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June 28, 2017

Mr. Dave Chiusano
Division of Environmental Remediation
New York State Department of Environmental Conservation
625 Broadway
Albany, New York 12233

Subject: **Field Activities Plan – July 2017 Media Sampling**
South Hill Dump Site (Site No. 712009)
Work Assignment # D007619-29
MACTEC Engineering and Consulting, P.C., Project # 3617137309

Dear Mr. Chiusano:

MACTEC Engineering and Consulting, P.C. (MACTEC), under contract to the New York State Department of Environmental Conservation (NYSDEC) is submitting this Field Activities Plan (FAP) for media sampling at the South Hill Dump site (Site) to monitor site contaminants. The Site, located in the Town of Cortlandville, Cortland County, New York, is listed as a Class 4 Inactive hazardous waste site; Site No. 712009 in the Registry of Hazardous Waste Sites in New York State (Figure 1). This FAP has been prepared in accordance with the NYSDEC requirements in work assignment No. D007619-29.

OBJECTIVES

The purpose of the work outlined in this FAP is to monitor site contaminants in groundwater, surface water, sediment, and leachate seep in accordance with the requirements outlined in the Site Management Plan (SMP) (MACTEC, 2015). The analytical results of the samples collected will

be compared to the post remediation baseline conditions to document changes to on-site groundwater quality.

In addition to regular long term monitoring (LTM) sampling for metals, volatile organic compounds (VOCs), and polychlorinated biphenyls (PCBs), additional sampling is being conducted at the request of the NYSDEC to evaluate the presence/absence of polyfluoroalkyl substances (PFAS) and 1,4-dioxane at the Site.

The evaluation for the presence/absence of PFAS will be conducted by sampling groundwater from one pair of upgradient monitoring wells (overburden and bedrock) and two pairs of downgradient monitoring wells (overburden and bedrock) during the routine LTM event scheduled for July 2017.

The evaluation for the presence/absence of 1,4-dioxane will be conducted by sampling groundwater from one pair of upgradient wells, one pair of downgradient monitoring wells, and a single downgradient overburden well. 1,4-dioxane was analyzed in samples collected previously from the Site in March 2016, and was not detected above the reporting limit of 0.04 mg/l. Since VOCs are present in groundwater at the Site, the NYSDEC has requested that additional 1,4-dioxane sampling be conducted using laboratory methods that yield a lower detection limit.

Table 1 presents a list of the wells proposed for sampling, and Figure 2 shows the sample locations.

BACKGROUND

The Site is in the Town of Cortlandville, Cortland County, approximately two miles south of the Village of McGraw, on the south side of South Hill Road (Figure 1). Much of the property is steeply sloped. The area surrounding the Site includes wooded areas, orchards, and active and former farm fields. The topography in this area slopes to the south, toward an unnamed stream located approximately ¼ mile south of the Site (MACTEC, 2006).

Two residential parcels abut the Site and are located along the southern and eastern sides of South Hill Road; the closest residence is less than ¼ mile southwest of the Site. The area west and north

of the Site consists primarily of active farm land. A former apple orchard is located farther west. A mix of meadow, farm land, apple orchards, and forest area is located northeast of the Site. The Tioughnioga River is located within two miles southwest of the Site. The unnamed stream located south and east of the Site discharges to the Tioughnioga River via Hoxie Gorge Creek.

The Site was operated as a municipal waste disposal facility by the Town of Cortlandville from the early 1960s until 1972, although it is reported that residents used the Site for trash disposal as early as 1949. During its years of operation, wastes were received from the Village of McGraw and the Towns of Cortlandville and Solon, as well as local industry. Access to the Site was reportedly unrestricted during this time. It has also been reported that waste was often permitted to burn during landfill operation, and that at one time a waste oil pit may have existed. Operations are reported to have involved pushing waste over the working face of the landfill with some spreading and compaction. Cover material was reportedly spread one or more times per week. Prior to the remedial action (RA), waste was observed protruding from the surface of the landfill across much of the Site, and included road construction debris, brush, stumps, tires, white metal, automobile parts, and miscellaneous industrial waste materials. Numerous decomposed drums were present across many areas of the landfill (MACTEC, 2006).

A RA was conducted at the Site in 2011 and 2012, in accordance with the Record of Decision (NYSDEC, 2008), and as documented in the Final Engineering Report (MACTEC, 2013a).

The RA included the following activities:

- Installation of stabilized vehicle entrance
- Installation of perimeter erosion and sedimentation controls
- Clearing of trees and brush above the ground surface
- Grubbing of areas within the limit of grading, and disposal of grubbings on-site (beneath the new landfill cover)
- Excavation of on-site waste outside the new solid waste boundary and consolidation within the new solid waste boundary
- Decommissioning of two existing groundwater monitoring wells (MW-3S and MW-3B)
- Installation of additional erosion and sedimentation controls and measures, including a sedimentation basin, in preparation for landfill grading and soil cover installation

- Grading of the landfill within the new solid waste boundary to achieve subgrade
- Excavation for installation of landfill storm water controls (slope benches and downdrains) within the new solid waste boundary
- Removal of bulky waste items uncovered during waste consolidation and landfill grading, with off-site disposal of removed bulky wastes
- Characterization and offsite disposal of uncovered buried waste drums, drum nests, and drum remnants
- Installation of 24-inch landfill cover system including associated landfill storm water controls
- Installation of landfill gas vents
- Installation of perimeter access road with waterbars
- Installation of perimeter storm water controls including riprap drainage channels and culverts
- Conversion of the sedimentation basin to a storm water detention basin
- Installation of two new groundwater monitoring wells (MW-3SR and MW-3BR)
- Seeding and mulching of all disturbed areas within the limit of work.

RA activities for the Site were completed in December 2012.

Concentrations of Site contaminants detected in groundwater samples collected during the most recent sampling event (March 2016) are similar to historic sampling results. In general, trichloroethene (TCE) and cis-1,2-dichloroethene concentrations remain consistent with past sampling events, but at lower levels than those observed in 2011.

The sampling proposed in this FAP will provide a measure of groundwater and other media quality with respect to the post remedy baseline results and help determine if additional RA may be warranted.

FIELD OPERATIONS

Companion documents and supporting forms to this FAP that will govern the execution of the field exploration activities include the following:

- MACTEC's Program Quality Assurance Plan (QAPP) (MACTEC, 2011a)
- Health and Safety Plan (HASP) (MACTEC, 2011b)

- Site-specific HASP (Attachment 1)
- Site-specific Quality Assurance Project Plan (QAPjP) (Attachment 2)
- Field Sampling Protocols to Avoid Cross-Contamination of Per- and PFAS (Attachment 3) (MACTEC, 2017)
- Field Data Records (FDR) (Attachment 4)
- USEP Method 537 – Field Reagent Blank Collection (Attachment 5)
- Laboratory Reporting Limits and Method Detection Limits (Attachment 6).

Health and Safety

The Site-specific HASP is provided as Attachment 1 to this document. Based on available Site information, MACTEC anticipates that the fieldwork will be conducted in Level D personal protection. Specific investigation activities and required level of personal protection are set forth in the Site-specific HASP. Criteria for upgrading or downgrading the specified level of protection are also provided in the Site-specific HASP. Additional health and safety requirements are set forth in the Program HASP (MACTEC, 2011b). Should conditions pose a threat to those present on-site, and/or should Site conditions warrant an upgrade from Level D, as defined by the HASP, work will stop and the situation will be re-evaluated by the NYSDEC and MACTEC.

Utility Clearance and Site Access

No subsurface work will be conducted during the proposed sampling; therefore, no utility clearances are necessary. If necessary, the NYSDEC will be responsible for notifying property owners and gaining site access so that existing wells can be sampled.

SITE ACTIVITIES

The following subsections describe the proposed field activities. The sample identifications and analytical program are provided in Table 1. Sampling locations are shown on Figure 2.

Scope of Work

The effectiveness of the landfill cap and drainage design will be evaluated as follows:

- **Groundwater Elevation Monitoring:** The collection of synoptic water levels from eleven monitoring wells as indicated on Table 1.
- **Monitoring Well Inventory and Repair:** A well inventory will be conducted during this sampling event to document the condition and integrity of the monitoring wells. Observations will be recorded on a monitoring well checklist and/or the field data record (FDR) and the field logbook. Repairs will be made on an as-needed basis.
- **Groundwater Sampling and Analysis:** The collection of "no purge" groundwater samples from eleven monitoring wells. Samples will be collected with existing HydraSleeve™ samplers (deployed following the March 2016 groundwater sampling) as described in the QAPjP (Attachment 2). A subset of wells will also be sampled for PFAS and low-level 1,4-dioxane as indicated in Table 1. PFAS samples will be collected using low-flow purge methods.
- **Surface Water/Sediment Sampling and Analysis:** The collection of surface water and sediment samples from the outfall of the storm water detention pond located at the southern end of the landfill.
- **Leachate Seep Sampling and Analysis:** The collection of surface water from the seep (if present) located at the northeastern end of the landfill.

The monitoring fieldwork will be conducted in accordance with the Site-specific QAPjP and the PFAS Field Sampling Protocols document appended to this report (see Attachments 2 and 3). The monitoring fieldwork activities are described in more detail in the following sections. If needed, the NYSDEC will assist with obtaining access to the Site as well as off-site groundwater sampling locations.

Groundwater Elevation Survey

A synoptic round of water level measurements will be collected from the eleven groundwater monitoring wells at the Site. The monitoring wells are listed on Table 1 and locations are shown on Figure 2. Water level measurements will be collected using procedures as described in the QAPjP (Attachment 2). Water level measurements will be measured to the surveyed top of riser and referenced to mean sea level. Water levels will be measured to the nearest 0.01 feet, and recorded in the field book and/or the FDR. The FDR is included in Attachment 4.

Groundwater Monitoring Well Inventory and Repair

During the groundwater elevation survey and groundwater sampling activities, a monitoring well checklist (Attachment 4) will be completed to document the condition and physical details of the

monitoring wells. Recommendations to repair damages or deficiencies that are noted during the well inventory will be included in the subsequent Field Activities Report.

Groundwater Sampling

Groundwater sampling events are conducted at 15 month intervals. Groundwater samples will be collected from eleven locations at the Site for the parameters listed in Table 1 and shown on Figure 2. Monitoring well locations will be sampled following the MACTEC NYSDEC Program QAPP (MACTEC, 2011b).

Because high turbidity was evident after well development and low-flow sampling, the wells were previously outfitted with HydraSleeve™ samplers to minimize turbidity and as an added benefit, eliminate purging and investigation-derived waste generation.

Prior to MACTEC's site demobilization following the previous groundwater monitoring round that occurred in March 2016, new low-density polyethylene (LDPE) HydraSleeve™ samplers were placed in groundwater of the screened zone in each of the eleven monitoring wells as described in the QAPjP. It is assumed that since HydraSleeve™ placement, the passage of time has allowed particulates disturbed within the water column to settle.

As shown in Table 1, a subset of wells will also be sampled for PFAS for analysis by USEPA Method 537 (modified). PFAS analysis includes the six compounds identified in the USEPA Safe Drinking Water Act Unregulated Contaminant Monitoring Rule. Given the low detection limits associated with laboratory PFAS analysis, and the many potential sources of trace levels of PFAS, field personnel will take precautions to limit the potential for false positive detections of PFAS as described in Attachment 3 *Field Sampling Protocols to Avoid Cross-contamination of Per and Polyfluoroalkyl Substances (PFAS)*. Samples will also be collected from a subset of wells for 1,4-dioxane and analyzed using United States Environmental Protection Agency (USEPA) method 8260-SIM to achieve lower detection limits (Table 1).

Samples for metals, VOCs and 1,4-dioxane will be collected using the HydraSleeves™. The

Hydrasleeves™ currently deployed are made of LDPE. Although LDPE does not contain PFAS, it is possible for these compounds to adhere to the material and could cause results to be biased low. Therefore, the six wells designated to be sampled for PFAS will be purged of one well volume using a peristaltic pump, allowed to recharge overnight, and sampled the following day for PFAS using low-flow groundwater methods with a peristaltic pump. Sampling using a peristaltic pump will likely yield samples that are high in turbidity, which can bias results high because of PFAS adherence to colloidal silica which is then analyzed as part of the sample.

Because the purpose of sampling for PFAS is at least initially, to determine presence or absence, a detection of PFAS in a turbid well would indicate that PFAS compounds are present at the site. If detected, and if above the USEPA Drinking Water Health Advisories (HA) of 70 nanograms per liter (ng/L), additional sampling would be necessary to determine whether its presence is limited to the colloidal particles in the well, or is in the groundwater.

The PFAS Sampling and Analysis Plan (Attachment 3) states that LDPE HydraSleeves™ should be replaced with high-density polyethylene (HDPE) HydraSleeves™, which would then be used to collect PFAS samples after equilibrating. However, at this Site, where turbidity is very high in groundwater, several months to over a year may be required before significant settling of particulates occur, and even after that extended period, high turbidity remains. For example, during the March 2016 sampling event, turbidity readings exceeded the meter's upper range in many wells, even 15 months after HydraSleeve™ placement in December 2014. For this reason, the short-term installation of HDPE HydraSleeves™ for PFAS sampling is not expected to significantly decrease turbidity in samples compared to sampling with a peristaltic pump, and is not a cost-effective method that will add value to the analytical results. Low-flow methods are considered adequate for determining presence or absence of PFAS in groundwater at the Site.

After the PFAS samples are collected, HDPE HydraSleeves™ will be deployed in the same six wells and allowed to equilibrate over the next 15-month period until the next anticipated LTM event (fall 2018). If further investigation of PFAS is required at that time, the HDPE HydraSleeves™ will be used.

Water levels, sample times, and turbidity readings will be recorded on the HydraSleeve™ Sampling FDR included in Attachment 4. Samples will be collected from eleven wells for metals and VOCs.

A duplicate, matrix spike, and matrix spike duplicate sample will be collected from MW-1S for Quality Assurance/Quality Control purposes. A field reagent blank will be collected in accordance with USEPA Method 537 (USEPA, 2009) to ensure that PFAS were not introduced into the sample during collection/handling. Section 8.3 of the Method 537 document describes the field reagent blank and is included as Attachment 5.

Groundwater samples will be shipped to TestAmerica Laboratories, Inc., (TestAmerica) for PFAS compound analysis using modified USEPA Method 537. Samples collected for 1,4-dioxane will be analyzed using USEPA Method 8260-SIM to obtain low detection limits.

Groundwater samples will be shipped to TestAmerica working under a NYSDEC callout contract, for analysis using the following USEPA Methods:

- Metals – 6010C
- VOCs - 8260C
- 1,4-Dioxane – 8260-SIM
- PFAS – 537 (modified)

Laboratory reporting will follow standard 30-day turnaround time. The analyte list and detection limits for this event are provided in Attachment 6.

Surface Water/Sediment Sampling

Concurrent with groundwater sampling, one surface water and one sediment sample will be collected from the storm water detention basin outfall located at the southern end of the Site. The approximate sampling location is shown in Figure 2.

The samples will be collected and documented in accordance with procedures detailed in the QAPjP (Attachment 2) using a surface water/sediment FDR (Attachment 3). The samples will be submitted to Test America for analysis of metals (USEPA Method 6010C), VOCs (8260C), and

polychlorinated biphenyls (PCBs) (8082A), with standard 30-day turnaround time for laboratory reporting.

Leachate Seep Sample and Analysis

Concurrent with groundwater sampling, one surface leachate sample will be collected from the seep (if present) located at the northeast portion of the Site. This sampling location has historically been dry. The approximate sampling location is shown in Figure 2.

The sample will be collected and documented in accordance with procedures detailed in the QAPjP (Attachment 2) using a surface water/sediment FDR (Attachment 3). The sample will be submitted to Test America for analysis of metals (USEPA Method 6010C), VOCs (8260C), and PCBs (8082A), with standard 30-day turnaround time for laboratory reporting.

GENERAL FIELD ACTIVITIES

General field activities supporting data collection include health and safety, decontamination, and investigation derived waste disposal. Prior to implementing the monitoring field event, sampling staff will familiarize themselves with Site history, health and safety requirements including preparation of and adherence to Site-specific HASP, equipment calibration procedures, and all other investigation methods and procedures.

Decontamination

Use of dedicated sampling equipment will be used during this field effort. Wash-water that may be necessary to clean water level indicators will be discharged to the ground in a controlled manner.

Purge Water

Purge water generated during this sampling event will be released on-site to the ground surface near the well, so as to allow the liquids to infiltrate into the soil and not run off-site. If purge water exhibits visual or olfactory evidence of site-related contamination, fluids will be containerized for sampling and offsite disposal.

Disposable Sampling Equipment/Personal Protective Equipment

Used disposable equipment and personal protective clothing will be double bagged in polyethylene trash bags and sealed with twist ties. The disposable equipment will be disposed of as nonhazardous municipal solid waste.

DATA EVALUATION AND REPORTING

Data Quality Objectives

Sampling for PFAS is being conducted to evaluate presence/absence of these compounds in groundwater at the Site. In the absence of New York standards or guidance values for PFAS in groundwater, the USEPA Drinking Water Health Advisories (HA) of 70 ng/L for the combined concentration of perfluorooctanoic acid (PFOA) and perfluorooctane sulfonic acid (PFOS) and a Regional Screening Level (RSL) of 380 micrograms per liter (µg/L) for residential tap water for perfluorobutanesulfonic acid (PFBS) will be used for assessing the presence/absence in site groundwater. Modified Method 537 achieves reporting limits for PFOA and PFOS of 2 ng/L (parts per trillion), well below the USEPA HA and RSL.

Sampling for 1,4-dioxane is being conducted to evaluate presence/absence in groundwater at the Site. New York does not currently have a standard or guidance value for 1,4-dioxane in groundwater, however, the USEPA issued a Regional Screening Level (RSL) of 0.46 µg/L for residential tap water (USEPA, 2016). For this sampling effort the NYSDEC has requested detection limits no higher than 0.2 µg/L (Sampling for 1,4-Dioxane - October, 2016).

Sampling for VOCs, metals, and PCBs is being conducted in accordance with the SMP to monitor Site contaminants. A chemistry review will be conducted to evaluate completeness, adherence to analytical holding times, quality control parameters, and potential for cross contamination.

Reporting

MACTEC will present the findings of the July 2017 groundwater sampling activities in a letter report to the NYSDEC, which will include discussion of the work performed, supporting field

documents, tabulated data results, and figures. The tabulated groundwater, surface water, and sediment data will include the following comparisons:

- Groundwater VOCs and metals results will be compared to Class GA Groundwater standards.
- Groundwater PFAS and 1,4-dioxane results will be compared to the HA and RSL values listed above.
- Surface water results will be compared to Class C Surface Water standards.
- Sediment results will be compared to NYSDEC Sediment Criteria.

A chemistry review will be completed as described below and will be included as an attachment to the report. Quality Control (QC) limits found in USEPA Region 2 validation guidelines in combination with the referenced analytical methods will be used during the data validation. The chemistry review includes the following evaluations:

- Lab Report Narrative Review
- Data Package Completeness and Chain of Custody Records
- Sample Preservation and Holding Times
- QC Blanks
- Laboratory Control Samples
- Matrix Spike/Matrix Spike Duplicates
- Surrogate Spikes (if applicable)
- Field Duplicates
- Reporting Limits
- Electronic Data Qualification and Verification

Upon completion of the chemistry review, an EQUIS electronic data deliverable will be submitted.

SCHEDULE

LTM sampling as well as PFAS/1,4-dioxane screening sampling will be conducted in July 2017.

If you have any questions or concerns, please feel free to call us at 207-775-5401.

Sincerely,

MACTEC Engineering and Consulting, P.C.

Rebecca M. Brosnan

Rebecca Brosnan
Senior Scientist

Mark Stelmack

Mark J. Stelmack, PE
Project Manager

cc: File

REFERENCES

MACTEC Engineering and Consulting, P.C., 2017. Field Sampling Protocols to Avoid Cross-Contamination of Per- and Polyfluoroalkyl Substances (PFAS). March 2017.

MACTEC Engineering and Consulting, P.C., 2015. Site Management Plan, South Hill Dump Site, Site No. 712009. Prepared for the New York State Department of Environmental Conservation, Albany, New York. Revision No. 3. December 2015.

MACTEC, 2013a. Final Engineering Report, South Hill Dump Remedial Action, Site No. 712009. Prepared for the New York State Department of Environmental Conservation, Albany, New York. November 2013.

MACTEC, 2011a. Field Activities Plan & Quality Assurance Program Plan. Prepared for the New York State Department of Environmental Conservation, Albany, New York. June 2011.

MACTEC, 2011b. Program Health and Safety Plan. Prepared for the New York State Department of Environmental Conservation, Albany, New York. June 2011.

MACTEC, 2006. Feasibility Study Report: South Hill Dump, NYSDEC Site No. 712009. December 2006.

New York State Department of Environmental Conservation (NYSDEC), 2010. DER-10, Technical Guidance for Site Investigation and Remediation. Division of Environmental Remediation. May 3, 2010.

NYSDEC, 2008. Record of Decision – South Hill Dump Site, Town of Cortlandville, Cortland County, New York: Site Number 712009. January 2008.

United States Environmental Protection Agency (USEPA), 2009. Method 537 – Determination of Selected Perfluorinated Alkyl Acids in Drinking Water by Solid Phase Extraction and Liquid Chromatography/Tanden Mass Spectrometry (LC/MS/MS). Version 1.1. EPA Document # EPA/600/R-08/092. September 2009.

REFERENCES (CONTINUED)

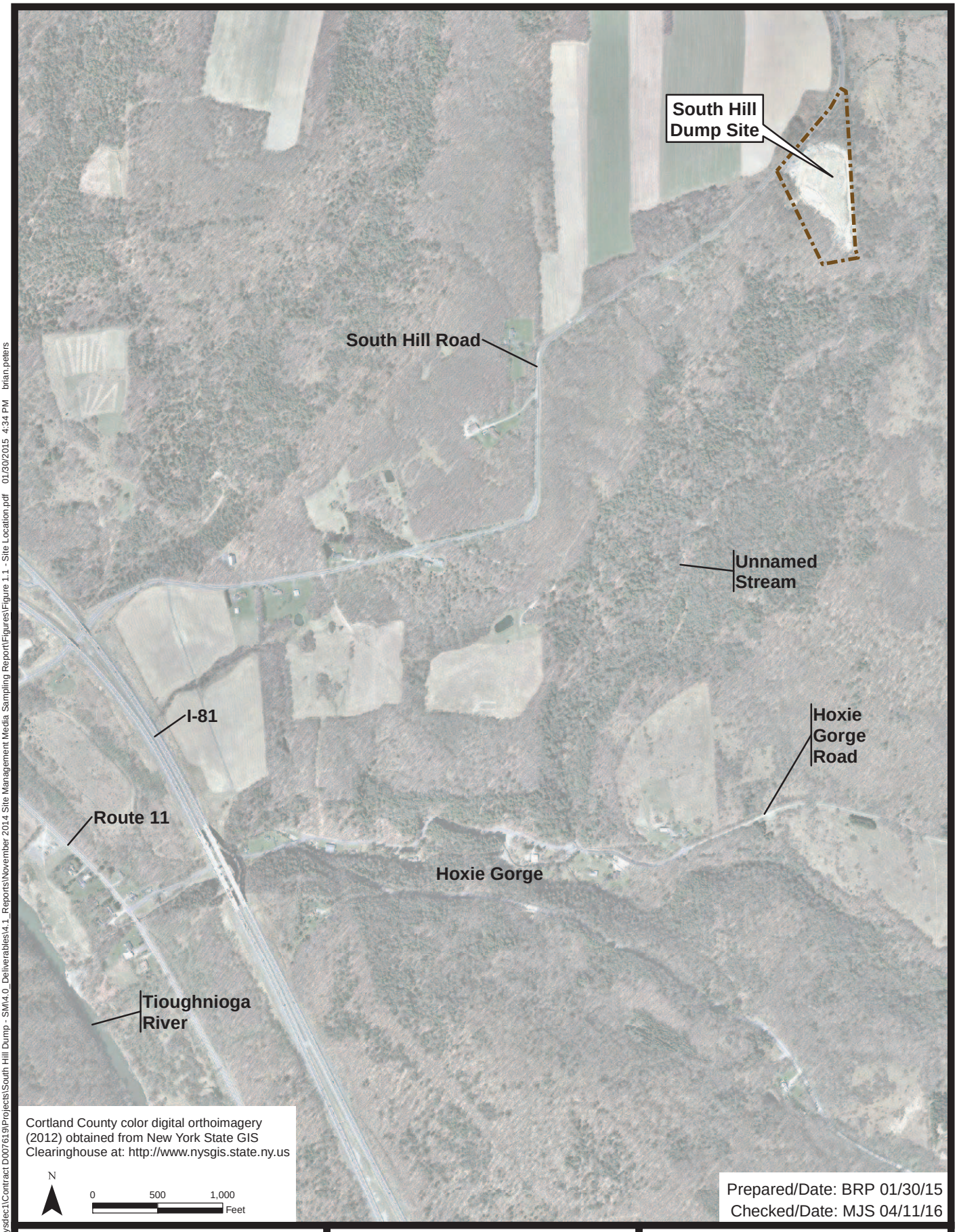
USEPA, 2016. Regional Screening Level (RSL) Resident Tapwater Table (TR=1E-06, HQ=1). May 2016.

LIST OF ACRONYMS AND ABBREVIATIONS

FAP	Field Activities Plan
FDR	Field Data Record
HA	USEPA Drinking Water Health Advisories
HASP	Health and Safety Plan
HDPE	high-density polyethylene
LDPE	low-density polyethylene
LTM	long term monitoring
MACTEC	MACTEC Engineering & Consulting, P.C.
µg/L	micrograms per liter
ng/L	nanograms per liter
NYSDEC	New York State Department of Environmental Conservation
PCB	Polychlorinated Biphenyl
PFAS	Polyfluoroalkyl Substances
PFBS	Perfluorobutanesulfonic acid
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctane sulfonic acid
QAPP	Quality Assurance Program Plan
QAPjP	Site Specific Quality Assurance Program Plan
QC	Quality Control

LIST OF ACRONYMS AND ABBREVIATONS (CONTINUED)

RA	Remedial Action
RSL	Regional Screening Level
Site	South Hill Dump
SMP	Site Management Plan
TCE	Trichloroethene
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound



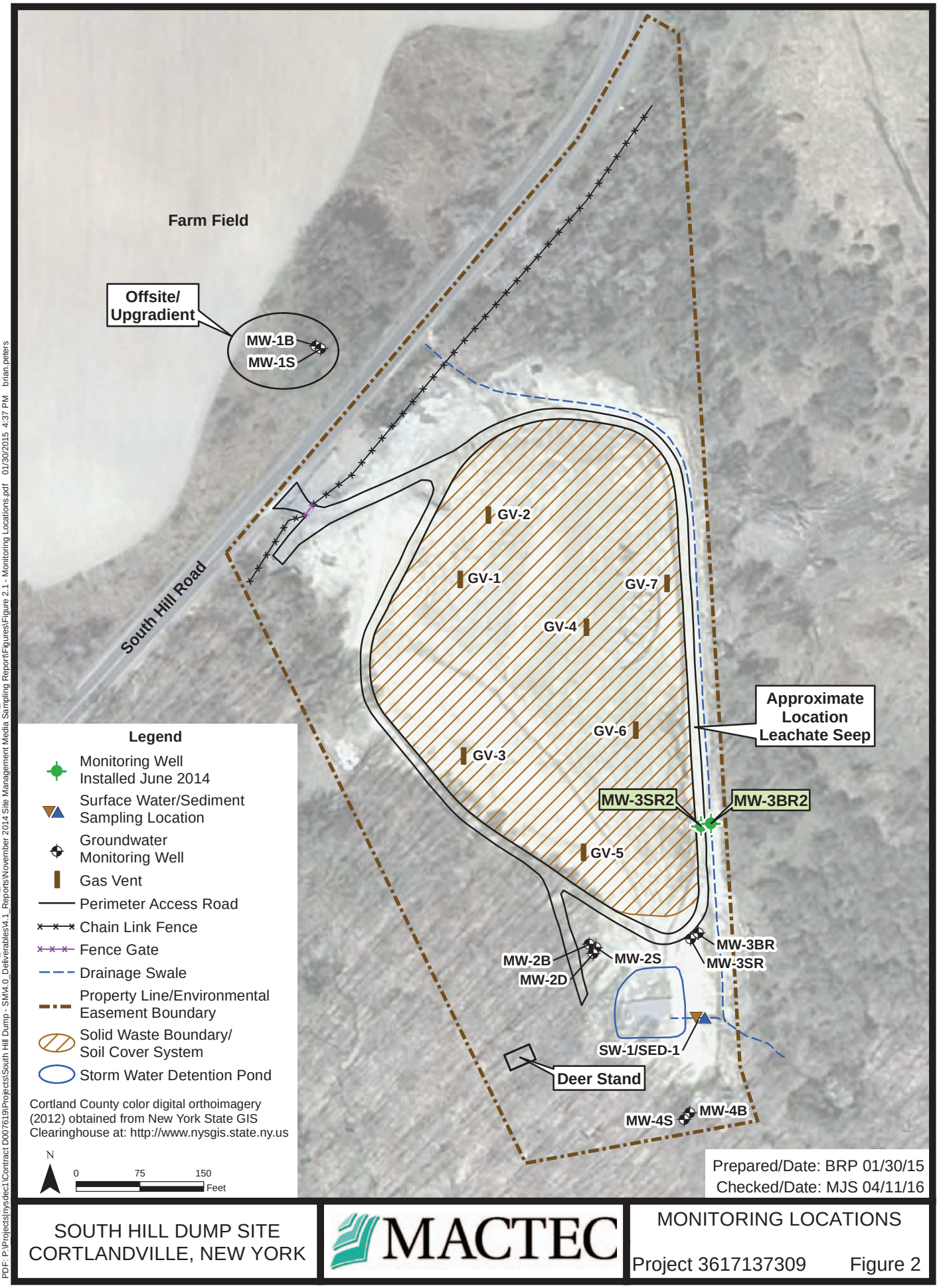
Prepared/Date: BRP 01/30/15
Checked/Date: MJS 04/11/16

SOUTH HILL DUMP SITE
CORTLANDVILLE, NEW YORK

MACTEC

SITE LOCATION

Project 3617137309 Figure 1



SOUTH HILL DUMP SITE
CORTLANDVILLE, NEW YORK

MACTEC

MONITORING LOCATIONS

Project 3617137309 Figure 2

Table 1: Monitoring Sampling and Analysis Plan

Sample Locations	Metals (6010B)	PCBs (8082)	VOC (8260B)	1,4-Dioxane (8260SIM)	PFAS (537)
Monitoring Wells					
MW-1S upgradient	X		X	X	X
MW-1B upgradient	X		X	X	X
MW-2S downgradient	X		X		
MW-2D downgradient	X		X		
MW-2B downgradient	X		X		
MW-3SR downgradient	X		X		
MW-3BR downgradient	X		X		
MW-3SR2 downgradient	X		X	X	X
MW-3BR2 downgradient	X		X	X	X
MW-4S downgradient	X		X		X
MW-4B downgradient	X		X	X	X
Surface Water					
SW-1 (Detention Basin Outfall)	X	X	X		
Sediment					
SED-1 (Detention Basin Outfall)	X	X	X		
Leachate Seep					
SEEP-1	X	X	X		
Quality Control					
MS/MSD	X	X	X	X	
Field Duplicate	X	X	X		
Field Reagent Blank					X

Notes:
An 'X' marked in a column indicates the analysis to be performed for that sample location.
VOCs = Volatile Organic Compounds
PFAS = per- and polyfluoroalkyl substances
NA = Not Applicable
MS/MSD = Matrix spike/matrix spike duplicate
Field duplicate, MS, and MSD samples to be collected from MW-1S

ATTACHMENT 1

MACTEC SHORT FORM HASP

MACTEC, Inc.

MACTEC Short Form HASP

Site: South Hill Dump Landfill Project Number: 3617137309 Task 04

Street Address: South Hill Road, Cortlandville, New York 13045

Proposed Date(s) of Investigation: July 5, 2017

Prepared by: Nate Vogan Date: 4/7/2017

*Approved by: Mark Stelmack Date: 6/27/17

Site Description: Capped landfill in rural setting in the Finger Lakes region of upstate New York. Steep landfill slopes of 3 horizontal to 1 vertical. An intermittent stream flows along the eastern boundary of the landfill. Upgradient well is in overgrown adjacent property.

Proposed Activity(s): MACTEC activities are limited to groundwater, surface water, and sediment sampling and landfill inspection.

*Approval also serves as certification of a Hazard Assessment as required by 29 CFR 1910.132

Tasks:

MACTEC	Remedial Action Contractor (RAC)	Task Description
☒	☐	**MACTEC activities** are limited to groundwater sampling and landfill inspection.

Dates of Required Training and Medical Surveillance (add additional training topics, as required**):**

Name	**Nate Vogan**	**Alex Klein**			
Job duties	**Field Team Lead**	**Field Team**			
	Dates	**Dates**	**Dates**	**Dates**	**Dates**
Medical Surveillance	9/29/16	10/2016			
Site Specific Medical Testing:_____					
40-Hour Initial	6/20/2008	1/2013			
8-Hour Supervisor [1, 3]	6/4/2013	1/2017			
8-Hour Refresher	4/5/2017	1/2017			
First Aid/CPR [1,2]	2/17/2017	2/17/2017			
Respirator Fit Test [1]					

[1] If required

[2] At least one worker must be trained in First Aid/CPR and should received Bloodborne Pathogen Training

[3] Required for Field Lead and Site Health and Safety Officer

The following are Known or Suspected Contaminants (include PELs [permissible exposure limits]/TLVs [threshold limit values]):

Contaminants of Concern	Historical Highest Groundwater Sample Data	PEL/TLV	Fact Sheet Included
Trichloroethene	540 micrograms per liter (ug/L)	10 parts per million (ppm) (25 ppm STEL)	X
1,2-dichloroethene	264 ug/L	200 ppm	X
Polychlorinated biphenyls (Arochlors General)	79 ug/L	0.5 mg/m3	X
Various Metals (inorganic) (Cu, Ca, Pb, Fe, Mn, Co, Ni, V, Ba, Zn.)	Various	Various	No

*Workers must be made aware of the signs, symptoms, and first aid for each COC. Information is located on the Attached COC fact sheets.

Air Monitoring Action Levels: MACTEC PERSONNEL HAVE NO RESPONSIBILITY TO STAY IN THE EXCLUSION ZONE AREAS IF ELEVATED OR PERSISTENT READINGS ARE OBSERVED.

PID/FID Reading[1]	Detector Tube[1]	Dust Meter[1]	LEL[2]/Oxygen[1]	Action
<9 ppm				Level D
≥ 9 ppm				Stop work, ventilate space

[1] Sustained readings measured in the breathing zone

[2] Readings at measured at the source (borehole, well, etc.)

