New York State Department of Environmental Conservation
625 Broadway • Albany, NY 12233

Friedrichsohn Cooperage
Site # 5-46-045
Waterford, New York
Work Assignment # D-004439-15

DRAFT

Remedial Investigation/Feasibility Study Work Plan

July 2009

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1. Introduction

The New York State Department of Environmental Conservation (NYSDEC) tasked Malcolm Pirnie, Inc. (Malcolm Pirnie) to perform a Remedial Investigation/Feasibility Study (RI/FS) at the Friedrichsohn Cooperage Site (HW 5-46-045), in the Town of Waterford, New York (Figure 1).

The RI/FS will be conducted under the NYSDEC State Superfund Standby Contract No. D004439-15. This RI/FS consists of the following three tasks:

- Task 1 – Schedule 2.11s and Executive Summary
- Task 2 – Remedial Investigation
- Task 3 – Feasibility Study

A brief summary of these tasks is included in Section 2.

1.1. Work Plan Development

Malcolm Pirnie has prepared this Work Plan following acceptance of the Work Assignment issued by the NYSDEC. The scope of the work generally includes Work Plan development, a remedial investigation, and a feasibility study. This Work Plan provides the following:

- Major tasks and subtasks,
- Site Specific Health and Safety Plan (Appendix A), and
- Community Air Monitoring Plan (Appendix B).

1.2. Site Information

The Friedrichsohn Cooperage site is located at 153-155 Saratoga Avenue in Waterford, New York (Figure 2). Residential properties border the site to the northeast and southwest of the site along Saratoga Avenue. There are residential properties and a commercial property located across Saratoga Avenue from the former Cooperage. The Old Champlain Canal borders the site to the southeast. A wastewater sewer line (part of the Town of Waterford sanitary sewer system) crosses beneath the canal to the west of the site and continues east along the opposite, southeast side of the canal. Based on a review of Town of Waterford drawings of the sewer line, this sewer line is below the water table in this area.

The town ballpark (recreational facility) is approximately 500 feet southeast of the site, and a small wetland is located directly west of ballpark (Figure 1). Samples of the surface soils collected and analyzed by the Town of Waterford in 2009 indicate there is no impact from this site to the playing surface in the ballfields.

A cooperage operated at the site from approximately 1817 to 1991. During its early operations, the cooperage made and refurbished wooden kegs and barrels. When the cooperage closed in 1991, the primary business was refurbishing metal drums. Facilities in the area used the materials shipped in drums in an industrial process. A portion of the contents would remain in each drum. The drums would be sent to the cooperage to be cleaned, repainted and sold. During the cleaning and refurbishing operation some portion of the contents of the drums was spilled, lost, or disposed of. The lost contents from these drums, and components of the cleaning and painting operation, are the contamination now found at the site. Inspection and examination of the Cooperage buildings in 1994 found thousands of drums, some leaking, and the buildings themselves in poor condition.

The United States Environmental Protection Agency (USEPA) conducted an emergency removal action between 1994 and 1996, removing 322.4 tons of contaminated sludge/soil, 9,000 gallons of liquid waste, and 3,767 drums from the property. The buildings were also torn down. This emergency removal action addressed the majority of the exposed wastes present at the site. The site now is a vacant lot.

The NYSDEC installed groundwater monitoring wells on the southeast side of the Old Champlain Canal and across Saratoga Avenue from the site. In April of 2008, consultants working for the NYSDEC collected samples of the soil, surface water, sediment, exposed waste, and groundwater to assess the presence or absence of contamination remaining after the emergency removal action. This investigation identified that wastes are exposed at the surface and contaminants were found in the soils at levels exceeding the Part 375 soil cleanup objectives for unrestricted use. Contaminants were also present in sediments at levels that exceeded the NYSDEC Guidance for Screening Contaminated Sediments and in surface water and groundwater at concentrations exceeding NYS class GA Standards for groundwater.

2. Scope of Work

A brief summary of the RI/FS tasks is included in Section 2.2. Details of each field activity are provided in Section 3.

The scope of work summarized in this Work Plan includes the development and implementation of an RI/FS. The Remedial Investigation (RI) will expand on earlier site investigations and provide a thorough characterization of the nature and extent of contamination. The RI will also provide the necessary data to evaluate interim remedial measures (IRMs), if necessary, and conduct a Feasibility Study (FS). The FS will identify and evaluate possible alternatives available to remediate the site. The FS will also be used as the basis for selecting a preferred remedial alternative.

2.1. RI/FS Objectives

The overall objectives of this RI/FS are to:

- Conduct a site survey and prepare a base map;
- Identify and characterize the overall distribution of contaminants on and adjacent to the site;
- Based on the distribution of contaminants and groundwater flow patterns, determine the hydraulic relationship between the groundwater system, the Old Champlain Canal, the nearby wetlands, and the sewer bedding;
- Evaluate the potential for soil vapor intrusion into select nearby residential homes; and
- Sufficiently characterize the geology and hydrogeology of the site to facilitate the evaluation of interim and final remedial alternatives.

2.2. RI/FS Tasks

A list of the RI/FS tasks is provided below. A summary of the anticipated field activities are provided in Section 3.

Task 1 – 2.11 Package and Executive Summary

- Includes a site visit, scoping session, subcontractor quotation procurement, and development of schedule 2.11 budget package.

Task 2 – Remedial Investigation

Preparation of the RI/FS Work Plan and modification of QAPP and HASP

- Preparation of this RI/FS Work Plan which includes a Site-Specific Health and Safety Plan (HASP) and Community Air Monitoring Plan.
- The pre-approved Generic Quality Assurance Project Plan (QAPP) is on file with NYSDEC and does not need to be modified for this RI/FS.
- Attend two meetings with NYSDEC, New York State Department of Health (NYSDOH), and the public to develop the RI/FS Work Plan tasks.

Site Survey and Basemap Preparation

- A 1-foot topographic survey of the site location and approximately 8 acres surrounding the site
- Survey of relevant site features and monitoring wells.

Geophysical Survey

- Geophysical survey of potential buried metal objects in exterior backyard portions of approximately five properties located along Saratoga Avenue, totaling approximately 0.5-acres using electromagnetic and ground penetrating radar devices.

Well Survey

- Review field notes from previous well survey and evaluate potential locations for additional wells.

Interim Remedial Measure Evaluation

- Continual evaluation of potential interim remedial measures (IRMs). Interim Remedial Measure or IRM means a discrete set of activities to address both emergency and non-emergency site conditions, which can be undertaken without extensive investigation and evaluation, to prevent, mitigate, or remedy human exposure and/or environmental damage or the consequences of human exposure and/or environmental damage attributable to a site. An IRM is an action taken to remove or mitigate contamination which may or may not end up being the final remedy at a site.

Groundwater Monitoring Program

- Installation of five overburden and five weathered bedrock interface monitoring wells, drilled to approximately 30 ft. bgs, and four bedrock monitoring wells, drilled to a maximum depth of 125 ft. bgs.
- Collection of groundwater samples from new and existing monitoring wells.
- Installation of groundwater sampling ports and sampling of groundwater from these ports in five manholes.
- Evaluation of the nature and extent of contamination in the groundwater.

Surface Water Monitoring

- Collection of six surface water samples from the Old Champlain Canal.
- Collection of two surface water samples from the wetland area downgradient of the site.
- Evaluation of the nature and extent of contamination in the surface water.

Water Level Survey

- Measurement of water levels in all on- and off-site monitoring wells.

Soil/Sediment Sampling Program

- Evaluation of the nature and extent of contamination in soil and sediment.

Soil Vapor Survey

- Installation of approximately 12 soil vapor points to four feet below ground surface (bgs).

Soil Vapor Intrusion Study

- Review existing soil vapor intrusion data.
- Collection of indoor air and sub-slab vapor samples from approximately six residences in accordance with the October 2006

NYSDOH Final Guidance for Evaluating Soil Vapor Intrusion in New York State.

Sample Analysis

- Analysis of groundwater, surface water, soil, and sediment samples for TCL Volatile Organic Compounds (VOCs), Semi-volatile Organic Compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), and TAL Metals.

- Analysis of air, sub-slab vapor, and soil vapor samples by USEPA Method TO-15. Air, sub-slab vapor, and soil vapor samples will be collected in individually certified clean canisters.

Follow Up Survey

- Survey of newly installed monitoring wells.

Community Air Monitoring

- Monitoring of air in accordance with NYSDOH guidance.

Remedial Investigation Report

- A Remedial Investigation Report will include a summary of activities, a conceptual site model, tables summarizing physical and analytical results, and conclusions and recommendations. The conceptual site model (CSM) will include a description of the site history, geology, hydrogeology, environmental setting, and nature and extent of contamination. The CSM will also provide an evaluation of contaminant fate and transport, potential human exposure pathways, and environmental concerns. The conclusions and recommendations of the Remedial Investigation Report will discuss whether collection of additional data is required, if a Supplemental RI is necessary, or if sufficient data exists to start the FS.

- Attend two meetings with NYSDEC, NYSDOH, and the public during the RI.

Task 3 - Feasibility Study

Standards, Criteria and Guidance (SCGs)

- SCGs for each contaminant detected and SCGs necessary for evaluation of remedial actions will be identified and compared to existing conditions on and off the site.

Development of Remedial Action Objectives

- Malcolm Pirnie will develop remedial action objectives (RAOs) for all contaminants of concern and affected media and evaluate analytical results relative to appropriate guidance.

Scoping and Development of Remedial Alternatives

- Malcolm Pirnie will attend a scoping meeting to discuss the remedial alternatives applicable to the site. Malcolm Pirnie will prepare a brief letter report discussing the remedial alternatives to be considered along with the conceptual details of the remedial alternative.

Detailed Analysis

- The detailed analysis of the remedial alternatives will include evaluation of the following factors:

  1) Overall protection of human health and the environment;
  2) Compliance with SCGs;
  3) Long-term effectiveness and permanence;
  4) Reduction of toxicity, mobility and volume;
  5) Short-term effectiveness;
  6) Implementation ability; and
  7) Cost.

FS Report Preparation

- An FS report, including discussions of each of the evaluation criteria for each of the alternatives (or technologies) being considered, will be prepared and submitted to NYSDEC. A summary, including a comparative analysis, will also be included in the report. A preferred remedy that is protective of public health and the environment,

complies to the maximum extent practicable with SCGs and cleanup objectives, reflects a preference for treatment over simple disposal, and is cost effective will be recommended. A conceptual plan for implementing the preferred alternative and verifying its feasibility will be prepared. The report will include limited site background and site characterization but will include a conceptual design of the preferred remedy which includes a detailed engineer's cost estimate.

3. Field Activities

The purpose of this RI/FS is to assess the nature and extent of contaminants in soil vapor, soil, sediment, surface water and groundwater, to provide the necessary data to evaluate interim remedial measures (IRMs), if applicable, and prepare an FS. Field activities will be conducted to acquire information necessary to identify, evaluate, and design potential remedial alternatives for the site. Field notes describing each day's activities will be recorded on a Daily Observation Log, which is provided in Appendix C. All soil, sediment, and water samples will be analyzed for TCL VOCs, SVOCs, pesticides, PCBs, and TAL metals as described in Section 4. All air, soil vapor, and sub-slab vapor samples will be analyzed for VOCs using USEPA Method TO-15 as described in Section 4. The approximate number of groundwater, surface water, soil, sediment, indoor air, outdoor air, sub-slab vapor, and soil vapor samples to be collected during the RI/FS are listed in Table 1. Field activities will be conducted in accordance with this Work Plan and, if not specified herein, the Generic QAPP, which is on file with NYSDEC.

3.1. Base Map Development

Malcolm Pirnie will oversee a survey of the site and surrounding area by a New York State Licensed Surveyor. The scope of survey work for the project will be completed in separate mobilizations based on the project schedule, which includes the following:

Mobilization 1

- A 1-foot topographic survey of the site location and surrounding area as shown on Figure 3 (approximately 8 acres).
- Complete survey of the site, to include the location of concrete slabs, adjacent buildings contiguous to the site property, the site fence line, and other site features.
- Survey of the surrounding area to include 9 existing groundwater monitoring wells as well as any relevant surface features, buildings, fences, and visible utilities (including power lines and manholes with invert elevations) within the topographic survey boundary (Figure 3).

Mobilization 2

- A survey of 16 groundwater monitoring wells to be installed during the RI/FS.

The monitoring well locations and site datum will be surveyed in State Plane coordinates (North American Datum of 1983) referenced to a USGS benchmark. All elevations will be in feet referenced to North American Vertical Datum 88 (NAVD 88). The locations shall be surveyed to within 0.1 foot, and elevation shall be surveyed within 0.01 foot.

Upon completion of the survey, a basemap will be developed showing all pertinent survey information (property boundary, buildings/structures, fences, utilities, borings, monitoring wells, etc.).

3.2. Sewer Bedding Sampling

Sewer bedding groundwater sampling points will be installed in the side walls of the sanitary sewer line at four off-site sewer manhole locations as shown on Figure 4. Each sewer point will be installed by drilling a hole, one-inch in diameter, through the side wall of the manhole one to two feet from the bottom. The hole will be advanced to a distance of approximately 1.5 feet beyond the wall. Once the hole is advanced, a monitoring point will be installed. The monitoring point will consist of ¾-inch diameter PVC, one-foot long, 10-slot screen with ¾-inch PVC solid wall pipes. The monitoring point will be inserted into the holes and the annular space surrounding the PVC and sealed with fast drying Portland cement, to prevent the seepage of water into the sewer from the bedding material. After the cement dries, an elbow with compression fittings will be attached at the monitoring point and tubing brought up to within reach of the manhole surface. A "stopcock" valve will be threaded onto the PVC, to allow for the collection of a groundwater sample at the ground surface.

3.3. Geophysical Survey

A geophysical survey firm will evaluate subsurface conditions in the exterior backyard portions of approximately five properties located to the northeast of the Site along Saratoga Avenue, totaling approximately 0.5-acres. The geophysical survey will be implemented to locate potential buried pipelines, utilities (i.e. water supply, sewer, and storm), tanks, and drums that may have been buried in the backyards of residential properties near the Site. Electromagnetic and ground penetrating radar geophysical techniques will be used. The extent of the geophysical survey is shown on Figure 5. A summary report, including scaled maps that show locations and depths of anomalies detected during the survey, will be produced by the geophysical survey firm. The summary report shall also include interpretations of observed anomalies.

3.4. Well Installation

Soil borings will be drilled on off-site properties using hollow-stem auger, air rotary, and water (mud) rotary drilling methods to facilitate the installation of monitoring wells. Five overburden monitoring wells and five weathered bedrock interface wells will be installed using 4.25-inch hollow-stem auger rotary drilling methods to approximately 15 to 30 feet (ft) bgs. Split spoon soil samples will be collected continuously from ground surface to the top of the water table and then every five feet thereafter. The overburden monitoring wells will be constructed using 2-inch diameter schedule 40 PVC with the well screen intersecting the water table and extending to the bottom of the monitoring well. Interface

wells would be screened across the weathered/ competent bedrock interface, and will consist of five-foot long screens.

Four bedrock monitoring wells will be installed using a combination of mud rotary drilling through the overburden and air rotary or mud rotary drilling through bedrock. The selection of which bedrock drilling method to use will be based on NYSDEC consultation, with consideration of public health and safety and potential odor issues. For budgeting purposes it is assumed that the bedrock will be reamed with air rotary methods. Fourteen proposed monitoring well locations are shown on Figure 6. The remaining two monitoring well locations will be determined based on analytical results from the sewer bedding sampling.

A 4-inch permanent PVC riser will be installed into a rock socket, which will be drilled a minimum of 5 feet into competent bedrock. The PVC riser will be grouted in place and allowed to set overnight prior to drilling the remainder of the bedrock monitoring well. The wells may be drilled to a maximum depth of 125 feet bgs but it is expected that most wells will be drilled to less than 70 feet bgs. Because of previous caving problems when existing bedrock wells were drilled, 2-inch diameter schedule 40 PVC wells (10 feet of 10-slot screen) will be placed into the open borehole and appropriately-sized filter-pack sand will be emplaced around the screen to a minimum of 5 feet above the top of the screen.

Drilling mud and soil cuttings will be contained in UN-approved 55-gallon steel drums and stored at the staging area on the Friedrichsohn Cooperage site. The monitoring wells will be developed no sooner than 24 hours following installation by surging and over-pumping with a submersible pump. Well development will be considered complete when temperature, conductivity, and pH have stabilized and a turbidity of less than 50 NTUs has been achieved. Development water will be placed in UN-approved 55-gallon steel drums and stored at the staging area.

MW-1, an existing 4-inch diameter 200-foot deep open hole bedrock monitoring well, has an obstruction at approximately 30 feet bgs (at the top of bedrock). This well will be investigated to evaluate if the obstruction has compromised the well and, if so, the well will be abandoned by grouting in place in accordance with the May 1995 NYSDEC *Groundwater Monitoring Well Decommissioning Procedures* document.

3.5. Groundwater Monitoring

Groundwater samples will be collected from on- and off-site monitoring wells during two separate sampling events. Approximately 24 wells, including the network of existing monitoring wells and new monitoring wells installed as part of the RI/FS, will be included in the groundwater sampling program. Groundwater samples will be collected from each well during two sampling events using USEPA low flow sampling techniques

with a peristaltic pump and analyzed for TCL VOCs, SVOCs, pesticides, PCBs, and TAL Metals. One duplicate sample and one matrix spike/ matrix spike duplicate (MS/MSD) sample will be collected per 20 original samples. One equipment blank sample will be collected per day of sampling if non-dedicated equipment is used. Water levels in on- and off-site monitoring wells included in the groundwater monitoring program will be measured prior to each groundwater sampling event to prepare a groundwater contour map and evaluate groundwater flow patterns at the site.

Malcolm Pirnie will examine the area between the existing wells and the wetland and ballpark to identify groundwater seeps. Water will be sampled from the seeps, if present.

3.6. Surface Water Monitoring

Proposed surface water sampling locations are shown on Figure 7. Six surface water samples will be collected from the Old Champlain Canal during two sampling events conducted concurrently with the groundwater sampling events. Two surface water samples will be collected from the wetland area downgradient of the site. Surface water samples will be analyzed for TCL VOCs, SVOCs, pesticides, PCBs, and TAL Metals.

3.7. Soil/Sediment Sampling

The soil/sediment sampling program will consist of drilling approximately 30 direct-push soil borings and the collection of approximately 21 surface soil samples and 31 sediment cores. Soil sampling procedures are described in the Generic QAPP, which is on file with NYSDEC. All soil samples will be analyzed for TCL VOCs, SVOCs, pesticides, PCBs, and TAL Metals. One duplicate sample and one MS/MSD sample will be collected per 20 original samples. One equipment blank sample will be collected per day of sampling.

3.7.1. Surface Soil Sampling

Surface soil samples will be collected from off-site locations to evaluate surface soil quality (Figure 8). As listed in Table 1, the following surface soil samples will be collected:

- Five background surface soil samples.
- Six on-site surface soil samples.
- Eight surface soil samples associated with the garage at 157 Saratoga Avenue.
- Five surface soil samples in the backyards of residences adjacent to 157 Saratoga Avenue.
- Two surface soil samples in the backyard of the residence at 154 Saratoga Avenue.
- Four surface soil samples in the off-site ballpark area.
- Two surface soil samples from the wetland area downgradient of the site.

3.7.2. Direct-Push Borings

Soil borings will be drilled both on- and off-site using direct-push methods to sample soil (Figure 9). The following soil borings will be advanced:

- 15 soil borings to the northwest of Saratoga Avenue (near the Waterford Health Center) to 5 feet bgs with continuous soil sample collection. Approximately two soil samples from each of these borings will be selected for laboratory analysis.
- Up to 10 of the original 15 locations (based on analytical results) with continuous soil sampling to the top of bedrock which is estimated to be between 15 feet to 35 feet bgs. Approximately four soil samples from each of these borings will be selected for laboratory analysis.
- 15 on-site soil borings to the top of bedrock, estimated to be between 15 feet to 35 feet bgs with continuous soil sample collection. Approximately four soil samples from each of these borings will be selected for laboratory analysis.

A summary of the number of soil samples to be selected for laboratory analysis from each of the above locations is provided in Table 1. Soil cuttings will be contained in UN-approved 55-gallon steel drums and stored at the staging area on the Friedrichsohn Cooperage site. The selection of subsurface soil materials for laboratory analysis will be made in consultation with the NYSDEC and will be based on:

1) Subsurface soil that shows visual signs of contamination; or

2) Subsurface soil that causes a sustained response above the measured background response on a calibrated photoionization screening instrument; or

3) A combination of these conditions.

