. Open the vial, set cap in a clean place, and collect the sample during the middle of the cycle. When collecting duplicates, collect both samples at the same time.

2. Fill the vial (previously acidified with correct amount of acid) to just overflowing. Do not rinse the vial, nor excessively overflow it. There should be a convex meniscus on the top of the vial.

3. Preserve samples, as required.

4. Check that the cap has not been contaminated (splashed) and carefully cap the vial. Place the cap directly over the top and screw down firmly. Do not overtighten and break the cap.

5. Invert the vial and tap gently. Observe vial for at least 10 seconds. If an air bubble appears, discard the sample and begin again. It is imperative that no entrapped air is in the sample vial.

6. Immediately place the vial in the protective foam sleeve and place into the cooler, oriented so that it is lying on its side, not straight up.

7. Ensure that the samples remain at 4°C, but do no allow them to freeze, during handling and transport to the offsite laboratory.

D.9 Calculations

If it is necessary to calculate the volume of the monitoring well, utilize the following equation:

$$\textit{Well volume (gallons)} = \Pi r^2 h\ (cf) \quad \text{[Equation 1]}$$

where:

Π = pi or 3.14
r = radius of monitoring well (feet)
h = height of the water column (feet) (This may be determined by subtracting the depth to water from the total depth of the well as measured from the same reference point.)
cf = conversion factor = 7.48 gallons per cubed feet (gal/ft^3)

Monitoring well diameters are typically 2, 3, 4, or 6 inches. Knowing the diameter of the monitoring well, there are a number of standard conversion factors which can be used to simplify the equation above.

The volume, in gallons per linear foot, for various standard monitoring well diameters can be calculated as follows:

Well Volume (gal/ft) = Πr^2 *(cf)* [Equation 2]

where:

Π = pi or 3.14
r = radius of monitoring well (feet)
cf = conversion factor (7.48 gal/ft^3)

For a 2-inch-diameter monitoring well, the volume per linear foot can be calculated as follows:

Well Volume (gal/ft) = Πr^2 *(cf)* [Equation 2]

= $3.14\ (1/12\ ft)^2\ \ 7.48\ gal/ft^3$

= *0.1632 gal/ft*

Remember that if you have a 2-inch-diameter monitoring well, you must convert this to the radius in feet to be able to use the equation.

The conversion factors for the common size monitoring wells are as follows:

Well diameter	2-inch	3-inch	4-inch	6-inch
Volume (gal/ft)	0.1632	0.3672	0.6528	1.4688

If you utilize the conversion factors above, Equation 1 should be modified as follows:

Well volume = (*h*)(*cf*) [Equation 3]

where:

h = height of water column (feet)
cf = the conversion factor calculated above (gal/ft)

D.10 Quality Assurance/Quality Control

There are no specific QA activities which apply to the implementation of these procedures. However, the following general QA procedures apply:

1. All data must be documented on field data sheets or within site logbooks.

2. All instrumentation must be operated in accordance with operating instructions as supplied by the manufacturer, unless otherwise specified in the work plan. Equipment checkout and calibration activities must occur prior to sampling/operation, and they must be documented.

3. The collection of rinsate blanks is recommended to evaluate potential for cross-contamination from the purging and/or sampling equipment when reusable, decontaminated sampling equipment is used.

4. Trip blanks are will be utilized during the collection of VOC samples.

BERN METAL/UNIVERSAL METAL SITE - BUFFALO, NEW YORK **SAMPLING PROGRAM**

Site *Event*

GROUNDWATER SAMPLING LOG

Sampling Personnel: _____ Well ID: _____

Job Number: _____ Date: _____

Weather: _____ Time In: _____ Time Out: _____

WELL INFORMATION *(record from top of inner casing at minimum)*

		TIC	TOC	BGS
Well Depth	(feet)			
Water Table Depth	(feet)			

check where appropriate

Well Type: Flushmount ☐ Stick-Up ☐

Well Locked: Yes ☐ No ☐

Measuring Point Marked: Yes ☐ No ☐

Well Diameter: 1" ☐ 2" ☐ Other: _____

WELL WATER INFORMATION

Length of Water Column:	(feet)	
Volume of Water in Well:	(gal)	
Pumping Rate of Pump:	(mL/min)	
Pumping Rate of Pump:	(GPM)	
Minutes of Pumping:	(min.)	
Total Volume Removed:	(gal)	

Conversion Factors				
gallons per feet of water column:	1" ID	2" ID	4" ID	6" ID
	0.094	0.16	0.66	1.5

1 gal = 3.785 L = 3785 mL = 0.1337 cubic ft.

