Site Management Plan

Honeywell, Inc. – Buffalo Research Laboratory
Buffalo, Erie County, New York

NYSDEC Site Number 915002
USEPA ID# NYD000632315

Prepared by:

GHD | 2055 Niagara Falls Boulevard Niagara Falls New York 14304

11110229 | Report No 3 | June 2019

Site Management Plan approved by NYSDEC in December 2013
Revisions to Final Approved Site Management Plan

Revision No.	Date Submitted	Summary of Revision	NYSDEC Approval Date
Original	March 2013	Soil Management Report requirement	12/6/2013
1		Modification to cover descriptions, new Environmental Easement, and new layout of SMP and EWP	05/23/2019

Certification Statement

I Richard J. Snyder certify that I am currently a NYS registered professional engineer as in defined in 6 NYCRR Part 375 and that this Site Management Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

Richard J. Snyder P.E.

June 5, 2019 Date

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List of Acronyms

ASP	Analytical Services Protocol
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CAMP	Community Air Monitoring Plan
CFR	Code of Federal Regulation
CLP	Contract Laboratory Program
DER	Division of Environmental Remediation
EC	Engineering Control
ECL	Environmental Conservation Law
ELAP	Environmental Laboratory Approval Program
EWP	Excavation Work Plan
HASP	Health and Safety Plan
IC	Institutional Control
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYCRR	New York Codes, Rules, and Regulations
O&M	Operation and Maintenance
OSHA	Occupational Safety and Health Administration
PID	Photoionization Detector
PRP	Potentially Responsible Party
PRR	Periodic Review Report
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
RCRA	Resource Conservation and Recovery Act
RP	Remedial Party
SCO	Soil Cleanup Objective
SMP	Site Management Plan
SPDES	State Pollutant Discharge Elimination System
TAL	Target Analyte List
TCL	Target Compound List
TCLP	Toxicity Characteristic Leachate Procedure
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank

Executive Summary

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

Site Identification:	NYSDEC Site No. 915002 USEPA ID No. NYD000632315 Honeywell, Inc. - Buffalo Research Laboratory 20 Peabody Street Buffalo, New York
Institutional Controls (per the March 7, 2017 Environmental Easement):	1. The Controlled Property may be used for Industrial purposes as described in 6NYCRR Part 375-1.8(g)(2)(iv).
	2. All Engineering Controls must be operated and maintained as specified in this Site Management Plan (SMP).
	3. All Engineering Controls must be inspected at a frequency and in a manner defined in this SMP.
	4. The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the Erie County Department of Health to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the Department.
	5. Groundwater and other environmental or public health monitoring must be performed as defined in this SMP.
	6. Data and information pertinent to Site Management of the Controlled Property must be reported at the frequency and in a manner defined in this SMP.
	7. All future activities on the property that will disturb remaining contaminated material must be conducted in accordance with this SMP.
	8. Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in this SMP.

Institutional Controls (per the March 7, 2017 Environmental Easement):	9. Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical components of the remedy shall be performed as defined in this SMP.
	10. Access to the Site must be provided to agents, employees, or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by the Environmental Easement.
	11. The Controlled Property shall not be used for Residential, Restricted Residential, or Commercial purposes as defined in 6NYCRR 375-1.8(g)(i), (ii), and (iii), and the above-stated engineering controls may not be discontinued without an amendment or extinguishment of the Environmental Easement.
	12. The SMP describes obligations that the Grantor assumes on behalf of Grantor, its successors and assigns. The Grantor's assumption of the obligations contained in this SMP, which may include sampling, monitoring, and/or operating a treatment system, and providing certified reports to the NYSDEC, is and remains a fundamental element of the Department's determination that the Controlled Property is safe for a specific use, but not all uses. This SMP may be modified in accordance with the Department's statutory and regulatory authority. The Grantor and all successors and assigns, assume the burden of complying with this SMP and obtaining an up-to-date version of this SMP from Site Control Section, Division of Environmental Remediation, NYSDEC, 625 Broadway, Albany, New York 12233, Phone (518) 402-9553.
	13. Grantor must provide all persons who acquire any interest in the Controlled Property a true and complete copy of this SMP that the Department approves for the Controlled Property and all Department-approved amendments to this SMP.

Institutional Controls (per the March 7, 2017 Environmental Easement):	14. Grantor covenants and agrees that until such time as the Environmental Easement is extinguished in accordance with the requirements of ECL Article 71, Title 36 of the ECL, the property deed and all subsequent instruments of conveyance relating to the Controlled Property shall state in at least fifteen-point bold-faced type: "This property is subject to an Environmental Easement held by the New York State Department of Environmental Conservation pursuant to Title 36 of Article 71 of the Environmental Conservation Law."
	15. Grantor covenants and agrees that the Environmental Easement shall be incorporated in full or by reference in any leases, licenses, or other instruments granting a right to use the Controlled Property.
	16. Grantor covenants and agrees that it shall, at such time as NYSDEC may require, submit to NYSDEC a written statement by an expert the NYSDEC may find acceptable certifying under penalty of perjury, in such form and manner as the Department may require, that 1) the inspection of the Site to confirm the effectiveness of the institutional and engineering controls required by the remedial program was performed under the direction of the individual set forth at 6 NYCRR Part 375-1.8(h)(3); (2) the institutional controls and/or engineering controls employed at such Site i) are in the place; ii) are unchanged from the previous certification, or that any identified changes to the controls employed were approved by the NYSDEC and that all controls are in the Department-approved format; and iii.) that nothing has occurred that would impair the ability of such control to protect the public health and the environment; (3) the owner will continue to allow access to such real property to evaluate the continued maintenance of such controls; (4) nothing has occurred that would constitute a violation or failure to comply with any site management plan for such controls; (5) the report and all attachments were prepared under the direction of, and reviewed by, the party making the certification; (6) to the best of his/her knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the site remedial program, and generally accepted engineering practices; and (7) the information presented is accurate and complete.

Engineering Controls:	1. The Site cover consists of grass, gravel, asphalt, concrete, and buildings. There will be no exposed soil meeting or exceeding the NYSDEC-approved Site action level of 24 mg/kg for arsenic. Such surface cover is required over all areas of the Site except in those areas in which the concentration of arsenic in the surface soil (depths of 0 to 2.0 feet below ground surface) has been shown to be below the NYSDEC-approved Site action level of 24 mg/kg through previous sampling and analysis.
	2. In the event of demolition of a building or paved area without replacement or restoration, the Excavation Work Plan will be implemented as appropriate and the area will be reseeded (manual seeding, hydro-seeding, etc.) with an appropriate grass mixture or the area will be covered by gravel. Disturbed soil below building or paved area (0 to 2.0 feet below ground surface) with total arsenic concentration of less than 24 mg/kg may be re-used on-site.
	3. Groundwater monitoring activities are required to confirm that arsenic and VOC groundwater contamination is isolated and not migrating. Annual monitoring will also provide a means to monitor for concentrations of barium, which is included based on previously detected low levels in Site groundwater samples. Monitoring will continue until permission to discontinue is granted in writing by the NYSDEC. If groundwater contaminant levels become asymptotic at a level that is acceptable to the NYSDEC, the need for additional monitoring will be evaluated.
Inspections:	**Frequency**
Site-wide inspection	Annually
Cover inspection	Quarterly (2013 through 2018) and then annually (starting in 2019)
Monitoring:	
Groundwater Monitoring	Annually (2013 through 2019). The Periodic Review Report generated for 2019 will propose a new groundwater monitoring frequency, based on the groundwater monitoring results for 2013 through 2019. This SMP will be updated following NYSDEC approval of the new monitoring frequency.

Maintenance:	
1. Cover maintenance	As needed
2. Monitoring Well maintenance	As needed

Reporting:	
1. Groundwater Monitoring Results	Annually, as a section in the Periodic Review Report
2. Periodic Review Report	Annually

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

1. Introduction

1.1 General

The Honeywell, Inc. Buffalo Research Laboratory facility ("facility") is located in Buffalo, New York. See Figure 1. The facility consists of four parcels addressed as 338 Elk Street, 340 Elk Street, 362 Elk Street, and 1027 Perry Street. See Figure 2. This Site Management Plan (SMP) is a required element of the remedial program for the portion of the facility consisting of the parcels addressed at 338 Elk Street, 340 Elk Street, and 1027 Perry Street. These three parcels are hereinafter referred to as the "Site". This Site Management Plan applies only to these three parcels. The Site is currently in the New York State (NYS) Resource Conservation and Recovery Act (RCRA) Corrective Action Program (Site No. 915002) which is administered by New York State Department of Environmental Conservation (NYSDEC).

Honeywell International, Inc. (Honeywell) entered into an Order on Consent and Administrative Settlement (Consent Order) on November 11, 2012 with the NYSDEC to complete corrective action post-closure requirements and to provide financial assurances for completing such post-closure requirements relative to the presence of arsenic in surface soils at concentrations above background levels. The arsenic contamination was identified during a RCRA Facility Assessment (RFA) completed at the Site in 1993. The corrective action post-closure requirements were to be completed in lieu of obtaining a post-closure permit. A figure showing the Site location and boundaries of the Site is provided in Figure 2. The boundaries of the Site are more fully described in the metes and bounds site description that is part of the Environmental Easement provided in Appendix A.

As the NYSDEC did not require remedial action relative to the identified arsenic contamination, areas of arsenic-impacted surface soils remain at the Site, which is hereafter referred to as "remaining contamination". The remaining contamination is defined as areas in which arsenic concentrations in surface soils meet or exceed the Site action level of 24 mg/kg at depths of 0 to 2.0 feet below ground surface (ft. bgs). Soil samples analyzed during historical investigations associated with the RCRA Facility Assessment were collected from locations strategically chosen in or near areas that would most likely exhibit contamination from past management practices. Therefore, there is the potential that additional areas exist where arsenic concentrations exceed the Site action level of 24 mg/kg since the entire Site was not characterized during the previous historical investigations. Institutional and Engineering Controls (ICs and ECs) are required by the Consent Order to control exposure to remaining contamination (including potential remaining contamination) to ensure protection of public health and the environment. An Environmental Easement granted to the NYSDEC, and recorded with the Erie County Clerk on March 7, 2017, requires compliance with this SMP and all ECs and ICs placed on the Site.

This SMP was prepared to manage remaining contamination at the Site until the Environmental Easement is extinguished in accordance with ECL Article 71, Title 36. **This SMP, all ECs and ICs, and the Environmental Easement apply to all surface soils (0 to 2 ft. bgs) at the Site, not just areas in which elevated concentrations of arsenic have been identified, as there is the potential that additional areas of arsenic-impacted surface soils that exceed the Site action**

level exist on-Site which have not yet been identified. Specifically, all areas of the Site must be covered unless the arsenic concentration in surface soil has been shown to be below the Site action level. The Site cover consists of grass, gravel, asphalt, concrete, and buildings.

This plan has been approved by the NYSDEC, and compliance with this plan is required by the grantor of the Environmental Easement and the grantor's successors and assigns. This SMP may only be revised with the approval of the NYSDEC.

It is important to note that:

- This SMP details the Site-specific implementation procedures that are required by the Environmental Easement. Failure to properly implement the SMP is a violation of the Environmental Easement.
- Failure to comply with this SMP is also a violation of Environmental Conservation Law, 6NYCRR Part 375 and the Order on Consent (Index #B9-0853-13-05; Site #915002) for the Site, and thereby subject to applicable penalties.

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

This SMP was initially prepared by Conestoga-Rovers & Associates (CRA) in March 2013 (draft), revised in October 2013, and approved by the NYSDEC on December 6, 2013. It was updated by GHD in August 2017, on behalf of Honeywell, in accordance with the requirements of the NYSDEC's DER-10 ("Technical Guidance for Site Investigation and Remediation"), dated May 2010, and the guidelines provided by the NYSDEC. This SMP addresses the means for implementing the Institutional Controls (ICs) and/or Engineering Controls (ECs) that are required by the Environmental Easement for the Site.

1.2 Revisions

Revisions to this plan will be proposed in writing to the NYSDEC's project manager. Revisions will be necessary upon, but not limited to, the following occurring:

- A change in media monitoring requirements
- Addition of a remedial system
- Removal of contaminated sediment or soil
- Other significant change to the Site conditions

In accordance with the Environmental Easement for the Site, the NYSDEC will provide a notice of any approved changes to the SMP, and append these notices to the SMP that is retained in its files.

1.3 Notifications

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

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

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

- At least 60 days prior to the change, the NYSDEC will be notified in writing of the proposed change. This will include a certification that the prospective purchaser/Remedial Party has been provided with a copy of the Order on Consent, and all approved work plans and reports, including this SMP.
- Within 15 days after the transfer of all or part of the Site, the new owner's name, contact representative, and contact information will be confirmed in writing to the NYSDEC.

Table 1 includes contact information for the above notification. The information on this table will be updated as necessary to provide accurate contact information. A full listing of Site-related contact information is provided in Appendix B. Should contact information change, Honeywell will submit a letter to the NYSDEC notifying them of the change. This SMP will not need to be resubmitted for NYSDEC approval based on a change in contact information.

Table 1: Notifications*

Name	Contact Information
Joshua M. Vaccaro	(716) 851-7220 joshua.vaccaro@dec.ny.gov
Stanley Radon, P.G.	(716) 851-7220 stanley.radon@dec.ny.gov
NYSDEC Site Control	(518) 402-9553

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

1.4 Contingency Plan

Emergencies may include injury to personnel, fire or explosion, environmental release, or serious weather conditions. In the event of any environmentally related situation or unplanned occurrence

requiring assistance, the Owner or Owner's representative(s) should contact the appropriate party from the contact list below. For emergencies, appropriate emergency response personnel should be contacted. These emergency contact lists must be maintained in an easily accessible location at the Site.

Table 2: Emergency Contact List

Organization/Name	Title/Location	Telephone
Medical, Fire, and Police		911
South Buffalo Mercy Hospital	565 Abbott Road, Buffalo, NY	716-826-7000
One Call Center (3-day notice required for utility markout)		800-272-4480
Poison Control Center		800-222-1222
National Response Center (Pollution/Toxic Chemical/Oil Spills)		800-424-8802
NYSDEC Spills Hotline		800-457-7362
Owner	Honeywell International, Inc. 20 Peabody Street Buffalo, NY 14210 Robert Sikorski, Site Leader	716-827-6318
Responsible Party	Honeywell International, Inc. 20 Peabody Street Buffalo, NY 14210 Robert Sikorski, Site Leader	716-827-6318
Honeywell's Consultant	GHD 2055 Niagara Falls Boulevard Niagara Falls, NY 14304 Mr. Dennis Hoyt	716-297-6150

In the case of an emergency, South Buffalo Mercy Hospital is the nearest health facility to the Site. The hospital is located at 565 Abbott Road, Buffalo, New York, a distance of approximately 2.4 miles (7 minutes).

2. Summary of Previous Investigations and Final Corrective Actions

2.1 Site Location and Description

The Honeywell Buffalo Research Lab facility is located in the City of Buffalo, Erie County, New York. The portion of the facility that is subject to this Site Management Plan, referred to as the "Site," consists of three parcels identified on the City of Buffalo Tax Map as the following (see Figure 2):

- Section 122.12, Block 1, Lot 7.2, addressed as 338 Elk Street (1.24 acres)
- Section 122.12, Block 1, Lot 7.1, addressed as 340 Elk Street (6.85 acres)
- Section 122.12, Block 1, Lot 3, addressed as 1027 Perry Street (0.97 acres)

The Site is an approximately 9.06-acre area and is bounded by Perry Street to the north, Elk Street to the south, Peabody Street to the east, and railroad tracks to the west (see Figure 2). Interstate I-190 is located to the north of the Site, and the nearest body of water is the Buffalo River, located approximately one-fourth to one-half mile south of the Site. The boundaries of the Site are more fully described in Appendix A–Environmental Easement. The owner of the Site parcels at the time of issuance of this revised SMP is Honeywell.

2.2 Physical Setting

2.2.1 Land Use

The Site consists of eight buildings utilized by Honeywell as a research laboratory. The facility became operational in the mid-1950s and currently conducts advanced research and development on a variety of organic and inorganic chemicals. The Site is zoned for industrial use.

The properties adjoining the Site and in the neighborhood surrounding the Site primarily include residential and industrial properties. The properties immediately south of the Site include industrial properties; the properties immediately north of the Site include residential and industrial properties; the properties immediately east of the Site include residential and vacant properties and a Honeywell parking lot; and the properties to the west of the Site include residential and industrial properties.

2.2.2 Geology

The Site is underlain by fill materials ranging in thickness from 2 to 7 feet below ground surface (ft. bgs). The fill consists of gray to black silty sand and gravel with varying amounts of slag and miscellaneous materials. Fill materials are underlain by a zone of interbedded lacustrine deposits, which extend to a depth of approximately 10 ft. bgs. Underlying the interbedded lacustrine deposits is a glaciofluvial clay unit extending to a depth of approximately 34 ft. bgs.

2.3 Previous Investigations

The following narrative provides a Site history and a brief summary of the available project records to document key investigative milestones for the Site. Full titles for each of the reports referenced below are provided in Section 9 - References.

On October 19, 1992, the NYSDEC issued a RCRA permit (Permit) for the Facility in accordance with Section 6 of the New York Codes, Rules and Regulations (6NYCRR) Article 27, Title 9. A RCRA Facility Assessment (RFA)[1] was completed by Remcor in 1993 to determine if a release of hazardous constituents had occurred from any Facility Solid Waste Management Units (SWMUs) or Areas of Concern (AOCs).

The findings of the RFA indicated the presence of certain hazardous constituents at low concentrations but above background concentrations in media samples collected and analyzed from the Facility. Based on the results of the RFA, the United States Environmental Protection Agency (USEPA) and NYSDEC concluded[2] that a RCRA Facility Investigation (RFI) was required pursuant to the Part B permit. Samples collected in the RFI were tested for constituents of interest, which were determined based on the results of the RFA and the historic activities at the facility.

The Part B Permit identified seven Project Tasks to be implemented pursuant to completion of an RFI. These tasks included:

- Task I Description of Current Conditions
- Task II Pre-Investigation Evaluation of Corrective Measures Technologies
- Task III RFI Management Plans
- Task IV Facility Investigation (RFI Work Plan)
- Task V Investigation Analysis
- Task VI Laboratory and Bench-Scale Studies
- Task VII Reporting

The Current Conditions Report (CCR)[3], completed as Project Task I, was submitted to NYSDEC and USEPA Region II on March 7, 1994. The Pre-Investigation Evaluation of Corrective Measures Technologies[4], Project Task II, was submitted concurrent with the RFI Work Plan[5] on April 6, 1994. The RFI Work Plan satisfied the requirements of Tasks III, IV, and V of the permit.

[1] Remcor, Inc., August 11, 1993, "Report, Field Sampling and Analysis Activities, RCRA Facility Assessment, AlliedSignal Inc., Buffalo, New York," prepared for AlliedSignal, Inc. Buffalo, New York.

[2] New York State Department of Environmental Conservation, Bureau of Western Hazardous Waste Programs, and United States Environmental Protection Agency Region II, December 7, 1993, "Notification to Conduct a RCRA Facility Investigation (RFI)," correspondence to AlliedSignal, Inc.

[3] Remcor, Inc., March 7, 1994, "Current Conditions Report, AlliedSignal Inc., Buffalo Research Laboratory," AlliedSignal, Inc., Buffalo, New York.

[4] Remcor, Inc., April 6, 1994, "Pre-Investigation Evaluation of Corrective Measures Technologies, AlliedSignal, Inc., Buffalo Research Laboratory," AlliedSignal, Inc., Buffalo, New York

[5] Remcor, Inc., April 6, 1994, "RCRA Facility Investigation Work Plan, AlliedSignal, Inc., Buffalo Research Laboratory," AlliedSignal, Inc., Buffalo, New York.

The RFI Report[6], Project Task VII, was submitted to the NYSDEC and USEPA on May 18, 1995. The NYSDEC and USEPA reviewed the report and issued comments in a letter dated August 25, 1995[7]. Harding Lawson Associates (HLA) responded to the NYSDEC comments in a letter dated December 19, 1995[8]. NYSDEC reviewed HLA's response to comments and approved supplemental sampling activities in a letter dated January 22, 1996[9]. HLA prepared a Supplemental Sampling and Analysis Plan[10] dated March 8, 1996, to conduct additional sampling in accordance with the NYSDEC comments. The supplemental sampling was completed and a letter report[11] presenting the findings of the supplemental sampling and finalizing the RFI report was submitted to the NYSDEC on August 6, 1996. NYSDEC reviewed the results of the supplemental sampling and concluded, in a letter dated September 12, 1996[12], that a Corrective Measures Study (CMS) should be completed in accordance with the requirements of the RCRA Permit.

The RFI concluded that the only Constituent of Concern at the Facility, which required further action, was arsenic in surface soil. As a result, a CMS was completed by HLA in January 1997 to evaluate several potential remedial alternatives with respect to arsenic in on-Site soils. The CMS Report[13] presented the evaluation of the following remedial alternatives:

- No Action (based on a Site-specific risk assessment)
- Excavation and disposal
- Containment by placement of topsoil
- Containment by placement of asphalt pavement
- Isolation through installation of a fence

Based on the findings of the CMS Report and the industrial nature of current and anticipated future Facility operations, a No Action remedial alternative was recommended for implementation. The NYSDEC reviewed the CMS Report and concurred, "The contamination currently does not pose a threat to human health and the environment."

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[6] Remcor, Inc., May 18, 1995, "RCRA Facility Investigation Report, AlliedSignal, Inc. Buffalo Research Laboratory," AlliedSignal, Inc., Buffalo, New York.

[7] New York State Department of Environmental Conservation, August 25, 1995, NYSDEC Comments, RCRA Facility Investigation Report, AlliedSignal, Inc., Buffalo Research Laboratory," correspondence to AlliedSignal, Inc., Buffalo, New York.

[8] Harding Lawson Associates, December 19, 1995, "Response to NYSDEC Comments, RCRA Facility Investigation Report, AlliedSignal, Inc., Buffalo Research Laboratory," correspondence to NYSDEC.

[9] New York State Department of Environmental Conservation, January 22, 1996, "RCRA Facility Investigation Report-Comment Response," correspondence to AlliedSignal, Inc.

[10] Harding Lawson Associates, March 8, 1996, "Supplemental Sampling and Analysis Plan, RCRA Facility Investigation, AlliedSignal, Inc., Buffalo Research Laboratory," prepared for AlliedSignal Inc., Buffalo, New York.

[11] Harding Lawson Associates, August 6, 1996, "Completion of Supplemental Sampling and Analysis, RCRA Facility Investigation – AlliedSignal, Inc. Buffalo Research Laboratory," correspondence to NYSDEC prepared for AlliedSignal, Inc., Buffalo, New York.

[12] New York State Department of Environmental Conservation, September 12, 1996, "Supplemental Sampling and Analysis – RCRA Facility Investigation," correspondence to AlliedSignal, Inc., Buffalo, New York.

[13] Harding Lawson Associates, December 8, 1997, "Corrective Measures Study, AlliedSignal, Inc., Buffalo Research Laboratory," prepared for AlliedSignal, Inc., Buffalo, New York.

2.4 Final Corrective Actions

Although the NYSDEC did not require remedial action based on the findings of the CMS Report, the NYSDEC required the implementation of several Final Corrective Measures to "ensure (the) long-term protection of human health and the environment". The Facility's Consent Order, effective November 11, 2012, included the following Final Corrective Measures:

- Development of an updated Maintenance and Inspection Plan including a detailed description and locations of all areas that are presently acting as a barrier for soils containing elevated concentrations of arsenic, inspection schedule and checklist, and contingencies and schedules for any necessary repair identified by inspections
- Development of an updated Groundwater Monitoring Plan
- Development of an updated Soil Management Plan including protocols and procedures for soil sampling, a health and safety plan (HASP), and implementation of the Plan
- Development of institutional and engineering controls in accordance with 6NYCRR 375-1.8(h)(1)
- Institutional and Engineering Control Certification in accordance with 6NYCRR 375-1.8(h)(3)

2.5 Remaining Contamination

Five general areas of known or suspected arsenic-impacted surface soils have been identified at the Site, based on the results of sampling and analyses conducted during the RFI and CMS. These areas are defined as areas in which arsenic concentrations were detected in exceedance of the Site action level of 24 mg/kg in soil samples collected from depths of 0 to 2.0 ft. bgs. Table 3 and Figure 3 summarize the areas in which surface soils have been identified as exceeding this action level.

Table 3: Summary of Arsenic-Impacted Areas

Area	Location	Arsenic Concentration (mg/kg)	Estimated Area Dimensions (feet)	Depth of Fill Bottom (feet)	Cover Materials(S)
1	North end of facility near Well MW-10	48.7 to 224	100 x 110	3.5	Grass
2	North, south, and east of Hazardous Waste Container Storage Area (SWMU) and area between Buildings 513 and 514	46.8 to 343	150 x 130	3.5 to 6.5	Grass, gravel, concrete, and asphalt
3	Near southeast corner of Building 515 (at Well MW-9)	97.2	50 x 30	2	Asphalt
4	Southern section of Drum Staging Area, south to Building 517	26.4 to 113	80 x 160	4 to 6	Asphalt, concrete, and grass
5	Southwest corner of Site near corner of fence to Building 509 to asphalt road	45.6	120 x 80	Not determined	Grass

The impacted soil is comprised of fill material present immediately below the surface pavement and/or organic soil surfaces present in the identified areas. The depth of this fill material in the impacted areas ranges from ground surface to 2.0 to 6.5 ft. bgs. Previous studies indicate that the fill material is arsenic-impacted at depths of 2 ft. bgs or less. These five areas are covered by grass, gravel, concrete, and/or asphalt.

Data regarding the arsenic-impacted surface soils were previously supplied to the NYSDEC in various investigation reports and letters. Copies of the data are available upon request. The data is summarized as follows:

- **Area 1**: Area 1 is located near monitoring well MW-10 at the north side of the Site. This area is bounded to the north and east by the existing fence and to the south and west by borings in which surface soil arsenic concentrations did not exceed 24 mg/kg. The surface cover consists of grass. The bottom of fill in this area is approximately 3.5 ft. bgs. Elevated arsenic concentrations in soil samples collected from depths of 2 ft. bgs or less range from 48.7 to 224 mg/kg.
- **Area 2**: Area 2 is located north, south, and east of the SWMU (Hazardous Waste Container Storage Area). This area extends along the northern edge of the asphalt road from the SWMU to Building 513, south to Building 514 (including the grass area between the buildings), west to the asphalt road that adjoins the SWMU, and the SWMU. The surface cover consists of areas of asphalt, gravel, and grass. The bottom of fill ranges from 3.5 to 6.5 ft. bgs. Arsenic concentrations in soil samples collected from depths of 2 ft. bgs or less ranged from 46.8 to 343 mg/kg.
- **Area 3**: Area 3 is located near the southeast corner of Building 515. This area is bounded by Building 515 and the edge of the asphalt road. The surface cover is asphalt. The bottom of fill at MW-9 is approximately 2 ft. bgs. Arsenic was detected in a sample of the fill collected from the MW-9 boring at a concentration of 97.2 mg/kg.
- **Area 4**: Area 4 includes the southern portion of the drum staging area, the asphalt road immediately east and south of the drum staging area, the area west of the unidentified building located immediately south of the drum staging area, and is bounded to the west by the existing property line fence. The surface cover in Area 4 consists of grass, concrete, and asphalt. The bottom of fill ranges from 4.0 to 6.0 ft. bgs. Arsenic concentrations in surface soil samples near the drum staging area range from 67.2 to 113 mg/kg, and in the surface soil sample collected at well MW-8, arsenic was detected at a concentration of 26.4 mg/kg.
- **Area 5**: Area 5 is located at the southwestern corner of the Site (near the location of Supplemental Investigation boring BS-7). In order to define this area, boundaries are established as the existing fence to the south and west, Building 509 to the north, and the asphalt road to the east. The surface cover consists of grass. The bottom of the fill has not been determined. Arsenic was detected at a concentration of 45.6 mg/kg in a soil sample collected from BS-7 at a depth of approximately 0 to 0.5 ft. bgs.

Soil samples analyzed during the RFI and CMS were collected from locations strategically chosen in or near areas that would most likely exhibit contamination from past management areas. Therefore, the five areas listed above represent only the known or suspected areas of arsenic contamination in surface soils. There is the potential that additional areas of arsenic-impacted surface soil exist at the Site that have not yet been identified.

The RFI concluded that the only Constituent of Concern at the Site requiring further action was arsenic in surface soil; however, volatile organic compounds (VOCs), arsenic, and barium were found to be present in groundwater. Groundwater monitoring activities are required to confirm that arsenic and VOC groundwater contamination is isolated and not migrating. The annual groundwater

monitoring will also provide a means to monitor for concentrations of barium. Barium is included in monitoring of groundwater based on previously detected, low levels in Site groundwater samples.

3. Institutional and Engineering Control Plan

3.1 General

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

3.2 Institutional Controls

A series of ICs is required by the Consent Order to:

1. Implement, maintain and monitor Engineering Control systems
2. Prevent future exposure to remaining contamination
3. Limit the use and development of the Site to industrial uses only

Adherence to these ICs on the Site is required by the Environmental Easement and will be implemented under this SMP. ICs identified in the Environmental Easement may not be discontinued without an amendment to or extinguishment of the Environmental Easement. The IC boundaries are shown on Figure 2, and are identical to the Site boundaries. Note that the Honeywell parking lot located on the 362 Elk Street parcel is not part of the Site as defined by the Environmental Easement, and is therefore not subject to the ICs and ECs outlined in the SMP and the Easement.

The ICs set forth in the Environmental Easement are:

- The Controlled Property may be used for Industrial purposes as described in 6 NYCRR Part 375-1.8(g)(2)(iv).
- All Engineering Controls must be operated and maintained as specified in this Site Management Plan (SMP).
- All Engineering Controls must be inspected at a frequency and in a manner defined in this SMP.
- The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the Erie County Department of Health to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the Department.
- Groundwater and other environmental or public health monitoring must be performed as defined in this SMP.
- Data and information pertinent to Site Management of the Controlled Property must be reported at the frequency and in a manner defined in this SMP.

- All future activities on the property that will disturb remaining contaminated material must be conducted in accordance with this SMP.
- Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in this SMP.
- Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical components of the remedy shall be performed as defined in this SMP.
- Access to the Site must be provided to agents, employees, or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by the Environmental Easement.
- The Controlled Property shall not be used for Residential, Restricted Residential, or Commercial purposes as defined in 6NYCRR 375-1.8(g)(i), (ii), and (iii), and the above-stated engineering controls may not be discontinued without an amendment or extinguishment of the Environmental Easement.
- This SMP describes obligations that the Grantor assumes on behalf of Grantor, its successors and assigns. The Grantor's assumption of the obligations contained in this SMP, which may include sampling, monitoring, and/or operating a treatment system, and providing certified reports to the NYSDEC, is and remains a fundamental element of the Department's determination that the Controlled Property is safe for a specific use, but not all uses. This SMP may be modified in accordance with the Department's statutory and regulatory authority. The Grantor and all successors and assigns, assume the burden of complying with this SMP and obtaining an up-to-date version of the SMP from Site Control Section, Division of Environmental Remediation, NYSDEC, 625 Broadway, Albany, New York 12233, Phone (518) 402-9553.
- Grantor must provide all persons who acquire any interest in the Controlled Property a true and complete copy of this SMP that the Department approves for the Controlled Property and all Department-approved amendments to this SMP.
- Grantor covenants and agrees that until such time as the Environmental Easement is extinguished in accordance with the requirements of ECL Article 71, Title 36 of the ECL, the property deed and all subsequent instruments of conveyance relating to the Controlled Property shall state in at least fifteen-point bold-faced type: "This property is subject to an Environmental Easement held by the New York State Department of Environmental Conservation pursuant to Title 36 of Article 71 of the Environmental Conservation Law."
- Grantor covenants and agrees that the Environmental Easement shall be incorporated in full or by reference in any leases, licenses, or other instruments granting a right to use the Controlled Property.
- Grantor covenants and agrees that it shall, at such time as NYSDEC may require, submit to NYSDEC a written statement by an expert the NYSDEC may find acceptable certifying under penalty of perjury, in such form and manner as the Department may require, that

  (1) The inspection of the Site to confirm the effectiveness of the institutional and engineering controls required by the remedial program was performed under the direction of the individual set forth at 6 NYCRR Part 375-1.8(h)(3)

(2) The institutional controls and/or engineering controls employed at such Site

i) Are in the place

ii) Are unchanged from the previous certification, or that any identified changes to the controls employed were approved by the NYSDEC and that all controls are in the Department-approved format

iii) That nothing has occurred that would impair the ability of such control to protect the public health and the environment

(3) The owner will continue to allow access to such real property to evaluate the continued maintenance of such controls

(4) Nothing has occurred that would constitute a violation or failure to comply with any site management plan for such controls

(5) The report and all attachments were prepared under the direction of, and reviewed by, the party making the certification

(6) To the best of his/her knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the site remedial program, and generally accepted engineering practices

(7) The information presented is accurate and complete

3.3 Engineering Controls

The purpose of the ECs is to eliminate the potential for human contact with impacted soil and to eliminate the potential for contaminated runoff from the Site. The ECs as identified by the NYSDEC include:

The Site cover consists of grass, gravel, asphalt, concrete, and buildings. There will be no exposed soil meeting or exceeding the NYSDEC-approved Site action level of 24 mg/kg for arsenic. Such surface cover is required over all areas of the Site except in areas in which the concentration of arsenic in the surface soil has been shown to be below the NYSDEC-approved Site action level of 24 mg/kg through previous sampling events. Specifically, all areas of the Site must be covered unless the arsenic concentration in surface soil has been shown to be below the Site action level.

- In the event of demolition of a building or paved area without replacement or restoration, the Excavation Work Plan will be implemented as appropriate and the area will be reseeded (manual seeding, hydro-seeding, etc.) with an appropriate grass mixture or the area will be covered by gravel. Disturbed soil below building or paved area (0 to 2.0 ft. bgs) with total arsenic concentration of less than 24 mg/kg may be re-used on-site.
- Groundwater monitoring activities are required to confirm that arsenic and VOC groundwater contamination is isolated and not migrating. Annual monitoring will also provide a means to monitor for concentrations of barium, which is included based on previously detected low levels in Site groundwater samples. Monitoring will continue until permission to discontinue is granted in writing by the NYSDEC. If groundwater contaminant levels become asymptotic at a level that is acceptable to the NYSDEC, the need for additional monitoring will be evaluated.

3.3.1 Site Cover

Exposure to remaining contamination at the Site is prevented by grass/gravel cover, asphalt pavement and concrete-covered areas, and concrete building slabs. Such surface cover is required over all areas of the Site except in areas in which the concentration of arsenic in the surface soil has been shown to be below the NYSDEC-approved Site action level of 24 mg/kg, based on sampling results. Areas 1 through 5 (Table 3 and Figure 3) are areas of known or suspected arsenic concentrations in surface soil that meet or exceed the Site action level, based on soil sampling conducted during the RFI and CMS, and therefore must remain covered. However, as these historical investigations only focused on areas of the Site with the greatest potential for contamination, additional areas of arsenic-impacted surface soils may exist on-Site which have not yet been identified; therefore, all areas of the Site must be covered unless the arsenic concentration in surface soil has been shown to be below the Site action level.

Figure 3 depicts the areas of the Site that are covered by grass, gravel, concrete, asphalt pavement, and buildings. In the event of demolition of a building or paved area without replacement or restoration, the Excavation Work Plan will be implemented as appropriate and the area will be reseeded (manual seeding, hydro-seeding, etc.) with an appropriate grass mixture or gravel cover will be placed. Disturbed soil below building or paved area (0 to 2.0 ft. bgs) with total arsenic concentration of less than 24 mg/kg may be re-used on-site.

The Excavation Work Plan (EWP) provided in Appendix C outlines the procedures required to be implemented during all intrusive subsurface activities at the Site and in the event the Site cover is breached, penetrated or temporarily removed, and any underlying remaining contamination or potential remaining contamination is disturbed. Procedures for the inspection and maintenance of the Site cover are provided in the Site Monitoring Plan and Cover Repair procedures included in Sections 4 and 7 of this SMP, respectively. In accordance with Section 1.9 of NYSDEC DER-10, any work conducted pursuant to the EWP or any investigation or remediation activity must also be conducted in accordance with the health and safety procedures defined in the Health and Safety Plan (HASP) and associated Community Air Monitoring Plan (CAMP) prepared for the Site, which are located in Appendix D.

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

3.3.2 Groundwater Monitoring

Groundwater monitoring activities are required to confirm that arsenic and VOC groundwater contamination is isolated and not migrating. Annual monitoring will also provide a means to monitor for concentrations of barium, which is included based on previously detected low levels in Site groundwater samples. Monitoring will continue until permission to discontinue is granted in writing by the NYSDEC. If groundwater contaminant levels become asymptotic at a level that is acceptable to the NYSDEC, the need for additional monitoring will be evaluated.

4. Site Monitoring Plan

4.1 General

This Site Monitoring Plan describes the measures for evaluating the overall performance and effectiveness of the ICs and ECs in place to prevent exposure to arsenic-impacted surface soils at the Site. This SMP may only be revised with the approval of the NYSDEC. Details regarding the sampling procedures, data quality usability objectives, analytical methods, etc. for all samples collected as part of Site management for the Site are included in the Quality Assurance Project Plan (QAPP) located in Appendix E. This SMP describes the methods to be used for periodically evaluating Site information to confirm that the ICs and ECs continue to be effective in protecting public health and the environment.

This SMP provides information on:

- Annual Site-wide inspection
- Quarterly cover inspections (2013 through 2018), then annually starting in 2019
- Annual groundwater monitoring

4.2 Annual Site – Wide Inspection

Site-wide inspections will be performed annually. The annual Site-wide inspection will be conducted and documented according to the SMP schedule, regardless of the frequency of the Periodic Review Report. Modification to the frequency or duration of the inspections will require approval from the NYSDEC. This SMP may be modified to reflect changes approved by the NYSDEC. During the Site-wide inspection, a Site-wide inspection form will be completed as provided in Appendix F – Site Management Forms. The form will compile sufficient information to assess and document the following:

- General Site conditions at the time of the inspection and a description of any Site management or maintenance activities being conducted
- Compliance with the SMP, the Environmental Easement, and all ICs, including Site usage
- An evaluation of the condition and continued effectiveness of ECs
- A determination if the ICs and ECs continue to be protective of human health and the environment
- Confirmation that Site records are up to date

Inspections will also be performed in the event of an emergency, and after all severe weather conditions that may affect ECs or monitoring devices. These inspections will be documented on the same form used for the annual Site-wide inspection. If an emergency, such as a natural disaster or an unforeseen failure of any of the ECs occurs that reduces or has the potential to reduce the effectiveness of ECs in place at the Site, verbal notice to the NYSDEC must be given by noon of the following day. In addition, an inspection of the Site will be conducted within 5 days of the event to verify the effectiveness of the IC/ECs implemented at the site by a qualified environmental

professional, as determined by the NYSDEC. Written confirmation must be provided to the NYSDEC within 7 days of the event that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public.

4.3 Quarterly Cover Inspections

The surface cover at the Site is intended to prevent contact between Site visitors and workers and the remaining contamination in Site soil. Inspections of the surface cover (grass, gravel, asphalt, and concrete) at the Site will be conducted quarterly from 2013 through 2018. Beginning in 2019, surface cover inspections will be conducted annually in conjunction with the annual Site-wide inspection. In addition, as required, inspections of the cover at the Site will be performed to investigate reports of damaged cover material or following severe weather conditions that may affect ECs or monitoring devices.

Each inspection event will include a walkover and visual assessment of the entire Site. Particular attention will be paid to the areas of known arsenic-impacted surface soil identified on Figure 3. The inspection will not include any areas where work is being performed in accordance with the Excavation Work Plan. During these inspections, a Cover Inspection Form will be completed as provided in Appendix F – Site Management Forms. The form will compile sufficient information to assess and document the following:

- General Site conditions at the time of the inspection
- An evaluation of the condition and continued effectiveness of the ECs

As noted on the Cover Inspection Form, the person performing the inspection will immediately notify the Facility's Health, Safety and Environment (HSE) Manager or a designee of the HSE Manager if areas of damaged or deteriorating cover materials or exposed soil are identified.

4.4 Groundwater Monitoring

Groundwater monitoring will be performed annually for the first six years (2013 – 2019) to confirm that arsenic and VOC groundwater contamination is isolated and not migrating. Annual groundwater monitoring will also provide a means to monitor for concentrations of barium. Barium is included based on previously detected low levels in Site groundwater samples. Based on the monitoring results for the first six years (2013 – 2019), the sixth year annual report can recommend a reduction in monitoring frequency. Trends in contaminant concentrations in groundwater will be evaluated to determine if the ICs and ECs in place at the Site continue to be effective in protecting public health and the environment. Modification to the frequency of monitoring or sampling or to the sampling requirements will require approval from the NYSDEC. This SMP will be modified to reflect changes approved by the NYSDEC.

Groundwater monitoring will be performed in ten wells that were installed as part of the remedial investigation of the Site. These wells include MW-1, MW-2, MW-3, MW-4, MW-5, MW-6, MW-7, MW-8, MW-9, and MW-10. The locations of these wells are shown on Figure 3. The NYSDEC will be notified of the annual monitoring event a minimum of 4 weeks in advance prior to sampling.

4.4.1 Visual Inspections

All ten monitoring wells, MW-1 through MW-10, will be visually inspected as part of the annual monitoring event. The wells will be inspected for protective covers, well locks, water-tight locking caps, and cement pads or flush mount conditions.

4.4.2 Hydraulic Monitoring

All ten monitoring wells will also be hydraulically monitored to assess groundwater flow conditions. Water level measurements will be collected on the same frequency as the groundwater quality monitoring program, and groundwater flow diagrams will be updated to evaluate the flow conditions at the Site. Table 4 summarizes the wells' identification numbers and reference elevations.

Table 4: Monitoring Well Reference Elevations

Well Identification	Measuring Point Elevation (ft.-AMSL)	Well Identification	Measuring Point Elevation (ft.-AMSL)
MW-1	585.69	MW-6	585.22
MW-2	587.32	MW-7	585.42
MW-3	587.55	MW-8	587.94
MW-4	583.87	MW-9	584.48
MW-5	583.47	MW-10	587.85

Notes: ft. AMSL = Feet Above Mean Sea Level

4.4.3 Groundwater Sampling

Of the ten monitoring wells, MW-3 and MW-5 will be sampled on an annual basis during the annual groundwater monitoring event. Well MW-3 was selected as a sampling location based on historical analytical results. Well MW-5 was selected since it represents the most down-gradient well at the Facility. These two monitoring wells will be sampled for the Site-specific contaminants of concern listed below:

- Total Arsenic – EPA SW846 6010C
- Total Barium – EPA SW846 6010C
- Target Compound List Volatile Organic Compounds – EPA SW846 8260B

4.5 Site Monitoring Reporting Requirements

Copies of the completed Site Inspection form, Cover Inspection form, groundwater sampling forms (Refer to Section 5 – Groundwater Sampling Protocol), and any other information generated during regular monitoring events and inspections will be kept on file at the Facility. All forms and other relevant reporting formats used during the monitoring/inspection events will be subject to approval by NYSDEC and will be submitted to the NYSDEC in electronic format as part of the annual Periodic Review Report (PRR). Any additional records, including media sampling data and cover maintenance reports, generated for the Site during the reporting period will also be submitted to the NYSDEC in electronic format as part of the PRR. Refer to Section 8 for additional details regarding the PRR.

A groundwater monitoring report will be submitted to the NYSDEC as a section of the PRR. The groundwater monitoring report will include, at a minimum, the following components:

Basic Information about the Sampling Event

- Date of sampling event
- Description of the activities performed
- Type of samples collected (e.g., groundwater)
- A figure illustrating sample type and sampling locations

Results of Required Visual Inspection (Section 4.4.1)

- Summary of well conditions based on visual inspection

Results of Required Hydraulic Monitoring (Section 4.4.2)

- Tabular presentation of potentiometric surface elevation
- Potentiometric surface contour map
- Discussion of groundwater flow direction across the Site

Results of Required Groundwater Sampling (Section 4.4.3)

- Tabular presentation of analytical results, including a list of all compounds analyzed
- Sampling results in comparison to appropriate standards/criteria, with all exceedances highlighted
- Sampling results in comparison to previous sampling results
- Summary and discussion of groundwater analytical results and contaminant concentration trends. The completed groundwater sampling forms and the laboratory report must be attached to the report
- The required laboratory data deliverables for all points sampled must be submitted electronically to the NYSDEC EQuIS database in accordance with the requirements found at this link: http://www.dec.ny.gov/chemical/62440.html.

Conclusions

- A determination regarding any changes to groundwater conditions since the last reporting event
- Any observations, conclusions, or recommendations regarding groundwater conditions
- Proposed modifications to the groundwater monitoring program (i.e. frequency)

5. Groundwater Sampling Protocol

5.1 General

All groundwater sampling activities will be recorded in a field book and associated sampling log as provided in Appendix G – Groundwater Sampling Forms. Scanned copies (electronic) of the

completed forms will be saved and submitted to the NYSDEC as part of the PRR. Other observations (e.g., groundwater monitoring well integrity, etc.) will be noted on the sampling log. The sampling log will serve as the inspection form for the monitoring network.

5.2 Well Gauging

Prior to groundwater sampling, each monitoring well will be gauged using an electronic groundwater probe to the nearest 0.01 foot. The depth of each well and the depth to groundwater will be measured from the top of the well casing. If observed, the presence of NAPL will be noted. The available water volume and gauging data will be recorded on the groundwater sampling form in Appendix G.

During well gauging, the monitoring well will be inspected for structural damage to the well cap, seal, protective pad, and visible portion of the well casing. The presence and condition of plugs and locks will also be noted. Well maintenance and/or repairs will be completed as necessary and to the extent practicable. Any structural damage or repairs will be noted in the field notebook.

5.3 Groundwater Purging

Monitoring wells MW-3 and MW-5 will be purged a minimum of three times the volume of water present in each well at the time of sampling (well volume). Static depth to water and well dimensions will be used to calculate a well volume. Table 5 identifies the well dimensions required for calculating the well volume and the estimated water volume at each well.

Table 5: Dimensions of Monitoring Wells MW-3 and MW-5

Well Identification	Well Diameter (inches)	Approximate Well Depth (ft. BTOC)	Approximate Water Level (ft. BTOC)	Approximate Well Volume (gallons)
MW-3	2	18.65	5.25	2.2
MW-5	2	16.60	4.75	2.0

Notes: ft. BTOC – Feet Below Top of Casing

A minimum of three well volumes of water will be removed using either a submersible pump, centrifugal pump, bottom-filling stainless steel bailer or disposable bailer. Field parameters including pH, temperature, specific conductance, and turbidity of the purge water will be monitored and recorded during purging. Field parameters will be measured using either a flow-through cell apparatus or hand-held equipment and recorded immediately while within the field. All meters will be calibrated daily in accordance with the manufacturer's instructions and a calibration record maintained in the field book.

All purge water generated during sampling activities will be staged on Site in a labeled container (polyethylene tank or 55-gallon drum) until proper disposal is arranged based on the analytical results by Honeywell.

5.4 Groundwater Sampling

Groundwater samples will be collected annually from monitoring wells MW-3 and MW-5. Following purging activities, groundwater sampling will be initiated within 2 hours. Groundwater samples will be collected using either a stainless-steel bottom filling bailer a centrifugal pump and polyethylene tubing or a disposable bailer.

Groundwater samples will be collected for arsenic, barium, and VOC analyses. Based on current requirements, the sample for arsenic and barium analyses will not be filtered prior to preservation. Immediately following collection, the sample bottles will be appropriately preserved and placed in a cooler and chilled to approximately 4 degrees Centigrade. The cooler and samples will then be prepared for shipment (via overnight courier or overnight shipping) or delivery to the subcontracted analytical laboratory. In preparation for shipment, each sample will be logged onto a Chain of Custody form.

In accordance with practices established during the completion of the RFI, each groundwater sample will be identified using the following convention:

- Samples will be initialized with the prefix "HBRL" for Honeywell Buffalo Research Laboratory
- The sample location will be identified next (e.g., MW-3)
- The final code will identify the sample collection date by identifying the month and year

Quality assurance/quality control samples will be identified as follows:

- D = duplicate
- MS = matrix spike
- MSD = matrix spike duplicate
- EB = equipment blank

Examples of this convention are as follows:

- HBRL - MW3-0698 = Sample collected from MW-3 in June 1998
- HBRL - MW3-0698D = Duplicate sample collected from MW-3 in June 1998
- HBRL - EB-0698 = Equipment blank collected in June 1998

The contract laboratory will be a NYSDOH-Environmental Laboratory Approval Program (ELAP) certified laboratory. Upon request by Honeywell, the NYSDOH-ELAP laboratory will provide copies of their current ELAP certifications for metals and VOC analysis, to show that the laboratory is certified to perform the requested analyses. Copies of the certifications will be requested by Honeywell annually and kept on record at the facility.

5.5 Quality Assurance/Quality Control and Data Reporting

Due to the limited number of field samples (two), the QA/QC samples will be limited to a trip blank. No duplicates, matrix spikes, matrix spike duplicates, or equipment blanks should be required. The

trip blank will be prepared for the aqueous samples in order to evaluate potential impacts on sample quality during field sampling or during analysis.

All sampling and data validation will be completed in accordance with applicable Federal, State and local regulations and the Site-Specific Quality Assurance Project Plan (QAPP) previously submitted under separate cover.

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

5.6 Monitoring Well Repairs, Replacement, and Decommissioning

The monitoring well network will be inspected annually as part of the groundwater monitoring program. If biofouling or silt accumulation occurs in the monitoring wells, the wells will be physically agitated/surged and redeveloped. In addition, monitoring wells will be properly decommissioned and replaced, if an event renders the wells unusable.

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

6. Operation and Maintenance Plan

The Site remedy does not rely on any mechanical systems, such as groundwater treatment systems, sub-slab depressurization systems or air sparge/soil vapor extraction systems to protect public health and the environment. Therefore, the operation and maintenance of such components is not included in this SMP.

7. Cover Repair

7.1 General

As indicated in Section 4, inspections of the Site cover will be performed on a quarterly schedule through 2018 and then on an annual basis starting in 2019. Inspections will also be performed as needed, to investigate reports of damaged cover material or following severe weather conditions that may affect ECs or monitoring devices. The Site cover is intended to prevent contact between Site visitors and workers and the remaining contamination in Site soil. This section describes procedures for repairing the Site cover when needed.

If, during maintenance or repair of the cover materials, it is necessary to handle or remove soil beneath the cover, such activities will be completed in accordance with the Excavation Work Plan located in Appendix C.

Snow cover, extreme cold or heat, heavy precipitation, etc. may exist at the Site, which may prohibit immediate permanent repair. Otherwise, all repairs, dependent upon weather conditions, will be required to be completed within 2 weeks of discovery.

7.2 Asphalt Pavement/Concrete Cover Repair

The asphalt pavement and concrete covers should be generally low-maintenance. Assessment of the severity of deterioration or damage to asphalt or concrete is subjective, and inspection personnel must use professional judgement in assessing what type and extent of deterioration/damage warrants repair or maintenance. As a guideline, areas of asphalt pavement or concrete cover will be repaired if it is cracked, broken, or otherwise damaged or missing which causes direct exposure of surface soil. If this condition is present within a work zone where work in being performed in accordance with the Excavation Work Plan in Appendix C, repair will not be needed.

Deteriorated asphalt pavement will be evaluated and repaired using cold mix for areas less than four (4) square feet, or hot mix asphalt and/or liquid bituminous material for larger areas. Concrete surfaces will be repaired using one or more appropriate methods selected based on the type and extent of concrete deterioration or damage. Such methods may include:

- Patching with cold mix asphalt (for areas less than 4 square feet)
- Patching with hot mix asphalt or bituminous materials
- Saw cutting and removing the damaged concrete and replacement with new concrete
- Use of low-slump concrete
- Replacement using 1-foot of clean quarried stone or crushed demolition material

For cases where concrete material is used to make the repairs, the use of reinforcing mesh or rebar and bonding agents may be used.

7.3 Grass Cover Repair

In the event that an area of grass cover becomes damaged or bare where the underlying soil is exposed, the following procedures will be used. Assessment of the severity of deterioration or damage to the grass cover system is subjective, and inspection personnel must use professional judgement in assessing what type and extent of deterioration/damage warrants repair or maintenance. As a guideline, the grass cover will be repaired if it is damaged or missing which causes direct exposure of surface soil. If this condition is present within a work zone where work is being performed in accordance with the Excavation Work Plan in Appendix C, repair will not be needed.

Repair will consist of replacing the topsoil and/or reseeding with an appropriate grass seed mixture. The area will be watered and maintained as necessary to reestablish grass growth. Damaged areas

may be temporarily covered with topsoil, mulch, plastic sheeting, tarps, or other material that will provide a temporary barrier during winter months until reseeding is possible.

7.4 Gravel Cover Repair

In the event that an area of gravel cover has been removed or rutted to expose underlying soil, the following procedures will be used. Assessment of the severity of deterioration or damage to the gravel cover is subjective, and inspection personnel must use professional judgement in assessing what type and extent of deterioration/damage warrants repair or maintenance. As a guideline, the gravel cover will be repaired if it is damaged or has been removed which causes direct exposure of surface soil. If this condition is present within a work zone where work is being performed in accordance with the Excavation Work Plan in Appendix C, repair will not be needed.

Repair will consist of regrading or adding gravel cover or by placing another acceptable cover material, such as grass, asphalt, or concrete, over the area.

8. Periodic Review Report

8.1 Periodic Review Report

A Periodic Review Report (PRR) will be submitted to the Department every year, beginning in 2019 (for reporting year 2018). In the event that the Site is subdivided into separate parcels with different ownership, a single Periodic Review Report will be prepared that addresses the Site described in Appendix A - Environmental Easement. The report will be prepared in accordance with NYSDEC's DER-10 and submitted within 30 days of the end of each certification period (January 1 through December 31). The report will include the following components:

Certification of ECs and ICs

- Identification, assessment and certification of all ECs/ICs required by the remedy for the Site (refer to Section 8.2 for instructions on how to perform the certification).

Results of Site Inspections

- Results of the required annual Site-wide inspection, cover inspections, and severe condition inspections, if applicable.
- The completed annual Site-wide inspection form, cover inspection forms, and other applicable Site management forms and records generated for the Site during the reporting period must be provided in the NYSDEC-approved electronic format (i.e., PDF).

