

INTERIM REMEDIAL MEASURE WORK PLAN

TRACT I SITE
3123 HIGHLAND AVENUE
NIAGARA FALLS, NIAGARA COUNTY, NEW YORK
SITE NO. 932131

SUBMITTED TO:

THE NEW YORK STATE DEPARTMENT
OF ENVIRONMENTAL CONSERVATION
DIVISION OF HAZARDOUS WASTE REMEDIATION

Prepared for:



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Prepared by



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Project 3410110832
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Robert E. Crowley
Senior Principal Scientist

I certify that I am currently a New York State registered professional engineer and
that this Interim Remedial Measure Work Plan was prepared in substantial
conformance with the DER Technical Guidance for Site Investigation and

Remediation (DER-10).



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ACRONYMS AND ABBREVIATIONS

NYS	New York State
P.E.	Professional Engineer
DER	Department of Environmental Resources
IRM	Interim Remedial Measure
WP	Work Plan
BCP	Brownfield Cleanup Program
NYSDEC	New York State Department of Environmental Conservation
ERP	Environmental Restoration Program
TCLP	Toxicity Characteristic Leaching Procedure
SCO	Soil Cleanup Objectives
mg/kg	Milligrams per kilogram
ROD	Record of Decision
mg/L	Milligrams per liter
USGS	United States Geological Survey
USEPA	United States Environmental Protection Agency
E&E	Ecology and Environment, Inc.
EA	EA Engineering, P.C.
PAH	Polycyclic aromatic hydrocarbon
SVOC	Semi volatile organic compound
TAL	Target Analyte List
VOC	Volatile organic compound
bgs	Below ground surface
PID	Photo Ionization Detector
XRF	X-ray fluorescence meter
SCGs	Standard, Criteria, and Guidance
CY	Cubic yards
PPE	Personal protective equipment
ACM	Asbestos Containing Material
BMP	Best management practice
SWPPP	Storm Water Pollution Prevention Plan
HASP	Health and Safety Plan
OSHA	Occupational Safety and Health Administration
CAMP	Community Air Monitoring Plan
SMP	Site Management Plan
FER	Final Engineering Report

EXECUTIVE SUMMARY

This Interim Remedial Measure (IRM) Work Plan (WP) presents a plan to design and execute an IRM at the Tract I Site (Site) located at 3123 Highland Avenue in

the city of Niagara Falls (City), Niagara County, New York. Brightfields, Inc. (Brightfields) has submitted an application under the New York State Brownfield Cleanup Program (BCP) concurrent with the submittal of this Work Plan. The New York State Department of Environmental Conservation (NYSDEC)



has been involved with the Tract I Site since 1998, initially working with the City of Niagara Falls under the Environmental Restoration Program (ERP). The remedial investigation of the Site was completed in three efforts in 1999, 2009, and 2011. Furthermore, the interior of the Power City Warehouse building was addressed in a Removal Action by the USEPA in 2009-2010. This WP addresses the outdoor areas of the Site, as well as the demolition of portions of the building.

The Site consists of approximately 5.9 acres of industrial property and has been vacant since the 1980s. It is owned by the City and approximately 55% of the Site is covered with structures. Immediately to the north of the Site is the Tulip Corporation property, which consists of approximately 5.7 acres located at 3125 Highland Avenue. To the south and east of the Site is the Tract II property (also owned by the City), which is approximately 18.5 acres in size. The western border of the Site is Highland Avenue. It is anticipated that the Tract I Site will be remediated and redeveloped in conjunction with similar work on the adjacent Tract II site.

The Highland Avenue community has a long history of activity to encourage and foster redevelopment of Tract II since the 1970s. New housing, called the Hope VI

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Project, has been constructed on the southern side of Beech Avenue. The Hope VI housing eliminated a park on Beech Avenue but only with the commitment of the City, that it would provide replacement park space on the Tract II Site. In order to support a viable redevelopment on the Tract II property, Brightfields has elected to enter the Tract I Site into the BCP, and remediate and redevelop it concurrent with the Tract II site. The potential future use of the Site is as an educational incubator for training the local work force. Building on past planning efforts and the City Draft Master Plan for the Highland Avenue area, this WP outlines a remedial approach that has been engineered to support a proposed redevelopment plan. The conceptual redevelopment plan has been discussed with the City, and the project team is in the process of gathering input from other stakeholders, particularly the community.

The combination of a remediation plan coupled with a viable redevelopment concept presents a unique opportunity to address legacy environmental issues with the Site and return an underutilized property back to productive use. This IRM WP includes input and analysis from a team of scientists, engineers, and urban planners, who have built upon past work, including the extensive planning efforts for the area.

Certain Site soils contain lead exceeding the Toxicity Characteristic Leaching Procedure (TCLP) standard as well as the potential Soil Cleanup Objectives (SCOs) for the Site. The SCOs are anticipated to be based on the redeveloped land use. Upon completion of the IRM the Site will meet the “Restricted Commercial” (lead SCO = 1,000 milligrams per kilogram [mg/kg]) standard. It is important to note that the Site Investigation Reports and the 2003 Record of Decision (ROD) for the Tract II site state that shallow groundwater is not used for potable or irrigation purposes and has not been impacted in the vicinity of the Site.

The IRM for the Site is excavation and off-Site disposal of soil exceeding the TCLP lead limit of 5 milligrams per liter (mg/L). Additionally, a demarcation layer and a minimum of six-inches of clean soil will be placed over the remaining soil exceeding the commercial standard of 1,000 mg/kg lead, and a portion of the Power City Warehouse Building will be demolished. The floor slab of the building will be left in place and covered, and/or new buildings constructed over it. The portion of the Power City Warehouse Building that remains standing will be reused.

1.0 INTRODUCTION

AMEC E&I, Inc. (Amec) has prepared this Interim Remedial Measure (IRM) Work Plan (WP) on behalf of Brightfields, Inc. (Brightfields) for the Tract I Site (Site) located at 3123 Highland Avenue, in the City of Niagara Falls (City), Niagara County, New York. Figure 1 shows the location of the Site on a United States Geological Survey (USGS) topographic map and Figure 2 shows the existing layout of the Site in plan view.

The Site is a former lead/acid battery manufacturing plant and has been the subject of site characterization by the New York State Department of Environmental Conservation (NYSDEC) and a Removal Action by the United States Environmental Protection Agency (USEPA) between 1999 and 2009. Adjacent to the Site to the south and east is the Tract II property, which is being remediated under the State of New York Inactive Hazardous Waste Site program.

The City has endeavored to redevelop both the Tract I and Tract II sites since closure of the industrial facilities in the early 1970's. In order to support a viable redevelopment on the Tract II property, Brightfields has elected to also remediate and redevelop the Tract I property. The Site will be remediated under the New York State Brownfield Cleanup Program (BCP), and the extensive Site characterization work which was completed under NYSDEC oversight in 1999, 2009, and 2011, meets the requirement for site characterization under the BCP. Brightfields is submitting the BCP application for the Site, in its capacity as a potential purchaser of the Site from the City, concurrent with this WP.

The purpose of this WP is to convey and document the process that will be used to prepare the IRM design for the Site, as well as identifying critical elements of implementing the IRM that need to be considered during the design phase. The IRM is intended to be the final Site remedy, foster Site redevelopment, and identify components of the redevelopment that may satisfy some of the remedial objectives.

1.1 SITE REDEVELOPMENT PLAN

The City and the local residents have endeavored to restore this Site to productive use since industrial activities ceased in the 1970s. A conceptual redevelopment plan is in the process of being prepared and requires input from stakeholders,

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particularly the community. The conceptual redevelopment plan is consistent with the City Master Plan for the Highland Avenue area and contemplates commercial use at the Site. The combination of a remediation plan that supports a viable redevelopment concept presents a unique opportunity to address legacy environmental issues with the Site and return an underutilized property back to productive use.

1.2 SITE LOCATION AND HISTORY

The Site is located in an industrial area of the City of Niagara Falls. The Site consists of approximately 5.9 acres located east of Highland Avenue, north and west

of the Tract II site, and south of the active Tulip Corporation property (Figure 2).



Site Layout on Aerial Photograph

The Site was first developed in approximately 1910 as the Power City Warehouse, a battery manufacturing facility for U.S. Light and Heat Co., and later Autolite Co. The facility was acquired by Prestolite Co. in

the 1960s for the manufacture of hard rubber battery cases, battery charging and filling. Battery manufacturing activities ceased in the 1970s and the Site was used as a warehouse and automotive body shop until the 1980s. By the late 1980s, the Site had been abandoned and various portions were in disrepair. At that time, the City acquired the property via tax foreclosure.

1.3 SITE REGULATORY HISTORY

The Site was originally being addressed by the City under the New York State Environmental Restoration Program (ERP), and was assigned the site number B00160. In May 1999, a remedial investigation was conducted on the Site by

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Ecology and Environment, Inc. (E&E) for the City under a grant from the NYSDEC. The results of the investigation were presented in a site investigation report prepared by E&E (E&E, 2000). In late 2007, the NYSDEC contracted EA Engineering, P.C. (EA), who performed an additional site characterization. The results of that investigation were presented in a report prepared by EA (EA, 2009). Because the Site was remediated under the ERP, the NYSDEC revised the designation of the Site as site number 932131.

In late 2009 and 2010, the USEPA conducted a Removal Action within the Power City Warehouse. These activities included fencing the Site, decontamination of the interior of the building, disposing of water in the building basement and removal of some asbestos from the Site.

1.4 IDENTIFICATION OF APPLICABLE STANDARDS, CRITERIA, AND GUIDELINES

To select the applicable Soil Cleanup Objectives (SCOs) for the Site, the end use of the Site needs to be considered. Potential redevelopment concepts for the Site include an education incubator and commercial facilities. Based on a conceptual redevelopment scenario that is consistent with the City's Master Plan, the western portion of Tract I could be designated as commercial space, the central and eastern portion of the Site could be designated as an adult education incubator, which would also be consistent with a commercial use scenario. In accordance with DER-10, the commercial lead SCO is 1,000 milligrams per kilogram (mg/kg). Note that if the Site were limited to only industrial uses, the lead SCO would be 3,900 mg/kg. Additionally, some of the lead concentrations exceed the Toxicity Characteristic Leaching Procedure (TCLP) standard of 5 milligrams per liter (mg/L) lead in the TCLP extract. Therefore, the 5 mg/L TCLP standard for lead will also be considered an SCO for the Site.

Summary of Lead SCOs

	Units	Commercial/ Industrial
TCLP Lead ⁽¹⁾	mg/L ⁽²⁾	5
Total Lead	mg/kg	1,000

Notes:

⁽¹⁾ "TCLP" indicates Toxicity Characteristic Leaching Procedure.

⁽²⁾ "mg/L" indicates milligrams per liter in TCLP extract.

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The objectives of the remedial measures at the Site will include reducing the lead concentration in the surface soil, and controlling potentially complete exposure pathways to soil containing lead exceeding the appropriate SCOs. Finally, although not necessarily an objective of the BCP program, the physical hazards associated with the dilapidated buildings will also be addressed. No SCOs are proposed for groundwater because no groundwater cleanup is anticipated as part of this IRM.

1.5 SUMMARY OF PROPOSED IRM

The interior of the building on the Site has been addressed by the USEPA Removal Action. The demolition and redevelopment plan will leave the existing concrete slab intact where portions of the building are to remain in place. As such, it is not likely that there is a potential for contact with lead present beneath the concrete floor and further remediation is not necessary beneath the footprint of the remaining building.

In the exposed soil areas on the building perimeter and under the concrete floor that will be removed, the remedial approach in this IRM is to excavate the soil exceeding the TCLP standard. This soil will be disposed of off-site in an approved landfill. The remainder of the soil containing lead exceeding 1,000 mg/kg will be covered with a demarcation layer and at least six inches of clean soil. The Site will be restricted to commercial use via an environmental easement placed on the Site.

1.6 PROJECT ORGANIZATION

Amec will prepare the design documents and oversee any field aspects of this IRM on behalf of Brightfields, Inc. The Amec Professional Engineer will oversee the design and stamp any required design figures and the design documents. Amec personnel will collect any samples, provide technical oversight, and direct any subcontractor(s) to complete work that has been deemed appropriate to achieve the project objectives.

Listed below are the key project personnel and their office/primary telephone numbers.

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1.7 WORK PLAN ORGANIZATION

The following sections of this IRM WP provide the information necessary to identify and evaluate the IRM for the Site. Those sections include: Background (Section 2.0), IRM Work Plan (Section 3.0), Permits and Other Authorizations (Section 4.0), Schedule (Section 5.0), Post-Construction Plans (Section 6.0), and References (Section 7.0).

1.8 LIMITATIONS

This WP presents a summary of information known to Amec concerning the Site that Amec considered pertinent to the scope of work and stated project objectives. Amec has performed this work with the care and skill ordinarily used by members of the profession practicing under similar conditions. The conclusions presented herein are those that are deemed pertinent by Amec based upon the assumed accuracy of the available information. No other warranty, expressed or implied, is made as to

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the professional advice included in this report. The information present in this report is not intended for any use other than the stated objectives of the project. This document was prepared for the sole use of Brightfields, Inc. and the NYSDEC, who are the only intended beneficiaries of our work.

2.0 BACKGROUND

This section provides a summary of the characterization of the Site and incorporates all of the available data collected in the various phases of the Site investigation. A discussion of the Site investigations and the results are provided.

2.1 SITE DESCRIPTION

The Tract I Site consists of approximately 5.9 acres of property located at 3123 Highland Ave. in Niagara Falls, Niagara County, New York. The Site is mostly covered by the former Power City Warehouse Building in various levels of disrepair. The western portion of the Site consists of a grassy area and a gravel drive to the loading dock area. Along the southern boundary of the Site are some trees and undergrowth with a segment of a retaining wall. The eastern portion of the Site has some grassy areas intermixed with broken asphalt and concrete sections of concrete pavement.

The Power City Warehouse Building covers a large portion of the Site (approximately 3.3 acres), and is a three-story masonry building. The building has had numerous additions to the original structure. Portions of the building roof have collapsed, making several areas of the warehouse building unsafe. Previous investigations of the Power City Warehouse Building have reported that concrete floors up to six inches thick cover approximately 70 percent of the rooms in the building. The concrete floors were noted to be intact (E&E, 2000). Some additions of the warehouse have brick floors as well. Drains and sumps were located throughout the building, and a basement access containing several feet of water was also discovered.

A second, considerably smaller, one-story building (approximately 462 square feet) is located in the northeast corner of Tract I. The smaller building is constructed of brick with a concrete floor. Past investigations have concluded that this building may have been used for chemical storage (E&E, 2000).

The Site consists of roughly 30 percent grass and concrete surface, 15 percent wooded and undergrowth, and approximately 55 percent building structures.

2.2 SITE GEOLOGY AND HYDROGEOLOGY

The Geologic Map of New York, Niagara Sheet published by the University of the State of New York indicates that the Site lies within the Silurian-aged Lockport Group. The Lockport Group consists of Geulph, Oak Orchard, Eramosa, and Goat Island Dolostones and the Gasport Limestone. The Tract II Site investigation revealed that bedrock is between 12.5 and 24.5 feet below ground surface in the vicinity of the Site. The unconsolidated material at the Site consists of various fill materials at the surface, underlain by silty clay. Dolostone bedrock is present below the silty clay.

Although no direct groundwater investigations have been performed on the Tract I site, previous investigations conducted for the NYSDEC on the adjacent Tract II site indicate that there is no significant groundwater aquifer within the overburden soils or fill materials (EA, 2009). The groundwater flow at the Site appears to be generally toward the southwest, toward the Niagara River, on top of the Dolostone bedrock formation. The NYSDEC concluded (from previous site characterization reports) that groundwater in the vicinity of the Site was not likely to be used as drinking water due to the small amount of water available, a local ordinance prohibiting water supply wells in the City, and the fact that public drinking water is available throughout the area.

2.3 SUMMARY OF REMEDIAL INVESTIGATIONS

The Site was investigated in three efforts between 1998 and 2011. These included the 1998-2000 E&E investigation, the 2008-2009 EA Supplemental Investigation, and the July 2011 Predesign Study investigation (Amec 2011). The following subsections summarize the findings of the Site characterization efforts.

2.3.1 1998-2000 E&E Site Investigation

In May 1999, E&E conducted the initial investigation of the Site. The E&E investigation consisted of collecting 10 composite and three grab surface soil samples from 13 surface locations (SS-PCW-01 through SS-PCW-13), two composite sediment samples from the central floor drains (SD-PCW-01 and SD-PCW-01/D), one composite lead paint sample (PT-PCW-01), and three potential asbestos containing material samples (AS-PCW-01 through AS-PCW-03). Three background soil samples were collected from areas around the Site. Soil samples were collected for semivolatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), and lead.

BACKGROUND

The results of this investigation were reported in the *Site Investigation Report for the Power City Warehouse* (E&E, 2000). The following subsection summarizes the results.

2.3.1.1 E&E Site Investigation Results

Results from the Site Investigation conducted by E&E in 1999 indicated that lead and some additional polycyclic aromatic hydrocarbons (PAHs) exceeded the Site SCOs in surface soil inside of the building. Lead levels exceeded the SCOs in all 10 of the samples analyzed, with a concentrations ranging from 2,350 to 178,000 mg/kg. A table summarizing the results is located in Appendix A. PAHs, which exceeded the SCOs in five of the ten sample locations were, detected during the sampling event included benzo(a)anthracene, benzo(b)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, and dibenz(a,h)anthracene.

The areas with higher concentrations of lead are located in the former Lead Foundary Area and Storage Plate Area (Appendix A). These areas are located in the building footprint in the northwest corner of the building. Samples collected outside of the building footprint with exceedances of lead were SS-PCW-11 and SS-PCW-12, with concentrations of 8,240 and 2,790 respectively.

2.3.2 2007-2009 EA Final Site Characterization

EA conducted additional characterization activities at the Site for NYSDEC from September 2007 to March 2009. EA submitted to the NYSDEC the *Final Site Characterization Report* (EA, 2009) in May 2009. The EA investigation included sample identification and warehouse floor inspection, debris sampling, debris volume estimation, basement water characterization and discharge, and subsurface soil sampling.

EA collected 19 debris samples throughout the building footprint area. Grab samples were collected from individual sumps and composite samples were collected from continuous floor drains and trenches. The samples were analyzed for SVOCs and Target Analyte List (TAL) and TCLP metals. Selected samples were also analyzed for Volatile Organic Compounds (VOCs) based upon field screening.

EA also characterized and discharged water from the basement of the former Power City Warehouse into the sanitary sewer. EA then collected one composite sample from the debris located in the basement, which was analyzed for TAL metals.

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EA collected subsurface soil samples from 23 locations at the Site. Subsurface soil was collected at 13 locations inside the footprint of the former Power City Warehouse and 10 soil samples were collected surrounding the structure. Subsurface soil samples were collected at each location from the 0 to 2 foot interval below ground surface (bgs). Additionally, subsurface soil was collected from areas from an interval that exhibited elevated Photo Ionization Detector (PID) readings, staining, or odors.

2.3.2.1 EA Supplemental Investigation Results

The former Power City Warehouse floor inspection determined that a large portion of the warehouse structure is constructed on a poured concrete foundation, including locations with a brick or asphalt floor. EA cored the concrete building foundation for subsurface soil sampling and determined that floor thicknesses were, on average, 6-inches thick. Subsurface soil samples were collected from 13 locations beneath the building sub-slab. Lead exceeded the Commercial SCOs in two locations (SB-08S and SB-12S) and chromium exceeded at SB-11S. There were no exceedances of VOCs or SVOCs beneath the building subslab.

EA collected 19 debris samples from throughout the interior of the former Power City Warehouse. Metals results from the samples indicated exceedances of the Commercial SCOs for arsenic, barium, cadmium, copper, lead, mercury, and zinc. SVOCs that exceeded the Commercial SCOs were acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, dibenzofuran, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, 2-methylphenol, 4-methylphenol, naphthalene, phenanthrene, phenol, pyrene, and 1,2,4-trichlorobenzene. There were no VOCs that exceeded the Commercial SCOs. All of the debris samples were collected above the concrete slab in the buildings. The debris was then collected and disposed of off-Site, and no longer is in the former Power City Warehouse building.

An inspection was performed on the basement walls and floor, which determined that the basement was constructed of poured concrete and was observed to be in good condition. Basement sampling results indicated arsenic, cadmium, and lead exceeding the NYSDEC Commercial SCOs.

Subsurface soil samples from outside the building footprint were collected and analyzed for VOCs, SVOCs, and TAL metals at nine locations. Several of the metal

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results exceeded the NYSDEC Commercial SCOs; they include arsenic, lead, and copper. Sample results were tabulated by EA and are included in Appendix B. A figure showing the locations of the exceedances to the SCOs is also included in Appendix B.

2.3.3 Amec Predesign Study

In July of 2011, Amec implemented a NYSDEC-approved predesign study on the Site. The predesign study was performed on soils outside of the structure on the Tract I Site. Samples were collected from 11 soil borings (B-10 through B-20) as shown on **Figure 3**. Additionally, a hand-held X-ray fluorescence (XRF) meter was used to measure real-time lead concentrations for later correlation to laboratory results. A building structural evaluation was also performed to determine if the buildings could be used during the remediation.

The samples collected in the predesign study were analyzed for lead, tin, antimony, TCLP lead, and pH. The results of the predesign samples showed all of the lead concentrations exceeded the commercial SCOs and ranged between 1,210 to 16,900 mg/kg. TCLP lead results exceeded TCLP lead levels of 5 mg/L at four locations. Two of the locations B-10 and B-11 (18.4 and 46.5 mg/L respectively) are located in the northeast corner of the Site; additionally, two locations, B-17 and B-18, located along the southern boundary of the property, exceeded the TCLP standard (21 and 69.7 mg/L respectively). The pH levels in all of the samples ranged from 7.16 to 8.25.

2.4 REMOVAL ACTION

During the summer of 2010, the USEPA began a Removal Action within the Power City Warehouse. Prior to the start of work actions the USEPA fenced the former Power City Warehouse in order to secure the Site. The cleanup involved the removal of asbestos, SVOC and lead contaminated sediment and debris within the building, and removal of any containers of hazardous material on the property. The USEPA removed or stabilized sections of the building to facilitate work activities. Pollution Reports detailing work activities are included in Appendix C.

3.0 INTERIM REMEDIAL MEASURES

3.1 REMEDIAL ACTION OBJECTIVES

Soils exceeding the appropriate NYSDEC commercial SCOs are located around the perimeter of the building on the Site. This area contains concentrations of lead and other constituents in soil above the appropriate SCOs. Additionally, samples from three “hot spot” locations of the impacted soil on the Site failed the TCLP test; lead in the extract exceeded the standard of 5 mg/L.

The goals of the NYSDEC remedial program are to meet the Standards, Criteria and Guidance (SCGs), and to be protective of human health and the environment. At a minimum, “the remedy must eliminate or mitigate all significant threats to the public health and to the environment presented by the hazardous substance and hazardous waste disposed at the Site through the proper application of scientific and engineering principles.”

The proposed future use of the Site includes educational and commercial facilities, both of which are consistent with the commercial SCGs. Commercial uses are defined in the NYSDEC Technical Guidance DER-10, and are among the most restrictive site uses described in the land-use hierarchy.

Based on existing zoning, the proposed land uses, and land-use controls, the following are potential remedial objectives that will be protective of human health and the environment, meet the SCGs, and encourage redevelopment of the Site:

- Reduce or control, to the extent practicable, the constituents present in the soil at concentrations exceeding the SCOs applicable to the intended use of the property parcels;
- Control the potential for human exposure to the constituents in soil exceeding the applicable SCOs;
- Control the physical hazards associated with the buildings and other appurtenances on the Site; and
- Excavate and dispose of soils identified to exceed the TCLP Standard.

3.2 IDENTIFICATION OF IMPACTED AREAS AND SOIL VOLUMES

To help evaluate potentially applicable remedial approaches, the sample data were plotted on the Site plan (Figure 3). “Hot spot” areas were marked around all of the TCLP samples exceeding 5.0 mg/L of lead. The hot spot areas that are anticipated to require remediation are shown on Figure 4. The “hot spot” areas are marked as areas A, B, and C. Area A is approximately 35 feet by 75 feet and Areas B and C are approximately 40 feet by 60 feet.

Based on subsurface soil sample results, only shallow soils exceed the TCLP standard. Using a total depth of one foot at each of the “hot spot” excavation areas, the in-place volume of impacted soil in Area A is approximately 100 cubic yards (CY) and Areas B, and C contain approximately 90 CY. The anticipated total in place volume of soil that exceeds the TCLP standard of 5 mg/L is 280 CY. Using a per cubic yard conversion factor of 1.7 tons/CY, approximately 475 tons of soil will be excavated for off-Site disposal. During the actual remediation, a combination of field screening and fixed laboratory analyses for both total and TCLP lead will be used to identify lead concentrations above the appropriate SCOs.

In addition to excavation of “hot spot” areas, areas with lead concentrations in soil exceeding the commercial SCO (1,000 mg/kg) will be placed below a soil cover or building structure. The area of soil cover over the Site is approximately 5.8 acres. The soil cover will be placed around the perimeter of the existing Power City Warehouse building. The current surface conditions at the Site consist primarily of grass, trees, undergrowth, and broken concrete. Portions of the existing building foundation will be left in place where the building structure will be reused for future activities.

3.3 SUMMARY OF AREAS REQUIRING REMEDIAL ACTION

The area requiring remedial action within the Site is around the building footprint of the former Power City Warehouse, as shown in Figure 5. Surface soil in this area contains lead in concentrations ranging from less than the restricted commercial SCO of 1,000 mg/kg to 16,900 mg/kg. Three “hot spots” containing lead above the applicable TCLP standard are present. The impacted soil in the “hot spot” areas is limited to surface soils. One of the areas (Area A) containing lead in soil is located in the northeast corner of the Site; two of the areas (Area B and C) are located along the southern Site boundary. Figure 4 shows the locations of the lead impacted “hot spots” on the Tract I Site.

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Groundwater is not used on-site or in the surrounding area, and as such, remedial measures are not required to address groundwater at the Site.

3.4 REMEDIAL APPROACH

The data obtained from the Amec's 2011 predesign work, as well as data obtained from previous studies has been used to develop the conceptual remedial approach for the Tract I Site, as presented in the following subsections.

3.4.1 *Dilapidated Building Demolition*

Prior to remedial construction, Brightfields will complete additional hazardous substance removal, including asbestos abatement, and then demolish portions of the existing Power City Warehouse structure. A portion of the structure will be left as part of the future Site development as shown in Figure 5. The work will be completed in accordance with applicable laws and regulations and/or approved variances and will be performed as described below:

Asbestos abatement was initiated by USEPA during the Removal Action; however, an asbestos evaluation will need to be completed to assess the remaining asbestos quantities at the Site. Asbestos abatement will include:

- Preparation of an asbestos abatement health and safety plan, to include requirements for employee training and medical monitoring, list of designated personnel, respiratory protection program, Personal Protective Equipment (PPE), site and community air monitoring, and emergency procedures;
- Implementation of a decontamination program;
- Implementation of a hazard communication program;
- Obtaining all required licenses, permits and approvals;
- Designation of regulated areas, including use of warning signs as appropriate;
- Provisions for adequate exhaust ventilation;
- Removal of friable asbestos, including pipe insulation and other insulating materials;
- Removal of non-friable asbestos, including floor tile, roofing materials, and transite;
- Implementation of a final cleaning and visual inspection program;

INTERIM REMEDIAL MEASURES

- Off-site disposal of Asbestos Containing Material (ACM) at licensed disposal facilities; and
- Preparation of submittals and reports, as necessary, to document the asbestos abatement program.

Demolition of the existing facility will include the following:

- Preparation and implementation of a demolition health and safety plan, to include requirements for employee training and medical monitoring, list of designated personnel, respiratory protection program, PPE, fire protection, site and community air monitoring programs, and emergency procedures;
- Implementation of a decontamination program;
- Implementation of a hazard communication program;
- Obtaining all required licenses, demolition permits and other permits, and approvals;
- Mobilization of equipment and site preparation;
- Capping/plugging of drains and sewer lines exposed during demolition;
- Demolition/removal of buildings, tanks, piping, and ancillary structures, as required;
- Backfilling to grade (after cleaning) of pits and sumps;
- Cleaning (power washing, scouring, scabbling, etc.);
- If appropriate, sealing of structural floor slabs that will remain in place;
- Implementation of dust control measures;
- Implementation of erosion and sediment control measures;
- Site restoration; and
- Preparation of reports and submittals, as necessary, to document the completion of demolition activities.

