Sterling Environmental Engineering, P.C.

FORMER M. ARGUESO AND CO., INC.
BROWNFIELD CLEANUP PROGRAM
441 & 442 WAVERLY AVENUE
MAMARONECK, NEW YORK
SITE NO. C360108

REMEDIAL ACTION WORK PLAN

Prepared for:

New Waverly Avenue Associates, LLC
566 Westchester Avenue
Rye Brook, New York 10573

Prepared by:

Sterling Environmental Engineering, P.C.
24 Wade Road
Latham, New York 12110

October 9, 2012

"Serving our clients and the environment since 1993"

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REMEDIAL ACTION WORK PLAN

TABLE OF CONTENTS

FIGURES

APPENDICES

REMEDIAL ACTION WORK PLAN CERTIFICATION

I, Mark P. Millspaugh, P.E., certify that I am currently a NYS registered professional engineer and that this Remedial Action Work Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

10/9/12
Date

Mark P. Millspaugh, P.E.
President
Sterling Environmental Engineering, P.C.

Seal

1.0 INTRODUCTION

This Remedial Action Work Plan (RAWP) details the proposed treatment method, post-treatment monitoring, project schedule and supporting plan requirements for the implementation of the recommended remedy set forth in the Alternatives Analysis (AA) document dated September 18, 2012. The remedy is based on the AA and the results of the Interim Remedial Measures/Remedial Investigation (IRM/RI) report dated September 7, 2012.

1.1 Site Description & Background

441 Waverly Avenue was purchased in the 1960s by M. Argueso and Company, Inc. (Argueso), who constructed a one (1) story office building and storage/parking garage. A Site Location Map is presented as Figure 1. Raw materials stored at 441 Waverly Avenue were used at the wax manufacturing facility located at 442 Waverly Avenue. Stored materials included virgin wax, recycled wax, additives and Tetrachloroethylene (PCE), which were stored in the below grade section of the storage/parking garage. Wax manufacturing operations ceased in the spring of 2005.

442 Waverly Avenue was a lumber planning mill in 1912. Subsequent uses include Mamaroneck Sash, Trim and Door, followed by the Mamaroneck Chemical Company. Argueso purchased 442 Waverly Avenue in the 1930s. Under Argueso's ownership, Site operations initially refined waxes and subsequently changed to manufacturing waxes for the investment casting industry.

A Phase II Site Investigation was conducted by GZA GeoEnvironmental, Inc. (GZA) in January and October 2005. Analytical results for groundwater reported concentrations of Volatile Organic Compounds (VOCs) and Naphthalene exceeding the applicable water quality standard for samples collected from the overburden aquifer. Analytical results for soil reported detectable concentrations of VOCs and Semi-Volatile Organic Compounds (SVOCs) less than the 6 NYCRR Part 375-6.8(b) Soil Cleanup Objectives (SCOs) for Restricted Commercial Use (Part 375 SCOs).

The Brownfield Site Cleanup Agreement (BCA) between New Waverly Avenue Associates, LLC (Site Owner) and the New York State Department of Environmental Conservation (NYSDEC) was signed April 9, 2009 for the properties located at 441 and 442 Waverly Avenue, Town and Village of Mamaroneck, Westchester County, New York (Site).

As part of the BCA, Remedial Investigations / Interim Remedial Measures (RI/IRMs) were conducted in August and September 2009, October 2010 and January 2012. A final IRM/RI Report was submitted to the NYSDEC on September 7, 2012. The Alternatives Analysis is based on the findings and conclusions provided in the IRM/RI Report. This report was submitted and approved by the NYSDEC on September 18, 2012.

2.0 SELECTION OF REMEDY

The statutory or regulatory remedial action goals for remedial actions undertaken pursuant to NYSDEC Division of Environmental Remediation (DER) Technical Guidance for Site Investigation and Remediation (DER-10) are set forth in the applicable regulations for the New York State Brownfield Cleanup Program (BCP), as defined by ECL, Article 27, Title 14. According to DER-10, Remedial Action Objectives (RAOs) are specific objectives for the protection of public health and the environment. The RAOs are developed based on specific Standards, Criteria and Guidance (SCGs) to address contamination identified at the Site. The RAO for the Site focuses on petroleum and chlorinated solvent VOCs, the identified contaminants of concern. Further, Site use has consistently been industrial/heavy

commercial, and this is considered in evaluating the predisposal condition.

RAOs reflect the results of the Remedial Investigation (RI) and applicable regulatory requirements and guidance, specifically the 6 NYCRR Part 375 Recommended SCOs.

2.1 Remedial Action Objectives

The RAOs for the Site are as follows:

Groundwater:

RAOs for Public Health Protection
- Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards.
- Prevent contact with, or inhalation of volatiles, from contaminated groundwater.

RAOs for Environmental Protection
- Restore groundwater aquifer to pre-disposal/pre-release conditions, to the extent practicable.
- Remove the source of groundwater contamination.

Soil:

RAOs for Public Health Protection
- Prevent ingestion/direct contact with contaminated soil.
- Prevent inhalation of or exposure from contaminants volatilizing from contaminants in soil.

RAOs for Environmental Protection
- Prevent migration of contaminants that would result in groundwater contamination.

Soil Vapor:

RAOs for Public Health Protection
- Mitigate impacts to public health resulting from existing, or the potential for, soil vapor intrusion into buildings at a site.

2.2 Identification & Screening of Technologies

The screening of technology types and process options is discussed below. This screening was based on the criteria of effectiveness for treating impacted soils and groundwater, and implementability.

The AA evaluated the following alternatives:

- Institutional Controls;
- Capping;
- In-Situ Treatment of Soil and Groundwater; and
- Excavation and Offsite Disposal.

These alternatives were then evaluated as specified in DER-10 as follows:

- Overall Protection of Public Health and the Environment
- Compliance with SCGs

- Long-Term Effectiveness and Permanence
- Reduction of Toxicity, Mobility or Volume of Contaminant through Treatment
- Short-Term Impacts and Effectiveness
- Implement Ability
- Cost-Effectiveness, Including Capitol Costs and Site Maintenance Plan Costs
- Community Acceptance
- Land Use

Community and State acceptance are also considered after public comments have been received for the AA Report and RAWP. The Decision Document (DD) for the Site will address community and State acceptance criteria.

2.3 Recommended Remedial Alternative

Based on the AA and intended use of the property, the recommended remedy for the Site includes a Soil Vapor Intrusion (SVI) evaluation; low permeability capping by asphalt pavement; managing stormwater collection; and in-situ treatment of groundwater in the vicinity of monitoring wells GZ-22D and GZ-23D. These measures will minimize potential human exposure to soil vapor and soils; minimize migration of contaminants through infiltration of precipitation which may cause leaching of VOCs into groundwater; and reduce VOC concentrations in groundwater. The recommended remedy is readily implemented and will address the area known to be contaminated with chlorinated VOCs.

Subsurface soils containing concentrations of VOCs above the groundwater SCOs will remain onsite. In addition to paving, an Environmental Easement (EE) with deed restrictions will also be employed to minimize future exposure. Periodic groundwater monitoring will be performed.

This remedy will improve groundwater quality over time by eliminating infiltration of stormwater runoff through VOC impacted soils and directly reducing chlorinated VOC concentrations through treatment. Adjacent areas are served by municipal water, and are not, therefore, exposed to any VOC impacted groundwater as a drinking water source.

Future ground intrusive activities will necessitate a Site Management Plan (SMP) that includes an Excavation Work Plan to be incorporated for any future site development. The SMP will include a provision for evaluation of soil vapor intrusion for any future buildings developed on the site, including provision for implementing actions recommended to address exposures related to soil vapor intrusion.

Institutional controls, including an EE and the SMP, will eliminate potential exposure to VOCs in onsite groundwater and soil. The SMP will include signs placed on the site which will warn utility and construction workers of the contaminated soil and groundwater; periodic site inspection; periodic groundwater monitoring; and will provide for contacting the NYSDEC prior to ground-intrusive activities. An EE will provide notice to prospective owners that certain uses and/or development of the Site will be restricted without further remedial action, in the event the property is transferred in the future.

3.0 IMPLEMENTATION OF THE REMEDY

The remedy involves the injection of a hydrogen release compound (HRC) in the areas of wells GZ-22D and GZ-23D under pressure to degrade the chlorinated compounds over time into non-toxic compounds, such as Ethene and Ethane. The proposed in-situ treatment areas are shown on Figure 2.

Implementation of the remedy will necessitate the following:

1. Injection of HRC

   The contractor will mix and inject the proper amount of HRC in the area surrounding wells GZ-22D and GZ-23D. This will consist of approximately 480 pounds of HRC at well GZ-22D and 120 pounds at well GW-23D, injected into the soil on a grid, as shown on Figure 2. Specific installation instructions are provided in Appendix A.

2. Groundwater Monitoring

   The remedy will include post-treatment groundwater monitoring events that will consist of sampling six eight (6) deep monitoring wells for VOC analysis to determine if the treatment method is decreasing the TCE and PCE concentrations in groundwater. The initial monitoring event will take place one to two months following treatment with additional monitoring events to be determined based on an evaluation of the data.

   The following wells will be sampled: four (4) existing onsite deep monitoring wells GZ-21D, GZ-22D, GZ-23D, B6-OWD; and two (2) offsite monitoring wells OSMW-3, and OSMW-4. Depth to water will be measured and recorded. The monitoring wells will be purged and sampled by low-flow methods consistent with prior monitoring events. All purged water will be contained and discharged to the Mamaroneck Wastewater Treatment Plant via the sanitary sewer system connected to the 524 Waverly Avenue building, as in previous monitoring events.