Results of Groundwater Monitoring

- Refer to Section 4.5 for required components of the groundwater monitoring section.

Site Evaluation

- Evaluation of the compliance of the remedy with the requirements of the Site-specific Decision Document

- Evaluation of the effectiveness of all engineering controls, including identification of any needed repairs or modifications
- Any new conclusions or observations regarding Site contamination based on inspections or data generated by the Site Monitoring Plan for the media being monitored
- Recommendations regarding any necessary changes to the remedy and/or Site Monitoring Plan
- Evaluation of the overall performance and effectiveness of the remedy

Site Management Reports

- All documentation related to any work conducted under the Excavation Work Plan (Appendix C)

8.2 Certification of Institutional and Engineering Controls

After the annual Site-wide inspection, a Professional Engineer licensed to practice in New York State or the Site Owner will prepare, and include in the Periodic Review Report, the following certification as per the requirements of NYSDEC DER-10:

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

- *The inspection of the Site to confirm the effectiveness of the institutional and engineering controls required by the remedial program was performed under my direction*
- *The institutional control and/or engineering control employed at this Site is unchanged from the date the control was put in place, or last approved by the Department*
- *Nothing has occurred that would impair the ability of the control to protect the public health and environment*
- *Nothing has occurred that would constitute a violation or failure to comply with any site management plan for this control*
- *Access to the Site will continue to be provided to the Department to evaluate the remedy, including access to evaluate the continued maintenance of this control*
- *Use of the Site is compliant with the environmental easement*
- *The engineering control systems are performing as designed and are effective*
- *To the best of my knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the site remedial program*
- *The information presented in this report is accurate and complete*

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

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

The Periodic Review Report will be submitted, in hard copy and electronic format, to the NYSDEC Region 9 Office.

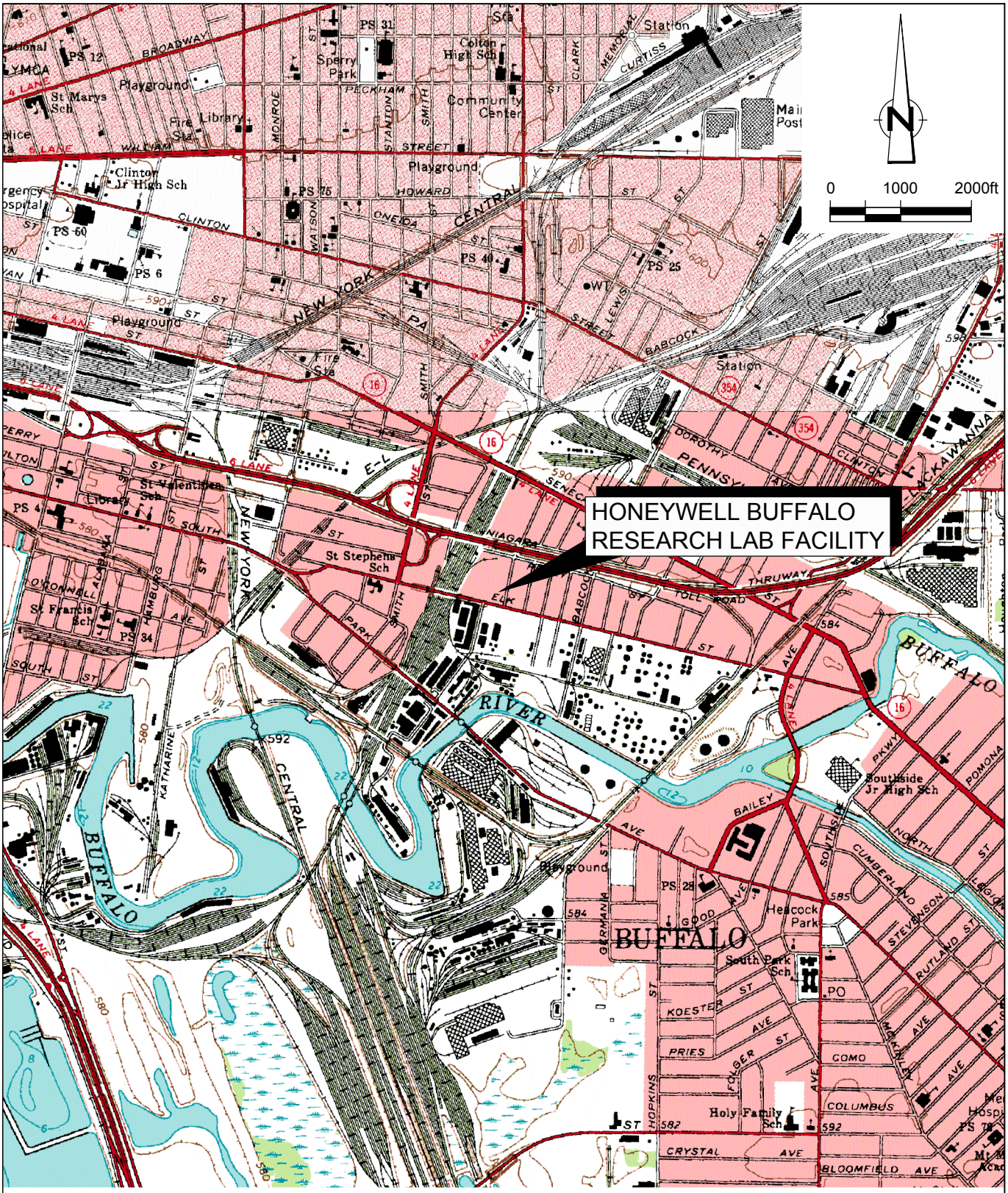
8.2 Corrective Measures Work Plan

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

9. References

- Harding Lawson Associates, December 19, 1995, "Response to NYSDEC Comments, RCRA Facility Investigation Report, AlliedSignal, Inc., Buffalo Research Laboratory", correspondence to NYSDEC.
- Harding Lawson Associates, March 8, 1996, "Supplemental Sampling and Analysis Plan, RCRA Facility Investigation, AlliedSignal, Inc., Buffalo Research Laboratory", prepared for AlliedSignal Inc., Buffalo, New York
- 6NYCRR Part 375, Environmental Remediation Programs. December 14, 2006
- NYSDEC DER-10 – "Technical Guidance for Site Investigation and Remediation"
- NYSDEC, 1998. Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1. June 1998 (April 2000 addendum)
- New York State Department of Environmental Conservation, Bureau of Western Hazardous Waste Programs, and United States Environmental Protection Agency Region II, December 7, 1993, "Notification to Conduct a RCRA Facility Investigation (RFI)," correspondence to AlliedSignal, Inc.
- New York State Department of Environmental Conservation, August 25, 1995, NYSDEC Comments, RCRA Facility Investigation Report, AlliedSignal, Inc., Buffalo Research Laboratory," correspondence to AlliedSignal, Inc., Buffalo, New York
- New York State Department of Environmental Conservation, January 22, 1996, "RCRA Facility Investigation Report-Comment Response", correspondence to AlliedSignal, Inc.
- Remcor, Inc., August 11, 1993, "Report, Field Sampling and Analysis Activities, RCRA Facility Assessment, AlliedSignal Inc., Buffalo, New York," prepared for AlliedSignal, Inc. Buffalo, New York
- Remcor, Inc., March 7, 1994, "Current Conditions Report, AlliedSignal Inc., Buffalo Research Laboratory," AlliedSignal, Inc., Buffalo, New York

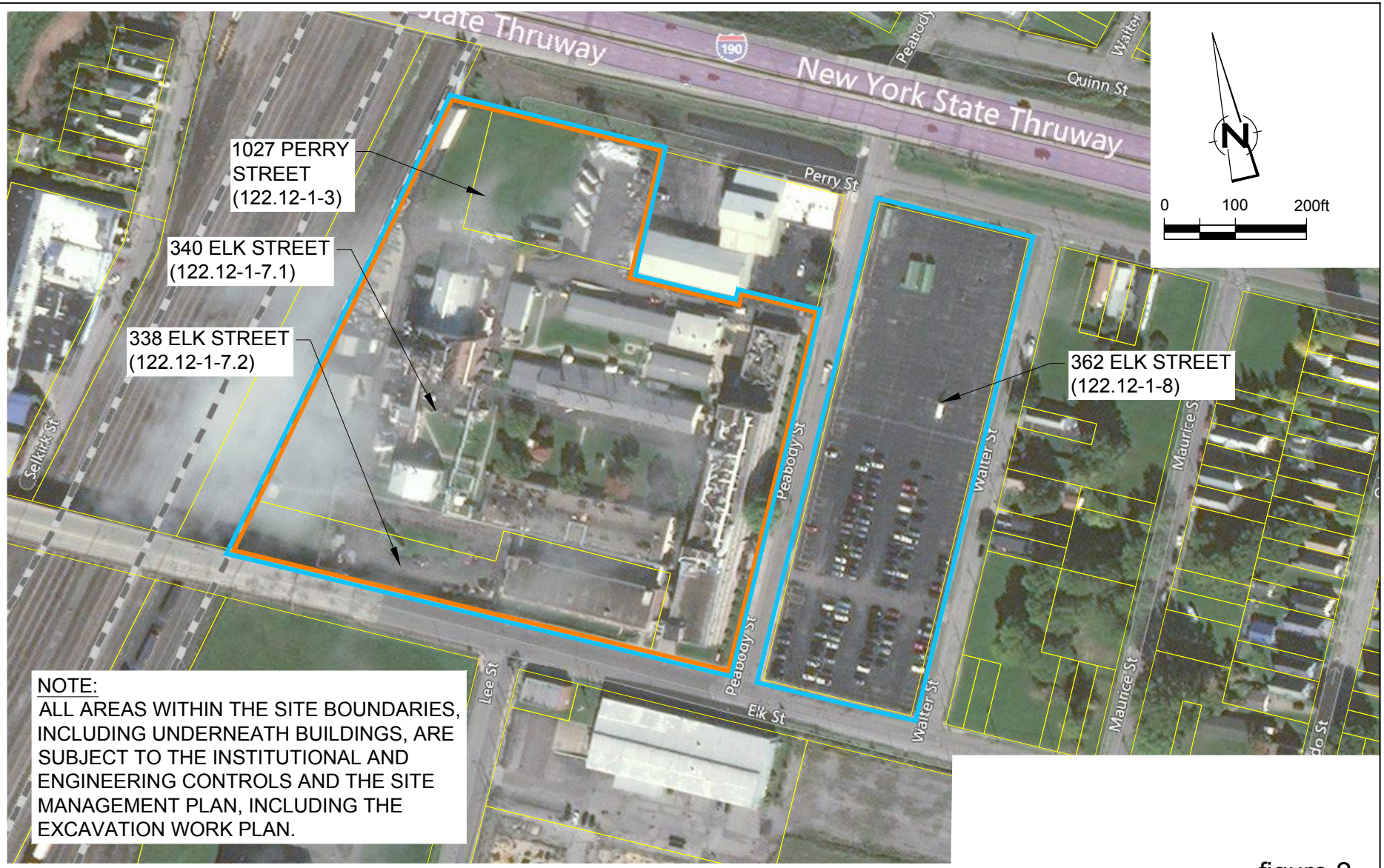
- Remcor, Inc., April 6, 1994, "Pre-Investigation Evaluation of Corrective Measures Technologies, AlliedSignal, Inc., Buffalo Research Laboratory," AlliedSignal, Inc., Buffalo, New York
- Remcor, Inc., April 6, 1994, "RCRA Facility Investigation Work Plan, AlliedSignal, Inc., Buffalo Research Laboratory," AlliedSignal, Inc., Buffalo, New York
- Remcor, Inc., May 18, 1995, "RCRA Facility Investigation Report, AlliedSignal, Inc. Buffalo Research Laboratory", AlliedSignal, Inc., Buffalo, New York



SOURCE: USGS 7.5 MINUTE SERIES, TOPO QUAD: BUFFALO NE BUFFALO SE, NY 1965

figure 1

FACILITY LOCATION MAP
20 PEABODY STREET
Buffalo, New York



LEGEND:

HONEYWELL BUFFALO RESEARCH LAB FACILITY

SITE BOUNDARY (FOR SITE MANAGEMENT PLAN)

figure 2

SITE PLAN
20 PEABODY STREET
Buffalo, New York

33979-00(003)GN-NI002 AUG 14/2017

LEGEND:

- SITE BOUNDARY (FOR SITE MANAGEMENT PLAN)
- = ESTIMATED AREA WITH ELEVATED ARSENIC CONCENTRATION IN SURFACE SOIL
- = MONITORING WELL LOCATION
- = SUPPLEMENTAL INVESTIGATION SOIL BORING LOCATION
- = TEST BORING LOCATION
- = CORRECTIVE MEASURE STUDY SOIL SAMPLE LOCATION
- = MANHOLE LOCATION
- AOC-1 = AREA OF CONCERN
- = GRASSY AREA
- = GRAVEL AREA
- = CONCRETE AREA
- = ASPHALT PAVEMENT AREA

NOTE:
ALL AREAS WITHIN THE SITE BOUNDARIES, INCLUDING UNDERNEATH BUILDINGS, ARE SUBJECT TO THE INSTITUTIONAL AND ENGINEERING CONTROLS AND THE SITE MANAGEMENT PLAN, INCLUDING THE EXCAVATION WORK PLAN.

figure 3

ESTIMATED AREAS OF ARSENIC IMPACT
20 PEABODY STREET
Buffalo, New York

Appendices

Appendix A
Environmental Easement

ERIE COUNTY CLERK'S OFFICE

County Clerk's Recording Page

Return to:

Party 1:
HONEYWELL INTERNATIONAL INC

Party 2:
PEOPLE OF THE STATE OF NEW YORK (THE)

Book Type: D Book: 11310 Page: 3027
Page Count: 13
Doc Type: EASEMENT/RTWY
Rec Date: 03/07/2017
Rec Time: 03:06:27 PM
Control #: 2017047689
UserID: ERECORD
Trans #: 17042407
Document Sequence Number
TT2016016370

Recording Fees:

RECORDING	$85.00
COE CO $1 RET	$1.00
COE STATE $14.25 GEN	$14.25
COE STATE $4.75 RM	$4.75
TP584	$10.00

Consideration Amount: 0.00

BASIC MT	$0.00
SONYMA MT	$0.00
ADDL MT/NFTA	$0.00
SP MT/M-RAIL	$0.00
NY STATE TT	$0.00
ROAD FUND TT	$0.00

Total: $115.00

STATE OF NEW YORK
ERIE COUNTY CLERK'S OFFICE

WARNING – THIS SHEET CONSTITUTES THE CLERK'S ENDORSEMENT REQUIRED BY SECTION 319&316-a (5) OF THE REAL PROPERTY LAW OF THE STATE OF NEW YORK. DO NOT DETACH. THIS IS NOT A BILL.

Peggy A. Lagree
Acting County Clerk

ENVIRONMENTAL EASEMENT GRANTED PURSUANT TO ARTICLE 71, TITLE 36 OF THE NEW YORK STATE ENVIRONMENTAL CONSERVATION LAW

THIS INDENTURE made this 6th day of February, 2017, between Owner(s) Honeywell International Inc., a Delaware corporation, successor in interest by merger or name change to AlliedSignal Inc., Allied-Signal Inc., Allied Chemical Corporation, Allied Corporation, Allied Chemical & Dye Corporation, having an office at 101 Columbia Road, Morristown, New Jersey 07960, County of Morris, State of New Jersey (the "Grantor"), and The People of the State of New York (the "Grantee."), acting through their Commissioner of the Department of Environmental Conservation (the "Commissioner", or "NYSDEC" or "Department" as the context requires) with its headquarters located at 625 Broadway, Albany, New York 12233,

WHEREAS, the Legislature of the State of New York has declared that it is in the public interest to encourage the remediation of abandoned and likely contaminated properties ("sites") that threaten the health and vitality of the communities they burden while at the same time ensuring the protection of public health and the environment; and

WHEREAS, the Legislature of the State of New York has declared that it is in the public interest to establish within the Department a statutory environmental remediation program that includes the use of Environmental Easements as an enforceable means of ensuring the performance of operation, maintenance, and/or monitoring requirements and the restriction of future uses of the land, when an environmental remediation project leaves residual contamination at levels that have been determined to be safe for a specific use, but not all uses, or which includes engineered structures that must be maintained or protected against damage to perform properly and be effective, or which requires groundwater use or soil management restrictions; and

WHEREAS, the Legislature of the State of New York has declared that Environmental Easement shall mean an interest in real property, created under and subject to the provisions of Article 71, Title 36 of the New York State Environmental Conservation Law ("ECL") which contains a use restriction and/or a prohibition on the use of land in a manner inconsistent with engineering controls which are intended to ensure the long term effectiveness of a site remedial program or eliminate potential exposure pathways to hazardous waste or petroleum; and

WHEREAS, Grantor, is the owner of real property located at the address of 1027 Perry Street in the City of Buffalo, County of Erie and State of New York, known and designated on the tax map of the County Clerk of Erie as tax map parcel number: Section 122.12 Block 1 Lot 3, being the same as that property conveyed to Grantor by deed dated January 24, 1958 and recorded in the Erie County Clerk's Office in Liber and Page 6272/97. The property subject to this Environmental Easement (the "Controlled Property") comprises approximately 0.9375 +/- acres, and is hereinafter more fully described in the Land Title Survey dated May 23, 2013 and last revised January 14, 2016 prepared by Matthew M. Webb, PLS on behalf of Bock & Clark's National Surveyors Network, which will be attached to the Site Management Plan. The Controlled Property description is set forth in and attached hereto as Parcel "A" in Schedule A; and

WHEREAS, Grantor, is the owner of real property located at the address of 340 Elk Street in the City of Buffalo, County of Erie and State of New York, known and designated on the tax map of the County Clerk of Erie as tax map parcel number: Section 122.12 Block 1 Lot 7.1, being the same as that property conveyed to Grantor by deeds dated:

1) November 26, 1945 and recorded in the Erie County Clerk's Office in Liber and Page 3806/143.
2) November 1, 1946 and recorded in the Erie County Clerk's Office in Liber and Page 4011/265.
3) November 18, 1946 and recorded in the Erie County Clerk's Office in Liber and Page 4020/391.
4) November 19, 1946 and recorded in the Erie County Clerk's Office in Liber and Page 4021/421.
5) November 19, 1946 and recorded in the Erie County Clerk's Office in Liber and Page 4022/31.
6) November 20, 1946 and recorded in the Erie County Clerk's Office in Liber and Page 4022/36.
7) November 21, 1946 and recorded in the Erie County Clerk's Office in Liber and Page 4023/192.
8) November 20, 1946 and recorded in the Erie County Clerk's Office in Liber and Page 4023/530.
9) November 21, 1946 and recorded in the Erie County Clerk's Office in Liber and Page 4023/544.
10) November 22, 1946 and recorded in the Erie County Clerk's Office in Liber and Page 4024/321.
11) December 3, 1946 and recorded in the Erie County Clerk's Office in Liber and Page 4030/328.
12) November 20, 1946 and recorded in the Erie County Clerk's Office in Liber and Page 4041/216.
13) December 9, 1946 and recorded in the Erie County Clerk's Office in Liber and Page 4051/23.
14) May 7, 1947 and recorded in the Erie County Clerk's Office in Liber and Page 4108/79.
15) August 18, 1947 and recorded in the Erie County Clerk's Office in Liber and Page 4202/421.
16) September 12, 1947 and recorded in the Erie County Clerk's Office in Liber and Page 4185/492.
17) March 31, 1949 and recorded in the Erie County Clerk's Office in Liber and Page 4496/277.
18) November 1, 1951 and recorded in the Erie County Clerk's Office in Liber and Page 5018/545.

The property subject to this Environmental Easement (the "Controlled Property") comprises approximately 6.8954 +/- acres, and is hereinafter more fully described in the Land Title Survey dated May 23, 2013 and last revised January 14, 2016 prepared by Matthew M. Webb, PLS on behalf of Bock & Clark's National Surveyors Network, which will be attached to the Site Management Plan. The Controlled Property description is set forth in and attached hereto as Parcel "B" in Schedule A; and

WHEREAS, Grantor, is the owner of real property located at the address of 338 Elk Street in the City of Buffalo, County of Erie and State of New York, known and designated on the tax map of the County Clerk of Erie as tax map parcel number: Section 122.12 Block 1 Lot 7.2, being the same as that property conveyed to Grantor by deed dated September 9, 1985 and recorded in the Erie County Clerk's Office in Liber and Page 9494/685. The property subject to this Environmental Easement (the "Controlled Property") comprises approximately 1.2658 +/- acres, and is hereinafter more fully described in the Land Title Survey dated May 23, 2013 and last revised January 14, 2016 prepared by Matthew M. Webb, PLS on behalf of Bock & Clark's National Surveyors Network, which will be attached to the Site Management Plan. The Controlled Property description is set forth in and attached hereto as Parcel "C" in Schedule A; and

WHEREAS, the Department accepts this Environmental Easement in order to ensure the protection of public health and the environment and to achieve the requirements for remediation established for the Controlled Property until such time as this Environmental Easement is extinguished pursuant to ECL Article 71, Title 36; and

NOW THEREFORE, in consideration of the mutual covenants contained herein and the terms and conditions of Order on Consent Index Number: B9-0853-13-05, Grantor conveys to Grantee a permanent Environmental Easement pursuant to ECL Article 71, Title 36 in, on, over, under, and upon the Controlled Property as more fully described herein ("Environmental Easement").

1. Purposes. Grantor and Grantee acknowledge that the Purposes of this Environmental Easement are: to convey to Grantee real property rights and interests that will run with the land in perpetuity in order to provide an effective and enforceable means of encouraging the reuse and redevelopment of this Controlled Property at a level that has been determined to be safe for a specific use while ensuring the performance of operation, maintenance, and/or monitoring requirements; and to ensure the restriction of future uses of the land that are inconsistent with the above-stated purpose.

2. Institutional and Engineering Controls. The controls and requirements listed in the Department approved Site Management Plan ("SMP") including any and all Department approved amendments to the SMP are incorporated into and made part of this Environmental Easement. These controls and requirements apply to the use of the Controlled Property, run with the land, are binding on the Grantor and the Grantor's successors and assigns, and are enforceable in law or equity against any owner of the Controlled Property, any lessees and any person using the Controlled Property.

A. (1) The Controlled Property may be used for:

Industrial as described in 6 NYCRR Part 375-1.8(g)(2)(iv)

(2) All Engineering Controls must be operated and maintained as specified in the Site Management Plan (SMP);

(3) All Engineering Controls must be inspected at a frequency and in a manner defined in the SMP;

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

(5) Groundwater and other environmental or public health monitoring must be performed as defined in the SMP;

(6) Data and information pertinent to Site Management of the Controlled Property must be reported at the frequency and in a manner defined in the SMP;

(7) All future activities on the property that will disturb remaining contaminated material must be conducted in accordance with the SMP;

(8) Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in the SMP;

(9) Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical components of the remedy shall be performed as defined in the SMP;

(10) Access to the site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by this Environmental Easement.

B. The Controlled Property shall not be used for Residential, Restricted Residential or Commercial purposes as defined in 6NYCRR 375-1.8(g)(i), (ii) and (iii), and the above-stated engineering controls may not be discontinued without an amendment or extinguishment of this Environmental Easement.

C. The SMP describes obligations that the Grantor assumes on behalf of Grantor, its successors and assigns. The Grantor's assumption of the obligations contained in the SMP which may include sampling, monitoring, and/or operating a treatment system, and providing certified reports to the NYSDEC, is and remains a fundamental element of the Department's determination that the Controlled Property is safe for a specific use, but not all uses. The SMP may be modified in accordance with the Department's statutory and regulatory authority. The Grantor and all successors and assigns, assume the burden of complying with the SMP and obtaining an up-to-date version of the SMP from:

Site Control Section
Division of Environmental Remediation
NYSDEC
625 Broadway
Albany, New York 12233
Phone: (518) 402-9553

D. Grantor must provide all persons who acquire any interest in the Controlled Property a true and complete copy of the SMP that the Department approves for the Controlled

Property and all Department-approved amendments to that SMP.

E. Grantor covenants and agrees that until such time as the Environmental Easement is extinguished in accordance with the requirements of ECL Article 71, Title 36 of the ECL, the property deed and all subsequent instruments of conveyance relating to the Controlled Property shall state in at least fifteen-point bold-faced type:

This property is subject to an Environmental Easement held by the New York State Department of Environmental Conservation pursuant to Title 36 of Article 71 of the Environmental Conservation Law.

F. Grantor covenants and agrees that this Environmental Easement shall be incorporated in full or by reference in any leases, licenses, or other instruments granting a right to use the Controlled Property.

G. Grantor covenants and agrees that it shall, at such time as NYSDEC may require, submit to NYSDEC a written statement by an expert the NYSDEC may find acceptable certifying under penalty of perjury, in such form and manner as the Department may require, that:

(1) the inspection of the site to confirm the effectiveness of the institutional and engineering controls required by the remedial program was performed under the direction of the individual set forth at 6 NYCRR Part 375-1.8(h)(3).

(2) the institutional controls and/or engineering controls employed at such site:

(i) are in-place;

(ii) are unchanged from the previous certification, or that any identified changes to the controls employed were approved by the NYSDEC and that all controls are in the Department-approved format; and

(iii) that nothing has occurred that would impair the ability of such control to protect the public health and environment;

(3) the owner will continue to allow access to such real property to evaluate the continued maintenance of such controls;

(4) nothing has occurred that would constitute a violation or failure to comply with any site management plan for such controls;

(5) the report and all attachments were prepared under the direction of, and reviewed by, the party making the certification;

(6) to the best of his/her knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the site remedial program, and generally accepted engineering practices; and

(7) the information presented is accurate and complete.

3. Right to Enter and Inspect. Grantee, its agents, employees, or other representatives of the State may enter and inspect the Controlled Property in a reasonable manner and at reasonable times to assure compliance with the above-stated restrictions.

4. Reserved Grantor's Rights. Grantor reserves for itself, its assigns, representatives, and successors in interest with respect to the Property, all rights as fee owner of the Property, including:

A. Use of the Controlled Property for all purposes not inconsistent with, or limited by the terms of this Environmental Easement;

B. The right to give, sell, assign, or otherwise transfer part or all of the underlying fee interest to the Controlled Property, subject and subordinate to this Environmental Easement;

5. Enforcement

A. This Environmental Easement is enforceable in law or equity in perpetuity by Grantor, Grantee, or any affected local government, as defined in ECL Section 71-3603, against the owner of the Property, any lessees, and any person using the land. Enforcement shall not be defeated because of any subsequent adverse possession, laches, estoppel, or waiver. It is not a defense in any action to enforce this Environmental Easement that: it is not appurtenant to an interest in real property; it is not of a character that has been recognized traditionally at common law; it imposes a negative burden; it imposes affirmative obligations upon the owner of any interest in the burdened property; the benefit does not touch or concern real property; there is no privity of estate or of contract; or it imposes an unreasonable restraint on alienation.

B. If any person violates this Environmental Easement, the Grantee may revoke the Certificate of Completion with respect to the Controlled Property.

C. Grantee shall notify Grantor of a breach or suspected breach of any of the terms of this Environmental Easement. Such notice shall set forth how Grantor can cure such breach or suspected breach and give Grantor a reasonable amount of time from the date of receipt of notice in which to cure. At the expiration of such period of time to cure, or any extensions granted by Grantee, the Grantee shall notify Grantor of any failure to adequately cure the breach or suspected breach, and Grantee may take any other appropriate action reasonably necessary to remedy any breach of this Environmental Easement, including the commencement of any proceedings in accordance with applicable law.

D. The failure of Grantee to enforce any of the terms contained herein shall not be deemed a waiver of any such term nor bar any enforcement rights.

6. Notice. Whenever notice to the Grantee (other than the annual certification) or approval from the Grantee is required, the Party providing such notice or seeking such approval shall identify the Controlled Property by referencing the following information:

County, NYSDEC Site Number, NYSDEC Brownfield Cleanup Agreement, State Assistance Contract or Order Number, and the County tax map number or the Liber and Page or computerized system identification number.

Parties shall address correspondence to: Site Number: 915002
Office of General Counsel
NYSDEC

625 Broadway
Albany New York 12233-5500

With a copy to:

Site Control Section
Division of Environmental Remediation
NYSDEC
625 Broadway
Albany, NY 12233

All notices and correspondence shall be delivered by hand, by registered mail or by Certified mail and return receipt requested. The Parties may provide for other means of receiving and communicating notices and responses to requests for approval.

7. Recordation. Grantor shall record this instrument, within thirty (30) days of execution of this instrument by the Commissioner or her/his authorized representative in the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

8. Amendment. Any amendment to this Environmental Easement may only be executed by the Commissioner of the New York State Department of Environmental Conservation or the Commissioner's Designee, and filed with the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

9. Extinguishment. This Environmental Easement may be extinguished only by a release by the Commissioner of the New York State Department of Environmental Conservation, or the Commissioner's Designee, and filed with the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

10. Joint Obligation. If there are two or more parties identified as Grantor herein, the obligations imposed by this instrument upon them shall be joint and several.

Remainder of Page Intentionally Left Blank

IN WITNESS WHEREOF, Grantor has caused this instrument to be signed in its name.

Honeywell International Inc.:

By: _____

Print Name: Daniel Kirschner

Title: Director, Americas PE Date: 12/21/16

Grantor's Acknowledgment

STATE OF ~~NEW YORK~~ Illinois)
) ss:
COUNTY OF Lake)

On the 21st day of December in the year 2016, before me, the undersigned, personally appeared Daniel Kirschner, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.

Karen A. Duvall
Notary Public - State of ~~New York~~ Illinois

OFFICIAL SEAL
KAREN A DUVALL
NOTARY PUBLIC - STATE OF ILLINOIS
MY COMMISSION EXPIRES:05/14/20

THIS ENVIRONMENTAL EASEMENT IS HEREBY ACCEPTED BY THE PEOPLE OF THE STATE OF NEW YORK, Acting By and Through the Department of Environmental Conservation as Designee of the Commissioner,

By: _____
Robert W. Schick, Director
Division of Environmental Remediation

Grantee's Acknowledgment

STATE OF NEW YORK)
) ss:
COUNTY OF ALBANY)

On the 6th day of February, in the year 2018 before me, the undersigned, personally appeared Robert W. Schick, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/ executed the same in his/her/ capacity as Designee of the Commissioner of the State of New York Department of Environmental Conservation, and that by his/her/ signature on the instrument, the individual, or the person upon behalf of which the individual acted, executed the instrument.

_____
Notary Public - State of New York

David J. Chiusano
Notary Public, State of New York
No. 01CH5032146
Qualified in Schenectady County
Commission Expires August 22, 2018

SCHEDULE "A" PROPERTY DESCRIPTION

BEING THE SAME PIECES AND OR PARCELS OF LAND CONVEYED TO ALLIED CHEMICAL & DYE CORPORATION AND TO ALLIED CORPORATION FROM LEHIGH VALLEY RAILROAD COMPANY TO ALLIED CHEMICAL & DYE CORPORATION BY DEED DATED 1/24/1958 AND RECORDED 2/25/1958 IN LIBER 6272 OF DEEDS, PAGE 97 (PARCEL A), FROM A) ORSON E. YEAGER AND KATHERINE C. YEAGER TO ALLIED CHEMICAL & DYE CORPORATION BY DEED DATED 11/26/1945 AND RECORDED 12/11/1945 IN LIBER 3806 OF DEEDS, PAGE 143; AND B) MARION V. SCHILK TO ALLIED CHEMICAL & DYE CORPORATION BY DEED DATED 11/1/1946 AND RECORDED 11/1/1946 IN LIBER 4011 OF DEEDS, PAGE 265; AND C) CARL P. KLINE AND HAZEL M. KLINE TO ALLIED CHEMICAL & DYE CORPORATION BY DEED DATED 11/18/1946 AND RECORDED 11/18/1946 IN LIBER 4020 OF DEEDS, PAGE 391; AND D) EDWARD P. O'BRIEN AND C. DOROTHY O'BRIEN TO ALLIED CHEMICAL & DYE CORPORATION BY DEED DATED 11/19/1946 AND RECORDED 11/19/1946 IN LIBER 4021 OF DEEDS, PAGE 421; AND E) JOHN WILK AND ROSE WILK TO ALLIED CHEMICAL & DYE CORPORATION BY DEED DATED 11/19/1946 AND RECORDED 11/19/1946 IN LIBER 4022 OF DEEDS, PAGE 31; AND F) WLADYSLAW KONIECZNY A/K/A WALTER KONIECZNY TO ALLIED CHEMICAL & DYE CORPORATION BY DEED DATED 11/20/1946 AND RECORDED 11/20/1946 IN LIBER 4022 OF DEEDS, PAGE 236; AND G) JOHN WNUK A/K/A JAN WNUK AND MAGDALENA WNUK TO ALLIED CHEMICAL & DYE CORPORATION BY DEED DATED 11/21/1946 AND RECORDED 11/21/1946 IN LIBER 4023 OF DEEDS, PAGE 192; AND H) JOHN J. MULLEN AND AGNES V. MULLEN TO ALLIED CHEMICAL & DYE CORPORATION BY DEED DATED 11/20/1946 AND RECORDED 11/21/1946 IN LIBER 4023 OF DEEDS, PAGE 530; AND I) WILLIAM C. SIMMONS AND CATHERINE E. SIMMONS TO ALLIED CHEMICAL & DYE CORPORATION BY DEED DATED 11/21/1946 AND RECORDED 11/21/1946 IN LIBER 4023 OF DEEDS, PAGE 544; AND J) MARY A. FLEISS TO ALLIED CHEMICAL & DYE CORPORATION BY DEED DATED 11/15/1946 AND RECORDED 11/22/1946 IN LIBER 4024 OF DEEDS, PAGE 321; AND K) MARTIN J. BUTLER AND SARAH BUTLER TO ALLIED CHEMICAL & DYE CORPORATION BY DEED DATED 12/3/1946 AND RECORDED 12/3/1946 IN LIBER 4030 OF DEEDS, PAGE 328; AND L) JOSEPH A. WECHTER AS EXECUTOR AND TRUSTEE UNDER THE LAST WILL AND TESTAMENT OF JOSEPH L. MCCLURE, LATE OF ERIE COUNTY, TO ALLIED CHEMICAL & DYE CORPORATION BY DEED DATED 11/20/1946 AND RECORDED 11/21/1946 IN LIBER 4041 OF DEEDS, PAGE 216; AND M) ELIZABETH MOYNIHAN, KATHERINE MOYNIHAN A/K/A KATHRYN MOYNIHAN, JENNIE L. MOYNIHAN A/K/A JANE L. MOYNIHAN, MARY E. KELSEY, MARGARET L. KELSEY, HENRY C. KELSEY, EDWARD J. KELSEY AND HENRY J. KELSEY TO ALLIED CHEMICAL & DYE CORPORATION BY DEED DATED 12/9/1946 AND RECORDED 12/9/1946 IN LIBER 4051 OF DEEDS, PAGE 23; AND N) FLORENCE FRIED TO ALLIED CHEMICAL & DYE CORPORATION BY DEED DATED 5/7/1947 AND RECORDED 5/7/1947 IN LIBER 4108 OF DEEDS, PAGE 79; AND O) THE BUFFALO CREEK RAILROAD COMPANY, ERIE RAILROAD COMPANY AND LEHIGH VALLEY RAILROAD COMPANY TO ALLIED CHEMICAL & DYE CORPORATION BY DEED DATED 8/18/1947 AND RECORDED 10/7/1947 IN LIBER 4202 OF DEEDS, PAGE 421; AND P) MICHAEL WALSH AND HANNAH WALSH TO ALLIED CHEMICAL & DYE CORPORATION BY DEED DATED 9/12/1947 AND RECORDED 9/15/1947 IN LIBER 4185 OF DEEDS, PAGE 492; AND Q) EDWARD WARTINGER SR. AND EDWARD

WARTINGER JR. TO ALLIED CHEMICAL & DYE CORPORATION BY DEED DATED 3/31/1949 AND RECORDED 4/1/1949 IN LIBER 4496 OF DEEDS, PAGE 277; AND R) BERTHA C. DAMINSKI TO ALLIED CHEMICAL & DYE CORPORATION BY DEED DATED 11/1/1951 AND RECORDED 11/1/1951 IN LIBER 5018 OF DEEDS, PAGE 545 (PARCEL B) AND FROM BUFFALO COLOR CORPORATION BY DEED DATED 9/19/1985 AND RECORDED 10/4/1985 IN LIBER 9494 OF DEEDS, PAGE 685 (PARCEL C) RECORDED IN THE ERIE COUNTY CLERK'S OFFICE

ENVIRONMENTAL EASEMENT AREA DESCRIPTION - PARCEL A

ALL THAT CERTAIN PIECE OR PARCEL OF LAND, SITUATE IN THE CITY OF BUFFALO, IN THE COUNTY OF ERIE, AND STATE OF NEW YORK, AND DESCRIBED AS FOLLOWS:

BEGINNING AT A POINT ON THE SOUTHERLY SIDE LINE OF PERRY STREET (66' WIDE PUBLIC R.O.W.), SAID POINT BEING 509.29' WESTERLY FROM THE INTERSECTION OF THE SOUTHERLY SIDE LINE OF PERRY STREET WITH THE WESTERLY SIDE LINE OF PEABODY STREET (50' WIDE PUBLIC R.O.W.), THENCE RUNNING FROM SAID BEGINNING POINT:

1. ALONG SAID SOUTHERLY SIDE LINE OF PERRY STREET SOUTH 76° 42' 38" EAST, 238.40 FEET TO A POINT; THENCE
2. SOUTH 13° 33' 35" WEST, 172.10 FEET TO A POINT; THENCE
3. NORTH 76° 12' 19" WEST, 239.10 FEET TO A POINT; THENCE
4. NORTH 13° 47' 41" EAST, 170.00 FEET TO THE POINT OR PLACE OF BEGINNING.

FOR INFORMATION ONLY: SECTION 122.12 BLOCK 1 LOT 3

ENVIRONMENTAL EASEMENT AREA DESCRIPTION - PARCEL B

ALL THAT CERTAIN PIECE OR PARCEL OF LAND, SITUATE IN THE CITY OF BUFFALO, IN THE COUNTY OF ERIE, AND STATE OF NEW YORK, AND DESCRIBED AS FOLLOWS:

BEGINNING AT POINT FORMED BY THE INTERSECTION OF THE NORTHERLY SIDE LINE OF ELK STREET (66' WIDE PUBLIC R.O.W.) WITH THE WESTERLY SIDE LINE OF PEABODY STREET (50' WIDE PUBLIC R.O.W.), THENCE RUNNING FROM SAID BEGINNING POINT:

1. ALONG SAID NORTHERLY SIDE LINE OF ELK STREET NORTH 76° 15' 19" WEST, 107.00 FEET TO A POINT IN THE DIVISION LINE WITH PARCEL C; THENCE
2. NORTHERLY AND WESTERLY IN GENERAL DIRECTION ALONG THE DIVISION LINE WITH PARCEL C THE FOLLOWING FOUR (4) BEARING AND DISTANCES: PARALLEL WITH PEABODY STREET NORTH 13° 34' 41" EAST, 115.64 FEET TO A POINT; THENCE
3. NORTH 76° 18' 29" WEST, 255.06 FEET TO A POINT; THENCE
4. SOUTH 13° 40' 31" WEST, 43.00 FEET TO A POINT; THENCE
5. NORTH 76° 18' 29" WEST, 347.08 FEET TO A POINT IN THE EASTERLY SIDE LINE OF THE BUFFALO CREEK RAILROAD LAND; THENCE

6. ALONG THE SAME NORTH 26° 21' 31" EAST, 516.11 FEET TO A POINT; THENCE
7. STILL ALONG THE SAME NORTH 26° 22' 26" EAST, 111.52 FEET TO A POINT IN THE SOUTHERLY SIDE LINE OF PERRY STREET (66' WIDE PUBLIC R.O.W.); THENCE
8. SOUTHEASTERLY ALONG SAID SOUTHERLY SIDE LINE OF PERRY STREET SOUTH 76° 42' 38" EAST, 60.79 FEET TO A POINT; THENCE
9. SOUTHWESTERLY ALONG THE WESTERLY SIDE OF PARCEL A SOUTH 13° 47' 41" WEST, 170.00 FEET TO POINT; THENCE
10. SOUTHEASTERLY ALONG THE SOUTHERLY SIDE OF PARCEL A SOUTH 76° 12' 19" EAST, 239.10 FEET TO A POINT; THENCE
11. SOUTH 13° 33' 35" WEST, 12.36 FEET TO A POINT; THENCE
12. SOUTH 76° 31' 19" EAST, 164.10 FEET TO A POINT; THENCE
13. NORTH 13° 34' 41" EAST, 15.00 FEET TO A POINT; THENCE
14. SOUTH 76° 31' 19" EAST, 107.00 FEET TO A POINT IN THE WESTERLY SIDE LINE OF SAID PEABODY STREET; THENCE
15. SOUTHWESTERLY ALONG SAID WESTERLY LINE OF PEABODY STREET SOUTH 13° 34' 41" WEST, 518.75 FEET TO THE POINT OR PLACE OF BEGINNING.

FOR INFORMATION ONLY: SECTION 122.12 BLOCK 1 LOT 7.1

ENVIRONMENTAL EASEMENT AREA DESCRIPTION - PARCEL C

ALL THAT CERTAIN PIECE OR PARCEL OF LAND, SITUATE IN THE CITY OF BUFFALO, IN THE COUNTY OF ERIE, AND STATE OF NEW YORK, AND DESCRIBED AS FOLLOWS:

BEGINNING AT A POINT ON THE NORTHERLY SIDE LINE OF ELK STREET (66' WIDE PUBLIC R.O.W.), SAID POINT BEING 107.00' WESTERLY FROM THE INTERSECTION OF THE NORTHERLY SIDE LINE OF ELK STREET WITH THE WESTERLY SIDE LINE OF PEABODY STREET (50' WIDE PUBLIC R.O.W.), THENCE RUNNING FROM SAID BEGINNING POINT:

1. NORTHWESTERLY ALONG SAID NORTHERLY SIDE LINE OF ELK STREET NORTH 76° 15' 19" WEST, 618.56 FEET TO A POINT IN THE EASTERLY SIDE LINE OF THE BUFFALO CREEK RAILROAD LAND; THENCE
2. ALONG THE SAME NORTH 26° 21' 31" EAST, 73.87 FEET TO A POINT; THENCE
3. EASTERLY AND NORTHERLY IN A GENERAL DIRECTION ALONG THE DIVISION LINE WITH PARCEL B THE FOLLOWING FOUR (4) BEARING AND DISTANCES: SOUTH 76° 18' 29" EAST, 347.08 FEET TO A POINT; THENCE
4. NORTH 13° 40' 31" EAST, 43.00 FEET TO A POINT; THENCE
5. SOUTH 76° 18' 29" EAST, 255.06 FEET TO A POINT; THENCE
6. SOUTH 13° 34' 41" WEST, 115.64 FEET TO THE POINT OR PLACE OF BEGINNING.

FOR INFORMATION ONLY: SECTION 122.12 BLOCK 1 LOT 7.2

ASSURANCE NOTE:
THE LANDS SURVEYED, SHOWN AND DESCRIBED HEREON ARE THE SAME LANDS AS DESCRIBED IN FIRST AMERICAN TITLE INSURANCE COMPANY PROFORMA NO. 593836 BEARING NO EFFECTIVE DATE.

Appendix B
List of Site Contacts

Appendix B

List of Site Contacts

Name	Phone/Email Address
Honeywell (Site Owner)	(716) 827-6200
Honeywell HSE contact	(716) 827-6325 frank.collis@Honeywell.com
GHD (Licensed Professional Engineering Company)	(716) 297-6150 Dennis.Hoyt@ghd.com
Joshua M. Vaccaro (NYSDEC DER Project Manager)	(716) 851-7220 joshua.vaccaro@dec.ny.gov
Stanley Radon, P.G. (NYSDEC Regional Remediation Geologist)	(716) 851-7220 stanley.radon@dec.ny.gov
NYSDEC Site Control	(518) 402-9553

Appendix C
Excavation Work Plan

Excavation Work Plan

Honeywell, Inc.

Buffalo Research Laboratory

Buffalo, New York

Prepared by:

GHD | 2055 Niagara Falls Boulevard Niagara Falls New York 14304 USA

11110229 | Report No 3 Appendix C | June 2019

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List of Attachments

1. Applicability of This Plan

The Honeywell, Inc. Buffalo Research Laboratory ("facility") is located in Buffalo, New York. The facility consists of four parcels addressed as 338 Elk Street, 340 Elk Street, 362 Elk Street, and 1027 Perry Street. See Figure 2 of the SMP. The SMP, and this Excavation Work Plan, pertain to the portion of the facility consisting of the parcels addressed as 338 Elk Street, 340 Elk Street, and 1027 Perry Street. These three parcels are hereinafter referred to as the "Site".

Based on historical soil sampling results for the Site, there are known areas of arsenic-impacted surface soil (0 to 2.0 feet below ground surface [ft. bgs]) at the Site. In addition, there is the potential that additional areas of arsenic-impacted surface soil exist at the Site, which have not yet been identified. Arsenic-impacted soil is anticipated to be limited to the upper 2 feet of dark gray to black silty sand and gravel material that is located beneath the Site cover. The Site cover consists of grass, gravel, asphalt, concrete, and buildings.

This Excavation Work Plan (EWP) presents the procedures to be followed during any intrusive activity performed at the Site in which surface soil (0 to 2.0 ft. bgs) beneath the Site cover is anticipated to be encountered, as this soil may be impacted with arsenic. The purpose of the EWP is to minimize the potential for human exposure to, and environmental impact resulting from, contaminated or potentially contaminated soil. **The entire Site, as defined by the Site boundary on Figure 2 of the SMP, is subject to this Excavation Work Plan, including soil beneath buildings.**

If soil screening identifies soil at any depth which appears to be significantly impacted by a substance other than arsenic, in the professional judgement of the environmental professional performing the soil screening, the facility Health, Safety, and Environment (HSE) Manager or designee will notify the NYSDEC Project Manager for guidance on management procedures. The procedures contained within this EWP apply only to surface soil (0 to 2.0 ft. bgs) at the Site.

In the event of an emergency, it may not be prudent to implement this plan as described herein at the risk of providing emergency repairs to the facility infrastructure, and therefore such an emergency would constitute an exception to the implementation of this EWP. For example, if an underground Site utility becomes damaged, and based on the judgment of the HSE Manager or designee requires immediate repair, the required work may be performed as an exception to this plan. In such cases, the HSE Manager or designee will identify that an emergency requires immediate attention. The HSE Manager or designee shall not identify a situation as an emergency for the purpose of circumventing implementation of procedures in this plan that would otherwise apply. Following identification of an emergency, repairs may be made to the buried infrastructure by plant personnel who are authorized to conduct other excavation work at the Site. If the emergency requires excavation of a buried utility, the utility will be exposed as necessary to perform the repair(s) and the excavated soil will be staged along the excavation on plastic sheeting having a minimum thickness of 10 mils. Following completion of the repair, the staged soil will be returned to the excavation. All work performed under an emergency situation will be performed in accordance with the appropriate health and safety considerations as established in the HASP (Appendix D of the SMP) and the HSE Manager or designee.

2. Identification of Responsible Individual

For each project or task involving soil removal or excavation in the upper 2 feet of the ground surface, the facility HSE Manager or designee will designate an individual who will be responsible for ensuring that the requirements of this EWP and the SMP are met and complied with during work activities. The responsible individual will observe and direct excavation and soil management activities and will disseminate the EWP and SMP requirements with employees and subcontractors prior to the start of each new project or task that involves excavation or soil removal. Each project/task will be appropriately documented using the form in Attachment C.1 or other appropriate means.

3. Revisions or Amendments to the Excavation Work Plan

This EWP is based on the assumption that Site conditions remain as they were at the time the RCRA investigations were performed. This plan provides generalized approaches to the management of soil in the upper 2 feet of the ground surface at the Site. This plan should be reviewed prior to the initiation of any Site work that will require excavation of soil beneath the Site cover (grass, gravel, asphalt, concrete, buildings). Certain portions of this plan may require amendments prior to initiation of a specific project. All amendments will require approval by the NYSDEC Project Manager for the Site.

This plan must be reviewed by a qualified representative of Honeywell to determine if revisions to the EWP are necessary if changes are made to the Order on Consent or to the facility's operations or physical condition, including the following:

- The Order on Consent is modified to reflect any revisions to the Site action level for arsenic in soil of 24 mg/kg.
- Honeywell (or its successor) is no longer the regulated party
- The Order on Consent is modified to allow non-industrial use of the Site
- Impacted soil is removed or remediated to levels below 24 mg/kg
- Previously untested soil is sampled and analyzed and the levels of arsenic are below 24 mg/kg

4. Notification

At least 15 days prior to the start of any intrusive activity conducted within the boundaries of the Site in which surface soil (depths of 0 to 2.0 ft. bgs) will be encountered, including beneath buildings, the Site owner or their representative will notify the NYSDEC. Table 1 includes contact information for the above notification. The information on this table will be updated as necessary to provide accurate contact information. A full listing of Site-related contact information is provided in Appendix B of the SMP. Should contact information change, Honeywell will submit a letter to the

NYSDEC notifying them of the change. This SMP will not need to be resubmitted for NYSDEC approval based on a change in contact information.

Table 1 Notifications*

Joshua Vaccaro (NYSDEC)	(716) 851-7220 joshua.vaccaro@dec.ny.gov

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

This notification will include:

- A detailed description of the work to be performed, including the location and areal extent of excavation, plans/drawings for Site re-grading, intrusive elements or utilities to be installed below the Site cover, estimated volumes of contaminated soil to be excavated and any work that may impact an engineering control
- A summary of environmental conditions anticipated to be encountered in the work areas, including the nature and concentration levels of contaminants of concern, potential presence of grossly contaminated media, and plans for any pre-construction sampling
- A schedule for the work, detailing the start and completion of all intrusive work
- A summary of the applicable components of this EWP
- A statement that the work will be performed in compliance with this EWP and 29 CFR 1910.120
- Identification of disposal facilities for potential waste streams
- Identification of sources of any anticipated backfill, along with all required chemical testing results

5. Soil Management Based on Arsenic Concentration

As previously indicated, arsenic-impacted soil present on the Site is anticipated to be limited to the upper 2 feet of dark gray to black silty sand and gravel fill material that is located beneath the Site cover (grass, gravel, asphalt, concrete, buildings). Based on soil sampling results, soil within the upper 2 feet of ground surface that is encountered during intrusive activities will be classified as either non-regulated, nonhazardous-regulated, or hazardous based on total arsenic concentration. Definitions of these classifications as they apply to this EWP and SMP are as follows:

- **Non-regulated: Total arsenic concentration less than 24 mg/kg**. Further use of these soils on the Site will be unrestricted. However, the soil cannot be taken off-Site unless it will be disposed or otherwise managed in accordance with applicable NYSDEC, Federal, and local laws and regulations. Refer to Section 13 for additional guidelines on the re-use of soil on-Site.
- **Nonhazardous-regulated: Total arsenic concentration greater than or equal to 24 mg/kg, but less than 100 mg/kg**. These soils will be managed as nonhazardous-regulated waste and will be transported to an off-Site disposal or treatment facility in accordance with applicable NYSDEC, Federal, and local laws and regulations.

- **Potentially hazardous:* Total arsenic concentration greater than or equal to 100 mg/kg.** These soils will be further analyzed, as described below.
- **Hazardous**: **Total arsenic concentration greater than or equal to 100 mg/kg and a TCLP arsenic result of 5.0 mg/L or greater.** These soils will be managed as a hazardous waste. Such soil will be stored, labeled, transported, and disposed of in accordance with applicable NYSDEC and Federal hazardous waste regulations and local requirements. Honeywell will use only licensed transporters and disposal facilities for hazardous soil disposal.

*All soil demonstrated through sampling and analyses to have a total arsenic concentration greater than or equal to 100 mg/kg will be subject to TCLP testing to determine if it must be handled as a hazardous soil. If the TCLP analysis result indicates an arsenic concentration of less than 5.0 mg/L, the soil will be classified and managed as a nonhazardous regulated soil/waste. If the TCLP analysis result indicates an arsenic concentration of greater than or equal to 5.0 mg/L, the soil will be classified and managed as a hazardous soil/waste.

Note, changes to Federal or State waste definition regulations may warrant or dictate changes to the soil management classifications contained in this plan.

6. Soil Characterization Prior to Excavation

Soils encountered within the upper 2 feet of ground surface at the Site during intrusive activities will be managed according to their classifications of either non-regulated, nonhazardous-regulated, or hazardous, based on total arsenic concentrations. Refer to Section 5 for definitions of these classifications as they pertain to this EWP and SMP. Therefore, for excavations in areas of the Site that were not characterized and sampled in either the RCRA Facility Investigation or Corrective Measures Study, soils present in the upper 2 feet of the ground surface within the proposed excavation areas will be sampled prior to excavation so appropriate soil management practices can be implemented. This requirement only applies if a project involves **either** of the following:

- The excavation of more than 1 cubic yard of soil
- The off-Site disposal of excavated soil

In areas that have already been characterized by previous sampling events, soil does not need to be characterized again. Based on the previous sampling results, the soil will be classified as either non-regulated, nonhazardous-regulated, or hazardous.

If soils cannot be sampled prior to excavation (e.g., during emergency repairs), these soils will be segregated and staged as material that requires further testing. Refer to Section 8 for the procedures on how to sample these soils.

For excavations in which soil characterization prior to excavation is required, soil samples will be collected in accordance with the following sampling requirements:

- Composite soil samples will be collected from the upper 2 feet of the proposed excavation area at a minimum rate of 1 per every 100 cubic yards of proposed excavation.

- Each composite soil sample will be analyzed for total arsenic via USEPA SW-846 Method 6010C.
- If total arsenic in a sample is greater than or equal to 100 mg/kg, this sample will be tested for TCLP arsenic based on the procedural dilution of 20 times in TCLP sample preparation.
- The soil samples will be collected from the ground surface to the predetermined sampling depth or immediately below any existing cover (grass, gravel, asphalt, concrete) to the predetermined sampling depth.
- The soil samples will be collected from specific horizons not less than 0.5 foot thick and no greater than 2.0 feet thick. The HSE Manager or designee will be responsible for determining the appropriate sampling interval.