3.4.2 Soil Remediation

Using the results of the previous investigations, the limits of proposed excavation for the lead exceeding the TCLP standard at three locations on Site have been identified (Figure 4). The proposed excavation areas are identified as Areas A, B, and C. The excavation program targets surface soil with greater than 5 mg/L of TCLP lead.

Excavation areas can be further described as follows (all quantities are approximate):

INTERIM REMEDIAL MEASURES

Area A

As shown on Figure 4, this excavation area will include removal of surface soil to a depth of 1-foot bgs.

- Removal of severely damaged surface concrete/pavement associated with previous driveway area will be completed prior to excavation at this location.
- Removal of fence will be completed and the fence will be reinstalled along property boundary lines following completion of remediation.
- Shallow excavation surface area (0-1 ft) = ~2,625 square feet (SF), total in-place volume = ~100 CY.
- Using a per cubic yard conversion factor of 1.7 tons/CY, approximate weight = ~170 tons.
- Previous testing indicates that the soil to be removed exceeds TCLP lead standards and will be disposed off-site as hazardous waste. Additional waste characterization testing will be completed as necessary to meet disposal facility requirements.

Area B

The area depicted on Figure 4 will be removed to an average depth of 1-foot bgs.

- The surface area of excavation = ~2,400 SF; total in-place volume = ~90 CY.
- Using a per cubic yard conversion factor of 1.7 tons/CY, approximate weight = ~150 tons.
- Previous testing indicates that the soil to be removed exceeds TCLP lead standards and will be disposed off site as hazardous waste. Additional waste characterization testing will be completed as necessary to meet disposal facility requirements.

Area C

The area depicted on Figure 4 will be removed to an average depth of 1-foot bgs.

- The surface area of excavation = ~2,400 SF; total in-place volume = ~90 CY.
- Using a per cubic yard conversion factor of 1.7 tons/CY, approximate weight = ~150 tons.
- Previous testing indicates that the soil to be removed exceeds TCLP lead standards and will be disposed off-site as hazardous waste. Additional waste

INTERIM REMEDIAL MEASURES

characterization testing will be completed as necessary to meet disposal facility requirements.

General – “Hot Spot” Area Excavations

- Caution must be exercised where excavations are near the property line, warehouse building, active storm/process sewers, and other structures.
- Prior to excavation, Contractor will remove surface pavements that are present within the limits of excavation. Any concrete or asphalt removed will be disposed of.
- Contractor will stockpile or direct load material designated for off-site disposal as necessary.
- Frost walls/concrete foundations may be present beside the excavation limits and will require care to ensure they are not damaged.
- Contractor will provide dust control equipment/material on-site for use as needed.
- Contractor will provide air monitoring as necessary during excavation activities to monitor the worker breathing zone and determine required PPE levels in accordance with the Contractor’s site-specific Health and Safety Plan.
- Backfill will be placed in a single lift with approved crushed demolition brick/concrete and/or borrow material.
- The excavated areas will receive a final cover (6-inch layer of clean soil/topsoil or new pavement).
- A NY-licensed surveyor will survey the final excavation limits; the survey data will be used to prepare the record drawings.

The final excavation areas and volumes may vary based on field conditions and the analytical results of record samples collected from the excavation sidewalls and bottoms.

3.4.2.1 Performance Criteria and Monitoring

Following the completion of excavation activities confirmation sampling will be completed on the excavation sidewalls. Excavation Area A has a total proposed perimeter of 220 feet; excavation Area B and C have a total proposed perimeter of 200 feet. NYSDEC DER-10 guidelines for sampling frequencies of soil excavations of 20 to 300 feet states, “one sample from the top of each sidewall for every 30 linear feet of sidewall and one sample from the excavation bottom for every 900 square feet

INTERIM REMEDIAL MEASURES

of bottom area.” To comply with DER-10 guidelines the total number of confirmatory samples in each “hot spot” area will be seven sidewall and three base samples.

The seven sidewall and three base confirmatory soil samples will be placed into laboratory-supplied jars and uniquely numbered. The time, date, analysis requested, the Site name, and the sampler’s initials will be written on the identification label. The soil samples will be placed into a cooler, on ice, for shipment to TestAmerica Laboratories, located in Amherst, NY. Soil samples for Tract I will be analyzed for lead by USEPA SW-846 Method 6010B and TCLP lead by SW-846 Method 1311/6010A.

3.4.3 Soil Cover System

A cover system that consists of a combination of 6-inches of clean soil or clean gravel (with underlying demarcation layer), concrete slabs from former structures and new or existing buildings will be incorporated throughout the entire Tract I Site. This cover system, once installed, will be maintained for the life of the property. The following sections provide design requirements for the soil cover system, which will be placed in all areas of the Site not covered by concrete or buildings.

Proposed locations of the soil cover for the Site are shown on Figure 5. The intent of the cover system is to provide a physical barrier between potential receptors and the existing site soils.

For areas that will not be covered by pavement, concrete or buildings, the cover system will consist of not less than 6-inches of clean soil. Where soil is placed, the Contractor will place not less than 4-inches of clean borrow material and not less than 2-inches of topsoil. The borrow material and top soil will be from an identified source and will be tested by the owner and approved by the NYSDEC prior to start of cover activities. Copies of the gradation and chemical test results for the borrow material will be provided to the NYSDEC.

The overall thickness of the soil layer will not be less than 6-inches, although it may be greater than 6-inches in some areas to achieve final grades. The cover system will be underlain by a demarcation layer. The intent of the demarcation layer is to create a visible separation between the cap materials and the existing site soils. The

INTERIM REMEDIAL MEASURES

demarcation layer will consist of a woven geotextile that was selected by the Owner and has been approved by the Engineer and the NYSDEC.

The Contractor will clear brush, trees, and deleterious materials prior to the placement of the cover system. Rough grading of the existing ground surface will be conducted to minimize high and low points such that a more uniform cover system thickness may be placed. The demarcation layer will be placed by hand directly on top of the rough graded surface. The demarcation fabric will be overlapped by 1-foot at the joints and staples placed at a minimum of every 20 feet along the outer edges and at overlaps/joints. Prior to placement of cover soils, the demarcation layer will be visually inspected by the Contractor for tears. All tears, holes or damaged geotextile will be repaired by placing a patch with a minimum of one-foot overlap or by replacing the entire panel if damage is excessive.

Clean borrow material will be placed over the demarcation layer by bulldozer or front end loader. Care will be taken such that the equipment will not tear or otherwise damage the demarcation layer during installation of cover soils. If the demarcation layer is damaged it will be repaired as described above. Clean borrow will be placed to a post-compaction thickness of at least 4-inches. Compaction of the cover material will be achieved via two to three passes made by a vibratory roller, with additional compaction achieved via passes by the dozer/front end loader. No quantitative compaction requirements (i.e. moisture-density tests) are required for the cover system soils. The final thickness of the topsoil layer will be at least 2-inches. Additional topsoil may be required in some areas to reach design grades for surficial drainage. After placement of the topsoil layer, the cover system will be seeded in accordance with best management practices (BMPs).

Construction and post-construction soil erosion and sedimentation control measures will be implemented as described in the Storm Water Pollution Prevention Plan (SWPPP).

Edges of the cover system must transition to meet existing pavement or property boundaries, without increasing potential for erosion and such that the required 6-inch thickness of the soil cover is carried to the edges of the cover. To ensure that these requirements are met, edges and transition zones will be constructed with a 5:1 slope over a 5-foot wide edge. The edges that will require sloping include any soil that encounters either the northern or western Site boundaries. The southern and

INTERIM REMEDIAL MEASURES

eastern Site boundaries will be tied into the final grades of the remediation activities associated with Tract II.

Concrete slabs that will remain following building demolition will undergo the following to leave them in a condition suitable for future reuse:

- Floor drains will be disconnected or sealed;
- Basements, sumps, and pits will be inspected and cleaned. Basements, sumps, and pits will then be filled with either clean fill or clean recycled hardfill material (shown through sampling/testing to meet on-Site reuse criteria as specified in the Interim Site Management Plan) and topped-off with a final lift of clean stone;
- Demolition debris will be removed from the slabs and a skid steer with broom attachment will be used for final cleaning via wet and dry sweeps;
- Areas of concrete with significant damage will be excavated and leveled with clean gravel; and
- Low spots will be leveled by placing a layer of stone to eliminate trip hazards.

Any other modifications or repairs needed to make the slabs ready for reuse will be completed as part of site redevelopment.

The existing chain link fence will be removed as necessary to facilitate the work, or for the placement of the soil cover. The fence will be replaced along an alignment determined by Brightfields once the cover system is in place.

A final survey will be performed and incorporated into the Site environmental easement.

4.0 PERMITS AND OTHER AUTHORIZATIONS

4.1 SOIL EROSION AND SEDIMENTATION PLAN

A soil erosion and sedimentation plan will be included in the IRM Design Report submitted to the NYSDEC prior to the disturbance of soils.

4.2 LOCAL PERMITS

Any local permits including but not limited to demolition, asbestos, or utilities will be received prior to the start of work by Brightfields or its subcontractor.

4.3 HEALTH AND SAFETY

Amec has prepared a Site-specific Health and Safety Plan (HASP) for the RD/RA Work Plan, a copy of which is provided in Appendix D. The HASP will be used by Amec employees and will address the potential hazards associated with the proposed work. The HASP has been prepared in accordance with Occupational Safety and Health Administration (OSHA) standards and includes an identification of the anticipated site hazards, requirements for PPE and air monitoring, action levels for upgrading PPE levels, and emergency procedures. Amec will require that visitors to the Site, including client and regulatory agency personnel, comply with Amec's HASP or provide their own HASP.

A Community Air Monitoring Plan (CAMP) will be provided prior to demolition activities which will detail work activities and procedures.

4.4 SITE MANAGEMENT PLAN

A Site Management Plan (SMP) will be included with the IRM Design Report, and it will address maintaining the cover system as well as protocols for sub-surface work on-Site, and management of disturbed materials.

5.0 SCHEDULE

The anticipated schedule for the Tract I Site includes the IRM Design, demolition activities, cover system installation, Final Engineering Report (FER), and SMP. The schedule indicates approximately eight months will elapse between the beginning of Site mobilization to submittal of the FER. The anticipated schedule for submission of documents and field activities is listed below. Final “as-built” drawings will be submitted with the Final Remedial Design following the completion construction activities. The actual schedule may vary and will be dependent on among other things, subcontractor availability, weather conditions, and regulatory agency review time.

BCP Application Submittal	12/20/2011
IRM WP Submittal	12/20/2011
CAMP Submittal	2/17/2012
IRM Design Submittal – 90%	3/30/2012
Tract I Demolition Activities	4/2/2012
Tract I Cover System Installation	9/3/2012
Alternative Analysis Report Submittal	9/3/2012
Site Management Submittal	10/12/2012
Final Engineering Report	11/30/2012

6.0 POST-CONSTRUCTION PLANS

6.1 ENGINEERING AND INSTITUTIONAL CONTROLS

Because constituents will remain on the Site above the SCOs, Engineering Controls and an Environmental Easement are required to protect human health and the environment. Additionally, the Site may only be used for commercial or industrial purposes.

Exposure to remaining constituents in soil/fill at the Site is addressed by a cover system placed over the Site (as shown on Figure 5). This cover system is comprised of a combination of imported clean soil with a minimum thickness of 6-inches with demarcation fabric layer, asphalt or concrete paved areas, and areas covered by existing buildings. Procedures for the inspection and maintenance of this cover will be provided in the SMP.

6.2 POST-REMEDIAL MONITORING

Post-remedial care and monitoring of the Site will be included in the SMP which will be submitted to the NYSDEC following the completion of remedial activities.

7.0 REFERENCES

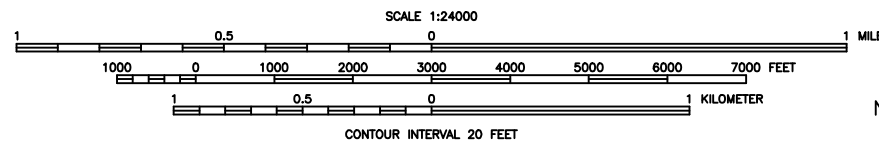
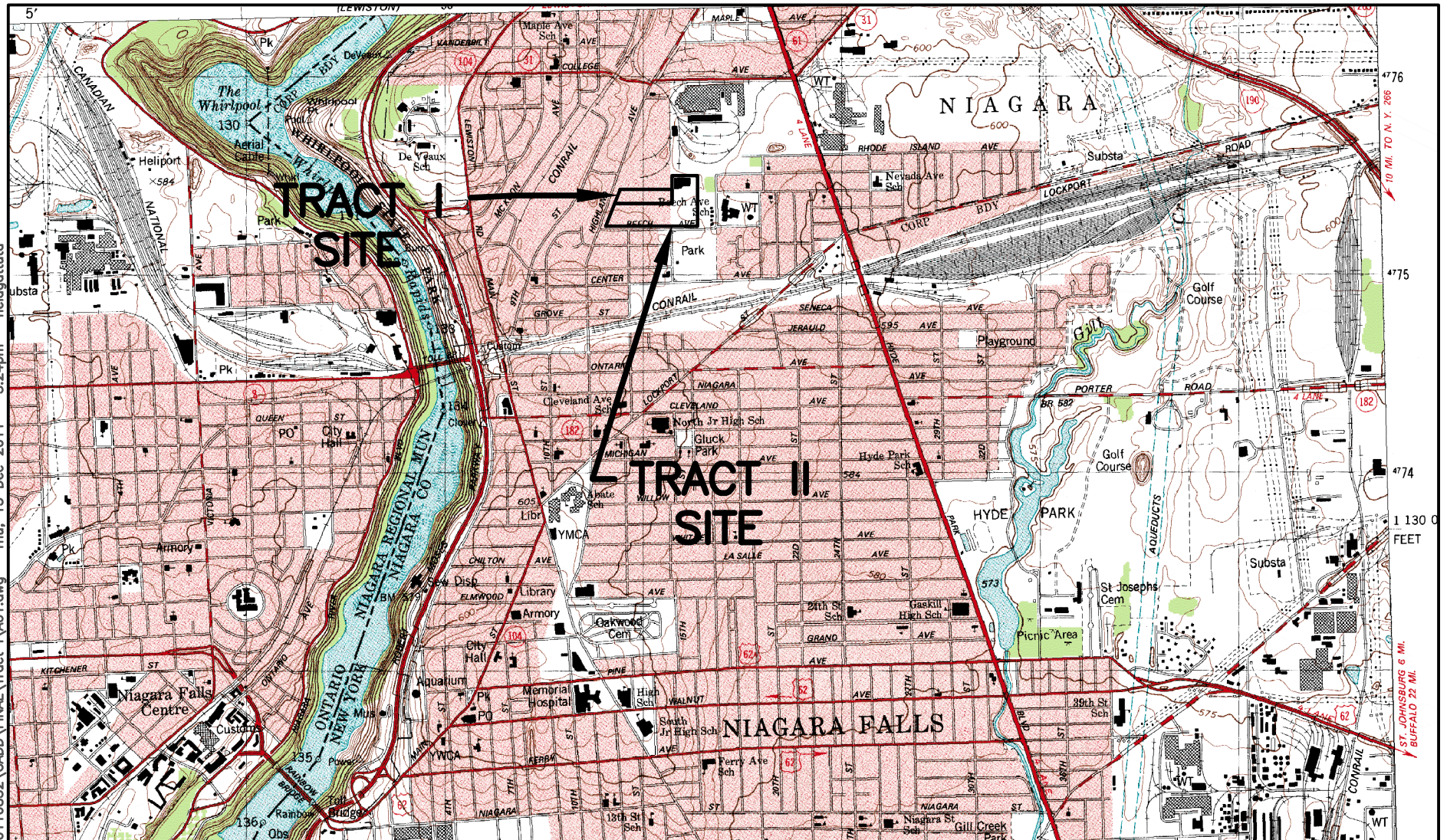
Ecology and Environment Engineering, P.C., May 31, 2000, "Site Investigation Report for the Power City Warehouse, Niagara Falls, New York".

EA Engineering, P.C., May 2009, "Final Site Characterization Report Power City Warehouse Site Highland Avenue (9-32-131), Niagara Falls, Niagara County, New York".

NYSDEC, 2010, *DER-10 Technical Guidance for Site Investigation and Remediation*, DEC Program Policy

Mactec Engineering and Consulting, Inc., June 20, 2011, "Predesign Study Work Plan Tract I and Tract II Sites, Niagara Falls, New York".

FIGURES



HONEYWELL INTERNATIONAL, INC.
NIAGARA FALLS, NEW YORK

Project No.: 3410110832

amec

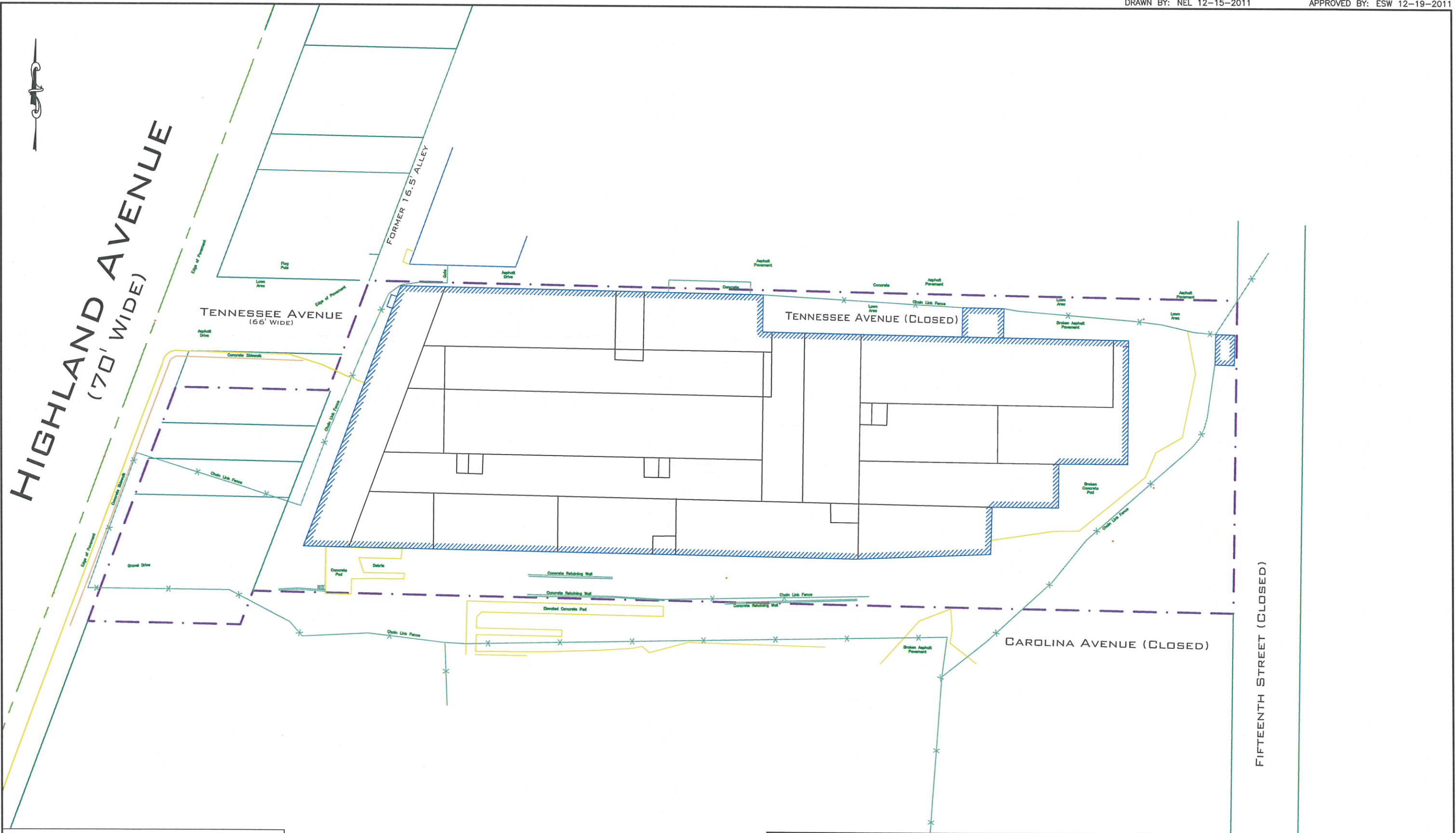
Environment & Infrastructure
800 North Bell Avenue, Suite 200
Pittsburgh, Pennsylvania 15106

SITE LOCATION MAP

Figure: 1

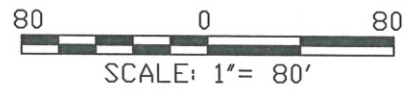
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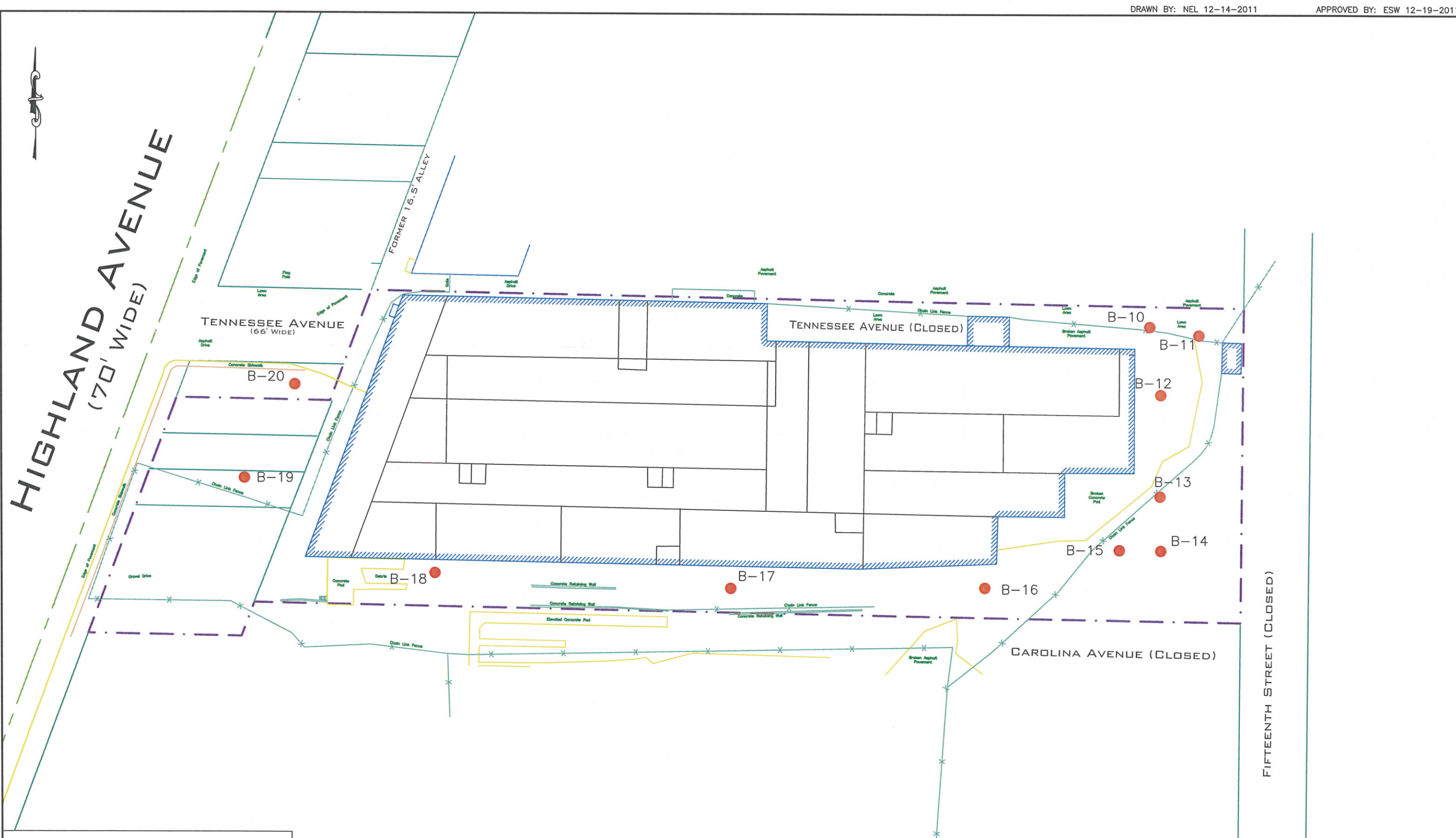
LEGEND

- PROPERTY BOUNDARY
- /// EXISTING STRUCTURE
- x- FENCE



HONEYWELL INTERNATIONAL, INC. NIAGARA FALLS, NEW YORK Project No.: 3410110832	amec Environment & Infrastructure 800 North Bell Avenue, Suite 200 Pittsburgh, Pennsylvania 15106	PLAN VIEW MAP OF SITE Figure: 2	2

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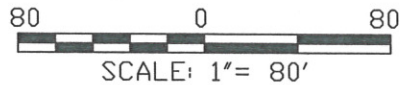
LEGEND

PROPERTY BOUNDARY

EXISTING STRUCTURE

FENCE

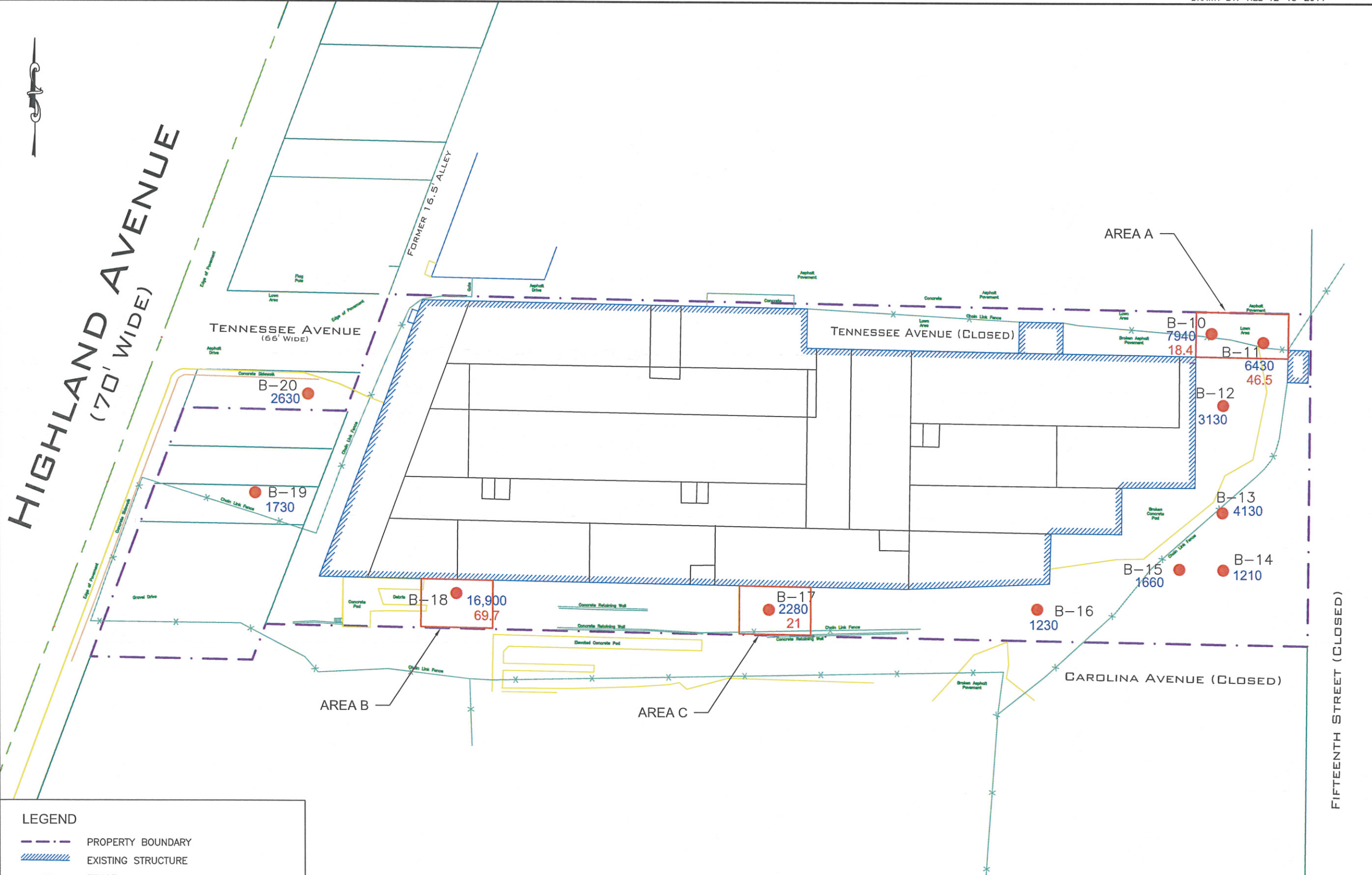
SOIL BORING



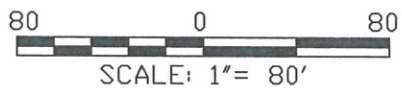
HONEYWELL INTERNATIONAL, INC. NIAGARA FALLS, NEW YORK Project No.: 3410110832	 Environment & Infrastructure 800 North Bell Avenue, Suite 200 Pittsburgh, Pennsylvania 15106	SURFACE SOIL BORING LOCATION MAP Figure: 3	3