Activity Hazard Analysis (AHA): Check and attach all that apply (add applicable AHAs not already listed):

Activity Specific AHAs:

☒	**Mobilization/Demobilization and Site Preparation**
☒	**Field Work – General**
☐	**Field Work – Oversight**
☒	Decontamination
☐	Utility Clearance Activities
☒	Groundwater Sampling
☒	Landfills
☐	Drilling Operation (MACTEC Driller)
☐	Geoprobe (MACTEC Geoprobe Operator)
☐	Excavations and Backfilling (reference**)**
☐	Stream/Wetlands Work

Hazard Specific AHAs:

☒	**Insect Stings and Bites**
☐	Gasoline
☒	Working with Preservatives (Acids)
☐	Clearing Brush and Trees (reference)
☒	Sediment and Surface Water Sampling
☐	
☐	
☐	
☐	
☐	
☐	

HAZARD IDENTIFICATION SUMMARY

Complete the checklist for summarizing the hazards identified in the JHAs

Standard Hazards			
☐ Falling Objects	☒ Slips and trips	☒ Pinch points	☐ Rotating equipment
☒ Falls	☐ Power equipment/tools	☐ Elevated work surfaces	☐ _____
Eye Hazards			
☒ Particulates	☒ Liquid splashes	☐ Welding Arc	☐ _____
Hearing Hazards			
☐ None	☐ Impact noise	☐ High frequency noise	☐ High ambient noise

Respiratory Hazards						
☐ None	☒ Dust/aerosols/particulates	☒ Organic Vapors	☐ Acid Gases	☐ O_2 deficient	☐ Metals	☐ Asbestos

Chemical Hazards			
☐ None	☐ Organic solvents	☐ Reactive metals	☒ PCBs
☒ Acids / bases	☐ Oxidizers	☒ Volatiles/Semi-volatiles	☒ Metal (inorganic)

Environmental Hazards				
☐ None	☒ Cold Stress	☒ Heat Stress	☐ Wet location	☒ Bio hazards (snakes, insects, spiders, poisonous plants, etc.)
☐ Explosive vapors	☐ Confined space	☐ Engulfment Hazard	☐ _____	

Electrical Hazards				
☒ None	☐ Energized equipment or circuits	☐ Overhead utilities	☐ Underground utilities	☐ Wet location

Fire Hazards			
☒ None	☐ Cutting, welding, or grinding generated sparks or heat sources	☐ Flammable materials present	☐ Oxygen enriched location

Ergonomic Hazards					
☒ Lifting	☒ Bending	☐ Twisting	☐ Pulling/tugging	☒ Repetitive motion	☒ Carrying
Computer Use in the: ☐ Office ☒ Field			☐ _____	☐ _____	

Radiological Hazards						
☒ None	☐ Alpha	☐ Beta	☐ Gamma/X-rays	☐ Neutron	☐ Radon	☐ Non-Ionizing

Other Hazards
☐

PPE and Monitoring Instruments

Initial Level of PPE *			
☒ Level D	☐ Modified Level D	☐ Level C	* Cannot use Short Form HASP for Level B or A work

Standard PPE					
☒ Hard Hat	☒ Safety boots	☒ Safety glasses	☐ Chem. Resistant Boots	☒ High visibility vest	☐ Other:_____

Eye and Face Protection

☐ Face shield	☐ Vented goggles	☐ Unvented goggles	☐ Indirect vented goggles

Hearing Protection

☐ Ear plugs	☐ Ear Muffs	☐ Ear plugs and muffs	☐ Other _____

Respiratory Protection

☒ None	☐ Dust mask	☐ Full Face APR	☐ Half Face APR	Cartridge Type: _____	Change Cartridges: _____

Protective Clothing

☒ Work uniform	☐ White uncoated Tyvek®	☐ Poly-coated Tyvek®	☐ Saranex®
☐ Boot covers	☒ Reflective vest	☐ Chaps or Snake Legs	☐ Other _____

Hand Protection

☐ None	☐ Cotton gloves	☐ Leather gloves	☐ Glove liners	☐ Cut-resistant gloves	☒ Other: nitrile
☐ Outer Gloves: List Type_____			☐ Inner Gloves: List Type_____		

Monitoring Instruments Required*

Periodic monitoring shall be conducted when the possibility of an IDLH condition or flammable atmosphere has developed or when there is indication that exposures may have risen over permissible exposure limits or published exposure levels since prior monitoring. Situations where it shall be considered whether the possibility that exposures have risen are as follows:

- When work begins on a different portion of the site.
- When contaminants other than those previously identified are being handled.
- When a different type of operation is initiated (e.g., drum opening as opposed to exploratory well drilling.)
- When employees are handling leaking drums or containers or working in areas with obvious liquid contamination (e.g., a spill or lagoon.)

☐ LEL/O2 Meter	☒ PID: ☒ 10.0-10.6 eV Lamp ☐ 11.7 eV Lamp	☐ FID	☐ Hydrogen Sulfide/Carbon Monoxide
☐ Dräger Pump (or equivalent) List Tubes_____	☐ Dust Meter: ☐ Respirable dust ☐ Total dust		☐ Other _____

*Monitoring instruments will be calibrated daily in accordance with manufacturer's instructions. Results will be recorded in the field logbook.

Chemicals Brought to the Site:
List all chemicals brought to the site (e.g., preservatives, decon solutions, calibration gases, gasoline, etc.).

Chemicals (Note: Name listed must match name on label and MSDS)	**MSDS Attached?**
ISOBUTYLENE CALIBRATION GAS	☒
HYDROCHLORIC ACID (HCL)	☒
NITRIC ACID (HNO3)	☒

Work Zones:

The work zones will be defined relative to the location of the work activity. The Exclusion Zone is considered the area within a 10-foot diameter of the sampling location. The Contamination Reduction Zone is considered to be the area with in a 20-foot diameter of the sampling location. The decontamination zone is to be located upwind of the work area. Work zones will be maintained through the use of:

☐ Warning Tape
☐ Cones and Barriers
☒ Visual Observations

Decontamination Procedures and Equipment:

Note: **MACTEC is not anticipated to be working or entering areas where decontamination procedures are required the following is provided for information purposes only**

Level D Decontamination Procedures

Decontamination Solution:	Detergent and Water
Station 1: Equipment Drop	Deposit equipment used on-site (tools, sampling devices and containers, monitoring instruments, radios, etc. on plastic drop cloths. Segregation at the drop reduces the probability of cross contamination. During hot weather operations, a cool-down station may be set up within this area.
Station 2: Outer Boots, and Gloves Wash and Rinse (if worn)	Scrub outer boots, and outer gloves decon solution or detergent water. Rinse off using copious amounts of water.
Station 3: Outer Boot and Glove Removal (if worn)	Remove outer boots and gloves. Deposit in plastic bag.
Station 4: Inner glove removal	Remove inner gloves and place in plastic bag.
Station 5: Field Wash	Hands and face are thoroughly washed. Shower as soon as possible.

Modified Level D and Level C PPE Decontamination Procedures

Decontamination Solution:	Detergent and Water
Station 1: Equipment Drop	Deposit equipment used on-site (tools, sampling devices and containers, monitoring instruments, radios, etc. on plastic drop cloths. Segregation at the drop reduces the probability of cross contamination. During hot weather operations, a cool-down station may be set up within this area.
Station 2: Outer Garment, Boots, and Gloves Wash and Rinse	Scrub outer boots, outer gloves, and splash suit with decon solution or detergent water. Rinse off using copious amounts of water.
Station 3: Outer Boot and Glove Removal	Remove outer boots and gloves. Deposit in container with plastic liner.
Station 4: Canister or Mask (Level C only)	If worker leaves exclusion zone to change canister (or mask), this is

Emergency Equipment:
The following emergency response equipment is required for this project and shall be readily available:

- ☒ Field First Aid Kit (including bloodborne pathogen kit/supplies)
- ☐ Fire Extinguisher (ABC type)
- ☐ Eyewash (Note: 15 minutes of free-flowing fresh water)
- ☐ Other: _____

EMERGENCY PROCEDURES

- The HSO (or alternate) should be immediately notified via the on-site communication system. The HSO assumes control of the emergency response.
- The HSO notifies the Project Manager and client contact of the emergency.
- If the emergency involves an injury to an MACTEC employee, the HSE Coordinator or Field Lead are to implement the MACTEC Early Injury Case Management program. See procedures and Flow Diagram below:
- If applicable, the HSO shall notify off-site emergency responders (e.g. fire department, hospital, police department, etc.) and shall inform the response team as to the nature and location of the emergency on-site.
- If applicable, the HSO evacuates the site. Site workers should move to the predetermined evacuation point (See Site Map).
- For small fires, flames should be extinguished using the fire extinguisher. Large fires should be handled by the local fire department.
- In an unknown situation or if responding to toxic gas emergencies, appropriate PPE, including SCBAs (if available), should be donned. If appropriate PPE is unavailable, site workers should evacuate and call in emergency personnel.
- For chemical spills, follow the job specific JHA for spill containment
- If chemicals are accidentally spilled or splashed into eyes or on skin, use eyewash and wash affected area. Site worker should shower as soon as possible after incident.
- If the emergency involves toxic gases, workers will back off and reassess. Prior to re-entering the work zone, the area must be determined to be safe. Entry will be using Level B PPE and utilize appropriate monitoring equipment to verify that the site is safe.
- An injured worker shall be decontaminated appropriately.
- Within 24 hours after any emergency response, the Incident Analysis Report (and Vehicle Incident Report if vehicle incident) shall be completed and returned to the Group HSE Manager. Injuries requiring medical treatment beyond first aid (as well as work-related vehicle incidents) will require the employee to submit a post incident drug test.

MACTEC Early Injury Case Management Program

<table>
<tr><th>NON-EMERGENCY INCIDENT</th><th>EMERGENCY INCIDENT</th></tr>
<tr><td>Steps 1 & 2 must be completed before seeking medical attention other than local first aid.
1. Provide first-aid as necessary. Report the situation to your immediate supervisor AND HSE coordinator (all incidents with the apparent starting event should be reported within 1 hour of occurrence).
2. Injured employee:</td><td>1. Provide emergency first aid. Supervisor on duty must immediately call 911 or local emergency number; no employee may respond to outside queries without prior authorization. Any outside media calls concerning this incident must be referred immediately to Lauren Gallagher at 602-757-3211.
2. Once medical attention is sought and provided, the supervisor must:</td></tr>
<tr><td colspan="2">Call WorkCare 24/7 Hotline*
(888) II-XPRTS or (888) 449-7787</td></tr>
<tr><td>WorkCare will assess the situation and determine whether the incident requires further medical attention. During this process, WorkCare will perform the following:
• Explain the process to the caller.
• Determine the nature of the concern.
• Provide appropriate medical advice to the caller.
• Determine appropriate path forward with the caller.
• Maintain appropriate medical confidentiality.
• Help caller to execute path forward, including referral to the appropriate local medical facility.
• Send an email notification to the Corporate HSE Department.</td><td>WorkCare will be responsible for performing the following:
• Contact the treating physician.
• Request copies of all medical records from clinic.
• Send an email update to the Corporate HSE Department.</td></tr>
<tr><td colspan="2">3. IMMEDIATELY after contacting WorkCare send a brief email notification AND inform verbally (direct contact is required) ONE of HSE corporate representatives See Figure 11.3.
4. Make all other local notifications and client notifications.
5. Local Supervisor, HSE Coordinator, SSHO and any applicable safety committees to complete preliminary investigation, along with the initial Incident Report within 24 hours.
6. Corporate Loss Prevention Manager to complete Worker’s Compensation Insurance notifications as needed.
7. Corporate HSE to conduct further incident notifications, investigation, include in statistics, classify, and develop lessons learned materials.
* - NOTE: Step 2 is only applicable to the North-American operations and to incidents involving MACTEC personnel. High potential near misses, subcontractors’ incidents, regulatory inspections, spills and property damages above $1,000 should be reported immediately, following directions from Step 3.</td></tr>
</table>

Site Specific Procedures are as follows:

1. As previously noted, MACTEC is conducting groundwater, sediment, and surface water sampling only.

Incident flow chart

Call immediately

E&I Corporate HSE department contact list

Name/email	Office location	Contact information
Bruce Voss bruce.voss@amecfw.com	Cathedral City, CA	760.202.3737 (office) 951.897.6381 (cell)
Chad Barnes chad.barnes@amecfw.com	Phoenix, AZ	602.733.6000 (office) 480.495.9846 (cell)
Cindy Sundquist cynthia.sundquist@amecfw.com	Portland, ME	207.828.3309 (office) 207.650.7593 (cell) 207.892.4402 (home)
Gabe Sandholm gabe.sandholm@amec.com	Minneapolis, MN	612.252.3785 (office) 206.683.9190 (cell)
John Mazur john.mazur@amec.com	Wilmington, NC	910.444.2978 (office) 910.431.2330 (cell) 910.681.0538 (home)
Lori Dowling lori.dowling@amec.com	Prince George, BC	250.564.3243 (office)
Philip Neville philip.neville@amec.com	Thorold, ON	905.687.6616 (office) 905.380.4465 (cell)
Tim Kihn tim.kihn@amec.com	Edmonton, AB	780.944.6363 (office) 780.717.5058 (cell)
Vladimir Ivensky (can call 24/7) vladimir.ivensky@amec.com	Plymouth Meeting, PA	610.877.6144 (office) 484.919.5175 (cell) 215.947.0393 (home)
Kirby Lastinger kirby.lastinger@amec.com	Lakeland, FL	836-667-2345 x207 (office) 863-272-4775 (cell)

*High potential near misses, subcontractor incidents, regulatory inspections, spills, and property damage should be reported within 60 minutes to one of the above HSE Representatives.
WITHIN 24 HOURS - Local Supervisor, HSE Coordinator, Project HSE Officer, and any applicable safety committees must complete preliminary investigation, along with the initial Incident Analysis Report Form and forward it to the Corporate HSE Department

Rev. Feb15-Hb

FIELD TEAM REVIEW: I acknowledge that I understand the requirements of this HASP, and agree to abide by the procedures and limitations specified herein. I also acknowledge that I have been given an opportunity to have my questions regarding the HASP and its requirements answered prior to performing field activities. Health and safety training and medical surveillance requirements applicable to my field activities at this site are current and will not expire during on-site activities.

Name: _____ Date: _____

Name: _____ Date: _____

Name: _____ Date: _____

Name: _____ Date: _____

Name: _____ Date: _____

Routes to Emergency Medical Facilities

PRIMARY HOSPITAL:

Facility Name: Cortland Regional Medical Center
Address: 134 Homer Avenue, Cortland, NY 13045
Telephone Number: (607) 756-3500

DIRECTIONS TO PRIMARY HOSPITAL (see attached directions and map):

-Depart site head north to South St. follow (northwest) for 1.4 miles
-Turn LEFT (west) onto Ridge Road follow for 2.0 miles
-Turn RIGHT (northwest) onto US 11 follow for 3.8 miles
-Turn LEFT (south) onto Homer Ave for 142 yards

ALTERNATE HOSPITAL:

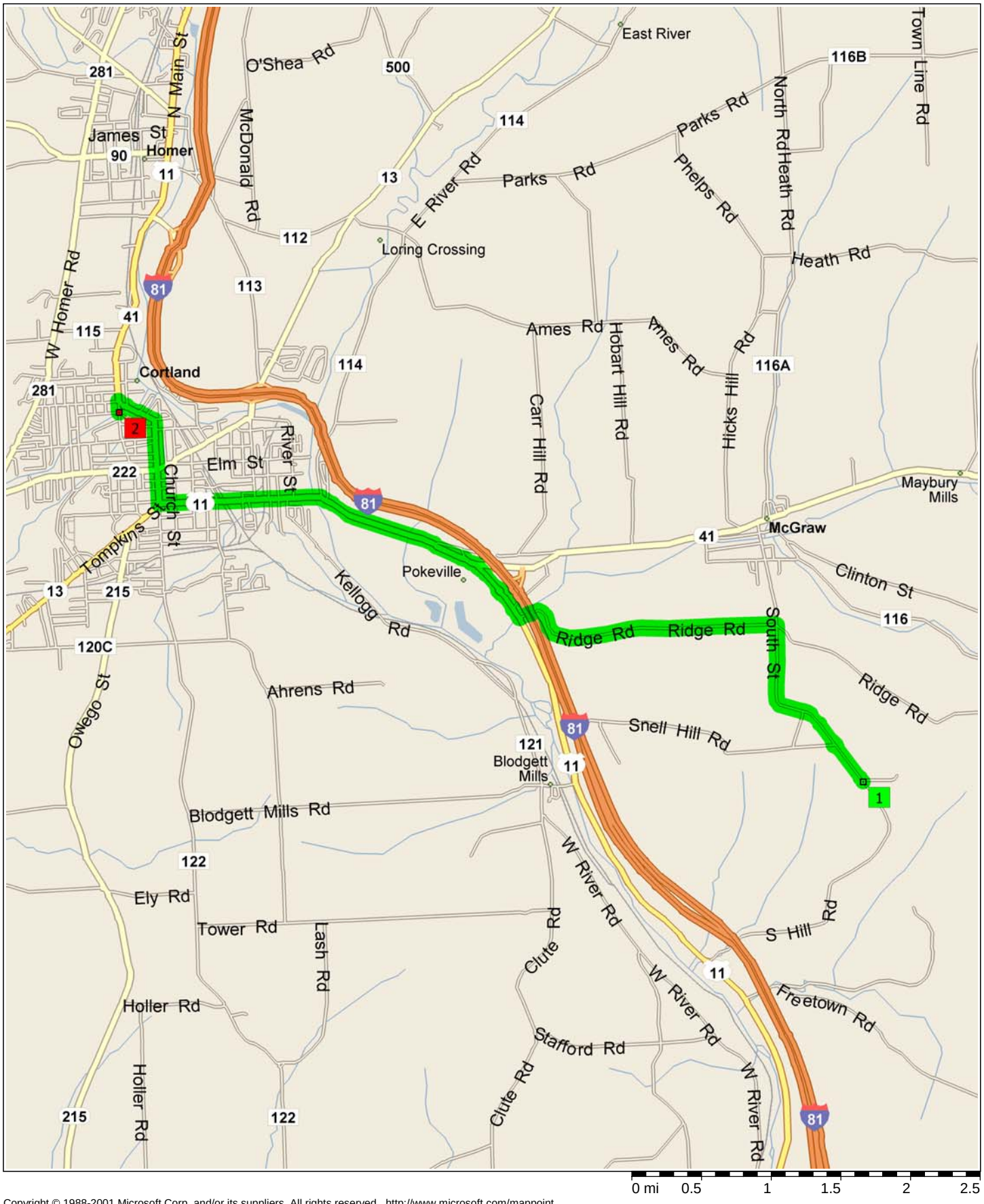
Facility Name: Cortland Convenient Care Center
Address: 1129 Commons Avenue, Cortland, NY 13045
Telephone Number: (607) 758-7770

DIRECTIONS TO ALTERNATE HOSPITAL (see attached directions and map):

-Depart site head north to South St. follow (northwest) for 1.4 miles
-Turn LEFT (west) onto Ridge Road follow for 2.0 miles
-Turn RIGHT (northwest) onto US 11 follow for 3.4 miles
-Turn LEFT (west) onto Madison St follow for 1.0 miles
-Turn RIGHT (north) onto SR-281 (West Road) for 174 yards
-Turn LEFT (west) onto Commons Ave

S Hill Rd, McGraw, NY 13101 to 134 Homer Ave, Cortland, NY 13045

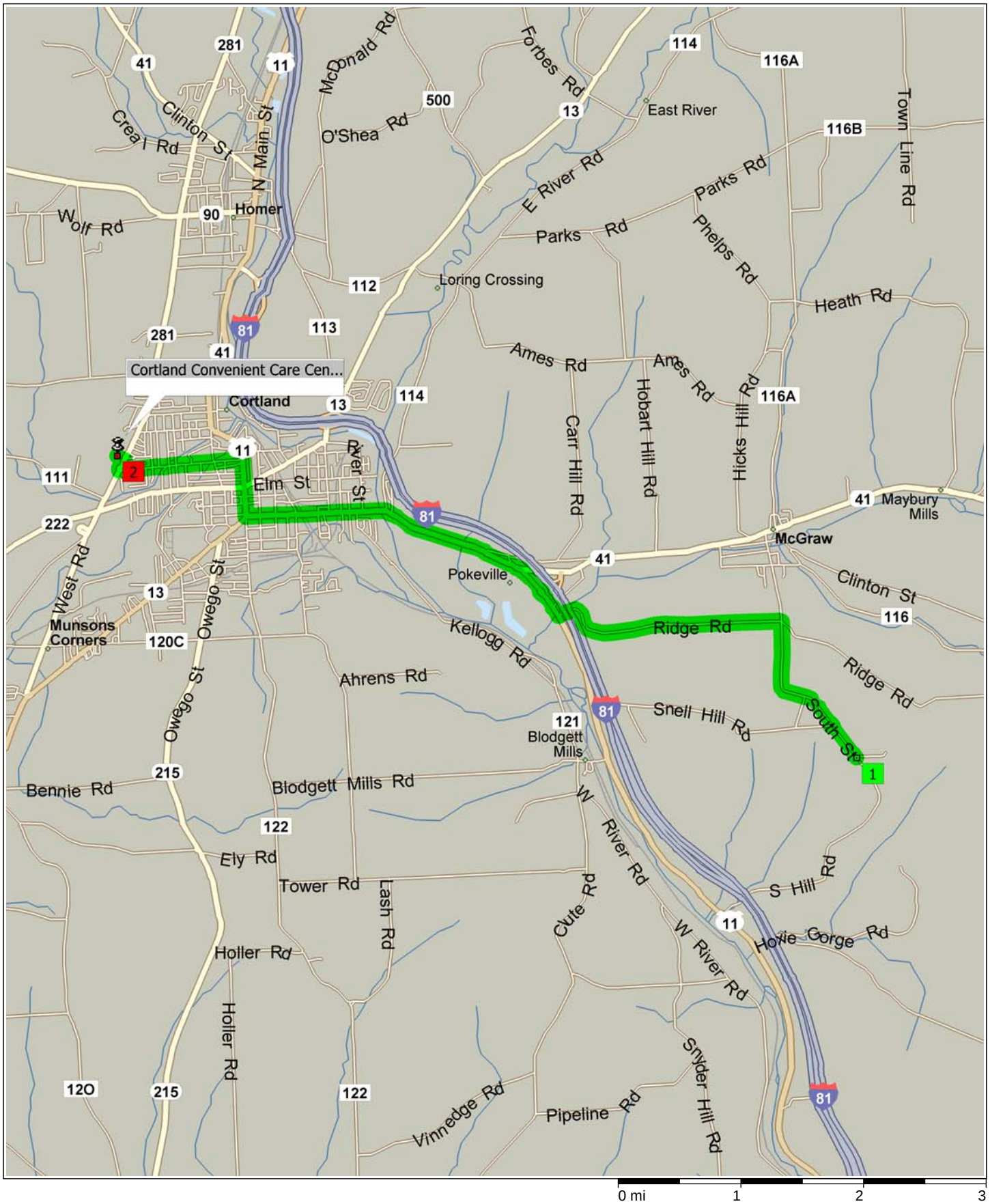
7.3 miles; 13 minutes



9:00 AM	0.0 mi	1 Depart S Hill Rd, McGraw, NY 13101 on South St [S Hill Rd] (North-West) for 1.4 mi
9:03 AM	1.4 mi	Turn LEFT (West) onto Ridge Rd [Sunset View Terrace] for 2.0 mi
9:07 AM	3.4 mi	Turn RIGHT (North-West) onto US-11 for 3.8 mi
9:13 AM	7.3 mi	Turn LEFT (South) onto Homer Ave for 142 yds
9:13 AM	7.3 mi	2 Arrive 134 Homer Ave, Cortland, NY 13045

S Hill Rd, McGraw, NY 13101 to Cortland Convenient Care Center

8.0 miles; 16 minutes



9:00 AM	0.0 mi	1 Depart S Hill Rd, McGraw, NY 13101 on South St [S Hill Rd] (North-West) for 1.4 mi
9:03 AM	1.4 mi	Turn LEFT (West) onto Ridge Rd [Sunset View Terrace] for 2.0 mi
9:07 AM	3.4 mi	Turn RIGHT (North-West) onto US-11 for 3.4 mi
9:12 AM	6.8 mi	Turn LEFT (West) onto Madison St for 1.0 mi
9:16 AM	7.9 mi	Turn RIGHT (North) onto SR-281 [West Rd] for 174 yds
9:16 AM	8.0 mi	Turn LEFT (West) onto Local road(s) for 120 yds
9:16 AM	8.0 mi	2 Arrive Cortland Convenient Care Center

TAILGATE SAFETY MEETING REPORT

Check One:

☐ Initial Kickoff Safety Meeting ☐ Regular/Daily Tailgate Safety Meeting ☐ Unscheduled Tailgate Safety Meeting

Date: _____ Site: _____

Site Manager: _____ Site Health and Safety Officer: _____
Print *Print*

Order of Business

Topics Discussed (Check all that apply)

- ☐ Scope of Work
- ☐ Site History/Site Layout
- ☐ Personnel Responsibilities
- ☐ Training Requirements
- ☐ Hazard Analysis of Work Tasks (chemical, physical, biological and energy health hazard effects)
- ☐ Applicable SOPs (e.g., Hearing Conservation Program, Safe Driving, etc.)
- ☐ Safe Work Practices
- ☐ Engineering Controls
- ☐ Chemical Hazards and Controls
- ☐ Signs and symptoms of over exposure to site chemicals
- ☐ Medical Surveillance Requirements
- ☐ Action Levels
- ☐ Monitoring Instruments and Personal Monitoring
- ☐ Perimeter Monitoring, Type and Frequency
- ☐ PPE Required/PPE Used
- ☐ Define PPE Levels, Donning, Doffing Procedures
- ☐ Decontamination Procedures for Personnel and Equipment
- ☐ Physical Hazards and Controls (e.g., overhead utility lines)
- ☐ Anticipated Weather (snow, high winds, rain)
- ☐ Temperature Extremes (heat or cold stress symptoms and controls)
- ☐ Biological Hazards and Controls (e.g., poison ivy, spiders)
- ☐ Site Control (visitor access, buddy system, work zones, security, communications)
- ☐ Sanitation and Illumination
- ☐ Logs, Reports, Recordkeeping
- ☐ Incident Reporting Procedures
- ☐ Near Misses/Hazard ID including worker suggestions to correct and work practices to avoid similar occurrences
- ☐ General Emergency Procedures (e.g., locations of air horns and what 1 or 2 blasts indicate)
- ☐ General Emergency Response Procedures (e.g., earthquake response, typhoon response, etc.)
- ☐ Medical Emergency Procedures (e.g., exposure control precautions, location of first aid kits, etc.)
- ☐ Route to Hospital and Medical Care Provider Visit Guidelines
- ☐ Site/Regional Emergency Response Procedures (e.g., exposure control precautions, location of first aid kits, etc.)
- ☐ Hazardous Materials Spill Procedures

Safety Suggestions by Site Workers: _____

Action Taken on Previous Suggestions: _____

Injuries/Incidents/Personnel Changes since last meeting: _____

Observations of unsafe work practices/conditions that have developed since previous meeting: _____

Location of (or changes in the locations of) evacuation routes/safe refuge areas:

Additional Comments:

Attendee signatures below indicate acknowledgment of the information and willingness to abide by the procedures discussed during this safety meeting

Name (Print)	Company	Signature

Meeting Conducted by: Title:

Print

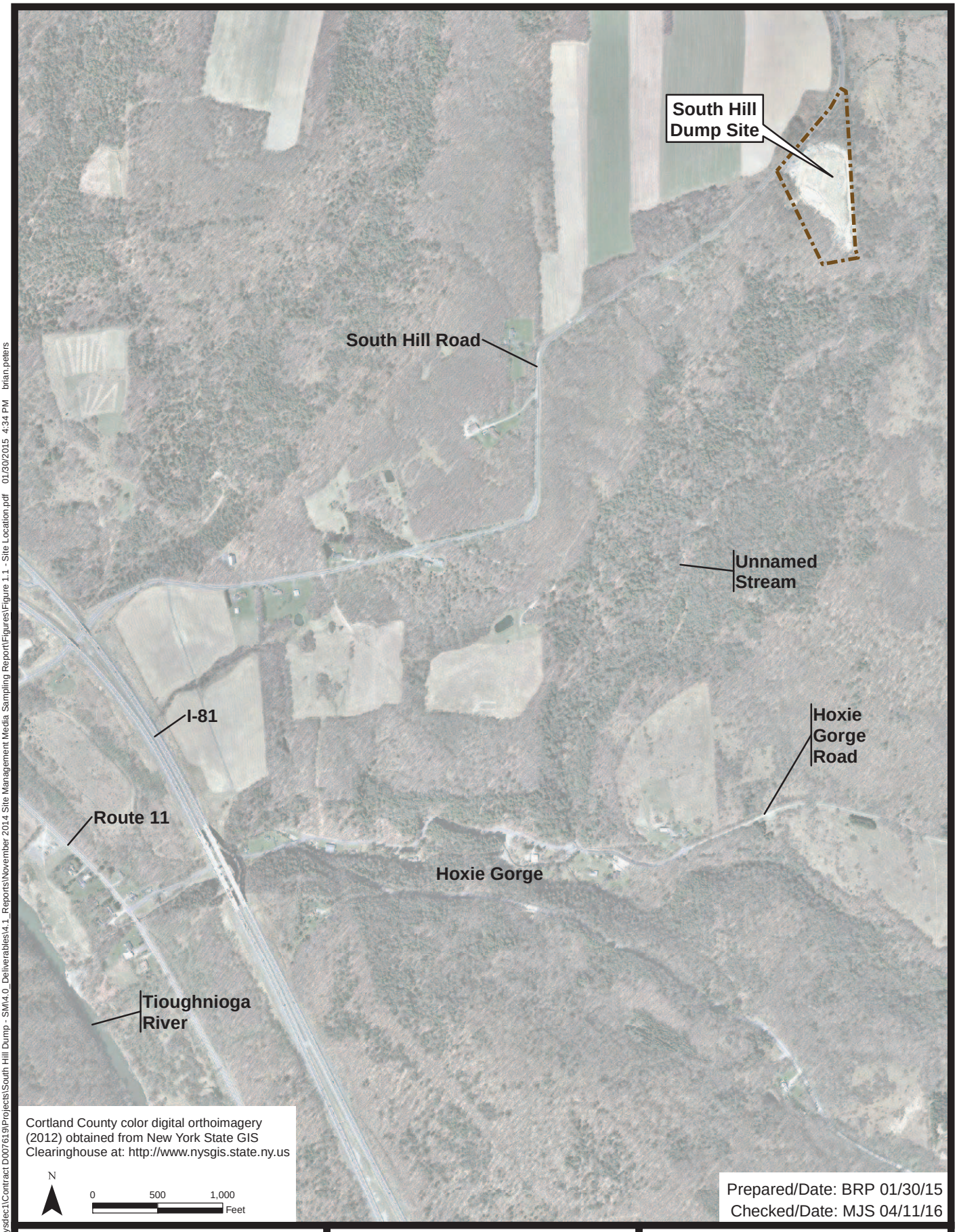
Signature: Time:

Print

PPE Selection Guidelines

When selecting the appropriate PPE for the job, consider the following:

- **Safety glasses** – general eye protection – source of hazard, typically coming from straight on, required at most sites
- **Tinted Safety Glasses** – same as above, but when working in direct sunlight. May need two both tinted and untinted if working in both sunlight and shade/overcast skys.
- **Safety goggles** – needed for splash hazard, more severe eye exposures coming from all directions. Non-vented or indirect venting for chemical splash, non-vented for hazardous gases or very fine dust, vented for larger particulates coming from all directions.
- **Face shield** – needed to protect face from cuts, burns, chemicals (corrosives or chemicals with skin notation), etc.
- **Safety boots** – needed if danger of items being dropped on foot that could injure foot
- **Hard hat** – danger from items falling on head – any overhead work, tools, equipment, etc that is above the head and could fall on head of item fails, or falls off work platform. Typically required at most sites as a general PPE
- **Thin, chemical protective inner gloves** (e.g., thin Nitrile, PVC – do not use latex – many people are allergic to latex) –needed to protect hands from incidental contact with low risk contamination at very low concentrations (ppb or low ppm concentrations in groundwater or soil) or used in combination with outer gloves as a last defense against contamination. Need to specify type
- **Outer gloves** – thicker gloves (e.g., Nitrile, Butyl, Viton, etc.) – used when potential for high concentrations of contaminants (e.g., floating product, percent ranges of contaminant, opening drums, handling pure undiluted chemicals, etc.). Need to specify type.
- **Leather gloves, leather palm, cotton** – good in protecting hands against cuts – no protection from chemicals. May be used in combination with chemical protective gloves.
- **Boot Covers –** when there is contamination in surface soils or waking surface in general. When safety boots need protection from contact with contaminants.
- **White (uncoated) Tyveks** – protect clothing from getting dirty, good for protection against solid, non-volatile chemicals (e.g., asbestos, metals) – no chemical protection.
- **Polycoated Tyveks** – least protective of chemical protective clothing. Used when some risk of contamination getting on skin or clothing. Usually, lower ppm ranges of contaminants.
- **Saranex** – Greater protection against contamination than Polycoated Tyveks. Used to protect against PCBs or higher concentrations of contaminants in the soil or groundwater.
- **Other Chemical protective clothing** – if significant risk of dermal exposure, contact H&S to determine best kind.
- **Long sleeved shirts, long pants** – if working in areas with poison ivy/oak/sumac, poisonous insects, etc. and no chemicals exposure. May want to use uncoated Tyveks for work in areas where poisonous plants are know to be to protect clothing.
- **Cartridge Respirator (Level C PPE)** – Need to calculate change schedule (contact Division EH&S Manager for this) to determine length of use. To be able to use cartridge respirators, need to know contaminants, estimate levels to be encountered in the breathing zone, need to ensure that cartridge will be effective against COCs, and need to be able to monitor for COCs using PID, FID, Dräger tubes, etc.. If can't do any of these, then Level B PPE is probably going to be needed.
- **High Visibility Vest** – needed for any road work (with in 15 feet of a road) or when working on a site with vehicular traffic or working around heavy equipment. Needed if work tasks would take employee concentration away from movement of vehicles and workers would have to rely on the other driver's ability to see the employee in order not to hit them. This includes heavy equipment as well as cars and trucks, on public roads or the jobsite. Not needed if wearing Polycoated Tyveks – as they are already high visibility.
- **Reflective Vest** – see above, but for use at night.
- **Hearing Protection** – needed if working at noise levels above 85 dBA on a time weighted average. If noise measurements are not available, use around noisy equipment, or in general, if you have to raise your voice to be heard when talking to someone standing two feet away.
- **PROTECTIVE CHAPS – REQUIRED WHEN USING A MACHETE OR CHAIN SAW OR ANY OTHER CUT HAZARD TO LEGS**



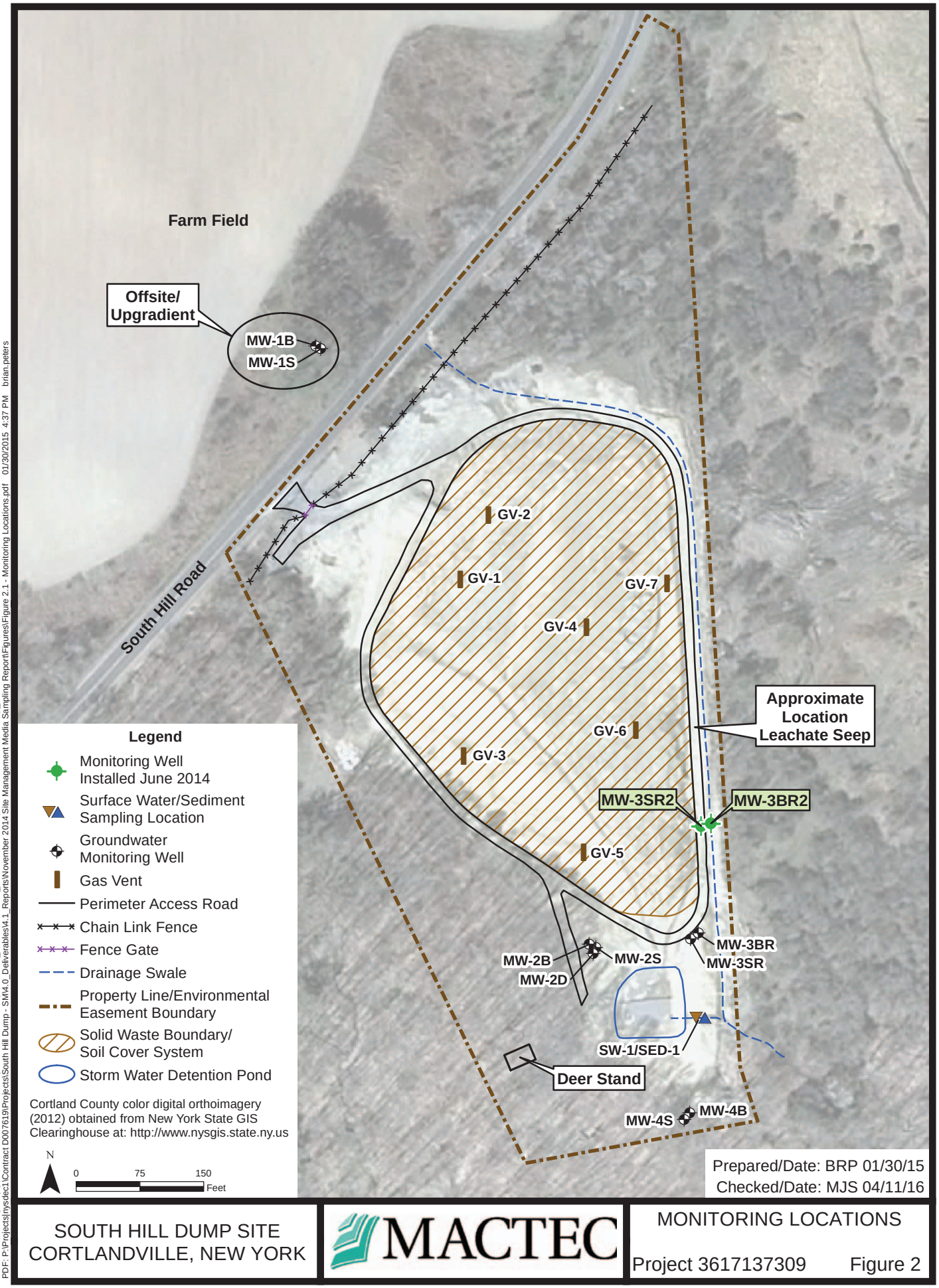
Prepared/Date: BRP 01/30/15
Checked/Date: MJS 04/11/16

SOUTH HILL DUMP SITE
CORTLANDVILLE, NEW YORK

MACTEC

SITE LOCATION

Project 3617137309 Figure 1



SOUTH HILL DUMP SITE
CORTLANDVILLE, NEW YORK

MACTEC

MONITORING LOCATIONS

Project 3617137309 Figure 2

Appendix 1A
New York State Department of Health
Generic Community Air Monitoring Plan

Overview

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

The generic CAMP presented below will be sufficient to cover many, if not most, sites. Specific requirements should be reviewed for each situation in consultation with NYSDOH to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical- specific monitoring with appropriately-sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements should be determined in consultation with NYSDOH.

Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

Community Air Monitoring Plan

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for VOCs and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Most sites will involve VOC and particulate monitoring; sites known to be contaminated with heavy metals alone may only require particulate monitoring. If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate DEC/NYSDOH staff.

Continuous monitoring will be required for all ground intrusive activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. "Periodic" monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or

overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions, particularly if wind direction changes. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

1. If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

2. If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

3. If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.

4. All 15-minute readings must be recorded and be available for State (DEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

1. If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.

2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^3 of the upwind level and in preventing visible dust migration.

3. All readings must be recorded and be available for State (DEC and NYSDOH) and County Health personnel to review.

December 2009

Appendix 1B
Fugitive Dust and Particulate Monitoring

A program for suppressing fugitive dust and particulate matter monitoring at hazardous waste sites is a responsibility on the remedial party performing the work. These procedures must be incorporated into appropriate intrusive work plans. The following fugitive dust suppression and particulate monitoring program should be employed at sites during construction and other intrusive activities which warrant its use:

1. Reasonable fugitive dust suppression techniques must be employed during all site activities which may generate fugitive dust.

2. Particulate monitoring must be employed during the handling of waste or contaminated soil or when activities on site may generate fugitive dust from exposed waste or contaminated soil. Remedial activities may also include the excavation, grading, or placement of clean fill. These control measures should not be considered necessary for these activities.

3. Particulate monitoring must be performed using real-time particulate monitors and shall monitor particulate matter less than ten microns (PM10) with the following minimum performance standards:

(a) Objects to be measured: Dust, mists or aerosols;
(b) Measurement Ranges: 0.001 to 400 mg/m3 (1 to 400,000 :ug/m3);
(c) Precision (2-sigma) at constant temperature: +/- 10 :g/m3 for one second averaging; and +/- 1.5 g/m3 for sixty second averaging;
(d) Accuracy: +/- 5% of reading +/- precision (Referred to gravimetric calibration with SAE fine test dust (mmd= 2 to 3 :m, g= 2.5, as aerosolized);
(e) Resolution: 0.1% of reading or 1g/m3, whichever is larger;
(f) Particle Size Range of Maximum Response: 0.1-10;
(g) Total Number of Data Points in Memory: 10,000;
(h) Logged Data: Each data point with average concentration, time/date and data point number
(i) Run Summary: overall average, maximum concentrations, time/date of maximum, total number of logged points, start time/date, total elapsed time (run duration), STEL concentration and time/date occurrence, averaging (logging) period, calibration factor, and tag number;
(j) Alarm Averaging Time (user selectable): real-time (1-60 seconds) or STEL (15 minutes), alarms required;
(k) Operating Time: 48 hours (fully charged NiCd battery); continuously with charger;
(l) Operating Temperature: -10 to 50° C (14 to 122° F);
(m) Particulate levels will be monitored upwind and immediately downwind at the working site and integrated over a period not to exceed 15 minutes.

4. In order to ensure the validity of the fugitive dust measurements performed, there must be appropriate Quality Assurance/Quality Control (QA/QC). It is the responsibility of the remedial party to adequately supplement QA/QC Plans to include the following critical features: periodic instrument calibration, operator training, daily instrument performance (span) checks, and a record keeping plan.

5. The action level will be established at 150 ug/m3 (15 minutes average). While conservative,

this short-term interval will provide a real-time assessment of on-site air quality to assure both health and safety. If particulate levels are detected in excess of 150 ug/m3, the upwind background level must be confirmed immediately. If the working site particulate measurement is greater than 100 ug/m3 above the background level, additional dust suppression techniques must be implemented to reduce the generation of fugitive dust and corrective action taken to protect site personnel and reduce the potential for contaminant migration. Corrective measures may include increasing the level of personal protection for on-site personnel and implementing additional dust suppression techniques (see paragraph 7). Should the action level of 150 ug/m3 continue to be exceeded work must stop and DER must be notified as provided in the site design or remedial work plan. The notification shall include a description of the control measures implemented to prevent further exceedances.

6. It must be recognized that the generation of dust from waste or contaminated soil that migrates off-site, has the potential for transporting contaminants off-site. There may be situations when dust is being generated and leaving the site and the monitoring equipment does not measure PM10 at or above the action level. Since this situation has the potential to allow for the migration of contaminants off-site, it is unacceptable. While it is not practical to quantify total suspended particulates on a real-time basis, it is appropriate to rely on visual observation. If dust is observed leaving the working site, additional dust suppression techniques must be employed. Activities that have a high dusting potential--such as solidification and treatment involving materials like kiln dust and lime--will require the need for special measures to be considered.

7. The following techniques have been shown to be effective for the controlling of the generation and migration of dust during construction activities:

(a) Applying water on haul roads;
(b) Wetting equipment and excavation faces;
(c) Spraying water on buckets during excavation and dumping;
(d) Hauling materials in properly tarped or watertight containers;
(e) Restricting vehicle speeds to 10 mph;
(f) Covering excavated areas and material after excavation activity ceases; and
(g) Reducing the excavation size and/or number of excavations.

Experience has shown that the chance of exceeding the 150ug/m3 action level is remote when the above-mentioned techniques are used. When techniques involving water application are used, care must be taken not to use excess water, which can result in unacceptably wet conditions. Using atomizing sprays will prevent overly wet conditions, conserve water, and provide an effective means of suppressing the fugitive dust.

8. The evaluation of weather conditions is necessary for proper fugitive dust control. When extreme wind conditions make dust control ineffective, as a last resort remedial actions may need to be suspended. There may be situations that require fugitive dust suppression and particulate monitoring requirements with action levels more stringent than those provided above. Under some circumstances, the contaminant concentration and/or toxicity may require additional monitoring to protect site personnel and the public. Additional integrated sampling and chemical analysis of the dust may also be in order. This must be evaluated when a health and safety plan is developed and when appropriate suppression and monitoring requirements are established for protection of health and the environment.

4.1.3 Community Air Monitoring Plan

Purpose

The purpose of the CAMP is to provide a measure of protection for the downwind community from potential airborne contaminant releases as a result of remedial work activities performed at the Site. Site-specific procedures described below are consistent with the NYSDOH generic CAMP, which is provided as an attachment in Appendix B.

Particulate Air Monitoring

The drilling methods proposed (HSA and/or drive and wash) are not anticipated to produce dust. In the event dust is being generated, particulate monitoring will be conducted continuously during ground intrusive activities (e.g., installation of soil borings and/or monitoring wells). Dust/particulate monitoring will be conducted near upwind and downwind perimeters of the exclusion zone or where dust generating operations are obvious. Dust monitoring may be suspended during periods of heavy precipitation and snow cover.

Particulate air monitoring will be conducted with a DataRAM-4 (or a similar device). This instrument is equipped with an audible alarm (indication of exceedance) and is capable of measuring particulate matter less than 10 micrometers in size (PM-10). It will continually record emissions (calculating 15-minute running average concentrations) generated during field activities. The dust monitoring devices (up wind and downwind) will be checked periodically throughout each day of intrusive activities to assess emissions and the need for corrective action.

Weather conditions, including the prevailing wind direction, will be observed and recorded for each day of site activities. As work and weather conditions change throughout the day, the locations where the dust monitoring devices are set up may be adjusted accordingly.

Particulate monitoring response and action levels include:

- If the downwind PM-10 particulate level is 100 micrograms per cubic meter ($\mu g/m^3$) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust

suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 µg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.

- If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 µg/m^3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 µg/m^3 of the upwind level and in preventing visible dust migration.

VOC Air Monitoring

VOC air monitoring will be conducted in conjunction with the dust monitoring program. VOC air monitoring will be conducted using a RAE Systems MiniRAE 2000 VOC instrument (or a similar PID device). This will provide real-time recordable air monitoring data.

VOC monitoring will be conducted for ground intrusive (continuous monitoring) and non-intrusive activities (periodic monitoring).

VOCs will be continuously monitored and recorded at the downwind perimeter of the immediate work area. Upwind concentrations will be measured before field activities commence and periodically throughout the day to establish background conditions. The downwind VOC monitoring device will also be checked periodically throughout the day to assess emissions and the need for corrective action.

VOC monitoring response and action levels include:

- If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 ppm above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.
- If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these step, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less – but in no case less than 20 feet, below 5 ppm over background for the 15 minute average.
- If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.

Weather conditions, including the prevailing wind direction, will be observed and recorded for each day of site activities. As work and weather conditions change throughout the day, the locations where the VOC monitoring devices are set up may be adjusted accordingly.

Documentation and Calibration

All air monitoring instruments shall be calibrated prior to commencing daily filed activities according to manufacturer's instructions and standard industrial hygiene practices. In addition, monitoring instruments will be checked for "drift" after daily field activities are complete. Calibration measurements shall be recorded on an appropriate field data record or site specific field logbooks. Also, all field measurements will be recorded and available for State (NYSDEC and NYSDOH) personnel to review. Upon completion of field activities, data recorded on both devices (dust and VOC) will be downloaded, evaluated and summarized in the RI Report.

Incident Report Forms

1. Incident Analysis Report (IAR)
2. Vehicle Incident Report (VIR)
3. Ground Disturbance Incident Report(GDR)

Check one
Initial Report: ☐
Update: ☐
Final Report: ☐ ___

INCIDENT ANALYSIS REPORT (IAR)

Amec Foster Wheeler E&I
Confidential - Privileged

Incident Potential Severity
Letter: Select One
Number: Select One
Investigation Level: Select One
Severity Matrix (LINK)

Group: Select One Group HSE Manager: ____ Incident Review Panel Team (if applicable): ____

Incident Date: _____ Report Date: _____

Section 1 – General Information

Employee Name: ____ Sex: ☐ M ☐ F Date of Birth: ____ Age Range: Select One

Job Position: Select One Hire Date: ____ Time employee began work: _____ Time of incident: ____ ☐ am | ☐ pm

Business Line: Select One Department Number: ____ Project Manager: ____

Project Name: ____ Project Number: ____ Client: ____

Office where employee works from: ____ Immediate Supervisor: ____ Hours employee worked during last 7 days: ____ hrs

Location: Select One Is this a Company controlled work site: ☐ Yes ☐ No Incident Assigned to: Select One

Location description: ____

Section 2 – Incident Type - Process (mark at least ONE BOLD TYPE and all that apply)

☐ **Fatality** ☐ **Environmental** ☐ **Injury/Illness Incident** If Injury/illness: Select One

☐ **Security** ☐ **Near Miss/Hazard ID** ☐ **Property Damage** If Damage: Select One ☐ 3rd Party?

☐ Hospitalization ☐ **Regulatory Inspection** ☐ **Notice of Violation or Citation** ☐ Agency Reportable

☐ Motor Vehicle Incident Involving Injury ☐ Other (describe): ____

Outcome/Result: Select One If "other", specify: ____ Source of Hazard: Select One If "other", specify: ____

Immediate Cause: Select One

A. If **injury/illness**: Indicate the part of the body: Select One If "other", specify: ____

Indicate body part location: Select One If "other", specify: ____

Injury Type: Select One If "other" specify: ____ Illness Type: Select One If "other", specify: ____

☐ Bleeding? Select One If yes, "First Aider" name: ____ ☐ Contact with blood/infectious material? Select One

Exposure Control Precautions taken by First Aider (check all that apply):

☐ None (If none, contact WorkCare) ☐ Gloves ☐ Previous HBV Immunization
☐ Immediate Personal Hygiene ☐ One-way CPR valve ☐ Recommended for HBV Immunization
☐ Eye protection ☐ Face mask ☐ Other (describe): ____

☐ Blood contaminated work area / surface? If contaminated, describe cleanup/disposal: ____

☐ Medical treatment provided (i.e. prescriptions, referrals, etc.). If medical treatment, describe: ____

☐ Physical limitations received from physician? If limitations, describe: ____ ☐ Modified Work Offer provided.

☐ Second medical opinion? If second opinion, describe: ____

☐ Workers Compensation claim filed? If filed, claim number: ____

B. If **property damage**: describe what happened and estimate ($) of damage to all objects involved? ____

C. If **environmental**: Environmental incident category: ☐ Pollution Event ☐ Non-conformance

Was Regulatory Action Taken: Select One If "Yes" describe: ____

Type of pollution event: Select One Type of substance: Select One Name, CAS#, physical state: ____

Quantity: ____ Substance Unit: Select One Source of release: Select One If "other", specify: ____

Duration of Breach: Select One Receiving Environment: Select One If "other", specify: ____

Level of Non-conformance: Select One Describe Non-conformance: ___

D. If **security**: Security Incident Type: Select One If Physical: Select One If Criminal: Select One If Intellectual: Select One

E. If an **inspection by a regulatory agency**, what agency, who were the inspectors, inspector contact information? ___

Section 3 – Incident Description

Attach and number additional pages, as needed, to ensure all details related to the incident are captured.

A. List the names of all persons involved in the incident, and employer information: ___

B. List the names of any witnesses, their employer, and a local/company telephone number or address: ___

C. Name of Employee's supervisor: ___ Contact phone number for supervisor: ___

D. What specific job/task or action was the employee(s) doing just prior to the incident: ___

E. Was a tool or equipment involved? ☐ Yes ☐ No What was it: ___ Last Inspection Date: ___Defects: ___

F. Explain in **detail** what happened: ___

G. Explain in **detail** what object or substance directly harmed the employee: ___

H. What were the weather conditions at time of incident?: ___

I. What was the lighting like at time of incident? Bright ☐ Shadows ☐ Dark ☐ Other: ___

J. List any damaged equipment or property (other than motor vehicles). Provide model and serial number **and** estimated costs to repair/replace damaged equipment or property, if applicable: ___

Section 4 - Incident Analysis

A. Was a Health and Safety Plan (HASP) or Activity Hazard Analysis (AHA) completed for the work being performed? ☐ Yes ☐ No
If "yes", Who prepared the document?: ___

B. Who and when was the last manager (Project, Unit, etc.) at the site of the incident?: ___

C. When and what safety training **directly related** to the incident has the person(s) involved had?: ___

D. List attached documentation (HASP acknowledgement forms, kickoff/daily/weekly meetings, inspections, photographs): ___

Section 5 - Incident Investigation Results and Corrective Actions

This section to be completed by the Group HSE Manager/IRP with support from location where incident occurred, in accordance with A-Z List of Accident Causes and Glossary of A-Z Causes (click links).

Causal Factors (Acts or Omissions / Conditions)

(Attach and number any additional pages as needed to completely address this section)

	IMMEDIATE CAUSE	IMMEDIATE CAUSE SUB-TYPE	DESCRIPTION
1	Select One	_____	_____
2	Select One	_____	_____
3	Select One	_____	_____
4	Select One	_____	_____

Root Cause(s) Analysis - The below items represents major root cause categories which have been determined to be Less Than Adequate (LTA). A more detailed determination of the root cause will be facilitated, if needed, by the applicable Group HSE Manager / IRP.

	ROOT CAUSE TYPE	ROOT CAUSE SUB-TYPE	DESCRIPTION
1	Select One	_____	_____

2	Select One	____	____
3	Select One	____	____
4	Select One	____	____

Amec Foster Wheeler Safety Rules and Safety Essentials

Safety Rules **Select all applicable breaches of rules or** ☐ None		**Safety Essentials** **Select all applicable breaches of behavioral expectations or** ☐ None	
☐ Permit to Work ☐ Ground Disturbance ☐ Driving ☐ Confined Spaces ☐ Working At Height	☐ Lifting Operations ☐ Energy Isolations ☐ Pressure Testing ☐ Plant and Equipment ☐ Housekeeping	☐ Always Take Care ☐ Follow the Rules ☐ Do a Risk Assessment	☐ You Must Intervene ☐ Manage Any Change ☐ Wear the Correct PPE

Corrective Actions

Root Cause #	**Corrective Actions Taken** (Attach additional pages as needed to completely address this section)	**Responsible Person**	**Proposed Completion Date**	**Closed on Date**	**Verified by and Date Verified**
____	___	___	___	___	___
____	___	___	___	___	___
____	___	___	___	___	___
____	___	___	___	___	___
____	___	___	___	___	___

Section 6 - Notifications, Certification & Approvals

Check the appropriate boxes indicating the applicable reports have been made to the following applicable organizations:

Auto Insurance Carrier was called ☐ Group HSE Manager Notified ☐

WorkCare was called ☐ Post-incident Drug/Alcohol Testing Performed ☐

Incident Report prepared by: ___

Employee (s): ___	Date: ___	Employee's Supervisor: ___	Date: ___
HSE Coordinator/Project/Unit Manager: ___	Date: ___	Group HSE Manager: ___	Date: ___

ATTACHMENT 2
VEHICLE INCIDENT REPORT

Confidential - Privileged

Section 1 - General Information Date of Incident: _____

Time incident occurred: _____ ☐ am | ☐ pm | Illumination: ☐ Dark ☐ Dusk ☐ Light | Road Condition: ☐ Dry ☐ Wet ☐ Icy/snow

Were police summoned to scene? ☐ Yes ☐ No Police Department and Location: _____

Report #; _____ Officer's Name: _____ Officer's Badge Number: _____

Section 2 - Company Driver and Vehicle

Driver's name: _____ D/L #: _____ State: _____

Driver's home office address: _____ Driver's Phone #: _____

Company Vehicle #: _____ Year: _____ Model: _____ License #: _____ State: _____

Company car?: ☐ Yes ☐ No Personal Vehicle?: ☐ Yes ☐ No Rental Vehicle?: ☐ Yes ☐ No

If rental, rented from: _____

Passenger/Witness Name(s): _____ Address: _____ Telephone: _____

Passenger/Witness Name(s): _____ Address: _____ Telephone: _____

Damage to vehicle: _____

Was an employee injured?: ☐ Yes ☐ No If yes, please describe: _____

Injuries to others?: ☐ Yes ☐ No If yes, please describe: _____

Vehicle was being used for: Company business ☐ Yes ☐ No Personal business ☐ Yes ☐ No

Towed?: ☐ Yes ☐ No If yes, by whom?: _____ To Where?: _____

Section 3 - Other Driver and Vehicle Information

Driver's Name: _____ D/L # : _____ State: _____

Current address: _____ City: _____ State: _____

Telephone: _____ Work: _____ Cell: _____

Registered Owner's Name: _____ Address: _____ City: _____ State: _____

(verify registration document)

The Other Vehicle: Make: _____ Model: _____ Year: _____ License #: _____ State: _____

Insurance company name: _____ Address: _____ Phone #: _____

Policy No.: _____ Contact Person: _____ Phone #: _____

Passenger/Witness Name(s): _____ Address: _____ Telephone: _____

Passenger/Witness Name(s): _____ Address: _____ Telephone: _____

Damage: (*Make note of pre-existing damage and take pictures if possible – you may attach additional pages if necessary):* _____

Injuries to other driver/passengers: _____

Section 4 – Approvals (signatures required)

Form completed by (please print): _____ Date: _____

Signature: _____

Office/Project Manager (please print): _____ Date: _____

Signature: _____

Things to Do First In The Event Of a Motor Vehicle Incident

GENERAL INFORMATION

1. Do not decide on your own whether a particular incident is "covered" by insurance. Should there be any doubt, it is always preferable to report an occurrence, as this allows underwriters, the Risk Management Department and insurance adjusters to determine if a covered loss has taken place.

2. Policy Conditions do require that all losses and occurrences, which may result in a claim be promptly reported.

3. Do not admit liability or offer your opinion of liability to anyone.

4. Complete this IAR/VIR form promptly and forward with all applicable supporting documentation. It is essential both division and location information be provided.

5. For automobile collisions within the **United States**, please indicate on the IAR form that you have contacted Zurich at:

Zurich Insurance Company
1-800-987-3373 or
1-877-928-4531
24 hours a day, 7 days a week

6. For automobile collisions within **Canada**, please indicate on the IAR form that you have contacted Zurich at:

Crawford Adjusters Canada
Claims Alert
1-888-218-2346
24 hours a day, 7 days a week

The more details you have the better but, don't delay reporting if you don't have all of the information - that may be obtained later. A Zurich trained operator will answer your call and ask for all relevant information regarding the incident. The initial information required includes:

- Your division,
- Office location and division contact name – advise that you are an AMEC Company
- Name, drivers license and phone number of the driver involved in the loss
- Description of the vehicle which he/she was driving (i.e., year, make, model, license plate number, serial number)
- Date, time and location of incident
- Passenger information (if applicable)
- Third party information (i.e., name, phone number, address, vehicle information, insurance information)
- If any injuries occurred (if applicable)
- Police information
- Witness information (if applicable)

Call 911 if there are serious injuries!

If you are injured or think you were injured, **contact your supervisor and call WorkCare at 888-449-7787**. Your supervisor will notify your HSE Coordinator and your Group HSE Manager. For additional instructions on what to do, go to AMEC's HSE website at:

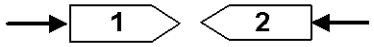
http://ee.amecnet.com/she/sheweb/incident_reporting.htm

1. Call for an officer if the incident occurred on public property (streets, highways or roads). Disputes often arise between the parties involved as to who was at fault; therefore, a police report is important. If an officer is unable to attend the scene of the collision, a counter police report may be filed at most stations. Insurance companies rely on police reports to determine liability.
2. Complete the Incident Investigation Report and the Vehicle Incident Report forms. It is important that both these forms are completed in detail. Include a diagram of the incident on the provided sheet. Incomplete information may lead to delays in processing associated claims and in helping to prevent this type of incident from occurring again.
3. Give only information that is required by the authorities or as directed by AMEC contractual requirements.
4. Sign only those statements required by the authorities or as directed by AMEC contractual requirements. Do not sign away your or the company's rights.

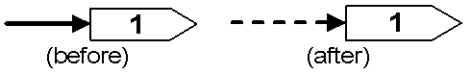
Vehicle Incident Diagram

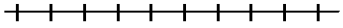
This or a similar diagram must be completed with all VIRs

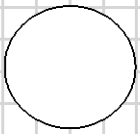
Instructions:

1. Number each vehicle and show directions 

2. Use a solid line to show path before incident and use a dotted line to show path after incient



3. Show pedestrian/non-motorist by: 
4. Show railroad by: 
5. Indicate north by arrow as: 
6. Show street or highway names or numbers
7. Show signs, signals, warning and traffic controls.



Prepared by: _____ Date: _____

GROUND DISTURBANCE INCIDENT REPORT

AMEC Environment & Infrastructure

Section 1 – General Information

Employee Name: _____ Time of incident: _____ ☐ am | ☐ pm Time Reported:_____ ☐ am | ☐ pm Report Date: _____

Project Name: _____ Project Number: _____ Client: _____

List of All Parties Present

Name	Company	Telephone No.	Role
____	____	____	____
____	____	____	____
____	____	____	____
____	____	____	____
____	____	____	____

Describe the chronological description of Incident and response:____

Section 2 – Date and Location of Event

A. *Date of Event: (MM/DD/YYYY)

B. ***Country** ***State** ***County** **City**

C. **Street address** **Nearest Intersection**

D. *Right of Way where event occurred

E. Public: ☐ City Street ☐ State Highway ☐ County Road ☐ Interstate Highway ☐ Public-Other

F. Private: ☐ Private Business ☐ Private Land Owner ☐ Private Easement

G. ☐ Pipeline ☐ Power /Transmission Line ☐ Dedicated Public Utility Easement

☐ Federal Land ☐ Railroad ☐ Data not collected ☐ Unknown/Other

List attached documentation (Public Utility Locates, Private Utility Locates, Copy of notifications submitted to Owner or other utility Owners, photographs): _____

Section 3 – Affected Facility Information

***What type of facility operation was affected?**

☐ Cable Television ☐ Electric ☐ Natural Gas ☐ Liquid Pipeline ☐ Sewer (Sanitary Sewer)

☐ Steam ☐ Telecommunications ☐ Water ☐ Unknown/Other

***What type of facility was affected?**

☐ Distribution ☐ Gathering ☐ Service/Drop ☐ Transmission ☐ Unknown/Other

Was the facility part of a joint trench?

☐ Unknown ☐ Yes ☐ No

Was the facility owner a member of One-Call Center?

☐ Unknown ☐ Yes ☐ No

Section 4 – Excavation Information

***Type of Excavator**

☐ Contractor ☐ County ☐ Developer ☐ Farmer ☐ Municipality ☐ Occupant
☐ Railroad ☐ State ☐ Utility ☐ Data not collected ☐ Unknown/Other

***Type of Excavation Equipment**

☐ Auger ☐ Backhoe/Trackhoe ☐ Boring ☐ Drilling ☐ Directional Drilling
☐ Explosives ☐ Farm Equipment ☐ Grader/Scraper ☐ Hand Tools ☐ Milling Equipment
☐ Probing Device ☐ Trencher ☐ Vacuum Equipment ☐ Data Not Collected ☐ Unknown/Other

***Type of Work Performed**

☐ Agriculture ☐ Cable Television ☐ Curb/Sidewalk ☐ Bldg. Construction ☐ Bldg. Demolition
☐ Drainage ☐ Driveway ☐ Electric ☐ Engineering/Survey ☐ Fencing
☐ Grading ☐ Irrigation ☐ Landscaping ☐ Liquid Pipeline ☐ Milling
☐ Natural Gas ☐ Pole ☐ Public Transit Auth. ☐ Railroad Maint. ☐ Road Work
☐ Sewer (San/Storm) ☐ Site Development ☐ Steam ☐ Storm Drain/Culvert ☐ Street Light
☐ Telecommunication ☐ Traffic Signal ☐ Traffic Sign ☐ Water ☐ Waterway Improvement
☐ Data Not Collected ☐ Unknown/Other

Section 5 – Pre-Excavation Notification

***Was the One-Call Center notified?**

☐ Yes ☐ No If Yes, which One-Call Center? Ticket number:

Was Private Contract Locator used?

☐ Yes ☐ No

Section 6 – Locating and Marking

***Type of Locator**

☐ Utility Owner ☐ Contract Locator ☐ Data Not Collected

***Were facility marks visible in the area of excavation?**

☐ Yes ☐ No ☐ Data Not Collected

***Were facilities marked correctly?**

☐ Yes ☐ No ☐ Data Not Collected

What technology was used to locate utilities?

☐ Maps ☐ Active(transmitter+receiver) ☐ Passive (receiver only) ☐ GPR
☐ Acoustic ☐ Magnetic ☐ Infrared ☐ Unknown/Other

What Factors affected the ability to locate services?

☐ Soil Type:_____ ☐ Non-Grounded ☐ Common Bonded ☐ Depth
☐ Electromagnetic interference ☐ Parallel facilities ☐ Congested facilities ☐ Unknown/Other

Section 7 – Excavator Downtime

Did Excavator incur down time?

☐ Yes ☐ No

If yes, how much time?

☐ Unknown ☐ Less than 1 hour ☐ 1 hour ☐ 2 hours ☐ 3 or more hours Exact Value _____If

Estimated cost of down time?

☐ Unknown ☐ $0 ☐ $1 to 500 ☐ $501 to 1,000 ☐ $1,001 to 2,500 ☐ $2,501 to 5,000
☐ $5,001 to 25,000 ☐ $25,001 to 50,000 ☐ $50,001 and over Exact Value _____

Section 8 – Description of Damage

***Was there damage to a facility?**
☐ Yes ☐ No (i.e. near miss)
***Did the damage cause an interruption in service?**
☐ Yes ☐ No ☐ Data Not Collected ☐ Unknown/Other
If yes, duration of interruption
☐ Unknown ☐ Less than 1 hour ☐ 1 to 2 hrs ☐ 2 to 4 hrs ☐ 4 to 8 hrs ☐ 8 to 12 hrs ☐ 12 to 24 hrs
☐ 1 to 2 days ☐ 2 to 3 days ☐ 3 or more days ☐ Data Not Collected Exact Value _____
Approximately how many customers were affected?
☐ Unknown ☐ 0 ☐ 1 ☐ 2 to 10 ☐ 11 to 50 ☐ 51 or more Exact Value _____
Estimated cost of damage / repair/restoration
☐ Unknown ☐ $0 ☐ $1 to 500 ☐ $501 to 1,000 ☐ $1,001 to 2,500 ☐ $2,501 to 5,000
☐ $5,001 to 25,000 ☐ $25,001 to 50,000 ☐ $50,001 and over Exact Value _____
Number of people injured
☐ Unknown ☐ 0 ☐ 1 ☐ 2 to 9 ☐ 10 to 19 ☐ 20 to 49 ☐ 50 to 99
☐ 100 or more Exact Value _____
Number of fatalities
☐ Unknown ☐ 0 ☐ 1 ☐ 2 to 9 ☐ 10 to 19 ☐ 20 to 49 ☐ 50 to 99
☐ 100 or more Exact Value _____

Was there a Product Release?
Product Release: ☐ No ☐ Yes ☐ N/A Type: ____ **If Yes, Incident Type is Environmental Report.**
Volume: ____ Spill Controls: ____
Repair Process: ____

Section 9 – Description of the Root Cause

Please choose one

One-Call Notification Practices Not Sufficient
☐ No notification made to the One-Call Center
☐ Notification to one-call center made, but not sufficient
☐ Wrong information provided to One Call Center

Locating Practices Not Sufficient
☐ Facility could not be found or located
☐ Facility marking or location not sufficient
☐ Facility was not located or marked
☐ Incorrect facility records/maps

Excavation Practices Not Sufficient
☐ Failure to maintain marks
☐ Failure to support exposed facilities
☐ Failure to use hand tools where required
☐ Failure to test-hole (pot-hole)
☐ Improper backfilling practices
☐ Failure to maintain clearance
☐ Other insufficient excavation practices

Miscellaneous Root Causes
☐ One-Call Center error
☐ Abandoned facility
☐ Deteriorated facility
☐ Previous damage
☐ Data Not Collected
☐ Other

Section 10 - Notifications, Certification & Approvals

Check the appropriate boxes indicating the applicable reports have been made to the following applicable organizations:

One Call was called ☐ **Spills Reporting Agency Notified ☐**

Emergency Responders (Fire) was called ☐ **Post-incident Drug/Alcohol Testing Performed**

List of All Agencies Contacted

Name/Agency	Phone #	Date	Time

Incident Report prepared by: ____

Employee (s): ____	Date: ____	Employee's Supervisor: ____	Date: ____
HSE Coordinator/Project/Unit Manager: ____	Date: ____	Group HSE Manager:____	Date: ____

Activity Hazard Analysis (AHAs)

1. **Mob-Demobe & Site Preparation**
2. **Field Work – General**
3. **Decontamination**
4. **Groundwater Sampling**
5. **Landfills**
6. **Insect Stings & Bites**
7. **Working with Preservatives**
8. **Surface water and Sediment Sampling**

MACTEC

Job Hazard Analysis – HASP Format

Job Title: Mobilization/Demobilization and Site Preparation **Date of Analysis:** 8/15/06

Minimum Recommended PPE*: High visibility vest, hard hat, steel-toed boots, safety glasses, hearing protection
*See HASP for all required PPE

Key Work Steps	Hazards/Potential Hazards	Safe Practices
1. Prepare for Site Visit	1A) N/A	1A) Prior to leaving for site ▪ Obtain and review HASP prior to site visit, if possible ▪ Determine PPE needs – bring required PPE to the site, if not otherwise being provided at the site (e.g., steel toed boots) ▪ Determine training and medical monitoring needs and ensure all required Health and Safety training and medical monitoring has been received and is current ▪ Ensure all workers are fit for duty (alert, well rested, and mentally and physically fit to perform work assignment) ▪ If respiratory protection is required/potentially required, ensure that training and fit-testing has occurred within the past year. ▪ Familiarize yourself with route to the site
	1B) Vehicle defects	1B) Inspect company owned/leased vehicle for defects such as: ▪ Flat tires ▪ Windshield wipers worn or torn ▪ Oil puddles under vehicle ▪ Headlights, brake lights, turn signals not working
	1C) Insufficient emergency equipment, unsecured loads	1C) Insufficient emergency equipment, unsecured loads ▪ Ensure vehicle has first aid kit and that all medications are current (if first aid kits are not provided at the site) ▪ Ensure vehicle is equpped with warning flashers and/or flares and that the warning flashers work ▪ Cell phones are recommended to call for help in the event of an emergency ▪ Vehicles carrying tools must have a safety cage in place. All tools must be properly secured ▪ Vehicles must be equipped with chocks if the vehicle is to be left running, unattended. ▪ Ensure sufficient gasoline is in the tank
2. Operating vehicles – general	2A) Collisions, unsafe driving conditions	2A) Drive Defensively! ▪ Seat belts must be used at all times when operating any vehicle on company business. ▪ Drive at safe speed for road conditions ▪ Maintain adequate following distance ▪ Pull over and stop if you have to look at a map ▪ Try to park so that you don't have to back up to leave. ▪ If backing in required, walk around vehicle to identify any hazards (especially low level hazards that may be difficult to see when in the vehicle) that might be present. Use a spotter if necessary
3. Driving to the jobsite	3A) Dusty, winding, narrow roads	3A) Dusty, winding, narrow roads ▪ Drive confidently and defensively at all times. ▪ Go slow around corners, occasionally clearing the windshield.
	3B) Rocky or one-lane roads	3B) Rocky or one-lane roads ▪ Stay clear of gullies and trenches, drive slowly over rocks. ▪ Yield right-of-way to oncoming vehicles---find a safe place to pull over.
	3C) Stormy weather, near confused tourists	3C) Stormy weather, near confused tourists ▪ Inquire about conditions before leaving the office. ▪ Be aware of oncoming storms. ▪ Drive to avoid accident situations created by the mistakes of others.

MACTEC

Job Hazard Analysis – HASP Format

Job Title: Mobilization/Demobilization and Site Preparation **Date of Analysis:** 8/15/06

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	3D) When angry or irritated	3D) When angry or irritated ▪ Attitude adjustment; change the subject or work out the problem before driving the vehicle. Let someone else drive.
	3E) Turning around on narrow roads	3E) Turning around on narrow roads ▪ Safely turn out with as much room as possible. ▪ Know what is ahead and behind the vehicle. ▪ Use a backer if available.
	3F) Sick or medicated	3F) Sick or medicated ▪ Let others on the crew know you do not feel well. ▪ Let someone else drive.
	3G) On wet or slimy roads	3G) On wet or slimy roads ▪ Drive slow and safe, wear seatbelts.
	3H) Animals on road	3H) Animals on road ▪ Drive slowly, watch for other animals nearby. ▪ Be alert for animals darting out of wooded areas
4. Gain permission to enter site	4A) Hostile landowner, livestock, pets	4A) Hostile landowner, livestock, pets ▪ Talk to land owner, be courteous and diplomatic ▪ Ensure all animals have been secured away from work area
5. Mobilization/ Demobilization of Equipment and Supplies	5A) Struck by Heavy Equipment/Vehicles	5A) Struck by heavy equipment ▪ Be aware of heavy equipment operations. ▪ Keep out of the swing radius of heavy equipment. ▪ Ground personnel in the vicinity of heavy equipment operations will be within the view of the operator at all times ▪ Employees shall wear a high visibility vest or T-shirt (reflective vest required if working at night). ▪ Ground personnel will be aware of the counterweight swing and maintain an adequate buffer zone. ▪ Ground personnel will not stand directly behind heavy equipment when it is in operation.
	5B) Struck by Equipment/Supplies	5B) Struck by Equipment/Supplies ▪ Workers will maintain proper space around their work area, if someone enters it, stop work. ▪ When entering another worker's work space, give a verbal warning so they know you are there.
	5C) Overexertion Unloading/Loading Supplies	5C) Overexertion Unloading/Loading Supplies ▪ Train workers on proper body mechanics, do not bend or twist at the waist while exerting force or lifting. ▪ Tightly secure all loads to the truck bed to avoid load shifting while in transit.
	5D) Caught in/on/between	5D) Caught in/on/between ▪ Do not place yourself between two vehicles or between a vehicle and a fixed object.
	5E) Slip/Trip/Fall	5E) 1E). Slip/Trip/Fall ▪ Mark all holes and low spots in area with banner tape. Instruct personnel to avoid these areas. ▪ Drivers will maintain 3 point contact when mounting/dismounting vehicles/equipment. ▪ Drivers will check surface before stepping, not jumping down.