Unit Stability					
pH	Cond.	Turb.	DO	Temp.	ORP
+/-	+/-	< 50	+/-	+/-	+/-
0.1	3.00%	NTU's	10%		10 mV

SAMPLING INFORMATION

Analyses:

_____ ☐

_____ ☐

_____ ☐

_____ ☐

_____ ☐

Sample ID: _____

Sample Time: _____

MS/MSD: Yes ☐ No ☐

Duplicate: Yes ☐ No ☐

Duplicate ID: _____

Total Bottles: _____

EVACUATION INFORMATION

Evacuation Method: Bailer ☐ Grundfos Pump ☐ Masterflex - Peristaltic Pump ☐

Tubing Used: Dedicated ☐ Deconned ☐

Sampling Method Bailer ☐ Grundfos Pump ☐ Masterflex - Peristaltic Pump ☐

Did well go dry? Yes ☐ No ☐

Water Quality Meter Type: _____

Time / Parameter	1 Initial	2	3	4	5	6	7	8	9
Volume Purged (gal)									
Purge Rate (mL/min)									
Depth to Water (ft. TIC)									
pH									
Conductance (mS/cm)									
Turbidity (NTU's)									
DO (mg/L)									
Temp (°C)									
ORP (mV)									

MISCELLANEOUS OBSERVATIONS/PROBLEMS

SAMPLE DESTINATION

Laboratory: _____ Sample was ☐ shipped day of sampling Chain of Custody Signed By:

Shipped Via: ☐ Federal Express Other: _____ ☐ sent on _____ _____

ATTACHMENT 2

Site Health and Safety Plan

Site Health and Safety Plan

Location:

Bern Metal Corporation
22 Bender Avenue
Buffalo, New York
NYSDEC Site Number 915135

Prepared for:

City of Buffalo
Office of Strategic Planning
Division of Environmental Affairs
65 Niagara Square Room 901
Buffalo, New York 14202

LaBella Project No. 2212554

January 2022

Olympic Towers, 300 Pearl Street, Suite 130 | Buffalo, NY 14202 | p 716-551-6281 | f 716-551-6282
www.labellapc.com

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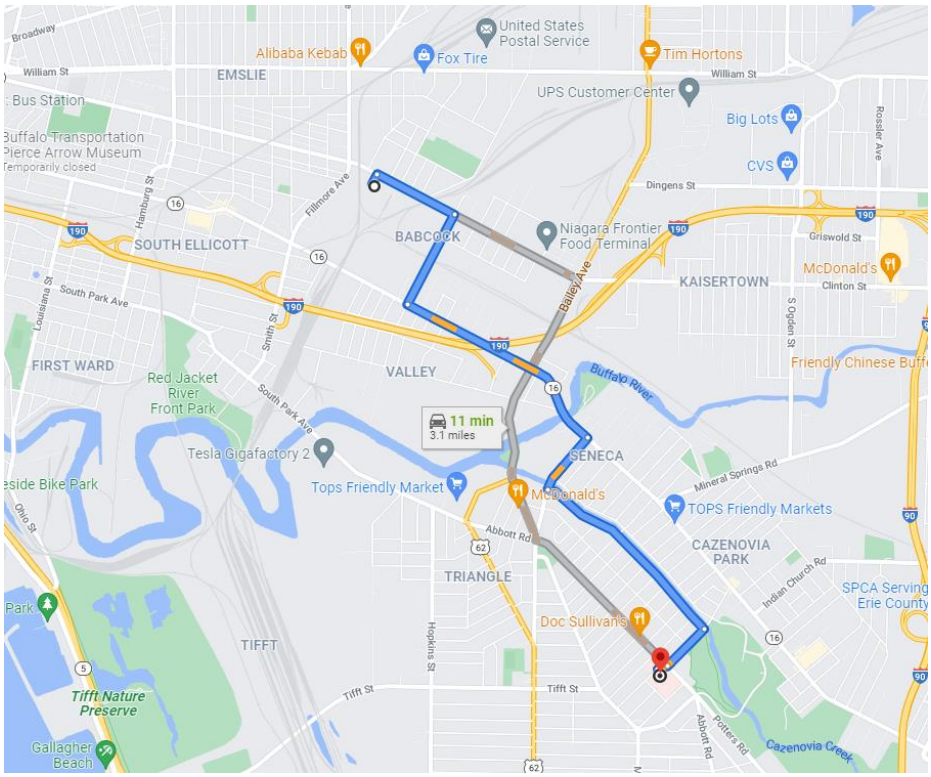
SITE HEALTH AND SAFETY PLAN