   The following parameters will be measured in the field: Temperature, pH, Specific Conductance, Oxidation Reduction Potential (ORP) and Dissolved Oxygen (DO). Groundwater samples will be collected and analyzed for VOCs using EPA Method SW8260 by a NYSDOH-certified laboratory.

   All groundwater samples will be collected in accordance with the NYSDEC Department of Environmental Remediation DER-10 – Technical Guidance for Site Investigation and Remediation (December, 2002), as follows:

   - At least ten (10) percent of all samples will be collected in duplicate for Quality Assurance/Quality Control (QA/QC).

   - Monitoring wells to be sampled in duplicate will be selected randomly at the time of sampling.

   A Data Usability Summary Report will be prepared for the groundwater monitoring data in accordance with DER-10.

3. Soil Vapor Intrusion (SVI) Investigation

A Soil Vapor Intrusion (SVI) investigation will be completed for the onsite building during the 2012 - 2013 heating season. Prior to conducting the investigation, a work plan following Final NYSDOH "Guidance for Evaluating Soil Vapor Intrusion in the State of New York", dated October 2006, will be submitted to the NYSDEC and NYSDOH for review and approval. The investigation will determine whether additional actions are necessary.

4.0 REMEDIATION SCHEDULE

The proposed remediation schedule is presented below.

Permits and Approvals. All necessary permits and approvals will be applied for and obtained to authorize the work. The following summarizes the anticipated approvals and permits.

NYSDEC	• Remedial Action Work Plan (RAWP) • Site Management Plan (SMP) • Soil Vapor Intrusion (SVI) Work Plan
NYSDOH	• Community Air Monitoring Plan (CAMP) • Health and Safety Plan (HASP)
EPA	• Underground Injection Control (UIC) Program Notification

Remedy Implementation: Implementation of the groundwater treatment component of the remedy is expected to be completed in one (1) day. A summary letter will be submitted to NYSDEC upon completion.

Post-Treatment Groundwater Monitoring: One (1) groundwater monitoring event will take place one to two months following treatment with additional monitoring events to be determined based on an evaluation of the data. A summary letter report will be submitted to NYSDEC and NYSDOH upon receipt of analytical results of the groundwater monitoring and will include recommendations.

Soil Vapor Investigation: The SVI investigation will take place during the 2012-2013 heating season.

Tentative Schedule

Decision Document NYSDEC/NYSDOH Approval	October 2012
Remedy Implementation/Summary Letter	November 2012
Groundwater Monitoring Event/Summary Report	December 2012
SVI Investigation	January/February 2013

5.0 PLAN SUBMITTALS

5.1 Site Management Plan (SMP)

An SMP will be prepared in accordance with DER-10.

The SMP will include requirements for placing signs on the Site which will warn utility and construction workers of the contaminated soil and groundwater; conducting periodic site inspections; conducting periodic groundwater monitoring; and providing for contacting the NYSDEC prior to any ground-intrusive activities.

5.2 Health and Safety Plan (HASP)

The Health and Safety Plan (HASP), presented as Appendix B, identifies specific measures to be taken to ensure that hazardous substances or conditions do not adversely impact the health and safety of personnel and the general community (public) for Site operations. The HASP is intended to identify potential hazards and appropriate precautions as defined by OSHA 29 CFR 1910.120 (Hazardous Waste Operations and Emergency Response).

All personnel working on this project must read this HASP, acknowledge understanding of this plan, and abide by its requirements.

In general, personnel are responsible for complying with all regulations and policies applicable to the work they are performing. The onsite Project Manager is authorized to stop work if any construction personnel/subcontractor fails to adhere to the required health and safety procedures.

In addition to the HASP provided, each contractor must provide a HASP that addresses minimum training requirements for activities specific to the project and identifies potential hazards specific to the project.

5.3 Community Air Monitoring Plan (CAMP)

The Community Air Monitoring Plan (CAMP), presented as Appendix C, provides for real-time monitoring of VOCs and particulates (i.e., dust) at the downwind perimeter of each designated work area when ground-intrusive activities are implemented at the Site property. The CAMP was developed from the New York State Department of Health (NYSDOH) Generic CAMP that is provided in the DER-10 Technical Guidance for Site Investigation and Remediation. In addition, the work space proximal to any ground intrusive activities will be monitored for explosive gas. The CAMP provides a measure of protection for the downwind community (potential receptors include residences, businesses, and personnel not directly involved with work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The CAMP also addresses ground intrusive activities within twenty (20) feet of a potentially exposed population or occupied structure and for indoor air monitoring activities. Contractors should employ Best Management Practices (BMPs) and common sense measures to minimize VOCs, dust, and odors around work areas.

For this groundwater treatment remedy, ground intrusive activities will take place surrounding existing monitoring wells GZ-22D and GZ-23D.

FIGURES

MAP REFERENCE:

PROPERTY LINE LOCATIONS FOR 441 AND 442 WAVERLY AVENUE ARE BASED ON THE FIGURE PROVIDED BY GEO ENVIRONMENTAL, INC. ENTITLED "FORMER ARGUESO FACILITY" DATED SEPTEMBER 16, 2005.

AERIAL PHOTOGRAPH PROVIDED BY NEW YORK STATE GIS, (2009).

LEGEND:

APPROXIMATE PROPERTY BOUNDARY

FIGURE 1

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SITE LOCATION MAP

441-442 WAVERLY AVENUE

SITE #C360108

NEW WAVERLY AVENUE ASSOCIATES, LLC

V/T OF MAMARONECK WESTCHESTER CO., N.Y.

PROJ. No.:	28012	DATE:	6/25/12	SCALE:	1"=200'	DWG. NO.	28012067	FIGURE	1

LEGEND:

- ⊕ MONITORING WELL
- • HRC INJECTION POINTS

(IN FEET)
1 inch = 60 ft.

MAP REFERENCE: AERIAL PHOTOGRAPH PROVIDED BY NEW YORK STATE GIS, (2009).

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PROPOSED TREATMENT AREA
REMEDIAL ACTION WORK PLAN
SITE #C360108
NEW WAVERLY AVENUE ASSOCIATES, LLC
V/T OF MAMARONECK WESTCHESTER CO., N.Y.

PROJ. No.:	28012	DATE:	10/2/12	SCALE:	1"=60'	DWG. NO.	28012080	FIGURE	2

APPENDIX A

REGENESIS HRC INSTALLATION INSTRUCTIONS

REGENESIS

Hydrogen Release Compound (HRC®)

INSTALLATION INSTRUCTIONS
Direct-Push Injection

GENERAL GUIDELINES

The best method to deliver HRC into the subsurface is to inject the material through direct push rods using hydraulic equipment. This approach increases the spreading and mixing of HRC into the aquifer. This set of instructions is specific to direct push equipment.

Regenesis has found that very few pumps can adequately deliver HRC to the subsurface. Although other pumps may be capable of injecting HRC, we have developed the following instructions specifically for use with an R.E. RUPE Company Model ORC/HRC 9-1500 mixing and pumping machine. There is also strong evidence that the Geoprobe GS-2000 pump can effectively deliver HRC to the subsurface. In general, Regenesis strongly recommends using a pump with a minimum pressure rating of 1,500 pounds per square inch (psi) and a minimum delivery rate of 3 gallons per minute.

The installation of HRC should span the entire vertical contaminated saturated thickness. If the vertical extent of HRC application is confined to a limited interval, then the HRC material should be placed across a vertical zone extending a minimum of 2 feet above and below the screened Interval of monitoring wells to be used to evaluate the performance of the bioremediation project.

MATERIAL OVERVIEW, HANDLING, AND SAFETY

HRC is shipped in 4.25-gallon buckets and each bucket has a gross weight of approximately 32 pounds (net weight of HRC is 30 pounds). At room temperature, HRC is a sticky gel with a viscosity of approximately 20,000 centipoise (roughly equivalent to cold honey). The HRC material has a nominal density of 1.3 grams/cubic centimeter or approximately 10.8 pounds per gallon. The viscosity of HRC is temperature sensitive. Significant changes in viscosity are observed with large changes in product temperature. It should be noted that the temperature/viscosity relationship is not linear. For ease of installation, HRC should be stored in a warm, dry place that is protected from direct sunlight. It is common for stored HRC to settle somewhat in a container. Pre-heating HRC makes it easier to work with the material. Although HRC is manufactured as a food-grade material that is safe to ingest, field personnel should take precautions while handling and applying HRC. Field personnel should use appropriate safety equipment, including eye protection. The low pH when dissolved in water and the viscosity of the product make eye protection mandatory. Gloves should be used as appropriate based on the exposure duration and field conditions. A Material Safety Data Sheet is provided with each shipment. Personnel who operate field equipment during the installation process should have appropriate training, supervision, and experience.

SPECIFIC INSTALLATION PROCEDURES

1) Prior to the installation of HRC, any surface or overhead impediments should be identified as well as the location of all underground structures. Underground structures include but are not limited to: utility lines, tanks, distribution piping, sewers, drains, and landscape irrigation systems.

2) The planned installation locations should be adjusted to account for all impediments and obstacles.

3) Regenesis recommends pre-heating HRC in a hot water bath. Place unopened buckets of HRC into an empty water tank. A Rubbermaid fiberglass Farm Trough Stock Tank (Model 4242-00-GRAY) is typically used for this application and can hold up to 16 buckets of HRC. Hot water (approximately 130-170°F or 54-77°C) should be added to the tank after the buckets of HRC have been placed inside. When the HRC reaches a minimum temperature of 95°F or 35°C (approximately 20-30 minutes) it is ready to be poured into the pump hopper.