MACTEC

Job Hazard Analysis – HASP Format

Job Title: Mobilization/Demobilization and Site Preparation **Date of Analysis:** 8/15/06

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	5F) Vehicle accident	5F) Vehicle accident ▪ Employees should follow MACTEC vehicle operation policy and be aware of all stationary and mobile vehicles.
6. Site Preparation	6A) Slip/Trip/Fall	6A) Slip/Trip/Fall ▪ Mark all holes and low spots in area with banner tape. Instruct personnel to avoid these areas
7. Installation of soil erosion and sediment controls	7A) Overexertion	7A) Overexertion ▪ Workers will be trained in the proper method of placing erosion controls. ▪ Do not bend and twist at the waist while lifting or exerting force.
	7B) Struck by Equipment/Supplies	7C) Struck by Equipment/Supplies ▪ Workers will maintain proper space around their work area, if someone enters it, stop work. ▪ When entering another worker's work space, give a verbal warning so they know you are there.
8. Driving back from the jobsite	8A) See hazards listed under item #3	8A) See safe work practices under item #3

Job Hazard Analysis - Short Form HASP

Job Title: Field Work - General **Date of Analysis:** August 29, 2011

Applicable ES&H Procedures:

2.5.A - Conducting Safe Drilling Operations
2.9.A - Hazardous Waste Operations and Emergency Response Program
2.9.B - Hearing Conservation Program
2.9.C - Respiratory Protection Program
2.9.D - Personal Protective Equipment Program
2.9.E - Hazard Communication Program
2.0.1 - Incident Reporting
2.5.1 - Operation of Company Vehicles and Use of Personal Vehicles on Company Business
2.5.2 - Heavy Equipment
2.9.21 - Power and Hand Tools
2.9.11 - Exposure Monitoring
2.9.16 - Thermal Stress
2.9.21 - Power and Hand Tools
2.13.1 - Medical Surveillance
2.13.2 - Medical Emergencies and First Aid
2.14.1 - Flammable and Combustible Liquids
2.14.2 - Handling, Storage, and Control of Hazardous Chemicals
2.14.5 - Collection of Field Samples

Minimum Recommended PPE*: hard hat, steel-toed boots, safety glasses, hearing protection. Leather gloves when using power and hand tools.
*See HASP for all required PPE

Key Work Steps	Hazards/Potential Hazards	Safe Practices
1. Mobilization/ See Mobilization/Demobilization and Site Preparation JHA Demobilization and Site Preparation	1A) See Mobilization/Demobilization and Site Preparation JHA	1A) See Mobilization/Demobilization and Site Preparation JHA
2. Communication	2A) Safety, crew unity	2A) Talk to each other. ▪ Let other crewmembers know when you see a hazard. ▪ Avoid working near known hazard trees (trees that are rotten, dead, damaged, etc.). ▪ Always know the wherabouts of fellow crewmembers. ▪ Carry a radio and spare batteries or cell phone. ▪ Review Emergency Evacuation Procedures (see below).
3. Walking and working in the field	3A) Falling down, twisted ankles and knees, poor footing	3A) Always watch your footing. ▪ Slow down and use extra caution around logs, rocks, and animal holes. ▪ Extremely steep slopes (>50%) can be hazardous under wet or dry conditions; consider an alternate route. ▪ Wear laced boots with a minimum 8" high upper and non-skid Vibram-type soles for ankle support and traction.

Job Hazard Analysis - Short Form HASP

Job Title: Field Work - General **Date of Analysis:** August 29, 2011

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	3B) Falling objects	3B) Protect head agains falling objects. ▪ Wear your hardhat for protection from falling limbs and pinecones, and from tools and equipment carried by other crewmembers. ▪ Stay out of the woods during extremely high winds.
	3C) Damage to eyes	3C) Protect eyes: ▪ Watch where you walk, ecpecially around trees and brush with limbs sticking out. ▪ Exercise caution when clearing limbs from tree trunks. Advise wearing eye protection. ▪ Ultraviolet light from the sun can be damaging to the eyes; look for sunglasses that specify significant protection from UV-A and UV-B radiation. If safety glasses require, use one's with tinted lenses
	3D) Bee and wasp stings	3D) See JHA for Insect Stings and Bites
	3E) Ticks and infected mosquitos	3E) See JHA for Insect Stings and Bites
	3F) Lifting Injuries (e.g., Back Injuries)	3F) Lifting Injuries (e.g., Back Injuries) • Site personnel will be instructed on proper lifting techniques. • Perform warm-up excercises before starting work. • **DO NOT EXCEED THE MACTEC LIFTING LIMIT OF 50 POUNDS.** • Use two people to lift, lower, or carry equipment or materials heavier than 50 pounds. • Mechanical devices should be used to reduce manual handling of materials. • Drive the field vehicle as close to the point that the heavy equipment/material will be used as long as the area is safe to drive into and you do not create hazards to you, your co-worker, or the vehicle.
	3G) Slips/Trips/Falls	3G) Slips/Trips/Falls • Maintain work areas safe and orderly; unloading areas should be on even terrain; mark or repair possible tripping hazards. • Site SHSO inspect the entire work area to identify and mark hazards. • Be aware of work area conditions that can cause slip hazards such as ponding of water on concrete surfaces. Ponding of water on smooth surfaces, such as concrete, coupled with the warm or freezing weather conditions has the potential to cause slippery condiitons such as growth of scum or ice, as applicable. Adding a layer of clean fill to the surface may prevent the growth of scum, and/or create a non-slippery walking surface.
	3H) Vehicular Traffic	3H) Vehicular Traffic ▪ Spotters will be used when backing up trucks and heavy equipment and when moving equipment. ▪ High visibility vests will be worn when workers are exposed to vehicular traffic at the site or on public roads.
	3I) Overhead Hazards	3I) Overhead Hazards ▪ Personnel will be required to wear hard hats that meet ANSI Standard Z89.1. ▪ All ground personnel will stay clear of suspended loads. ▪ All equipment will be provided with guards, canopies or grills to protect the operator from falling or flying objects. ▪ All overhead hazards will be identified prior to commencing work operations.
	3J) Dropped Objects	3J) Dropped Objects ▪ Steel toe boots meeting ANSI Standard Z41 will be worn.

Job Hazard Analysis - Short Form HASP

Job Title: Field Work - General **Date of Analysis:** August 29, 2011

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	3K) Noise	3K) Noise ▪ Hearing protection will be worn with a noise reduction rating capable of maintaining personal exposure below 85 dBA (ear muffs or plugs); all equipment will be equipped with manufacturer's required mufflers. Hearing protection shall be worn by all personnel working in or near heavy equipment.
	3L) Eye Injuries	3L) Eye Injuries ▪ Safety glasses meeting ANSI Standard Z87 will be worn.
	3M) Heavy Equipment (overhead hazards, spills, struck by or against)	3M) Heavy Equipment ▪ Equipment will have seat belts. ▪ Operators will wear seat belts when operating equipment. ▪ Do not operate equipment on grades that exceed manufacturer's recommendations. ▪ Equipment will have guards, canopies or grills to protect from flying objects. ▪ Ground personnel will stay clear of all suspended loads. ▪ Ground personnel will wear high visibility vests ▪ Spill and absorbent materials will be readily available. ▪ Drip pans, polyethylene sheeting or other means will be used for secondary containment. ▪ Ground personnel will stay out of the swing radius of excavators. ▪ Eye contact with operators will be made before approaching equipment. ▪ Operator will acknowledge eye contact by removing his hands from the controls. ▪ Equipment will not be approached on blind sides. ▪ All equipment will be equipped with backup alarms and use spotters when significant physical movement of equipment occurs on-site, (i.e., other than in place excavation or truck loading).
	3N) Struck by vehicle/equipment	3N) Struck by vehicle/equipment ▪ Be aware of heavy equipment operations. ▪ Keep out of the swing radius of heavy equipment. ▪ Ground personnel in the vicinity of heavy equipment operations will be within the view of the operator at all times and will wear high visibility vests. ▪ Ground personnel will be aware of the counterweight swing and maintain an adequate buffer zone. ▪ Ground personnel will not stand directly behind heavy equipment when it is in operation. ▪ Drivers will keep workers on foot in their vision at all times, if you lose sight of someone, Stop!
	3O) Struck/cut by tools	3O) Struck/cut by tools ▪ Cut resistant work gloves will be worn when dealing with sharp objects. ▪ All hand and power tools will be maintained in safe condition. ▪ Guards will be kept in place while using hand and power tools.
	3P) Caught in/on/between	3P) Caught in/on/between ▪ Workers will not position themselves between equipment and a stationary object. ▪ Workers will not wear long hair down (place in pony-tail and tuck into shirt) or jewelry if working with tools/machinery.

Job Hazard Analysis - Short Form HASP

Job Title: Field Work - General **Date of Analysis:** August 29, 2011

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	3Q) Contact with Electricity/Lightning	3Q) Contact with Electricity/Lighting ▪ All electrical tools and equipment will be equipped with GFCI. ▪ Electrical extension cords will be of the "Hard" or "Extra Hard" service type. ▪ All extension cords shall have a three-blade grounding plug. ▪ Personnel shall not use extension cords with damaged outer covers, exposed inner wires, or splices. ▪ Electrical cords shall not be laid across roads where vehicular traffic may damage the cord without appropriate guarding. ▪ All electrical work will be conducted by a licensed electrician. ▪ All utilities will be marked prior to excavation activities. ▪ All equipment will stay a minimum of 10 feet from overhead energized electrical lines (50 kV). This distance will increase by 4 inches for each 10 kV above 50 kV. Rule of Thumb: Stay 10 feet away from all overhead powerlines known to be 50 kV or less and 35 feet from all others.) ▪ The SHSO shall halt outdoor site operations whenever lightning is visible, outdoor work will not resume until 30 minutes after the last sighting of lightning.
	3R) Equipment failure	3R) Equipment failure ▪ All equipment will be inspected before use. If any safety problems are noted, the equipment should be tagged and removed from service until repaired or replaced.
	3S) Hand & power tool usage, cuts, burns, etc.	3S) Hand & power tool usage ▪ Inspect the tool daily. ▪ Remove broken or damaged tools from service. ▪ Use the tool for its intended purpose. ▪ Use in accordance with manufacturers instructions.

Job Hazard Analysis - Short Form HASP

Job Title: Field Work - General **Date of Analysis:** August 29, 2011

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	3T) Burns and Exposure to Exhaust from Portable Propane Torch Use	3T) Portable propane torch usage • Read the manual to become familiar with the propane torch and follow all safety precautions. Don PPE (safety glasses, heavy leather gloves) before using the torch. • Inspect the propane cylinder and the torch tip to ensure there are no defects, damage, etc. • Assemble the torch kit per instruction manual. The torch is designed to be used with the small propane cylinder, do not attempt to attach the torch to any other gas cylinder. • Do not use the torch in areas where gasoline or other liquids having flammable vapors are stored or used. • Do not smoke while igniting or operating the propane torch. • Have an ABC type fire extinguisher readily accessible to the work area. • Be sure the torch tip has a tight seal to the cylinder. If you smell gas, do not try to light the torch. Check the seal between the cylinder and torch. Do not attempt to light the torch until the seal is secure and no gas is leaking. • To ignite the torch flame, first position the point of the torch tip away from you. • If the unit requires a striker to ignite the torch, only use the striker provided with the unit. Never use a match or lighter to ignite torch. • Do not place hand or any part of your body in the path of the flame while lighting or operating the propane torch. • Never leave an ignited torch unattended while in operation. When not in use, the torch tip must be removed from the propane cylinder. • Be aware of the weather conditions. On bright sunny days, the torch flame may be barely visible. On windy days, the wind may carry the torch's heat back towards you. • The torch can produce combustion products such as carbon monoxide. Do not breathe in the exhaust. Propane vapors are heavier than air and can accumulate in low or confined areas. Use the torch only in a well ventilated area. • Heating a surface may cause heat to be conducted to adjoining surfaces that may be combustible or become pressurized when heated. Always check to make sure no unintended parts or materials are being heated. • Torch will be extremely hot, allow the torch to cool before touching it to remove it from the cylinder. • Never store a torch that is still hot. • When cooled, disconnect the torch from the cylinder for storage, and store them in a safe manner to prevent damage.

Job Hazard Analysis - Short Form HASP

Job Title: Field Work - General **Date of Analysis:** August 29, 2011

Key Work Steps	Hazards/Potential Hazards	Safe Practices
4. Environmental health considerations	4A) HEAT Stress	4A) Take precautions to prevent heat stress ▪ Remain constantly aware of the four basic factors that determine the degree of heat stress (air temperature, humidity, air movement, and heat radiation) relative to the surrounding work environmental heat load. ▪ Know the signs and symptoms of heat exhaustion, heat cramps, and heat stroke. Heat stroke is a true medical emergency requiring immediate emergency response action. NOTE: The severity of the effects of a given environmental heat stress is decreased by reducing the work load, increasing the frequency and/or duration of rest periods, and by introducing measures which will protect employees from hot environments. ▪ Maintain adequate water intake by drinking water periodically in small amounts throughout the day (flavoring water with citrus flavors or extracts enhances palatability). ▪ Allow approximately 2 weeks with progressive degrees of heat exposure and physical exertion for substantial acclimatization. ▪ Acclimatization is necessary regardless of an employee's physical condition (the better one's physical condition, the quicker the acclimatization). Tailor the work schedule to fit the climate, the physical condition of employees, and mission requirements. ▪ A reduction of work load markedly decreases total heat stress. ▪ Lessen work load and/or duration of physical exertion the first days of heat exposure to allow gradual acclimatization. ▪ Alternate work and rest periods. More severe conditions may require longer rest periods and electrolyte fluid replacement.
	4B) Wet Bulb Globe Temperature (WBGT) Index	4B) WBGT ▪ Curtail or suspend physical work when conditions are extremely severe (see attached Heat Stress Index). ▪ Compute a Wet Bulb Globe Temperature Index to determine the level of physical activity (take WBGT index measurements in a location that is similar or closely approximates the environment to which employees will be exposed). WBGT THRESHOLD VALUES FOR INSTITUTING PREVENTIVE MEASURES 80-90 degrees F — Fatigue possible with prolonged exposure and physical activity. 90-105 degrees F — Heat exhaustion and heat stroke possible with prolonged exposure and physical activity. 105-130 degrees F — Heat exhaustion and heat stroke are likely with prolonged heat exposure and physical activity.

Job Hazard Analysis - Short Form HASP

Job Title: Field Work - General **Date of Analysis:** August 29, 2011

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	4C) Cold Extremes	4C) Take precautions to prevent cold stress injuries ▪ Cover all exposed skin and be aware of frostbite. While cold air will not freeze the tissues of the lungs, slow down and use a mask or scarf to minimize the effect of cold air on air passages. ▪ Dress in layers with wicking garments (those that carry moisture away from the body – e.g., cotton) and a weatherproof slicker. A wool outer garment is recommended. ▪ Take layers off as you heat up; put them on as you cool down. ▪ Wear head protection that provides adequate insulation and protects the ears. ▪ Maintain your energy level. Avoid exhaustion and over-exertion which causes sweating, dampens clothing, and accelerates loss of body heat and increases the potential for hypothermia. ▪ Acclimate to the cold climate to minimize discomfort. ▪ Maintain adequate water/fluid intake to avoid dehydration.
	4D) Wind	4D) Effects of the wind ▪ Wind chill greatly affects heat loss (see attached Wind Chill Index). ▪ Avoid marking in old, defective timber, especially hardwoods, during periods of high winds due to snag hazards.
	4E) Thunderstorms	4E) Thunderstorms ▪ Monitor weather channels to determine if electrical storms are forcased. ▪ Plan ahead and identify safe locations to be in the event of a storm. (e.g., sturdy building, vehicle, etc.) ▪ Suspend all field work at the first sound of thurnder. You should be in a safe place when the time between the lightning and thunder is less than 30 seconds. ▪ Only return to work 30 minutes after the after the last strike or sound of thunder
5. Check and calibrate industrial hygiene and other field instruments and	5A) Exposure to Calibration Gases/Chemicals due to: • Use of damaged instruments.	5A) Verify proper operation of the instrument prior to calibration. Calibrate instruments in an area with adequate ventilation and follow the manufacturer's recommendations. ▪ Wear appropriate PPE to conduct calibrations as specified in the instrument manual.

Job Hazard Analysis - Short Form HASP

Job Title: Field Work - General **Date of Analysis:** August 29, 2011

Key Work Steps	Hazards/Potential Hazards	Safe Practices
equipment as required and as recommended by the manufacturer	5B) Exposure to Site contaminants due to: • Improper instrument calibration; • Misinterpretation of calibration results; • Improper instrument repair; • Improper use of instrument due to lack of training.	5B) Calibrate the instrument in accordance with the manufacturer's recommendations (see instrument manual) using the applicable calibration standard and calibration procedure. • Perform calibrations at a frequency recommended by the manufacturer. Be aware of the instrument's limitations (e.g., detection limit, maximum sensitivity) and the conditions (e.g., humidity) that may affect correct operation or accuracy of that equipment. Possible sources of error that may affect the correct calibration of the instrument. • Use only calibration materials recommended by the manufacturer for calibration. Do not use substitutions. • Confirm that the connections between the instrument and the calibration gas/material is leak-free. • Record all instrument calibrations in the field logbook. Include the instrument ID (type/manufacture/serial number/lamp eV, etc.), calibration gas used (chemical and concentration), and instrument result. • Do not attempt to repair instrument. Return to the vendor for replacement. Report any damaged or malfunctioning instrument to the vendor. • All personnel must be familiar with operation of the instrument and understand: - Theroy of its operation including any alarms and their setpoints - Materials the instrument can and cannot detect, - Instrument's limitations - The expected responses to calibration gases/materials - Interfering gases/chemicals and their affects on the instrument readings - When re-zeroing is appropriate

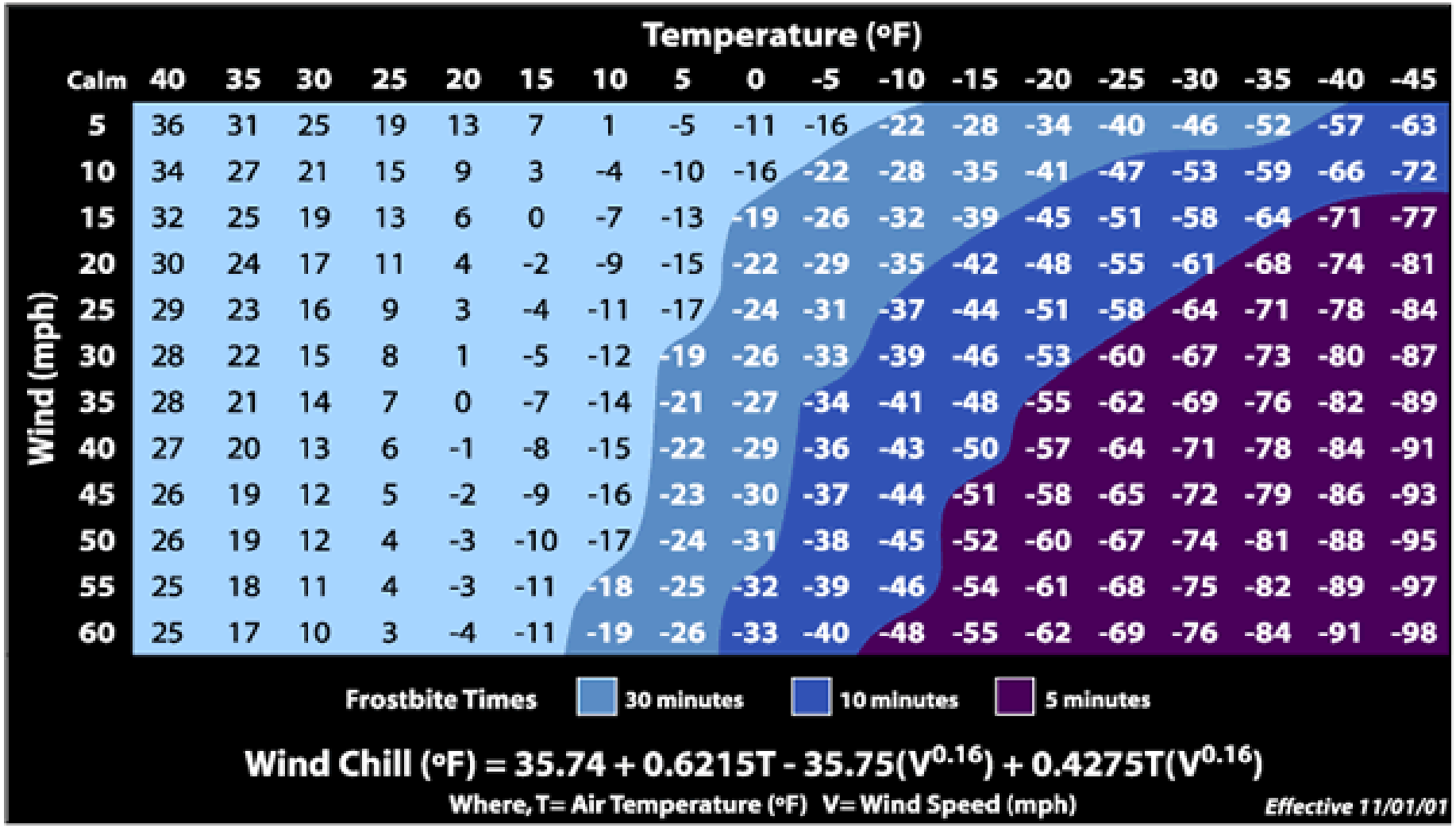
Heat Index Chart

Temperature \ % Relative Humidity	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90
110	108	112	117	123	130											
105	102	105	108	113	117	122	130									
100	97	98	102	104	107	110	115	120	126	132						
95	91	93	95	96	98	100	104	106	109	113	119	124	130			
90	86	87	88	90	91	92	95	97	98	100	103	106	110	114	117	121
85	81	82	83	84	85	86	87	88	89	90	92	94	96	97	100	102
80	76	77	78	78	79	79	80	81	82	83	84	85	86	87	88	89

Legend

80-89 degrees	Fatigue is possible with prolonged exposure and/or physical activity.
90-104 degrees	Sunstroke, heat cramps and heat exhaustion are possible with prolonged exposure and/or physical activity.
105-129 degrees	Sunstroke, heat cramps and heat exhaustion are likely. Heat stroke is possible with prolonged exposure and/or physical activity.
130+ degrees	Heatstroke/sunstroke is highly likely with continued exposure.

Wind Chill Chart



Wind (mph) \ Temperature (°F)	Calm	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
5		36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
10		34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
15		32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
20		30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
25		29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
30		28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
35		28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
40		27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
45		26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
50		26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95
55		25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89	-97
60		25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91	-98

$$\text{Wind Chill (°F)} = 35.74 + 0.6215T - 35.75(V^{0.16}) + 0.4275T(V^{0.16})$$

Where, T= Air Temperature (°F) V= Wind Speed (mph)

Effective 11/01/01

Completed by: Annette McLean Date: August 29, 2011

Identify Hazards and PPE

Complete the checklists for hazard identification and PPE requirements. Information from the RA and applicable permits are included in this section.

Standard Hazards			
☐ Falling Objects	☒ Slips and trips	☐ Pinch points	☐ Rotating equipment (drill rigs, etc.)
☐ Falls	☒ Power equipment/tools	☐ Elevated work surfaces	☐ Spills of or residual hazardous materials on floor and/or equipment

Eye Hazards			
☐ Particulates	☐ Liquid splashes	☐ Welding Arc	☒ Propane torch flame

Hearing Hazards			
☒ None	☐ Impact noise	☐ High frequency noise	☐ High ambient noise

Respiratory Hazards						
☐ None	☐ Dust/particulates	☒ Organic Vapors	☐ Acid Gases	☐ Radon	☐ Asbestos	☐ Be, Hg, Cr, Pb
☐ Oxygen deficient		☐ Welding fumes	☐ Aerosols/Particulates		☒ Propane torch combustion vapors	

Chemical Hazards			
☒ None	☐ Organic solvents	☐ Reactive metals	☐ PCBs
☐ Acids / bases	☐ Oxidizers	☐ Volatiles / Semi-volatiles	☐ _____

Environmental Hazards					
☐ None	☒ Temperature extremes: ☒ Cold ☐ Heat	☐ Wet location	☐ Explosive vapors	☐ Confined space	☐ Engulfment Hazard
☐ Bio hazards (poisonous plants, insects, animals, animal droppings, mold, fungus, etc.)				☐ _____	

Electrical Hazards					
☐ None	☐ Overhead utilities	☒ Underground utilities	☐ Hidden utilities	☐ Energized equip/circuits	☐ Wet location

Fire Hazards			
☒ None	☐ Cutting, welding, or grinding generated sparks or heat sources	☐ Flammable materials present	☐ Oxygen enriched location

Ergonomic Hazards					
☐ None	☒ Lifting	☒ Bending	☒ Twisting	☒ Pulling/tugging	☐ Repetitive motion
Computer Use in the:	☐ Office	☐ Field	☐ _____		

Radiological Hazards					
☒ None	☐ Loose contamination	☐ Fixed Contamination	☐ Airborne contamination	☐ Radiation	☐ Radon
☐ Alpha	☐ Beta	☐ Gamma/X-rays	☐ Neutron	☐ EMF	☐ Criticality	☐ Tritium	☐ TRU
☐ Depleted Uranium	☐ Enriched Uranium	☐ _____	☐ _____		

Other Hazards
☒ Facility: Active Groundwater Treatment System.

Completed by: Annette McLean Date: August 29, 2011

PPE and Monitoring Requirements

Standard PPE					
☒ Hard Hat (if overhead hazards exist)	☒ Safety boot	☒ Safety glasses	☐ Boot Covers	☐ Rubber Boots	☒ High Visibility Vest (if vehicular traffic or heavy equipment is present)
Eye and Face Protection					
☐ Welding glasses	☐ Welding helmet	☐ Face shield	☐ Chemical goggles	☐ Welding screens	
Hearing Protection					
☒ Ear plugs (when working around heavy equipment or when noise levels are >85 decibels)	☐ Ear Muffs	☐ Ear plugs and muffs	☐ Other _____		
Respiratory Protection					
☒ None	☐ Upgrade Only	☐ Full Face APR	☐ Half Face APR	Cart. Type _____	☐ PAPR
☐ Airline respirator	☐ SCBA	☐ Dust mask	☐ _____		
Protective Clothing					
☐ Tyvek® coveralls	☐ Poly-coated Tyvek® Coveralls	☐ Saranex® Coveralls	☐ Fully encapsulating suit	☐ Apron	
☐ Cotton coveralls	☐ Modesty Clothing	☐ Fire resistant clothing	☐ Other _____		
Hand Protection					
☐ None	☐ Cotton gloves	☒ Leather gloves	☐ Cut-resistant gloves	☐ Glove liners	
Outer Gloves					
☒ Nitrile when sampling	☐ Viton®	☐ Butyl	☐ Neoprene	☐ Other _____	
Inner Gloves					
☒ Nitrile when sampling	☐ Vinyl	☐ Other _____	☐ Other _____		
Other Required PPE					
☐ Personal Flotation Device	☐ Waders	☐ _____	☐ _____		
Monitoring Requirements					
☐ Oxygen	☐ Flammable gases/vapors	☒ Toxic Gas/vapors	☐ Hydrogen Sulfide	☐ Carbon Monoxide	
☐ Asbestos	☐ Full time IH coverage	☐ Part time IH coverage	☐ Be, Hg, Cr, Pb		
☐ Metals Specify: _____					
☐ Organic Vapors Specify: _____					
☐ None	☐ TLD required	☐ CAM	☐ Radon		
☐ Full time RCT coverage	☐ Part time RCT coverage	☐ Radioactive air particulates	☐ Other _____		
☐ Other _____		☐ Other _____			

PPE and monitoring requirements completed by: Annette McLean Date: August 29, 2011

Job Hazard Analysis - HASP Format

Job Title: Decontamination **Date of Analysis:** 5/30/06

Minimum Recommended PPE*: High visibility vest, hard hat, steel-toed boots, safety glasses, hearing protection
*See HASP for all required PPE

Key Work Steps	Hazards/Potential Hazards	Safe Practices
1. Establish Decontamination Station	1A) Materials Handling	1A) Materials Handling ▪ Use proper lifting techniques ▪ Use mechanical aids, if available, to move heavy items.
2. Decontamination / Steam cleaning.	2A) Struck by steam/hot water/pressure washing	2A) Struck by steam/hot water ▪ Workers not directly engaged in steam cleaning operations must stay clear. ▪ Workers using steam cleaning equipment must be trained on operation and safety devices/procedures using the owners/operators manual. ▪ Use face shield **and** safety glasses or goggles, if steam cleaning. ▪ Stay out of the splash/steam radius. ▪ Pressure washer must have dead man switch. ▪ Do not direct steam at anyone. ▪ Do not hold objects with your feet or hands. ▪ Ensure that direction of spray minimizes spread of contaminants of concern. ▪ Use shielding as necessary.
	2B) Exposure to contaminants	2B) Exposure to contaminants ▪ Conduct air monitoring (see HASP). ▪ Wear proper PPE (see HASP). ▪ See MSDSs for hazards associated with the decon solutions used (if other than water alone us used).
	2C) Slips/Trips/Falls	2C) Slips/Trips/Falls ▪ Be cautious as ground/plastic can become slippery ▪ Use boots or boot covers with good traction
3. Vehicle Decontamination	3A) Vehicle traffic in and out of the CRZ	3A) Large Vehicle Traffic ▪ Always wear a hard hat, steel toe boots, and a high visibility vest (unless Tyveks are used and are high visibility). ▪ Vehicle drivers are not to exit the vehicle in the CRZ. ▪ Identify an individual to communicate with vehicle drivers and maintain order ▪ Trucks will be lined with plastic and kept out of direct contact with any contaminated materials during loading. Wear PPE when removing plastic lining from truck beds. ▪ If not in the vehicle, obtain eye contact with the driver, so he is aware of your presence and location in the CRZ. ▪ If you are driving the vehicle, be aware of personnel in the CRZ and maintain communication with the identified personnel.
	3B) Exposure to contaminants	3B) Exposure to contaminants ▪ Use safety glasses or goggles, Polycoated Tyvek (if level of contamination poses dermal hazard or to keep work clothes dry), high visibility vest (if high visibility Tyveks are not used) hard hats, steel toe boots, and gloves while cleaning contaminated materials. ▪ Do not doff PPE until decontamination of the vehicle is complete and a decontamination certificate has been issued by the HSO. ▪ Conduct air monitoring (see HASP). ▪ See MSDSs for hazards associated with the decon solutions (if other than water alone is used).

Job Hazard Analysis - HASP Format

Job Title: Decontamination **Date of Analysis:** 5/30/06

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	3C) Slips/Trips/Falls	3C) Slips/Trips/Falls ▪ Be cautious as ground/plastic can become slippery ▪ Use boots or boot covers with good traction
4. Equipment and Sample Decontamination	4A) Chemical exposure when handling contaminated sample jars and equipment	4A) Chemical exposure ▪ Wear PPE as outlined in the HASP. ▪ Refer to MSDS for specific hazards associated with decon solutions ▪ Monitor breathing zone for contaminants ▪ Monitor breathing zone for decon solutions (e.g., methanol, hexane, etc.) if appropriate (see HASP)
	4B) Materials Handling related injuries	4B) Materials Handling related injuries ▪ Use proper lifting techniques when lifting heavy equipment ▪ Use two person lift for heavy coolers
5. Personal Decontamination	4C) Exposure to contaminants	4C) Exposure to contaminants ▪ Avoid bringing contaminated materials via shoes and clothing into the CRZ by examining such prior to exiting the EZ. ▪ Removal of PPE will be performed by the following tasks in the listed order: ▪ Gross boot wash and rinse and removal ▪ Outer glove removal ▪ Suit removal ▪ Respirator removal (if worn). ▪ Inner glove removal ▪ Contaminated PPE is to be placed in the appropriate, provided receptacles. ▪ Respirators will be removed and decontaminated at a specified location within the CRZ by a designated technician, then placed in storage bag. ▪ Employees will wash hands, face, and any other exposed areas with soap and water. ▪ Portable eyewash stations and showers will be available should employees come into direct contact with contaminated materials. ▪ See MSDSs for hazards associated with the decontamination solutions used. ▪ Decon solutions will be disposed of according to the work plan.

Job Hazard Analysis - HASP Format

Job Title: Groundwater Sampling **Date of Analysis:** 9/21/06

Minimum Recommended PPE*: steel-toed boots, safety glasses, chemical resistant gloves
*See HASP for all required PPE

Key Work Steps	Hazards/Potential Hazards	Safe Practices
1. Mobilization	3A) See JHA Mobilization/Demobilization/Site Preparation	1A) See JHA Mobilization/Demobilization/Site Preparation
2. General Site Hazards	2A) See JHA Field Work - General	2A) See JHA Field Work - General
	2B) Chemical exposure	2B) Chemical Exposure ▪ Read HASP and determine air monitoring and PPE needs.
3. Calibrate monitoring equipment	4A) Exposure to calibration gases	4A) Exposure to calibration gases ▪ Review equipment manuals ▪ Calibrate in a clean, well ventilated area
4. Opening the well cap, taking water level readings	5A) Contact with poisonous plants or the oil from poisonous plants	5A) Contact with poisonous plants or the oil from those plants: ▪ Look for signs of poisonous plants and avoid. ▪ Ensure all field workers can identify the plants. Mark identified poisonous plants with spray paint if working at a fixed location. ▪ Wear PPE as described in the HASP. ▪ Do not touch any part of your body/clothing. ▪ Always wash gloves before removing them. ▪ Discard PPE in accordance with the HASP. ▪ Use commercially available products such as Ivy Block or Ivy Wash as appropriate.
	5B) Contact with biting insects (i.e., spiders, bees, etc.) which may have constructed a nest in the well cap/well.	5B) Contact with stinging/biting insects ▪ Discuss the types of insects expected at the Site and be able to identify them. ▪ Look for signs of insects in and around the well. ▪ Wear Level of PPE as described in the HASP. At a minimum, follow guidelines in the JHA "Insects Stings and Bites." ▪ If necessary, wear protective netting over your head/face. ▪ Avoid contact with the insects if possible. ▪ Inform your supervisor and the Site Health and Safety Supervisor if you have any allergies to insects and insect bites. Make sure you have identification of your allergies with you at all times and appropriate response kits if applicable. ▪ Get medical help immediately if you are bitten by a black widow or brown recluse, or if you have a severe reaction to any spider bite or bee sting.
	5C) Exposure to hazardous Inhalation and contact with hazardous substances (VOC contaminated groundwater/ soil); liquid splash; flammable atmospheres.	5C) Exposure to hazardous substances ▪ Wear PPE as identified in HASP. ▪ Review hazardous properties of site contaminants with workers before sampling operations begin ▪ Immediately monitor breathing zone after opening well to determine exposure and verify that level of PPE is adequate – see Action Levels in HASP ▪ Monitor headspace in well. After the initial headspace reading (if required by the Work Plan), allow the well to vent for several minutes before obtaining water level and before sampling. ▪ When decontaminating equipment wear additional eye/face protection over the safety glasses such as a face shield.
	5D) Back strain due to lifting bailers or pumps and from moving equipment to well locations	5D) Back strain ▪ Use mechanical aids when possible, if mechanical aids are not available, use two person lifts for heavy items. ▪ Use proper lifting techniques

Job Hazard Analysis - HASP Format

Job Title: Groundwater Sampling **Date of Analysis:** 9/21/06

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	5E) Foot injuries from dropped equipment	5E) Foot Injuries ▪ Be aware when moving objects, ensure you have a good grip when lifting and carrying objects. ▪ Do not carry more than you can handle safely ▪ Wear Steel toed boots
5. Collecting water samples	6A) Fire/Explosion/Contamination hazard from refueling generators	6A) Fire/Explosion/Contamination hazard from refueling generators ▪ Turn the generator off and let it cool down before refueling ▪ Segregate fuel and other hydrocarbons from samples to minimize contamination potential ▪ Transport fuels in approved safety containers. The use of containers other than those specifically designed to carry fuel is prohibited ▪ See JHA for Gasoline use
	6B) Electrocution	6B) Electrocution ▪ A ground fault circuit interrupter (GFCI) device must protect all AC electrical circuits. ▪ Use only correctly grounded equipment. Never use three-pronged cords which have had the third prong broken off. ▪ Make sure that the electrical cords from generators and power tools are not allowed to be in contact with water ▪ Do not stand in wet areas while operating power equipment ▪ Always make sure all electrically-powered sampling equipment is in good repair. Report any problems so the equipment can be repaired or replaced. ▪ When unplugging a cord, pull on the plug rather than the cord. ▪ Never do repairs on electrical equipment unless you are both authorized and qualified to do so.
	6C) Exposure to contaminants	6C) Exposure to Contaminants ▪ Stand up wind when sampling ▪ Monitor breathing zone with appropriate monitoring equipment (see HASP) ▪ Wear chemical resistant PPE as identified in HASP ▪ See section 4C) under Safe Practices above
	6D) Infectious water born diseases	6D) Infectious water born diseases ▪ Wear chemical resistant gloves and other PPE – as identified in HASP ▪ Prevent water from contacting skin ▪ Wash exposed skin with soap and water ASAP after sampling event ▪ Ensure that all equipment is adequately decontaminated using a 10% bleach solution
	6E) Exposure to water preservatives	6E) Exposure to water preservatives ▪ Work in a well ventilated area, upwind of samples ▪ Wear chemical resistant PPE as identified in HASP ▪ When preserving samples always add acid to water, avoid the opposite. ▪ See JHA Acids - Sampling
	6F) Slips/trips/falls	6F) Slips/trips/falls ▪ Ground can become wet/muddy, created by spilled water ▪ Place all purged water in drums for removal ▪ Wear good slip resistant footwear
	6G) Repetitive Motion and other Ergonomic Issues	6G) Ergonomic Issues ▪ Use mechanical means where possible to raise and lower equipment into well. ▪ Alternate raising and lowering equipment between field sampling team members, and alternate bailing the well. ▪ Use safe lifting techniques.

