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File No. 30603-011

New York State Department of Environmental Conservation
Division of Environmental Remediation, Region 7
Kirkwood Sub-Office
1679 NY Route 11
Kirkwood, New York 13795-1602

Attention: Mr. Gary Priscott

Subject: Brownfield Cleanup Agreement Supplemental Remedial Investigation Work Plan Addendum (SRI Work Plan Addendum)
Former Endicott-Johnson Ranger Paracord Facility - "Southern Parcel"
Johnson City, New York

Ladies and Gentlemen:

On behalf of the property owner, Stella Ireland Road Associates, LLC ("Stella"), Haley & Aldrich is pleased to present this Supplemental Remedial Investigation Work Plan Addendum (SRI Work Plan Addendum) to the "Brownfield Cleanup Agreement Supplemental Investigation Work Plan (SIWP)," dated 24 October 2005. This SRI Work Plan Addendum has been prepared as requested by the New York State Department of Environmental Conservation (NYSDEC) in their letter dated 17 August 2007 in response to the "Supplemental Remedial Investigation Report (SRI Report)," dated 24 July 2007; and in accordance with the Brownfield Cleanup Agreement ("BCA") between Stella and the NYSDEC, which was made effective 13 September 2005.

This document presents:

- A brief description of relevant Site activities that took place at the Site as part of the recent Supplemental Remedial Investigation and Geotechnical Investigations. *A more comprehensive site background is included in the October 2005 SIWP, and the July 2007 SRI Report.*
- A description of the additional supplemental remedial investigations activities to be performed as requested by the NYSDEC in its 17 August 2007 letter.
- A discussion of the anticipated schedule for work activities and related submittals in accordance with the BCA.

SUMMARY OF APPLICABLE RESULTS FROM PREVIOUS INVESTIGATIONS

Supplemental Remedial Investigation Results – Areas L, M, and N

As described in the SIWP, and SRI Report, Haley & Aldrich conducted groundwater and/or soil investigations at four areas of concern identified by Dames & Moore in their 1997 Phase II Report and Cleanup Plan. The areas were designated K through N. A discussion of each area and the work performed in each area is included in the SIWP and SRI Report. Additionally, historical analytical data for each area and the Site as a whole is included in Appendix A of the SIWP.

During the supplemental remedial investigations conducted during December 2006, groundwater sampling from a temporary monitoring well was completed in area K, and soil sampling was conducted in areas L, M, and N. A brief description of the results of the supplemental remedial investigation as they pertain to the soil sampling at areas L through N (the subject of this Addendum) is discussed below. Refer to the SRI Report for a discussion of the groundwater sampling and soil sampling methods and the results from Area K. Historical and recent analytical data collected from Areas L, M, and N are included as Tables 2 through 4; a summary of regulatory comparison information is included as Table 1. The analytical data was included as Appendix A in the SRI Report.

The objective of the soil analysis was to define the lateral and vertical boundaries of the areas of concern identified by Dames & Moore. Sixteen (16) soil borings were installed via GeoProbe and forty-one (41) soil samples were obtained from Dames & Moore Areas of Concern L, M, and N. Boring logs are included in Appendix B of the SRI Report. Analytical soil results were compared to the New York State Soil Cleanup Objectives Commercial Criteria (SCOs) for soil (DEC Part-375, 2006, Table 1). A comprehensive review of historical site-wide soil data along with recent data from the SRI indicated that compounds detected in the Areas of Concern do not appear to be originating from distinct point sources, and are found in fill that is ubiquitous throughout virtually the entire site.

Geotechnical Investigation Results – Test Pits #1 and #2

On 22 May 2007, two test pits (TP-1 and TP-2) were excavated by Hawk Engineering on the northeastern side of the Site in the area of the former Mechanical and Zing Buildings as part of a geotechnical evaluation (Figure 1). Hawk Engineering staff observed a petroleum-type odor and a sheen on the groundwater in TP-1, located approximately 85 feet west of the NYSEG substation on the eastern boundary of the property. A second test pit, TP-2, was excavated approximately 122 feet south of TP-1. A slight odor was detected in TP-2; however a petroleum sheen was not observed. Also observed in the test pits were rubber scraps as shown in the attached test pit logs and photo log (Appendix A).The test pits were backfilled by Hawk Engineering.

Similar solid waste and rubber scraps were previously encountered by Haley & Aldrich in fill near the southern side of the former Zing Building on the immediately adjacent northern property referred to as the Gannett Parcel (located in the vicinity of Hawk Engineering's TP-1 and TP-2), during excavations associated with construction activities on the Gannett Parcel in June 2004. Petroleum odors and water sheens were also encountered during the June 2004 excavations at the Gannett Parcel (see photographs in Appendix A of the Gannett Parcel Area H excavation and test pits). It was determined at that time that the sheen and odor encountered at

the Gannet Parcel were a result of the solid waste fill and they were therefore not considered a regulated waste. Furthermore, results of soil samples obtained from test pits in this area did not indicate elevated levels of compounds. Additional information is provided in Section 2.4 of the June 2006 Final Engineering Report for the Gannett Parcel. The Gannett Parcel subsequently received a Certificate of Completion from the NYSDEC in December 2006.

Given that the fill and subsequent petroleum odor and sheen observed during the May 2007 excavations at the Site appear consistent with what was encountered in the immediate vicinity in June 2004 during Gannett Parcel excavations, it is likely that the sheen and petroleum odors encountered during the recent excavations are a result of the same solid waste fill (rubber scraps) located in that area of the Site, and not the result of a petroleum release. Furthermore, as described in the Conceptual Site Model dated 13 July 2007, it is anticipated that although the fill and shallow groundwater may be seasonally in contact with one another, groundwater is not being adversely impacted by solid waste fill at the Site (Refer to the historical Site-wide groundwater sampling data included in Appendix A of the SIWP, and to the Conceptual Site Model included as Appendix D of the SRI Report).

OBJECTIVES AND PROPOSED WORK PLAN

Under this Work Plan, additional Supplemental Remedial Investigations will be conducted in Areas L, M, and N and in the area near TP-2 as requested by the NYSDEC in a letter dated 17 August 2007, which was generated in response to the July 2007 SRI Report. The additional investigations will consist of groundwater sampling in the above-referenced areas for the purpose of determining if groundwater in the vicinity of these areas has been impacted by the compounds encountered in the fill material.

Site-wide groundwater sampling will not be conducted, as that was previously addressed during the remediation efforts for the Gannett Parcel and NYSEG-Related Areas. Localized groundwater sampling will occur as part of these investigations as described in the sections below.

Monitoring Well Installation

Four (4) permanent, 2-inch diameter, monitoring wells will be installed immediately downgradient of areas L, M, N, and TP-2, and will be referred to as MW-101, MW-102, MW-103, and MW-104, respectively (Figure 1).

At each new monitoring well location, a boring will be advanced using a hollow-stem auger to the top of the water table (approximately 9 - 15 feet below ground surface), and monitoring well will be installed in the boring as described in Section A below.

A. Monitoring Well Completion

Monitoring wells will be completed in the exploratory borings as follows: A 2-inch diameter, 10-foot length (or other length as determined by field conditions) of PVC, 10-slot (0.010 inch) well screen attached to a riser section will be installed such that it straddles the water table as measured in the field. Sufficient solid riser pipe will be used to complete the well at ground surface or as a stick-up casing approximately 2 to 3 feet above ground surface.

The well construction will include installation of a sand filter pack around the well screen extending approximately 2 feet above the top of the screen, a (hydrated) bentonite-pellet seal approximately 2 feet thick above the sand pack, and bentonite/cement grout to ground surface, as well as a protective, lockable, flush-mounted or stick-up casing.

Well installation will be followed by development to remove fines yielded by the formation during drilling and further development by surging or over-pumping to reduce well-water turbidity.

B. Monitoring Well Development

Upon the completion of a well, it will be developed to provide sufficient communication with the formation to yield representative data. Three development techniques, including mechanical surging with a rubber surge block, over-pumping using a submersible pump, and bailing have been identified for use at the discretion of the staff in charge of the fieldwork.

The amount of water removed during development will be recorded on a Monitoring Well Development form. Development will continue until the conductivity and pH have stabilized and the development water is relatively free of sediment, exhibiting a turbidity of 50 NTU or as close to 50 NTU as practicable. Some wells may never reach the target level of 50 NTU.

The development water will be recharged on-site.

Groundwater Sampling

One round of groundwater sampling will be conducted at a minimum of two weeks after completion of development activities. The groundwater sampling event will include water-level monitoring and sample collection at each of the four new wells (MW-101 through MW-104). Prior to groundwater sampling, water level monitoring will occur at each of the wells

The wells will be purged prior to sampling using low-flow methods and a bladder pump. A summary of low-flow procedures is described below. Refer to Appendix B of this plan for the Standard Operating Procedures (SOPs) utilized for low-flow groundwater sampling. The following groundwater quality parameters will be monitored during the purge using a flow-through cell: pH, temperature, oxidation/reduction potential (ORP), dissolved oxygen (DO), turbidity, and conductivity. Groundwater samples will be collected once groundwater quality parameters stabilize (defined in the SOP in Appendix B). The flow-through cell will be disconnected before collecting a sample. Disposable bladders and tubing will be replaced at each well location. Because analysis for metals is required as part of this sampling program, well purging techniques and requirements for Turbidity stabilization will be conducted and adhered to according to NYSDEC TAGM 4015 – Policy Regarding Alteration of Groundwater

Samples Collected for Metals Analysis requirements.

Groundwater samples will be submitted to Columbia Analytical Services of Rochester, New York, an ELAP certified laboratory. Groundwater samples from MW-101 through MW-103 (Areas L through M) will be analyzed for Target Compound List (TCL) of Volatile Organic Compounds (VOCs) using EPA Method 8260B, Polycyclic Aromatic Hydrocarbons (PAHs) using EPA Method 8270C, and metals according to Table A below:

Table A: Metals Analysis for MW-101, MW-102, & MW-103

Well ID	Metals Analyzed
MW-101 (Area L)	Arsenic, Mercury
MW-102 (Area M)	Arsenic, Copper, Mercury
MW-103 (Area N)	Arsenic, Cadmium, Chromium, Copper, Lead, Magnesium, Mercury, Nickel, Zinc.

The metals analyses listed in Table A above were chosen for each individual well to be consistent with the metals identified by Dames & Moore as metals of concern in their 1997 Phase II and Cleanup Plan. Additionally, those metals were detected above Soil Cleanup Objectives during the December 2006 Supplemental Remedial Investigation (See Tables 1 through 4).

The groundwater sample from MW-104 (downgradient of TP-2) will be analyzed for TCL VOCs by EPA Method 8260B, and TCL Semi-Volatile Organic Hydrocarbons (SVOCs) by EPA Method 8270C.

Well Survey and Groundwater Level Data

As described in the section above, water-level data will be collected at each new groundwater well (MW-101 through MW-104) during the sampling event. In addition, each groundwater well location will be surveyed for purposes of developing updated groundwater contours at the Site.

Data Usability Summary Report

Denis Conley of Haley & Aldrich, a qualified data validator will serve as Quality Assurance Officer for this project. Mr. Conley's resume was included in Appendix B of the October 2005 SIWP. Data will be reviewed, a Data Usability Summary Report (DUSR) will be completed consistent with NYSDEC DUSR guidance, and conclusions regarding the usability of the data will be included with the Supplemental Remedial Investigation Report Addendum.

REPORTING

A Supplemental Remedial Investigation Results Addendum will be generated based on the work described above, including:

- A summary of supplemental field work performed, and associated field and laboratory data presented in tabular summary form.
- Site plans showing exploration locations and pertinent features.
- Site plan showing groundwater contours generated based on groundwater-level and survey data.
- Appendices with raw laboratory reports and similar information that forms the basis for text discussion, evaluation and conclusions.

SCHEDULE

Stella and Haley & Aldrich are prepared to begin work within two to four weeks of NYSDEC and New York State Department of Health (NYSDOH) approval of this SRI Work Plan Addendum (timing depends on driller availability). It is anticipated that two to three days of field work will be required for the exploratory boring/well installation and groundwater sampling portions of the work.

HEALTH AND SAFETY PLAN

Haley & Aldrich has prepared a Site-specific health and safety plan (HASP), using site-specific sample chemical data and Site history information, in accordance with NYSDEC and NYSDOH guidelines. The HASP includes a description of health & safety protocols to be followed during the supplemental investigation activities, and is structured to allow modification based on the results of that work, if necessary. The HASP has been developed for use by Haley & Aldrich field staff and other personnel who will work at the Site during planned investigation and remediation activities. A copy of the Site-specific HASP is provided in Appendix C.

We trust that the additional work scope summarized herein is sufficient to be responsive to your request. Please do not hesitate to call if you have any questions or comments.

Sincerely yours,
HALEY & ALDRICH OF NEW YORK

Claire L. DeBergalis
Environmental Scientist

Lisa Turturro
Senior Environmental Geologist

Vincent B. Dick
Vice President

Enclosures:

Table 1 – Summary of Regulatory and Background Data for Comparison Purposes
Table 2 – Summary of Historical and Recent Soil Analytical Data – Area L
Table 3 – Summary of Historical and Recent Soil Analytical Data – Area M
Table 4 – Summary of Historical and Recent Soil Analytical Data – Area N
Figure 1 – Site Plan - Proposed Monitoring Well Locations
Appendix A – TP-1 & TP-2 Test Pit Logs, TP-2 Photo Log, and Gannett Parcel Excavation Photo Log
Appendix B – Standard Operating Procedures (SOPs)
Appendix C – Health & Safety Plan

c: Kenneth Kamlet, Esq. – Stella Ireland Road Associates, LLC
Gregg Townsend – New York State Department of Environmental Conservation
Krista Anders – New York State Department of Health

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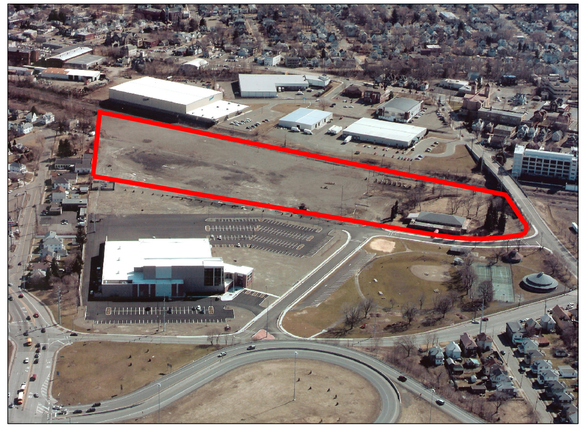


AERIAL VIEW OF EJ RANGER PARACORD - SOUTHERN PARCEL
TAKEN 29 MARCH 2006

NOTE:

1. Water levels labeled on each of the monitoring wells (MW-1, MW-2, MW-3 and MW-8) are based on the most recent survey/sampling data available.

2. Grey Background features represent proposed site redevelopment.

LEGEND:

- Fence
- Approximate Southern Parcel Property Boundary
- Approximate Groundwater flow direction
- MW-8 (9.25) — Approximate location of existing monitoring well. Value in parenthesis represents groundwater depth, see note 5.
- Approximate location of subsurface exploration, conducted previously by others.
- Approximate location of subsurface exploration, conducted previously by others, for which physical observations or field screening data was recorded, but from which lab data was not obtained.
- HPBG-3 — Approximate location of hydropunch, conducted previously by others.
- Approximate location of Soil Boring, conducted as part of the Supplemental Investigation by Haley & Aldrich, Inc., December 2006.
- Approximate location of Soil Boring, conducted by others June 2007.
- Approximate location of Test Pit, conducted by others June 2007.
- MW-101 — Approximate location of Proposed Monitoring Wells.
- NYSEG Related Areas
- I-N — "Hot Spot" Locations identified in Dames & Moore's 1997 Cleanup Plan.
- O — Existing Water Supply Well to be Decommissioned.