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HIGHLAND AVENUE
(70' WIDE)

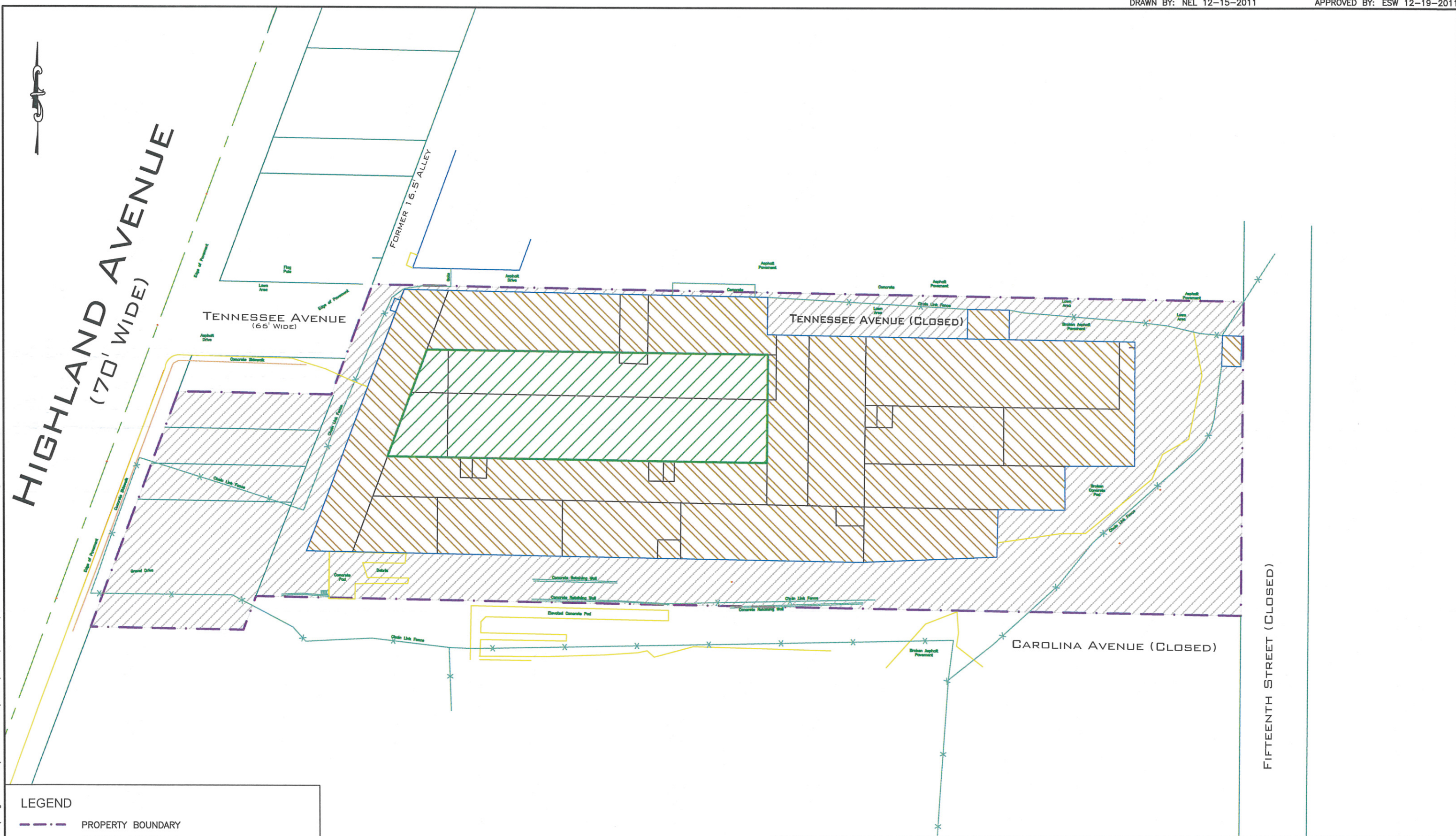


LEGEND	
	PROPERTY BOUNDARY
	EXISTING STRUCTURE
	FENCE
	SOIL BORING
16,900	LEAD SOIL EXCEEDING NYSDEC RESTRICTED USE COMMERCIAL STANDARD
69.7	TCLP LEAD EXCEEDING 5mg/L
	PROPOSED EXCAVATION AREA



HONEYWELL INTERNATIONAL, INC. NIAGARA FALLS, NEW YORK Project No.: 3410110832	amec Environment & Infrastructure 800 North Bell Avenue, Suite 200 Pittsburgh, Pennsylvania 15106	"HOT SPOT" EXCAVATION AREAS Figure: 4	4

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- LEGEND**
- PROPERTY BOUNDARY
 - EXISTING STRUCTURE
 - * FENCE
 - STRUCTURE TO REMAIN FOLLOWING DEMOLITION
 - SOIL COVER AREAS
 - CONCRETE TO BE REMOVED WITH SOIL COVER

80 0 80
SCALE: 1" = 80'

HONEYWELL INTERNATIONAL, INC.
NIAGARA FALLS, NEW YORK

Project No.: 3410110832

amec

Environment & Infrastructure
800 North Bell Avenue, Suite 200
Pittsburgh, Pennsylvania 15106

SOIL COVER AREAS AND
STRUCTURE TO REMAIN
FOLLOWING DEMOLITION

Figure: 5

APPENDIX A

ECOLOGY AND ENVIRONMENT SITE INVESTIGATION REPORT



ecology and environment engineering, p.c.

BUFFALO CORPORATE CENTER
368 Pleasant View Drive, Lancaster, New York 14086
Tel: 716/684-8060, Fax: 716/684-0844

May 31, 2000

Christopher Schmidt
Environmental Assistant
Office of Environmental Services
Niagara Falls City Hall
745 Main Street
Niagara Falls, New York 14302-0069

RECEIVED

AUG 3 2000

NYDEC-REG-9
FOIL
REL UNREL

Re: Site Investigation Report for the Power City Warehouse, Niagara Falls, New York

Dear Mr. Schmidt:

Ecology and Environment Engineering, P.C. (E & E) is pleased to submit to the City of Niagara Falls this Final Site Investigation (SI) Report for the Power City Warehouse, Niagara Falls, New York. This report includes a description of the field activities, a site location map (Figure 1) and an illustration showing the sample locations (Figure 2), summaries of the samples collected and descriptions of their exact locations (Tables 1 and 2), a discussion of the field investigation results, tabulated summaries of the positive analytical results for each sample location and a tabulated comparison summary of the analytical results with regulatory screening levels (Tables 3 through 7), a summary of the asbestos analyses (Table 8), a photolog (Attachment A), the Data Usability Summary Report (Attachment B), and a Remedial Cost Analysis (Attachment C).

E & E conducted this SI to characterize the nature and extent of contamination at the site. The investigation was conducted in compliance with the requirements of the New York State Department of Environmental Conservation (NYSDEC) guidelines and under the review of the United States Environmental Protection Agency (USEPA) Region 2.

This report is being submitted in final form as per your request stated during the May 22, 2000 telephone conversation between E & E and yourself.

Introduction

The 4.03-acre Power City Warehouse Site is located at 3123 Highland Avenue in the City of Niagara Falls (see Figures 1 and 2). The former industrial location is situated in an area of various land uses, including former and current industrial; light commercial (consisting of small retail stores) and residential. The residences east and west of the site are primarily managed by the Niagara Falls Housing Authority, although some private homes also exist on separate lots. A

railroad right-of-way (ROW) is located south of the site beyond Center Avenue and west of the site beyond Highland Avenue. Homes and a few small businesses are located on the west side of Highland Avenue across from the site. Residential communities continue west toward the railroad ROW. The concentration of industry along Highland Avenue increases northward from the site whereas small businesses become more prevalent to the south.

A small community park is located directly south of Beech Avenue and a church, homes, and an electric power transformer building occupy the south side of Beech Avenue across from the site. Residential communities and a girls' club are located further south, leading to a wide railroad ROW. The rail yard separates this area from the areas further south. Individual homes and a church are located east of the site, and an elementary school is located approximately 0.25 mile northeast of the site. Residential communities continue to the east across Hyde Park Boulevard. Interspersed in the residential areas are a few community service buildings and small businesses such as convenience stores. A large expanse of industrial properties lies directly north of the site, continuing to the intersection of Highland and Hyde Park Boulevard.

Site History

The large, abandoned, brick Power City Warehouse building was formerly used for lead-acid battery manufacturing. Various battery types were produced at the facility, including automobile, truck, and tractor batteries. Battery manufacturing was started at the facility by U.S. Light and Heat Co., then continued under Autolite Co. In the 1960s, Prestolite Co. acquired the facility and changed operations to the manufacturing of hard rubber battery cases, filling of batteries with sulfuric acid, and charging of batteries. In the mid-1970s, all operations were relocated to 3001 Highland Avenue, and the building at 3123 Highland Avenue was vacated. The building has undergone various uses since Prestolite's departure, including use as an automotive body shop and as a warehouse by the Power City Distribution Company and the HDL Distribution Center, Inc. Currently, there is no activity at the site. Potential environmental concerns at the site include the presence of residuals from battery manufacturing processes, and possible building material hazards such as lead-based paint and asbestos.

Site Geology

Based on subsurface conditions observed and reported by E & E while conducting a SI at the Tract II property directly south of the Power City Warehouse Site, the geology in this area consists of glacio-lacustrine deposits and glacial till overlying fractured dolostone bedrock. The layer of glacio-lacustrine clay and silt ranges from approximately 12.5 feet to 23.5 feet in thickness and overlies a relatively thin layer of glacial till. This till is composed of unstratified reddish-brown clay and sand with varying amounts of silt, gravel, and cobbles, as well as fragments from the dolostone bedrock that directly underlies it. The bedrock beneath the overburden at the site is the Lockport Dolostone formation of the Middle Silurian-age Lockport group.

Field Investigation Activities

Introduction

A project work plan was prepared prior to the field activities and reviewed by the City of Niagara Falls and USEPA Region 2. This document included a field sampling plan (FSP), a quality assurance project plan (QAPjP), a health and safety plan (HASp), and a community participation plan (CPP).

Field investigation activities at the Power City Warehouse Site conducted on May 6 and 7, 1999 consisted of a building inspection and multimedia sampling. Sampling activities consisted of surface soil sampling, sludge sampling, collection of a paint chip sample, and collection of suspected asbestos-containing materials (ACM). All field activities were performed as specified in the FSP.

Building Inspection

A general inspection of the Power City Warehouse was performed to determine whether petroleum products such as oil and grease, or other hazardous substances are present in the building. It should be noted that this inspection was limited to the first floor due to the severely dilapidated and unsafe condition of the building's higher floors. During the inspection, three samples of suspected ACM and one sample of suspected lead-based paint chips were collected for analysis. Miscellaneous debris, including hundreds of boxes of greeting cards, boxes of automobile billing records, numerous automobile parts, tires, and an air hammer unit, were found in the various rooms and building additions. The site consists of a main building with a number of additions and rooms, a single-room building labeled by E & E as "Operational Area of Unknown Use" located in the northeast corner of the site, the foundations of an electrical substation building in the southeast corner of the site, and the open yard and loading dock.

Approximately 70% of the rooms and building additions have concrete floors. Based on exposed surfaces and attempts to break through the concrete, the concrete floors were estimated to be approximately 3 feet thick in some rooms and were intact in most cases. Brick floors were also present in some of the rooms (Central Factory Building, E Building Addition, and Storage Inspection room). Round drains/sumps were located in several rooms, including the E Building Addition, F Building, Oil House, Boosting Building, Moulding Room, and Lead Foundry. Water was observed in the drains/sumps in the Lead Foundry and the Boosting Building. A basement access containing several feet of water was discovered in the Central Factory Building directly south of the Lead Foundry. Some staining was discovered on the floor of some of the rooms (i.e., E Building Addition, Moulding Room). A second linear floor drain was found in the Central Factory Building. This floor drain is shorter in length, just as wide (approximately 8 inches), and parallel to the one shown in Figure 2. No standing water was found in these floor drains; however, the sediment in them was moist. Circular impressions on the floor were

observed in the Oil House, suggesting that in the past drums were stored there.

A ventilation system, fire extinguishing system, and an outside alarm were discovered during the inspection of the Operational Area of Unknown Use at the northeast corner of the Power City Warehouse Site. Based on the inspection, it is believed that this building may have been used as a chemical storage area. Miscellaneous debris, including a television set, insulators, and an oxygen tank, was found in the building.

A concrete pad, possibly used as a transformer mount, was found in the northeast corner of the electrical substation located in the southeast corner of the site. Some staining was observed on this concrete pad.

Surface Soil Sampling

Surface soil samples were collected from the 0-to 0.5-foot depth interval in 10 operational rooms within the building and the loading dock and open yard, and two operations areas on the property outside the warehouse (see Figure 2 and Table 1). Visual inspection of the Acid Storage Tank Area concluded that the concrete floor at the Tank Area is completely intact. Therefore, and according to the FSP, no sample was collected from this location.

Within each room, either a grab sample or a composite surface soil sample consisting of up to three aliquots was collected. Sample numbers, types (grab versus composite), locations, and analyses are summarized in Table 1. Table 2 lists descriptions of all the surface soil sample locations.

Various floor coverings in the operational rooms were encountered and sampling procedures varied accordingly. In rooms with brick or highly fractured concrete floors, the bricks were removed or the concrete was broken and samples were collected from the underlying soil. In rooms with floor drains and concrete floors that are completely intact, composite aliquots or individual grab samples were collected from the drains. Selection of aliquot locations was based on site features such as staining, fractured concrete, presence of drains or sumps, or proximity to doorways (see Table 2).

Composite surface soil samples were collected from two locations in the area surrounding the main building: the Operational Area of Unknown Use in the northeastern section of the property and the electrical substation in the southeastern section of the property. Up to three soil aliquots from the 0-to-0.5-foot depth interval were collected and composited at each of the two locations. Similarly, one five-way composite soil sample was collected from the yard surrounding the building and the loading dock area. All surface soil samples were collected as described in the FSP with the following exceptions:

- The dust bin was not found during the field investigation. Consequently, instead of collecting a three-way composite at the dust bin site, a single grab sample was collected from an area of visible soil discoloration at the general location where the dust bin was reported to exist.
- Due to the small size of the Air Room and the presence of one distinct oil-stained location, a single grab soil sample was collected instead of a three-way composite soil sample.
- The concrete floor in the Oil House was completely intact. A dry floor drain was found in the center of the room; a single grab soil sample was collected from this drain instead of a three-way composite soil sample from beneath the concrete floor.
- Due to the small size of the Plate Storage Area, a two-way composite soil sample was collected instead of a three-way sample.
- The concrete floor of the Operational Area of Unknown Use appeared completely intact, and the floor drain contained only air-blown debris and soil. Consequently, a two-way composite sample was collected instead of a four-way composite soil sample. However, the concrete ramp by the north door was fractured. One aliquot of the two-way composite sample was collected from underneath the fractured area of the concrete ramp; the other aliquot was collected adjacent to the outer northeast corner of the room at the end of the concrete, the suspected location to which any spills or leaks in this area would flow.
- The concrete foundation of the Electrical Substation location was mostly intact. Consequently, a three-way composite soil sample was collected at this area instead of a four-way sample. One aliquot was collected beneath the concrete at a seam between two rooms; the other two aliquots were collected adjacent to a concrete pad with visible staining.
- The FSP specified that for comparative purposes, existing data from chemical analyses of background samples collected for the Tract II site SI would be used. However, based on recommendations from EPA Region 2, three background surface soil samples were collected from the area adjacent to Power City Warehouse and were submitted for lead analysis.

*back
green
suppl*

pH analysis was added to the analyses performed for the soil sample collected from the E Building Addition. This analysis was added because of the possibility that staining on a section of the concrete floor of this building was caused by acid spills.

Composite Sediment Sampling

A composite sediment sample was collected from the building's central floor drain. Three

sediment aliquots were collected from the 0- to 0.5-foot depth interval within the drain and then composited. The three aliquots were evenly spaced along the length of the drain. Sediment sample number, type (grab versus composite), location, and analyses are summarized in Table 1. Table 2 provides a description of the sediment sample location.

Materials Samples

During the asbestos inspection and sampling effort, three samples of suspected ACM were collected. These samples consisted of:

- One sample of magnesium TSI (a type of insulation) from a 3-inch pipe located in the Central Factory Building (sample AS-PCW-01);
- One sample of "Aircell" thermal system insulation (TSI) from a 2-inch pipe located in the Storage/Inspection area (sample AS-PCW-02); and
- One sample of roofing material from a portion of the roof that had fallen into the Storage/Inspection area (sample AS-PCW-03).

The ACM samples were submitted to E & E's subcontract laboratory (Chopra-Lee) for Polarized Light Microscopy (PLM) analysis (see Table 1). As required by New York State Law, Chopra-Lee analyzed organically bound potential ACM using Transmission Electron Microscopy (TEM) to accurately determine the asbestos content. Additionally, one lead paint sample was submitted for Toxicity Characteristic Leaching Procedure (TCLP) lead analysis (Table 1). This sample consisted of different colors paint chips found in the Moulding Room.

Field Investigation Results

Sample Analysis

Each soil, sediment, and paint chip sample collected at the Power City Warehouse Site was submitted to E & E's Analytical Services Center (ASC) for analysis. The ACM samples were submitted for analysis to Chopra-Lee. All sample analyses were performed according to the FSP and are summarized in Table 1. Two of the 13 soil samples were analyzed only for TAL total lead (SS-PCW-04 and SS-PCW-07); two were analyzed only for TCL PCBs (SS-PCW-08 and SS-PCW-13); and one of them (SS-PCW-10) was analyzed only for TCL BNAs and PCBs. The remaining eight of the 13 soil samples and the sediment sample were submitted for target compound list (TCL) base/neutral acid extractable organic compounds (BNA), TCL polychlorinated biphenyls (PCBs), and target analyte lists (TAL) total lead analysis. One of these eight soil samples (SS-PCW-01) was also analyzed for pH. As mentioned earlier, the three background samples were submitted for TAL total lead analysis only while the paint chip sample was submitted for toxicity characteristic leaching procedure (TCLP) lead.

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Sample analysis was performed according to the procedures established in New York State Analytical Services Protocol (ASP), October 1995 revision. All resulting data were reviewed by quality assurance specialists. The laboratory Form I reports include USEPA data qualifiers.

Compounds and analytes that were not detected are listed as "ND" in the positive analytical data summary tables (Tables 3 through 7). Concentrations listed with no qualifiers are accepted as such values; however, some of the reported concentrations are qualified due to conditions associated with analysis of the sample. Qualifiers are listed along with reported values in the summary tables.

Several samples contained compounds and analytes at concentrations greater than what could be accurately quantified without diluting the sample. In order to properly analyze such samples, they were diluted and the values were qualified as "D". While this procedure allows for the proper analysis of analytes present at high concentration, it also raises the detection limit.

BNA analyses of samples SS-PCW-03 and SS-PCW-10 were performed on medium level extractions due to the poor quality of the extractions from these samples (see Attachment B). Consequently, the quantitation limits were raised, and very few compounds were detected in these two samples above the raised quantitation limits.

In those cases in which an analyte concentration value can only be estimated, it is qualified with a "J". Similarly, when an elevated detection limit results from a dilution, and the detection limit itself is estimated, the value is qualified as "UJ."

Quality control samples including laboratory blanks were included in the analysis of the field samples. Blanks were used to determine whether other sources of an analyte besides the sample matrix exist. No organic compounds were detected in the laboratory blanks with the exception of acetophenone, a tentatively identified semivolatile organic compound, in laboratory blank SBLKS1.

Tentatively identified compounds (TICs) are chromatograph peaks in gas chromatography/mass spectrometry analyses for volatile and semivolatile organics that are not target compounds, system monitoring compounds, or internal standards. TICs were qualitatively identified through a mass spectral library search, and the identifications were estimated by a qualified data reviewer. No standard response factor is used in the quantitation of TIC compounds; therefore, all TIC concentrations are estimated values. This process is used to identify and estimate concentrations of any potential unknown contaminants in each sample.

Surface Soil Investigation Results

As discussed earlier, three grab and 10 composite surface soil samples were collected at the site.

The results of the organic and inorganic analyses of these samples are presented in Table 3. Additionally, three grab background surface soil samples were collected for lead analysis from the areas adjacent to the site. Background surface soil sample analytical data are presented in Table 4.

A total of 24 semivolatile organic compounds (SVOCs), including 19 polynuclear aromatic hydrocarbons (PAHs) and five phthalates, were found in the nine soil samples analyzed for TCL BNAs (E Building Addition, F Building/F Building Extension, Boosting Building, Moulding Room, Lead foundry, Central Factory Building, Oil House, Operational Area of Unknown Use, and open yard and loading dock). No PAHs were detected in the samples collected from the Boosting Building (SS-PCW-03) and the Oil House (SS-PCW-10); however, the quantitation limits for the analyses of these samples were high due to medium extraction levels (see Attachment B). Consequently, the absence of PAHs in these samples may be an artifact of the raised quantitation limits.

One PCB, Aroclor 1254, was detected in seven of the 11 soil samples analyzed for PCBs. PCB concentrations ranged from 930 $\mu\text{g/kg}$ (in the Moulding Room sample) to 21,000 $\mu\text{g/kg}$ (in the E Building Addition sample). PCBs were not detected in the samples collected from the Air Room (SS-PCW-08), the Electrical Substation (SS-PCW-13), or the open yard and loading dock (SS-PCW-12). Pesticide analysis results were also reported for all the samples submitted for TCL PCB analyses as part of the contract laboratory program reporting. A total of 16 pesticides was detected in the 11 samples: methoxychlor was detected in nine of the samples; heptachlor epoxide was detected in seven samples; endrin ketone and DDT were detected in five samples; and dieldrin was detected in four samples (see Table 3). The sample collected at the open yard and loading dock contained the lowest concentrations of pesticides.

Lead was detected in the three background surface soil samples at concentrations ranging from 201 mg/kg to 1,400 mg/kg (see Table 4). Lead was detected at elevated concentrations in all 10 soil samples analyzed for total lead. Concentrations of lead ranged from 2,350 mg/kg (in the E Building Addition sample) to 178,000 mg/kg (in the Storage Plate Area sample) and exceeded the background lead concentrations.

One of the sample SS-PCW-01 (E Building Addition sample) aliquots was collected beneath the concrete at an area with yellow staining suspected to be the result of acid leaks or spills. pH was measured for all the samples submitted for BNA and PCB analyses as part of these analyses. The 4.9 pH measured for sample SS-PCW-01 was much lower than the pH measured in the other soil samples.

Several TICs including unknown PAHs, other unknown aromatics, unknown oxygenated hydrocarbons, other unknown hydrocarbons, unknown alkyl amine, hexadecanoic acid,

octadecanoic acid, unknown carboxylic esters, methoxychlor isomers, nonylphenol isomers, unknown alkyl phenols, anthracenedione, a benxonaphthothiophene isomer, straight-chain alkanes, an unknown terpene, and a benzocarbazole isomer were detected in the surface soil samples. The highest estimated concentration of total TICs was 467.38 $\mu\text{g/kg}$ and was detected in sample SS-PCW-10 (Oil House sample).

Sediment/Sludge Results

One sludge sample and a duplicate were also collected from the linear central floor drain located in the Central Factory Building. The results for this sludge sample and the field duplicate are presented in Table 5. Seven PAHs were detected in sample SD-PCW-01 and nine PAHs were detected in duplicate sample SD-PCW-01/D. One PCB, Aroclor 1254, was detected at an estimated concentration of 1,800 $\mu\text{g/kg}$ in sludge sample SD-PCW-01 and 1,200 $\mu\text{g/kg}$ in the duplicate sample (SD-PCW-01/D). Elevated concentrations of lead were detected in both samples. Lead was detected in sample SD-PCW-01 at a concentration of 225,000 mg/kg and in sample SD-PCW-01/D at a concentration of 270,000 mg/kg.

Several TICs including unknown PAHs, unknown oxygenated hydrocarbons, unknown hydrocarbons, and unknown aromatics were detected in the sludge samples at total estimated concentrations of 243.41 $\mu\text{g/kg}$ in SD-PCW-01 and 372.66 $\mu\text{g/kg}$ in SD-PCW-01/D.

Paint Chip Sample

One paint chip sample was collected from the wooden beams in the Moulding Room and was submitted for TCLP lead analysis. The TCLP analysis result was 42.3 mg/L (see Table 6).

Comparison to Regulatory Criteria

Several SVOCs, PCB Aroclor 1254, and lead concentrations exceeded New York State Department of Environmental Conservation (NYSDEC) Technical and Administrative Guidance Memorandum (TAGM) 4046 criteria and EPA Region 3 Risk-based Concentrations (RBCs) in several samples. Table 7 presents a comparison of the sample analytical data to the above regulatory criteria.

Analysis of the 13 surface soil samples indicates the presence of 24 SVOCs, including 19 PAHs and five phthalates. PAH concentrations exceeding NYSDEC criteria and EPA RBCs were detected in seven of the soil samples. Ten of these PAHs, including phenanthrene, fluoranthene, pyrene, chrysesne, benzo(a)anthracene benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(g,h,i)perylene, and ideno(1,2,3-cd)pyrene, were detected at concentrations exceeding NYSDEC criteria. The concentrations of five of these PAHs also exceed EPA Region 3 RBCs.

Elevated PAH concentrations were detected in the samples collected from the E Building

Addition, F Building/F Building Extension, Moulding Room, Lead Foundry, Central Factory Building, Operational Area of Unknown Use, and the open yard and loading dock. Four PAHs were detected at concentrations exceeding EPA RBCs in the samples collected from the Central Factory Building, E Building Addition, and F Building/F Building Extension; two PAHs were detected at concentrations exceeding EPA RBCs in the samples collected from the Moulding Room, Lead Foundry, and open yard and loading dock; one PAH was detected at a concentration above the RBC in the sample collected from the Operational Area of Unknown Use.

Although PAHs were not detected in samples SS-PCW-03 (Oil House) or SS-PCW-10 (Boosting Building), PAHs may be present at concentrations below the quantitation limits but above screening levels. The quantitation limits of 14,000 $\mu\text{g/kg}$ for sample SS-PCW-03 and 20,000 $\mu\text{g/kg}$ for sample SS-PCW-10 exceed NYSDEC criteria for naphthalene, dibenzofuran, and chrysene and exceed EPA RBCs and NYSDEC criteria for benzo(a) anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, and indeno(1,2,3-cd)pyrene.

PCB concentrations exceeded the NYSDEC criterion in eight samples. Moreover, in two (E Building Addition and F Building/F Building Extension samples) of these eight samples, concentrations also exceeded the EPA RBCs. One pesticide, heptachlor epoxide, was detected in seven samples at concentrations exceeding the NYSDEC criterion. The concentration of heptachlor epoxide in the sample from Central Factory Building also exceeded the EPA RBC. Dieldrin was detected at concentrations above NYSDEC criteria in four samples; aldrin was detected at concentrations above NYSDEC criteria in three samples; endrin was detected at concentrations above NYSDEC criteria in two samples; and gamma-BHC (lindane) and methoxychlor were detected at concentrations above NYSDEC criteria in one sample. The samples collected from the Central Factory Building, E Building Addition, and F Building/F Building Extension contained at least three pesticides each at concentrations exceeding the NYSDEC criteria.

Lead concentrations exceeded the NYSDEC criterion and EPA RBC in all 10 samples analyzed.

Concentrations of five PAHs and Aroclor 1254 in the sediment samples exceeded NYSDEC criteria. Benzo(a)pyrene and lead concentrations in both sludge samples exceeded both NYSDEC criteria and the EPA RBCs.

Finally, the TCLP analysis of the paint chip sample result of 42.3 mg/L exceeds USEPA's threshold of value of 5 mg/L.

Asbestos Sampling Results

Two samples of pipe insulation and one sample of roofing material suspected of containing asbestos were collected inside the main building at the site. Analytical results indicate that all

three samples contained more than 10% asbestos, and should be considered as ACM. The specific type of asbestos and respective concentration in each sample is summarized in Table 8.

