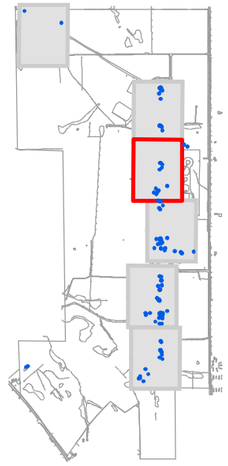


Sample Location
- Water
- Miniwell
- Boring
- PCB
- Sediment
- Test Pit
- Sewer Line
- Electric Line
- Former Tank Location

EBS Sample
- Water
- Manhole
- Miniwell
- Monitoring Well
- Boring
- MIP
- PCB
- Sediment
- Surface Soil Sample

EBS Analytical Results

RI/FS Analytical Results

*all results shown in parts per billion (ppb) unless noted

SCALE:

1 inch = 80 feet

0 25 50 100
Feet

DATE: MAY 2014

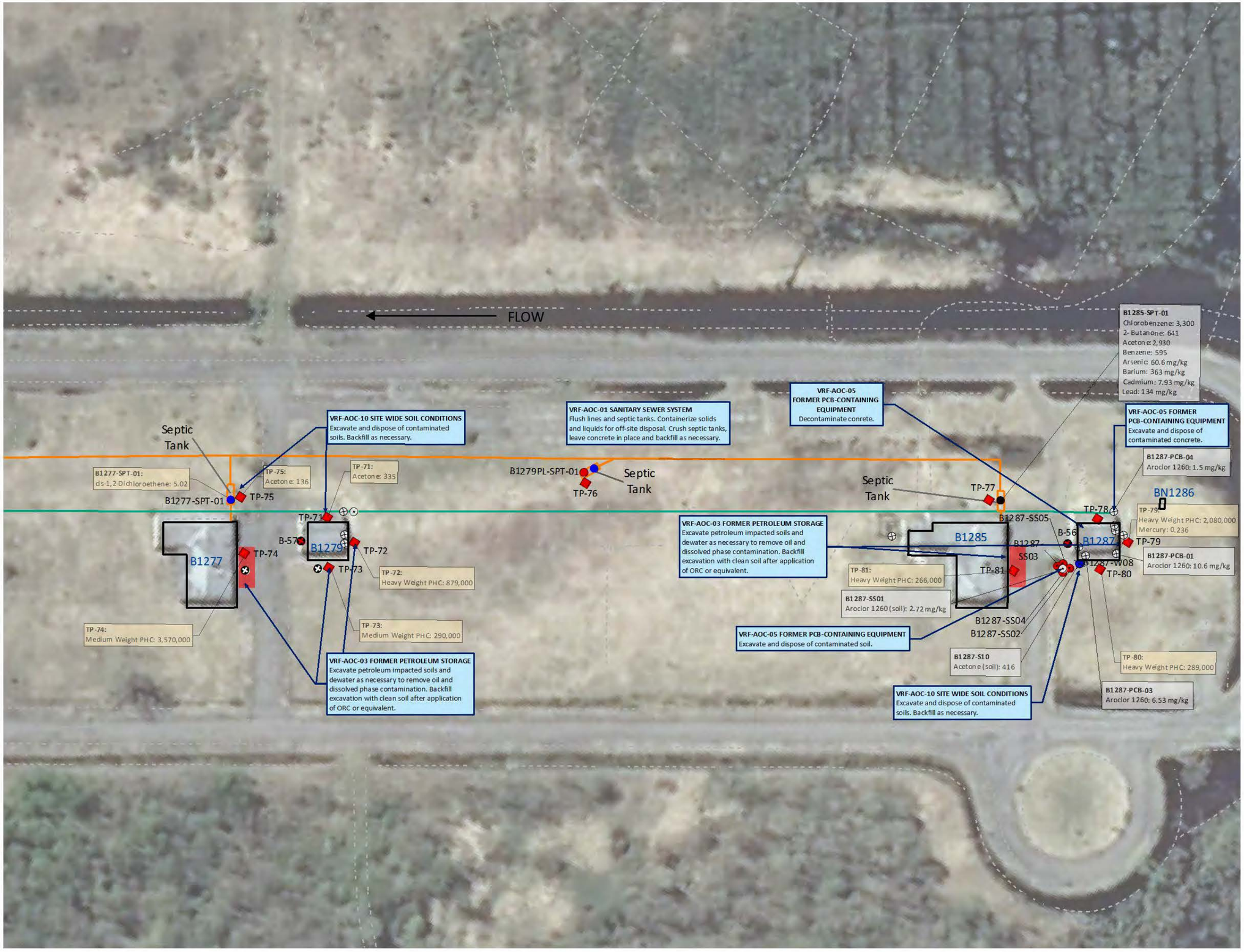
SCALE: 1 inch= 80 feet

DRAWN/CHECKED: SMK/LMN/GLA

DATA SOURCE:
NYS GIS CLEARINGHOUSE
ORTHOIMAGERY

FIGURE 6
VERONA RESEARCH FACILITY IRM WORK PLAN
VERONA, NY

Lu Engineers
ENVIRONMENTAL • TRANSPORTATION • CIVIL



Sample Location
- Water
- Boring
- Sediment
- Surface Soil
- Test Pit
- Sewer Line
- Electric Line
- Former Tank Location

EBS Sample
- Water
- Manhole
- Miniwell
- Monitoring Well
- Boring
- MIP
- PCB
- Sediment
- Surface Soil Sample

EBS Analytical Results

RI/FS Analytical Results

*all results shown in parts per billion (ppb) unless noted

SCALE:

1 inch = 80 feet

0 25 50 100

Feet

DATE: MAY 2014

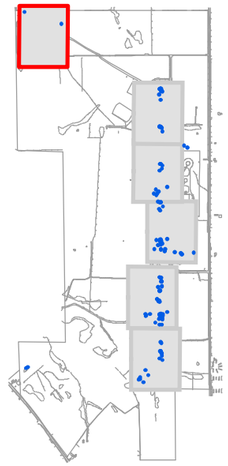
SCALE: 1 inch= 80 feet

DRAWN/CHECKED: SMK/LMN/GLA

DATA SOURCE:
NYS GIS CLEARINGHOUSE
ORTHOIMAGERY

FIGURE 7
VERONA RESEARCH FACILITY IRM WORK PLAN
VERONA, NY

Lu Engineers
ENVIRONMENTAL · TRANSPORTATION · CIVIL



Sample Location
- PCB
- Test Pit

EBS Sample
- Water
- Manhole
- Miniwell
- Monitoring Well
- Boring
- MIP
- PCB
- Sediment
- Surface Soil Sample

EBS Analytical Results

RI/FS Analytical Results

*all results shown in parts per billion (ppb) unless noted

SCALE:

1 inch = 100 feet

0 30 60 120

Feet

DATE: MAY 2014

SCALE: 1 inch= 80 feet

DRAWN/CHECKED: SMK/LMN/GLA

DATA SOURCE:
NYS GIS CLEARINGHOUSE
ORTHOIMAGERY

FIGURE 8

VERONA RESEARCH FACILITY IRM WORK PLAN

VERONA, NY

Lu Engineers

Appendix A – Site Specific Quality Assurance Project Plan

Verona Research Facility
Germany Road
Town of Verona
Oneida County, New York
NYSDEC Site No. 633046

Quality Assurance Project Plan

Prepared for:

Air Force Research Laboratory
Rome Research Site

150 Electronic Parkway
Rome, New York 13441

Prepared By:

Lu Engineers
ENVIRONMENTAL • TRANSPORTATION • CIVIL

175 Sully's Trail, Suite 202
Pittsford, New York 14534

August 2014

Verona Research Facility
Germany Road
Town of Verona
Oneida County, New York

Quality Assurance Project Plan

Prepared for:

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August 2014

Table of Contents

1.0 Introduction

This Quality Assurance Project Plan (QAPP) was prepared in accordance with the United States Environmental Protection Agency (US EPA) Region 2 "Guidance for the Development of Quality Assurance Project Plans for Environmental Monitoring Projects" (April 2004) and is subject to the review and approval by the New York State Department of Environmental Conservation (NYSDEC) for the Verona Research Facility (VRF), Town of Verona, New York. This QAPP provides quality assurance/quality control (QA/QC) protocols and guidance that are to be followed when implementing the Interim Remedial Measures (IRM) Work Plan for the Site to ensure that data of a known and acceptable precision and accuracy are generated.

The QAPP also provides a summary of the project, identifies personnel responsibilities, and provides procedures to be used during sampling of environmental media, other field activities, and the analytical laboratory testing of samples.

1.1 Project Scope and Objective

The QAPP applies to the aspects of the project associated with the collection of field data, laboratory testing of field samples and QA/QC samples, and evaluation of the quality of data that is generated. The scope of work is described in the IRM Work Plan Section 4.0. In general, the project objective is to use previously collected data to implement remedial measures in contaminated areas of the site.

2.0 Project Organization and Responsibility

Project organization and tentative personnel to implement the work are outlined in this section of the QAPP.

2.1 Rome Research Site Project Manager

Ms. Jacklyn Karam will serve as the Rome Research Site (RRS) Project Manager on this project. Ms. Karam will review project documents, assist in key decisions as they relate to various components of the project, etc., as deemed necessary by RRS.

2.2 Lu Engineers Organization

Lu Engineers will provide environmental consulting and engineering for the project. Additional information regarding key personnel is provided as follows, and resumes of key personnel are included in the IRM Work Plan - Attachment D.

Project Director and Manager

The project director and manager for this project will be Gregory Andrus, CHMM. As project director, Mr. Andrus will have overall responsibility for ensuring that the project meets client objectives and Lu Engineers' quality standards. In addition, the project director will be responsible for technical quality control and project oversight and will provide the project manager with access to upper management.

As project manager, Mr. Andrus will be responsible for implementing the project and will have the authority to commit the resources necessary to meet project objectives and requirements. The project manager's primary function is to ensure that technical, financial, and scheduling objectives are achieved. The project manager will provide the major point of contact and control for matters concerning the project.

Quality Assurance Officer (QAO)

The QA officer responsible for QA/QC on this project is Steven A. Campbell. The QAO may conduct audits of the operations at the Site to ensure that work is being performed in accordance with the QAPP.

Technical Staff

The technical staff (team members) for this project will be drawn from Lu Engineers pool of resources. The technical team staff will be utilized to gather and analyze data and to prepare various task reports and support materials. All of the designated technical team members are experienced professionals who possess the degree of specialization, training, and technical competence required to effectively and efficiently perform the required work.

2.3 Analytical Laboratory

Paradigm Environmental Services Inc. of Rochester, New York will provide analytical services for the project. Paradigm is a New York State Department of Health (NYSDOH) Environmental Laboratory Accreditation Program (ELAP) Contract Laboratory Protocol (CLP)-certified laboratory (ELAP ID 10958). A copy of Paradigm's Statement of Qualifications is available upon request.

The laboratory Project Manager for this project is Marshall Shannon.

The laboratory QA Manager is Bruce Hoogester.

2.4 Data Validation Staff

All environmental data will be validated in accordance with the USEPA Region 2, Data Validation SOPs for SW-846 methods. The third party data validation staff is to be determined.

If necessary, data validation will include technical specialists who remain independent of the laboratory and project management. The staff will independently validate analytical data to assess and summarize their accuracy, precision, and reliability and determine their usability. The staff will also perform audits and document the historical record of project activities, including any factors affecting data usability, such as data discrepancies and deviations from standard practices.

3.0 Quality Assurance/Quality Control

As part of this QAPP, QA/QC protocol and procedures have been developed and are described below. The objective of the QA/QC protocol and procedures is to ensure that the information, data, and decisions associated with this project are technically sound and properly documented. These QA/QC protocol and procedures will be modified in supplemental work plans when deemed appropriate.

3.1 Operation and Calibration of On-Site Monitoring Equipment

The on-Site monitoring equipment includes volatile organic compound (VOC) monitors, particulate monitors, electronic water level indicators, water quality meters, and Global Positioning System (GPS) units. Operation and calibration of monitoring equipment anticipated for use during the project are discussed below.