Soil samples will be collected in accordance with the following field procedures:

- Sampling will be completed by a qualified Honeywell representative or designee.
- Each composite sample will be mixed prior to filling the sample jar.
- Each sample will be collected using a decontaminated or new stainless steel or plastic sampling device (hand trowel, shovel, scoop, hand auger, or other appropriate sampling device)
- Immediately upon collection, samples will be labeled and placed into coolers chilled with crushed ice to approximately 4°C (Celsius). The samples will be handled and delivered to the laboratory in accordance with standard laboratory sampling and chain of custody protocols.
- All samples will be submitted to a New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP)-certified laboratory.

Soil that meets or exceeds the Site action level of 24 mg/kg for total arsenic will require off-Site disposal/treatment, as either nonhazardous-regulated waste or hazardous waste, depending on the TCLP arsenic concentration. All other soil (total arsenic concentration less than 24 mg/kg) may be used as backfill.

If the soil/fill material requires off-Site disposal, analysis for additional parameters, as required by the disposal facility, may be necessary.

Sample handling, equipment decontamination, and field quality assurance/quality control (QA/QC) procedures required to be followed during sampling are described in Section 9.

7. Soil Screening, Segregation, and Staging

Screening

As appropriate, visual, olfactory, and instrument-based (e.g. photoionization detector) soil screening will be performed by a qualified environmental professional. Soil screening will be performed during all intrusive activities conducted within the boundaries of the Site in which soil within 2 feet of the ground surface may be encountered, as this soil may be impacted by arsenic. Soil beneath buildings will be screened when there is risk of exposure to the underlying surface soils

(0 to 2 ft. bgs) as a result of the nature of the intrusive activity to be performed. Soil screening will be performed regardless of when the intrusive work is done.

As indicated in the SMP, surface soils will also be sampled and submitted for laboratory analysis for total arsenic.

Segregation and Staging

Soil below 2 feet in depth may be segregated and is not subject to this EWP.

If surface soil (0 to 2.0 ft. bgs) has been sampled prior to excavation, but analytical results have not yet been received by the time the soil is excavated and staged, the soil will be considered as "pre-characterization staged soil." A sign will be placed at the pre-characterization staged soil indicating that the soil is pre-characterized, pending analytical results. Pre-characterized soil may be segregated based on its source area and the number of samples that have been collected. Once analytical results are received, the soil will be considered "post-characterized staged soil" and will be classified as either non-regulated, nonhazardous-regulated, or hazardous.

Any surface soil (0 to 2.0 ft. bgs) excavated in the process of performing an emergency repair to the Site infrastructure (as defined in Section 1) will be considered "emergency excavation staged soil." At the completion of the emergency repair, the soil will be returned to the excavation. If this soil is to remain staged overnight, a sign will be placed at the staged soil indicating the soil is emergency excavation soil and will be returned to the excavation upon completion of the repairs. If any soil remains following completion of the emergency repair, that soil will be considered pre-characterization staged soil and will be marked as such, and will be sampled at the first available date according to the procedures in Section 8.

When analytical results are received for any excavated surface soil (0 to 2.0 ft. bgs), whether before or after excavation, the soil will be considered as "post-characterization staged soil" and will be classified as non-regulated, nonhazardous-regulated, or hazardous according to the classifications described in Section 5. Based on the classification, the excavated soil will be segregated into material that requires off-site disposal (nonhazardous-regulated and hazardous) and material that can be returned to the subsurface (non-regulated). A sign will be placed at the post-characterized staged soil indicating that the soil is post-characterized, and will indicate the classification of the soil with respect to arsenic concentration (non-regulated, nonhazardous-regulated, or hazardous-regulated).

Acceptable Methods of Staging

Excavated soil that is classified as non-regulated may be staged in any manner that provides adequate sedimentation run-off control as required at non-regulated construction sites.

Excavated soil that is classified as nonhazardous-regulated, hazardous, or for which analytical results have not yet been received, will be stored in a manner that is consistent with the existing Consent Order and that will reduce the potential for contact with the non-impacted ground surface and dust generation until proper disposal can be arranged. Acceptable storage containers include covered roll-off boxes, hoppers, 55-gallon drums, or other impermeable containers or liners as determined by the Honeywell HSE Manager or designee. Stockpiled soils classified as

nonhazardous-regulated or hazardous will be removed from the Site within 90 days of excavation and properly disposed of off-site according to the procedures in Sections 10 through 12.

As an alternative to containerization, excavated soil may be staged by placing it on and covering it with an impermeable material such as plastic sheeting or tarps. If plastic sheeting is used, the sheeting will have a minimum thickness of 10 mils. Cover sheeting or tarps will be secured with stakes, hay bales, or other materials to prevent uncovering or wind damage. Staging areas will be inspected daily, and damaged cover sheeting will be replaced or repaired.

Soil containers or stockpiles will be identified by signs, stakes, or labels that indicate the origination point (e.g., location and depth) of the soil and the date the soil was first containerized or staged. When the soil has been characterized, signs will be placed that indicate whether the staged soil is classified as non-regulated, nonhazardous-regulated, or hazardous.

Stockpile Management

Soil stockpiles will be continuously encircled with a soil or asphalt/concrete berm and/or silt fence to prevent surface water run-off from the stockpiles and surface water run-on from the surrounding ground surface. Hay bales will be used as needed near catch basins, surface waters and other discharge points.

Stockpiles will be kept covered at all times with appropriately anchored tarps. Damaged tarp covers will be promptly replaced. Stockpiles will be inspected at a minimum once each week and after every storm event. Results of inspections will be documented and maintained at the Site and available for inspection by the NYSDEC.

8. Soil Characterization Following Excavation

If excavated soils cannot be sampled prior to excavation (e.g., during emergency repairs), these soils will be segregated and stockpiled according to the procedures outlined in Section 7 and will be sampled at the first available opportunity. Soil samples will be collected in accordance with the following sampling requirements:

- Composite samples will be collected from each separate group of containers or soil pile(s) at a minimum frequency of one sample for every 100 cubic yards of soil. The table below summarizes the collection frequency required.

Container or Storage Method	Sample Type	Minimum Sample Frequency
Soil Pile	Composite consisting of grab samples collected at four locations	One composite sample per 100 cubic yards of stockpiled soil
Containers (roll-off boxes, drums, or other)	Composite sample collected from each individual container	One sample for every 100 cubic yards of container volume (minimum of one sample per group of containers)

- Each sample will be collected at an approximate depth of 8 inches below the soil surface
- Each composite soil sample will be analyzed for total arsenic via USEPA SW-846 Method 6010C
- If total arsenic in a sample is greater than or equal to 100 mg/kg, this sample will be tested for TCLP arsenic based on the procedural dilution of 20 times in TCLP sample preparation

Soil samples will be collected in accordance with the following field procedures:

- Sampling will be completed by a qualified Honeywell representative or designee.
- Each composite sample will be mixed prior to filling the sample jar.
- Each sample will be collected using a decontaminated or new stainless steel or plastic sampling device (hand trowel, shovel, scoop, hand auger, or other appropriate sampling device)
- Immediately upon collection, samples will be labeled and placed into coolers chilled with crushed ice to approximately 4°C (Celsius). The sample labels will identify the sample location and depth, sample type (grab or composite), time and date of collection, name of the sampler, and required analyses. Sealed sample coolers will be delivered with accompanying chain of custody documentation to the analytical laboratory.
- All samples will be submitted to a New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP)-certified laboratory.

Soil that meets or exceeds the Site action level of 24 mg/kg for total arsenic will require off-Site disposal/treatment, as either nonhazardous-regulated or hazardous waste, depending on the TCLP arsenic concentration. All other soil (total arsenic concentration less than 24 mg/kg) may be reused on-Site.

If the soil/fill material requires off-Site disposal, analysis for additional parameters, as required by the disposal facility, may be necessary.

Sample handling, equipment decontamination, and field quality assurance/quality control (QA/QC) procedures required to be followed during sampling are described in Section 9.

9. Sample Management and Quality Control during Sampling

Equipment Decontamination

To minimize the potential for cross-contamination, disposable sampling equipment will be used, if possible. If sampling equipment is reused, the equipment will be decontaminated prior to each use using the following procedures:

- Potable water/non-phosphate detergent (e.g., Alconox) solution wash
- Potable or distilled water rinse
- Dilute nitric acid (10 percent) solution rinse

- Distilled water rinse
- Wipe or air dry

Decontamination rinsate will be collected and disposed of in accordance with applicable NYSDEC guidance and regulations.

Field Quality Assurance Control

Field QA/QC samples will be collected during soil characterization sampling and will include field blank and duplicate samples (as appropriate). These samples are discussed individually below:

- Field blank samples will be collected to assess the quality of sample equipment decontamination and the cleanliness of decontaminated non-disposable sampling equipment. Each field blank sample will be collected by pouring laboratory-supplied analyte-free (deionized) water over, into, or through decontaminated sampling equipment and collecting the rinsate in the appropriate laboratory containers. One field blank will be collected for every 10 soil characterization samples, if a single project involves collection of at least 10 samples. The field blank will be analyzed for the same parameters (e.g., arsenic) as the characterization samples.
- Duplicate samples will be collected to assess the reproducibility of sample collection and laboratory analytical procedures. Each duplicate will be collected simultaneously with a primary soil characterization sample from the same location and using the same procedures. One duplicate sample will be collected for every 10 soil characterization samples, if a single project involves collection of at least 10 samples. The duplicate will be analyzed for the same parameters (e.g., arsenic) as the characterization samples.

Because trip blank samples are associated with analyses of volatile organic compounds (VOCs), which are not required for analysis under the SMP, trip blanks will not be required.

10. Excavation and Load-Out of Regulated Soils

Applicability

If arsenic concentrations in sampled surface soil (0 to 2.0 ft. bgs) are greater than or equal to 24 mg/kg, the soil must be excavated, transported, and disposed of off-Site in accordance with the procedures in Sections 10 through 12.

If arsenic concentrations are below 24 mg/kg at or below a given horizontal strata (within the upper 2 feet of the ground surface), then soil at or below that depth may be segregated and shall be considered non-regulated and can be re-used on-Site in accordance with Section 13.

Roles and Responsibilities

The HSE Manager or designee will oversee all invasive work and the excavation and load-out of all excavated material. The owner of the property and its contractors are solely responsible for safe execution of all invasive and other work performed under this Plan.

The presence of utilities and easements on the Site will be investigated by the qualified environmental professional. It will be determined whether a risk or impediment to the planned work under this SMP is posed by utilities or easements on the Site.

The responsible individual designated by Honeywell (refer to Section 2) will complete daily field logs that document Site activities associated with the removal and disposal of arsenic-impacted soil. The field logs will include information regarding:

- Work performed
- Hours worked
- Equipment, personnel, and materials used
- Excavation location and approximate dimensions
- Segregation, stockpiling, and storage information related to excavated soil (Refer to Section 7)
- Soil characterization sampling (sample collection procedures, times, types,, and locations) (Refer to Section 8)
- Soil load-out quantities and information related to off-Site disposal

A chain of custody form will be completed for each group of samples submitted for laboratory analysis. A copy of the chain of custody will be retained by Honeywell. Laboratory analytical results will be provided in the analytical reports prepared by the laboratory.

Prevention of Contaminant Transport

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

A truck wash will be operated on-Site, when the scope and breadth of work deems it necessary. The HSE Manager or designee will be responsible for ensuring that all outbound trucks will be washed at the truck wash before leaving the Site until the activities performed under this section are complete. As an alternative, truck routes on the Site can be specified in such a manner as to prevent the trucks' tires and undercarriages from coming into contact with contaminated soil. If this method is used, trucks need only be inspected (and cleaned if necessary) rather than washed.

The HSE Manager or designee will be responsible for ensuring that all egress points for truck and equipment transport from the Site are clean of dirt and other materials derived from the Site during intrusive excavation activities. Locations where vehicles enter or exit the Site shall be inspected daily for evidence of off-site soil tracking. Cleaning of the adjacent streets will be performed as needed to maintain a clean condition with respect to Site-derived materials.

Excavation areas and haul roads will be inspected daily. No excavated arsenic-impacted soil will be permitted to remain outside of the staging area (such as spilled soil along haul roads or around the excavation edge) and will be placed in the staging area or returned to the excavation.

Excavation equipment and tools that contact arsenic-impacted soil will be decontaminated upon completion of excavation activities. Decontamination will be accomplished with a pressure washer,

hose, hand-washing with soap and water, or other method as determined by Honeywell. Decontamination water/rinsate will be collected for proper disposal by Honeywell's HSE Manager or designee in compliance with the existing permits and regulations.

11. Materials Transport Off-Site

Although excavated soil may be categorized as nonregulated as defined by the SMP for the purpose of on-Site soil management if arsenic concentrations are less than 24 mg/kg, this action level is above the NYSDEC Part 375 Soil Cleanup Objectives (SCOs) (16 mg/kg) for residential through industrial use. Therefore, all excavated soil needs to be managed as a contaminated soil and can be assumed to be nonhazardous based on generator knowledge. As such, the excavated soil needs to be transported and disposed of in accordance with DOT and RCRA requirements. All transport of excavated soil off Site, regardless of contaminant class or category, will be performed by licensed haulers in accordance with appropriate local, State, and Federal regulations, including 6NYCRR Part 364. Haulers will be appropriately licensed and trucks properly placarded.

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

With the noted exception in Section 10, all trucks will be washed prior to leaving the Site. If trucks are washed, truck wash waters will be collected and disposed of off-Site in an appropriate manner. Sediment from the truck washing will be disposed of off-Site with one of the loads of soil being exported.

Truck transport routes are as follows:

- Upon exiting the Site, trucks shall travel south on Peabody Street and then west on Elk Street. Trucks will then travel north on Smith Street to the entrances to the Interstate I-190 South and I-190 North.

All trucks loaded with site materials will exit the vicinity of the Site using only the approved truck route noted above. This is the most appropriate route and takes into account:

a) Limiting transport through residential areas and past sensitive sites

b) Use of city mapped truck routes

c) Prohibiting off-site queuing of trucks entering the facility

d) Limiting total distance to major highways

e) Promoting safety in access to highways

f) Overall safety in transport.

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

Egress points for truck and equipment transport from the site will be kept clean of dirt and other materials during the work.

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

12. Materials Disposal Off-Site

Although excavated soil may be categorized as nonregulated as defined by the SMP for the purpose of on-Site soil management if arsenic concentrations are less than 24 mg/kg, this action level is above the NYSDEC Part 375 Soil Cleanup Objectives (SCOs) (16 mg/kg) for residential through industrial use. Therefore, all excavated soil needs to be managed as a contaminated soil and can be assumed to be nonhazardous based on generator knowledge. As such, the excavated soil needs to be transported and disposed of in accordance with DOT and RCRA requirements. All soil/fill/solid waste excavated and removed from the Site, regardless of contaminant class or category, will be treated as contaminated and regulated material (unless otherwise determined through appropriate testing or knowledge) and will be transported and disposed in accordance with all local, State (including 6NYCRR Part 360) and Federal regulations. If disposal of soil/fill from this Site is proposed for unregulated off-Site disposal (e.g. clean soil removed for development purposes), a formal request with an associated plan will be made to the NYSDEC. Unregulated off-Site management of materials from this Site will not occur without formal NYSDEC approval.

Off-site disposal locations for excavated soils will be identified in the pre-excavation notification. This will include estimated quantities and a breakdown by class of disposal facility if appropriate, e.g. hazardous waste disposal facility, solid waste landfill, petroleum treatment facility, C/D recycling facility, etc. Actual disposal quantities and associated documentation for all disposed wastes, including both hazardous and nonhazardous wastes, will be reported to the NYSDEC in the Periodic Review Report, which is an annual report providing information on Site management for the preceding year. (Note, disposal quantities and associated documentation for disposed hazardous wastes will also be included in the Hazardous Waste Annual Report, which is not governed by this SMP.)

Documentation that will be retained for inclusion in the PRR include the following:

- Copies of waste characterization test results and waste profiles generated based on those test results
- Generator disclosure forms used to arrange for acceptance of soil by the disposal facility
- Copies of hazardous waste manifests signed upon receipt at the disposal facility
- Bills of lading (for nonhazardous materials)
- Copies of weigh slips or certificates of disposal issued by the disposal facility, or other equivalent proof of disposal (i.e., invoices)
- Copies of any correspondence with the NYSDEC and other regulatory agencies regarding soil disposal

Nonhazardous historic fill and contaminated soils taken off-Site will be handled, at minimum, as a Municipal Solid Waste per 6NYCRR Part 360-1.2. Material that does not meet Unrestricted SCOs

(Track 1) is prohibited from being taken to a New York State recycling facility (6NYCRR Part 360-16 Registration Facility).

13. Materials Reuse On-Site

If, based on sampling results, total arsenic concentration in surface soil (0 to 2.0 ft. bgs) is less than 24 mg/kg, this soil will be classified as non-regulated and can be re-used on-Site. Further use of these soils on the Site will be unrestricted. However, the soil cannot be taken off-Site unless it will be disposed or otherwise managed in accordance with applicable NYSDEC, Federal, and local laws and regulations.

The HSE Manager or designee will ensure that procedures defined for materials reuse in this EWP are followed and that unacceptable material does not remain on-Site. Soil that is acceptable for reuse on-Site will be unrestricted, but will be placed beneath an impervious surface such as asphalt or concrete, or will be placed and either reseeded (manual reseeding, hydro-seeding, etc.) with an appropriate grass mixture or covered by gravel.

14. Fluids Management

All liquids generated at the Site, including but not limited to, excavation dewatering, truck washing, decontamination waters and groundwater monitoring well purge and development waters, will be handled, transported and disposed in accordance with applicable local, State, and Federal regulations. Dewatering, purge and development fluids will not be recharged back to the land surface or subsurface of the Site, and will be managed off-Site, unless prior approval is obtained from NYSDEC. All water generated during excavation or groundwater monitoring activities will be staged on-Site in a labeled container (polyethylene tank or 55-gallon drum) until proper disposal is arranged by Honeywell based on the analytical results.

15. Site Cover Restoration

After the completion of soil removal and any other invasive activities, the Site cover will be restored in a manner that complies with Section 7.0 of the SMP. The Site cover is comprised of a minimum of buildings, asphalt, concrete, grass, and gravel. If the type of cover in an area on-Site changes from that which exists prior to the excavation (e.g., a grass or gravel cover is replaced by asphalt or concrete), as shown on Figure 3 of the SMP, this will constitute a modification of the cover and the upper surface of the remaining contamination. A figure showing the modified surface will be included in the subsequent Periodic Review Report and in any updates to the SMP.

16. Backfill from Off-Site Sources

All materials proposed for import onto the Site will be approved by the HSE Manager or designee and the NYSDEC Project Manager, as per DER-10 Part 5.4(e), and will be in compliance with

provisions in this SMP prior to receipt at the Site. A request to import soil from off-Site will be made to the NYSDEC Project Manager prior to the import of such material, leaving sufficient time to allow for sampling of the material, if required by the NYSDEC Project Manager. All imported soils will meet the backfill and cover soil quality standards established in 6NYCRR 375-6.7(d). If sampling of the proposed soil for import is required by the NYSDEC Project Manager, sampling of such soil shall be conducted according to the following:

- One representative composite sample will be collected per source for virgin soils.
- One representative composite sample will be collected per 500 cubic yards of material for non-virgin soils.
- If more than 1,000 cubic yards of soil are obtained from a given off-site non-virgin soil source area, one representative composite sample will be collected for every 2,500 cubic yards of material.
- If more than 5,000 cubic yards of soil are obtained from a given off-site non-virgin soil source area, one representative composite sample will be collected for every 5,000 cubic yards of material.
- All samples will be analyzed for Target Compound List (TCL) VOCs, SVOCs, pesticides, PCBs, arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver, and cyanide.

Materials brought on Site for construction purposes, which will not be used as backfill, such as steel rebar, piping, and concrete, do not require any pre-approval. If crushed rock is to be used as backfill, such as to backfill a utility trench, pre-approval will still be required in accordance with NYSDEC's DER-10 requirements, unless the material is from a NYSDOT-approved borrow source (https://www.dot.ny.gov/divisions/engineering/technical-services/materials-bureau/fine-coarse-aggregates).

Off-Site borrow areas will be documented as having no evidence of disposal or release of solid or hazardous wastes, hazardous or toxic substances, radioactive materials, or petroleum products. Material from industrial sites, spill sites, or other environmental remediation sites or potentially contaminated sites will not be imported to the Site. Solid waste will not be imported onto the Site. Off-Site soil intended for use as backfill cannot otherwise be defined as a solid waste in accordance with 6 NYCRR Part 360. Soils that meet 'exempt' fill requirements under 6 NYCRR Part 360, but do not meet backfill or cover soil objectives for this Site, will not be imported onto the Site without prior approval by NYSDEC.

According to 6NYCRR 375-6.7(d)(1)(c), for industrial sites, soil brought to the Site for use in the Site cover or backfill will meet the lower of the protection of groundwater or the protection of public health soil cleanup objectives for commercial use will be used. The public health soil cleanup objectives for commercial use may be used for the Site, unless otherwise required by the NYSDEC. These soil quality standards for the analytes to be tested are listed in Table 2.

Table 2 Soil Quality for Imported Soil*

Analyte	Soil Quality Standard (mg/kg)
VOCs	
1,1,1-Trichloroethane	500
1,1-Dichloroethane	240
1,1-Dichloroethene	500
1,2-Dichlorobenzene	500
1,2-Dichloroethane	30
cis-1,2-Dichloroethene	500
trans-1,2-Dichloroethene	500
1,3-Dichlorobenzene	280
1,4-Dichlorobenzene	130
1,4-Dioxane	130
Acetone	500
Benzene	44
Butylbenzene	500
Carbon tetrachloride	22
Chlorobenzene	500
Chloroform	350
Ethylbenzene	390
Hexachlorobenzene	6
Methyl ethyl ketone	500
Methyl tert-butyl ether	500
Methylene chloride	500
n-Propylbenzene	500
sec-Butylbenzene	500
tert-Butylbenzene	500
Tetrachloroethene	150
Toluene	500
Trichloroethene	200
1,2,4-Trimethylbenzene	190
1,3,5-Trimethylbenzene	190
Vinyl chloride	13
Xylene (total)	500
SVOCs	
Acenaphthene	500
Acenapthylene	500
Anthracene	500
Benz(a)anthracene	5.6
Benzo(a)pyrene	1
Benzo(b)fluoranthene	5.6
Benzo(g,h,i)perylene	500
Benzo(k)fluoranthene	56

Analyte	Soil Quality Standard (mg/kg)
Chrysene	56
Dibenz(a,h)anthracene	0.56
Fluoranthene	500
Fluorene	500
Indeno(1,2,3-cd)pyrene	5.6
m-Cresol	500
Naphthalene	500
o-Cresol	500
p-Cresol	500
Pentachlorophenol	6.7
Phenanthrene	500
Phenol	500
Pyrene	500
PCBs/Pesticides	
2,4,5-TP Acid (Silvex)	500
4,4'-DDE	62
4,4'-DDT	47
4,4'-DDD	92
Aldrin	0.68
alpha-BHC	3.4
beta-BHC	3
Chlordane (alpha)	24
delta-BHC	500
Dibenzofuran	350
Dieldrin	1.4
Endosulfan I	200
Endosulfan II	200
Endosulfan sulfate	200
Endrin	89
Heptachlor	15
Lindane	9.2
Polychlorinated biphenyls (PCBs)	1
Metals and Cyanide	
Arsenic	16
Barium	400
Cadmium	9.3
Chromium, hexavalent	400
Chromium, trivalent	1,500
Total Cyanide	27
Lead	1,000

Analyte	Soil Quality Standard (mg/kg)
Total Mercury	2.8
Selenium	1,500
Silver	1,500

* Note: Values are from Table 375-6.8(b), Protection of Public Health, Commercial.

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

17. Stormwater Pollution Prevention

Small Excavations (less than 1 acre)

Run-off from the Site could impact municipal sewers and/or surface waters. For small excavations, silt fencing, hay bales, or berms will be installed over the entire perimeter of the construction area. Barriers and hay bale checks will be installed and inspected once a week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the site and available for inspection by the NYSDEC. All necessary repairs shall be made immediately. Accumulated sediments will be removed as required to keep the barrier and hay bale check functional.

If silt fencing is used, undercutting or erosion of the silt fence toe anchor shall be repaired immediately with appropriate backfill materials. Manufacturer's recommendations will be followed for replacing silt fencing damaged due to weathering.

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

Large Excavations (one acre or greater)

Any disturbance of more than one acre of the Site will require the Owner to follow the requirements for coverage under the Construction Storm Water General Permit including the submittal of a Notice of Intent (NOI) form and the development of a Storm Water Pollution Prevention Plan (SWPPP). Approval will be sought to discharge storm water to the Buffalo Sewer Authority. The SWPPP must fulfill all permit requirements and must be prepared in accordance with Part III of the New York State General Permit No. GP-0-10-001. The SWPPP, in accordance with permit requirements, must provide the following information:

- A background discussion of the scope of the construction project
- A statement of the storm water management objectives
- An evaluation of post-development run-off conditions
- A description of proposed storm water control measures

- A description of the type and frequency of maintenance activities required to support the control measure

The SWPPP will address issues such as erosion prevention, sedimentation control, hydraulic loading, pollutant loading, ecological protection, physical Site characteristics that impact design, and Site management planning. All descriptions of proposed features and structures at the Site will include a description of structure placement, support engineering data and calculations, construction scheduling, and references to establish detailed design criteria. The SWPPP will conform to all requirements as established by the applicable regulatory agencies.

18. Excavation Contingency Plan

If underground tanks or other previously unidentified contaminant sources are found during subsurface excavations or development related construction, excavation activities will be suspended until sufficient equipment is mobilized to address the condition and the NYSDEC Project Manager will be notified.

Sampling will be performed on product, sediment and surrounding soils, etc. as necessary to determine the nature of the material and proper disposal method. Chemical analysis will be performed for a full list of analytes (TAL metals; TCL volatiles and semi-volatiles, TCL pesticides and PCBs), unless the Site history and previous sampling results provide a sufficient justification to limit the list of analytes. In this case, a reduced list of analytes will be proposed to the NYSDEC for approval prior to sampling.

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

19. Community Air Monitoring Plan

Work involving the excavation of surface soils (0 to 2 ft. bgs) with arsenic concentrations greater than or equal to 24 mg/kg, or when arsenic concentrations are not known at the time of excavation, will require adherence to the Community Air Monitoring Plan (CAMP).

The CAMP requires real-time monitoring for VOCs and particulates (dust) at the Site property downwind of each designated work area when intrusive and certain non-intrusive dust-producing activities are in progress at contaminated sites. When such activities are being completed indoors or in an enclosed area with no migration pathways to the public, VOC and particulate monitoring will be required to protect workers from the potential inhalation hazard. All monitoring will be conducted in accordance with the CAMP, which is included in the HASP (Appendix D of the SMP) and will be kept on-Site during construction activities.

Exceedances of action levels listed in the CAMP will be reported to NYSDEC Project Manager.

20. Odor Control Plan

Excavation activities may encounter soils impacted with contaminants other than arsenic, which may produce odors. If such soils are encountered, procedures to control the odors will be followed.

This odor control plan is capable of controlling emissions of nuisance odors off-Site. Specific odor control methods to be used during intrusive activities or activities which encounter or expose Site soils will include screening excavated soils with a photoionization detector (PID) and storage of soils with PID readings in excess of 100 ppm (ppm) beneath tarps or possibly within an enclosed structure. If nuisance odors are identified at the Site boundary, or if odor complaints are received, work will be halted and the source of odors will be identified and corrected. Work will not resume until all nuisance odors have been abated. NYSDEC and NYSDOH will be notified of all odor events and of any other complaints about the project. Implementation of all odor controls, including the halt of work, is the responsibility of the HSE Manager or designee, and any measures that are implemented will be discussed in the Periodic Review Report.

All necessary means will be employed to prevent on- and off-site nuisances. At a minimum, these measures will include:

i.) limiting the area of open excavations and size of soil stockpiles

ii.) shrouding open excavations with tarps and other covers

iii.) using foams to cover exposed odorous soils

If odors develop and cannot be otherwise controlled, additional means to eliminate odor nuisances will include:

i.) direct load-out of soils to trucks for off-site disposal

ii.) use of chemical odorants in spray or misting systems

iii.) use of staff to monitor odors in surrounding neighborhoods

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

21. Dust Control Plan

A dust suppression plan that addresses dust management during invasive on-Site work will be determined by the HSE Manager or designee. Should it be determined that a dust suppression plan is necessary, it will include, at a minimum, the items listed below:

- Dust suppression will be achieved through the use of a dedicated on-site water truck or system for road wetting. The truck (or system) will be equipped with a water cannon capable of spraying water directly onto off-road areas including excavations and stockpiles.

- Clearing and grubbing of larger sites will be done in stages to limit the area of exposed, unvegetated soils vulnerable to dust production.
- If necessary, gravel will be used on roadways to provide a clean and dust-free road surface.
- On-Site roads will be limited in total area to minimize the area required for water truck sprinkling.

22. Other Nuisances

If deemed necessary by the HSE Manager or designee, a plan for rodent control will be developed and utilized by the contractor prior to and during Site clearing and Site grubbing, and during all remedial work.

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

23. Soil Management Report

As an attachment to the annual Periodic Review Report, Honeywell will include a Soil Management Report for each year in which Honeywell is required to characterize soil per Section 6 of this EWP. The Soil Management Report will include:

- A description of the work performed, including excavation, staging, soil characterization sampling, and Site restoration activities
- Maps or site plans detailing excavation, staging, treatment, and other work areas, as appropriate
- The total volume or amount of soil excavated or treated
- The analytical results for soil characterization samples
- Copies of daily field logs and chain of custody forms
- Disposal documentation
- Agency correspondence

Honeywell will retain electronic copies of the Periodic Review Reports (which include the Soil Management reports) for a period of 5 years for as long as the current Consent Order remains in effect.

Excavation Work Plan
Soil Management Coordination Form

Honeywell, Inc.
Buffalo Research Laboratory
Buffalo, New York

Date: _____ **Time:** _____

Description of Work to Be Performed: _____

_____

_____

_____

_____

_____

Meeting Conducted By: _____
Signature

Topics Discussed: _____

_____

_____

_____

_____

_____

Attendees:

Name (Print)	Company	Signature

Appendix D
Health and Safety Plan

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HEALTH AND SAFETY PLAN
Signature Page

Site Name: Honeywell, Inc. - Buffalo Research Laboratory

Location Address: 20 Peabody Street, Buffalo, New York

Reference No.: 11110229 GHD Office: Niagara Falls

Anticipated Start Date: _____ Anticipated Project Duration: _____

Prepared By (Signature): _____ Date: _____

Project Manager (Signature): _____ Date: _____

Reviewed By (Signature): _____ Date: _____

1. Introduction

1.1 Purpose

The purpose of this site-specific health and safety plan (HASP) is to provide specific guidelines and establish procedures for the protection of personnel performing the activities described in the Site Management Plan (SMP) and Section 2.0 Site Operations of this HASP. The information in this HASP has been developed in accordance with applicable standards and is, to the extent possible, based on information available to date. The HASP is also a living document, in that it must continually evolve as site conditions and knowledge of the site work activities change over time.

This HASP was developed based on the following safety concepts which are to be implemented before and during work activities:

- **Before Work Activities:** Communicate the contents of this HASP to all site personnel and subcontractors who will be performing the work activities prior to the initiation of work activities. Revise or develop Job Safety Analysis (JSA) forms for activities to be performed, and review with personnel who will be performing the work. All JSAs must be approved the by the Health and Safety Supervisor.
- **During Work Activities:** Eliminate unsafe conditions. Identify conditions that can contribute to an incident and remove exposure to these conditions. Reduce unsafe acts and require that personnel maintain a high degree of safety awareness. Review site conditions and potential hazards before beginning any task, after an incident, and/or during any unusual circumstances. Stop the activities to think about the task, analyze the task hazards, and determine methods to reduce risk. Review the results with appropriate personnel. Conduct and document safety inspections of the work area and correct any deficiencies before resuming work.

1.2 Stop Work Authority

All Honeywell employees are empowered and expected to stop the work of co-workers, subcontractors, client employees, or other contractors if any person's safety or the environment are at risk. No repercussions will result from this action. Reporting of unsafe condition/acts and/or Stop Work Authority (SWA) shall be documented using the appropriate form designed by Honeywell.

The discovery of any condition that would suggest the existence of a situation more hazardous than anticipated shall result in the removal of site personnel from that area and reevaluation of the hazard and the levels of protection.

1.3 Personnel Requirements

All personnel conducting SMP activities on site must conduct their activities in compliance with all applicable Safety and Health legislation throughout North America to include, but not limited to, the Occupational Safety and Health Administration (OSHA) 29 CFR 1910, 29 CFR 1926, and Honeywell's policies and procedures. **Project personnel must also be familiar with the procedures and requirements of this HASP**. In the event of conflicting safety

procedures/requirements, personnel must implement those safety practices affording the highest level of safety and protection.

1.4 Project Management and Safety Responsibilities

Project Manager – Honeywell

The Honeywell Project Manager (PM) shall be responsible for the overall implementation of the HASP and for ensuring that all safety and health (S&H) responsibilities relative to the SMP work activities are carried out. This shall include, but is not limited to, review and approval of the HASP, qualifying and directing subcontractors relative to S&H performance, coordinating all S&H submittals, and consulting with the Contractor Coordinator (CC) regarding appropriate changes to the HASP, when needed. The PM will also ensure that the appropriate resources are provided to support the work activities.

Contractor Coordinator – Honeywell

The CC is the person who, under the supervision of the Honeywell PM, shall be responsible for communicating site requirements to all site personnel and subcontractors performing the SMP work activities. The CC will perform the following duties:

1. Review/approve the HASP and ensure that JSA forms are completed/revised prior to the start of work activities. This will also include determining if any modifications to the procedures outlined in the HASP need to be made based on the specific requirements of the planned work activities. All proposed modifications will be approved by the PM and communicated to appropriate personnel prior to the start of SMP work activities.
2. Verify that the emergency contact information in Table 2 of the HASP is current prior to the start of SMP work activities.
3. Based on the requirements of the HASP, ensure that all personnel and subcontractors performing SMP work activities will be equipped with the appropriate personal protective equipment (PPE) and other required safety equipment/items prior to the start of work activities.
4. Conduct a daily safety meeting immediately prior to the start of SMP work activities that communicates the site-specific hazards for the planned work activities, reviews relevant JSAs and Safety Data Sheets (SDS), and outlines the proactive measures that will be taken to minimize the hazards. The CC will document the topics covered and meeting attendees.
5. Conduct a pre-entry briefing with personnel new to the site to familiarize them with the HASP. The CC will document this briefing.
6. Ensure that site personnel and subcontractors are evaluating site conditions and potential hazards before and during work activities, and enforce safe work practices. The CC will oversee and will ultimately be responsible for the health and safety of all personnel performing work activities, and will order the immediate shutdown of activities in the case of a medical emergency, unsafe condition, or unsafe practice. Communication will be maintained with the Honeywell PM during all work activities.

7. Ensure that all necessary cleanup and maintenance of safety equipment is conducted by the appropriate project personnel.

8. Ensure that any required safety-related forms are completed and filed correctly.

Supervisor of Health, Safety and Environmental – Honeywell

The Supervisor of Health, Safety and Environmental (SHSE*)* is a full-time Honeywell employee who is trained as a safety and health professional, and serves in a consulting role to the PM and CC regarding potential safety and health issues.

Employee Safety Responsibility

Honeywell employees are responsible for their own safety as well as the safety of those around them. Honeywell employees shall use any equipment that is provided to them in a safe and responsible manner, as directed by their supervisor.

Employees are directed to take the following actions when appropriate:

- Suspend any operations that may cause an imminent health hazard to employees, subcontractors, or others.
- Evaluate site conditions and potential hazards before initiating work.
- Assist in the development and revision of JSA forms that are appropriate to their current scope of work.
- Prepare, submit, and review behavior-based safety observations.
- Inspect tools and other equipment before each use or as manufacturer and/or OSHA dictates.
- Correct job site hazards when possible without endangering life or health.
- Report safety and health concerns to the CC, PM, or SHSE.

Subcontractors. Honeywell subcontractors are responsible for the implementation of their own HASP and agree to comply with its contents. In the event of conflicting safety procedures or requirements, personnel must implement those safety practices that afford the highest level of safety and protection. In addition, non-compliance with safety and health policies and procedures may subject the subcontractor to disciplinary action up to and including termination of their contract with Honeywell. Subcontractors will be required to attend an initial site orientation and subsequent annual training as well as pre-job planning meetings.

Equipment Operators. All equipment operators are responsible for the safe operation of heavy equipment. Operators are responsible for inspecting their equipment on a daily basis to ensure safe performance. Brakes, hydraulic lines, backup alarms, and fire extinguishers must be inspected routinely throughout the project. Equipment will be taken out of service if an unsafe condition occurs. Documentation of inspections is required.

Authorized Visitors. Authorized visitors, as approved by Honeywell, shall be provided with all known information with respect to the site operations and hazards as applicable to the purpose of their visit. Visitors will be escorted unless they have received Contractor Training (Refer to Section 1.6.1).

1.5 Site HASP Amendments

Modifications to the procedures outlined in the HASP based on the requirements of specific SMP work activities will require approval by the SHSE and PM and internal documentation, but will not require modification to the HASP itself. Any universal modifications to the procedures outlined in the HASP will require revision of the HASP.

1.6 Training Requirements

All personnel conducting SMP work at this site shall have completed the appropriate safety and health training as applicable to their job tasks/duties. The required training is referenced throughout the HASP and identified on each JSA form.

1.6.1 Site-Specific Training

An initial site-specific training session or briefing (i.e., contractor training) shall be conducted by the PM or CC prior to commencement of work activities. During this initial training session, all personnel and subcontractors performing SMP work activities shall be instructed on the following topics:

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

The various components of the project HASP will be presented, followed by an opportunity to ask questions to ensure that each attendee understands the HASP. Personnel will not be permitted to enter or work in potentially contaminated areas of the site until they have completed the site-specific training session.

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

1.6.2 Safety Meeting/Safety and Health Plan Review

Safety meetings will take place each day prior to beginning the day's work. All personnel and subcontractors performing SMP work activities that day will attend the safety meeting. The safety meetings will cover specific safety and health issues, including the appropriate JSAs, site activities, changes in site conditions, and a review of topics covered in the site-specific pre-entry briefing. The

safety meetings will be documented each day on sheets containing a list of topics discussed and personnel in attendance.

2. Site Operations

2.1 Site History/Background

The Honeywell, Inc. Buffalo Research Laboratory facility ("facility") is located in Buffalo, New York. See Figure 1 of the SMP. The facility consists of four parcels addressed as 338 Elk Street, 340 Elk Street, 362 Elk Street, and 1027 Perry Street. See Figure 2 of the SMP. The SMP is a required element of the remedial program for the portion of the facility consisting of the parcels addressed at 338 Elk Street, 340 Elk Street, and 1027 Perry Street. These three parcels are referred to as the "Site". The Site is currently in the New York State (NYS) Resource Conservation and Recovery Act (RCRA) Corrective Action Program (Site No. 915002) administered by the New York State Department of Environmental Conservation (NYSDEC).

Honeywell entered into an Order on Consent and Administrative Settlement (Consent Order) on November 11, 2012 with the NYSDEC to complete corrective action post-closure requirements and to provide financial assurances for completing such post-closure requirements relative to the presence of arsenic in surface soils at concentrations above background levels. The arsenic contamination was identified during a RCRA Facility Assessment (RFA) completed at the Site in 1993. The corrective action post-closure requirements were completed in lieu of obtaining a post-closure permit. The Site location and boundaries of the Site are provided on Figure 2 of the SMP. The boundaries of the Site are more fully described in the metes and bounds site description that is part of the Environmental Easement provided in Appendix A of the SMP.

As the NYSDEC did not require remedial action relative to the identified arsenic contamination, areas of arsenic-impacted surface soils remain at the Site, which is referred to as "remaining contamination". The remaining contamination is defined as areas in which arsenic concentrations in surface soils meet or exceed the Site action level of 24 mg/kg at depths of 0 to 2.0 feet below ground surface (ft. bgs). Soil samples analyzed during historical investigations associated with the RCRA Facility Assessment were collected from locations strategically chosen in or near areas that would most likely exhibit contamination from past management practices. Therefore, there is the potential that additional areas exist where arsenic concentrations exceed the Site action level of 24 mg/kg since the entire Site was not characterized during the previous historical investigations. Institutional and Engineering Controls (ICs and ECs) are required by the Consent Order to control exposure to remaining contamination (including potential remaining contamination) to ensure protection of public health and the environment. An Environmental Easement granted to the NYSDEC, and recorded with the Erie County Clerk on March 7, 2017, requires compliance with this SMP and all ECs and ICs placed on the Site.

Refer to Section 2 of the SMP for a detailed Site history.

2.2 Scope of Work

This HASP covers the specific site SMP activities that will be conducted by Honeywell personnel and their subcontractors. These activities potentially are as follows:

- Mobilization of personnel, materials, and equipment to and from the site
- Site reconnaissance activities
- Soil excavation
- Groundwater sampling
- Decontamination of personnel and equipment

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

3. Hazard Evaluation

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

Specific activity JSA forms (located in Appendix A) have been developed to address the hazards associated with the site operations outlined in Section 2.0. New JSAs will be developed on an as-necessary basis if a JSA for that specific task is not available in the HASP. Additionally, current JSAs will be modified and customized in the field to ensure that the task-specific requirements are addressed each time the task is performed.

3.1 Chemical Hazards

The chemical hazards associated with conducting site operations include the potential exposure to on-site contaminants encountered during field activities such as soil excavation, products used in decontamination of equipment, and support products such as fuel. The potential routes of exposure from these products during normal use may occur through inhalation of vapors and dusts, or direct contact or absorption with the materials. The chemical hazards of concern that may be encountered during the tasks identified in the project's scope of work include arsenic**.** A listing of the contaminants of concern is found in Table 1.0, which includes exposure limits, signs and symptoms of exposure, chemical properties, and physical characteristics.

Current Safety Data Sheets (SDS), formerly known as Material Safety Data Sheets (MSDS), for products to be used during work activities will be obtained from Honeywell and subcontractors prior to the start of work activities. The SDS will be made available for review to all project personnel prior to the start of work activities during the daily safety meeting.

3.1.1 Chemical Hazard Controls

Exposure to potential on-site contaminants/chemicals, such as those listed in Table 1.0 and on SDS, shall be controlled by:

- Monitoring air concentrations with appropriate equipment in the breathing zone
- Revising JSAs to list chemical hazards and associated hazard controls on a task-specific basis
- Employing dust control measures such as wetting the immediate area
- Using PPE/respiratory protection, as appropriate, in areas known to have concentrations above the specified action level for each contaminant

3.1.2 Skin Contact and Absorption Contaminants

Skin contact with chemicals may be controlled by use of the proper PPE and good housekeeping procedures. The proper PPE (e.g., Tyvek®, gloves) as described in Section 4.0 shall be worn for all activities where contact with potentially harmful media or materials is anticipated. Utilize manufacturer data on permeation and degradation to minimize skin contact potential (see Section 4.2.1 for additional information).

3.1.3 Hazard Communication/WHMIS

Personnel required to handle or use hazardous materials as part of their job duties will be trained and educated in accordance with the Hazard Communication or Workplace Hazardous Materials Information System (WHMIS) standard as applicable. The training shall include instruction on the safe use and handling procedures of hazardous materials, how to read and access SDS, and the proper labeling requirements.

As indicated above, the appropriate SDS for the chemicals in use at the site will be maintained by and available for project personnel throughout the course of the project. SDS copies will be reviewed for chemicals being used in the project site area prior to performing project tasks.

3.1.4 Flammable and Combustible Liquids

The storage, dispensing, and handling of flammable and combustible liquids must be in accordance with industry standards such as National Fire Protection Agency (NFPA) guidelines. The specific flammable or combustible liquids used at the site may include gasoline, diesel, kerosene, oils, and solvents.

Flammable and combustible liquids are classified according to flash point. This is the temperature at which the liquid gives off sufficient vapors to readily ignite. Flammable liquids have flash points below 100°F (37.8°C). Combustible liquids have flash points above 100°F (37.8°C) and below 200°F (93.3°C).

Storage

Many flammables can ignite at temperatures at or below room temperature. They are far more dangerous than combustibles when they are heated. As a result, these products must be handled very carefully. At normal temperatures, these liquids can release vapors that are explosive and

hazardous to employee health. Exposure to heat can cause some of these liquids to break down into acids, corrosives, or toxic gases. For this reason, flammable and combustible liquids should be stored in cool, well ventilated areas away from any source of ignition. Always consult the SDS of the product for specific information.

Flammable and combustible liquids must be stored in designated areas. Such areas must be isolated from equipment and work activity that may produce flames, sparks, heat, or any form of ignition, including smoking. The most practical method is the use of one or more approved (commercially available) flammable/combustible liquid storage cabinets.

Cabinets must be labeled "Flammable – Keep Fire Away". Doors must be kept closed and labeled accordingly. Containers must be kept in the cabinet when not in use.

General Requirements

- Keep containers of flammable/combustible liquids closed when not in use.
- Keep flammable/combustible liquids in designated areas and approved cabinets.
- Do not allow use of unapproved containers for transfer or storage. Use only approved safety cans (5-gallon maximum) with a spring closing lid and spout cover, designated to safely relieve internal pressure when exposed to heat or fire.
- Use only approved self-closing spigots, faucets, and manual pumps when drawing flammable/combustible liquids from larger containers/barrels.
- Use only approved metal waste cans with lids for disposal of shop towels/oily rags.
- Designate "Smoking" and "No Smoking" areas.
- Designate fueling areas.
- Observe all signs indicating "No Smoking", "No Flames", and "No Ignition".

Transferring Flammable/Combustible Liquids

- This seemingly routine task can be hazardous if certain precautions are not followed. Grounding and bonding must be observed at all times to prevent the accumulation of static electricity when transferring containers/barrels one to another.
- Drums should be grounded to a grounding rod using a #4 copper conductor.
- Bonding is necessary between conductive containers (e.g., a barrel and a 5-gallon container).

3.2 Physical Hazards

Physical hazards that may be present during project work include: potential for close proximity to heavy equipment and drilling devices, noise, overhead or underground utilities, vehicle traffic, material handling, heavy lifting, electrical or stored energy, excavations, use of hand and power tools, use of utility task vehicles, slip/trip/hit/fall injuries, hot work (e.g., welding, cutting, and open flame), heat/cold stress, working at night or with illumination difficulties, biological hazards, other potential adverse weather conditions, working alone, and aggressive or menacing behavior. In

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

3.2.1 Heavy Equipment and Drilling Safety

Heavy Equipment

The following practices shall be adhered to by personnel operating heavy equipment (such as backhoes) and personnel working in the vicinity of heavy equipment:

- Heavy equipment is to be inspected when equipment is initially mobilized, delivered to a job site, or after it is repaired and returned to service, to ensure that it meets all manufacturer and OSHA specifications (e.g., fire extinguishers, backup alarms, etc.).
- Heavy equipment is to be inspected on a daily basis. Documentation of this daily pre-operational inspection is to be filed with the project files.
- Heavy equipment is only to be operated by authorized, competent operators.
- Seat belts are to be provided and used on heavy equipment that is not designed for stand-up operation.
- Equipment/vehicles whose payload is loaded by crane, excavator, loader, etc. will have a cab shield and/or canopy to protect the operator.
- Personnel will not be raised/lowered in buckets.
- Personnel will not ride on fender steps or any place outside the cab.
- Before leaving the equipment controls, ensure that the equipment is in its safe resting position. For a backhoe, apply the parking brake, put the front loader bucket down on the ground level, and ensure that the rear excavator bucket is locked in the travel position. Bulldozers and scraper blades, loader buckets, dump bodies, and similar equipment will be fully lowered or blocked when not in use.
- Before raising any booms, buckets, etc., check for overhead obstructions.
- Employees involved in the operation shall not wear any loose-fitting clothing, as it has the potential to be caught in moving machinery.
- Personnel shall wear steel-toed shoes, safety glasses, hearing protection (if necessary), and hardhats during heavy equipment operations.
- When moving heavy equipment or when working within 10 feet of a stationary object or in tight quarters, a spotter will be used.

Drilling Equipment

The following practices shall be adhered to by drilling personnel:

- Equipment should be inspected daily by the operator to ensure that there are no operational problems.
- The kill switch will be function-checked and verified to be operational during the documented daily equipment check.

- Personnel shall be instructed in the location and use of the emergency kill switch on the drill rig.
- Employees involved in the operation shall not wear any loose-fitting clothing, including untied shoe/boot laces, draw strings, etc., which have the potential to be caught in moving machinery.
- Before leaving the controls, shift the transmission controlling the rotary drive into neutral and place the feed lever in neutral. Before leaving the vicinity of the drill, shut down the drill engine.
- Before raising the mast, check for overhead obstructions.
- Before the mast of a drill rig is raised, the drill rig must first be leveled and stabilized with leveling jacks and/or cribbing. Re-level the drill rig if it settles after initial setup. Lower the mast only when the leveling jacks are down, and do not raise the leveling jack pads until the mast is lowered completely.
- During freezing weather, do not touch any metal parts of the drill rig with exposed flesh. Freezing of moist skin to metal can occur almost instantaneously.
- Personnel shall wear steel-toed shoes, safety glasses, hearing protection, and hardhats during drilling operations.
- The area shall be roped off, marked, or posted to keep the area clear of pedestrian traffic or spectators.

3.2.2 Noise

Project activities that include working in close proximity to heavy equipment and/or drilling operations, or using power tools that generate noise levels exceeding the decibel range of 85 dBA, will require the use of hearing protection with a Noise Reduction Rating (NRR) of at least 20. Hearing protection (earplugs/muffs) will be available to personnel and visitors requiring entry into these areas.

When it is difficult to hear a coworker 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 high noise levels will undertake precautions to prevent hearing loss.

3.2.3 Utility Clearances

Elevated superstructures (e.g., drill rigs, backhoes, scaffolding, ladders, cranes) shall remain a distance of 10 feet away from utility lines (<50 kV) and 20 feet away from power lines (>50 kV). Underground utilities, if present, shall be clearly marked and identified prior to commencement of work. Follow local/state/provincial regulations and client requirements concerning utility locating requirements (e.g., One-Call).

Personnel involved in intrusive work shall:

- Confirm proposed excavation(s) and heavy truck routes are not in the area of subsurface utilities. This meeting is to be documented.
- Adhere to the subsurface utility clearance protocol required by the Honeywell Project Manager. Use prudent digging techniques inside 18-inches of the outside edge of an underground facility. This distance will vary based on state law, facility/client requirements, etc.

- **Document that utility clearances, both public and private, have been performed prior to the start of work activities.**
- Be able to determine the minimum distance from marked utilities, identify the work that can be conducted with the assistance of the locator line service, coordinate document/drawing review, and inspect the site for manholes, catch basins, valve boxes, etc. that may indicate the direction/depth of underground installations. Marking indicates only the approximate location of buried lines. After obtaining the facility owner's permission, hand dig test holes (or use an equivalent means) in a careful and prudent manner to determine the precise location of underground facility lines. If the location of the lines is still undeterminable after hand digging/probing/soft digging, call the facility owner for additional direction and assistance prior to initiating intrusive operations.
- If you must expose a line, state law requires protection and support of the underground facility line while working at the site.

3.2.4 Vehicle Traffic and Control

The following safety measures are to be taken by Honeywell personnel that have the potential to be exposed to vehicle traffic:

- A high visibility safety vest meeting American National Standard Institute (ANSI) Class II garment requirements is to be worn at all times
- Employees will work using the "buddy system"
- Cones and other visible markers will be used to demarcate a safe work zone around the active work zone(s)
- Appropriate signage will be posted as necessary, to inform roadway/parking lot users of any additional control measures necessary to protect the public and Honeywell employees

Additionally**, if work on an active municipal roadway or along the shoulder or side of the municipal road is necessary**, project personnel must follow the requirements presented in the Manual on Uniform Traffic Control Devices (MUTCD), which is found at: **https://mutcd.fhwa.dot.gov/**. This will include the implementation of a Temporary Traffic Control Plan (TTCP) and discussion with the local municipality as to the responsible party who will implement the TTCP. The TTCP has four components: The Advanced Warning Area, the Transition Area, the Activity Area, and the Termination Area.

3.2.5 Material Handling and Storage

Material handling and storage practices to be conducted at the project site include manual lifting of materials and possibly the use of hoisting and rigging equipment. As a rule, use mechanical means for lifting heavy loads whenever possible.

General Storage Practices

The basic safety requirement for storage areas is that the storage of materials and supplies shall not create a hazard. Additional general storage area practices include the following:

- Bags, containers, bundles, etc. stored in tiers shall be stacked, blocked, interlocked, and limited in height so that they are stable and secure against sliding or collapse.
- All stacked materials, cargo, etc. shall be examined for sharp edges, protrusions, signs of damage, or other factors likely to cause injury to persons handling these objects. Defects should be corrected as they are detected.
- Storage areas shall be kept free from accumulation of materials that constitute hazards from tripping, fire, explosion, or pest harborage.
- Storage areas shall have provisions to minimize manual lifting and carrying. Aisles and passageways shall provide for the movement of mechanical lifting and conveyance devices.
- Stored materials shall not block or obstruct access to emergency exits, fire extinguishers, alarm boxes, first aid equipment, lights, electrical control panels, or other control boxes.
- "NO SMOKING" signs shall be conspicuously posted, as needed, in areas where combustible or flammable materials are stored and handled.

Cylindrical materials such as pipes and poles shall be stored in racks or stacked on the ground and blocked.

Special Precautions for Hazardous or Incompatible Materials Storage

Generally, materials are considered hazardous if they are ignitable, corrosive, reactive, or toxic. Manufacturers and suppliers of these materials must provide the recipient with SDS, which describe their hazardous characteristics and give instructions for their safe handling and storage.

Many hazardous materials are incompatible, which means they form mixtures that may have hazardous characteristics not described on the individual SDS. The following special precautions shall be followed regarding the storage of hazardous materials:

- Based on the information available on the SDS, incompatible materials shall be kept in separate storage areas
- Warning signs shall be conspicuously posted, as needed, in areas where hazardous materials are stored

3.2.6 Hoisting and Rigging

Wire ropes, chains, ropes, and other rigging equipment will be inspected prior to each use and as necessary during use to assure their safety. Defective rigging equipment will be immediately removed from service.

Rigging will not be used unless the weight of the load falls within the rigging's safe work operating range. This must be verified by the authorized rigger prior to any "pick" or lifting operation.

Only personnel trained in safe rigging procedures will be authorized to engage in rigging procedures. Additionally, the rigger must understand and use recognized crane signals.