Job Hazard Analysis - HASP Format

Job Title: Groundwater Sampling **Date of Analysis:** 9/21/06

Key Work Steps	Hazards/Potential Hazards	Safe Practices
6. Sample Processing	7A) Contaminated water	7A) Contaminated water ▪ Wear appropriate PPE as identified in HASP ▪ Decontaminate outside of bottles ▪ Prevent water from contacting skin ▪ Work in well ventilated area – upwind of samples ▪ Waste will be returned to the operation office for storage and disposal
7. Shipping Samples	8A) Freeze burns, back strain, hazardous chemical exposure, sample leakage	8A) Freeze burns, back strain, hazardous chemical exposure, sample leakage ▪ Wear appropriate chemical resistant gloves as identified in HASP. ▪ Wear leather or insulated gloves when handling dry ice. ▪ Follow safe lifting techniques – get help lifting heavy coolers. ▪ Samples that contain hazardous materials under the DOT definition, must be packaged, manifested and shipped by personnel that have the appropriate DOT HAZMAT training.

AHA -

Activity/Work Task:	Landfill		
Project Location:			
Contract Number:			
Date Prepared:	9/21/06	**Date Accepted:**	
Prepared by (Name/Title):	Kendra Bavor		
Reviewed by (Name/Title):			

Overall Risk Assessment Code (RAC) (Use highest code) **M**

Risk Assessment Code (RAC) Matrix

Severity	Probability				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

Notes: (Field Notes, Review Comments, etc.)

This AHA involves the following:

- Establishing site specific measures
-

This AHA is not an exhaustive summary of all hazards associated with the Site. Refer to the site HASP for additional requirements. Contractor to follow general site safety controls for Slips Trips and Falls, Biological hazards, cuts lacerations and pinch points, and emergency procedures.

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.

RAC Chart

- **E = Extremely High Risk**
- **H = High Risk**
- **M = Moderate Risk**
- **L = Low Risk**

Job Steps	Hazards	Controls	RAC
1. Mobilization	3A) See JHA Mobilization/ Demobilization/Site Preparation	1. See JHA Mobilization/Demobilization/Site Preparation	L
2. General Site Hazards	**See JHA Field Work - General**	**See JHA Field Work - General**	L
3. Drive Vehicle on Landfill Property	3A) Moving heavy equipment	3A) Moving heavy equipment ▪ Make contact (hand signals, etc.) with operators before crossing equipment path.	M
	3B) Side Slopes	3B) Side Slopes 1. Use roads to climb landfills. Do not park on side slopes.	L
	Heavy Truck Traffic	3C) Heavy Truck Traffic Pull over to right when meeting other vehicles.	L
	3C) Grass Fires	3D) Grass Fires ▪ Modify the task, Check that catalytic converter is not in contact with tall grass	L
4. Walk on landfill property	4A) Moving heavy equipment	4A) Moving heavy equipment ▪ Employ PPE, Wear orange safety vest, however in any circumstance, do not rely on operator being able to see you.	M

	4B) Large open unshaded areas	4B) Large open unshaded areas ▪ Wear appropriate clothing and/or sunscreen	**L**
	4C) Flying Debris and Dust	4C) Flying Debris and Dust ▪ Employ PPE, Wear eye protection and hard hat.	**L**
	4D) Potholes	4D) Potholes ▪ Watch out for uneven surfaces	**L**
	4E) Snakes and other animals	4E) Snakes and other animals ▪ Listen and keep an eye out for snakes and other animals. ▪ Avoid if possible.	**L**
	4F) Landfill gas	4F) Landfill gas ▪ Stay at least 100 feet away from gas vents and active flares, if possible. ▪ Avoid areas where gas is accumulating as evidenced by open gas vents, dead vegetation and/or odors. ▪ Do not smoke.	**L**
	4G) Overexertion	4G) Overexertion ▪ Avoid climbing side slopes	**L**
	4H) Heat exhaustion	4H) Heat exhaustion ▪ Drink plenty of fluids, and understand symptoms.	**L**
5. Near Working Face	5A) Moving Heavy Equipment	5A) Moving Heavy Equipment ▪ Employ PPE, Wear orange safety vest, however in any circumstance, do not rely on operator being able to see you.	**M**
	5B) Stockpiled waste - Sharp Objects	5B) Stockpiled waste - Sharp Objects ▪ Employ PPE, wear eye protection and hard hat ▪ Employ training, Wear safety shoes	**M**
	5C) “Landslides”	5C) “Landslides” ▪ Waste stacked without proper compaction and sloping has the potential to collapse similar to a landslide. ▪ Keep a safe distance away from this type of pile.	**L**
	5D) Contaminated waste	5D) Contaminated waste ▪ See HASP for PPE and monitoring requirements	**M**
	5E) Birds (Droppings)	5E) Birds (Droppings) ▪ Employ PPE, Wear hard hat. ▪ Wash droppings off with soap and water.	**L**
6. Drilling into Landfill	6A) Chemical Exposure	6A) Chemical Exposure ▪ Wear Level B PPE unless it is KNOWN that there is no potential for exposures above the PEL/TLV (see HASP for specific PPE required) ▪ Monitor breathing zone	**M**

	6B) Landfill Gases	6B) Landfill Gases ▪ Monitor source (e.g., borehole) with LEL/O2 meter ▪ Use engineering controls (e.g., fan, intrinsically safe equipment, non-sparking tools, spark arrestors, etc.) if readings at source are greater than 10% of the LEL	**L**
	6C) See Drilling JHA	6C) See Drilling JHA	**L**
7. Test Pitting	7A) See JHA Excavation and Backfilling	7A) See JHA Excavation and Backfilling	**M**
8. Treatment Facility	8A) Leachate	8A) Leachate ▪ Avoid direct contact with leachate or aerosols during aeration process via inhalation.	**M**
	8B) Open basins	8B) Open basins ▪ Engineering controls. Stay behind safety chains, do not step onto plastic liner	**L**
	8C) Overhead piping	8C) Overhead piping ▪ Employ PPE, Wear hardhat, and look for low hanging obstructions.	**L**
9. Demobilization	9A) See JHA Mobilization/ Demobilization/Site Preparation	9A) See JHA Mobilization/Demobilization/Site Preparation	**L**

Equipment to be Used	Training Requirements/Competent or Qualified Personnel name(s)	Inspection Requirements
PPE (Hard Hat, safety glasses, gloves, steel toe work boots, high visibility safety vest, hearing protection)	**Competent / Qualified Personnel:** Name – Position/Employer – See HASP **Training requirements:** List specific certification (as applicable) Site Specific HASP Orientation Toolbox safety meeting Task kick-off meeting	Daily inspection of equipment per manufacturer's instructions. Tag tools that are defective and remove from service. Inspect power cord sets prior to use. Inspect all PPE prior to use

MACTEC

Job Hazard Analysis - HASP Format

Job Title: Insect Stings and Bites **Date of Analysis:** 4/20/06

Minimum Recommended PPE*: Long sleeved shirt and pants, light colored clothing
*See HASP for all required PPE

Key Work Steps	Hazards/Potential Hazards	Safe Practices
1. Traveling/working in areas with potential Tick Bites –Example outdoor wooded areas or fields.	1. Lyme Disease, Rocky Mountain Spotted Fever, etc.	▪ Spray clothing with insect repellant as a barrier. ▪ Wear light colored clothing that fits tightly at the wrists, ankles, and waist. ▪ Each outer garment should overlap the one above it. ▪ Cover trouser legs with high socks or boots. ▪ Tuck in shirt tails. ▪ Search the body on a regular basis, especially hair and clothing; ticks generally do not attach for the first couple of hours. ▪ If a tick becomes attached, pull it by grasping it as close as possible to the point of attachment and pull straight out with gentle pressure. Wash skin with soap and water then cleanse with rubbing alcohol. Place the tick in an empty container for later identification, if the victim should have a reaction. Record dates of exposure and removal. ▪ Do not try to remove the tick by burning with a match or covering it with chemical agents. ▪ If you can not remove the tick, or the head detaches, seek propmt medical help. ▪ Watch for warning signs of illness: a large red spot on the bite area; fever, chills, headache, joint and muscle ache, significant fatigue, and facial paralysis are reactions that may appear within two weeks of the attack. Symptoms specific to Lyme disease include: confusion, short-term memory loss, and disorientation.
2. Working/traveling in areas with potential bee and wasp stings-Example wooded areas and fields	2. Allergic reactions, painful stings	▪ Be alert to hives in brush or in hollow logs. Watch for insects travelling in and out of one location. ▪ If you or anyone you are working with is known to have allergic reactions to bee stings, tell the rest of the crew and your supervisor. Make sure you carry emergency medication with you at all times. ▪ Wear long sleeve shirts and trousers; tuck in shirt.. Bright colors and metal objects may attract bees. ▪ If you are stung, cold compresses may bring relief. ▪ If a stinger is left behind, scrape it off the skin. Do not use a tweezers as this squeezes the venom sack, worsening the injury. ▪ If the victim develops hives, asthmatic breathing, tissue swelling, or a drop in blood pressure, seek medical help immediately. Give victim antihistime, (Benadryl, chlo-amine tabs).
3. Traveling/working in areas of potential Mosquito Bites-Example- Woods, fields, near bodies of water and etc.	3. Skin irritation, encephalitis	▪ Wear long sleeves and trousers. ▪ Avoid heavy scents. ▪ Use insect repellants. If using DEET, do not apply directly to skin, apply to clothing only. ▪ Carry after-bite medication to reduce skin irritation.

Job Hazard Analysis - HASP Format

Job Title: Working with Preservatives (Acids) **Date of Analysis:** 5/30/06

Minimum Recommended PPE*: Safety glasses/goggles, nitrile gloves,
*See HASP for all required PPE

Key Work Steps	Hazards/Potential Hazards	Safe Practices
1. Opening the box of ampoules	1A) Cuts or punctures with a knife	1A) Cuts or punctures with a knife ▪ Use appropriate techniques when handling a knife. Always cut away from you.
	1B) Broken ampoules in the box. Cuts from the broken glass.	1B) Broken ampoules in the box. Cuts from the broken glass. ▪ Wear safety goggles and protective gloves. ▪ Dispose of the preservative and broken glass by approved methods.
	1C) Broken ampoules in the box. Breathing fumes.	1C) Broken ampoules in the box. Breathing fumes. ▪ Wear safety goggles and protective gloves. ▪ Always work in a well-ventilated area.
2. Breaking top of glass ampoule	2A) Cuts from the broken glass.	2A) Cuts from the broken glass ▪ Wear safety goggles and protective gloves. ▪ Use a paper towel to wrap ampoule in to snap the top or use an ampoule breaker. ▪ Always point the ampoule away from you when you snap off the top.
	2B) Skin contact chemical burns.	2B) Skin contact chemical burns. ▪ Wear safety goggles and protective gloves. ▪ Fumes may come into contact with the perspiration on your skin and rehydrate to form an acid. ▪ If your skin itches, flush affected area for 15 minutes with water.
	2C) Eye contact	2C) Eye contact ▪ Wear safety goggles. ▪ If acid splashes in the eyes, flush eyes for 15 minutes with water. Seek medical advice.
	2D) Breathing fumes	2D) Breathing fumes ▪ HNO_3 and HCL have high vapor pressure. Always work in a well-ventilated area.
3. Adding acid to sample	3A) Chemical reaction	3A) Chemical reaction ▪ Wear safety goggles and protective gloves. Acid may react with high alkaline sample and fizz (releases CO_2).
	3B) Eye contact	3B) Eye contact ▪ Wear safety goggles. ▪ If acid splashes in the eyes, flush eyes for 15 minutes with water. Seek medical advice.
	3C) Skin contact chemical burns.	3C) Skin contact chemical burns. ▪ Wear safety goggles and protective gloves.
4. Ampoule disposal	4A) Cuts from the broken glass.	4A) Cuts from the broken glass. ▪ Wear safety goggles and protective gloves. ▪ Place used ampoules in an empty, non-reactive container in the field and bring it back to the office. Dispose of the preservative and broken glass by approved methods.

Activity Hazard Analysis

Job Title: Surface Water/Sediment Sampling from the Shore **Date of Analysis:** 8/29/2011

Applicable AMEC ES&H Procedures:

- 2.9.A - Hazardous Waste Operations and Emergency Response Program
- 2.9.D - Personal Protective Equipment Program
- 2.9.E - Hazard Communication Program
- 2.9.16 - Thermal Stress
- 2.9.23 - Working Over or Near Water
- 2.13.1 - Medical Surveillance

Minimum Recommended PPE*: Safety Boots/Shoes; Safety Glasses; Rubber boots; Waders; Personal Flotation Device

*See SSHP for all required PPE

Key Work Steps	Hazards/Potential Hazards	Safe Practices
1. Prepare for site visit	1A) Slips, trips, falls	1A) Familiarize self with site prior to visit. ▪ Complete appropriate training before going on site. ▪ Provide appropriate person in district office your itinerary. ▪ Prepare listing of emergency phone numbers, both on and offsite. ▪ Identify site/activity PPE needs. ▪ Ensure that first aid training is current, and that tetanus booster are current.
2. Check and calibrate sampling equipment.	2A) Muscle Strain - lifting, twisting, tugging	2A) Muscle Strain - lifting, twisting, tugging ▪ Inspect all PPE and equipment and ensure that it is working properly. ▪ Get assistance from a coworker or use mechanical means to move equipment (dolly, cart, etc.)
	2B) Slips, trips, falls, strain	2B) Slips, trips, and falls ▪ Wear proper footwear. ▪ Pay attention to where walking.
3. Load/carry equipment to the site.	3A) Slips, trips, falls,	3A) Slips, trips, falls ▪ See Mobilization / Demobilization and Site Preparation AHA.
	3B) Muscle Strain - lifting, twisting, tugging	3B) Muscle Strain - lifting, twisting, tugging ▪ NEVER LIST MORE THAN 50 POUNDS ▪ Proper lifting, ergonomic practices and body mechanics. ▪ Share the load, move items in smaller shifts, or use cart.
	3C) Irate property owners, pets	3C) Irate property owners, pets ▪ Call property owners in advance. ▪ Check in to introduce yourself upon arrival. ▪ Be courteous and diplomatic
	3D) Crime	3D) Crime ▪ Do not enter areas where threats are present. ▪ Contract security where applicable. ▪ Use the buddy system. ▪ Maintain contact with support such as radio or cell phone.
	3E) Struck by traffic - sampling from a bridge or roadway.	3E) Struck by traffic - sampling from a bridge or roadway. ▪ High visibility reflective safety vest ▪ Use buddy system. ▪ Use traffic cones and a lookout. ▪ Attempt to sample away from the bridge if possible

Activity Hazard Analysis

Job Title: Surface Water/Sediment Sampling from the Shore **Date of Analysis:** 8/29/2011

Key Work Steps	Hazards/Potential Hazards	Safe Practices
4. Field parameters	4A) Falling into water	4A) Falling into water ▪ Limit access to water. ▪ Use equipment that facilitates reaching the location from a safe distance. ▪ Work using the buddy system. Wear PFD if working over water.
	4B) Slips trips and falls	4B) Slips trips and falls ▪ Wear appropriate footwear. ▪ Survey and clear walking area. ▪ Do not walk on slippery surfaces. ▪ Housekeeping.
	4C) Stuck in the mud or sand	4C) Stuck in the mud or sand ▪ Ensure secure footing. ▪ Provide walkways, platforms or secure walking surface. ▪ Use the buddy system and maintain communications with support staff.
	4D) Stings and bites from insects	4D) Vermin, leaches, Insect/animal born disease ▪ Survey the area for dens, nests, etc. ▪ Identify areas where biological hazards may be present. ▪ Be aware of your surroundings. ▪ Wear insect netting clothing or apply insect repellant on all exposed skin surfaces as appropriate – consider sample contamination ▪ Wear long sleeve shirt and full length pants ▪ Wear appropriate footwear (snake boots, etc.) ▪ Avoid high grass areas if possible ▪ Tuck pants leg into boot ▪ Do not put hand/arm into/under an area that you can not see into/under clearly ▪ Do not touch any suspected contaminant without appropriate hand PPE ▪ Wash hands as soon as possible upon completion of task. ▪ Perform routine inspections for ticks, leaches, etc. of yourself and co-workers. ▪ Contract vermin relocation, if applicable. ▪ Remain vigilant and respectful of wildlife. ▪ See JHA for Insects, Stings and Bites ▪ See JHA for Dog – Wildlife Safety.

Activity Hazard Analysis

Job Title: Surface Water/Sediment Sampling from the Shore **Date of Analysis:** 8/29/2011

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	4E) Weather – temperature extremes	4E) Weather – temperature extremes ▪ Train workers about weather and appropriate precautions. ▪ Heat: o Familiarize self with signs of heat related illnesses: cramps, heat rash, dehydration, heat exhaustion, and heat stroke. ▪ Sun: o Keep body protected o Wear sunscreen, wide brimmed hat or hardhat. o Drink plenty of fluids to remain hydrated. o Schedule work for cool part of day. o Take breaks in the shade. ▪ Wind: o Wear layered clothing, gloves, hard hat with winter liner, etc. ▪ Cold: o During cold weather - layer clothing and wear wind impervious outerwear o During warm months – wear a long sleeve cotton/breathable fabric shirt and pant.
5. Sample collection	5A) Same as Item #4 above.	5A) Same as Item #4 above.
	5B) Bending, pulling, twisting	5B) Bending, pulling, twisting ▪ Use a vibrating or wiggling motion on the sample device to break the soil suction. ▪ Proper lifting technique.
	5C) Splash	5C) Splash ▪ Wear appropriate safety glasses (tinted for sun). ▪ Be aware if sampling water through a filter, if it becomes plugged with sediment it may unexpectedly "blow off" the hose and splash. ▪ Change filter prior to sedimentation back pressure.
	5D) Chemical exposure	5D) Chemical exposure ▪ Wear PPE including protective gloves, coveralls, safety glasses as appropriate. ▪ Work upwind of the sample location. ▪ Minimize exposure using a shovel/spoon or tool to collect the sample. ▪ Review and understand MSDS for all chemicals being handled. ▪ Be careful when handling acids and caustic substances. ▪ Wear adequate PPE and wash hands after completion of task.
	5E) Vegetation, sticks, reeds, - cuts and punctures	5E) Vegetation, sticks, reeds, - cuts and punctures ▪ Clear access to site. ▪ Be familiar with toxic plants such as poison ivy. Avoid such plants. ▪ Wash thoroughly after accidental contact with toxic materials and plants.
	5F) Contact with drill rig equipment.	5F) See Geoprobe Oversight AHA.
6. Sample preparation.	6A) Lifting heavy objects (covers, pumps, sampling equipment, coolers, etc.) Muscle strain	6A) Lifting heavy objects (covers, pumps, sampling equipment, coolers, etc.) Muscle strain ▪ Use proper ergonomics when lifting heavy objects ▪ Use appropriate mechanical assistance and tools when possible.

Activity Hazard Analysis

Job Title: Surface Water/Sediment Sampling from the Shore **Date of Analysis:** 8/29/2011

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	6B) Chemical Exposure	6B) Chemical Exposure ▪ Wear PPE including protective gloves, coveralls, safety glasses as appropriate. ▪ Wash/wipe or decontaminate exterior of sample containers and equipment. ▪ Use care handling preservatives (acids/bases.)
	6C) Sharps and knives	6C) Sharps and knives ▪ Use care handling tape dispensers, knives and sharp objects.
	6D) Extreme cold (ice preservation)	6D) Extreme cold (ice preservation) ▪ Minimize exposure to ice. ▪ Use a shovel/spoon or tool to fill bags for preserving samples in coolers.
7. Site exit and drive home or next site.	7A) Vehicle contamination	7A) Vehicle contamination ▪ Wash hands promptly. ▪ Contaminated PPE (booties, Tyvek, nitrile gloves) should be disposed on-site. ▪ Remove boots and soiled clothing for secure storage in trunk; decontaminate as soon as possible. ▪ Update exposure log.
	7B) Traffic hazards.	7B) Traffic hazards. ▪ See Mobilization / Demobilization and Site Preparation AHA.

Completed by: Annette McLean Date: August 29, 2011

Chemicals of Concern

1. Trichloroethene
2. 1,2-dichloroethene
3. Polychlorinated biphenyls (Arochlors General)
4. Various Metals (inorganic) (Cu, Ca, Pb, Fe, Mn, Co, Ni, V, Ba, Zn.)

ATTACHMENT A

CONTAMINANT FACT SHEET

CONTAMINANT FACT SHEET

Chemical Name: Trichloroethene

CAS Number: 79-01-6

Synonyms: Ethylene trichloride, TCE, Trichloroethylene, Trilene

HEALTH HAZARD DATA

Color: Colorless

Physical State: Solid ___ Liquid X Gas ___

Odor: Chloroform-like

Odor Threshold: 82 ppm

Vapor Density: 4.5 g/L

Ionization Potential (IP): 9.45 eV

IDLH: 1000 ppm

Carcinogen: OSHA ___ IARC ___ NTP ___ ACGIH ___ NIOSH X

Skin absorbable: yes ___ no X

Skin corrosive: yes ___ no X

Signs/Symptoms of Acute Exposure: Irritant to eyes and skin, headache nausea, vomiting, dermatitis, vertigo, visual disturbance, fatigue, giddiness, sleepiness

Source	TWA (units)	STEL (units)	C (units)
OSHA PELs	100 ppm		200 ppm
ACGIH TLVs	10 ppm	100 ppm	
NIOSH RELs	25 ppm		

AIR MONITORING

Type	Brand/Model No.	Calibrations Method/Media	Relative Response or Conversion Factor	Meter Specific Action Level
PID	Microtip 10.6eV	Isobutylene 100 ppm	0.92	23
PID	HNu 10.2eV	Isobutylene 100 ppm	0.90	22.5
Detector Tube	Drager 6828541	2 - 50 ppm		25

Checked by: Emmet F. Curtis Date: 12/5/03

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials:

Suits: Viton, PE/EVAL, Tychem, Barricade, Trellchem, Teflon, Responder

Gloves: Viton, Teflon, Polyvinyl alcohol (do not use in water)

Boots: Teflon, Viton

Service Limit Concentration (ppm): 1000

MUC 1/2 Mask APR = TWA x 10 = 250 ppm

MUC Full-Face APR = TWA x 10 = 250 ppm

FIRE/REACTIVITY DATA

Flash Point: Unknown

LEL/UEL: 8% / 10.5%

Fire Extinguishing Media:

Dry Chemical	X	Alcohol resistant Foam	X
Water Spray	X	CO_2	X

Incompatibilities: Strong caustics and alkalis, chemically-active metals (such as barium, lithium, sodium, magnesium, titanium, and beryllium)

Note: The recommended protective clothing materials assumes that potential for direct contact (by splashing, dust inhalation, or other means) with the contaminant exists. Professional judgement and knowledge of on-site hazards should be used in selecting PPE appropriate to the concentration of the contaminant (trace vs percentage) to which the individual is likely to be exposed.

ATTACHMENT A

CONTAMINANT FACT SHEET

CONTAMINANT FACT SHEET

Chemical Name:
1,2-Dichloroethylene 156-59-2,
CAS Number: 540-59-0, 156-60-5
Synonyms:
Acetylene dichloride,
cis -Acetylene dichloride,
trans-Acetylene dichloride,

HEALTH HAZARD DATA

Color: Colorless

Physical State: Solid
Liquid X
Gas

Odor: Chloroform-like

Odor Threshold: 0.08-17 ppm

Vapor Density: 3.35 g/L

Ionization Potential (IP): 9.65 eV

IDLH: 1000 ppm

Carcinogen: OSHA
IARC
NTP
ACGIH
NIOSH

Skin absorbable: yes ___ no X
Skin corrosive: yes ___ no X

Signs/Symptoms of Acute Exposure:
Irritant to eyes and respiratory system,
CNS, depression

Source	TWA (units)	STEL (units)	C (units)
OSHA PELs	200 ppm		
ACGIH TLVs	200 ppm		
NIOSH RELs	200 ppm		

AIR MONITORING

Type	Brand/Model No.	Calibrations Method/Media	Relative Response or Conversion Factor	Meter Specific Action Level
PID	Microtip 10.6eV	Isobutylene 100 ppm	1.45	290

Checked by: Emmet F. Curtis Date: 12/5/03

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials:
Suits: Teflon, Viton, PE/EVAL, Barricade, CPF3, Tychem Responder
Gloves: Viton, Teflon, Polyvinyl Alcohol (do not use in water)
Boots: Teflon, Viton

Service Limit Concentration (ppm): 1000

MUC 1/2 Mask APR = TWA x 10 = 1000 ppm
MUC Full-Face APR = TWA x 10 = 1000 ppm

FIRE/REACTIVITY DATA

Flash Point: 36-39 ° F

LEL/UEL: 5.6% / 12.8%

Fire Extinguishing Media:
Dry Chemical X Foam X
Water Spray X CO_2 X

Incompatibilities:
Strong oxidizers, strong alkalis, potassium hydroxide, copper

Note: The recommended protective clothing materials assumes that potential for direct contact (by splashing, dust inhalation, or other means) with the contaminant exists. Professional judgement and knowledge of on-site hazards should be used in selecting PPE appropriate to the concentration of the contaminant (trace vs percentage) to which the individual is likely to be exposed.

ATTACHMENT A

CONTAMINANT FACT SHEET

CONTAMINANT FACT SHEET

Chemical Name:
Aroclors-General 1336-36-3,
CAS Number: 11097-69-1, 53469-21-9
Synonyms:
Chlorodiphenyls
Polychlorinated biphenyls (PCBs)

HEALTH HAZARD DATA

Color: Colorless to pale yellow

Physical State: Solid X (below 50^0 F)
Liquid (Viscous)
Gas

Odor: Hydrocarbon-like

Odor Threshold: NA

Vapor Density: NA

Ionization Potential (IP): Unknown

IDLH: 5 mg/m^3

Carcinogen: OSHA
IARC X
NTP X
ACGIH X
NIOSH X

Skin absorbable: yes X no ___

Skin corrosive: yes X no ___

Signs/Symptoms of Acute Exposure:
Irritant to eyes, chloracne, liver damage

Source	TWA (units)	STEL (units)	C (units)
OSHA PELs	0.5 mg/m^3 (1254)		
ACGIH TLVs	0.5 mg/m^3 (1254)		
NIOSH RELs	0.001 mg/m^3 (1254)		

AIR MONITORING

Type	Brand/Model No.	Calibrations Method/Media	Relative Response or Conversion Factor	Meter Specific Action Level
Not Applicable (NA)				

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials:

Suits: Saranex, Butyl Rubber, Neoprene, Viton, Teflon, Barricade, Responder

Gloves: Viton, Butyl Rubber, Teflon, Neoprene

Boots: Butyl Rubber, Neoprene

Service Limit Concentration (ppm): NA

MUC 1/2 Mask APR = TWA x 10 = 2.5 mg/m^3

MUC Full-Face APR =TWA x 10 = 2.5 mg/m^3

FIRE/REACTIVITY DATA

Flash Point: NA

LEL/UEL: NA/NA

Fire Extinguishing Media:
Dry Chemical X Foam X
Water Spray X CO_2 X

Incompatibilities:
Strong oxidizers

Checked by: Emmet F. Curtis Date: 12/5/03

Note: The recommended protective clothing materials assumes that potential for direct contact (by splashing, dust inhalation, or other means) with the contaminants exists. Professional judgment and knowledge of on-site hazards should be used in selecting PPE appropriate to the concentration of the contaminant (trace vs percentage) to which the individual is likely to be exposed.

Safety Data Sheets (SDS)
Materials Brought to the Site

1. **Cal Gas Isobutylene PID**
2. **Hydrochloric Acid**
3. **Nitric Acid**

SAFETY DATA SHEET

Isobutylene

Section 1. Identification

GHS product identifier : Isobutylene

Chemical name : 2-methylpropene

Other means of identification : 1-Propene, 2-methyl-; Isobutene; Isobutylene; 1-Propene, 2-methyl- (isobutene)

Product use : Synthetic/Analytical chemistry.

Synonym : 1-Propene, 2-methyl-; Isobutene; Isobutylene; 1-Propene, 2-methyl- (isobutene)

SDS # : 001031

Supplier's details : Airgas USA, LLC and its affiliates
259 North Radnor-Chester Road
Suite 100
Radnor, PA 19087-5283
1-610-687-5253

Emergency telephone number (with hours of operation) : 1-866-734-3438

Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture : FLAMMABLE GASES - Category 1
GASES UNDER PRESSURE - Liquefied gas

GHS label elements

Hazard pictograms :

Signal word : Danger

Hazard statements : Extremely flammable gas.
Contains gas under pressure; may explode if heated.
May cause frostbite.
May displace oxygen and cause rapid suffocation.

Precautionary statements

General : Read and follow all Safety Data Sheets (SDS'S) before use. Read label before use. Keep out of reach of children. If medical advice is needed, have product container or label at hand. Close valve after each use and when empty. Use equipment rated for cylinder pressure. Do not open valve until connected to equipment prepared for use. Use a back flow preventative device in the piping. Use only equipment of compatible materials of construction. Always keep container in upright position. Approach suspected leak area with caution.

Prevention : Never Put cylinders into unventilated areas of passenger vehicles. Keep away from heat, sparks, open flames and hot surfaces. - No smoking. Use and store only outdoors or in a well ventilated place.

Response : Leaking gas fire: Do not extinguish, unless leak can be stopped safely. Eliminate all ignition sources if safe to do so.

Storage : Protect from sunlight. Protect from sunlight when ambient temperature exceeds 52°C/125°F. Store in a well-ventilated place.

Section 2. Hazards identification

Disposal : Not applicable.

Hazards not otherwise classified : In addition to any other important health or physical hazards, this product may displace oxygen and cause rapid suffocation.

Section 3. Composition/information on ingredients

Substance/mixture : Substance

Chemical name : 2-methylpropene

Other means of identification : 1-Propene, 2-methyl-; Isobutene; Isobutylene; 1-Propene, 2-methyl- (isobutene)

CAS number/other identifiers

CAS number : 115-11-7

Product code : 001031

Ingredient name	%	CAS number
2-methylpropene	100	115-11-7

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

Eye contact : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention if irritation occurs.

Inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention if adverse health effects persist or are severe. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Skin contact : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. To avoid the risk of static discharges and gas ignition, soak contaminated clothing thoroughly with water before removing it. Get medical attention if symptoms occur. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Ingestion : As this product is a gas, refer to the inhalation section.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact : No known significant effects or critical hazards.

Inhalation : No known significant effects or critical hazards.

Skin contact : No known significant effects or critical hazards.

Frostbite : Try to warm up the frozen tissues and seek medical attention.

Ingestion : As this product is a gas, refer to the inhalation section.

Over-exposure signs/symptoms

Eye contact : No specific data.

Inhalation : No specific data.

Section 4. First aid measures

Skin contact : No specific data.

Ingestion : No specific data.

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

Specific treatments : No specific treatment.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media : Use an extinguishing agent suitable for the surrounding fire.

Unsuitable extinguishing media : None known.

Specific hazards arising from the chemical : Contains gas under pressure. Extremely flammable gas. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion.

Hazardous thermal decomposition products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide

Special protective actions for fire-fighters : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Contact supplier immediately for specialist advice. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool. If involved in fire, shut off flow immediately if it can be done without risk. If this is impossible, withdraw from area and allow fire to burn. Fight fire from protected location or maximum possible distance. Eliminate all ignition sources if safe to do so.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : Accidental releases pose a serious fire or explosion hazard. No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing gas. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

For emergency responders : If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Environmental precautions : Ensure emergency procedures to deal with accidental gas releases are in place to avoid contamination of the environment. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Section 6. Accidental release measures

Methods and materials for containment and cleaning up

Small spill : Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment.

Large spill : Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8). Contains gas under pressure. Avoid contact with eyes, skin and clothing. Avoid breathing gas. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use only non-sparking tools. Empty containers retain product residue and can be hazardous. Do not puncture or incinerate container. Use equipment rated for cylinder pressure. Close valve after each use and when empty. Protect cylinders from physical damage; do not drag, roll, slide, or drop. Use a suitable hand truck for cylinder movement.

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities : Store in accordance with local regulations. Store in a segregated and approved area. Store away from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10). Eliminate all ignition sources. Keep container tightly closed and sealed until ready for use. Cylinders should be stored upright, with valve protection cap in place, and firmly secured to prevent falling or being knocked over. Cylinder temperatures should not exceed 52 °C (125 °F).

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
2-methylpropene	**ACGIH TLV (United States, 3/2012).** TWA: 250 ppm 8 hours.

Appropriate engineering controls : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Section 8. Exposure controls/personal protection

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields.

Skin protection

Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. When there is a risk of ignition from static electricity, wear anti-static protective clothing. For the greatest protection from static discharges, clothing should include anti-static overalls, boots and gloves.

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Section 9. Physical and chemical properties

Appearance

Physical state : Gas. [Liquefied compressed gas.]

Color : Colorless.

Molecular weight : 56.12 g/mole

Molecular formula : C4-H8

Boiling/condensation point : -6.9°C (19.6°F)

Melting/freezing point : -140.7°C (-221.3°F)

Critical temperature : 144.75°C (292.6°F)

Odor : Characteristic.

Odor threshold : Not available.

pH : Not available.

Flash point : Closed cup: -76.1°C (-105°F)

Burning time : Not applicable.

Burning rate : Not applicable.

Evaporation rate : Not available.

Flammability (solid, gas) : Extremely flammable in the presence of the following materials or conditions: open flames, sparks and static discharge and oxidizing materials.

Lower and upper explosive (flammable) limits : Lower: 1.8%
Upper: 9.6%

Section 9. Physical and chemical properties

Vapor pressure : 24.3 (psig)

Vapor density : 1.94 (Air = 1)

Specific Volume (ft ^{3}/lb) : 6.6845

Gas Density (lb/ft ^{3}) : 0.1496 (25°C / 77 to °F)

Relative density : Not applicable.

Solubility : Not available.

Solubility in water : 0.263 g/l

Partition coefficient: n-octanol/water : 2.34

Auto-ignition temperature : 465°C (869°F)

Decomposition temperature : Not available.

SADT : Not available.

Viscosity : Not applicable.

Section 10. Stability and reactivity

Reactivity : No specific test data related to reactivity available for this product or its ingredients.

Chemical stability : The product is stable.

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

Conditions to avoid : Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition.