Project Title:	Bern Metal Corporation – Operation, Maintenance, and Monitoring Plan Addendum
Project Location (Site):	22 Bender Avenue, Buffalo, New York
Environmental Director:	Rob Napieralski (LaBella Associates D.P.C.)
Project Manager:	Andrew Benkleman (LaBella Associates D.P.C.)
Plan Review Date:	January 20, 2022
Plan Approval Date:	January 20, 2022
Plan Approved By:	Richard Rote, CIH (LaBella Associates D.P.C.)
Site Safety Supervisor:	Andrew Benkleman (LaBella Associates D.P.C.)
Site Contact:	Jason Paananen (City of Buffalo)
Safety Director:	Richard Rote, CIH (LaBella Associates D.P.C.)
Proposed Date(s) of Field Activities:	N/A
Site Conditions:	Raised site, encompassing approximately 3.0499 acres
Site Environmental Information Provided By:	Operations, Maintenance, and Monitoring Plan by Blasland, Bouck & Lee, Inc.
Air Monitoring Provided By:	N/A
Site Control Provided By:	Contractor(s)

EMERGENCY CONTACTS

	Name	Phone Number
Ambulance:	As Per Emergency Service	911
Hospital Emergency:	Mercy Hospital	716-826-7000
Poison Control Center:	National Poison Control Center (serving Buffalo Area)	1-800-222-1222
Police (local, state):	Police Buffalo Police	911 716-851-4403
Fire Department:	Buffalo Fire Department	911
Site Contact:	Jason Paananen (City of Buffalo)	716-667-1234
Agency Contact:	Megan Kuczka (NYSDEC)	716-851-7220
Environmental Director:	Rob Napieralski (LaBella Associates D.P.C.)	Direct: 716-551-6283
Project Manager:	Andrew Benkleman (LaBella.)	Direct: 716-768-3184
Site Safety Supervisor:	Andrew Benkleman (LaBella.)	Direct: 716-768-3184
Safety Director	Richard Rote, CIH (LaBella Associates D.P.C.)	Direct: 704-941-2123

MAP AND DIRECTIONS TO THE MEDICAL FACILITY: MERCY HOSPITAL



10 min (3.3 miles)

via Seneca St and S Legion Dr

Fastest route, lighter traffic than usual

22 Bender Ave
Buffalo, NY 14206

- Head northeast on Bender Ave toward Clinton St
  11 s (253 ft)
- Turn right onto Clinton St
  1 min (0.4 mi)
- Turn right onto Babcock St
  1 min (0.4 mi)
- Continue on Seneca St to S Legion Dr
  4 min (1.3 mi)
- Continue on S Legion Dr to your destination
  4 min (1.2 mi)

Mercy Hospital of Buffalo
565 Abbott Rd, Buffalo, NY 14220

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.

1.0 INTRODUCTION

The purpose of this Health and Safety Plan (HASP) is to provide guidelines for responding to potential health and safety issues that may be encountered during future monitoring and maintenance work at the Project Site located at 22 Bender Avenue in the City of Buffalo, Erie County, New York. This document's project specifications and the Operation, Maintenance, and Monitoring (OM&M) Plan are to be consulted for guidance in preventing and quickly abating any threat to human safety or the environment. The provisions of the HASP were developed in general accordance with 29 CFR 1910 and 29 CFR 1926 and do not replace or supersede any regulatory requirements of the USEPA, NYSDEC, OSHA or and other regulatory body. Furthermore, should the nature of the field activities and/or the site conditions warrant modifications or additions to this HASP, an addendum shall be prepared and issued by a qualified health and safety professional.