Job or shop hooks and links and other makeshift fasteners **shall not** be used. When U-bolts are used for eye splices, the U-bolt will be applied so the "U" section is in contact with the dead end of the rope.

Wire ropes, chains, ropes, and other rigging equipment shall be stored where they will remain clean, dry, and protected from the weather and corrosive fumes.

The proper length of rope or chain slings will be used to avoid wide-angle lifts and dangerous slack. Knotted ropes or lengths of ropes reduced by bolts, knots, or other keepers will not be used.

3.2.7 Cranes and Hoists

The use of cranes will take place during project activities, and carries many associated hazards. Potential contact with overhead electrical lines and potential crushing of workers who may wander into the swing path radius of the crane are just two. When cranes are brought on-site for use, Honeywell will ensure that the following safety practices are enforced:

- Crane operator will provide a copy of the crane's inspection report and operator’s license to the SHSE/CC prior to initiating operations.
- Operators of cranes and hoists will make visual and operational inspections of the equipment prior to use. Any discrepancies that would jeopardize the safe operation of the equipment will be corrected prior to use. These inspections are to be documented via a daily inspection checklist or equivalent.
- The posted capacity of the crane will be adhered to and overloading of the equipment will not be allowed.
- The accessible swing radius of the crane will be demarcated and/or barricaded to prevent employees from entering the area.
- The crane's load and boom will be kept a minimum of 10 feet away from utility lines and 20 feet from power lines. **Any deviation must be approved by the PM in conjunction with the SHSE.**
- A competent person will investigate the soil for stability and determine the necessary amount of "cribbing" to be placed under the outrigger pads or if crane mats are necessary.
- No personnel will be permitted to work under a suspended load.
- Except for emergency communications, the operator will only recognize signs and signals from one designated signal person. This signal person will serve as the crane operator's eyes in areas that the crane operator cannot see. This person will be familiar with crane signals, operation of the crane, and safe methods of securing and handling a load.

3.2.8 Manual Lifting

Proper lifting takes the hazard out of moving heavy objects. Below are some items that should be considered prior to a lift.

- Establish that you can lift the load safely; if the load is in excess of 50 pounds, you are required to ask for assistance

- Use a mechanical lifting device if available
- Inspect route to be traveled, confirming sufficient clearance
- Look for any obstructions or spills
- Inspect the object to determine how it should be grasped
- Look for any sharp edges, slivers, or other things that may cause personal injury
- Do not move any object that will obstruct your field of vision when transporting the load

When lifting objects, use the following proper lifting techniques:

- Feet must be parted, with one foot alongside the object being lifted and one foot behind. When the feet are comfortably spread, a more stable lift can occur and the rear foot is in a better position for the upward thrust of the lift.
- Use the squat position and keep the back straight - but remember that straight does not mean vertical. A straight back keeps the spine, back muscles, and organs of the body in correct alignment, and minimizes the compression of the guts that can cause a hernia.
- Grip is one of the most important elements of correct lifting. The fingers and the hand are extended around the object, using the full palm. Fingers have very little power, so use the strength of your entire hand.
- The load must be drawn close, and the arms and elbows must be tucked into the side of the body. Holding the arms away from the body increases the strain on the arms and elbows. Keeping the arms tucked in helps keep the body weight centered.

The body must be positioned so that the weight of the body is centered over the feet. This provides a more powerful line of thrust and also ensures better balance. Start the lift with a thrust of the rear foot. Do not twist.

3.2.9 Hand and Power Tools

Hand Tools

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

Power Tools

- All power tools must be inspected regularly and used in accordance with the manufacturer's instructions and the tool's capabilities
- Electric tools must not be used in areas subject to fire or explosion hazards, unless they are approved for that purpose
- Portable electric tools must be connected to a Ground Fault Circuit Interrupter (GFCI) when working in wet areas
- Proper eye protection must be used when working with power tools
- Personnel must be trained in the proper use of each specific tool
- Any damaged or defective power tools must be immediately tagged and removed from service

3.2.10 Electrical Hazards

Only qualified individuals will be allowed to perform work on electrical circuits or perform electrical work on equipment. No employee shall be permitted to work on any part of an electrical power circuit unless the person is protected against electric shock by de-energizing the circuit and grounding it, or ensuring that it has been locked and tagged out:

- All electrical wiring and equipment shall be a type listed by Underwriters Laboratories (UL) or Factory Mutual (FM) for the specific application.
- All installations shall comply with the National Electric Code (NEC) and the National Electric Safety Code (NESC).
- All electrical circuits shall be grounded according to NEC and NESC Code. GFCIs shall be used in the absence of properly grounded circuitry or when portable tools must be used around wet areas.
- Generators and like equipment will be grounded in accordance with NEC, unless exempted by NEC 250-6.
- All live wiring or equipment shall be guarded to protect all persons or objects from harm.

3.2.11 Control of Hazardous Energy

Hazardous energy sources may be encountered during the servicing and maintenance of machines and equipment, in which the unexpected energization or startup of the machines or equipment could cause injury to employees.

The minimum performance requirements to control hazardous energy require that employers develop and implement an energy control program. The elements of an energy control program are as follows:

- Lockout/tagout
- Employee protection
- Energy control procedure

- Protective materials and hardware
- Periodic inspections
- Training and communication
- Energy isolation
- Employee notification

Project personnel who are required to conduct operations and maintenance activities that will require the isolation of an energy hazard through the use of a lockout/tagout device shall follow the Honeywell, Inc. program requirements and written procedures for that operation. The program requirements can be provided by Honeywell personnel.

Employee Training

Employees authorized to attach and remove lockout/tagout devices shall be provided with initial training regarding the safe application, usage, and removal of such devices. Each authorized employee will receive training in the recognition of applicable hazardous energy sources, the type and magnitude of the associated energy, and the methods necessary for energy isolation and control.

All authorized employees will be provided with refresher training annually, or at more frequent intervals whenever the following conditions apply:

- A job assignment change
- A change in machinery or equipment, or a process change that presents new hazards
- A change in the energy control procedures
- Possible deficiencies in the employee's understanding of the following
    - The hazards associated with the energy that controls the machinery or equipment in the employee's work area
    - Application and removal procedures for lockout/tagout devices

Employees who work in areas where lockout/tagout procedures are used shall receive initial and annual refresher training in the purpose and use of lockout/tagout devices and principles behind their use.

3.2.12 Excavations

All Honeywell excavation and trenching operations that employees shall enter will be observed by a designated competent person. The competent person shall be responsible for evaluating and inspecting excavation and trenching operations to prevent possible cave-in and entrapment, and to avoid other hazards presented by excavation activities.

Each employee in an excavation shall be protected from cave-ins by one of three systems:

- Sloping and benching systems
- Shoring
- Shielding systems

All excavation and trenching operations shall be conducted in accordance and in compliance with OSHA's Standards for the Construction Industry. At a minimum, the following safety guidelines shall be adhered to while conducting excavation and trenching activities:

- Excavation and trenching operations require pre-planning to determine whether sloping or shoring systems are required, and to develop appropriate designs for such systems. Also, the estimated location of all underground installations must be determined before digging/drilling begins. Necessary clearances must be observed.
- If there are any nearby buildings, walls, sidewalks, trees, or roads that may be threatened or undermined by the excavation, or where the stability of any of these items may be endangered by the excavation, they must be removed or supported by adequate shoring, bracing, or underpinning.
- Excavations may **not** go below the base of footings, foundations, or retaining walls unless they are adequately supported or a person who is registered as a Professional Engineer (PE) has determined that they will not be affected by the soil removal. Civil engineers or those with licenses in a related discipline and experience should be consulted in the design and use of sloping and shoring systems. PE qualifications must be documented in writing.

Access and Egress

Personnel access and egress from trench and/or excavations are as follows:

- A stairway, ladder, ramp, or other means of egress must be provided in trenches greater than 4 feet deep and for every 25 feet of lateral travel
- All ladders shall extend 3 feet above the top of the excavation
- Structural ramps used for access or egress of equipment will be designed by a competent person qualified in structural design or by a licensed professional engineer

Atmosphere Monitoring and Testing

Air quality is measured using three parameters: oxygen concentration, flammability, and the presence of hazardous substances.

Employees should not be exposed to atmospheres containing less than 19.5 percent oxygen or having a lower flammable limit greater than 10 percent, and employees should not be exposed to hazardous levels of atmospheric contaminants.

Whenever potentially hazardous atmospheres are suspected in excavations and trenches, the atmosphere shall be tested by a competent person. Detector tubes, gas monitors, and explosion meters are examples of monitoring equipment that may be used.

In the event that an unusual odor or liquid is suspected in excavations and trenches, the competent person shall stop work on the site and arrange for air quality assessment and mitigation, if necessary.

Atmospheric testing and monitoring shall be performed in excavations in or adjacent to landfill areas, in areas where hazardous materials are/were stored, or in areas where the presence of hazardous materials is suspected.

Daily Inspections

The competent person shall perform daily inspections of excavations, the adjacent areas, and all protective systems for situations that could potentially result in slope failure.

Additionally, the competent person shall be aware of the potential for confined space situations and other hazardous work conditions.

The competent person shall inspect, evaluate, and complete the excavation checklist at the following intervals:

- Prior to the start of work, after each extended halt in work, and as needed throughout the shift, as new sections of the excavation or trench are opened
- After every rainstorm and other natural or manmade event that may increase the load on the walls of the excavation, or otherwise affect their stability

The inspections shall be documented using the Honeywell Excavation Inspection Checklist attached to this HASP.

The competent person shall stop the work and instruct all employees to leave the excavation or trench when any potential hazards are detected. The competent person has the **authority** to immediately suspend work if any unsafe condition is detected.

3.2.13 UST/AST Removals

The site safety supervisor shall ensure that the tank is vapor free prior to the tank's removal. Vapor free means the internal atmosphere of the tank must be less than 10 percent of the Lower Explosive Limit (LEL) or less than 10 percent of the oxygen (O_2) concentration as prescribed by the following methodology.

Degassing

Degassing the tank may be performed by purging the tank using an eductor or diffuser. An extension to the eductor shall be installed at a minimum of 12 feet above grade in order to discharge vapors from the tank to atmosphere. The suction line for the eductor must extend to the bottom of the tank to effectively create a vacuum at the lowest point of the tank. This will ensure the proper evacuation of vapors from the tank. The tank will be monitored routinely to ensure that the internal atmosphere is less than 10 percent of the LEL.

Inerting

Inerting the tank is a process of displacing oxygen within the tank using an inert gas. Inerting may be performed by introducing nitrogen into the tank or inserting solid carbon dioxide (dry ice) on the bottom of the tank. Allow the inerting media to displace the oxygen to a level below 10 percent O_2 concentration in the vapor zone.

Vent pipes, fill pipes, or tanks may not be cut or torched using any device until the tank has been purged of explosive gases at less than 10 percent LEL.

3.2.14 Confined Space Entry

Entry into a confined space will only be undertaken after remote methods have been tried and found not to be successful. If confined space entry is required, such work will only be undertaken following the guidelines presented in the Honeywell Safety and Health Program for Confined Space Entry work. The most recent version of this program and permit are available at the Honeywell Facility, and must be reviewed prior to any confined space work. If a subcontractor will be performing work at the site and wishes to use its own confined space SOP, then the subcontractor's SOP must minimally meet the requirements set forth in the Honeywell SOP.

3.2.15 Compressed Gas Cylinders

Compressed gases present several hazards. The cylinder must be properly labeled, identifying the hazardous properties of the gas, such as toxicity, flammability, or the presence of an oxidizer, and a SDS must be supplied by the manufacturer. In addition to the gas hazards, compressed gas cylinders pose other hazards simply because they contain gas under pressure.

Regardless of the properties of the gas, any gas under pressure can explode if the cylinder is improperly stored or handled. Improperly releasing the gas from a compressed gas cylinder is extremely dangerous. A sudden release of the gas can cause a cylinder to become a missile-like projectile, destroying everything in its path. Cylinders have been known to penetrate concrete-block walls. To prevent such a dangerous situation, there are several general procedures to follow for the safe storage and handling of a compressed gas cylinder:

- Store cylinders in an area specifically designated for that purpose. This area must protect the cylinders from being struck by another object. The area must be well-ventilated, away from sources of heat, and at least 20 feet away from highly combustible materials. Oxidizers must be stored at least 20 feet away from flammable gases.
- Cylinders must not be dropped or allowed to fall. Chain and rack them in an upright position during use and storage. When transporting cylinders, they must be secured from falling.
- When moving a cylinder, even for a short distance, all the valves must be closed, the regulator removed, and the valve cap installed. Never use the valve cap to lift a cylinder. If you are using a crane or some other lifting device to move a cylinder, use a cradle or boat designed for that purpose. Never use a sling or a magnet to move a cylinder.
- Never permit cylinders to contact live electrical equipment or grounding cables.

- Cylinders must be protected from the sun's direct rays, especially in high-temperature climates. Cylinders must also be protected from ice and snow accumulation.
- Before the gas is used, install the proper pressure-reducing regulator on the valve. After installation, verify the regulator is working, all gauges are operating correctly, and all connections are tight to ensure that there are no leaks. When you are ready to use the gas, open the valve with your hands. Never use a wrench or other tool. If you cannot open it with your hands, do not use it.

3.2.16 Fall Hazards

Personnel that will use ladders and have the potential hazard of working on elevated surfaces or platforms of 6 feet or greater during project activities shall follow Honeywell's Safety and Health Program for fall protection. The fall protection program includes leading edge work, rooftop work, aerial lifts, ladders, and scaffolds. Specific guidelines for portable ladders are outlined below.

The emergency rescue plan for retrieving any worker who has fallen and is suspended in air is as follows: Time is of the essence to prevent the development of a life threatening condition, such as orthostatic intolerance or suspension trauma, due to being suspended for a period of time. Rescue methods and equipment will be specific to the project site; however, the following information provides examples of typical rescue methods/equipment:

- A scissor lift or articulating boom already on site
- Lower/raise worker by an acceptable physical and/or mechanical means (self-rescue not acceptable as primary rescue method)
- A rescue team trained in above ground rescue techniques
- A rope or cable system to lower employee to ground (requires point of attachment for rigging tackle)
- A crane man-basket setup in advance for rescue

3.2.17 Portable Ladders

Employees who use ladders on work sites must be familiar with safe ladder usage.

- Use the 4-to-1 ratio. Place the ladder so its feet are 1 foot away from what it leans against for every 4 feet in height to the point where the ladder rests. Example: If the top of a 16-foot ladder leans against a wall, its feet should be placed 4 feet from the wall. The "fireman's method" is a convenient way of checking the angle of the ladder. Place your toes against the base of the ladder; fully extend both arms toward the side rail and parallel to the ground. When standing erect you should be able to hold the ladder's side rails.
- Do not use a ladder in a horizontal position as a runway or a scaffold.
- Do not place a ladder in front of a door that opens toward it unless the door is locked, blocked, or guarded by someone.
- Place a portable ladder so that both side rails have a secure footing. Provide solid footing on soft ground to prevent the ladder from sinking.

- Place the ladder's feet on a substantial and level base, not on a movable object.
- On uneven surfaces, use a block, wedge, or ladder foot.
- On wet or oily pavement, a smooth floor, or an icy or metal surface, the ladder footing must be lashed, blocked, or otherwise secured.
- Do not lean a ladder against unsafe backing, such as loose boxes or barrels.
- When using a ladder for access to high places, securely lash or otherwise fasten the ladder to prevent it from slipping.
- To gain access to a roof or elevated platform, extend the ladder at least three rungs (3 feet) above the point of support.

Ascending or Descending of Ladders

- Maintain three points of contact at all times when going up or down. If material must be handled, raise or lower it with a rope.
- Always face the ladder when ascending or descending.
- Maintain clean, dry footwear as much as possible to prevent slipping on the rungs.

3.2.18 Slip/Trip/Hit/Fall

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

- Spot check the work area to identify hazards
- Establish and utilize a pathway free of slip and trip hazards
- Beware of trip hazards such as wet floors, slippery floors, and uneven surfaces or terrain
- Carry only loads you can see over
- Keep work areas clean and free of clutter, especially in storage rooms and walkways
- Communicate hazards to on-site personnel
- Secure all loose clothing and ties, and remove jewelry while around machinery
- Report and/or remove hazards
- Keep a safe buffer zone between workers using equipment and tools

3.2.19 Heat Stress

Recognition and Symptoms

Temperature stress is one of the most common illnesses faced by project personnel when working in elevated temperatures and/or humidity. Acclimatization and frequent rest periods must be established for conducting activities where temperature stress may occur. Below are listed signs and symptoms of heat stress. Personnel should follow appropriate guidelines if any personnel exhibit these symptoms:

- *Heat Rash*: Redness of skin. Frequent rest and change of clothing.
- *Heat Cramps*: Painful muscle spasms in hands, feet, and/or abdomen. Administer lightly salted water by mouth, unless there are medical restrictions.
- *Heat Exhaustion*: Clammy, moist, pale skin, along with dizziness, nausea, rapid pulse, fainting. Remove to cooler area and administer fluids.
- *Heat Stroke*: Hot dry skin; red, spotted, or bluish; high body temperature of 104°F; mental confusion; loss of consciousness; convulsions or coma. Immediately cool victim by immersion in cool water. Wrap with wet sheet and sponge with cool liquid while fanning, treat for shock. **DO NOT DELAY TREATMENT. COOL BODY WHILE AWAITING AMBULANCE.**

Work Practices

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

- Heat stress monitoring
- Acclimatization
- Work/rest regimes (schedule of breaks) - mandatory breaks scheduled in summer months or during high risk activities for heat stress
- Heat stress safety personal protective equipment (cool-vests, bandanas, etc.)
- Liquids that replace electrolytes, water, and salty foods available during rest
- Use of buddy system

Acclimatization

The level of heat stress at which excessive heat strain will result depends on the heat tolerance capabilities of the worker. Each worker has an upper limit for heat stress, beyond which the resulting heat strain can cause the worker to become a heat casualty. In most workers, appropriate repeated exposure to elevated heat stress causes a series of physiologic adaptations called acclimatization, whereby the body becomes more efficient in coping with the heat stress. Work/rest regimes should be planned as a component of project preparation and discussed during the daily tailgate safety meetings.

Worker Information and Training

All new and current employees who work in areas where there is a reasonable likelihood of heat injury or illness should be kept informed through continuing education programs (e.g., hazards, effects, preventative measures, drug/alcohol interaction).

3.2.20 Sun Exposure

Overexposure to sunlight is a common concern when field activities occur during warm weather conditions. Overexposure can occur on clear, sunny days as well as on overcast and cloudy days. Ultraviolet (UV) rays from the sun can cause skin damage or sunburn, but can also result in vision

problems, allergic reactions, and other skin concerns. Two types of UV rays are emitted from the sun: UVA and UVB rays.

UVB rays cause sunburn, skin cancer, and premature aging of the skin. UVB rays stimulate tanning but are also linked to other problems such as impaired vision, skin rashes, and some allergic and other reactions to certain drugs. Extra care should be taken if activities are to be conducted on or near water. Sunlight reflected off the surface of the water is intensified resulting in accelerated effects. The following steps should be taken to protect against overexposure to sunlight:

- **Always Use Sunscreen**: Apply a broad spectrum sunscreen with Sun Protection Factor (SPF) of at least 15 or higher liberally on exposed skin. Reapply every 2 hours or more. Even waterproof sunscreen can come off when you towel off or sweat.
- **Cover Up**: Wearing tightly woven, loose-fitting, and full-length clothing is a good way to protect your skin from UV rays.
- **Wear a Hat**: A hat with a wide brim offers good sun protection to your eyes, ears, face, and the back of your neck – areas particularly prone to overexposure to the sun.
- **Wear Sunglasses That Block 99 to 100 Percent of UV Radiation**: Sunglasses that provide 99 to 100 percent UVA and UVB protection will greatly reduce sun exposure that can lead to cataracts and other eye damage. Check the label when buying sunglasses.
- **Seek Shade**: Shade is a good source of protection, but keep in mind that shade structures (e.g., trees, umbrellas, canopies) do not offer complete sun protection.
- **Limit Time in the Midday Sun**: The sun's rays are strongest between 10 a.m. and 4 p.m. Whenever possible, limit exposure to the sun during these hours.

3.2.21 Cold Stress

Cold stress is similar to heat stress, in that it is caused by a number of interacting factors including environmental conditions, clothing, and workload, as well as the physical and conditioning characteristics of the individual. Fatal exposures to cold have been reported in employees failing to escape from low environmental air temperatures or from immersion in low temperature water. Hypothermia, a condition in which the body's deep core temperature falls significantly below 98.6°F (37°C), can be life threatening. A drop in core temperature to 95°F (35°C) or lower must be prevented.

Air temperature is not sufficient to determine the cold hazard of the work environment. The wind chill must be considered as it contributes to the effective temperature and insulating capabilities of clothing. The equivalent chill temperature should be used when estimating the combined cooling effect of wind and low air temperatures on exposed skin or when determining clothing insulation requirements to maintain the body's core temperature.

The body's physiologic defense against cold includes constriction of the blood vessels, inhibition of the sweat glands to prevent loss of heat via evaporation, glucose production, and involuntary shivering to produce heat by rapid muscle contraction.

The frequency of incidents increases with cold temperature exposures as the body's nerve impulses slow down, individuals react sluggishly, and numb extremities make for increased clumsiness.

Additional safety hazards include ice, snow blindness, reflections from snow, and possible skin burns from contact with cold metal.

Pain in the extremities may be the first early warning of danger to cold stress. During exposure to cold, maximum severe shivering develops when the body temperature has fallen to 95°F (35°C). This must be taken as a sign of danger to the employees on site, and cold exposures should be immediately terminated for any employee when severe shivering becomes evident. Useful physical or mental work is limited when severe shivering occurs.

Predisposing Factors for Cold Stress

Certain predisposing factors make an individual more susceptible to cold stress. The project team members are responsible for informing the SHSE/CC to monitor an individual, if necessary, or use other means of preventing/reducing the individual's likelihood of experiencing a cold related illness or disorder.

Predisposing factors that will increase an individual's susceptibility to cold stress are listed below:

- **Dehydration:** The use of diuretics and/or alcohol, or diarrhea can cause dehydration. Dehydration reduces blood circulation to the extremities.
- **Fatigue During Physical Activity:** Exhaustion reduces the body's ability to constrict blood vessels. This results in the blood circulation occurring closer to the surface of the skin and the rapid loss of body heat.
- **Age:** Some older and very young individuals may have an impaired ability to sense cold.
- **Poor Circulation:** Vasoconstriction of peripheral vessels reduces blood flow to the skin surface.
- **Heavy Work Load:** Heavy workloads generate metabolic heat and make an individual perspire even in extremely cold environments. If perspiration is absorbed by the individual's clothing and is in contact with the skin, cooling of the body will occur.
- **Use of PPE:** PPE usage that traps sweat inside the PPE may increase an individual's susceptibility to cold stress.
- **Lack of Acclimatization:** Acclimatization, the gradual introduction of workers into a cold environment, allows the body to physiologically adjust to cold working conditions.
- **History of Cold Injury:** Previous injury from cold exposures may result in increased cold sensitivity.

Prevention of Cold Stress

A variety of measures can be implemented to prevent or reduce the likelihood of employees developing cold related ailments and disorders. These include acclimatization, fluid and electrolyte replenishment, eating a well-balanced diet, wearing warm clothing, the provision of shelter from the cold, thermal insulation of metal surfaces, adjusting work schedules, and employee education.

- **Acclimatization:** Acclimatization is the gradual introduction of workers into the cold environment to allow their bodies to physiologically adjust to cold working conditions. However,

the physiological changes are usually minor and require repeated uncomfortably cold exposures to induce them.

- **Fluid and Electrolyte Replenishment:** Cold, dry air can cause employees to lose significant amounts of water through the skin and lungs. Dehydration affects the flow of blood to the extremities and increases the risk of cold injury. Warm, sweet, caffeine-free, non-alcoholic drinks, and soup are good sources to replenish body fluids.
- **Eating a Well-Balanced Diet:** Restricted diets including low salt diets can deprive the body of elements needed to withstand cold stress. Eat high-energy foods throughout the day.
- **Warm Clothing:** Maintaining air space between the body and outer layers of clothing is beneficial in order to retain body heat. However, the insulating effect provided by such air spaces is lost when the skin or clothing is wet.
- **Work/Rest Regimes:** Schedule work during the warmest part of the day, if possible. Rotate personnel and adjust the work/rest schedule to enable employees to recover from the effects of cold stress.

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

3.2.22 Adverse Weather Conditions

The CC shall decide on the continuation or discontinuation of work based on current and pending weather conditions. Electrical storms, heavy rains, hurricanes, tornado warnings, and sustained strong winds (approximately 40 mph) are examples of conditions that would call for the discontinuation of work and evacuation of site.

In addition, no work with elevated super structures (e.g., drilling, crane operations) will be permitted during any type of electrical storm or during wind events that have wind speeds exceeding 40 mph.

3.2.23 Hot Work Hazards

Personnel conducting hot work, including burning, pipe welding, cutting, brazing, grinding, or other activities capable of producing ignition sources, or personnel working in the vicinity of hot work, must adhere to the following practices:

- No open flames will be used without prior approval by CC.
- Torches will be equipped with anti-flashback devices.
- Where electrode holders are left unattended, electrodes will be removed and the holders will be replaced so they cannot make electrical contact.
- All arc welding and cutting cables will be completely insulated. No repairs or splices will be located within 10 feet of the electrode holder, except where splices are insulated equal to the insulation of the original cable. Defective cable will be repaired or replaced.
- No welding, cutting, or hot work will be conducted on used drums, tanks, or containers until they have been cleaned and purged.

- Only employees with documented training and work experience in these activities shall conduct hot work.
- At a minimum, a 2A/10BC-type fire extinguisher and a first aid kit must be available. When hot work is underway, and for an agreed upon period afterwards, a fire watch must be maintained.
- Employees involved in the operation shall wear appropriate personal protective equipment specific to the task, such as a welder's helmet with an appropriate eye shade, leather or heavy duty cloth gloves, coveralls or a long-sleeved shirt and pants to prevent skin exposure, steel-toed or safety shoes, hearing protection, etc.
- Appropriate activity segregation equipment, such as welding screens for welding operations, should be erected whenever practical to isolate the hot work from the remainder of the site activities and site personnel.
- The area should be cleared of any flammable and combustible materials before hot work begins.

3.2.24 Aggressive or Menacing Behavior

When confronted by an individual whose behavior becomes aggressive or menacing, staff should remain as calm as possible. Avoid arguing with or physically confronting the individual. Attempt to distance yourself from the individual. Advise others in the area to leave the scene and request police assistance by having someone call 911. Use the team approach. A staff member who is physically unable to break away from an attacker should shout for help.

The use of physical force is justified when a person believes that such force is necessary to protect himself or herself against the use or imminent use of unlawful physical force by another person. The use of physical force is also justified in the defense of another party, such as a co-worker, who is being subjected to unlawful physical force. Staff members can use any technique of legal self-defense in order to halt or distract an attacker until law officers arrive on the scene.

Should an aggressor only be interested in the taking or damaging of property, do not interfere. Obtain a description of the individual to provide to local authorities, including height, weight, race, sex, clothing, accent, unusual markings such as tattoos, facial piercings, scars, hair color, and weapon, if any.

File an Incident Report with your immediate supervisor who will forward same accordingly.

3.3 Biological Hazards

Honeywell employees conduct numerous project activities that may encounter biological hazards, including bloodborne pathogens, insects, spiders, scorpions, rodents, snakes, and large predators. This section identifies precautions to be taken if these hazards are encountered.

3.3.1 Vegetation Overgrowth

Overgrown weeds, bushes, trees, grass, and other vegetation are fire and safety hazards. A number of hidden hazards may not be immediately recognized due to the overgrowth of vegetation in areas where field activities may occur, including discarded junk, litter, and debris. Construction

materials such as boards, nails, concrete, and other debris may be hidden beneath tall grass, weeds, and bushes. Other hazards may include steep slopes, potholes, trenches, soft spots, dips, etc., all dangerously concealed from the view of the individual walking or operating motorized equipment in the area. Additionally, biological hazards such as snakes, ticks, chiggers, and mosquitoes may be present, as they breed in overgrowth conditions.

Here are some simple actions that can be taken:

- Assess the work area and determine if the area requires vegetation clearance. Consider that overgrowth extending above the lowest level of motorized equipment (i.e., bumper or fender) or 6 inches above your ankle has hidden hazards that you will not be able to readily identify.
- Determine if the area is safe to walk or whether you need motorized equipment. Consider the limitations of the equipment.
- Identify slip, trip, and fall hazards and remove from the general work area. Remember to give adequate clearance so that the items being removed do not pose future hazards.
- Adequately protect yourself against the hazards by wearing boots that protect the ankles, wearing long pants, and using insecticides.
- Consider the limitations of manual or mechanical equipment for the clearance of overgrowth, particularly the safety hazards when using sling blades, machetes, weed eaters, bush hogs, or other brush removing equipment.

Before taking any action, determine whether there any ecological issues that would affect or prevent the removal of overgrowth in protected areas such as wetlands, wildlife habitats, or sanctuaries for endangered and/or protected species.

3.3.2 Poisonous Plants

Common **poison ivy** grows as a small plant, a vine, and a shrub. Poison ivy occurs in every state. The leaves always consist of three glossy leaflets. **Poison sumac** grows as a woody shrub or small tree 5 to 25 feet tall. It usually contains nine leaves, with eight paired leaves and one on top, and is common in swampy areas. The plants are potent sensitizers and can cause a mild to severe allergic reaction, referred to as "contact dermatitis". ***These plants are found in the U.S. and Canada.***

Dermatitis, in Rhus-sensitive persons, may result from contact with the milky sap found in the roots, stems, leaves, and fruit, and may be carried by contacted animals, equipment, or apparel.

The best form of prevention is to avoid contact. Wearing long sleeves, gloves, and disposable clothing, such as Tyvek, is recommended in high-risk areas to avoid exposure from contaminated apparel. Barrier creams and cleaners are also recommended.

3.3.3 Insects

Ticks

Ticks are blood feeding external parasites of mammals, birds, and reptiles throughout the world. Some human diseases of current interest in the United States caused by tick-borne pathogens include Lyme disease, ehrlichiosis, babesiosis, Rocky Mountain spotted fever, tularemia, and

tick-borne relapsing fever. Lyme disease is caused by a bacterial parasite called spirochete and is spread by infected ticks that live in and near wooded areas, tall grass, and brush. The ticks that cause the disease in the Northeast and Midwest are often no bigger than a poppy seed or a comma in newsprint. The peak months for human infection are June through October. Many other tick-borne diseases, such as Rocky Mountain spotted fever, can be carried by a variety of ticks. The prevention and treatment of these diseases are similar to those of Lyme disease.

Prevention

Preventative measures include wearing light-colored clothing, keeping clothing buttoned, tucking pant legs in socks, and keeping shirttails tucked in. Periodic checks for ticks should be made during the day, and especially at night. Hair should also be checked by parting it and combing through it to make sure that no ticks have attached to the scalp. Also, check clothing when it is first removed, before ticks have a chance to crawl off. A shower or bath should be taken as soon as possible after leaving the site for the day.

The most common repellent recommended for ticks is N,N-dimethyl-m-toluamide, or DEET. It is important to follow the manufacturer's instructions found on the container with all insecticides, especially those containing DEET.

In general, DEET insect repellent should only be applied to clothing, not directly on the skin. Do not apply to sunburns, cuts, or abrasions. Use soap and water to remove DEET once indoors. However, the DEET user is required to read the insect repellant label and/or SDS for safe use requirements. If ticks are not responding to DEET or other safety methods, then the PM and SHSE are to be notified and additional safety controls may be utilized.

Removal

The best way to remove a tick is removal by tweezers. If tweezers are not available, cover your fingers (tissue paper) while grasping the tick. It is important to grasp the tick as close as possible to the site of attachment and use a firm steady pull to remove it. When removing the tick, be certain to remove all the mouth parts from your skin so as not to cause irritation or infection. Wash hands immediately after with soap and water, and apply antiseptic to the area where tick was removed. Get medical attention if necessary.

Symptoms of Lyme Disease

The first symptoms of Lyme disease usually appear from 2 days to a few weeks after a person is bitten by an infected tick. Symptoms usually consist of a ring-like red rash on the skin where the tick attached, and is often bull's eye-like with red on the outside and clear in the center. The rash may be warm, itchy, tender, and/or "doughy" and appears in only 60 to 80 percent of infected persons. An infected person also has flu-like symptoms of fever, fatigue, chills, headaches, a stiff neck, and muscle aches and pains (especially knees). Rashes may be found some distance away from original rash. Symptoms often disappear after a few weeks.

Bees, Wasps, and Yellow Jackets

Stinging insects are members of the order Hymenoptera of the class Insecta. There are two major subgroups: Apidae (honeybees and bumblebees) and vespids (wasps, yellow jackets, and hornets).

Apidae are docile and usually do not sting unless provoked. The stinger of the honeybee has multiple barbs, which usually detach after a sting. Vespids have few barbs and can inflict multiple stings.

Types of stinging insects that might be encountered on this project site may include:

- Carpenter bees
- Bumblebees
- Mud dauber wasps
- Africanized killer bees
- Cicada killer wasps
- Giant hornets
- Honeybees
- Paper wasps
- Yellow jackets

Symptoms

If you are stung, three types of reactions are possible: a normal, a toxic, or an allergic reaction.

- **Normal Reaction**: Only lasts a few hours and consists of pain, redness, swelling, itching, and warmth near the sting area
- **Toxic Reaction**: Will last for several days, results from multiple stings, and may cause cramps, headaches, fever, and drowsiness
- **Allergic Reaction:** Can cause hives, itching, swelling, tightness in the chest area, and a possibility of breathing difficulties, dizziness, unconsciousness, and cardiac arrest.

The stingers of many Hymenoptera may remain in the skin and should be removed as quickly as possible without concern for the method of removal. An ice cube placed over the sting will reduce pain; aspirin may also be useful. Persons with known hypersensitivity to such stings should carry a kit containing epinephrine in a prefilled syringe. Antihistamines may help decrease hives and angioedema. Persons who have severe symptoms of anaphylaxis, have positive venom skin test results, and are at risk for subsequent stings should receive immunotherapy regardless of age or time since anaphylaxis.

Precautions

The following precautions can help you avoid stings. Try to wear light colored clothing and shy away from dark or floral prints. Avoid wearing perfumes, hairsprays, colognes, and scented deodorants while working outside. If eating outside, keep all food and drinks covered; sweet foods and strong scents attract stinging insects as well. Never swat or swing at the insect; it is best to wait for it to leave, softly blow it away, or gently brush it aside. Seek medical attention when the reaction to a sting includes swelling, itching, dizziness, or shortness of breath.

If physical control measures are not effective, use a pesticide that will have a minimal impact on both you and the environment.

Mosquitoes

Mosquitoes are common pests that can be found in any state and any work environment where warm, humid conditions exist. Mosquitoes can pass along diseases such as West Nile virus and malaria. Several different methods can be used to control adult mosquito populations: repellants such as DEET, mosquito traps, foggers, and vegetation and water management. ***Mosquitoes are found from the tropics to the Arctic Circle and from lowlands to the peaks of high mountains***.

3.3.4 Poisonous Spiders

Black Widow

Black Widow spiders are not usually deadly (especially to adults) and only the female is venomous. The female spider is shiny black, usually with a reddish hourglass shape on the underside of her spherical abdomen. Her body is about 1.5 inches long, while the adult male's is approximately half that. The spider's span ranges from 1 to 3 inches. The adult males are harmless, have longer legs, and usually have yellow and red bands and spots over their back, while the young black widows are colored orange and white. The bite of a black widow is often not painful and may go unnoticed. However, the poison injected by the spider's bite can cause severe reactions in certain individuals.

Symptoms

Symptoms include abdominal pain, profuse sweating, swelling of the eyelids, pains to muscles or the soles of the feet, salivation and dry-mouth (alternating), and paralysis of the diaphragm. If a person is bitten, they should seek immediate medical attention. Clean the area of the bite with soap and water. Apply a cool compress to the bite location. Keep effected limb elevated to about heart level. Ask a doctor if Tylenol or aspirin can be taken to relieve minor symptoms. Additional information can be obtained from the Poison Center (1-800-222-1222). ***Black widows are found throughout the tropics, U.S., and Canada.***

Brown Recluse

Brown recluse spiders are usually light brown in color, but in some instances they may be darker. Brown recluse spiders are highly venomous spiders, native to the United States, and found coast to coast. The brown recluse can vary in size, but some can obtain bodies of 5/8 inches in length with a leg span of 1 1/2 inches in diameter. They can be identified by their three pairs of eyes along the head area and their fiddle shaped markings on the back. Most brown recluse bites are defensive rather than offensive. They generally only bite when they feel threatened.

Symptoms

If bitten by a brown recluse, an individual may experience open, ulcerated sores, which when left untreated may become infected and cause tissue necrosis. If an individual believes a spider has bitten them, they need to seek medical attention as soon as possible. In order to minimize the occurrence of brown recluse bites, individuals should shake their clothing and shoes thoroughly, eliminate the presence of cluttered areas, and spray the building perimeters with pesticides. ***Brown recluse are found throughout the U.S., Mexico, and Canada.***

3.3.5 Threatening Dogs

If you are approached by a frightened or menacing dog:

- Do not attempt to run and do not turn your back
- Stay quiet, and remember to breathe
- Be still, with arms at sides or folded over chest with hands in fists
- Slowly walk away sideways

- Don't stare a dog in the eyes, as this will be interpreted as a threat
- Avoid eye contact
- If you have a jacket, you could wrap it around your arm and should he snap, take the bite harmlessly

3.3.6 Rodents

Rodentia: (rats, mice, squirrels)

Rodents, or Rodentia, are the most abundant order of mammals. There are hundreds of species of rats; the most common are the black and brown rat.

The *Brown Rat* has small ears, blunt nose, and short hair. It is approximately 14 to 18 inches long (with tail). They frequently infest garbage/rubbish, slaughterhouses, domestic dwellings, warehouses, shops, and supermarkets; they also frequent any space with an easy meal and potential nesting sites.

The *Black Rat* can be identified by its tail, which is always longer than the combined length of the head and body. It is also slimmer and more agile than the Norwegian or Brown rat. Its size varies according to its environment and food supply.

The *House Mouse* has the amazing ability to adapt and now can frequently be found in human dwellings. In buildings, mice will live anywhere and they are very difficult to keep out. Mice are also totally omnivorous; in other words, they will eat anything.

Rats and mice often become a serious problem in cold winter months when they seek food and warmth inside buildings. They may suddenly appear in large numbers when excavation work disturbs their in-ground nesting locations or their food source is changed.

There are six major problems caused by rats and mice:

1. They eat food and contaminate it with urine and excrement.
2. They gnaw into materials such as paper, books, wood, or upholstery, which they use as nest material. They also gnaw plastic, cinder blocks, soft metals such as lead and aluminum, and wiring, which may cause a fire hazard.
3. Rats occasionally bite people and may kill small animals.
4. They, or the parasites they carry (such as fleas, mites, and worms), spread many diseases such as salmonella, trichinosis, rat bite fever, hantavirus, Weil's disease, and the bubonic plague.
5. Rats can damage ornamental plants by burrowing among the roots or feeding on new growth or twigs. They also eat some garden vegetables, such as corn and squash.
6. Rats and mice are socially unacceptable. These rodents have been a problem for centuries, chiefly because they have an incredible ability to survive and are so difficult to eliminate. In addition, they are extremely compatible with human behavior and needs.

3.3.7 Bloodborne Pathogens

Hepatitis and other communicable diseases are largely transmitted through exposure to bodily fluids containing the hepatitis virus, which could be found on refuse encountered in subsurface investigations. This includes activities occurring at landfills, sewage treatment facilities, sewers, topical spreading of treated waste and medical wastes (e.g., contaminated needles and syringes). Individuals performing tasks for these types of project should consult with their physicians and be properly vaccinated. The primary method of transmission depends on the prevalence of the disease in a given area.

Hepatitis A is a liver disease caused by the hepatitis A virus. Hepatitis A can affect anyone and can occur in situations ranging from isolated cases of disease to widespread epidemics.

Hepatitis B is a serious disease caused by a virus that attacks the liver. The virus, which is called hepatitis B virus (HBV), can cause lifelong infection, cirrhosis (scarring) of the liver, liver cancer, liver failure, and death.

Hepatitis C is a liver disease caused by the hepatitis C virus (HCV), which is found in the blood of persons who have the disease. HCV is spread by contact with the blood of an infected person.

Hepatitis D is a liver disease caused by the hepatitis D virus (HDV), a defective virus that needs the hepatitis B virus to exist. HDV is found in the blood of persons infected with the virus.

Hepatitis E is a liver disease caused by the hepatitis E virus (HEV) and is transmitted in much the same way as hepatitis A virus. Hepatitis E, however, does not often occur in North America.

Prevention

Preventative measures include wearing appropriate PPE: leather work gloves, a long-sleeved shirt, and safety footwear. Several vaccines have been developed for the prevention of hepatitis B and C virus infection. Vaccines rely on the use of one of the viral proteins (hepatitis B surface antigen or HBsAg). The vaccine was originally prepared from plasma obtained from patients who had long-standing hepatitis B virus infection. However, currently these are more often made using recombinant technology, though plasma-derived vaccines continue to be used; the two types of vaccines are equally effective and safe.

4. Personal Protective Equipment

4.1 General

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

The purpose of PPE is to shield or isolate individuals from the chemical and physical hazards that may be encountered during work activities.

4.2 Types of Personal Protective Equipment

The type of PPE required for a project will vary based on the level of protection required to protect the employee from physical, chemical, biological, and thermal hazards.

4.2.1 Types of Protective Material

Protective clothing is constructed of a variety of different materials for protection against exposure to specific chemicals. No universal protective material exists. All will decompose, be permeated, or otherwise fail to protect under certain circumstances.

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

In order to obtain optimum usage from PPE, the following procedures are to be followed by all site personnel using PPE:

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

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

4.3 Respiratory Protection

Respiratory protection may be worn by personnel during project activities. Personnel required to work in these areas will wear an air-purifying respirator, follow the procedures and guidelines as described below, and follow Honeywell's respiratory protection requirements.

All personnel required to use this equipment shall first be instructed in how to properly fit a respirator to achieve the required face-piece-to-face seal for respiratory protective purposes. The presence of beards, sideburns, eyeglasses, and the absence of upper or lower dentures could affect this face seal.

The air-purifying respirator cartridges selected for use during project work at this site are task dependent. Cartridges will be selected to have the ability to protect against the known contaminant concentrations at the work site.

All cartridges will be changed prior to breakthrough or at a minimum daily. Changes will also be made when personnel begin to experience increased inhalation resistance or breakthrough of a chemical warning property.

4.3.1 Respirator Cleaning

Respiratory equipment and other non-disposable equipment will be fully decontaminated and then placed in a clean storage area. Respirator decontamination will be conducted at a minimum once daily. Face pieces will be disassembled, the cartridges thrown away, and all other parts placed in a cleansing solution. After an appropriate amount of time in the solution, the parts will be removed and reseated with tap water.

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

4.4 Levels of Protection

The level of protection must correspond to the level of hazard known or suspected in the specific work area. PPE has been selected with specific considerations to the hazards associated with site activities. The specific PPE to be used for each activity is outlined in each JSA table located in Appendix A.

- All PPE will be disposed of and/or decontaminated at the conclusion of each workday as described below. Decontamination procedures will follow the concept of decontaminating the most contaminated PPE first.
- All disposable equipment shall be removed before meal breaks and at the conclusion of the workday and replaced with new equipment prior to commencing work.

- Eating, drinking, chewing gum or tobacco, and smoking are prohibited while working in areas where the potential for chemical and/or explosive hazards may be present. Personnel must wash thoroughly before initiating any of the aforementioned activities.

4.4.1 Reassessment of Protection Levels

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

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

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

All proposed changes to protection levels and PPE requirements will be reviewed and approved prior to their implementation by the CC.

5. Air Monitoring Program

Inhalation hazards are caused from the intake of vapors and contaminated dust. Air monitoring shall be performed while intrusive activities are taking place to detect the presence and relative level of those air contaminants that are inhalation hazards. The purpose of air monitoring is to identify and quantify airborne contaminants in order to determine the level of worker protection needed. Initial screening for identification is often qualitative, but the determination of its concentration (quantification) must await subsequent testing.

All instruments will be calibrated on a daily basis in accordance with the manufacturer's guidelines. Records of all calibrations and real-time measurements will be kept in a bound field logbook or documented via air monitoring and calibration log sheets.

When air monitoring is required, the workers breathing zone(s) will be monitored and the results recorded. Additionally, area samples at the following locations will be taken daily. Record time, location, and results of monitoring and actions taken based on the readings:

- Upwind of work areas to establish background concentrations
- In support zone to check for contamination or migration of emissions

- Along decontamination line to check that decontamination workers are properly protected and on-site workers are not removing protective equipment in a contaminated area
- Downwind of work area to track any contaminants/emissions leaving the site

The data collected throughout the monitoring effort shall be used to determine the appropriate levels of protection. Action levels for upgrading or downgrading of PPE have been established and Table 2 presents the action levels for the on-site Air Monitoring Program.

5.1 Exposure Monitoring

Air monitoring equipment to be used during site activities shall consist of:

- Photoionization Detector
- Dust Monitors

5.1.1 Photoionization Detectors

Exposure to VOCs shall be monitored with a photoionization detector (PID) with a 10.6 eV lamp. The PID has the ability to detect organic vapor concentrations from 1 part per million (ppm) to 2,000 ppm. All PID monitoring shall be conducted in the breathing zone.

5.1.2 Dust Monitors

The MIE PDR Personal DataRam Monitor is a direct reading aerosol photometer. The DataRam monitor is designed to detect aerosol dust or respirable dust in the ambient air. Aerosol is a term to describe fine particulates (solid or liquid) suspended in air. Concentrations are evaluated by two scales, which read from 0.01 to 10.0 mg/m^3 and 0.1 to 100.0 mg/m^3, respectively.

5.1.3 Monitoring Frequency

Monitoring will be conducted continuously during ground intrusive activities or during any activity where airborne hazards (e.g., organic vapors) may be present. The monitoring equipment listed per work activity relates to the initial level of protection. The monitoring frequency may be decreased if the work areas and activities are unchanging, the result of the first hour of monitoring indicates contaminant concentrations are non-detect, and no differing conditions are observed.

Monitoring results will be legibly documented each work day. They will note project name/number, date, time, serial number, date of last calibration, name of person performing calibration, name of person performing monitoring, monitor location within the site, and monitoring results. Daily documentation will be kept with the CC and included in the project file.

5.1.4 Safety and Health Action Levels

An action level is a point at which increased protection or cessation of activities is required due to the concentration of contaminants in the work area. All activities shall be initiated in Modified Level D. The appropriate actions are to be taken at designated action levels. The initial action level(s) for site work can be located in Table 2.

In addition to the action level, an upgrade to Level C is required if:

- Any symptoms occur, as described in Section 3.0
- Requested by an individual performing the task
- Any irritation to eye, nose, throat, or skin occurs

A work stoppage and evacuation (cease and desist) at the specific work area is required if levels in the breathing zone exceed the protection factor of the respirator.

6. Site Control

The purpose of site control is to minimize potential contamination of workers and protect the public from hazards found on site. Site control is especially important in emergency situations.

- Site control and work area demarcation will be achieved through posting of signage and placement of barricades. All construction areas will have the appropriate signage posted. Barricades and warning signs will be placed to warn personnel of potential hazards. A standby person (spotter) may be utilized in place of barricades, where appropriate. The following materials may be used to barricade construction areas, crane swing radius, and control traffic:
  - Temporary fence
  - High visibility tape, rope, or chains
  - Traffic cones
  - Sawhorses
  - Wood or metal guardrails

One pathway should be established for heavy equipment and one for personnel decontamination.

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

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

6.1 Communication

Each member of the project team will be able to communicate with other team members at all times. Communications will be by way of an air horn, walkie-talkie, telephone, or hand signals.

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

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

(Note: The authorized use of cellular phones must be cleared by Honeywell prior to entering site.)

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

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

6.2 Buddy System

6.2.1 Responsibilities

A buddy system shall be implemented when conducting intrusive activities on this site when deemed necessary due to safety concerns. This buddy shall be able to:

- Provide his or her partner with assistance
- Observe his or her partner for signs of chemical exposure or temperature stress
- Periodically check the integrity of his or her partner's protective clothing
- Notify emergency personnel if emergency help is needed

6.3 Site Security

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

6.4 Decontamination

The following are questions/items that may need to be addressed based on Site-specific protocols:

- Is formal equipment and/or personal decontamination necessary? If so, what measures will be implemented to manage residual wash waters, sediments, soils, etc.? Disposal measures for used/spent PPE?
- Does a decontamination pad already exist?

- What type(s) of equipment and decontamination cleansers/reagents will be necessary?
- Will wipe sampling and/or other forms of verification be required?
- Is there a decontamination pad/facility present at the site or will a pad need to be constructed? Location(s) of permanent and/or temporary facilities?
- Who is responsible for disposal of any wastes generated by decontamination activities?

The CC is responsible for ensuring that all personnel and pieces of equipment coming off site are properly decontaminated according to the procedures outlined below. Documentation of decontamination must be made in the field log notebook and will become part of the permanent project file.

6.4.1 Personnel and Equipment Decontamination Procedures

All PPE will be disposed of and/or decontaminated at the conclusion of each workday as described below. Decontamination procedures will follow the concept of decontaminating the most contaminated PPE first.

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

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

- **Personnel:** Decontamination will be initiated prior to exiting the contaminated work area and completed in the Contamination Reduction Zone.
- **Modified Level D**: First, remove outer protective wear. Remove gloves and properly dispose in designated waste container. Wash hands and face.
- **Level C**: Wash and rinse outer gloves, boots, and suit, and remove; remove respirator; dispose of cartridges; wash respirator; and remove inner gloves and dispose. Wash hands and face. Handle all clothing inside out when possible.
- **Equipment:** All equipment must be decontaminated with Alconox/Liquinox solution or discarded upon exit from the contaminated area in a well-ventilated area. A temporary decontamination pad with a low-volume high-pressure washer will be set up on site during project operations. All decontamination materials will be drummed for subsequent disposal.

7. Emergency Procedures

7.1 On-Site Emergencies

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

protocols to ensure compatibility between this document and facility/client programs and expectations.

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

7.2 Incident, Injury, Illness Reporting, and Investigation

Any work-related incident, injury, illness, exposure, or property loss must be reported to your supervisor or the CC **as soon as possible.** The report and investigative results must be filed for the following circumstances:

- Incident, injury, illness, or exposure of an employee
- Injury of a subcontractor
- Damage, loss, or theft of property
- Any motor vehicle accident, regardless of fault, which involves a company vehicle, rental vehicle, or personal vehicle while the employee is acting in the course of employment

Occupational incidents resulting in employee injury or illness will be investigated by the CC and Health, Safety and Environmental (HSE) team. This investigation will focus on determining the cause of the incident and modifying future work activities to eliminate the hazard.

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

7.3 Emergency Equipment/First Aid

Safety equipment will be available for use by site personnel, located within 30 feet of the work area(s), and maintained at the site. The safety equipment may include, but is not limited to, the following:

- First Aid kit (size is dependent upon the number of personnel on site):

  Contents: Each first aid kit shall contain, as a minimum (ANSI 308.1-2003):

1	Absorbent Compress (32 square inches, no side less than 4 inches)
16	Adhesive Bandages (1 inch x 3 inches)
1	Adhesive Tape (roll, 3/8 inch x 5 yards)
10	Individual Antiseptic (0.5 g)
6	Burn Treatments (Antibiotic) (each 1/32 oz.)
2 pair	Medical Exam Gloves (not to be reused)
4	Sterile Pads (3 inches x 3 inches)
1	Triangular Bandage

This list shall be placed in each first aid kit for the purposes of inspection and restocking.

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

7.4 Emergency Procedures for Contaminated Personnel

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

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

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

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

7.5 Site Evacuation

In the event of an emergency situation such as fire, explosion, or significant release of toxic gases, project personnel in the field will be notified through established communications to evacuate the area. In the event of an emergency, Honeywell personnel will gather at their primary mustering point for a head count. The HSE and Emergency Response Team will determine a primary and secondary muster point to be used as an assembly area in the event of an emergency. The secondary muster point will be located in an appropriate safe area, depending on wind direction. These locations will be communicated to the work crew(s) during the Site-specific training prior to commencement of work activities, and prior to the advent of potentially threatening weather. Muster points will be identified in the Emergency Response Plan and are indicated on the map.

7.6 Spill and Release Contingencies

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

8. Recordkeeping

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

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

Table 1

Properties of Potential Site Contaminants

Chemical Name (Synonyms)	Concentration at Site	Exposure Limits	Routes Of Entry	Symptoms/Health Effects	Chemical Properties	Physical Characteristics
Arsenic CAS-7440-38-2		TLV: 0.01 mg/m3 PEL: 0.010 mg/m3 STEL: NE IDLH: 5 mg/m3 (as As)	Inhalation Absorption Ingestion	ACUTE: Contact dermatitis, gastrointestinal disturbances, ulceration of the nasal septum, and respiratory irritation. CHRONIC: Hyperpigmentation of the skin and cancers of the skin, lungs, and lymphatic system.	(FP) NA (VP) 0 mm (approx.) (IP) NA (UEL) NA (LEL) NA	Silver-gray or tin-white, brittle, odorless, solid.