Incompatibility with various substances : Extremely reactive or incompatible with the following materials: oxidizing materials.

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Hazardous polymerization : Under normal conditions of storage and use, hazardous polymerization will not occur.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
2-methylpropene	LC50 Inhalation Vapor	Rat	550000 mg/m³	4 hours

Irritation/Corrosion

Not available.

Sensitization

Not available.

Mutagenicity

Not available.

Section 11. Toxicological information

Carcinogenicity

Not available.

Reproductive toxicity

Not available.

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

Not available.

Specific target organ toxicity (repeated exposure)

Not available.

Aspiration hazard

Not available.

Information on the likely routes of exposure : Not available.

Potential acute health effects

Eye contact : No known significant effects or critical hazards.

Inhalation : No known significant effects or critical hazards.

Skin contact : No known significant effects or critical hazards.

Ingestion : As this product is a gas, refer to the inhalation section.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : No specific data.

Inhalation : No specific data.

Skin contact : No specific data.

Ingestion : No specific data.

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Potential chronic health effects

Not available.

General : No known significant effects or critical hazards.

Carcinogenicity : No known significant effects or critical hazards.

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Section 11. Toxicological information

Numerical measures of toxicity

Acute toxicity estimates

Not available.

Section 12. Ecological information

Toxicity

Not available.

Persistence and degradability

Not available.

Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
2-methylpropene	2.34	-	low

Mobility in soil

Soil/water partition coefficient (K_{OC}) : Not available.

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Empty Airgas-owned pressure vessels should be returned to Airgas. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Empty containers or liners may retain some product residues. Do not puncture or incinerate container.

Section 14. Transport information

	DOT	TDG	Mexico	IMDG	IATA
UN number	UN1055	UN1055	UN1055	UN1055	UN1055
UN proper shipping name	ISOBUTYLENE	ISOBUTYLENE	ISOBUTYLENE	ISOBUTYLENE	ISOBUTYLENE
Transport hazard class(es)	2.1 	2.1 	2.1 	2.1 	2.1 

Section 14. Transport information

Packing group	-	-	-	-	-
Environment	No.	No.	No.	No.	No.
Additional information	**Limited quantity** Yes. **Packaging instruction** **Passenger aircraft** Quantity limitation: Forbidden. **Cargo aircraft** Quantity limitation: 150 kg **Special provisions** 19, T50	**Explosive Limit and Limited Quantity Index** 0.125 **ERAP Index** 3000 **Passenger Carrying Ship Index** Forbidden **Passenger Carrying Road or Rail Index** Forbidden **Special provisions** 29	-	-	**Passenger and Cargo Aircraft**Quantity limitation: 0 Forbidden **Cargo Aircraft Only** Quantity limitation: 150 kg

"Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product."

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code : Not available.

Section 15. Regulatory information

U.S. Federal regulations : **TSCA 8(a) CDR Exempt/Partial exemption**: Not determined

United States inventory (TSCA 8b): This material is listed or exempted.

Clean Air Act (CAA) 112 regulated flammable substances: 2-methylpropene

Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs) : Not listed

Clean Air Act Section 602 Class I Substances : Not listed

Clean Air Act Section 602 Class II Substances : Not listed

DEA List I Chemicals (Precursor Chemicals) : Not listed

DEA List II Chemicals (Essential Chemicals) : Not listed

SARA 302/304

Composition/information on ingredients

No products were found.

SARA 304 RQ : Not applicable.

SARA 311/312

Classification : Fire hazard
Sudden release of pressure

Section 15. Regulatory information

Composition/information on ingredients

Name	%	Fire hazard	Sudden release of pressure	Reactive	Immediate (acute) health hazard	Delayed (chronic) health hazard
2-methylpropene	100	Yes.	Yes.	No.	No.	No.

State regulations

Massachusetts : This material is listed.

New York : This material is not listed.

New Jersey : This material is listed.

Pennsylvania : This material is listed.

Canada inventory : This material is listed or exempted.

International regulations

International lists : **Australia inventory (AICS)**: This material is listed or exempted.
China inventory (IECSC): This material is listed or exempted.
Japan inventory: This material is listed or exempted.
Korea inventory: This material is listed or exempted.
Malaysia Inventory (EHS Register): Not determined.
New Zealand Inventory of Chemicals (NZIoC): This material is listed or exempted.
Philippines inventory (PICCS): This material is listed or exempted.
Taiwan inventory (CSNN): Not determined.

Chemical Weapons Convention List Schedule I Chemicals : Not listed

Chemical Weapons Convention List Schedule II Chemicals : Not listed

Chemical Weapons Convention List Schedule III Chemicals : Not listed

Canada

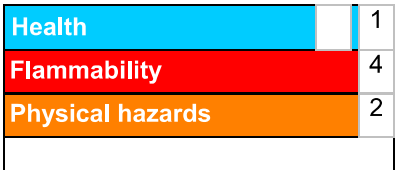
WHMIS (Canada) : Class A: Compressed gas.
Class B-1: Flammable gas.

CEPA Toxic substances: This material is not listed.
Canadian ARET: This material is not listed.
Canadian NPRI: This material is listed.
Alberta Designated Substances: This material is not listed.
Ontario Designated Substances: This material is not listed.
Quebec Designated Substances: This material is not listed.

Section 16. Other information

Canada Label requirements : Class A: Compressed gas.
Class B-1: Flammable gas.

Hazardous Material Information System (U.S.A.)



Section 16. Other information

Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks Although HMIS® ratings are not required on SDSs under 29 CFR 1910. 1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

The customer is responsible for determining the PPE code for this material.

National Fire Protection Association (U.S.A.)

Reprinted with permission from NFPA 704-2001, Identification of the Hazards of Materials for Emergency Response Copyright ©1997, National Fire Protection Association, Quincy, MA 02269. This reprinted material is not the complete and official position of the National Fire Protection Association, on the referenced subject which is represented only by the standard in its entirety.

Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

History

Date of printing	:	10/15/2014.
Date of issue/Date of revision	:	10/15/2014.
Date of previous issue	:	10/6/2014.
Version	:	0.02
Key to abbreviations	:	ATE = Acute Toxicity Estimate BCF = Bioconcentration Factor GHS = Globally Harmonized System of Classification and Labelling of Chemicals IATA = International Air Transport Association IBC = Intermediate Bulk Container IMDG = International Maritime Dangerous Goods LogPow = logarithm of the octanol/water partition coefficient MARPOL 73/78 = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution) UN = United NationsACGIH – American Conference of Governmental Industrial Hygienists AIHA – American Industrial Hygiene Association CAS – Chemical Abstract Services CEPA – Canadian Environmental Protection Act CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act (EPA) CFR – United States Code of Federal Regulations CPR – Controlled Products Regulations DSL – Domestic Substances List GWP – Global Warming Potential IARC – International Agency for Research on Cancer ICAO – International Civil Aviation Organisation Inh – Inhalation LC – Lethal concentration LD – Lethal dosage NDSL – Non-Domestic Substances List NIOSH – National Institute for Occupational Safety and Health

Section 16. Other information

TDG – Canadian Transportation of Dangerous Goods Act and Regulations
TLV – Threshold Limit Value
TSCA – Toxic Substances Control Act
WEEL – Workplace Environmental Exposure Level
WHMIS – Canadian Workplace Hazardous Material Information System

References : Not available.

Indicates information that has changed from previously issued version.

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

SAFETY DATA SHEET

1. Identification

Product identifier: HYDROCHLORIC ACID

Other means of identification
Synonyms: Muriatic Acid, Hydrogen Chloride, Aqueous
Product No.: 9385, 9538, 9165, V226, V187, V078, V001, 6900, 2624, 2515, H999, H987, H616, 5861, 2062, 5814, 2626, 2612, 5800, 9625, 5587, 9551, 9544, 9539, 9535, 9530, 9529, 5367, H613, 37825, 25496, 20620, H613

Recommended use and restriction on use

Recommended use: Not available.
Restrictions on use: Not known.

Manufacturer/Importer/Supplier/Distributor Information

Manufacturer

Company Name:	Avantor Performance Materials, Inc.
Address:	3477 Corporate Parkway, Suite 200 Center Valley, PA 18034
Telephone:	Customer Service: 855-282-6867
Fax:	
Contact Person:	Environmental Health & Safety
e-mail:	info@avantormaterials.com

Emergency telephone number:
24 Hour Emergency: 908-859-2151

Chemtrec: 800-424-9300

2. Hazard(s) identification

Hazard Classification

Physical Hazards

Corrosive to metals	Category 1

Health Hazards

Acute toxicity (Oral)	Category 4
Skin Corrosion/Irritation	Category 1
Serious Eye Damage/Eye Irritation	Category 1
Specific Target Organ Toxicity - Single Exposure (Inhalation - vapor)	Category 3

Label Elements

Hazard Symbol:

Signal Word: Danger

Hazard Statement: May be corrosive to metals.
Harmful if swallowed.
Causes severe skin burns and eye damage.
May cause respiratory irritation.

Precautionary Statement

Prevention: Keep only in original container. Wash thoroughly after handling. Do not breathe dust/fume/gas/mist/vapors/spray. Use only outdoors or in a well-ventilated area. Wear protective gloves/protective clothing/eye protection/face protection. Do not eat, drink or smoke when using this product.

Response: Absorb spillage to prevent material damage. IF SWALLOWED: Rinse mouth. Do NOT induce vomiting. IF ON SKIN (or hair): Remove/take off immediately all contaminated clothing. Rinse skin with water/shower. Wash contaminated clothing before reuse. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Immediately call a POISON CENTER or doctor/physician.

Storage: Store locked up. Store in a well-ventilated place. Keep container tightly closed. Store in corrosive resistant container with a resistant inner liner.

Disposal: Dispose of contents/container to an appropriate treatment and disposal facility in accordance with applicable laws and regulations, and product characteristics at time of disposal.

Other hazards which do not result in GHS classification: None.

3. Composition/information on ingredients

Mixtures

Chemical Identity	Common name and synonyms	CAS number	Content in percent (%)*
HYDROCHLORIC ACID		7647-01-0	20 - 40%

* All concentrations are percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

4. First-aid measures

General information: Get medical advice/attention if you feel unwell. Show this safety data sheet to the doctor in attendance.

Ingestion: Call a physician or poison control center immediately. Do not induce vomiting without advice from poison control center. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs.

Inhalation: Move to fresh air. Call a physician or poison control center immediately. Apply artificial respiration if victim is not breathing If breathing is difficult, give oxygen.

Skin Contact: Immediately flush with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Call a physician or poison control center immediately. Wash contaminated clothing before reuse. Destroy or thoroughly clean contaminated shoes.

Eye contact: Immediately flush with plenty of water for at least 15 minutes. If easy to do, remove contact lenses. Call a physician or poison control center immediately. In case of irritation from airborne exposure, move to fresh air. Get medical attention immediately.

Most important symptoms/effects, acute and delayed

Symptoms: Causes severe skin and eye burns. Harmful if swallowed.

Indication of immediate medical attention and special treatment needed

Treatment: Treat symptomatically. Symptoms may be delayed.

5. Fire-fighting measures

General Fire Hazards: No data available.

Suitable (and unsuitable) extinguishing media

Suitable extinguishing media: The product is non-combustible. Use fire-extinguishing media appropriate for surrounding materials.

Unsuitable extinguishing media: None known.

Specific hazards arising from the chemical: Fire or excessive heat may produce hazardous decomposition products.

Special protective equipment and precautions for firefighters

Special fire fighting procedures: Move containers from fire area if you can do so without risk. Use water spray to keep fire-exposed containers cool.

Special protective equipment for fire-fighters: Firefighters must use standard protective equipment including flame retardant coat, helmet with face shield, gloves, rubber boots, and in enclosed spaces, SCBA.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures: Ventilate closed spaces before entering them. Keep unauthorized personnel away. Evacuate area. Keep upwind. See Section 8 of the SDS for Personal Protective Equipment. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.

Methods and material for containment and cleaning up: Neutralize with lime or soda ash. Absorb spill with vermiculite or other inert material, then place in a container for chemical waste. Dike far ahead of larger spill for later recovery and disposal.

Notification Procedures: Inform authorities if large amounts are involved.

Environmental Precautions: Do not contaminate water sources or sewer. Prevent further leakage or spillage if safe to do so.

7. Handling and storage

Precautions for safe handling: Do not eat, drink or smoke when using the product. Do not get in eyes, on skin, on clothing. Wash hands thoroughly after handling. Do not breathe dust/fume/gas/mist/vapors/spray. Use caution when adding this material to water.

Conditions for safe storage, including any incompatibilities: Keep container tightly closed. Store in a well-ventilated place. Unsuitable containers: metals.

8. Exposure controls/personal protection

Control Parameters

Occupational Exposure Limits

Chemical Identity	Type	Exposure Limit Values	Source
HYDROCHLORIC ACID	Ceiling	2 ppm	US. ACGIH Threshold Limit Values (2011)
	Ceil_Time	5 ppm 7 mg/m3	US. NIOSH: Pocket Guide to Chemical Hazards (2010)
	Ceiling	5 ppm 7 mg/m3	US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000) (02 2006)
	Ceiling	5 ppm 7 mg/m3	US. OSHA Table Z-1-A (29 CFR 1910.1000) (1989)

Appropriate Engineering Controls No data available.

Individual protection measures, such as personal protective equipment

General information: Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. An eye wash and safety shower must be available in the immediate work area.

Eye/face protection: Wear safety glasses with side shields (or goggles) and a face shield.

Skin Protection

Hand Protection: Chemical resistant gloves

Other: Wear suitable protective clothing and gloves.

Respiratory Protection: If engineering controls do not maintain airborne concentrations below recommended exposure limits (where applicable) or to an acceptable level (in countries where exposure limits have not been established), an approved respirator must be worn. Air-purifying respirator with an appropriate, government approved (where applicable), air-purifying filter, cartridge or canister. Contact health and safety professional or manufacturer for specific information.

Hygiene measures: Provide eyewash station and safety shower. Observe good industrial hygiene practices. Wash hands before breaks and immediately after handling the product. Do not get in eyes. Wash contaminated clothing before reuse. Do not get this material in contact with skin.

9. Physical and chemical properties

Appearance

Physical state: Liquid
Form: Liquid
Color: Colorless
Odor: Pungent
Odor threshold: No data available.
pH: 0.1 (1 N aqueous solution)
Melting point/freezing point: -35 °C

Initial boiling point and boiling range:	48 °C
Flash Point:	Not applicable
Evaporation rate:	No data available.
Flammability (solid, gas):	No data available.
Upper/lower limit on flammability or explosive limits	
Flammability limit - upper (%):	No data available.
Flammability limit - lower (%):	No data available.
Explosive limit - upper (%):	No data available.
Explosive limit - lower (%):	No data available.
Vapor pressure:	14.1 kPa
Vapor density:	No data available.
Relative density:	1.18 (20 °C)
Solubility(ies)	
Solubility in water:	Soluble
Solubility (other):	No data available.
Partition coefficient (n-octanol/water):	No data available.
Auto-ignition temperature:	No data available.
Decomposition temperature:	No data available.
Viscosity:	No data available.

10. Stability and reactivity

Reactivity:	Reacts violently with strong alkaline substances.
Chemical Stability:	Material is stable under normal conditions.
Possibility of Hazardous Reactions:	Hazardous polymerization does not occur.
Conditions to Avoid:	Avoid contact with strong reducing agents. Strong oxidizing agents. Contact with alkalis.
Incompatible Materials:	Acids. Amines. Alkalies. Metals. Reducing agents. Oxidizing agents.
Hazardous Decomposition Products:	Chlorine. hydrogen chloride By heating and fire, corrosive vapors/gases may be formed.

11. Toxicological information

Information on likely routes of exposure

Ingestion:	Harmful if swallowed.
Inhalation:	Causes severe burns.
Skin Contact:	Causes severe skin burns.
Eye contact:	Causes serious eye damage.

Information on toxicological effects

Acute toxicity (list all possible routes of exposure)

Oral

Product: ATEmix (Rat): 581 mg/kg

Dermal

Product: No data available.

Specified substance(s):

HYDROCHLORIC ACID	LD 50 (Mouse): 1,449 mg/kg

Inhalation

Product: No data available.

Specified substance(s):

HYDROCHLORIC ACID	LC 50 (Mouse, 1 h): 1108 ppm LC 50 (Rat, 1 h): 3124 ppm

Repeated Dose Toxicity

Product: No data available.

Skin Corrosion/Irritation

Product: Causes severe skin burns.

Serious Eye Damage/Eye Irritation

Product: Causes serious eye damage.

Respiratory or Skin Sensitization

Product: Not a skin sensitizer.

Carcinogenicity

Product: This substance has no evidence of carcinogenic properties.

IARC Monographs on the Evaluation of Carcinogenic Risks to Humans:
No carcinogenic components identified

US. National Toxicology Program (NTP) Report on Carcinogens:
No carcinogenic components identified

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050):
No carcinogenic components identified

Germ Cell Mutagenicity

In vitro

Product: No mutagenic components identified

In vivo

Product: No mutagenic components identified

Reproductive Toxicity

Product: No components toxic to reproduction

Specific Target Organ Toxicity - Single Exposure

Product: Respiratory tract irritation.

Specific Target Organ Toxicity - Repeated Exposure

Product: None known.

Aspiration Hazard

Product: Not classified

Other Effects: None known.

12. Ecological information

Ecotoxicity:

Acute hazards to the aquatic environment:

Fish

Product:	No data available.
Specified substance(s):	
HYDROCHLORIC ACID	LC 50 (Western mosquitofish (Gambusia affinis), 96 h): 282 mg/l Mortality

Aquatic Invertebrates

Product:	No data available.
Specified substance(s):	
HYDROCHLORIC ACID	LC 50 (Green or European shore crab (Carcinus maenas), 48 h): 240 mg/l Mortality LC 50 (Common shrimp, sand shrimp (Crangon crangon), 48 h): 260 mg/l Mortality

Chronic hazards to the aquatic environment:

Fish

Product:	No data available.

Aquatic Invertebrates

Product:	No data available.

Toxicity to Aquatic Plants

Product:	No data available.

Persistence and Degradability

Biodegradation

Product:	Expected to be readily biodegradable.

BOD/COD Ratio

Product:	No data available.

Bioaccumulative Potential

Bioconcentration Factor (BCF)

Product:	No data available on bioaccumulation.

Partition Coefficient n-octanol / water (log Kow)

Product:	No data available.

Mobility in Soil:	The product is water soluble and may spread in water systems.
Other Adverse Effects:	Large amounts of the product may affect the acidity (pH-factor) in water with possible risk of harmful effects to aquatic organisms.

13. Disposal considerations

Disposal instructions:	Discharge, treatment, or disposal may be subject to national, state, or local laws. Since emptied containers retain product residue, follow label warnings even after container is emptied.
Contaminated Packaging:	No data available.

14. Transport information

DOT

UN Number:	UN 1789
UN Proper Shipping Name:	Hydrochloric acid
Transport Hazard Class(es)	
Class(es):	8
Label(s):	8
Packing Group:	II
Marine Pollutant:	No

IMDG

UN Number:	UN 1789
UN Proper Shipping Name:	HYDROCHLORIC ACID
Transport Hazard Class(es)	
Class(es):	8
Label(s):	8
EmS No.:	F-A, S-B
Packing Group:	II
Marine Pollutant:	No

IATA

UN Number:	UN 1789
Proper Shipping Name:	Hydrochloric acid
Transport Hazard Class(es):	
Class(es):	8
Label(s):	8
Marine Pollutant:	No
Packing Group:	II

15. Regulatory information

US Federal Regulations

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

None present or none present in regulated quantities.

CERCLA Hazardous Substance List (40 CFR 302.4):

HYDROCHLORIC ACID Reportable quantity: 5000 lbs.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories

[X] Acute (Immediate) [ ] Chronic (Delayed) [ ] Fire [ ] Reactive [ ] Pressure Generating

SARA 302 Extremely Hazardous Substance

Chemical Identity	RQ	Threshold Planning Quantity
HYDROCHLORIC ACID	5000 lbs.	500 lbs.

SARA 304 Emergency Release Notification

Chemical Identity	RQ
HYDROCHLORIC ACID	5000 lbs.

SARA 311/312 Hazardous Chemical

Chemical Identity	Threshold Planning Quantity
HYDROCHLORIC ACID	500lbs

SARA 313 (TRI Reporting)

Chemical Identity	Reporting threshold for other users	Reporting threshold for manufacturing and processing
HYDROCHLORIC ACID	10000 lbs	25000 lbs.

Clean Water Act Section 311 Hazardous Substances (40 CFR 117.3)

HYDROCHLORIC ACID Reportable quantity: 5000 lbs.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130):

HYDROCHLORIC ACID Threshold quantity: 15000 lbs

HYDROCHLORIC ACID Threshold quantity: 5000 lbs

US State Regulations

US. California Proposition 65

No ingredient regulated by CA Prop 65 present.

US. New Jersey Worker and Community Right-to-Know Act

HYDROCHLORIC ACID Listed

US. Massachusetts RTK - Substance List

HYDROCHLORIC ACID Listed

US. Pennsylvania RTK - Hazardous Substances

HYDROCHLORIC ACID Listed

US. Rhode Island RTK

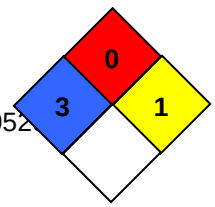
HYDROCHLORIC ACID Listed

Inventory Status:

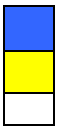
Australia AICS:	On or in compliance with the inventory
Canada DSL Inventory List:	On or in compliance with the inventory
EU EINECS List:	On or in compliance with the inventory
EU ELINCS List:	Not in compliance with the inventory.
Japan (ENCS) List:	On or in compliance with the inventory
EU No Longer Polymers List:	Not in compliance with the inventory.
China Inv. Existing Chemical Substances:	On or in compliance with the inventory
Korea Existing Chemicals Inv. (KECI):	On or in compliance with the inventory
Canada NDSL Inventory:	Not in compliance with the inventory.
Philippines PICCS:	On or in compliance with the inventory
US TSCA Inventory:	On or in compliance with the inventory
New Zealand Inventory of Chemicals:	On or in compliance with the inventory
Switzerland Consolidated Inventory:	Not in compliance with the inventory.
Japan ISHL Listing:	Not in compliance with the inventory.
Japan Pharmacopoeia Listing:	Not in compliance with the inventory.

16.Other information, including date of preparation or last revision

NFPA Hazard ID



Flammability



Hazard rating: 0 - Minimal; 1 - Slight; 2 - Moderate; 3 - Serious; 4 - Severe

Issue Date:	02-02-2015
Revision Date:	No data available.
Version #:	4.0
Further Information:	No data available.
Disclaimer:	THE INFORMATION PRESENTED IN THIS MATERIAL SAFETY DATA SHEET (MSDS/SDS) WAS PREPARED BY TECHNICAL PERSONNEL BASED ON DATA THAT THEY BELIEVE IN THEIR GOOD FAITH JUDGMENT IS ACCURATE. HOWEVER, THE INFORMATION PROVIDED HEREIN IS PROVIDED “AS IS,” AND AVANTOR PERFORMANCE MATERIALS MAKES AND GIVES NO REPRESENTATIONS OR WARRANTIES WHATSOEVER, AND EXPRESSLY DISCLAIMS ALL WARRANTIES REGARDING SUCH INFORMATION AND THE PRODUCT TO WHICH IT RELATES, WHETHER EXPRESS, IMPLIED, OR STATUTORY, INCLUDING WITHOUT LIMITATION<(>,<)> WARRANTIES OF ACCURACY, COMPLETENESS, MERCHANTABILITY, NON-INFRINGEMENT, PERFORMANCE, SAFETY, SUITABILITY, STABILITY, AND FITNESS FOR A PARTICULAR PURPOSE, AND ANY WARRANTIES ARISING FROM COURSE OF DEALING, COURSE OF PERFORMANCE, OR USAGE OF TRADE. THIS MSDS/SDS IS INTENDED ONLY AS A GUIDE TO THE APPROPRIATE PRECAUTIONARY HANDLING OF THE MATERIAL BY A PROPERLY TRAINED PERSON USING THIS PRODUCT, AND IS NOT INTENDED TO BE COMPREHENSIVE AS TO THE MANNER AND CONDITIONS OF USE, HANDLING, STORAGE, OR DISPOSAL OF THE PRODUCT. INDIVIDUALS RECEIVING THIS MSDS/SDS MUST ALWAYS EXERCISE THEIR OWN INDEPENDENT JUDGMENT IN DETERMINING THE APPROPRIATENESS OF SUCH ISSUES. ACCORDINGLY, AVANTOR PERFORMANCE MATERIALS ASSUMES NO LIABILITY WHATSOEVER FOR THE USE OF OR RELIANCE UPON THIS INFORMATION. NO SUGGESTIONS FOR USE ARE INTENDED AS, AND NOTHING HEREIN SHALL BE CONSTRUED AS, A RECOMMENDATION TO INFRINGE ANY EXISTING PATENTS OR TO VIOLATE ANY FEDERAL, STATE, LOCAL, OR FOREIGN LAWS. AVANTOR PERFORMANCE MATERIALS REMINDS YOU THAT IT IS YOUR LEGAL DUTY TO MAKE ALL INFORMATION IN THIS MSDS/SDS AVAILABLE TO YOUR EMPLOYEES.

SAFETY DATA SHEET

1. Identification

Product identifier: NITRIC ACID

Other means of identification

Synonyms: Aqua Fortis, Azotic Acid

Product No.: 9604, V471, V231, V230, V077, 6623, 2712, 2707, 2706, 2704, H988, 5876, 5856, 5801, 5796, 1409, 9761, 9670, 9618, 9617, 9616, 9615, 9612, 9607, 9606, 9601, 9598, 9597, 5371, 20758, 20754, 20752, 20750

Recommended use and restriction on use

Recommended use: Not available.

Restrictions on use: Not known.

Manufacturer/Importer/Supplier/Distributor information

Manufacturer

Company Name:	Avantor Performance Materials, Inc.
Address:	3477 Corporate Parkway, Suite 200 Center Valley, PA 18034
Telephone:	Customer Service: 855-282-6867
Fax:	
Contact Person:	Environmental Health & Safety
e-mail:	info@avantormaterials.com

Emergency telephone number:

24 Hour Emergency: 908-859-2151

Chemtrec: 800-424-9300

2. Hazard(s) identification

Hazard classification

Physical hazards

Oxidizing liquids	Category 3
Corrosive to metals	Category 1

Health hazards

Skin corrosion/irritation	Category 1A

Unknown toxicity

Acute toxicity, oral	65 %
Acute toxicity, dermal	65 %
Acute toxicity, inhalation, vapor	100 %
Acute toxicity, inhalation, dust or mist	100 %

Unknown toxicity

Acute hazards to the aquatic environment	65 %
Chronic hazards to the aquatic environment	65 %

Label elements

Hazard symbol:

Signal word: Danger

Hazard statement: May intensify fire; oxidizer.
May be corrosive to metals.
Causes severe skin burns and eye damage.

Precautionary statement

Prevention: Wear protective gloves/protective clothing/eye protection/face protection. Wash hands thoroughly after handling. Keep only in original container. Keep away from heat. Keep/Store away from clothing/combustible materials. Take any precaution to avoid mixing with combustibles. Use only outdoors or in a well-ventilated area.

Response: In case of fire: Use water spray, foam, dry powder or carbon dioxide for extinction. Immediately call a POISON CENTER/doctor. IF SWALLOWED: Rinse mouth. Do NOT induce vomiting. IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. Wash contaminated clothing before reuse. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. IF INHALED: Remove person to fresh air and keep comfortable for breathing. Absorb spillage to prevent material damage.

Storage: Store locked up. Store in corrosive resistant container with a resistant inner liner. Store in a well-ventilated place. Keep container tightly closed.

Disposal: Dispose of contents/container to an appropriate treatment and disposal facility in accordance with applicable laws and regulations, and product characteristics at time of disposal.

Other hazards which do not result in GHS classification: None.

3. Composition/information on ingredients

Mixtures

Chemical identity	Common name and synonyms	CAS number	Content in percent (%)*
NITRIC ACID		7697-37-2	65 - 70%

* All concentrations are percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

4. First-aid measures

General information: Get medical advice/attention if you feel unwell. Show this safety data sheet to the doctor in attendance.

Ingestion: Call a physician or poison control center immediately. Do NOT induce vomiting. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs.

Inhalation:	Move to fresh air. Call a physician or poison control center immediately. If breathing stops, provide artificial respiration. If breathing is difficult, give oxygen.
Skin contact:	Immediately flush with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Call a physician or poison control center immediately. Wash contaminated clothing before reuse. Destroy or thoroughly clean contaminated shoes.
Eye contact:	Immediately flush with plenty of water for at least 15 minutes. If easy to do, remove contact lenses. Call a physician or poison control center immediately. In case of irritation from airborne exposure, move to fresh air. Get medical attention immediately.

Most important symptoms/effects, acute and delayed

Symptoms:	Corrosive to skin and eyes. Causes digestive tract burns. Spray mists may cause respiratory tract irritation.

Indication of immediate medical attention and special treatment needed

Treatment:	Treat symptomatically. Symptoms may be delayed.

5. Fire-fighting measures

General fire hazards:	Strong oxidizer - contact with other material may cause fire.

Suitable (and unsuitable) extinguishing media

Suitable extinguishing media:	Water spray, fog, CO2, dry chemical, or regular foam.
Unsuitable extinguishing media:	None known.
Specific hazards arising from the chemical:	Oxidizing Contact with combustible material may cause fire. Fire may produce irritating, corrosive and/or toxic gases.

Special protective equipment and precautions for firefighters

Special fire fighting procedures:	Move containers from fire area if you can do so without risk. Use water spray to keep fire-exposed containers cool. Cool containers exposed to flames with water until well after the fire is out.
Special protective equipment for fire-fighters:	Firefighters must use standard protective equipment including flame retardant coat, helmet with face shield, gloves, rubber boots, and in enclosed spaces, SCBA. Self-contained breathing apparatus and full protective clothing must be worn in case of fire.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures:	Keep unauthorized personnel away. ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). Use personal protective equipment. See Section 8 of the MSDS for Personal Protective Equipment. Ventilate closed spaces before entering them. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.

Methods and material for containment and cleaning up: Keep combustibles (wood, paper, oil, etc.) away from spilled material. Stop leak if possible without any risk. Do not absorb in sawdust or other combustible materials. Absorb spill with vermiculite or other inert material. Collect in a non-combustible container for prompt disposal. Clean surface thoroughly to remove residual contamination. Dike far ahead of larger spill for later recovery and disposal.

Notification Procedures: Dike for later disposal. Prevent entry into waterways, sewer, basements or confined areas. Stop the flow of material, if this is without risk. Inform authorities if large amounts are involved.

Environmental precautions: Do not contaminate water sources or sewer. Prevent further leakage or spillage if safe to do so. Avoid discharge into drains, water courses or onto the ground.

7. Handling and storage

Precautions for safe handling: Keep away from combustible material. Do not get in eyes, on skin, on clothing. Wash hands thoroughly after handling. Do not eat, drink or smoke when using the product. Do not taste or swallow. Never add water to acid! Never pour water into acid/base. Dilute by slowly pouring the product into water while stirring.

Conditions for safe storage, including any incompatibilities: Do not store in metal containers. Store away from heat and light. Keep away from combustible material. Keep containers closed when not in use. Store in a cool, dry place. Keep container in a well-ventilated place.

8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Chemical identity	Type	Exposure Limit values		Source
NITRIC ACID	TWA	2 ppm		US. ACGIH Threshold Limit Values (2011)
	STEL	4 ppm		US. ACGIH Threshold Limit Values (2011)
	STEL	4 ppm	10 mg/m3	US. NIOSH: Pocket Guide to Chemical Hazards (2010)
	REL	2 ppm	5 mg/m3	US. NIOSH: Pocket Guide to Chemical Hazards (2010)
	PEL	2 ppm	5 mg/m3	US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000) (02 2006)
	TWA	2 ppm	5 mg/m3	US. OSHA Table Z-1-A (29 CFR 1910.1000) (1989)
	STEL	4 ppm	10 mg/m3	US. OSHA Table Z-1-A (29 CFR 1910.1000) (1989)

Appropriate engineering controls No data available.

Individual protection measures, such as personal protective equipment

General information: Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. An eye wash and safety shower must be available in the immediate work area.

Eye/face protection: Wear safety glasses with side shields (or goggles) and a face shield.

Skin protection

Hand protection: Chemical resistant gloves

Other:	Wear suitable protective clothing.
Respiratory protection:	In case of inadequate ventilation use suitable respirator. Chemical respirator with acid gas cartridge.
Hygiene measures:	Provide eyewash station and safety shower. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing to remove contaminants. Discard contaminated footwear that cannot be cleaned.

9. Physical and chemical properties

Appearance

Physical state:	Liquid
Form:	Liquid
Color:	Colorless to slightly yellow
Odor:	Pungent
Odor threshold:	No data available.
pH:	1 (0.1 molar aqueous solution)
Melting point/freezing point:	-42 °C
Initial boiling point and boiling range:	122 °C
Flash Point:	Not applicable
Evaporation rate:	No data available.
Flammability (solid, gas):	No data available.
Upper/lower limit on flammability or explosive limits	
Flammability limit - upper (%):	No data available.
Flammability limit - lower (%):	No data available.
Explosive limit - upper (%):	No data available.
Explosive limit - lower (%):	No data available.
Vapor pressure:	6.4 kPa
Vapor density:	2.5
Relative density:	1.41 (20 °C)
Solubility(ies)	
Solubility in water:	Soluble
Solubility (other):	No data available.
Partition coefficient (n-octanol/water):	No data available.
Auto-ignition temperature:	No data available.
Decomposition temperature:	No data available.
Viscosity:	No data available.

10. Stability and reactivity

Reactivity:	Reacts violently with strong alkaline substances.
Chemical stability:	Material is stable under normal conditions.
Possibility of hazardous reactions:	Hazardous polymerization does not occur. Decomposes on heating.
Conditions to avoid:	Reacts violently with strong alkaline substances. Avoid contact with strong reducing agents. Excessive heat. Contact with incompatible materials.
Incompatible materials:	Alcohols. Reducing agents. Metals. Alkalies.
Hazardous decomposition products:	Nitrogen Oxides By heating and fire, corrosive vapors/gases may be formed.

11. Toxicological information

Information on likely routes of exposure

Ingestion: May cause burns of the gastrointestinal tract if swallowed.

Inhalation: May cause damage to mucous membranes in nose, throat, lungs and bronchial system.

Skin contact: Causes severe skin burns.

Eye contact: Causes serious eye damage.

Information on toxicological effects

Acute toxicity (list all possible routes of exposure)

Oral

Product: No data available.

Dermal

Product: No data available.

Inhalation

Product: No data available.

Specified substance(s):

NITRIC ACID LC 50 (Rat, 4 h): 65 mg/l

Repeated dose toxicity

Product: No data available.

Skin corrosion/irritation

Product: Causes severe skin burns.

Serious eye damage/eye irritation

Product: Causes serious eye damage.

Respiratory or skin sensitization

Product: Not a skin nor a respiratory sensitizer.

Carcinogenicity

Product: This substance has no evidence of carcinogenic properties.

IARC Monographs on the Evaluation of Carcinogenic Risks to Humans:
No carcinogenic components identified

US. National Toxicology Program (NTP) Report on Carcinogens:
No carcinogenic components identified

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050):
No carcinogenic components identified

Germ cell mutagenicity

In vitro
Product: No mutagenic components identified

In vivo
Product: No mutagenic components identified

Reproductive toxicity
Product: No components toxic to reproduction

Specific target organ toxicity - single exposure
Product: None known.

Specific target organ toxicity - repeated exposure
Product: None known.

Aspiration hazard
Product: Not classified

Other effects: None known.

12. Ecological information

Ecotoxicity:

Acute hazards to the aquatic environment:

Fish
Product: No data available.

Specified substance(s):
NITRIC ACID — LC 50 (Fish, 48 h): 100 - 330 mg/l Mortality

Aquatic invertebrates
Product: No data available.

Specified substance(s):
NITRIC ACID — LC 50 (Cockle (Cerastoderma edule), 48 h): 330 - 1,000 mg/l Mortality
LC 50 (Green or European shore crab (Carcinus maenas), 48 h): 180 mg/l Mortality

Chronic hazards to the aquatic environment:

Fish
Product: No data available.

Aquatic invertebrates
Product: No data available.

Toxicity to Aquatic Plants
Product: No data available.

Persistence and degradability

Biodegradation
Product: Expected to be readily biodegradable.

BOD/COD ratio
Product: No data available.