3.7.3. Sediment Sampling

Sediment cores will be collected at approximately 31 locations in the Old Champlain Canal using direct push and tripod drilling methods (Figure 10). Up to 21 borings will be advanced to collect sediment in the canal overlying the clay liner. Up to five additional borings will be advanced through the clay liner to collect soil samples from directly below the liner. Sediment cores (split-spoon samples) will also be collected from within the site fence using a tripod rig at approximately 5 locations. Malcolm Pirnie and the NYSDEC will coordinate canal access as necessary.

The borings in the center of the canal will be advanced from a floating barge or boat and borings inside the site fence will be advanced with a tripod rig. Before a boring is advanced through the clay liner, a casing will be set in the liner and the water evacuated. After sub-liner soil samples are collected, cement-bentonite grout will be tremmied into the remaining annulus to repair the liner.

Continuous samples will be collected during drilling of the borings. Up to two sediment samples from above the clay liner at each boring location will be selected for laboratory analysis. At the locations where borings are advanced through the clay liner, one clay liner sample and one soil sample from beneath the liner will be selected for laboratory analysis. Recovered sediment and soil not sent for laboratory analysis will be placed in a UN-approved 55-gallon drum and staged at the site.

3.8. Soil Vapor Intrusion Study

Indoor air and sub-slab vapor sampling will be conducted at approximately six properties near the site. The overall goal of the indoor air sampling program is to evaluate the potential for vapor intrusion into these residences and potential human exposure to VOCs known to be present in groundwater at the site. The SVI work will be conducted during the 2009-2010 heating season and will build on the information collected during the 2008-2009 heating season. The information developed from the sampling and analysis will be used to evaluate the need for mitigation measures at each structure and if necessary the design and installation of mitigation systems, such as a sub-slab depressurization system. Air and sub-slab vapor sampling procedures are provided in Appendix D. The analyte list, method detection limits, and reporting limits are provided in Table 2.

3.9. Soil Vapor Survey

Soil borings will be drilled at approximately 12 on- and off-site locations using direct-push methods to sample soil and to install soil vapor sampling points. Proposed soil vapor sampling point locations are shown on Figure 11. The actual locations of the points will be dependent on the locations of subsurface utilities and other field conditions. The target depth for each of the soil vapor points will be the basement floor level of the adjacent residential structures or just above the groundwater table, whichever is shallower. The soil vapor points will be installed using a direct-push drilling rig to advance a borehole and collect soil samples continuously to the target depth. Upon reaching the target depth, a six-inch small-diameter stainless steel screen attached to Teflon or Teflon-lined tubing will be lowered to the bottom of the borehole. The bottom one-foot of the borehole will then be backfilled with clean silica sand. The remaining borehole annulus will be backfilled to the surface with hydrated bentonite. The point will be completed with a flush mount casing. Soil vapor sampling and analysis will then be conducted using the same methods and procedures as those for sub-slab soil vapor sampling. Helium will be used as a tracer gas to test the integrity of the soil vapor sampling points.

3.10. Field Equipment Decontamination Procedure

This procedure describes the methods used to decontaminate non-dedicated sampling equipment (excluding pumps) and sample processing tools for the Friedrichsohn Cooperage Remedial Investigation/Feasibility Study. This procedure specifically addresses equipment used to collect soil, sediment, groundwater and surface water samples.

3.10.1. Equipment and Supplies

The following equipment will be used to decontaminate equipment and tools used to collect soil, sediment and water samples:

1. Tap water for initial cleaning and rinsing of equipment.
2. De-ionized water for final rinsing of equipment after tap water or solvent rinse.
3. Non-phosphate detergent (e.g., Alconox™) for cleaning equipment.
4. Dishwashing detergent to remove oily or organic residue.
5. Nitric acid as a 1% solution for removing metal contaminants from equipment
6. Isopropyl alcohol
7. Organic solvent for final cleaning of equipment (e.g., hexane or equivalent)
8. Personnel protective equipment (PPE) - including disposable gloves (Nitrile preferred), disposable wipes, eye wash system, first aid kit, and waterproof outerwear (if necessary).
9. Re-sealable buckets approved for waste collection and transportation.
10. Squirt bottles for water, alcohol, and solvents.
11. Brushes for cleaning equipment.
12. Field notebooks, pens, pencils, and digital camera to document decontamination procedures.

3.10.2. Decontamination Guidelines

1. Non-dedicated soil and water sampling and processing equipment should be decontaminated between sampling intervals and between locations.

2. All solvents must be captured and disposed of in appropriate, labeled, soil or aqueous waste containers. All instruments that come into contact with the sample water must be cleaned in the same manner as the sampling device.

3. Liquids collected into the chemical waste container must be discarded in an appropriate waste stream.

4. Staff performing decontamination procedures are required to wear appropriate PPE, gloves (*e.g.*, Nitrile) and eye protection.

5. Care should be taken during cleaning to prevent cleaning solution contact with clothing. If circumstances dictate that contact will occur (*e.g.*, high wind), waterproof outer clothing (e.g., foul weather gear or rain gear) and face shields must be worn.

6. The project work plan may designate collection of equipment rinse samples to document effectiveness of cleaning.

7. This Work Plan does not address radioactive waste decontamination, PPE for radioactive waste, or disposal of radioactive contaminated waste material.

3.10.3. Decontamination Procedure

1. Disassemble item(s) (if necessary).

2. Rinse each item with tap water.

3. Thoroughly scrub the item with a brush and soapy water, using non-phosphate detergent such as Alconox™ for non-oily residue, or a detergent for items with oily or other sticky organic residue.

4. During the scrubbing process, be sure to bleed Alconox™ solution or equivalent through small passageways/nozzles/vents, etc.

5. Rinse the item with tap water to remove all residual soap. Be sure to bleed tap water through small passageways/nozzles/vents, etc.

6. Rinse the item with 10% nitric acid to remove residual metals. Be sure to bleed 10% nitric acid through small passageways/nozzles/vents, etc.

7. Rinse the item with de-ionized water. Be sure to bleed de-ionized water through small passageways/nozzles/vents, etc.

8. Rinse the item with isopropyl alcohol. Be sure to bleed isopropyl alcohol through small passageways/nozzles/vents, etc.

9. Rinse the item with de-ionized water. Be sure to bleed de-ionized water through small passageways/nozzles/vents, etc.

10. Rinse the item with organic solvent (*e.g.*, hexane or equivalent). Be sure to bleed organic solvent through small passageways/nozzles/vents, etc.

11. Rinse the item with de-ionized or analyte-free water and allow to air dry. Be sure to bleed de-ionized or analyte-free water through small passageways, nozzles, vents, etc.

12. Re-assemble item(s) (if necessary).

13. Wrap the item(s) in aluminum foil or plastic bag to protect it until it is used.

3.10.4. Reference

American Society for Testing and Materials (ASTM), 1994. Standard Practice for Decontamination of Field Equipment Used at Nonradioactive Waste Sites. Designation: D 5088 – 90.

3.11. Community Air Monitoring

Community air monitoring will be conducted in accordance with NYSDOH guidance as summarized in Appendix B.

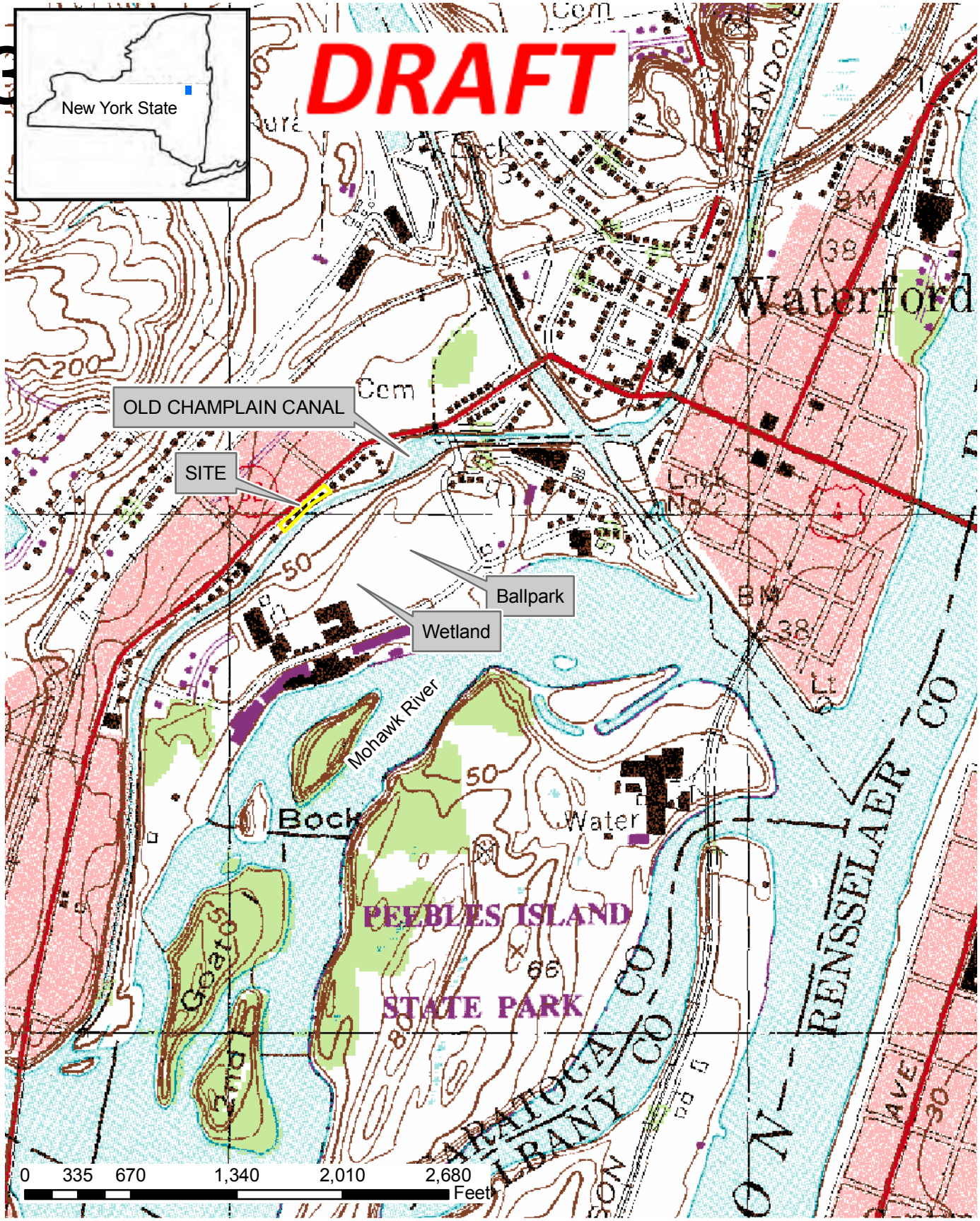
4. Laboratory Analysis and Data Validation

The approximate number of groundwater, surface water, soil, sediment, indoor air, outdoor air, sub-slab vapor, and soil vapor samples to be collected during the RI/FS are listed in Table 1. Analyses will be performed by a NYSDOH Environmental Laboratory Approval Program (ELAP) certified laboratory. Air, soil vapor, and sub-slab vapor samples will be analyzed using USEPA Method TO-15 for the compounds listed in Table 2. The indoor air, sub-slab vapor, and soil vapor sample analyses will achieve minimum reporting limits of less than 1 microgram per cubic meter ($\mu g/m^3$) for each compound except for Trichloroethene and Carbon Tetrachloride, which will have a minimum reporting limit of 0.25 $\mu g/m^3$, and 1,2,4-Trichlorobenzene, 2,2,4-Trimethylpentane, Hexachloro-1,3-butadiene, and t-Butyl Alcohol (TBA), which will have a minimum reporting limit of slightly greater than 1 $\mu g/m^3$. Soil and groundwater samples will be analyzed for VOCs by USEPA Method 8260B, SVOCs by USEPA Method 8270C, pesticides by 8081A (soil) or 608 (water), PCBs by USEPA Method 8082 (soil) or 608 (water) and TAL metals by method 6010B (soil) or 200.7 (water).

The collection and reporting of reliable data is a primary focus of the sampling and analytical activities. Laboratory and field data will be reviewed to ensure that the procedures are effective and that the data generated provides sufficient information to achieve the project objectives. Limitations of the data will also be noted. A qualified independent third party will evaluate the laboratory analytical data according to NYSDEC-Division of Environmental Remediation Data Usability Summary Report guidelines.

Figures

MALCOLM PIRNIE



Source: Earthvisions US Terrain Series: Troy North Quadrangle

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FRIEDRICHSOHN COOPERAGE SITE
TOWN OF WATERFORD, SARATOGA COUNTY, NY

SITE LOCATION

JULY 2009

FIGURE 1

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Source: High Resolution Orthoimagery, 2007, GIS Clearinghouse.

MALCOLM PIRNIE

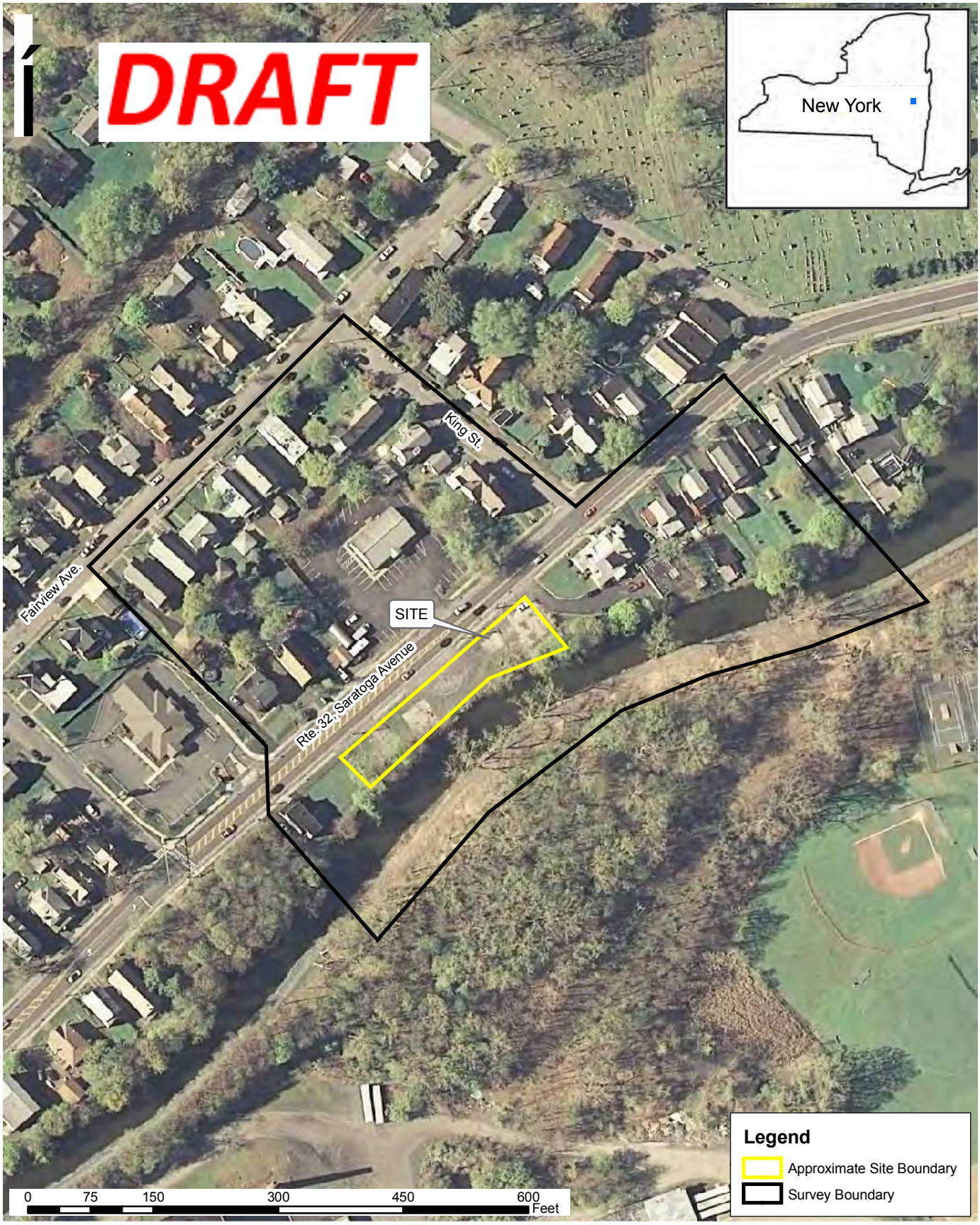
FRIEDRICHSOHN COOPERAGE SITE
TOWN OF WATERFORD, SARATOGA COUNTY, NY

SITE MAP

JULY 2009

FIGURE 2

M:\GISMOD\0266382\0266382\SiteMap.mxd



Source: High Resolution Orthoimagery, 2007, GIS Clearinghouse.

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FRIEDRICHSOHN COOPERAGE SITE
TOWN OF WATERFORD, SARATOGA COUNTY, NY

BASE MAP DEVELOPMENT BOUNDARY

JULY 2009

FIGURE 3

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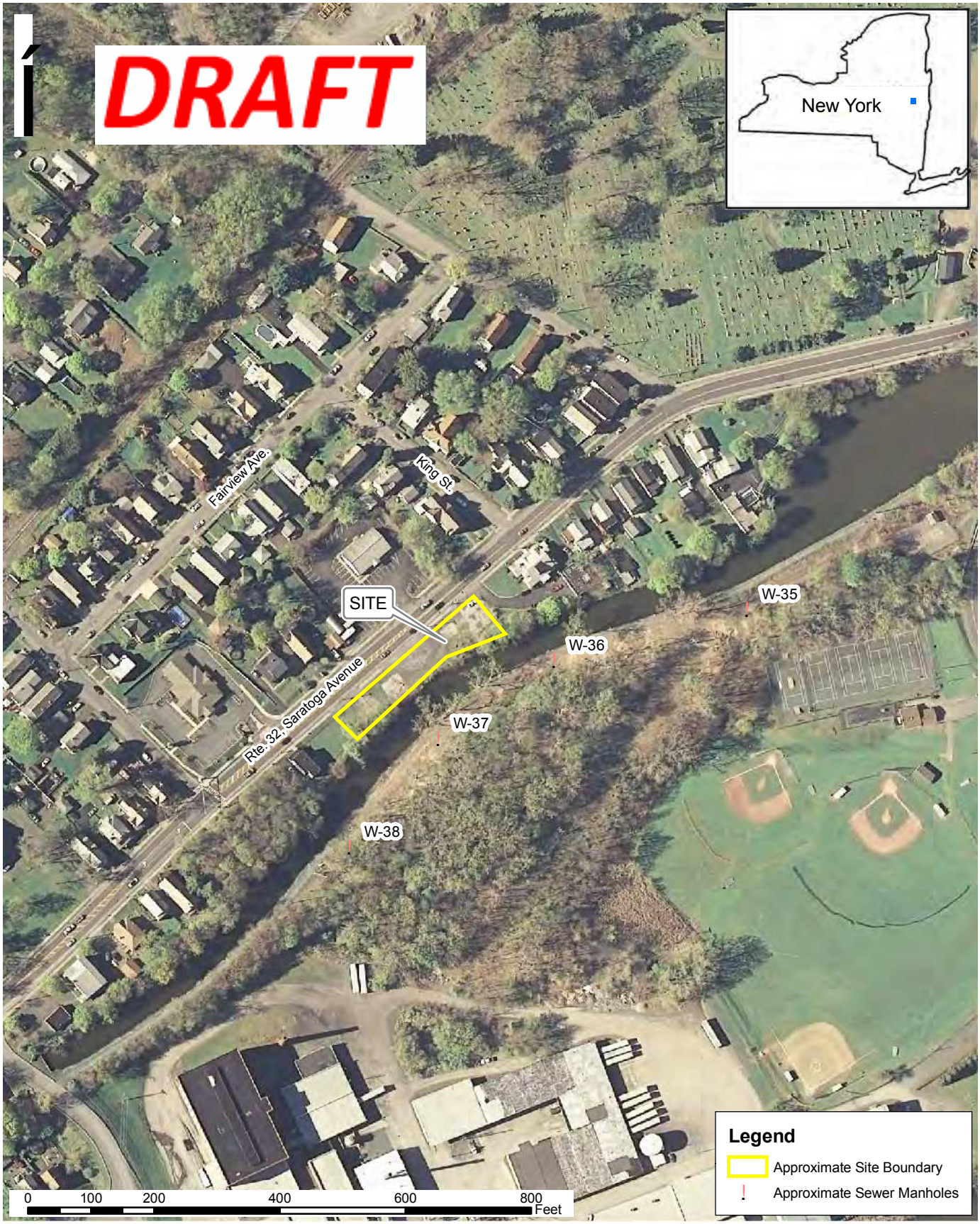

Source: High Resolution Orthoimagery, 2007, GIS Clearinghouse.