4) Pre-mark the installation locations, noting any points that may have different vertical application requirements or total depth.

5) Set up the direct push unit over each specific point and follow the manufacturer standard operating procedures (SOP) for the direct push equipment. Care should be taken to assure that probe holes remain in the vertical.

6) For most applications, Regenesis suggests using 1.25-inch O.D./0.625-inch I.D Geoprobe brand drive rods. However, some applications may require the use of 2.125-inch O.D./1.5-inch I.D. drive rods.

7) The HRC delivery sub-assemblies that Regenesis currently uses are designed for 1.25-inch Geoprobe rods. Other brands of drive rods can also be used but require the fabrication of a sub-assembly (see Regenesis Website).

8) Advance drive rods through the surface pavement, as necessary, following SOP.

9) Push the drive rod assembly with an expendable tip to the desired maximum depth. Regenesis suggests pre-counting the number of drive rods needed to reach depth prior to starting injection activities.

10) After the drive rods have been pushed to the desired depth, the rod assembly should be withdrawn three to six inches. Then the expendable tip can be dropped from the drive rods, following SOP.

    a) If an injection tool was used instead of an expendable tip, the application of material can take place without any preliminary withdrawal of the rods.

11) In some cases, introduction of a large column of air may be problematic. This is particularly the case in deep injections (>50 ft) with large diameter rods (>1.5-inch O.D.). To prevent the injection of air into the aquifer during HRC application, fill the drive rods with water.

12) Pour the pre-heated HRC into the pump hopper (up to 40 gallons). Remove the separated HRC from the bucket bottom by tipping the bucket into the hopper and scraping out the smooth residual material. Use the pumps mixing and recirculation features to create a uniform consistency. This typically requires recirculation of approximately one hopper volume. NOTE: Do not attempt to mix HRC with water or other liquids to thin or decrease the viscosity of the material. This may adversely affect HRC longevity.

13) A volume check should be performed prior to injecting HRC. Determining the volume displaced per pump stroke can be accomplished in two easy steps.

    a) Determine the number of pump strokes needed to deliver 3 gallons of HRC (use a graduated bucket for this)

    b) Divide 3 gallons by the results from the first step to determine the number of gallons of HRC delivered by each pump stroke.

    c) Level indicators present in the hopper are in 3 gallon increments.

    d) The volume of HRC displaced should be confirmed using the HRC level indicators located inside the pump hopper.

14) Connect the 1.25-inch O.D., 1-inch I.D. delivery hose to the pump outlet and the provided HRC delivery sub-assembly. Circulate HRC though the hose and the delivery sub-assembly to displace air in the hose.

15) Connect the HRC sub-assembly to the drive rod. After confirming that all of the connections are secure, pump the HRC through the delivery system to displace the water/fluid in the rods. **NOTE:** Prior to pumping HRC into the aquifer, close the pump recirculation valve; failure to do so will allow material to short-circuit into the hopper and change the volume of HRC delivered per pump stroke.

16) The pump engine RPM and hydraulic settings should remain constant throughout the day. However, if the hydraulic system starts to "squeal", the pump speed should be decreased until the noise is mitigated.

17) Use the pump's stroke counter and the provided volume/weight conversions to apply the appropriate HRC volume per injection location (and per vertical foot of contaminated saturated zone). Table 1 shows typical HRC delivery information followed by an example calculation.

Table 1: Pump Volume Calculation

Example: For each injection location, install 60 pounds of HRC across 10 vertical feet of aquifer (an application rate of 6 pounds per vertical foot).

Solution:

- 60 pounds/10.8 pounds per gallon ≈ 5.6 gallons for the injection location
- 5.6 gallons/0.2 gallons per stroke ≈ 28 pump strokes for the injection location
- 28 pump strokes/10 vertical feet = 2.8 strokes per vertical foot
- 2.8 strokes per vertical foot = 8.4 strokes per 3 foot drive rod
- 2.8 strokes per vertical foot = 11.2 strokes per 4 foot drive rod

18) Slowly withdraw the drive rods using Geoprobe Rod Grip or Pull Plate Assembly (Part AT1222-For 1.25-inch drive rods). While slowly withdrawing single lengths of drive rod (3 or 4 feet), pump the pre-determined volume of HRC into the aquifer across the desired treatment interval (Step 13). Use the stroke counter and pump on/off switch to control volume of injection. See Helpful Hints at the end of this section.

19) Remove one section of the drive rod. The drive rod may contain some residual HRC. Place the HRC-filled rod in a clean, empty bucket and allow the HRC to drain. Eventually, the HRC should be returned to the HRC pump hopper for reuse.

20) Observe any indications of aquifer refusal. This is typically indicated by a high-pitched squeal in the pump's hydraulic system or (in the case of shallow applications) HRC "surfacing" around the injection rods or previously installed injection points. If aquifer acceptance appears to be low, allow enough time for the aquifer to equilibrate prior to removing the drive rod.

21) Repeat steps 15 through 20 until treatment of the entire contaminated vertical zone has been achieved.

22) Install an appropriate seal, such as bentonite, above the HRC material through the entire vadose zone. Depending on soil conditions and local regulations, use a bentonite seal via chips or pellets after the probe rods have been removed. This assures that the HRC remains properly placed and prevents contaminant migration from the surface. If HRC continues to "surface" up the direct push borehole, an appropriately sized (oversized) disposable drive tip or wood plug/stake can be used to plug the hole until the aquifer equilibrates and the HRC stops surfacing.

23) Remove and clean the drive rods as necessary.

24) Finish the borehole at the surface as appropriate (concrete or asphalt cap, if necessary).

25) Periodically compare the pre- and post-injection volumes of HRC in the pump hopper using the pre-marked volume levels. Volume level indicators are not on all pump hoppers. In this

case, volume level markings can be temporarily added using known amounts of water and a carpenter's grease pencil (Kiel crayon). We suggest marking the water levels in 3-gallon increments.

26) Move to the next probe point, repeating steps 8 through 25.

HELPFUL HINTS

1) *Application in Cold Weather Settings*

The viscosity of HRC is directly related to the ambient temperature. As discussed in the Material Overview, Handling, and Safety section, cold weather tends to increase HRC viscosity and decrease ease of pumping. To maintain HRC at a temperature/viscosity at which it is easy to apply:

Raise and maintain the temperature of the HRC to at least 95°F (35°C) prior to pouring it into the pump hopper.

Insulate the delivery hose and keep the pump and hot water bath inside an enclosed structure such as a cargo van or trailer.

Periodically check the HRC temperature in the hopper.

Occasionally re-circulate HRC through the pump and hose to maintain temperature and viscosity.

The volume of HRC recirculated should not exceed the volume of HRC in the hopper.

Do not constantly recirculate HRC through the pump and hoses, as this may adversely affect the longevity of HRC.

2) *HRC Pump Information*

Regenesis has evaluated a number of pumps that are capable of delivering 20,000 centipoise HRC to the subsurface at a sufficient pressure and volumetric rate. Although a number of pumps may be capable of delivering the HRC to the subsurface at adequate pressures and volume, each pump has a set of practical issues that make it difficult to manage in a field setting. As a result of this evaluation, Regenesis has determined that the R.E. RUPE Company Model ORC/HRC 9-1500 meets the pressure and volume requirements needed to successfully inject HRC in the field. In general, Regenesis strongly recommends using a pump with a minimum pressure rating of 1,500 pounds per square inch (psi) and a minimum delivery rate of 3 gallons per minute. When applying measured volumes of HRC via probe boreholes, it is useful to know the volume of a single pump stroke (Table 1 above) and the associated delivery system lines. The following additional information is provided for reference:

Table 2: HRC Physical Characteristics

Density	1.3 g/cc or 10.8 lbs/gal
Viscosity	Approx. 20,000 centipoise

Table 3: Equipment Volume and HRC Weight per length

Equipment	Volume	HRC weight
1-inch OD; 0.625-inch ID hose (10 feet long)	0.2 gallon	1.8 lbs.
1.25-inch OD; 0.625-inch ID drive rod (3 feet length):	0.05 gallon	0.5 lbs.
1.25-inch OD; 0.625-inch ID drive rod (4 feet length):	0.06 gallon	0.7 lbs.

3) *Pump Cleaning*

For best results, use a hot water pressure washer (150 - 170 °F or 66 - 77 °C) to clean equipment and rods periodically throughout the day. Internal pump mechanisms and hoses can be easily cleaned by circulating hot water and a biodegradable cleaner such as Simple Green through the pump and delivery hose. Further cleaning and decontamination (if necessary due to subsurface conditions) should be performed according to the equipment supplier's standard procedures and local regulatory requirements.

NOTE: The remote control/pump counter should be kept dry at all times. If it gets wet, it will short-circuit and will need to be replaced.

Before using the Rupe Pump, check the following:

- Fuel level prior to engaging in pumping activities (it would be best to start with a full tank)
- Remote control/pump stroke counter LCD display (if no display is present, the electronic counter will need to be replaced (Grainger Stock No. 2A540))

Monitor pump strokes by observing the proximity switches (these are located on the top of the piston).

4) *HRC Bedrock Applications*

When contaminants are present in competent bedrock aquifers, the use of direct push technology as a delivery method is not possible. *Regenesis is in the process of developing methods for applying HRC via boreholes drilled using conventional rotary techniques.* To develop the best installation strategy for a particular bedrock site, it is critical that our customers call the technical support department at Regenesis early in the design process.