0 130 260
SCALE IN FEET

HALEY & ALDRICH

FORMER ENDICOTT- JOHNSON RANGER PARACORD SITE
SOUTHERN PARCEL
JOHNSON CITY, NEW YORK

SITE PLAN - PROPOSED MONITORING WELL LOCATIONS

SCALE: AS SHOWN
SEPTEMBER 2007

FIGURE 1

G:\PROJECTS\30603\011 (SOUTHERN PARCEL SUPPLEMENTAL INVESTIGATION)\SITE PLANS\2007 0706_SITEPLAN_PROPOSED MW.DWG

TABLE 1
SUMMARY OF REGULATORY AND BACKGROUND DATA FOR COMPARISON PURPOSES
FORMER ENDICOTT-JOHNSON RANGER PARACORD FACILITY- SOUTHERN PARCEL
JOHNSON CITY, NEW YORK

	NYS TOGs - Standards and Guidance Values (mg/L)	NYSDEC TAGM 4046 Cleanup Criteria (mg/kg)	NYS SCO Criteria Residential (mg/kg)	NYS SCO Criteria Restricted Residential (mg/kg)	NYS SCO Criteria Commercial (mg/kg)	NYS SCO Criteria Industrial (mg/kg)	NYS SCO Criteria Protection of Ecological Resources (mg/kg)	NYS SCO Protection of Groundwater (mg/kg)	Johnson City Background (See Note 8) (mg/kg)
PAHs (mg/L)									
Acenaphthene	0.02	NS	100	100	**500**	1000	20	98	NS
Acenaphthylene	NS	NS	100	100	**500**	1000	NS	107	NS
Anthracene	0.05	NS	100	100	**500**	1000	NS	1000	NS
Benzo(a)anthracene	2.00E-06	NS	1	1	**5.6**	11	NS	1	NS
Benzo(a)pyrene	NS	NS	1	1	**1**	1.1	2.6	22	NS
Benzo(b)fluoranthene	2.00E-06	NS	1	1	**5.6**	11	NS	1.7	NS
Benzo(g,h,i)perylene	NS	NS	100	100	**500**	1000	NS	1000	NS
Benzo(k)fluoranthene	2.00E-06	NS	1	3.9	**56**	110	NS	1.7	NS
Chrysene	2.00E-06	NS	1	3.9	**56**	110	NS	1	NS
Dibenzo(a,h)anthracene	NS	NS	0.33	0.33	**0.56**	1.1	NS	1000	NS
Fluoranthene	0.05	NS	100	100	**500**	1000	NS	1000	NS
Fluorene	0.05	NS	100	100	**500**	1000	30	386	NS
Indeno(1,2,3-cd)pyrene	2.00E-06	NS	0.5	0.5	**5.6**	11	NS	8.2	NS
Naphthalene	0.01	NS	100	100	**500**	1000	NS	12	NS
Phenanthrene	0.05	NS	100	100	**500**	1000	NS	1000	NS
Pyrene	0.05	NS	100	100	**500**	1000	NS	1000	NS
SVOCS									
Napthalene	NS	13	100	100	**500**	1000	NS	12	ND-0.300 J
Acenaphthylene	NS	41	100	100	**500**	1000	NS	107	ND-0.190 J
Acenaphthene	NS	50	100	100	**500**	1000	20	98	ND-0.360 J
Fluorene	NS	50	100	100	**500**	1000	30	386	ND-0.330 J
Phenanthrene	NS	50	100	100	**500**	1000	NS	1000	0.030 J-2.700
Anthracene	NS	50	100	100	**500**	1000	NS	1000	ND-0.740
Fluoranthene	NS	50	100	100	**500**	1000	NS	1000	0.068 J-3.600
Pyrene	NS	50	100	100	**500**	1000	NS	1000	0.057 J-3.500
Benzo(a)anthracene	NS	0.224 or MDL	1	1	**5.6**	11	NS	1	0.032 J-1.700
Chrysene	NS	0.4	1	3.9	**56**	110	NS	1	0.055 J-2.000
Benzo(b)fluoranthene	NS	1.1	1	1	**5.6**	11	NS	1.7	0.060-2.200
Benzo(k)fluoranthene	NS	1.1	1	3.9	**56**	110	NS	1.7	0.020 J-0.820
Benzo(a)pyrene	NS	0.061 or MDL	1	1	**1**	1.1	2.6	22	0.30 J-1.600
Indeno(1,2,3-cd)pyrene	NS	3.2	0.5	0.5	**5.6**	11	NS	8.2	0.013 J-0.660
Dibenz(a,h)anthracene	NS	0.014 or MDL	0.33	0.33	**0.56**	1.1	NS	1000	0.015 J-0.190
Benzo(g,h,i)Perylene	NS	50	100	100	**500**	1000	NS	1000	0.013 J-0.600

TABLE 1
SUMMARY OF REGULATORY AND BACKGROUND DATA FOR COMPARISON PURPOSES
FORMER ENDICOTT-JOHNSON RANGER PARACORD FACILITY- SOUTHERN PARCEL
JOHNSON CITY, NEW YORK

	NYS TOGs - Standards and Guidance Values (mg/L)	NYSDEC TAGM 4046 Cleanup Criteria (mg/kg)	NYS SCO Criteria Residential (mg/kg)	NYS SCO Criteria Restricted Residential (mg/kg)	NYS SCO Criteria Commercial (mg/kg)	NYS SCO Criteria Industrial (mg/kg)	NYS SCO Criteria Protection of Ecological Resources (mg/kg)	NYS SCO Protection of Groundwater (mg/kg)	Johnson City Background (See Note 8) (mg/kg)
Volatile Organic Compounds (mg/L)									
Acetone	0.05	NS	100.0	100.0	**500.0**	1000.0	2.2	0.05	NS
Metals (mg/kg)									
Arsenic	NS	7.5 or SB	16	16	**16**	16	13	16	3-12
Cadmium	NS	1 or SB	2.5	4.3	**9.3**	60	4	7.5	0.1-1
Chromium	NS	10 or SB	22	110	**400**	800	1	19	1.5-40
Copper	NS	25 or SB	270	270	**270**	10000	50	1720	1-50
Lead	NS	SB	400	400	**1000**	3900	63	450	200-500
Magnesium	NS	SB	NS	NS	**NS**	NS	NS	NS	NS
Mercury	NS	0.1	0.81	0.81	**2.8**	5.7	0.18	0.73	0.001-0.2
Nickel	NS	13 or SB	140	310	**310**	10000	30	130	0.5-25
Zinc	NS	20 or SB	2200	10000	**10000**	10000	109	2480	9-50

Notes:

1) ND = Not Detected above method detection limit. Detection limit shown in parentheses.
2) NS= Not Specified
3) SB= site background
4) MDL= Method Detection Limit
5) J= approximate
6) NYS TOGS Standards obtained from NYS DEC Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations (June, 1998).
7) NYS SCO Criteria obtained from NYS DEC Remedial Program Soil Cleanup Objectives (6 NYCRR Subpart 375-6) (December, 2006)
   Note: Bolded commercial values apply to Ranger Southern Parcel Site
8) Background Concentrations:
   SVOC background derived from historical sample collection site background range.
   Metals background analysis using Eastern USA Background Concentrations.

TABLE 2
SUMMARY OF HISTORICAL AND RECENT SOIL ANALYTICAL DATA
AREA L- FORMER COAL STORAGE AREA - CS-8
FORMER ENDICOTT-JOHNSON RANGER PARACORD FACILITY-SOUTHERN PARCEL
JOHNSON CITY, NEW YORK

Sample ID	**CS-8A**	**CS-8B**	**CSA-8A**	**LSB-1(0-2)**	**LSB-1(2-4)**	**LSB-2(0-2)**	**LSB-2(2-4)**	**LSB-3(0-2)**	**LSB-3(2-4)**	**LSB-4(0-2)**
Sample Depth	**0.5-1 ft. bg.**	**1.5-2 ft. bg.**	**1-3 ft. bg.**	**0-2 ft. bg.**	**2-4 ft. bg.**	**0-2 ft. bg.**	**2-4 ft. bg.**	**0-2 ft. bg.**	**2-4 ft. bg.**	**0-2 ft. bg.**
Sample Date	**6/18/1993**	**6/18/1993**	**1/27/1995**	**12/6/2006**	**12/6/2006**	**12/6/2006**	**12/6/2006**	**12/6/2006**	**12/6/2006**	**12/6/2006**
Sample Area	**L**	**L**	**L**	**L**	**L**	**L**	**L**	**L**	**L**	**L**
Sampled By	**D&M**	**D&M**	**D&M**	**H&A**	**H&A**	**H&A**	**H&A**	**H&A**	**H&A**	**H&A**
Metals (mg/kg)										
Arsenic	**541**	**31.2**	8.6	**310**	**34.9**	**394**	**30.6**	**174**	**7.1**	--
Mercury	**0.27**	0.15	ND(.12)	0.09	0.04	**0.32**	0.04	**0.17**	0.04	--
TCLP Metals (mg/L)										
Arsenic	--	--	--	--	--	--	--	--	--	ND(0.5)

Notes:

1) "--" = Sample not tested for corresponding compound.
2) ND = Not Detected above method detection limit. Detection limit shown in parentheses.
3) Refer to Table 1 for comparison criteria:
   a) Bold text shows values that exceed TAGM 4046 criteria
   b) Red-bolded values exceed TAGM 4046 criteria and Background Concentrations.
   c) Yellow-highlighted cell values exceed DEC Part 375 criteria.

TABLE 3
SUMMARY OF HISTORICAL AND RECENT SOIL ANALYTICAL DATA
AREA M - FORMER COAL STORAGE AREA - CSA-21
FORMER ENDICOTT-JOHNSON RANGER PARACORD FACILITY-SOUTHERN PARCEL
JOHNSON CITY, NEW YORK

Sample ID	**CS-21**	**CS-21C**	**CSA-21A**	**CSA-21B**	**CSA-21C**	**MSB-1(0-0.5)**	**MSB-1(3-5)**	**MSB-1(5-7)**	**MSB-1(7-9)**	**MSB-1(9-11)**
Sample Depth	**3 ft. bg.**	**0.5 ft. bg.**	**3-5 ft. bg.**	**5-7 ft. bg.**	**7-9 ft. bg.**	**0-0.5 ft. bg.**	**3-5 ft. bg.**	**5-7 ft. bg.**	**7-9 ft. bg.**	**9-11 ft. bg.**
Sample Date	**8/12/1993**	**8/12/1993**	**1/31/1995**	**1/31/1995**	**1/31/1995**	**12/6/2006**	**12/6/2006**	**12/6/2006**	**12/6/2006**	**12/6/2006**
Sample Area	**M**	**M**	**M**	**M**	**M**	**M**	**M**	**M**	**M**	**M**
Sampled By	**D&M**	**D&M**	**D&M**	**D&M**	**D&M**	**H&A**	**H&A**	**H&A**	**H&A**	**H&A**
Metals (mg/kg)										
Arsenic	**298**	12.0 J	**245**	**319**	**122**	--	5.9	4.7	4.5	**19.2**
Copper	30	**113**	--	--	--	**32.7**	--	--	--	--
Mercury	**0.48**	**0.64**	0.12	--	--	--	**0.119**	**0.108**	**0.108**	ND(0.045)
TCLP (mg/L)										
Arsenic	--	--	--	--	--	--	--	--	--	--

TABLE 3
SUMMARY OF HISTORICAL AND RECENT SOIL ANALYTICAL DATA
AREA M - FORMER COAL STORAGE AREA - CSA-21
FORMER ENDICOTT-JOHNSON RANGER PARACORD FACILITY-SOUTHERN PARCEL
JOHNSON CITY, NEW YORK

Sample ID	**MSB-2 (0-0.5)**	**MSB-2 (3-5)**	**MSB-2 (5-7)**	**MSB-2 (7-9)**	**MSB-2 (9-11)**	**MSB-3 (0-0.5)**	**MSB-3 (3-5)**	**MSB-3 (5-7)**
Sample Depth	**0-0.5 ft. bg.**	**3-5 ft. bg.**	**5-7 ft. bg.**	**7-9 ft. bg.**	**9-11 ft. bg.**	**0-0.5 ft. bg.**	**3-5 ft. bg.**	**5-7 ft. bg.**
Sample Date	**12/6/2006**	**12/6/2006**	**12/6/2006**	**12/6/2006**	**12/6/2006**	**12/6/2006**	**12/6/2006**	**12/6/2006**
Sample Area	**M**	**M**	**M**	**M**	**M**	**M**	**M**	**M**
Sampled By	**H&A**	**H&A**	**H&A**	**H&A**	**H&A**	**H&A**	**H&A**	**H&A**
Metals (mg/kg)								
Arsenic	--	7.1	5.6	**12.3**	**29.2**	--	**43.6**	**101**
Copper	23.1	--	--	--	--	12.5	--	--
Mercury	--	ND(0.031)	ND(0.035)	ND(0.031)	0.059	--	ND(0.036)	ND(0.043)
TCLP (mg/L)								
Arsenic	--	--	--	--	--	--	--	--

TABLE 3
SUMMARY OF HISTORICAL AND RECENT SOIL ANALYTICAL DATA
AREA M - FORMER COAL STORAGE AREA - CSA-21
FORMER ENDICOTT-JOHNSON RANGER PARACORD FACILITY-SOUTHERN PARCEL
JOHNSON CITY, NEW YORK

Sample ID	**MSB-3 (7-9)**	**MSB-3 (9-11)**	**MSB-4 (0-0.5)**	**MSB-4 (3-5)**	**MSB-4 (5-7)**	**MSB-4 (7-9)**	**MSB-4 (9-11)**	**MSB-5 Comp(3-9)**
Sample Depth	**7-9 ft. bg.**	**9-11 ft. bg.**	**0-0.5 ft. bg.**	**3-5 ft. bg.**	**5-7 ft. bg.**	**7-9 ft. bg.**	**9-11 ft. bg.**	**3-9 ft. bg.**
Sample Date	**12/6/2006**	**12/6/2006**	**12/6/2006**	**12/6/2006**	**12/6/2006**	**12/6/2006**	**12/6/2006**	**12/6/2006**
Sample Area	**M**	**M**	**M**	**M**	**M**	**M**	**M**	**M**
Sampled By	**H&A**	**H&A**	**H&A**	**H&A**	**H&A**	**H&A**	**H&A**	**H&A**
Metals (mg/kg)								
Arsenic	**99.3**	ND(1.2)	--	**74.3**	**48.6**	**11**	4.8	--
Copper	--	--	18.8	--	--	--	--	--
Mercury	0.096	ND(0.037)	--	**0.18**	0.066	0.091	ND(0.036)	--
TCLP (mg/L)								
Arsenic	--	--	--	--	--	--	--	ND(0.5)

Notes:

1) "--" = Sample not tested for corresponding compound.
2) ND = Not Detected above method detection limit. Detection limit shown in parentheses.
3) J = Approximately
4) Refer to Table 1 for comparison criteria:
a) Bold text shows values that exceed TAGM 4046 criteria
b) Red-bolded values exceed TAGM 4046 criteria and Background Concentrations.
c) Yellow-highlighted cell values exceed DEC Part 375 criteria.

TABLE 4
SUMMARY OF HISTORICAL AND RECENT SOIL ANALYTICAL DATA
AREA N-MECHANICAL BUILDING DRY WELLS
FORMER ENDICOTT-JOHNSON RANGER PARACORD FACILITY-SOUTHERN PARCEL
JOHNSON CITY, NEW YORK

Sample ID	**DW-1-1**	**DW-1-2**	**DW-1-3**	**DW-1-4**	**DW-2R**	**DW-3**	**DW2-PE1**	**DW3-PE1**	**DWP-PE1**	**DWP-PE2**	**NSB-1(0-3)**	**NSB-1(3-5)**
Sample Depth	**2-4 ft. bg.**	**2-4 ft. bg.**	**2-4 ft. bg.**	**DW-Base**	**DW-Base**	**DW-Base**	**2.5-3 ft. bg.**	**2.5-3 ft. bg.**	**2-2.5 ft. bg.**	**2-2.5 ft. bg.**	**0-3 ft. bg.**	**3-5 ft. bg.**
Sample Date	**6/17/1993**	**6/17/1993**	**6/17/1993**	**6/15/1993**	**6/15/1993**	**6/15/1993**	**1/24/1995**	**1/24/1995**	**1/25/1995**	**1/25/1995**	**12/7/2006**	**12/7/2006**
Sample Area	**N**	**N**	**N**	**N**	**N**	**N**	**N**	**N**	**N**	**N**	**N**	**N**
Sampled By	**D&M**	**D&M**	**D&M**	**D&M**	**D&M**	**D&M**	**D&M**	**D&M**	**D&M**	**D&M**	**H&A**	**H&A**
Semi-Volatile Organic Compounds (mg/kg)												
Napthalene	0.062 J	ND(.44)	0.110 J	**ND(94)**	0.530 J	4.1 J	0.084 J	ND(.51)	0.280 J	0.120 J	ND(9.6)	0.130 J
Acenaphthylene	0.068 J	ND(.44)	0.100 J	**ND(94)**	ND(2.3)	ND(22)	0.084 J	0.060 J	2.8	0.410 J	ND(9.6)	0.086 J
Acenaphthene	ND(.42)	0.040 J	0.066 J	**ND(94)**	0.530 J	ND(22)	0.100 J	ND(.51)	3.8	0.130 J	ND(9.6)	0.140 J
Fluorene	ND(.42)	0.087 J	0.094 J	**ND(94)**	0.57 J	ND(22)	0.130 J	ND(.51)	4.2	0.018 J	ND(9.6)	0.160 J
Phenanthrene	0.48	1.1	8.2	**ND(94)**	3.9	ND(22)	1.10 J	0.099 J	39	2.20 J	ND(9.6)	1
Anthracene	0.14 J	0.23 J	0.20 J	**ND(94)**	0.95 J	ND(22)	0.260 J	0.053 J	9.80 J	0.62	ND(9.6)	0.210 J
Fluoranthene	0.91	1.7	1	**ND(94)**	3.9	ND(22)	1.4	0.14 J	**80**	3.1	ND(9.6)	1.2
Pyrene	0.79	1.5	1	**ND(94)**	4.9	3.1 J	1.4	0.220 J	**64**	3.3	ND(9.6)	0.89
Benzo(a)anthracene	**0.48**	**1.2**	**0.6 J**	**ND(94)**	**2.1 J**	ND(22)	**0.77**	0.130 J	ND(.44)	**1.5**	ND(9.6)	0.510 J
Chrysene	**0.82**	**1.9**	**1.1**	**9.5 J**	**3.1**	**2.3 J**	**0.85**	0.200 J	**47**	**1.6**	ND(9.6)	**0.580 J**
Benzo(b)fluoranthene	0.67	**1.3**	0.8 J	**ND(94)**	**2.7 J**	**ND(22)**	0.77	0.220 J	**42**	**1.5**	ND(9.6)	0.510 J
Benzo(k)fluoranthene	0.39 J	0.88	0.53 J	**ND(94)**	**1.7 J**	**ND(22)**	0.460 J	0.150 J	**39**	**2.1**	ND(9.6)	0.480 J
Benzo(a)pyrene	**0.42**	**1.1**	**0.620 J**	**ND(94)**	**2.4 J**	ND(22)	**0.61**	0.140 J	**36**	**1.3**	ND(9.6)	0.390 J
Indeno(1,2,3-cd)pyrene	0.28 J	1.1	0.45 J	**ND(94)**	0.93 J	ND(22)	0.190 J	0.076 J	**15.0 J**	0.360 J	0.870 J	0.290 J
Dibenz(a,h)anthracene	0.099 J	**0.54**	**0.17 J**	**ND(94)**	**0.36 J**	ND(22)	ND(.55)	ND(.51)	**8.50 J**	**0.160 J**	ND(9.6)	0.130 J
Benzo(g,h,i)Perylene	0.21 J	0.96	0.37 J	**ND(94)**	1 J	ND(22)	0.160 J	0.074 J	14.0 J	0.380 J	1.20 J	0.380 J
Total Confident Conc. SVOCs	4.57	13.28	3.92		20.9		5.8		362.02	17.4	2.07J	7.086J
Metals (mg/kg)												
Arsenic	12.0 J	5.7 J	**18.2 J**	**15.6 J**	**12.7 J**	**20.6 J**	**21**	**43.7**	**17.5**	**21.4**	**17**	**8.8**
Cadmium	ND(.39)	ND(.41)	0.80 J	3.6 J	**7.1**	**14.4**	**2.5**	**2.7**	**2.9**	**5.7**	ND(.58)	ND(.6)
Chromium	**61.6**	**48.5**	**143**	**65.3**	35.9	**70.2**	**178**	**149**	30.4	37.2	**19.3**	**34.1**
Copper	**112**	27.8	**795**	**294**	**223**	**522**	**313**	**766**	104	163	**38.7**	**48.6**
Lead	283	25.7	**438**	**750**	**765**	**717**	343	390	194	441	**32.1**	**1010**
Magnesium	2070	1940	1850	2340	4930	**6770**	2100	1580	**11200**	2840	**5490**	**3580**
Mercury	**0.48 J**	**0.26 J**	**0.36 J**	**0.92 J**	ND(.14)	0.19	**2.1**	**0.34**	**0.26**	**0.39**	**0.11**	**0.27**
Nickel	17.2 J	18.8 J	30.6 J	**46.7**	**43.9**	**74.6**	*30.8*	17.9	**25.7**	**45.2**	**18.3**	**26.2**
Zinc	**430 J**	**336 J**	**1070 J**	**887 J**	**1640 J**	**2240 J**	**1060**	**1170**	**662**	**1500**	**200**	**521**
TCLP Metals												
Chromium	--	--	--	--	--	--	--	--	--	--	--	--
Lead	--	--	--	--	--	--	--	--	--	--	--	--