3.1.1 VOC Monitoring Equipment

Real-time monitoring for VOCs will be conducted to evaluate the nature and extent of petroleum discharges at the Site and to monitor worker breathing zone air as noted in the Health and Safety Plan (HASP). The primary field instrument for monitoring VOCs will be a photoionization detector (PID). It is anticipated that a MiniRAE 3000 PID equipped with a 10.6 eV lamp will be used during this project. An accredited firm/testing laboratory will calibrate the equipment on a yearly basis. During fieldwork, the PID will be calibrated on a daily basis in accordance with the manufacturer's specifications. Isobutylene gas will be used to calibrate the PID prior to use and as necessary during fieldwork. Daily PID calibrations will be recorded in the field logbook.

3.1.2 Miscellaneous Field Monitoring Equipment

Several other types of field monitoring equipment will be used during the project, including:

- A TSI Dustrak Aerosol Monitor Model 8520 or equivalent will also be used continuously during all intrusive work activities to measure airborne particulate levels.

These meters will be calibrated, operated, and maintained in accordance with the manufacturer's recommendations.

3.2 Confirmatory Soil Sampling

Confirmatory samples will be collected to demonstrate effective removal of impacted soil, sludge, concrete and dewatered groundwater. Confirmatory sampling will occur as deemed appropriate by the project manager (including but not limited to excavation sidewall and floor samples and geoprobe samples). All confirmatory samples will be collected in accordance with DER-10.

Additional samples will be collected from staged soil piles to determine on-Site soil re-use applicability. Grab and composite samples will be collected in accordance with DER-10 Section 5.4(e) based on the total quantity of staged soil.

Confirmatory samples will be collected with excavators from open excavations and to monitor in-situ remedial techniques.

Confirmatory soil samples will be analyzed for the following parameters: VOCs, SVOCs, metals and PCBs.

3.3 Dewatering Samples

Dewatered groundwater will be stored in frac tanks on-Site, sampled for waste characterization parameters, treated and discharged on Site.

3.4 General Soil Screening and Logging

During subsurface investigation, a Lu Engineers field team member will document visual observations, screen the soils with a PID, collect selected samples for laboratory analysis, photograph the field work, and prepare the appropriate field logs to document pertinent information. Pertinent information will be recorded on test pit logs and boring/well logs, and will include:

- Date, location identification, and project identification;
- Name of individual completing the log;
- Name of contractor;
- Equipment make and model, and auger size;
- Drilling methods used;
- Depths recorded in feet and fractions thereof referenced to ground surface;
- Standard penetration test (American Standards Testing Materials (ASTM) D-1586) blow counts;
- Sample depth interval and % recovered;
- Description of soil type using the Unified Soil Classification System or New York State Department of Transportation (NYSDOT) Soil Control Procedure STP-2 “An Engineering Description of Soils, Visual-Manual Procedure”;
- Depth of water encountered;

- Well specifications (materials, screened interval, etc.); and
- PID screening results of soil samples.

Logs for wells advanced into bedrock will also include pertinent information pertaining to the following characteristic noted on the bedrock cores:

- Bedrock type and lithology;
- Core Recovery Calculations and Rock Quality Determinations (RQDs);
- Bedrock field strength, color, and texture;
- Bedrock degree of decomposition, weathering, and disintegration;
- Bedrock fracture types (i.e., vertical, lateral, diagonal, mechanical), density, and fracture infilling; and
- The anticipated formation name.

3.5 Installation and Development of Additional Monitoring Wells

Using a rotary drill rig, additional and/or replacement overburden monitoring wells will be installed following the completion of the each IRM and Site restoration activities as previously described. The actual number of wells and locations are subject to change based on field conditions encountered and input from the AFRL and NYSDEC.

The additional monitoring wells will be installed utilizing a two-inch inside diameter, Schedule 40 PVC casing and screen materials. A No. 10 slot screen will be attached to a solid PVC riser casing with a PVC cap that will extend from the top of the screened section to approximately the ground surface. The anticipated screen length will be 10 feet. The actual length of the well screen may vary due to the encountered field conditions.

The annulus around the collection sump and well screen will be filled with a washed and graded silica sand pack that will be placed to at least two feet above the top of the screen interval. A minimum two-foot thick bentonite seal will be placed above the sand pack and hydrated with water. Following hydration of the bentonite, the remaining annulus will be filled with cement/bentonite grout consisting of approximately 96% Portland type 1 (or similar) cement to 4% granular bentonite mixture and water. The cement/bentonite grout will be tremied into the well annulus to approximately one foot below grade, as necessary. Wells will be completed with lockable protective steel covers.

3.6 Well Development

After completion of the wells, but not sooner than 48-hours after grouting is completed, development will be accomplished using submersible pumps. No dispersing agents, acids, disinfectants, or other additives will be used during development, nor will they be introduced into the well at any other time. During development, water will be removed throughout the entire water column by periodically lowering and raising the pump intake.

Well development will consist of gentle surging followed by pumping the well to remove sediments from the well screen and surrounding formation. In a case where considerable drill water is lost to the formation during drilling, an attempt to remove a volume of water greater than the volume lost will be made. If this is not feasible, a greater amount of time between development and groundwater sampling will be allotted.

The development process will continue until clarity (goal of <50 NTUs) of the discharge is achieved, the well is purged dry repeatedly, or for a maximum of two hours.

The well development procedure is listed below:

- Obtain pre-development static water level and oil/water interface reading for presence of DNAPL using a Heron Model HO1.L oil/water interface probe or similar instrument;
- Calculate water/sediment volume in the well;
- Obtain initial field water quality measurements (e.g., pH, specific conductivity, turbidity, temperature, and PID readings). The pH, specific conductivity, turbidity and temperature readings will be obtained using YSI Quattro Pro water quality meter (or similar equipment);
- Select development method and set up equipment depending on method used;
- Alternate water agitation methods (e.g., moving a bailer or pump tubing up and down inside the screened interval) and water removal methods (e.g., pumping or bailing) in order to suspend and remove solids from the well;
- Obtain field water quality measurements for every two to five gallons of water removed. Record water quantities and rates removed;
- Stop development when the following water quality criteria are met and at least 10 well volumes have been removed;
    - Water is clear and free of sediment and turbidity is less than 50 nephelometric turbidity units (NTUs);
    - pH is ±0.1 standard unit between readings;
    - Specific conductivity is ±3% between readings, and;
    - Temperature is ±10% between readings.
- Obtain post-development water level readings; and
- Document development procedures, measurements, quantities, etc.

Pertinent information for each well will be recorded on well development logs.

3.7 Low-Flow Groundwater Purging and Sampling

Prior to purging and sampling, static water level measurements will be taken from each well using a Solinst water level meter, or similar instrument. The presence and thickness of any light non-aqueous phase liquids (LNAPL) will be noted in the field logbook.

A portable peristaltic pump (i.e., Geopump) connected to new disposable polyethylene tubing will be used for collection of groundwater samples. The tubing will be lowered into the well and positioned at or slightly above the mid-point of the well screen. Care will be taken to install and lower the tubing slowly in order to minimize disturbance of the water column.

A pumping rate of less than 500 ml/min will be selected. The water level in the well will be measured and the pump rate will be adjusted until the drawdown is stabilized.
The water level in the well will be measured periodically using an electronic water level meter to ensure optimum flow rate for purging and sampling.

When the water level in the well has stabilized (i.e., goal of <0.3 feet of drawdown once stabilized), water quality parameters will be monitored at a frequency of 3-5 minutes with a YSI Professional Plus (or equivalent) water quality meter using an in-line flow-through cell. Turbidity will be measured with a LaMotte 2020e (or equivalent) turbidity meter. Water quality indicator parameters will be considered stabilized after three consecutive readings of each of the following parameters are achieved:

- pH ($\pm$ 0.1)
- specific conductance ($\pm$ 3%)
- dissolved oxygen ($\pm$ 10%)
- oxidation-reduction potential ($\pm$ 10 mV)
- temperature ($\pm$ 10%)
- turbidity ($\pm$ 10%, when turbidity is greater than 10 NTUs)

Following stabilization of water quality parameters, the flow-through cell will be disconnected and a groundwater sample will be collected from the tubing. The pumping rate during sampling will remain at the established purge rate or it may be adjusted downward to minimize aeration. A pumping rate below 250 ml/min will be used when collecting VOC samples.

Field observations, water quality parameters, and other pertinent information obtained during sampling will be recorded on Low-Flow Groundwater Sampling Field Records.

3.8 Field QC Samples

Various types of field QC samples are used to check the cleanliness and effectiveness of field handling methods. They are analyzed in the laboratory as samples, and their purpose is to assess the sampling and transport procedures as possible sources of sample contamination and document overall sampling and analytical precision.

- **Field Equipment/Rinseate Blanks** are blank samples designed to demonstrate that sampling equipment has been properly prepared and cleaned before field use and that cleaning procedures between samples are sufficient to minimize cross-contamination. Rinseate blanks are prepared by passing analyte-free water over sampling equipment and analyzing the samples for all applicable parameters. If a sampling team is familiar with a particular site, its members may be able to predict which areas or samples are likely to have the highest concentration of contaminants. Unless other constraints apply, these samples should be taken last to avoid excessive contamination of sampling equipment. Rinseate blanks are not required if dedicated sampling equipment is used for sample collection.
- **Field Duplicates** consist of a set of two (2) samples collected independently at a sampling location during a single sampling event. Field duplicates can be sent to the laboratory so that they are indistinguishable from other analytical samples and personnel performing the analysis are not able to determine which of the samples field duplicates are. Field duplicates are designed to assess the consistency of the overall sampling and analytical system.

Field QC samples and the frequency of analysis for this project are summarized in Table 1.

4.0 Equipment Decontamination Procedures

All decontamination will be performed in accordance with NYSDEC-approved decontamination procedures. Sampling methods and equipment have been chosen to minimize decontamination requirements and prevent the possibility of cross-contamination.

Split-spoons, other non-disposable sampling equipment, and stainless steel spoons will be decontaminated using the following procedure:

- Alconox/tap water wash
- Tap water rinse
- Deionized/distilled water rinse
- Air dry

During periods of transportation and non-use, all decontaminated sampling equipment should be wrapped in aluminum foil.

One field rinseate blank will be collected for each type of equipment used each day a decontamination event is carried out.

If necessary, a temporary decontamination pad will be established in a secure area on-site using 6-mil polyethylene sheeting. The equipment and associated tooling will be decontaminated using steam-cleaning methods at the designated location. Fluids generated during decontamination will be collected in the plastic-lined decontamination pad. All decontamination wastes will be transferred into drums or an on-site holding tank for appropriate staging and disposal. The RRS contractor/representative will be responsible for proper staging and disposal of all investigation-derived wastes. Final disposal of soils and water will be dependent on the results of the soil and groundwater analyses to be conducted during this investigation.

5.0 Sample Handling and Custody Requirements

This section describes procedures for sample handling and chain-of-custody to be followed by Lu Engineers sampling personnel and the analytical laboratory. The purpose of these procedures is to ensure that the integrity of the samples is maintained during their collection, transportation, storage, and analysis. All chain-of-custody requirements comply with SOPs (Standard operating procedures) indicated in EPA sample-handling protocols, described in the EPA QAPP guidance and Contract Laboratory Protocols.

Sample identification documents will be carefully prepared so that sample identification and chain-of-custody can be maintained and sample disposition controlled. Sample identification documents include field notebooks, sample labels, custody seals, chain-of-custody records, and laboratory sample log-in and tracking forms.

The primary objective of the chain-of-custody procedures is to provide an accurate written record that can be used to trace the possession and handling of a sample from the moment of its collection through it analyses. A sample is in custody if it is:

- In someone's physical possession;
- In someone's view;
- Locked up; or
- Kept in a secured area that is restricted to authorized personnel.

5.1 Sample Containers and Preservation

New laboratory-grade sample containers obtained from a reliable supplier will be provided by the analytical laboratory. All containers provided by the laboratory are pre-cleaned (Level 1), with Certificates of Analysis available for each bottle type. Certifications of Analysis provided by the vendor are kept on file by the laboratory.

All samples will be stored on ice pending delivery to the laboratory. A list of preservatives and holding times for each type of analysis is included in the following table.