HRC can be applied into a bedrock aquifer in cased and uncased boreholes. HRC can be delivered by simply filling the borehole without pressure or by using a single or straddle packer system to inject HRC under pressure. Selection of the appropriate delivery

method is predicated on site-specific conditions. The following issues should be considered in developing an HRC delivery strategy:

- Is the aquifer's transmissivity controlled by fractures?
- Backfilling may be the better delivery method in massive, unfractured bedrock. This is particularly true in an aquifer setting with high permeability and little fracturing (such as that found in massive sandstone).
- Down-hole packer systems may be more advantageous in fractured bedrock aquifers.
    - In this case the fracture type, trends, and interconnections should be evaluated and identified.
- Are the injection wells and monitoring wells connected by the same fractures?
- Determine if it is likely that the HRC injection zone is connected to the proposed monitoring points.
- If pressure injection via straddle packers is desired, consideration should be given to the well construction. Specific issues to be considered are:
    - Diameter of the uncased borehole (*will casing diameter allow a packer system to be used*?).
    - Diameter of the casing (*same as above*).
    - Strength of the casing (*can it withstand the delivery pressures?*).
    - Length of screened interval (*screened intervals greater than 10 feet will require a straddle packer system*).

REGENESIS

Hydrogen Release Compound (HRC®) Installation Instructions

(HELPFUL HINTS)

Application in Cold Weather Settings:

The viscosity of HRC is directly related to the ambient temperature. As discussed in the Material Overview, Handling, and Safety section, cold weather tends to increase HRC viscosity and decrease ease of pumping. To maintain HRC at a temperature/viscosity at which it is easy to apply:

1. Raise and maintain HRC's temperature to at least 95°F (35°C) prior to pouring it into the pump hopper

2. Insulate the delivery hose and keep the pump and hot water bath inside an enclosed structure such as a cargo van or trailer

3. Periodically check the HRC temperature in the hopper

4. Occasionally re-circulate HRC through the pump and hose to maintain temperature and viscosity

5. The volume of HRC recirculated should not exceed the volume of HRC in the hopper

6. Do not constantly recirculate HRC through the pump and hoses, as this may adversely affect HRC's longevity.

HRC Bedrock Applications:

When contaminants are present in competent bedrock aquifers, the use of direct push technology as a delivery method is not possible. *Regenesis is in the process of developing methods for applying HRC via boreholes drilled using conventional rotary techniques.* To develop the best installation strategy for a particular bedrock site, it is critical that our customers call the technical support department at Regenesis early in the design process.

HRC can be applied into a bedrock aquifer in cased and uncased boreholes. HRC can be delivered by simply filling the borehole without pressure or by using a single or straddle packer system to inject HRC under pressure. Selection of the appropriate

delivery method is predicated on site-specific conditions. The following issues should be considered in developing an HRC delivery strategy:

Is the aquifers transmissivity controlled by fractures?

Backfilling may be the better delivery method in massive, un-fractured bedrock, this is particularly true in an aquifer setting with high permeability and little fracturing

Intervals greater than 10 feet will require a straddle packer system).

- such as found in massive sandstone

- Down-hole packer systems may be more advantageous in fractured bedrock aquifers

- In this case the fracture type, trends, and interconnections should be evaluated and identified

Is the injection and monitoring wells connected by the same fractures?

Determine if it is likely that the HRC injection zone is connected to the proposed monitoring points

If pressure injection via straddle packers is desired, consideration should be given to the well construction. Specific issues to be considered are:

- Diameter of the uncased borehole (*will casing diameter allow a packer system to be used*?)

- Diameter of the casing (same as above)

- Strength of the casing (can it withstand the delivery pressures?)

- Length of screened interval (screened intervals greater than 10 feet will require a straddle packer system).

For direct assistance or answers to any questions you may have regarding these instructions, contact Regenesis Technical Services at 949-366-8000.

REGENESIS

Hydrogen Release Compound (HRC®) Installation Instructions

(Pump Information)

Regenesis has evaluated a number of pumps that are capable of delivering 20,000 centipoise HRC to the subsurface at a sufficient pressure and volumetric rate. Although a number of pumps may be capable of delivering the HRC to the subsurface at adequate pressures and volume, each pump has a set of practical issues that make it difficult to manage in a field setting. As a result of this evaluation, Regenesis has determined that the R.E. RUPE Company Model ORC/HRC 9-1500 meets the pressure and volume requirements needed to successfully inject HRC in the field. When applying measured volumes of HRC via probe boreholes, it is useful to know the volume of a single pump stroke and the associated delivery system lines. The following additional information is provided for reference

HRC Physical Characteristics:

Density	1.3 g/cc or 10.8 lbs./gal.
Viscosity	Approx. 20,000 centipoise

Equipment Volume and HRC Weight per length

Equipment	Volume	HRC weight
1 inch OD; 0.625 ID hose (10 feet long)	0.2 gallon	1.8 lbs.
1.25 inch OD; 0625 inch ID drive rod (3 feet length):	0.05 gallon	0.5 lbs.
1.25 inch OD; .625 inch ID drive rod (4 feet length):	0.06 gallon	0.7 lbs.

Before using the Rupe Pump, check the following:

- Fuel level prior to engaging in pumping activities (it's best to start with a full tank)

- Remote control/pump stroke counter LCD display; if no display is present, the electronic counter will need to be replaced (Grainger Stock No. 2A540)

- Monitor pump strokes by observing the proximity switches (these are located on the top of the piston)

Pump Cleaning after HRC Use:

For best results use a hot water (150-170 °F or 66-77 °C) pressure washer to clean equipment and rods periodically throughout the day. Internal pump mechanisms and hoses can be easily cleaned by circulating hot water and a biodegradable cleaner such as Simple Green through the pump and delivery hose. In order to maintain optimal pumping conditions, it is desirable to circulate pure glycerin through the pump after the pump has been thoroughly cleaned. A small volume of glycerin should be left in the pump works and hopper during storage or shipping. Further cleaning and decontamination (if necessary due to subsurface conditions) should be performed according to the equipment supplier's standard procedures and local regulatory requirements.

NOTE: The remote control/pump counter should be kept dry at all times, if it gets wet it will short-circuit and ill need to be replaced.

For direct assistance or answers to any questions you may have regarding these instructions, contact Regenesis Technical Services at 949-366-8000.

APPENDIX B

HEALTH AND SAFETY PLAN

FORMER M. ARGUESO AND CO., INC.
BROWNFIELD CLEANUP PROGRAM
441 & 442 WAVERLY AVENUE
MAMARONECK, NEW YORK
SITE NO. C360108

HEALTH AND SAFETY PLAN (HASP)

1.0 GENERAL INFORMATION

The Health and Safety Plan (HASP) identifies specific measures to be taken during any ground intrusive activities such as excavation and drilling to ensure that hazardous substances or conditions do not adversely impact the health and safety of personnel and the general community (public) for site operations. The HASP is intended to identify potential hazards and appropriate precautions as defined by OSHA 29 CFR 1910.120 (Hazardous Waste Operations and Emergency Response).

All personnel working on this site must read this HASP, acknowledge understanding of this plan, and abide by its requirements.

In general, personnel are responsible for complying with all regulations and policies applicable to the work they are performing. The Project Manager is authorized to stop work if any construction personnel/subcontractor fails to adhere to the required health and safety procedures.

In addition to this HASP, each contractor must provide a HASP that addresses minimum training requirements for activities specific to a project and identified potential hazards that are not discussed herein.

2.0 DESIGNATION OF RESPONSIBILITIES

Implementing this HASP is the responsibility of the onsite Project Manager. The Project Manager will be designated prior to any site activities and can be the contractor hired for a particular project, or an independent consultant hired by the Owner.

The Project Manager is responsible for:

- Ensuring the availability, use, and proper maintenance of specified personal protective equipment, decontamination, and other health or safety equipment.
- Maintaining a high level of safety awareness among personnel and subcontractors and communicating pertinent matters to them promptly.
- Ensuring all site activities are performed in a manner consistent with this HASP.
- Monitoring for dangerous conditions during site activities.
- Ensuring proper decontamination of personnel and equipment.

- Coordinating with emergency response personnel and medical support facilities.
- Initiating immediate corrective actions in the event of an emergency or unsafe condition.
- Notifying the NYSDEC and project owner of any emergency, unsafe condition, problem encountered, or exception to the requirements of this HASP.
- Recommending improved health and safety measures to the NYSDEC.

The Project Manager must be present for all intrusive investigative activities on the site property. However, the presence of the Project Manager shall in no way relieve any person or company of its obligations to comply with the requirements of the HASP and all applicable Federal, State and local laws and regulations.

All personnel involved in a site project must be familiar with and conform to the safety protocols prescribed in this HASP, and communicate any relevant experience or observations to the Project Manager to help improve overall safety.

3.0 SITE PROPERTY SPECIFIC HEALTH AND SAFETY CONCERNS

Airborne Exposure Limits

Table 1 lists the published airborne exposure limits for those substances that are known or suspected to be present at the site.

Unknown or unexpected hazardous materials may be encountered during ground intrusive activities. No work will be conducted if field measurements or observations indicate there is potentially uncontrolled exposure to undefined hazards, or if exposures exceed protection provided by requirements in this HASP.

Explosive Gas

Explosive gas, including hydrogen sulfide (H_2S), may be present in the subsurface pore spaces and therefore any major ground intrusive activity must be monitored with a gas unit that measures the Lower Explosive Limit (LEL) in percent and H_2S in parts per million (ppm). Action levels for explosive gas and H_2S are provided in Table 2.

Personal Protective Equipment (PPE)

Specific types of PPE for levels C and D are also listed on Table 2.

No work is anticipated requiring Levels A or B PPE and very limited work in Level C. If air monitoring results require PPE upgrades from Level D, then only medically qualified, trained personnel experienced in the use and limitations of air purifying or supplied air respirators will be used. Air purifying respirators with High-Efficiency Particulate Air (HEPA) filters, capable of removing particles of 0.3 micron or larger from air at 99.97% or greater efficiency, should be used when exposure to dust is a potential risk.