A general quantification of these materials was performed during the sampling effort. This quantification indicated that more than 1,000 linear feet of both types of pipe insulation were present in the building. Moreover, the total area of roofing which is constructed of the same materials as those found collapsed in the Storage/Inspection area (tar and felt roofing materials) should be considered as ACM and handled appropriately. Also, during the building inspection, floor tiles that typically contain asbestos were observed in the west side of the Central Factory Building. Such materials are classified as "Presumed ACM" and are not sampled during initial asbestos surveys.

Draft Remedial Cost Analysis

In October 1999, a draft remedial analysis was prepared based on the above-presented data in accordance with the scope of work presented to the City of Niagara Falls in E & E's letter dated August 11, 1999. This cost analysis does not include costs for the actual demolition of buildings at the site, the asbestos survey, or additional sampling that may be required for disposal of site materials. A copy of this analysis is presented in Attachment C.

Conclusions and Recommendations

Data Limitations and Recommendations for Future Work

Site sampling locations were selected to represent the overall site conditions. Most of the soil samples collected were composite samples consisting of two to five aliquots collected from the same room or operational area. To better identify the source of contamination detected within each sampled area, multiple single-source grab samples will be required. A number of drains and sumps were found in the building and according to the FSP were not sampled. Therefore, E & E also recommends sampling of these drains and sumps. A human health risk evaluation should be performed prior to building demolition to determine risk to workers.

A total of three asbestos samples was collected from the main building; however, additional asbestos sampling will be needed if this material is removed. Before the building is demolished, a complete asbestos survey will be necessary to determine the quantity of ACM to be removed.

As previously noted, the investigation was performed only at the ground level of the building due to the severely dilapidated and unsafe condition of the building. As a result, the basement and upper floors were not inspected. Sampling was limited only to surface soils and precursory materials sampling (asbestos and paint).

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Indications of Contaminant Sources

Lead was detected at concentrations exceeding NYSDEC regulatory criteria at all the locations sampled, including the open yard. In addition, elevated PCB and PAHs concentrations were detected in most of the rooms and operational areas sampled. The source of these compounds is most likely associated with the activities conducted in the warehouse at the time of operation. The source of pesticides in the samples collected inside the buildings is unknown. The source of elevated PCB, PAH, and lead concentrations in the central drain is also unknown.

If you have any questions regarding this submittal, please contact Jon Nickerson or me at 716/684-8060.

Sincerely,
Ecology and Environment Engineering, P.C.

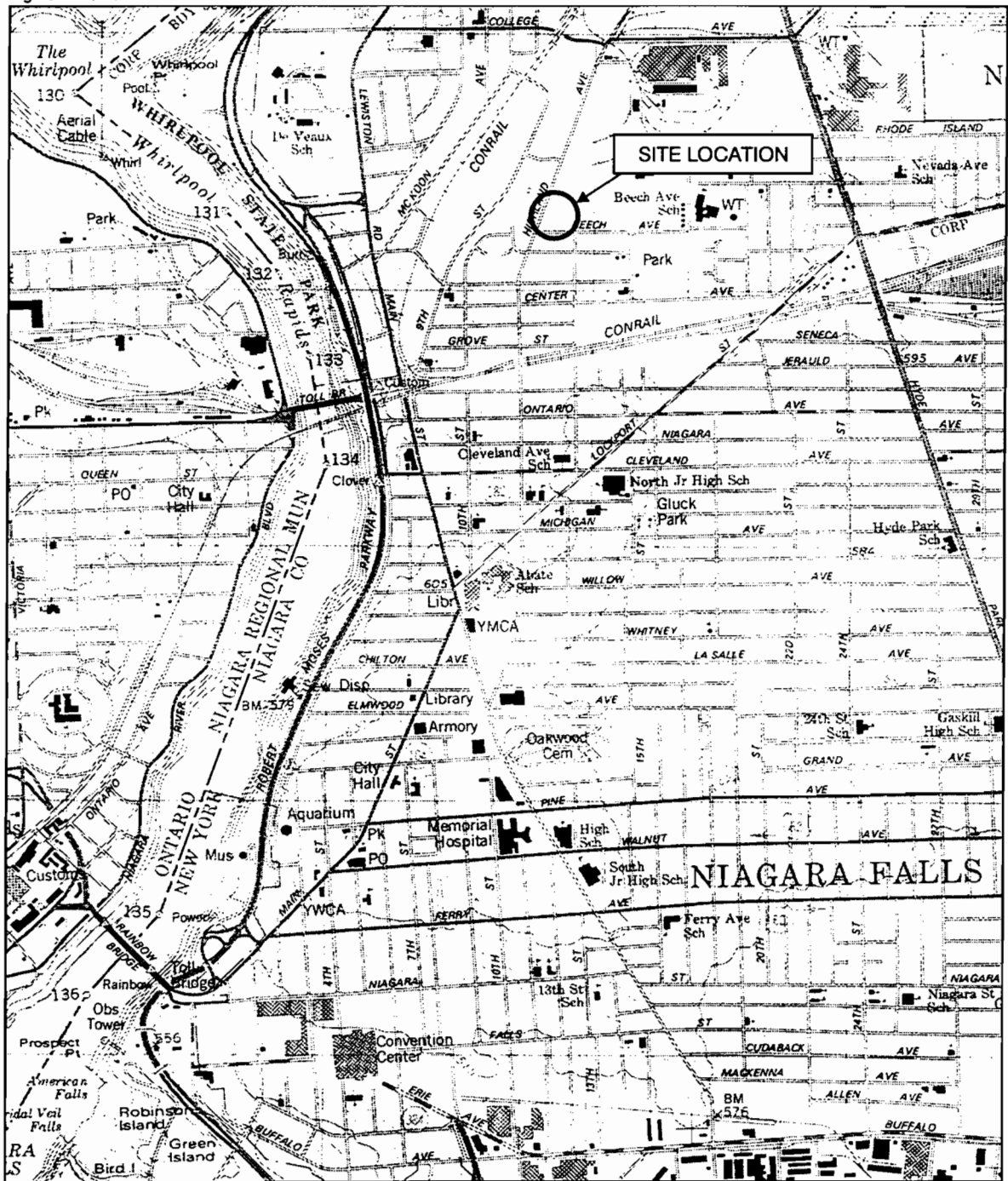
A handwritten signature in black ink, appearing to read 'Lea Angelaki', is written over the printed name.

Lea Angelaki
Project Manager

attachments

cc: Jon Nickerson, CHMM (E & E)
CTF-NF01

FIGURES



SOURCE: USGS 7.5 Minute Series (Topographic) Quadrangle: Niagara Falls, NY - Ont., 1980.

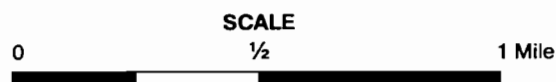
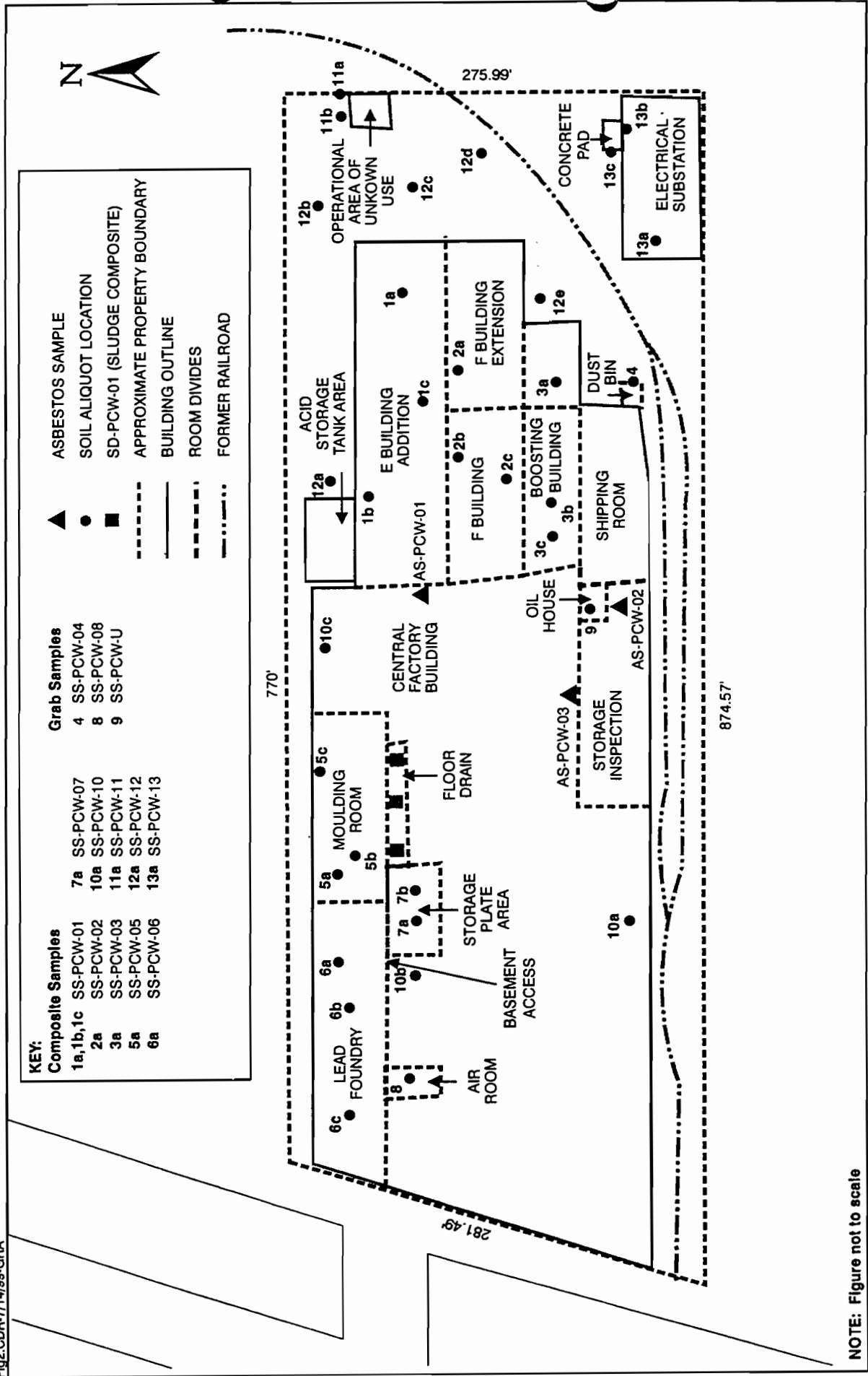


**Figure 1 POWER CITY WAREHOUSE SITE,
NIAGARA FALLS, NY**



NOTE: Figure not to scale

Figure 2 SITE PLAN WITH APPROXIMATE SAMPLE LOCATIONS
POWER CITY WAREHOUSE SITE
NIAGARA FALLS, NEW YORK

TABLES

**Table 1 Sample Summary,
Power City Warehouse Site**

Sample Number	Sample Location	Sample Type ^a	Sample Analyses
Surface Soil Samples from Operational Rooms			
SS-PCW-01	E Building Addition	three-way Composite	TCL BNAs, PCBs; TAL Total Lead, pH
SS-PCW-02	F Building/F Building Extension	three-way Composite	TCL BNAs, PCBs; TAL Total Lead
SS-PCW-03	Boosting Building	three-way Composite	TCL BNAs, PCBs; TAL Total Lead
SS-PCW-04	Dust Bin	Grab	TAL Total Lead
Surface Soil Samples from Operational Rooms			
SS-PCW-05	Moulding Room	three-way Composite	TCL BNAs, PCBs; TAL Total Lead
SS-PCW-06	Lead Foundry	three-way Composite	TCL BNAs, PCBs; TAL Total Lead
SS-PCW-07	Storage Plate Area	two-way Composite	TAL Total Lead
SS-PCW-08	Air Room	Grab	TCL PCBs
SS-PCW-09	Central Factory Building	three-way Composite	TCL BNAs, PCBs; TAL Total Lead
SS-PCW-10	Oil House	Grab	TCL BNAs, PCBs
Composite Operational Areas Surface Soil Samples			
SS-PCW-11	Operational Area of Unknown Use	two-way Composite	TCL BNAs, PCBs; TAL Total Lead
SS-PCW-13	Electrical Substation	three-way Composite	TCL PCBs
Composite Open Yard and Loading Dock Sample			
SS-PCW-12	Open Yard and Loading Dock	five-way Composite	TCL BNAs, PCBs; TAL Total Lead

Table 1 (continued)

Sample Number	Sample Location	Sample Type ^a	Sample Analyses
Composite Sediment Samples			
SD-PCW-01	Central Floor Drain	three-way Composite	TCL BNAs, PCBs; TAL Total Lead
SD-PCW-01/D	Central Floor Drain	three-way Composite	TCL BNAs, PCBs; TAL Total Lead
Materials Samples			
PT-PCW-01	Lead Paint	Composite	TCLP Lead
SS-PCW-01	Potential ACM	Grab	Polarized Light Microscopy
Background Samples			
SS-PCW-BK01	Southeast of corner of Profit Lane and 9 th Street	Grab	TAL Total Lead
SS-PCW-BK02	Tulip Corporation yard on Highland Avenue north of Power City Warehouse	Grab	TAL Total Lead
SS-PCW-BK03	East of Doris Jones Tennis Courts (Highland Avenue)	Grab	TAL Total Lead
^a Composite samples are identified by the number of aliquots which comprise the total sample. For example, a three-way composite is a composite sample consisting of three aliquots Key: ACM = asbestos-containing material AS = asbestos sample BK = background sample BNA = base/neutral acid extractable organic compound /D = duplicate sample PCB = polychlorinated biphenyl PCW = Power City Warehouse Site PT = paint chips sample SD = sediment/sludge sample SS = surface soil sample TAL = target analyte list TCL = target compound list TCLP = toxicity characteristic leaching procedure			

**Table 2 Descriptions of Surface Soil and Sediment Sampling Locations
 (Individual Aliquots and Grab Samples),
 Power City Warehouse Site**

Sample Number	Building/Room	Aliquot Number	Aliquot / Grab Sample Location
Surface Soil Samples from Operational Rooms			
SS-PCW-01	E Building Addition	1a	Inside a covered round sump at the east side of the E Building Addition.
		1b	Yellow-stained brick floor at the north side of the E Building Addition.
		1c	Underneath brick floor with dark staining.
SS-PCW-02	F Building/F Building Extension	2a	Inside a 12-inch, round floor drain in the F Building Extension, east of the collapsed roof.
		2b	Underneath the red brick floor at the north section of F Building.
		2c	Adjacent to a big pile of miscellaneous debris at the south section of F Building.
SS-PCW-03	Boosting Building	3a	Inside a 14-inch drain at the east side of the Boosting Building.
		3b	Inside a sump located in the center section of the Boosting Building. Water was preset in the sump.
		3c	At a seam on the floor to which any spills or leaks in this area would flow (west side of the Boosting Building).
SS-PCW-04	Dust Bin	Grab	From an area of visible soil

Table 2 (continued)

Sample Number	Sample Location	Aliquot Number	Aliquot Location
Surface Soil Samples from Operational Rooms			
SS-PCW-05	Moulding Room	5a	Inside a 4-inch floor drain at the west side of the Moulding Room.
		5b	Approximately 25 feet south of the north wall of the room.
		5c	Adjacent to the north wall.
SS-PCW-06	Lead Foundry	6a	From a sump-like elbow access port covered with wooden blocks located approximately 6 feet from the north wall (6 inches of water in the sump).
		6b	In the center of the Lead Foundry from the only low point in the concrete floor from which soil was easily accessible.
		6c	Inside the floor drain on the west side of the Lead Foundry.
SS-PCW-07	Storage Plate Area	7a	Underneath the heavily broken up concrete floor.
		7b	Underneath the heavily broken-up concrete floor east of aliquot 1b.
SS-PCW-08	Air Room	Grab	From an area with visible oil staining on the floor.
SS-PCW-09	Central Factory Building	9a	Underneath the heavily broken-up concrete floor in the south section of the room.
		9b	From a 2-inch drain in the north section of the room southwest of the basement access.
SS-PCW-09		9c	Underneath the brick floor, approximately 8 feet south of the north wall in the east side of the room.
SS-PCW-10	Oil House	Grab	Inside a floor drain in the middle of the room.

Table 2 (continued)

Sample Number	Sample Location	Aliquot Number	Aliquot Location
Composite Operational Areas and Open Yard and Loading Dock Surface Soil Samples			
SS-PCW-11	Operational Area of Unknown Use	11a	Adjacent to the outer northeast corner of the building, at the end of the concrete, the suspected location to which any spills or leaks in this area would flow.
		11b	Underneath the fractured area of the concrete ramp in the north side of the building.
SS-PCW-12	Open Yard and Loading Dock	12a	Adjacent to the loading dock at the north side of the main warehouse building, approximately 5 feet east of the east wall and 20 feet north of the north wall.
		12b	At the open yard, approximately 10 feet south of the property line and 10 feet east of the northeast corner of the E Building Addition.
		12c	At the open yard, approximately 21 feet east of the east wall of the E Building Addition and 41 feet south of the northeast corner of the E Building Addition.
		12d	At the open yard, approximately 27 feet east of the east wall of the F Building Extension and 21 feet north of the southeast corner of the F Building Extension.
SS-PCW-12		12e	At the open yard, approximately 3 feet east of the east wall of the Boosting Building and 5 feet south of the south wall of the F Building Extension.

Table 2 (continued)

Sample Number	Sample Location	Aliquot Number	Aliquot Location
SS-PCW-13	Electrical Substation	13a	At a seam in the concrete floor between rooms in the northeast side of the substation foundation, approximately 5 feet east of the F Building Extension in southeast corner and 20 feet south of the transformer pad.
		13b	Adjacent to the transformer pad located in the northeast corner of the building, approximately 3 feet south of the southeast corner of the transformer pad.
		13c	Adjacent to the west side of the transformer pad.
Composite Sediment Samples			
SD-PCW-01 and SD-PCW-01/D	Central Floor Drain	1a, 1b, and 1c	The three aliquots were collected at equal distances along the length of the drain.
Key: /D = duplicate sample PCW = Power City Warehouse Site SD = sediment/sludge sample SS = surface soil sample			

**Table 3 Positive Analytical Results Summary, Surface Soil,
Power City Warehouse, Niagara Falls, New York**

Sample ID: Location:	SS-PCW-01 E Building Addition	SS-PCW-02 F Building/ F Extension	SS-PCW-03 Boosting Building	SS-PCW-04 Dust Bin	SS-PCW-05 Moulding Room
TCL BNA (µg/kg)					
Naphthalene	1,100 J	ND	ND	NA	ND
2-methylnaphthalene	510 J	ND	ND	NA	ND
Acenaphthylene	580 J	ND	ND	NA	ND
Acenaphthene	3,900 J	4,600 J	ND	NA	ND
Dibenzofuran	2,400 J	2,700 J	ND	NA	ND
Diethylphthalate	ND	ND	ND	NA	ND
Fluorene	3,500 J	3,100 J	ND	NA	ND
Phenanthrene	33,000 D	91,000	ND	NA	5,500 J
Anthracene	12,000	7,400 J	ND	NA	ND
Carbazole	4,600	7,600 J	ND	NA	ND
Di-n-Butylphthalate	ND	ND	ND	NA	ND
Fluoranthene	53,000 D	87,000 D	ND	NA	10,000 J
Pyrene	50,000 D	100,000 D	ND	NA	9,100 J
Butylbenzylphthalate	ND	1,700 J	13,000 J	NA	ND
Benzo(a)anthracene	2,800	22,000	ND	NA	3,900 J
Chrysene	22,000 D	35,000	ND	NA	6,400 J
bis(2-Ethylhexyl)phthalate	5,300	1,400 J	1,800 J	NA	3,100 J
Di-n-Octyl Phthalate	ND J	2,000 J	ND	NA	ND
Benzo(b)Fluoranthene	23,000 D	33,000 D	ND	NA	7,500 J
Benzo(k)Fluoranthene	24,000 D	38,000 D	ND	NA	6,400 J
Benzo(a)pyrene	30,000 J	28,000 D	ND	NA	4,900 J
Indeno(1,2,3-cd)pyrene	9,800 J	7,700 J	ND	NA	1,500 J
Dibenz(a,h)anthracene	3,600 J	2,500 J	ND	NA	ND
Benzo(g,h,i)perylene	8,900 J	6,300 J	ND	NA	1,600 J

Table 3 (continued)

Sample ID: Location:	SS-PCW-01 E Building Addition	SS-PCW-02 F Building/ F Extension	SS-PCW-03 Boosting Building	SS-PCW-04 Dust Bin	SS-PCW-05 Moulding Room
TCL Pesticide/PCB (µg/kg)					
Aldrin	120	92	ND	NA	ND
Heptachlor Epoxide	390	310	ND	NA	130
Dieldrin	260	110 J	ND	NA	ND
Endrin	290	ND	ND	NA	ND
Endosulfan Sulfate	120	ND	ND	NA	ND
4,4'-DDT	260	120 J	ND	NA	ND
Methoxychlor	950	ND	1,800	NA	300 J
Endrin Ketone	140	150	ND	NA	ND
gamma-Chlordane	150	ND	ND	NA	ND
Aroclor 1254	21,000	7,900	1,300 J	NA	930 J
TAL Metals (mg/kg)					
Lead	2,350	3,540	3,650	11,300	19,200
pH (s.u)					
pH	4.9	6.3	7.2	NA	7.8
Key: BNA = base/neutral acid extractable organic compound D = diluted sample analysis, no affect on data usability J = estimated value NA = sample not analyzed for this compound ND = compound not detected PCB = polychlorinated biphenyl PCW = Power City Warehouse Site SS = surface soil sample s.u. = standard units TAL = target analyte list µg/kg = micrograms per kilogram mg/kg = milligrams per kilogram					

**Table 3 (continued) Positive Analytical Results Summary, Surface Soil,
Power City Warehouse, Niagara Falls, New York**

Sample ID: Location:	SS-PCW-06 Lead Foundry	SS-PCW-07 Storage Plate Area	SS-PCW-08 Air Room	SS-PCW-09 Central Factory Bldg.
TCL BNA (µg/kg)				
Naphthalene	ND	NA	NA	2,800 J
2-methylnaphthalene	ND	NA	NA	1,200 J
Acenaphthylene	ND	NA	NA	640 J
Acenaphthene	ND	NA	NA	6,600
Dibenzofuran	ND	NA	NA	4,400 J
Diethylphthalate	ND	NA	NA	ND
Fluorene	ND	NA	NA	5,700
Phenanthrene	6,500 J	NA	NA	68,000 D
Anthracene	ND	NA	NA	19,000
Carbazole	ND	NA	NA	9,000
Di-n-Butylphthalate	ND	NA	NA	790 J
Fluoranthene	13,000 J	NA	NA	63,000 D
Pyrene	11,000 J	NA	NA	130,000 DJ
Butylbenzylphthalate	ND	NA	NA	ND
Benzo(a)anthracene	4,300 J	NA	NA	29,000
Chrysene	7,700 J	NA	NA	36,000
bis(2-Ethylhexyl)phthalate	ND	NA	NA	2,000 J
Di-n-Octyl Phthalate	ND	NA	NA	ND
Benzo(b)Fluoranthene	8,100 J	NA	NA	35,000 J
Benzo(k)Fluoranthene	7,800 J	NA	NA	39,000 J
Benzo(a)pyrene	4,800 J	NA	NA	31,000 J
Indeno(1,2,3-cd)pyrene	1,900 J	NA	NA	7,500 J
Dibenz(a,h)anthracene	ND	NA	NA	2,700 J
Benzo(g,h,i)perylene	ND	NA	NA	7,300 J
TCL Pesticide/PCB (µg/kg)				
beta-BHC	73 J	NA	ND	87
delta-BHC	280	NA	ND	240
gamma-BHC	79 J	NA	ND	54 J
Heptachlor	ND	NA	ND	55 J
Aldrin	ND	NA	ND	210
Heptachlor Epoxide	200	NA	ND	700

Table 3 (continued)

Sample ID: Location:	SS-PCW-06 Lead Foundry	SS-PCW-07 Storage Plate Area	SS-PCW-08 Air Room	SS-PCW-09 Central Factory Bldg.
Dieldrin	ND	NA	ND	240
Endrin	ND	NA	ND	330
Endosulfan II	ND	NA	ND	150
Endosulfan Sulfate	ND	NA	ND	210
4,4'-DDT	150 J	NA	ND	400
Methoxychlor	650 J	NA	ND	1,500
Endrin Ketone	120 J	NA	ND	340
Aroclor 1254	2,100 J	NA	ND	17,000
TAL Metals (mg/kg)				
Lead	137,000	178,000	NA	31,800
pH (s.u.)				
pH	7.3	NA	6.8	6.9
Key: - BNA = base/neutral acid extractable organic compound - D = diluted sample analysis, no affect on data usability - J = estimated value - NA = sample not analyzed for this compound. - ND = compound not detected - PCB = polychlorinated biphenyl - PCW = Power City Warehouse Site - SS = surface soil sample - s.u. = standard units - TAL = target analyte list - µg/kg = micrograms per kilogram - mg/kg = milligrams per kilogram				

**Table 3 (continued) Positive Analytical Results Summary, Surface Soil,
Power City Warehouse, Niagara Falls, New York**

Sample ID: Location:	SS-PCW-10 Oil House	SS-PCW-11 Area of Unknown Use	SS-PCW-12 Loading Dock & Open Yard	SS-PCW-13 Electrical Substation
TCL BNA (µg/kg)				
Naphthalene	ND	480	330 J	NA
2-methylnaphthalene	ND	300 J	230 J	NA
Acenaphthylene	ND	75 J	170 J	NA
Acenaphthene	ND	360 J	1,800	NA
Dibenzofuran	ND	310 J	830	NA
Diethylphthalate	ND	55 J	ND	NA
Fluorene	ND	360 J	1,300	NA
Phenanthrene	ND	4,200 D	17,000 D	NA
Anthracene	ND	710	4,100 DJ	NA
Carbazole	ND	450	1,300	NA
Di-n-Butylphthalate	ND	100 J	ND	NA
Fluoranthene	ND	4,800 D	21,000 D	NA
Pyrene	ND	6,900 D	20,000 D	NA
Butylbenzylphthalate	ND	150 J	220 J	NA
Benzo(a)anthracene	ND	1,800 D	6,500 D	NA
Chrysene	ND	2,300 D	7,100 D	NA
bis(2-Ethylhexyl)phthalate	3,300 J	570 J	160 J	NA
Di-n-Octyl Phthalate	ND	ND J	ND	NA
Benzo(b)Fluoranthene	ND	2,500 J	6,300 D	NA
Benzo(k)Fluoranthene	ND	2,400 J	6,500 D	NA
Benzo(a)pyrene	ND	2,000 J	6,500 D	NA
Indeno(1,2,3-cd)pyrene	ND	800 J	2,200 J	NA
Dibenz(a,h)anthracene	ND	300 J	820 J	NA
Benzo(g,h,i)perylene	ND	930 J	2,100 J	NA
TCL Pesticide/PCB (µg/kg)				
beta-BHC	ND	70	ND	ND
gamma-BHC	ND J	55	ND	ND
Heptachlor	ND	65	ND	ND
Heptachlor Epoxide	ND	ND	74	180
Dieldrin	ND J	110	ND	ND

Table 3 (continued)

Sample ID: Location:	SS-PCW-10 Oil House	SS-PCW-11 Area of Unknown Use	SS-PCW-12 Loading Dock & Open Yard	SS-PCW-13 Electrical Substation
4,4'-DDT	ND	200	ND	ND
Methoxychlor	380 J	37,000	140	810
Endrin Ketone	200 J	ND	ND	ND
Endrin aldehyde	ND	220	ND	ND
gamma-Chlordane	ND	69	ND	ND
Aroclor-1260	3,700	3,800 J	ND	ND
TAL Metals (mg/kg)				
Lead	NA	8,240	2,790	NA
pH (s.u.)				
pH	8	9.6	8.5	8.8
Key: BNA = base/neutral acid extractable organic compound D = diluted sample analysis, no affect on data usability J = estimated value NA = sample not analyzed for this compound ND = compound not detected PCB = polychlorinated biphenyl PCW = Power City Warehouse Site SS = surface soil sample s.u. = standard units TAL = target analyte list TCL = target compound list µg/kg = micrograms per kilogram mg/kg = milligrams per kilogram.				