TABLE 4
SUMMARY OF HISTORICAL AND RECENT SOIL ANALYTICAL DATA
AREA N-MECHANICAL BUILDING DRY WELLS
FORMER ENDICOTT-JOHNSON RANGER PARACORD FACILITY-SOUTHERN PARCEL
JOHNSON CITY, NEW YORK

Sample ID	**NSB-2(0-3)**	**NSB-2(3-5)**	**NSB-3(0-3)**	**NSB-3(3-5)**	**NSB-4(0-3)**	**NSB-4(3-5)**	**NSB-5(0-3)**	**NSB-5(3-5)**	**NSB-6(0-3)**	**NSB-6(3-5)**	**NSB-7 COMP(0-5)**
Sample Depth	**0-3 ft. bg.**	**3-5 ft. bg.**	**0-3 ft. bg.**	**3-5 ft. bg.**	**0-3 ft. bg.**	**3-5 ft. bg.**	**0-3 ft. bg.**	**3-5 ft. bg.**	**0-3 ft. bg.**	**3-5 ft. bg.**	**0-5 ft. bg.**
Sample Date	**12/7/2006**	**12/7/2006**	**12/7/2006**	**12/7/2006**	**12/7/2006**	**12/7/2006**	**12/7/2006**	**12/7/2006**	**12/7/2006**	**12/7/2006**	**12/7/2006**
Sample Area	**N**	**N**	**N**	**N**	**N**	**N**	**N**	**N**	**N**	**N**	**N**
Sampled By	**H&A**	**H&A**	**H&A**	**H&A**	**H&A**	**H&A**	**H&A**	**H&A**	**H&A**	**H&A**	**H&A**
Semi-Volatile Organic Compounds (mg/kg)											
Napthalene	1.70 J	5.7	ND(9)	ND(2.8)	0.620 J	0.062 J	2.2	ND(0.46)	ND(38)	ND(1.3)	--
Acenaphthylene	ND(7.7)	ND(1.6)	1.2 J	2.9	0.99 J	0.58 J	0.42 J	ND(0.46)	2.5 J	0.14 J	--
Acenaphthene	ND(7.7)	ND(1.6)	ND(9)	ND(2.8)	ND(9.1)	0.09 J	0.88 J	ND(0.46)	ND(38)	ND(1.3)	--
Fluorene	ND(7.7)	ND(1.6)	ND(9)	0.33 J	ND(9.1)	0.170 J	0.98 J	ND(0.46)	ND(38)	ND(1.3)	--
Phenanthrene	ND(7.7)	ND(1.6)	4.9 J	2.1 J	6.7 J	1.1	9.2	ND(0.46)	32.0 J	0.13 J	--
Anthracene	ND(7.7)	ND(1.6)	1.6 J	1.6 J	1.8 J	0.520 J	2.2	ND(0.46)	6.8 J	0.14 J	--
Fluoranthene	ND(7.7)	ND(1.6)	7.8 J	7.6	11	2.6	11	0.051 J	44	0.13 J	--
Pyrene	ND(7.7)	ND(1.6)	5.9 J	5.8	7.6 J	1.9	9	ND(0.46)	34.0 J	ND(1.3)	--
Benzo(a)anthracene	ND(7.7)	ND(1.6)	**5.0 J**	**4.4**	**5.9 J**	**1.4**	**6.1**	ND(0.46)	**23.0 J**	ND(1.3)	--
Chrysene	ND(7.7)	ND(1.6)	**4.6 J**	**4.1**	**6.3 J**	**1.3**	**6.3**	ND(0.46)	**27.0 J**	0.15 J	--
Benzo(b)fluoranthene	ND(7.7)	ND(1.6)	**4.8 J**	**4.9**	**4.9 J**	**1.3**	**5**	ND(0.46)	**21.0 J**	0.15 J	--
Benzo(k)fluoranthene	ND(7.7)	ND(1.6)	**4.1 J**	**4.3**	**5.6 J**	**1.4**	**4.2**	ND(0.46)	**19.0 J**	0.1 J	--
Benzo(a)pyrene	ND(7.7)	ND(1.6)	**5.3 J**	**5.9**	**5.6 J**	**1.6**	**5.1**	ND(0.46)	**22.0 J**	ND(1.3)	--
Indeno(1,2,3-cd)pyrene	ND(7.7)	ND(1.6)	3.0 J	**4**	**3.2 J**	0.820 J	2.7	ND(0.46)	**15.0 J**	0.19 J	--
Dibenz(a,h)anthracene	ND(7.7)	ND(1.6)	**0.840 J**	**1.0 J**	**1.1 J**	**0.260 J**	**1.1 J**	ND(0.46)	**5.7 J**	ND(1.3)	--
Benzo(g,h,i)Perylene	ND(7.7)	ND(1.6)	3.3 J	4.8	3.3 J	0.840 J	3	ND(0.46)	16.0 J	0.37 J	--
Total Confident Conc. SVOCs	1.7J	5.7	52.34J	53.73J	64.61J	15.9J	69.38J	0.051J	268J	1.5J	--
Metals (mg/kg)											
Arsenic	**10**	**65.5**	3.9	5.8	**7.8**	**22.1**	**17.9**	**17.9**	**13.5**	**51.6**	--
Cadmium	ND(.56)	0.79	ND(.55)	ND(.51)	ND(.52)	ND(.62)	0.84	0.87	**1.2**	**2.6**	--
Chromium	**18.5**	**595**	**10.4**	**140**	**17.2**	**3810**	**152**	**123**	**43.2**	**120**	--
Copper	**31.7**	**2590**	17.1	**85**	**69.7**	**491**	**224**	**205**	**245**	**198**	--
Lead	**64.6**	**2950**	**9.3**	**13.1**	**50.2**	**624**	**428**	**348**	**101**	**944**	--
Magnesium	**4160**	**9100**	**38100**	**650**	**6770**	**2290**	**3730**	**3200**	**13300**	**1570**	--
Mercury	**0.11**	0.05	0.08	0.04	0.06	**0.12**	**0.59**	**0.22**	**0.12**	**0.43**	--
Nickel	**17.8**	**112**	10.1	**29.8**	**16.9**	**66**	**23.6**	**28.9**	**26**	**43.8**	--
Zinc	**261**	**1360**	**34.5**	**274**	**269**	**603**	**705**	**811**	**558**	**1240**	--
TCLP Metals											
Chromium	--	--	--	--	--	--	--	--	--	--	ND(0.1)
Lead	--	--	--	--	--	--	--	--	--	--	ND(0.1)

Notes:

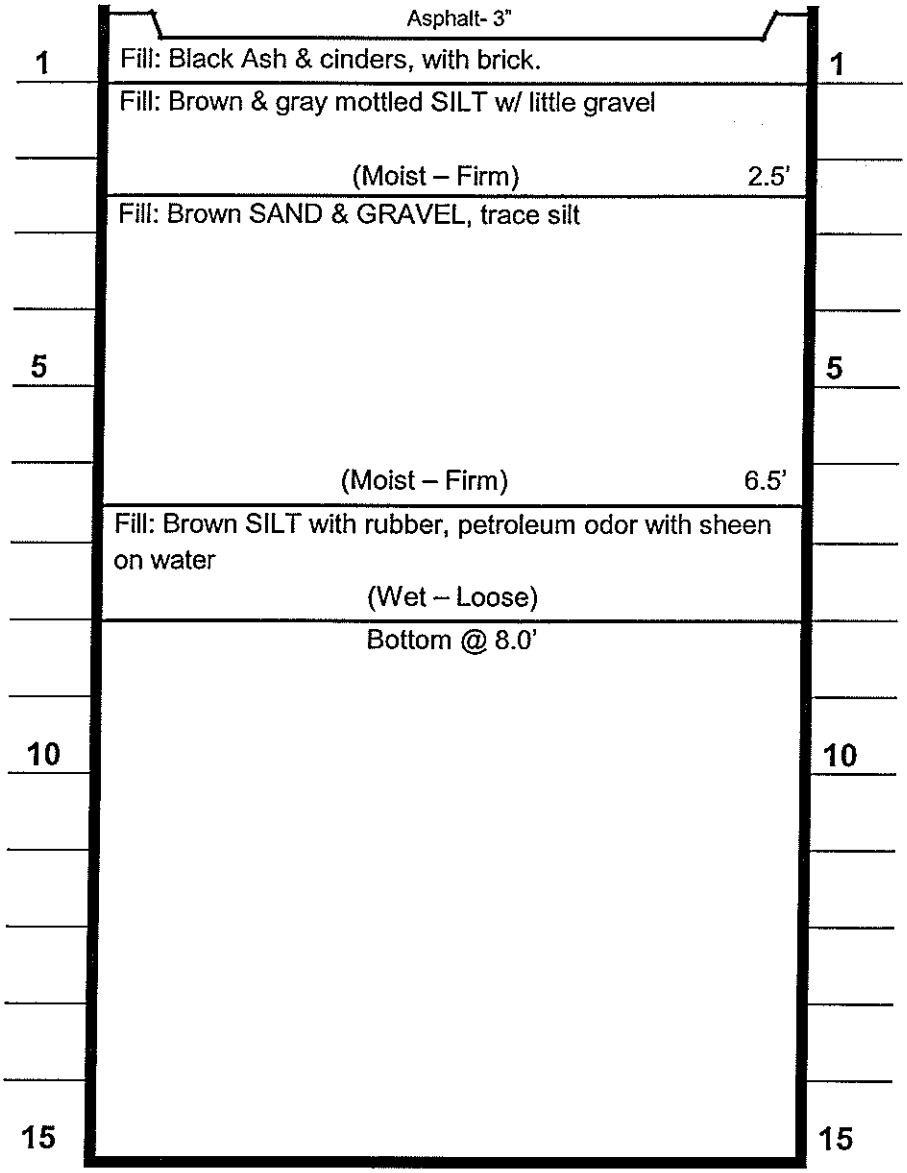
1) "--" = Sample not tested for corresponding compound.
2) ND = Not Detected above method detection limit. Detection limit shown in parentheses.
3) J = Approximately
4) Refer to Table 1 for comparison criteria:
a) Bold text shows values that exceed TAGM 4046 criteria
b) Red-bolded values exceed TAGM 4046 criteria and Background Concentrations.
c) Yellow-highlighted cell values exceed DEC Part 375 criteria.

APPENDIX A

TP-1 & TP-2 Test Pit Logs, TP-2 Photo Log, and Gannett Parcel Excavation Photo Log

HAWK ENGINEERING, P.C.
P.O. Box 427
Binghamton, New York 13902-0427
(607) 584-0140

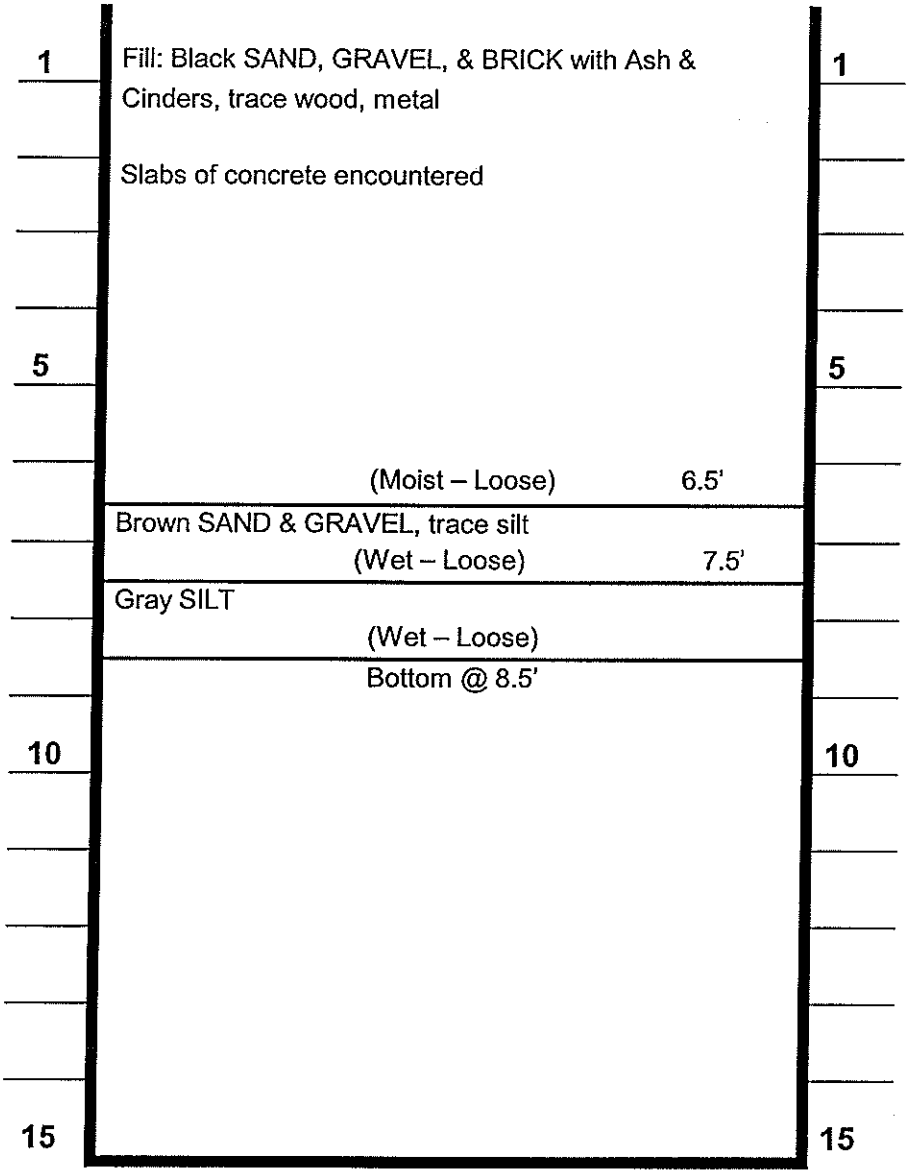
Test Pit – 1



DATE:	5/22/07	**COMMENTS:**
PROJECT NO.:	7042.01	Excavated with Case
PROJECT:	Proposed Wal-Mart	580 Super L Backhoe
LOCATION:	Johnson City, NY	Groundwater encountered @ 7.5'
LOGGED BY:	CTG	Elevation - 844.21'

HAWK ENGINEERING, P.C.
P.O. Box 427
Binghamton, New York 13902-0427
(607) 584-0140

Test Pit – 2



DATE:	5/22/07	**COMMENTS:**
PROJECT NO.:	7042.01	Excavated with Case
PROJECT:	Proposed Wal-Mart	580 Super L Backhoe
LOCATION:	Johnson City, NY	Groundwater encountered @ 7.5'
LOGGED BY:	CTG	Elevation - 843.48'

Former Endicott-Johnson Ranger Paracord Facility – Southern Parcel
TP-1 & TP-2 Excavation by Hawk Engineering
May 2007

Photograph 1: View of fill material encountered at Test Pit 1

Photograph 2: View of Test Pit 2

Former Endicott-Johnson Ranger Paracord Facility – Southern Parcel
TP-1 & TP-2 Excavation by Hawk Engineering
May 2007

Photograph 3: View of fill material encountered at Test Pit 2.