Unless the Project Manager directs otherwise, respirators used for organic vapors or particulates should have cartridges changed after eight (8) hours of use, or at the end of each shift, or when any indication of breakthrough or excessive resistance to breathing is detected. OSHA regulations require a Respiratory

Protection Program for companies that require employees to enter areas where respirators are required and such Respiratory Protection Programs must address the requirements for replacement of cartridges.

Suspected Safety Hazards

Suspected safety hazards include those inherent with the operation of heavy equipment such as drilling rigs or excavators, and proximity to excavations. Inspections to ensure appropriate safety measures are in place and the use of lockout and tagout procedures during maintenance of this equipment will control these inherent hazards. Personal protective equipment (PPE) including hard hats, safety shoes and eye protection will be worn to augment other safety precautions.

Drilling rigs and excavators must not operate closer than thirty (30) feet to any overhead lines, measured directly between any part of the equipment and the lines themselves except where electrical distribution and transmission lines have been de-energized and visibly grounded at the point of work, or where insulating barriers have been erected to prevent physical contact with the lines. If drilling or excavating is required within thirty (30) feet of any overhead lines, a written work plan must be provided by the contractor or other equipment operator that includes special measures designed to mitigate the risks and is in accordance with 29 CFR 1926.550(a)(15). The work plan must be reviewed and approved by written signature by the Project Manager.

Care must be taken to ensure loose clothing does not get tangled in any moving equipment associated with drilling rigs or excavators. There may be slip or trip hazards associated with rough, slippery or elevated work surfaces.

There is also the possibility of organic vapors being encountered during ground intrusive activities due to the presence of petroleum compounds in soil and groundwater. The Project Manager will use continuous monitoring instruments that measure total VOCs while each task is being conducted to determine ambient levels of contaminants. Procedures for monitoring VOCs and airborne particulates are provided in the Community Air Monitoring Plan (CAMP).

All excavations will be maintained to prevent access by unauthorized persons and will be filled or fenced off by the end of the workday. No one is permitted to enter the excavations. All subsurface samples will be obtained by operation of the excavating equipment and will be collected from the excavator bucket.

Excavator and Drill Rig Operations

Excavation will be performed with a track-mounted excavator or backhoe. To conduct soil borings, a hollow-stem auger or direct push drilling rig will be used. Working with or near this equipment poses potential hazards, including inhaling dust from coring being struck by, or pinched/caught by equipment, potentially resulting in serious physical bodily harm.

In particular, the following precautions will be used to reduce the potential for injuries and accidents:

- The emergency stop control on a drilling rig will be shown to all personnel.
- The inspection of excavator and drill rig brakes, hydraulic lines, light signals, fire extinguishers, fluid levels, steering, tires, horn, and other safety devices will be conducted prior to the initial mobilization and checked routinely throughout the project.
- Excavator and drill rig cabs will be kept free of all nonessential items and all loose items will be secured.

- Excavators and drill rigs will be provided with necessary safety equipment, including seat belts.
- Drill rig cables and auger flight connections will be checked for evidence of wear. Frayed or broken cables or defective connections will be replaced immediately.
- Parking brakes will be set before shutting off any heavy equipment or vehicle.
- All employees will be briefed on the potential hazards prior to the start of each excavation or drilling project.

Adverse Weather

Drilling or excavating is dangerous during electrical storms. All field activity must terminate during thunderstorms. Extreme heat and cold, ice and heavy rain can produce unsafe conditions for drilling work. Such conditions, when present, will be evaluated on a case-by-case basis to determine if work shall continue.

Fire and Explosion

Use of gasoline or diesel powered equipment increases the risk of fire and explosion hazards. Contractors will be required to store diesel fuel and gasoline in metal cans with self-closing lids and flash arrestors.

Requirement to Conduct Utility Mark Out

Prior to the start of any subsurface work, underground utilities and piping that may pose a potential hazard will be identified and located. DigSafely.NewYork or an equivalent service will be called and underground utilities will be located and marked. Also, the location of privately owned utility lines will be determined.

In the event a pipe or line is struck, work will stop and the Emergency Action Plan will be implemented (see Section 5.0).

Confined Space Entry

Confined space entry is not anticipated for excavating and sampling activities. If a project requires confined space entry, a specific HASP will be implemented.

Confined Space is defined as a space that:

1. is large enough and so configured that an employee can bodily enter and perform assigned work;
2. has limited or restricted means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry); and
3. is not designed for continuous employee occupancy.

Excavation and Sampling Work Zones

One of the basic elements of an effective HASP is to delineate work zones for each ground intrusive location. The purpose of establishing work zones is to:

- Reduce the accidental spread of hazardous substances by personnel or equipment from the contaminated areas to the clean areas;
- Confine work activities to the appropriate areas, thereby minimizing the likelihood of accidental exposures;
- Facilitate the location and evacuation of personnel in case of an emergency; and
- Prevent unauthorized personnel from entering controlled areas.

Although a work site may be divided into as many zones as necessary to ensure minimal employee exposure to hazardous substances, this HASP uses the three (3) most frequently identified zones: the Exclusion Zone, Decontamination Zone, and Support Zone. Movement of personnel and equipment between these zones should be minimized and restricted to specific access control points to minimize the spreading of contamination.

- Exclusion Zone

  During investigative work, the Exclusion Zone is the immediate excavation, test pit, borehole, or other area where contamination is either known or expected to occur and where the greatest potential for exposure exists. The following protective measures will be taken in the Exclusion Zone.

  Unprotected onlookers will be restricted from the excavation location so that they are at least twenty-five (25) feet upwind or fifty (50) feet downwind of excavation or drilling activities.

  Personnel conducting activities and sampling in the Exclusion Zone will wear the applicable PPE. The actions to be taken and PPE to be worn in the Exclusion Zone if VOCs are above background levels are described in Table 2.

- Decontamination Zone

  During investigative work, a Decontamination Zone will be established at the perimeter of the Exclusion Zone, and will include the personnel, equipment and supplies that are needed to decontaminate equipment. The size will be selected by the Project Manager to conduct the necessary decontamination activities. Personnel and equipment in the Exclusion Zone must pass through this zone before leaving or entering the Support Zone. The necessary decontamination must be completed in this zone and the requirements are described in Section 6.0. This zone should always be established and maintained upwind of the Exclusion Zone.

- Support Zone

  During investigative work, the areas located beyond the Decontamination Zone will be considered the Support Zone. Break areas, operational direction and support facilities will be located in this area. Eating and drinking will be allowed only in the Support Zone.

Natural Hazards

Work that takes place in the natural environment may be affected by plants and animals that are known to be hazardous to humans. Spiders, bees, wasps, hornets, ticks, poison oak and poison ivy are only some of the natural hazards that may be encountered. Individuals who may potentially be exposed to these hazards should be made aware of their existence and instructed in their identification. Emergencies resulting from contact with a natural hazard should be handled through the normal medical emergency procedures. Individuals who are sensitive or allergic to these types of natural hazards should indicate their susceptibility to the Project Manager.

Heat and Cold Stress Hazards

If work is to be conducted during the winter, cold stress is a concern to the health and safety of personnel. Because disposal clothing such as Tyvek does not "breathe", perspiration does not evaporate and the suits can become wet. Wet clothes combined with cold temperatures can lead to hypothermia. If the air temperature is less than 40 degrees Fahrenheit (°F) and personnel's clothes become wet due to perspiration, personnel must change to dry clothes.

Signs and Symptoms of Cold Stress

- **Incipient frostbite**: is a mild form of cold stress characterized by sudden blanching or whitening of the skin.

- **Chilblain:** is an inflammation of the hands and feet caused by exposure to cold moisture. It is characterized by a recurrent localized itching, swelling, and painful inflammation of the fingers, toes, or ears. Such a sequence produces severe spasms, accompanied by pain.

- **Second-degree frostbite** is manifested by skin which has a white, waxy appearance and is firm to the touch. Individuals with this condition are generally not aware of its seriousness, because the underlying nerves are frozen and unable to transmit signals to warm the body. Immediate first aid and medical treatment are required.

- **Third-degree frostbite** will appear as blue, blotchy skin. This tissue is cold, pale and solid. Immediate medical attention is required.

- **Hypothermia** develops when body temperature falls below a critical level. In extreme cases, cardiac failure and death may occur. Immediate medical attention is warranted when the following symptoms are observed:

    - Involuntary shivering;
    - Irrational behavior;
    - Slurred speech;
    - Sluggishness; and
    - Loss of consciousness.

Preventing Cold Related Illness/Injury

- Train personnel to identify the signs and symptoms of cold stress. Require field personnel to wear proper clothing for cold, wet and windy conditions, including layers that can be adjusted to changing weather conditions. It is important to keep hands and feet dry.

- Field personnel working in extremely cold conditions must take frequent short breaks in warm, dry shelters to allow their body temperature to increase. If possible, field work should be scheduled during the warmest part of the day. The buddy system should be used so that personnel can assist each other in recognizing signs of cold stress.

- Drink warm, sweet beverages and avoid drinks with caffeine and alcohol. Eat warm, high-calorie foods.

- Personnel with medical conditions such as diabetes, hypertension or cardiovascular disease or who take certain medications, may be at increased risk for cold stress.

Treatment of Cold Related Injuries

If cold stress symptoms are evident, the affected person must move into a warm, dry sheltered area and all wet clothing should be removed and replaced with dry clothing. If frostbite is suspected, the affected person should be treated by trained medical personnel.