**Table 4 Positive Analytical Results Summary, Background Surface Soil,
Power City Warehouse, Niagara Falls, New York**

Sample ID: Location:	SS-PCW-BK01 Background	SS-PCW-BK02 Background	SS-PCW-BK03 Background
TAL Metals (mg/kg)			
Lead	201	1400	281
Key: BK = background sample PCW = Power City Warehouse Site SS = surface soil sample TAL = target analyte list mg/kg = milligrams per kilogram			

TULIP CORP.
YARD

**Table 5 Positive Analytical Results Summary, Sediment/Sludge,
Power City Warehouse, Niagara Falls, New York**

Sample ID:	SD-PCW-01	SD-PCW-01/D
Location:	Central Floor Drain	Central Floor Drain
TCL BNA ($\mu\text{g/kg}$)		
Phenanthrene	1,800 J	5,500 J
Fluoranthene	2,700 J	6,100 J
Pyrene	2,400 J	5,000 J
Benzo(a)anthracene	ND	2,400 J
Chrysene	1,800 J	3,400 J
Benzo(b)Fluoranthene	2,400 J	3,100 J
Benzo(k)Fluoranthene	2,100 J	3,900 J
Benzo(a)pyrene	2,100 J	2,900 J
Benzo(g,h,i)perylene	ND	1,600 J
TCL Pesticide/PCB ($\mu\text{g/kg}$)		
Aroclor 1254	1,800 J	1,200 J
TAL Total Lead (mg/kg)		
Lead	225,000	270,000
pH (s.u.)		
pH	8.3	8.3
Key:		
BNA = base/neutral acid extractable organic compound J = estimated value ND = compound not detected PCB = polychlorinated biphenyl PCW = Power City Warehouse Site SD = sediment sample s.u. = standard units TAL = target analyte list TCL = target compound list $\mu\text{g/kg}$ = micrograms per kilogram mg/kg = milligrams per kilogram		

**Table 6 Analytical Results Summary, Paint Chips,
Power City Warehouse, Niagara Falls, New York**

Sample ID:	PT-PCW-01
Location:	Paint - Moulding Room
TCLP Lead (mg/L)	42.3
Key:	
PCW = Power City Warehouse Site TCLP = toxicity characteristic leaching procedure mg/L = milligrams per liter	

**Table 7 Summary of Screening of Analytical Results for Surface Soil,
 Power City Warehouse, Niagara Falls, New York**

Compound	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Local Background Concentration	EPA Region 3 Industrial Soil RBC	Frequency of Detections Exceeding RBC	NYSDEC TAGM 4046 Level	Frequency of Detections Exceeding TAGM 4046
Semi-Volatile Organics (mg/kg)								
Naphthalene	4/9	0.33 J	2.80 J	ND	41,000	0/9	13 ^d	0/9
2-methylnaphthalene	3/9	0.23 J	1.2 J	ND	41,000 ^a	0/9	36.4 ^d	0/9
Acenaphthylene	4/9	0.075 J	0.64 J	ND	41,000 ^a	0/9	41 ^d	0/9
Acenaphthene	5/9	0.36 J	6.60	0.065 J	120,000	0/9	50 ^e	0/9
Dibenzofuran	5/9	0.31 J	4.40 J	ND	8,200	0/9	6.2 ^d	0/9
Diethylphthalate	1/9	0.055 J	0.055 J	ND	1,600,000	0/9	7.1	0/9
Fluorene	5/9	0.36 J	5.70	ND	82,000	0/9	50 ^e	0/9
Phenanthrene	7/9	4.20 D	91.00	0.45	41,000 ^a	0/9	50 ^e	2/9
Anthracene	5/9	0.71	19.00	0.1 J	610,000	0/9	50 ^e	0/9
Carbazole	5/9	0.45	9.00	0.071 J	290,000 ^b	0/9	NA	NA
Di-n-butylphthalate	1/9	0.10 J	0.79 J	ND	200,000	0/9	8.1 ^d	0/9
Fluoranthene	7/9	4.8 D	87.00 D	0.67	82,000	0/9	50 ^e	3/9
Pyrene	7/9	6.9 D	130.00 DJ	0.63	61,000	0/9	50 ^e	2/9
Butylbenzylphthalate	4/9	0.15 J	13.00 J	ND	410,000	0/9	50 ^e	0/9
Benzo(a)anthracene	7/9	1.80 D	29.00	0.4 J	7.8 ^b	2/9	0.224 ^f	7/9
Chrysene	7/9	2.30	36.00	0.48	780 ^b	0/9	0.4 ^d	7/9
bis(2-ethylhexyl)phthalate	8/9	0.16 J	5.30	ND	410	0/9	50 ^e	0/9
Di-n-octylphthalate	1/9	2.00 J	2.00 J	ND	410,000	0/9	50 ^e	0/9
Benzo(b)Fluoranthene	7/9	2.50	39.00	0.35 J	7.8 ^b	4/9	1.1 ^d	7/9

Table 7 (continued)

Compound	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Local Background Concentration	EPA Region 3 Industrial Soil RBC	Frequency of Detections Exceeding RBC	NYSDEC TAGM 4046 Level	Frequency of Detections Exceeding TAGM 4046
Semi-Volatile Organics (mg/kg)								
Benzo(k)Fluoranthene	7/9	2.40	39.00 J	0.36 J	78 ^b	0/9	1.1 ^d	7/9
Dibenz(a,h)anthracene	6/9	0.30 J	12.0 J	0.13 J	0.78 ^b	5/9	0.014 ^f	6/9
Benzo(a)pyrene	7/9	2.00	31.00 J	0.41 J	0.78 ^b	7/9	0.061 ^f	7/9
Indeno(1,2,3-cd)pyrene	7/9	0.80	9.80	0.29 J	7.8 ^b	1/9	3.2 ^d	3/9
Benzo(g,h,i)perylene	6/9	0.93	8.90	0.34 J	NA	NA	50 ^c	0/9
Pesticides/PCBs (mg/kg)								
beta-BHC	3/11	0.070	0.087	ND	NA	NA	0.2	0/11
delta-BHC	2/11	0.24	0.28	ND	NA	NA	0.3	0/11
gamma-BHC	3/11	0.054 J	0.079 J	ND	4.4	0/11	0.06	1/11
Heptachlor	2/11	0.055	0.065	ND	1.3	0/11	0.10	0/11
Aldrin	3/11	0.092	0.21	ND	0.34	0/11	0.041	3/11
Heptachlor Epoxide	7/11	0.074	0.70	0.0025 J	0.63	1/11	0.02	7/11
Dieldrin	4/11	0.11	0.26	0.3 D	0.36	0/11	0.044	4/11
Endrin	2/11	0.29	0.33	ND	610	0/11	0.10	2/11
Endosulfan II	1/11	0.15	0.15	ND	NA	0/11	0.9	0/11
Endosulfan Sulfate	2/11	0.12	0.21	ND	NA	0/11	1.0	0/11
4,4'-DDT	5/11	0.12 J	0.40	ND	17	0/11	2.1	0/11
Methoxychlor	9/11	0.14	37	ND	10000	0/11	10	1/11
Endrin Ketone	5/11	0.12	0.34	ND	NA	NA	NA	NA
Endrin aldehyde	1/11	0.22	0.22	ND	NA	NA	NA	NA

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Table 7 (continued)

Compound	Frequency of Detection	Minimum Concentration Detected	Maximum Concentration Detected	Local Background Concentration	EPA Region 3 Industrial Soil RBC	Frequency of Detections Exceeding RBC	NYSDEC TAGM 4046 Level	Frequency of Detections Exceeding TAGM 4046
gamma-Chlordane	2/11	0.069	0.15	ND	16	0/11	0.54	0/11
Aroclor-1254	8/11	0.930 J	21,000	ND	2.9 ^b	5/11	1 ^g	7/11
Lead (mg/kg)	10/10	2,350	178,000	201-1,400	400 ^c	10/10	201-1,400	10/10

^a Corresponds to an upper-bound cancer risk of 1×10^{-6} .
^b RBC for naphthalene.
^c EPA screening level for lead in soil in residential setting.
^d Soil cleanup objective to protect groundwater quality.
^e Objective for individual SVOCs is <50 ppm.
^f Objective based on potential cancer risk for soil.

Key:

D = diluted sample analysis, no affect on data usability	EPA = Environmental Protection Agency
J = estimated value	mg/kg = milligrams per kilogram
ND = not detected	NYSDEC = New York State Department of Environmental Conservation
NA = no value or not applicable	PCB = polychlorinated biphenyl
ppm = parts per million	RBC = Risk-based Concentration
SVOC = semivolatile organic compound	TAGM = Technical and Administrative Guidance Memorandum

270,000
Talco Corporation

Table 8 Analytical Results Summary, Suspected Asbestos-containing Material, Power City Warehouse, Niagara Falls, New York

Sample Identification	Material Description	Asbestos Content	Other Content
AS-PCW-01	Magnesium TSI type 3" pipe insulation	30% Chrysotile	70% non-fibrous material
AS-PCW-02	"air-cell" type pipe insulation	68% Chrysotile	6% cellulose and 26% non-fibrous material
AS-PCW-03	roofing material	49% Chrysotile	3% synthetic and 48% non-fibrous material

ATTACHMENT A

Photolog

PHOTOGRAPHIC RECORD

SITE NAME: Power City Warehouse
SITE LOCATION: Niagara Falls, New York
JOB NUMBER: 000970.NF01.00.04.90

Photo Number:

1

Photographer:

L. Angelaki

Date:

5-6-99



Subject: Power City Warehouse exterior (west side).

Photo Number: 2

Photographer:

L. Angelaki

Date:

5-6-99



Subject: F Building.

PHOTOGRAPHIC RECORD

SITE NAME: Power City Warehouse
SITE LOCATION: Niagara Falls, New York
JOB NUMBER: 000970.NF01.00.04.90

Photo Number:

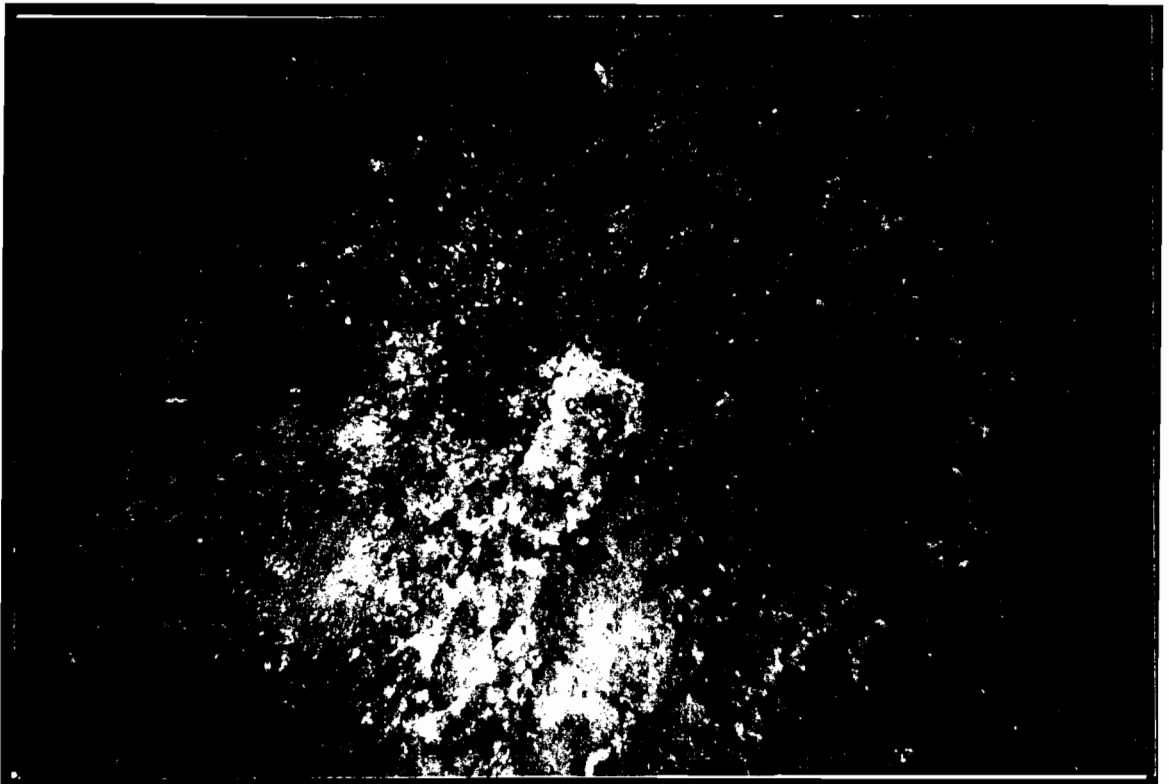
3

Photographer:

L. Angelaki

Date:

5-6-99



Subject: E Building Addition, yellow-stained floor probably caused by acid spill/leak.

Photo Number:

4

Photographer:

L. Angelaki

Date:

5-6-99



Subject: Central Factory Building and drain.

PHOTOGRAPHIC RECORD

SITE NAME: Power City Warehouse
SITE LOCATION: Niagara Falls, New York
JOB NUMBER: 000970.NF01.00.04.90

Photo Number:

5

Photographer:

L. Angelaki

Date:

5-6-99



Subject: Central Factory Building (east side).

Photo Number:

6

Photographer:

L. Angelaki

Date:

5-6-99



Subject: Shipping Room exterior (east side).

ATTACHMENT B

Data Usability Summary Report

Ecology and Environment, Inc., (E & E) Data Usability Summary Report (DUSR)	
Prepared by: <u>Marcia Meredith Galloway</u> Project Name: <u>Power City Warehouse</u> Project #: <u>000970-NF01-00-04-00</u>	Date Prepared: <u>July 12, 1999</u> Lab Name: <u>E & E Analytical Services Center</u>
Lab Report No.: <u>9901.360, 370</u> Report Date: <u>June 3, 1999</u> Date Sample(s) Taken: <u>May 6 and 7, 1999</u>	Sample Matrices: <u>19 Soils</u> <u>0 Water</u> Field QC Samples: <u>Field Dup SD-PCW-01/D</u>
Project Sample ID: = SS-PCW-01 to SS-PCW-13, SD-PCW-01, PT-PCW-01, and SS-PCW-BK01 to SS-PCW-BK03	
Specific analyses conducted on each sample are documented on the chain-of-custody (COC) forms and include the following: Target Compound List (TCL) Base Neutral Acid Extractables (BNAs), TCL Polychlorinated Biphenyls (PCBS), and Total Lead. All methods follow Contract Laboratory Procedures (CLP) found in New York State Department of Environmental Conservation (NYSDEC) Analytical Services Protocol (ASP) 10/95.	
The analytical data provided by the laboratory were reviewed for precision, accuracy, and completeness per NYSDEC Division of Environmental Remediation Guidance for the Development of DUSRs. Specific criteria for QC limits were obtained from the NYSDEC ASP 10/95. Qualifiers were assigned based on guidance in United States Environmental Protection Agency (USEPA) Functional Guidelines for Reviewing Organic and Inorganic Analyses. Compliance with the project QA program is indicated on the attached checklist and concerns are listed below. The checklist also indicates whether data qualification is required and/or the type of qualifier assigned. Qualifiers for specific samples were marked on copies of laboratory Form 1's and are attached to this DUSR.	
Major Concerns: None	
Minor Concerns:	
TCL BNAs -	
Samples SD-PCW-01, SD-PCW-01D, SS-PCW-01DL, SS-PCW-02, SS-PCW-03, SS-PCW-05, SS-PCW-06, and SS-PCW-10 were extracted using the medium level protocol due to matrix and the viscous nature of the extracts. The detection limits of these samples are elevated. For sample SS-PCW-01DL, the comparability of the results are not affected because the a low concentration run also was reported. For sample SS-PCW-02, the comparability of the results are not affected because the concentrations of contaminants are so high. For the remaining the samples, the medium level extraction resulted in no contaminants reported above the detection limit. Samples SD-PCW-01, SD-PCW-01D,, SS-PCW-05, and SS-PCW-06 had several polynuclear aromatic hydrocarbons reported below the detection limit and qualified "J" as estimated. For samples SS-PCW-03 and SS-PCW-10, the comparability of the data are affected by the high detection limits because only phthalates were detected in the samples which are typical of field or laboratory contamination. Since the samples could not be extracted by the laboratory at low level due to the viscous nature of the extracts, there is no corrective action necessary. These samples did contain high levels of PCBs and lead that exceed	

Ecology and Environment, Inc., (E & E)
Data Usability Summary Report (DUSR)

Prepared by: Marcia Meredith Galloway

Project Name: Power City Warehouse

Project #: 000970-NF01-00-04-00

Date Prepared: July 12, 1999

Lab Name: E & E Analytical Services Center

NYSDEC criteria, there the overall usability of the data are not affected. For sample SS-PCW-10, the tentatively identified compound (TICs) evaluation of the sample also confirmed the presence of the pesticide methoxychlor. No other significant TICs were reported in the samples analyzed at medium level.

Internal standard recoveries for the later eluting compounds were low for several samples due to hydrocarbon interferences from the sample matrix. In most cases, the diluted analysis of these samples gave acceptable internal standard recoveries confirming the matrix effects. Positive values and detection limits associated with the low internal standard recoveries are flagged "J" as estimated (see attached Form 1's). For sample SS-PCW-09, surrogate recoveries were diluted out and no data qualification are necessary. Recovery of the surrogate terphenyl-d14 was high for samples SS-PCW-11 and SS-PCW-12. Surrogate recoveries were acceptable for the secondary dilutions of these samples. No data qualification are necessary because only one surrogate was outside limits.

The level of several PAH compounds exceeded the calibrated range for samples SS-PCW-01, SS-PCW-02, SS-PCW-09, SS-PCW-11, and SS-PCW-12. The samples were reanalyzed at secondary dilutions. Results from both analyses are included in the laboratory. Results from the diluted analysis are reported as flagged "D". The results are acceptable with no affect on data usability.

Recovery of pyrene was erratic for the low level matrix spike/spike duplicate (MS/MSD) analysis of samples SS-PCW-01 due to the high concentration of pyrene native to this sample. RPD values for acenaphthene and pyrene were high for the low level MS/MSD due to the presence of compounds in the sample. Spiked blank recoveries were all within acceptable limits, and no data qualification are necessary.

TCL PCBs

Because the samples were analyzed by CLP methods, both pesticides and PCBs were reported. The pesticide results did not exceed any EPA risk-based criteria for industrial soils. The only high concentration pesticide was methoxychlor in samples collected outside the buildings. All samples were extracted using 1.0 gram of sample due to the high concentration of PCBs expected. Quantitation limits of were elevated, but there is no effect on data usability because PCBs were detected in the samples.

Samples were analyzed at secondary dilutions based on matrix or the level of target compounds present. As per the Statement of Work, all diluted samples were also analyzed 10 more concentrated. Results from both analyses are included in this report. In general, the lower dilution result was reported. All PCB results were confirmed on a second column in addition to the pattern recognition. If the percent difference of the concentrations of the PCBs in the original and confirmation exceeded 25, then the results were flagged "P" by the laboratory. The "P" flags were converted to "J" flags on

Ecology and Environment, Inc., (E & E)
Data Usability Summary Report (DUSR)

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Project Name: Power City Warehouse
Project #: 000970-NF01-00-04-00

Date Prepared: July 12, 1999
Lab Name: E & E Analytical Services Center

the final report indicating the concentrations are estimated.

Recovery of the surrogate decachlorobiphenyl exceeded advisory limits on the RTX-5 column for sample SS-PCW-08DL and on the RTX-35 column for SS-PCW-08DL, SS-PCW-09, SS-PCW-09DL, and SS-PCW-13. No corrective action was required and no data qualification are required because the reported result were already qualified for the concern due to the "P" flag.

TOTAL LEAD

Recovery limits were not applied to the matrix spike analysis of sample SS-PCW-01 since the sample concentration exceeded the spike amount added by more than four times.

DUSR CHECKLIST FOR LABORATORY REPORT #: <u>9901.360, 370</u>		CIRCLE ONE	QUALIFIERS
LABORATORY: <u>EVE ANALYTICAL SERVICES CENTER</u>			
1) Statements made in the Analytical Data Case Narrative supported by the analytical data ~~or indicated severe concerns?~~ <u>ANA 7/12/99</u>	☒ Yes ☐ No ☐ NA		
2) Coolers received properly with no discrepancies?	☒ Yes ☐ No ☐ NA		
3) Chain of custody records present and completed correctly?	☒ Yes ☐ No ☐ NA		
4) Samples correctly preserved and documented at lab?	☒ Yes ☐ No ☐ NA		
5) Analysis run as per the method in the work plan? <u>BACKGROUND SAMPLES ADD 50</u>	Yes ☒ No ☐ NA	<u>NONE</u>	
6) Holding times met for all matrices and analytical parameters?	☒ Yes ☐ No ☐ NA		
7) Instrument performance checks within acceptance criteria?	☒ Yes ☐ No ☐ NA		
8) Initial calibrations run correctly and within acceptance criteria?	☒ Yes ☐ No ☐ NA		
9) Daily calibrations run correctly and within acceptance criteria?	☒ Yes ☐ No ☐ NA		
10) Method blanks $\leq$ reporting limit and at rate of 1/20 samples? <u>One BNA TK, Acetophenone</u>	☒ Yes ☐ No ☐ NA		
11) Field blanks $\leq$ reporting limit and run per work plan?	Yes ☐ No ☒ NA		
12) Compounds found in blanks common lab and field contaminants?	Yes ☒ No ☐ NA		
13) Surrogates within the acceptance limits?	Yes ☒ No ☐ NA		
14) MS/MSD or MS/D analyzed at rate of 1/20 samples?	☒ Yes ☐ No ☐ NA		
15) MS/MSD or MS/D meet the %R and RPD acceptance criteria? <u>Spike compounds present in sample at high concentration</u>	Yes ☒ No ☐ NA	<u>None</u>	
16) LCS or ~~LSCD~~ analyzed at rate of 1/20 samples? <u>ANA 7/12/99</u>	☒ Yes ☐ No ☐ NA		
17) LCS ~~LSCD~~ meet the %R and RPD acceptance criteria? <u>ANA 7/12/99</u>	☒ Yes ☐ No ☐ NA		
18) Internal standards meet the acceptance criteria for GC/MS?	Yes ☒ No ☐ NA	<u>Yes "J"</u> <u>See attached</u>	
19) Field duplicate results $\leq$ 40 RPD waters and $\leq$ 70 RPD soils? <u>- trace level results are not considered in evaluation.</u>	☒ Yes ☐ No ☐ NA		
20) Dilutions made as required and were reporting levels elevated?	☒ Yes ☐ No ☐ NA		
21) Discrepancies noted when review of raw data (instrument printouts and chromatograms) was performed?	Yes ☒ No ☐ NA		
22) Did discrepancies noted above significantly impact the usability of the data based on data needs and objectives of the project?	Yes ☒ No ☐ NA		
Comments: _____			
Completed by: <u>Margie M. Gallows</u> Date: <u>7/12/99</u>			

1C
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

DEC SAMPLE NO.

SS-PCW-01

Lab Name: E & E INC.

Contract:

Lab Code: EANDE

Case No.: 9901.360 SAS No.:

SDG No.: SSPCW01

Matrix: (soil/water) SOIL

Lab Sample ID: 33106

Sample wt/vol: 30.6 (g/mL) G

Lab File ID: I7057

Level: (low/med) LOW

Date Received: 05/06/99

% Moisture: 21 decanted: (Y/N) N

Date Extracted: 05/10/99

Concentrated Extract Volume: 500.0 (uL)

Date Analyzed: 05/24/99

Injection Volume: 2.0 (uL)

Dilution Factor: 10.0

GPC Cleanup: (Y/N) Y pH: 4.9

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NO.

COMPOUND

Q

132-64-9-----	Dibenzofuran	2400	J
121-14-2-----	2,4-Dinitrotoluene	4100	U
84-66-2-----	Diethylphthalate	4100	U
7005-72-3-----	4-Chlorophenyl-phenylether	4100	U
86-73-7-----	Fluorene	3500	J
100-01-6-----	4-Nitroaniline	10000	U
534-52-1-----	4,6-Dinitro-2-methylphenol	10000	U
86-30-6-----	N-Nitrosodiphenylamine (1)	4100	U
101-55-3-----	4-Bromophenyl-phenylether	4100	U
118-74-1-----	Hexachlorobenzene	4100	U
87-86-5-----	Pentachlorophenol	10000	U
85-01-8-----	Phenanthrene	73000	E
120-12-7-----	Anthracene	12000	
86-74-8-----	Carbazole	4600	
84-74-2-----	Di-n-Butylphthalate	4100	U
206-44-0-----	Fluoranthene	92000	E
129-00-0-----	Pyrene	130000	E
85-68-7-----	Butylbenzylphthalate	4100	U
91-94-1-----	3,3'-Dichlorobenzidine	4100	U
56-55-3-----	Benzo(a)Anthracene	28000	
218-01-9-----	Chrysene	37000	E
117-81-7-----	bis(2-Ethylhexyl)Phthalate	5300	
117-84-0-----	Di-n-Octyl Phthalate	4100	U
205-99-2-----	Benzo(b)Fluoranthene	38000	E
207-08-9-----	Benzo(k)Fluoranthene	35000	E
50-32-8-----	Benzo(a)Pyrene	30000	
193-39-5-----	Indeno(1,2,3-cd)Pyrene	9800	
53-70-3-----	Dibenz(a,h)Anthracene	3600	J
191-24-2-----	Benzo(g,h,i)Perylene	8900	

(1) - Cannot be separated from Diphenylamine

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

DEC SAMPLE NO.

SS-PCW-02

Lab Name: E & E INC.

Contract:

Lab Code: EANDE

Case No.: 9901.360 SAS No.:

SDG No.: SSPCW01

Matrix: (soil/water) SOIL

Lab Sample ID: 33107

Sample wt/vol: 1.0 (g/mL) G

Lab File ID: I7000

Level: (low/med) MED

Date Received: 05/06/99

% Moisture: 18 decanted: (Y/N) N

Date Extracted: 05/11/99

Concentrated Extract Volume: 500.0 (uL)

Date Analyzed: 05/18/99

Injection Volume: 2.0 (uL)

Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 6.3

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG Q

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
132-64-9	Dibenzofuran	2700	J
121-14-2	2,4-Dinitrotoluene	12000	U
84-66-2	Diethylphthalate	12000	U
7005-72-3	4-Chlorophenyl-phenylether	12000	U
86-73-7	Fluorene	3100	J
100-01-6	4-Nitroaniline	30000	U
534-52-1	4,6-Dinitro-2-methylphenol	30000	U
86-30-6	N-Nitrosodiphenylamine (1)	12000	U
101-55-3	4-Bromophenyl-phenylether	12000	U
118-74-1	Hexachlorobenzene	12000	U
87-86-5	Pentachlorophenol	30000	U
85-01-8	Phenanthrene	91000	
120-12-7	Anthracene	7400	J
86-74-8	Carbazole	7600	J
84-74-2	Di-n-Butylphthalate	12000	U
206-44-0	Fluoranthene	110000	E
129-00-0	Pyrene	110000	E
85-68-7	Butylbenzylphthalate	1700	J
91-94-1	3,3'-Dichlorobenzidine	12000	U
56-55-3	Benzo(a)Anthracene	22000	
218-01-9	Chrysene	35000	
117-81-7	bis(2-Ethylhexyl)Phthalate	1400	J
117-84-0	Di-n-Octyl Phthalate	2000	J
205-99-2	Benzo(b)Fluoranthene	34000	
207-08-9	Benzo(k)Fluoranthene	33000	
50-32-8	Benzo(a)Pyrene	27000	
193-39-5	Indeno(1,2,3-cd)Pyrene	7700	J
53-70-3	Dibenz(a,h)Anthracene	2500	J
191-24-2	Benzo(g,h,i)Perylene	6300	J

(1) - Cannot be separated from Diphenylamine

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

DEC SAMPLE NO.

SS-PCW-09

Lab Name: E & E INC.

Contract:

Lab Code: EANDE

Case No.: 9901.360 SAS No.:

SDG No.: SSPCW01

Matrix: (soil/water) SOIL

Lab Sample ID: 33116

Sample wt/vol: 30.4 (g/mL) G

Lab File ID: I7060

Level: (low/med) LOW

Date Received: 05/06/99

% Moisture: 34 decanted: (Y/N) N

Date Extracted: 05/10/99

Concentrated Extract Volume: 500.0 (uL)

Date Analyzed: 05/24/99

Injection Volume: 2.0 (uL)

Dilution Factor: 10.0

GPC Cleanup: (Y/N) Y pH: 6.9

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NO.