Bioaccumulative potential
Bioconcentration factor (BCF)
Product: No data available on bioaccumulation.

Partition coefficient n-octanol / water (log Kow)
Product: No data available.

Mobility in soil: The product is water soluble and may spread in water systems.

Other adverse effects: The product may affect the acidity (pH-factor) in water with risk of harmful effects to aquatic organisms.

13. Disposal considerations

Disposal instructions: Discharge, treatment, or disposal may be subject to national, state, or local laws.

Contaminated packaging: Since emptied containers retain product residue, follow label warnings even after container is emptied.

14. Transport information

DOT

UN number:	UN 2031
UN proper shipping name:	Nitric acid
Transport hazard class(es)	
Class(es):	8, 5.1
Label(s):	8, 5.1
Packing group:	II
Marine Pollutant:	No

IMDG

UN number:	UN 2031
UN proper shipping name:	NITRIC ACID
Transport hazard class(es)	
Class(es):	8, 5.1
Label(s):	8, 5.1
EmS No.:	F-A, S-Q
Packing group:	II
Marine Pollutant:	No

IATA

UN number:	UN 2031
Proper Shipping Name:	Nitric acid
Transport hazard class(es):	
Class(es):	8, 5.1
Label(s):	8, 5.1
Marine Pollutant:	No
Packing group:	II

15. Regulatory information

US federal regulations

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)
US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)
None present or none present in regulated quantities.

CERCLA Hazardous Substance List (40 CFR 302.4):
NITRIC ACID Reportable quantity: 1000 lbs.

Superfund amendments and reauthorization act of 1986 (SARA)

Hazard categories

X	Acute (Immediate)	X	Chronic (Delayed)	X	Fire		Reactive		Pressure Generating

SARA 302 Extremely hazardous substance

Chemical identity	RQ	Threshold Planning Quantity
NITRIC ACID	1000 lbs.	1000 lbs.

SARA 304 Emergency release notification

Chemical identity	RQ
NITRIC ACID	1000 lbs.

SARA 311/312 Hazardous chemical

Chemical identity	Threshold Planning Quantity
NITRIC ACID	500lbs

SARA 313 (TRI reporting)

Chemical identity	Reporting threshold for other users	Reporting threshold for manufacturing and processing
NITRIC ACID	10000 lbs	25000 lbs.

Clean Water Act Section 311 Hazardous Substances (40 CFR 117.3)

NITRIC ACID Reportable quantity: 1000 lbs.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130):

NITRIC ACID Threshold quantity: 15000 lbs

US state regulations

US. California Proposition 65

No ingredient regulated by CA Prop 65 present.

US. New Jersey Worker and Community Right-to-Know Act

NITRIC ACID Listed

US. Massachusetts RTK - Substance List

NITRIC ACID Listed

US. Pennsylvania RTK - Hazardous Substances

NITRIC ACID Listed

US. Rhode Island RTK

NITRIC ACID Listed

Inventory Status:

Australia AICS:	On or in compliance with the inventory
Canada DSL Inventory List:	On or in compliance with the inventory
EINECS, ELINCS or NLP:	On or in compliance with the inventory
Japan (ENCS) List:	On or in compliance with the inventory
China Inv. Existing Chemical Substances:	Not in compliance with the inventory.
Korea Existing Chemicals Inv. (KECI):	On or in compliance with the inventory
Canada NDSL Inventory:	Not in compliance with the inventory.
Philippines PICCS:	On or in compliance with the inventory
US TSCA Inventory:	On or in compliance with the inventory
New Zealand Inventory of Chemicals:	On or in compliance with the inventory
Japan ISHL Listing:	Not in compliance with the inventory.
Japan Pharmacopoeia Listing:	Not in compliance with the inventory.

16.Other information, including date of preparation or last revision

NFPA Hazard ID

Hazard rating: 0 - Minimal; 1 - Slight; 2 - Moderate; 3 - Serious; 4 - Severe
OXY: Oxidizer

Issue date:	06-04-2014
Revision date:	No data available.
Version #:	2.0
Further information:	No data available.

Disclaimer:

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ATTACHMENT 2

QUALITY ASSURANCE PROJECT PLAN

QUALITY ASSURANCE PROJECT PLAN

SOUTH HILL DUMP – SITE MANAGEMENT PLAN

This Site-specific quality assurance project plan (QAPjP) describes specific procedure and method variations to sections of the New York State Department of Environmental Conservation (NYSDEC) quality assurance project plan (QAPP) (MACTEC, June 2011). Variations include: monitoring well sampling protocol, purge water disposal, specifications for the analytical methods used for laboratory analysis of environmental samples, and sampling identification.

General Procedures and Practices. The general procedures used to conduct the Site Management Plan (SMP) scope of work at the South Hill Dump site will be taken from the following sections of the NYSDEC program QAPP:

Section 2.0	Program Organization and Responsibilities
Section 7.0	Analytical Program
Section 8.0	Data Reduction, Validation, and Reporting
Section 9.0	Internal Quality Control
Section 11.0	Preventive Maintenance
Section 12.0	Data Assessment
Section 13.0	Corrective Action
Section 14.0	Reports to Management

Field Procedures and Sampling. The following field sampling procedures set forth in the program QAPP will be used at the site:

QA/QC Procedures	Section 3.0
Decontamination	Subsection 4.3
Sample Collection and Handling	Sections 4.0 and 5.0
Sediment Sampling	Section 4.5.5
Surface Water Sampling	Section 4.5.4.1
Field Instrument Calibration	Section 6.0

The following variances to the above procedures are described in sections 1.0 to 1.3

1.0 Monitoring Well Sampling. Groundwater samples will be collected using a "no purge" sampling technique. The procedure for collecting these samples using the HydraSleeve sampler is included as Attachment 1.

1.1 Purge Water Disposal. Decontamination of equipment will follow procedures described in the QAPP except for disposal of purge water Purge water from groundwater sampling will be released on-Site to the ground surface in the area of well, so as to allow the liquids to infiltrate into the soil and not run off-Site. In the event that purge water exhibits visual or olfactory evidence of site-related contamination, fluids will be containerized for proper disposal.

1.2 Data Quality Objectives. Data Quality Objectives (DQOs) for the South Hill Dump site sampling activities are summarized in Table 1-1. DQOs are described in accordance with USEPA guidelines (USEPA, 1987) and the NYSDEC ASP (NYSDEC, 2005).

Analytical data requirements were established using the methods described in the ASP. Analytical methods to be used for laboratory analysis are presented in Table 1-2. Analytical Category B deliverables as described in the ASP will be provided by the laboratory. A Category A review will be conducted by MACTEC for each batch of groundwater, sediment, surface water, and leachate analytical data, and the data will be submitted to the NYSDEC as an EQuIS electronic data deliverable.

1.3 Sampling Identification. Sample identification will adhere to the Site's pre-designated monitoring location IDs.

REFERENCES

MACTEC, 2011. *Program Quality Assurance Program Plan*. Prepared for the New York State Department of Environmental Conservation, Albany, New York. June, 2011.

New York State Department of Environmental Conservation (NYSDEC), 2005. *"Analytical Services Protocols"*; 7/05Edition; July 2005.

United States Environmental Protection Agency (USEPA), 1987. *"Data Quality Objectives for Remedial Response Activities"*; Office of Emergency and Remedial Response and Office of Waste Programs Enforcement; Washington DC; EPA/540/G-87/003; March 1987.

Table 1-1

Analytical DQO Levels

Parameter	Use	Data Quality Level
Turbidity	Provides physical data on groundwater samples for use during sampling collection.	Level I (Field measurements)
PID screening	Provides qualitative real-time information on air quality in the breathing zone for health and safety decisions, and to identify potentially contaminated groundwater.	Level I (Field measurements)
VOCs, Metals, and PCBs	Provides analytical information to: 1) compare to standards and guidance values, 2) evaluate groundwater quality	Level III

Table 1-2

Summary of Analytical Methods

Media	Parameter	Method
Groundwater from Monitoring Wells	VOCs Metals	8260B 6010B
Surface Water, Sediment, and Leachate	VOCs Metals PCBs	8260B 6010B 8082

ATTACHMENT 1

HYDRASLEEVE SAMPLER STANDARD OPERATING PROCEEDURE

Groundwater sampling using HYDRASleeve™ samplers

This procedure is intended to describe the procedure for collection of representative groundwater samples using the HydraSleeve sampler. The HydraSleeve is classified as a no-purge (passive) grab sampling device designed to collect groundwater samples directly from the screened interval of a monitoring well without having to purge the well prior to sample collection. The Hydrasleeve can be used to collect representative groundwater samples for all analytes including; VOCs, SVOCs, metals, anions, dissolved gasses total dissolved solids radionuclides, PCBs and other compounds.

The sampling generally uses the following equipment/items:

- Well construction data, location map, and field data from the previous sampling event,
- Water level tape (0.01-ft accuracy),
- HydraSleeve samplers,
- Groundwater FDR,
- PID,
- PPE,
- Sample containers and cooler (provided by the laboratory),
- Ice for sample preservation, and
- Clean plastic sheeting, and miscellaneous supplies.

The HydraSleeve sampler consists of the following basic components;

- A suspension line or tether attached to a spring tip at the top of the sampler or directly to the sampler itself.
- A long (36 to 38 inches) flexible, 4-mil thick lay-flat polyethylene sample sleeve, sealed at the bottom and with a self-sealing reed type polyethylene check valve at the top.
- A reusable stainless steel weight with clip, which is attached to the bottom of the sample sleeve.
- A discharge tube that is used to puncture the sample sleeve after it is recovered from the well so the sample can be decanted into bottles.
- Just above the self-sealing check valve at the top of the sleeve are two holes which provide attachment points for the spring clip or suspension line. At the bottom of the sleeve are two holes which provide attachment points for the weight clip and weight.

HydraSleeve deployment

Before installing the HydraSleeve you will need to know the following;

- The inside diameter of the well.
- The length of the well screen.
- The water level in the well.
- The length and depth of the well screen.
- The total depth of the well.

HydraSleeve placement

The Hydrasleeve should be placed such that the stainless steel weight attached to the bottom of the sample sleeve is at the bottom of the well or within 6 inches of the bottom of the well.

Procedures for sampling with the HydraSleeve

- Collect well measurements including depth to water and depth to bottom of well.
- Assemble the HydraSleeve
- Remove HydraSleeve from its packing, unfold it and hold by its top.
- Crimp the top of the HydraSleeve by folding the hard polyethylene reinforcing strips at the holes.
- Attach the spring clip to the holes to insure the top remains open until the sampler is retrieved.
- Attach suspension line to spring clip. Alternatively if no spring clip is used attach line to one (not both) of the holes at the top of the HydraSleeve.
- Fold the flaps with the two holes at the bottom of the HydraSleeve together and slid the weight clip thru the holes.
- Attach a weight to the bottom of the weight clip to insure that the HydraSleeve will descend to the bottom of the well.
- Measure the suspension line so that the weight attached to the bottom of the HydraSleeve will be positioned at the bottom of the well screen.
- Using the suspension line carefully lower the Hydrasleeve to the desired sample position. Make sure that the HydraSleeve is not pulled upwards at any time during installation into the well. If the HydraSleeve is pulled upward at a rate of 0.5 feet/second the top check valve will open and water will enter the HydraSleeve prematurely.
- Secure the HydraSleeve sampler in place by tying off the suspension line at the top of the well.
- Allow the monitoring well to equilibrate following installation of the HydraSleeve. In many cases the well will equilibrate within a few hours but the HydraSleeve can be left in place indefinitely.

HydraSleeve recovery and sample collection.

- Access the monitoring well and secure the suspension line without moving HydraSleeve.
- Measure the water level.
- In on smooth motion pull the suspension line (and HydraSleeve) upwards for three to five feet at a rate of 1 foot per second or faster. The motion will open the top check valve and allow the HydraSleeve to fill (it should fill after being pulled up about 1 to 1.5 times the length of the HydraSleeve). When the HydraSleeve is full the top check valve will close. You should begin to feel the weight of the HydraSleeve on the suspension line after the valve closes and the full sampler begins displace water.
- Continue to pull the suspension line until the HydraSleeve is at the top of the well.
- Decant and discard the small volume of water trapped in the HydraSleeve above the check valve by turning the sleeve over.
- Remove the discharge tube from its packing sleeve.
- Hold the HydraSleeve at the check valve.
- Puncture the HydraSleeve just below the check valve with the pointed end of the discharge tube.
- Discharge water from the HydraSleeve through the discharge tube into sample containers. The discharge rate can be controlled by either raising the bottom of the HydraSleeve or by squeezing it like a tube of toothpaste.

Collection of Field Water Quality Parameters.

After sample collection, a turbidity sample will be collected and analyzed using a HACH 2100P (or similar). The field sampling form will be completed after each well is sampled, including sample date and time (time of retrieval from the well), well sampling sequence, types of sample bottles used, sample identification numbers, preservatives used, parameters requested for analysis, and field observations of the sampling event. Finally, replace the cap and lock the well.

Change	the last step in the decontamination procedure. Worker's canister is exchanged, new outer gloves and boot covers are donned, joints are taped, and worker returns to duty.
Station 5: Boot, Gloves and Outer Garment Removal	Boots, chemical resistant splash suit, and inner gloves are removed and deposited in separate containers lined with plastic.
Station 6: Face Piece Removal (Level C only)	Facepiece is removed. Avoid touching face with fingers. Facepiece is deposited on plastic sheet.
Station 7: Field Wash	Hands and face are thoroughly washed. Shower as soon as possible.

Site Communication: MACTEC field personnel should be communicating with the MACTEC Project Manager and or their direct report on a daily basis.

- ☒ Verbal
- ☒ Two-way radio
- ☒ Cellular telephone
- ☐ Hand signals
  - Hand gripping throat ---------- Out of air, can't breathe
  - Grip partner's wrist or both hands around waist ---------- Leave area immediately
  - Hands on top of head ---------- Need assistance
  - Thumbs up ---------- OK, I am all right, I understand
  - Thumbs down ---------- No, negative
- ☐ Horn
- ☐ Siren

EMERGENCY CONTACTS

NAME	TELEPHONE NUMBERS		DATE OF PRE-EMERGENCY NOTIFICATION (if applicable)
Fire Department:	911		
Primary Hospital: Cortland Regional Medical Center	(607) 756-3500		
Alternative Hospital: Cortland Convenient Care Center	(607) 758-7770		
WorkCare	(888) 449-7787		
Site Health And Safety Officer:	Office:	Home:	
Client Contact: **Dave Chiusano**	Office: 518-402-9814	Pager:	
Project Manager: **Mark Stelmack**	Office: 207-828-3592	Home:	
Eastern Group HSE Manager: Cindy Sundquist	Office: 207-828-3309 (w) 207-650-7593(c)	Home: 207-892-4402	
Police Department:	911		
OTHER: Ambulance	911		
EPA/DEP (if applicable):			

ATTACHMENT 3

FIELD SAMPLING PROTOCOLS TO AVOID CROSS-CONTAMINATION OF PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS)

FIELD SAMPLING PROTOCOLS TO AVOID CROSS-CONTAMINATION OF PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS)

1.0 PURPOSE

This Standard Operating Procedure (SOP) is to be used on New York State Department of Environmental Conservation (NYSDEC) project sites, in conjunction with the NYSDEC Engineering Services Contract Number D007619 Field Activities & Quality Assurance Program Plan (QAPP) prepared by MACTEC Engineering and Consulting, P.C. (MACTEC, 2011). The purpose of this SOP is to describe the procedures/considerations when collecting soil, sediment, surface water, and groundwater samples at potential per- and polyfluoroalkyl substances (PFAS) release areas. This SOP also describes a tiered approach that should be used to assist with field decisions. Sampling specific SOPs should also be reviewed prior to conducting field sampling activities at PFAS areas.

2.0 SCOPE

This procedure applies to all Amec Foster Wheeler Environment & Infrastructure, Inc. (Amec Foster Wheeler) personnel and subcontractors who collect or otherwise handle samples of soil, sediment, surface water, and groundwater for analysis of PFAS. This SOP should be reviewed by all on-site personnel prior to implementation of field activities.

3.0 REFERENCES

MACTEC, 2011. Field Activities & Quality Assurance Program Plan; Submitted to New York State Department of Environmental Protection; Submitted by MACTEC Engineering and Consulting, P.C. June.

NYSDEC, 2016. Collection of Groundwater Samples for Perfluorooctanoic Acid (PFOA) and Perfluorinated Compounds (PFCs) from Monitoring Wells- Sample Protocol. Revision 1.2 June 29, 2016

4.0 GENERAL

Given the low detection limits associated with laboratory PFAS analysis, and the many potential sources of trace levels of PFAS, field personnel are advised to act on the side of caution by strictly following the subject protocols, frequently replacing nitrile gloves, and rinsing field equipment to help mitigate the potential for false detections of PFAS. Specific items related to field sampling are discussed below.

5.0 PROCEDURES

This section contains both the responsibilities and procedures involved with field sampling for analysis of PFAS. Proper procedures are necessary to insure the quality and integrity of the samples. The details within this SOP should be used in conjunction with site-specific work plans. The site-specific work plans will generally provide the following information:

- Sample collection objectives;
- Locations to be sampled;
- Number and volume of samples to be collected at each location;
- Types of chemical analyses to be conducted for the samples;
- Specific quality control (QC) procedures, including type (MS/MSD, field duplicates, and blanks) and sampling required;
- Any additional sampling requirements or procedures beyond those covered in this SOP, as necessary; and,
- At a minimum, the procedures outlined in this SOP for field sampling will be followed.

5.1 RESPONSIBILITIES

Project Manager

The Project Manager shall provide the Quality Assurance Program Plan (QAPP)(MACTEC, 2011), and site-specific work plan to the Field Lead and Field Personnel, which shall include the sampling requirements for each investigation area. The Project Manager will detail deviations to the procedure provided in this SOP in the site-specific report.

Field Lead

The Field Lead shall ensure that samples are collected using procedures that are in accordance with the QAPP (MACTEC, 2011), site-specific work plans, and applicable SOPs. The Field Lead shall also be required to make rational and justifiable decisions when deviations from these procedures are necessary because of field conditions or unforeseen issues and report the deviations to the Project Manager.

Field Personnel

Field personnel assigned to sampling activities are responsible for completing their tasks according to specifications outlined in the QAPP (MACTEC, 2011), site-specific work plans,

applicable SOPs, and other appropriate procedures. Field personnel are responsible for reporting deviations from procedures to the Project Manager.

5.2 FIELD PROCEDURES/CONSIDERATIONS

The following are procedures/considerations to be made during field activities at potential PFAS release or sampling areas. A summary of the prohibited and acceptable items for PFAS investigation areas is included in Table 1. A checklist, provided as Attachment 1, shall be used by the Field Personnel daily prior to the commencement of fieldwork to ensure the field team is in compliance with this protocol.

Field Equipment

- **Do not use Teflon®-containing materials** (e.g., Teflon® tubing, bailers, tape, plumbing paste, or other Teflon® materials) since Teflon® contains fluorinated compounds.
- Sample containers and collected samples will be stored and shipped using dedicated coolers provided by the laboratory.
- Stainless steel, high-density polyethylene (HDPE), polypropylene, and silicon materials are acceptable for sampling. Samples should not be collected with tubing or stored in containers made of low-density polyethylene (LDPE) materials (fluorinated compounds are known to adsorb to LDPE). All sampling equipment components and sample containers should not come in contact with aluminum foil, LDPE, glass or polytetrafluoroethylene (PTFE, Teflon™) materials including sample bottle cap liners with a PTFE layer.
- Amec Foster Wheeler will use peristaltic pumps for groundwater sample collection at depths shallower than 25 feet. Amec Foster Wheeler will use ProActive SS Pumps with polyvinyl chloride (PVC) leads or Geotech SS Geosub pumps for groundwater sample collection at depths greater than 25 feet. These pumps are constructed with stainless steel and will minimize introductions of PFAS. However, for groundwater sample depths greater than 150 feet, a Grundfos RediFlo pump (or similar) may be used due to the pumping limitations of stainless steel pumps. PFAS-free bladder pumps may also be used for sampling. Whale® pumps can be used for well development, if needed, but should not be used for sampling, or left in the wells.
- When using liners to collect soil samples during direct-push technology or during conventional drilling and sampling methodologies, acetate liners are to be used.
- **Rite in the Rain products are the only waterproof field books that may be used**. To avoid plastic coating or glue materials, do not use other brands of waterproof field books. If Rite

in the Rain products are not available, field reports will be documented on loose paper secured on masonite or aluminum clipboards (i.e. plastic clipboards, binders, or spiral hard cover notebooks are not acceptable) using a pen or pencil.

- **Post-It Notes are not allowed** on project sites.
- Use ballpoint pens. Pens will be used when documenting field activities in the field log and on field forms as well as labeling sample containers and preparing the Chain of Custody.
- **Do not use chemical (blue) ice packs** during the sampling program. This includes the use of ice packs for the storage of food and/or samples.

Field Clothing and Personal Protective Equipment

- **Do not wear water resistant, waterproof, or stain-treated clothing** during the field program. Field clothing made of synthetic and natural fibers (preferably cotton) are acceptable. Field clothing should be laundered without the use of fabric softener. Preferably, field gear should be cotton construction and well laundered (i.e., washed a minimum of three times prior to use after purchase). New clothing may contain PFAS related treatments. **Do not use new clothing** while sampling or sample handling.
- **Do not wear clothing or boots containing Gore-Tex™** during the sampling program as it contains a PFAS membrane.
- Safety footwear will consist of steel-toed boots made with polyurethane and PVC, untreated leather boots, or well-worn leather boots. Newer leather boots may be worn if they are covered with polypropylene, polyethane, or PVC boot covers.
- Disposable nitrile gloves must be worn at all times. Further, a new pair of nitrile gloves shall be donned prior to the following activities at each sample location:
  - Decontamination of re-usable sampling equipment;
  - Prior to contact with sample bottles or water containers;
  - Insertion of anything into the well (e.g., HDPE tubing, HydraSleeve bailer, etc.);
  - Insertion of silicon tubing into the peristaltic pump;
  - Completion of monitor well purging, prior to sample collection;
  - Handling of any quality assurance/quality control samples including field blanks and equipment blanks; and,
  - After the handling of any non-dedicated sampling equipment, contact with non-decontaminated surfaces, or when judged necessary by field personnel.

Sample Containers

- Different laboratories may supply sample collection containers of varying sizes dependent on the type of media to be sampled (e.g., soil, groundwater, etc.). All samples should be collected in polypropylene or HDPE bottles. The screw cap will be made of polypropylene or HDPE and may be lined or unlined. However, if lined, the liner may not be made of Teflon® or contain PFAS.
- Container labels will be completed using pen after the caps have been placed back on each bottle.
- Glass sample containers are not to be used due to potential loss of analyte through adsorption.

Wet Weather

- Field sampling occurring during wet weather (e.g., rainfall and snowfall) should be conducted while wearing appropriate clothing that will not pose a risk for cross-contamination. Teams will avoid synthetic gear that has been treated with water-repellant finishes containing PFAS. Use rain gear made from polyurethane, vinyl, and wax or rubber-coated materials.
- Teams should consider the use of a gazebo tent, which can be erected overtop of the sample location and provide shelter from the rain. It should be noted that the canopy material is likely a treated surface and should be handled as such; therefore, gloves should be worn when setting up and moving the tent, changed immediately afterwards and further contact with the tent should be avoided until all sampling activities have been finished and the team is ready to move on to the next sample location.

Equipment Decontamination

- Field sampling equipment, including oil/water interface meters and water level indicators, and other downhole equipment used at each sample location, will require cleaning between uses. Alconox® and Liquinox® soap is acceptable for use since the Safety Data Sheets do not list fluoro-surfactants as an ingredient (do not use Liquinox® soap if also sampling for 1,4-dioxane). However, Decon 90 will not be used during decontamination activities. Water used for the final rinse during decontamination of sampling equipment will be laboratory certified “PFAS-free” water.
- For larger equipment (e.g., drill rig and large downhole drilling and sampling equipment), decontamination will be conducted with potable water using a high-pressure washer and then rinsed using potable water.

Groundwater Sampling

- At sites with dedicated sampling equipment installed in the wells that contains Teflon (e.g., tubing, pumps), this equipment should be removed from the wells and replaced with HDPE tubing and non-Teflon containing equipment, if possible. These wells will be re-developed by removing three well volumes of water, if possible, and letting the wells recover for at least 48 hours prior to sampling.
- At sites with dedicated sampling equipment installed in the wells that contain LDPE tubing, this tubing should be removed from the wells and replaced with HDPE tubing. These wells can be sampled immediately following replacement of tubing; however, attempts should be made to remove one well volume prior to sampling. For larger wells, with higher volumes of water, it may be preferable to redevelop the wells and remove one well volume with a higher volume pump. In such cases the wells should be allowed to recover for at least 48 hours prior to sampling.

Personnel Hygiene

- Field personnel will not use cosmetics, moisturizers, hand cream, or other related products as part of their personal cleaning/showering routine on the morning of a sampling event, unless the products are applied to a part of the body that will be coved by clothing. These products may contain surfactants and represent a potential source of PFAS.
- All clothing worn by sampling personnel must have been laundered multiple times.
- Many manufactured sunblock and insect repellants contain PFAS and should not be brought or used on-site. Sunblock and insect repellants that are used on-site should consist of 100% natural ingredients, unless previously vetted by the project chemist. A list of acceptable sunscreens and insect repellents is provided in Table 1.
- For washroom breaks, field personnel will leave the exclusion zone and then remove gloves and overalls. Field personnel should wash as normal with extra time for rinsing with water after soap use. When finished washing, the use of a mechanical dryer is preferred and the use of paper towel for drying is to be avoided (if possible).

Food Considerations

- No food or drink shall be brought on-site, with the exception of bottled water and hydration drinks (e.g., Gatorade® and Powerade®), which will only be allowed to be brought and consumed within the staging area.

Visitors

- Visitors to the investigation area are asked to remain outside of the exclusion zone during sampling activities.

6.0 TIERED APPROACH TO ASSIST WITH FIELD DECISIONS

In evaluating whether products contain PFAS and are suitable for use in the field, the tiered approach presented in Table 2 will be used to assist with field decisions. Any member of the field team should contact the Project Manager with questions.

Table 1. Summary of Prohibited and Acceptable Items for PFAS Sampling

Prohibited Items	Acceptable Items
Field Equipment	
Teflon® containing materials	High-density polyethylene (HDPE) materials
Storage of samples in containers made of LDPE materials	Acetate liners, HDPE bottles
Teflon® tubing	HDPE or silicon tubing
Waterproof field books not manufactured by Rite in the Rain	Rite in the Rain products or Loose paper (non-waterproof)
Plastic clipboards, binders, or spiral hard cover notebooks	Aluminum field clipboards or with Masonite
Sharpies®, if possible	Ballpoint pens
Post-It Notes	
Chemical (blue) ice packs	Regular ice
Excel Purity Paste TFW Multipurpose Thread Sealant Vibra-Tite Thread Sealant	Gasoils NT Non-PTFE Thread Sealant Bentonite
Equipment with Viton Components (need to be evaluated on a case by case basis, Viton contains PTFE, but may be acceptable if used in gaskets or O-rings that are sealed away and will not come into contact with sample or sampling equipment.)	
Field Clothing and PPE	
New clothing or water resistant, waterproof, or stain-treated clothing, clothing containing Gore-Tex™	Well-laundered clothing, defined as clothing that has been washed 6 or more times after purchase, made of synthetic or natural fibers (preferable cotton)
Clothing laundered using fabric softener	No fabric softener
Boots containing Gore-Tex™	Boots made with polyurethane and PVC, well-worn or untreated leather boots, leather boots with boot covers
	Reflective safety vests, Tyvek®, Cotton Clothing, synthetic under clothing, body braces
No cosmetics, moisturizers, hand cream, or other	**Sunscreens** - Alba Organics Natural Sunscreen, Yes To

related products as part of personal cleaning/showering routine on the morning of sampling, unless the products are applied to body parts that will be covered by clothing.	Cucumbers, Aubrey Organics, Jason Natural Sun Block, Kiss my face, Baby sunscreens that are "free" or "natural" **Insect Repellents** - Jason Natural Quit Bugging Me, Repel Lemon Eucalyptus Insect repellant, Herbal Armor, California Baby Natural Bug Spray, BabyGanics, Deep Woods Off **Sunscreen and insect repellant -** Avon Skin So Soft Bug Guard Plus – SPF 30 Lotion
Sample Containers	
LDPE or glass containers	HDPE or polypropylene
Teflon®-lined caps	Lined or unlined HDPE or polypropylene caps
Rain Events	
Waterproof or resistant rain gear	Polyurethane, vinyl, wax or rubber-coated rain gear. Gazebo tent that is only touched or moved prior to and following sampling activities
Equipment Decontamination	
Decon 90	Alconox® and/or Liquinox® (Do not use Liquinox® if also sampling for 1,4-dioxane).
Water from an on-site well	Potable water from municipal drinking water supply
Food Considerations	
All food and drink, with exceptions noted on the right	Bottled water and hydration drinks (i.e. Gatorade® and Powerade®) to be brought and consumed only in the staging area

Table 2. Tiered Approach

Tier and Description	Action
Tier 1: Products that *will come into direct contact* with field samples include, but are not limited to, drilling grease, sampling equipment, sample containers, and well construction materials	These products will undergo the greatest scrutiny and requires chemist's input to help evaluate the materials as a possible source of contamination[A] and as possible sampling or storage materials or both
Tier 2: Products that *will not come into direct contact* with samples, but could be *reasonably expected to contain PFAS*, such as waterproof or nonstick products	Project team/affected person can review the Safety Data Sheet (SDS)[B] and if it shows PFAS, product should not be used. If product SDS does not indicate PFAS, confirm with chemist before use
Tier 3: Products that *will not come into direct contact* with samples and are *not expected to contain PFAS*, such as ballpoint pens, zipper bags, and body braces	Project team/affected person can review SDS and if no PFAS, then appropriate to use

[A] Tier 1 products will undergo the closest scrutiny. It may be necessary to have Tier 1 products analyzed for PFAS to confirm that a specific batch or lot number does not contain PFAS. Alternate products will need to be evaluated/used if PFAS are identified in the product.

[B] SDS Check: To evaluate product SDS and/or manufacturing specs, check if the product contains anything with "fluoro" in the name or the acronyms TPE, FEP, ETFE, and/or PFA. If fluorinated compounds are not listed in the manufacturing specs and/or on the SDSs, product can be used.

Attachment 1
Daily PFAS Protocol Checklist

Date: _____ Installation Name: _____

Weather (*temp./precipitation*): _____ Investigation Area:_____

Field Clothing and PPE:

☐ Field crew in compliance with Tables 1 and 2 in SOP

☐ Field crew has not used fabric softener on clothing

☐ Field crew has not used cosmetics, moisturizers, hand cream, or other related products on exposed body parts this morning

☐ Field crew has not applied unacceptable sunscreen or insect repellant

Field Equipment:

☐ No Teflon® containing materials on-site

☐ All sample materials made from stainless steel, HDPE, acetate, silicon, or polypropylene

☐ No waterproof field books on-site other than Rite in the Rain products

☐ No plastic clipboards, binders, or spiral hard cover notebooks on-site

☐ No adhesives (Post-It Notes) on-site

☐ Coolers filled with regular ice only. No chemical (blue) ice packs in possession

Sample Containers:

☐ All sample containers made of HDPE or polypropylene. Samples are not stored in containers made of LDPE

☐ Caps are lined or unlined and made of HDPE or polypropylene

Wet Weather (as applicable):

☐ For personnel in direct contact with samples and/or sampling equipment, wet weather gear made of vinyl, polyurethane, PVC, wax or rubber- coated materials only

Equipment Decontamination:

☐ "PFAS-free" water on-site for decontamination of sample equipment

☐ Alconox and Liquinox to be used as decontamination materials (Do not use Liquinox if also sampling for 1,4-dioxane).

Food Considerations:

☐ No food or drink on-site with exception of bottled water and/or hydration drinks (e.g., Gatorade and Powerade) that is available for consumption only in the staging area

If any applicable boxes cannot be checked, the Field Manager shall describe the noncompliance issues below and work with field personnel to address noncompliance issues prior to commencement of that day's work. Corrective action shall include removal of noncompliance items from the investigation area or removal of worker offsite until in compliance. Repeated failure to comply with PFAS sample protocols will result in the permanent removal of worker(s) from the investigation area.

Describe the noncompliance issues (include personnel not in compliance) and action/outcome of noncompliance:

_____

_____

_____

Field Lead Name: _____

Field Lead Signature: _____ Time: _____

ATTACHMENT 4

FIELD DATA RECORDS

FIELD INSTRUMENTATION CALIBRATION RECORD

PROJECT NAME: _____ TASK NO: _____ DATE: _____
PROJECT NUMBER: _____ MACTEC CREW: _____
PROJECT LOCATION: _____ SAMPLER NAME: _____
WEATHER CONDITIONS (AM): _____ SAMPLER SIGNATURE: _____
WEATHER CONDITIONS (PM): _____ CHECKED BY: _____ DATE: _____

MULTI-PARAMETER WATER QUALITY METER

METER TYPE _____
MODEL NO. _____
UNIT ID NO. _____

AM CALIBRATION Start Time _____/End Time_____

POST CALIBRATION CHECK Start Time _____/End Time_____

	Units	Standard Value	Meter Value	*Acceptance Criteria (AM)	Standard Value	Meter Value	*Acceptance Criteria (PM)
pH (4)	SU	4.0		+/- 0.1 pH Units			
pH (7)	SU	7.0		+/- 0.1 pH Units	7.0		+/- 0.3 pH Units
pH (10)	SU	10.0		+/- 0.1 pH Units			
Redox	+/- mV	240		+/- 10 mV	240		+/- 10 mV
Conductivity	mS/cm	1.413		+/- 0.5 % of standard	1.413		+/- 5% of standard
DO (saturated)	%	100		+/- 2% of standard			
DO (saturated)	mg/L[1] (see Chart 1)			+/- 0.2 mg/L			+/- 0.5 mg/L of standard
DO (<0.1)	mg/L	<0.1		< 0.5 mg/L			
Temperature	°C						
Baro. Press.	mmHg						

TURBIDITY METER

METER TYPE _____
MODEL NO. _____
UNIT ID NO. _____

	Units	Standard Value	Meter Value	Standard Value	Meter Value	*Acceptance Criteria (PM)
<0.1 Standard	NTU	<0.1		<0.1		+/- 0.3 NTU of stan.
20 Standard	NTU	20		20		+/- 5% of standard
100 Standard	NTU	100		100		+/- 5% of standard
800 Standard	NTU	800		800		+/- 5% of standard

PHOTOIONIZATION DETECTOR

METER TYPE _____
MODEL NO. _____
UNIT ID NO. _____

Background	ppmv	<0.1		<0.1		within 5 ppmv of BG
Span Gas	ppmv	100		100		+/- 10% of standard

O_2-LEL 4 GAS METER

METER TYPE _____
MODEL NO. _____
UNIT ID NO. _____

Methane	%	50		50		+/- 10% of standard
O_2	%	20.9		20.9		+/- 10% of standard
H_2S	ppmv	25		25		+/- 10% of standard
CO	ppmv	50		50		+/- 10% of standard

OTHER METER

METER TYPE _____
MODEL NO. _____
UNIT ID NO. _____

See Notes Below for Additional Information

☐ Equipment calibrated within the Acceptance Criteria specified for each of the parameters listed above.
☐ Equipment (not) calibrated within the Acceptance Criteria specified for each of the parameters listed above**.

MATERIALS RECORD

Deionized Water Source: Portland FOS
Lot#/Date Produced: _____
Trip Blank Source: _____
Sample Preservatives Source: _____
Disposable Filter Type: 0.45µm cellulose
Calibration Fluids / Standard Source:
- DO Calibration Fluid (<0.1 mg/L) Portland FOS
- Other _____
- Other _____
- Other _____

	Cal. Standard Lot Number	Exp. Date
pH (4)		
pH (7)		
pH (10)		
ORP		
Conductivity		
<0.1 Turb. Stan.		
20 Turb. Stan.		
100 Turb. Stan.		
800 Turb. Stan.		
PID Span Gas		
O_2-LEL Span Gas		
Other		

NOTES:

* = Unless otherwise noted, calibration procedures and acceptance criteria are in general accordance with USEPA Region 1 SOPs for Field Instrument Calibration (EQASOP-FieldCalibrat) and Low Stress Purging and Sampling (EQASOP-GW001), each dated 1/19/2010. Additonal acceptance criteria obtained from instrument specific manufacturer recommendations.
** = If meter reading is not within acceptance criteria, clean/replace probe and re-calibrate, or use calibrated back-up meter if available. If project requirements necessitate use of the instrument, clearly document any deviations from acceptance criteria on all data sheets and log book entries.
1 = DO Saturated standard value is calculated based on Oxygen Solubility at Indicated Pressure Chart from the USEPA Region 1 SOP for Field Instrument Calibration (EQASOP-FieldCalibrat), dated 1/19/2010.