Signs and Symptoms of Heat Stress

Wearing PPE also puts personnel at a considerable risk for developing heat stress. This can result in health effects ranging from heat fatigue to serious illness or death. Consequently, regular monitoring, remaining hydrated and other precautions are vital.

- **Heat Rash** may result from continuous exposure to heat and humid air.

- **Heat Cramps** are caused by heavy sweating with inadequate electrolyte replacement. Signs and symptoms include:

    - Muscle spasms; and
    - Pain in the hands, feet and abdomen.

- **Heat Exhaustion** occurs from increased stress on various body organs, including inadequate blood circulation due to cardiovascular insufficiency or dehydration. Signs and symptoms include:

    - Pale, cool, and moist skin;
    - Heavy sweating; and
    - Dizziness, fainting, and nausea.

- **Heat Stroke** is the most serious form of heat stress. Temperature regulation fails, and the body temperature rises to critical levels. Immediate action must be taken to cool the body before serious injury or death occurs. Competent medical help must be obtained. Signs and symptoms are:

    - Red, hot, and unusually dry skin;
    - Lack of or reduced perspiration;
    - Dizziness and confusion;
    - Strong, rapid pulse; and
    - Loss of consciousness.

Preventing Heat Related Illness/Injury

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

- Have personnel drink sixteen (16) oz. (0.5 liter) of fluid (preferably water or diluted drinks) before beginning work. Urge personnel to drink a cup or two every fifteen (15) to twenty (20) minutes, or at each monitoring break. A total of 1 to 1.6 gallons (four (4) to six (6) liters) of fluid per day are recommended, but more may be necessary to maintain body weight.

- If possible, adjust work schedules to avoid the hottest parts of the day.

- Encourage personnel to maintain an optimal level of physical fitness.

- Shelter (air-conditioned, if possible) or shaded areas should be provided to protect personnel during rest periods.

- Train personnel to recognize, identify, and treat heat stress.

For personnel wearing standard work clothes, recommendations for monitoring and work/rest schedules are those approved by American Conference of Governmental Industrial Hygienists (ACGIH) and National Institute of Occupational Safety and Health (NIOSH). Personnel wearing semi-permeable PPE or impermeable PPE should be monitored when the temperature in the work area is above 70°F.

Noise Hazards

Work that involves the use of heavy equipment such as a drill rig or excavator can expose personnel to noise during field activities that can result in noise-induced hearing loss. The Project Manager will monitor the noise exposure and will determine whether noise protection is warranted for each personnel. The Project Manager will ensure that either ear muffs or disposable foam earplugs are available and are used by personnel in the immediate vicinity of the field operation as required.

Slip, Trip and Fall Hazards

Ground intrusive locations can contain a number of slip, trip and fall hazards for personnel, such as:

- Holes, pits, or ditches
- Excavation faces
- Slippery surfaces
- Steep grades
- Uneven grades
- Snow and ice
- Sharp objects

All personnel must be instructed to keep back three (3) feet from the top edge of excavation faces.

Drill auger sections will be stored on the transport vehicle as long as possible to avoid creating a trip hazard. Drill auger sections and other tools will be stored in neat arrangements convenient to the driller, but sufficiently distant from the immediate area around the drill rig to minimize trip hazards.

Personnel will be instructed to look for potential safety hazards and immediately inform the Project Manager regarding any new hazards. If the hazard cannot be immediately removed, actions must be taken to warn personnel about the hazard.

Modifications to this Plan

Requirements and guidelines in this HASP are subject to modification by the Project Manager in response to additional information obtained during field work regarding the potential for exposure to hazards.

4.0 MEDICAL SURVEILLANCE PROGRAM

General

Personnel who participate in field activities that meet the following criteria will be included in the Medical Surveillance Program:

- All who may be exposed to hazardous substances or health hazards at or above permissible exposure limits, without regard to the use of respirators, for thirty (30) days or more per year, as required by 29 CFR 1926.65(f)(2)(i-iv).

- All who wear a respirator for thirty (30) days or more every year as required by 29 CFR 1926.65(f)(2)(i-iv).

- All who are injured because of overexposure from an incident involving hazardous substances or health hazards.

Frequency of Medical Exams

Medical examinations and consultations will be provided on the following schedule to personnel who meet the above listed general qualifications:

- Prior to assignment to a work site, if any of the criteria noted above are anticipated.

- At least once every twelve (12) months, unless the physician believes a longer interval (not greater than two (2) years) is appropriate.

- As soon as possible upon notification that personnel has developed signs or symptoms indicating possible overexposure to hazardous materials.

5.0 EMERGENCY ACTION PLAN

Personnel will use the following standard emergency procedures. The Project Manager will be notified of any emergency and be responsible for ensuring the appropriate procedures are followed and that the Project Manager is notified. A first aid kit, an eye wash unit that can provide a minimum flow rate of 0.4 GPM for fifteen (15) minutes, and a fire extinguisher rated 20A-B-C (or higher) will be readily available to personnel. All personnel will be trained in use of emergency supplies. Questions regarding procedures and practices described in the HASP should be directed to the Project Manager.

Notification

Any symptoms of adverse health, regardless of the suspected cause, are to be immediately reported to the Project Manager.

Upon the occurrence of an emergency, including an unplanned chemical release, fire or explosion, personnel will be alerted and the area evacuated immediately. The Project Manager will notify the ambulance service, fire department and/or police department, as required. Emergency contact telephone numbers are provided below. Re-entry to the work area will be limited to those required to assist injured personnel or for firefighting or spill control. Anyone entering the work area following an emergency incident must wear appropriate protective equipment (PPE).

Emergency Services

Emergency Services	Telephone Number
Owner: New Waverly Avenue Associates, LLC	(914) 935-3950
Town of Mamaroneck Fire Department	911 or (914) 834-2192
Town of Mamaroneck Police Department	911 or (914) 381-6100
Ambulance	911 or (914) 381-7838
Hospital: Sound Shore Medical Center	(914) 632-5000
Poison Control Center	(800) 222-1222
NYSDEC Spills Emergency Response Program	(800) 457-7362

A map showing the preferred route to the hospital with written directions is presented in Figure 1; and written directions are also included on the map.

The following alarm systems will be utilized to alert personnel to evacuate the restricted area:

- Direct Verbal Communication
- Radio Communication or Equivalent
- Portable or Fixed Telephone

The following standard hand signals will also be used as necessary:

Hand Signal	Message
Hand gripping throat	Can't breathe/out of air
Grip co-worker's wrist	Leave area immediately, no debate!
Hands on top of head	Need assistance
Thumbs up	Yes/O.K.
Thumbs down	No/Problem

Upon activation of an alarm, personnel will proceed to a designated assembly area. The designated assembly area will be determined on a daily basis by the Project Manager and updated as necessary depending upon work conditions, weather, air monitoring, etc. The location of the designated assembly area will be clearly marked and communicated to employees daily or upon relocation of the area. Personnel gathered in the designated assembly area will remain there until their presence has been noted. A tally of personnel on the daily restricted area access roster will be made as necessary to ensure all personnel have been properly evacuated and accounted for.

Personnel may return to the designated work area following authorization by the Project Manager.

Personal Injury

If anyone within a work area is injured and cannot leave the restricted area without assistance, emergency medical services will be notified (see Section 5.0) and appropriate first aid will be administered by certified Emergency Medical Technicians (EMTs).

Fire/Explosion

Upon the occurrence of a fire beyond the incipient stage or an explosion anywhere on the site property, the fire department will be alerted and all personnel moved to a safe distance from the involved area.

Equipment Failure

If any equipment fails to operate properly, the Project Manager will determine the effect of this failure on continuing operations. If the failure affects the safety of personnel (e.g., failure of monitoring equipment) or prevents completion of the planned tasks, all personnel will leave the work area until appropriate corrective actions have been taken.

Record Keeping

The Project Manager will maintain records of reports concerning occupational injuries and illnesses in accordance with 29 CFR 1904.

6.0 DECONTAMINATION METHODS

6.1 Contamination Prevention Methods

The Project Manager will make all personnel aware of the potential for contamination. The following procedures will be established to minimize contact with waste:

- Personnel will not walk through areas obvious of contamination;
- Personnel will not directly touch potentially hazardous substances;
- Personnel will wear gloves when touching soil or waste;
- Personnel will wear disposable outer garments where appropriate; and
- Excavated soils will be placed on plastic sheeting and covered with plastic sheeting at the end of the workday.

6.2 Heavy Equipment Decontamination

All equipment, tools and materials associated with sampling events must be cleaned or decontaminated prior to usage. Items such as drill rigs, auger flights, trackhoes, and backhoes all present potential sources of contamination to environmental samples. Therefore, all heavy equipment utilized at the site must undergo the following decontamination procedures:

- The equipment will be high pressure, hot washed or steam-cleaned with potable water; and,
- The equipment will be rinsed thoroughly with potable water.

Contain, collect and dispose of all decontamination fluids in accordance with project-specific requirements. The bucket of trackhoes and backhoes may be cleaned over the excavation allowing high pressure decontamination washwater to return to the excavation.

6.3 Cleaning of Field Sampling Equipment

All equipment and tools used to collect samples for chemical analyses, including spatulas, spoons, scoops, trowels, split-spoons, augers, etc. will be decontaminated using the following procedures:

- Non-phosphate detergent wash;
- Potable water or distilled/deionized water rinse; and
- Air dry.