COMPOUND

Q

132-64-9-----	Dibenzofuran	4400	J
121-14-2-----	2,4-Dinitrotoluene	4900	U
84-66-2-----	Diethylphthalate	4900	U
7005-72-3-----	4-Chlorophenyl-phenylether	4900	U
86-73-7-----	Fluorene	5700	
100-01-6-----	4-Nitroaniline	12000	U
534-52-1-----	4,6-Dinitro-2-methylphenol	12000	U
86-30-6-----	N-Nitrosodiphenylamine (1)	4900	U
101-55-3-----	4-Bromophenyl-phenylether	4900	U
118-74-1-----	Hexachlorobenzene	4900	U
87-86-5-----	Pentachlorophenol	12000	U
85-01-8-----	Phenanthrene	110000	E
120-12-7-----	Anthracene	19000	
86-74-8-----	Carbazole	9000	
84-74-2-----	Di-n-Butylphthalate	790	J
206-44-0-----	Fluoranthene	120000	E
129-00-0-----	Pyrene	140000	E
85-68-7-----	Butylbenzylphthalate	4900	U
91-94-1-----	3,3'-Dichlorobenzidine	4900	U
56-55-3-----	Benzo(a)Anthracene	29000	
218-01-9-----	Chrysene	36000	
117-81-7-----	bis(2-Ethylhexyl) Phthalate	2000	J
117-84-0-----	Di-n-Octyl Phthalate	4900	U
205-99-2-----	Benzo(b)Fluoranthene	35000	
207-08-9-----	Benzo(k)Fluoranthene	39000	
50-32-8-----	Benzo(a)Pyrene	31000	
193-39-5-----	Indeno(1,2,3-cd)Pyrene	7500	
53-70-3-----	Dibenz(a,h)Anthracene	2700	J
191-24-2-----	Benzo(g,h,i)Perylene	7300	

(1) - Cannot be separated from Diphenylamine

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

DEC SAMPLE NO.

SS-PCW-09DL

Lab Name: E & E INC.

Contract:

Lab Code: EANDE

Case No.: 9901.360 SAS No.:

SDG No.: SSPCW01

Matrix: (soil/water) SOIL

Lab Sample ID: 33116DL

Sample wt/vol: 30.4 (g/mL) G

Lab File ID: I7067

Level: (low/med) LOW

Date Received: 05/06/99

% Moisture: 34 decanted: (Y/N) N

Date Extracted: 05/10/99

Concentrated Extract Volume: 500.0 (uL)

Date Analyzed: 05/25/99

Injection Volume: 2.0 (uL)

Dilution Factor: 50.0

GPC Cleanup: (Y/N) Y pH: 6.9

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG Q

CAS NO.	COMPOUND		
132-64-9	Dibenzofuran	4100	DJ
121-14-2	2,4-Dinitrotoluene	25000	U
84-66-2	Diethylphthalate	25000	U
7005-72-3	4-Chlorophenyl-phenylether	25000	U
86-73-7	Fluorene	5000	DJ
100-01-6	4-Nitroaniline	62000	U
534-52-1	4,6-Dinitro-2-methylphenol	62000	U
86-30-6	N-Nitrosodiphenylamine (1)	25000	U
101-55-3	4-Bromophenyl-phenylether	25000	U
118-74-1	Hexachlorobenzene	25000	U
87-86-5	Pentachlorophenol	62000	U
85-01-8	Phenanthrene	68000	D
120-12-7	Anthracene	14000	DJ
86-74-8	Carbazole	7600	DJ
84-74-2	Di-n-Butylphthalate	25000	U
206-44-0	Fluoranthene	63000	D
129-00-0	Pyrene	130000	D
85-68-7	Butylbenzylphthalate	25000	U
91-94-1	3,3'-Dichlorobenzidine	25000	U
56-55-3	Benzo(a)Anthracene	24000	DJ
218-01-9	Chrysene	30000	D
117-81-7	bis(2-Ethylhexyl)Phthalate	25000	U
117-84-0	Di-n-Octyl Phthalate	25000	U
205-99-2	Benzo(b)Fluoranthene	38000	D
207-08-9	Benzo(k)Fluoranthene	35000	D
50-32-8	Benzo(a)Pyrene	27000	D
193-39-5	Indeno(1,2,3-cd)Pyrene	9700	DJ
53-70-3	Dibenz(a,h)Anthracene	2600	DJ
191-24-2	Benzo(g,h,i)Perylene	10000	DJ

(1) - Cannot be separated from Diphenylamine

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

DEC SAMPLE NO.

SS-PCW-11

Lab Name: E & E INC.

Contract:

Lab Code: EANDE

Case No.: 9901.360 SAS No.:

SDG No.: SSPCW01

Matrix: (soil/water) SOIL

Lab Sample ID: 33217

Sample wt/vol: 31.8 (g/mL) G

Lab File ID: I7061

Level: (low/med) LOW

Date Received: 05/07/99

% Moisture: 16 decanted: (Y/N) N

Date Extracted: 05/10/99

Concentrated Extract Volume: 500.0 (uL)

Date Analyzed: 05/24/99

Injection Volume: 2.0 (uL)

Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 9.6

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NO.

COMPOUND

Q

132-64-9-----	Dibenzofuran	310	J
121-14-2-----	2,4-Dinitrotoluene	370	U
84-66-2-----	Diethylphthalate	55	J
7005-72-3-----	4-Chlorophenyl-phenylether	370	U
86-73-7-----	Fluorene	360	J
100-01-6-----	4-Nitroaniline	930	U
534-52-1-----	4,6-Dinitro-2-methylphenol	930	U
86-30-6-----	N-Nitrosodiphenylamine (1)	370	U
101-55-3-----	4-Bromophenyl-phenylether	370	U
118-74-1-----	Hexachlorobenzene	370	U
87-86-5-----	Pentachlorophenol	930	U
85-01-8-----	Phenanthrene	4100	E
120-12-7-----	Anthracene	710	
86-74-8-----	Carbazole	450	
84-74-2-----	Di-n-Butylphthalate	100	J
206-44-0-----	Fluoranthene	3000	E
129-00-0-----	Pyrene	12000	E
85-68-7-----	Butylbenzylphthalate	150	J
91-94-1-----	3,3'-Dichlorobenzidine	370	U
56-55-3-----	Benzo(a)Anthracene	1600	
218-01-9-----	Chrysene	2300	
117-81-7-----	bis(2-Ethylhexyl)Phthalate	570	
117-84-0-----	Di-n-Octyl Phthalate	370	U
205-99-2-----	Benzo(b)Fluoranthene	2500	
207-08-9-----	Benzo(k)Fluoranthene	2400	
50-32-8-----	Benzo(a)Pyrene	2000	
193-39-5-----	Indeno(1,2,3-cd)Pyrene	800	
53-70-3-----	Dibenz(a,h)Anthracene	300	J
191-24-2-----	Benzo(g,h,i)Perylene	930	

(1) - Cannot be separated from Diphenylamine

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

DEC SAMPLE NO.

SS-PCW-11DL

Lab Name: E & E INC.

Contract:

Lab Code: EANDE

Case No.: 9901.360 SAS No.:

SDG No.: SSPCW01

Matrix: (soil/water) SOIL

Lab Sample ID: 33217DL

Sample wt/vol: 31.8 (g/mL) G

Lab File ID: I7086

Level: (low/med) LOW

Date Received: 05/07/99

% Moisture: 16 decanted: (Y/N) N

Date Extracted: 05/10/99

Concentrated Extract Volume: 500.0 (uL)

Date Analyzed: 05/26/99

Injection Volume: 2.0 (uL)

Dilution Factor: 3.0

GPC Cleanup: (Y/N) Y pH: 9.6

CONCENTRATION UNITS:

CAS NO.

COMPOUND

(ug/L or ug/Kg) UG/KG

Q

132-64-9-----	Dibenzofuran	310	DJ
121-14-2-----	2,4-Dinitrotoluene	1100	U
84-66-2-----	Diethylphthalate	1100	U
7005-72-3-----	4-Chlorophenyl-phenylether	1100	U
86-73-7-----	Fluorene	320	DJ
100-01-6-----	4-Nitroaniline	2800	U
534-52-1-----	4,6-Dinitro-2-methylphenol	2800	U
86-30-6-----	N-Nitrosodiphenylamine (1)	1100	U
101-55-3-----	4-Bromophenyl-phenylether	1100	U
118-74-1-----	Hexachlorobenzene	1100	U
87-86-5-----	Pentachlorophenol	2800	U
85-01-8-----	Phenanthrene	4200	D
120-12-7-----	Anthracene	710	DJ
86-74-8-----	Carbazole	500	DJ
84-74-2-----	Di-n-Butylphthalate	120	DJ
206-44-0-----	Fluoranthene	4800	D
129-00-0-----	Pyrene	6900	D
85-68-7-----	Butylbenzylphthalate	210	DJ
91-94-1-----	3,3'-Dichlorobenzidine	1100	U
56-55-3-----	Benzo(a)Anthracene	1800	D
218-01-9-----	Chrysene	2300	D
117-81-7-----	bis(2-Ethylhexyl) Phthalate	540	DJ
117-84-0-----	Di-n-Octyl Phthalate	1100	U
205-99-2-----	Benzo(b) Fluoranthene	2500	D
207-08-9-----	Benzo(k) Fluoranthene	2900	D
50-32-8-----	Benzo(a) Pyrene	2200	D
193-39-5-----	Indeno(1,2,3-cd) Pyrene	690	DJ
53-70-3-----	Dibenz(a,h) Anthracene	250	DJ
191-24-2-----	Benzo(g,h,i) Perylene	710	DJ

(1) - Cannot be separated from Diphenylamine

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7/12/99

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SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

DEC SAMPLE NO.

SS-PCW-12

Lab Name: E & E INC.

Contract:

Lab Code: EAND E

Case No.: 9901.360 SAS No.:

SDG No.: SSPCW01

Matrix: (soil/water) SOIL

Lab Sample ID: 33218

Sample wt/vol: 31.5 (g/mL) G

Lab File ID: I7062

Level: (low/med) LOW

Date Received: 05/07/99

% Moisture: 9 decanted: (Y/N) N

Date Extracted: 05/10/99

Concentrated Extract Volume: 500.0 (uL)

Date Analyzed: 05/24/99

Injection Volume: 2.0 (uL)

Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 8.5

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG Q

CAS NO.	COMPOUND	UG/KG	Q
132-64-9	Dibenzofuran	830	
121-14-2	2,4-Dinitrotoluene	350	U
84-66-2	Diethylphthalate	350	U
7005-72-3	4-Chlorophenyl-phenylether	350	U
86-73-7	Fluorene	1300	
100-01-6	4-Nitroaniline	870	U
534-52-1	4,6-Dinitro-2-methylphenol	870	U
86-30-6	N-Nitrosodiphenylamine (1)	350	U
101-55-3	4-Bromophenyl-phenylether	350	U
118-74-1	Hexachlorobenzene	350	U
87-86-5	Pentachlorophenol	870	U
85-01-8	Phenanthrene	24000	E
120-12-7	Anthracene	5200	E
86-74-8	Carbazole	1300	
84-74-2	Di-n-Butylphthalate	350	U
206-44-0	Fluoranthene	17000	E
129-00-0	Pyrene	51000	E
85-68-7	Butylbenzylphthalate	220	J
91-94-1	3,3'-Dichlorobenzidine	350	U
56-55-3	Benzo(a)Anthracene	6600	E
218-01-9	Chrysene	7400	E
117-81-7	bis(2-Ethylhexyl)Phthalate	160	J
117-84-0	Di-n-Octyl Phthalate	350	U
205-99-2	Benzo(b)Fluoranthene	6300	E
207-08-9	Benzo(k)Fluoranthene	6200	E
50-32-8	Benzo(a)Pyrene	5800	E
193-39-5	Indeno(1,2,3-cd)Pyrene	2200	
53-70-3	Dibenz(a,h)Anthracene	820	
191-24-2	Benzo(g,h,i)Perylene	2100	

(1) - Cannot be separated from Diphenylamine

7/12/99

ATTACHMENT C

Remedial Cost Analysis

Draft Remedial Cost Analysis

This cost analysis was prepared based on the results of the site investigation, site sketches, and site visits as per the scope of work presented to the City of Niagara Falls in E & E's August 11, 1999 letter. As such, it does not include costs for the actual demolition of the buildings at the site, asbestos survey costs, or additional sampling that may be required for disposal of site materials.

In addition to other costs associated with the remediation of the Power City Warehouse, a risk-based screening analysis will be needed to evaluate potential risks to workers from exposures to contaminants present in soils during future excavation and construction activities at the site. It is estimated that preparation of the risk evaluation would cost less than \$5,000.

Remedial Alternative Cost Analysis for the Power City Warehouse Site Niagara Falls, New York

General Cost Estimate Assumptions

Cost is for removal and disposal only, actual building demolition is not included.

25% of the roofing, wood and soil is hazardous;

75% of the concrete, brick, and steel is recyclable; 25% of the remaining volume (or 6.25% of the total volume) is hazardous. Site will be backfilled to existing grade with clean soils.

Cost Scenarios

Building Slab Remains

Scenario 1: Buildings will be demolished to grade, leaving the ground floor intact.

Building basement(s) will be filled with crushed debris. Site soils will be excavated one foot deep.

Site excavations will be backfilled with one foot of clean soil.

Estimated Cost: \$ 462,000

Scenario 2: Buildings will be demolished to grade, leaving the ground floor intact.

Building basement(s) will be filled with crushed debris. Site soils will be excavated two feet deep.

Site excavations will be backfilled with two feet of clean soil.

Estimated Cost: \$ 713,000

Building Slab Removed

Scenario 3: Buildings will be demolished and the ground floor removed.

Building basement(s) will be filled with crushed debris. Site soils will be excavated one foot deep.

Site excavations will be backfilled with one foot of clean soil.

Estimated Cost: \$ 784,000

Scenario 4: Buildings will be demolished and the ground floor removed.

Building basement(s) will be filled with crushed debris. Site soils will be excavated two feet deep.

Site excavations will be backfilled with two feet of clean soil.

Estimated Cost: \$ 1,890,000

Scenario 1 Assumptions

The building will be removed to grade. The concrete slab will remain. Basement will be filled.

Volume of basement is approx. 75,000 cubic feet, 2,800 cubic yards.

Soil will be removed outside the building limits to a depth of 1' below grade.

Percentage of material that can be recycled is shown in the table below. Also shown are the estimated percentages of materials to be disposed off site as C&D/non-hazardous waste and and hazardous waste.

Item	Total Quantity Units	Recycle Quantity	Disposal Quantity	
			C&D/Non Haz	Hazardous
<u>CONCRETE</u>		75%	18.75%	6.25%
Volume of Concrete	770 CY	580	140	50
Specific Weight	2600 LB/CY			
Weight of Concrete	1000 Ton	750	190	60
<u>STEEL</u>		75%	18.75%	6.25%
Volume of Steel	40 CY	30	10	0
Weight of Steel	310 Ton	230	60	20
<u>ROOFING</u>		0%	75%	25%
Volume of Roofing	120 CY	0	90	30
Specific Weight	700 LB/CY			
Weight of Roofing	40 Ton	0	30	10
<u>WOOD</u>		0%	75%	25%
Volume of Wood	370 CY	0	280	90
Specific Weight	500 LB/CY			
Weight of Wood	90 Ton	0	70	20
<u>BRICK</u>		75%	18.75%	6.25%
Volume of Brick	2,500 CY	1,880	470	160
Specific Weight	1,700 LB/CY			
Weight of Brick	2,100 Ton	1,580	390	130
<u>SOIL</u>		0%	75%	25%
Volume Excavated Soil	2,000 CY	0	1,500	500
Specific Weight	1.6 Tons/CY			
Weight of Soil	3,200 Tons	0	2,400	800
	5,800 CY	2,490	2,490	830
TOTALS	6,740 Tons	2,560	3,140	1,040
Recyclable Transport	311 CY	(Assumes 10 CY w/25% air space per load)		
C&D Transport (no soils)	99 Loads	(Assumes 10 CY per load)		
Haz Waste Transport	83 Loads	(Assumes 10 CY per load)		

Power City Warehouse**Cost Estimate**

Scenario 1: Slab remains and one foot of site soils are removed and replaced with clean soils.

Remedial Alternative Item	Units	Quantity	Unit Cost (\$)	Total Cost (\$)
Site Work				
Mobilization/Demobilization	LS	1	2,000	2,000
Site prep/clearing/grubbing	LS	1	15,000	15,000
Soil Excavation (Backhoe)	CY	2,000	1.79	3,580
Dust Control	LS	1	5,000	5,000
Backfill Site (including basement)	CY	4,800	6.15	29,520
Filling/Compaction (basement)	CY	2,800	2.78	7,784
Subtotal				62,884
Transportation/Off-Site Disposal of Recyclables				
Load Recyclables	CY	2,490	1.59	3,959
Transport Recyclable Material	CY	2,490	11.35	28,262
Concrete Disposal by Recycling	Ton	750	0	0
Brick Disposal by Recycling	Ton	1,580	0	0
Steel Disposal by Recycling	Ton	230	(40)	(9,200)
Subtotal				23,021
Transportation/Off-Site Disposal of C&D (no soil)				
Load C&D	CY	990	1.59	1,574
C&D Transportation (no soil)	Load	99	140	13,860
C&D Disposal	Ton	740	40	29,600
Subtotal				45,034
Transportation/Off-Site Disposal of Non-hazardous Soil				
Soil Loading	CY	1,500	1.59	2,385
Soil Transport and Disposal	Ton	2,400	30	72,000
Subtotal				74,385
Transportation/Off-Site Disposal of Hazardous Waste				
Load Hazardous Waste	CY	830	2.26	1,876
Haz Waste Transportation	Load	83	650	53,950
Haz Waste Disposal	Ton	1,040	135	140,400
Subtotal				196,226
Subtotal				401,550
Contingency (15%)				60,000
Total Disposal Cost (rounded)				462,000

Scenario 2 Assumptions

The building will be removed to grade. The concrete slab will remain. Basement will be filled.

Volume of basement is approx. 75,000 cubic feet, 2,800 cubic yards.

Soil will be removed outside the building limits to a depth of two feet below grade.

Percentage of material that can be recycled is shown in the table below. Also shown are the estimated percentages of materials to be disposed off site as C&D/non-hazardous waste and and hazardous waste.

Item	Total Quantity Units	Recycle Quantity	Disposal Quantity C&D/Non Haz	Hazardous
<u>CONCRETE</u>		75%	18.75%	6.25%
Volume of Concrete	770 CY	580	140	50
Specific Weight	2600 LB/CY			
Weight of Concrete	1000 Ton	750	190	60
<u>STEEL</u>		75%	18.75%	6.25%
Volume of Steel	40 CY	30	10	0
Weight of Steel	310 Ton	230	60	20
<u>ROOFING</u>		0%	75%	25%
Volume of Roofing	120 CY	0	90	30
Specific Weight	700 LB/CY			
Weight of Roofing	40 Ton	0	30	10
<u>WOOD</u>		0%	75%	25%
Volume of Wood	370 CY	0	280	90
Specific Weight	500 LB/CY			
Weight of Wood	90 Ton	0	70	20
<u>BRICK</u>		75%	18.75%	6.25%
Volume of Brick	2,500 CY	1,880	470	160
Specific Weight	1,700 LB/CY			
Weight of Brick	2,100 Ton	1,580	390	130
<u>SOIL</u>		0%	75%	25%
Volume Excavated Soil	3,900 CY	0	2,930	980
Specific Weight	1.6 Tons/CY			
Weight of Soil	6,200 Tons	0	4,650	1550
	7,700 CY	2,490	3,920	1,310
TOTALS	9,740 Tons	2,560	5,390	1,790
Recyclable Transport	311 CY	(Assumes 10 CY w/25% air space per load)		
C&D Transport (no soils)	99 Loads	(Assumes 10 CY per load)		
Haz Waste Transport	131 Loads	(Assumes 10 CY per load)		

Power City Warehouse**Cost Estimate**

Scenario 2: Slab remains and two feet of site soils are removed and replaced with clean soils.

Remedial Alternative Item	Units	Quantity	Unit Cost (\$)	Total Cost (\$)
Site Work				
Mobilization/Demobilization	LS	1	2,000	2,000
Site prep/clearing/grubbing	LS	1	15,000	15,000
Soil Excavation (Backhoe)	CY	3,900	1.79	6,981
Dust Control	LS	1	5,000	5,000
Backfill Site (including basement)	CY	6,700	6.15	41,205
Filling/Compaction (basement)	CY	2,800	2.78	7,784
Subtotal				77,970
Transportation/Off-Site Disposal of Recyclables				
Load Recyclables	CY	2,490	1.59	3,959
Transport Recyclable Material	CY	2,490	11.35	28,262
Concrete Disposal by Recycling	Ton	750	0	0
Brick Disposal by Recycling	Ton	1,580	0	0
Steel Disposal by Recycling	Ton	230	(40)	(9,200)
Subtotal				23,021
Transportation/Off-Site Disposal of C&D (no soil)				
Load C&D	CY	990	1.59	1,574
C&D Transportation (no soil)	Load	99	140	13,860
C&D Disposal	Ton	740	40	29,600
Subtotal				45,034
Transportation/Off-Site Disposal of Non-hazardous Soil				
Soil Loading	CY	2,930	1.59	4,659
Soil Transport and Disposal	Ton	4,650	30	139,500
Subtotal				144,159
Transportation/Off-Site Disposal of Hazardous Waste				
Load Hazardous Waste	CY	1,310	2.26	2,961
Haz Waste Transportation	Load	131	650	85,150
Haz Waste Disposal	Ton	1,790	135	241,650
Subtotal				329,761
Subtotal				619,944
Contingency (15%)				93,000
Total Disposal Cost (rounded)				713,000

Scenario 3 Assumptions

The building will be removed to grade. The concrete slab will be removed, approximately 6,400 cubic yards. Basement will be filled.

Volume of basement is approx. 75,000 cubic feet, 2,800 cubic yards.

Soil will be removed outside the building limits to a depth of one foot below grade.

Percentage of material that can be recycled is shown in the table below. Also shown are the estimated percentages of materials to be disposed off site as C&D/non-hazardous waste and and hazardous waste.

Item	Total Quantity Units	Recycle Quantity	Disposal Quantity C&D/Non Haz	Hazardous
<u>CONCRETE</u>		75%	18.75%	6.25%
Volume of Concrete	7,190 CY	5,390	1,350	450
Specific Weight	2,600 LB/CY			
Weight of Concrete	9,350 Ton	7,010	1,750	580
<u>STEEL</u>		75%	18.75%	6.25%
Volume of Steel	40 CY	30	10	0
Weight of Steel	310 Ton	230	60	20
<u>ROOFING</u>		0%	75%	25%
Volume of Roofing	120 CY	0	90	30
Specific Weight	700 LB/CY			
Weight of Roofing	40 Ton	0	30	10
<u>WOOD</u>		0%	75%	25%
Volume of Wood	370 CY	0	280	90
Specific Weight	500 LB/CY			
Weight of Wood	90 Ton	0	70	20
<u>BRICK</u>		75%	18.75%	6.25%
Volume of Brick	2,500 CY	1,880	470	160
Specific Weight	1,700 LB/CY			
Weight of Brick	2,100 Ton	1,580	390	130
<u>SOIL</u>		0%	75%	25%
Volume Excavated Soil	2,000 CY	0	1,500	500
Specific Weight	1.6 Tons/CY			
Weight of Soil	3,200 Tons	0	2,400	800
	12,220 CY	7,300	3,700	1,230
TOTALS	15,090 Tons	8,820	4,700	1,560

Recyclable Transport	913 CY	(Assumes 10 CY w/25% air space per load)
C&D Transport (no soils)	220 Loads	(Assumes 10 CY per load)
Haz Waste Transport	123 Loads	(Assumes 10 CY per load)

Power City Warehouse

Cost Estimate

Scenario 3: Building slab is removed, and one foot of site soils are removed.

The entire site then is covered with one foot of clean soils.

Remedial Alternative Item	Units	Quantity	Unit Cost (\$)	Total Cost (\$)
Site Work				
Mobilization/Demobilization	LS	1	2,000	2,000
Site prep/clearing/grubbing	LS	1	15,000	15,000
Soil Excavation (Backhoe)	CY	2,000	1.79	3,580
Dust Control	LS	1	5,000	5,000
Backfill Site (including basement)	CY	11,200	6.15	68,880
Filling/Compaction (basement)	CY	2,800	2.78	7,784
Subtotal				102,244
Transportation/Off-Site Disposal of Recyclables				
Load Recyclables	CY	7,300	1.59	11,607
Transport Recyclable Material	CY	7,300	11.35	82,855
Concrete Disposal by Recycling	Ton	7,010	0	0
Brick Disposal by Recycling	Ton	1,580	0	0
Steel Disposal by Recycling	Ton	230	(40)	(9,200)
Subtotal				85,262
Transportation/Off-Site Disposal of C&D (no soil)				
Load C&D	CY	2,200	1.59	3,498
C&D Transportation (no soil)	Load	220	140	30,800
C&D Disposal	Ton	2,300	40	92,000
Subtotal				126,298
Transportation/Off-Site Disposal of Non-hazardous Soil				
Soil Loading	CY	1,500	1.59	2,385
Soil Transport and Disposal	Ton	2,400	30	72,000
Subtotal				74,385
Transportation/Off-Site Disposal of Hazardous Waste				
Load Hazardous Waste	CY	1,230	2.26	2,780
Haz Waste Transportation	Load	123	650	79,950
Haz Waste Disposal	Ton	1,560	135	210,600
Subtotal				293,330
Subtotal				681,519
Contingency (15%)				102,000
Total Disposal Cost (rounded)				784,000

Scenario 4 Assumptions

The building will be removed to grade. The concrete slab will be removed to two feet below grade.

Concrete floor is approximately 1-foot thick, 6,400 cubic yards. Soil is assumed for the next foot. Basement will be filled.

Volume of basement is approx. 75,000 cubic feet, 2,800 cubic yards.

Soil will be removed outside the building limits to a depth of two feet below grade.

Percentage of material that can be recycled is shown in the table below. Also shown are the estimated percentages of materials to be disposed off site as C&D/non-hazardous waste and and hazardous waste.

Item	Total Quantity Units	Recycle Quantity	Disposal Quantity	
			C&D/Non Haz	Hazardous
<u>CONCRETE</u>		75%	18.75%	6.25%
Volume of Concrete	7,190 CY	5,390	1,350	450
Specific Weight	2,600 LB/CY			
Weight of Concrete	9,350 Ton	7,010	1,750	580
<u>STEEL</u>		75%	18.75%	6.25%
Volume of Steel	40 CY	30	10	0
Weight of Steel	310 Ton	230	60	20
<u>ROOFING</u>		0%	75%	25%
Volume of Roofing	120 CY	0	90	30
Specific Weight	700 LB/CY			
Weight of Roofing	40 Ton	0	30	10
<u>WOOD</u>		0%	75%	25%
Volume of Wood	370 CY	0	280	90
Specific Weight	500 LB/CY			
Weight of Wood	90 Ton	0	70	20
<u>BRICK</u>		75%	18.75%	6.25%
Volume of Brick	2,500 CY	1,880	470	160
Specific Weight	1,700 LB/CY			
Weight of Brick	2,100 Ton	1,580	390	130
<u>SOIL</u>		0%	75%	25%
Volume Excavated Soil	10,300 CY	0	7,730	2580
Specific Weight	1.6 Tons/CY			
Weight of Soil	16,500 Tons	0	12,380	4130
	20,520 CY	7,300	9,930	3,310
TOTALS	28,390 Tons	8,820	14,680	4,890
Recyclable Transport	913 CY	(Assumes 10 CY w/25% air space per load)		
C&D Transport (no soils)	220 Loads	(Assumes 10 CY per load)		
Haz Waste Transport	331 Loads	(Assumes 10 CY per load)		

Power City Warehouse**Cost Estimate**

Scenario 4: Building slab is removed to two feet below top of slab and two feet of site soils are removed. Site is restored to grade with clean soils.