Notes:

FP	FP - Flash Point	PEL	PEL - OSHA Permissible Exposure Limit
IDLH	IDLH - Immediately Dangerous to Life ord Health	STEL	STEL - Short Term Exposure Limit
IP	IP - Ionization Potential	TLV	TLV - ACGIH Threshold Limit Value
NE	NE - Not Established (Information Not Available)	VP	VP - Vapor Pressure
NA	NA - Not Applicable	C	C - Ceiling Exposure Limit
CNS	CNS - Central Nervous System	[skin]	[skin] - potential for dermal absorption
PNS	PNS - Peripheral Nervous System	mm	mm - milimeters Hg (mercury)
ppm	ppm - parts per million	eV	eV - electrovolts
mg/m3	mg/m3 - miligrams per cubic meter		

Table 2

On-Site Air Monitoring Program Action Levels
Health and Safety Plan

Monitoring Device	Action Level	Action
Photoionization Detector (PID)	**Benzene present in the Breathing Zone:**	Determine via Colorimetric Sampling
10.6 or greater eV lamp	<1.0 ppm or Background	Full-Face Respirator Available
Detector Tubes	≥1.0 ppm and ≤5 ppm	Full-face air purifying respirator Level C PPE MSA GME P100 Cartridge
	>5 ppm and <500 ppm	Supplied air respirator Level B PPE. Implement additional engineering controls
	≥500 ppm	Shut down activities. Notify SHO. Implement additional engineering controls
	Benzene not present in the Breathing Zone:	Determine via Colorimetric Sampling
	<10 ppm or Background	Full-Face Respirator Available
	≥10 ppm and <50 ppm	Wear Full-Face Respirator - Level C PPE
	≥50 ppm and <1,000 ppm	Wear Supplied Air Respirator - Level B PPE, Implement Additional Engineering Controls
	≥1,000 ppm	Shut down activities. Notify SHO. Implement additional engineering controls
	Vinyl Chloride present in the Breathing Zone:	Determine via Colorimetric Sampling
	<1 ppm or Background	No Action Required - Continue Monitoring
	≥1 ppm	Level B - Continue Monitoring
Dust/Particulate - (Impacted Soils/Sludges/Sediments)	<2.0 mg/m³ or Background	Full-Face Respirator Available
	≥2.0 mg/m³ and <50 mg/m³	Wear Full-Face Respirator - Level C PPE
	>50 mg/m³	Wear Supplied Air Respirator - Level B PPE, Implement Additional Engineering Controls
Hydrogen Sulfide	>5 ppm	Shut down activities. Notify SHO. Implement additional engineering controls
Carbon Monoxide	>35 ppm	Shut down activities. Notify SHO. Implement additional engineering controls
Combustible Gas Indicator	>10 Percent LEL	Cease operations and move to a safe place. Notify SHO. Do not continue working until conditions are constantly below 10 percent LEL
Oxygen Meter	<19.5 Percent or >23.5 Percent When oxygen levels are outside this range, percent LEL readings are not reliable	Cease operations and move to a safe place. Notify SHO. Do not continue working until oxygen levels are between 19.5 and 23.5 percent

If GHD is unable to identify/quantify the contaminants, supplied air will be required when the PID reading is greater than background, as the contaminant will be unknown and NIOSH, OSHA, and the manufacturer's use requirements for Level C (air purifying respirators) will not be met. If PID readings subside, workers can downgrade as necessary. GHD will upgrade to supplied air and attempt to obtain additional information for possible chemicals present in GHD's work area. The Owner will need to provide/obtain additional information as to the identity of the contaminant(s) in order to permit the use of Modified D and/or Level C.

Notes:

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

Appendix A
Job Safety Analysis Forms

Job **Safety Analysis (JSA)**

Air Monitoring

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

Date issued/revised:		**Client:**			
Project number:		**Created by**		**Sim OPS Yes/No**	**SSE on site? Yes/No**
Project address:					
Specific task	Construction activities				
Key equipment:	Select (four gas or five gas monitors, colorimetric detector tube, PID}				
Task-specific training:	Training and understanding of specific model of meter being used				

Hard hat	**Gloves (ANSI/EN 388)**	**Eye protections**	**Fall protection**	**APR**	**Vest**	**PPE clothing**
☐ Type I (top impact)	☐ Chemical protective (i.e. nitrile)	☒ ANSI/CSA safety glasses	☐ Harness	☐ Full face mask	☒ Class II	☐ Coveralls
☐ Type II (side impact)	☒ Level 1 light duty	☐ Goggles/spoggles	☐ Shock absorb lanyard	☐ Half face mask	☐ Class III	☐ Fire retardant clothing (FRC)
☒ Class E (standard)	☐ Level 2 light duty with protection	☐ Face shield	☐ Lifeline		☐ Anti-static	☐ High viz clothing
☐ Class G	☐ Level 3 medium duty	☐ Other*		**Cartridges**	☐ FRC	☐ Long pants
	☐ Level 4 heavy duty			☐ N95		☐ Long sleeve shirts
Foot protection	☐ High viz	**Hearing protection**	**Arc flash**	☐ P100		☐ Paper tyvek
☒ Industrial grade safety boot	☐ Other*	☐ NOT Required	☐ Haz.cat 2	☐ P95		☐ Polyethyene tyvek
☐ Rubber boots (industrial grade)		☐ Required	☐ Haz cat 4	☐ R95		☒ Other *
☐ Hip waders				☐ Organic vapor		
	*see key equipment			☐ Specialty/other*		

Project development team		Modified by	Reviewed by	Date
Name	**Signature**			
Dennis Hoyt				
Craig Gebhardt				

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
1	Prepare to enter work area	• Low oxygen levels • Flammable or explosive conditions • Organic vapors	• Consult the site specific HASP to identify known and suspected chemicals or concern • Ensure the gas meter selected is correct for the items identified • Ensure meter has been properly calibrated and documented • Ensure the meter is fully charged or the correct style and type of replacement battery is available • Document readings at appropriate intervals • Enter area to perform work only when you are certain conditions are safe • If uncertain or untrained on the specific meter being used or if you have concerns over meter functioning correctly or you receive readings of concern, exercise SWA, relocate to a safe area, and contact your site supervisor or regional safety supervisor • Reference Table 2 of the HASP for Action Levels		
2	Continued monitoring of work area	• Low oxygen levels • Flammable or explosive conditions • Organic vapors	• While performing work tasks keep meter with you and record readings at predetermined times • If job conditions change or meter alarms exercise SWA, move to a safe location, notify the site supervisor, and re-evaluate the task • Re-enter only when certain safe conditions exist		

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
3	Completion of work or end of work day	• Low oxygen levels • Flammable or explosive conditions • Organic vapors	• Document readings and time • If work complete return meter to stores • If work is continuing clean, inspect, and recharge meter • Store meter in a safe place in clean dry conditions		
4	Continued meter use	• Low oxygen levels • Flammable or explosive conditions • Organic vapors	• Ensure meter is charged or replacement batteries are available • Perform daily checks and meter calibrations required for the specific meter being used • Record checks and calibrations – If meter is good, proceed with use as above – If meter does not perform or is suspect, do not use, inform site supervisor, and do not enter work area until a working meter is available		

(1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

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

Name/Company	Sign	Date

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

Presenter signature: _____ Date/time: _____

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

Supervisor signature: _____ Date/time: _____

Location of mustering point: _____ Wind direction (current): _____

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

Supervisor signature documenting daily debrief has been completed: _____

Job **Safety Analysis (JSA)**

Concrete Breaking - Excavator with Hydraulic Hammer

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

Date issued/revised:		**Client:**			
Project number:		**Created by**		**Sim OPS Yes/No**	**SSE on site? Yes/No**
Project address:					
Specific task	Concrete breaking				
Key equipment:	Excavator and hydraulic hammer				
Task-specific training:	Mobile/heavy equipment training, HASP, hydraulic hammer operation and limitations				

Hard hat	Gloves (ANSI/EN 388)	Eye protections	Fall protection	APR	Vest	PPE clothing
☐ Type I (top impact)	☐ Chemical protective (i.e. nitrile)	☒ ANSI/CSA safety glasses	☐ Harness	☐ Full face mask	☒ Class II	☐ Coveralls
☐ Type II (side impact)	☐ Level 1 light duty	☐ Goggles/spoggles	☐ Shock absorb lanyard	☐ Half face mask	☐ Class III	☐ Fire retardant clothing (FRC)
☒ Class E (standard)	☒ Level 2 light duty with protection	☐ Face shield	☐ Lifeline		☐ Anti-static	☐ High viz clothing
☐ Class G	☐ Level 3 medium duty	☐ Other*		**Cartridges**	☐ FRC	☒ Long pants
	☐ Level 4 heavy duty			☐ N95		☐ Long sleeve shirts
Foot protection	☐ High viz	**Hearing protection**	**Arc flash**	☐ P100		☐ Paper tyvek
☒ Industrial grade safety boot	☐ Other*	☐ NOT Required	☐ Haz.cat 2	☐ P95		☐ Polyethyene tyvek
☐ Rubber boots (industrial grade)		☒ Required	☐ Haz cat 4	☐ R95		☐Other *
☐ Hip waders				☐ Organic vapor		
	*see key equipment			☐ Specialty/other*		

Project development team		Modified by	Reviewed by	Date
Name	**Signature**			
Dennis Hoyt				
Craig Gebhardt				

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
1	Use the STAR Process and discuss SWA – modify JSA as necessary A. Inspect work area B. Determine the hazards of performing the task and survey the work area	• Slip/trip/fall hazards • Situational risks • Failing to identify hazardous conditions resulting in losses or near losses • Utility clearance • Miscommunications	• Verify personnel's training is sufficient for the scheduled task(s) • Is job instruction training (hands on) training necessary? • Consider weather conditions • Always consider the worst case scenario • Analyze the hazards determined • Discuss task and determine best plan of action towards safety and property • Confirm utilities within the work area(s) • For every hour of continuous operation the operator shall exit the equipment and refocus on the task at hand. This micro break shall consist of (i.e., walk around the equipment, kick the tires, obtain a drink of water, etc.).		

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
2	Inspect equipment A. Mobile equipment checklist B. Preventive maintenance C. Housekeeping procedures	• Equipment failure/malfunction • Property damage • Release of stored energy • Slip/trip/fall hazards • Pinch points • Visibility • Poor housekeeping	• Inspect equipment using daily equipment checklist • Report all damaged, missing, or broken components to your site supervisor immediately • Follow manufacturer's recommended daily inspections. • Wear appropriate hand protection; identify pinch point areas and keep hands and fingers clear • Make sure equipment is in "Zero" energy mode and off during the inspection • Clean windshield and side windows as necessary • Keep cab of machine clean and free of all debris especially around the foot controls and levers		
3	Entering and exiting the equipment	• Slips and Falls • Muddy Conditions • Worn/dirty/muddy soles on boots	• Mount/dismount equipment using three points of contact • Use manufacturer designed steps and handrails • Keep steps and work boots free of debris (i.e., mud, clay) • Keep work boots in good condition; replace as necessary to prevent slips and loss of traction		
4	Moving equipment A. Start the machine B. Review travel path prior to moving C. Tracking, travel, and swing	• Ground personnel • Inclement weather • Dust • Poor visibility • Property damage • Overhead utilities • Distractions	• Pre plan your route; use the STAR process and consult with your supervisor • Wear the appropriate PPE • Always look up when mobilizing to the work area • Be aware of your surroundings and ground personnel; use SWA if unsafe acts or conditions exist • Do not operate during electrical storms; SWA in effect • No eating, drinking, or cell phone use while operating machinery • Keep lines of communication open via hand signals, two way radios or both.		

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
5	Breaking concrete A. Block B. Foundations C. Platforms	• Flying debris • Ground personnel • Equipment damage • Uneven surfaces • Noisy environment • Sprains • Utilities	• Wear hearing protection • Keep all personnel out of the “line of fire” and set up safe zone around work area – use SWA if personnel enter “line of fire” • Set up controlled/demarcated work zone in high traffic areas • Position machinery on solid, even surfaces; use the STAR process and discuss with your supervisor • Understand the equipment’s limitations • Watch for sharp objects protruding out from the concrete (i.e., rebar, steel, etc.) Never walk into the pile. Clear and area if necessary. • Watch for any known utilities		
6	End of task A. Breaks B. Fueling C. Parking – set equipment to a “zero energy state”	• Slip/trip hazards • Spills • Obstructions • Equipment damage • Vandalism • Unauthorized personnel	• Be aware of your surrounding conditions (footing, weather conditions, etc.) • Restore equipment to “Zero” energy mode • Use three points of contact when dismounting equipment • Refer to JSA on “Fueling of Equipment” • Remove key from equipment, close all windows and lock the cab • Secure the work zone • Stage equipment appropriately • Park on solid, level surface		

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(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

Site personnel participating in JSA review:
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Name/Company	Sign	Date

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

Presenter signature: _____ Date/time: _____

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

Supervisor signature: _____ Date/time: _____

Location of mustering point: _____ Wind direction (current): _____

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

Supervisor signature documenting daily debrief has been completed: _____

Job **Safety Analysis (JSA)**

Corded Power Drill

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

Date issued/revised:		**Client:**			
Project number:		**Created by**		**Sim OPS Yes/No**	**SSE on site? Yes/No**
Project address:					
Specific task					
Key equipment:	corded drill, portable GFCI unit. Additional or specific PPE may be appropriate based on what material is being drilled (ex: concrete – face shield, respiratory protection from silica and particulates, etc. .				
Task-specific training:	SMART (BBS) Training, 8-Hour Refresher, Hazard Communication. Supervisor shall be training in CPR, First Aid, and have Supervisor Training. Hand and Power tool training. **Operator will review the Manufacturer's Operating instructions prior to use.**				

Hard hat	**Gloves (ANSI/EN 388)**	**Eye protections**	**Fall protection**	**APR**	**Vest**	**PPE clothing**
☐ Type I (top impact)	☐ Chemical protective (i.e. nitrile)	☒ ANSI/CSA safety glasses	☐ Harness	☐ Full face mask	☒ Class II	☐ Coveralls
☐ Type II (side impact)	☐ Level 1 light duty	☐ Goggles/spoggles	☐ Shock absorb lanyard	☐ Half face mask	☐ Class III	☐ Fire retardant clothing (FRC)
☒ Class E (standard)	☒ Level 2 light duty with protection	☐ Face shield	☐ Lifeline		☐ Anti-static	☐ High viz clothing
☐ Class G	☐ Level 3 medium duty	☐ Other*		**Cartridges**	☐ FRC	☐ Long pants
	☐ Level 4 heavy duty			☐ N95		☐ Long sleeve shirts
Foot protection	☐ High viz	**Hearing protection**	**Arc flash**	☐ P100		☐ Paper tyvek
☒ Industrial grade safety boot	☐ Other*	☐ NOT Required	☐ Haz.cat 2	☐ P95		☐ Polyethyene tyvek
☐ Rubber boots (industrial grade)		☒ Required	☐ Haz cat 4	☐ R95		☒Other *
☐ Hip waders				☐ Organic vapor		
	*see key equipment			☐ Specialty/other*		

Project development team		Modified by	Reviewed by	Date
Name	Signature			
Dennis Hoyt				
Craig Gebhardt				

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
1	Discuss STAR and SWA Process. Discuss Emergency Evacuation Plan and Review JSA	• Stakeholder encounters • Miscommunication • Unsafe acts/conditions by others • Fire/Explosion on refinery • Inclement weather	• All personnel will clearly understand SWA. • Follow stakeholder communications guide • Communicate mustering points • Follow emergency notifications from Main Gate. Stop all work as directed when lightning or severe storms are in the area. Personnel must wait till an ALL CLEAR has been announced over the radio before resuming work.		
2	Inspect Drill -**refer (review) to the specific equipment's equipment manufacturer's operating manual before using the equipment.** **Inspect area to be drilled to ensure utilities will not be encountered and that punch through will not injure individuals or damage other equipment.**	• Cracked, missing or broken parts • Broken Bits • Accidental start • Improper Bit	• **Wear EN 388 Cut/Abrasion Level 2 or greater gloves and other required PPE** • Complete a Hand and power tool safety checklist. Report defects to supervisor immediately. Do not use until replaced or repaired. • Unsure Tool doesn't have a "locked on" switch and meets Client and GHD requirements or that the "locked on" switch is never used • Inspect power cord on tool. • A portable GFCI unit must be used in between power cord and extension cord. • Test the GFCI unit. Run tool and hit the trip button on GFCI. Ensure GFCI works • Unplug tool before making any adjustments to drill.		

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
3	Set up material to be drilled	• Slips/trips/ falls • Personal injury • Property damage • Strains • Pinch points	• **Wear EN 388 Cut and Puncture, Level 3 Med/Hvy duty Impact gloves.** • Use a mechanical assist or the buddy system if material needs to be lifted and placed off the ground and is bulky, awkward, or weighs 50lbs or greater. • Keep hands out of pinch point areas when placing material. • Use proper body posture when lifting using your legs, slight bend in knees and back straight.		
4	Drill Operations (warm up muscles to be used prior to initiating drill operation.) – rotate personnel frequently to ensure active recovery time is provided to each drill operator. Take breaks.	• Excessive force • Blade breakage • Vibrations • Body strains • Fatigue • Musculoskeletal/ergo issues • Cuts • Caught by • Visibility • Electrocution	• **Wear EN 388 Cut and Puncture, Level 3 Med/Hvy duty Impact gloves.** • Use both hands when operating the drill. No one-handed operation. Always hold drill at designated insulated grip points. • Never use your feet to support or hold down material being drilled. • When bit becomes dull, replace to avoid excessive force using your hands and arms. • Rotate drill operations to a fresh operator frequently-allow for active recovery. • Take concurrent breaks so all team members can recover. • Warm up muscles prior to beginning drill operation and after any extended break periods. • Stretch arms, shoulders, wrists, and neck throughout breaks and as needed. • Release trigger on drill immediately after making hole. Keep drill off the ground and put away when completed. • Secure all loose fitting clothing. • Unplug device when changing bit. • Do not use in wet conditions		

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(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

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Name/Company	Sign	Date

SAFE YOU ME GHD
ENVIRONMENT & PEOPLE

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

Presenter signature: _____ Date/time: _____

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

Supervisor signature: _____ Date/time: _____

Location of mustering point: _____ Wind direction (current): _____

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

Supervisor signature documenting daily debrief has been completed: _____

Job **Safety Analysis (JSA)**

Earthwork Trenching

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

Date issued/revised:		**Client:**			
Project number:		**Created by**		**Sim OPS Yes/No**	**SSE on site? Yes/No**
Project address:					
Specific task	Trench excavation				
Key equipment:	Excavator; backhoe; protective abrasion-resistant gloves; lifeline and harness will be used in deep excavations. Trench box as necessary. Tabulated data sheet for trench box must be on site with box(es)				
Task-specific training:	Excavation Safety Training; Excavation Competent Person (for supervisors); Heavy Equipment Safety; Trench Box Setup/Entry/Egress				

Hard hat	**Gloves (ANSI/EN 388)**	**Eye protections**	**Fall protection**	**APR**	**Vest**	**PPE clothing**
☐ Type I (top impact)	☐ Chemical protective (i.e. nitrile)	☒ ANSI/CSA safety glasses	☒ Harness	☐ Full face mask	☒ Class II	☐ Coveralls
☐ Type II (side impact)	☐ Level 1 light duty	☐ Goggles/spoggles	☒ Shock absorb lanyard	☐ Half face mask	☐ Class III	☐ Fire retardant clothing (FRC)
☒ Class E (standard)	☒ Level 2 light duty with protection	☐ Face shield	☒ Lifeline		☐ Anti-static	☐ High viz clothing
☐ Class G	☐ Level 3 medium duty	☐ Other*		**Cartridges**	☐ FRC	☐ Long pants
	☐ Level 4 heavy duty			☐ N95		☐ Long sleeve shirts
Foot protection	☐ High viz	**Hearing protection**	**Arc flash**	☐ P100		☐ Paper tyvek
☒ Industrial grade safety boot	☐ Other*	☐ NOT Required	☐ Haz.cat 2	☐ P95		☐ Polyethyene tyvek
☐ Rubber boots (industrial grade)		☐ Required	☐ Haz cat 4	☐ R95		☐Other *
☐ Hip waders				☐ Organic vapor		
	*see key equipment			☐ Specialty/other*		

Project development team		Modified by	Reviewed by	Date
Name	**Signature**			
Dennis Hoyt				
Craig Gebhardt				

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
1	Verify Utility Clearance procedures completed (overhead and underground); verify excavation trench layout	• Underground utility strike • Overhead utilities	• QSF 019 on file? • Utility Locate Ticket number on file within 10 days of excavation startup? • Mark work area and safe distances for overhead lines • use spotter as necessary		
2	Setup necessary work area and traffic controls	• Fall-in • Caught-between and struck-by hazards	• Demarcate site and work areas to ensure that personnel and truck/equipment traffic is maintained safely and smoothly • Stockpile and laydown area are setup properly		
3	Hand digging and pot holing activities conducted (where/if necessary based on utility locates)	• Underground utility strike	• Use preventive techniques • Maintain proper utility clearances with heavy equipment and use hand digging/pot holing when necessary		
4	Heavy equipment operations to excavate and handle soils and spoils	• Caught-between and struck-by hazards • Underground/overhead utilities	• Stay out of swing radius • Use spotters to verify clear route of travel and work area; maintain eye contact with operator and/or signal operator; keep soil 2 feet from edges • Inspect heavy equipment – document inspection • Ensure above utility clearances and safe work protocols are followed		
5	Trenching activities	• Soil cave-in; noise • Struck-by/against • Encountering impacted soils	• Keep proper distances from edge of excavation • Limit equipment operations in trench area • Keep work area free of trip hazards • Perform necessary soil classification • Use hearing protection as necessary • Follow air monitoring protocols • Contact site supervisor if odors and/or discolored soils are encountered		

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
6	Trench entry activities	• Soil cave-in • Struck-by/against • Encountering slag • Hazardous atmospheres • Slip/trip/fall hazards • Emergency egress	• Keep proper distances from edge of excavation • Limit equipment operations in trench area • Keep work area free of trip hazards • Perform necessary soil classification • Use daily inspection form to document/meet competent person inspection requirements • Inspect trench after any change in conditions (rain, equipment vibrations, etc.) • Utilize trench box properly; ensure that tabulated data sheet is on site • Contact health physics/radiation safety contractor if slag encountered • Use 4 gas monitor and PID to screen excavation air prior to and during entry • Ladder safety and proper slope of ladder • If necessary based on air monitoring and/or other site conditions use harness and lifeline when entering trenches over 5 feet deep		

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(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

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Name/Company	Sign	Date

SAFE YOU ME GHD
ENVIRONMENT & PEOPLE

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Presenter signature: _____ Date/time: _____

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Supervisor signature: _____ Date/time: _____

Location of mustering point: _____ Wind direction (current): _____

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

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Job **Safety Analysis (JSA)**

Excavation Oversight

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

Date issued/revised:		**Client:**			
Project number:		**Created by**		**Sim OPS** Yes/No	**SSE on site?** Yes/No
Project address:					
Specific task	Excavation oversight				
Key equipment:	Excavator; Excavation Safety Checklist;				
Task-specific training:	40-Hour and 8-Hour HAZWOPER; PPE; Mobile Equipment Operations; Excavation Safety Training; Excavation Competent Person; Confined Space Entry				

Hard hat	**Gloves (ANSI/EN 388)**	**Eye protections**	**Fall protection**	**APR**	**Vest**	**PPE clothing**
☐ Type I (top impact)	☐ Chemical protective (i.e. nitrile)	☐ ANSI/CSA safety glasses	☐ Harness	☐ Full face mask	☒ Class II	☐ Coveralls
☐ Type II (side impact)	☒ Level 1 light duty	☐ Goggles/spoggles	☐ Shock absorb lanyard	☐ Half face mask	☐ Class III	☐ Fire retardant clothing (FRC)
☒ Class E (standard)	☐ Level 2 light duty with protection	☐ Face shield	☐ Lifeline		☐ Anti-static	☐ High viz clothing
☐ Class G	☐ Level 3 medium duty	☐ Other*		**Cartridges**	☐ FRC	☐ Long pants
	☐ Level 4 heavy duty			☐ N95		☐ Long sleeve shirts
Foot protection	☐ High viz	**Hearing protection**	**Arc flash**	☐ P100		☐ Paper tyvek
☒ Industrial grade safety boot	☐ Other*	☐ NOT Required	☐ Haz.cat 2	☐ P95		☐ Polyethyene tyvek
☐ Rubber boots (industrial grade)		☐ Required	☐ Haz cat 4	☐ R95		☐Other *
☐ Hip waders				☐ Organic vapor		
	*see key equipment			☐ Specialty/other*		

Project development team		Modified by	Reviewed by	Date
Name	**Signature**			
Dennis Hoyt				
Craig Gebhardt				

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
1	Perform the STAR process; discuss SWA; verify Permit to Excavate and Utility Clearance Form is completed (overhead and underground); verify excavation layout	• Underground utility strike • Overhead utilities	• QSF 019 and Permit to Excavate Forms completed and signed off • Utility Locate Ticket number on file within 10 days of excavation startup? • Mark work area and safe distances for overhead lines; use spotter as necessary		
2	Set up necessary work area and traffic controls	• Fall-in • Caught-between • struck-by • Lifting hazards • Manual material handling • Back injury	• Demarcate site and work areas to ensure that personnel and truck/equipment traffic is maintained safely and smoothly • Stockpile and laydown area are set up properly • Perform a pre start meeting, inform subcontractor of safe lifting practices • Reduce travel distance when there is a need to carry/lift materials • Make sure grip is adequate; wear leather/cotton gloves when setting up barricades • Size up the load; if the object is too large or odd shaped OR is in excess of 50 pounds (23 kg) then assistance (mechanical or a buddy lift) will be required • Lift with the legs (bend at the knees and use the leg muscles) to protect the lower back and keep lower back in a neutral position • Avoid one handed carrying if possible; maintain awareness of footing		

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
3	Hand digging and potholing activities (where/if necessary based on utility locates)	• Underground utility strike	• Use preventive techniques • Maintain proper utility clearances with heavy equipment and use hand digging/potholing when necessary • Refer to step 2 and the HASP for additional lifting information		
4	Heavy equipment operations to excavate and handle soils and waste materials	• Caught-between and struck-by hazards • Underground/overhead utilities	• Stay out of swing radius • Use spotters to verify clear route of travel and work area • Maintain eye contact with operator and/or signal operator • Keep soil 2 feet from edges • Inspect heavy equipment and document inspection • Ensure the above utility clearances and safe work protocols are followed		
5	Excavating activities	• Soil cave-in • Noise hazard • Struck-by/against hazards • Potential contact with chemical waste material, organic vapors, and particulate	• Keep proper distances from edge of excavation • Limit equipment operations in trench area • Keep work area free of trip hazards • Perform necessary soil classification • Use hearing protection as necessary • Wear designated PPE and conduct air monitoring		

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
6	Excavation entry activities (if required)	• Soil cave-in • Struck-by/against hazards • Hazardous atmospheres • Slip/trip/fall hazards • Emergency egress	• Keep proper distances from edge of excavation • Limit equipment operations in trench area • Keep work area free of trip hazards • Perform necessary soil classification • Use daily inspection form to document/meet competent person inspection requirements • Inspect trench after any change in conditions (e.g., rain, equipment vibrations) • Provide fall protection measures • Utilize shoring equipment properly – ensure that tabulated data sheet is on site • Use 4 gas monitor and PID to screen excavation air prior to and during entry • Ladder safety and proper slope of ladder • Use harness and lifeline when entering trenches over 5 feet deep		

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(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

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Name/Company	Sign	Date

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

Presenter signature: _____ Date/time: _____

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

Supervisor signature: _____ Date/time: _____

Location of mustering point: _____ Wind direction (current): _____

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

Supervisor signature documenting daily debrief has been completed: _____

Job **Safety Analysis (JSA)**

Hand Tools (Non-Powered)

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

Date issued/revised:		**Client:**			
Project number:		**Created by**		**Sim OPS Yes/No**	**SSE on site? Yes/No**
Project address:					
Specific task	Multiple tasks involving hand tools (all types and sizes)				
Key equipment:	Hand Tools (Non-Powered): Wrenches, screwdrivers, hammers, cold and wood chisels, shovels, utility knifes, metal files (square or round), sockets, saws, post hole digger, T-post driver, wire cutters, come-a-long, pickaxe, racks, grease guns, bottle/floor jack, tire wrench, first aid kit, etc.; Fire retardant coveralls				
Task-specific training:	Basic Hand Tools (Non-Powered) Principals and Common Sense, CPR, First-Aid				

Hard hat	**Gloves (ANSI/EN 388)**	**Eye protections**	**Fall protection**	**APR**	**Vest**	**PPE clothing**
☐ Type I (top impact)	☐ Chemical protective (i.e. nitrile)	☒ ANSI/CSA safety glasses	☐ Harness	☐ Full face mask	☒ Class II	☐ Coveralls
☐ Type II (side impact)	☐ Level 1 light duty	☐ Goggles/spoggles	☐ Shock absorb lanyard	☐ Half face mask	☐ Class III	☐ Fire retardant clothing (FRC)
☒ Class E (standard)	☒ Level 2 light duty with protection	☐ Face shield	☐ Lifeline		☐ Anti-static	☐ High viz clothing
☐ Class G	☐ Level 3 medium duty	☐ Other*		**Cartridges**	☐ FRC	☐ Long pants
	☐ Level 4 heavy duty			☐ N95		☐ Long sleeve shirts
Foot protection	☐ High viz	**Hearing protection**	**Arc flash**	☐ P100		☐ Paper tyvek
☒ Industrial grade safety boot	☐ Other*	☐ NOT Required	☐ Haz.cat 2	☐ P95		☐ Polyethyene tyvek
☐ Rubber boots (industrial grade)		☐ Required	☐ Haz cat 4	☐ R95		☐Other *
☐ Hip waders				☐ Organic vapor		
	*see key equipment			☐ Specialty/other*		

Project development team		Modified by	Reviewed by	Date
Name	**Signature**			
Dennis Hoyt				
Craig Gebhardt				

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
1	Perform STAR process	• Unsafe acts • Property damage • Personal injury • Utilities • Electrical components	• Stop, Think, Act, and Review • Identify hazards; change JSA accordingly and discuss task and expectations of the task with supervisor • Select appropriate PPE requirements (at minimum safety glasses and hand protection) • Identify all utilities if conducting work using tools for dirt work (e.g., construction fence, silt fence, trenching, tree planting) • Personnel must be trained on "Control of Hazardous Energy (Lockout/Tagout)"		
2	Hand tool selection	• Injury to body, hands, face • Lacerations • Lack of knowledge • Taking short cuts • Missing, cracked, or broken • Chemicals	• Use the appropriate tool for the task; do not take shortcuts by using one tool to perform another tool's effective and safe capabilities • Ensure you understand the tool usage and purpose for each one selected • Understand the dangers associated with the tools (e.g., spark producers) • Ensure the tool(s) selected are of solid integrity • If proper tool(s), for the task is not available, utilize the STAR process and discuss obtaining the proper tool with your Supervisor		

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
3	Inspect tool(s)	• Flying objects/projectile • Pinch Points • Cuts • Cracked, chipped, or broken • Fatigue or stress • Grease/oil • Dull blades (utility, wood, metal)	• Wear appropriate hand and eye protection • Wear Kevlar gloves when working with cutting/saw tools • Check tools for missing, broken, cracked, chipped, spilt, knurled, beveled, bent, mushroomed, condition; remove unsafe tool(s) from service immediately by tagging out and/or properly disposing of • Check all wood handled tools; do not use if cracked, split, or severely gouged; replace handle as needed or applicable • Ensure tool(s) are clean and free of oil, grease, adhesives (Silicone) for sure gripping capabilities • Check cutting type tools for dullness; replace or have sharpened by qualified person		

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
4	Use of tool(s)	• Tool loss/damage • Smashed fingers • Pinch points • Blisters • Cuts/scrapes • Bruises • Flying debris • Ergonomics • Strains • Repetitive motions • Slip/trip hazards • Utilities	• Wear appropriate hand and eye protection • Keep hands and fingers out of "line of fire" • Use proper body positioning and solid footing • Use hearing protection; refer to HASP "Hearing Conservation Program" • Take frequent breaks to avoid joint and muscle numbness/fatigue; stretch and circulate as necessary • Don't force or exceed the tools limitations • Confirm with your supervisor that utilities have been cleared (Note: Shovels, post hole diggers, pickaxe, and T posts). A QSF 019 must be completed as due diligence. • If task is requiring additional tools, use the STAR process and determine proper tool selection and use the tool designed for the task • Never use a tool near, in, or against "live" electrical components		

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
5	End of tool usage	• Overhead • Damaged • Theft • Poor housekeeping • Cuts/punctures	• Place tools on firm solid surfaces or in tool box when not in use • Do not create an overhead or trip hazard with the tools • Return tools back to their proper storage (e.g., shop, warehouse, tool box, tool crib, cabinet) • Be courteous! Ensure all tools are wiped clean of grease, oil, adhesives, etc.) • Tools must be of good working condition for the next person to use • Damage tools must be taken out of service and tagged; report this to your Field Equipment Manager, Supervisor, or both • Be responsible!. Secure all tools to prevent theft • Properly dispose of disposal blades that are no longer useful		

(1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

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

Name/Company	Sign	Date

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

Presenter signature: _____ Date/time: _____

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

Supervisor signature: _____ Date/time: _____

Location of mustering point: _____ Wind direction (current): _____

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

Supervisor signature documenting daily debrief has been completed: _____

Job **Safety Analysis (JSA)**

Heavy Equipment Decontamination - Pressure Steam Heat

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

Date issued/revised:		**Client:**			
Project number:		**Created by**		**Sim OPS Yes/No**	**SSE on site? Yes/No**
Project address:					
Specific task	Pressure washing - portable (steam heat generated)				
Key equipment:	2,000 to 4,000 psi pressure washer - portable; gasoline, kerosene, or diesel powered; Splash shield, poly coated Tyvek, rubber neoprene gloves (insulated)				
Task-specific training:	40-Hour HAZWOPER, 8-Hour Refresher, Hand and Power Tool Training				

Hard hat	**Gloves (ANSI/EN 388)**	**Eye protections**	**Fall protection**	**APR**	**Vest**	**PPE clothing**
☐ Type I (top impact)	☐ Chemical protective (i.e. nitrile)	☒ ANSI/CSA safety glasses	☐ Harness	☐ Full face mask	☐ Class II	☐ Coveralls
☐ Type II (side impact)	☐ Level 1 light duty	☐ Goggles/spoggles	☐ Shock absorb lanyard	☐ Half face mask	☐ Class III	☐ Fire retardant clothing (FRC)
☒ Class E (standard)	☐ Level 2 light duty with protection	☒ Face shield	☐ Lifeline		☐ Anti-static	☐ High viz clothing
☐ Class G	☐ Level 3 medium duty	☐ Other*		**Cartridges**	☐ FRC	☐ Long pants
	☐ Level 4 heavy duty			☐ N95		☐ Long sleeve shirts
Foot protection	☐ High viz	**Hearing protection**	**Arc flash**	☐ P100		☐ Paper tyvek
☒ Industrial grade safety boot	☒ Other*	☐ NOT Required	☐ Haz.cat 2	☐ P95		☐ Polyethyene tyvek
☐ Rubber boots (industrial grade)		☒ Required	☐ Haz cat 4	☐ R95		☐Other *
☐ Hip waders				☐ Organic vapor		
	*see key equipment			☐ Specialty/other*		

Project development team		Modified by	Reviewed by	Date
Name	**Signature**			
Dennis Hoyt				
Craig Gebhardt				

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
1	Discuss STAR and SWA	• Site personnel not aware of STAR and SWA • Property damage • Personal injury • Cross contamination	• Project team (GHD) discusses importance of and documentation procedures for SWA during pre-job safety meeting • Use SWA if unsafe conditions exist • Discuss all potential hazards based on location, utilities, terrain, and waste water disposal		
2 2A	Review manufacturer's Operation and Maintenance Manual (prior to initial operations of pressure washer) Rental units	• Improper inspection procedures • Lack of recognition/ knowledge of specific manufactured model • High pressure (>2,000 psi)	• Review manufacturer's Operation and Maintenance Manual • Utilize the STAR process and discuss with site supervisor on the operations of the washer • Make sure rental company provides a copy of the manual or have them illustrate proper operating procedures including daily checks • Important: Read manufacturer's warning labels on the pressure unit itself for step by step operations (DOs and DON'Ts)		

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
3	Inspect equipment	• Equipment malfunction • Leaks • Missing/broken components • Personal injury • Property damage • Spills	• Complete a daily equipment checklist – Report all NR (Needs Repair) or items in question to your site supervisor – Do not use until repairs/parts have been completed • Thoroughly check hose, hose fitting, pressure wand, o-rings, leaks, pressure tips, engine oil, fuel type, etc. • Reference Manufacturer's Operation and Maintenance Manual for specific daily checks • Wear hand protection (leather) • Review site JSA on Fueling Operations • Avoid overfilling and immediately clean up spills using absorbent pads, towels and shovel or combination of all three and dispose of properly • Review Haz. Com. (MSDS) on type of fuel used in unit (i.e., Flammable, Combustible and Health risks). • Use an approved OSHA safety can (red or yellow) for dispensing needs; remove can from service if severely dented, missing, or broken components; tag out of service immediately • Keep gasoline can away from any heat sources; place in OSHA- approved storage cabinet or in a fenced-off secondary spill containment area with signage and labeled		

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
4	Mobilize washer into position	• Slip/trip/fall hazards • Back strain • Property damage • Unsecured • Uneven terrain • Heavy lifting	• Get assistance (buddy system) when moving washer either physically or means of powered equipment • Use proper lifting techniques; keep back straight and knees slightly bent when placing unit into the decon area • Keep hose(s) and wand securely on unit • Place washer on solid, level ground • Determine your route of travel to work area; avoid uneven ground, slopes, and inclines • Secure washer if transporting by truck, trailer, or loader using nylon ratchet straps; DO NOT use chains or bungee cords • Determine best place to position washer to account for length of hose to reach all points of washing		
5	Connect water source to pressure washer	• Splashing • Slip hazard • Pinch points • Improper fittings • Water pressure • Property damage • Personal injury • Electrical - electrocution	• Don appropriate PPE (poly coated Tyveks, rubber gloves, rubber overboots, splash shield, hard hat, hearing protection, etc.) • Check water hose condition and connections • Install one end of hose to unit first and then to water source • Slowly release water into pressure washer unit; avoid excessive splashing and don't leave unit unattended • Keep hands and fingers clear of pinch points • Minimize water pooling; tighten connections as necessary to avoid slip hazards • Keep water away from electrical panels, outlets, and power cords		

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
6	Operate pressure washer In this Order: 1. Select proper wash tip 2. Start the washer unit 3. Move into position 4. Hold pressure wand and handle firmly with both hands 5. Point wand in area to begin wash 6. Pull trigger and begin washing	• High pressure (>2,000 psi) • Infections bacteria • Eye, hand, foot Injury • Flying debris • Slip/trip hazards • Hose whipping • Kink in hose • Equipment malfunction • Property damage • Hand and wrist fatigue/numb • Noise • Poor visibility • Windy conditions • Clogged pressure tips • Poor communications • Steam burns	• Wear splash shield and hearing protection! • Determine wind direction and place back to the wind to avoid over spray of water back into the operator's face • Install proper washing tip on the end of wand; turn unit off, relieve pressure from unit, and let it cool down before changing tips • Keep both hands on the wand at all times to avoid excessive fatigue and numbness in hand and wrists • Keep hands off metal section of wand to avoid a burn to the hand • Do not point the spray towards others, ground, or hose • Position your body off to one side during washing to prevent deflection of material debris back in your direction; keep a safe distance between surface to be washed and the spray • Keep hoses free and clear to avoid trips; be aware of your surroundings • Keep face shield clear as best as you can; stop washing and wipe off as needed • Never unclog a tip while the unit is running; shut off unit, depressurize hose and wand, then remove tip for cleaning • Keep hands, feet, and eyes out of the "line of fire" of the spray – High pressure can cut through gloves, boots, and severely and cause bodily injury; infections can occur if cut into the skin • DO NOT use steam washer to remove debris from clothing (PPE) or any parts of the body!		

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
6	End of task 1. Relieve pressure 2. Turn off water supply to unit and disconnect 3. Shut off pressure washer 4. Allow to cool down 5. Storage	• Burns (muffler) • Hose damage • Equipment damage • Theft • Slips • Back strain	• Doff PPE and dispose of properly • Relieve pressure on hose and drain the water from hose and unit • Avoid placing hands on muffler section of washer unit; allow unit to cool down before handling and or filling with gasoline • Drain hose and wrap up to unit; inspect hose for excessive wear or blistering • During cold temperatures, winterize unit using environmentally safe anti-freeze • Secure unit inside connex trailer or use chain and padlock to prevent theft • Check unit over and make sure all components (tips, wand, hose) are in good condition • Turn gasoline valve to off/close when not in use or in storage • Use proper lifting techniques when moving unit and get assistance (buddy system)		
7	Collect a wipe sample (if necessary)	• Cross contamination • Liability	• Confirm with site supervisor if a wipe sample is needed prior to demobilization of equipment from the site (rental and GHD owned equipment)		

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(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

Site personnel participating in JSA review:
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Name/Company	Sign	Date

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

Presenter signature: _____ Date/time: _____

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

Supervisor signature: _____ Date/time: _____

Location of mustering point: _____ Wind direction (current): _____

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

Supervisor signature documenting daily debrief has been completed: _____

Job **Safety Analysis (JSA)**

Heavy Equipment Operation - [Articulated] Dump Truck

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

Date issued/revised:		**Client:**			
Project number:		**Created by**		**Sim OPS** Yes/No	**SSE on site?** Yes/No
Project address:					
Specific task	Dump truck operation				
Key equipment:	Dump truck; inspection checklist; driver's logbook; commercial driver's license; fire extinguisher				
Task-specific training:	Heavy Equipment Operation; Spotter Safety; Towing/Trailering				

Hard hat	**Gloves (ANSI/EN 388)**	**Eye protections**	**Fall protection**	**APR**	**Vest**	**PPE clothing**
☐ Type I (top impact)	☐ Chemical protective (i.e. nitrile)	☒ ANSI/CSA safety glasses	☐ Harness	☐ Full face mask	☒ Class II	☐ Coveralls
☐ Type II (side impact)	☒ Level 1 light duty	☐ Goggles/spoggles	☐ Shock absorb lanyard	☐ Half face mask	☐ Class III	☐ Fire retardant clothing (FRC)
☒ Class E (standard)	☐ Level 2 light duty with protection	☐ Face shield	☐ Lifeline		☐ Anti-static	☐ High viz clothing
☐ Class G	☐ Level 3 medium duty	☐ Other*		**Cartridges**	☐ FRC	☐ Long pants
	☐ Level 4 heavy duty			☐ N95		☐ Long sleeve shirts
Foot protection	☐ High viz	**Hearing protection**	**Arc flash**	☐ P100		☐ Paper tyvek
☒ Industrial grade safety boot	☐ Other*	☐ NOT Required	☐ Haz.cat 2	☐ P95		☐ Polyethyene tyvek
☐ Rubber boots (industrial grade)		☒ Required	☐ Haz cat 4	☐ R95		☐Other *
☐ Hip waders				☐ Organic vapor		
	*see key equipment			☐ Specialty/other*		

Project development team		Modified by	Reviewed by	Date
Name	**Signature**			
Dennis Hoyt				
Craig Gebhardt				

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
1	Discuss STAR and SWA		• Determine the hazards of performing the task and survey the work area • Consider weather conditions such as fog that could reduce visibility • Always consider the worst-case scenario • Analyze the hazards determined • Decide a plan of action to eliminate or reduce the hazards and act on it • Review the JSA for spotters; establish communications • For every hour of continuous operation the operator shall exit the equipment and refocus on the task at hand. This micro break shall consist of (i.e., walk around the equipment, kick the tires, obtain a drink of water, etc.).		
2	Equipment inspection/ maintenance	• Slip/trip/fall hazards • Faulty equipment • Pinch points/hot surfaces	• Inspect travel path for weather related hazards (i.e., wet, puddles, mud, obstacles) • Use three points of contact • Do not jump off of equipment • Must pass equipment inspection checklist prior to operation • Wear leather gloves • Identify and avoid pinch points		

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
3	Transport	• Contact with heavy equipment • Overturning • Contact with utilities • Struck by	• Operators must slow down when approaching the excavation area • Operators shall follow the approved haul routes as determined by the supervisor and confirmed in the daily Tailgate Safety Meeting • Load must be covered with a tarp per DOTD specifications (if required) • Control speed • Use proper gear for situation and use turn signals • Monitor truck operation and braking abilities during operation • Evaluate road for slippery conditions, protruding hazards, or changes in grade • Follow established traffic patterns and instructions • Be cautious of other personnel on site		

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
4	Loading truck	• Overturning • Collision/personnel struck by truck • Contact with utilities • Falling material from side of truck or swing of excavator • Falling from truck/trailer	• Evaluate surface • Use spotter when backing; keep spotter in view at all times; practice SWA if you lose line of sight with spotter • Stop truck completely prior to starting loading operations • Be cautious of trackhoe operator signals (two honks to stop) for starting and completing loading ops • Do not exit until signaled by operator or spotter • Spotter required within 10 feet of overhead utilities (contact RHSM for additional planning) • Maintain a minimum 10 feet from overhead lines and increase distance for high voltage (see HASP and regulations for proper clearances) • Utilities (subsurface, power poles, etc.) shall be identified, marked, and protected against contact with heavy equipment • Load from the rear of truck and do not swing bucket over cab • Excavator operator must ensure that the load is evenly distributed prior to haul truck leaving area • Spotter stays clear of truck while loading and pulling away from area; keep in line of sight of all operators • If spotter/driver mounts truck to check load level, etc., always maintain three points of contact with truck/trailer		

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
5	Dumping load	• Overturning • Collision, personnel struck by truck • Falling material • Contact with utilities	• Evaluate surface for uneven grades and protruding hazards • Use spotter when backing; keep spotter in view at all times; practice SWA if you lose line of sight with spotter • Back up slowly • Stop truck completely prior to starting dumping operations • Do not exit until signaled by operator or spotter • spotter required within 10 feet of overhead utilities (contact RHSM for additional planning) • Maintain a minimum 10 feet from overhead lines and increase distance for high voltage (see HASP and regulations for proper clearances) • Utilities (subsurface, power poles, etc.) shall be identified, marked, and protected again contact with heavy equipment • Spotter stays clear of truck while dumping, keep in line of sight of all operators • If spotter/driver mounts truck to check load level, etc., always maintain three points of contact with truck/trailer • Lower bed fully before moving vehicle • Use caution when dumping loads of wet material as it may stick to the truck bed causing a load imbalance		

(1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

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

Name/Company	Sign	Date

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

Presenter signature: _____ Date/time: _____

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

Supervisor signature: _____ Date/time: _____

Location of mustering point: _____ Wind direction (current): _____

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

Supervisor signature documenting daily debrief has been completed: _____

Job **Safety Analysis (JSA)**

Heavy Equipment Operation – Hydraulic Track Excavator

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

Date issued/revised:		**Client:**			
Project number:		**Created by**		**Sim OPS** Yes/No	**SSE on site?** Yes/No
Project address:					
Specific task	Hydraulic Track Excavator				
Key equipment:	Hydraulic excavator (appropriately sized);fire extinguisher				
Task-specific training:	Heavy Equipment Operation; HASP; OQ training				

Hard hat	**Gloves (ANSI/EN 388)**	**Eye protections**	**Fall protection**	**APR**	**Vest**	**PPE clothing**
☐ Type I (top impact)	☐ Chemical protective (i.e. nitrile)	☒ ANSI/CSA safety glasses	☐ Harness	☐ Full face mask	☒ Class II	☐ Coveralls
☐ Type II (side impact)	☒ Level 1 light duty	☐ Goggles/spoggles	☐ Shock absorb lanyard	☐ Half face mask	☐ Class III	☐ Fire retardant clothing (FRC)
☒ Class E (standard)	☐ Level 2 light duty with protection	☐ Face shield	☐ Lifeline		☐ Anti-static	☐ High viz clothing
☐ Class G	☐ Level 3 medium duty	☐ Other*		**Cartridges**	☐ FRC	☐ Long pants
	☐ Level 4 heavy duty			☐ N95		☐ Long sleeve shirts
Foot protection	☐ High viz	**Hearing protection**	**Arc flash**	☐ P100		☐ Paper tyvek
☒ Industrial grade safety boot	☐ Other*	☐ NOT Required	☐ Haz.cat 2	☐ P95		☐ Polyethyene tyvek
☐ Rubber boots (industrial grade)		☐ Required	☐ Haz cat 4	☐ R95		☐Other *
☐ Hip waders				☐ Organic vapor		
	*see key equipment			☐ Specialty/other*		

Project development team		Modified by	Reviewed by	Date
Name	**Signature**			
Dennis Hoyt				
Craig Gebhardt				

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
1	Discuss STAR and SWA	• Failing to identify hazardous conditions resulting in losses or near losses	• Determine the hazards of performing the task and survey the work area • Consider weather conditions such as fog that could reduce visibility • Always consider the worst case scenario • Analyze the hazards determined • Decide a plan of action to eliminate or reduce the hazards and act on it • For every hour of continuous operation the operator shall exit the equipment and refocus on the task at hand. This micro break shall consist of (i.e., walk around the equipment, kick the tires, obtain a drink of water, etc.).		

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
2	Inspect equipment	• Equipment malfunction or damage • Hydraulic fluid, fuel, oil leaks/spills • Loss of steering, loss of brakes, etc.; accidents, decreased visibility • Fire • Slip/trip/fall hazards • Unexpected operation of equipment • Swing radius signage missing	• Follow GHD Equipment Inspection Form/Tag Out if malfunction found • Grease moving parts • Check all fluids • Ensure that fluids are not too low or too full • Walk around equipment and look for leaking fluids • Ensure that tracks are acceptable (no unacceptable wear and no objects present) • Ensure that windows and mirrors are clean. Adjust mirrors! • Remove trash or other debris from cab • Ensure that back up alarm and horn are operational • Correct any problems immediately and inform supervisor • If equipment appears as though it has been tampered with or vandalized, do not start it • Ensure that fire extinguisher is in place and functioning • Inspect the fire extinguisher monthly • Use three point mount/dismount at all times • Be cautious of where you step and be aware of your surroundings • Ensure that ignition key is in your pocket, equipment is in neutral and parking brake is engaged • Use interlock safety mechanism any time equipment is not conducting a productive and/or controlled activity		

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
3	Entering equipment	• Reduced visibility • Uncomfortable seating - back strain • Debris on floor getting stuck under pedals • Unexpected movement of excavator	• Adjust seat and mirrors so that you are able to see where traveling • Adjust controls and seat to your comfort and safety • Ensure that all materials inside cab are secured • Be cautious of where you step and be aware of your surroundings • Ensure steps are clear of water, mud, and other debris • Ensure parking brake is engaged and gear is in neutral • Use interlock safety mechanism any time equipment is not conducting a productive and/or controlled activity		
4	Configure controls and seating	• Ergonomics/unnecessary physical stress/ back injury • Incapable of reaching controls • Visual blocks	• Upon sitting, adjust seat fully to accommodate reach and comfort zone • Fasten seat belt • Make certain all controls are set in neutral positions • Adjust mirrors		
5	Starting and warming up	• Unanticipated rolling or movement, engine fire, or mechanical/electrical faults	• Review operator's manual if new to this particular machine • Start engine and check controls to ensure all are in working conditions • Allow a minimum of 2 minutes to warm up		
6	Moving equipment work area	• Other equipment, personnel, or objects in work area • Uneven terrain	• Perform STAR – be aware of surroundings • Know the daily task and other people and equipment in the area • Make eye contact with other operators and site personnel in the immediate vicinity • Inspect pathway prior to moving equipment to ensure clear pathway		

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
7	Performing tasks	• Other equipment (collision) • Slopes, ground conditions possible injuries to personnel and equipment, buried obstacles, underground and overhead utilities • Dust	• Perform STAR • Know where utilities are located – know where your bucket is in relation to any underground utilities at all times • Be aware of the scope of work to be performed • Use a spotter • Know the paths of other equipment or persons entering and leaving your work area • Communicate with supervisors and other operators throughout the day with any questions • Stop work immediately and contact a supervisor if you are uncertain of your task, experience equipment failure, or personal injury or near loss • Wear dust mask if conditions warrant		
8	Stopping at end of day	• Slip/trip/fall hazards • Overnight parking of equipment	• Be cautious of where you step and be aware of your surroundings • Park in designated area • Set brake/control locks • Idle for 2 minutes if engine is hot • Lower bucket to ground – zero energy state • Turn equipment off; remove keys • Use three point dismount • Secure inside instruments (i.e., fire extinguisher)		

(1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

Site personnel participating in JSA review:
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Name/Company	Sign	Date

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

Presenter signature: _____ Date/time: _____

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

Supervisor signature: _____ Date/time: _____

Location of mustering point: _____ Wind direction (current): _____

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

Supervisor signature documenting daily debrief has been completed: _____

Job **Safety Analysis (JSA)**

Heavy Equipment Operation - Loader

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

Date issued/revised:		**Client:**			
Project number:		**Created by**		**Sim OPS Yes/No**	**SSE on site? Yes/No**
Project address:					
Specific task	Heavy equipment operation – loader				
Key equipment:	Loader; fire extinguisher				
Task-specific training:	Heavy Equipment Operation				

Hard hat	Gloves (ANSI/EN 388)	Eye protections	Fall protection	APR	Vest	PPE clothing
☐ Type I (top impact)	☐ Chemical protective (i.e. nitrile)	☒ ANSI/CSA safety glasses	☐ Harness	☐ Full face mask	☒ Class II	☐ Coveralls
☐ Type II (side impact)	☒ Level 1 light duty	☐ Goggles/spoggles	☐ Shock absorb lanyard	☐ Half face mask	☐ Class III	☐ Fire retardant clothing (FRC)
☒ Class E (standard)	☐ Level 2 light duty with protection	☐ Face shield	☐ Lifeline		☐ Anti-static	☐ High viz clothing
☐ Class G	☐ Level 3 medium duty	☐ Other*		**Cartridges**	☐ FRC	☐ Long pants
	☐ Level 4 heavy duty			☐ N95		☐ Long sleeve shirts
Foot protection	☐ High viz	**Hearing protection**	**Arc flash**	☐ P100		☐ Paper tyvek
☒ Industrial grade safety boot	☐ Other*	☐ NOT Required	☐ Haz.cat 2	☐ P95		☐ Polyethyene tyvek
☐ Rubber boots (industrial grade)		☒ Required	☐ Haz cat 4	☐ R95		☐Other *
☐ Hip waders				☐ Organic vapor		
	*see key equipment			☐ Specialty/other*		

Project development team		Modified by	Reviewed by	Date
Name	**Signature**			
Dennis Hoyt				
Craig Gebhardt				

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
1	Review JSA - General Site Activities	• Failing to identify hazardous conditions resulting in losses or near losses	• Conduct STAR • Assess the risks • Determine the hazards of performing the task and survey the work area • Consider weather conditions such as fog that could reduce visibility • Always consider the worst case scenario • Analyze the hazards determined • Decide a plan of action to eliminate or reduce the hazards and act on it		

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
2	Inspect equipment	• Equipment malfunction or damage • Hydraulic fluid, fuel, oil leaks/spills • Loss of steering, loss of brakes, etc.; accidents, decreased visibility • Fire • Slip/trip/fall hazards • Unexpected operation of equipment	• Follow GHD equipment inspection form/tag out if malfunction found • Grease moving parts • Check all fluids • Ensure that fluids are not too low or too full • Walk around equipment and look for leaking fluids • Ensure that loader tracks are acceptable (no unacceptable wear and no objects present) • Ensure that windows and mirrors are clean • Remove trash or other debris from cab • Ensure that back up alarm and horn are operational • Correct any problems immediately and inform supervisor • If equipment appears as though it has been tampered with or vandalized, do not start it • Ensure that fire extinguisher is in place and functioning • Inspect the fire extinguisher monthly • Use three point mount/dismount at all times • Be cautious of where you step and be aware of your surroundings • Ensure that ignition key is in your pocket, equipment is in neutral and parking brake is engaged		
3	Entering equipment	• Reduced visibility, uncomfortable seating - back strain • Debris on floor getting stuck under pedals • Unexpected movement of truck • Unexpected movement of truck	• Adjust seat and mirrors so that you are able to see where traveling • Adjust controls and seat to your comfort and safety • Ensure that all materials inside dozer cab are secured • Be cautious of where you step and be aware of your surroundings • Ensure steps are clear of water, mud, and other debris • Ensure parking brake is engaged and gear is in neutral		

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
4	Configure controls and seating	• Ergonomics/unnecessary physical stress • Incapable of reaching controls • Visual blocks	• Upon sitting, adjust seat fully to accommodate reach and comfort zone • Fasten seat belt • Make certain all controls are set in neutral positions • Adjust mirrors		
5	Starting and warming up	• Unanticipated rolling or movement, engine fire, or mechanical/electrical faults	• Review operator's manual if new to this particular machine • Start engine and check controls to ensure all are in working conditions • Allow a minimum of 2 minutes to warm up		
6	Moving equipment work area	• Other equipment, personnel, or objects in work area • Uneven terrain	• Conducts SPSA • Know the daily task and other people and equipment in the area • Make eye contact with other operators and site personnel in the immediate vicinity • Inspect pathway prior to moving equipment to ensure clear pathway		
7	Performing tasks	• Other equipment (collision) • Slopes, ground conditions possible injuries to personnel and equipment, buried obstacles, underground and overhead utilities • Dust	• Perform SPSA • Know where utilities are located. Be aware of the scope of work to be performed • Know the paths of other equipment or persons entering and leaving your work area • Communicate with supervisors and other operators throughout the day with any questions • Stop work immediately and contact a supervisor if you are uncertain of your task, experience equipment failure, or personal injury or near loss • Wear dust mask if conditions warrant • For every hour of continuous operation the operator shall exit the equipment and refocus on the task at hand. This micro break shall consist of (i.e., walk around the equipment, kick the tires, obtain a drink of water, etc.).		