Table 5.1
Sample Preservation and Holding Times

Sample Matrix	Analysis	Container Type and Size	Preservation	Holding Time
Soil and Sediment	VOC	2-4 oz. wide mouth glass jar with Teflon-lined cap	Cool to 4°C; minimize headspace	14 days
	SVOC	2-4 oz. amber wide mouth glass jar with Teflon-lined cap	Cool to 4°C	14 days
	Metals	8 oz. glass	Cool to 4°C	6 months
	PCBs	8 oz. amber glass jar with Teflon-lined cap	Cool to 4°C	14 days
	Pesticides	8 oz. amber glass jar with Teflon-lined cap	Cool to 4°C	14 days
	Total Petroleum Hydrocarbon	4 oz. wide mouth glass jar with Teflon-lined cap	None	14 days
PCB samples	PCB	Concrete chip, wipe, or bulk sample	Cool to 4°C	40 Days
Groundwater and water	VOC	3 - 40-ml.glass vial with Teflon-lined cap	Cool to 4°C; minimize headspace	14 days
	Metals Mercury	40-ml. polyethylene or glass	HNO_3 to a pH <2	6 months 28 Days
	PCBs	2 - ½ L Amber Glass Jars	Cool to 4°C	7 days
Waste samples	TCLP- metals Mercury Cyanide	1 L polyethylene or glass jar	Cool to 4°C; HNO_3 to pH<2	6 months 28 Days 14 Days
	TCLP- VOC	3 - 40-ml.glass vial with Teflon-lined cap	Cool to 4°C	14 days
	TCLP- SVOC	2 - ½ L Amber Glass Jars with Teflon-lined cap	Cool to 4°C	14 days

* Holding times are based on verified time of sample receipt

Sample preservation will be verified at the lab just prior to extraction, digestion, and/or analysis and the pH will be recorded in the extraction/digestion logbook. The pH may be checked upon arrival, if desired. If the samples are improperly preserved, a QA/QC discrepancy form will be submitted to the lab manager and QA coordinator for appropriate follow-up action (i.e., evaluation of the data during the data validation process and, if necessary, additional instruction of personnel regarding proper procedures).

5.2 Sample Identification

All containers of samples collected by Lu Engineers from the project will be identified using a format identified in the field on a label affixed to the sample container (labels are to be covered with clear tape). Generally, the format will include the following.

- Building number or location if applicable (i.e., B1250; MH-Manhole; WDA- Waste Disposal Area; etc.); leave blank if Test Pit or Geoprobe sample is not associated with a specific building or area
- One, two or three letters identifying the type of sample:

  GP- Geoprobe soil sample
  TP- test pit soil sample
  MW- groundwater sample
  WB- well boring soil sample
  SV- soil vapor sample
  SS- surface soil sample
  S-soil
  W-water
  PCB- PCB sample
  SPT- Septic system
- Two numbers identifying a sample number;
- Additional letters identifying special parameters, if applicable.

  D – Field Duplicate
  MS – Matrix Spike
  MD- Matrix Spike Duplicate

Example: B1227-PCB-03 is a PCB oil sample collected from B1227. WDA-02-01 is a soil sample collected from Waste Disposal Area (WDA)-02.

Each sample will be sealed and labeled immediately after collection. To minimize handling of sample containers, labels may be filled out prior to sample collection. The sample label will be filled out using waterproof ink and will be firmly affixed to the sample containers and protected with Mylar tape. The sample label will give the sample number, the date of the collection, analysis required, and pH and preservation, if appropriate.

5.3 Field Custody Procedures

- Sample bottles must be obtained pre-cleaned from the laboratory or directly from an approved retail source. All containers will be prepared in a manner consistent with the NYSDEC ASP 1991 bottle-washing procedures.

  Coolers or boxes containing cleaned bottles should be sealed with a custody tape seal during transport to the field or while in storage prior to use.
- All containers will have assigned lot numbers to ensure traceability through the supplier.
- As few persons as possible should handle samples.
- The sample collector is personally responsible for the care and custody of samples collected until the samples are relinquished to another person or dispatched properly under chain-of-custody rules.
- The sample collector will record sample data in the field notebook.
- The project manager will determine whether proper custody procedures were followed during the fieldwork and decide if additional samples are required.

5.3.1 Custody Seals

Custody seals are preprinted adhesive-backed seals with security slots designed to break if the seals are disturbed. A custody seal is placed over the cap of individual sample bottles by the sampling technician. Sample shipping containers (coolers, cardboard boxed, etc., as appropriate) are sealed in as many places as necessary to ensure security. Seals must be signed and dated before use. Strapping tape should be placed around the lid to ensure that seals are not accidentally broken during shipment and in a manner that allows easy removal by laboratory personnel. On receipt at the laboratory, the custodian must check (and certify, by completing logbook entries) that seals on boxes and bottles are intact.

5.3.2 Chain-of-Custody Record

The chain-of-custody record must be fully completed in duplicate, using black carbon paper where possible, by the field technician who has been designated by the project manager as responsible for sample shipment to the appropriate laboratory for analysis. In addition, if samples are known to require rapid turnaround in the laboratory because of project time constraints or analytical concerns (e.g., extraction time or sample retention period limitations, etc.), the person completing the chain-of-custody record should note these constraints in the “Remarks” section of the custody record. An example custody record is as follows:

PARADIGM

179 Lake Avenue, Rochester, NY 14608 Office (585) 647-2530 Fax (585) 647-3311

CHAIN OF CUSTODY

REPORT TO:

COMPANY:
ADDRESS:
CITY: STATE: ZIP:
PHONE: FAX:
ATTN:
COMMENTS:

INVOICE TO:

COMPANY: Same
ADDRESS:
CITY: STATE: ZIP:
PHONE: FAX:
ATTN:

LAB PROJECT #:
CLIENT PROJECT #:
TURNAROUND TIME: (WORKING DAYS)
1 2 3 5 STD OTHER
Quotation #

PROJECT NAME/SITE NAME:

REQUESTED ANALYSIS

	DATE	TIME	COMPOSITE	GRAB	SAMPLE LOCATION/FIELD ID	MATRIX	CONTAINERS	REMARKS	PARADIGM LAB SAMPLE NUMBER
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									

****LAB USE ONLY BELOW THIS LINE****

Sample Condition: Per NELAC/ELAP 210/241/242/243/244

Receipt Parameter — NELAC Compliance

Container Type: Y ☐ N ☐
Comments:

Preservation: Y ☐ N ☐
Comments:

Holding Time: Y ☐ N ☐
Comments:

Temperature: Y ☐ N ☐
Comments:

Sampled By _____ Date/Time _____ Total Cost:

Relinquished By _____ Date/Time _____

Received By _____ Date/Time _____ P.I.F.

Received @ Lab By _____ Date/Time _____

5.4 Sample Handling, Packaging and Shipping

The transportation and handling of samples must be accomplished in a manner that not only protects the integrity of the sample but also prevents any detrimental effects due to the possible hazardous nature of samples. Regulations for packaging, marking, labeling, and shipping hazardous materials are promulgated by the United States Department of Transportation (DOT) in the Code of Federal Regulations, 49 CFR 171 through 177.

5.4.1 Sample Packaging

Samples must be packaged carefully to avoid breakage or cross-contamination and must be shipped to the laboratory at proper temperatures. The following sample packaging requirements will be followed:

- Sample bottle lids must never be mixed. All sample lids must stay with the original containers.
- The sample bottle should never be completely filled except for VOA bottles. At a minimum, a 10% void space should be left in the bottle to allow for expansion.
- All sample bottles must be sealed around the neck or the jar lid with clear tape. Any custody seals should be affixed prior to sealing the bottle.
- All sample bottles shall be placed in plastic Zip-lock bags to minimize contact with inert packing material, unless foam inserts are used.
- Foam inserts should be used as inert packing material when shipping low hazard water samples via a common carrier to the laboratory.
- Low-hazard environmental samples are to be cooled. “Blue ice” or some other artificial icing material, or ice placed in plastic bags, may be used. Ice will not be used as a substitute for packing material.
- A duplicate custody record must be placed in a plastic bag and taped to the inside of the cooler lid. Custody seals are affixed to the sample cooler.

5.4.2 Shipping Containers

Environmental samples will be properly packaged and labeled for transport and dispatched for analysis to the appropriate subcontracted laboratory. A separate chain-of-custody record must be prepared for each container. The following requirements for marking and labeling of shipping containers will be observed:

- Use abbreviations only where specified;
- The words “This End Up” or “This Side Up” must be clearly printed on the top of the outer package. Upward-pointing arrows should be placed on the sides of the package. The words “Laboratory Samples” should also be printed on the top of the package; and

- After a container has been closed, two custody seals are placed on the container—one on the front and one on the back. The seals are protected from accidental damage by placing strapping tape over them.

Field personnel will make timely arrangements for transportation of samples to the laboratory. When custody is relinquished to a shipper, field personnel will telephone the laboratory custodian to inform him of the expected time of arrival of the sample shipment and to advise him of any time constraints on sample analysis.

5.4.3 Shipping Procedures

- The coolers in which the samples are packed must be accompanied by a chain-of-custody record. When transferring samples, the individuals relinquishing and receiving them must sign, date, and note the time on the record. This record documents sample custody transfer.
- Samples must be dispatched to the laboratory for analysis with a separate chain-of-custody record accompanying each shipment. Shipping containers must be sealed with custody seals for shipment to the laboratory. The method of shipment, name of courier, and other pertinent information are entered in the "Remarks" section of the chain-of-custody record.
- All shipments must be accompanied by the chain-of-custody record identifying their contents. The original record accompanies the shipment, and the yellow copy is retained by the site team leader.
- If sent by mail, the package is registered with return receipt requested. If sent by common carrier, a bill of lading is used. Freight bills, Postal Service receipts, and bills of lading are retained as part of the permanent documentation.
- Samples must be shipped to the analytical laboratory within 24 to 48 hours from the time of collection.

5.5 Laboratory Custody Procedures

The designated sample custodian at the laboratory will be responsible for maintaining the chain-of-custody for samples received at the lab. Among other things, the custodian must adhere to the following basic requirements:

- When the sample arrives at the lab, the custodian will complete a Cooler Receipt & Preservation Form for each cooler/package container.
- Upon receipt, the coolers are examined for the presence and condition of custody seals, locks, shipping papers, etc. Shipping labels are removed and placed on scrap paper and added to the receiving paper work. The custodian then completes the chain-of-custody record by signing and recording the date and time the package is opened.
- Acceptance criteria for cooler temperature is 0-6^{o}C. If a cooler exhibits a temperature outside this range, the anomalies are noted on the Cooler Receipt & Preservation Form.

- The custodian will then unload the samples from the cooler(s)/container(s), assign an identification number to each sample container, and affix a barcode label to each sample container for logging in and out of the LIMS system.

Adherence to this procedure will ensure that all samples can be referenced in the computer tracking system. All sample control and chain-of-custody procedures applicable to the analytical laboratory are presented in laboratory SOPs available for review.

6.0 Analytical Quality Assurance/Quality Control

All laboratory analyses will be performed by Paradigm Environmental Services INC., an accredited and appropriately certified (NYSDEC ELAP CLP) analytical laboratory.

Method detection limits are determined according to procedures outlined in 40 CFR Part 136, Appendix B or EPA CLP. General analytical detection limits are usually determined by the lowest point on the curve. Detection limits are determined at least annually for all appropriate analytical methods. A listing of the laboratory's method detection limits is available upon request.

6.1 Quality Control Samples

Laboratory QC consists of analysis of laboratory blanks, duplicates, spikes, standards, and QC check samples as appropriate to the methodology. These laboratory QC samples are described below.

6.1.1 Laboratory Blanks

Three types of laboratory blanks, one or more of which will be utilized depending on the analysis are described below:

- Method blanks consist of analyte-free water and are subjected to every step of the analytical procedure to determine possible contamination.
- Reagent blanks are similar to method blanks but incorporate only one of the preparation reagents in the analysis. When a method blank indicates significant contamination, one or more reagent blanks are analyzed to determine the source.
- Calibration blanks consist of pure reagent matrix and are used to zero an instrument's response, thus establishing the baseline.