2.0 RESPONSIBILITIES

This HASP presents guidelines to minimize the risk of injury to project personnel, and to provide rapid response in the event of injury. The HASP is applicable only to activities of personnel implementing the OM&M Plan. It is the responsibility of said persons to follow the requirements of this HASP, and all applicable safety procedures. The Project Manager shall implement the provisions of this HASP for the duration of the applicable activities.

3.0 ACTIVITIES COVERED

The activities covered under this HASP include the following:

- Management of remediation activities
- Environmental monitoring
- Management of excavated soil and fill
- Management of groundwater, surface water, and excavation water
- Installation of engineering controls (i.e., site cover)

4.0 WORK AREA ACCESS AND SITE CONTROLS

The contractor(s) will have primary responsibility for work area access and site control.

5.0 POTENTIAL HEALTH AND SAFETY HAZARDS

This section lists some potential health and safety hazards that project personnel may encounter at the Project Site and some actions to be implemented by approved personnel to control and reduce the associated risk to health and safety. This is not intended to be a complete listing of any and all potential health and safety hazards. New or different hazards may be encountered as site environmental and site work conditions change. The suggested actions to be taken under this plan are not to be substituted for good judgment on the part of project personnel. At all times, the Site Safety Officer has responsibility for site safety and his or her instructions must be followed.

5.1 Hazards Due to Heavy Machinery

Potential Hazard:
Heavy machinery including trucks, excavators, backhoes, etc. may be in operation at the Project Site. The presence of such equipment presents the danger of being struck or crushed. Use caution when working near heavy machinery.

Protective Action:
Make sure that operators are aware of your activities, and heed operator's instructions and warnings. Wear bright colored clothing and walk safe distances from heavy equipment. A hard hat, safety glasses, and steel toe shoes are required.

5.2 Cuts, Punctures, and Other Injuries

Potential Hazard:
In any work site there is the potential for the presence of sharp or jagged edges on rock, metal materials, and other sharp objects. Serious cuts and punctures can result in loss of blood and infection.

Protective Action:
The Project Manager is responsible for making First Aid supplies available at the work site to treat minor injuries. The Site Safety Officer is responsible for arranging the transportation of authorized on-site personnel to medical facilities when First Aid treatment in not sufficient. Do not move seriously injured workers. All injuries requiring treatment are to be reported to the Project Manager. Serious injuries are to be reported immediately to the Site Safety Officer.

5.3 Injury Due to Exposure of Chemical Hazards

Potential Hazards:
Lead from soils or groundwater may be encountered during inspection and sampling activities at the Project Site. Exposure to lead can cause anemia, weakness, and brain and kidney damage.

Protective Action:
Employees that will encounter soils or groundwater will be required to be in level D personal protective equipment (PPE).

5.4 Injury Due to Extreme Hot or Cold Weather Conditions

Potential Hazards:
Extreme hot weather conditions can cause heat exhaustion, heat stress and heat stroke or extreme cold weather conditions can cause hypothermia.

Protective Action:
Precaution measures should be taken such as dress appropriately for the weather conditions and drink plenty of fluid. If personnel should suffer from any of the above conditions, proper techniques should be taken to cool down or heat up the body and taken to the nearest hospital if needed.

6.0 WORK ZONES

In the event that conditions warrant establishing various work zones (i.e., based on hazards - Section 5.0), the following work zones should be established:

Exclusion Zone (EZ):
The EZ will be established in the immediate vicinity and adjacent downwind direction of site activities that elevate breathing zone VOC and/or dust concentrations to unacceptable levels based on field screening. These site activities include contaminated soil excavation and soil sampling activities. If access to the site is required to accommodate non-project related personnel then an EZ will be established by constructing a barrier around the work area (yellow caution tape and/or construction fencing). The EZ barrier shall encompass the work area and any equipment staging/soil staging areas necessary to perform the associated work. The contractor(s) will be responsible for establishing the EZ and limiting access to approved personnel. Depending on the condition for establishing the EZ, access to the EZ may require adequate PPE (e.g., Level C).