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
8	Stopping at end of day	• Slip/trip/fall hazards • Overnight parking of equipment	• Be cautious of where you step and be aware of your surroundings • Park in designated area • Set brake/control locks • Idle for 2 minutes if engine is hot • Lower blade to ground • Turn equipment off • Use three point dismount • Secure inside instruments (i.e., fire extinguisher)		

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(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

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Name/Company	Sign	Date

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

Presenter signature: _____ Date/time: _____

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

Supervisor signature: _____ Date/time: _____

Location of mustering point: _____ Wind direction (current): _____

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

Supervisor signature documenting daily debrief has been completed: _____

Job **Safety Analysis (JSA)**

Heavy Equipment Operation – Skid Steer

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

Date issued/revised:		**Client:**			
Project number:		**Created by**		**Sim OPS Yes/No**	**SSE on site? Yes/No**
Project address:					
Specific task					
Key equipment:	Skid Steer – attachments; chemical protective gloves (i.e., nitrile coated), sunscreen, insect repellant; fire extinguisher				
Task-specific training:	Skid Steer Operation, WHMIS, operator manual				

Hard hat	Gloves (ANSI/EN 388)	Eye protections	Fall protection	APR	Vest	PPE clothing
☐ Type I (top impact)	☐ Chemical protective (i.e. nitrile)	☒ ANSI/CSA safety glasses	☐ Harness	☐ Full face mask	☒ Class II	☐ Coveralls
☐ Type II (side impact)	☐ Level 1 light duty	☐ Goggles/spoggles	☐ Shock absorb lanyard	☒ Half face mask	☐ Class III	☐ Fire retardant clothing (FRC)
☒ Class E (standard)	☐ Level 2 light duty with protection	☐ Face shield	☐ Lifeline		☐ Anti-static	☐ High viz clothing
☐ Class G	☐ Level 3 medium duty	☐ Other*		**Cartridges**	☐ FRC	☐ Long pants
	☐ Level 4 heavy duty			☐ N95		☐ Long sleeve shirts
Foot protection	☐ High viz	**Hearing protection**	**Arc flash**	☐ P100		☐ Paper tyvek
☒ Industrial grade safety boot	☐ Other*	☐ NOT Required	☐ Haz.cat 2	☐ P95		☐ Polyethyene tyvek
☐ Rubber boots (industrial grade)		☒ Required	☐ Haz cat 4	☐ R95		☒Other *
☐ Hip waders				☐ Organic vapor		
	*see key equipment			☐ Specialty/other*		

Project development team		Modified by	Reviewed by	Date
Name	**Signature**			
Dennis Hoyt				
Craig Gebhardt				

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
1	Inspect equipment	• Equipment malfunction or damage • Chemical exposure • Hand injury • Hydraulic fluid, fuel, oil leaks/spills • Loss of steering, loss of brakes, etc.; accidents, decreased visibility • Fire • Slip/trip/fall hazards • Unexpected operation of equipment • Heat/cold stress • Biological hazards • Pathological	• Visually inspect and complete equipment Inspection form and tag out if malfunction//defective part found • Avoid pinch points. • Wear chemical protective gloves (i.e. nitrile coated work gloves) when inspecting, checking fluids, greasing equipment, contact with waste contamination, etc. • Check all fluids • Ensure that fluids are not too low or too full • Walk around vehicle and look for leaking fluids • Ensure that tracks are acceptable (no unacceptable wear and no objects present) • Ensure that windows and mirrors are clean • Remove trash or other debris from cab • Correct any problems immediately and inform supervisor • If equipment appears as though it has been tampered with or vandalized, do not start it • Ensure that fire extinguisher is in place and functioning • Inspect the fire extinguisher monthly • Use three point mount/dismount at all times • Be cautious of where you step and be aware of your surroundings • Dress appropriately for the weather; use sunscreen if necessary and wear extra clothing in cold months • Keep hydrated at all times • Monitor all personnel for signs and symptoms of heat/cold stress and refer to HASP for recommendations • Use of insect repellant if required • Inspect for other hazards that may affect the hands/feet (hypodermic needles, waste pathogens etc.)	Operator	

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
2	Entering equipment	• Reduced visibility, uncomfortable seating - back strain • Debris on floor getting stuck under pedals • Unexpected movement of vehicle	• Adjust seat and mirrors so that you are able to see where traveling • Adjust controls and seat to your comfort and safety • Ensure that all materials inside cab are secured • Be cautious of where you step and be aware of your surroundings • Ensure steps are clear of water, mud, and other debris • Ensure parking brake is engaged	Operator	
3	Configure controls and seating	• Ergonomics/unnecessary physical stress • Incapable of reaching controls • Visual blocks	• Upon sitting, adjust seat fully to accommodate reach and comfort zone • Fasten seat belt • Adjust mirrors	Operator	
4	Starting and warming up	• Unanticipated rolling or movement, engine fire, or mechanical/electrical faults	• Start engine and check controls to ensure all are in working conditions • Allow a minimum of 2 minutes to warm up	Operator	
5	Moving vehicle to work area	• Other equipment, personnel, or objects in work area • Uneven terrain	• Perform STAR • Know the daily task and other people and equipment in the area • Make eye contact with other operators and site personnel in the immediate vicinity • Inspect pathway prior to moving equipment to ensure clear pathway	Operator	
6	Switching attachments (i.e. forks, sweeper, bucket)	• Hydraulic fluid release • Struck by the skid steer while disconnecting the hydraulic hoses • Unexpected operation of equipment • Crushed fingers or hands from the hydraulic levers when removing or attaching equipment attachments • Pinch points	• Make sure the hydraulic connections are disconnected before removing and driving away from the attachment • Shut down the equipment before disconnecting the hydraulic hoses and set the parking brake. • Operation of the hydraulic levers should be done from inside the cab as the equipment is designed to do so. • If the levers will not engage or disengage, do not try by hand (SWA and re-evaluate). All repairs will be completed off site. • Identify pinch points and avoid pinch points	Operator	

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
7	Stopping at end of day	• Slip/trip/fall hazards • Overnight parking of equipment	• Be cautious of where you step and be aware of your surroundings • Park in designated area • Set brake • Secure inside instruments (i.e., fire extinguisher)	Operator	

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Name/Company	Sign	Date

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Presenter signature: _____ Date/time: _____

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Supervisor signature: _____ Date/time: _____

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Job **Safety Analysis (JSA)**

Heavy Equipment Spotting

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

Date issued/revised:		**Client:**			
Project number:		**Created by**		**Sim OPS Yes/No**	**SSE on site? Yes/No**
Project address:					
Specific task	Spotting Heavy Equipment and Delivering Trucks				
Key equipment:	Air horn, high visibility Type 2 shirt/vest				
Task-specific training:	Heavy and/or Mobile Equipment Safety Training				

Hard hat	Gloves (ANSI/EN 388)	Eye protections	Fall protection	APR	Vest	PPE clothing
☐ Type I (top impact)	☐ Chemical protective (i.e. nitrile)	☒ ANSI/CSA safety glasses	☐ Harness	☐ Full face mask	☒ Class II	☐ Coveralls
☐ Type II (side impact)	☒ Level 1 light duty	☐ Goggles/spoggles	☐ Shock absorb lanyard	☐ Half face mask	☐ Class III	☐ Fire retardant clothing (FRC)
☒ Class E (standard)	☐ Level 2 light duty with protection	☐ Face shield	☐ Lifeline		☐ Anti-static	☐ High viz clothing
☐ Class G	☐ Level 3 medium duty	☐ Other*		**Cartridges**	☐ FRC	☐ Long pants
	☐ Level 4 heavy duty			☐ N95		☐ Long sleeve shirts
Foot protection	☐ High viz	**Hearing protection**	**Arc flash**	☐ P100		☐ Paper tyvek
☒ Industrial grade safety boot	☐ Other*	☐ NOT Required	☐ Haz.cat 2	☐ P95		☐ Polyethyene tyvek
☐ Rubber boots (industrial grade)		☐ Required	☐ Haz cat 4	☐ R95		☐Other *
☐ Hip waders				☐ Organic vapor		
	*see key equipment			☐ Specialty/other*		

Project development team		Modified by	Reviewed by	Date
Name	**Signature**			
Dennis Hoyt				
Craig Gebhardt				

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
1	Perform STAR Process and discuss SWA with operators, delivery drivers and spotters	• Site personnel not aware of STAR and SWA • Personnel not aware of blind spots	• Conduct a pre task meeting to establish and address any safety concerns • Inform subcontractors and delivery drivers of SWA and discuss emergency STOP signal(s) a clenched/closed fist will dictate that all activity is to cease immediately		
2	Discuss any hand signals to be used – assign one spotter to each activity. Operator will not take signals from multiple sources.	• Struck by – crushing • Property damage • Inappropriate/unknown signals	• Do not stand between equipment and immovable objects • Always stay within operator's line of sight – if operator loses view of spotter, implement SWA immediately • Do not permit equipment operation within 2 feet of immovable objects/walls • Review/use signals that operator is familiar with and understands • No cell phone use while driving, operating, or spotting • Spotters will have no other assigned duties while spotting		
3	Determine accepted path of travel and walk prior to use – note all hazards. Determine safe loading/unloading zones – do not setup under/near/over utility lines.	• Slip/trip/fall hazards • Property damage • Uneven ground • Stuck equipment or trucks	• Use STAR process and watch where you walk • Note any obstructions to be avoided • If necessary set up traffic signage/delineators to indicate safe paths of travel		

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
4	Know height restrictions of any overhead utilities. A) Spotters will not locate equipment and/or trucks under overhead utilities during material handling (loading/unloading) activities. B) Operators will not work within utility clearance limits.	• Property damage • Electrocution • Contact with/against	• Know the height of the vehicle as to avoid overhead utilities • If vehicle will not clear utilize proper stopping hand signal or air horn to get driver's attention – know emergency stop signal • Spotter should stay within viewing distance of equipment and utilities but far enough away to avoid danger from shock, tip over, falling loads • Ensure vehicle has adequate clearance of utility		
5	Make/maintain eye contact with driver/operator using side-view mirrors while backing up	• Struck by • Slip/trip/fall hazards • Property damage • Loss of communication	• Once communication and eye contact are initiated, maintain throughout process • Do not stand next to a truck while its dumping tip over • Maintain a safe, but reasonable, distance away from moving vehicle (in order to maintain eye contact)		

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(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

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Name/Company	Sign	Date

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

Presenter signature: _____ Date/time: _____

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Job **Safety Analysis (JSA)**

Heavy Equipment Spotting

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Date issued/revised:		**Client:**			
Project number:		**Created by**		**Sim OPS Yes/No**	**SSE on site? Yes/No**
Project address:					
Specific task	Spotting Heavy Equipment and Delivering Trucks				
Key equipment:	Air horn, high visibility Type 2 shirt/vest				
Task-specific training:	Heavy and/or Mobile Equipment Safety Training				

Hard hat	Gloves (ANSI/EN 388)	Eye protections	Fall protection	APR	Vest	PPE clothing
☐ Type I (top impact)	☐ Chemical protective (i.e. nitrile)	☒ ANSI/CSA safety glasses	☐ Harness	☐ Full face mask	☒ Class II	☐ Coveralls
☐ Type II (side impact)	☒ Level 1 light duty	☐ Goggles/spoggles	☐ Shock absorb lanyard	☐ Half face mask	☐ Class III	☐ Fire retardant clothing (FRC)
☒ Class E (standard)	☐ Level 2 light duty with protection	☐ Face shield	☐ Lifeline		☐ Anti-static	☐ High viz clothing
☐ Class G	☐ Level 3 medium duty	☐ Other*		**Cartridges**	☐ FRC	☐ Long pants
	☐ Level 4 heavy duty			☐ N95		☐ Long sleeve shirts
Foot protection	☐ High viz	**Hearing protection**	**Arc flash**	☐ P100		☐ Paper tyvek
☒ Industrial grade safety boot	☐ Other*	☐ NOT Required	☐ Haz.cat 2	☐ P95		☐ Polyethyene tyvek
☐ Rubber boots (industrial grade)		☐ Required	☐ Haz cat 4	☐ R95		☐Other *
☐ Hip waders				☐ Organic vapor		
	*see key equipment			☐ Specialty/other*		

Project development team		Modified by	Reviewed by	Date
Name	**Signature**			
Dennis Hoyt				
Craig Gebhardt				

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
1	Perform STAR Process and discuss SWA with operators, delivery drivers and spotters	• Site personnel not aware of STAR and SWA • Personnel not aware of blind spots	• Conduct a pre task meeting to establish and address any safety concerns • Inform subcontractors and delivery drivers of SWA and discuss emergency STOP signal(s) a clenched/closed fist will dictate that all activity is to cease immediately		
2	Discuss any hand signals to be used – assign one spotter to each activity. Operator will not take signals from multiple sources.	• Struck by – crushing • Property damage • Inappropriate/unknown signals	• Do not stand between equipment and immovable objects • Always stay within operator's line of sight – if operator loses view of spotter, implement SWA immediately • Do not permit equipment operation within 2 feet of immovable objects/walls • Review/use signals that operator is familiar with and understands • No cell phone use while driving, operating, or spotting • Spotters will have no other assigned duties while spotting		
3	Determine accepted path of travel and walk prior to use – note all hazards. Determine safe loading/unloading zones – do not setup under/near/over utility lines.	• Slip/trip/fall hazards • Property damage • Uneven ground • Stuck equipment or trucks	• Use STAR process and watch where you walk • Note any obstructions to be avoided • If necessary set up traffic signage/delineators to indicate safe paths of travel		

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
4	Know height restrictions of any overhead utilities. A) Spotters will not locate equipment and/or trucks under overhead utilities during material handling (loading/unloading) activities. B) Operators will not work within utility clearance limits.	• Property damage • Electrocution • Contact with/against	• Know the height of the vehicle as to avoid overhead utilities • If vehicle will not clear utilize proper stopping hand signal or air horn to get driver's attention – know emergency stop signal • Spotter should stay within viewing distance of equipment and utilities but far enough away to avoid danger from shock, tip over, falling loads • Ensure vehicle has adequate clearance of utility		
5	Make/maintain eye contact with driver/operator using side-view mirrors while backing up	• Struck by • Slip/trip/fall hazards • Property damage • Loss of communication	• Once communication and eye contact are initiated, maintain throughout process • Do not stand next to a truck while its dumping tip over • Maintain a safe, but reasonable, distance away from moving vehicle (in order to maintain eye contact)		

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(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

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

Name/Company	Sign	Date

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

Presenter signature: _____ Date/time: _____

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

Supervisor signature: _____ Date/time: _____

Location of mustering point: _____ Wind direction (current): _____

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

Supervisor signature documenting daily debrief has been completed: _____

Job **Safety Analysis (JSA)**

Loading Soil with Excavator

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

Date issued/revised:		**Client:**			
Project number:		**Created by**		**Sim OPS** Yes/No	**SSE on site?** Yes/No
Project address:					
Specific task	Loading soil with excavator				
Key equipment:	Modified Level D (MLD) PPE; Photoionization detector (PID)				
Task-specific training:	Identify any special/additional training necessary to safely complete this task				

Hard hat	**Gloves (ANSI/EN 388)**	**Eye protections**	**Fall protection**	**APR**	**Vest**	**PPE clothing**
☐ Type I (top impact)	☐ Chemical protective (i.e. nitrile)	☒ ANSI/CSA safety glasses	☐ Harness	☐ Full face mask	☒ Class II	☐ Coveralls
☐ Type II (side impact)	☒ Level 1 light duty	☐ Goggles/spoggles	☐ Shock absorb lanyard	☐ Half face mask	☐ Class III	☐ Fire retardant clothing (FRC)
☒ Class E (standard)	☒ Level 2 light duty with protection	☒ Face shield	☐ Lifeline		☐ Anti-static	☐ High viz clothing
☐ Class G	☐ Level 3 medium duty	☐ Other*		**Cartridges**	☐ FRC	☐ Long pants
	☐ Level 4 heavy duty			☐ N95		☐ Long sleeve shirts
Foot protection	☐ High viz	**Hearing protection**	**Arc flash**	☐ P100		☐ Paper tyvek
☒ Industrial grade safety boot	☐ Other*	☐ NOT Required	☐ Haz.cat 2	☐ P95		☐ Polyethyene tyvek
☐ Rubber boots (industrial grade)		☐ Required	☐ Haz cat 4	☐ R95		☒ Other *
☐ Hip waders				☐ Organic vapor		
	*see key equipment			☐ Specialty/other*		

Project development team		Modified by	Reviewed by	Date
Name	**Signature**			
Dennis Hoyt				
Craig Gebhardt				

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
1	Inspect work area	• Slip/trip/fall hazards • Biological hazards	• Clear any hazards that are clearable • Mark major obstructions with orange tape • Exercise caution • Pay close attention to the ground surface • Inspect immediate surroundings • Walk cautiously		
2	Inspect equipment	• Slip/trip/fall hazards • damage to equipment or self if there is undetected equipment damage	• Use three points of contact • Follow intact equipment inspection form • Parking brake should be engaged and key in pocket • Maintain a three point mount/dismount • Correct any matters immediately and/or report to supervisor		
3	Establish communication	• Know response for emergencies and accidents	• Hand and horn signals established • Emergency signal established		
4	Begin excavation	• Equipment damage • People/hazards in swing radius slides • Cave-ins	• All operators must be trained, skilled, and experienced • Operator must look around area and be aware of surroundings at all times • Use proper sloping/shoring techniques • Keep excavator on even or undisturbed surfaces		
5	Excavator loads soil into truck	• Truck running into excavator • Tipping over	• Operators have stopping signal (two honks) • Awareness of surroundings • Do not overload truck or bucket to avoid spillage • Spread the soil in the truck bed to avoid having one side heavier than the other • Trucks need to remain on level ground		

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(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

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Name/Company	Sign	Date

SAFE YOU ME GHD
ENVIRONMENT & PEOPLE

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

Presenter signature: _____ Date/time: _____

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

Supervisor signature: _____ Date/time: _____

Location of mustering point: _____ Wind direction (current): _____

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

Supervisor signature documenting daily debrief has been completed: _____

Job **Safety Analysis (JSA)**

Material Handling (General)

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

Date issued/revised:		**Client:**			
Project number:		**Created by**		**Sim OPS** Yes/No	**SSE on site?** Yes/No
Project address:					
Specific task	Lifting and Rigging: Placement of concrete or steel components, pipe, vaults, or manhole rings and lids				
Key equipment:	Excavator, backhoe, or crane; Protective gloves; PPE				
Task-specific training:	Rigging; lifting signals; heavy equipment safety; use of taglines; proper use of load charts; Certified Rigging Training (Rigger).				

Hard hat	Gloves (ANSI/EN 388)	Eye protections	Fall protection	APR	Vest	PPE clothing
☐ Type I (top impact)	☐ Chemical protective (i.e. nitrile)	☒ ANSI/CSA safety glasses	☐ Harness	☐ Full face mask	☒ Class II	☐ Coveralls
☐ Type II (side impact)	☒ Level 1 light duty	☐ Goggles/spoggles	☐ Shock absorb lanyard	☐ Half face mask	☐ Class III	☐ Fire retardant clothing (FRC)
☒ Class E (standard)	☒ Level 2 light duty with protection	☐ Face shield	☐ Lifeline		☐ Anti-static	☐ High viz clothing
☐ Class G	☐ Level 3 medium duty	☐ Other*		**Cartridges**	☐ FRC	☐ Long pants
	☐ Level 4 heavy duty			☐ N95		☐ Long sleeve shirts
Foot protection	☐ High viz	**Hearing protection**	**Arc flash**	☐ P100		☐ Paper tyvek
☒ Industrial grade safety boot	☐ Other*	☐ NOT Required	☐ Haz.cat 2	☐ P95		☐ Polyethyene tyvek
☐ Rubber boots (industrial grade)		☐ Required	☐ Haz cat 4	☐ R95		☒ Other *
☐ Hip waders				☐ Organic vapor		
	*see key equipment			☐ Specialty/other*		

Project development team		Modified by	Reviewed by	Date
Name	**Signature**			
Dennis Hoyt				
Craig Gebhardt				

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
1	Equipment Inspection	• Hydraulic failure	• Inspect equipment lines and fluid reservoirs		
2	Rigging components – inspection of load and rigging	• Attachment point failure	• Inspect attachment hook/ring for fractures, dents, or abuse • Do not use hook if it is stretched +15% of its original size or twisted +10° • Certify load capability of attachment point		
3	Rigging components – continue inspection of load, rigging, and material to be lifted	• Rigging assembly failure	• Inspect rigging chains, wire rope, cables, hooks, slings, d rings, splitters, spreaders, and all other components for unusual shape, fractures, fraying, dents, abuse, or abnormalities • Ensure components used have annual certification, proper load rating and are implemented as recommended by training and manufacturer		
4	Rigging components	• Improper component attachment • Improper lifting point usage • incorrect balance or component orientation	• Allow only certified riggers to rig materials • Use manufacturer's recommended lifting attachment points, slots, or cable points to secure load to be rigged • Use proper rigging components to assure load is evenly distributed, proper balance is achieved, and place hoisting equipment and rigged components in proper orientation to assure placement logistics are correct		

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
5	Tag lines – proper placement of taglines to ensure control of load. No one is to work under a suspended load.	• Lift control failure	• Use of tag lines as a lifting control measure is mandatory as appropriate for correct placement of rigged component or to prevent it from spinning • Personnel assisting rigging or lift should never physically be in contact with rigged or lifted components as a measure of component control		
6a	Pre-plan the lift and prepare the landing zone	• Objects/personnel in swing radius path • Lifting outside of equipment's load safe load radius • Electrical shock hazard from potential contact with overhead utility lines • Improper clothing/items that have potential to catch moving machinery	• Pre-plan the lift to ensure swing radius does not impact other operations • Ensure that load and load path stays within load radius of lifting equipment • Ensure that there is at least a 20-foot clearance between the lifting equipment and overhead power lines • Secure loose clothing and objects. Be aware that sudden movements by operator can result in hazardous consequences		
6b	Component placement – pick the load and place the item in the correct position	• Improper preparation of location receiving rigged or lifted component resulting in need for multiple lifts • Tipping	• Preparation of the area receiving the rigged or lifted component to avoid and necessary re lift or multiple lifts • Do not drag load • Keep load parallel with the ground level		
7	Maintain control of area	• Unauthorized personnel or equipment in rigging or lifting exclusion zone	• Area marking and clearance of all personnel and equipment to prevent interference during rigging or lifting activities • Spotter action to terminate rigging or lifting if situational changes occur putting personnel or equipment at risk • SWA is to be used if anyone is located underneath a raised load		

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
8	Control of communication between task personnel	• Multiple signals interfering with operator	• During lifting or rigging activities, a communication order must be established previous to any attempt to hoist load • Spotters communicate to one load controller, load controller communicates to operator • Operator must maintain visual contact with load controller at all times • All operations are controlled by ground controller • If spotters/guideline personnel are working at night or are not in the operator's field of vision, use of radios is mandatory for communication. Batteries in radios are to be checked every 4 hours		
9	Trench entry in order to place materials and piping – see JSA for Trenching	• Trenching hazards	• Follow JSA for Trenching		

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(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

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Name/Company	Sign	Date

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

Presenter signature: _____ Date/time: _____

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

Supervisor signature: _____ Date/time: _____

Location of mustering point: _____ Wind direction (current): _____

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

Supervisor signature documenting daily debrief has been completed: _____

Job **Safety Analysis (JSA)**

Mobile Equipment - General

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

Date issued/revised:		**Client:**			
Project number:		**Created by**		**Sim OPS Yes/No**	**SSE on site? Yes/No**
Project address:					
Specific task	Moving and operating mobile/heavy equipment				
Key equipment:	Hydraulic excavator; bulldozer; marsh buggy; protective gloves; protective hard toe type logging boots; properly fitted clothing				
Task-specific training:	Identify any special/additional training necessary to safely complete this task				

Hard hat	**Gloves (ANSI/EN 388)**	**Eye protections**	**Fall protection**	**APR**	**Vest**	**PPE clothing**
☐ Type I (top impact)	☐ Chemical protective (i.e. nitrile)	☒ ANSI/CSA safety glasses	☐ Harness	☐ Full face mask	☒ Class II	☐ Coveralls
☐ Type II (side impact)	☒ Level 1 light duty	☐ Goggles/spoggles	☐ Shock absorb lanyard	☐ Half face mask	☐ Class III	☐ Fire retardant clothing (FRC)
☒ Class E (standard)	☒ Level 2 light duty with protection	☐ Face shield	☐ Lifeline		☐ Anti-static	☐ High viz clothing
☐ Class G	☐ Level 3 medium duty	☐ Other*		**Cartridges**	☐ FRC	☐ Long pants
	☐ Level 4 heavy duty			☐ N95		☐ Long sleeve shirts
Foot protection	☐ High viz	**Hearing protection**	**Arc flash**	☐ P100		☐ Paper tyvek
☒ Industrial grade safety boot	☐ Other*	☐ NOT Required	☐ Haz.cat 2	☐ P95		☐ Polyethyene tyvek
☐ Rubber boots (industrial grade)		☒ Required	☐ Haz cat 4	☐ R95		☐Other *
☐ Hip waders				☐ Organic vapor		
	*see key equipment			☐ Specialty/other*		

Project development team		Modified by	Reviewed by	Date
Name	**Signature**			
Dennis Hoyt				
Craig Gebhardt				

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
1	Perform STAR process; refer to the mobile/heavy equipment manufacturer's operators manual before operating equipment. Woods equipment shall be equipped as necessary to protect the operator (ROPS, FOPS, mesh enclosures, etc.).	• Slip/trip/fall hazards • Situational risks • Short service employees	• Verify personnel training is sufficient for scheduled task(s) • Is Job Instruction Training (hands on) training necessary? • Employees should remove finger rings, necklaces, or jewelry which may be hazardous in equipment operation		
2a	Perform daily (pre-shift) equipment inspection include area around the equipment and PPE and perform a complete walk around inspection	• Equipment failure • PPE failure	• Don all necessary PPE • Provide training to personnel on inspection procedures • Document daily inspection • Defects must be corrected before operating unit		
2b	Mount/dismount the equipment (Note: The most common cause of injury for equipment operators is slipping/falling while mounting/ dismounting the machine. **Never jump from the machine**.)	• Slip/trip/fall hazards • Sprains • Strains	• Use three points of contact • Clear tracks and personnel access points of debris and mud as necessary • Only a trained operator will be allowed on equipment • Never carry riders unless unit is so designed		
3a	Starting heavy/mobile equipment (Note: All operators manuals should be available for each piece of equipment and used in employee training)	• Struck-by • Caught between • Equipment failure	• Perform inspection (see Task 2) • Check to be certain all workers and equipment are a safe distance from unit • Allow proper warm up and wait for gauges to register properly • Raise the blade, cable and chokers, boom, grapple, or other attachments before moving the unit		

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
3b	Operation of heavy/mobile equipment	• Struck-by • Caught between • Overhead/underground utilities • Flying debris • Rollover • Fire • Improper housekeeping • Winch failure	• Appropriate guarding (according to machine type and use) shall be in place at all times unit is in operation • Backup alarms shall be functional • Seat belts shall be provided and their use enforced • Fire extinguishers and first aid kits shall be provided on each unit • Fire extinguishers shall be inspected for functionality on a daily basis • Do not overload winch		
4a	Perform equipment maintenance	• Equipment failure/loss • Sharp objects • Pinch points	• Use STAR process • Follow equipment manufacturer's preventive maintenance procedures and instructions • Only qualified individuals should perform maintenance activities on equipment		
4b	Cleaning and housekeeping of equipment	• Fire • Slip/trip/fall hazards • Equipment failure	• Remove loose items from operator's compartment • At least once per day remove trash from equipment • Clean equipment as necessary to prevent buildup of debris, wood chips, etc. that may cause fire		

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Name/Company	Sign	Date

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

Presenter signature: _____ Date/time: _____

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

Supervisor signature: _____ Date/time: _____

Location of mustering point: _____ Wind direction (current): _____

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

Supervisor signature documenting daily debrief has been completed: _____

Job Safety Analysis (JSA)

Portable/Extension Ladders

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

Date issued/revised:		**Client:**			
Project Number:		**Created By**		**Sim OPS Yes/No**	**SSE on site? Yes/No**
Project Address:					
Specific Task	Transporting, set up and use				
Key equipment:	Step ladders (4,6,8,10 ft. and extension ladders)				
Task-specific training:	Ladder safety training, fall protection awareness, SMART program.				

Hard Hat	Gloves (ANSI/EN 388)	Eye protections	Fall protection	APR	Vest	PPE clothing
☐ Type I (Top Impact)	☐ Chemical Protective (i.e. Nitrile)	☒ ANSI/CSA safety glasses	☐ Harness	☐ Full Face Mask	☐ Class II	☐ Coveralls
☐ Type II (Side Impact)	☒ Level 1 Light duty	☐ Goggles/spoggles	☐ Shock absorb lanyard	☐ Half Face Mask	☐ Class III	☐ Fire retardant clothing (FRC)
☒ Class E (standard)	☐ Level 2 Light duty with protection	☐ Face shield	☐ Lifeline		☐ Anti-Static	☐ High viz clothing
☐ Class G	☐ Level 3 Medium duty	☐ Other*		**Cartridges**	☐ FRC	☒ Long pants
	☐ Level 4 Heavy duty			☐ N95	☐ PFD	☐ Long sleeve shirts
Foot Protection	☐ High viz	**Hearing protection**	**Arc flash**	☐ P100		☐ Paper tyvek
☒ Industrial grade safety boot	☐ Other*	☐ NOT Required	☐ Haz.Cat 2	☐ P95		☐ Polyethyene tyvek
☐ Rubber boots (industrial grade)		☐ Required	☐ Haz Cat 4	☐ R95		☐Other *
☐ Hip waders				☐ Organic vapor		
	*			☐ Specialty/other*		

Project Development Team		Modified by	Reviewed by	Date
Name	**Signature**			
Dennis Hoyt				
Craig Gebhardt				

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
1	Perform the STAR process	Overhead utilities • Electrical • Mechanical • Chemical • Restricted/limited spaces • Unstable/uneven ground surfaces • Wet surfaces • Property damage	• Conduct a hazard analysis of the work site to determine if any unsafe conditons exist for which the ladders will be set up. • Mitigate any unsafe conditions • Determine the proper size and load rating of the ladder • Confirm any known overhead utilities or obstructionss		
2	Inspect the Ladder	• Cracked or missing components • Slips and falls • Improper load rating-breach if overloaded (human weight + materials) • Defective, worn or missing rungs	• Perform a thorough inspection of ladder and document. • Tag out of service if defective, missing or broken components are present. Replace ladder. • Comfirm the Type and load rating. Ensure ladder is rated to support total human weight plus any material handling while ascending/descending the ladder. • Adhere to warning labeling from the manufacture.		
3	Transporting the Ladder	• Back strain • Stationary objects • Pinch points • Overhead objects • Property damage	• Determine the path of travel. • Transport ladder by using both hands. Keep hand/fingers out of pinch points • Keep ladder close to body and at waist level. • Get assistance when handling larger ladders (>10 ft)		

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
4	Set-up • Indoors • outdoors	• Overhead objects • Property damage • Inclement weather • Struck by/against • Strains • Unstable ground surface	• Always look up first before setting ladders upright. • Confirm stable and level ground, • Ensure proper clearance is made to maintain 4:1 ratio for extention ladders. • Ladder to extend 3 ft above leading edge (outdoors) and secured • Ensure to ALWAYS lock the spreader on step ladders • Do not prop step ladders in the closed postion against structures. All 4 legs/rails must be set.		
5	Ascending/descending the ladder	• Falls • Slips • Unstable ground • Overloading • Tipping over	• Maintain 3 points of contact at all times. • Keep soles of work boots free of debris, mud and have proper traction/tread • Carry supplies in tool pouch or bucket. • Keep body postion with the center of the ladder • Never overextend or reach causing the ladder to slide or tip over. Descend ladder and re-position. • Always face towards the ladder during ascending and descending • Do not stand on the Top step.		

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(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

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

Name/Company	Sign	Date

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

Presenter signature: _____ Date/time: _____

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

Supervisor Signature: _____ Date/time: _____

Location of mustering point: _____ Wind direction (current): _____

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

Supervisor signature documenting daily debrief has been completed: _____

Job **Safety Analysis (JSA)**

Silt Fence Installation

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

Date issued/revised:		**Client:**			
Project number:		**Created by**		**Sim OPS** Yes/No	**SSE on site?** Yes/No
Project address:					
Specific task	Silt fence installation				
Key equipment:	Excavator, backhoe, and ground labor; protective gloves, insect repellant				
Task-specific training:	Hand Tools, Heavy Equipment Safety				

Hard hat	**Gloves (ANSI/EN 388)**	**Eye protections**	**Fall protection**	**APR**	**Vest**	**PPE clothing**
☐ Type I (top impact)	☐ Chemical protective (i.e. nitrile)	☒ ANSI/CSA safety glasses	☐ Harness	☐ Full face mask	☒ Class II	☐ Coveralls
☐ Type II (side impact)	☐ Level 1 light duty	☐ Goggles/spoggles	☐ Shock absorb lanyard	☐ Half face mask	☐ Class III	☐ Fire retardant clothing (FRC)
☒ Class E (standard)	☒ Level 2 light duty with protection	☐ Face shield	☐ Lifeline		☐ Anti-static	☐ High viz clothing
☐ Class G	☐ Level 3 medium duty	☐ Other*		**Cartridges**	☐ FRC	☐ Long pants
	☐ Level 4 heavy duty			☐ N95		☐ Long sleeve shirts
Foot protection	☐ High viz	**Hearing protection**	**Arc flash**	☐ P100		☐ Paper tyvek
☒ Industrial grade safety boot	☐ Other*	☐ NOT Required	☐ Haz.cat 2	☐ P95		☐ Polyethyene tyvek
☐ Rubber boots (industrial grade)		☒ Required	☐ Haz cat 4	☐ R95		☐Other *
☐ Hip waders				☐ Organic vapor		
	*see key equipment			☐ Specialty/other*		

Project development team		Modified by	Reviewed by	Date
Name	Signature			
Dennis Hoyt				
Craig Gebhardt				

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
1	Equipment Inspection	• Hydraulic failure	• Inspect equipment lines and fluid reservoirs		
2	Underground utilities	• Impact, breach, or rupture of underground utilities	• Inspect area • Call underground utility locator and monitor locator during locating activities • Ask questions • Use GHD Underground Utility Clearance Form and verify all markings, locations, and procedures prior to installation work		
3	Installation zone inspection	• Underground Insects/hives • Poisonous plants • Stinging/biting insects	• Visually inspect area of fence installation for any activity regarding hornets, yellow jackets, bees, fire ants, or termites • A slow walk or drive along the fence path prior to excavation to inspect for insects flying in and out or ground, ant humps or mounds, and trails		
4	Hand tool use	• Improper hammer selection • Stapler use	• Use only a hammer of a weight and handle length appropriate to individual laborer's capability • Inspect every stake for knots, splits, and fractures before impacting stake with hammer • Knotty or split reinforcing stakes should be replaced without exception. Inspect stapler for correct staple installation • Inspect stapler and test operation for gauging correct drive pressure • Use staples of a length needed for the job • Safety glasses and awareness of installer hand location during use of a hammer or staple gun		

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
5	Fence layout activities	• Lifting hazards • Manual material handling • Back injury	• Reduce distance traveled when carrying materials • Make sure grip is adequate; use gloves to enhance grip when necessary • Size up the load; if the object is too large or odd shaped OR is in excess of 50 pounds (23 kg) then assistance (mechanical or a buddy lift) will be required • Lift with the legs (bend at the knees and use the leg muscles) to protect the lower back and keep lower back in a neutral position • Avoid one handed carrying if possible; maintain awareness of footing • 100 foot fence rolls require a coordinated two man effort to place fence correctly and according to manufacturer's requirements		

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(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

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Name/Company	Sign	Date

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

Presenter signature: _____ Date/time: _____

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

Supervisor signature: _____ Date/time: _____

Location of mustering point: _____ Wind direction (current): _____

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

Supervisor signature documenting daily debrief has been completed: _____

Job **Safety Analysis (JSA)**

Trenching/Excavating with Backhoe

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

Date issued/revised:		**Client:**			
Project number:		**Created by**		**Sim OPS Yes/No**	**SSE on site? Yes/No**
Project address:					
Specific task	Excavation with backhoe				
Key equipment:	Backhoe				
Task-specific training:	Heavy Equipment Safety				

Hard hat	**Gloves (ANSI/EN 388)**	**Eye protections**	**Fall protection**	**APR**	**Vest**	**PPE clothing**
☐ Type I (top impact)	☐ Chemical protective (i.e. nitrile)	☒ ANSI/CSA safety glasses	☐ Harness	☐ Full face mask	☒ Class II	☐ Coveralls
☐ Type II (side impact)	☒ Level 1 light duty	☐ Goggles/spoggles	☐ Shock absorb lanyard	☐ Half face mask	☐ Class III	☐ Fire retardant clothing (FRC)
☒ Class E (standard)	☒ Level 2 light duty with protection	☐ Face shield	☐ Lifeline		☐ Anti-static	☐ High viz clothing
☐ Class G	☐ Level 3 medium duty	☐ Other*		**Cartridges**	☐ FRC	☐ Long pants
	☐ Level 4 heavy duty			☐ N95		☐ Long sleeve shirts
Foot protection	☐ High viz	**Hearing protection**	**Arc flash**	☐ P100		☐ Paper tyvek
☒ Industrial grade safety boot	☐ Other*	☐ NOT Required	☐ Haz.cat 2	☐ P95		☐ Polyethyene tyvek
☐ Rubber boots (industrial grade)		☒ Required	☐ Haz cat 4	☐ R95		☐Other *
☐ Hip waders				☐ Organic vapor		
	*see key equipment			☐ Specialty/other*		

Project development team		Modified by	Reviewed by	Date
Name	**Signature**			
Dennis Hoyt				
Craig Gebhardt				

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
1	Set up traffic and site control	• Struck-by traffic hazards	• Refer to Traffic Control Plan and HASP • Use buddy system when placing traffic control devices • Always face traffic		
2	Site preparation (includes air monitoring, excavation layout, inspect work area, etc.)	• Chemical hazard • Overhead/underground installations • Biological hazards	• Follow air monitoring program in HASP • Inspect work area for utilities, biological hazards, traffic hazards, off-site receptors • Ensure One-Call Locate ticket number is current, QSF-019 is complete, and that all other relevant utility locate actions have been completed		
3a	Position/set up backhoe	• Pedestrian and vehicular traffic • Slip/trip/fall hazards • Existing/overhead structures	• Always use a spotter to direct backhoe into position • Set outriggers and make sure ground is solid; avoid soft terrain • Set up exclusion work zone with traffic barricades and signage to secure work area • Be aware of the height restrictions of the equipment • Make sure work area remains clean and organized		
3b	Inspect backhoe and surrounding area	• Hydraulic line failure • pedestrian struck by equipment or debris • Release to environment	• Visually inspect all components of equipment, no oil/fluid leaks, tires properly inflated, fluid levels and associated equipment in good condition • Replace worn or damaged hoses • Ensure barricades/work zone is setup to protect public		

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
4	Prepare surface for excavation activities: cut pavement at location (as necessary), etc.	• Moving blade • Eye hazards • Exhaust from motor • Dust inhalation • Noise – hearing impairment • Back strain • Traffic hazards	• Wear face shield, gloves, ear plugs or muffs, control dust with water or wear dust mask • Employ proper lifting techniques or mechanical assistance • Keep work area clear of debris • Use buddy system or spotter when possible • Maintain traffic control and face oncoming traffic • Refer to TCP and/or HASP		
5	Backhoe operation	• Hitting an underground or overhead utility/structure • Flying debris • COC exposure • Noise - hearing impairment • Dust inhalation • Back strain • Traffic hazards • Heat/cold stress • Slip/trip/fall hazards	• Wear all required PPE by HASP • Initiate air monitoring as necessary • Watch overhead clearance at all times, use spotters as necessary • Be aware of the height restrictions of the equipment • Only those workers wearing proper PPE should be allowed near the excavation while backhoe is operating • Use proper lifting techniques • Ensure work area remains clean and organized • Take breaks as necessary or as indicated in the HASP to avoid back strain (repetitive/vibration ergo issues and heat/cold stress) • Perform periodic visual inspection of equipment • Maintain traffic control and face oncoming traffic		
6	Backfill cleared excavations and mark cleared locations	• Back strain • Eye injury • COC exposure • Slip/trip/fall hazards • Struck-by hazards	• Avoid one-handed carrying if possible; maintain awareness of footing • Make sure work area remains clean and organized • Clearly mark cleared locations with a permanent method (e.g., paint, stakes) • Map cleared locations, site structures, and location of wastes • Keep clear of swing radius; demarcate safe work area/zone		

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
7	Site cleanup	• Slip/trip/fall hazards • Back strain	• Use proper lifting techniques • Make sure work area remains clean and organized • Use buddy system, if possible, to remove traffic controls • Leave site clean of debris and refuse		

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Name/Company	Sign	Date

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Presenter signature: _____ Date/time: _____

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Supervisor signature: _____ Date/time: _____

Location of mustering point: _____ Wind direction (current): _____

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

Supervisor signature documenting daily debrief has been completed: _____

Job **Safety Analysis (JSA)**

Vacuum Truck Operation Oversight

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

Date issued/revised:		**Client:**			
Project number:		**Created by**		**Sim OPS Yes/No**	**SSE on site? Yes/No**
Project address:					
Specific task	Vacuum Truck Operation Oversight				
Key equipment:	Vacuum Truck; High visibility vest, fit for purpose hand protection, hard hat, safety glasses, steel toes with chem or oil resist soles, and long sleeve clothing				
Task-specific training:	GHD SMART (BBS) Training, 40-Hour HAZWOPER, 8-Hour Refresher, Hazard Communication. Supervisor shall be trained in CPR, First Aid, and have Supervisor Training.				

Hard hat	**Gloves (ANSI/EN 388)**	**Eye protections**	**Fall protection**	**APR**	**Vest**	**PPE clothing**
☐ Type I (top impact)	☐ Chemical protective (i.e. nitrile)	☒ ANSI/CSA safety glasses	☐ Harness	☐ Full face mask	☒ Class II	☐ Coveralls
☐ Type II (side impact)	☒ Level 1 light duty	☐ Goggles/spoggles	☐ Shock absorb lanyard	☐ Half face mask	☐ Class III	☐ Fire retardant clothing (FRC)
☒ Class E (standard)	☒ Level 2 light duty with protection	☐ Face shield	☐ Lifeline		☐ Anti-static	☐ High viz clothing
☐ Class G	☐ Level 3 medium duty	☐ Other*		**Cartridges**	☐ FRC	☐ Long pants
	☐ Level 4 heavy duty			☐ N95		☒ Long sleeve shirts
Foot protection	☐ High viz	**Hearing protection**	**Arc flash**	☐ P100		☐ Paper tyvek
☒ Industrial grade safety boot	☐ Other*	☐ NOT Required	☐ Haz.cat 2	☐ P95		☐ Polyethyene tyvek
☐ Rubber boots (industrial grade)		☒ Required	☐ Haz cat 4	☐ R95		☐Other *
☐ Hip waders				☐ Organic vapor		
	*see key equipment			☐ Specialty/other*		

Project development team		Modified by	Reviewed by	Date
Name	**Signature**			
Dennis Hoyt				
Craig Gebhardt				

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
1	Obtain necessary permits, agreements, and bonds; coordinate inspections and subcontractors, and notify stakeholders	• Fines, law suits, delays, or added work	• Coordinate with project manager to ensure all approvals are obtained (well, encroachment, access agreements, traffic control plans, etc.) and owner, tenant, subcontractors, and agencies are notified of start date		
2	Mobilize with proper equipment/supplies	• Delay or improper performance of work due to improper equipment on site	• Make sure subcontractors are aware of their responsibilities for safety, labor, equipment and supplies • Provide subcontractor with minimum checklist (they can use their own if more protective) and ensure equipment has been checked and meets expected standards before it mobs to the site. • Review the HASP and permit conditions and gather necessary PPE		
3	Meet with Property Manager (or designee) on start date before commencing work	• Unknown traffic or other work hazards • Lack of communication between all interested parties	• Explain planned activities • Confirm locations to be cleared and tentative schedule • Locate emergency product shut-off switch for facilities with potential hydrocarbon exposures. Communicate that location to all personnel		

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
4	Perform STAR and tailgate safety meeting upon arrival at site	• Consider worst-case scenario (including weather conditions) • Loud conditions (hearing protection and communications with crew)	• Review the HASP with co-workers • Highlight aspects identified by SPSA and, if necessary, add to HASP and modify JSAs • Have all co-workers sign the HASP • Discuss crew communication in high noise environments, have communications means on hand (air horn, whistle, etc.) • Ensure that all site workers have donned PPE and it is in good condition • Confirm all necessary subcontractor certifications and keep copies on site		
5	Verify necessary traffic control	• Accident during placement or as a result of improper traffic control equipment placement	• Use buddy system for placing traffic control • Reference traffic control plan section of the HASP (may include specific requirements based on encroachment permit)		
6	Verify exclusion zone(s) and establish work areas/heavy equipment pathways	• On-site vehicular accident with heavy equipment • Injury or exposure to public or other on-site personnel • Slip/fall hazards	• Use orange fencing, delineators with flags at least 4 feet tall, and caution tape • Implement exclusion zone setup instructions of the HASP • Set up clear walking paths between workstations		

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
7	Verify set up of vacuum truck	• Damage caused by vac rig while accessing setup locations • Overhead or underground utilities	• Make sure subcontractor ensures clear pathway to location to be cleared • Provide as-needed hand signals and guidance to driver to place rig • Visually inspect vehicle (fire extinguisher on board, no oil or other fluid leaks, pressurized hoses secured with whip-checks or adequate substitute, water tank not leaking?) • Confirm local utility locations • Visually verify bonding and grounding have been performed • Verify that all gauges work, determine when relief valves were last serviced, that all drains/valves open/close as needed and document and perform function check of emergency shutdown switch • Post person at one of the emergency shutdown switches to shut down operation if unplanned events happen with the rig or that could affect the project		
8	Observe operation of vacuum truck	• Eye injury from flying debris • Exposure to chemical hazards • Hearing damage • Catastrophic equipment failure • Damage to adjacent structures and vehicles • Personal or property damage due to accidental activation of vac rig • Back strain	• Don any additional PPE and make sure all people not associated with work at hand are a safe distance from equipment and far enough away that they are safe from flying debris • Ensure that the stinger is safely secured when not in use by shutting off or blocking pressure supply to prevent accidental activation • Use proper lifting techniques and tools		
9	Verify the removal of all traffic control devices and inspect site for cleanliness	• Traffic • Nuisance or safety hazard left on site • Possible spills	• Use buddy system as necessary to remove traffic control • Leave site clean of refuse and debris • Clearly mark/barricade any holes that need later topping off or curing • Notify station personnel of departure • Map locations and note any cuttings/purge water left on site		

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Name/Company	Sign	Date

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Presenter signature: _____ Date/time: _____

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Supervisor signature: _____ Date/time: _____

Location of mustering point: _____ Wind direction (current): _____

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

Supervisor signature documenting daily debrief has been completed: _____

Job Safety Analysis (JSA)

Work Zone Delineation

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

Date issued/revised:		**Client:**			
Project number:		**Created by**		**Sim OPS** Yes/No	**SSE on site?** Yes/No
Project address:					
Specific task	Work zone barricading				
Key equipment:	Delineators (48-inch minimum), flags, caution tape; Above ankle work boots, protective gloves (suitable for weather conditions). Gloves must be worn at all times when setting up work zone				
Task-specific training:	40-Hour HAZWOPER,				

Hard hat	**Gloves (ANSI/EN 388)**	**Eye protections**	**Fall protection**	**APR**	**Vest**	**PPE clothing**
☐ Type I (top impact)	☐ Chemical protective (i.e. nitrile)	☒ ANSI/CSA safety glasses	☐ Harness	☐ Full face mask	☒ Class II	☐ Coveralls
☐ Type II (side impact)	☒ Level 1 light duty	☐ Goggles/spoggles	☐ Shock absorb lanyard	☐ Half face mask	☐ Class III	☐ Fire retardant clothing (FRC)
☒ Class E (standard)	☐ Level 2 light duty with protection	☐ Face shield	☐ Lifeline		☐ Anti-static	☐ High viz clothing
☐ Class G	☐ Level 3 medium duty	☐ Other*		**Cartridges**	☐ FRC	☐ Long pants
	☐ Level 4 heavy duty			☐ N95		☐ Long sleeve shirts
Foot protection	☐ High viz	**Hearing protection**	**Arc flash**	☐ P100		☐ Paper tyvek
☒ Industrial grade safety boot	☐ Other*	☐ NOT Required	☐ Haz.cat 2	☐ P95		☐ Polyethyene tyvek
☐ Rubber boots (industrial grade)		☐ Required	☐ Haz cat 4	☐ R95		☐Other *
☐ Hip waders				☐ Organic vapor		
	*see key equipment			☐ Specialty/other*		

Project development team		Modified by	Reviewed by	Date
Name	**Signature**			
Dennis Hoyt				
Craig Gebhardt				

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
1	Coordinate site access	• Delays or added work	• Notify Station Manager of schedule • Notify other required personnel if applicable (e.g., city, regulators, private property owners) • Schedule work during hours of good natural light • Try to plan activities during hours of lower traffic volume		
2	Mobilize with proper equipment/supplies for sampling	• Delay or improper/unsafe performance of work due to improper equipment on site • Equipment failure • Back injury	• Review work plan to determine equipment/supply needs • Inspect equipment as you load it to the vehicle • If work is scheduled for the hours of low light, will additional lighting be required • Review the HASP and gather necessary PPE • Size up the load; if the object is too large or is in excess of 50 pounds (23 kg) then assistance (mechanical or a buddy lift) will be required • Lift with the legs (bend at the knees and use the leg muscles) to protect the lower back and keep lower back in a neutral position • Avoid one-handed carrying if possible; maintain awareness of footing • Avoid placing hands/fingers in pinch point locations • Refer to HASP for additional lifting information		

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
3	Site arrival	• Unknown traffic or other work hazards	• Meet with station attendant or other site personnel and explain planned activities • Review STAR and SWA • Discuss importance of and documentation procedures for SWA; use SWA to stop unsafe or illegal work practices • Discuss work zone set up activities with supervisor/employees using HASP and JSA, scan work area to determine best vehicle position and set up • Check weather report for poor conditions that may affect work • Don appropriate PPE (high visibility garment, gloves, hard hat, glasses, safety rated boots)		
4	Incident free	• Take one last look around for missed hazards	• Conduct LMRA before putting hands on work		
5	Securing work zone/ setup	• Vehicular traffic - struck-by hazards • Slip/trip/fall hazards • Lifting hazards • Back injury • Manual material handling	• Park vehicle in a blocking position; engage park brake, and hazard lights • Perform LMRA, circle check the area for potential hazards (walking surfaces, dogs, construction) • Check mirrors and look over shoulder before exiting the vehicle; open the door slowly to avoid potential collision with passing vehicle/pedestrians • Refer to step 2 for back safety • Work using buddy system and maintain constant checks for vehicles and pedestrians • Determine 6-foot (2 m) perimeter, and place Delineators spaced at 3 to 6 feet (1 to 2 m) circling the work area • Flag each Delineator (if required) • Install caution tape a minimum 48 inches from the ground (top of Delineator), encircling the work zone. • Cease operations if unsafe conditions are present that have not been addressed or cannot be corrected		

Example of proper Work Zone Set-up

(1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

Site personnel participating in JSA review:
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Name/Company	Sign	Date

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

Presenter signature: _____ Date/time: _____

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

Supervisor signature: _____ Date/time: _____

Location of mustering point: _____ Wind direction (current): _____

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

Supervisor signature documenting daily debrief has been completed: _____

Job Safety Analysis (JSA)