Remedial Alternative Item	Units	Quantity	Unit Cost (\$)	Total Cost (\$)
Site Work				
Mobilization/Demobilization	LS	1	2,000	2,000
Site prep/clearing/grubbing	LS	1	15,000	15,000
Soil Excavation (Backhoe)	CY	10,300	1.79	18,437
Dust Control	LS	1	5,000	5,000
Backfill Site (including basement)	CY	19,500	6.15	119,925
Filling/Compaction (basement)	CY	2,800	2.78	7,784
Subtotal				168,146
Transportation/Off-Site Disposal of Recyclables				
Load Recyclables	CY	7,300	1.59	11,607
Transport Recyclable Material	CY	7,300	11.35	82,855
Concrete Disposal by Recycling	Ton	7,010	0	0
Brick Disposal by Recycling	Ton	1,580	0	0
Steel Disposal by Recycling	Ton	230	(40)	(9,200)
Subtotal				85,262
Transportation/Off-Site Disposal of C&D (no soil)				
Load C&D	CY	2,200	1.59	3,498
C&D Transportation (no soil)	Load	220	140	30,800
C&D Disposal	Ton	2,300	40	92,000
Subtotal				126,298
Transportation/Off-Site Disposal of Non-hazardous Soil				
Soil Loading	CY	7,730	1.59	12,291
Soil Transport and Disposal	Ton	12,380	30	371,400
Subtotal				383,691
Transportation/Off-Site Disposal of Hazardous Waste				
Load Hazardous Waste	CY	3,310	2.26	7,481
Haz Waste Transportation	Load	331	650	215,150
Haz Waste Disposal	Ton	4,890	135	660,150
Subtotal				882,781
Subtotal				1,646,177
Contingency (15%)				247,000
Total Disposal Cost (rounded)				1,890,000

APPENDIX B

EA SITE INVESTIGATION REPORT

FINAL SITE CHARACTERIZATION REPORT

Power City Warehouse Site (9-32-131)
Niagara Falls, Niagara County, New York



Prepared for:



New York State Department of Environmental Conservation
Division of Environmental Remediation

Prepared by:



EA ENGINEERING, P.C. and Its Affiliate
EA SCIENCE and TECHNOLOGY

May 2009

Site Characterization Report Power City Warehouse Site (9-32-131) Niagara Falls, New York

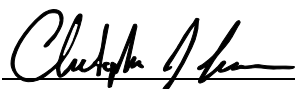
Prepared for

New York State Department of Environmental Conservation
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Albany, New York 12233



Prepared by

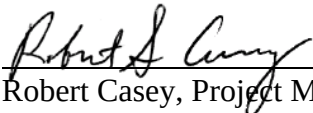
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1. INTRODUCTION

1.1 PROJECT BACKGROUND

The Power City Warehouse site (No. 9-32-131) is located in the city of Niagara Falls, Niagara County, New York, to the east of the Niagara River (Figure 1). The Power City Warehouse was used as a former battery manufacturing facility located at 3123 Highland Avenue in the city of Niagara Falls, New York. Sometime around 1910, U.S. Light and Hest Co., and later Autolite Co., began automobile, truck, and tractor battery manufacturing. Prestolite Co. acquired the facility in the 1960s and retooled operations for manufacturing of hard rubber battery cases, filling of batteries with sulfuric acid, and battery charging. Operations at the facility ceased in the mid-1970s and relocated to 3001 Highland Avenue. After battery manufacturing ended in the mid-1970s, the site was used as an automotive body shop and a warehouse. The site has been vacant since the late 1980s. In 1990, the city of Niagara Falls retained ownership of the site due to tax foreclosure. The site encompasses approximately 4 acres and is covered almost completely by warehouse buildings. Due to historical operations at the site, there were environmental concerns about potential residual impacts associated with the battery manufacturing processes.

In 1999, the city of Niagara Falls commissioned Ecology and Environment (E&E) to conduct a limited site investigation. The site investigation included a building inspection of the first floor; collection of suspected asbestos-containing materials; and collection of surface soil samples, sludge sampling, and a paint chip sample. Based on the site investigation activities, E&E prepared a Site Investigation Report in May 2000.

The site investigation reported that approximately 70 percent of the rooms in the main warehouse building and in the building additions have concrete floors. Floors were noted to be intact and E&E estimated some to be up to 3-ft thick. Brick floors were noted in some rooms, and drains and sumps were noted in some buildings as well. Composite soil samples were collected from floor cracks within various rooms within the buildings. Several sumps and floor drains containing soil/sediment were also sampled. Water was observed in several drains and sumps, as well as in the basement of the main building. Several semivolatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), and metals were detected in site soil and sediment samples at concentrations much higher than New York State Department of Environmental Conservation (NYSDEC) Technical and Administrative Guidance Memorandum (TAGM) 4046 soil cleanup guidance.

EA Engineering, P.C. and its affiliate EA Science and Technology (EA) conducted site characterization activities from September 2007 to March 2009 to determine if the Power City Warehouse site requires remediation. This Site Characterization Report presents the activities conducted during the site investigation, and the findings and recommendations in accordance with NYSDEC Draft DER-10, Technical Guidance for Site Investigation and Remediation (2002).

1.2 OBJECTIVES

The purpose of the site characterization at the Power City Warehouse site was to characterize known contaminants of concern (COCs) at the site with respect to 6 New York Code of Rules and Regulations (NYCRR) Part 375 Soil Cleanup Objectives and to determine the extent to which site contaminants pose a threat to human health and the environment.

Initial site characterization activities consisted of a historic data review and field investigation activities which included the collection of 19 debris samples from floor drains, sumps, pits, and trenches located throughout the Power City Warehouse structure. Following completion of the initial site characterization, additional tasks were added to this work assignment including pumping and inspecting the flooded basement within the Power City Warehouse structure and subsurface soil sampling at locations beneath the foundation and surrounding exterior of the structure.

This Site Characterization Report was completed to summarize the historic data review, provide a summary of the site geology and hydrogeology as presented in a remedial investigation report completed for an adjacent parcel, and discuss the field investigation activities and analytical results, as well as present an interpretation of the data collected during the site characterization activities.

1.3 REPORT ORGANIZATION

A summary of the site history, geology, hydrogeology and historic data review is provided in Section 2. A summary of field investigation activities completed in September 2007 is provided in Section 3. The analytical results of the field sampling activities are discussed in Section 4, with analytical results summarized in table format. Section 5 contains recommendations and conclusions for the site, based upon the activities completed as part of this site characterization.

The following are provided as appendixes:

- **Appendix A**—Environmental Data Resources (EDR) Database Report and Historical Records Review Files – Provided on CD
- **Appendix B**—Daily Field Reports & Photo Logs
- **Appendix C**—Debris Sampling Logs
- **Appendix D**—Industrial Discharge Permitting Documentation
- **Appendix E**—Subsurface Soil Sampling Logs
- **Appendix F**—Data Usability Summary Report – Provided on CD
- **Appendix G**—Laboratory Analytical Data, Form Is, Chain of Custody Forms – Provided on CD.

2. SITE HISTORY AND HISTORIC RECORDS REVIEW

2.1 SITE LOCATION AND DESCRIPTION

The Power City Warehouse site is a former battery manufacturing facility located at 3123 Highland Avenue in the city of Niagara Falls, New York. The immediate area around the site is urban with industrial, residential, and light commercial use in the surrounding properties (Figure 2). The site is situated in an area that historically has been used as industrial, light commercial, and residential. Residential properties are located to the east, west, and south of the site. There is a railroad right-of-way to the south beyond Center Avenue and west of the site beyond Highland Avenue. Concentrations of industrial facilities are prevalent north along Highland Avenue.

2.1.1 Geology and Hydrogeology

The area is generally flat and underlain by glacio-lacustrine clay and silt and a thin layer of glacial till over Lockport Dolostone formation bedrock; till overburden on-site is believed to be between 12.5 and 23.5 ft below the surface.

There is no significant groundwater aquifer within overburden soils or fill materials. Groundwater flows generally northeast to southwest, towards the Niagara River, on top of the Dolostone bedrock formation.

2.2 PREVIOUS INVESTIGATION

A limited site investigation was previously performed during the late-1990s by the city of Niagara Falls. The result was a May 2000 Site Investigation Report prepared by E&E. This investigation was basic in scope and limited to the dirt floor of the building and select surface soil locations outside of the warehouse structure. The site investigation reported that approximately 70 percent of the rooms in the main warehouse building and in the building additions have concrete floors. Most floors were intact and E&E estimated some to be up to 3-ft thick. Brick floors were noted in some rooms, and drains and sumps were noted in some buildings as well. Soil and debris samples from cracks in the floor were collected from within various rooms within the buildings. Several sumps and floor drains containing soil/sediment were also sampled. Water was observed in several drains and sumps, as well as in the basement of the main building. Several SVOCs, pesticides, PCBs, and metals were detected in site soil and sediment samples at concentrations much higher than NYSDEC TAGM 4046 soil cleanup guidance values.

2.3 HISTORIC DATA REVIEW

Prior to initiation of field activities, a detailed historical data and records review was completed for the Power City Warehouse site. A radius map report was obtained from EDR to supplement data provided by the NYSDEC. A complete copy of the EDR database report is included in Appendix A.

The EDR report contained no listings of the subject site or any adjacent properties for any federal, state, or local government database listings.

2.3.1 Property Tax Files

EA contacted the city of Niagara Falls Assessor for property tax information pertaining to the 3123 Highland Avenue property. A review of property information cards on file at the City Assessor's Office indicated that initial construction of the Power City Warehouse commenced in 1910, with additional sections being completed in 1920, 1940, and 1955. No other information regarding the property was available at the time of the records review. Property information cards are included in Appendix A.

2.3.2 Building Department Files

EA contacted the city of Niagara Falls Building Department/Code Enforcement Office for historical information regarding code violations and building permits for the Power City Warehouse site. A temporary building permit for a tent to be constructed onsite was issued in 1979. No other information regarding building permits and code violations at the site were available at the time of the records review.

2.3.3 Engineering Office Files

EA Contacted the city of Niagara Falls Office of the City Engineer for information regarding historical construction diagrams of the Power City Warehouse. EA obtained a copy of the layout of surface, roof, acid, and sewage drains of the structure, as constructed in 1910. A copy of the drawing is included in Appendix A.

2.3.4 Planning and Environmental Department Files

EA contacted the city of Niagara Falls Planning and Environmental Department for information regarding the property at 3123 Highland Avenue. Mr. Alan Nausbaum provided a records review of information regarding city acquisition of the property through foreclosure, a record of previous sampling completed with United States Environmental Protection Agency (USEPA) funding, and a series of applications and subsequent correspondence prepared by the city in an attempt to obtain federal and state grants for cleanup of the site. Additionally, Mr. Nausbaum provided a copy of the most recent site survey on record for the Power City Warehouse property. The site survey is including in Appendix A.

2.4 HISTORICAL USE – PROPERTY AND ADJOINING PROPERTIES

The following discussions are presented for the purpose of compiling historical information on activities that occurred at the subject site and adjoining properties that may have impacted environmental conditions at the subject site.

Based upon a review of historical information, as included in the following sections, the subject site appears to have been developed with one large industrial structure in 1910, with a series of additions and building configuration changes taking place between the initial construction and 1955. This structure was utilized for battery manufacturing including a lead foundry area, moulding room, paint room, assembly areas, and storage areas consisting of lead and oil storage. Railroad tracks historically ran along the south side of the building. Two underground oil tanks were identified as being located to the southeast of the structure, between the building and the railroad tracks. A power house was historically located on-site. Proposed sampling locations were developed upon completion of the historic records review. Specific areas of concern noted during the historic review are illustrated in Figure 3.

2.4.1 Historical Topographic Maps

Historic United States Geological Survey (USGS) topographic maps dated 1901, 1944, 1965, 1980, and 1995 were reviewed. The results of this review are included in the following table.

DATE	SOURCE	3123 HIGHLAND AVENUE	ADJACENT PROPERTIES
1901	USGS	The subject site appears to be undeveloped.	Adjacent and down gradient properties appear to be undeveloped.
1944	USGS	The subject site appears to be developed with a large commercial/industrial structure with a railroad track running through the property.	North and south adjacent properties appear to be developed with industrial structures, while west adjacent properties appear to be developed with residential or small commercial structures, and the area to the east of the site remains undeveloped.
1965	USGS	The subject site appears to be undeveloped except for a railroad track running through the property. (note: for this year, municipal structures and large scale industrial site are the only structures shown on map)	Adjacent and down gradient properties appear to be undeveloped. (note: for this year, municipal structures and large scale industrial site are the only structures shown on map)
1980	USGS	The subject site appears to be undeveloped. (note: for this year, municipal structures and large scale industrial site are the only structures shown on map)	Adjacent and down gradient properties appear to be undeveloped. (note: for this year, municipal structures and large scale industrial site are the only structures shown on map)
1995	USGS	The subject site appears to be undeveloped. (note: for this year, municipal structures and large scale industrial sites are the only structures shown on map)	Adjacent and down gradient properties appear to be undeveloped. (note: for this year, municipal structures and large scale industrial site are the only structures shown on map)

2.4.2 Aerial Photographs

Aerial photographs dated 1970, 1985, 1995, and 2003 were reviewed. Observations made from the reviewed aerial photographs are presented in the following table.

DATE	SOURCE	3123 HIGHLAND AVENUE	ADJACENT PROPERTIES
1970	USGS	Developed with current existing structure.	Adjacent properties same as development observed in 1985 aerial photograph.
1985	USGS	Developed with current existing structure.	North and south adjacent properties contain industrial structures; west adjacent contains residential structures; east adjacent properties undeveloped.
1995	USGS	Developed with current existing structure.	Adjacent properties same as current development.
2003	NYSGIS Clearinghouse	Developed with current existing structure.	Adjacent properties same as current development.

2.4.3 Fire Insurance Maps

Sanborn Fire Insurance maps dated 1914, 1950, 1955, 1958, 1965, 1979, and 1985 were reviewed. Observations made from the reviewed Sanborn Fire Insurance maps are presented in the following table.

DATE	SOURCE	3123 HIGHLAND AVENUE	ADJACENT PROPERTIES
1914	EDR	Site is developed with a lead foundry, smedging shop, battery developing and assembly areas, machine shop, paint shop, and storage areas. Oil house and power house located on-site, in addition to railroad tracks and two 15,000 underground oil tanks.	North adjacent property identified as battery formation, south adjacent properties contain undeveloped land, railroad track, and a carbon paper/business form production facility. East and west adjacent properties appear undeveloped.
1950	EDR	Site appears developed with similar improvements as 1914 Sanborn Fire Insurance Maps. Underground oil tanks no long present on-site. Acid storage tanks located on-site.	Adjacent properties appear developed similar to 1914 Sanborn Fire Insurance Maps.
1955	EDR	Site appears developed with similar improvements as 1950 Sanborn Fire Insurance Maps. Transformer House located on-site	Adjacent properties appear developed similar to 1950 Sanborn Fire Insurance Maps.
1958	EDR	Site appears developed with similar improvements as 1955 Sanborn Fire Insurance Maps.	Adjacent properties appear developed similar to 1955 Sanborn Fire Insurance Maps.
1965	EDR	Site appears developed with similar improvements as 1958 Sanborn Fire Insurance Maps.	Adjacent properties appear developed similar to 1958 Sanborn Fire Insurance Maps.
1979	EDR	Site appears developed with similar improvements as 1965 Sanborn Fire Insurance Maps.	Adjacent properties appear developed similar to 1965 Sanborn Fire Insurance Maps.
1985	EDR	Site appears developed with similar improvements as 1979 Sanborn Fire Insurance Maps.	Adjacent properties appear developed similar to 1979 Sanborn Fire Insurance Maps.

Based on the EDR report, information obtained from the city of Niagara Falls, and the historical Sanborn fire insurance maps, a site conceptual model and proposed surface soil and debris

sampling locations were identified during the work plan development process. These sampling locations are illustrated on Figure 4.

3. FIELD INVESTIGATION ACTIVITIES

This section presents the overall approach of the field investigation activities that were performed to meet the stated objectives of the site characterization. EA's approach for implementing the work assignment included field sampling activities designed to evaluate the presence or absence of COCs at the site and to summarize the concentrations of potential COCs through laboratory analysis.

The field investigation program was performed during September 2007 and June, September, and October 2008, and included the following activities:

- ***Sample Identification and Warehouse Floor Inspection***—Determination of flooring and sub-floor material throughout the Power City Warehouse.
- ***Debris Sampling***—Collection and analysis of debris samples from 19 sample locations
- ***Debris Volume Estimate***—Calculation of estimated volume of debris within onsite floor drains and trenches.
- ***Basement Water Intrusion Discharge and inspection***—Obtain city of Niagara Falls Discharge Permit for discharge of flooded basement into sanitary sewer system and complete discharge, allowing for detailed inspection of basement construction, and condition and sampling of debris remaining in basement following discharge.
- ***Subsurface Soil Sampling***—Collection and analysis of subsurface soil samples from 13 locations beneath the foundation of the Power City Warehouse structure and from 10 locations surrounding the exterior of the structure.

Copies of the daily field reports are provided in Appendix B. Field investigation sampling locations are illustrated in Figures 5 and 10.

3.1 SAMPLE IDENTIFICATION AND WAREHOUSE FLOOR INSPECTION

3.1.1 Sample Identification

EA and NYSDEC located the proposed soil and debris sampling locations outlined in the work plan on 11 September 2007. The sampling locations identified in the field were selected based on historical operations at the site and in areas where representative volume requirements could be collected. In addition to locating sampling areas, EA completed measurements to sampling locations from structure features, as well as describe the general sampling areas. Field measurements to sample areas are provided in the daily field reports. Figure 5 illustrates the locations of debris samples.

3.1.2 Warehouse Floor Inspection

Prior to soil and debris sampling activities, a cursory inspection was performed of floor materials throughout the Power City Warehouse site. Bricks were removed from several locations throughout the structure in order to determine sub-floor materials and visually evaluate the condition of the foundation material. Soil sampling locations where brick flooring was underlain with concrete were moved to areas where sufficient soil was available for sampling. It was observed during the inspection that the concrete sub-floor extended throughout the structure and the overlying soil/sand was most likely used as bedding material for the brick floor. Figure 5 illustrates the flooring material at the site based on the inspection. Based on the visual condition of the concrete sub-floor material, EA and the NYSDEC representative determined that no soil samples would be collected, rather additional debris sampling would be performed.

Information obtained during the warehouse floor inspection was utilized to determine final debris sampling locations, as directed by the NYSDEC representative. The final sampling locations deviated from the originally proposed locations submitted in the work plan based on the inspection activities and in concurrence with the NYSDEC.

3.2 DEBRIS SAMPLING

On 12 September 2007, debris sampling was performed at the Power City Warehouse site. A total of 19 debris samples, both grab and composite, were collected from sampling locations selected as a result of the historic records review, warehouse floor inspection, and in conjunction with the NYSDEC representative. Figure 5 depicts the locations of the debris samples. As directed by the NYSDEC representative, grab samples were taken from individual sumps/pits and composite samples were collected from continuous floor drains and trenches. Stainless steel sampling equipment was used to collect the samples

Debris samples were submitted for analysis of SVOCs and target analyte list (TAL) and toxicity characteristic leaching procedure (TCLP) metals. In addition, selected samples were submitted for analysis of volatile organic compounds (VOCs), dependant upon field screening with a photoionization detector (PID). Copies of the debris sampling forms are included in Appendix C.

Debris samples were submitted under standard chain of custody to Mitkem Corporation, Warwick, Rhode Island, for analysis of VOCs by USEPA Method 8260B, SVOCs by USEPA Method 8270C, TAL metals by USEPA Method 6010, and TCLP metals by USEPA Method 1311. Mitkem Corporation is an approved New York State Department of Health Environmental Laboratory Approval Program (ELAP)-certified laboratory. All analytical methods were performed in accordance with the NYSDEC Analytical Services Protocol (ASP).

3.3 DEBRIS VOLUME ESTIMATE

Concurrent with debris sampling activities, debris volume calculations were performed for sample collection areas including floor drains, catch basins, and floor trenches located within the

structure. Measurements were taken to assess estimated volumes of debris present within the floor drains, catch basins, and floor trenches.

3.4 BASEMENT WATER INTRUSION DISCHARGE AND INSPECTION

During debris sampling activities, the partial basement located within the northern portion of the Power City Warehouse was observed to be flooded. At the request of the NYSDEC, EA consulted with the city of Niagara Falls Water Board (NFWB) in order to obtain an industrial discharge permit. The permit was required in order to discharge water from the flooded basement into the Sanitary Sewer. Following discharge, an inspection of the basement conditions was performed and a composite sample of debris found to be within the basement was collected. The Industrial Discharge Permit application, approved permit, and permit discharge report are included in Appendix D.

3.4.1 Industrial Discharge Permitting

NFWB permit requirements included one single composite sample from the basement water to be analyzed for VOCs by USEPA Method 8260B, SVOCs by USEPA Method 8270C, TAL metals by USEPA Method 6010/7470, total organic carbon by USEPA Method 5310B, and total suspended solids by USEPA Method 2540. The basement composite sample was collected on 27 June 2008 and submitted under standard chain of custody to Mitkem Corporation for the required analyses.

Upon receipt of analytical results, the results were forwarded on to the NFWB, along with a completed Industrial Discharge Permit application (Appendix D). Based upon review of the analytical data, NFWB issued EA an industrial discharge permit to pump water from the basement of the Power City Warehouse into the combined sanitary/storm sewer at a rate not to exceed 50,000 gallons per day.

3.4.2 Basement Pumping/Discharge to Sewer

Basement pumping and discharge to the city of Niagara Falls sanitary sewer system took place on 15 through 17 September 2008. A 3-in. trash pump equipped with a suction hose was utilized to pump water from the basement through a section of discharge hose and into the combined sanitary/storm sewer at a manhole located directly west of the Power City Warehouse. The flow rate of the trash pump was regulated to limit discharge to the sanitary sewer to no more than 50,000 gal per day, as permitted.

3.4.3 Basement Inspection

Following completion of basement pumping and discharge to the combined sewer system, the basement area was inspected by EA personnel. The general condition of the basement, type of debris and other materials present, and amount of debris were noted during the inspection. Photographs collected during the inspection are included in Appendix B.

3.4.4 Basement Sampling

At the request of the NYSDEC representative, one composite sample was collected from the debris observed within the basement area following the water discharge event. One composite sample was collected and sent to Mitkem Laboratory for analysis of TAL metals by USEPA Method 6010/7470.

3.5 SUBSURFACE SOIL SAMPLING

Subsurface soil samples were collected from 23 locations on-site, including 13 locations within the Power City Warehouse structure, and 10 locations surrounding the structure. Interior locations, which were from building areas with a concrete foundation were selected and the foundation cleared utilizing a concrete coring machine equipped with a 4-in. diamond coring bit.

3.5.1 Soil Boring Sampling

A total of 23 soil borings were installed by Nothnagle Drilling (Scottsville, New York) using a track-mounted Geoprobe® and direct-push technologies. Soil borings were installed to assess subsurface conditions relative to historic manufacturing processes at the site. Soil samples were recovered using a 5-ft macro-core and dedicated acetate sleeves, and sampled continuously until reaching the confining clay layer which characterizes site geology. Soil samples were screened at 1 ft intervals using a PID. Each soil sample was described and logged identifying its geologic characteristics, features, PID readings, and properties. The Unified Soil Classification System was used to characterize the soil samples. Soil boring logs are provided in Appendix D.

Soil samples were collected at shallow depths (0-2 ft below ground surface [bgs]) to assess metals contamination within shallow subsurface soils. If elevated VOCs, staining, or odors were detected, soil samples were collected for VOCs and SVOCs from the interval in which elevated PID readings, staining, or odors were noted.

A total of 32 soil samples were collected and sent for laboratory analysis. Soil samples were analyzed for VOCs by USEPA Method 8260B, SVOCs by USEPA Method 8270C, and TAL metals and mercury by USEPA Methods 6010/7470.

3.6 DATA VALIDATION

Upon receipt of the analytical data packages from Mitkem, EA reviewed the packages for completeness and noted any corrective actions. The full data packages and electronic data deliverables (EDDs) were submitted to Environmental Data Services, Inc. for validation.

4. FIELD INVESTIGATION RESULTS

Section 4 presents analytical results from the field investigation sampling activities conducted during the site characterization. Analytical methods were performed by Mitkem Laboratories, an ELAP-certified laboratory. In addition, the laboratory followed the quality assurance/quality control (QA/QC), holding time and reporting requirements as defined in the NYSDEC ASP, Category B deliverables of June 2000. Analytical data was validated by Environmental Data Services, Inc. an independent third party. The Data Usability Summary Reports (DUSRs) are presented in Appendix D.

Standards, criteria, and guidance (SCGs) are promulgated requirements and non-promulgated guidance which govern activities that may affect the environment and are widely used at different stages of an investigation and remediation of a site. The SCGs applicable for the data set collected during this site characterization are 6 NYCRR Subpart 375-6 Soil Cleanup Objectives - Protection of Public Health – Unrestricted, Commercial Use, and Industrial Use guidance values. Industrial use guidance values have been used to evaluate debris sample results. Subsurface soil analytical results were compared to unrestricted, commercial, and industrial use values.

Analytical summary tables for the debris samples are provided in Tables 1 through 4. Volume calculation estimates for debris contained in trenches, pits, sumps, floor drains, and the basement are provided in Tables 5. Subsurface soil analytical summary tables are provided as Tables 6 through 8. Laboratory analytical data, form Is, and chain of custody forms are provided in Appendix E.

4.1 WAREHOUSE FLOOR INSPECTION RESULTS

The warehouse floor inspection determined that a large portion of the Power City Warehouse structure is constructed on a poured concrete foundation. During the inspection the brick and asphalt flooring material was removed and revealed a poured concrete foundation/slab. The concrete foundation appeared to be in good condition as no major cracks or deterioration was observed at locations where the foundation was inspected. During the May 2000 investigation conducted by E&E, it was estimated that the concrete foundation was up to 3-ft thick. EA cored the concrete foundation at locations where subsurface soil sampling was to be performed. During coring activities, the concrete foundation was determined to be on average 6-in. thick. The presence of the concrete slab/foundation throughout the structure would provide a low permeable surface that would significantly limit the migration of COCs to the subsurface. General floor and sub-floor materials present on-site are shown in Figure 6. Field photos showing the concrete subfloor at various locations throughout the structure are provided in the daily field reports.

4.2 DEBRIS SAMPLING RESULTS

4.2.1 Volatile Organic Compounds Results

No VOCs were detected above the applicable SCGs. A summary of detected VOCs above the laboratory reporting limits in debris samples is provided in Table 1.

4.2.2 Semivolatile Organic Compounds Results

SVOC analytes, specifically polycyclic aromatic hydrocarbons (PAHs) were detected in debris samples above the applicable SCGs. Elevated levels of PAHs including acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, fluoranthene, fluorine, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, and pyrene were detected in every debris sample collected at the site. The debris samples were collected from floor drains, trenches, sumps, and pits located throughout the warehouse structure. PAHs were also reported at elevated levels in the surface soil samples collected during the previous site investigation in 1999. A summary of detected SVOCs in debris samples is provided in Table 2. SVOCs detected above SCGs are illustrated in Figure 7.

In general, PAH compounds are typically less water-soluble and less volatile in the environment which means PAHs are found primarily in soil, sediment, and oily substances, as opposed to in water or air. The PAHs identified at the site have higher partitioning coefficient values which makes them less mobile, but more persistent in the environment.

It is known that coals contain significant amounts of PAHs; PAHs are also found in processed fossil fuels and tars. Because of the prevalent historical uses of coal and fossil fuels in industrialized areas, PAHs are a widespread organic pollutant. Battery manufacturing by U.S. Light and Heat Co., and then Autolite Co., at the Power City Warehouse would likely have used coal and fossil fuels in the manufacturing processes.

PAHs were also detected above TAGM 4046 in the surface soil at the adjacent Tract II Site (B-00022/932136); however, PAHs were not found to be present in the groundwater at the Tract II Site.

4.2.3 TAL Metals Results

Four metals were detected above SCGs in debris samples collected at the site. Specifically, arsenic, lead, mercury, and zinc were above the cleanup objectives in a number of debris samples. Lead concentrations exceeded SCGs in each of the debris samples collected throughout the site. Concentrations of lead ranged from an estimated 4,890 mg/kg (DS-20) to 103,000 mg/kg (basement) as compared with the 3,900 mg/kg industrial cleanup objective. Historical background levels for total lead concentrations from samples collected during the 1999 site investigation ranged from 201 mg/kg to 1,400 mg/kg. Arsenic was also detected at

concentrations above SCGs in each of the debris samples. Concentrations of arsenic were detected from 41.6 mg/kg (DS-15) to 537 mg/kg (DS-7).

Mercury concentrations were detected above SCGs in 3 of the 19 debris samples. These debris sample locations were located in former storage areas and the assembly area of the structure, and were all grab sample locations. In addition, two grab samples (DS-05 & DS-07) reported concentrations of zinc above the applicable SCGs. These samples were collected from the same trench located in the eastern portion of the former materials storage area. The trench pit was 2 ft deep × 2 ft wide and noted to have approximately 2-4 in. of black sand/silt and general debris within the bottom of the trench.