6.1.2 Calibration Standards

A calibration standard may be prepared in the laboratory by dissolving a known amount of a pure compound in an appropriate matrix. The final concentration calculated from the known quantities is the true value of the standard. The results obtained from these standards are used to generate a standard curve and thereby quantitate the compound in the environmental sample. A minimum of three calibration standards will be used to generate a standard curve for all analyses.

6.1.3 Reference Standard

A reference standard is prepared in the same manner as a calibration standard but from a different source. Reference standards may be obtained from the EPA.

The final concentration calculated from the known quantities is the "true" value of the standard. The important difference in a reference standard is that it is not carried through the same process used for the environmental samples, but is analyzed without digestion or extraction. A reference standard result is used to validate an existing concentration calibration standard file or calibration curve.

6.1.4 Spike Sample

A spike sample is prepared by adding to an environmental sample (before extraction or digestion) a known amount of pure compound of the same type that is to be assayed for in the environmental sample. Spikes are added at one to 10 times the expected sample concentration or approximately 10 times the method detection limit. These spikes simulate the background and interferences found in the actual samples, and the calculated percent recovery of the spike is taken as a measure of the accuracy of the total analytical method.

A blank spike is the same as a spike sample except the spike is added to analyte-free water. The blank spike is used to determine whether the sample preparation and analysis are under control.

6.1.5 Surrogate Standard

A surrogate is prepared by adding a known amount of pure compound to the environmental sample; the compound selected is not one expected to be found in the sample, but is similar in nature to the compound of interest. Surrogate compounds are added to the sample prior to extraction or digestion. Surrogate spike concentrations indicate the percent recovery of the analytes and, therefore, the efficiency of the methodology.

6.1.6 Internal Standard

Internal standards are similar to surrogate standards in chemical composition but are used to quantify the concentration of analytes sampled based on the relative response factor. Internal standards are added to the environmental sample just prior to instrumental analysis.

6.1.7 Laboratory Duplicate or Matrix Spike Duplicate

Laboratory duplicates are aliquots of the same sample that are split prior to analysis and treated exactly the same throughout the analytical method. Spikes and duplicates for the batch are normally aliquots of the same sample.
For organics, spikes are added at approximately 10 times the method detection limit. The RPD between the values of the matrix spike and matrix spike duplicate for organics or between the original and the duplicate for inorganics is taken as a measure of the precision of the analytical method.

In general, the tolerance limit for RPDs between laboratory duplicates should not exceed 20% for validation in homogeneous samples.

6.1.8 Check Standard/Samples

Inorganic and organic check standards or samples are prepared with reference standards or are available from the EPA. They are used as a means of evaluating analytical techniques of the analyst. Check standards or samples are subjected to the entire sample procedure, including extraction, digestion, etc., as appropriate for the analytical method utilized. The check standard or sample can provide information on the accuracy of the analytical method independent of various sample matrices.

6.2 Laboratory Instrumentation

Laboratory capabilities will be demonstrated initially for instrument and reagent/standards performance as well as accuracy and precision of analytical methodology. A discussion of reagent/standard procedures and brief descriptions of calibration procedures for major instrument types follow.

All standards are obtained directly from EPA or through a reliable commercial supplier with a proven record for quality standards. All commercially supplied standards will be traceable to EPA or NIST reference standards and appropriate documentation will be obtained from the supplier. In cases where documentation is not available, the laboratory will analyze the standard and compare the results to a known EPA-supplied or previous NIST-traceable standard.

All sections of the laboratory will have SOP for standard and reagent procedures to document specific standard receipt, documentation, and preparation activities. In general, the individual SOPs incorporate the following items:

- Documentation and labeling of date received, lot number, date opened, and expiration date;
- Documentation of traceability;
- Preparation, storage, and labeling of stock and working solutions; and
- Establishing and documenting expiration dates and disposal of unusable standards.

Each laboratory instrument will be labeled clearly with a unique identifier that relates to all laboratory calibration documentation. Laboratory SOPs and calibration procedures are detailed in the laboratory's Quality Assurance Manual, available upon request.

7.0 Data Reporting and Validation

Laboratory test results will be reported in NYSDEC Analytical Services Protocol (ASP) Category B deliverable reports. In addition, analytical results will be provided using an electronic database deliverable format.

7.1 Category B Data Package

All analytical data will be reported by the laboratory with NYSDEC ASP Category B deliverables. The Category B data package includes:

1. A detailed summary of the report contents and any quality control outliers or corrective actions taken.
2. Chain of Custody documentation
3. Sample Information including: date collected, date extracted, date analyzed, and analytical methods.
4. Data (including raw data) for:
   - samples
   - laboratory duplicates
   - method blanks
   - spikes and spike duplicates
   - surrogate recoveries
   - internal standard recoveries
   - calibrations
   - any other applicable QC data
5. Method detection limits and/or instrument detection limits
6. Run logs, standard preparation logs, and sample preparation logs
7. Percent solids (where applicable).

7.2 Quality Assurance Reports

For the laboratory, a general QA report summarizing problems encountered throughout the laboratory effort, including sample custody, analyses, and reporting, is provided to Lu Engineers' project QA management by the QA coordinator. This report identifies areas of concern and possible resolutions in an effort to ensure data quality.

Upon completion of a project sampling effort, analytical and QC data will be included in a comprehensive report that summarizes the work and provides a data evaluation. A discussion of the validity of the results in the context of QA/QC procedures will be made, as well as a summation of all QA/QC activity.

Serious analytical or sampling problems will be reported to NYSDEC. Time and type of corrective action, if needed, will depend on the severity of the problem and relative overall project importance. Corrective actions may include altering procedures in the field, conducting an audit, or modifying laboratory protocol. All corrective actions will be implemented after notification and approval of NYSDEC.

In addition to the laboratory report narrative, QA data validation reports that include any contractual requirements will also be provided to NYSDEC. These QA reports will be submitted with the analytical data, on a monthly basis, or at the conclusion of the project.

7.3 Data Validation and Usability

Prior to the submission of the report to NYSDEC, all data will be evaluated for precision, accuracy, and completeness.

QA/QC requirements from both methodology and company protocols will be strictly adhered to during sampling and analytical work. All data generated will be reviewed by comparing and interpreting results from instrumental responses, retention time, determination of percent recovery of spiked samples or blanks, and reproducibility of duplicate sample results. All calculations and data manipulations are included in the appropriate methodology references. Control charts and calibration curves will be used to review the data and identify outlying results.

7.3.1 Data Validation

If necessary, a third-party validator will be responsible for an independent review of all analytical work performed under the NYSDEC ASP-CLP protocol. The functions will be to assess and summarize the quality and reliability of the data for the purpose of determining its usability and to document for the historical record of each site any factors affecting data usability, such as discrepancies, poor laboratory practices, and site locations that are difficult to analyze. The data validator will be responsible for determining completeness and compliance. Lu Engineers' QA officer will be responsible for determining data usability and overseeing the work of the data validator.

Information available to the data validator and the QA officer for performance of these functions include the NYSDEC ASP Category B data package, information from the sampling team regarding field conditions and field QA samples, chain-of-custody and shipping forms. The data package is designed to provide all necessary documentation to verify compliance with NYSDEC ASP CLP protocol and the accuracy and reliability of the reported results.

The laboratory will deliver the data package to the project QA coordinator for processing prior to submission to the data validator. The project QA coordinator will review the report for immediate problems, summarize the data for in-house use, and process the work order for the third-party data-validation subcontract within five working days.

In order to effectively review the data package, the data validator will obtain a general overview of each case. This includes the exact number of samples, their assigned numbers, and their matrix. The data validator will deliver the data validation report within 30 days of receipt of the data package.

If a problem arises between the data validator and the laboratory, the data validator must submit written questions to the laboratory. The laboratory will be required to respond in writing within 10 working days to correct any deficiencies. If the data validator does not receive a written response from the laboratory within the specified time period, the data in question shall be considered noncompliant.

Sampling locations will be obtained from the sampling records, such as the chain-of-custody forms. This information is necessary for preparation of the data summary, evaluation of adherence to sample holding times, discussion of matrix problems, and discussion of contaminants detected in the samples.

The following is a brief outline of the data validation process:

- Compilation of all samples with the dates of sampling, laboratory receipt, and analysis;
- Compilation of all QC samples, such as field blanks, field duplicates, MS/MSD samples, laboratory blanks, and laboratory replicates;
- Review of chain-of-custody documents for completeness and correctness;
- Review of laboratory analytical procedure and instrument performance criteria;
- Qualification of data outside acceptable QC criteria ranges;
- Preparation of a memorandum summarizing any problems encountered and the potential effects on data usability;
- Preparation of a data summary, including validated results, with sample matrix, location, and identification; and
- Tabulation of field duplicates, laboratory replicate, and blank results.

Copies of all data validation and usability reports, as well as all data summary packages, will be provided to the NYSDEC project manager. In addition, copies of all analytical raw data will be provided to NYSDEC upon request.

7.3.2 Data Usability

If required, a Data Usability Summary Report (DUSR) will be provided after review and evaluation of the analytical data package. The DUSR will contain required elements listed in Appendix 2B of *DER-10 Technical Guidance for Site Investigation and Remediation*.

The DUSR will include a description of the samples and analytical procedures used. Any data deficiencies, protocol deviations, or quality control problems will be discussed as to their effect on data results. The report will also include any suggestions for resampling or reanalysis.

TABLE 1:
SAMPLING AND ANALYSIS SUMMARY

AOC	Sample Type	Sample Location	Analytical Parameter	Analytical Method	Reporting Level	Approximate # Field Samples	Field Duplicates	Blanks		MS/MSD	Total
								Equip	Trip		
VRF-AOC-01	Soil (surface soil, test pits, soil borings)	(see Work Plan Fig. 3-7)	VOCs, RCRA Metals, PCBs, Pesticides	8260, 6010B/7470A, 8082,8081B	Category B (Level IV)	25	2	NA	2	2	31
	Groundwater (mini-wells)	(see Work Plan Fig. 3-7)	VOCs + STARS, RCRA Metals,	8260, 6010B/7470A,		2	1	NA	1	1	5
VRF-AOC-03	Soil (surface soil, test pits, soil borings)	(see Work Plan Fig. 3-7)	VOCs, TPH	8260, 310.13	Category B (Level IV)	50	5	NA	1	5	61
VRF-AOC-05	Soil (surface soil, test pits, soil borings)	(see Work Plan Fig. 3-7)	PCBs	8082	Category B (Level IV)	5 Wipes	NA	NA	NA	NA	5
VRF-AOC-07	Soil (surface soil, test pits, soil borings)	(see Work Plan Fig. 3-7)	VOCs & RCRA Metals,	8260, 6010B/7470A,	Category B (Level IV)	12	1	NA	1	1	15
	Groundwater (mini-wells)	(see Work Plan Fig. 3-7)	VOCs & RCRA Metals,	8260, 6010B/7470A,		12	1	NA	1	1	15

TABLE 1:
SAMPLING AND ANALYSIS SUMMARY

AOC	Sample Type	Sample Location	Analytical Parameter	Analytical Method	Reporting Level	Approximate # Field Samples	Field Duplicates	Blanks		MS/MSD	Total
								Equip	Trip		
VRF-AOC-08	Soil (surface soil, test pits, soil borings)	(see Work Plan Fig. 3-7)	VOCs, PCBs, Pesticides	8260 8082,8081B	Category B (Level IV)	21	2	NA	1	2	26
	Groundwater (mini-wells)	(see Work Plan Fig. 3-7)	VOCs	8260		23	4	NA	4	4	5
VRF-AOC-09	Groundwater (mini-wells)	(see Work Plan Fig. 3-7)	VOCs, RCRA Metals, PCBs	8260, 6010B/7470A, 8082	Category B (Level IV)	48	8	NA	8	8	72
VRF-AOC-10	Soil (surface soil, test pits, soil borings)	(see Work Plan Fig. 3-7)	VOCs & RCRA Metals,	8260, 6010B/7470A,	Category B (Level IV)	48	5	NA	2	5	60
VRF-AOC-11	Soil (surface soil, test pits, soil borings)	(see Work Plan Fig. 3-7)	VOCs, RCRA Metals, Pesticides	8260, 6010B/7470A, 8081B	Category B (Level IV)	16	2	NA	1	2	21