Hydro-Vac Excavation

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

Date issued/revised:		**Client:**			
Project number:		**Created by**		**Sim OPS** Yes/No	**SSE on site?** Yes/No
Project address:					
Specific task	Hydro-Vac excavation activities (contractor oversight or subcontractor management)				
Key equipment:	Pressure washer and Vac-Truck; protective gloves; appropriate work clothing				
Task-specific training:	40 Hour HAZWOPER, Utility Locating Field Method Training				

Hard hat	Gloves (ANSI/EN 388)	Eye protections	Fall protection	APR	Vest	PPE clothing
☐ Type I (top impact)	☐ Chemical protective (i.e. nitrile)	☒ ANSI/CSA safety glasses	☐ Harness	☐ Full face mask	☒ Class II	☒ Coveralls
☐ Type II (side impact)	☒ Level 1 light duty	☐ Goggles/spoggles	☐ Shock absorb lanyard	☐ Half face mask	☐ Class III	☐ Fire retardant clothing (FRC)
☒ Class E (standard)	☐ Level 2 light duty with protection	☒ Face shield	☐ Lifeline		☐ Anti-static	☐ High viz clothing
☐ Class G	☐ Level 3 medium duty	☐ Other*		**Cartridges**	☐ FRC	☐ Long pants
	☐ Level 4 heavy duty			☐ N95		☐ Long sleeve shirts
Foot protection	☐ High viz	**Hearing protection**	**Arc flash**	☐ P100		☐ Paper tyvek
☒ Industrial grade safety boot	☐ Other*	☐ NOT Required	☐ Haz.cat 2	☐ P95		☐ Polyethyene tyvek
☐ Rubber boots (industrial grade)		☒ Required	☐ Haz cat 4	☐ R95		☐Other *
☐ Hip waders				☐ Organic vapor		
	*see key equipment			☐ Specialty/other*		

Project development team		Modified by	Reviewed by	Date
Name	**Signature**			
Dennis Hoyt				
Craig Gebhardt				

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
1	Identify borehole locations	• Traffic hazards • Struck-by	• Refer to Traffic Control Plan; wear appropriate PPE; use buddy system if possible; face oncoming traffic • Ensure Utility Locate Ticket is current and available; review drawings, pavement markings, site geography/features, known locations of underground structures, etc.		
2	Setup necessary traffic control	• Traffic hazards • Lifting hazards • Back injury • Manual material handling	• Refer to TCP, work plan, and permits; use buddy system when placing traffic control equipment • Reduce travel distance when there is a need to carry/lift materials • Make sure grip is adequate; wear leather/cotton gloves when setting up barricades • Size up the load, If the object is too large or odd shaped OR is in excess of 50 pounds (23 kg) then assistance (mechanical or a buddy lift) will be required • Lift with the legs (bend at the knees and use the leg muscles) to protect the lower back and keep lower back in a neutral position • Avoid one-handed carrying if possible; maintain awareness of footing		

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
3a	Oversight or management of Hydro-Vac excavation Hydro-Vac activities	• Hitting underground or overhead structures • Equipment failure • Flying debris • Chemical exposure • Noise • Dust • Lifting hazards • Back injury • Manual material handling • Heat/cold stress • Slip/trip/fall hazards • Contact with high pressure water	• Ensure utility clearances conducted • Use soft dig techniques • Use spotting when necessary; be aware of height/equipment clearances • Ensure that all equipment is inspected according to manufacturer's instructions; document all inspections • Wear appropriate PPE • Demarcate safe work area • Air monitor as per HASP; control dust • Take breaks and monitor for heat/cold stress symptoms • Perform a pre-start meeting, inform subcontractor of safe lifting practices • Move objects with cart or dolly when possible. • Refer to step 2 and the HASP for additional lifting information • Employ proper housekeeping procedures; keep work area free of clutter		
3b	Oversight or management of Hydro-Vac excavation Hydro-Vac activities, continued	• Vacuum injury • Equipment damage • Pinch points • Falls	• Keep limbs and body clear of vacuum intake • Ensure emergency line breaks are installed and in working condition • Do not vacuum large objects or cause excessive pressure in lines • Keep personnel a safe distance from excavation; demarcate safe work area		
4	Lifting large objects out of excavation; working with wand	• Lifting hazards • Back injury • Manual material handling • Repetitive motion injury	• Maintain proper lifting techniques as discussed in steps 2 and 3a • Buddy lifts on ramps, stairs or ladders: The tallest and/or strongest person should be situated at the bottom of the load, and use rope and /or other means to lower tools and equipment into the excavation) • Take frequent breaks as needed to avoid repetitive motion and muscle fatigue		

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Name/Company	Sign	Date

SAFE YOU ME GHD
ENVIRONMENT & PEOPLE

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

Presenter signature: _____ Date/time: _____

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Supervisor signature: _____ Date/time: _____

Location of mustering point: _____ Wind direction (current): _____

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

Supervisor signature documenting daily debrief has been completed: _____

Job **Safety Analysis (JSA)**

Operating Geoprobe with Augers

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

Date issued/revised:		**Client:**			
Project number:		**Created by**		**Sim OPS** Yes/No	**SSE on site?** Yes/No
Project address:					
Specific task	Drilling with auger (General procedures)				
Key equipment:	Geoprobe drill rig; Gloves are dependent on the task and chemical contamination suspected or present				
Task-specific training:	Spinning augers with Geoprobe				

Hard hat	**Gloves (ANSI/EN 388)**	**Eye protections**	**Fall protection**	**APR**	**Vest**	**PPE clothing**
☐ Type I (top impact)	☐ Chemical protective (i.e. nitrile)	☒ ANSI/CSA safety glasses	☐ Harness	☐ Full face mask	☐ Class II	☐ Coveralls
☐ Type II (side impact)	☐ Level 1 light duty	☐ Goggles/spoggles	☐ Shock absorb lanyard	☐ Half face mask	☐ Class III	☐ Fire retardant clothing (FRC)
☒ Class E (standard)	☐ Level 2 light duty with protection	☐ Face shield	☐ Lifeline		☐ Anti-static	☐ High viz clothing
☐ Class G	☐ Level 3 medium duty	☐ Other*		**Cartridges**	☐ FRC	☐ Long pants
	☐ Level 4 heavy duty			☐ N95		☐ Long sleeve shirts
Foot protection	☐ High viz	**Hearing protection**	**Arc flash**	☐ P100		☐ Paper tyvek
☒ Industrial grade safety boot	☒ Other*	☐ NOT Required	☐ Haz.cat 2	☐ P95		☐ Polyethyene tyvek
☐ Rubber boots (industrial grade)		☒ Required	☐ Haz cat 4	☐ R95		☐Other *
☐ Hip waders				☐ Organic vapor		
	*see key equipment			☐ Specialty/other*		

Project development team		Modified by	Reviewed by	Date
Name	**Signature**			
Dennis Hoyt				
Craig Gebhardt				

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
1	• Discuss STAR and SWA	• Site personnel not using the STAR process and SWA	• Project team (GHD) discusses importance of and documentation procedures for SWA during pre-job safety meeting • Use SWA to stop any work that is unsafe		
2	• Raise mask, slide extension ¾ ways out, lower foot on ground surface, lower out riggers to level machine • Raise hammer assembly to fold out auger head and secure with a bolt or pin.	• Slip/trip/fall hazards • Overhead wires • Underground utility • Pinch and crush points - hands, feet, fingers • Unstable ground conditions	• Use STAR process • Be aware of footing at all times • Verify that all utilities have been cleared • Machine has all pinch and crush points marked in reflective tape • Wear appropriate PPE • Inspect soil for loose, soft or unstable conditions under rig jacks or outriggers		
3	• Place HSA drive cap in auger head and secure with pin • Place wooden auger plug into cutting head • Lift auger with cutting head and bolt to HSA drive cap • Apply down pressure with hammer assembly • Keep auger plum • Clear soils as needed	• Back strain • Pinch points • Pulled in by rotation of auger • Shift or kick out of auger • Shovel hitting auger during rotation	• Use proper lifting techniques • Use two people when lifting augers • Maintain awareness of pinch and crush points at all times • No loose clothing or jewelry • Adjust side to side or forward and backward to keep auger plumb • Keep shovel clear of auger while auger is in rotation • Wear proper PPE		
4	• Don't raise foot off the ground while advancing auger • Repeat step 3 as you add more flights	• Pinch and crush points - hands, feet, and fingers • Kick out of auger	• Maintain awareness of pinch and crush points at all times • Maintain awareness of auger		

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
5	• Pulling augers, remove HSA from auger and then remove from auger head • Fold auger head back and secure with bolt or pin • Lower hammer assembly to place, auger pulling system on hammer and flights • Raise hammer assembly to pull augers from ground, and fork lower auger at ground surface • Unbolt the auger connection • Lift auger and place on ground repeat until all flights are removed from ground	• Back strain • Pinch and crush points - hands, feet, and fingers • Contaminant exposure	• Use proper lifting techniques • Use two people when lifting augers • Maintain awareness of pinch and crush points at all times • Wear proper PPE		
6	• Lower hammer all the way down • Raise foot from ground surface, slide extension in • Lower mask, raise out riggers	• Slip/trip/fall hazards • Pinch and crush points - hands, feet, and fingers	• Be aware of footing at all times • Machine has all pinch and crush points marked in reflective tape		

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Name/Company	Sign	Date

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Location of mustering point: _____ Wind direction (current): _____

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

Supervisor signature documenting daily debrief has been completed: _____

Job **Safety Analysis (JSA)**

Decontamination of Sampling Equipment and Personnel (PPE Level D)

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

Date issued/revised:		**Client:**			
Project number:		**Created by**		**Sim OPS** Yes/No	**SSE on site?** Yes/No
Project address:					
Specific task	Decontamination of sampling equipment and personnel (PPE Level D)				
Key equipment:	Alconox/Liquinox, brushes, _____ [Add any task/site-specific decon chemicals, refer to their MSDSs, and 'dirty' the JSA.; Nitrile gloves to be worn when decontaminating reusable equipment				
Task-specific training:	Decontamination/Site Control; Quality Control/Sampling Plan				

Hard hat	**Gloves (ANSI/EN 388)**	**Eye protections**	**Fall protection**	**APR**	**Vest**	**PPE clothing**
☐ Type I (top impact)	☒ Chemical protective (i.e. nitrile)	☒ ANSI/CSA safety glasses	☐ Harness	☐ Full face mask	☒ Class II	☐ Coveralls
☐ Type II (side impact)	☐ Level 1 light duty	☐ Goggles/spoggles	☐ Shock absorb lanyard	☐ Half face mask	☐ Class III	☐ Fire retardant clothing (FRC)
☒ Class E (standard)	☐ Level 2 light duty with protection	☐ Face shield	☐ Lifeline		☐ Anti-static	☐ High viz clothing
☐ Class G	☐ Level 3 medium duty	☐ Other*		**Cartridges**	☐ FRC	☐ Long pants
	☐ Level 4 heavy duty			☐ N95		☐ Long sleeve shirts
Foot protection	☐ High viz	**Hearing protection**	**Arc flash**	☐ P100		☐ Paper tyvek
☒ Industrial grade safety boot	☒ Other*	☒ NOT Required	☐ Haz.cat 2	☐ P95		☐ Polyethyene tyvek
☐ Rubber boots (industrial grade)		☐ Required	☐ Haz cat 4	☐ R95		☐Other *
☐ Hip waders				☐ Organic vapor		
	*see key equipment			☐ Specialty/other*		

Project development team		Modified by	Reviewed by	Date
Name	**Signature**			
Dennis Hoyt				
Craig Gebhardt				

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

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
3	Management of waste derived from decontamination activities	• Contaminant exposure • Lifting hazards • Back injury • Manual material handling	• Containerize decon waste (e.g., water, used PPE) as required • Properly dispose of decon fluids (e.g., sediments) • Refer to step 1 and the HASP for additional lifting information	Sampling personnel	

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Supervisor signature: _____ Date/time: _____

Location of mustering point: _____ Wind direction (current): _____

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

Supervisor signature documenting daily debrief has been completed: _____

Job **Safety Analysis (JSA)**

Fluid Level Monitoring

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

Date issued/revised:		**Client:**			
Project number:		**Created by**		**Sim OPS Yes/No**	**SSE on site? Yes/No**
Project address:					
Specific task	Fluid level monitoring (collecting water/LNAPL levels/gauging wells)				
Key equipment:	Water level meter or oil/water interface meter, PID, PPE; Use nitrile gloves when performing work; use hearing protection as necessary based on site conditions				
Task-specific training:	Fluid Level Monitoring; reference HASP for additional site/client safety training requirements				

Hard hat	**Gloves (ANSI/EN 388)**	**Eye protections**	**Fall protection**	**APR**	**Vest**	**PPE clothing**
☐ Type I (top impact)	☒ Chemical protective (i.e. nitrile)	☒ ANSI/CSA safety glasses	☐ Harness	☐ Full face mask	☒ Class II	☐ Coveralls
☐ Type II (side impact)	☐ Level 1 light duty	☐ Goggles/spoggles	☐ Shock absorb lanyard	☐ Half face mask	☐ Class III	☐ Fire retardant clothing (FRC)
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☐ Rubber boots (industrial grade)		☒ Required	☐ Haz cat 4	☐ R95		☐Other *
☐ Hip waders				☐ Organic vapor		
	*see key equipment			☐ Specialty/other*		

Project development team		Modified by	Reviewed by	Date
Name	**Signature**			
Dennis Hoyt				
Craig Gebhardt				

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
1	Inspect/calibrate equipment	• Loss due to malfunctioning equipment	• Check all equipment to ensure it is in proper working order and has been calibrated to GHD and manufacturer's standards, then document	Sampling Technician	
2	Establish work zone at monitoring well location	• Traffic • Pinch points • Lifting hazards • Back injury • Manual material handling	• Review work zone controls using the STAR process; is it safe to proceed? • Maintain awareness of on-site traffic patterns and walking paths • Reduce travel distance when there is a need to carry/lift materials • Make sure grip is adequate; wear leather/cotton gloves • Size up the load; if the object is too large or odd shaped OR is in excess of 50 pounds (23 kg) then assistance (mechanical or a buddy lift) will be required • Lift with the legs (bend at the knees and use the leg muscles) to protect the lower back and keep lower back in a neutral position • Avoid one-handed carrying if possible; maintain awareness of footing	Sampling Technician	

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
3	Open monitoring well cover(s)	• Pinch points • Hand injury • Biological hazards	• Avoid placing hands in pinch points • Wear proper PPE for task and use the proper tool when opening well covers (open face wrench/socket wrench) • Maintain good housekeeping; stow bolts, locks, wrench, plug, etc. in a safe area to prevent loss • Inspect for other hazards that may affect the hands (hypodermic needles, etc.) • Use PID to monitor air quality in breathing space • Heightened awareness of wasps, ants, bees, spiders, and poison plants	Sampling Technician	
4	Measure water/LNAPL levels	• Contaminant exposure • Cross contamination	• Wear proper PPE; use chemical-resistant gloves but be aware of abrasion hazards using the STAR process • Use PID to monitor air quality in breathing space • Decon probe and measuring tape following gauging of well	Sampling Technician	
5	Close monitoring well cover	• Traffic • Hand injury • Pinch points	• Maintain awareness of on-site traffic patterns; verify barricades are still in place • Wear abrasion-resistant gloves and use proper tools • Avoid placing hands in pinch points	Sampling Technician	

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Presenter signature: _____ Date/time: _____

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Supervisor signature: _____ Date/time: _____

Location of mustering point: _____ Wind direction (current): _____

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

Supervisor signature documenting daily debrief has been completed: _____

Job **Safety Analysis (JSA)**

Monitoring Well Closure

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

Date issued/revised:		**Client:**			
Project number:		**Created by**		**Sim OPS Yes/No**	**SSE on site? Yes/No**
Project address:					
Specific task	Well Closure				
Key equipment:	Photo ionization detector; hand tools, drill rig				
Task-specific training:	Hand Tool Procedures: Proper training in use of jack hammer, backhoe operations, and grout machine operations. Reference HASP for additional site/client safety training requirements.				

Hard hat	**Gloves (ANSI/EN 388)**	**Eye protections**	**Fall protection**	**APR**	**Vest**	**PPE clothing**
☐ Type I (top impact)	☐ Chemical protective (i.e. nitrile)	☒ ANSI/CSA safety glasses	☐ Harness	☐ Full face mask	☒ Class II	☐ Coveralls
☐ Type II (side impact)	☐ Level 1 light duty	☐ Goggles/spoggles	☐ Shock absorb lanyard	☐ Half face mask	☐ Class III	☐ Fire retardant clothing (FRC)
☒ Class E (standard)	☒ Level 2 light duty with protection	☐ Face shield	☐ Lifeline		☐ Anti-static	☐ High viz clothing
☐ Class G	☐ Level 3 medium duty	☐ Other*		**Cartridges**	☐ FRC	☐ Long pants
	☐ Level 4 heavy duty			☐ N95		☐ Long sleeve shirts
Foot protection	☐ High viz	**Hearing protection**	**Arc flash**	☐ P100		☐ Paper tyvek
☒ Industrial grade safety boot	☐ Other*	☐ NOT Required	☐ Haz.cat 2	☐ P95		☐ Polyethyene tyvek
☐ Rubber boots (industrial grade)		☒ Required	☐ Haz cat 4	☐ R95		☐ Other *
☐ Hip waders				☐ Organic vapor		
	*see key equipment			☐ Specialty/other*		

Project development team		Modified by	Reviewed by	Date
Name	Signature			
Dennis Hoyt				
Craig Gebhardt				

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
1	Inspect PPE for suitability and service	• Lack of expected protection from hazards	• Replace all questionable PPE identified	Sampling Technician	
2	Establish work zone at monitoring well location	• Traffic • Pinch points • Lifting hazards • Back injury • Manual material handling	• Maintain awareness of on-site traffic patterns and walking paths; set up barricades • Wear medium duty gloves • Reduce travel distance where there is a need to carry/lift materials • Make sure grip is adequate • Size up the load; if the object is too large or odd shaped OR is in excess of 50 pounds (23 kg) then assistance (mechanical or a buddy lift) will be required • Lift with the legs (bend at the knees and use the leg muscles) to protect the lower back and keep lower back in a neutral position • Avoid one-handed carrying if possible; maintain awareness of footing	Sampling Technician	
3	Open monitoring well cover(s)	• Pinch points • Hand injury • Biological hazards	• Inspect for other hazards that may affect the hands and knees (e.g., hypodermic needles) • Heightened awareness of wasps, ants, bees, spiders, and poison plants • Use knee pads or kneeling pad for flush mounts • Wear medium duty gloves • Avoid placing hands in pinch points • When opening flush mount well covers use a ratchet wrench with the appropriate sized socket or an open-ended wrench	Sampling Technician	

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
4	Measure water level and total depth	• Contaminant exposure • Cross contamination	• Avoid placing hands in pinch points • Wear Ndex nitrile gloves over medium duty gloves • Use PID to monitor air quality • Wear knee pads or place a foam pad to kneel on • Decon probe and measuring tape following gauging of well	Sampling Technician	
5	Remove existing flush mount or vault and concrete	• Projectile hazard – eye hazard • Electrical or air pressure hazard (depending on the type of jack hammer) • Cuts and scrapes • Airline whipping	• Wear safety glasses • Proper training and use of proper tools (jackhammer) or backhoe (refer to JHA for backhoe operations) • Wear Ndex nitrile gloves over medium duty gloves Keep hands away from pinch points • GHD oversight to stay clear of work area • Absolutely no use of hammer and chisel by hand • Use anti-whip device on all airline connections	Subcontractor	
6	Mix cement bentonite grout in grout mixer and tremie into riser	• Projectile hazard – eye hazard • Chemical exposure • Burns from hot engine muffler	• Wear safety glasses • Wear Ndex nitrile gloves over medium duty gloves that meet Personnel operating the mixer must wear a dust mask • Proper training on use of grout mixing machine (refer to drillers JHA for grout mixer)	Subcontractor	
7	Cut existing riser several feet below ground surface	• Cuts/scrapes	• Use an inside diameter pipe cutter or other appropriate cutting tool; no open fixed blades should be used • Wear Ndex nitrile gloves over medium duty gloves	Subcontractor	
8	Finish abandonment by applying concrete several inches below ground surface then asphalt flush with pavement	• Cuts/scrapes opening concrete bag and mixing	• No open fixed blades should be used to open the bags • Wear Ndex nitrile gloves over medium duty	Subcontractor	

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
9	Manage any investigative derived waste (IDW)	• Chemical exposure • Pinch points • Slip/trip/fall hazards • Heavy lifting • Mislabeling waste	• Avoid pinch points • Wear Ndex nitrile gloves over medium duty gloves • Inspect for proper housekeeping; clean-up work area • Size up the load; if the object is too large or odd shaped OR is in excess of 50 pounds (23 kg) then assistance (mechanical or a buddy lift) will be required • Lift with the legs (bend at the knees and use the leg muscles) to protect the lower back and keep lower back in a neutral position • Avoid one-handed carrying if possible; maintain awareness of footing • Label IDW appropriately (generator, contact number, identification of contents, and site location); specify type of contents; arrange for disposal	Sampling Technician and Project Manager	

(1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

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

Name/Company	Sign	Date

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

Presenter signature: _____ Date/time: _____

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

Supervisor signature: _____ Date/time: _____

Location of mustering point: _____ Wind direction (current): _____

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

Supervisor signature documenting daily debrief has been completed: _____

Job **Safety Analysis (JSA)**

Monitoring Well Sampling

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

Date issued/revised:		**Client:**			
Project number:		**Created by**		**Sim OPS Yes/No**	**SSE on site? Yes/No**
Project address:					
Specific task	Monitoring well sampling/gauging				
Key equipment:					
Task-specific training:	Identify any special/additional training necessary to safely complete this task				

Hard hat	Gloves (ANSI/EN 388)	Eye protections	Fall protection	APR	Vest	PPE clothing
☐ Type I (top impact)	☒ Chemical protective (i.e. nitrile)	☐ ANSI/CSA safety glasses	☐ Harness	☐ Full face mask	☐ Class II	☐ Coveralls
☐ Type II (side impact)	☐ Level 1 light duty	☐ Goggles/spoggles	☐ Shock absorb lanyard	☐ Half face mask	☐ Class III	☐ Fire retardant clothing (FRC)
☐ Class E (standard)	☐ Level 2 light duty with protection	☐ Face shield	☐ Lifeline		☐ Anti-static	☐ High viz clothing
☐ Class G	☐ Level 3 medium duty	☐ Other*		**Cartridges**	☐ FRC	☐ Long pants
	☐ Level 4 heavy duty			☐ N95		☐ Long sleeve shirts
Foot protection	☐ High viz	**Hearing protection**	**Arc flash**	☐ P100		☐ Paper tyvek
☐ Industrial grade safety boot	☐ Other*	☐ NOT Required	☐ Haz.cat 2	☐ P95		☐ Polyethyene tyvek
☐ Rubber boots (industrial grade)		☐ Required	☐ Haz cat 4	☐ R95		☐Other *
☐ Hip waders				☐ Organic vapor		
	*see key equipment			☐ Specialty/other*		

Project development team		Modified by	Reviewed by	Date
Name	**Signature**			
Dennis Hoyt				
Craig Gebhardt				

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
1	Coordinate site access	• Delays or added work	• Notify Station Manager of schedule • Notify other required personnel if applicable (city, regulators, private property owners, etc.)		
2	Mobilize with proper equipment/ supplies for sampling	• Delay or improper/unsafe performance of work due to improper equipment on site • Cross-contamination of wells	• Review work plan to determine equipment/supply needs • Make sure all sampling/gauging equipment is decontaminated • Bring ice for sample storage • Review THE HASP and gather necessary PPE		
3	Notify other personnel on site	• Unknown traffic or other work hazards • Lack of communication between all interested parties	• Meet with station attendant or other site personnel and explain planned activities		
4	Determine sampling order	• Cross-contamination of samples and wells due to incomplete decontamination of sampling equipment	• Review prior analytical results and set sampling order from lowest to highest concentration wells		
5	Perform STAR and tailgate safety meeting upon arrival at site	• Consider worst-case scenario (including weather conditions)	• Review HASP with co-workers • Highlight aspects identified by HASP and, if necessary, add to HASP • Get signature of all co-workers on HASP		
6	Set up exclusion zone(s)	• Injury or exposure to public or other on-site personnel • Slip/trip/fall hazards	• Implement exclusion zone setup instructions of THE HASP (barricades, caution tape, cones, etc.) • Set up work area free of trip hazards		

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
7	Gauge water levels and product thickness (where applicable) in wells	• Back strain • Inhalation or dermal exposure to chemical hazards	• Don any additional PPE and initiate air quality monitoring in accordance with the HASP • Maintain safe distance from well head • Bend at knees, not waist		
8	Purge well(s) and collect purge water	• Cross-contamination • Lifting hazards • Back injury • Manual material handling • Inhalation or dermal exposure to chemicals • Slip/trip/fall hazards • Spilling contaminated water	• Decontaminate purging equipment between each sampling location • Reduce travel distance when there is a need to carry/lift materials • Make sure grip is adequate; wear leather/cotton gloves • Size up the load; if the object is too large or odd shaped OR is in excess of 50 pounds (23 kg) then assistance (mechanical or a buddy lift) will be required • Lift with the legs (bend at the knees and use the leg muscles) to protect the lower back and keep lower back in a neutral position • Avoid one-handed carrying if possible; maintain awareness of footing • Use PPE and monitoring in accordance with the HASP • Keep work area clear of tripping or slipping hazards • Store purge water in appropriate containers		
9	Collect samples in accordance with sampling plan	• Cross-contamination • Lifting hazards • Back injury • Manual material handling • Inhalation or dermal exposure to chemical hazards • Slip/trip/fall hazards • Improper labeling or storage • Injury due to acid burn (unsealed or leaking sample bottle) • Injury from broken sample bottle (cuts or acid burn)	• Use PPE in accordance with the HASP • Use PPE whenever handling or labeling samples • Decontaminate sampling equipment between each well (unless disposable) • Refer to step 9 and the HASP for additional lifting methods • Label samples in accordance with sampling plan • Keep samples stored in proper containers, at correct temperature, and away from work area • Wear nitrile gloves when handling bottles • Handle bottles carefully		

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
10	Dispose or store purge water onsite	• Lifting hazards • Back injury • Manual material handling • Exposure to chemicals • If disposing through on-site treatment system, damage or injury from improper use of equipment • Improper storage or disposal	• Use proper equipment to transport water (pumps, drum dollies, etc.) • Refer to step 9 and the HASP for additional lifting methods • Where PPE in accordance with the HASP • Review any necessary instructions for use of on-site treatment systems • Label storage containers properly and locate in isolated area away from traffic and other site functions • Coordinate off-site disposal (where applicable)		
11	Clean site/demobilize	• Traffic • Nuisance or safety hazard left on site • Back strain	• Use buddy system as necessary to remove traffic control • Leave site clean of refuse and debris • Notify station personnel of departure, and note any purge water left on site • Exercise caution when lifting coolers out of the trunk of a car; use the buddy system if justified		
12	Package and deliver samples to lab	• Bottle breakage • Improper temperature • Exceeding hold times • Improper completion of Chain of Custody (COC)	• Pack samples in ice, use bubble wrap/bags for sample bottles • Use standard COC forms and labels • Submit samples to lab as soon as possible (no more than 3 days, but check sampling plan for any special requirements such as rush turnaround or special hold time restrictions)		

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(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

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

Name/Company	Sign	Date

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

Presenter signature: _____ Date/time: _____

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

Supervisor signature: _____ Date/time: _____

Location of mustering point: _____ Wind direction (current): _____

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

Supervisor signature documenting daily debrief has been completed: _____

Job **Safety Analysis (JSA)**

Oversight of Monitoring Well Installation and/or Soil Boring

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

Date issued/revised:		**Client:**			
Project number:		**Created by**		**Sim OPS Yes/No**	**SSE on site? Yes/No**
Project address:					
Specific task	Oversight of installation of monitoring wells, abandonment of monitoring wells, and general repair (bollards and concrete pads).				
Key equipment:	Air monitoring equipment; safety cones/fencing/barricades (not needed in vacant, fenced areas)				
Task-specific training:					

Hard hat	**Gloves (ANSI/EN 388)**	**Eye protections**	**Fall protection**	**APR**	**Vest**	**PPE clothing**
☐ Type I (top impact)	☐ Chemical protective (i.e. nitrile)	☒ ANSI/CSA safety glasses	☐ Harness	☐ Full face mask	☒ Class II	☐ Coveralls
☐ Type II (side impact)	☐ Level 1 light duty	☐ Goggles/spoggles	☐ Shock absorb lanyard	☐ Half face mask	☐ Class III	☐ Fire retardant clothing (FRC)
☒ Class E (standard)	☒ Level 2 light duty with protection	☐ Face shield	☐ Lifeline		☐ Anti-static	☐ High viz clothing
☐ Class G	☐ Level 3 medium duty	☐ Other*		**Cartridges**	☐ FRC	☐ Long pants
	☐ Level 4 heavy duty			☐ N95		☐ Long sleeve shirts
Foot protection	☐ High viz	**Hearing protection**	**Arc flash**	☐ P100		☐ Paper tyvek
☒ Industrial grade safety boot	☐ Other*	☐ NOT Required	☐ Haz.cat 2	☐ P95		☐ Polyethyene tyvek
☐ Rubber boots (industrial grade)		☒ Required	☐ Haz cat 4	☐ R95		☐Other *
☐ Hip waders				☐ Organic vapor		
	*see key equipment			☐ Specialty/other*		

Project development team		Modified by	Reviewed by	Date
Name	**Signature**			
Dennis Hoyt				
Craig Gebhardt				

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
1	Markout underground utilities	• Property damage • Explosion • Electrocution • Injury • Death	• Call public underground utility agency (One-Call) at least 5 or more days prior to work activities • Review State Law pertaining to underground pipe line safety and have private utility mark-out performed • Expose lines if warranted (i.e., hand dig, test pit, or daylight)	Project Manager and Site Supervisor	
2	Conduct site walk - identify unsafe conditions and determine sample point locations	• Traffic hazard • Slip/trip/fall hazards • Biological hazard • Overhead/underground hazards	• Maintain awareness of on-site traffic and walking surfaces • When selecting soil boring locations, be aware of biological hazards (e.g., ants, poison ivy, wasps) and overhead/underground hazards (e.g., overhead utilities, concrete scarring, station canopy)	Site Personnel	
3	Equipment inspection	• Pinch points • Property damage • Lost time due to damaged equipment/parts	• Discuss pinch points on equipment (e.g., drill rig, air knife, pressure washer, etc.) • Familiarize all personnel with location/operation of fire extinguisher(s) and kill switch on drill rig • Visually inspect equipment/parts for damage and document inspections	Site Personnel	

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
4	Set up work zone for drilling	• Traffic hazard • Slip/trip/fall hazards • Property damage • Overhead hazards • Environmental impact • Unstable ground conditions	• Maintain awareness of on-site traffic, work zones, walking surfaces, overhead hazards (e.g., canopy and low hanging overhead lines) • Utilize barricades/cones/caution tape to define work zone and direct traffic • Wear leather/cotton when setting up barricades • Be aware of any potential sensitive receptors and verify all personnel are aware of the location of spill kit • Inspect soil for loose, soft or unstable conditions under rig jacks or outriggers	Site Personnel	
5	Set up staging area	• Traffic hazard • Slip/trip/fall hazards • Lifting hazards • Back injury • Manual material handling • Pinch points • Heat/cold stress	• Maintain awareness of on-site traffic and walking surfaces • Utilize barricades/cones/caution tape to define work zone and direct traffic • Reduce distance needed to travel when carrying materials and or equipment • Wear leather/cotton gloves when setting up barricades • Size up the load, If the object is too large or odd shaped OR is in excess of 50 pounds (23 kg) then assistance (mechanical or a buddy lift) will be required. • Lift with the legs (bend at the knees and use the leg muscles) to protect the lower back and keep lower back in a neutral position • Avoid one-handed carrying if possible; maintain awareness of footing • Avoid placing hands/fingers in pinch point locations • In extreme temperatures, ensure all personnel have proper clothing, hydration, and heat/cold protection (e.g., canopy, fan, glove warmers)	Site Personnel	

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
6	Contractor oversight/ management of hole clearance/drilling activities	• Traffic hazard • Slip/trip/fall hazards • Lifting hazards • Back injury • Manual material handling • Damage to underground utilities • Contaminant exposure • Heat/cold stress • Injury to personnel and public • Cross-contamination • Equipment failure	• Maintain awareness of on-site traffic and practice good housekeeping • Perform a prestart meeting, inform subcontractor of safe lifting practices • Refer to step 5 and the HASP for additional lifting information • Ensure subcontractors don proper PPE (e.g., face shield, leather/cotton gloves, hearing protection). No loose clothing. • Complete and sign off utility clearance. If non-native material (e.g., pea gravel, sand, fill material) or underground utilities are observed, utilize SWA and assess situation. • Monitor breathing zone and refer to HASP for action levels • Monitor all personnel for signs and symptoms of heat/cold stress and refer to HASP for recommendations • Be aware of unsafe hoisting and material handling practices • Be aware of proper augering and auger handling techniques. Visually monitor performance and functioning of drill rig for signs of failure. Monitor safe drill movement/positional setup. • Decontaminate sampling equipment after collecting a sample and decontaminate drilling equipment after each borehole • Watch where you step, look for debris which may be covered by brush or rubble	Site Personnel	

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
7	Construct well	• Lifting hazards • Back injury • Manual material handling • Cross-contamination • Non-approved construction • Slip, trip, and fall hazards • Eye injury • Cuts	• Use proper lifting techniques as discussed in Step 5 and HASP • Prior to going into the borehole, inspect casing and other materials to ensure they are free of jagged/sharp edges • Confirm construction with project manager • Ensure presence or other authorization by any required inspectors for well installation/grouting • Keep pathways and work area clean of debris and possible tripping hazards • Use PPE and monitoring in accordance with the JSA • Use safe cutting tools (no fixed open blade knives)		
8	Site/boring security, clean site, demobilize	• Traffic hazard • Slip/trip/fall hazards • Lifting hazards • Back safety • Manual material handling	• Use buddy system as necessary to remove traffic control • Do not work with your back to traffic • Wear leather/cotton gloves when moving barricades • Maintain awareness of on-site traffic and walking surfaces • Maintain proper lifting techniques as described in Step 5 and HASP. • Ensure good housekeeping methods are practiced. Work area is kept clean of debris. • Leave site clean of refuse and debris • Clearly mark/barricade any borings that need later topping off or curing • Notify property personnel of departure • Secure boring location if open overnight		

(1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

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

Name/Company	Sign	Date

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

Presenter signature: _____ Date/time: _____

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

Supervisor signature: _____ Date/time: _____

Location of mustering point: _____ Wind direction (current): _____

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

Supervisor signature documenting daily debrief has been completed: _____

Job **Safety Analysis (JSA)**

Soil Borings

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

Date issued/revised:		**Client:**			
Project number:		**Created by**		**Sim OPS Yes/No**	**SSE on site? Yes/No**
Project address:					
Specific task					
Key equipment:	Air monitoring equipment; safety cones/fencing/barricades				
Task-specific training:					

Hard hat	Gloves (ANSI/EN 388)	Eye protections	Fall protection	APR	Vest	PPE clothing
☐ Type I (top impact)	☐ Chemical protective (i.e. nitrile)	☒ ANSI/CSA safety glasses	☐ Harness	☐ Full face mask	☒ Class II	☐ Coveralls
☐ Type II (side impact)	☒ Level 1 light duty	☐ Goggles/spoggles	☐ Shock absorb lanyard	☐ Half face mask	☐ Class III	☐ Fire retardant clothing (FRC)
☒ Class E (standard)	☐ Level 2 light duty with protection	☐ Face shield	☐ Lifeline		☐ Anti-static	☐ High viz clothing
☐ Class G	☐ Level 3 medium duty	☐ Other*		**Cartridges**	☐ FRC	☐ Long pants
	☐ Level 4 heavy duty			☐ N95		☐ Long sleeve shirts
Foot protection	☐ High viz	**Hearing protection**	**Arc flash**	☐ P100		☐ Paper tyvek
☒ Industrial grade safety boot	☐ Other*	☐ NOT Required	☐ Haz.cat 2	☐ P95		☐ Polyethyene tyvek
☐ Rubber boots (industrial grade)		☒ Required	☐ Haz cat 4	☐ R95		☐Other *
☐ Hip waders				☐ Organic vapor		
	*see key equipment			☐ Specialty/other*		

Project development team		Modified by	Reviewed by	Date
Name	**Signature**			
Dennis Hoyt				
Craig Gebhardt				

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
1	Mark out underground utilities	• Property damage • Explosion • Electrocution • Injury • Death	• Call public underground utility agency (One-Call) at least 5 or more days prior to work activities • Review state law pertaining to underground pipe line safety and have private utility mark-out performed • Expose lines if warranted (i.e., hand dig, test pit, or daylight)	Project Manager and Site Supervisor	
2	Conduct site walk, identify unsafe conditions, and determine sample point locations	• Traffic • Slip/trip/fall hazards • Biological hazard • Overhead/underground hazards	• Maintain awareness of on-site traffic and walking surfaces • When selecting soil boring locations, be aware of biological hazards (e.g., ants, poison ivy, wasps) and overhead/underground hazards (e.g., overhead utilities, concrete scarring, station canopy)	Site Personnel	
3	Equipment inspection	• Pinch points • Property damage • Lost time due to damaged equipment/parts	• Discuss pinch points on equipment (e.g., drill rig, air knife, pressure washer, etc.) • Familiarize all personnel with location/operation of fire extinguisher(s) and kill switch on drill rig • Visually inspect equipment/parts for damage and document inspections	Site Personnel	

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
4	Set up work zone for drilling	• Traffic • Slip/trip/fall hazards • Property damage • Overhead hazards • Environmental impact • Unstable ground conditions	• Maintain awareness of on-site traffic, work zones, walking surfaces, overhead hazards (e.g., canopy and low hanging overhead lines) • Utilize barricades/cones/caution tape to define work zone and direct traffic • Wear leather/cotton when setting up barricades • Be aware of any potential sensitive receptors and verify all personnel are aware of the location of spill kit • Inspect soil for loose, soft or unstable conditions under rig jacks or outriggers	Site Personnel	
5	Set up staging area	• Traffic • Slip/trip/fall hazards • Lifting hazards • Manual material handling • Back injury • Pinch points • Heat/cold stress	• Maintain awareness of on-site traffic and walking surfaces • Utilize barricades/cones/caution tape to define work zone and direct traffic • Reduce travel distance when there is a need to carry/lift materials • Make sure grip is adequate; wear leather/cotton gloves • Size up the load; if the object is too large or odd shaped OR is in excess of 50 pounds (23 kg) then assistance (mechanical or a buddy lift) will be required • Lift with the legs (bend at the knees and use the leg muscles) to protect the lower back and keep lower back in a neutral position • Avoid one-handed carrying if possible; maintain awareness of footing • Avoid placing hands/fingers in pinch point locations • In extreme temperatures, ensure all personnel have proper clothing, hydration, and heat/cold protection (e.g., canopy, fan, glove warmers)	Site Personnel	

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
6	Contractor oversight/ management of hole clearance/drilling activities	• Traffic • Slip/trip/fall hazards • Lifting hazards • Back injury • Manual material handling • Underground utilities • Contaminant exposure • Heat/cold stress	• Maintain awareness of on-site traffic and practice good house keeping • Ensure subcontractors don proper PPE (e.g., face shield, leather/cotton gloves, hearing protection) and utilize proper lifting techniques • If non-native material (e.g., pea gravel, sand, fill material) or underground utilities are observed, utilize SWA and assess situation • Perform a prestart meeting, inform the subcontractor of safe lifting practices • Refer to step 5 and the HASP for additional lifting information • Monitor safe drill movement/positional setup • Monitor breathing zone and refer to the HASP for action levels • Monitor all personnel for signs and symptoms of heat/cold stress and refer to the HASP for recommendations • Be aware of unsafe hoisting and material handling practices • Be aware of proper augering and auger handling techniques	Site Personnel	
7	Site/boring security	• Traffic • Slip/trip/fall hazards • Lifting hazards • Back injury • Manual material handling	• Wear leather/cotton gloves when moving barricades • Maintain awareness of on-site traffic and walking surfaces • Maintain proper lifting techniques as described in steps 5 and 6. • Ensure good housekeeping methods are practiced and work area is kept clean of debris • Secure boring location if open overnight	Site Personnel	

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(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

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

Name/Company	Sign	Date

SAFE YOU ME GHD
ENVIRONMENT & PEOPLE

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

Presenter signature: _____ Date/time: _____

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

Supervisor signature: _____ Date/time: _____

Location of mustering point: _____ Wind direction (current): _____

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

Supervisor signature documenting daily debrief has been completed: _____

Job **Safety Analysis (JSA)**

Soil Sampling

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

Date issued/revised:		**Client:**			
Project number:		**Created by**		**Sim OPS Yes/No**	**SSE on site? Yes/No**
Project address:					
Specific task	Soil sampling				
Key equipment:	Air monitoring equipment, PPE - Tyvek if Level C initiated; gloves dependent on the task and chemical contamination present or suspected present				
Task-specific training:	GHD Field Method Training on Soil Sampling Procedures				

Hard hat	**Gloves (ANSI/EN 388)**	**Eye protections**	**Fall protection**	**APR**	**Vest**	**PPE clothing**
☐ Type I (top impact)	☐ Chemical protective (i.e. nitrile)	☒ ANSI/CSA safety glasses	☐ Harness	☐ Full face mask	☒ Class II	☐ Coveralls
☐ Type II (side impact)	☐ Level 1 light duty	☐ Goggles/spoggles	☐ Shock absorb lanyard	☐ Half face mask	☐ Class III	☐ Fire retardant clothing (FRC)
☒ Class E (standard)	☐ Level 2 light duty with protection	☐ Face shield	☐ Lifeline		☐ Anti-static	☐ High viz clothing
☐ Class G	☐ Level 3 medium duty	☐ Other*		**Cartridges**	☐ FRC	☐ Long pants
	☐ Level 4 heavy duty			☐ N95		☐ Long sleeve shirts
Foot protection	☐ High viz	**Hearing protection**	**Arc flash**	☐ P100		☐ Paper tyvek
☒ Industrial grade safety boot	☒ Other*	☒ NOT Required	☐ Haz.cat 2	☐ P95		☐ Polyethyene tyvek
☐ Rubber boots (industrial grade)		☐ Required	☐ Haz cat 4	☐ R95		☒ Other *
☐ Hip waders				☐ Organic vapor		
	*see key equipment			☐ Specialty/other*		

Project development team		Modified by	Reviewed by	Date
Name	**Signature**			
Dennis Hoyt				
Craig Gebhardt				

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
1	Discuss STAR and SWA	• Site personnel not aware of STAR and SWA	• Project team (GHD) discusses importance of and documentation procedures for SWA during pre-job safety meeting • Use SWA to stop any work that is unsafe	Site Personnel	
2	Inspect and calibrate sampling and monitoring equipment	• Lost time from improperly functioning equipment • Incorrect sampling procedures/ collection due to malfunctioning equipment	• Ensure all equipment is functioning properly • Complete Quality Control documents	Sampling Technician	
3	Prepare to collect soil samples	• Lifting hazards • Back injury • Manual material handling • Pinch points • Cuts • Punctures • Sample misidentification	• Size up the load; if the object is too large or odd shaped OR is in excess of 50 pounds (23 kg) then assistance (mechanical or a buddy lift) will be required • Lift with the legs (bend at the knees and use the leg muscles) to protect the lower back and keep lower back in a neutral position • Avoid one-handed carrying if possible; maintain awareness of footing • No bending or twisting while under load • Refer to the HASP for additional lifting information • Avoid placing hands/fingers in pinch point locations • Use proper tools when opening container packaging • Do not use fixed open blade knives when opening boxes or containers • Ensure the sample id label matches sample location with site plan/GHD site supervisor/subcontractor	Sampling Technician	

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
4	Opening the sample sleeve (if applicable)	• Cuts due to sharp edges of sample sleeve • Contaminant exposure	• Use sleeve cutter for opening the sample sleeves • Keep hands clear of the sleeve when cutting • Wear nitrile gloves • Maintain awareness of sharp edges of sample sleeve	Sampling Technician	
5	Sample collection	• Contaminant exposure • Cuts from container breakage • Sample misidentification	• Wear nitrile gloves and replace between soil samples • Inspect glass bottles for breaks/cracks • Do not attempt to use any suspect containers • Close glass sample containers carefully to avoid breakage • Check sample labels for accuracy prior to placing in cooler	Sampling Technician	
6	Headspace screening of samples	• Contaminant exposure • Incorrect headspace readings	• Wear nitrile gloves • Ensure proper calibration of equipment	Sampling Technician	
7	Sample selection	• Bottle breakage • Contaminant exposure • Pinch points • Lost time due to incorrect sample selection	• Wear nitrile gloves when handling sample containers • Confirm selected samples are correct based on work plan selection criteria, PID readings, and soil boring logs • Avoid placing hands/fingers in pinch point locations (e.g., between cooler and lid)	Sampling Technician	

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
8	Packing samples in cooler(s)	• Bottle breakage • Contaminant exposure • Cuts • Pinch points • Lifting hazards • Back injury • Manual material handling • Lost time due to incorrect sample packaging or hold time exceedances	• Wear nitrile gloves when handling sample containers • Pack glass containers in bubble wrap • Check COC against sample labels and SSOW for accuracy before shipping • Avoid placing hands/fingers in pinch point locations (e.g., between cooler and lid) • Use proper lifting techniques as discussed in step 3 • If possible use a dolly or cart if cooler is heavy or has to be moved over a long distance • Ensure equipment and supplies are loaded correctly and do not shift during transport	Sampling Technician	
9	Investigation derived waste (IDW) management	• Contaminant exposure • Lifting hazards • Back injury • Manual material handling • Pinch points • Slips/trips/fall hazards • Mislabeled waste	• Wear nitrile gloves when handling IDW • Use proper lifting techniques as discussed in step 3 • Avoid placing hands/fingers in pinch point locations • Maintain awareness of walking surfaces • Label IDW with generator, a contact number, identification of contents, and site location • Specify IDW as either hazardous or non-hazardous material	Sampling Technician	

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(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

Site personnel participating in JSA review:
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Name/Company	Sign	Date

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

Presenter signature: _____ Date/time: _____

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

Supervisor signature: _____ Date/time: _____

Location of mustering point: _____ Wind direction (current): _____

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

Supervisor signature documenting daily debrief has been completed: _____

Job **Safety Analysis (JSA)**

Driving and Off-Road Driving

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

Date issued/revised:		**Client:**			
Project number:		**Created by**		**Sim OPS** Yes/No	**SSE on site?** Yes/No
Project address:					
Specific task	Travel on rough roads, fields, ravines, creek beds				
Key equipment:	Four-wheel drive vehicle, valid driver's license, 360-degree topper; seat belt				
Task-specific training:	Defensive Driving; review of owner's/operator's manual				

Hard hat	**Gloves (ANSI/EN 388)**	**Eye protections**	**Fall protection**	**APR**	**Vest**	**PPE clothing**
☐ Type I (top impact)	☐ Chemical protective (i.e. nitrile)	☐ ANSI/CSA safety glasses	☐ Harness	☐ Full face mask	☐ Class II	☐ Coveralls
☐ Type II (side impact)	☐ Level 1 light duty	☐ Goggles/spoggles	☐ Shock absorb lanyard	☐ Half face mask	☐ Class III	☐ Fire retardant clothing (FRC)
☐ Class E (standard)	☐ Level 2 light duty with protection	☐ Face shield	☐ Lifeline		☐ Anti-static	☐ High viz clothing
☐ Class G	☐ Level 3 medium duty	☐ Other*		**Cartridges**	☐ FRC	☐ Long pants
	☐ Level 4 heavy duty			☐ N95		☐ Long sleeve shirts
Foot protection	☐ High viz	**Hearing protection**	**Arc flash**	☐ P100		☐ Paper tyvek
☐ Industrial grade safety boot	☐ Other*	☐ NOT Required	☐ Haz.cat 2	☐ P95		☐ Polyethyene tyvek
☐ Rubber boots (industrial grade)		☐ Required	☐ Haz cat 4	☐ R95		☐Other *
☐ Hip waders				☐ Organic vapor		
	*see key equipment			☐ Specialty/other*		

Project development team		Modified by	Reviewed by	Date
Name	**Signature**			
Dennis Hoyt				
Craig Gebhardt				

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

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

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
8	Driving – Do not deviate from established traffic patterns unless new path/area has been physically walked by personnel and reviewed for hazards; pay attention to hidden obstacles (holes, obscured objects, etc.)	• Arriving late • Collision • Vehicle damage • Injury or death to occupants or other parties • Unseen/hidden obstacles or other hazards	• Acknowledge and comply with all traffic regulations, laws, and ordinances • Do not use 2-way communicating devices or perform other distracting activities while vehicle is in motion • Constantly scan intersections, move eyes, check mirrors, and assess traffic patterns • Maintain safety cushion around vehicle (front, sides, and rear) and 4-second following distance (add an extra second for each hazardous condition, triple following distance in poor weather conditions) • Avoid driving in treed areas that would result in paint and side mirror damage • Do not drive in other vehicles' blind spots • Review path of travel or follow established traffic pattern(s) • Utilize all driving defensive techniques	Driver	
9	Walk the selected route if covered with tall vegetation before driving	• Slip/trip/fall hazards	• Use a walking stick to probe in high vegetation to ensure that ground conditions are suitable for driving at slow speeds	Driver	
10	Clear and grub path if access is required frequently	• Refer to Clearing and Grubbing JSA	• Refer to Clearing and Grubbing JSA	Project Coordinator	
11	Park vehicle	• Pedestrian injury • Property damage	• Maintain awareness of pedestrian/vehicular traffic • Park vehicle in pull-through parking space or facing the exit • Parking in a parking space that is not a designated parking space will require the placement of the 360-degree topper on the hood of the vehicle • Use caution and mirrors/spotter when backing vehicle • Set parking brake	Driver	

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
12	Demobilization	• Collision • Injury or death to occupants or other parties	• Perform perimeter vehicle check • Maintain awareness of pedestrian/vehicular traffic when exiting site • Utilize defensive driving techniques • Complete post-departure checklist and report vehicle problems to company vehicle maintenance manager or rental car agency	Driver or Passenger	
13	Report maintenance or mechanical problems upon returning vehicle	• Conditions worsen leading to mechanical failure resulting in collision and injury	• Report vehicle problems immediately to company representative or rental car agency • Schedule and/or perform repairs as soon as possible	Driver	

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Name/Company	Sign	Date

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

Presenter signature: _____ Date/time: _____

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

Supervisor signature: _____ Date/time: _____

Location of mustering point: _____ Wind direction (current): _____

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

Supervisor signature documenting daily debrief has been completed: _____

Job **Safety Analysis (JSA)**

Mobilization/Demobilization

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

Date issued/revised:		**Client:**			
Project number:		**Created by**		**Sim OPS Yes/No**	**SSE on site? Yes/No**
Project address:					
Specific task					
Key equipment:	360-degree topper				
Task-specific training:					

Hard hat	**Gloves (ANSI/EN 388)**	**Eye protections**	**Fall protection**	**APR**	**Vest**	**PPE clothing**
☐ Type I (top impact)	☐ Chemical protective (i.e. nitrile)	☐ ANSI/CSA safety glasses	☐ Harness	☐ Full face mask	☐ Class II	☐ Coveralls
☐ Type II (side impact)	☒ Level 1 light duty	☐ Goggles/spoggles	☐ Shock absorb lanyard	☐ Half face mask	☐ Class III	☐ Fire retardant clothing (FRC)
☐ Class E (standard)	☐ Level 2 light duty with protection	☐ Face shield	☐ Lifeline		☐ Anti-static	☐ High viz clothing
☐ Class G	☐ Level 3 medium duty	☐ Other*		**Cartridges**	☐ FRC	☐ Long pants
	☐ Level 4 heavy duty			☐ N95		☐ Long sleeve shirts
Foot protection	☐ High viz	**Hearing protection**	**Arc flash**	☐ P100		☐ Paper tyvek
☒ Industrial grade safety boot	☐ Other*	☐ NOT Required	☐ Haz.cat 2	☐ P95		☐ Polyethyene tyvek
☐ Rubber boots (industrial grade)		☐ Required	☐ Haz cat 4	☐ R95		☐Other *
☐ Hip waders				☐ Organic vapor		
	*see key equipment			☐ Specialty/other*		

Project development team		Modified by	Reviewed by	Date
Name	**Signature**			
Dennis Hoyt				
Craig Gebhardt				

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
1	Discuss STAR and SWA	• Site personnel not aware of STAR and SWA	• Project team (GHD) discusses importance of and documentation procedures for SWA during pre-job safety meeting • Use SWA to stop any work that is unsafe		
2	Check weather	• Unexpected storm • Fog, rain, snow; lightening/thunder • Heat/cold stress	• Check local weather forecast • If adverse weather conditions are likely, prepare a contingency plan for lodging, etc. with project manager • Discuss weather issues and precautions to take while driving and on site during the pre-job safety meeting • If weather conditions (e.g., fog, rain, snow, etc.) impair the ability/vision of the driver, exit at nearest safe location and assess the situation • While on site, at first sign of lightening/thunder utilize SWA and assess weather conditions • In extreme temperatures, ensure all personnel have proper clothing, hydration, and heat/cold protection (e.g., canopy, fan, glove warmers)		

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
3	Load equipment into vehicle	• Lifting hazards • Manual material handling • Back injury • Cuts • Pinch points • Hand/foot injury • Forgotten or damaged equipment • Materials or equipment leaving the vehicle bed during travel create hazards for other drivers	• Reduce travel distance when there is a need to carry/lift materials • Make sure grip is adequate; wear leather/cotton gloves • Size up the load; if the object is too large or odd shaped OR is in excess of 50 pounds (23 kg) then assistance (mechanical or a buddy lift) will be required • Maintain neutral back posture - Lift with the legs (bend at the knees and use the leg muscles) to protect the lower back and make sure to shift with the feet rather than twisting at the back • Maintain neutral wrist posture when lifting, carrying, pushing or pulling. The wrist is the strongest and most stable when it is straight. • Avoid one-handed carrying if possible; maintain awareness of footing • Avoid placing hands/fingers in pinch point locations • Wear safety-toed boots • Verify requested equipment against warehouse form • Load equipment in an organized manner to prevent shifting during transport or use cargo netting • Secure materials or equipment with cargo netting. Ensure netting does not loosen during travel by securing the straps with plastic wire ties or equivalent measures.		