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FRIEDRICHSOHN COOPERAGE SITE
TOWN OF WATERFORD, SARATOGA COUNTY, NY

APPROXIMATE MANHOLE LOCATIONS

JULY 2009

FIGURE 4

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Source: High Resolution Orthoimagery, 2007, GIS Clearinghouse.

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FRIEDRICHSOHN COOPERAGE SITE
TOWN OF WATERFORD, SARATOGA COUNTY, NY

GEOPHYSICAL SURVEY BOUNDARY

JULY 2009

FIGURE 5

M:\GISMOD\0266382\Sitemap3.mxd

Source: High Resolution Orthoimagery, 2007, GIS Clearinghouse.

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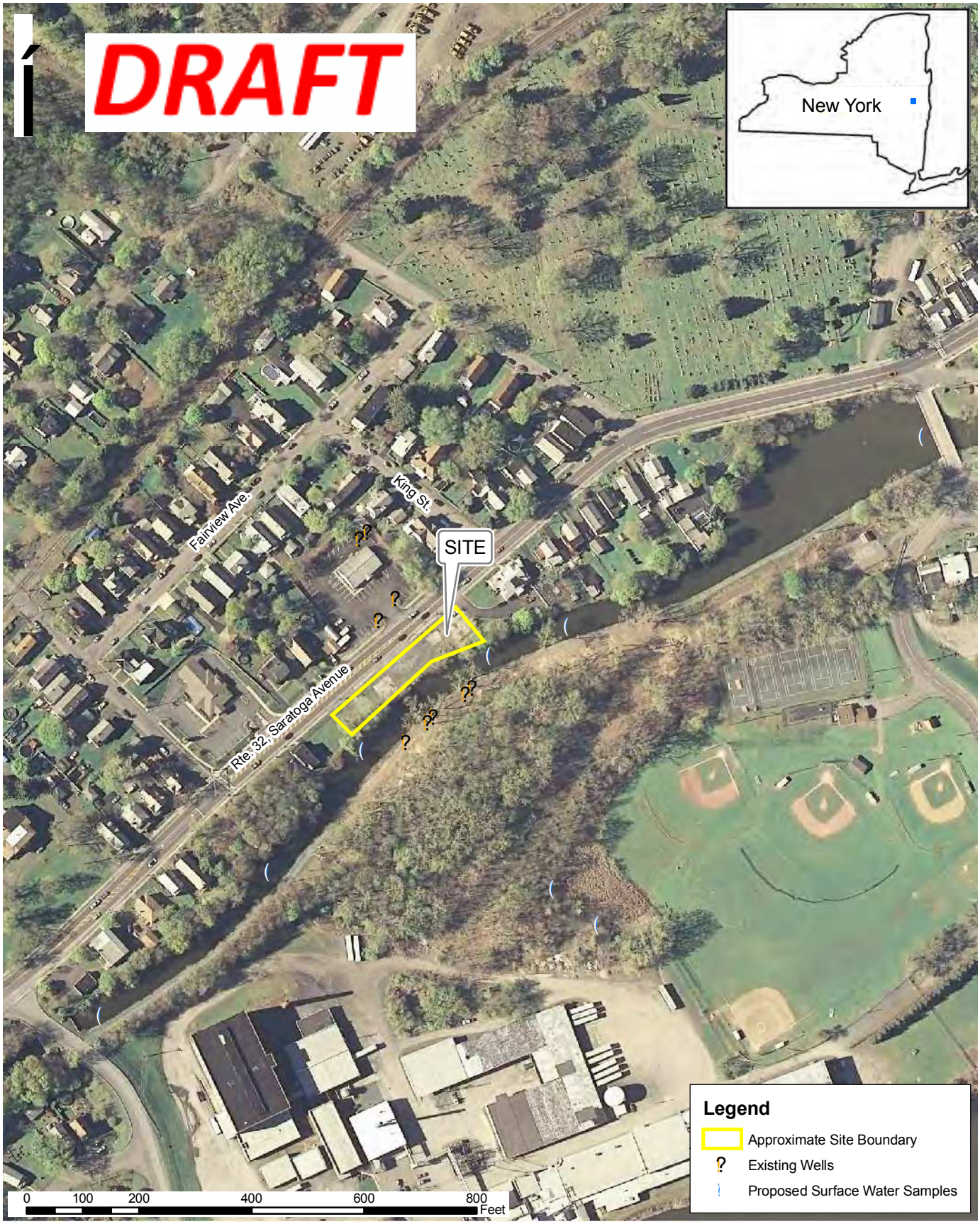
FRIEDRICHSOHN COOPERAGE SITE
TOWN OF WATERFORD, SARATOGA COUNTY, NY

PROPOSED WELL LOCATIONS

JULY 2009

FIGURE 6



Source: High Resolution Orthoimagery, 2007, GIS Clearinghouse.

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FRIEDRICHSOHN COOPERAGE SITE
TOWN OF WATERFORD, SARATOGA COUNTY, NY

PROPOSED SURFACE WATER SAMPLING LOCATIONS

JULY 2009

FIGURE 7

M:\02663820\266382\Sitemap3.mxd

Source: High Resolution Orthoimagery, 2007, GIS Clearinghouse.

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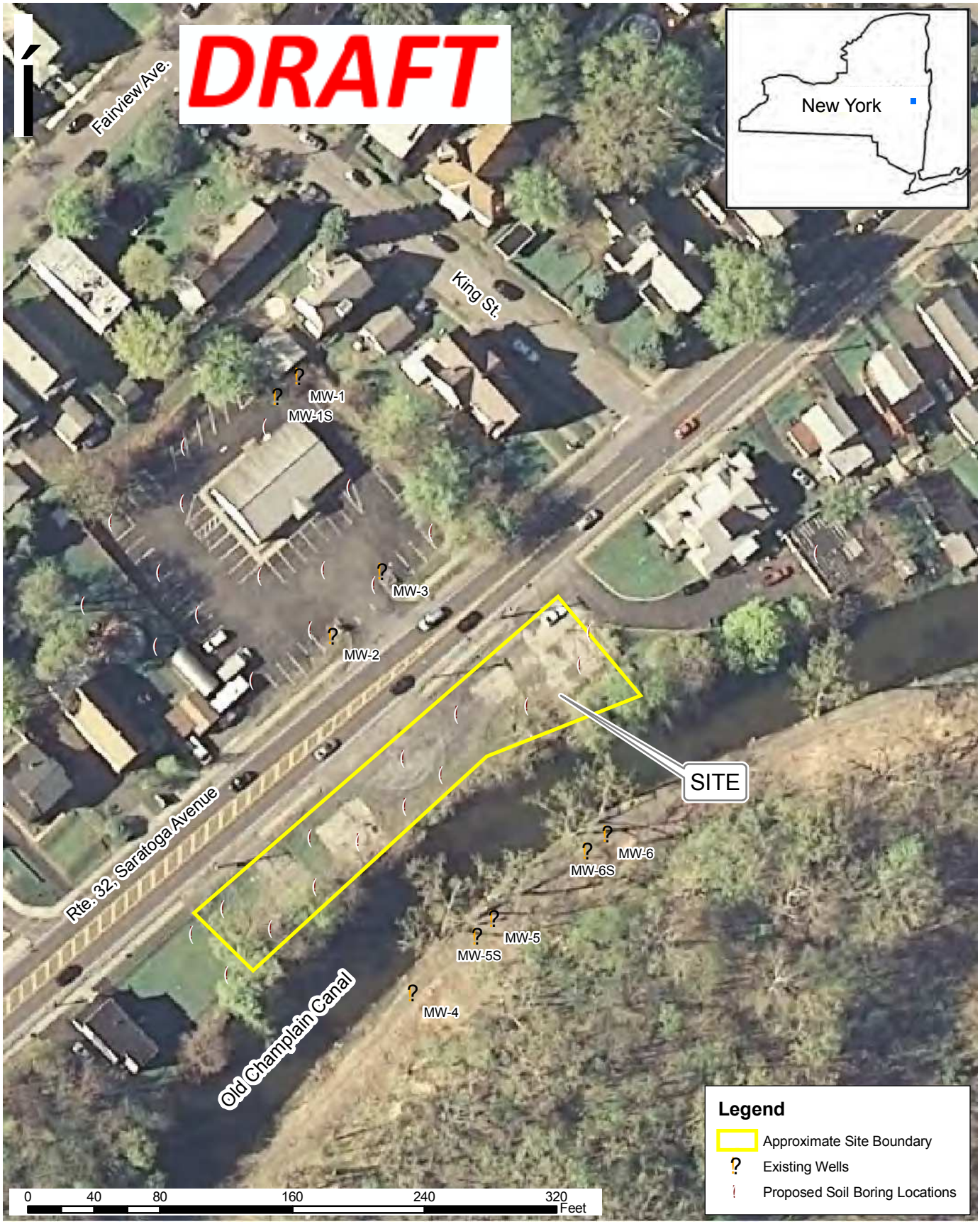
FRIEDRICHSOHN COOPERAGE SITE
TOWN OF WATERFORD, SARATOGA COUNTY, NY

PROPOSED SURFACE SOIL SAMPLING LOCATIONS

JULY 2009

FIGURE 8

M:\GISMOD\0266382\0266382\SurfaceSoil.mxd



Source: High Resolution Orthoimagery, 2007, GIS Clearinghouse.

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FRIEDRICHSOHN COOPERAGE SITE
TOWN OF WATERFORD, SARATOGA COUNTY, NY

PROPOSED DIRECT-PUSH SOIL BORING LOCATIONS

JULY 2009

FIGURE 9

M:\GISMOD\0266382\0266382\SoilBorings.mxd

Source: High Resolution Orthoimagery, 2007, GIS Clearinghouse.

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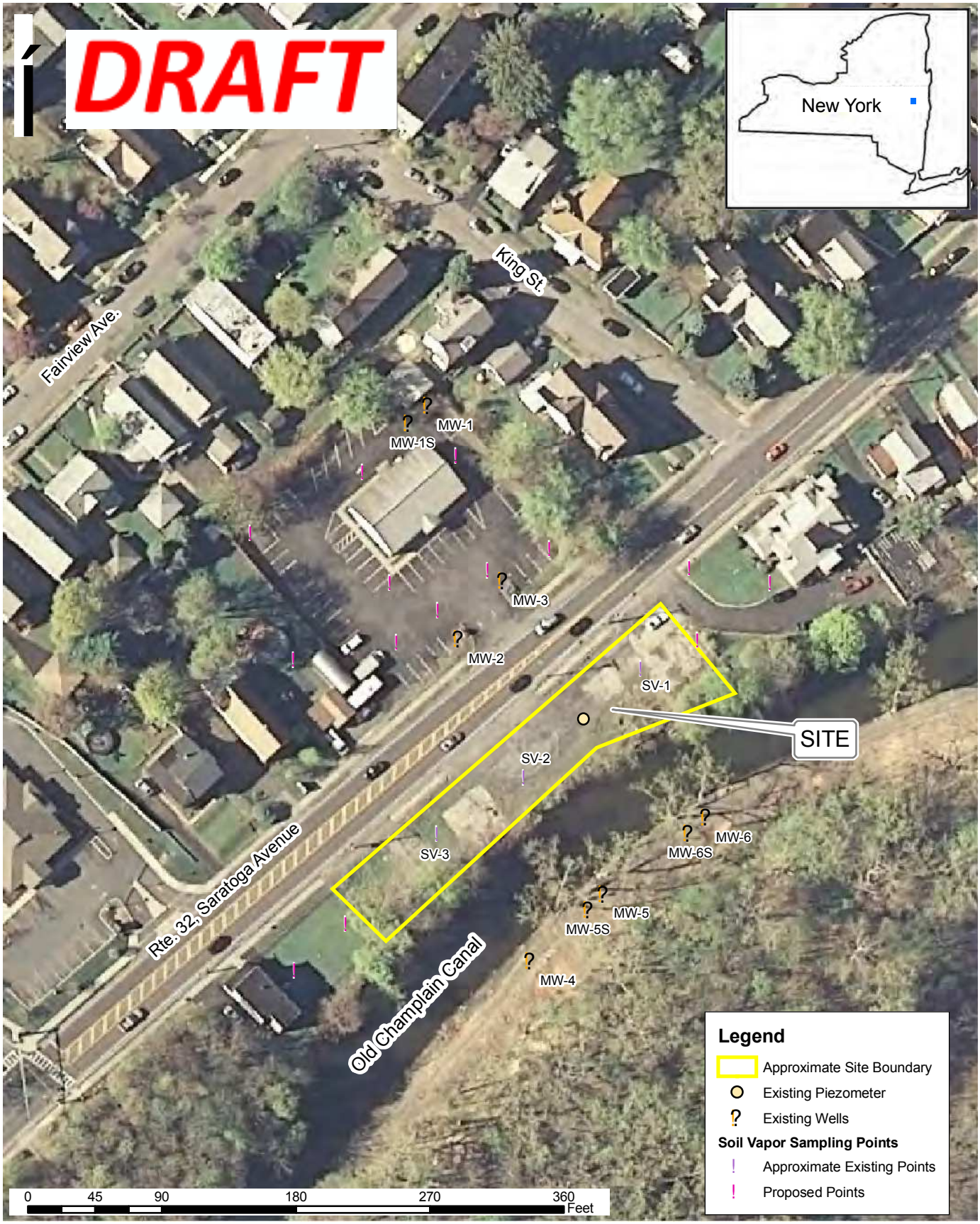
FRIEDRICHSOHN COOPERAGE SITE
TOWN OF WATERFORD, SARATOGA COUNTY, NY

PROPOSED SEDIMENT SAMPLING LOCATIONS

JULY 2009

FIGURE 10

M:\GISMOD\0266382\0266382\Sitemap3.mxd



Source: High Resolution Orthoimagery, 2007, GIS Clearinghouse.

M:\GISMOD\0266382\0266382\SoilVapor.mxd

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FRIEDRICHSOHN COOPERAGE SITE
TOWN OF WATERFORD, SARATOGA COUNTY, NY

PROPOSED SOIL VAPOR SAMPLING POINTS

JULY 2009

FIGURE 11

New York State Department of Environmental Conservation
RI/FS Work Plan - Friedrichsohn Cooperage Site # 5-46-045

Tables

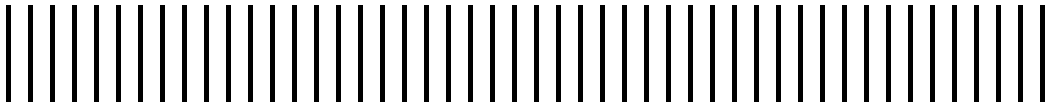

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Table 1
Approximate Number and Type of RI/FS Samples to be Collected
Friedrichsohn Cooperage Site
Waterford, New York

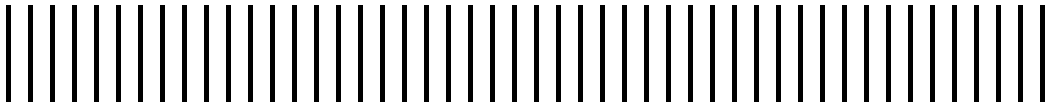
Sample Type	Approximate Number of Soil/Sediment Samples	Approximate Number of Aqueous Samples	Approximate Number of Air/Soil Vapor Samples
Groundwater			
Monitoring Wells		50	
Groundwater Seeps		6	
Manhole Sewer Bedding Groundwater		8	
Duplicate		3	
Matrix Spike/Matrix Spike Duplicate		6	
Trip Blank		8	
Surface Water			
Canal Water		12	
Wetland Water		4	
Duplicate		1	
Matrix Spike/Matrix Spike Duplicate		2	
Trip Blank		3	
Soil			
Well Installation	0		
Initial Health Center Direct-push Borings	30		
Follow-up Health Center Direct-push Borings	40		
On-site Direct-push Borings	60		
Garage - 157 Saratoga Ave Surface Soil	8		
Backyard Surface Soil	7		
Background Surface Soil	5		
Ballpark Surface Soil	4		
Wetland Soil	2		
On-site Surface Soil	6		
Duplicate	9		
Matrix Spike/Matrix Spike Duplicate	18		
Field/Equipment Blank		15	
Sediment			
Canal Sediment	62		
Duplicate	4		
Matrix Spike/Matrix Spike Duplicate	8		
Field/Equipment Blank		10	
Air/Sub-slab Vapor/Soil Vapor			
Indoor Air			12
Ambient (Outdoor) Air			4
Sub-slab Vapor			6
Duplicate			3
Soil Vapor			14
Summary			
Groundwater	*0*	*81*	*0*
Surface Water	*0*	*22*	*0*
Soil	*189*	*15*	*0*
Sediment	*74*	*10*	*0*
Air/Sub-slab Vapor/Soil Vapor	*0*	*0*	*39*
Total	**263**	**128**	**39**

Table 2
Volatile Organic Compounds (VOCs)
EPA Method TO-15 Analyte List
Air Toxics, Ltd.