Former Endicott-Johnson Ranger Paracord Facility – Gannett Parcel
Gannett Parcel Excavation (Area H)
June 2004

Photograph 1: View of rubber scraps within the fill at the Area H Gannett Parcel Excavation.

Photograph 2: View of rubber scraps within the fill at the Area H Gannett Parcel Excavation.

Former Endicott-Johnson Ranger Paracord Facility – Gannett Parcel
Gannett Parcel Excavation (Area H)
June 2004

Photograph 3: View of sheen on water in a test pit excavated at Area H on the Gannett Parcel.

APPENDIX B

Standard Operating Procedures (SOPs)

OPERATING PROCEDURE: OP3012

LOW STRESS/LOW FLOW GROUNDWATER SAMPLE COLLECTION PROCEDURE

PREPARATION AND APPROVALS

VERSION	AUTHORED/DATE	REVIEWED / DATE	REVIEWED / DATE	REVIEWED / DATE	APPROVED / DATE
Ver. 0.0	SLB/GMW / 05-02	NVD/ 12-01-02	GJM/ 6-5-02		JAK/ 6-10-03

Total Pages: 22

HALEY & ALDRICH

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OPERATING PROCEDURE: OP3012

LOW STRESS/LOW FLOW GROUNDWATER SAMPLE COLLECTION PROCEDURE

1. PURPOSE

This document describes procedures for collection of groundwater samples for laboratory analysis utilizing the "Low Stress/Low Flow Method". This method should be employed when it is critical to collect groundwater samples not impacted by over-purging, aeration, and sediment/colloid presence. Although the procedures described in this document are generally appropriate for obtaining groundwater samples as part of Monitored Natural Attenuation (MNA) programs, a more complete procedure for MNA programs is described in a separate document (Monitored Natural Attenuation Sample Collection Procedure).

The method described herein is most appropriate for wells that can accept a submersible pump and have a screened interval of ten feet or less. However, the procedure is flexible and can be modified for a variety of well construction and groundwater yield situations. The low-flow purging and sampling method is not appropriate for use in all hydrogeologic regimes, and certain groundwater monitoring well designs may make the method unsuitable (e.g. open hole and long screen monitoring wells in bedrock and stratified sand and clay where the water bearing zones have not been characterized).
This procedure does not address wells that contain Non-Aqueous Phase Liquids (NAPLs).

Note: The methods described in this document are provided for training use and general information. Depending upon regulatory agency and other project specific requirements, appropriate field procedures may differ from those described herein. These procedures should be confirmed with the Haley & Aldrich Project Manager prior to implementation.

1.1 BACKGROUND

Research conducted by Puls et al. (1992), Puls and Powell (1992), and Powell and Puls (1993) has shown that high-volume purging and sampling cause significant turbidity and suspended particulate artifacts that can result in an overestimation of certain analytes of interest (e.g., metals or hydrophobic organic compounds). Additionally, standard purging procedures can cause pressure changes and bailing can cause aeration that can strip volatile organic compounds from groundwater samples (Pennino, 1988) and provide misrepresentative data on aquifer conditions (such as dissolved oxygen and redox). Overpurging of a well can cause water to cascade down the well screen, causing undesirable aeration and volatilization.

The use of low-flow pumping devices for purging and sampling minimizes both the disturbance of water in well casing and the potential for mobilization of colloidal material (Barcelona et al., 1994). Low-flow purging with maintenance of water level in the well and stabilization of indicator parameters (especially turbidity) allows collection of groundwater samples that are more representative of conditions without filtering (U.S. EPA, 1993; Backhus et al., 1993). In many cases, use of a low-flow pump to purge and sample monitoring

wells decreases sampling time, reduces the need to handle large volumes of purge water and lowers the cost associated with its disposal, and may allow collection of samples for without filtering.

Low-flow refers to the velocity with which water enters the pump intake and that is imparted to the formation pore water in the immediate vicinity of the well screen. It does not necessarily refer to the flow rate of water discharged at the surface that can be affected by flow regulators or restriction. Water level drawdown provides the best indication of the stress imparted by a given flow-rate for a given hydrological situation. The objective is to pump in a manner that minimizes stress (drawdown) to the system to the extent practicable taking into account established site sampling objectives (USEPA, Puls and Barcelona, April 1996).

2. EQUIPMENT & SUPPLIES

1. Adjustable rate, positive displacement pumps (e.g. low flow-rate submersible centrifugal or bladder pumps constructed of stainless steel or Teflon). The pump should be easily adjustable and capable of operating reliably at lower flow rates. An example is QED MicroPurge bladder pump (available for purchase or rental at US Environmental 781-899-6969, among others).

   Under most regulatory programs, peristaltic pumps may be used for collection of inorganic samples only – they are NOT appropriate for collection of VOCs. Bailers are inappropriate for use in this procedure. Waterra tubing purging and sampling is also not recommended for low-flow sampling by the USEPA.

2. Tubing: Tubing used in purging and sampling each well must be dedicated to the individual well. Once properly located, moving the pump in the well should be avoided. Consequently, the same tubing should be used for purging and sampling. The tubing wall thickness should be maximized (3/8 to ½ inch) and the tubing length should be minimized (i.e. do not have excess tubing outside of the well)

   - **Organic analysis**: Teflon or Teflon-lined polyethylene tubing must be used to collect samples.
   - **Inorganic analysis**: Teflon or Teflon lined polyethylene, PVC, Tygon or polyethylene tubing may be used to collect samples.

3. Polyethylene sheeting and sampling gloves.

4. Water level measuring device, 0.01 feet accuracy, (electronic preferred for tracking water level drawdown during all pumping operations).

5. Flow measurement supplies (e.g. graduated cylinder and stopwatch).

6. Interface probe, if needed.

7. Power source (e.g. generator, located downwind; nitrogen tank, etc). The generator should not be oversized for the pump.

8. In-line flow-through cell containing purge criteria parameter monitoring instruments for pH, turbidity, specific conductance, temperature, Eh and dissolved oxygen (DO). The in-line device should be bypassed or disconnected during sample collection. An example is the Horiba U-22 which is a flow-through cell that comes with probes capable of measuring pH, dissolved oxygen, conductivity, salinity, TDS, temperature, turbidity and oxidation-reduction potential. Available from Ashtead Technologies, 800.242.3910, www.ashtead-technology.com or Pine Environmental, 800-301-9663, www.pine-environmental.com, among others.

9. Photoionization detector (PID), or flame ionization detector (FID) or equivalent.

10. Nylon stay-ties

11. Decontamination supplies

12. Field book or well sampling form

13. Sample Bottles. It is recommended that preservatives be added to sample bottles prior to field activities to reduce potential error or introduction of contaminants.

14. Sample preservation supplies (as required by the analytical method; see previous item)

15. Sample tags or labels, and chain of custody.

16. Well construction data, location map, field data from last sampling event.

17. Sampling Plan or Work Plan

18. Health & Safety Plan

19. pH meter

20. Conductivity meter

21. Dissolved Oxygen (DO) meter

22. Oxidation -reduction (REDOX) reaction potential (ORP) meter

23. Nephlometer (turbidity)

24. Temperature gauge

25. Field test kits (such as Hach kits for measurement of dissolved iron (Fe^{+2}), carbon dioxide, and alkalinity). See the document "Monitored Natural Attenuation Groundwater Sample Collection Procedure" for specifications and ordering information for these types of kits.

26. Field filtration units (if required)

3. PROCEDURE

3.1 Sampling Preparatory Activities

Prior to entering the field there are several activities that should be conducted. The activities are as follows:

- Obtain and review a copy of the Sampling or Work Plan and Health & Safety Plan.
- Obtain and review previous groundwater sampling data (if available), previous water level measurements and well construction details (total depth and length of well screen).
- Locate a site map denoting the wells to be sampled.
- Obtain well wrenches, well keys and any other equipment needed to access the wells.
- Coordinate site access.
- Coordinate with laboratory to obtain sample bottles and necessary quality assurance samples.
- Perform an inventory of necessary purging, sampling, and field measurement equipment. Certain equipment may need to be purchased or rented for the sampling event. Check field measurement probes for proper calibration and ensure that the probes and kits are complete (i.e., contain calibration and analytical solutions) for the entire sampling event.

3.2 Preliminary Site Activities

Once on site the following activities should be conducted prior to beginning sampling.

- Verify well identification and location using borehole log details and location site map. Check the condition of the well and record any evidence of damage or need for repair in the field book or field sampling form. Following field activities inform the Project Manager of any necessary repair work required.
- Lay out sheet of clean polyethylene around the well for monitoring and sampling equipment.

- Prior to opening the well cap, measure the breathing space above the well casing with a PID or FID to establish baseline levels. Repeat this measurement once the well cap is opened. If either of these measurements exceeds the air quality criteria in the health and safety plan, field personnel should adjust their PPE accordingly.

- If the well does not have a water level reference point (usually a V-cut or indelible mark in the well casing), make one. Describe its location and record the date of the mark in the field book or sampling form.

- Collect a round of synoptic water level measurements and well depth (in the shortest possible time) before any purging or sampling activities begin. Water levels and well depths should be measured and reported to 0.01 ft. The water levels should be obtained from the denoted reference point on the well.

- Water level and total depth measurements must be obtained to determine the well volume for hydraulic purposes. In some settings it maybe necessary to allow the water level time to equilibrate. This condition exists if a watertight seal exists at the well cap and the water level has fluctuated above the top of screen thereby creating a vacuum or pressurized area in this air space. Three water level checks will verify static water level conditions or changing conditions.

- Check newly constructed wells for the presence of light or dense aqueous phase liquids before sampling.

3.3 Sampling Procedure

It is preferable to sample the wells in order of increasing chemical concentrations (known or anticipated). The following describes the procedure for the low-flow purging and sampling method. Equipment calibration, logbook documentation, sample bottle filling and preservation, and shipping will be conducted in accordance with the site-specific Quality Assurance Project Plan (QAPjP). Personal protective equipment will be donned in accordance with the requirements of the site-specific Health and Safety Plan.

1. Attach and secure the polyethylene tubing to the low-flow pump. See the equipment and materials section for recommended pump types. As the pump is slowly lowered into the well, secure the safety drop cable, tubing, and electrical lines to each other using nylon stay-ties. It is recommended that the pump be placed in the well 12 to (preferably) 48 hours prior to purging/sampling to minimize the effects of turbidity and mixing in the well from introducing the pump.

2. Pump, safety cable, tubing and electrical lines should be lowered slowly into the well to a depth corresponding to the center of the saturated screen section of the well, or at a location determined to either be a preferential flow path or zone where contamination is present. The pump intake should be kept above the bottom of the well to prevent mobilization of any sediment present in the bottom of the well.

3. Before starting the pump, measure the water level again with the pump in the well. Start pumping water from the well at a rate of **100 to 500 milliliters per minute (mL/min) which correlates to 0.03**

to 0.13 gallons per minute. Avoid surging. Observe air bubbles displaced from discharge tube to assess progress of steady pumping until water arrives at the surface. The pumping rate should cause little or no water level drawdown in the well (less than 0.2 ft) and the water level should stabilize.

Water level measurements should be made every three to five minutes. Precautions should be taken to avoid pump suction loss or air entrainment. Pumping rates should, if needed, be reduced to the minimum capabilities of the pump to avoid pumping the well dry and ensure stabilization of indicator parameters. If the recharge rate of the well is very low, purging should be interrupted so as not to cause the drawdown within the well to advance below the pump intake but the operator should attempt to maintain a steady flow rate with the pump to the extent practicable. Record adjustments made to the pumping rates and water levels immediately after each adjustment.

In low-yielding wells, where 100 mL/min exceeds the entrance rate of groundwater into the well, it is important to avoid dewatering the well screen interval and purging the well dry should be avoided to the extent possible. In these cases, the pump should remain in place and the water level should be allowed to recover repeatedly until there is sufficient volume in the well to permit collection of samples. Under these low-yield conditions, it may become difficult to maintain an adequate water volume in the flow-through cell described in the next step. An alternative means of sample collection may be necessary under these conditions and should be discussed with the Project Manager.

4. While purging the well, measurements of water quality indicator parameters utilizing an in-line flow-through cell (or similar equipment) should be collected every three to five minutes until all of the parameters have stabilized. See the Equipment and Materials section for recommendations. Stabilization is achieved when three successive readings are within the following tolerances noted in the table below.

Parameter	Stabilization Level (3 successive readings within)
Turbidity	+10% and final value between 5 and 10 NTU
Specific conductance	+3%
pH	±0.1
Dissolved oxygen (DO)	±10%
Redox potential (Eh)	±10mv

In general, the order of stabilization is pH, temperature and specific conductance, followed by redox potential, dissolved oxygen, and turbidity (USEPA, 1996). A minimum subset of these parameters that can be used to determine stabilization during purging in this procedure are pH, specific conductivity and turbidity or DO. Turbidity and DO are typically the last parameters to stabilize. If the parameters have stabilized, but the turbidity is not in the range of 10 NTU, then follow step 6. For informational purposes, the following table provides typical ranges of the various field parameters. Field data collected during purging and sampling should be compared against these values and, if substantial differences exist, the accuracy of the meter should be verified to rule out potential operational problems with the equipment.

Parameter	Typical Range of Values
Turbidity	10 – 500 NTU
Specific conductance	50 – 500 mS
pH	6 - 9
Dissolved oxygen (DO)	ND – 9 mg/L
Redox potential (Eh)	-250 - +400 mV

5. Once stabilization has been documented, go to step 8.

6. Should stabilization not be achieved for all field parameters (or turbidity only as described in Step 4), purging is continued until a maximum of 20 well screen volumes have been purged from the well. Since low-flow purging (LFP) likely will not draw groundwater from a significant distance above or below the pump intake, the screen volume is based upon a 5-foot (1.4 m) screen length. After purging 20 well screen volumes, purging is continued if the purge water remains visually turbid and appears to be clearing, or if stabilization parameters are varying slightly outside of the stabilization criteria listed above and appear to be approaching stabilization.

   - If low-turbidity samples are critical to the project goals, purging will be extended until turbidity has been reduced to 5 NTU or less.

   - The pump must not be removed from the well between purging and sampling.

7. If the turbidity measurements do not approach the range of that of natural groundwater (10 NTU), both filtered and unfiltered samples should be collected for analysis of compounds such as metals or hydrophobic compounds[1]. Filtered metal samples are to be collected with an in-line filter. A high capacity, in-line 0.45 micron particulate filter must be pre-rinsed according to the manufacturers recommendations, or with approximately 1 liter of groundwater following purging and prior to sampling. After the sample is filtered it must be preserved immediately.

8. Collect groundwater samples. All sample containers should be filled by allowing the pump discharge to gently flow down inside the container with minimal turbulence. The flow-through cell, or similar equipment, should be bypassed during sampling. As each sample bottle is collected, the bottle should be labeled with the following information then place into a cooler with the proper temperature control.

   - Sample number/ID
   - Date and time
   - Parameters to be analyzed
   - Project Reference ID
   - Samplers initials

[1] Filtering of samples for analysis is a project-specific requirement and should be confirmed with the Project Manager prior to filtration.

After collection of the samples, the tubing from the pump should be properly discarded or dedicated to the well for re-sampling (by hanging the tubing inside the well). Avoid handling the interior of the bottle or bottle cap and don new gloves for each well sampled to avoid contamination of the sample.

VOC and gas sensitive (e.g. Fe^{+2}, CH_4, H_2S/HS) parameter samples should be collected first. Refer the project sampling and analysis plan to determine which analytes will be measured in the field (wellhead) and which will be submitted to a fixed-base laboratory. The order of sample collection is as follows:

1. Volatile organic compounds
2. Gas sensitive parameters (e.g. Fe^{+2}, CH_4, H_2S/HS)
3. Semi-volatile organic compounds
4. Total organic carbon (TOC)
5. Total organic halogens (TOX)
6. Extractable organics
7. Total metals
8. Dissolved metals
9. Phenols
10. Cyanide
11. Sulfate and chloride
12. Nitrate and ammonia
13. Radionuclides

*Note: **The pumping rate used to collect a sample for VOCs should not exceed 100 mL/min.** Samples should be transferred directly to the final container 40 mL glass vials completely full and topped with a Teflon cap. Once capped the vial must be inverted and tapped to check for headspace/air presence (bubbles). If air is present the sample vial will be discarded, and re-collected until free of air. Field filtration will be performed if dictated by the project Work Plan.*

9. Measure and record final water level and well depth.

10. Secure the well (close and lock).

3.4 Decontamination

Decontaminate sampling equipment prior to use in the first well and following sampling of each subsequent well. Pumps will not be removed from well between purging and sampling operations. The pump and tubing (including support cable and electrical wires that are in contact with the well) will be decontaminated by one of the procedures listed below.

3.4.1 Procedure 1

Decontamination solutions can be pumped from buckets through the pump, or the pump can be disassembled and flushed with the decontamination solutions. It is recommended that the detergent

and isopropyl alcohol be used sparingly in the decontamination process and that water-flushing steps be extended to ensure that any sediment trapped in the pump is removed. The pump exterior and electrical wires must be rinsed with the decontaminating solutions, as well. The procedure is as follows:

1. Flush the equipment/pump with potable water.

2. Flush with non-phosphate detergent solution. If the solution is recycled, the solution must be changed periodically.

3. Flush with potable or distilled/deionized water to remove all of the detergent solution. If the water is recycled, the water must be changed periodically.