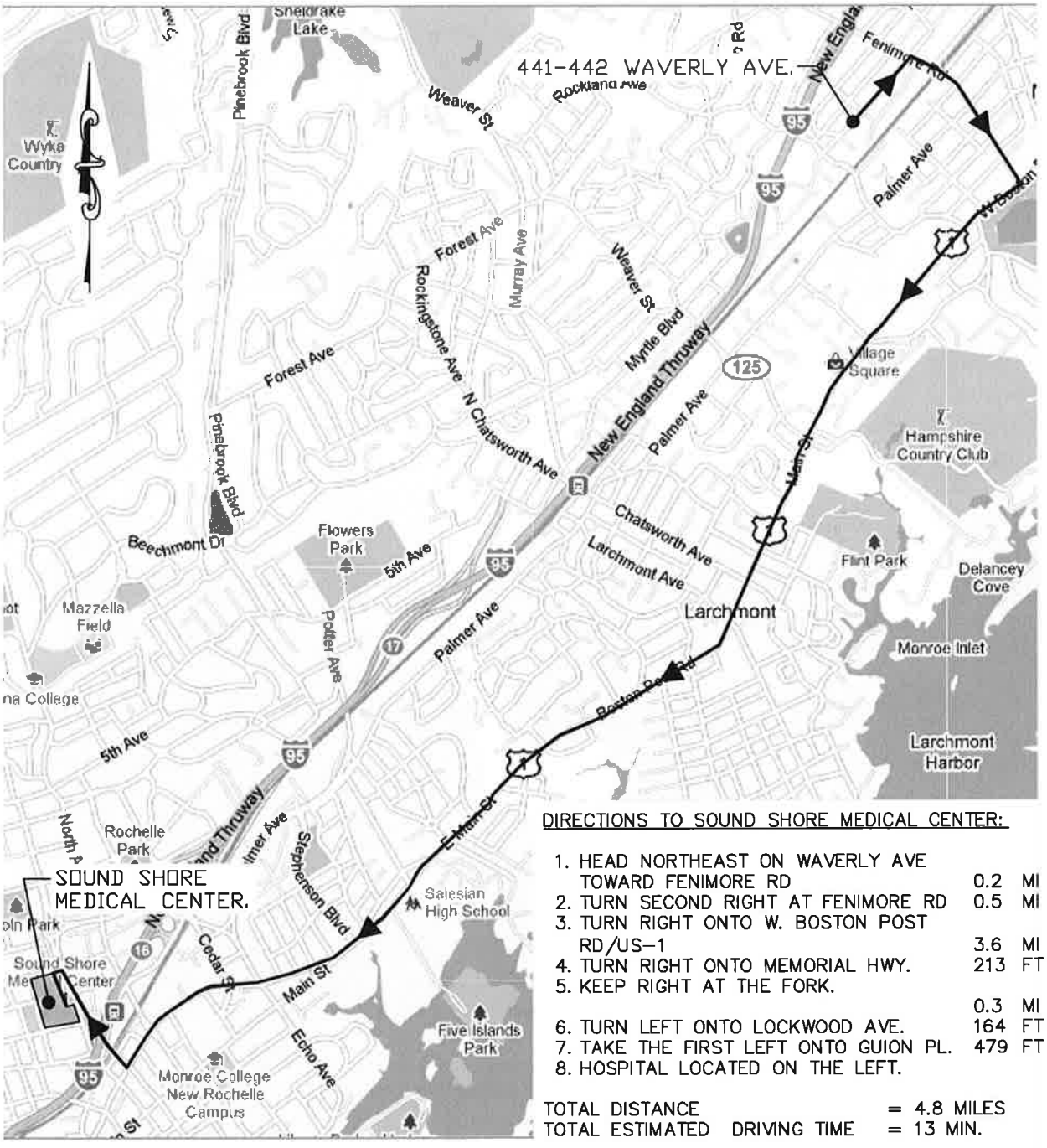
If the equipment is to be stored for future use, allow to dry and then wrap in aluminum foil (shiny-side out) or seal in plastic bags.

Collect or dispose of all decontamination fluids in accordance with project-specific requirements.

6.4 Personal Clothing Decontamination

All footwear worn in and around the contamination area will be washed down using soap and water to remove soil or oily residue remnants. If disposable gloves, boots or suits (such as Tyvek® suits) are worn, such are to be removed and disposed in a designated 55-gallon drum or garbage bag on-site for future disposal. Any other clothing that comes in contact with potentially contaminated material should not be worn more than 24-hours and should be washed prior to wearing again.

SOUND SHORE MEDICAL CENTER
16 GUION PLACE
NEW ROCHELLE, NY 10801
(914) 632-5000



DIRECTIONS TO SOUND SHORE MEDICAL CENTER:

1. HEAD NORTHEAST ON WAVERLY AVE TOWARD FENIMORE RD	0.2	MI
2. TURN SECOND RIGHT AT FENIMORE RD	0.5	MI
3. TURN RIGHT ONTO W. BOSTON POST RD/US-1	3.6	MI
4. TURN RIGHT ONTO MEMORIAL HWY.	213	FT
5. KEEP RIGHT AT THE FORK.	0.3	MI
6. TURN LEFT ONTO LOCKWOOD AVE.	164	FT
7. TAKE THE FIRST LEFT ONTO GUION PL.	479	FT
8. HOSPITAL LOCATED ON THE LEFT.		

TOTAL DISTANCE = 4.8 MILES
TOTAL ESTIMATED DRIVING TIME = 13 MIN.

NOTE: SCALE IS APPROXIMATE

FIGURE 1

STERLING
Sterling Environmental Engineering, P.C.
24 Wade Road • Latham, New York 12110

HOSPITAL ROUTE
SITE #C360108
441-442 WAVERLY AVENUE
NEW WAVERLY AVENUE ASSOCIATES, LLC
T/V OF MAMARONECK WESTCHESTER CO., N.Y.

PROJ. No.:	DATE:	SCALE:	DWG. NO.	FIGURE
28012	7-13-11	1" = 2000'	28012012	1

Table 1
Published Airborne Exposure Limits or Odor Thresholds in Parts Per Million (PPM)
for Substances that Exceed Applicable Standards in Soil and Groundwater

Substance	OSHA PEL/STEL/C	NIOSH REL/STEL	ACGIH TLV/STEL	IDLH	Cancer Causing	Range of Odor Thresholds
VOCs:						
Benzene	1/5/25	0.1/1	0.5/2.5	500	Y	1.5
n-Butylbenzene	NA	NA	NA	NA	NA	NA
sec- Butylbenzene	NA	NA	NA	NA	NA	NA
tert- Butylbenzene	NA	NA	NA	NA	NA	NA
Carbon Tetrachloride	10/-/25	-/2	5/10	200	Y	10
Chloroethane	1000/-/-		100/-		Y	4.2
Cis-1,2-Dichloroethene (cis-1,2-DCE)	200/-/-	200/-	200/-	1000	N	19.1
1,2 Dichlorobenzene	-/-/50	50/-	25/50	200	N	
1,1 Dichloroethane	100/-/-	100/-	100/-	3000	N	120
1,2 Dichloroethane	50/-/100	1/2	10/-	50	Y	6-10
Trans 1,2 Dichloroethene						
Ethylbenzene	100/-/-	100/125	100/125	800	N	2.3
Isopropylbenzene	50/-/-	50/-	50/-	900	N	
Naphthalene	10/-/-	10/15	10/15	250	N	0.084
N-Propylbenzene	NA	NA	NA	NA	NA	NA
Tetrachloroethene	100/-/200	NA	25/100	150	Y	1
Trichloroethene	100/-/200	25/-	50/100	1000	Y	28
Vinyl Chloride	1/-/5	NA	1/-		Y	3,000
SVOCs:						
Naphthalene	10/-/-	10/15	10/15	250	N	0.084

NA = Not Available
Definitions of PEL, REL, STEL, TLV, C and IDLH are provided below:

PEL The Occupational Safety and Health Administration's (OSHA) Permissible Exposure Limit for airborne contaminants as a time-weighted average for an eight (8) hour work shift, as listed in 29 CFR 1910.1000.

REL The National Institute for Occupational Safety and Health's (NIOSH) Recommended Exposure Level for a work shift.

STEL A Short Term Exposure Limit as a 15-minute time-weighted average (No more than four (4) exposures per shift).

TLV The American Conference of Governmental Industrial Hygienists' (ACGIH) Threshold Limit Value for airborne concentrations to which it is believed that nearly all workers may be repeatedly exposed day after day without adverse effects.

C Ceiling Concentration – The concentration that should not be exceeded during any part of the working exposure.

IDLH The Immediately Dangerous to Life and Health maximum concentration from which one could escape within 30 minutes without experiencing any escape–impairing or irreversible health effects. (Note: Level C air-purifying respirators do not adequately protect an individual exposed to these concentrations.) These IDLH values were established by NIOSH and have not been peer reviewed. Caution is recommended with their application.