Appendix B - Health and Safety Plan

Verona Research Facility
Germany Road
Town of Verona
Oneida County, New York

Health and Safety Plan

Prepared for:

Air Force Research Laboratory
Rome Research Site

150 Electronic Parkway
Rome, New York 13441

Prepared By:

Lu Engineers
ENVIRONMENTAL • TRANSPORTATION • CIVIL

175 Sully's Trail, Suite 202
Pittsford, New York 14534

August 2014

Verona Research Facility
Germany Road
Town of Verona
Oneida County, New York

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August 2014

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APPENDICES

Lu Engineers
Site Safety Plan

A. GENERAL INFORMATION

Project Title: Verona Research Site Lu Project No. 13163-01
Oneida County, New York
Interim Remedial Measures (IRM) Work Plan

Project Director and Manager: Gregory L. Andrus, CHMM

Site Safety Officer: Eric Detweiler
Location: Germany Road
Town of Verona, Herkimer County, New York

Prepared by: Sara Kashtan/ Janet Bissi Date Prepared: August 6, 2014
Date Revised: August 14, 2014

Approved by: Gregory L. Andrus, CHMM Date Approved: 8/20/14

Site Safety Officer Review: Eric Detweiler Date Reviewed:

Scope/Objective of Work:

The purpose of planned IRM activities is to remediate Areas of Concern (AOCs) identified in the August 2013 Environmental Baseline Survey (EBS) Report and August 2014 Remedial Investigation and Feasibility Study (RI/FS) Report The Scope of Work includes the following tasks:

- **VRF-AOC-01**: Flush, clean and crush septic tanks and associated contaminated manhole structures; flush and clean associated sewer lines; dispose of waste
- **VRF-AOC-02**: Remove and dispose of accessible free-phase oil from system to prevent further spillage
- **VRF-AOC-03**: Remediate petroleum-contaminated soils and accessible free-phase oil; and use an Oxygen Releasing Compound (ORC) or equivalent to address residual contamination
- **VRF-AOC-05**: Remove and dispose of transformer, concrete pad and underlying soil at B1226 and B1266, decontaminate building surfaces at B1287 and B1298 and remove/dispose of surface soils on east side of B1287
- **VRF-AOC-07(WDA-03):** Remove and dispose of solid wastes, remediate contaminated soils, and dewater as necessary
- **VRF-AOC-08**: Excavate, and dispose of hazardous and non-hazardous soils and dewater
- **VRF-AOC-09**: Complete in-situ bioremediation by remedial agent injection around affected locations
- **VRF-AOC-10**: Complete small-scale soil removals and off-Site disposal at locations where contaminants were detected above applicable guidance criteria
- **VRF-AOC-11**: Complete small-scale sediment removals and off-Site disposal at locations where contaminants were detected above applicable guidance criteria

The location of each AOC is illustrated on Figures 2 through 8.

Proposed Date of Field Activities: Fall 2014

Background Information: [ ] Complete [X] Preliminary (limited analytical data)

Overall Chemical Hazard: [ ] Serious [ ] Moderate
[X] Low [ ] Unknown

Overall Physical Hazard: [ ] Serious [ ] Moderate
[X] Low [ ] Unknown

B. SITE/WASTE CHARACTERISTICS

Waste Type(s):

[X] Liquid [X] Solid [X] Sludge [X] Gas/Vapor

Characteristic(s):

[X] Flammable/Ignitable [X] Volatile [X] Corrosive [ ] Acutely Toxic
[ ] Explosive (moderate) [ ] Reactive [X] Carcinogen [ ] Radioactive
Other: _____

Physical Hazards:

[X] Overhead [ ] Confined Space [X] Below Grade [X] Trip/Fall
[X] Puncture [ ] Burn [X] Cut [X] Splash
[X] Noise [X] Other: Heat Stress/Cold Stress

Site History/Description and Unusual Features:
The Verona Research Facility (VRF), initially known as the Verona Test Annex, is located at 5586 Germany Road, in the Town of Verona, Oneida County, New York. The current VRF property (including the Space Command Complex currently utilized by the Oneida Indian Nation) includes approximately 512-acres of land developed with approximately 27 buildings, including laboratories and powerhouses. The property was developed in the 1950s to support research and development of precision antenna systems and aircraft navigation equipment, including electronic countermeasure and electronic counter-countermeasure research. Operations at VRF ceased in 2000.

A full description of the Site history is detailed in the 2013 EBS Report.

Locations of Chemicals/Wastes: Soil, groundwater, septic system, communication conduits, and sediments.

Estimated Volume of Chemicals/Wastes: unknown

Site Currently in Operation: [ ] Yes [X] No [ ] Not Applicable

C. HAZARD EVALUATION

PHYSICAL HAZARD EVALUATION:		
TASK	**HAZARD(S)**	**HAZARD PREVENTION**
Tasks 1 through 9	Heat stress/ cold stress exposure	Implement heat stress management techniques such as shifting work hours, increasing fluid intake, and monitoring employees**. See Appendix A.**
	Weather Extremes	Establish site-specific contingencies for severe weather situations. Discontinue work in severe weather.
	Slip/ trip/ fall	Observe terrain and be aware of the dangers of machete, while walking to minimize slips and falls. Steel-toed boots provide additional support and stability. Use adequate lighting. Inspect Site and mark existing hazards.
	Noise	**See Appendix B**
	Native wildlife presents the possibility of insect bites and associated diseases.	Avoid wildlife when possible. Use insect repellant. Check for ticks on skin and clothing.
	Biological (flora, fauna, etc.)	Be aware of sharp, rough vegetation especially during geophysical survey. Wear proper work boots and clothing.
Tasks 2-8	General physical hazards associated with drilling and excavating operations (overhead equipment, noise).	Hard hats and steel-toed boots required while working around heavy equipment. Keep a safe distance from equipment. **See Appendix B.**
	Heavy Equipment Operation	Define equipment routes, traffic patterns, and site-specific safety measures. Ensure that operators are properly trained and equipment has been properly inspected and maintained. Verify back-up alarms. Ensure that ground spotters are assigned and informed of proper hand signals and communication protocols. Identify special PPE and monitoring needs. Ensure that field personnel do not work in close proximity to operating equipment. Ensure that lifting capacities, load limits, etc., are not exceeded. Overhead obstructions and falling objects.
	Overhead Hazards/ Falling Objects	Wear hard hat. Identify overhead hazards prior to each task.
	Contact with or inhalation of contaminants, potentially in high concentration in soil.	To minimize exposure to chemical contaminants, a thorough review of suspected contaminants should be completed and implementation of an adequate protection program.
	Power Tools	Ensure compliance with 29 CFR 1910 Subpart P.
	Utility Lines	Identify/locate existing utilities prior to work. Ensure overhead utility lines are at least 25 feet away from project activities. Contact utilities to confirm locations, as necessary.
	Contact with or inhalation of decontamination solutions.	Material Safety Data Sheets for all decon solutions. First aid equipment available.
	Installation of sheet piling	Wear steel toe boots, hard hat and safety glasses to avoid slip, trip, fall and overhead hazards. Wear hearing protection to when machines are running to avoid hearing damage. Be aware of pinch dangers.
	Contact with or inhalation of remedial solutions or compounds.	Avoid contact with skin and eyes.

Physical Hazard Evaluation: Basic health and safety protection (steel-toed boots, work clothes, and safety glasses or goggles) will be worn by all personnel at all times. Any allergies should be reported to the Site Safety Officer prior to the start of the project. Respirators and Tyvek suits required for entry into buildings posted for asbestos.

D. SITE SAFETY WORK PLAN

Site Control: Entrances to the Site are gated and locked. Only authorized personnel may enter the Site. On-site buildings are posted for asbestos contamination and therefore, no buildings will be entered unless prior authorization has been granted and proper PPE is worn.

Perimeter Identified? [Y] **Site Secured? [N]**

Work Areas Designated? [Y] **Zone(s) of contamination identified? [Y]**

Anticipated Level of Protection (cross-reference task numbers in Section C):

Level of PPE:	A	B	C	D
		For entering on-Site buildings only	Available	X

All Site work will be performed at Level D (steel-toed boots, work clothes, eye protection, gloves and hard hats) unless monitoring indicates otherwise. Chemical resistant boots or booties shall be worn as appropriate to avoid contact with wet areas.

Level C will be available and shall be donned if sustained photoionization detector (PID) readings exceed 5 ppm and/or olfactory indications warrant. If building entrance is necessary,

Level B (Tyvek suits and half-face air respirators with HEPA cartridges) will be worn and disposed of within the buildings upon exiting.

Air Monitoring:

Contaminant	Monitoring Device	Frequency
Organic Vapors	MiniRAE 3000 PID	As Necessary
Particulates	Dustrack/Sidepack	Per Generic NYSDOH CAMP

Action Level Organic Vapors:
PID readings of **>5 ppm to 10 ppm** above background in the breathing zone, sustained for greater than 1 minute,

Action: Hault work activities and move away from the vapor source. Consider vapor suppression actions. If PID readings drop to within 5 ppm above background, work may resume with continuous air monitoring.

PID readings of **10 ppm to <25 ppm** above background at breathing zone, sustained for greater than 1 minute,
Action: Stop work and consider upgrade to Level C protection.

PID readings of **>25 ppm** above background at breathing zone, sustained for greater than 1 minute,

Action: Stop work.
All air monitoring results as well as wind direction and speed (estimates) will be documented in the site-specific log book.

Action Level Particulates (Per NYSDOH CAMP):
If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m3) 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/m3 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 mcg/m3 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/m3 of the upwind level and in preventing visible dust migration.

Decontamination Solutions and Procedures for Equipment, Sampling Gear, etc.
Specified in work plan.

Personnel Decon Protocol: Soap, water, and paper towels or baby wipes will be available for all personnel and will be used before eating, drinking or leaving the site. Personnel will shower upon return to home or hotel. Disposable PPE will be double bagged and disposed of in a sanitary waste dumpster. Tykev suits will be disposed of in the site buildings upon exiting the building.

Decon Solution Monitoring Procedures, if Applicable: Based on previous investigations, it is assumed that decontamination solutions may be discharged onsite to the ground surface.

Special Site Equipment, Facilities or Procedures (Sanitary Facilities and Lighting Must Meet 29CFR 1910.120): Due to the remote location of the Site, personnel will be required to maintain the Buddy System. All parties will be required to attend an on-Site briefing, which will identify the roles of each organization's personnel and will integrate emergency procedures for all Site participants. A portable restroom will be mobilized the Site for the duration of field activities.

Site Entry Procedures and Special Considerations: Entry to the Site should be limited to authorized personnel, through the main gate, in accordance with the AFRL and VRS regulations. The Buddy System should be employed when on-site and entering and exiting the Site, along with the work zone areas.

Work Limitations (time of day, weather conditions, etc.) and Heat/Cold Stress Requirements:
All work will be completed during daylights hours. Severe inclement weather may be cause to suspend outdoor activities. Cold stress protocol will dictate work/rest regimen. Heavy equipment will not be used during electrical storms. No transfer of materials can be conducted outside of normal RRS working hours.

Investigation Derived Material (i.e., Expendables, Decon Waste, Cuttings) Disposal: Specified in work plan.

Sampling Handling Procedures Including Protective Wear: All sample handling will be performed while wearing nitrile gloves. To minimize hazards to lab personnel, sample volumes will be no larger than necessary, and the outside of all sample containers will be wiped clean prior to shipment.

Accident and Injury Reporting: Any work-related incident, accident, injury, illness, exposure, or property loss must be reported to the Lu Engineers project manager. This includes:

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

E. TRAINING REQUIREMENTS

All personnel conducting field activities on site are required to have completed training sessions in accordance with Occupational Safety and Health Administration (OSHA) for Parts 1926 and 1910 (Title 29 Code of Federal Regulations [CFR] Part 1926.65 and Part 1910.120 - Hazardous Waste Operations and Emergency Response- 'HazWOPER'). This training shall consist of a minimum of 40 hours of instruction off-site and three days of actual field experience under the direct supervision of a trained, experienced supervisor. Each employer will maintain documentation stating that its on-site personnel have complied with this regulation.