	Compound	CAS Number	Method Detection Limit (ug/m^3)	Reporting Limit (ug/m^3)
1	1,1,1-Trichloroethane	71-55-6	0.18	0.55
2	1,1,2,2-Tetrachlorethane	79-34-5	0.18	0.70
3	1,1,2-Trichloro –1,2,2-trifluoroethane (FREON 113)	76-13-1	0.22	0.78
4	1,1,2-Trichloroethane	79-00-5	0.12	0.55
5	1,1-Dichloroethane	75-35-3	0.16	0.41
6	1,1-Dichloroethene	75-35-4	0.16	0.40
7	1,2,4-Trichlorobenzene	120-82-1	0.12	3.8
8	1,2,4-Trimethylbenzene	95-63-6	0.095	0.5
9	1,2-Dibromoethane	106-93-4	0.55	0.78
10	1,2-Dichlorobenzene	95-50-1	0.13	0.61
11	1,2-Dichloroethane	107-06-2	0.16	0.41
12	1,2-Dichloropropane	78-87-5	0.12	0.47
13	1,3,5-Trimethylbenzene	108-67-8	0.090	0.50
14	1,4-Dichlorobenzene	106-46-7	0.17	0.61
15	1,4-Dioxane	123-91-1	0.11	0.37
16	2-Butanone (MEK)	78-93-3	0.22	0.30
17	1.3-Dichlorobenzene	541-73-1	0.21	0.61
18	2,2,4-Trimethylpentane	540-84-1	NA	2.4
19	Benzene	71-43-2	0.088	0.32
20	Benzyl Chloride	100-44-7	0.17	0.53
21	Bromodichloromethane	75-27-4	0.20	0.68
22	Bromoform	75-25-2	0.35	1.0
23	Bromomethane	74-83-9	0.26	0.39
24	Carbon tetrachloride	56-23-5	0.013	0.13
25	Chlorobenzene	108-90-7	0.066	0.47
26	Chloroethane	75-00-3	0.10	0.27
27	Chloroform	67-66-3	0.18	0.50
28	Cyclohexane	110-82-7	0.11	0.35
29	Chloromethane	74-87-3	0.073	0.21
30	cis-1,2-Dichloroethene	156-59-2	0.20	0.40
31	cis-1,3-Dichloropropene	10061-01-5	0.15	0.46
32	Dibromochloromethane	124-48-1	0.24	0.86
33	Dichlorodifluoromethane	75-71-8	0.31	0.50
34	Ethanol	64-17-5	0.19	0.96
35	Ethylbenzene	100-41-4	0.20	0.44
36	FREON 114 (1,2-Dichlorotetrafluoroethane)	76-14-2	0.28	0.71
37	n-Hexane	110-54-3	0.10	0.36
38	Hexachloro-1,3-butadiene	87-68-3	0.37	5.4
39	4-Methyl-2-pentanone (MIBK)	108-10-1	0.083	0.42
40	Methyl t-Butyl Ether	1634-04-4	0.18	0.37
41	Methylene Chloride	75-09-2	0.10	0.71
42	Styrene	100-42-5	0.043	0.43
43	t-Butyl Alcohol (TBA)	75-65-0	NA	1.5
44	Tetrachloroethene	127-18-4	0.22	0.69
45	Toluene	108-88-3	0.10	0.38
46	m,p-Xylenes	108-38-3,106-42-3	0.075	0.44
47	o-Xylenes	95-47-6	0.097	0.44
48	Trans-1,2-Dichloroethene	156-60-5	0.22	0.40
49	Trans-1,3-Dichloropropene	10061-02-6	0.23	0.46
50	Trichloroethene	79-01-6	0.006	0.11
51	Trichlorofluoromethane (FREON 11)	75-69-4	0.12	0.57
52	Vinyl Chloride	75-01-4	0.16	0.26

New York State Department of Environmental Conservation
RI/FS Work Plan - Friedrichsohn Cooperage Site # 5-46-045

Appendix A:
Site-specific Health & Safety Plan



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HEALTH AND SAFETY PLAN

All requirements of the Pirnie Health and Safety Program are Incorporated into this Document by Reference

PROJECT NAME:	Friedrichsohn Cooperage Site # 5-46-045
SITE ADDRESS:	153-155 Saratoga Avenue, Waterford, NY
PIRNIE PROJECT AND TASK NUMBER:	0266382
CLIENT ORGANIZATION:	NYSDEC Work Assignment # D-004439-15
CLIENT ON-SITE CONTACT NAME:	
CLIENT SITE CONTACT PHONE No:	
CLIENT OFF-SITE CONTACT NAME:	Dan Eaton
CLIENT OFF-SITE CONTACT PHONE No:	518-427-5019

☐ **AMENDMENT TO EXISTING APPROVED HASP** | **EXISTING HASP AMENDMENT NUMBER**

SITE TYPE: *Check as many as applicable. Add more if needed.*

☐ Active ☑ Secure ☐ Enclosed space ☐ Uncontrolled ☐ Recovery ☐ Unknown ☐ Other *(Specify)*

☑ Inactive ☐ Unsecured ☐ Landfill ☐ Industrial ☐ Well Field ☐ Military ☐ Other *(Specify)*

EMERGENCY CONTACTS	PHONE
Water Supply:	518-237-0422
Electric Supply:	1-800-892-2345
EPA Release Report #:	1-800-424-8802
Pirnie H&S Emergency #:	800-478-6870 914-557-0004
Facility Management:	NA
Other (Specify):	NA

MEDICAL EMERGENCY	PHONE
Hospital Name:	Samaritan Hospital
Hospital Address:	2231 Burdett Avenue
Name of Contact at Hospital:	
Name of 24 Hour Ambulance:	-911

EMERGENCY CONTACTS	NAME	PHONE
Health and Safety Director:	Charles Myers	914-641-2610
Project Manager:	Dan Lang	518-250-7358
Site Safety Coordinator:	Mark Flusche	518-250-7322
Client contact:	Dan Eaton	518-427-5019
Other (Specify):		
State Spill Number:	NYSDEC Spill Hotline	518-457-7362
fire Department:	Northside Fire District	518-235-5830 or 911
Police Department:	Waterford Police Department	518-237-3341 or 911
State Police:	New York State Police Troop G	518-783-3211 or 911
Health Department:	NYS Dept. of Health (Saratoga Cty)	518-584-7460
Poison Control Center:	NYS PCC	1-800-222-1222
Occupational Physician:		

Route and distance to hospital:

See Figure 2. Approx. 13 minutes. 5.5 miles.

HEALTH AND SAFETY PLAN APPROVALS *Not valid if not signed by Corporate H&S*

	PRINTED NAME	SIGNATURE
Prepared by:	**Danielle Giroux**	
PM Signature:	**Daniel Lang**	
Corporate H&S	**Charles Myers**	
Local H&S Coordinator	**Aaron Bobar**	

HEALTH AND SAFETY PLAN

All requirements of the Pirnie Health and Safety Program are Incorporated into this Document by Reference

OBJECTIVES OF FIELD WORK: *(e.g. collect surface soil samples)*

1. Drill soil borings and collect surface and subsurface soil samples.
2. Collect sediment samples from wetlands and canal.
3. Install monitoring wells and collect groundwater samples.
4. Collect air samples.
5. Install sewer bedding water collection points.
6. Collect surface water samples.

SITE HISTORY: *Summarize known hazardous conditions. Include spills, previous investigations or agency actions, known injuries, etc.*

The site is the former location of the Friedrichsohn Cooperage that operated from 1901 to 1991. It is bordered to the southeast by the Old Champlain Canal. The USEPA conducted an emergency removal action between 1994 and 1996, removing drums and soil, as well as the buildings located on the property. In April 2008, the NYSDEC conducted an investigation to determine whether the USEPA's emergency removal action completed the remedial action for the site. It was determined that contamination still exists in the soil and groundwater that exceeds NYS standards (see page 5 for list of known contaminants). The site is currently a vacant lot with a fence around the perimeter (see Figure 1).

SAFETY NARRATIVE: *Summarize Below*

The site will be investigated by Malcom Pirnie on behalf of the NYSDEC to: 1. Identify the overall distribution of contaminants on and adjacent to the site, 2. Define the limits of the groundwater plume, 3. Determine the hydraulic relationship between the groundwater system, the Old Champlain Canal, the nearby wetlands, and the sewer bedding, and 4. Perform sub-slab and indoor air sampling to evaluate the potential for soil vapor intrusion into residential homes over the plume. Work performed on the Old Champlain Canal will require the use of personal floatation devices. Work performed off-site on surrounding properties (ie. in the Waterford Health Center parking lot) will require the use of caution cones to delineate work zones.

HEALTH AND SAFETY PLAN

All requirements of the Pirnie Health and Safety Program are Incorporated into this Document by Reference

PERSONNEL AND RESPONSIBILITIES	TRAINING	PROJECT OR SITE RESPONSIBILITIES	TASKS
Danielle Giroux	OSHA HAZWOPER 40-hr. training + current 8-hr. refresher	Site Investigation	☐ None ☑ 1 ☑ 2 ☑ 3 ☑ 4 ☐ 5 ☑ 6
Mark Flusche	OSHA HAZWOPER 40-hr. training + current 8-hr. refresher, 8-hr. Site Supervisor Training	Field Team Leader	☐ None ☐ 1 ☐ 2 ☐ 3 ☑ 4 ☑ 5 ☐ 6
Jeremy Wyckoff	OSHA HAZWOPER 40-hr. training + current 8-hr. refresher, CSE training, 8-hr. Site Supervisor Training	Site Investigation	☐ None ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☑ 5 ☐ 6
Elias Moskal	OSHA HAZWOPER 40-hr. training + current 8-hr. refresher, 8-hr. Site Supervisor Training	Site Investigation	☐ None ☑ 1 ☑ 2 ☑ 3 ☑ 4 ☐ 5 ☑ 6
Christine Thomas	OSHA HAZWOPER 40-hr. training + current 8-hr. refresher, 8-hr. Site Supervisor Training	Site Investigation	☐ None ☑ 1 ☑ 2 ☑ 3 ☑ 4 ☐ 5 ☑ 6

HAZARDS OF CONCERN: *Check as many as applicable.*

☐ Animal/ Plants	☑ Dust, Harmful	☐ Falling Objects	☐ Ionizing Radiation	☐ Oxygen Deficient	☐ Traffic (Struck by)
☐ Asbestos/ Lead	☑ Dust, Nuisance	☑ Heat Stress	☐ Light Radiation *(i.e., Welding, High Intensity)*	☐ Poor Visibility	☑ Other: (Print)
☐ Biological	☐ Electrical	☐ Heavy Equipment	☐ Limited Contact	☐ Powered Platforms	Sampling on Water
☐ Chemical Exposure *(See Section 5B/5C)*	☐ Excavations *(See Section 13)*	☐ Heavy Lifting	☐ Motorized Traffic	☐ Radiological	
☐ Cold Stress	☐ Explosive/ Flamable	☐ Heavy Machinery	☐ Moving Parts (LO/TO)	☐ Rolling Objects	
☑ Confined Space *(See Section 12)*	☐ Extreme Cold	☐ Hot Work	☑ Noise (>85cB)	☐ Scaffolding	
☐ Demolition	☐ Fall, >6' Vertical	☐ Hunting Season	☐ Non-Ionizing Radiation	☐ Sharp Objects	
☑ Drilling	☐ Falling Objeccts	☐ Immersion	☑ Organic Chemicals	☐ Slips & Falls	
☑ Drum Handling	☐ Heat Stress	☑ Inorganic Chemicals	☐ Overhead Objects	☐ Terrain	

THIS PLAN INCORPORATES PROCEDURES FOR: (CLICK ON THE RELEVANT TOPIC TO DOWNLOAD THE HAZARD GUIDELINE. DELETE IRRELEVANT TOPICS)

Confined Space Entry
Hazard Communication
Hazardous Waste and Emergency Response
Personal Protective Equipment
Community Air Monitoring Program - See attachment B of the Work Plan

HEALTH AND SAFETY PLAN

All requirements of the Pirnie Health and Safety Program are Incorporated into this Document by Reference

DESCRIPTION OF SITE AND TOPOGRAPHICAL FUTURES:

Include location of principal operations and unusual features (containers, buildings, dikes, power lines, hill slopes, rivers, etc.)

The site is a vacant lot that is generally level and bordered by a chain-linked fence. A portion of the sediment sampling and surface water sampling will occur on and along Champlain Canal, which is approximately 5-feet deep and 20-feet wide. A portion of the soil boring and sampling will occur in the Health Center parking lot across from the Site on Saratoga Ave.

SURROUNDING POPULATION: ☑ Residential ☑ Commercial ☐ Urban ☐ Rural ☐ Industrial ☐ Other

ANTICIPATED ON SITE CHEMICALS AND ESTIMATED QUANTITY

Solids: *(Quantitiy/ Concentration)*		**Sludge:** *(Quantitiy/ Concentration)*		**Solvents:** *(Quantitiy/ Concentration)*		**Oils:** *(Quantitiy/ Concentration)*		**Others:** *(Quantitiy/ Concentration)*	
Flyash		Pigments		Ketones		Oily Wastes		Acids	
Mill or Mine Tailings		Metal Sludges		Aromatics		Gasoline		Pickling Liquiors	
Asbestos		POTW Sludge		Hydrocarbons		Diesel Oil		Caustics	
Ferrous Smelter		Distillation Bottoms		Alcohols		Lubricants		Pesticides	
Non-Ferrous Smelter		Aluminum		Halogenated		Polynuclear Aromatics		Dyes or Inks	
Metals		Other - Specify		Esters		PCBs		Cyanides	
Dioxins				Ethers		Heating Oil		Phenols	
Other - Specify				Other - Specify		Other - Specify		Halogens	
								Other - Specify	

ANTICIPATED WASTE TYPES: ☐ Liquid ☐ Sludge ☐ Unknown ☐ Solid ☐ Gas ☐ Other, specify

FACILITY'S PAST AND PRESENT DISPOSAL METHODS AND PRACTICES, IF APPLICABLE:

There is a container on site formerly held drums containing soil from previous investigations by DEC contractors. Drums containing soil were shipped off site for disposal.

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HEALTH AND SAFETY PLAN

All requirements of the Pirnie Health and Safety Program are Incorporated into this Document by Reference

KNOWN CONTAMINANTS	HIGHEST OBSERVED CONCENTRATION *WHICH MEDIA?*	8 HR TIME WEIGHTED AVERAGE IN AIR (PEL/TLV) *SPECIFY UNITS*	IDLH *SPECIFY UNITS*	WARNING CONCENTRATION IF ANY *SPECIFY UNITS*	SYMPTOMS & EFFECTS OF ACUTE EXPOSURE	MEDIA	PHOTO-IONIZATION POTENTIAL *(FOR VOCs)*
Phenol	160 ppm / sediment	5 ppm / skin	250 ppm		eye irritation, lassitude, muscle ache, kidney damage	SW, S, SD, GW	
PCBs	25,000 ppm / soil	0.5 mg/m3 / skin	5 mg/m3		dermatitis, liver damage	S, SD, GW	
Barium	1,260 ppm / soil	0.5 mg/m3	50 mg/m3		eye, skin irritation, skin burns, muscle irritation	S, GW	
Chromium	452 ppm / soil	0.5 mg/m3	250 mg/m3		eye, skin irritation, lung fibrosis	SW, S, SD, GW	
Lead	2,320 ppm / soil	0.050 mg/m3	100 mg/m3		weakness, insomnia, anorexia, constipation, abdominal pain	SW, S, SD, GW	
Mercury	3.4 ppm / sediment	0.05 mg/m3	10 mg/m3		eye, skin irritation, chest pain, bronchitis	SW, S, SD	
DDT	0.77 ppm / soil	0.5 mg/m3	500 mg/m3		eye, skin irriation, parethesia-tongue, lips, face, anxiety, dizziness	S, SD	
Arsenic	40 ppm / sediment	0.010 mg/m3	5 mg/m3		dermatitis, gastrointestinal pain, ulceration of nasal septum	SW, SD, GW	
cis DCE	1,300 ppb / gw	NA	NA		NA	GW	9.65 eV
Acetone	2,000 ppb / gw	250 ppm	2500 ppm		irritation of eyes, nose, throat, headache, dizziness	SD, GW	9.69 eV
Vinyl Chloride	2,000 ppb / gw	1 ppm	NA		dizziness, drowsiness, eye redness and pain	GW	10 eV

NA = Not Available **NE = None Established** **U = Unknown**

S = Soil SW = Surface Water SD = Sediments
A = Air GW = Ground Water OFF = Off-Site
W = Waste L = Lagoons
D = Drums TK = Tanks

Attach a Material Safety Data Sheet for each chemical you will use at the site

MALCOLM PIRNIE

HEALTH AND SAFETY PLAN

All requirements of the Pirnie Health and Safety Program are Incorporated into this Document by Reference

SPECIFIC TASK DESCRIPTIONS	TASK - SPECIFIC HAZARDS	CONTROL MECHANISM
1. Install soil borings and collect surface and subsurface soil samples.	DRILLING CHEMICAL EXPOSURE (See Section 5B/5C)	1. Work Practices 2. Engineering Controls 3. PPE
2. Collect sediment samples from wetlands and canal.	CHEMICAL EXPOSURE (See Section 5B/5C) Other: Sampling on water, Contact with soil.	1. Work Practices 2. Engineering Controls 3. PPE
3. Install monitoring wells and collect groundwater samples.	DRILLING CHEMICAL EXPOSURE (See Section 5B/5C) Other:	1. Work Practices 2. Engineering Controls 3. PPE
4. Collect air samples.	Other:	1. Work Practices 2. Engineering Controls 3. PPE
5. Install sewer bedding water collection points.	CONFINED SPACE (See Section 12) Other:	1. Work Practices 2. Engineering Controls 3. PPE
6. Collect surface water samples.	CHEMICAL EXPOSURE (See Section 5B/5C) Other: Sampling on/near water.	1. Work Practices 2. Engineering Controls 3. PPE
SPECIALIZED TRAINING REQUIRED: Confined Space Training for Sewer Bedding Installation Points	**SPECIAL MEDICAL SURVEILLANCE REQUIREMENTS:**	

OVERALL HAZARD EVALUATION: ☐ High ☑ Medium ☐ Low ☐ Unknown (Evaluate each hazard)

1. Medium
2. Medium
3. Low
4. Low
5. High
6. Medium

JUSTIFICATION: (i.e., why is this task a low or medium or high hazard?)

1. Proximity to drill rig; contaminant exposure potential.
2. Contaminant exposure potential.
3. Proximity to drill rig; contaminant exposure potential.
4. Limited exposure; closed system.
5. CSE, contaminant exposure potential.
6. Contaminant exposure potential; working on water.

FIRE/EXPLOSION POTENTIAL ☐ High ☐ Medium ☑ Low ☐ Unknown

PROTECTIVE EQUIPMENT — *Specify by task. Indicate type and/or material, as necessary. Group tasks if possible. Use copies of this sheet if needed.*

TASK 1

LEVEL: A - B - C - D - Modified ( ) Primary ( ) Contingency

Respiratory ☑ Not needed
- ☐ SCBA
- ☐ Airline
- ☐ Full Face
  - Specify Cartridge _____
- ☐ Escape Mask
- ☐ Other (specify)_____

Head and Eye ☐ Not needed
- ☑ Safety Glasses
- ☐ Face Shield
- ☐ Goggles
- ☑ Hard Hat
- ☐ Other

Boots ☐ Not needed
- ☑ Leather/Steel-Toe
- ☐ Rubber Overboots
- ☐ Steel Shank
- ☐ Other (specify)_____

Prot. Clothing ☐ Not needed
- ☐ Fully Encapsulating Suit
- ☐ Splash Suit
- ☑ Tyvek Coverall (upgrade to, if necessary)
- ☐ Saranex Coverall
- ☐ Reflective Vest
- ☐ Other (specify)_____

Gloves ☐ Not needed
- ☑ Nitrile
- ☐ Work Gloves
- ☐ Latexs
- ☐ Viton
- ☐ Other (specify)_____

MISC: Specify below
- ☐ Insect Repellent
- ☐ USCG Personal Flotation Device
- ☑ Hearing (specify NRR) ear plugs
- ☑ Sun Screen
- ☐ Other (specify)_____

TASK 2

LEVEL: A - B - C - D - Modified ( ) Primary ( ) Contingency

Respiratory ☑ Not needed
- ☐ SCBA
- ☐ Airline
- ☐ Full Face
  - Specify Cartridge _____
- ☐ Escape Mask
- ☐ Other (specify)_____

Head and Eye ☐ Not needed
- ☐ Safety Glasses
- ☐ Face Shield
- ☐ Goggles
- ☑ Hard Hat
- ☐ Other

Boots ☐ Not needed
- ☑ Leather/Steel-Toe
- ☐ Rubber Overboots
- ☐ Steel Shank
- ☐ Other (specify)_____

Prot. Clothing ☑ Not needed
- ☐ Fully Encapsulating Suit
- ☐ Splash Suit
- ☐ Tyvek Coverall
- ☐ Saranex Coverall
- ☐ Reflective Vest
- ☐ Other (specify)_____

Gloves ☐ Not needed
- ☑ Nitrile
- ☐ Work Gloves
- ☐ Latexs
- ☐ Viton
- ☐ Other (specify)_____

MISC: Specify below
- ☐ Insect Repellent
- ☑ USCG Personal Flotation Device
- ☐ Hearing (specify NRR)_____
- ☑ Sun Screen
- ☐ Other (specify)_____

TASK 3

LEVEL: A - B - C - D - Modified ( ) Primary ( ) Contingency

Respiratory ☑ Not needed
- ☐ SCBA
- ☐ Airline
- ☐ Full Face
  - Specify Cartridge _____
- ☐ Escape Mask
- ☐ Other (specify)_____

Head and Eye ☐ Not needed
- ☑ Safety Glasses
- ☐ Face Shield
- ☐ Goggles
- ☑ Hard Hat
- ☐ Other (specify)_____

Boots ☐ Not needed
- ☑ Leather/Steel-Toe
- ☐ Rubber Overboots
- ☐ Steel Shank
- ☐ Other (specify)_____

Prot. Clothing ☐ Not needed
- ☐ Fully Encapsulating Suit
- ☐ Splash Suit
- ☑ Tyvek Coverall (upgrade to, if necessary)
- ☐ Saranex Coverall
- ☐ Reflective Vest
- ☐ Other (specify)_____

Gloves ☐ Not needed
- ☑ Nitrile
- ☐ Work Gloves
- ☐ Latexs
- ☐ Viton
- ☐ Other (specify)_____

MISC: Specify below
- ☐ Insect Repellent
- ☐ USCG Personal Flotation Device
- ☑ Hearing (specify NRR)_____
- ☐ Sun Screen
- ☐ Other (specify)_____

TASK 4

LEVEL: A - B - C - D - Modified ( ) Primary ( ) Contingency

Respiratory ☑ Not needed
- ☐ SCBA
- ☐ Airline
- ☐ Full Face
  - Specify Cartridge _____
- ☐ Escape Mask
- ☐ Other (specify)_____