TABLE 2

AIR MONITORING METHODS, ACTION LEVELS, AND PROTECTIVE LEVELS FOR PERSONNEL

Hazard	Monitoring Unit	Action Level	Protective Levels/Action	Monitoring Schedule
Organic Vapors (2)	PID	0-10 ppm above background in the breathing zone	Level D-Continue Work (3)	Continuous for ground intrusive activities.
		10-100 ppm above background in the breathing zone	Level C-Continue Work	
		> 100 ppm above background in the breathing zone	STOP WORK EVACUATE AREA (1)	
Oxygen-Deficient Atmosphere	Q-RAE 4-Gas Meter or Equivalent	19.5-23.5%	Level D-Continue Work	Continuous for ground intrusive activities.
		< 19.5%	Do not enter Confined Space, STOP WORK EVACUATE AREA (1)	
		> 23.5%	Fire explosion hazard; EVACUATE AREA (1)	
Explosive Gas (LEL)	Q-RAE 4-Gas Meter or Equivalent	< 10% LEL	Level D-Continue Work	Continuous for ground intrusive activities.
		10-20% LEL	Issue Warning	
		> 20% LEL	EVACUATE AREA (1)	
Hydrogen Sulfide (H_2S) (2)	Q-RAE 4-Gas Meter or Equivalent	< 5 ppm	Level D-Continue Work	Continuous for ground intrusive activities.
		5-10 ppm	Issue Warning	
		> 10 ppm	STOP WORK EVACUATE AREA (1)	
Dust	Particulate Monitor Miniram or Equivalent	< 5 mg/m^3 above background in the breathing zone.	Level D-Continue Work	Continuous for ground intrusive activities.
		5-10 mg/m^3 above background in the breathing zone.	Level C-Continue Work	
		> 10 mg/m^3 above background in the breathing zone.	STOP WORK EVACUATE AREA (1)	

Protection Levels:

Level C - Required Personal Protective Equipment (PPE): Half or full face, air purifying respirator, chemical resistant clothing, inner and outer chemica resistant gloves, safety boots (steel toe/shank with chemical resistant overboots), hard hat and hearing protection (if warranted).

Level D - Required PPE: Safety goggles, hard hat, safety boots (steel toe/shank) and work clothes or coveralls.

Notes:

LEL - Lower Explosive Limit
ppm= parts per million

(1) For all circumstances where work is stopped, the New York State Department of Environmental Conservation (NYSDEC) must be notified.
(2) Action levels provided represent fifteen (15) minute average values.
"Continuous" monitoring indicates the monitoring unit will collect readings and a fifteen (15) minute average will be calculated for the general breathing space/work area.
(3) Test breathing space for Benzene concentration with Drager tube, if concentration is two (2) ppm or greater, move to Level C PPE.

APPENDIX C

COMMUNITY AIR MONITORING PLAN

FORMER M. ARGUESO AND CO., INC.
BROWNFIELD CLEANUP PROGRAM
441 & 442 WAVERLY AVENUE
MAMARONECK, NEW YORK
SITE NO. C360108

COMMUNITY AIR MONITORING PLAN (CAMP)

The Community Air Monitoring Plan (CAMP) provides for real-time monitoring of Volatile Organic Compounds (VOCs) and particulates at the downwind perimeter of each designated work area when ground-intrusive activities, such as excavation and drilling, are implemented at the site. The CAMP was developed from the New York State Department of Health (NYSDOH) Generic CAMP that is provided in the DER-10 Technical Guidance for Site Investigation and Remediation. The CAMP provides a measure of protection for the downwind community (potential receptors include residences, businesses, and personnel not directly involved with work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The CAMP also addresses ground intrusive activities within twenty (20) feet of a potentially exposed population or occupied structure and for indoor air monitoring activities. Contractors should employ Best Management Practices (BMPs) and common sense measures to minimize VOCs, dust, and odors around work areas.

Table 1 provides action levels and corresponding required actions for VOCs and particulate monitoring that include increased monitoring, corrective actions to abate emissions, and/or work shutdown.

1.0 VOLATILE ORGANIC COMPOUND (VOC) MONITORING, RESPONSE LEVELS AND ACTIONS

Real time air monitoring for VOCs and/or particulate levels is required at the perimeter of the Exclusion Zone.

Periodic monitoring for VOCs will be required during minor ground intrusive (< 20 cubic yards) or non-intrusive activities, such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. Periodic VOC monitoring of the breathing space area during a sample collection event will occur upon arrival at a sample location, while opening a well cap or overturning soil, during well baling/purging, and prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring will be required during sampling activities. Examples of such situations include groundwater sampling adjacent to or within twenty (20) feet of structures.

Continuous monitoring for VOCs and particulates will be required for all major ground intrusive activities (> 20 cubic yards) of excavated soil and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

VOCs will be monitored at the downwind perimeter of the immediate work area on a continuous basis. Upwind concentrations will be measured at the start of each workday and periodically thereafter to establish background conditions. The monitoring equipment must be appropriate to measure the types of contaminants known or suspected to be present. The equipment must be calibrated at least daily for the

contaminant(s) of concern or for an appropriate surrogate. The equipment must be capable of calculating fifteen (15) minute running average concentrations, which will be compared to the following levels:

- If the ambient air concentration of total VOCs at the downwind perimeter of the work area exceeds five (5) parts per million (ppm) above the determined background level for the fifteen (15) minute average, work activities must be temporarily halted and monitoring continued. If the total VOC level decreases rapidly to less than five (5) ppm over background, work activities can resume with continued monitoring.

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

- If the organic vapor level is above twenty-five (25) ppm at the perimeter of the Exclusion Zone, activities must be halted.

- All fifteen (15) minute readings must be recorded and should be available for review by the NYSDOH, New York State Department of Environmental Conservation (NYSDEC) and Westchester County Health Department, if requested. Instantaneous readings, if any, used for decision purposes should also be recorded.

2.0 PARTICULATE MONITORING, RESPONSE LEVELS AND ACTIONS

Periodic monitoring for particulates will be required during minor ground intrusive activities (< 20 cubic yards) and will include monitoring the breathing space for personnel and at the downwind perimeter of the designated work area. Continuous monitoring will be required during sampling activities if ground intrusive activities occur within twenty (20) feet of a structure or if they are in the proximity of individuals potentially exposed.

Particulate concentrations must be monitored continuously for all major ground intrusive activities (> 20 cy) at the upwind and downwind perimeters of the work area at temporary particulate monitoring stations. The particulate monitoring must use real time monitoring equipment capable of measuring particulate matter that are less than ten (10) micrometers in size (PM-10) and is capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

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

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

- All readings must be recorded and be available for review by the NYSDOH, NYSDEC and Westchester County Health Department, if requested.

3.0 GENERAL RECOMMENDATIONS FOR WORK AREAS WITHIN 20 FEET OF POTENTIALLY EXPOSED POPULATIONS OR OCCUPIED STRUCTURES

When work areas are within twenty (20) feet of potentially exposed populations or occupied structures, the continuous monitoring locations for VOCs and particulates must be based on the nearest potentially exposed individuals and the location of ventilation system intakes for nearby structures. The use of engineering controls such as vapor/dust barriers, temporary negative-pressure enclosures, or special ventilation devices will be considered to prevent exposures related to the work activities and to control dust and odors. Consideration will be given to implementing the planned activities when potentially exposed populations are at a minimum, such as during weekends or evening hours.

- If total VOC readings exceed one (1) ppm at locations that are next to the walls of occupied rooms or next to intake vents, monitoring will also occur within the adjacent occupied room(s). Depending upon the nature of contamination, chemical-specific colorimetric tubes of sufficient sensitivity may be necessary for comparing the exposure point concentrations with appropriate pre-determined response levels and response actions. Background readings in the occupied rooms must be measured prior to commencement of the planned work. Any background readings that are greater than one (1) ppm should be discussed with the NYSDEC prior to commencement of the work.

- If total particulate readings exceed 150 ug/m^3 next to the walls of adjacent occupied room(s) or next to intake vents, work activities should be suspended until controls are implemented and are successful in reducing the total particulate concentration to 150 ug/m^3 or less at the monitoring point. Particulate response levels and actions should be pre-determined.

- Depending upon the nature of contamination and remedial activities, other parameters (e.g., explosive gas, oxygen, carbon monoxide) may also need to be monitored in accordance with the Health and Safety Plan (HASP).

Table 1 Air Monitoring Action Levels at Downwind Perimeter of Exclusion Zone		
Parameter/ Instrument	**Action Level**	**Action**
VOCs/PID	The 15-minute average of continuous readings for Total VOCs at downwind perimeter of Exclusion Zone exceeds 5 ppm above the determined background level.	Work activities are temporarily halted and VOCs monitoring continued. If downwind Exclusion Zone VOC readings decrease to < 5 ppm above background level, work can resume with continuous monitoring.
VOCs/PID	The 15-minute average of continuous readings is greater than 5 ppm but less than 25 ppm over the background level at the downwind perimeter of the Exclusion Zone.	Work activities must be halted, the source of vapors must be identified and corrective actions taken to abate emissions. Following these steps, work may continue if air monitoring readings indicate the Total VOCs level is 5 ppm or less over background for the 15-minute average at 200 feet downwind of the Exclusion Zone, or at half the distance to the nearest potential receptor or building, whichever is less (but in no case less than 20 feet).
VOCs/PID	Continuous reading of 25 ppm or greater over the background level at the downwind perimeter of the Exclusion Zone.	Stop Work. Reevaluate work conditions and procedures. Contact NYSDEC for authorization prior to resuming work.
Particulates/ Monitor Unit and Direct Observation	PM-10 particulate level is 100 micrograms per cubic meter (ug/m3) or greater than the background level for the 15-minute period at the downwind edge of the Exclusion Zone or visible dust is leaving the Exclusion Zone.	Suppress particulates by spraying the dusty area with water, work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 ug/m^3 above the upwind level and provided that no visible dust is migrating from the Exclusion Zone.
Particulates/ Monitor Unit and Direct Observation	After implementation of dust suppression techniques, downwind PM-10 particulate levels at the downwind edge of the exclusion zone are greater than 150 ug/m^3 above the upwind level.	Work must be stopped and the NYSDEC must be notified. Re-evaluate dust suppression techniques. Workers are required to use full face respirators with NIOSH approved P100 cartridges or combination cartridges. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 ug/m^3 of the upwind level and in preventing visible dust migration.

References:

DER-10 Technical Guidance for Site Investigation and Remediation, NYSDOH Generic Community Air Monitoring Plan