In addition, each employee PPE worn by each employee will be in compliance with OSHA Parts 1910.132-140. Also, each employee needed to wear a respirator will be in compliance with OSHA Respiratory Protection standards Part 1910.134.

All personnel will have reviewed this HASP and received a site-specific health and safety briefing prior to participating in field work.

All visitors entering the work area must review the HASP and be equipped with the proper PPE. All site personnel and visitors shall sign the last page of the HASP as an acknowledgement that they have read and understand the Site health and safety requirements.

Medical Surveillance Requirements: All Lu Engineers field staff who engage in onsite activities for 30 days or more per year participate in a medical monitoring program and have completed applicable training per 29CFR 1910.120. Respiratory protection program meets requirements of 29CFR 1910.134.

Team Member*	Responsibility
Gregory L. Andrus	Project Manager
Steven Campbell	Safety Officer
Eric Detweiler	Field Geologist/Field Team Leader
Ari Cheremeteff	Field Team Leader
Gina Ferruzza	Field Technician

* All entries into the work zone require use of "Buddy System".

F. EMERGENCY INFORMATION

LOCAL RESOURCES

Ambulance:	911
Hospital Emergency Room:	Oneida Health Care Center
	321 Genesee Street, Oneida New York
Poison Control Center:	911
Police (include local, county sheriff, state):	911
Fire Department:	911
Airport:	N/A
Laboratory:	Paradigm Environmental Services, Inc. 179 Lake Ave., Rochester, NY 14608 (585) 647-3311
UPS/Federal Express:	**Nearest Fed Ex**: 115 Dry Rd., Oriskany, NY 13424 (last ground pickup 6:00 pm M-F) **Nearest UPS**: 761 Lenox Ave, Oneida, NY 13421 (last ground pickup 4:00 pm M-F) Alternate UPS: 5880 Success Dr., Rome, NY (last ground pickup 6:00 pm M-F)

SITE RESOURCES

Site Emergency Evaluation Alarm Method:	Sound vehicle horn
Water Supply Source:	Gallons of water will be available in vehicles
Telephone Location, Number:	None available
Cellular Phone, if Available:	Onsite cell # TBD
Other: IFOCV Office	(315) 330-2098

EMERGENCY CONTACTS

1.	Fire/Police:	911
2.	Lu Engineers, Safety Director:	(585) 385-7417 (office)
3.	Lu Engineers, Gregory L. Andrus	(585) 385-7417, Ext. 215 (office) (585) 732-5786 (Cellular phone)

EMERGENCY ROUTES

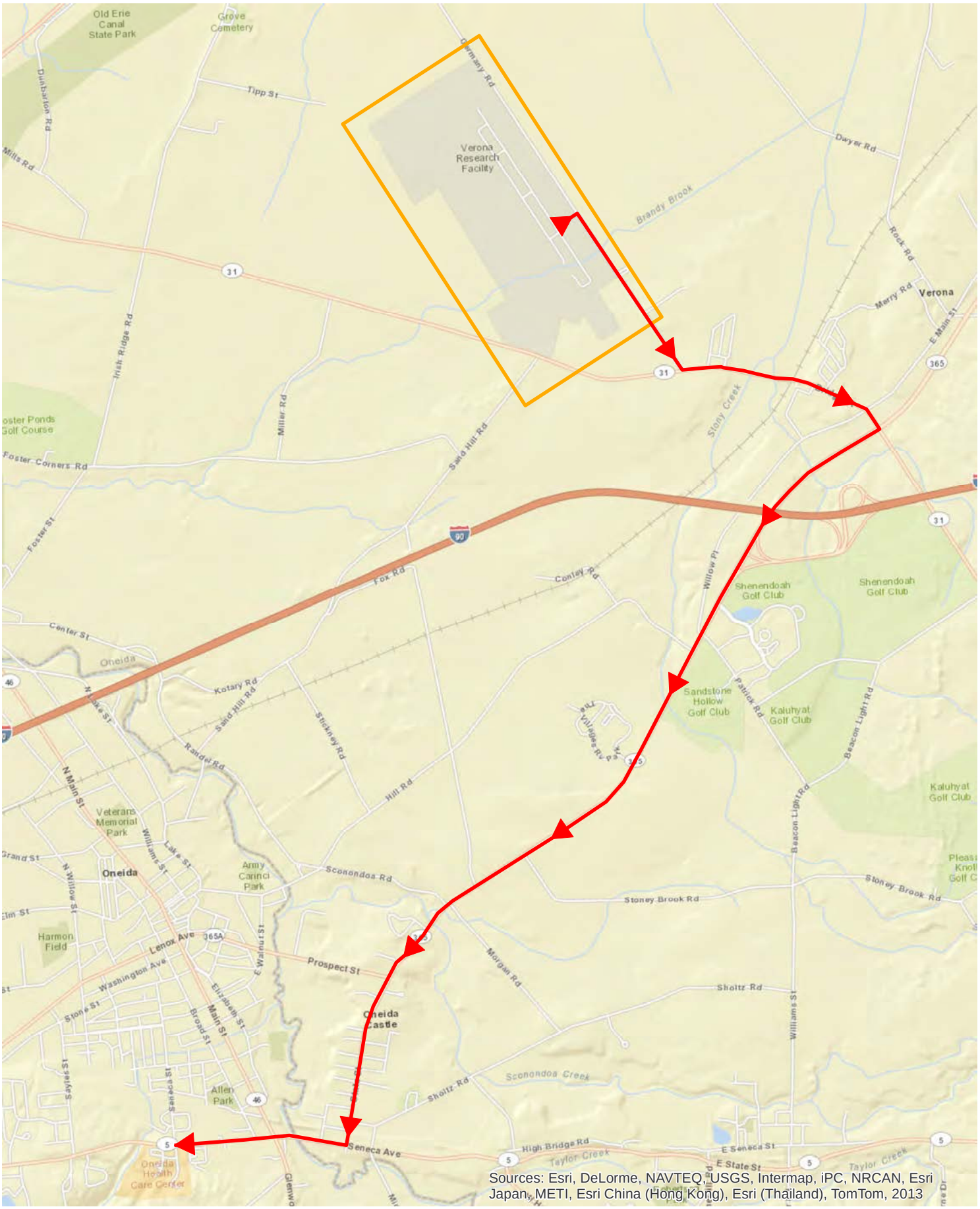
Note: Field team must know route(s) prior to start of work.

Directions from the site to Oneida Health Care Center (map on following page):
Proceed east to main gate. Turn right onto Germany Road. Turn left onto NYS 31 and proceed east to NYS Route 365. Veer right (west) onto NYS Route 365. Proceed 4.8 miles to State Route 5. Turn right (west) onto State Route 5 and proceed 1 mile. Hospital is on the left side of the road at the intersection of Seneca Street and State Route 5.

On-site Assembly Area: At Site entry point.

Off-site Assembly Area: Consult with RRS/IFCOV.

Emergency egress routes to get off-Site: East or west on Germany Road.



Sources: Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013

Lu Engineers
ENVIRONMENTAL • TRANSPORTATION • CIVIL

HOSPITAL ROUTE MAP
VERONA RESEARCH FACILITY
VERONA, NY

DATE: AUGUST 2013
SCALE: 1:24,000
DRAWN/CHECKED: GLA/SMK
DATA SOURCE: USGS Digital Raster Graphic quadrangle 1978

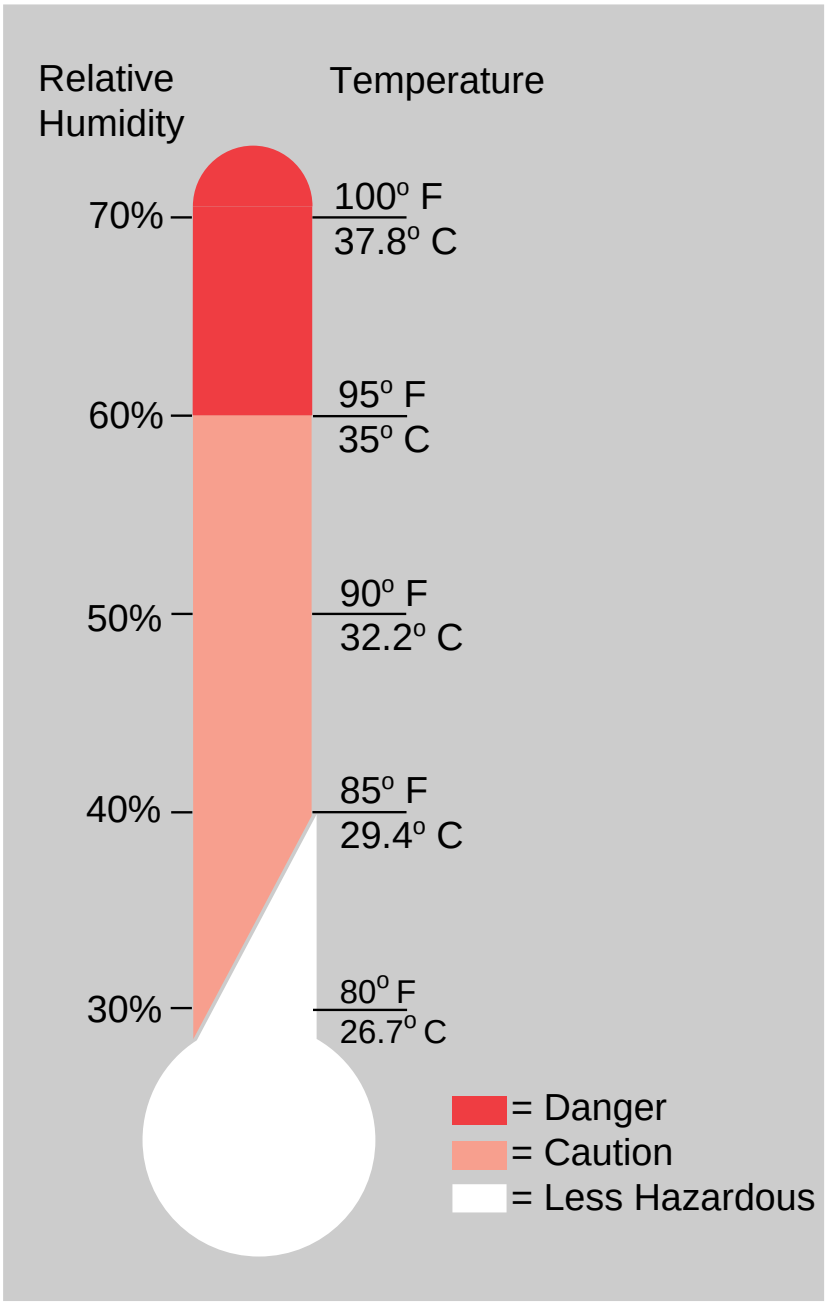
APPENDIX A

HEAT AND COLD EXPOSURE

THE HEAT EQUATION

HIGH TEMPERATURE + HIGH HUMIDITY + PHYSICAL WORK = HEAT ILLNESS

When the body is unable to cool itself through sweating, **serious** heat illnesses may occur. The most severe heat-induced illnesses are **heat exhaustion** and **heat stroke**. If actions are not taken to treat heat exhaustion, the illness could progress to heat stroke and possible **death**.



U.S. Department of Labor
Occupational Safety and Health Administration

OSHA 3154
1998

HEAT EXHAUSTION

What Happens to the Body:

HEADACHES, DIZZINESS/LIGHT HEADEDNESS, WEAKNESS, MOOD CHANGES (irritable, or confused/can't think straight), FEELING SICK TO YOUR STOMACH, VOMITING/THROWING UP, DECREASED and DARK COLORED URINE, FAINTING/PASSING OUT, and PALE CLAMMY SKIN.