Head and Eye ☐ Not needed
- ☑ Safety Glasses
- ☐ Face Shield
- ☐ Goggles
- ☐ Hard Hat
- ☐ Other

Boots ☐ Not needed
- ☑ Leather/Steel-Toe
- ☐ Rubber Overboots
- ☐ Steel Shank
- ☐ Other (specify)_____

Prot. Clothing ☑ Not needed
- ☐ Fully Encapsulating Suit
- ☐ Splash Suit
- ☐ Tyvek Coverall
- ☐ Saranex Coverall
- ☐ Reflective Vest
- ☐ Other (specify)_____

Gloves ☐ Not needed
- ☑ Nitrile
- ☐ Work Gloves
- ☐ Latexs
- ☐ Viton
- ☐ Other (specify)_____

MISC: Specify below
- ☐ Insect Repellent
- ☐ USCG Personal Flotation Device
- ☐ Hearing (specify NRR)_____
- ☐ Sun Screen
- ☐ Other (specify)_____

PROTECTIVE EQUIPMENT — *Specify by task. Indicate type and/or material, as necessary. Group tasks if possible. Use copies of this sheet if needed.*

TASK 5

LEVEL: A - B - C - D - Modified
( ) Primary ( ) Contingency

Respiratory ☑ Not needed
- ☐ SCBA
- ☐ Airline
- ☐ Full Face
  - Specify Cartridge _____
- ☐ Escape Mask
- ☐ Other (specify)_____

Head and Eye ☑ Not needed
- ☑ Safety Glasses
- ☐ Face Shield
- ☐ Goggles
- ☑ Hard Hat
- ☐ Other

Boots ☐ Not needed
- ☑ Leather/Steel-Toe
- ☐ Rubber Overboots
- ☐ Steel Shank
- ☐ Other (specify)_____

Prot. Clothing ☑ Not needed
- ☐ Fully Encapsulating Suit
- ☐ Splash Suit
- ☐ Tyvek Coverall
- ☐ Saranex Coverall
- ☐ Reflective Vest
- ☐ Other (specify)_____

Gloves ☐ Not needed
- ☑ Nitrile
- ☐ Work Gloves
- ☐ Latexs
- ☐ Viton
- ☐ Other (specify)_____

MISC: Specify below
- ☐ Insect Repellent
- ☐ USCG Personal Flotation Device
- ☐ Hearing (specify NRR)_____
- ☑ Sun Screen
- ☐ Other (specify)_____

TASK 6

LEVEL: A - B - C - D - Modified
( ) Primary ( ) Contingency

Respiratory ☑ Not needed
- ☐ SCBA
- ☐ Airline
- ☐ Full Face
  - Specify Cartridge _____
- ☐ Escape Mask
- ☐ Other (specify)_____

Head and Eye ☑ Not needed
- ☐ Safety Glasses
- ☐ Face Shield
- ☐ Goggles
- ☐ Hard Hat
- ☐ Other

Boots ☐ Not needed
- ☑ Leather/Steel-Toe
- ☑ Rubber Overboots (if necessary)
- ☐ Steel Shank
- ☐ Other (specify)_____

Prot. Clothing ☑ Not needed
- ☐ Fully Encapsulating Suit
- ☐ Splash Suit
- ☐ Tyvek Coverall
- ☐ Saranex Coverall
- ☐ Reflective Vest
- ☐ Other (specify)_____

Gloves ☐ Not needed
- ☑ Nitrile
- ☐ Work Gloves
- ☐ Latexs
- ☐ Viton
- ☐ Other (specify)_____

MISC: Specify below
- ☐ Insect Repellent
- ☑ USCG Personal Flotation Device
- ☐ Hearing (specify NRR)_____
- ☐ Sun Screen
- ☐ Other (specify)_____

MONITORING EQUIPMENT: Specify by task. Indicate type as necessary. Attach additional sheets if needed.			
INSTRUMENT	**ACTION GUIDELINES**		**COMMENTS**
Combustible Gas Indicator	0-10% LEL 10-25% LEL >25% LEL	*No explosion hazard* *Potential explosion hazard. Reconsider Work Plan. Proceed Cautiously* *Explosion hazard. Evacuate Immediately. Warn Others.*	☑ Not Needed
Oxygen Indicator	19.5-23.5 % < 19.5% >23.5 %	*Oxygen normal* *Oxygen deficient. Evacuate Immediately. Warn Others.* *Explosion hazard. Evacuate Immediately. Warn Others.*	☑ Not Needed
Radiation Survey Meter	3 x Background: >2mR/hr:	*Notify RSO if unanticipated. Withdraw and await instructions* *Establish Rad Exclusion Zone*	☑ Not Needed
Photoionization Detector 10.6 eV Lamp Type: MiniRAE2000	 0-3 units over ambient 3-5 units over ambient >5 units over ambient	 *0-3 meter units over background, continue work* *If sustained for 5 minutes--reconsider work plan. Proceed with caution.* *If sustained for 5 minutes--evacuate or don respiratory protection*	☐ Not Needed
Flame Ionization Detector Type_____	0-3 units over ambient 3-5 units over ambient >5 units over ambient	*0-3 meter units over background, continue work* *If sustained for 5 minutes--reconsider work plan. Proceed with caution.* *If sustained for 5 minutes--evacuate or don respiratory protection*	☑ Not Needed
Single Gas Type_____	*Specify:*		☑ Not Needed
Respirable Dust Monitor Type: MIE MiniRAM	*Specify:* 0.1 mg/m3 above bkgd 0.15 mg/m3 above bkgd	 *Dust suppression techniques will be employed* *Stop work, re-evaluate activities*	☐ Not Needed
Other *Specify:* Type_____	*Specify:*		☐ Not Needed
Other *Specify:* Type_____	*Specify:*		☐ Not Needed

DECONTAMINATION PROCEDURES

ATTACH SITE MAP INDICATING EXCLUSION, DECONTAMINATION, & SUPPORT ZONES

Personnel Decontamination *Summarize below or attach diagram.* Boot wash containers will be available on-site for decontamination after sediment sampling. Scrub boots using Alconox and rinse with tap water. ☐ Not Needed	**Exclusion Zone** *Summarize below or attach diagram.* see Site Map. Orange caution cones and/or caution tape will be used to delineate work zone. ☐ Not Needed	**Sampling Equipment Decontamination** *Summarize below or attach diagram.* See Figure 1 and Work Plan (Section 3.10) for more detailed information. Equipment decontamination areas will be located within the on-site fence or inside work zones (delineated by caution cones or tape). Clean all equipment with deionized water and alconox, then a 10% nitric acid solution, then isopropyl alcohol, then hexane. Rinse with DI water between steps. Wrap in aluminum foil until ready to use again. ☐ Not Needed
Containment and Disposal Method All decontamination water will be contained in a 55-gallon drum on site and disposed of according to IDW procedures. ☐ Not Needed	**Containment and Disposal Method** ☐ Not Needed	**Containment and Disposal Method** All decontamination water will be contained in a 55-gallon drum on site and disposed of according to IDW procedures. ☐ Not Needed

HAZARDOUS MATERIALS TO BE BROUGHT ONSITE

Preservatives		*Decontamination*		*Calibration*	
☑ Hydrochloric Acid	☐ Zinc Acetate	☑ Alconox ™	☐ Mineral Spirits	☑ 100 ppm isobutylene	☐ Hydrogen Sulfide
☑ Nitric Acid	☐ Ascorbic Acid	☐ Liquinox ™	☑ Hexane	☐ Methane	☐ Carbon Monoxide
☐ Sulfuric Acid	☐ Acetic Acid	☐ Acetone	☑ Isopropanol	☐ Pentane	☐ pH Standards
☐ Sodium Hydroxide	☐ Other:	☐ Methanol	☑ Nitric Acid	☐ Hydrogen	☐ Conductivity
		☐ Methanol	☐ Other:	☐ Propane	☐ Other:

SITE MAP: *Show Exclusion Zone, Contamination Reduction Zone, and Support Zones. Indicate Evacuation and Reassembly Points*

Work zone will be delineated with orange caution cones or caution tape at each sampling location.

HEALTH AND SAFETY PLAN SIGNATURE FORM

Pirnie Health and Safety Plan

All on-site Pirnie personnel must sign this form indicating receipt of the HASP. Keep this original on site as part of the permanent project files. Send a copy to the Health and Safety Lead for your BU.

SITE NAME Friedrichsohn Cooperage

SITE LOCATION: 153-155 Saratoga Avenue, Waterford, NY, 12188

CERTIFICATION:

I understand that I am responsible for my safety and that of others. I agree to comply with the provisions of this HASP for work activities on this project. I agree to report any injuries, illnesses or exposure incidents to the Field Team Leader.

PRINTED NAME	SIGNATURE	DATE

Source: Earthvisions US Terrain Series: Troy North Quadrangle

MALCOLM PIRNIE

FRIEDRICHSOHN COOPERAGE SITE
TOWN OF WATERFORD, SARATOGA COUNTY, NY

HEALTH AND SAFETY PLAN
SITE LOCATION

JUNE 2009

FIGURE 1

M:\GISMOD\0266382\SiteLocation.mxd

Route and distance to Samaritan Hospital
2231 Burdett Ave, Troy, NY
Approximately 13 minutes from Site. 5.5 miles

1. Head south on Saratoga Ave. (1.1 mi)

2. Turn left onto I-787S (2.4 mi).

3. Take exit 9E to merge onto NY-7E toward Bennington/Troy.

4. Continue east on NY-7-Hoosick St (1.7mi)

5. Turn right at Burdett Ave. (0.3 mi)

MALCOLM PIRNIE	FRIEDRICHSOHN COOPERAGE SITE (5-46-045) WATERFORD, NY **HEALTH AND SAFETY PLAN**	**JUNE 2009** **FIGURE 2**

MALCOLM PIRNIE

CONFINED SPACE ENTRY

TABLE OF CONTENTS

1.0 INTRODUCTION

On January 14, 1993, the Occupational Safety and Health Administration (OSHA) released its final standard on confined space entry, 29 CFR 1910.146, "Permit-Required Confined Spaces." The standard (effective June 29, 1993) and its amendments contains specific procedures to protect employees from confined space hazards including provisions for a written Confined Space Entry Program, atmospheric monitoring, an entry permit system, and employee training.

OSHA documents suggest that asphyxiation is the leading cause of confined space fatalities, generally resulted from oxygen deficiency or from exposure to toxic atmospheres. OSHA has also documented many confined space accidents in which the victims were engulfed by solid or liquid material, burned, or crushed or battered by rotating or moving parts inside equipment. Failure to de-energize equipment inside the space before the employee entered was a factor in many of those accidents.

OSHA also has documented a high percentage of confined space accident victims have been would-be rescuers, many times untrained coworkers whose good intentions and poor preparation lead to tragedy. In some cases, the unsuccessful rescuer or rescuers have died while the initial entrant(s) have recovered. This determination is consistent with the finding by the National Institute of Occupational Safety and Health (NIOSH) that "rescuers" accounted for more than 60 percent of confined space fatalities.

OSHA has determined, based upon this information that working in permit-required confined spaces involves significant risks for employees and that the permit-required confined space standard is necessary to alleviate or control such risks.

At Malcolm Pirnie, projects that involve construction, facility and equipment inspections, sewer entries and sampling in tanks and pits have the potential to expose project employees to confined space hazards. These hazards can often be controlled and the risk minimized by carefully planning the task, training employees in proper procedures and emergency response actions, and using the proper equipment and tools. Confined space entry is a team exercise: a team consisting of two or more properly trained and equipped individuals.

2.0 REFERENCES

- OSHA's 29 CFR 1910.146, Permit-required confined spaces
- OSHA's 29 CFR 1926.21(6)(i)-(ii), Safety training and education (confined and enclosed spaces)

3.0 POLICY

The policy statements below have been embedded in the text of this program. They respond to regulatory and business practice issues that impact company operations, and appear in *Italics*.

4.0 SCOPE AND APPLICATION

Procedures and actions pertaining to the entry into confined spaces by Malcolm Pirnie or subcontractors shall comply with the requirements of the OSHA General Industry Standard on Permit-Required Confined Spaces (29 CFR 1910.146).

Confined spaces will only be entered when entry is the only feasible means of completing project tasks.

This Program contains requirements for practices and procedures to protect Malcolm Pirnie employees from:

- Hazards of entry into permit-required confined spaces as defined by this program, and
- Hazards of entry into construction confined or enclosed spaces as defined this program.

This Program applies to all Malcolm Pirnie employees:

- Working in non-permit required confined spaces;
- Working near, but not entering permit-required confined spaces; or,
- Who are entering, attending entries, or supervising entry into permit-required confined spaces or construction confined or enclosed spaces.

The text in this program was developed specifically for internal use by Malcolm Pirnie employees and should not be used as a regulatory compliance document for client guidance.

5.0 PROJECT MANAGEMENT RESPONSIBILITIES

The following project management responsibilities, as they relate to the management of confined space entry activities, and any associated policy statements, summarizes Malcolm Pirnie's confined space roles and responsibilities that are detailed in this program. Responsibilities of the AUTHORIZED ENTRANT, ATTENDANT, and ENTRY SUPERVISOR as they relate to the entry itself can be found in the CONFINED SPACE ENTRY TEAM section

5.1. Identifying Confined Spaces

The **Project Manager** is responsible for identifying projects that involve or are suspected to involve entry into confined spaces by Malcolm Pirnie or subcontractors. Once identified: *your Corporate Health and Safety SBU Leader will be consulted before initiating ANY project with confined space entry tasks.*

5.2. Identifying Permit-Required Confined Spaces

The **Host Employer (client, owner, or general contractor)** is responsible for identifying the location of permit-required confined spaces in their facility and documenting the basis of the classification.

Malcolm Pirnie initially classifies all confined spaces as permit-required until the following criteria are met:

- *The client, complying with the Confined Space Entry Standard has, based upon previous monitoring and experience, designated the space as a non-permit space and has documentation to support it;*
- *A Malcolm Pirnie ENTRY SUPERVISOR classifies the confined space as non-permit required based upon a physical evaluation and repeated monitoring data developed by confined space entry trained employees, and has submitted a Pre-entry Inspection Checklist to the Corporate Health and Safety SBU Leader;*
- *The characteristics that cause the confined space to be classified permit-required have been sufficiently changed, removed or controlled to warrant the change in classification. This change of classification may be proposed by Malcolm Pirnie, its subcontractors or a contractor working in the space but must be approved by the Owner/Controlling employer before taking effect.*

5.3. Written Permit Program

Corporate Health and Safety is responsible for developing and implementing a written permit-required Confined Space Program and making it available to Malcolm Pirnie employees, host employers, the Assistant Secretary of Labor, and subcontractors.

5.4. Completing the Pre-Entry Checklist

The **Project Manager AND the ENTRY SUPERVISOR** are responsible to ensure the Pre-Entry Checklist is completed and submitted to Corporate Health and Safety

Entry Conditions and SOP Development

The **Project Manager AND the Corporate Health and Safety SBU Leader** are responsible for identifying permit conditions and developing and implementing standard operating procedures (SOPs) for entry.

5.5. Equipment

The **Project Manager** is responsible for providing all equipment necessary to ensure employee safety during a confined space entry.

The **ENTRY SUPERVISOR** is responsible for all determining that all the equipment necessary to ensure employee safety during a confined space entry is present on-site and is used in an appropriate manner.

5.6. Non-Permit Entry

The **Host Employer AND Project Manager** is responsible for:

- Verifying the space is safe through a written certification
- Re-evaluating a non-permit space when there are changes in the use or configuration that might increase the hazards to entrants.
- Documenting the basis for determining that all hazards in a permit space have been eliminated.
- Implementing the measures necessary to prevent unauthorized entry.

5.7. Testing and Evaluation

The **ENTRY SUPERVISOR** is responsible for:

- Ensuring conditions in the permit-required confined space have been tested to determine if acceptable entry conditions exist before entry begins.
- Ensuring that the permit-required confined space is tested or monitored as necessary to determine if acceptable entry conditions are being maintained during the course of entry operations
- Re-evaluating the space in the presence of any entrant or their representative who request that the space be reevaluated if they have reason to believe the evaluation may not have been adequate.
- Providing each entrant with monitoring results immediately.
- Making sure there is at least one attendant outside the confined space for the duration of the entry.
- Identifying all Malcolm Pirnie or subcontractors who have roles in a confined space entry and discuss their roles with them.

5.8. Procedure Development

The **ENTRY SUPERVISOR** is responsible for developing the following procedures:

- Summoning rescue and emergency services to rescue entrants from permit spaces.
- Preventing unauthorized personnel from attempting a rescue.
- Preparing, using, and canceling entry permits.
- Concluding the entry after operations have been completed.

The **ENTRY SUPERVISOR** is responsible for**:**

- Coordinating entry operations with contractors.

Corporate Health and Safety is responsible for:

- Issuing permits to ENTRY SUPERVISORS.
- Reviewing entry operations as necessary to correct deficiencies found to exist before subsequent entries are authorized.
- Reviewing the permit space program using the cancelled permits retained for one year and revising the program as necessary.

5.9. Training

The **Project Manager** is responsible for ensuring employee training is conducted:

- Before the employee is first assigned duties related to entry.
- Before there is a change in assigned duties.
- When there is a change in permit space operations that present a hazard in which an employee has not previously been trained.
- When there is reason to believe there are deviations from the permit space entry procedures or there are inadequacies in the employee's knowledge of the procedures.

Corporate Health and Safety is responsible for

- For documenting certification that the employee has completed the necessary training.
- For evaluating employee performance as it pertains to demonstrated knowledge of this program and through Malcolm Pirnie's duties as part of the Confined Space Entry team.

Subcontractors

The **Project Manager AND Corporate Health and Safety** is responsible for:

- Making sure entry is done in compliance with OSHA's Permit-required Confined Space Standard, 29 CFR 1910.146, and if applicable, Malcolm Pirnie's Confined Space Entry Program

- Making the subcontractor aware of the elements that make the space in question a permit space.
- Apprising the subcontractor of any procedures that Malcolm Pirnie and/or the host employer/owner of the space has implemented for the protection of employees of Malcolm Pirnie or subcontractors.
- Coordinating entry operations with the contractor when Malcolm Pirnie and subcontractors will be entering the space simultaneously.
- Debriefing the subcontractor at the conclusion of the entry**.**

6.0 CONFINED SPACE ENTRY TEAM

A safe confined space entry requires a properly trained team of Malcolm Pirnie or subcontractor employees who remain continuously aware of their surroundings, the environment in the confined space, and each other.

OSHA identifies three sets of duties that must be performed by members of the confined space entry team. These duties are divided among three job titles: authorized ENTRANT, ATTENDANT, and the ENTRY SUPERVISOR.

6.1. ENTRANT

The **ENTRANT** is an employee authorized by each employer to enter a permit-required confined space. The ENTRANT has received the appropriate level of confined space entry training and shown competence in carrying out an ENTRANT'S responsibilities.

The responsibilities of an authorized ENTRANT are as follows:

Hazard Recognition - The **ENTRANT** shall:

- Know the chemical, physical, or electrical or mechanical hazards that may be faced during entry.
- Recognize the signs and symptoms of exposure to potential chemical or physical hazards.
- Understand the consequences of exposure to these hazards.

Communication - The **ENTRANT** shall:

- Maintain contact with the ATTENDANT.
- Notify the ATTENDANT when the ENTRANTS intend to leave a permitted space.

Protective Equipment - The **ENTRANT** shall:

- Be knowledgeable in the use of personal protective equipment such as retrieval lines, respirators or protective clothing needed for safe entry and exit.
- Inspect and use personal protective equipment properly.

- Be knowledgeable in the use of external barriers needed to protect entrants from external hazards.

Exit - Authorized **ENTRANT** shall rapidly exit the permit space when:

- The ATTENDANT or ENTRY SUPERVISOR orders evacuation.
- An automatic alarm sounds.
- The authorized ENTRANT perceives that he/she is in danger.

6.2. ATTENDANT

The **ATTENDANT** is an employee authorized by the employer to observe the ENTRANT during entry into a permit-required confined space. The **ATTENDANT** has received the appropriate level of confined space entry training and shown competence in carrying out an **ATTENDANT'S** responsibilities. No confined space entry will be undertaken without the presence of an **ATTENDANT**.

The responsibilities of an authorized ATTENDANT are as follows:

Number of Entrants – The **ATTENDANT** continuously maintains an accurate count of persons in the confined space. The **ATTENDANT** is only assigned to one Confined Space entrance at a time, even if there is an emergency.