4. Flush with isopropyl alcohol (pesticide grade). If equipment blank data from the previous sampling event shows that the level of contamination is low, then this step may be skipped.

5. Flush with distilled/deionized water. The final water rinse must not be recycled.

6. Decontaminate the in-line flow-through cell and other sampling equipment with similar procedures, as appropriate.

3.4.2 Procedure 2

1. Steam clean the outside of the submersible pump.

2. Pump hot potable water from the steam cleaner through the outside of the pump. This can be accomplished by placing the pump inside a three or four inch diameter PVC pipe with cap. Hot water from the steam cleaner jet will be directed inside the PVC pipe and the pump exterior will be cleaned. The hot water from the steam cleaner will then be pumped from the PVC pipe through the pump and collected into another container. Note: additives or solutions should not be added to the steam cleaner.

3. Pump non-phosphate detergent solution through the inside of the pump. If the solution is recycled, the solution must be changed periodically.

4. Pump potable water through the inside of the pump to remove all of the detergent solution. If the solution is recycled, the solution must be changed periodically.
5. Pump distilled/deionized water through the pump. The final water rinse must not be recycled.

6. Decontaminate the in-line flow-through cell and other sampling equipment with appropriate procedures.

3.5 Field Documentation

Field notes must document all the events, equipment used, and measurements collected during the sampling activities. The logbook or sampling form (see Appendix C Forms) should document the following for each well sampled:

- Identification of well
- Well depth
- Static water level depth and measurement technique
- Sounded well depth
- Presence of immiscible layers and detection/collection method
- Well yield - high or low
- Purge volume and pumping rate
- Time well purged
- Measured field parameters - record measurements obtained every 3-5 minutes to monitor for stabilization, see attached example record log.
- Purge/sampling device used
- Well sampling sequence
- Sampling appearance
- Sample odors
- Sample volume
- Types of sample containers and sample identification
- Preservative(s) used
- Parameters requested for analysis
- Field analysis data and method(s)
- Sample distribution and transporter

- Laboratory shipped to
- Chain of custody number for shipment to laboratory
- Field observations on sampling event
- Name collector(s)
- Climatic conditions including air temperature
- Problems encountered and any deviations made from the established sampling protocol.

3.6 Groundwater/Decontamination Fluid Disposal

Groundwater disposal methods will vary on a case-by-case basis and field personnel should consult the Project Manager for site-specific requirements. Disposal options may include:

- Off-site treatment at private treatment/disposal facilities or public owned treatment facilities.
- On-site treatment at Facility operated facilities.
- Direct discharge to the surrounding ground surface, allowing groundwater infiltration to the underlying subsurface regime.
- Direct discharge to impervious pavement surfaces, allowing evaporation to occur
- Decontamination fluids should be segregated and collected separately from wash waters/groundwater containers. Often small volumes of solvents used during the day can be allowed to evaporate if left in an open pail. In the event evaporation is not possible or practical, off-site disposal arrangements must be made.

APPENDIX A
REFERENCES

- USEPA Low-flow (minimal drawdown) groundwater sampling procedures (EPA/540/S-95/504), April 1996.
- USEPA Ground-Water Sampling-A Workshop Summary, Dallas, Texas, November 30 - December 2, 1993. EPA/600/R-94/205.
- Backhus, D.A., J.N. Ryan, D.M. Groher, J.K. MacFarlane, and P. M. Gschwend. 1993. Sampling Colloids and Colloid-Associated Contaminants in Ground Water. Ground Water. V. 31, pp. 466-479.
- Barcelona, M.J., H.A. Wehrmann, and M.D. Varljen. 1994. Reproducible Well Purging Procedures and VOC Stabilization Criteria for Ground-Water Sampling. Ground Water. V. 32, pp. 12-22.
- Pennino, J.D. 1988. There is No Such Thing as a Representative Ground Water Sample. Ground Water Monitoring Review. V 8, pp. 4-9.
- Powell, R.M. and R.W. Puls. 1993. Passive Sampling of Ground-Water Monitoring Wells without Purging: Multilevel Well Chemistry and Tracer Disappearance. Journal Contaminant Hydrology. V.12, pp. 51-77.
- Puls, R.W. and R.M. Powell. 1992. Acquisition of Representative Ground Water Quality Samples for Metals. Ground Water Monitoring Review. V. 12, pp. 167-176.
- Puls, R.W., D.A. Clark, B. Bledsoe, R.M. Powell, and C.J. Paul. 1992. Metals in Ground Water: Sampling Artifacts and Reproducibility. Hazardous Waste and Hazardous Materials. V. 9, pp. 149-162.
- USEPA Region 3. 1997. Recommended Procedure for Low-Flow Purging and Sampling of Groundwater Monitoring Wells. Waste and Chemicals Management Division - Low Flow Sampling. Bulletin No. QAD023.
- USEPA Region 1. 1996. Low Stress (Low Flow) Purging and Sampling for the Collection of Groundwater Samples from Monitoring Wells. SOP #: GW 001. Revision 2. pp.13.
- USEPA Region 2. 1998. Ground Water Sampling Procedure, Low Stress (Low Flow) Purging and Sampling. GW Sampling SOP, Final.

APPENDIX B
RELATED HALEY & ALDRICH PROCEDURES

- OP3000 General Environmental Field Procedures and Protocol
- OP3001 Preservation and Shipment of Environmental Samples
- OP3008 Manual Water Level Measurement Procedure
- OP3009 Monitoring Well Development Procedure
- OP3010 Groundwater Quality Sampling Procedure
- OP3013 Monitored Natural Attenuation Groundwater Sample Collection Procedure
- OP3014 NAPL Monitoring and Sampling Procedure

APPENDIX C
FORMS

- Form 3001 Sampling Labels (Environmental)
- Form 3003 Chain of Custody
- Form 3004 Sampling Record
- Form 3005 Groundwater Sampling Record
- Form 3006 Monitoring Well Development Report

HALEY & ALDRICH

Haley & Aldrich, Inc.
465 Medford St., Suite 2200
Boston, MA 02129
Tel: 617-886-7400

Sample ID:	**File Number:**
Depth:	**Project:**
Date:	**Analysis:**
Time:	**Preservative:**
Collected By:	**Laboratory:**
Comments:	

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Collected By:	**Laboratory:**
Comments:	

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CHAIN OF CUSTODY RECORD

Phone (617) 886-7400
Fax (617) 886-7600

H&A FILE NO. _____ LABORATORY _____ DELIVERY DATE _____

PROJECT NAME _____ ADDRESS _____ TURNAROUND TIME _____

H&A CONTACT _____ CONTACT _____ PROJECT MANAGER _____

Sample No.	Date	Time	Depth	Type	Analysis Requested: VOA	ABNs PAH only	Metals RCRA (8) PP(13)	Pesticides PCBs	VPH Full Suite C-ranges only	EPH Full Suite C-ranges only	TPH (specify)	TCLP (specify)	Reactivity Ignitability Corrosivity				Number of Containers	Comments (special instructions, precautions, additional method numbers, etc.)

Sampled and Relinquished by	Received by
Sign	Sign
Print	Print
Firm	Firm
Date Time	Date Time
Relinquished by	**Received by**
Sign	Sign
Print	Print
Firm	Firm
Date Time	Date Time
Relinquished by	**Received by**
Sign	Sign
Print	Print
Firm	Firm
Date Time	Date Time

LIQUID													
													VOA Vial
													Amber Glass
													Plastic Bottle
													Preservative
													Volume
SOLID													
													VOA Vial
													Amber Glass
													Clear Glass
													Preservative
													Volume

PRESERVATION KEY

A Sample chilled **C** NaOH **E** H_2SO_4 **G** Methanol

B Sample filtered **D** HNO_3 **F** HCL **H** Sodium Bisulfate

Sampling Comments

Evidence samples were tampered with? YES NO

If YES, please explain in section below.

WHITE - Laboratory **CANARY** - Project Manager **PINK** - Haley & Aldrich Laboratory **GOLDENROD** - Haley & Aldrich Contact

WATER AND WASTEWATER METHODS

Analysis Description	Method No.	Preservative	Solid Sample Volume/Container	Liquid Sample Volume/Container	Holding Time
Alkalinity	310	Cool 4° C	N/A	250 mL HDPE	14 days
Amenable Cyanide	Std. Mth. 412 F.	pH>12 NaOH, Cool 4° C	N/A	1 L HDPE	14 days
Ammonia	350	pH<2 H2SO4, Cool 4° C	N/A	1 L HDPE	28 days
Base/Neutral & Acid Extractables	625	Cool 4° C	N/A	1 L Amber	7 days Ext/40 days Analyze
Biochemical Oxygen Demand (BOD)	405.1	Cool 4° C	N/A	2 L HDPE	48 hours
Chemical Oxygen Demand (COD)	410	pH<2 H2SO4, Cool 4° C	N/A	125 mL HDPE	28 days
Chloride	300.0, 325	None Required	N/A	125 mL HDPE	28 days
Chromium, Hexavalent	3500D, 218.4/5	None Required	N/A	1 L HDPE	24 hours
Fluoride	300.0, 340	None Required	N/A	500 mL HDPE	28 days
Hardness, Total (as CaCO3)	130	pH<2 H2SO4, Cool 4° C	N/A	250 mL HDPE	6 Months
Nitrate	300.0, 352.1	Cool 4° C	N/A	250 mL HDPE	48 Hours
Nitrite	300.0, 354.1	Cool 4° C	N/A	125 mL HDPE	48 Hours
Orthophosphate	300.0, 365	Filter, Cool 4° C	N/A	125 mL HDPE	48 Hours
PCBs	608	Cool 4° C	N/A	1 L Amber	7 days Ext/40 days Analyze
Pesticides	608	Cool 4° C	N/A	1 L Amber	7 days Ext/40 days Analyze
Physiologically Available Cyanid	MADEP draft	pH>12 NaOH, 4° C	N/A	1 L HDPE	14 days
Priority Pollutant Metals (13 Metals	200.7/AA, 200 Series	pH<2 HNO3, 4° C	N/A	1 L HDPE	28 days (Hg), 6 mos. (others)
Purgeable Halocarbons & Aromatics	601/602	pH 2 HCl, Cool 4° C	N/A	40 mL Glass Vial	14 days
RCRA Metals (8 Metals)	200.7/AA, 200 Series	pH<2 HNO3, 4° C	N/A	1 L HDPE	28 days (Hg), 6 mos. (others)
Sulfate	300.0, 375	Cool 4° C	N/A	250 mL HDPE	28 days
Sulfide	376	pH>9 NaOH, Zn Acetate, Cool 4° C	N/A	1 L HDPE	7 days
Sulfite	377.1	None Required	N/A	125 mL HDPE	Analyze Immediately
Total Cyanide	335	pH>12 NaOH, Cool 4° C	N/A	1 L HDPE	14 days
Total Dissolved Solids (TDS)	209	Cool 4° C	N/A	250 mL HDPE	7 days
Total Organic Carbon (TOC)	415	pH<2 HCl or H2SO4, Cool 4° C, Dark	N/A	40 mL Amber	28 days
Total Organic Halogen (TOX)	506	pH<2 HNO3, 4° C	N/A	1 L Amber	check with lab
Total Phenolics	420.1	pH<2 H2SO4, Cool 4° C	N/A	1 L Amber	28 days
Total Phosphorus	365	pH<2 H2SO4, Cool 4oC	N/A	125 mL HDPE	28 days
Total Solids (TS)	160.3	Cool 4° C	N/A	250 mL HDPE	7 days
Total Suspended Solids (TSS)	160.2	Cool 4° C	N/A	250 mL HDPE	7 days
Volatile Organics	624	pH 2 HCl, Cool 4° C	N/A	40 mL Glass Vial	14 days
Weak and Dissociable Cyanide	Std. Mth. 412 H.	pH>12 NaOH, Cool 4° C	N/A	1 L HDPE	14 days
DRINKING WATER ANALYSIS					
Volatile Organics	502.2 or 524.2	pH 2 HCl, Cool 4° C	N/A	40 mL Glass Vial	14 days
MICROBIOLOGY					
Fecal Coliform	STDMTH	Cool 4o C	N/A	sterile, 125 mL	6 hours
Standard Plate Count	STDMTH	Cool 4o C	N/A	sterile, 125 mL	6 hours
Total Coliform	STDMTH	Cool 4o C	N/A	sterile, 125 mL	6 hours
Yeast and Mold	STDMTH	Cool 4o C	N/A	sterile, 125 mL	6 hours

SOIL/SEDIMENTS/WATER

Solids (S) / Liquids (L)

Analysis Description	Method No.	Preservative	Solid Sample Volume/Container	Liquid Sample Volume/Container	Holding Time
Acid Extractables/Base/Neutral Extractables	8270	S/L: Cool 4° C	8 oz. CWM	1 L Amber	7 days Ext/40 days Analyze
Amenable Cyanide	-	S: 4° C / L: pH>12 NaOH, 4° C	4 oz. CWM	1 L HDPE	14 days
Chromium, Hexavalent	3060A/7196	S/L: Cool 4° C	8 oz. CWM	1 L HDPE	24 hours
Extractable Hydrocarbons	8015B	S: Cool 4° C / L: pH<2 HCl, 4° C	8 oz. CWM	1 L Amber	7 days Ext/40 days Analyze
Herbicides	8150	S/L: Cool 4° C	8 oz. CWM	1 L Amber	7 days Ext/40 days Analyze
Non-Halogenated Organics	8015B	S: Cool 4° C / L: pH<2 HCl, 4° C	4 oz. CWM	40 mL Glass Vial	14 days
PAH (low level)	8310 or GC/MS SIM	S/L: Cool 4° C	8 oz. AWM	1 L Amber	7 days Ext/40 days Analyze
Paint Filter Liquids Test	9095	S: Cool 4° C	8 oz. CWM	1 L Amber	Analyze ASAP
PCBs	8082	S/L: Cool 4° C	8 oz. CWM	1 L Amber	7 days Ext/40 days Analyze
Pesticides	8081	S/L: Cool 4° C	8 oz. CWM	1 L Amber	7 days Ext/40 days Analyze
Physiologically Available Cyanid	MADEP draft	S: 4° C / L: pH>12 NaOH, 4° C	4 oz. CWM	1 L HDPE	14 days
Priority Pollutant Metals(13 Metals)	6010&7000	S: 4° C / L: pH<2 HNO3, 4° C	8 oz. CWM	1 L Amber	28 days (Hg), 6 mos. (others)
RCRA Metals (8 Metals)	6010&7000	S: 4° C / L: pH<2 HNO3, 4° C	8 oz. CWM	1 L Amber	28 days (Hg), 6 mos. (others)
Total Cyanide	9010	S: 4° C / L: pH>12 NaOH, 4° C	4 oz. CWM	1 L HDPE	14 days
Volatile Hydrocarbons	8015B	S: Cool 4° C / L: pH<2 HCl, 4° C	4 oz. CWM	40 mL Glass Vial	14 days
Volatile Organics	8260B, 8021	S: methanol/$NaHSO_4$, 4° C / L: pH<2 HCl, 4° C	4 oz. CWM	40 mL Glass Vial	14 days
RCRA HAZARDOUS WASTE CHARACTERIZATION					
Corrosivity (pH only)	SW846-7.2	S: Cool 4° C	4 oz. CWM	check with lab	Analyze ASAP
Ignitability/Flashpoin	SW846-7.1	S: Cool 4° C	4 oz. CWM	check with lab	Analyze ASAP
Reactivity (CN-/S2-)	SW846-7.3	S: Cool 4° C	4 oz. CWM	check with lab	Analyze ASAP
TCLP (RCRA 8) Metals (check for mercury)	1311	S: Cool 4° C	16 oz. CWM	check with lab	6 mos. Ext/6 mos. Analyze
TCLP Pesticides/Herbicides	1311	S: Cool 4° C	16 oz. CWM	check with lab	14 days Ext/40 days Analyze
TCLP Semivolatiles	1311	S: Cool 4° C	16 oz. CWM	check with lab	14 days Ext/40 days Analyze
TCLP Volatiles	1311	S: Cool 4° C	8 oz. CWM	check with lab	14 days Ext/14 days Analyze
HYDROCARBON OIL & GREASE ANALYSIS					
MADEP EPH Method	MADEP REV. 0	S: Cool 4° C / L: pH<2 HCl, 4° C	4 oz. Amber	1 L Amber	S:7 days Ext / L:14 days Ext
MADEP EPH Method (C-Ranges only)	MADEP REV. 0	S: Cool 4° C / L: pH<2 HCl, 4° C	4 oz. Amber	1 L Amber	S:7 days Ext / L:14 days Ext
MADEP VPH Method	MADEP REV. 0	S: methanol, 4° C / L: pH<2 HCl, 4° C	40 mL+2 oz. CWM.	40 mL Glass Vial	S: 28 days / L: 14 days
MADEP VPH Method (C-Ranges only)	MADEP REV. 0	S: methanol, 4° C / L: pH<2 HCl, 4° C	40 mL+2 oz. CWM.	40 mL Glass Vial	S: 28 days / L: 14 days
MADEP EPH Method - with selected PAHs (including acenaphthene, naphthalene, 2-methylnaphthalene, and phenanthrene	MADEP REV. 0	S: Cool 4° C / L: pH<2 HCl, 4° C	4 oz. Amber	1 L Amber	S:7 days Ext / L:14 days Ext
Petroleum Identification Quantitative (include Chromatograms	ASTM D3328	S: Cool 4° C / L: pH<2 H_2SO_4, 4° C	4 oz. CWM	1 L Amber	S: 7 days / L: 28 days
Total Petroleum Hydrocarbons (Infrared	418.1	S: Cool 4° C / L: pH<2 H_2SO_4, 4° C	4 oz. CWM	1 L Amber	S: 7 days / L: 28 days

AIR METHODS

Analysis Description	Method No.	Preservative	Sample Volume/Container		Holding Time
Volatile Organic Compounds	EPA T01/T02	tubes: 4° C; Tedlar Bags: dark	N/A	N/A	tube: 14 days; bag: 72 hours
Volatile Organic Compounds	EPA T014	check with lab	N/A	N/A	can: 14 days; bag: 72 hours
VPH in air	EPA T01/T02	tubes: 4° C; Tedlar Bags: dark	N/A	N/A	tube: 14 days; bag: 72 hours
VPH in air	EPA T014	check with lab	N/A	N/A	can: 14 days; bag: 72 hours

HALEY & ALDRICH

SAMPLING RECORD

Page of

PROJECT		**H&A FILE NO.**	
LOCATION		**PROJECT MGR.**	
CLIENT		**FIELD REP**	
CONTRACTOR		**DATE**	

Weather **Temperature**

Ground surface Conditions ☐ Dry ☐ Wet ☐ Damp ☐ Standing Water ☐ Snow (_____in) ☐ Other_____

Comments

SOIL SAMPLING AND SURFACE WATER SAMPLING INFORMATION

Sample No.	Location	Depth (ft)	Time	Sample Description	Sampling Device	Cleaning Prodedure	Container Type

General Comments: (ie: field filtrations, persons communicated with at site, etc.)