What Should Be Done:

- Move the person to a cool shaded area to rest. Don't leave the person alone. If the person is dizzy or light headed, lay them on their back and raise their legs about 6-8 inches. If the person is sick to their stomach lay them on their side.
- Loosen and remove any heavy clothing.
- Have the person drink some cool water (a small cup every 15 minutes) if they are not feeling sick to their stomach.
- Try to cool the person by fanning them. Cool the skin with a cool spray mist of water or wet cloth.
- If the person does not feel better in a few minutes call for emergency help (Ambulance or Call 911).

(If heat exhaustion is not treated, the illness may advance to heat stroke.)

HEAT STROKE—A MEDICAL EMERGENCY

What Happens to the Body:

DRY PALE SKIN (no sweating), HOT RED SKIN (looks like a sunburn), MOOD CHANGES (irritable, confused/not making any sense), SEIZURES/FITS, and COLLAPSE/PASSED OUT (will not respond).

What Should Be Done:

- Call for emergency help (Ambulance or Call 911).
- Move the person to a cool shaded area. Don't leave the person alone. Lay them on their back and if the person is having seizures/fits remove any objects close to them so they won't strike against them. If the person is sick to their stomach lay them on their side.
- Remove any heavy and outer clothing.
- Have the person drink some cool water (a small cup every 15 minutes) if they are alert enough to drink anything and not feeling sick to their stomach.
- Try to cool the person by fanning them. Cool the skin with a cool spray mist of water, wet cloth, or wet sheet.
- If ice is available, place ice packs under the arm pits and groin area.

How to Protect Workers

- Learn the signs and symptoms of heat-induced illnesses and what to do to help the worker.
- Train the workforce about heat-induced illnesses.
- Perform the heaviest work in the coolest part of the day.
- Slowly build up tolerance to the heat and the work activity (usually takes up to 2 weeks).
- Use the buddy system (work in pairs).
- Drink plenty of cool water (one small cup every 15-20 minutes)
- Wear light, loose-fitting, breathable (like cotton) clothing.
- . Take frequent short breaks in cool shaded areas (allow your body to cool down).
- Avoid eating large meals before working in hot environments.
- Avoid caffeine and alcoholic beverages (these beverages make the body lose water and increase the risk for heat illnesses).

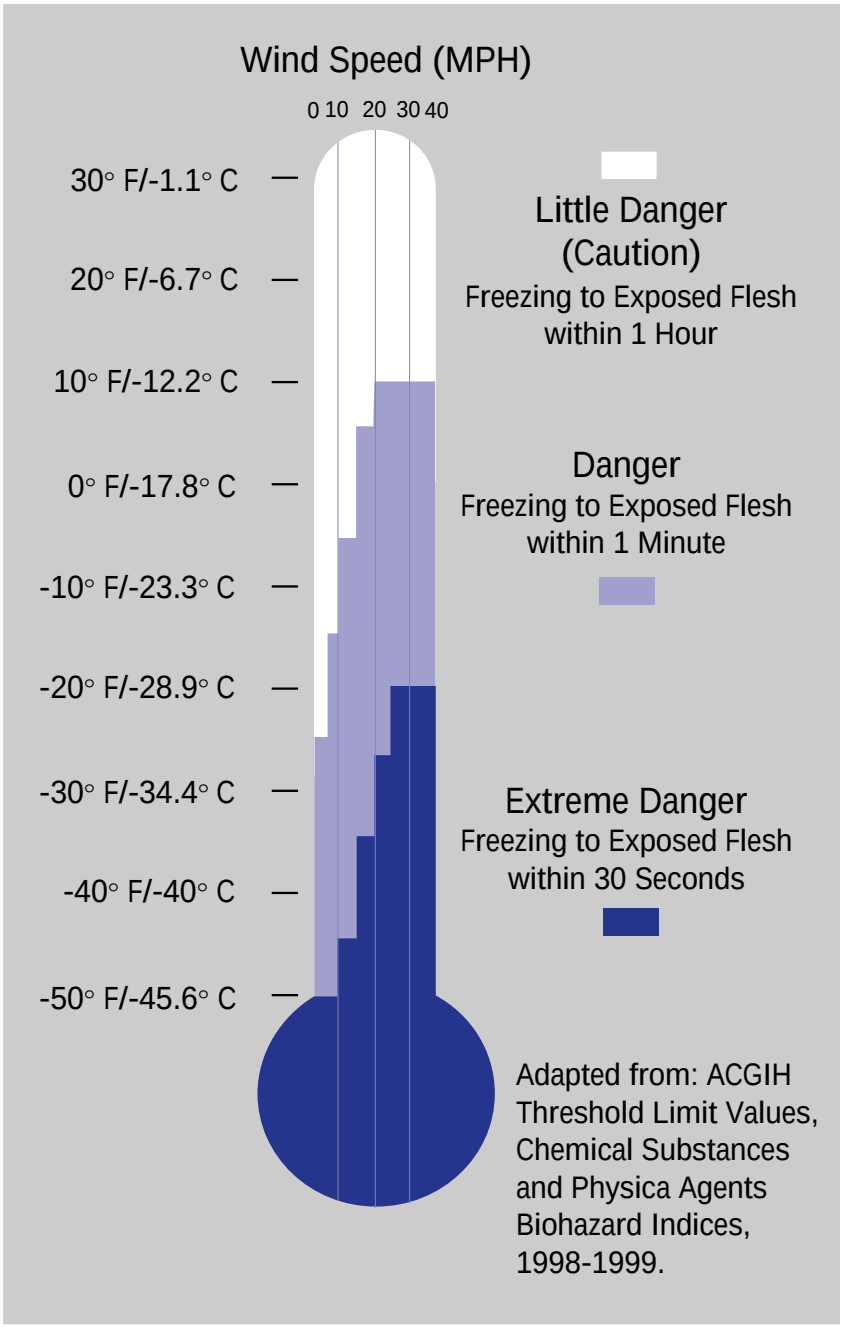
Workers Are at Increased Risk When

- They take certain medication (check with your doctor, nurse, or pharmacy and ask if any medicines you are taking affect you when working in hot environments).
- They have had a heat-induced illness in the past.
- They wear personal protective equipment (like respirators or suits).

THE COLD STRESS EQUATION

LOW TEMPERATURE + WIND SPEED + WETNESS = INJURIES & ILLNESS

When the body is unable to warm itself, serious cold-related illnesses and injuries may occur, and permanent tissue damage and death may result. **Hypothermia** can occur when *land temperatures* are **above** freezing or *water temperatures* are below 98.6°F/ 37°C. Cold-related illnesses can slowly overcome a person who has been chilled by low temperatures, brisk winds, or wet clothing.



U.S. Department of Labor
Occupational Safety and Health Administration

OSHA 3156
1998

FROST BITE

What Happens to the Body:

FREEZING IN DEEP LAYERS OF SKIN AND TISSUE; PALE, WAXY-WHITE SKIN COLOR; SKIN BECOMES HARD and NUMB; USUALLY AFFECTS THE FINGERS, HANDS, TOES, FEET, EARS, and NOSE.

What Should Be Done: (land temperatures)

- Move the person to a warm dry area. Don't leave the person alone.
- Remove any wet or tight clothing that may cut off blood flow to the affected area.
- **DO NOT** rub the affected area, because rubbing causes damage to the skin and tissue.
- **Gently** place the affected area in a warm (105°F) water bath and monitor the water temperature to **slowly** warm the tissue. Don't pour warm water directly on the affected area because it will warm the tissue too fast causing tissue damage. Warming takes about 25-40 minutes.
- After the affected area has been warmed, it may become puffy and blister. The affected area may have a burning feeling or numbness. When normal feeling, movement, and skin color have returned, the affected area should be dried and wrapped to keep it warm. **NOTE:** If there is a chance the affected area may get cold again, do not warm the skin. If the skin is warmed and then becomes cold again, it will cause severe tissue damage.
- Seek medical attention as soon as possible.

HYPOTHERMIA - (Medical Emergency)

What Happens to the Body:

NORMAL BODY TEMPERATURE (98.6° F/37°C) DROPS TO OR BELOW 95°F (35^0 C); FATIGUE OR DROWSINESS; UNCONTROLLED SHIVERING; COOL BLUISH SKIN; SLURRED SPEECH; CLUMSY MOVEMENTS; IRRITABLE, IRRATIONAL OR CONFUSED BEHAVIOR.

What Should Be Done: (land temperatures)

- Call for emergency help (i.e., Ambulance or Call 911).
- Move the person to a warm, dry area. Don't leave the person alone. Remove any wet clothing and replace with warm, dry clothing or wrap the person in blankets.
- Have the person drink warm, sweet drinks (sugar water or sports-type drinks) if they are alert. **Avoid drinks with caffeine** (coffee, tea, or hot chocolate) or alcohol.
- Have the person move their arms and legs to create muscle heat. If they are unable to do this, place warm bottles or hot packs in the arm pits, groin, neck, and head areas. **DO NOT** rub the person's body or place them in warm water bath. This may stop their heart.

What Should Be Done: (water temperatures)

- Call for emergency help (Ambulance or Call 911). Body heat is lost up to 25 times faster in water.
- **DO NOT** remove any clothing. Button, buckle, zip, and tighten any collars, cuffs, shoes, and hoods because the layer of trapped water closest to the body provides a layer of insulation that slows the loss of heat. Keep the head out of the water and put on a hat or hood.
- Get out of the water as quickly as possible or climb on anything floating. **DO NOT** attempt to swim unless a floating object or another person can be reached because swimming or other physical activity uses the body's heat and reduces survival time by about 50 percent.
- If getting out of the water is not possible, wait quietly and conserve body heat by folding arms across the chest, keeping thighs together, bending knees, and crossing ankles. If another person is in the water, huddle together with chests held closely.

How to Protect Workers

- Recognize the environmental and workplace conditions that lead to potential cold-induced illnesses and injuries.
- Learn the signs and symptoms of cold-induced illnesses/injuries and what to do to help the worker.
- Train the workforce about cold-induced illnesses and injuries.
- Select proper clothing for cold, wet, and windy conditions. Layer clothing to adjust to changing environmental temperatures. Wear a hat and gloves, in addition to underwear that will keep water away from the skin (polypropylene).
- Take frequent short breaks in warm dry shelters to allow the body to warm up.
- Perform work during the warmest part of the day.
- Avoid exhaustion or fatigue because energy is needed to keep muscles warm.
- Use the buddy system (work in pairs).
- Drink warm, sweet beverages (sugar water, sports-type drinks). Avoid drinks with caffeine (coffee, tea, or hot chocolate) or alcohol.
- Eat warm, high-calorie foods like hot pasta dishes.

Workers Are at Increased Risk When…

- They have predisposing health conditions such as cardiovascular disease, diabetes, and hypertension.
- They take certain medication (check with your doctor, nurse, or pharmacy and ask if any medicines you are taking affect you while working in cold environments).
- They are in poor physical condition, have a poor diet, or are older.

APPENDIX B

ADDITIONAL POTENTIAL PHYSICAL AND CHEMICAL HAZARDS

ADDITIONAL POTENTIAL PHYSICAL AND CHEMICAL HAZARDS	
POTENTIAL PHYSICAL HAZARDS	**CONTROL METHODS**
Overhead Hazards/Falling Objects	Overhead hazards will be identified prior to each task (i.e., inspecting drill rig mast, building structure). Hard hats will be required for each task that poses an overhead hazard.
Contact with Utilities	Prior to initiating site activities, all utilities will be located by the appropriate utility company and will be marked and/or barricaded to minimize the potential of accidental contact. A minimum distance of 25 feet between the derrick and overhead power lines must be maintained at all times.
Noise Exposure	Areas of potentially high sound pressure levels (>85 dBA) will be restricted to authorized personnel only. Engineering controls will be used to the extent possible. Hearing protection will be made available to all workers on site. Exposure to time-weighted average levels in excess of 85 dBA is not anticipated.
POTENTIAL CHEMICAL HAZARDS	**GENERAL CONTROL METHODS**
Contaminant Inhalation	Direct reading instruments (Op-Tech) and/or olfactory indications will be used to monitor airborne contaminants. Established Lu Engineers' action levels will limit exposure to safe levels. Respiratory protection will be used as appropriate.
Contaminant Ingestion	Standard safety procedures such as restricting eating, drinking, and smoking to the support zone and utilizing proper personal decontamination procedures will minimize ingestion as a potential route of exposure.
Dermal Contaminant Contact	The proper selection and use of personal protective clothing and decontamination procedures will minimize dermal contaminant contact.
Potential contact with lower concentration waste and naturally occurring contaminants (i.e., methane)	Dermal contact with contaminants will be minimized by proper use of the following PPE: • Tyvex coveralls • Neoprene gloves • Booties (latex) or over-boots.
Splash hazard	The proper selection and use of personal protective clothing and decontamination procedures will minimize splash contaminant contact.