Hazard Recognition - The **ATTENDANT** shall:

- Recognize potential chemical, physical, electrical or mechanical confined space hazards, the signs, symptoms and consequences of exposure to these hazards, and report any unusual circumstance to the ENTRY SUPERVISOR.
- Monitor activities inside and outside the confined space and judge if it is safe for the ENTRANTS to remain in the space.
- Monitor the air quality inside the confined space.

Communication - The **ATTENDANT** shall:

- Keep in contact with authorized ENTRANTS during entry.
- Keep in contact with authorized ENTRANTS during entry.
- Order authorized ENTRANTS to evacuate the permit space immediately when:
  - The **ATTENDANT** observes an activity or condition outside the acceptable entry conditions for that confined space.
  - The **ATTENDANT** detects a situation outside the confined space that could endanger the ENTRANTS.
  - The **ATTENDANT** detects an uncontrolled hazard within the confined space.
  - An emergency in a nearby confined space may distract the **ATTENDANT** from his or her responsibilities.

***Rescue* -** The **ATTENDANT** shall:

- Notify 911 or appropriate emergency response team.
- **Never enter the confined space to attempt a rescue of ENTRANTS**.
- Properly use any remote rescue equipment provided and perform any other assigned rescue and emergency duties without entering the confined space.
- Warn, advise or stop unauthorized entrants.

6.3. ENTRY SUPERVISOR

The **ENTRY SUPERVISOR** is an employee authorized by the employer to be responsible for determining if acceptable entry conditions are present at a permit space, for authorizing entry, overseeing entry operations, and for ending the entry. The ENTRY SUPERVISOR has received the appropriate level of confined space entry training, knows the hazards faced during entry including the mode, signs, symptoms, and consequences, has shown competence in carrying out an ENTRY SUPERVISOR'S responsibilities, and is recognized as competent in managing complex field tasks.

The ENTRY SUPERVISOR also may serve as the ATTENDANT or the authorized ENTRANT as long as the ENTRY SUPERVISOR is trained and equipped as required for each role he/she fills.

***Entry Authorization and Supervision* - The ENTRY SUPERVISOR shall:**

- Verify that the information on the Pre-entry Inspection Checklist accurately reflects the conditions and hazards of the confined space.
- Verify that the completed entry permit reflects the availability and proper working condition of the equipment to be used for atmospheric monitoring, entry, and remote emergency retrieval before authorizing or allowing entry.
- Verify that the necessary procedures, practices and equipment for safe entry are present and in effect before allowing entry.
- Verify that rescue services are available and that the means for summoning them are operable.
- Oversee the initial air monitoring to determine if an acceptable entry condition is present.
- Verify that all ENTRANTS and ATTENDANTS have received appropriate training, medical and respiratory protection clearances before initiating an entry.
- Verify, at appropriate intervals, that the entry operations remain consistent with the terms of the entry permit and that acceptable entry conditions are present.
- Cancel the entry authorization and end the entry whenever the ENTRY SUPERVISOR determines that acceptable entry conditions are not present.
- Take the necessary measures for concluding an entry operation, cancel the permit, replace the cover or otherwise restrict access to the confined space.

***Dealing with Unauthorized Personnel* - The ENTRY SUPERVISOR shall:**

- Take the appropriate measures to prevent individuals who the company has not authorized for entry from lingering in or near an active confined space entry.

***Equipment* - The ENTRY SUPERVISOR shall:**

- Arrange to use all required field and safety equipment before initiating entry.
- Inspect all equipment before entry and ensure that the environmental monitors have been properly calibrated, passed a function check, and operate correctly.

7.0 EMPLOYEE TRAINING – INITIAL, PROJECT SPECIFIC, AND REFRESHER

Malcolm Pirnie employees who may or will be entering confined spaces will be trained and certified as competent to conduct confined space entries as authorized ENTRANT, ATTENDANT, and ENTRY SUPERVISOR by Malcolm Pirnie. An employee will be deemed competent if the employee has demonstrated the understanding, knowledge, and skills necessary for the safe and competent performance of their duties before assignment to confined space entry tasks.

Training will be provided to each eligible employee before:

- Assigning the employee to confined space entry tasks.
- When the employee is unfamiliar with the hazards presented by a change in permit space operations.
- Whenever the ENTRY SUPERVISOR or Project Manager believe either that there are significant deviations from the permit space entry procedures on a project or that there are inadequacies in the employee's knowledge or use of these procedures.

All employees of Malcolm Pirnie or subcontractors assigned to perform confined space entry tasks shall receive classroom training and hands-on sessions with air monitoring, confined space and personal protective equipment. Proficiency will be documented by testing and practical evaluation on the subject matter and the execution of drills.

7.1. Awareness Training

Malcolm Pirnie employees who are, or will be working in non-permit required confined spaces OR working near, but not entering, attending, or supervising entry into permit required confined spaces must have basic knowledge needed to identify actual and/or potential hazards of confined spaces. These individuals shall be trained in confined space definitions; confined space hazards and risks; and working restrictions in or about confined spaces.

This training can be completed as part of Malcolm Pirnie's Health and Safety Training Program or through external training providers.

7.2. Initial Training

Malcolm Pirnie employees, who will or may perform duties as an authorized ENTRANT, ATTENDANT or ENTRY SUPERVISOR, must have basic knowledge and skills needed to protect themselves and others from the actual or potential hazards of a confined space. These individuals will be trained in permit required confined space program procedures; use of a permit required confined space permit; and entry and egress methods and procedures. After completing the training, employees will be competent in evaluating confined spaces, monitoring confined spaces, the roles and responsibilities of individuals working with confined spaces, and the use of confined space entry and egress equipment.

Confined space training is provided through the Malcolm Pirnie's Health and Safety Training Program. Upon completion of the training, Malcolm Pirnie employees may perform the duties of an authorized ENTRANT, ATTENDANT or ENTRY SUPERVISOR in the field.

Training can also be received through approved external training providers. If a Malcolm Pirnie employee completes confined space entry training through an external provider though, they must review all elements of this written program, including the permit system, and use of confined space entry and air monitoring equipment with the Corporate Health and Safety SBU Leader prior working on a permit-required confined space project, and may NOT serve as a ENTRY SUPERVISOR on their first permit-required confined space entry project.

7.3. Equivalent Training

Malcolm Pirnie employees, who believe they can show by documentation or certification that they have met the training requirements as an authorized ENTRANT, ATTENDANT or ENTRY SUPERVISOR prior to employment by Malcolm Pirnie, can submit such documentation or certification to Corporate Health and Safety for approval. Approval will be based on length of training (minimum 8 hours), training provider, training curricula, type of documentation, familiarity with confined space entry and air monitoring equipment, and previous experience with permit-required confined space entries. If approved, effected Malcolm Pirnie employees must review all elements of this written program, including the permit system, with Corporate Health and Safety SBU Leader prior to performing the duties of an authorized ENTRANT, ATTENDANT or ENTRY SUPERVISOR.

7.4. Project Specific Training

As necessary, Malcolm Pirnie employees will be trained to use specialized equipment needed for the project, and the highest level of authorized personal protective equipment appropriate to the project, including respiratory protection equipment.

7.5. Refresher Training

Malcolm Pirnie employees who have not entered a confined space in the previous year shall receive refresher training before entry to maintain their level of competence.

The duration of the refresher training is subject to the amount and type of material required by the individual or class and the hazards presented by the proposed confined space entry project.

8.0 MULTI-EMPLOYER WORKSITES

The client, representatives of the client or a subcontractor may be required to enter a confined space with Malcolm Pirnie employees. OSHA requires the coordination of entry operations when employees of more than one employer are working simultaneously as authorized entrants in a confined space. Planning the task and making these arrangements in advance could prevent the purchase or rental of redundant equipment and the assignment of extra employees to the project.

OSHA identifies the employer who controls the confined space as the “host employer”, and all other employers who may enter the space as a contractor or “guest” employer. Malcolm Pirnie is usually a “guest employer" in relation to our clients and to client-hired contractors. Malcolm Pirnie is always a “host employer" to Malcolm Pirnie hired subcontractors.

As a “guest employer”, Malcolm Pirnie shall:

- Provide a copy of this written confined space entry program to the “host employer” to allow for coordination of efforts;
- Provide documentation of Malcolm Pirnie or subcontractor employees’ confined space entry training;
- Obtain any available information regarding permit space hazards and entry operations from the “host employer”;
- Independently assess the classification of a confined space using observation, instrumentation, and direct communication with the client and document such information on a Pre-Entry Inspection Checklist; and
- Communicate to the “host employer” any hazards confronted or created during the entry.

Should a "host employer" require Malcolm Pirnie and subcontractor employees to follow the host employer's written confined space entry program (i.e., "host employer" employees will be entering the space with Malcolm Pirnie employees), the Corporate Health and Safety SBU Leader and the Project Manager will coordinate operations with that of the "host employer."

As a "host employer", Malcolm Pirnie shall:

- Obtain a copy of the subcontractor's written confined space entry program.
- Obtain documentation of subcontractor employees' confined space entry training;
- Provide to the subcontractor any available information regarding permit space hazards and entry operations from the client/owner of the confined space;
- Independently assess the classification of a confined space using observation, instrumentation, and direct communication with the client/owner and document such information on a Pre-Entry Inspection Checklist; and
- Debrief the subcontractor and communicate to the "host employer" any hazards confronted or created during the entry.

Should the subcontractor not have a written confined space entry program, OR both Malcolm Pirnie and subcontractors will be working in or near the confined space, the Malcolm Pirnie Program will be used and Malcolm Pirnie employees will serve as the ENTRY SUPERVISOR and ATTENDANT. Any subcontractor ENTRANT must be trained and equipped to the satisfaction of the Corporate Health and Safety SBU Leader.

9.0 PRE-ENTRY PROCEDURES

9.1. Notification

The appropriate Corporate Health and Safety SBU Leader will be consulted before initiating ANY project with confined space entry tasks, may it be by Malcolm Pirnie or subcontractors.

Notification may be email or by telephone. This notification will include:

- Project name, location, and project manager.
- Anticipated confined space entry tasks.
- Names of the proposed members of the confined space entry team(s), and in the case of Malcolm Pirnie serving as "host employer", the name of the subcontractor making entry.

The Corporate Health and Safety SBU Leader will:

- Review the confined space entry task(s) and provide constructive input on confined space hazard recognition and control

- Review the possible hazards, potential requirements and procedures, and proposed staffing with the Project Manager to determine that project staff have the required training, medical and respiratory protection clearances, and/or if Corporate Health and Safety staff need to be present on site.
- Request a Confined Space Pre-entry Inspection Checklist be completed and sent to Corporate Health and Safety for review. If possible, the Checklist should be completed in the project proposal phase to ensure qualified personnel are assigned and necessary equipment is available to produce an accurate project staff team and budget.
- If the project includes a subcontractor entry, request a copy of the subcontractors written permit-required confined space entry program, including a copy of their entry permit, and copies of training certificates of subcontractor authorized entrants, attendants, or entry supervisors.

Before conducting a confined space entry task, a Pre-entry Inspection Checklist will be completed by the ENTRY SUPERVISOR or a confined space entry trained designee to develop first hand knowledge of the potential hazards faced by the confined space entry team in and around the confined space.

The company classifies all confined spaces as permit-required until the following criteria are met:

- *The client, complying with the Confined Space Entry Standard has, based upon previous monitoring and experience, designated the space as a non-permit space and has documentation to support it, and/or*
- An ENTRY SUPERVISOR classifies the confined space as non-permit required based upon a physical evaluation and repeated monitoring data developed by confined space entry trained employees, and has submitted a Pre-entry Inspection Checklist to Corporate Health and Safety

9.2. Pre-Entry Inspection

OSHA requires the host employer (in most cases, the Malcolm Pirnie client) to provide Malcolm Pirnie with the following information:

- The location of permit-required confined spaces in their facility and the basis of the classification.
- Certification of any confined space classified as a non-permit confined space and the basis for the classification.
- The host employer's experience with their confined spaces. This experience could include any history of past flooding, unusual discharges or patterns of discharge. Previous air measurements in the spaces indicating low oxygen levels, high LELs, or high levels of toxics must be disclosed.
- Any precautions or procedures that the host employer has set up for the protection of employees in or near permit space.

From this information, the following can be documented on the Pre-Entry Inspection Checklist:

- Classification of the confined space to be entered and the need to utilize permit-required confined space entry procedures.
- Assessment of hazards presented by this confined space during an entry.
- Need for various equipment, i.e., ventilation, emergency retrieval equipment, fall protection and personal protective equipment.
- Name and location and response time of rescue and other emergency services.

9.3. Technical Notes

Technical notes developed during a pre-entry site inspection could include, but are not limited to one or all the following as applicable to the individual confined space and entry task:

- Entryway or utility access hole accessibility and condition. All entryways and utility access holes will be opened and inspected.
- Other sewers in the area that might affect a sewer to be entered.
- Industries that might have an affect on the flow or type of discharge.
- Current or past contents of pipes, sumps, or tanks.
- A determination that the available atmospheric testing equipment can remotely test the confined space.
- Any structural modifications or additions required to make a safe entry.
- The possible effect of peak flow times and adverse weather.
- The locations of entry, exit, and ports for mechanical venting.
- Lockout/Tagout, block and bleed, or isolation requirements.
- The types of safety and environmental monitoring equipment required to make a safe entry.
- The location and path to a secondary means of egress if available.
- Traffic control requirements.
- The number of team members required to complete the assigned tasks and maintain communication with the entrants.

The ENTRY SUPERVISOR or designee should use good professional judgement in the evaluation of hazards posed by a confined space entry task, erring always on the side of safety.

9.4. Post-Inspection

Once the Pre-Entry Inspection Checklist is completed, Corporate Health and Safety will review identified confined space hazards and entry and/or permit-entry requirements and

procedures, including **necessary rescue services**, with the Project Manager. If the entry will be a permit-required entry performed or supervised by Malcolm Pirnie employees, Corporate Health and Safety will issue one or more consecutively numbered Confined Space Entry Permits to the project. The entry permit hazard identification and evaluation checklist is used to authorize entry into a permit-required confined space and must be completed and posted outside the permit space prior to entry.

10.0 ATMOSPHERIC TESTING

Malcolm Pirnie employees will be equipped, trained and declared competent to use air-monitoring equipment that can measure oxygen concentrations, explosive gas levels, and any other location-specific air contaminants. Measurements will be made before entry into any confined space, and continuously for the duration of the entry.

Atmospheric testing is required for two distinct purposes: evaluation of the hazards of the permit space, and verification that acceptable conditions for entry into that space exist

10.1. Evaluation Testing

During the Pre-entry Inspection, the atmosphere of a confined space will be analyzed using equipment of sufficient sensitivity and specificity to identify and evaluate any hazardous atmospheres that may exist or arise, so that appropriate permit entry procedures can be developed and acceptable entry conditions stipulated for that space.

This data can be obtained from the owner of the confined space (host employer) and/or by Malcolm Pirnie employees trained to do so, and the results are to be documented on the Pre-Entry Inspection checklist. The Project Manager and/or the ENTRY SUPERVISOR and Corporate Health and Safety will review this data and determine acceptable entry conditions.

Measurement of values for each atmospheric parameter should be made for at least the minimum response time of the test instrument specified by the manufacturer.

10.2. Verification Testing

The atmosphere of a permit space that may contain a hazardous atmosphere will be tested before entry for the contaminants identified during the Pre-entry Inspection using equipment specified in the permit. Initial measurement of values for each atmospheric parameter should be made for at least the minimum response time of the test instrument specified by the manufacturer, including procedures to identify stratified atmospheres.

Evaluation and interpretation of this data (i.e., is atmospheric contaminant concentrations within the range of acceptable entry conditions) will be done by the ENTRY SUPERVISOR.

For all Malcolm Pirnie or contractor confined space entries, there will be continuous atmospheric monitoring for the duration of the entry.

Results of testing (i.e., actual concentration, etc.) should be recorded on the permit in the space provided next to the stipulated acceptable entry condition and, if applicable, in the project field manual.

11.0 ENTRY

Due to the severe personal injury that may result from improper entry into confined spaces, Malcolm Pirnie employees who willfully put themselves and others at risk during an entry into a confined space are subject to disciplinary action that may include termination of employment.

11.1. Permit

The Malcolm Pirnie Confined Space Entry Permit (permit) consists of engineering controls, safety equipment, personal protective equipment, respiratory protection, and rescue services permit conditions that may be appropriate for any given confined space. Based on information obtained from the pre-entry inspection and documented on the Pre-entry Inspection Checklist, each individually listed permit condition will be identified as necessary for the entry or not. **For purposes of this written program, the following permit conditions are required for all Malcolm Pirnie or subcontractor permit-required entries:**

- Lockout / Tagout (unless not applicable, i.e., no hazardous energy present or any potentially moving equipment)
- Lines Broken or Cap (unless not applicable, i.e., no lines in space)
- Ventilation (unless mechanical ventilation is not possible or would not be effective)
- Secured area
- Air monitoring
- Full Body Harness
- Emergency Retrieval and/or Lifeline and/or Fall Protection
- Fire Extinguisher / First Aid Kit
- Safety Glasses and/or goggles
- Hard Hat
- Escape Self-contained Breathing Apparatus (ESCBA) (unless higher respiratory protection is needed OR there are no potential atmospheric hazards and the ESCBA could cause a entanglement hazard
- Emergency services notified or standing by

Any member of the confined space entry team may fill out the Malcolm Pirnie Confined Space Entry Permit (permit).

The ENTRY SUPERVISOR is responsible for verifying that the information on the permit is correct, all permit conditions have been met, and all equipment, including personal protective equipment, is in working order and being properly used. If all conditions are met, the ENTRY SUPERVISOR is to review the permit with the authorized ENTRANT and ATTENDANT and signs the entry permit and posts it at the entrance to the confined space.

11.2. Entry

Whenever possible, entry should be horizontal with the ENTRANT wearing a full body harness attached to a retrieval line.
For vertical openings, entry may be made by a ladder inserted into the confined space or by lowering the ENTRANT into the space using a man-rated winch. During any vertical entry fall protection shall be provided for the ENTRANT and ATTENDANT and shall consist of a full body harness, a shock absorbing fall lanyard, or an ANSI certified retractable lifeline/emergency retrieval winch combination, or equivalent.

A mechanical retrieval system shall be available to retrieve employees from vertical entry confined spaces more than five feet deep.

If the entrant will be stopping at several different heights for more than a few minutes (i.e., to do an inspection of the walls), a boatswain's chair will be used when the opening to the space has a diameter larger than 24 inches. Use of a boatsman chair will be in accordance with OSHA 29 CFR 1910.28 (k), 1926.104, and 1926.451 (l).

11.3. Entry Termination

The ENTRY SUPERVISOR will cancel the entry permit when:

- The entry operations covered by the permit have been completed
- A prohibited condition that is not allowed under the entry permit arises in or near the permit space.

12.0 EMERGENCY RESPONSE AND RESCUE

OSHA requires Malcolm Pirnie to develop and implement procedures for summoning rescue and emergency services for rescuing entrants from permit required confined spaces, for providing necessary emergency services to rescued employees, and for preventing unauthorized personnel from attempting a rescue.

Malcolm Pirnie has not trained or authorized a Malcolm Pirnie "in-house" rescue team in lieu of notifying and/or staging an "external" trained and equipped rescue team at confined space entry projects. Therefore, permit-required entries will not be allowed into

ANY confined space unless a trained and equipped rescue team has been notified and is available to respond prior to entry; AND

Permit-required entries will not be allowed into confined spaces with atmospheres exceeding concentrations known or suspected to be Immediately Dangerous to Life and Health (IDLH) unless a trained and equipped and authorized rescue entrant or rescue team, approved by Corporate Health and Safety, is staged onsite prior to entry.

For purposes of this written program and the above policy, the one of the following rescue services arrangements must be made prior to the confined space entry:

A rescue team can be notified at the time of entry and be available to respond if called if:

- Entrants will not be wearing supplied air respirators, AND
- Entrants are not expected to be exposed to obvious IDLH conditions, AND
- Entrants can be expected to "self-rescue" or be "non-entry rescued" under normal circumstances, AND
- No other need for a standby rescue team.