Contaminant Reduction Zone (CRZ):
The CRZ will be the area where personnel entering the EZ will don proper PPE prior to entering the EZ and the area where PPE may be removed. The CRZ will also be the area where decontamination of equipment and personnel will be conducted as necessary.

7.0 DECONTAMINATION PROCEDURES

Upon leaving the work area, approved personnel shall decontaminate footwear as needed. Under normal work conditions, detailed personal decontamination procedures will not be necessary. Work clothing may become contaminated in the event of an unexpected splash or spill or contact with a contaminated substance. Minor splashes on clothing and footwear can be rinsed with clean water. Heavily contaminated clothing should be removed if it cannot be rinsed with water. Personnel assigned to this project should be prepared with a change of clothing whenever on site.

Personnel will use the contractor's disposal container for disposal of PPE.

8.0 PERSONAL PROTECTIVE EQUIPMENT

Generally, Project Site conditions at this work site require level of protection of Level D or modified Level D. If necessary, air monitoring will be conducted to determine if up-grading to Level C PPE is required (refer to Section 9.0). Descriptions of the typical safety equipment associated with Level D and Level C are provided below:

Level D:
Hard hat, safety glasses, rubber nitrile sampling gloves, steel toe construction grade boots, etc.

Level C:
Level D PPE and full or ½-face respirator and tyvek suit (if necessary). [*Note: Organic vapor cartridges are to be changed after each 8 hours of use or more frequently.*]

9.0 AIR MONITORING

According to 29 CFR 1910.120(h), air monitoring shall be used to identify and quantify airborne levels of hazardous substances and health hazards in order to determine the appropriate level of employee protection required for personnel working onsite. Air monitoring will be conducted during intrusive activities that break the Site cover system and/or disturb underlying soil/fill materials at the Site.

The Air Monitor will utilize a PID to screen the ambient air in the work areas for total VOCs and a DustTrak™ Model 8520 aerosol monitor or equivalent for measuring particulates. Work area ambient air will generally be monitored in the work area and downwind of the work area. Air monitoring of the work areas and downwind of the work areas will be performed at least every 60 minutes or more often using a PID, and the DustTrak meter.

If sustained PID readings of greater than 25 ppm are recorded in the breathing zone, then either personnel are to leave the work area until satisfactory readings are obtained or approved personnel may re-enter the work areas wearing at a minimum a ½ face respirator with organic vapor cartridges for an 8-hour duration (i.e., upgrade to Level C PPE). Organic vapor cartridges are to be changed after each 8 hours of use or more frequently, if necessary. If PID readings are sustained, in the work area, at levels above 25 ppm for a 5 minute average, work will be stopped immediately until safe levels of VOCs are encountered or additional PPE will be required (i.e., Level B).

If dust concentrations exceed the upwind concentration by 150 µg/m^3 (0.15 mg/m^3) consistently for a 10 minute period within the work area or at the downwind location, then personnel may not re-enter the work area until dust concentrations in the work area decrease below 150 µg/m^3 (0.15 mg/m^3), which may be accomplished by the construction manager implementing dust control or suppression measures.

If ground intrusive activities are conducted at more than one location simultaneously, additional upwind and downwind perimeter sampling will be completed.

10.0 EMERGENCY ACTION PLAN

In the event of an emergency, employees are to turn off and shut down all powered equipment and leave the work areas immediately. Employees are to walk or drive out of the Site as quickly as possible and wait at the assigned 'safe area'. Follow the instructions of the Site Safety Officer.

Employees are not authorized or trained to provide rescue and medical efforts. Rescue and medical efforts will be provided by local authorities.

11.0 MEDICAL SURVEILLANCE

Medical surveillance will be provided to all employees who are injured due to overexposure from an emergency incident involving hazardous substances at this site.

12.0 EMPLOYEE TRAINING

Personnel who are not familiar with this site plan will receive training on its entire content and organization before working at the Site.