APPENDIX C

CHEMICAL HAZARD EVALUATION

CHEMICAL HAZARD EVALUATION

Task Number	Compound	Exposure Limits (TWA)			Dermal Hazard (Y/N)	Route(s) of Exposure	Acute Symptoms	Odor Threshold/ Description	FID/PID	
		PEL	REL	TLV					Relative Response	Ionization Potential (eV)
2-8	Acetone	1000 ppm	250 ppm	500 ppm	Y	Inh, Ing, Con	Irritation to eyes, nose, or throat, skin, skin burns, loss of coordination and equilibrium	Sharp penetrating odor, mint like	1.1	9.69
2-8	Aroclor 1260 (PCB)*	0.5 ^{sk} mg/m^3	---	0.5 ^{sk} mg/m^3	Y	Abs, Inh, Ing	Irritation to eyes and skin; dermatitis, liver damage	---	---	---
2-8	Arsenic*	0.010 mg/m^3	---	0.01 mg/m^3	Y	Inh, Ing, Abs, Con	Coughing, irritation to eyes, nose, throat, respiratory tract, inflammation of mucous membranes, dyspnea (labored breathing), cyanosis, and rales (rattle breathing), vomiting, bloody diarrhea, cold clammy skin, low blood pressure, weakness, headache cramps, convulsions, coma, redness, burns to skin	Odorless/silver gray or tin white brittle (metal, inorganic), also can be in solution (clear & odorless)	---	---
2-8	Asbestos*	0.1 fibers/cc	---	0.2 - 2.0 fibers/cc	N	Inh, Ing	None.	Odorless	---	---
2-8	Barium	0.5 mg/m^3	---	0.5 mg/m^3	N	Inh, Ing, Con	Irritation to eyes, nose, throat, or skin; stomach pains, slow pulse, irregular heart beat	Odorless	---	---
2-8	Benzene*	1 ppm	---	10 ppm	Y	Inh, Abs, Ing, Con	Irritation to eyes, skin, nose, respiratory system; headache, nausea, dizziness, drowsiness, unconsciousness, harmful, fatal if aspirated into lungs	Colorless to light yellow liquid, sweet aromatic odor	0.5	9.25

CHEMICAL HAZARD EVALUATION										
Task Number	**Compound**	**Exposure Limits (TWA)**			**Dermal Hazard (Y/N)**	**Route(s) of Exposure**	**Acute Symptoms**	**Odor Threshold/ Description**	**FID/PID**	
		PEL	**REL**	**TLV**					**Relative Response**	**Ionization Potential (eV)**
2-8	Cadmium*	0.005 mg/m^3	LFC	0.01 mg/m^3	N	Inh, Ing, Con	Irritation to eyes, nose, throat, cough, tight chest/pain, dyspnea, pulmonary edema, sweating, chills, slow pulse, muscle aches, weakness, death	Silvery/white (blue tinged) lustrous solid, odorless	---	N/A
2-8	Chlorobenzene	75 ppm	---	10 ppm	Y	Inh, Ing, Con	Irritation skin, eyes, nose, respiratory tract, coughing, shortness of breath, dizziness, incoordination, unconsciousness. GI irritation, toxic may cause systematic poisoning, nausea, vomiting, diarrhea	Colorless liquid, faint almond-like odor	0.4	9.06
2-8	Chromium (metal)	1.0 mg/m^3	0.5 mg/m^3	0.5 mg/m^3	N	Inh, Ing, Con	Irritation to eyes, skin and respiratory tract (lungs), ulceration of skin and mucous membranes, rash, electrolyte disturbances	Blue-white to steel gray lustrous brittle hard, odorless solid	---	N/A
	1,2-Dichlorobenzene	50 ppm	---	---	Y	Inh, Ing, Con	Irritation to eyes, skin	2 ppm	---	---
	1,3-Dichlorobenzene	No Data	No Data	No Data	Y	Inh, Abs, Con, Ing	INHALATION: Causes headache, drousiness, unsteadiness. Irritating to mucous membranes. EYES: Severe irritation. SKIN: Severe irritation. INGESTION: Irritation of gastric mucosa, nausea, vomiting, diarrhea, abdominal cramps and cyanosis.	odorless	No Data	No Data

CHEMICAL HAZARD EVALUATION										
Task Number	Compound	Exposure Limits (TWA)			Dermal Hazard (Y/N)	Route(s) of Exposure	Acute Symptoms	Odor Threshold/ Description	FID/PID	
		PEL	REL	TLV					Relative Response	Ionization Potential (eV)
	1,4-Dichlorobenzene*	75 ppm	---	10 ppm	Y	Inh, Abs, Con, Ing	Irritation to eyes, nose, throat, skin, coughing/wheezing, shortness of breath, headache, nausea, burning sensation, vomiting	Mothball odor	---	8.98
	CIS-1,2-Dichloroethene	200 ppm	200 ppm	200 ppm	Y	Inh, Ing, Con, Abs	Irritant to skin, eyes, respiratory tract, mucous membranes, liver damage, narcotic effect at high concentrations		0.8	9.66
2-8	1,2-Dichloroethane*	1 ppm	40 mg/m^3	10 ppm	Y	Inh, Ing, Abs, Con	Nausea, vomiting mental confusion, headache, skin burns, dermatitis, cornea (eye) damage	Pleasant chloroform odor, sweet taste	NR	11.05
2-8	4,4'-DDT*	1 mg/m^3		1 mg/m^3		Avoid physical contact	N/A (Toxic irritant)			
2-8	Dichlorobenzene (p-)	75 ppm	---	10 ppm	Y	Inh, Ing, Abs, Con	Irritation to eyes, nose, throat, skin, loss of consciousness, cyanosis, irregular pulse	Moth balls	---	---
2-8	Dichlorodifluoromethane (CFC 12)	1000 ppm	1000 ppm	---	N	Inh, skin or eye contact	Dizziness, tremor, asphyxia, unconsciousness, cardiac arrhythmias, cardiac arrest; liquid: frostbite	Colorless, odorless gas	---	11.75
2-8	Dieldrin	N/A	---	N/A	Y	Inh, Con, Abs	Irritation to eyes, nose, throat, skin, death	---	---	---
2-8	Diesel Fuel	N/A	---	N/A	Y	Ing, Ing, Abs, Con	Irritation to eyes, lungs, skin	Gasoline	---	---
2-8	Endosulfan II (beta)	---	---	---	N	Inh, Ing, Con	N/A (Toxic irritant)	Grayish-white powder (pesticide)	---	N/A

CHEMICAL HAZARD EVALUATION										
Task Number	**Compound**	**Exposure Limits (TWA)**			**Dermal Hazard (Y/N)**	**Route(s) of Exposure**	**Acute Symptoms**	**Odor Threshold/ Description**	**FID/PID**	
		PEL	**REL**	**TLV**					**Relative Response**	**Ionization Potential (eV)**
2-8	Lead	0.05 mg/m^3	0.05 mg/m^3	0.05 mg/m^3	Y	Inh, Ing, Con	Poison, abdominal pain, spasms, nausea, vomiting, headache, irritation to eyes; skin, weakness, metallic taste, anorexia/loss of appetite, insomnia, facial pallor, colic, anemia, tremor, "lead line" in gums, constipation, abdominal pain, paralysis in wrists and ankles, encephalopathy (inflammation of brain)	Odorless	---	---
2-8	Mercury	0.1 ^{sk} mg/m^3 ceiling	0.1 mg/m^3 ceiling 0.05 mg/m^3 ceiling	0.025 ^{sk} mg/m^3	Y	Inh, Abs, Ing, Con	Severe respiratory tract damage, sore throat, coughing, pain, tightness in chest, breathing difficulties, headache, muscle weakness, anorexia, GI disturbances, ringing in ear, liver changes fever, bronchitis, pneumonitis, burning in mouth, abdominal pain, vomiting, corrosive ulceration, bloody diarrhea, weak & rapid pulse, paleness, exhaustion, tremors, collapse, thirst, burns and irritates skin, eyes, blurred vision, pain in eyes	Silver-white, heavy, odorless liquid metal	---	N/A
2-8	Methyl Ethyl Ketone (2-Butanone, MEK)	200 ppm	200 ppm	200 ppm	Y	Inh, Ing, Con	Irritation to eyes, nose; skin, dizziness, nausea, drowsiness, CNS depression, unconsciousness	Mint or acetone-like	0.9	9.51

CHEMICAL HAZARD EVALUATION										
Task Number	**Compound**	**Exposure Limits (TWA)**			**Dermal Hazard (Y/N)**	**Route(s) of Exposure**	**Acute Symptoms**	**Odor Threshold/ Description**	**FID/PID**	
		PEL	**REL**	**TLV**					**Relative Response**	**Ionization Potential (eV)**
	ORC (Oxygen Reducing Compound)	5 mg/m^3	5 mg/m^3)	5 mg/m^3	Y	Ing, Con	Irritation to eyes and skin	Odorless	---	---
2-8	Silver	0.01 mg/m^3	---	0.1 mg/m^3	Y	Inh, Ing, Con	Blue gray eyes, irritation to nasal septum, throat, skin, ulcerations to skin, GI disturbances	White to gray lustrous/ metallic solid, odorless	---	---
2-8	1,2,3-Trichlorobenzene	---	---	---	Y	Inh, Ing	Causes eye, skin, and respiratory tract irritation. Harmful if swallowed.	White solid with a sharp chlorobenzene odor. (mothlike) Insoluble in water and denser than water.	---	
2-8	1,2,4-Trichlorobenzene	N/A	---	N/A	N	Inh, Abs, Ing, Con	Irritation to eyes, mucous membranes, possible liver, kidney damage	Colorless to white liquid, aromatic odor (@ 63 F turns solid/ crystalline)	---	N/A
2-8	Trichloroethene* (TCE)	100 ppm (per 6/97 NIOSH Pocket Guide)	25 ppm (per 2005 NIOSH Pocket Guide)	10 ppm	Y	Inh, Abs, Ing, Con	Irritation to eyes, skin, mucous membranes and GI, headache, vertigo, fatigue, giddiness, tremors, vomiting, nausea, may burn skin, visual disturbance, paresthesia, cardiac arrhythmias	Colorless liquid, sometimes dyed blue, chloroform odor	---	9.45
2-8	Vinyl Chloride*	1 ppm	---	1 ppm	Y	Inh, Con	Dulled auditory and visual response, headache, weakness, frostbite, GI bleeding, pallor or cyanosis of extremities, abdominal pain, bleeding	Colorless liquefied gas, pleasant odor at high concentrations (3000 ppm)	2.0	9.99

KEY:

PEL = Permissible Exposure Limit
REL = Recommended Exposure Limit
--- = Information not available
TLV = Threshold Limit Value(ACGIH)
Inh = Inhalation
Ing = Ingestion
mg/m^3 = Milligrams per cubic meter
* = Chemical is a known or suspected carcinogen
Abs = Skin Absorption
Con = Skin and/or eye Contact
ppm = Parts per million
sk = Skin notation

Appendix C – Community Air Monitoring Plan

New York State Department of Health
Generic Community Air Monitoring Plan

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.

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

Continuous monitoring will be required for ground intrusive activities during implementation of the IRM. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil samples and waste characterization samples. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include sampling staged wastes near a busy urban street, near 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 the wind direction changes. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

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

- If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest

potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

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

All 15-minute readings must be recorded and be available for State (DEC and DOH) 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.

- If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the Site, 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/m3 above the upwind level and provided that no visible dust is migrating off-site from the work area.

- If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m3 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/m3 of the upwind level and in preventing visible dust migration.

All readings must be recorded and be available for State (DEC and DOH) personnel to review.