Form 3004

HALEY & ALDRICH

GROUNDWATER SAMPLING RECORD

Page of

PROJECT		**H&A FILE NO.**	
LOCATION		**PROJECT MGR.**	
CLIENT		**FIELD REP**	
CONTRACTOR		**DATE**	

GROUNDWATER SAMPLING INFORMATION

Well No.							
Water Depth (ft)							
Time							
Product							
Depth Of Well (ft)							
Inside Diameter (in)							
Standing Water Depth (ft) (1)							
Volume Of Water In Well (gal)							
Purging Device							
Volume of Bailer/Pump Capacity							
Cleaning Procedure							
Bails Removed/ Volume Removed							
Time Purging Started							
Time Purging Stopped							
Sampling Device							
Cleaning Procedure							
TIME SAMPLES TAKEN	VOA						
	ABN						
	Metals						
PARAMETERS	Color						
	Odor						
	pH						
	Conductivity						
	Turbidity						
	Dissolved Oxygen						
	Temp, ^{0} C						
	Salinity						

Remarks: (ie: field filtrations, persons communicated with at site, etc.)

1. Standing Water Depth = Depth of Well - Water Depth

Form 3005

HALEY & ALDRICH

MONITORING WELL DEVELOPMENT REPORT

Well No.

PROJECT		**H&A FILE NO.**	
LOCATION		**PROJECT MGR.**	
CLIENT		**FIELD REP.**	
CONTRACTOR		**DATE**	
ELEVATION SUBTRAHEND			

Estimated Volume of Water Lost During Drilling: _____ gallons

Comments: _____

_____

Depth to Water Before Development: _____ feet

Comments: _____

_____

Depth to Well Bottom Before Development: _____ feet

Comments: _____

_____

Turubitiy of Water Before Development: _____ NTU

Comments: _____

_____

Volume of Water Removed: _____ gallons

Comments: _____

_____

Method of Removal (bailing, pumping): _____

Comments: _____

_____

Depth to Well Bottom After Development: _____ feet

Comments: _____

_____

Depth to Water After Development: _____ feet

Comments: _____

_____

Turubitiy of Water After Development: _____ NTU

Comments: _____

_____

APPENDIX C

Health & Safety Plan

HALEY & ALDRICH, INC.

SITE-SPECIFIC HEALTH & SAFETY PLAN

for

Former Endicott-Johnson Ranger Paracord Site – Southern Parcel
Supplemental Remedial BCP Investigation - Addendum

Johnson City, New York

Project/File No. 30603-011

Prepared by: Claire DeBergalis Date: 17 September 2007

Revised by: Date:

APPROVALS: The following signatures constitute approval of this Health & Safety Plan. Deviations from this Plan are not permitted without prior approval from the undersigned.

Michael G. Beikirch - Office H&S Coordinator Date

Lisa Turturro - Site/Project Manager Date

Tom Benedict - Corporate H&S Manager Date

PRE-WORK HEALTH & SAFETY BRIEFING

I have attended a briefing on this Health & Safety Plan prior to the start of on-site work and declare that I understand and agree to follow the provisions and procedures set forth herein while working on this site.

PRINTED NAME	SIGNATURE	DATE

NOTE: This Site Health and Safety Plan provides only site-specific descriptions and work procedures. General safety and health compliance programs in support of this site plan, including safe work, training, medical monitoring, and recordkeeping practices, are described in the Haley & Aldrich Corporate Health and Safety Program Manual and are hereby made part of this plan by reference. The manual is available to all employees and to outside parties by request.

1.0 PROJECT INFORMATION

Name of Project: BCP Supplemental Remedial Investigation Addendum	**H&A File No.:** 30603-011
Location: Former Endicott-Johnson Ranger Paracord Site – Southern Parcel	
Client/Site Contact: Ken Kamlet, Stella Ireland Road Associates LLC	**Contact Phone No.:** 607-770-0155 x229
H&A Project Manager: Lisa Turturro	**PM Phone No.:** 585-321-4237

SCOPE OF WORK:

The Brownfields Cleanup Program Supplemental Investigation includes: a) installation of soil borings to facilitate soil sampling; b) installation and collection of groundwater samples from a monitoring well; and c) removal of foundation slabs and subsurface utilities.

Subcontractor(s) to be involved in on-site Investigation activities:

Name	Work Activity
Drilling Subcontractor	Installation of monitoring wells

Projected Start Date: Fall/Winter 2007

Projected Completion Date: Winter 2007

Estimated Number of Days to Complete Field Work: Two to three days for monitoring well installation and monitoring well sampling.

2.0 SITE DESCRIPTION

Check one of the following:

Site classification:			Industrial		Commercial	X	Other: Vacant former industrial

2.1 General Description: (include site history/usage; type of facility; type of investigation; materials stored/used on site; whether paved or landscaped, etc.)

Former rubber manufacturing plant proposed for redevelopment. The supplemental investigation is being performed in support of the NYSDEC Brownfield Cleanup Program process. Initial site investigations have been performed to characterize the site. PAHs, petroleum, metals, and VOCs have been detected at the site. The site is vacant. Previously existing buildings have been demolished.

Site Status (mark all that apply):

	Active	X	Inactive
	Partially Active		Other:

Site history information sources used; check all that apply:

	Geological References	X	State Files
X	Previous reports by others		Water Quality Maps
X	Sanborn Maps		Inquiries

Is a **site plan** or sketch available? Y_X_ N___ If yes, attach a copy to this plan.

Indicate any **unusual features** at the site (power lines, variable terrain, etc.):

None

2.2 Work Areas

List/identify each specific work area(s) on the job site and indicate its location(s) on the site plan:

1. Exterior Locations – Install monitoring wells to facilitate collection of groundwater samples.

3.0 PROJECT TASK BREAKDOWN

List and describe each distinct work task below:

Task No.	Task Description	Employee(s)	Work Date(s) or Duration
1	Installation of monitoring wells. Collection of groundwater samples.	Drilling subcontractor (TBD)	1 day
2	Collection of groundwater samples	H&A field tech. (TBD)	1 day

1. Driller will install 2 inch-diameter permanent monitoring wells using a drilling rig at exterior locations. Haley & Aldrich personnel will monitor and observe installations.

2. Haley & Aldrich personnel will collect the groundwater sample for laboratory analysis from installed monitoring well using a pump and dedicated tubing.

4.0 HAZARD ASSESSMENT

4.1 Chemical Hazards

Is **chemical analysis data** available? Y_X_ N__ (If yes, a data summary should be attached)

Does chemical analysis data indicate that the site is contaminated? Y_X_ N __

Potential **physical state** of the hazardous materials at the site (mark all that apply):

	Gas/Vapor		Sludge
X	Liquid	X	Solid/Particulate

Anticipated/actual **class of compounds** (mark all that apply):

	Asbestos		Inorganics
X	BTEX		Pesticides
	Chlorinated Solvents	X	Petroleum products
X	Heavy Metals	X	Other: PAHs

Impacted environments (indicate all media in which contamination is expected):

	Air	X	Groundwater
X	Soil		Sediment
	Surface water		Other:

Estimated concentrations/medium of major chemicals expected to be encountered by onsite personnel: (Refer to data tables attached in accompanying work plan for specific concentrations previously detected.)

Work Activity	Media	Chemical	Anticipated Concentration
Groundwater well installation	SO	Metals, PAHs	Generally at or one order of magnitude above TAGM criteria.
Groundwater sampling	GW	VOCs and petroleum SVOCs	Generally below NYSDEC Ambient Water Quality Criteria

(Media key: A = Air; GW = Groundwater; SW = Surface Water; SO = Soil; SE = Sediment)

Other site (safety) concerns related to the chemicals present on this site: N/A

4.2 Physical Hazards

Is any site work area(s) to be entered for this project considered a confined space? Y___N **_X**
If yes, indicate which area(s) and why: N/A

ALL CONFINED SPACE ENTRIES REQUIRE SPECIAL PROCEDURES, PERMITS AND TRAINING AND MUST BE APPROVED BY THE CORPORATE HEALTH & SAFETY MANAGER

Physical Hazard Checklist

Indicate all hazards that may be present for each task. If any of these potential hazards are checked, it is the project manager's responsibility to determine how to eliminate/minimize the hazard to protect onsite personnel. Note: Task numbers refer to those identified in section 3.

(Highlight the check mark [√], copy and paste in the appropriate box)

Hazards	Task 1	Task 2
Underground utilities	√	
Overhead utilities	√	
Excavations greater than 4' depth		
Open excavation fall hazards		
Heavy equipment	√	
Drilling hazards	√	
Noise (above 85 dBA)	√	
Traffic concerns		
Extreme weather conditions		
Rough terrain for drilling equipment		
Buried drums		
Heavy lifting (more than 50 lbs)		
High risk fire hazard		
Poisonous insects or plants		
Water hazards		
Use of a boat		
Lockout/Tagout requirements		
Other:		

Describe any special precautions to be taken with respect to the hazards checked above:

5.0 PROTECTIVE MEASURES

5.1 Personal Protective Equipment Requirements

PPE Checklist

(Highlight the check mark [√], copy and paste in the appropriate box)

Required PPE	Task 1	Task 2
Hard hat	√	√
Safety glasses w/side shields	√	√
Steel-toe footwear	√	√
Hearing protection (plugs, muffs)	√	
Tyvek ™ coveralls		
PE-coated Tyvek™ coveralls		
Boots, chemical resistant	√	√
Boot covers, disposable		
Leather work gloves		
Inner gloves - latex	√	√
Outer gloves - pvc		
Tape all wrist/ankle interfaces		
Half-face respirator		
Full-face respirator		
Organic vapor cartridges		
Acid gas cartridges		
Other cartridges:		
P-100 (HEPA) filters		
Face shield		
Other:		
Level of protection required [C or D]:	**D mod**	**D mod**

Standby equipment to be available onsite:

5.2 Personal Hygiene Safeguards

5.3 Site Safety Equipment

Check all items that are required to be on site:

	Fire extinguisher	√	First aid kit	√	Flashlight
	Air horn/Signaling device	√	Cellular phone		Duct tape
	Ladder	√	Barricade tape		Drum dolly
	Personal flotation devices	√	Safety cones		Harness/Lanyard
	Other, specify:				

5.4 Site Security & Work Area Controls

Access to each contaminated work area will be controlled during on-site activities as follows:

Access onto the property is generally restricted by fences and posted signs.

Exterior Locations- the area adjacent to the drilling rig (within 25 feet) will be designated as the work area and cones, safety barriers, caution tape or similar means will be used to identify.

Can **site access** be controlled by a perimeter fence or similar means? Y _x _ N ___
(security - see above)
If not, how will the site/work area be controlled during non-work hours to prevent access by unauthorized persons?

Equipment and tools will be locked down during non-work hours while working at exterior locations.

6.0 MONITORING PLAN AND EQUIPMENT

Is air/**exposure monitoring** required at this work site for personal protection? Y _X_ N __

Is **perimeter monitoring** required for community protection? Y __ N _X_
(see below)

Monitoring/Screening equipment required to be on site:

	HNu analyzer (PID)		10.2e V		11.7eV		Combustible Gas Indicator (CGI) (LEL)
	Organic vapor monitor (FID)						Multiple Gas Detector - LEL/O_2/H_2S/CO
X	Photovac Micro Tip, 10.6eV, Mini Rae 2000						Dust/Aerosol/Fiber count monitor
	Photovac GC						Colorimetric tubes; Specify:
	Other:						

Standard action levels and required responses for readings obtained with a multiple gas detector or an individual monitoring instrument are listed below. Do not deviate from these guidelines unless granted specific approval from the Corporate Health and Safety Manager.

Instrument	**Normal**	**Operating levels**	**Action levels – required responses**
Oxygen Meter	20.9%	Between 19.5-23.5%	Below 19.5 %: leave area, requires supplied air Above 23.5%: leave area, fire hazard
CGI	0%	Less than 10%	Greater than 10%: fire/explosion hazard; cease work
Hydrogen Sulfide	0%	Less than 10 ppm.	Greater than 15 ppm (or 10 ppm for 8 hrs) requires supplied air respirator (SAR)
Carbon Monoxide	0%	Less than 25 ppm	Greater than 200 ppm for 1 hour or 25 ppm for 8 hrs requires SAR

Description of Monitoring Requirements (include frequency and location by Task):

Monitoring Plan for Task Number(s):		Frequency:		times per	

1,2 1 15 minutes

#1,2 – All activities if VOCs are encountered in BZ, increase monitoring to continuous and begin perimeter monitoring of work area to ensure elevated levels (see action levels) are not exceeded. If action levels are exceeded, stop work and evaluate further (install engineering controls to mitigate vapors or upgrade PPE) & continue perimeter monitoring until levels fall below detectable levels or work is completed.

In accordance with NYSDOH generic CAM guidance, if VOC levels are measured at a concentration greater than 5 ppm above background and are sustained for 5 minutes, a CAM program will be implemented during supplemental investigation activities, as described in the attached generic CAM plan.

COMMUNITY AIR MONITORING PLAN

In the event that total organic vapor readings in the work area breathing zone exceed 5 ppm above background, real-time air monitoring for volatile compounds at the exclusion zone perimeter will be required. If total organic vapor levels exceed 5 ppm above background at the exclusion zone perimeter, work will be halted and monitoring will be continued under the provisions of a Minor Vapor Emission Response Plan, as described below. All readings must be recorded and be available for NYSDEC and NYSDOH personnel to review.

Minor Vapor Emissions Response Plan

If the ambient concentration of organic vapors exceeds 5 ppm at the work area perimeter, work will be halted and monitoring will continue. If the vapor levels decrease below 5 ppm above background, work activities can resume. If the organic vapor levels are greater than 5 ppm but less than 25 ppm over background at the work area perimeter, work activities can resume provided:

1. The organic vapor level 200 ft downwind of the work area or one-half the distance to the nearest residential or commercial structure, whichever is less, is below 5 ppm over background; AND
2. The benzene and vinyl chloride levels (as measured with a Draeger tube) at the work area perimeter are less than 0.5 ppm; AND
3. More frequent intervals of monitoring, as directed by the safety officer, are conducted.

If the total organic vapor level is above 25 ppm, or the benzene or vinyl chloride level is over 0.5 ppm at the work area perimeter, work must be stopped. Downwind monitoring will be continued to minimize the potential impact to the nearest residential/commercial structure, at the levels specified in the Major Vapor Emissions Response Plan described below.

Major Vapor Emissions Response Plan

If the total organic vapor levels measured 200 ft downwind of the work area, or one-half the distance to the nearest downwind residential or commercial structure (whichever is less), is more than 5 ppm over background, air monitoring must be performed within 20 ft of these structures (“20-ft Zone”).

All active operations at the site shall stop and remain down if any of the following vapor levels are observed within the 20-ft Zone:

1. Total organic vapors at 5 ppm or greater over background; OR
2. Benzene or vinyl chloride levels greater than 0.5 ppm.

If, following cessation of work activities, efforts to abate the emission source are unsuccessful (engineering controls, etc.) and any of the above levels persist for more than 30 minutes in the 20-ft Zone, the Major Vapor Emissions Response Plan (MVERP) shall be placed into effect. In addition, any of the following **within the 20-ft Zone** will necessitate activation of the MVERP:

- Organic vapor levels greater than 50 ppm over background
  Benzene or vinyl chloride levels greater than 0.5 ppm.

Major Vapor Emissions Response Plan Activation

Upon MVERP activation, the following activities will be undertaken:

1. The site safety officer will be notified, all Emergency Response Contacts listed in the Health & Safety Plan will be contacted, including local police authorities; AND
2. Frequent air monitoring will be conducted at 30-minute intervals within the 20-ft Zone. If two successive readings below action levels are measured, air monitoring may be halted or modified by the safety officer.

All appropriate personnel will be briefed with regard to the details of the Minor and Major Vapor Emissions Response Plans, including anticipated hazards, safety practices, emergency procedures, and communication pathways prior to initiating work.