A rescue team can be notified at the time of entry and be available to respond if called if:

- Entrants will be wearing supplied air respirators, AND
- Entrants can be expected to be "non-entry rescued" under normal circumstances, AND
- The entry is a straight horizontal or vertical, AND
- No other need for a standby rescue team; AND
- A trained and authorized Rescue Entrant, in addition to the ATTENDANT, is staged at the entry.

A rescue team will be notified and staged at the time of entry if:

- Entrants will be wearing supplied air respirators, AND
- Entrants are expected to be exposed to obvious IDLH conditions,

AND/OR

- Entrants would be expected to have difficulty in being "non-entry rescued" under normal circumstances,

AND/OR

- Any other need for an on-site rescue team.

Arrangements must be completed with rescue and emergency services (i.e., emergency medical services) prior to the confined space entry. The "host employer" / confined space owner should identify the designated rescue service during the pre-entry inspection. The service should be contacted by the ENTRY SUPERVISOR, and determination of interest to serve as the rescue team, availability, response time, equipment, familiarity with the site, and responder training must be documented.

NOT ALL FIRE DEPARTMENTS ARE QUALIFIED TO SERVE AS CONFINED SPACE RESCUE TEAMS.

For each confined space entry project, an Emergency Response Form should be completed by the ENTRY SUPERVISOR or designate and posted with the Entry Permit near the opening of the confined space or by the nearest telephone or other means of summing help. Emergency escape routes and directions to the nearest hospital (attach maps) should be developed and attached to the Emergency Response Form.

13.0 RECORDKEEPING

13.1. Written Program

Corporate Health and Safety will maintain this written program on the Health and Safety Intranet Homepage. Corporate Health and Safety will also maintain a "master copy" of the program with documented approvals and reviews.

13.2. Documentation

Once Corporate Health and Safety issues to a project one or more consecutively numbered Confined Space Entry Permits, Corporate Health and Safety logs these permits into a Confined Space Permit Log by

- permit number(s),
- date issued,
- office,
- project number, and
- name of the person requesting the permits.

Upon completion of the project, the Project Manager and ENTRY SUPERVISOR are responsible to ensure the following:

- The top white copy of each completed and cancelled entry permit, the Confined Space Classification Form (if used), the Confined Space Pre-entry Inspection Form, and the Emergency Response Form are filed with the project documents and become part of the permanent project file.
- The pink copy of each completed and cancelled permit is maintained on-file for one year from the date of cancellation by the project responsible office.
- The yellow copy of each completed and cancelled permit AND any unused permit(s) issued to the project are returned to Corporate Health and Safety, which will maintain them for at least two years.

13.3. Training

A permanent record of training shall be made and maintained by Corporate Health and Safety. Training certificates and/or paper records of classroom and on-the-job training shall be maintained in the employee's Health and Safety file and, as applicable, in the Health and Safety Training Database.

Training certificates and/or paper records of classroom and on-the-job training shall also be maintained in the employee's office's Health and Safety file.

14.0 DISCIPLINARY POLICY

Due to the severe personal injury that may result from improper entry into confined spaces, Malcolm Pirnie employees who willfully put themselves and others at risk during an entry into a confined space are subject to disciplinary action that may include termination of employment.

15.0 PROGRAM REVIEW

Corporate Health and Safety will review this Confined Space Entry Program at least annually. The review will be based upon Confined Space Pre-entry Inspection forms, cancelled permits, and other project information and experiences from the previous 12 months. Corporate Health and Safety, based upon this review, will evaluate compliance with the OSHA standards and whether Malcolm Pirnie or subcontractor employees participating in entry operations continue to be protected from confined space hazards. Corporate Health and Safety, based upon this review, will revise the written program, permits, forms, and training curricula as necessary to protect Malcolm Pirnie or subcontractor employees.

16.0 DEFINITIONS

17.0 CONFINED SPACE AND ENTRY DEFINITIONS

OSHA has specific definitions of "confined spaces," "non-permit required confined spaces," "permit-required confined spaces," and “entry.”

A **confined space** is a space that:

- Is large enough and so configured that an employee can bodily enter and do assigned work.
- Has limited or restricted means for entry or exit.
- Is not designed for continuous employee occupancy.

Examples of confined spaces include, but are not limited to:

boilers	trenches
degreasers	tunnels
Sewers	bunkers
pipelines	sumps
utility vaults	wells
pumping stations	excavations
sewage digesters	smokestacks
vats	ductwork
tanks	reaction or process vessels

A **non-permit required confined space** means a confined space that does not contain or, with respect to atmospheric hazards, have the potential to contain any hazard that can cause death or serious physical harm.

A **permit-required confined space** (or "permit space") means a confined space that has **any one** of the following characteristics:

- Contains or has the potential to contain a hazardous atmosphere.
- Contains a material with the potential for engulfment of an entrant.
- Has an internal shape such that an entrant could be trapped or asphyxiated by inwardly converging walls, or a floor that slopes downward and tapers to a smaller cross-section.
- Contains any other recognized serious safety and health hazard (such as moving machinery or the potential for the release of thermal energy).

Entry into a permit-required confined space requires use of trained personnel, following written practices and procedures, use of an entry permit system, and arrangement of rescue services described in this written program.

Malcolm Pirnie or subcontractor employees who work in confined or enclosed spaces in shipyard operations, including vessels, vessel sections, and on land-side operations regardless of geographic location shall comply with the requirements of the OSHA Shipyard (maritime) Industry Standard on confined spaces (29 CFR 1915.11 to 16). Malcolm Pirnie employees will also comply with the requirements of this written program during any maritime confined space entry and treat such spaces as permit-required confined spaces.

A **permit-space, hazard eliminated** or **non-permit space due to ventilation and monitoring** or **alternate entry procedure permit-space** means a permit space that an employer can demonstrate that the only hazard posed by the permit space is an actual or potential hazardous atmosphere, and:

- that continuous forced ventilation alone is sufficient to maintain the permit space safe for entry;
- there is monitoring and inspection data that supports this; and
- atmospheric testing continues during entries

Entry into a permit space, hazard eliminated, et al, does not require use of a permit system. **For purposes of this written program, <u>only</u> the host employer/owner of the confined space can classify and document these spaces as such.**

A **construction confined or enclosed space,** means any space during construction having a limited means of egress, which is subject to the accumulation of toxic or flammable contaminants or has an oxygen deficient atmosphere. Construction confined or enclosed spaces include, but are not limited to, storage tanks, process vessels, bins, boilers, ventilation or exhaust ducts, sewers, underground utility vaults, tunnels, pipelines, and ANY open top spaces more than 4 feet in depth such as pits, tubs, vaults, and vessels. **For purposes of this written program, Malcolm Pirnie classifies construction confined or enclosed spaces as permit-required confined spaces.**

Malcolm Pirnie or subcontractor entry of trenches and narrow excavations shall comply with the requirements of the OSHA Construction Industry Standards on Excavations (29 CFR 1926.650 to 653). Malcolm Pirnie employees shall also develop and comply with the requirements of a written Health and Safety Plan (HASP), approved by Corporate Health and Safety, for any project involving Malcolm Pirnie entry of a trench and narrow excavation

Entry means the act by which a person intentionally passes through an opening into a permit-required confined space. Entry includes ensuing work activities in that space, and occurs when any part of the entrant's body breaks the plane of an opening into the space.

18.0 CONFINED SPACE HAZARDS DEFINITIONS

Hazardous atmosphere means an atmosphere that may expose Malcolm Pirnie or subcontractor employees to the risk of death, incapacitation, impairment to self-rescue, injury, or acute illness from one or more of the following causes:

- **Atmospheric oxygen** concentration below 19.5% (**"Oxygen deficient atmosphere")** or above 23.5% (**"Oxygen enriched atmosphere"**). Any atmosphere with less than 19.5% oxygen **will not** be entered without the use of an approved supplied air system.

NOTE: the oxygen level in a confined space can decrease because of work in progress, such as welding, cutting or brazing. It can also be decreased by certain chemical reactions (rusting) or through bacterial action (fermentation). The oxygen level also may be low if another gas, such as carbon dioxide or nitrogen, displaces the oxygen in the space. An oxygen-rich atmosphere (above 23.5%) will cause combustible materials to burn violently when ignited, and should be avoided.

- **Flammable gas, vapor, or mist** more than 10% of its lower explosive (flammable) limit (LEL/LFL).

NOTE: Different materials have different flammable ranges. An explosion may result if a source of ignition (a sparking or electrical tool) produces a spark in a flammable atmosphere. The LEL/LFL represents the lowest concentration of a flammable gas, vapor, or dust mixture in air that in the presence of an ignition source will ignite.

- **Airborne combustible dust** at a concentration that meets or exceeds the LEL.

NOTE: This concentration may be approximated as a condition in which the dust obscures vision at a distance of 5 feet (1.52 m) or less.

- **Toxic substances** (liquids, vapors, gases, mists, solid materials, and dusts) at atmospheric concentrations that could result in employee exposures exceeding a published exposure limit. Only those substances that can cause death, incapacitation, impairment of the ability to self-rescue, injury, or acute illness due to their health effects are considered as components of toxic atmospheres for the purposes of this OSHA standard. Some sources of toxic substances are:

  - Material previously stored in the space: Contents can be absorbed into the walls and gradually vaporize after the contents have been removed. Removing contents residue may release gases, vapors or dusts into the space.
  - Work tasks in a confined space: Examples include welding, cutting, brazing, painting, scraping, sanding, degreasing, etc. Various processes generate toxic substances that may collect in the confined space.
  - Areas next to the confined space: Toxics produced by work outside of a confined space can enter and accumulate in the confined space.

    NOTE: Although OSHA's Permissible Exposure Limits (PELs) represent minimum legal limits, the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs) represent more "up-to-date" worker exposure values. Malcolm Pirnie will adhere to the ACGIH's TLV unless the OSHA PEL is more protective.

Immediately dangerous to life and health (IDLH) concentrations represent the maximum concentrations of specific atmospheric contaminants from which, in the event of respirator failure, one could escape within 30 minutes without a respirator and without experiencing any escape-impairing or irreversible health effects.

Engulfment means the surrounding and effective capture of a person by a liquid or finely divided (flowable) solid substance (such as grain, sand, or powdered chemicals). Engulfment can cause death or serious injury by filling or plugging the respiratory system by aspiration, or that can exert enough force on the body to cause death or serious injury by strangulation, constriction, or crushing.

Other recognized serious safety and health hazard means conditions that will cause or have the potential to cause death or serious injury or illness (i.e., requiring hospitalization). Examples include, but are not limited to:

- **Electrical/Mechanical/Hazardous Energy hazards** include any machinery, equipment or line that can be unexpectedly energized or started up, or cause the release of stored energy that would create a safety hazard.
- **Fall hazard** means any condition creating a potential fall of 6 feet or more.
- **Hot work** means operations such as riveting, welding, cutting, burning, and heating, which are capable of providing a source of ignition and/or cause or have the potential to cause a hazardous atmosphere.
- **Limited contact / Reduced visibility** means conditions where direct communications with others is not possible or visibility is limited to less than 5 feet due to darkness or non-flammable
- **Noise** within a confined space can be amplified because of the acoustical properties of the space. Excessive noise cannot only damage hearing, but also can affect communication, such as causing a shouted warning to go unheard.
- **Temperature extremes** mean conditions that can cause burning or heat stress, or frostbite or cold stress problems for Malcolm Pirnie or subcontractor employees.

19.0 OTHER CONFINED SPACE ENTRY DEFINITIONS

Acceptable entry conditions means the conditions that must exist in a permit space to allow entry and to ensure that Malcolm Pirnie or subcontractor employees involved with a permit-required confined space entry can safely enter and work within the space.

Attendant means an individual stationed outside one or more permit spaces who monitors the authorized entrants and who performs all attendants' duties assigned in the Malcolm Pirnie permit space program.

Authorized entrant means an employee who is authorized by the employer to enter a permit space.

Blanking or blinding means the absolute closure of a pipe, line, or duct by the fastening of a solid plate (such as a spectacle blind or a skillet blind) that completely covers the bore and that is capable of withstanding the maximum pressure of the pipe, line, or duct with no leakage beyond the plate.

Double block and bleed means the closure of a line, duct, or pipe by closing and locking or tagging two in-line valves and by opening and locking or tagging a drain or vent valve in the line between the two closed valves.

Emergency means any occurrence (including any failure of hazard control or monitoring equipment) or event internal or external to the permit space that could endanger entrants.

Entry permit (permit) means the written or printed document that is provided by the employer to allow and control entry into a permit space and that contains the information:

- The permit space to be entered;
- the purpose of the entry;
- authorized entrants, attendants and entry supervisors;
- hazards of the permit space to be entered and measures used to isolate the permit space and to eliminate or control permit space hazards;
- acceptable entry conditions, and results of initial and periodic tests; and
- equipment, such as personal protective equipment, testing equipment, communications equipment, alarm systems, and rescue equipment.

Entry supervisor means the person responsible for determining if acceptable entry conditions are present at a permit space where entry is planned, for authorizing entry and overseeing entry operations, and for terminating entry as required by this section.

Hot work permit means Malcolm Pirnie's written authorization to perform operations (for example, riveting, welding, cutting, burning, and heating) capable of providing a source of ignition.

Inerting means the displacement of the atmosphere in a permit space by a noncombustible gas (such as nitrogen) to such an extent that the resulting atmosphere is noncombustible. (NOTE: This procedure produces an IDLH oxygen-deficient atmosphere.)

Isolation means the process by which a permit space is removed from service and completely protected against the release of energy and material into the space. Techniques include: blanking or blinding; misaligning or removing sections of lines, pipes, or ducts; a double block and bleed system; lockout or tagout of all sources of energy; or blocking or disconnecting all mechanical linkages.

Line breaking means the intentional opening of a pipe, line, or duct that is or has been carrying flammable, corrosive, or toxic material, an inert gas, or any fluid at a volume, pressure, or temperature capable of causing injury.

Permit-required confined space program (permit space program) means the Malcolm Pirnie's overall program for controlling, and, where appropriate, for protecting Malcolm Pirnie or subcontractor employees from, permit space hazards and for regulating employee entry into permit spaces.

Permit system means Malcolm Pirnie's written procedure for preparing and issuing permits for entry and for returning the permit space to service following termination of entry.

Prohibited condition means any condition in a permit space that is not allowed by the permit during the period when entry is authorized.

Rescue service means the personnel designated to rescue Malcolm Pirnie or subcontractor employees from permit spaces.

Retrieval system means the equipment (including a retrieval line, chest or full-body harness, wristlets, if appropriate, and a lifting device or anchor) used for non-entry rescue of persons from permit spaces.

Testing means the process by which the hazards that may confront entrants of a permit space are identified and evaluated. Testing includes specifying the tests that are to be performed in the permit space.

CONFINED SPACE ENTRY EMERGENCY RESPONSE FORM
Post this form at the work site near the Confined Space Entry Permit and/or Nearest Telephone

CONFINED SPACE RESCUE TEAM	CONTACT NAME	TELEPHONE NUMBER
ON-SITE CONFINED SPACE RESCUE TEAM ☐ FACILITY ☐ CONTRACTED RESPONSE TIME: _____		
OFF-SITE CONFINED SPACE RESCUE TEAM ☐ FIRE ☐ POLICE ☐ EMS ☐ CONTRACTED RESPONSE TIME: _____		

OTHER EMERGENCY SERVICES	CONTACT NAME	TELEPHONE NUMBER
ON-SITE SECURITY		
OTHER ON-SITE RESPONSE TEAM(S)		
MUNICIPAL EMERGENCY MEDICAL SERVICES		
MUNICIPAL FIRE DEPARTMENT		
MUNICIPAL POLICE DEPARTMENT		

Note: Please contact the emergency services listed above prior to conducting entry operations **to determine their ability to respond in an emergency.**

LOCATION OF NEAREST TELEPHONE:_____
_____

MALCOLM PIRNIE

CONFINED SPACE ENTRY

TELEPHONE NUMBER:

_____

____

CORPORATE HEALTH AND SAFETY

MARK A. MCGOWAN, III. CIH. CSP	**MANAGER, HEALTH AND SAFETY**	**914-641-2484 WHI 800-478-6870 EMERGENCY**
JOSEPH M. GOLDEN, JR., CET. REMT	**SENIOR HEALTH AND SAFETY TRAINER**	**914-641-2978 WHI 800-478-6870 EMERGENCY**

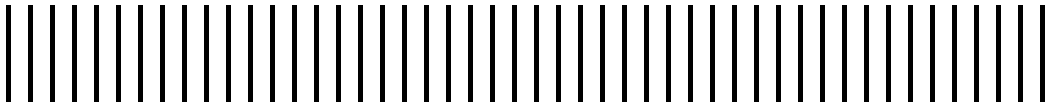
OTHERS TO BE NOTIFIED IN CASE OF ACCIDENT

PATRICIA OLSIEWICZ	**WORKERS' COMPENSATION ADMINISTRATOR**	**914-641-2913 WHI**
GERRY CAVALUZZI	**LEGAL DEPARTMENT**	**914-641-2950 WHI**
_____ _____	**PROJECT MANAGER**	
_____ _____	**LOCAL HEALTH AND SAFETY COORDINATOR**	

NOTE: WHEN THE CONFINED SPACE IS EVACUATED DUE TO ON-SITE EMERGENCY, PERSONNEL SHALL NOT RE-ENTER UNTIL:

- THE CONDITIONS RESULTING IN THE EMERGENCY HAVE BEEN CORRECTED
- THE HAZARDS HAVE BEEN REASSESSED;
- CORPORATE HEALTH AND SAFETY HAS BEEN NOTIFIED;
- A NEW ENTRY PERMIT HAS BEEN COMPLETED; AND
- THE ENTRY TEAM HAS BEEN BRIEFED ON PROPOSED CHANGES IN WORK PRACTICES, PERSONAL PROTECTION AND PERMITTED SPACE HAZARDS.

Appendix B:
Community Air Monitoring Plan



MALCOLM PIRNIE

COMMUNITY HEALTH AND SAFETY PLAN
COMMUNITY AIR MONITORING PLAN
REMEDIAL INVESTIGATION/FEASIBILITY STUDY
FRIEDRICHSOHN COOPERAGE SITE, WATERFORD, NEW YORK

To provide a measure of protection for any potential downwind receptors, and to confirm that work activities do not generate airborne contaminants, Malcolm Pirnie will conduct continuous monitoring for volatile organic compounds (VOCs) and particulate matter (dust) during all ground intrusive activities at the site. Monitoring will be conducted at the downwind perimeter of each work area.

VOC MONITORING, RESPONSE LEVELS, AND ACTIONS

Volatile organic compounds (VOCs) will be monitored on a continuous basis during all ground-intrusive activities. Upwind concentrations will be measured at the start of each workday and periodically thereafter to establish background conditions. VOC monitoring will be conducted using a MiniRae 2000 photoionization detector (PID) or PPB Rae PID. The PID will be calibrated at least daily using the span calibration gas recommended by the manufacturer. The PID will calculate 15-minute running average concentrations. These averages will be compared to the action levels specified below.

Action Levels

- 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 will be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities will 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 will be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities will 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, all work activities will be stopped.

All 15-minute average readings will be recorded and be available for review by the New York State Department of Environmental Conservation (NYSDEC) or the NYS Department of Health (DOH). Instantaneous readings, if any, used for decision purposes will also be recorded.

PARTICULATE MONITORING, RESPONSE LEVELS, AND ACTIONS

Particulate concentrations will be monitored continuously at the upwind and downwind perimeter of the each work area during all ground-intrusive activities. 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) will be used for the particulate monitoring. The equipment will be equipped with an audible alarm to indicate exceedance of the action levels summarized below. Any fugitive dust migration will also be visually assessed during all work activities.

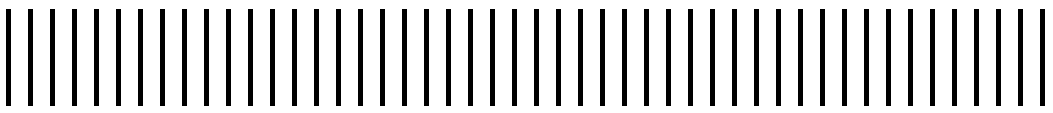
Action Levels

- If the downwind PM-10 particulate level is 0.1 milligrams per cubic meter (mg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques will be employed. Work will continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 0.15 mg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.

- If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 0.15 mg/m^3 above the upwind level, work will be stopped and a re-evaluation of activities initiated. Work will resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 0.15 mg/m^3 of the upwind level and in preventing visible dust migration.