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
4	Complete GHD Daily Operator Vehicle Checklist	• Damaged vehicle lights, tires, windows, mirrors, horn • Inadequate vehicle documents and/or safety items	• Check for fluid leaks under vehicle • Test operation of headlights, front/rear turn signals, backup lights, brake lights, and emergency flashers • Visually check the pressure/wear of tires • Ensure the vehicle has a spare tire • Assure windshield and window glass is clean and free from obstructions • Test the windshield wipers and horn • Verify vehicle registration, insurance card, and inspection sticker is present and valid • Ensure the vehicle contains a first aid kit, fire extinguisher, and road hazard kit • Check immediate vehicle perimeter and initial path of travel for obstructions		
5	Check and adjust seat, steering wheel, headrest, and mirrors	• Back/body strain • Blind spot • Impaired vision	• Adjust seat, headrest, and steering wheel height so body is fully supported/comfortable and pedals are within easy reach • Ensure mirrors are properly adjusted		
6	Fasten seat belt(s) and ensure passenger(s) seat belts are fastened	• Serious injury, ejection, or death from collision and/or traffic citation	• Verify driver and passenger(s) seat belts are in good condition and properly latched		
7	Ensure vehicle doors are locked	• Serious injury, ejection, or death from collision • Unwanted intrusion • Lost equipment	• Manually lock all doors to vehicle		
8	Start engine and check gauges and warning lights	• Vehicle breakdown	• Verify sufficient fuel and other hazard lamps (e.g., battery, oil, and temperature) are not lit		
9	Mobilize to site	• Arriving late • Collision • Injury or death to occupants or other parties	• Do not use cell phones or perform other distracting activities while vehicle is in motion • Constantly scan intersections, move eyes, check mirrors, and assess traffic lights (fresh vs. stale) • Maintain safety cushion around vehicle (front, sides, and rear) and 4-second following distance • Utilize all driving defensive techniques		

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
10	Arrive at site	• Pedestrian injury • Collision	• Maintain awareness of pedestrian/vehicular traffic when entering site and traveling to work zone		
11	Park vehicle	• Pedestrian injury • Collision • Property damage	• Maintain awareness of pedestrian/vehicular traffic • Park vehicle in pull-through parking space or facing the exit • Parking in a parking space that is not a designated parking space will require the placement of the 360-degree topper on the hood of the vehicle • Use caution and mirrors/spotter when backing vehicle • Set parking brake		
12	Demobilization	• Collision • Injury or death to occupants or other parties	• Check immediate vehicle perimeter and initial path of travel for obstructions • Maintain awareness of pedestrian/vehicular traffic when exiting site • Utilize defensive driving techniques • Complete post-departure checklist and report vehicle problems to company vehicle maintenance manager or rental car agency		

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Location of mustering point: _____ Wind direction (current): _____

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Supervisor signature documenting daily debrief has been completed: _____

Job **Safety Analysis (JSA)**

Routine O&M Activities

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

Date issued/revised:		**Client:**			
Project number:		**Created by**		**Sim OPS Yes/No**	**SSE on site? Yes/No**
Project address:					
Specific task	Routine O&M activities				
Key equipment:	Multi-Phase Extraction (MPX) System; NRR 20 hearing protection, leather or nitrile gloves				
Task-specific training:	40-hour HAZWOPER or 8-hour Refresher, HAZComm, PPE, New Jersey N2 License				

Hard hat	**Gloves (ANSI/EN 388)**	**Eye protections**	**Fall protection**	**APR**	**Vest**	**PPE clothing**
☐ Type I (top impact)	☒ Chemical protective (i.e. nitrile)	☒ ANSI/CSA safety glasses	☐ Harness	☐ Full face mask	☐ Class II	☐ Coveralls
☐ Type II (side impact)	☒ Level 1 light duty	☐ Goggles/spoggles	☐ Shock absorb lanyard	☐ Half face mask	☐ Class III	☐ Fire retardant clothing (FRC)
☒ Class E (standard)	☐ Level 2 light duty with protection	☐ Face shield	☐ Lifeline		☐ Anti-static	☐ High viz clothing
☐ Class G	☐ Level 3 medium duty	☐ Other*		**Cartridges**	☐ FRC	☐ Long pants
	☐ Level 4 heavy duty			☐ N95		☐ Long sleeve shirts
Foot protection	☐ High viz	**Hearing protection**	**Arc flash**	☐ P100		☐ Paper tyvek
☒ Industrial grade safety boot	☐ Other*	☐ NOT Required	☐ Haz.cat 2	☐ P95		☐ Polyethyene tyvek
☐ Rubber boots (industrial grade)		☒ Required	☐ Haz cat 4	☐ R95		☐Other *
☐ Hip waders				☐ Organic vapor		
	*see key equipment			☐ Specialty/other*		

Project development team		Modified by	Reviewed by	Date
Name	**Signature**			
Dennis Hoyt				
Craig Gebhardt				

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
1	Tailgate safety meeting	• Not identifying all hazards while performing tasks • Injury • Property damage	• Discuss work to be performed and associated hazards with GHD personnel and subcontractors • Include discussion on hospital route, evacuation procedures, and emergency contacts; complete daily tailgate forms • Discuss site-specific requirements for working on facility • Refer to task-specific JSAs for other O&M activities	GHD project personnel on site	
2	Discuss STAR and SWA	• Site personnel (GHD and subcontractors) not aware of STAR and SWA	• Project team (GHD) discusses importance of and documentation procedures for SWA during pre-job safety meeting • Determine whether current procedures and JSAs are adequate for the task at hand; if procedures/JSAs are not adequate, GHD personnel will need to re-evaluate and develop proper procedures and JSAs before proceeding with tasks • Use SWA to stop any work that is unsafe	GHD project personnel on site	
3	Routine O&M activities	• Slip/trip/fall hazards	• Keep work areas and walkways free of excess materials and debris to reduce trip hazards • Keep all work surfaces dry when possible	GHD project personnel on site	
3, continued	Routine O&M activities, continued	• Heat and cold stress	• Take breaks if you feel tired or start to sweat excessively • Consume adequate food/beverage – keep hydrated	GHD project personnel on site	

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
3, continued	Routine O&M activities, continued	• Biological hazards	• Inspect work area upon arrival to identify biological hazards (snakes, insects, poisonous plants, etc) • Open enclosures slowly and cautiously while looking for the possible presence of biological hazards	GHD project personnel on site	
3, continued	Routine O&M activities, continued	• Fire/explosion	• Do not smoke in work area • Ensure that there are two 20-pound fully charged fire extinguishers in the trailer (as per owner's requirements) and perform monthly inspection of each unit • Ensure that a fire watch is implemented for activities that involve hot work and ensure that the fire watch procedure meets the requirements of the facility	GHD project personnel on site	
3, continued	Routine O&M activities, continued	• Equipment containing impact, high temperature, or pressurized liquids and gases (pneumatic pumps, compressors, piping, etc.)	• Perform Lock-out/Tag-out (LOTO) procedures • Drain and relieve pressure from lines before opening or loosening fittings • Wear appropriate PPE require for task at hand • Inspect tools prior to use, if faulty, do not use • Avoid potential hot surfaces and ensure that potential hot surfaces are labeled	GHD project personnel on site	
3, continued	Routine O&M activities, continued	• Contaminated materials	• Wear appropriate PPE required for task at hand	GHD project personnel on site	
3, continued	Routine O&M activities, continued	• High noise levels	• Hearing protection must be worn while working around operating equipment	GHD project personnel on site	
3, continued	Routine O&M activities, continued	• Moving equipment	• Keep hands and loose clothing away from moving equipment	GHD project personnel on site	
3, continued	Routine O&M activities, continued	• Sharp materials	• Wear appropriate PPE including leather gloves, hard hat	GHD project personnel on site	

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
3, continued	Routine O&M activities, continued	• Lifting hazards • Manual material handling • Back injury	• Reduce travel distance when there is a need to carry/lift materials • Make sure grip is adequate; wear leather/cotton gloves • Size up the load; if the object is too large or odd shaped OR is in excess of 50 pounds (23 kg) then assistance (mechanical or a buddy lift) will be required • Lift with the legs (bend at the knees and use the leg muscles) to protect the lower back and keep lower back in a neutral position • Avoid one-handed carrying if possible; maintain awareness of footing	GHD project personnel on site	
3, continued	Routine O&M activities, continued	• Electric/battery contact	• Ensure electrical service has been shut down and follow LOTO procedures to ensure power remains off prior to opening panel or working on electrical components • Inspect power tools/electrical cords prior to use, if faulty do no use until repaired or replaced • Electrical cords must be grounded and inserted into a GFCI outlet	GHD project personnel on site	

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Supervisor signature: _____ Date/time: _____

Location of mustering point: _____ Wind direction (current): _____

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

Supervisor signature documenting daily debrief has been completed: _____

Job **Safety Analysis (JSA)**

Well Maintenance/Inspection

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

Date issued/revised:		**Client:**			
Project number:		**Created by**		**Sim OPS Yes/No**	**SSE on site? Yes/No**
Project address:					
Specific task	Well maintenance/inspection				
Key equipment:	Minimum Level D PPE; type of gloves dependent on job specific requirements. Additional PPE may be required in the Health and Safety Plan (HASP). Also refer to the HASP for required traffic control, air monitoring, and emergency procedures.				
Task-specific training:	40-Hour HAZWOPER; LPS training (as applicable)				

Hard hat	**Gloves (ANSI/EN 388)**	**Eye protections**	**Fall protection**	**APR**	**Vest**	**PPE clothing**
☐ Type I (top impact)	☐ Chemical protective (i.e. nitrile)	☒ ANSI/CSA safety glasses	☐ Harness	☐ Full face mask	☒ Class II	☐ Coveralls
☐ Type II (side impact)	☐ Level 1 light duty	☒ Goggles/spoggles	☐ Shock absorb lanyard	☐ Half face mask	☐ Class III	☐ Fire retardant clothing (FRC)
☒ Class E (standard)	☐ Level 2 light duty with protection	☐ Face shield	☐ Lifeline		☐ Anti-static	☐ High viz clothing
☐ Class G	☐ Level 3 medium duty	☐ Other*		**Cartridges**	☐ FRC	☐ Long pants
	☐ Level 4 heavy duty			☐ N95		☐ Long sleeve shirts
Foot protection	☐ High viz	**Hearing protection**	**Arc flash**	☐ P100		☐ Paper tyvek
☒ Industrial grade safety boot	☒ Other*	☐ NOT Required	☐ Haz.cat 2	☐ P95		☐ Polyethyene tyvek
☐ Rubber boots (industrial grade)		☒ Required	☐ Haz cat 4	☐ R95		☒Other *
☐ Hip waders				☐ Organic vapor		
	*see key equipment			☐ Specialty/other*		

Project development team		Modified by	Reviewed by	Date
Name	Signature			
Dennis Hoyt				
Craig Gebhardt				

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
1	Coordinate site access	• Delays or added work	• Notify site personnel of schedule • Notify other required personnel if applicable (city, regulators, private property owners, etc.)		
2	Mobilize with proper equipment/supplies	• Delay or improper/unsafe performance of work due to improper equipment on site • Chemical exposure • Lifting hazards • Manual material handling • Back injury	• Review work plan to determine equipment/supply needs • Make sure all equipment is decontaminated • Review the HASP and gather necessary PPE • Reduce travel distance when there is a need to carry/lift materials • Make sure grip is adequate; wear leather/cotton gloves • Size up the load; if the object is too large or odd shaped OR is in excess of 50 pounds (23 kg) then assistance (mechanical or a buddy lift) will be required • Lift with the legs (bend at the knees and use the leg muscles) to protect the lower back and keep lower back in a neutral position • Avoid one-handed carrying if possible; maintain awareness of footing		
3	Notify other personnel on site	• Unknown traffic or other work hazards • Lack of communication between all interested parties	• Meet with site superintendent or other site personnel and explain planned activities • Meet with all affected/interested parties and discuss work hazards		
4	Perform STAR upon arrival at site	• Consider worst-case scenario (including weather conditions)	• Review site-specific procedures • Highlight aspects identified by STAR and, if necessary, add to HASP • Have all co-workers sign the HASP		

Job steps[1]	Task activity	Potential hazard(s)[2] Include energy sources from hazard wheel -	Corrective measure(s)[3]	Person responsible (Print first and last names)	Verified by (Print first and last names)
5	Set up necessary traffic control	• Accident during placement or as a result of improper traffic control equipment placement • Lifting hazards • Manual material handling • Back injury	• Use buddy system for placing traffic control • Refer to step 2 and HASP for additional lifting methods/information • Reference traffic control plan section of the HASP (may include specific requirements based on encroachment permit)		
6	Set up exclusion zone(s)	• Injury or exposure to public or other on-site personnel • Slip and fall hazards to workers	• Implement exclusion zone setup instructions of the HASP (barricades, caution tape, cones, etc.) • Set up work area free of trip hazards		
7	Open well vaults, pull pumps for inspection, reset pumps	• Lifting hazards • Manual material handling • Back injury • Exposure to contaminants • Insect or animal bites • Chemical exposure by pump contents • Pressurized air or electrical hazard	• Identify site-specific hazards using the STAR process and 'dirty' the JSA • Refer to step 2 and HASP for additional lifting methods/information • Wear appropriate PPE • Have first aid kit available • Use tool to open well box • Practice zero energy procedures/lockout		
8	Clean site/demobilize	• Traffic • Nuisance or safety hazard left on site	• Use buddy system as necessary to remove traffic control • Leave site clean of refuse and debris • Notify site personnel of departure, and note any refuse left on site		

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Appendix E
Quality Assurance Project Plan

Table of Contents

Table of Contents

Table Index

1. Introduction

This Quality Assurance Project Plan (QAPP) is Site-specific and has been prepared for the Site Management Plan (SMP) for the Honeywell International, Inc. (Honeywell), Buffalo Research Laboratory facility, located at 20 Peabody Street, Buffalo, New York (Site).

The objectives of this QAPP are to provide data and documentation in support of activities outlined in the SMP. This QAPP provides comprehensive information regarding the project personnel responsibilities and sets forth specific procedures to be used during sampling of relevant environmental matrices and analyses of data.

2. Project Background

2.1 General

This QAPP provides quality assurance/quality control (QA/QC) criteria for work efforts associated with soil and groundwater analyses. Methods for sample analyses have been selected to provide results, which characterize the samples, such that the sampling objectives can be met.

3. Project Organization and Responsibility

A brief description of the duties of the key project personnel is presented below.

Project Manager – Honeywell (or Consultant)

- Provides technical representation for the overall project
- Advises on corrective actions
- Oversees field activities
- Provides resources on an as-needed basis
- Prepares and reviews project-related reports
- Coordinates project technical staff

Project Manager – Laboratory

- Provides laboratory resources on an as-needed basis
- Reviews final analytical reports
- Approves final reports prior to submission to Honeywell

Quality Assurance/Quality Control Officer – Honeywell (or Consultant)

- Reviews laboratory QA/QC
- Coordinates and reviews data validation and assessment
- Advises on laboratory corrective action procedures

- Prepares and writes QA reports
- QA/QC representation of project activities

Quality Assurance/Quality Control Officer – Laboratory

- Coordinates and oversees laboratory systems audits
- Provides an overview of QA/QC documentation
- Conducts detailed data review
- Implements and documents laboratory corrective actions, if required
- Provides technical representation of laboratory QA procedures
- Oversees preparation of laboratory Standard Operating Procedures (SOPs)

Sample Custodian – Laboratory

- Receives and inspects incoming sample containers
- Records the condition of incoming sample containers
- Signs appropriate documents
- Verifies correctness of chain of custody documentation
- Notifies Laboratory Project Manager of non-conformances identified during sample receipt and inspection
- Assigns a unique identification number to each sample, and enters the client identification number and sample identification numbers into the sample receiving log
- Initiates transfer of the samples to appropriate laboratory sections
- Controls and monitors access/storage of samples and extracts

The analytical laboratory selected to perform the analyses will be a full-service chemical analytical laboratory certified by the New York State Department of Health (NYSDOH) through the Environmental Laboratory Approval Program (ELAP) and the Contract Laboratory Program (CLP) for the appropriate categories of analysis.

4. Project Objectives

4.1 Quality Assurance Objectives for Measurement Data

The overall QA objective is to develop and implement procedures for sample collection and analyses which will provide data with an acceptable level of accuracy and precision.

Quality assurance measures for this project will begin with sample containers. Sample containers will be purchased from a certified manufacturer and will be precleaned (I-Chem Series 200 or equivalent).

4.2 Laboratory Quality Assurance

The following subsections define the QA goals required to meet the Data Quality Objectives (DQOs) of the project.

4.2.1 Accuracy, Precision, and Sensitivity of Analysis

The fundamental QA objective with respect to the accuracy, precision, and sensitivity of analytical data is to meet the QC acceptance criteria of each analytical protocol. Analytical methods and targeted detection limits listed have been specified to meet DQOs.

A summary of the targeted detection limits is provided in Table 1. It should be noted that these limits are targeted detection limits only; limits are highly matrix dependent and may not always be achieved.

The method accuracy (percent recovery) will be determined by spiking selected samples (matrix spikes) with the method recommended spiking compounds. Accuracy will be reported as the percent recovery of the spiking compound(s) and will compare with the criteria given in the appropriate methods, as identified in Section 7.0.

The method(s) precision (reproducibility between duplicate analyses) will be determined based on the duplicate analysis of matrix spike samples for organic parameters and duplicate sample analyses for inorganic parameters. Precision will be reported as Relative Percent Differences (RPDs) between duplicate analyses; acceptance criteria will be as specified in the appropriate methods identified in Section 7.0.

4.2.2 Completeness, Representativeness and Comparability

A completeness requirement of 90 percent will be targeted for the program (see Section 13.1.3 for definition of completeness).

4.3 Field Measurement Quality Assurance

Measurement data will be generated during field activities. These activities include, but are not limited to, the following:

i) Documenting time and weather conditions

ii) Observation of sample appearance and other conditions

The general QA objective for measurement data is to obtain reproducible and comparable measurements to a degree of accuracy consistent with the use of standardized procedures.

5. Sampling Procedures

The sample collection procedures are described in Section 5 of the SMP.

The sample container, preservation, shipping, and packaging requirements are identified in Table 2.

6. Sample Custody and Document Control

The following documentation procedures will be used during sampling and analysis to provide Chain of Custody control during transfer of samples from collection through storage. Record keeping documentation will include use of the following:

i) Field logbooks (bound with numbered pages) to document sampling activities in the field

ii) Labels to identify individual samples

iii) Chain of Custody record sheet to document analyses to be performed

iv) Laboratory sample custody logbook

6.1 Field Logbook

In the field, the sampler will record the following information in the field logbook (bound) for each sample collected:

i) Project number

ii) Sample matrix

iii) Name of sampler

iv) Sample source

v) Time and date

vi) Pertinent data (i.e., depth)

vii) Analysis to be conducted

viii) Sampling method

ix) Appearance of each sample (e.g., color, evidence of soil staining)

x) Preservation added, if any

xi) Number of sample bottles collected

xii) Pertinent weather data

Each field logbook page will be signed by the sampler.

6.2 Sample Numbering

A sample numbering system will be used that assigns a unique number to each sample. This system will provide a tracking number to allow retrieval and cross-referencing of sample information. The sample numbering system to be used is described as follows:

In accordance with practices established during the completion of the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI), each groundwater sample will be identified using the following convention:

- Samples will be initialized with the prefix "HBRL" for Honeywell Buffalo Research Laboratory
- The sample location will be identified next (i.e., MW-3)
- The final code will identify the sample collection date by identifying the month and year

Quality assurance/quality control samples will be identified as follows:

- D = duplicate
- MS = matrix spike
- MSD = matrix spike duplicate
- EB = equipment blank

Examples of this convention are as follows:

- HBRL -MW3-0698 = Sample collected from MW-3 in June 1998
- HBRL -MW3-0698D = Duplicate sample collected from MW-3 in June 1998
- HBRL -EB-0698 = Equipment blank collected in June 1998

For soil samples, the following naming convention will apply:

Example: HBRL-SO-XXX-052605

Where: SO - Designates sample Type (SO = Soil)

XXX: Unique sample location ID

052605: Date of collection (mm/dd/yy)

QC samples will also be numbered with a unique sample number.

6.3 Chain of Custody Records

Chain of Custody forms will be completed for all samples collected during the program.

The Chain of Custody form will document the transfer of sample containers. Custody seals will be placed on each cooler. The cooler will then be sealed with packing tape. Sample container labels will include sample number, place of collection and date, and time of collection. All samples will be refrigerated using wet ice at 4°C (±2°C) and delivered to the analytical laboratory within 24 to 48 hours of collection. All samples will be delivered to the laboratory by commercial courier or Contractor personnel. All samples will be stored at 4°C (±2°C) at the laboratory.

The Chain of Custody record, completed at the time of sampling, will contain, but not be limited to, the sample number, date and time of sampling, and the name of the sampler. The Chain of Custody document will be signed, timed, and dated by the sampler when transferring the samples.

Each sample cooler being shipped to the laboratory will contain a Chain of Custody form. The Chain of Custody form will consist of four copies that will be distributed as follows: the shipper will maintain a copy while the other three copies will be enclosed in a waterproof envelope within the cooler with the samples. The cooler will then be affixed with a custody seal and sealed properly for shipment. The laboratory, upon receiving the samples, will complete the three remaining copies. The

laboratory will maintain one copy for their records. One copy will be returned to the QA/QC Officer-Sampling and Analytical Activities upon receipt of the samples by the laboratory. One copy will be returned with the data deliverables package.

Upon receipt of the cooler at the laboratory, the shipping cooler and the custody seal will be inspected by the Sample Custodian. The condition of the cooler and the custody seal will be noted on the Chain of Custody record sheet by the Sample Custodian. The Sample Custodian will record the temperature of one sample (or temperature blank) from each cooler and the temperature will be noted on the Chain of Custody. If the shipping cooler seal is intact, the sample containers will be accepted for analyses. The Sample Custodian will document the date and time of receipt of the container and sign the form.

If damage or discrepancies are noticed (including sample temperature exceedances), they will be recorded in the remarks column of the record sheet, dated and signed. Any damage or discrepancies will be reported to the Laboratory Project Manager and Laboratory QA/QC Officer before samples are processed.

6.4 Sample Documentation in the Laboratory

Each sample or group of samples shipped to the laboratory for analysis will be given a unique identification number. The Sample Custodian will record the client name, number of samples and date of receipt of samples in the Sample Control Logbook. Samples removed from storage for analyses will be documented in the Sample Control Logbook.

The laboratory will be responsible for maintaining analytical logbooks and laboratory data as well as a sample (on hand) inventory for submittal to the Honeywell QA/QC Officer on an "as required" basis. Raw laboratory data produced from the analysis of samples submitted for this program will be inventoried and maintained by the laboratory for a period of 5 years at which time the Honeywell QA/QC Officer will advise the laboratory regarding the need for additional storage.

6.5 Storage of Samples

After the Sample Custodian has completed the Chain of Custody forms and the incoming sample log, the Chain of Custody will be checked to ensure that all samples are stored in the appropriate locations. All samples will be stored within an access-controlled custody room and will be maintained at 4°C (±2°C) until all analytical work is complete.

6.6 Sample Documentation

Evidentiary files for the entire project shall be inventoried and maintained by the Honeywell QA/QC Officer and shall consist of the following:

i) Project related plans

ii) Project logbooks

iii) Field data records

iv) Sample identification documents

v) Chain of Custody records

vi) Report notes, calculations, etc.

vii) Lab data, etc.

viii) References, copies of pertinent literature

ix) Miscellaneous - photos, maps, drawings, etc.

x) Copies of all final reports pertaining to the project

The evidentiary file materials shall be the responsibility of the Honeywell Project Manager with respect to maintenance and document removal.

7. Analytical Procedures for Chemical Analyses

Samples collected for laboratory chemical analyses will be analyzed for the parameters listed in Table 1, using the methods cited in Table 3. These methods have been selected to meet the DQOs for each sampling activity. All reporting and deliverables will be consistent with Analytical Services Protocol (ASP) Category A format, but including QA/QC summary forms. The data package should include all items listed in Table 4.

Internal standards or isotopic dilution will be employed for analyte quantitation as detailed in the appropriate analytical methods.

8. Calibration Procedures and Frequency

Calibration of instrumentation is required to ensure that the analytical system is operating correctly and functioning at the proper sensitivity to meet established reporting limits. Each instrument is calibrated with standard solutions appropriate to the type of instrument and the linear range established for the analytical method. The frequency of calibration and the concentration of calibration standards are determined by the manufacturer's guidelines, the analytical method, or the requirements of special contracts.

A bound notebook will be kept with each instrument requiring calibration in which will be recorded activities associated with QA monitoring and repairs program. These records will be checked during periodic equipment review and internal and external QA/QC audits.

8.1 Gas Chromatography/Mass Spectrometry (GC/MS)

It is necessary to establish that a given GC/MS meets the standard mass spectral abundance criteria prior to initiating any ongoing data collection. This is accomplished through the analyses of tuning compounds as specified in the analytical methods.

Calibration of the GC/MS system will be performed daily at the beginning of the day or with each 12 hours of instrument operating time. All method-specified calibration criteria must be met prior to sample analyses. All calibrations must be performed using either average response factors or first-order linear regression (with a correlation coefficient requirement of ≥0.995). Higher order fits will not be allowed.

9. Data Reduction, Validation Assessment and Reporting

9.1 General

The contract laboratory will perform analytical data reduction and validation in-house under the direction of the Laboratory QA/QC Officer. The Laboratory QA/QC Officer will be responsible for assessing data quality and advising of any data that were rated "preliminary" or "unacceptable" or other qualifications based on the QC criteria outlined in the relevant methods, which would caution the data user of possible unreliability. Data reduction, validation, and reporting by the laboratory will be conducted as detailed in the following:

i) Raw data produced and checked by the responsible analysts is turned over for independent review by another analyst

ii) The area supervisor reviews the data for attainment of quality control criteria presented in the referenced analytical methods

iii) Upon completion of all reviews and acceptance of the raw data by the Laboratory Operations Manager, a computerized report will be generated and sent to the Laboratory QA/QC Officer

iv) The Laboratory QA/QC Officer will complete a thorough inspection of all reports

v) The Laboratory QA/QC Officer and area supervisor will decide whether any sample reanalysis is required

vi) Upon acceptance of the preliminary reports by the Laboratory QA/QC Officer, final reports will be generated and signed by the Laboratory Project Manager

Validation of the analytical data will be performed by the Honeywell QA/QC Officer (or Consultant). Assessment of analytical data will include checks on data consistency by looking for comparability of duplicate analyses, comparability to previous data from the same sampling location (if available), adherence to accuracy and precision control criteria detailed in this QAPP, and anomalously high or low parameter values. The results of these data validations will be reported to the Project Manager and the contract laboratory, noting any discrepancies and their effect upon acceptability of the data.

Raw data from field measurements and sample collection activities that are used in project reports will be appropriately identified and appended to the report. Where data have been reduced or summarized, the method of reduction will be documented in the report. Field data will be audited for anomalously high or low values that may appear to be inconsistent with other data.

9.2 Laboratory Reporting, Data, Presentation and Final Report

Reporting and deliverables should be ASP Category A and shall include, but not be limited to, all items listed in Table 4.

All sample data and corresponding QA/QC data as specified in the analytical methods, shall be maintained accessible either in hard copy or on magnetic tape or disk (computer data files).

The laboratory will submit one copy of the final analytical report within 21 calendar days of receipt of the final sample included in the sample delivery group (SDG) and an electronic data deliverable in EQuIS format.

9.3 Document Control System

A document control system ensures that all documents are accounted for when the project is complete.

A project number will be assigned to the project. This number will appear on sample identification tags, logbooks, data sheets, control charts, project memos and analytical reports, document control logs, corrective action forms and logs, QA plans, and other project analytical records.

9.4 QC Check Points and Data Flow

The following specific QC check points will be common to all metals, GC, and GC/MS analyses. They are presented with the decision points:

Chemist - Bench Level Checks

i) Systems check: sensitivity, linearity, and reproducibility within specified limits

ii) Duplicate analyses within control limits

iii) Matrix spike results within control limits

iv) Surrogate spike results within control limits (organics only)

v) Calculation/data reduction checks: calculations cross-checked, any discrepancies between forms and results evident, results tabulated sequentially on the correct forms

Laboratory Project Manager

i) Systems operating within limits

ii) Data transcription correct

iii) Data complete

iv) Data acceptable

Sample Control

i) Samples returned to sample control following analysis

Laboratory QA/QC Officer

i) QA objectives met

ii) QC checks are completed

iii) Final data and report package is complete

10. Internal Quality Control Checks and Frequency

10.1 QC for Laboratory Analyses

Specific procedures related to internal laboratory QC samples are described in the following subsections. **Reagent Blanks**

A reagent blank will be analyzed by the laboratory at a frequency of one blank per analytical batch. The reagent blank, an aliquot of analyte-free water or solvent, will be carried through the entire analytical procedure.

10.1.2 Matrix Spike/Matrix Spike Duplicate (MS/MSD) /Duplicate Analyses

An MS/MSD sample will be analyzed for organic parameters (except high resolution gas chromatograph/high resolution mass spectrometer [HRGC/HRMS]) and a duplicate and matrix spike will be analyzed for inorganic parameters at a minimum frequency of one per analytical batch. Acceptable criteria and analytes that will be used for matrix spikes are identified in the methods. Where method specified limits were not available, general control limits should be used. Percent spike recoveries will be used to evaluate analytical accuracy, while percent relative standard deviation or the RPD between duplicate analyses will be used to assess analytical precision.

10.1.3 Surrogate Analyses

Surrogates are organic compounds which are similar to the analytes of interest, but which are not normally found in environmental samples. Surrogates are added to samples to monitor the effect of the matrix on the accuracy of the analysis. Every blank, standard, and environmental sample analyzed by GC or GC/MS, including MS/MSD samples, will be spiked with surrogate compounds prior to sample preparation.

The compounds that will be used as surrogates and the levels of recommended spiking are specified in the methods. Surrogate spike recoveries must fall within the control limits specified in the methods. If surrogate recoveries are excessively low (<10 percent), the laboratory will contact the Honeywell QA/QC Officer (or Consultant) for further instructions. Dilution of samples to bring the analyte concentration into the linear range of calibration may dilute the surrogates out of the quantification limit. Reanalysis of these samples is not required. Assessment of analytical quality in these cases will be based on the MS/MSD sample analysis results.

10.2 QC for Field Sampling

To assess the quality of data resulting from the field sampling program, field duplicate and field blank samples may be collected and submitted to the analytical laboratory as samples.

10.2.1 Field (Rinse) Blanks

Field blanks will be used during the sampling programs to detect contamination introduced through sample collection procedures and equipment, external field conditions, sample transport, sample container preparation, sample storage, and/or the analytical process.

10.2.2 Field Duplicate Samples

Field duplicate samples will be collected and used to assess the aggregate precision of sampling techniques and laboratory analysis. This duplicate will be packed and shipped to the laboratory for analysis.

11. Performance and System Audits

For the purpose of external evaluation, performance evaluation check samples are analyzed periodically by the laboratory. Internally, the evaluation of data from these samples is done on a continuing basis over the duration of a given project.

The Honeywell QA/QC Officer (or Consultant) may carry out performance and/or systems audits to insure that data of known and defensible quality are consistently produced during this program.

Systems audits are qualitative evaluations of all components of field and laboratory quality control measurement systems. They determine if the measurement systems are being used appropriately. The audits may be carried out before all systems are operational, during the program, or after completion of the program. Such audits typically involve a comparison of the activities given in the QA/QC Plan described herein, with activities actually scheduled or performed. A special type of systems audit is the data management audit. This audit addresses only data collection and management activities.

The performance audit is a quantitative evaluation of the measurement systems used for a monitoring program. It requires testing the measurement systems with samples of known composition or behavior to quantitatively evaluate precision and accuracy. A performance audit may be carried out by or under the auspices of the Honeywell QA/QC Officer (or Consultant) without the knowledge of the analyst during each sampling event for this program.

It should be noted, however, that any additional external QA audits will only be performed if deemed necessary.

12. Preventative Maintenance

This section applies to both field and laboratory equipment. Specific preventive maintenance procedures for field equipment will be consistent with the manufacturer's guidelines. Specific preventive maintenance protocols for laboratory equipment will be consistent with the contract laboratory's standard operating procedures.

All analytical instruments to be used in this project will be serviced by laboratory personnel at regularly scheduled intervals in accordance with the manufacturers' recommendations. Instruments may also be serviced at other times due to failure. Requisite servicing beyond the abilities of laboratory personnel will be performed by the equipment manufacturer or their designated representative.

Routine maintenance of the instruments will be performed as per manufacturers' recommendations. The Laboratory Project Manager is responsible for the preventive maintenance of the instruments.

13. Specific Routine Procedures Uses to Assess Data Precision, Accuracy and Completeness

13.1 QA Measurement Quality Indicators

13.1.1 Precision

Precision will be assessed by comparing the analytical results between duplicate spike analyses. Precision as percent relative difference will be calculated as follows for values significantly greater than the associated detection limit:

$$\text{Precision} = \left| \frac{(D_2 - D_1)}{(D_1 + D_2)/2} \right| \times 100$$

D_1 = matrix spike recovery

D_2 = matrix spike duplicate spike recovery

For results near the associated detection limits, precision will be assessed based on the following criteria:

$$\text{Precision} = \left| \text{Original result - duplicate result} \right| < \text{CRDL}^1$$

13.1.2 Accuracy

Accuracy will be assessed by comparing a set of analytical results to the accepted or "true" values that would be expected. In general, MS/MSD and check sample recoveries will be used to assess accuracy. Accuracy as percent recovery will be calculated as follows:

$$\text{Accuracy} = \frac{A - B}{C} \times 100$$

A = The analyte determined experimentally from the spike sample

B = The background level determined by a separate analysis of the unspiked sample

C = The amount of spike added

In some cases, MS and/or MSD recoveries may not be available due to elevated levels of the spiked analyte in the investigative sample. In such cases, accuracy will be assessed based on surrogate spike recoveries and/or laboratory control samples.

13.1.3 Completeness

Completeness is a measure of the amount of valid data obtained from a measurement system compared with the amount that was expected to be obtained under normal conditions.

[1] Contract Required Detection Limit (CRDL).

To be considered complete, the data set must contain all QC check analyses verifying precision and accuracy for the analytical protocol. In addition, all data are reviewed in terms of stated goals in order to determine if the database is sufficient.

When possible, the percent completeness for each set of samples will be calculated as follows:

$$\text{Completeness} = \frac{\text{usable data obtained}}{\text{total data planned}} \times 100 \text{ percent}$$

13.1.4 Outliers

Procedures discussed previously will be followed for documenting deviations. In the event that a result deviates significantly from method established control limits, this deviation will be noted and its effect on the quality of the remaining data assessed and documented.

14. Corrective Action

The need for corrective action may be identified by system or performance audits or by standard QC procedures. The essential steps in the corrective actions system will be:

i) Checking the predetermined limits for data acceptability beyond which corrective action is required

ii) Identifying and defining problems

iii) Assigning responsibility for investigating the problem

iv) Investigating and determining the cause of the problem

v) Determination of a corrective action to eliminate the problem (this may include reanalysis or resampling and analyses)

vi) Assigning and accepting responsibility for implementing the corrective action

vii) Implementing the corrective action and evaluating the effectiveness

viii) Verifying that the corrective action has eliminated the problem

ix) Documenting the corrective action taken

For each measurement system, the laboratory QA/QC Officer will be responsible for initiating the corrective action and the Laboratory Project Manager will be responsible for implementing the corrective action.

15. Quality Assurance Reports

Final reports will contain a discussion on QA/QC summarizing the quality of the data collected and/or used as appropriate for each phase of the project. The Project Manager who has responsibility for these summaries, will rely on written reports/memoranda documenting the data assessment activities, performance and systems audits, and footnotes identifying qualifications to the data, if any.

Each summary of sampling activities will include a tabulation of the data including:

i) Field blank and field duplicate sample results

ii) Maps showing well locations

iii) An explanation of any sampling conditions or quality assurance problems and their effect on data quality

QA reports will be prepared by the Honeywell QA/QC Officer (or Consultant) following receipt of all analytical data. These reports will include discussions of the following and their effects on the quality of the data reported:

i) Sample holding times

ii) Laboratory/reagent blank data

iii) Surrogate spike, matrix spike, and matrix spike duplicate data

iv) Field QA/QC data

v) Pertinent instrument performance per method protocols

vi) Audit results (if performed)

In addition, the QA reports will summarize all QA problems and give a general assessment of QA results versus control criteria for such parameters as accuracy, precision, etc.

The QA reports will be forwarded to the Project Manager.

Table 1

Target Quantitation Limits
Site Management Plan
Honeywell International, Inc.
Buffalo, New York

	CAS Number	Water Quantitation Limits µg/L	Soil/Sediment Quantitation Limits µg/kg
Volatiles			
1,1,2,2-Tetrachloroethane	79-34-5	10	10
1,1,2-Trichloroethane	79-00-5	10	10
1,1-Dichloroethane	75-34-3	10	10
1,1-Dichloroethylene	75-35-4	10	10
1,2-Dibromo-3-chloropropane	96-12-8	10	10
1,2-Dibromoethane	106-93-4	10	10
1,2-Dichloroethane	107-06-2	10	10
1,2-Dichloropropane	78-87-5	10	10
Bromodichloromethane	75-27-4	10	10
Bromoform	75-25-2	10	10
Carbon tetrachloride	56-23-5	10	10
Chlorobenzene	108-90-7	10	10
Chloroethane	75-00-3	10	10
Chloroform	67-66-3	10	10
cis-1,3-Dichloropropene	10061-01-5	10	10
Dibromochloromethane	124-48-1	10	10
Dichlorodifluoromethane	75-71-8	10	10
m-Dichlorobenzene	541-73-1	10	10
Bromomethane	74-83-9	10	10
Chloromethane	74-87-3	10	10
Methylene chloride	75-09-2	10	10
o-Dichlorobenzene	95-50-1	10	10
p-Dichlorobenzene	106-46-7	10	10
Tetrachloroethylene	127-18-4	10	10
trans-1,2-Dichloroethylene	156-60-5	10	10
trans-1,3-Dichloropropene	10061-02-6	10	10
Trichloroethylene	79-01-6	10	10
Trichlorofluoromethane	75-69-4	10	10
Vinyl chloride	75-01-4	10	10
4-Methyl-2-pentanone	108-10-1	10	10
2-Butanone	78-93-3	10	10
Benzene	71-43-2	10	10
Ethylbenzene	100-41-4	10	10
Styrene	100-42-5	10	10
Toluene	108-88-3	10	10
Xylene(total)	1330-20-7	10	10
1,1,1-Trichloroethane	71-55-6	10	10
2-Hexanone	591-78-6	10	10
Acetone	67-64-1	10	10
Carbon disulfide	75-15-0	10	10
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	10	10
Methyl Acetate	79-20-9	10	10
Methyl tert-Butyl Ether	1634-04-4	10	10
cis-1,2-Dichloroethene	156-59-2	10	10
Cyclohexane	110-82-7	10	10
Methylcyclohexane	108-87-2	10	10
Isopropylbenzene	98-82-8	10	10
1,2,-Trichlorobenzene	120-82-1	10	10
		µg/L	**mg/kg**
Target Analyte List Metals			
Arsenic	7440-38-2	10	1.0
Barium	7440-39-3	200	20

Notes:

µg/L - Micrograms per liter
µg/kg - Micrograms per kilogram
mg/kg - Milligrams per kilogram

Table 2

Sample Container, Preservation, And Holding Time Periods
Site Management Plan
Honeywell International, Inc.
Buffalo, New York

Analyses	Containers	Preservation	Maximum Holding Time	Notes
Soil/Sediment				
TAL Metals	One 4-oz. glass jar with Teflon-lined septum	Cool to 4°C	180 days from collection to analysis with exception of mercury, which is 28 days from collection to analysis.	Fill completely
Water				
TCL VOCs	Two 40-mL glass vial with Teflon-lined septum	HCl to pH<2, cool to 4°C	14 days from collection to analysis	Fill completely, no headspace
TAL Metals	One 1-L plastic bottle	HNO_3 to pH<2 cool to 4°C	180 days from collection to analysis with exception of mercury, which is 28 days	Fill to neck of bottle

Notes:

TAL - Target Analyte List
TCL - Target Compound List
VOCs - Volatile Organic Compounds
oz. - Ounce
mL - Milliliter
L - Liter

Table 3

Sampling And Analysis Summary
Site Management Plan
Honeywell International, Inc.
Buffalo, New York

Sample Matrix	Analytical Parameters	Analytical Method	Estimated Number of Samples	Field Duplicates	Equipment Blanks	Trip Blanks	MS/MSD
Soil	Total Arsenic Only	SW-846 6010	Varies	10%	10%	-	10%/10%
	Total Barium Only	SW-846 6010	Varies	10%	10%	-	10%/10%
Surface Soils	Total Arsenic Only	SW-846 6010	Varies	10%	10%	-	10%/10%
	Total Barium Only	SW-846 6010	Varies	10%	10%	-	10%/10%
Groundwater	TCL VOCs	SW-846 8260B	2	1	1	1/day	1/1
	Total Arsenic Only	SW-846 6010	2	1	1	-	1/1
	Total Barium Only	SW-846 6010	2	1	1	-	1/1

Notes:

MS - Matrix Spike
MSD - Matrix Spike Duplicate
TCL - Target Compound List
VOCs - Volatile Organic Compounds
- - Not applicable

Table 4

Laboratory Reporting Deliverables - Standard Data Package
Site Management Plan
Honeywell International, Inc.
Buffalo, New York

A detailed report narrative should accompany each submission, summarizing the contents and results.

A. Chain of Custody Documentation and Detailed Narrative [(1)]

B. Sample Information
- i) Date collected
- ii) Date extracted or digested
- iii) Date analyzed
- iv) Analytical method and reference

C. Field Results
- i) Samples
- ii) Laboratory duplicates [(2)]
- iii) Method blanks
- iv) Spikes; spike duplicates [(2)(3)]
- v) Surrogate recoveries [(2)]
- vi) Internal standard recoveries
- vii) TICs (if applicable)

D. Miscellaneous
- i) Method detection limits and/or instrument detection limits
- ii) Percent solids (where applicable)
- iii) Metals run logs
- iv) Dates of extraction or digestion and analysis for method blanks and blank spikes

All sample data and its corresponding QA/QC data shall be maintained accessible to GHD either in hard copy or on magnetic tape or disc (computer data files). All solid sample results must be reported on a dry-weight basis.

Notes:

(1) - Any QC outliers must be addressed, and corrective action taken must be specified

(2) - Laboratory must specify applicable control limits for all QC sample results

(3) - A blank spike must be prepared and analyzed with each sample batch

TICs - Tentative Identified Compounds

QA/QC - Quality Assurance/Quality Control

Appendix F
Site Management Forms

Cover Inspection Form
(Quarterly/Annual)

Honeywell, Inc.
Buffalo Research Laboratory
Buffalo, New York

SECTION I. GENERAL INFORMATION

Inspector Name and Title: _____
Names of Others Present During Inspection: _____
_____
Date of Inspection: _____ Time of Inspection: _____
Date of Last Inspection: _____
Weather: _____

SECTION II. INSPECTION RESULTS

Walk through the entire Site and answer the following questions.

1. **Are there any locations where work is being performed in accordance with the Site's Excavation Work Plan?**

   Yes No

   If you answered "Yes," attach to this inspection form a brief description of the location, type of work, start date, and expected completion date for the work.

2. **For grass-covered areas, did you observe any locations with damaged or missing grass cover, not within a work zone where work is currently being performed in accordance with the Site's Excavation Work Plan, which cause direct exposure of surface soil?**

   Yes No

3. **Did you observe any locations of exposed soil (such as due to vehicle traffic, erosion, or runoff) not within a work zone where work is currently being performed in accordance with the Site's Excavation Work Plan?**

   Yes No

4. **Did you observe any areas of cracked, broken, or otherwise damaged or missing asphalt or concrete not within a work zone where work is currently being performed in accordance with the Site's Excavation Work Plan, which cause direct exposure of surface soil?**

   Yes No

5. **Did you observe any gravel-covered areas where the gravel cover has been damaged or removed not within a work zone where work is currently being performed in accordance with the Site's Excavation Work, which cause direct exposure of surface soil?**

   Yes No

SECTION III. IDENTIFICATION OF LOCATIONS REQUIRING CONTINGENCY ACTION

If you answered "Yes" to any of Questions 2 through 5 in Section II, complete the following (place a check next to each item to verify completion):

_____1. Attach a detailed description of the area(s) for which you answered "Yes" in Section II. Include photographs as appropriate.

_____2. Identify on an attached Site Plan the approximate location of the area(s) for which you answered "Yes" in Section II.

_____ 3. Immediately notify and provide a copy of this form to the HSE Manager or designee so that corrective action can be implemented in accordance with the Site Monitoring and Cover Repair Plans (Sections 4.0 and 7.0 of the Site Management Plan). Obtain HSE Manager or designee signature below.

SECTION IV. SIGNATURES

Required for each inspection:

_____ _____

Inspector Date

If required by Section III:

_____ _____

HSE Manager Date

or

_____ _____

HSE Manager Designee Date

Attachments (List): _____

_____

Filing Requirements: Original to Inspection Form file
Copy to HSE Manager or designee

Site Plan


Bldg 504
0
80
160
APPROXIMATE SCALE IN FEET
Awareness Ave
Bldg 513
Alley
Waste Pad
Hard Hat
First Blvd
Bldg 511
Bldg 515
Bldg 514/516
PPE Parkway
Safety
Tanker Ave
Bldg 517
Bldg 518
Bldg 520
Bldg 512
Bldg 509
ERT Terrace
Bldg 510
Evacuation Area #2
CONCRETE

Site-Wide Inspection Form
(Annual and Emergency)

Honeywell, Inc.
Buffalo Research Laboratory
Buffalo, New York

SECTION I. GENERAL INFORMATION

Inspector Name and Title: _____
Names of Others Present During Inspection: _____
_____
Date of Inspection: _____ Time of Inspection: _____
Date of Last Inspection: _____
Weather: _____

SECTION II. INSTITUTIONAL & ENGINEERING CONTROLS

Complete a Cover Inspection Form (in fulfillment of either the quarterly/annual or emergency requirements). Attach the form to this one, and answer the following questions.

1. **Is the Site use consistent with Institutional Controls laid out in the Environmental Easement? These include relegation of the Site to industrial use, prohibition of groundwater use, and the prohibition of vegetable growing/farming, and annual certifications.**

   Yes No

2. **Do the Engineering Controls laid out in the Site Management Plan (SMP) continue to be in place and effective, as evidenced by continued and current Site cover and Groundwater Monitoring Programs, in accordance with the Site Monitoring Plan (Section 4.0 of the SMP) and Cover Repair Plan (Section 7.0 of the SMP)?**

   Yes No

3. **Has the Site gone without any non-routine management activities that are not already covered by an Excavation Work Plan?**

   Yes No

4. **Has the Site complied with all permit and reporting requirements since the completion of the last Site-wide Inspection?**

   Yes No

5. **Are all Site records up to date?**

   Yes No

SECTION III. IDENTIFICATION OF SITUATIONS REQUIRING ACTION

If you answered "No" to any questions in Section II, complete the following (place a check next to each item to verify completion):

_____1. Attach a detailed description of the reason(s) for which you answered "No" in Section II. Include photographs as appropriate.

_____2. Identify on an attached Site Plan the approximate location of the area(s) for which you answered "Yes" in Section II, if applicable.

_____ 3. Immediately notify and provide a copy of this form to the Honeywell HSE Manager or designee so that corrective action can be implemented in accordance with the Site Monitoring and Cover Repair Plans (Sections 4.0 and 7.0 of the Site Management Plan). Obtain HSE Manager or designee signature below.

SECTION IV. SIGNATURES

Required for each inspection:

_____ _____

Inspector Date

If required by Section III:

_____ _____

HSE Manager Date

or

_____ _____

HSE Manager Designee Date

Attachments (List): _____

_____

Filing Requirements: Original to Inspection Form file
Copy to HSE Manager or designee
Copy to be included in Periodic Review Report

Appendix G
Groundwater Sampling Forms

WELL PURGING FIELD INFORMATION FORM

JOB# _____ - _____

SITE/PROJECT NAME: _____ WELL# _____

WELL PURGING INFORMATION

PURGE DATE (MM DD YY)	SAMPLE DATE (MM DD YY)	WATER VOL. IN CASING (LITERS/GALLONS)	ACTUAL VOLUME PURGED (LITERS/GALLONS)

PURGING AND SAMPLING EQUIPMENT

PURGING EQUIPMENT.....DEDICATED Y N (CIRCLE ONE)

SAMPLING EQUIPMENT.....DEDICATED Y N (CIRCLE ONE)

PURGING DEVICE		A - SUBMERSIBLE PUMP	D - GAS LIFT PUMP	G - BAILER	X- PURGING OTHER (SPECIFY)
		B - PERISTALTIC PUMP	E - PURGE PUMP	H - WATERRA®	
SAMPLING DEVICE		C - BLADDER PUMP	F - DIPPER BOTTLE		X- SAMPLING OTHER (SPECIFY)
PURGING MATERIAL		A - TEFLON	D - PVC		X- PURGING OTHER (SPECIFY)
		B - STAINLESS STEEL	E - POLYETHYLENE		
SAMPLING MATERIAL		C - POLYPROPYLENE			X- SAMPLING OTHER (SPECIFY)
TUBING PURGING		A - TEFLON	D - POLYPROPYLENE	F - SILICONE	X- PURGING OTHER (SPECIFY)
		B - TYGON	E - POLYETHYLENE	G - COMBINATION TEFLON/POLYPROPYLENE	
TUBING SAMPLING		C - ROPE	X- (SPECIFY)		X- SAMPLING OTHER (SPECIFY)
FILTERING DEVICES 0.45		A - IN-LINE DISPOSABLE	B - PRESSURE	C - VACUUM	

FIELD MEASUREMENTS

WELL ELEVATION	(m/ft)	GROUNDWATER ELEVATION	(m/ft)
DEPTH TO WATER	(m/ft)	WELL DEPTH	(m/ft)

pH	TURBIDITY	CONDUCTIVITY	SAMPLE TEMPERATURE
(std)	(NTU)	(µm/cm) AT 25°C	(°C)
(std)	(NTU)	(µm/cm) AT 25°C	(°C)
(std)	(NTU)	(µm/cm) AT 25°C	(°C)
(std)	(NTU)	(µm/cm) AT 25°C	(°C)
(std)	(NTU)	(µm/cm) AT 25°C	(°C)

FIELD COMMENTS

SAMPLE APPEARANCE: _____ ODOR: _____ COLOR: _____ TURBIDITY: _____

WEATHER CONDITIONS: WIND SPEED _____ DIRECTION _____ PRECIPITATION Y/N OUTLOOK _____

SPECIFIC COMMENTS _____

I CERTIFY THAT SAMPLING PROCEDURES WERE IN ACCORDANCE WITH APPLICABLE PROTOCOLS

DATE PRINT SIGNATURE

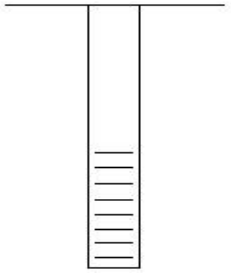
MONITORING WELL RECORD FOR LOW-FLOW PURGING

Project Data:

Project Name: _____ Date: _____

Ref. No.: _____ Personnel: _____

_____



Monitoring Well Data:

Well No.: _____

Vapor PID (ppm): _____ Saturated Screen Length (m/ft): _____

Measurement Point: _____ Depth to Pump Intake (m/ft)[(1)]: _____

Constructed Well Depth (m/ft): _____ Well Diameter, D (cm/in): _____

Measured Well Depth (m/ft): _____ Well Screen Volume, V_S (L)[(2)]: _____

Depth of Sediment (m/ft): _____ Initial Depth to Water (m/ft): _____

Time	*Pumping Rate (mL/min)*	*Depth to Water (m/ft)*	*Drawdown from Initial Water Level (m/ft)* [(3)]	*Temperature °C*	*Conductivity (mS/cm)*	*Turbidity NTU*	*DO (mg/L)*	*pH*	*ORP (mV)*	*Volume Purged, Vp (L)*	*No. of Well Screen Volumes Purged* [(4)]
			Precision Required [(5)] ***:***	***±3 %***	***±0.005 or 0.01*** [(6)]	***±10 %***	***±10 %***	***±0.1 Units***	***±10 mV***		

Notes:

(1) The pump intake will be placed at the well screen mid-point or at a minimum of 0.6 m (2 ft) above any sediment accumulated at the well bottom.

(2) The well screen volume will be based on a 1.52 meters (5-foot) screen length (L). For metric units, $V_s=\pi*(r^2)*L$ in mL, where r (r=D/2) and L are in cm. For Imperial units, $V_s=\pi*(r^2)*L*(2.54)^3$, where r and L are in inches

(3) The drawdown from the initial water level should not exceed 0.1 m (0.3 ft). The pumping rate should not exceed 600 mL/min.

(4) Purging will continue until stabilization is achieved or until 20 well screen volumes have been purged (unless purge water remains visually turbid and appears to be clearing, or unless stabilization parameters are varying slightly outside of the stabilization criteria and appear to be stabilizing), No. of Well Screen Volumes Purged= Vp/Vs.

(5) For conductivity, the average value of three readings <1 mS/cm ±0.005 mS/cm or where conductivity >1 mS/cm ±0.01 mS/cm.

SAMPLE COLLECTION DATA SHEET - GROUNDWATER SAMPLING PROGRAM

PROJECT NAME _____ PROJECT NO. _____

SAMPLING CREW MEMBERS _____ SUPERVISOR _____

DATE OF SAMPLE COLLECTION _____

[Note: For 2" dia. well, 1 ft. = 0.14 gal (imp) or 0.16 gal (us)]

Sample I.D. Number	Well Number	Measuring Point Elev. (ft. AMSL)	Bottom Depth (ft. btoc)	Water Depth (ft. btoc)	Water Elevation (ft. AMSL)	Well Volume (gallons)	Bailer Volume No. Bails	Volume Purged (gallons)	Field pH	Field Temp.	Field Cond.	Time	Sample Description & Analysis

Additional Comments: _____

Copies to: _____

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