It is anticipated that dust control measures will be employed during the Supplemental Investigation, including the slab and utility removal activities, thereby eliminating the need for perimeter dust monitoring unless those control measures are ineffective at reducing fugitive dust on the site. Perimeter dust monitoring will be implemented during those activities only if the dust control measures are not effective at preventing fugitive dust.

Notes: 1. Exposure Guidelines for common contaminants are listed in **Table 1 (attached)**.
2. Requirements for PPE upgrades based on monitoring are in **Table 2 (attached)**.

7.0 DECONTAMINATION

7.1 Personnel Decontamination

Are **decontamination procedures** required for personnel working on site? Y _X__ N ___
If yes, describe steps:

1. Remove any PPE and contain in plastic bag prior to leaving work area, in following order: boots, gloves.

2. Decontaminate any personal equipment which is not disposable with alconox wash and water rinse.

3. Dispose of PPE at appropriate location at site (ie, solid waste dumpster) in the following order: disposable boots; outer gloves; Inner gloves.

Location of decontamination station: At the work area boundary next to drilling or sampling equipment.

Disposal of PPE: At site with solid waste or as appropriate waste stream at site.

7.2 Tools & Equipment Decontamination

Check all **equipment and materials needed for decontamination** of tools and other equipment:

	Acetone		Distilled water		Poly sheeting
√	Alconox soap	√	Drums for water	√	Steam cleaner
√	Brushes		Hexane	√	Tap water
	Disposal bags		Methanol	√	Washtubs
	Other, specify:				

Outline the **equipment decontamination procedures** for this project:

1. Decontamination of drilling equipment and tools with steam cleaner.

2. Decontaminate smaller tools or sampling equipment at each work area using alconox wash and water rinse (ie, buckets, wash tubs, etc)

Disposal methods for contaminated decontamination materials (e.g., wash water, rags, brushes, poly sheeting) will consist of:

The solid waste materials will be managed with the solid waste disposed off-site. Decon water will be disposed onsite unless water is identified to be contaminated (we do not currently anticipate the water will be contaminated during the decon process, as only low-level VOCs have been previously identified at the site) in which case it will be contained.

8.0 CONTINGENCY PLAN

EMERGENCY RESPONSE RESOURCES

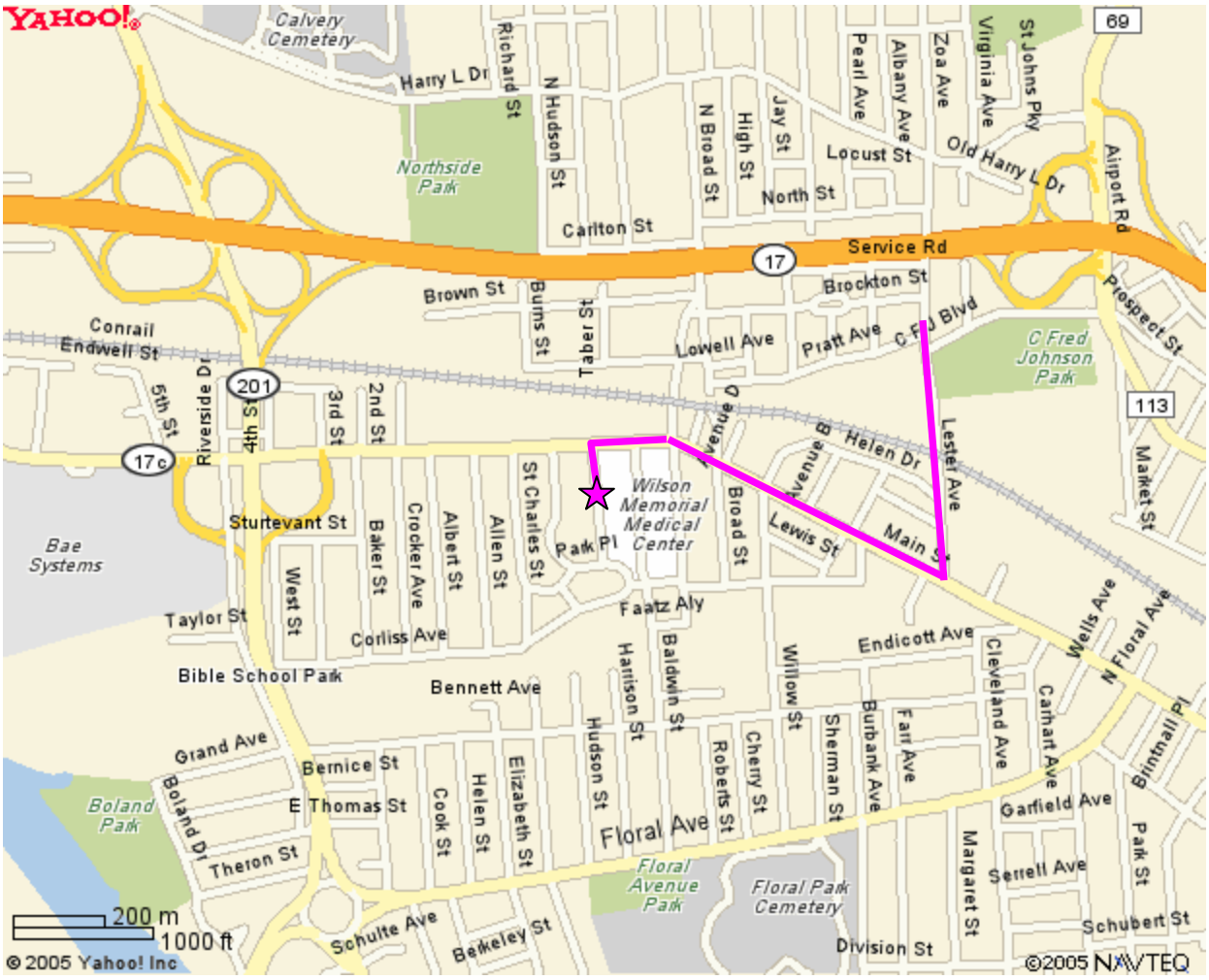
Nearest Hospital: (see attached map) Address: Phone Number:	Wilson Memorial Regional Medical Center 33-57 Harrison Street Johnson City, NY 13790 607-762-2494
Emergency Response Number:	**911**
Local Emergency Response Number (if not on 911 system):	911
Other Ambulance, Fire, Police, or Environmental Emergency Resources:	911
Occupational Health Physician: Address: Phone Number: Emergency Phone Number:	Strong Occupational Health Center 601 Elmwood Avenue Rochester, New York 14624 585-275-9192 585-275-9192
Haley & Aldrich Project Manager: Phone Number: Cell Phone Number: Emergency Phone Number: Client Contact/Project Manager: Phone Number: Emergency Phone Number:	Lisa Turturro 585-321-4237 585-370-3087 Office Main No. 716-359-9000 or Cell No.
Other Entity: Address: Phone Number:	

Evacuation alarms and/or emergency information be communicated among personnel on site by the following means: _X_ Verbal communication. If communication will be by other means, describe:

Emergency services will be summoned: __X_ Via on-site phone or on-site cell phone. If contact will be by other means, describe:

The **site evacuation plan** is as follows: For exterior work, move to fence gates and through egress routes to an offsite location.

Wilson Memorial Regional Medical Center
33-57 Harrison St.
Johnson City, NY 13790
Phone: (607) 762-2494



Directions:
1. Start on **Lester Ave** going toward **Helen Dr. (0.3 mi)**
2. Turn **Right** on **Main St. [Rt-17C] (0.5 mi)**
3. Turn **Left** on **Harrison St. (0.1 mi)**
4. Arrive at **Wilson Memorial Regional Medical Center** on the **Left**

(paste map showing route to hospital here)

Wilson Memorial Regional Medica
33-57 Harrison St, Johnson City, NY 13790
Phone: (607)762-2494

Driving directions

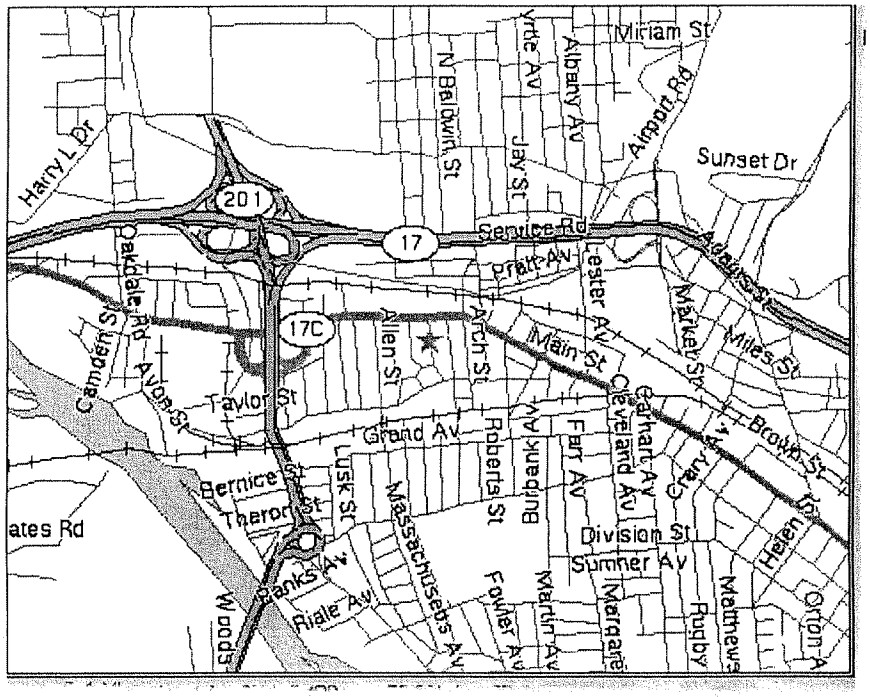


TABLE 1
HAZARD MONITORING

(CIRCLE CONTAMINANTS OF CONCERN, WRITE ADDITIONAL CONTAMINANTS AND EXPOSURE ON LAST PAGE)

CONTAMINANTS OF CONCERN	ROUTES OF EXPOSURE	IDLH	PEL	TLV	PID (IP eV)	FID	ODOR THRES-HOLD	IRRITATION THRESHOLD	ODOR DESCRIPTION
Acetone	R, I, C	2500	1000	500 Cv 750	9.69	60	13	--	Chem, sweet, pungent
Ammonia	R, A, I, C	300	50	25 Cv 35	--	--	0.5-2	10	Pungent suffocating odor
Benzene	R,A,I,C	Ca	1	Sk 0.5	9.25	150	4.68	--	Solvent
Carbon tetrachloride (Tetrachlormethane)	R,A,I,C	Ca	2 Cv25 200: 5 min peak	Sk 5 Cv 10	11.47**	10	50	--	Sweet, pungent
Chlorobenzene	R,I,C	1000	75	10	9.07	200	0.68	--	Almond like
Chloroform	R,I,C	Ca	2	10	11.42**	65	50	--	Sweet
Cyanides (CN salts)	R,A,I,C	50 mg/m^3	5 mg/m^3	Sk Cv 5 mg/m^3	--	--	--	--	Faint almond odor
o-Dichlorobenzene	R,A,I,C	200	Cv 50	25 Cv 50	9.06	50	0.3	E 20-30	Pleasant, aromatic
p-Dichlorobenzene	R,I,C	150	Cv 75	10	8.94	--	0.18	E 80-160	Distinct, aromatic mothball-like
Dichlorodifluoromethane (Freon 12)	R,C	1500	1000	1000	11.97**	15	--	--	--
1,1-Dichloroethane	R,I,C	3000	100	100	--	80	200	--	Distinct
1,2-Dichloroethane	R,I,A,C	Ca	Cv 100 50	10	11.12**	80	88	--	Chloroform
1,1-Dichloroethylene (Vinylidene chloride, 1,1-DCE	R,I	Ca	--	5 Cv 20	*	40	190	--	--
1,2-Dichloroethylene	R,I,C	1000	200	200	9.65	50	0.85	--	Ether-like acrid
Ethanol	R,A,I,C	--	1000	1000	10.48**	25	10	--	Sweet
Ethylbenzene	R,I,C	800	100	Cv 125 100	8.76	100	2.3	E 200	Aromatic
Ethylene Glycol vapor	R,A,I,C	--	100 mg/m^3	-	--	--	--	--	--
Formaldehyde	I,C	Ca	0.75	Cv 0.3	10.88**	--	0.83	--	Hay
Gasoline	R,I,C	Ca	--	300	--	--	--	E 0.5	Petroleum
Hexane, n-isomer	R,I,C	--	500	50	10.18	70	130	E.T 1400-1500	Mild, gasoline-like
Hydrogen Cyanide (as CN)	R,A,I,C	50	10	Sk Cv-4.7	**	--	0.58	--	Bitter almond
Hydrogen peroxide	R,I,C	75	1	1	11**	--	--	--	Shar[
Methanol	R,I,C	25000	Sk 200	Sk 200	10.84**	12	1000	--	Sweet
MEK peroxide	R,I,C	--	Cv 0.7	Cv 0.2	--	--	--	--	--
Methyl Chloroform (1,1,1-TCA)	R,I,C	700	350	350	**	105	20-100	--	Chloroform-like
Methylene Chloride (Dichloromethane, Methylene dichloride)	R,I,C	Ca	25	50	11.35**	100	25-50	E 5000	Ether-like
Methyl Mercaptan	R,C	150	Cv 10	0.5	9.44	--	--	--	Garlic, Rotten Cabbage
MIBK (Hexone)	R,I,C	500	100	50 Cv 75	--	--	--	--	Pleasant
Naptha (coal tar)	R,I,C	1000	100	400	--	--	--	--	Aromatic
Naphthalene	R,A,I,C	250	10	10	8.14	--	0.3	E 15	Mothball-like
Octane	R,I,C	750	500	300 Cv 375	9.9	80	48	--	Gasoline-like
Pentachlorophenol	R,A,I,C	Ca 2.5 mg/m^3	0.5 mg/m^3 Sk	Sk 0.5 mg/m^3	--	--	--	--	Pungent when hot
Phenol	R,A,I,C	250	Sk 5	Sk 5	8.5	--	0.04	E.N.T. 68	Medicinal
Propane	R,C	2100	1000	2500	10.95**	80	1600	--	Natural gas odor

TABLE 1
HAZARD MONITORING

(CIRCLE CONTAMINANTS OF CONCERN, WRITE ADDITIONAL CONTAMINANTS AND EXPOSURE ON LAST PAGE)

CONTAMINANTS OF CONCERN	ROUTES OF EXPOSURE	IDLH	PEL	TLV	PID (IP eV)	FID	ODOR THRES-HOLD	IRRITATION THRESHOLD	ODOR DESCRIPTION
Stoddard Solvent (Mineral Sprits	R,CI,I	20000 mg/m^3	500	100	*	--	1	E 400	Kerosene-like
1,1,2,2-Tetrachloroethane	R,A,I,C	Ca (100)	Sk 5	1	11.1**	100	1.5	--	--
Tetrachloroethylene (Perchloroethylene)	R,I,C	Ca	100	25	9.32	70	4.68	N.T513-690	Ether, chloroform-like
Toluene	R,A,I,C	500	200	50	8.82	110	2.14	E300-400	Mothball-like
Trichloroethylene	R,I,C	Ca (1000)	100	50	9.47	70	21.4	--	Solvent, chloroform-like
Turpentine	R,A,I,C	800	100	100	--	--	200	E.N 200	Pine-like
Vinyl Chloride	R	Ca	1	2	9.995	--	3000	--	Ethereal
Xylenes	R,A,I,C	1000	100	100	8.56/8.44	111/116	1.1	E.N.T. 200	Aromatic
DUSTS, MISTS AND MISCELLANEOUS COMPOUNDS									
Asbestos	R	Ca	0.1 fibr/cc	Species dependent	--	--	--	--	--
PCBs-42% Chlorine	R,A,I,C	Ca	1 mg/m^3 Sk	1 mg/m^3 Sk	--	--	--	--	Mild, hydrocarbon
PCBs-54% Chlorine	R,A,I,C	Ca	0.5 mg/m^3 Sk	0.5 mg/m^3 Sk	--	--	--	--	Mild, hydrocarbon
Styrene	R,I,C	700	100	20	8.47	85	0.047	E 200-400	Rubber, solvent
Aluminum- metal dust- total	R,I,C	--	15 mg/m^3	10 mg/m^3	--	--	--	--	--
-soluble salts	R,I,C	--	2 mg/m^3	2 mg/m^3	--	--	--	--	--
Arsenic- inorganic	R,A,I,C	Ca	0.01 mg/m^3	0.2 mg/m^3	--	--	--	--	--
Barium:soluble compounds	R,I,C	250 mg/m^3	0.5 mg/m^3	0.5 mg/m^3	--	--	--	--	--
Cadmium dusts	R,I	Ca	0.005 mg/m^3	0.01 mg/m^3	--	--	--	--	--
Chromium: Species Dependent (Hexavalent)	R,I,A,C	25 mg/m^3	Spec Dep hex- (.5mg/m^3)	Spec Dep	--	--	--	--	--
Copper - dust & mist	R,I,C	--	1 mg/m^3	1 mg/m^3	--	--	--	--	--
Lead - arsenate	R,I,C	Ca	0.05 mg/m^3	0.15 mg/m^3	--	--	--	--	--
- inorg. dust & fume	R,I,C	--	0.5 mg/m^3	0.15 mg/m^3	--	--	--	--	--
- chromate	R,I,C	--	--	0.05 mg/m^3	--	--	--	--	--
Manganese & compounds	R,I	500 mg/m^3	Cv-5 mg/m^3	0.2 mg/m^3	--	--	--	--	--
Mercury & inorg. comp.	R,A,C	10 mg/m^3	Cv0.1 mg/m^3	0.1 mg/m^3	--	--	--	--	--
- (organo) alkyl comp.	R,A,I,C	2 mg/m^3	0.01 mg/m^3	0.1 mg/m^3	--	--	--	--	--
Nickel - metal, insoluble	R,I,C	Ca	1 mg/m^3	1 mg/m^3	--	--	--	--	--
- soluble comp.	R,I,C	Ca	0.1 mg/m^3	0.1 mg/m^3	--	--	--	--	--
Nuisance Dust			5mg/m^3(Resp) 15mg/m^3(total)						
Portland cement	R,I,C	--	15 mg/m^3	10 mg/m^3	--	--	--	--	--
Selenium compounds	R,A,I,C	100 mg/m^3	0.2 mg/m^3	0.2 mg/m^3	--	--	--	--	--
Silver - metal	R,I,C	--	0.01 mg/m^3	0.1 mg/m^3	--	--	--	--	--
- soluble comp.	R,I,C	--	--	0.1 mg/m^3	--	--	--	--	--
Thallium, soluble	R,A,I,C	20 mg/m^3	0.1 mg/m^3 Sk	0.1 mg/m^3 Sk	--	--	--	--	--
Tin, metal & inorganic	R,C	400 mg/m^3	2 mg/m^3	2	--	--	--	--	--
Comp. except oxides									
Tin, organic compounds	R,A,I,C	200 mg/m^3	0.1 mg/m^3	0.1 mg/m^3 Sk	--	--	--	--	--
Zinc chromates, as Cr	R,I,C	--	Cv 0.1 mg/m^3	Cv 0.1 mg/m^3	--	--	--	--	--
Zinc oxide dust (total)	R,I,C	--	15 mg/m^3	10 mg/m^3	--	--	--	--	--

TABLE 1
HAZARD MONITORING

(CIRCLE CONTAMINANTS OF CONCERN, WRITE ADDITIONAL CONTAMINANTS AND EXPOSURE ON LAST PAGE)

CONTAMINANTS OF CONCERN	ROUTES OF EXPOSURE	IDLH	PEL	TLV	PID (IP eV)	FID	ODOR THRES-HOLD	IRRITATION THRESHOLD	ODOR DESCRIPTION

Notes: All units in ppm unless otherwise noted.