All particulate monitoring measurements readings will be recorded and made available for NYSDEC and NYSDOH review.

Appendix C:
Daily Report



MALCOLM PIRNIE

DAILY OBSERVATION REPORT **Day:_____ Date:_____**

NYSDEC

Division of Environmental Remediation
Friedrichsohn Cooperage Site
NYSDEC Site # HW 5-46-045

Contract # D-004439-15

Waterford, New York

Temperature: (F) (am) (pm)

Wind Direction: (am) (pm)

Weather: (am)

(pm)

Arrive at site (am)

Leave site: (pm)

HEALTH & SAFETY:

Are there any changes to the Health & Safety Plan? Yes ( ) No ( )
(If yes, list the deviation under items for concern)

Are monitoring results at acceptable levels?

Soil	Yes ( )	n/a ( )	* No ( )
Waters	Yes ( )	n/a ( )	* No ( )
Air	Yes ( )	n/a ( )	* No ( )

- *If No, provide comments*

OTHER ITEMS:

Site Sketch Attached: Yes ( ) No ( )
Photos Taken: Yes ( ) No ( )

DESCRIPTION OF DAILY WORK PERFORMED:

PROJECT TOTALS:

SAMPLING (Soil/Water/Air)

Contractor Sample ID:	DEC Sample ID:	Description:

DAILY OBSERVATION REPORT Day:_____ Date:_____

CONTRACTOR/SUBCONTRACTOR EQUIPMENT AND PERSONNEL ON SITE:

(Name of contractor) personnel:

(Name of Subcontractor) personnel:

(Name of contractor) equipment:

(*Indicates active equipment)

Other Subcontractors:

VISITORS TO SITE:

1.

PROJECT SCHEDULE ISSUES:

PROJECT BUDGET ISSUES:

ITEMS OF CONCERN:

COMMENTS:

ATTACHMENT(S) TO THIS REPORT:

SITE REPRESENTATIVE:

Name: (*signature*)
cc:

DAILY PHOTOLOG

Appendix D:
Air and Sub-slab Vapor Sampling Procedures

MALCOLM PIRNIE

AIR AND SUB-SLAB VAPOR SAMPLING PROCEDURES
REMEDIAL INVESTIGATION/FEASIBILITY STUDY
FRIEDRICHSOHN COOPERAGE SITE, WATERFORD, NEW YORK

The air sampling program will be conducted in accordance with the October 2006 Final NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York. The work described herein involves indoor air sampling and/or sub-slab soil vapor sampling at residences in the vicinity of the site. It is anticipated that the sampling activities will be conducted over a one-week period and NYSDEC and/or NYSDOH personnel will provide field assistance and guidance.

Indoor air and sub-slab vapor sampling will be performed at approximately six properties near the site. The NYSDEC will select the properties at which samples will be collected. Sampling at these structures is contingent on approval by property owners. Prior to initiating the air sampling, the property owners will be contacted by a telephone call and then by a 10-day written notice consistent with NYSDEC TAGM 4053. The NYSDEC Project Manager will contact the property owners, discuss the sampling program, and schedule the sampling. The NYSDEC Project Manager will provide the consultant with a copy of the correspondence and indoor air sampling schedule.

Prior to sampling at each of the selected residences, an inspection will be conducted to inventory household products that could interfere with sampling results and document heating, ventilation, and air conditioning (HVAC) systems. An active approach utilizing laboratory-certified Summa canisters will be used to evaluate the indoor air and sub-slab soil vapor quality. During the inspection, sampling locations will be selected in consultation with the NYSDEC or NYSDOH and the homeowner. Samples will be collected over a 24-hour period. Air and sub-slab soil vapor samples will be analyzed for VOCs using USEPA Method TO-15. The analyte list, method detection limits, and reporting limits are provided in Table 2.

One indoor air sample will be collected from both the first floor living space and basement (if applicable) of each residence. Sub-slab vapor sampling will be conducted in structures with competent floors or slabs. If the floor is primarily unfinished (e.g., dirt floor), no sub-slab sample will be collected. A minimum of one outdoor ambient air sample will be collected per day of sampling, concurrently with the indoor air samples, in the vicinity of the residences where indoor air samples are being collected.

Duplicate samples will be collected at the rate of 1 duplicate sample per 20 original samples. For duplicate sub-slab samples, the samples will be collected by installing an in-line "tee," which will split the flow coming from the sample tubing penetrating the floor to two canisters set up adjacent to each other and each collecting vapors at identical flow rates.

Building Inspection

An inspection of general site conditions will be performed at each property prior to the air sampling. The inspection will include the following activities:

- Completion of the NYSDOH Indoor Air Quality Questionnaire and Building Inventory included in the October 2006 Final NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York. The questionnaire is provided in Attachment 1. NYSDEC or Malcolm Pirnie personnel will complete the questionnaire with the homeowners. As part of the questionnaire, a basement and first floor product inventory will be prepared. An inventory of the first floor would be intrusive and will not be completed unless sampling results indicate the need for such an inventory. Sections 1 through 13 of the questionnaire will be completed with the exception of Section 4, which is an evaluation of air flow using air current tubes or tracer smoke.
- Documentation of weather conditions outside and temperature inside.
- Ambient air (indoor and outdoor) screening using field equipment (i.e., photoionization detector).
- Evaluation of HVAC systems and other ventilation (windows, etc.).
- Selection of air sampling locations.

Air Sampling Procedures

Indoor air samples will be collected in accordance with the October 2006 Final NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York and the following procedures:

1. Place canister in desired sampling location. Canister will be a 6-Liter (L) canister with a vacuum gauge and flow controller. The canister must be individually certified clean (in accordance with EPA Method TO-15) and under a vacuum pressure of no more than -25 inches of mercury (in Hg). Flow controllers will be set for a 24-hour collection period.
2. Make sure all valves, gauges, and filters are properly attached.
3. Open valve ½ turn or as indicated in the laboratory specifications. Manufacturer or laboratory protocols will be followed when operating the valve on the sample containers.
4. Record initial vacuum pressure, time, and date on field data form.

Sub-Slab Vapor Sampling Procedures

The collection of sub-slab vapor samples will be in accordance with the following procedures:

1. Visually assess the condition of the floor. Select an area for sampling that is out of the line of traffic and away from major cracks and other floor penetrations (sumps, pipes, etc.). Take a digital photograph of the area before drilling or sampling for use as a reference when the area is being restored to pre-sampling conditions. Photographs will not be taken if the homeowner objects.
2. Drill a 1-inch diameter hole 1 inch into the concrete floor slab using an electric hammer drill.
3. Drill a 1/4-inch diameter hole through the 1-inch hole completely through the concrete floor slab.
4. Sweep concrete dust away from the drill hole and wipe the floor with a dampened towel. Concrete dust can be cleaned up with a dust brush and pan or vacuum equipped with a HEPA filter only after sample collection has been completed.

5. Insert inert tubing, such as Teflon or Teflon-lined polyethylene tubing (¼-inch outside diameter [OD]), approximately 3 feet long; into the hole drilled in the floor, extending no further than 2 inches below the bottom of the floor slab.
6. Pour melted bees wax or place modeling clay around the tubing at the floor penetration ensuring that an effective seal has been established.
7. Attach a syringe to the sampling tube and purge approximately 60 mL of air/vapor at a consistent flow rate that is less than or equal to 0.2 liters per minute. The syringe will be capped and the air released outside the building or into a Tedlar® bag as to not influence the indoor air quality.
8. Place canister on a stable surface (floor) adjacent to the sample tube. Canister will be a 6-Liter (L) canister with a vacuum gauge and flow controller. The canister must be individually certified clean (in accordance with EPA Method TO-15) and under a vacuum pressure of no more than -25 inches of mercury (in Hg). Flow controllers will be set for a 24-hour collection period. Samples will be collected at a consistent flow rate that is less than 0.2 liters per minute.
9. Record the canister's serial number on the chain of custody (COC) and field notebook/sample form. Assign sample identification on canister ID tag and record on COC and field notebook/sample form. For property owner privacy, do not use a sample identifier containing the name or address of the property or property owner.
10. Record gauge pressure; vacuum gauge pressure must read -25 in Hg or less or the canister cannot be used. Connect the sample tubing to the canister inlet fitting. Open canister valve in accordance with manufacturer and laboratory protocols to initiate sample collection at the laboratory's preset flow rate.
11. Record the start time on the COC in the field notebook/sample form and take a digital photograph of canister setup and surrounding area. Photographs will not be taken if the homeowner objects.

Termination of Sample Collection

1. Close the canister valve and record the stop time on the COC and in the field notebook/sample form.

2. Record the final gauge pressure and disconnect the sample tubing and pressure gauge/flow controller from canister, if applicable.
3. Install plug on canister inlet fitting and place the sample container in the original box.
4. Complete the sample collection log with the appropriate information and log each sample on the COC form.
5. Remove temporary subsurface probe and properly seal hole in the slab with cement.
6. All canisters will be returned at the completion of the field sampling to the laboratory by overnight shipment or courier and in accordance with any laboratory specifications (i.e. holding time requirements). No work or shipment of samples will be expected on weekends or holidays.

Attachment 1

NYSDOH Indoor Air Quality Questionnaire and Building Inventory

NEW YORK STATE DEPARTMENT OF HEALTH
INDOOR AIR QUALITY QUESTIONNAIRE AND BUILDING INVENTORY
CENTER FOR ENVIRONMENTAL HEALTH

This form must be completed for each residence involved in indoor air testing.

Preparer's Name _____ Date/Time Prepared _____

Preparer's Affiliation _____ Phone No._____

Purpose of Investigation_____

1. OCCUPANT:

Interviewed: Y / N

Last Name: _____ First Name: _____

Address: _____

County: _____

Home Phone: _____ Office Phone: _____

Number of Occupants/persons at this location _____ Age of Occupants _____

2. OWNER OR LANDLORD: (Check if same as occupant ___)

Interviewed: Y / N

Last Name: _____First Name: _____

Address: _____

County: _____

Home Phone: _____ Office Phone: _____

3. BUILDING CHARACTERISTICS

Type of Building: (Circle appropriate response)

Residential	School	Commercial/Multi-use
Industrial	Church	Other: _____

If the property is residential, type? (Circle appropriate response)

Ranch	2-Family	3-Family
Raised Ranch	Split Level	Colonial
Cape Cod	Contemporary	Mobile Home
Duplex	Apartment House	Townhouses/Condos
Modular	Log Home	Other:_____

If multiple units, how many? _____

If the property is commercial, type?

Business Type(s) _____

Does it include residences (i.e., multi-use)? Y / N If yes, how many? _____

Other characteristics:

Number of floors_____ Building age_____

Is the building insulated? Y / N How air tight? Tight / Average / Not Tight

4. AIRFLOW

Use air current tubes or tracer smoke to evaluate airflow patterns and qualitatively describe:

Airflow between floors

_____

_____

_____

Airflow near source

_____

_____

_____

Outdoor air infiltration

_____

_____

_____

Infiltration into air ducts

_____

_____

_____

5. BASEMENT AND CONSTRUCTION CHARACTERISTICS (Circle all that apply)

a. Above grade construction:	wood frame	concrete	stone	brick
b. Basement type:	full	crawlspace	slab	other _____
c. Basement floor:	concrete	dirt	stone	other _____
d. Basement floor:	uncovered	covered	covered with _____	
e. Concrete floor:	unsealed	sealed	sealed with _____	
f. Foundation walls:	poured	block	stone	other _____
g. Foundation walls:	unsealed	sealed	sealed with _____	
h. The basement is:	wet	damp	dry	moldy
i. The basement is:	finished	unfinished	partially finished	
j. Sump present?	Y / N			
k. Water in sump?	Y / N / not applicable			

Basement/Lowest level depth below grade: _____(feet)

Identify potential soil vapor entry points and approximate size (e.g., cracks, utility ports, drains)

_____

_____

6. HEATING, VENTING and AIR CONDITIONING (Circle all that apply)

Type of heating system(s) used in this building: (circle all that apply – note primary)

Hot air circulation	Heat pump	Hot water baseboard	
Space Heaters	Stream radiation	Radiant floor	
Electric baseboard	Wood stove	Outdoor wood boiler	Other _____

The primary type of fuel used is:

Natural Gas	Fuel Oil	Kerosene
Electric	Propane	Solar
Wood	Coal	

Domestic hot water tank fueled by: _____

Boiler/furnace located in:	Basement	Outdoors	Main Floor	Other_____
Air conditioning:	Central Air	Window units	Open Windows	None

Are there air distribution ducts present? Y / N

Describe the supply and cold air return ductwork, and its condition where visible, including whether there is a cold air return and the tightness of duct joints. Indicate the locations on the floor plan diagram.

_____

_____

_____

_____

7. OCCUPANCY

Is basement/lowest level occupied? Full-time Occasionally Seldom Almost Never

Level	**General Use of Each Floor (e.g., familyroom, bedroom, laundry, workshop, storage)**
Basement	_____
1st Floor	_____
2nd Floor	_____
3rd Floor	_____
4th Floor	_____

8. FACTORS THAT MAY INFLUENCE INDOOR AIR QUALITY

a. Is there an attached garage? Y / N

b. Does the garage have a separate heating unit? Y / N / NA

c. Are petroleum-powered machines or vehicles stored in the garage (e.g., lawnmower, atv, car) Y / N / NA Please specify_____

d. Has the building ever had a fire? Y / N When?_____

e. Is a kerosene or unvented gas space heater present? Y / N Where? _____

f. Is there a workshop or hobby/craft area? Y / N Where & Type? _____

g. Is there smoking in the building? Y / N How frequently? _____

h. Have cleaning products been used recently? Y / N When & Type? _____

i. Have cosmetic products been used recently? Y / N When & Type? _____

j. Has painting/staining been done in the last 6 months? Y / N Where & When? _____

k. Is there new carpet, drapes or other textiles? Y / N Where & When? _____

l. Have air fresheners been used recently? Y / N When & Type? _____

m. Is there a kitchen exhaust fan? Y / N If yes, where vented?_____

n. Is there a bathroom exhaust fan? Y / N If yes, where vented?_____

o. Is there a clothes dryer? Y / N If yes, is it vented outside? Y / N

p. Has there been a pesticide application? Y / N When & Type?_____

Are there odors in the building? Y / N
If yes, please describe: _____

Do any of the building occupants use solvents at work? Y / N
(e.g., chemical manufacturing or laboratory, auto mechanic or auto body shop, painting, fuel oil delivery, boiler mechanic, pesticide application, cosmetologist

If yes, what types of solvents are used? _____

If yes, are their clothes washed at work? Y / N

Do any of the building occupants regularly use or work at a dry-cleaning service? (Circle appropriate response)

Yes, use dry-cleaning regularly (weekly) No
Yes, use dry-cleaning infrequently (monthly or less) Unknown
Yes, work at a dry-cleaning service

Is there a radon mitigation system for the building/structure? Y / N Date of Installation: _____
Is the system active or passive? Active/Passive

9. WATER AND SEWAGE

Water Supply:	Public Water	Drilled Well	Driven Well	Dug Well	Other: _____
Sewage Disposal:	Public Sewer	Septic Tank	Leach Field	Dry Well	Other: _____

10. RELOCATION INFORMATION (for oil spill residential emergency)

a. Provide reasons why relocation is recommended: _____

b. Residents choose to: remain in home relocate to friends/family relocate to hotel/motel

c. Responsibility for costs associated with reimbursement explained? Y / N

d. Relocation package provided and explained to residents? Y / N

11. FLOOR PLANS

Draw a plan view sketch of the basement and first floor of the building. Indicate air sampling locations, possible indoor air pollution sources and PID meter readings. If the building does not have a basement, please note.

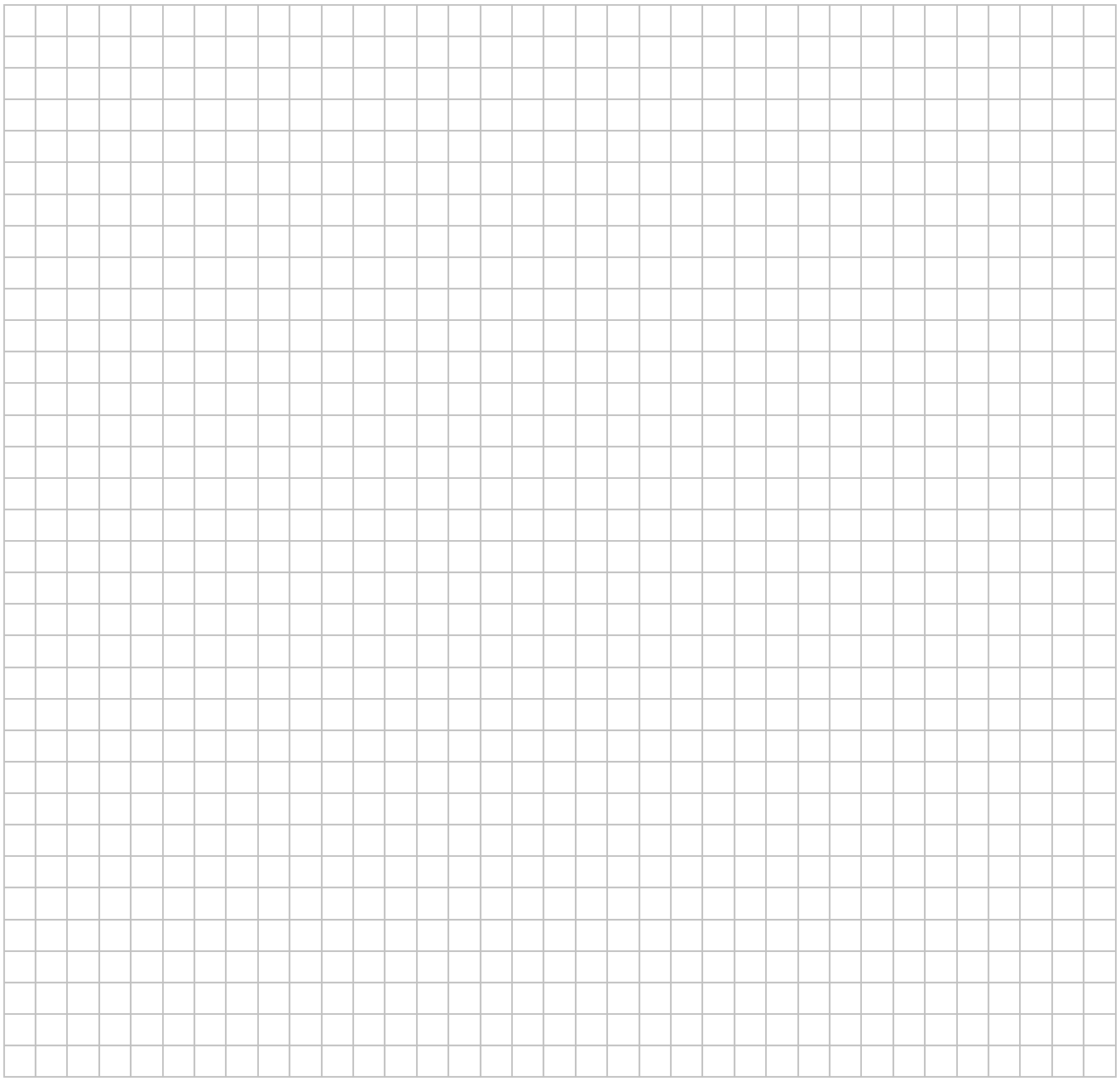
Basement:

First Floor:

12. OUTDOOR PLOT

Draw a sketch of the area surrounding the building being sampled. If applicable, provide information on spill locations, potential air contamination sources (industries, gas stations, repair shops, landfills, etc.), outdoor air sampling location(s) and PID meter readings.

Also indicate compass direction, wind direction and speed during sampling, the locations of the well and septic system, if applicable, and a qualifying statement to help locate the site on a topographic map.



13. PRODUCT INVENTORY FORM

Make & Model of field instrument used: _____

List specific products found in the residence that have the potential to affect indoor air quality.

Location	Product Description	Size (units)	Condition*	Chemical Ingredients	Field Instrument Reading (units)	Photo ** Y / N

* Describe the condition of the product containers as **Unopened (UO), Used (U),** or **Deteriorated (D)**
** Photographs of the **front and back** of product containers can replace the handwritten list of chemical ingredients. However, the photographs must be of good quality and ingredient labels must be legible.