MACTEC
511 Congress Street, Portland Maine 04101

FIGURE 6.1
FIELD INSTRUMENT CALIBRATION RECORD
NYSDEC QUALITY ASSURANCE PROJECT PLAN

Groundwater Elevation Survey Field Data Record

South Hill Dump

Field Activity Plan - July 2017

Well ID	Casing Elevation (ft)	Riser Elevation (ft)	Ground Elevation (ft)	Total Depth of Well (ft, below measuring point)	Comments	Screen (ft, bgs)	Depth to Water (ft, below measuring point)	Groundwater Elevation (ft)
MW-1S	1670.85	1670.95	1668.10	17.9	2-inch Overburden	10-ft Screen (5'-15')		
MW-1B	1671.65	1671.35	1668.50	37.9	2-inch Bedrock	10-ft Screen (25'-35')		
MW-2B	1574.85	No Riser	1573.40	44.0	3-inch Open Hole Bedrock	Open from 31.5'-41.5'		
MW-2D	1576.30	1575.00	1572.00	27.0	2-inch Overburden	10-ft Screen (14'-24')		
MW-2S	1575.40	1575.45	1572.60	12.9	2-inchOverburden	5-ft Screen (5'-10')		
*MW-3BR	1562.61	No Riser	1559.83	43.9	3-inch Open Hole Bedrock	Open from 31'-41'		
*MW-3SR	1563.68	1563.04	1561.35	25.3	2-inch Overburden	5-ft Screen (19'-24')		
**MW-SR2	Flush-to-Ground	1565.76	1566.02	11.0	2-inch Overburden	5-ft Screen (6'-11')		
**MW-BR2	1565.25	No Riser	1565.61	26.0	4-inch Open Hole Bedrock	Open from 14'-26'		
MW-4B	1545.45	No Riser	1541.90	48.4	3-inch Open Hole Bedrock	Open from 36.6'-46.6'		
MW-4S	1545.45	1545.40	1542.60	18.8	2-inch Overburden	10-ft Screen (6'-16')		

All Data taken from "Bedrock Monitoring Well Construction Log 1997" Except where noted (* and **)
March/April 1997, SJB Services, Inc
*Monitoring Wells Installed October 2012 - Data taken from Boring/Well Development Logs
October 2012, SJB Services, Inc
** Monitoring Wells Installed June 2014 - Data taken from Well Construction Diagrams
June 2014, MACTEC Engineering and Consulting, P.C.
ft = Feet
bgs = below ground surface

Prepared by: BPW 1/21/2016
Checked by: HA1/22/2016

FIELD DATA RECORD - LOW FLOW GROUNDWATER SAMPLING

JOB NUMBER: 3617137309

PROJECT: NYSDEC South Hill Dump

FIELD SAMPLE NUMBER:

SITE ID: ##

SITE TYPE: WELL

DATE:

ACTIVITY: START END

SAMPLE TIME:

WATER LEVEL / PUMP SETTINGS

INITIAL DEPTH TO WATER: FT

FINAL DEPTH TO WATER: FT

DRAWDOWN VOLUME: GAL

(initial - final x 0.16 {2-inch} or x 0.65 {4-inch})

TOTAL VOL. PURGED: GAL

(purge volume (milliliters per minute) x time duration (minutes) x 0.00026 gal/milliliter)

MEASUREMENT POINT
- ☐ TOP OF WELL RISER
- ☐ TOP OF PROTECTIVE CASING

WELL DEPTH (TOR): FT

SCREEN LENGTH: FT

RATIO OF DRAWDOWN VOLUME TO TOTAL VOLUME PURGED:

PROTECTIVE CASING STICKUP (FROM GROUND): FT

PID AMBIENT AIR: PPM

PID WELL MOUTH: PPM

PRESSURE TO PUMP: PSI

REFILL SETTING:

CASING / WELL DIFFER.: FT

WELL DIAM.: IN

WELL INTERGRITY:

	YES	NO	N/A
CAP			
CASING			
LOCKED			
COLLAR			

DISCHARGE SETTING:

PURGE DATA

TIME	DEPTH TO WATER (ft)	PURGE RATE (ml/m)	TEMP. (deg. c) +/- 1.0	SPECIFIC CONDUCTANCE (mS/cm) +/- 3%	pH (units) +/- 0.1	DISS. O2 (mg/L) 10%	TURBIDITY (ntu)+/-10% <10	ORP (mv) +/- 10	COMMENTS

EQUIPMENT DOCUMENTATION

TYPE OF PUMP	TYPE OF TUBING	TYPE OF PUMP MATERIAL	TYPE OF BLADDER MATERIAL
☐ GEOPUMP (peristaltic)	☐ LOW DENSITY POLYETHYLENE	☐ STAINLESS STEEL	☐ TEFLON
☐ QED BLADDER	☐ OTHER _____	☐ OTHER _____	☐ OTHER _____

ANALYTICAL PARAMETERS

		METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	
☐	VOCs	USEPA - 8260B	HCl to pH <2	2 X 40 ml vial	☐	
☐	SVOCs	USEPA - 8270C	4 DEG. C	2 X 1L AG	☐	
☐	Specific Metals	USEPA 6010B/7470A/7141A	HNO3 to pH <2	500 ml poly	☐	
☐	Specific Metals (Dissolved)	USEPA 6010B/7470A/7141A	HNO3 to pH <2	500 ml poly	☐	Field Filtered
☐	Fluoride/Sulfate/Nitrate	USEPA -300	4 DEG. C	250 ml poly	☐	
☐	Hex Chrome (Cr+6)	7199	4 DEG. C	125 ml poly	☐	
☐	TPH	USEPA -8015	4 DEG. C	250 ml poly	☐	
☐	PCBs (low level)and/or Pesticides	USEPA - 8082/8081	4 DEG. C	2 X 1L AG	☐	
☐	Ammoniia	350.1	H2SO4	250 ml poly	☐	
X	Other - PFAS	USEPA - 537	4 DEG. C	250 ml HDPE	☐	

NOTES:

Specific Metals:
Arsenic, Barium, Cadmium, Chromium, Copper, Lead, Mercury, Manganese, Molybdenum, Nickel, Selenium

SIGNATURE: _____

LOCATION SKETCH

Field Data Record - HydraSleeve Sampling
South Hill Dump
Field Activity Plan - July 2017

Sampler Name:
Date HydraSleeves Deployed:
Date HydraSleeves Retrieved:

Sample Location	Sample I.D.	Sample Time	Water Level (Ft BTOR)	Turbidity (ntu)	Sample collected				Comments/Observations
					VOC (8260B)	Metals (6010B)	1,4-Dioxane (8260SIM)	Other	
MW-1S	MW-1S								
MW-1B	MW-1B								
MW-2S	MW-2S								
MW-2B	MW-2B								
MW-2D	MW-2D								
MW-3SR	MW-3SR								
MW-3BR	MW-3BR								
MW-3SR2	MW-3SR2								
MW-3BR2	MW-3BR2								
MW-4S	MW-4S								
MW-4B	MW-4B								

Notes:
Ft BTOR - feet below top of riser
ntu - nephlometric turbidity unit

Prepared by: RMB 5/11/17
Checked by:

SURFACE WATER AND SEDIMENT SAMPLING RECORD

MACTEC

511 Congress Street, Portland Maine 04101

PROJECT NAME		SAMPLE LOCATION	DATE
PROJECT NUMBER		START TIME	END TIME
SAMPLE ID	SAMPLE TIME	SITE NAME/NUMBER	PAGE OF

SURFACE WATER DATA

WATER DEPTH AT SAMPLE LOCATION _____ FT. DEPTH OF SAMPLE BELOW WATER SURFACE _____ FT. FLOW RATE _____ ML/MIN

WATER QUALITY PARAMETERS:

TEMPERATURE _____ °C
SPEC. COND. _____ mS/cm
PH _____ pH Units
ORP _____ mV
TURBIDITY _____ NTUs
DO _____ mg/L

☐ WINKLER METHOD
☐ DO PROBE

EQUIPMENT USED:

☐ BEAKER
☐ BOTTLE
☐ PACS BOMB
☐ PUMP _____
☐ FILTER
No. _____ Type: _____

☐ FIELD DUPLICATE COLLECTED
DUP. ID _____

TYPE OF SURFACE WATER:

☐ STREAM
☐ RIVER
☐ LAKE
☐ POND
☐ SEEP
☐ _____

FIELD SKETCH SHOWN/ATTACHED

☐ YES ☐ NO

DECON FLUIDS USED

☐ ALL USED
☐ LIQUINOX/DI H_2O SOLUTION
☐ DEIONIZED WATER
☐ POTABLE WATER
☐ NITRIC ACID
☐ HEXANE
☐ 25% METHANOL/75% ASTM TYPE II H_2O
☐ ETHYL ALCOHOL
☐ _____

SAMPLING EQUIPMENT

WATER QUALITY METER MODEL NO. _____ UNIT ID NO. _____
TURBIDITY METER MODEL NO. _____ UNIT ID NO. _____

SEDIMENT AMPLE INFORMATION

TYPE OF SAMPLE

☐ DISCRETE
☐ COMPOSITE

SAMPLE INTERVAL:

TOP _____
BOTTOM _____

COLLECTION EQUIPMENT

☐ HAND AUGER/CORER
☐ S.S. SPLIT BARREL
☐ ALUMINIUM PAN
☐ S.S. SHOVEL
☐ HAND SPOON/SPATULA
☐ S.S. BUCKET
☐ OTHER _____

DECON FLUIDS USED

☐ ALL USED
☐ LIQUINOX/DI H_2O SOLUTION
☐ DEIONIZED WATER
☐ POTABLE WATER
☐ NITRIC ACID
☐ HEXANE
☐ 25% METHANOL/75% ASTM TYPE II H_2O
☐ ETHYL ALCOHOL

QC SAMPLES

☐ DUPLICATE _____
☐ EQ BLK _____

TYPE OF MATERIAL:

☐ ORGANIC
☐ SAND
☐ GRAVEL
☐ CLAY
☐ FILL
☐ OTHER_____

MS/MSD:

☐ YES
☐ NO

SAMPLE OBSERVATIONS

ODOR _____
COLOR _____
OTHER _____
PID _____

FIELD SKETCH SHOWN/ATTACHED

☐ YES
☐ NO

ANALYTICAL PARAMETERS

	PARAMETER	METHOD NUMBER	PRESERVATION METHOD	VOLUME REQUIRED	SAMPLE COLLECTED	QC COLLECTED	SAMPLE BOTTLE ID NUMBERS
☐							
☐							
☐							
☐							
☐							
☐							
☐							
☐							
☐							

NOTES/SKETCH

Sampler Signature: Print Name:

Checked By: Date:

FIGURE 4.14
SURFACE WATER AND SEDIMENT SAMPLING RECORD
NYSDEC QUALITY ASSURANCE PROJECT PLAN

Well Inspection Checklist Field Data Record
South Hill Dump
Filed Activity Plan - July 2017

Inspected by:

Date:

Well ID	Measuring Point Elevation	Protective Casing Stickup (ft. AGS)	Protective Casing Stickup/Well Difference (ft.)	Depth to Water (ft. TOR)	Depth to BOW (ft. TOR)	Well ID Clearly Labeled (Y/N)	Well Lock/Cap (G/F/P)	Protective Casing (G/F/P)	Water in Annular Space (Y/N)	Concrete Pad (G/F/P)	Well Riser/Cap (G/F/P)	Well Obstruction (Y/N)	Comments
MW-1S	TOR	2.70	+0.11		17.9								
MW-1B	TOR	3.08	-0.24		37.9								
MW-2S	TOR	2.76	+0.08		12.9								
MW-2D	TOR	2.70	+0.13		27.0								
MW-2B	TOC	2.69	N/A		44.0								
MW-3SR	TOR	2.50	-0.63		25.3								
MW-3BR	TOC	2.76	N/A		43.9								
MW-3SR2	TOR	Flush	-0.21										
MW-3BR2	TOR	Flush	-0.40										
MW-4S	TOR	2.86	0.08		18.8								
MW-4B	TOC	3.30	N/A		48.4								

Notes:

G = Good	N = No	ft. = feet	AGS = Above ground surface
F = Fair	Y = Yes	in. = inches	TOR = Top of Riser
P = Poor	N/A = Not Applicable	BOW = bottom of well	TOC = Top of Casing

Prepared by: BPW 1/21/2016
Checked by:HA 1/22/2016

ATTACHMENT 5

EPA METHOD 537 - FIELD REAGENT BLANK COLLECTION

appropriate QC measures are documented demonstrating the CAL standard stability.

8. SAMPLE COLLECTION, PRESERVATION, AND STORAGE

8.1 SAMPLE BOTTLE PREPARATION

8.1.1 Samples must be collected in a 250-mL polypropylene bottle fitted with a polypropylene screw-cap.

8.1.2 The preservation reagent, listed in the table below, is added to each sample bottle as a solid prior to shipment to the field (or prior to sample collection).

Compound	Amount	Purpose
Trizma®	5.0 g/L	buffering reagent and removes free chlorine

8.2 SAMPLE COLLECTION

8.2.1 The sample handler must wash their hands before sampling and wear nitrile gloves while filling and sealing the sample bottles. PFAA contamination during sampling can occur from a number of common sources, such as food packaging and certain foods and beverages. Proper hand washing and wearing nitrile gloves will aid in minimizing this type of accidental contamination of the samples.

Method 537

8.2.2 Open the tap and allow the system to flush until the water temperature has stabilized (approximately 3 to 5 min). Collect samples from the flowing system.

8.2.3 Fill sample bottles, taking care not to flush out the sample preservation reagent. Samples do not need to be collected headspace free.

8.2.4 After collecting the sample, cap the bottle and agitate by hand until preservative is dissolved. Keep the sample sealed from time of collection until extraction.

8.3 FIELD REAGENT BLANKS (FRB)

8.3.1 A FRB must be handled along with each sample set. The sample set is composed of samples collected from the same sample site and at the same time. At the laboratory, fill the field blank sample bottle with reagent water and preservatives, seal, and ship to the sampling site along with the sample bottles. For each FRB shipped, an empty sample bottle (no preservatives) must also be shipped. At the sampling site, the sampler must open the shipped FRB and pour the preserved reagent water into the empty shipped sample bottle, seal and label this bottle as the FRB. The FRB is shipped back to the laboratory along with the samples and analyzed to ensure that PFAAs were not introduced into the sample during sample collection/handling.

8.3.2 The same batch of preservative must be used for the FRBs as for the field samples.

8.3.3 The reagent water used for the FRBs must be initially analyzed for method analytes as a LRB and must meet the LRB criteria in Section 9.3.1 prior to use. This requirement will ensure samples are not being discarded due to contaminated reagent water rather than contamination during sampling.

8.4 SAMPLE SHIPMENT AND STORAGE – Samples must be chilled during shipment and must not exceed 10 °C during the first 48 hours after collection. Sample temperature must be confirmed to be at or below 10 °C when the samples are received at the laboratory. Samples stored in the lab must be held at or below 6 °C until extraction, but should not be frozen.

NOTE: Samples that are significantly above 10° C, at the time of collection, may need to be iced or refrigerated for a period of time, in order to chill them prior to shipping. This will allow them to be shipped with sufficient ice to meet the above requirements.

8.5 SAMPLE AND EXTRACT HOLDING TIMES – Results of the sample storage stability study (Table 10) indicated that all compounds listed in this method have adequate stability for 14 days when collected, preserved, shipped and stored as described in Sections 8.1, 8.2, and 8.4. Therefore, water samples should be extracted as soon as possible but must be extracted within 14 days. Extracts must be stored at room temperature and analyzed within 28 days after extraction. The extract storage stability study data are presented in Table 11.

9. QUALITY CONTROL

9.1 QC requirements include the Initial Demonstration of Capability (IDC) and ongoing QC requirements that must be met when preparing and analyzing Field Samples. This section describes the QC parameters, their required frequencies, and the performance criteria that must be met in order to meet EPA quality objectives. The QC criteria discussed in the following sections are summarized in Tables 12 and 13. These QC requirements are considered the minimum acceptable QC criteria. Laboratories are encouraged to institute additional QC practices to meet their specific needs.

9.1.1 METHOD MODIFICATIONS – The analyst is permitted to modify LC columns, LC conditions, evaporation techniques, internal standards or surrogate standards, and MS and MS/MS conditions. Each time such method modifications are made, the analyst must repeat the procedures of the IDC. **Modifications to LC conditions should still produce conditions such that co-elution of the method analytes is minimized to reduce the probability of suppression/enhancement effects.**

ATTACHMENT 6

LABORATORY REPORTING LIMITS AND METHOD DETECTION LIMITS

TEST AMERICA LABORATORIES, INC. (TAL)
TARGET ANALYTES, REPORTING LIMITS (RLs), AND METHOD DETECTION LIMITS (MDLs)

Method Description	Method	Analyte Description	CAS Number	RL	MDL	Units
Water						
Volatile Organic Compounds (GC/MS)	8260C	1,1,1-Trichloroethane	71-55-6	1.00	0.820	ug/L
		1,1,2,2-Tetrachloroethane	79-34-5	1.00	0.210	ug/L
		1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	1.00	0.310	ug/L
		1,1,2-Trichloroethane	79-00-5	1.00	0.230	ug/L
		1,1-Dichloroethane	75-34-3	1.00	0.380	ug/L
		1,1-Dichloroethene	75-35-4	1.00	0.290	ug/L
		1,2,3-Trichlorobenzene	87-61-6	1.00	0.410	ug/L
		1,2,4-Trichlorobenzene	120-82-1	1.00	0.410	ug/L
		1,2-Dibromo-3-Chloropropane	96-12-8	1.00	0.390	ug/L
		1,2-Dibromoethane	106-93-4	1.00	0.730	ug/L
		1,2-Dichlorobenzene	95-50-1	1.00	0.790	ug/L
		1,2-Dichloroethane	107-06-2	1.00	0.210	ug/L
		1,2-Dichloropropane	78-87-5	1.00	0.720	ug/L
		1,3-Dichlorobenzene	541-73-1	1.00	0.780	ug/L
		1,4-Dichlorobenzene	106-46-7	1.00	0.840	ug/L
		1,4-Dioxane	123-91-1	40.0	9.32	ug/L
		2-Butanone (MEK)	78-93-3	10.0	1.32	ug/L
		2-Hexanone	591-78-6	5.00	1.24	ug/L
		4-Methyl-2-pentanone (MIBK)	108-10-1	5.00	2.10	ug/L
		Acetone	67-64-1	10.0	3.00	ug/L
		Benzene	71-43-2	1.00	0.410	ug/L
		Bromochloromethane	74-97-5	1.00	0.870	ug/L
		Bromodichloromethane	75-27-4	1.00	0.390	ug/L
		Bromoform	75-25-2	1.00	0.260	ug/L
		Bromomethane	74-83-9	1.00	0.690	ug/L
		Carbon disulfide	75-15-0	1.00	0.190	ug/L
		Carbon tetrachloride	56-23-5	1.00	0.270	ug/L
		Chlorobenzene	108-90-7	1.00	0.750	ug/L
		Chloroethane	75-00-3	1.00	0.320	ug/L
		Chloroform	67-66-3	1.00	0.340	ug/L
		Chloromethane	74-87-3	1.00	0.350	ug/L
		cis-1,2-Dichloroethene	156-59-2	1.00	0.810	ug/L
		cis-1,3-Dichloropropene	10061-01-5	1.00	0.360	ug/L
		Cyclohexane	110-82-7	1.00	0.180	ug/L
		Dibromochloromethane	124-48-1	1.00	0.320	ug/L
		Dichlorodifluoromethane	75-71-8	1.00	0.680	ug/L
		Ethylbenzene	100-41-4	1.00	0.740	ug/L
		Isopropylbenzene	98-82-8	1.00	0.790	ug/L
		Methyl acetate	79-20-9	2.50	1.30	ug/L
		Methyl tert-butyl ether	1634-04-4	1.00	0.160	ug/L

Prepared by: J. Stone (TAL)
Checked by: JAR 5/31/17

TEST AMERICA LABORATORIES, INC. (TAL)
TARGET ANALYTES, REPORTING LIMITS (RLs), AND METHOD DETECTION LIMITS (MDLs)

Method Description	Method	Analyte Description	CAS Number	RL	MDL	Units
Water						
Volatile Organic Compounds (GC/MS)	8260C	Methylcyclohexane	108-87-2	1.00	0.160	ug/L
		Methylene Chloride	75-09-2	1.00	0.440	ug/L
		Styrene	100-42-5	1.00	0.730	ug/L
		Tetrachloroethene	127-18-4	1.00	0.360	ug/L
		Toluene	108-88-3	1.00	0.510	ug/L
		trans-1,2-Dichloroethene	156-60-5	1.00	0.900	ug/L
		trans-1,3-Dichloropropene	10061-02-6	1.00	0.370	ug/L
		Trichloroethene	79-01-6	1.00	0.460	ug/L
		Trichlorofluoromethane	75-69-4	1.00	0.880	ug/L
		Vinyl chloride	75-01-4	1.00	0.900	ug/L
		Xylenes, Total	1330-20-7	2.00	0.660	ug/L
Metals (ICP)	6010C	Aluminum	7429-90-5	0.200	0.0600	mg/L
		Antimony	7440-36-0	0.0200	0.00679	mg/L
		Arsenic	7440-38-2	0.0150	0.00555	mg/L
		Barium	7440-39-3	0.00200	0.000700	mg/L
		Beryllium	7440-41-7	0.00200	0.000300	mg/L
		Cadmium	7440-43-9	0.00200	0.000500	mg/L
		Calcium	7440-70-2	0.500	0.100	mg/L
		Chromium	7440-47-3	0.00400	0.00100	mg/L
		Cobalt	7440-48-4	0.00400	0.000630	mg/L
		Copper	7440-50-8	0.0100	0.00160	mg/L
		Iron	7439-89-6	0.0500	0.0193	mg/L
		Lead	7439-92-1	0.0100	0.00300	mg/L
		Magnesium	7439-95-4	0.200	0.0434	mg/L
		Manganese	7439-96-5	0.00300	0.000400	mg/L
		Nickel	7440-02-0	0.0100	0.00126	mg/L
		Potassium	7440-09-7	0.500	0.100	mg/L
		Selenium	7782-49-2	0.0250	0.00870	mg/L
		Silver	7440-22-4	0.00600	0.00170	mg/L
		Sodium	7440-23-5	1.00	0.324	mg/L
		Thallium	7440-28-0	0.0200	0.0102	mg/L
		Vanadium	7440-62-2	0.00500	0.00150	mg/L
		Zinc	7440-66-6	0.0100	0.00150	mg/L
Volatile Organic Compounds (GC/MS)	8260C_SIM	1,4-Dioxane	123-91-1	0.400	0.200	ug/L
Perfluorinated Hydrocarbons	PFC_IDA	Perfluorobutanoic acid (PFBA)	375-22-4	2.00	0.458	ng/L
		Perfluoropentanoic acid (PFPeA)	2706-90-3	2.00	0.989	ng/L
		Perfluorohexanoic acid (PFHxA)	307-24-4	2.00	0.786	ng/L

Prepared by: J. Stone (TAL)
Checked by: JAR 5/31/17

TEST AMERICA LABORATORIES, INC. (TAL)
TARGET ANALYTES, REPORTING LIMITS (RLs), AND METHOD DETECTION LIMITS (MDLs)

Method Description	Method	Analyte Description	CAS Number	RL	MDL	Units
Water						
Perfluorinated Hydrocarbons	PFC_IDA	Perfluoroheptanoic acid (PFHpA)	375-85-9	2.00	0.802	ng/L
		Perfluorooctanoic acid (PFOA)	335-67-1	2.00	0.748	ng/L
		Perfluorononanoic acid (PFNA)	375-95-1	2.00	0.654	ng/L
		Perfluorodecanoic acid (PFDA)	335-76-2	2.00	0.440	ng/L
		Perfluoroundecanoic acid (PFUnA)	2058-94-8	2.00	0.748	ng/L
		Perfluorododecanoic acid (PFDoA)	307-55-1	2.00	0.584	ng/L
		Perfluorotridecanoic Acid (PFTriA)	72629-94-8	2.00	0.551	ng/L
		Perfluorotetradecanoic acid (PFTeA)	376-06-7	2.00	0.199	ng/L
		Perfluorobutanesulfonic acid (PFBS)	375-73-5	2.00	0.918	ng/L
		Perfluorohexanesulfonic acid (PFHxS)	355-46-4	2.00	0.870	ng/L
		Perfluoroheptanesulfonic Acid (PFHpS)	375-92-8	2.00	0.713	ng/L
		Perfluorooctanesulfonic acid (PFOS)	1763-23-1	2.00	1.28	ng/L
		Perfluorodecanesulfonic acid (PFDS)	335-77-3	2.00	1.21	ng/L
Soil/Sediment						
Metals (ICP)	6010C	Aluminum	7429-90-5	10.0	4.40	mg/Kg
		Antimony	7440-36-0	15.0	0.400	mg/Kg
		Arsenic	7440-38-2	2.00	0.400	mg/Kg
		Barium	7440-39-3	0.500	0.110	mg/Kg
		Beryllium	7440-41-7	0.200	0.0280	mg/Kg
		Cadmium	7440-43-9	0.200	0.0300	mg/Kg
		Calcium	7440-70-2	50.0	3.30	mg/Kg
		Chromium	7440-47-3	0.500	0.200	mg/Kg
		Cobalt	7440-48-4	0.500	0.0500	mg/Kg
		Copper	7440-50-8	1.00	0.210	mg/Kg
		Iron	7439-89-6	10.0	3.50	mg/Kg
		Lead	7439-92-1	1.00	0.240	mg/Kg
		Magnesium	7439-95-4	20.0	0.927	mg/Kg
		Manganese	7439-96-5	0.200	0.0320	mg/Kg
		Nickel	7440-02-0	5.00	0.230	mg/Kg
		Potassium	7440-09-7	30.0	20.0	mg/Kg
		Selenium	7782-49-2	4.00	0.400	mg/Kg
		Silver	7440-22-4	0.600	0.200	mg/Kg
		Sodium	7440-23-5	140	13.0	mg/Kg
		Thallium	7440-28-0	6.00	0.300	mg/Kg
		Vanadium	7440-62-2	0.500	0.110	mg/Kg
		Zinc	7440-66-6	2.00	0.640	mg/Kg
Volatile Organic Compounds (GC/MS)	8260C	1,1,1-Trichloroethane	71-55-6	5.00	0.363	ug/Kg
		1,1,2,2-Tetrachloroethane	79-34-5	5.00	0.811	ug/Kg

Prepared by: J. Stone (TAL)
Checked by: JAR 5/31/17

TEST AMERICA LABORATORIES, INC. (TAL)
TARGET ANALYTES, REPORTING LIMITS (RLs), AND METHOD DETECTION LIMITS (MDLs)

Method Description	Method	Analyte Description	CAS Number	RL	MDL	Units
Soil/Sediment						
Volatile Organic Compounds (GC/MS)	8260C	1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	5.00	1.14	ug/Kg
		1,1,2-Trichloroethane	79-00-5	5.00	0.650	ug/Kg
		1,1-Dichloroethane	75-34-3	5.00	0.610	ug/Kg
		1,1-Dichloroethene	75-35-4	5.00	0.612	ug/Kg
		1,2,3-Trichlorobenzene	87-61-6	5.00	0.531	ug/Kg
		1,2,4-Trichlorobenzene	120-82-1	5.00	0.304	ug/Kg
		1,2-Dibromo-3-Chloropropane	96-12-8	5.00	2.50	ug/Kg
		1,2-Dibromoethane	106-93-4	5.00	0.642	ug/Kg
		1,2-Dichlorobenzene	95-50-1	5.00	0.391	ug/Kg
		1,2-Dichloroethane	107-06-2	5.00	0.251	ug/Kg
		1,2-Dichloropropane	78-87-5	5.00	2.50	ug/Kg
		1,3-Dichlorobenzene	541-73-1	5.00	0.257	ug/Kg
		1,4-Dichlorobenzene	106-46-7	5.00	0.700	ug/Kg
		1,4-Dioxane	123-91-1	100	21.8	ug/Kg
		2-Butanone (MEK)	78-93-3	25.0	1.83	ug/Kg
		2-Hexanone	591-78-6	25.0	2.50	ug/Kg
		4-Methyl-2-pentanone (MIBK)	108-10-1	25.0	1.64	ug/Kg
		Acetone	67-64-1	25.0	4.21	ug/Kg
		Benzene	71-43-2	5.00	0.245	ug/Kg
		Bromochloromethane	74-97-5	5.00	0.361	ug/Kg
		Bromodichloromethane	75-27-4	5.00	0.670	ug/Kg
		Bromoform	75-25-2	5.00	2.50	ug/Kg
		Bromomethane	74-83-9	5.00	0.450	ug/Kg
		Carbon disulfide	75-15-0	5.00	2.50	ug/Kg
		Carbon tetrachloride	56-23-5	5.00	0.484	ug/Kg
		Chlorobenzene	108-90-7	5.00	0.660	ug/Kg
		Chloroethane	75-00-3	5.00	1.13	ug/Kg
		Chloroform	67-66-3	5.00	0.309	ug/Kg
		Chloromethane	74-87-3	5.00	0.302	ug/Kg
		cis-1,2-Dichloroethene	156-59-2	5.00	0.640	ug/Kg
		cis-1,3-Dichloropropene	10061-01-5	5.00	0.720	ug/Kg
		Cyclohexane	110-82-7	5.00	0.700	ug/Kg
		Dibromochloromethane	124-48-1	5.00	0.640	ug/Kg
		Dichlorodifluoromethane	75-71-8	5.00	0.413	ug/Kg
		Ethylbenzene	100-41-4	5.00	0.345	ug/Kg
		Isopropylbenzene	98-82-8	5.00	0.754	ug/Kg
		Methyl acetate	79-20-9	25.0	3.02	ug/Kg
		Methyl tert-butyl ether	1634-04-4	5.00	0.491	ug/Kg
		Methylcyclohexane	108-87-2	5.00	0.760	ug/Kg
		Methylene Chloride	75-09-2	5.00	2.30	ug/Kg

Prepared by: J. Stone (TAL)
Checked by: JAR 5/31/17

TEST AMERICA LABORATORIES, INC. (TAL)
TARGET ANALYTES, REPORTING LIMITS (RLs), AND METHOD DETECTION LIMITS (MDLs)

Method Description	Method	Analyte Description	CAS Number	RL	MDL	Units
Soil/Sediment						
Volatile Organic Compounds (GC/MS)	8260C	Styrene	100-42-5	5.00	0.250	ug/Kg
		Tetrachloroethene	127-18-4	5.00	0.671	ug/Kg
		Toluene	108-88-3	5.00	0.378	ug/Kg
		trans-1,2-Dichloroethene	156-60-5	5.00	0.516	ug/Kg
		trans-1,3-Dichloropropene	10061-02-6	5.00	2.20	ug/Kg
		Trichloroethene	79-01-6	5.00	1.10	ug/Kg
		Trichlorofluoromethane	75-69-4	5.00	0.473	ug/Kg
		Vinyl chloride	75-01-4	5.00	0.610	ug/Kg
		Xylenes, Total	1330-20-7	10.0	0.840	ug/Kg
Volatile Organic Compounds (GC/MS)	8260C	1,1,1-Trichloroethane	71-55-6	100	27.7	ug/Kg
(medium level)		1,1,2,2-Tetrachloroethane	79-34-5	100	16.2	ug/Kg
		1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	100	50.0	ug/Kg
		1,1,2-Trichloroethane	79-00-5	100	21.0	ug/Kg
		1,1-Dichloroethane	75-34-3	100	30.9	ug/Kg
		1,1-Dichloroethene	75-35-4	100	34.6	ug/Kg
		1,2,3-Trichlorobenzene	87-61-6	100	46.0	ug/Kg
		1,2,4-Trichlorobenzene	120-82-1	100	37.9	ug/Kg
		1,2-Dibromo-3-Chloropropane	96-12-8	100	50.0	ug/Kg
		1,2-Dibromoethane	106-93-4	100	17.5	ug/Kg
		1,2-Dichlorobenzene	95-50-1	100	25.5	ug/Kg
		1,2-Dichloroethane	107-06-2	100	40.9	ug/Kg
		1,2-Dichloropropane	78-87-5	100	16.2	ug/Kg
		1,3-Dichlorobenzene	541-73-1	100	26.7	ug/Kg
		1,4-Dichlorobenzene	106-46-7	100	14.0	ug/Kg
		1,4-Dioxane	123-91-1	1900	510	ug/Kg
		2-Butanone (MEK)	78-93-3	500	297	ug/Kg
		2-Hexanone	591-78-6	500	205	ug/Kg
		4-Methyl-2-pentanone (MIBK)	108-10-1	500	32.0	ug/Kg
		Acetone	67-64-1	500	411	ug/Kg
		Benzene	71-43-2	100	19.0	ug/Kg
		Bromochloromethane	74-97-5	100	36.1	ug/Kg
		Bromodichloromethane	75-27-4	100	20.0	ug/Kg
		Bromoform	75-25-2	100	50.0	ug/Kg
		Bromomethane	74-83-9	100	22.0	ug/Kg
		Carbon disulfide	75-15-0	100	45.5	ug/Kg
		Carbon tetrachloride	56-23-5	100	25.5	ug/Kg
		Chlorobenzene	108-90-7	100	13.2	ug/Kg
		Chloroethane	75-00-3	100	20.8	ug/Kg
		Chloroform	67-66-3	100	68.6	ug/Kg

Prepared by: J. Stone (TAL)
Checked by: JAR 5/31/17

TEST AMERICA LABORATORIES, INC. (TAL)
TARGET ANALYTES, REPORTING LIMITS (RLs), AND METHOD DETECTION LIMITS (MDLs)

Method Description	Method	Analyte Description	CAS Number	RL	MDL	Units
Soil/Sediment						
Volatile Organic Compounds (GC/MS)	8260C	Chloromethane	74-87-3	100	23.8	ug/Kg
(medium level)		cis-1,2-Dichloroethene	156-59-2	100	27.6	ug/Kg
		cis-1,3-Dichloropropene	10061-01-5	100	23.9	ug/Kg
		Cyclohexane	110-82-7	100	22.2	ug/Kg
		Dibromochloromethane	124-48-1	100	48.4	ug/Kg
		Dichlorodifluoromethane	75-71-8	100	43.6	ug/Kg
		Ethylbenzene	100-41-4	100	29.1	ug/Kg
		Isopropylbenzene	98-82-8	100	15.0	ug/Kg
		Methyl acetate	79-20-9	500	47.6	ug/Kg
		Methyl tert-butyl ether	1634-04-4	100	37.8	ug/Kg
		Methylcyclohexane	108-87-2	100	46.8	ug/Kg
		Methylene Chloride	75-09-2	100	19.8	ug/Kg
		Styrene	100-42-5	100	24.1	ug/Kg
		Tetrachloroethene	127-18-4	100	13.4	ug/Kg
		Toluene	108-88-3	100	26.8	ug/Kg
		trans-1,2-Dichloroethene	156-60-5	100	23.6	ug/Kg
		trans-1,3-Dichloropropene	10061-02-6	100	9.83	ug/Kg
		Trichloroethene	79-01-6	100	27.8	ug/Kg
		Trichlorofluoromethane	75-69-4	100	46.9	ug/Kg
		Vinyl chloride	75-01-4	100	33.5	ug/Kg
		Xylenes, Total	1330-20-7	200	55.4	ug/Kg
Polychlorinated Biphenyls (PCBs) by Gas Chromatography	8082A	PCB-1016	12674-11-2	0.250	0.0489	mg/Kg
		PCB-1221	11104-28-2	0.250	0.0489	mg/Kg
		PCB-1232	11141-16-5	0.250	0.0489	mg/Kg
		PCB-1242	53469-21-9	0.250	0.0489	mg/Kg
		PCB-1248	12672-29-6	0.250	0.0489	mg/Kg
		PCB-1254	11097-69-1	0.250	0.117	mg/Kg
		PCB-1260	11096-82-5	0.250	0.117	mg/Kg
		PCB-1262	37324-23-5	0.250	0.117	mg/Kg
		PCB-1268	11100-14-4	0.250	0.117	mg/Kg

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