R = Respiratory (Inhalation) I = Ingestion A = Skin Absorption C = Skin and/or Eye Contact

Cv = Ceiling value Ca = Carcinogen Sk = Skin

** = Use 11.7 eV lamp

TABLE 2
Last Revised September 2002

MONITORING METHOD, ACTION LEVELS AND PROTECTIVE MEASURES

INSTRUMENT	HAZARD	ACTION LEVEL	ACTION RESPONSE
Respirable Dust Monitor	Total Particulates	> 5 mg/m^3	Upgrade to Level C Protection
OVA, HNU[2], Photovac Microtip	Total Organic Vapors	Background	Level D Protection
		10 ppm > background or lowest OSHA permissible exposure limit, whichever is lower, or as modified for this task. Sustained for >5 minutes in the breathing zone.	Upgrade to Level C - site evacuation may be necessary for specific compounds
		50 ppm over background, unless lower values required due to respirator protection factors	Cease work; upgrade to Level B[3] may be required
Explosimeter[4] (LEL)	Flammable/Explosive Atmosphere	<10% Scale Reading	Proceed with work
		10-15% Scale Reading	Monitor with extreme caution
		>15% Scale Reading	Evacuate site
0xygen Meter[5]	Oxygen-Deficient Atmosphere	19.5% - 23.5% 0_2	Normal - Continue work
		< 19.5% 0_2	Evacuate site; oxygen deficient
		> 23.5% 0_2	Evacuate site; fire hazard
Radiation Meter[6]	Ionizing Radiation	0.1 Millirem/Hour	If > 0.1, radiation sources may be present[7]
		> 1 Millirem/Hour	Evacuate site; radiation hazard
Drager Tubes	Vapors/Gases	Species Dependent > 1 ppm vinyl chloride > 1 ppm benzene > 1 ppm 1,1-DCE	Consult Table 1 or other resources for concentration toxicity/detection data. Upgrade to Level C if concentration of compounds exceed thresholds shown at left; May need to cease work if other levels exceeded - site specific
Gas Chromatograph (GC)	Organic Vapors	3 ppm total OV > background or > lowest specific OSHA permissible exposure limit, whichever is lower	On-site monitoring or tedlar bag sample collection for off-site/laboratory analysis

Notes:
1. Monitor breathing zone.
2. Can also be used to monitor some inorganic species.
3. Positive pressure demand self contained breathing apparatus
4. Lower explosive limit (LEL) scale is 0-100%. LEL for most gasses is 15%.
5. Normal atmospheric oxygen concentration at sea level is 20%
6. Background gamma radiation is ~0.01-0.02 millirems/hour.
7. Contact H&A Health and Safety staff immediately.

New York State Department of Health
Generic Community Air Monitoring Plan

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

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

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

Community Air Monitoring Plan

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

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

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. "Periodic" monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

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

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

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

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

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

Particulate Monitoring, Response Levels, and Actions

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

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

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

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

TABLE 1
HAZARD MONITORING

(CIRCLE CONTAMINANTS OF CONCERN, WRITE ADDITIONAL CONTAMINANTS AND EXPOSURE ON LAST PAGE)

CONTAMINANTS OF CONCERN	ROUTES OF EXPOSURE	IDLH	PEL	TLV	PID (IP eV)	FID	ODOR THRES-HOLD	IRRITATION THRESHOLD	ODOR DESCRIPTION
Acetone	R, I, C	2500	1000	500 Cv 750	9.69	60	13	--	Chem, sweet, pungent
Ammonia	R, A, I, C	300	50	25 Cv 35	--	--	0.5-2	10	Pungent suffocating odor
Benzene	R,A,I,C	Ca	1	Sk 0.5	9.25	150	4.68	--	Solvent
Carbon tetrachloride (Tetrachlormethane)	R,A,I,C	Ca	2 Cv25 200: 5 min peak	Sk 5 Cv 10	11.47**	10	50	--	Sweet, pungent
Chlorobenzene	R,I,C	1000	75	10	9.07	200	0.68	--	Almond like
Chloroform	R,I,C	Ca	2	10	11.42**	65	50	--	Sweet
Cyanides (CN salts)	R,A,I,C	50 mg/m^3	5 mg/m^3	Sk Cv 5 mg/m^3	--	--	--	--	Faint almond odor
o-Dichlorobenzene	R,A,I,C	200	Cv 50	25 Cv 50	9.06	50	0.3	E 20-30	Pleasant, aromatic
p-Dichlorobenzene	R,I,C	150	Cv 75	10	8.94	--	0.18	E 80-160	Distinct, aromatic mothball-like
Dichlorodifluoromethane (Freon 12)	R,C	1500	1000	1000	11.97**	15	--	--	--
1,1-Dichloroethane	R,I,C	3000	100	100	--	80	200	--	Distinct
1,2-Dichloroethane	R,I,A,C	Ca	Cv 100 50	10	11.12**	80	88	--	Chloroform
1,1-Dichloroethylene (Vinylidene chloride, 1,1-DCE	R,I	Ca	--	5 Cv 20	*	40	190	--	--
1,2-Dichloroethylene	R,I,C	1000	200	200	9.65	50	0.85	--	Ether-like acrid
Ethanol	R,A,I,C	--	1000	1000	10.48**	25	10	--	Sweet
Ethylbenzene	R,I,C	800	100	Cv 125 100	8.76	100	2.3	E 200	Aromatic
Ethylene Glycol vapor	R,A,I,C	--	100 mg/m^3	-	--	--	--	--	--
Formaldehyde	I,C	Ca	0.75	Cv 0.3	10.88**	--	0.83	--	Hay
Gasoline	R,I,C	Ca	--	300	--	--	--	E 0.5	Petroleum
Hexane, n-isomer	R,I,C	--	500	50	10.18	70	130	E.T 1400-1500	Mild, gasoline-like
Hydrogen Cyanide (as CN)	R,A,I,C	50	10	Sk Cv-4.7	**	--	0.58	--	Bitter almond
Hydrogen peroxide	R,I,C	75	1	1	11**	--	--	--	Shar[
Methanol	R,I,C	25000	Sk 200	Sk 200	10.84**	12	1000	--	Sweet
MEK peroxide	R,I,C	--	Cv 0.7	Cv 0.2	--	--	--	--	--
Methyl Chloroform (1,1,1-TCA)	R,I,C	700	350	350	**	105	20-100	--	Chloroform-like
Methylene Chloride (Dichloromethane, Methylene dichloride)	R,I,C	Ca	25	50	11.35**	100	25-50	E 5000	Ether-like
Methyl Mercaptan	R,C	150	Cv 10	0.5	9.44	--	--	--	Garlic, Rotten Cabbage
MIBK (Hexone)	R,I,C	500	100	50 Cv 75	--	--	--	--	Pleasant
Naptha (coal tar)	R,I,C	1000	100	400	--	--	--	--	Aromatic
Naphthalene	R,A,I,C	250	10	10	8.14	--	0.3	E 15	Mothball-like
Octane	R,I,C	750	500	300 Cv 375	9.9	80	48	--	Gasoline-like
Pentachlorophenol	R,A,I,C	Ca 2.5 mg/m^3	0.5 mg/m^3 Sk	Sk 0.5 mg/m^3	--	--	--	--	Pungent when hot
Phenol	R,A,I,C	250	Sk 5	Sk 5	8.5	--	0.04	E.N.T. 68	Medicinal

TABLE 1
HAZARD MONITORING

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CONTAMINANTS OF CONCERN	ROUTES OF EXPOSURE	IDLH	PEL	TLV	PID (IP eV)	FID	ODOR THRES-HOLD	IRRITATION THRESHOLD	ODOR DESCRIPTION
Propane	R,C	2100	1000	2500	10.95**	80	1600	--	Natural gas odor
Stoddard Solvent (Mineral Sprits	R,CI,I	20000 mg/m^3	500	100	*	--	1	E 400	Kerosene-like
1,1,2,2-Tetrachloroethane	R,A,I,C	Ca (100)	Sk 5	1	11.1**	100	1.5	--	--
Tetrachloroethylene (Perchloroethylene)	R,I,C	Ca	100	25	9.32	70	4.68	N.T513-690	Ether, chloroform-like
Toluene	R,A,I,C	500	200	50	8.82	110	2.14	E300-400	Mothball-like
Trichloroethylene	R,I,C	Ca (1000)	100	50	9.47	70	21.4	--	Solventy, chloroform-like
Turpentine	R,A,I,C	800	100	100	--	--	200	E.N 200	Pine-like
Vinyl Chloride	R	Ca	1	2	9.995	--	3000	--	Ethereal
Xylenes	R,A,I,C	1000	100	100	8.56/8.44	111/116	1.1	E.N.T. 200	Aromatic
DUSTS, MISTS AND MISCELLANEOUS COMPOUNDS									
Asbestos	R	Ca	0.1 fibr/cc	Species dependent	--	--	--	--	--
PCBs-42% Chlorine	R,A,I,C	Ca	1 mg/m^3 Sk	1 mg/m^3 Sk	--	--	--	--	Mild, hydrocarbon
PCBs-54% Chlorine	R,A,I,C	Ca	0.5 mg/m^3 Sk	0.5 mg/m^3 Sk	--	--	--	--	Mild, hydrocarbon
Styrene	R,I,C	700	100	20	8.47	85	0.047	E 200-400	Rubber, solvent
Aluminum- metal dust- total	R,I,C	--	15 mg/m^3	10 mg/m^3	--	--	--	--	--
-soluble salts	R,I,C	--	2 mg/m^3	2 mg/m^3	--	--	--	--	--
Arsenic- inorganic	R,A,I,C	Ca	0.01 mg/m^3	0.2 mg/m^3	--	--	--	--	--
Barium:soluble compounds	R,I,C	250 mg/m^3	0.5 mg/m^3	0.5 mg/m^3	--	--	--	--	--
Cadmium dusts	R,I	Ca	0.005 mg/m^3	0.01 mg/m^3	--	--	--	--	--
Chromium: Species Dependent (Hexavalent)	R,I,A,C	25 mg/m^3	Spec Dep hex- (.5mg/m^3)	Spec Dep	--	--	--	--	--
Copper - dust & mist	R,I,C	--	1 mg/m^3	1 mg/m^3	--	--	--	--	--
Lead - arsenate	R,I,C	Ca	0.05 mg/m^3	0.15 mg/m^3	--	--	--	--	--
- inorg. dust & fume	R,I,C	--	0.5 mg/m^3	0.15 mg/m^3	--	--	--	--	--
- chromate	R,I,C	--	--	0.05 mg/m^3	--	--	--	--	--
Manganese & compounds	R,I	500 mg/m^3	Cv-5 mg/m^3	0.2 mg/m^3	--	--	--	--	--
Mercury & inorg. comp.	R,A,C	10 mg/m^3	Cv0.1 mg/m^3	0.1 mg/m^3	--	--	--	--	--
- (organo) alkyl comp.	R,A,I,C	2 mg/m^3	0.01 mg/m^3	0.1 mg/m^3	--	--	--	--	--
Nickel - metal, insoluble	R,I,C	Ca	1 mg/m^3	1 mg/m^3	--	--	--	--	--
- soluble comp.	R,I,C	Ca	0.1 mg/m^3	0.1 mg/m^3	--	--	--	--	--
Nuisance Dust			5mg/m^3(Resp) 15mg/m^3(total)						
Portland cement	R,I,C	--	15 mg/m^3	10 mg/m^3	--	--	--	--	--
Selenium compounds	R,A,I,C	100 mg/m^3	0.2 mg/m^3	0.2 mg/m^3	--	--	--	--	--
Silver - metal	R,I,C	--	0.01 mg/m^3	0.1 mg/m^3	--	--	--	--	--
- soluble comp.	R,I,C	--	--	0.1 mg/m^3	--	--	--	--	--
Thallium, soluble	R,A,I,C	20 mg/m^3	0.1 mg/m^3 Sk	0.1 mg/m^3 Sk	--	--	--	--	--
Tin, metal & inorganic	R,C	400 mg/m^3	2 mg/m^3	2	--	--	--	--	--
Comp. except oxides									
Tin, organic compounds	R,A,I,C	200 mg/m^3	0.1 mg/m^3	0.1 mg/m^3 Sk	--	--	--	--	--
Zinc chromates, as Cr	R,I,C	--	Cv 0.1 mg/m^3	Cv 0.1 mg/m^3	--	--	--	--	--

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HAZARD MONITORING

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CONTAMINANTS OF CONCERN	ROUTES OF EXPOSURE	IDLH	PEL	TLV	PID (IP eV)	FID	ODOR THRES-HOLD	IRRITATION THRESHOLD	ODOR DESCRIPTION
Zinc oxide dust (total)	R,I,C	--	15 mg/m^3	10 mg/m^3	--	--	--	--	--

Notes: All units in ppm unless otherwise noted.

R = Respiratory (Inhalation) I = Ingestion A = Skin Absorption C = Skin and/or Eye Contact

Cv = Ceiling value Ca = Carcinogen Sk = Skin

** = Use 11.7 eV lamp

TABLE 2
Last Revised September 2002

MONITORING METHOD, ACTION LEVELS AND PROTECTIVE MEASURES

INSTRUMENT	HAZARD	ACTION LEVEL	ACTION RESPONSE
Respirable Dust Monitor	Total Particulates	> 5 mg/m^3	Upgrade to Level C Protection
OVA, HNU[2], Photovac Microtip	Total Organic Vapors	Background	Level D Protection
		10 ppm > background or lowest OSHA permissible exposure limit, whichever is lower, or as modified for this task. Sustained for >5 minutes in the breathing zone.	Upgrade to Level C - site evacuation may be necessary for specific compounds
		50 ppm over background, unless lower values required due to respirator protection factors	Cease work; upgrade to Level B[3] may be required
Explosimeter[4] (LEL)	Flammable/Explosive Atmosphere	<10% Scale Reading	Proceed with work
		10-15% Scale Reading	Monitor with extreme caution
		>15% Scale Reading	Evacuate site
0xygen Meter[5]	Oxygen-Deficient Atmosphere	19.5% - 23.5% 0_2	Normal - Continue work
		< 19.5% 0_2	Evacuate site; oxygen deficient
		> 23.5% 0_2	Evacuate site; fire hazard
Radiation Meter[6]	Ionizing Radiation	0.1 Millirem/Hour	If > 0.1, radiation sources may be present[7]
		> 1 Millirem/Hour	Evacuate site; radiation hazard
Drager Tubes	Vapors/Gases	Species Dependent > 1 ppm vinyl chloride > 1 ppm benzene > 1 ppm 1,1-DCE	Consult Table 1 or other resources for concentration toxicity/detection data. Upgrade to Level C if concentration of compounds exceed thresholds shown at left; May need to cease work if other levels exceeded - site specific
Gas Chromatograph (GC)	Organic Vapors	3 ppm total OV > background or > lowest specific OSHA permissible exposure limit, whichever is lower	On-site monitoring or tedlar bag sample collection for off-site/laboratory analysis

Notes:

1. Monitor breathing zone.
2. Can also be used to monitor some inorganic species.
3. Positive pressure demand self contained breathing apparatus
4. Lower explosive limit (LEL) scale is 0-100%. LEL for most gasses is 15%.
5. Normal atmospheric oxygen concentration at sea level is 20%
6. Background gamma radiation is ~0.01-0.02 millirems/hour.
7. Contact H&A Health and Safety staff immediately.