The heavy metals reported above SCGs in the debris samples collected at the site are consistent with the former operations at the structure. The production of batteries required the use of hazardous chemicals and heavy metals including mercury, lead, cadmium, nickel, zinc, manganese, potassium hydroxide, and manganese dioxide. These types of heavy metals are very persistent in the environment and through precipitation of their compounds, or by ion exchange into soil, sediment, and muds, heavy metals can localize and lay dormant. Heavy metals do not tend to breakdown or decay as readily as organic compounds and therefore accumulate in environmental media.

A summary of detected TAL metals in debris samples is provided in Table 2. TAL metals exceeding the SCGs are illustrated in Figure 8.

4.2.4 TCLP Metals Results

The TCLP for metals was performed on all of the debris samples collected in September 2007 to characterize the media at the site as either hazardous or non-hazardous waste. Lead was detected above USEPA TCLP maximum concentrations in all 19 samples collected, ranging from 5,310 µg/L (DS-20) to 1,630,000 µg/L (DS-19). The reported concentration range for lead was typically between two and three orders of magnitude higher than the USEPA hazardous waste levels for toxicity characteristics based on leaching results. A summary of detected TCLP metals is provided in Table 4 and the TCLP lead concentrations are illustrated in Figure 9.

4.3 DEBRIS VOLUME ESTIMATE RESULTS

Based upon inspection and evaluation of debris sample collection areas within the Power City Warehouse, it is estimated that approximately 20 cubic yards of debris are currently located within the structures basement, floor drains, trenches, sumps, pits, and catch basins. Results of the debris volume calculations are detailed in Table 5.

4.4 BASEMENT DISCHARGE AND SAMPLING RESULTS

The small basement located within the Power City Warehouse structure was pumped out, with floodwaters being discharged into the local sanitary sewer system. Following the pumping of the flooded basement, an inspection of the basement area was performed to assess general structural

conditions, and amount and types of waste and debris that were present within the area. One basement composite sample was collected from debris observed during the inspection of the basement and analyzed for TAL metals, similar to other debris samples that were collected in September 2007.

Basement discharge reporting forms submitted to the NFWB are included in Appendix D

4.4.1 Basement Inspection Results

The basement inspection determined that a layer of sandy sediment was covering much of the basement flooring, walls, and stairs. A large number of bricks, several sections of steel piping and tubing, and two opened 55-gallon drums were observed within the basement, with several additional sections of piping located on the stairway leading into the basement area. The basement was completed with a poured concrete floor and sidewalls, which were observed to be in good condition, with the exception of a small groundwater intrusion which entered through the north exterior wall of the basement. This small flow ceased within one day, indicating it was likely residual water between the building foundation and surrounding soil.

As a result of the basement inspection, it is estimated that an additional 10 cubic yards of debris materials remains in the formerly flooded basement. Field photos showing the pumped basement are provided in the daily field reports. A debris volume estimate is included in Table 5.

4.4.2 Basement Sampling Results

The basement composite sample collected was analyzed for TAL metals and compared to industrial use cleanup objectives, as were all other debris samples collected during this site characterization.

Several TAL metals were detected within the basement composite sample collected in September 2008. Of these, only arsenic (185 mg/kg), cadmium (117 mg/kg), and lead (103,000 mg/kg) were detected above their respective industrial use cleanup objectives. No other TAL metals were detected above industrial use cleanup objectives.

These results are consistent with the 2007 debris samples collected at the site and correspond with the known historic industrial uses of the site. A summary of detected TAL metals is provided in Table 3.

4.5 SUBSURFACE SOIL SAMPLING RESULTS

Subsurface soil samples were collected from 23 locations at the site, including 13 interior locations collected from below the building foundation and 10 exterior locations surrounding the structure. Samples were analyzed for VOCs, SVOCs, and TAL metals.

4.5.1 Volatile Organic Compounds Results

Acetone was the only VOC detected above applicable Part 375 Guidelines for Unrestricted Use at sample locations SB-19 (4-7) (0.10 mg/kg) and at SB-06D (5-6) (0.150 mg/kg). It should be noted however, that these values remain well below Part 375 Guidelines for Commercial and Industrial uses. No other VOCs were detected above SCGs. A summary of detected VOCs in subsurface soil samples above SCGs is provided in Table 6. Figure 11 presents the VOCs detected in subsurface soil samples above SCGs.

4.5.2 Semivolatile Organic Compounds Results

No SVOCs were detected above applicable Part 375 Guidelines for Unrestricted use within the subsurface soil samples submitted for analysis. A summary of detected SVOCs in subsurface soil samples is provided in Table 7.

4.5.3 TAL Metals Results

Eight metals were detected above SCGs in the subsurface soil samples collected at the site. Specifically, arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc were above the cleanup objectives in a number of subsurface soil samples. The following summary details soil sample results that were detected above SCGs based on industrial, commercial, and unrestricted use guidelines.

The concentration of arsenic exceeded the industrial use cleanup objective of 16 mg/kg within soil sample SB-22S (40.40 mg/kg).

Lead was detected above its industrial use guideline of 3,900 mg/kg within soil sample SB-08S (9,410 mg/kg). Detections of lead within soil samples SB-12S (1,160 mg/kg) and SB-22S (2,160 mg/kg) were above the commercial cleanup objective of 1,000 mg/kg, but below the industrial use guideline. Additionally, lead was detected above its unrestricted use guideline of 63 mg/kg, but below its commercial use guideline within soil samples SB-11S (148 mg/kg) and SB-21S (247 mg/kg).

The concentration of copper within soil sample SB-22S (421 mg/kg) was above unrestricted use (50 mg/kg) and commercial use (270 mg/kg) guidelines, but well below industrial use guidelines (10,000 mg/kg).

The concentration of cadmium exceeded the unrestricted use cleanup objective of 2.5 mg/kg within soil sample SB-13S (2.80 mg/kg). However, this concentration is below respective commercial (9.3 mg/kg) and industrial (60 mg/kg) use cleanup objectives.

Chromium was detected slightly above its unrestricted use cleanup objective of 31 mg/kg within soil samples SB-07S (32.20 mg/kg), SB-13S (32.20 mg/kg), and SB-22S (33.60 mg/kg). Each of these values is well below respective commercial (1,900 mg/kg) and industrial (7,600 mg/kg) use cleanup objective for chromium.

Mercury was detected above its unrestricted use guideline of 0.18 mg/kg within soil samples SB-08S (0.280 mg/kg) and SB-22S (0.270 mg/kg). Both of these detections are below respective commercial (2.8 mg/kg) and industrial (5.7 mg/kg) use guidelines for mercury.

Nickel was detected above its unrestricted use guideline of 30 mg/kg within samples SB-14S (38.0 mg/kg), SB-20S (35.70 mg/kg), and SB-22S (47.40 mg/kg). Each of these detections are below respective commercial (310 mg/kg) and industrial (10,000 mg/kg) use guidelines for nickel.

Zinc was detected above its unrestricted use guideline of 109 mg/kg within six subsurface soil samples ranging from 119.0 mg/kg (SB-12S) to 5,490 mg/kg (SB-13S). Detections of zinc within subsurface soils were below the applicable commercial and industrial use guidelines of 10,000 mg/kg.

The detections of these heavy metals within shallow subsurface soils at the site are consistent with analytical results for the debris samples and the battery manufacturing operations historically performed at the site.

A summary of detected TAL metals in subsurface soil samples is provided in Table 8. TAL metals detected within subsurface soil samples above SCGs are illustrated in Figure 12 (interior locations) and Figure 13 (exterior locations).

4.6 DATA VALIDATION

All analytical data results were submitted to Environmental Data Services, Inc. for validation. This validation included a review of pertinent QA/QC data such as sample extraction and analysis, holding times, calibration, a review of laboratory blanks and QA/QC sample results, and a review of the analytical case narrative. A DUSR was prepared which includes a compliance chart, a list of samples included in each sample delivery group, and recalculations of sample results. Nonconforming QA/QC results were evaluated with respect to their implications for data reliability and usability and data results were flagged accordingly on the results sheets. These qualifiers were entered into the site-specific database and appear in the summary tables presented in this report. The DUSR for the analytical data packages is provided in Appendix F.

5. CONCLUSIONS AND RECOMMENDATIONS

This section provides conclusions based on data collected during the historic records review and field investigation activities, as well as any recommendations for future actions at the Power City Warehouse site.

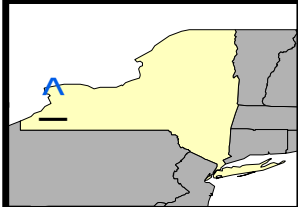
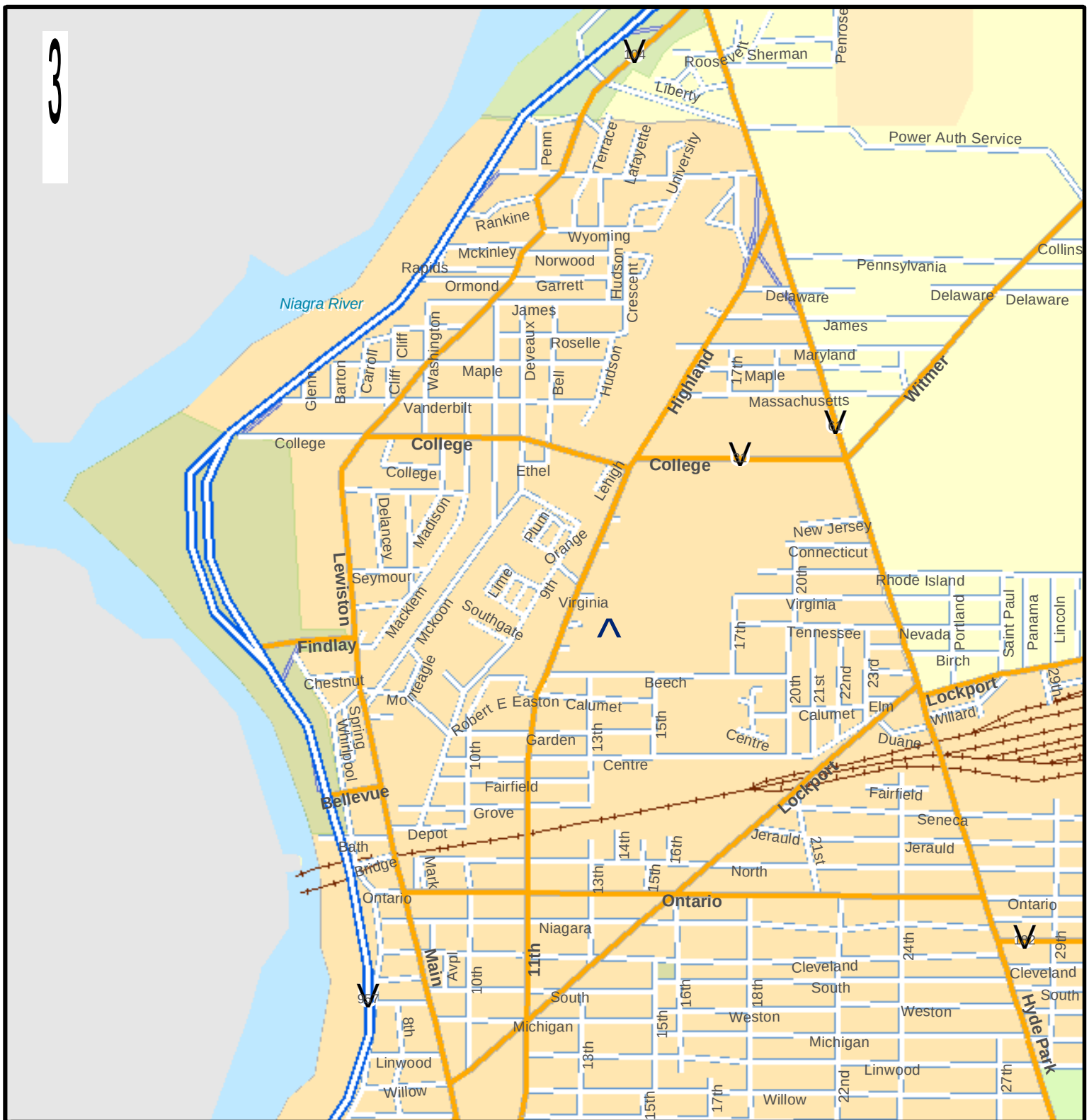
5.1 CONCLUSIONS

- Several SVOCs, specifically PAHs, and four TAL metals were detected above industrial use SCGs in debris samples collected from the floor drains, trenches, sumps, and pits located throughout the Power City Warehouse site. Lead results from the TCLP analysis characterized the debris material as hazardous waste based on USEPA regulations.
- Approximately 20 cubic yards of debris material is estimated to be located within the basement, drains, trenches, sumps, and pits within the warehouse structure.
- Inspection of flooring and sub-flooring materials revealed that the majority of the structure contains a poured concreted foundation, which was observed to be in good condition with no major deterioration identified.
- One VOC (acetone) and eight TAL metals were detected above unrestricted use cleanup objectives within subsurface soil samples collected from beneath the foundation and surrounding the exterior of the Power City Warehouse. Of these, only lead (SB-08S, SB-12S, SB-22S) and copper (SB-22S) were detected above commercial use cleanup objectives, and one sample (SB-08S) detected lead and one sample (SB-22S) detected arsenic above applicable industrial use cleanup objectives.
- Based on the results of the previous site investigation and this site characterization, elevated concentrations of PAHs and heavy metals are present in the surface soil and debris material at the site. Additionally, elevated concentrations of heavy metals are present within shallow subsurface soils consisting of fill materials located beneath the foundation and surrounding the exterior of the former Power City Warehouse. This analytical data are consistent with the surface soil results from the site investigation performed at the adjacent (to the south and east) Tract II site.

5.2 RECOMMENDATIONS

Prior to any renovations, construction, demolition, or general use of the structure, all debris material should be removed from the structure and disposed of at a hazardous waste landfill in accordance with 6 NYCRR Part 370-375. EA also recommends that engineering and institutional controls be implemented at the site to limit site access and reduce the potential for human and environmental receptor pathways to the hazardous materials until a remedial action is implemented.

A groundwater investigation was not completed as part of this site characterization. While the floor and sub-floor inspections revealed a poured concrete foundation which was observed to be in good condition, shallow subsurface soils beneath the building foundation and surrounding the structure have shown concentrations of heavy metals within the subsurface environment. In addition to the impacts observed to shallow subsurface soils, the historical uses of the site may have impacted groundwater. The monitoring wells located at the adjacent Tract II site did not reveal the presence of COCs identified at the Power City Warehouse site in groundwater. A groundwater investigation would need to be completed to fully characterize any potential impacts to the groundwater located beneath the site.



LEGEND

▲ Site Location

0 0.1 0.2 0.4 0.6 0.8 Miles

Source: NYSGIS Clearinghouse



POWER CITY WAREHOUSE SITE (9-32-131)
SITE CHARACTERIZATION REPORT
NIAGARA FALLS, NEW YORK

FIGURE 1
Site Location Map

PROJECT MGR:
RSC

DESIGNED BY:
CJS

CREATED BY:
DCC

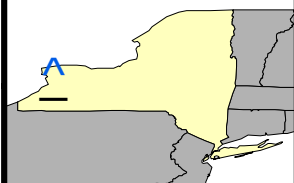
CHECKED BY:
RJC

SCALE:
AS SHOWN

DATE:
MAY 2009

PROJECT NO:
14368.11

FILE NO:
GIS/PROJECTS/
PowerCity_Figure1.MXD



Legend

- Approximate Site Boundary
- Approximate Boundaries of Adjacent Properties

0 100 200 400 600 800 Feet

Source: NYSGIS Clearinghouse



POWER CITY WAREHOUSE SITE (9-32-131)
SITE CHARACTERIZATION REPORT
NIAGARA FALLS, NEW YORK

FIGURE 2
Aerial Photography

PROJECT MGR:
RSC

DESIGNED BY:
CJS

CREATED BY:
DCC

CHECKED BY:
RSC

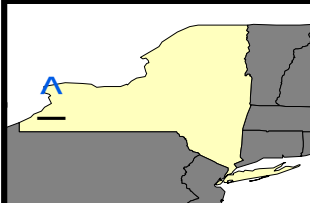
SCALE:
AS SHOWN

DATE:
MAY 2009

PROJECT NO:
14368.11

FILE NO:
GIS/PROJECTS/
FIGURE2.MXD

3



Legend

Building Outline

0 50 100 200 Feet

Source: USGS EROS 2005



POWER CITY WAREHOUSE SITE (9-32-131)
SITE CHARACTERIZATION REPORT
NIAGARA FALLS, NEW YORK

FIGURE 3
Historic Process Areas

PROJECT MGR:
RSC

DESIGNED BY:
CJS

CREATED BY:
CJS

CHECKED BY:
RSC

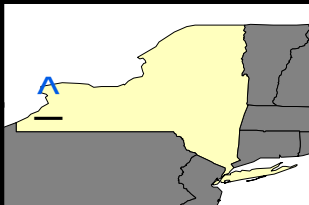
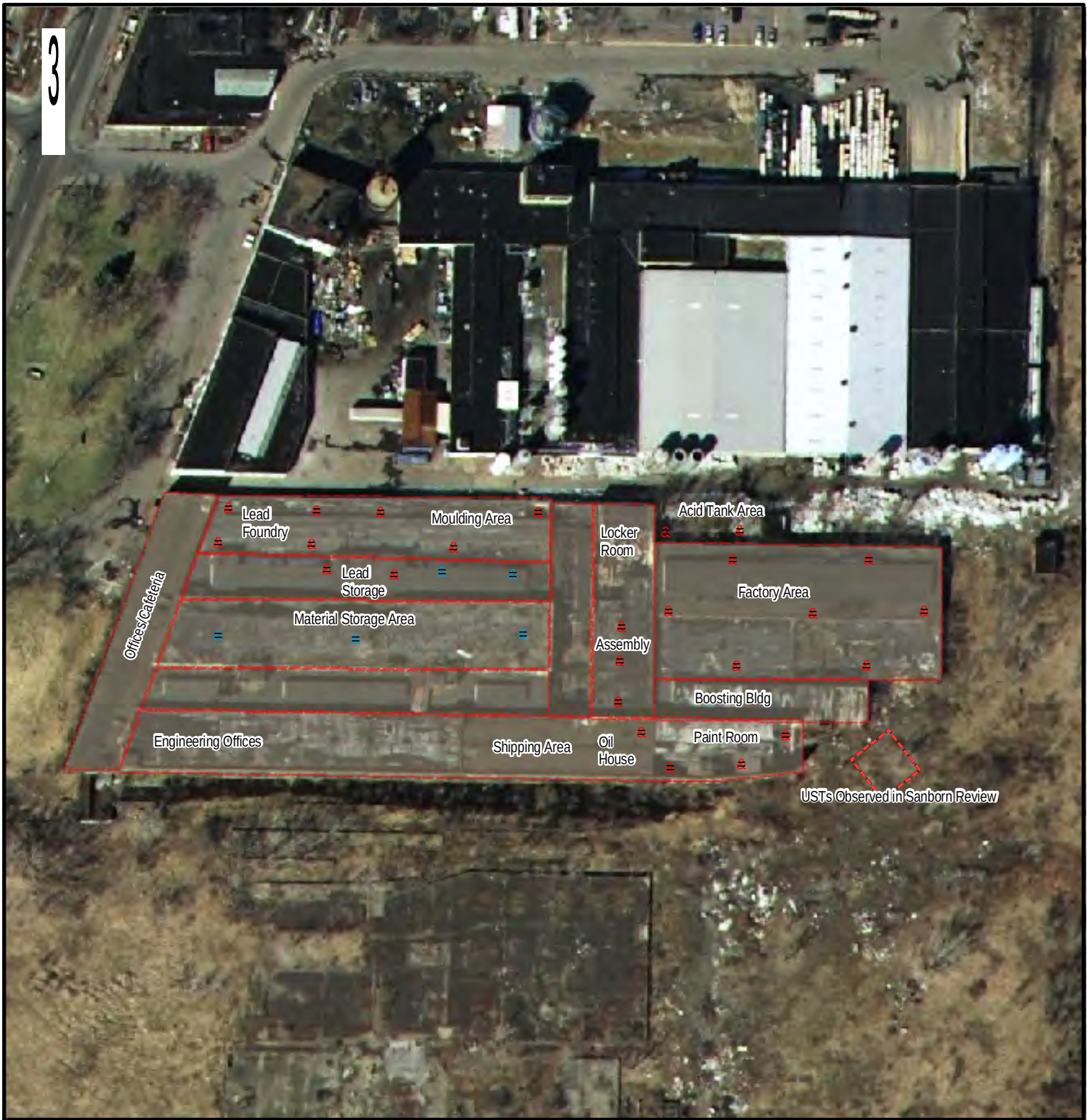
SCALE:
AS SHOWN

DATE:
MAY 2009

PROJECT NO:
14368.11

FILE NO:
...GIS/PROJECTS/
FIGURE3.MXD

3



Legend

- Building Outline
- ⊗ Proposed Soil Sample Location
- ⊗ Proposed Debris Sample Location

0 50 100 200 Feet

Source: USGS EROS 2005



POWER CITY WAREHOUSE SITE (9-32-131)
SITE CHARACTERIZATION REPORT
NIAGARA FALLS, NEW YORK

FIGURE 4
Proposed Soil and Debris
Sampling Locations

PROJECT MGR:
RSC

DESIGNED BY:
CJS

CREATED BY:
CJS

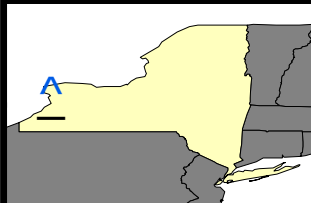
CHECKED BY:
RSC

SCALE:
AS SHOWN

DATE:
MAY 2009

PROJECT NO:
14368.11

FILE NO:
...GIS/PROJECTS/
FIGURE4.MXD



Legend

- Building Outline
- Debris Sample Location

0 50 100 200 Feet

Source: USGS EROS 2005



POWER CITY WAREHOUSE SITE (9-32-131)
SITE CHARACTERIZATION REPORT
NIAGARA FALLS, NEW YORK

FIGURE 5
Debris Sampling Locations

PROJECT MGR:
RSC

DESIGNED BY:
CJS

CREATED BY:
DCC

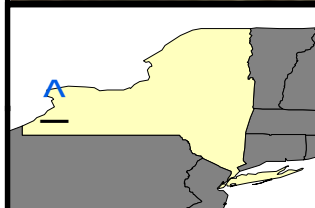
CHECKED BY:
RSC

SCALE:
AS SHOWN

DATE:
MAY 2009

PROJECT NO:
14368.11

FILE NO:
...GIS/PROJECTS/
FIGURE5.MXD



Legend

- Brick Floor Over Concrete Sub-Floor
- Concrete Slab
- Asphalt Paved Area Over Concrete Sub-Floor

0 50 100 200 Feet

Source: USGS EROS 2005



POWER CITY WAREHOUSE SITE (9-32-131)
SITE CHARACTERIZATION REPORT
NIAGARA FALLS, NEW YORK

FIGURE 6
Floor and Sub-Floor
Construction Materials

PROJECT MGR:
RSC

DESIGNED BY:
CJS

CREATED BY:
DCC

CHECKED BY:
RSC

SCALE:
AS SHOWN

DATE:
MAY 2009

PROJECT NO:
14368.11

FILE NO:
...GIS/PROJECTS/
FIGURE6.MXD



Legend

- Building Outline
- PowerCityWarehouse
- Debris Sample Location
- mg/kg** Milligrams per kilogram
- J** Value is an estimate
- D** Dilution

Values in **RED** indicate concentration is above the SCG.

0

50

100

200

Feet

POWER CITY WAREHOUSE SITE (9-32-131)

SITE CHARACTERIZATION REPORT

NIAGARA FALLS, NEW YORK

PROJECT MGR:
RSC

DESIGNED BY:
CJS

CREATED BY:
DCC

CHECKED BY:
RSC

SCALE:
AS SHOWN

DATE:
MAY 2009

PROJECT NO:
14368.11

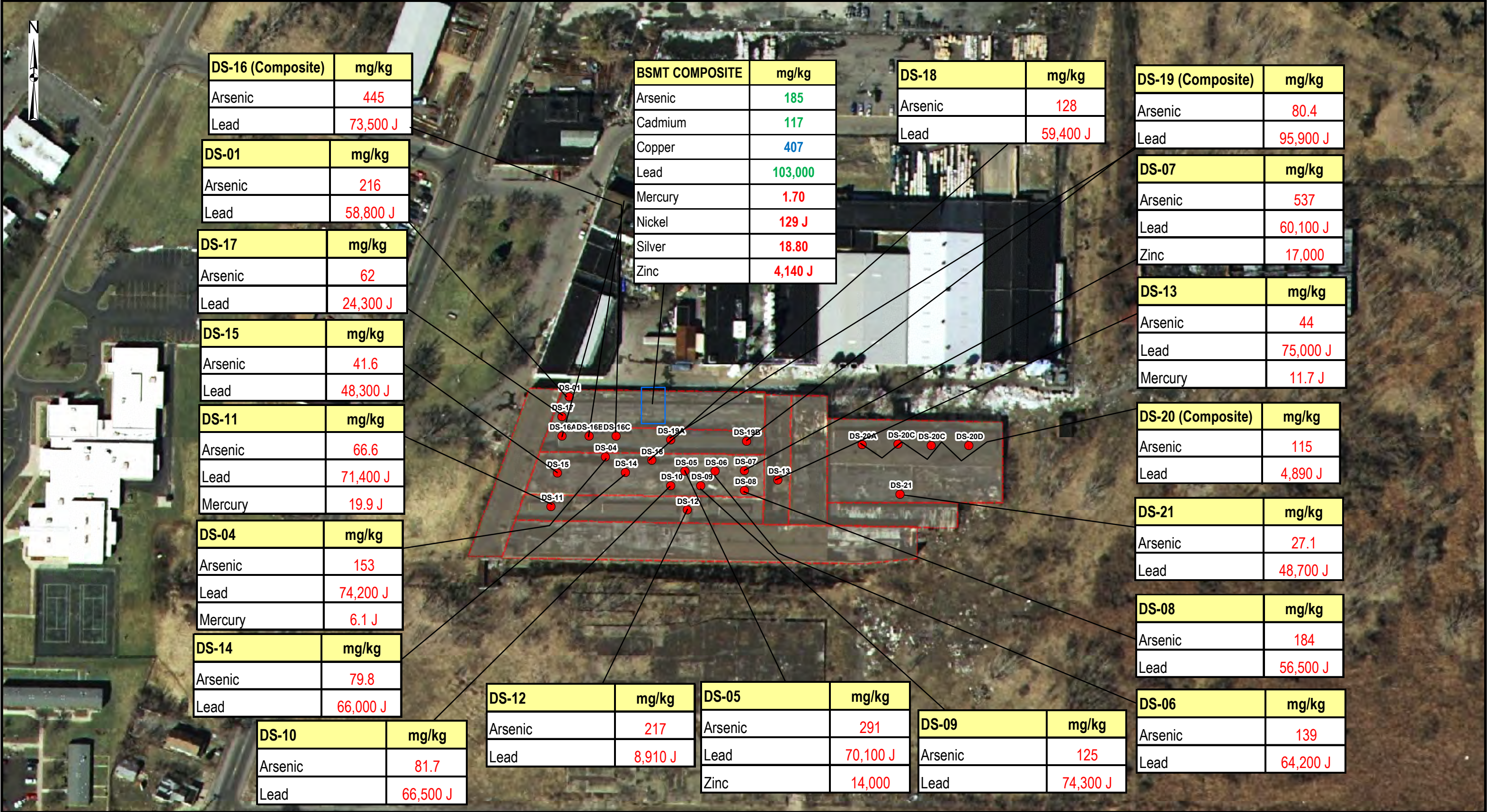
FILE NO:
...GIS/PROJECTS/
FIGURE7.MXD

FIGURE 7

SVOC Detected above Industrial Use

SCGs in Debris Samples

Source: USGS EROS 2005



Legend

0 50 100 200 Feet

mg/kg Milligrams per kilogram

J Value is an estimate

D Dilution

Values in RED indicate concentration is above the Part 375 Guidelines for unrestricted use, but below commercial use guidelines

Values in BLUE indicate concentration is above commercial use guidelines, but below industrial use guidelines

Values in GREEN indicate concentration is above industrial use guidelines

POWER CITY WAREHOUSE SITE (9-32-131)

SITE CHARACTERIZATION REPORT

NIAGARA FALLS, NEW YORK

FIGURE 8

TAL Metals Detected above Industrial Use SCGs in Debris Samples

Source: USGS EROS 2005

PROJECT MGR:
RSC

DESIGNED BY:
CJS

CREATED BY:
DCC

CHECKED BY:
RSC

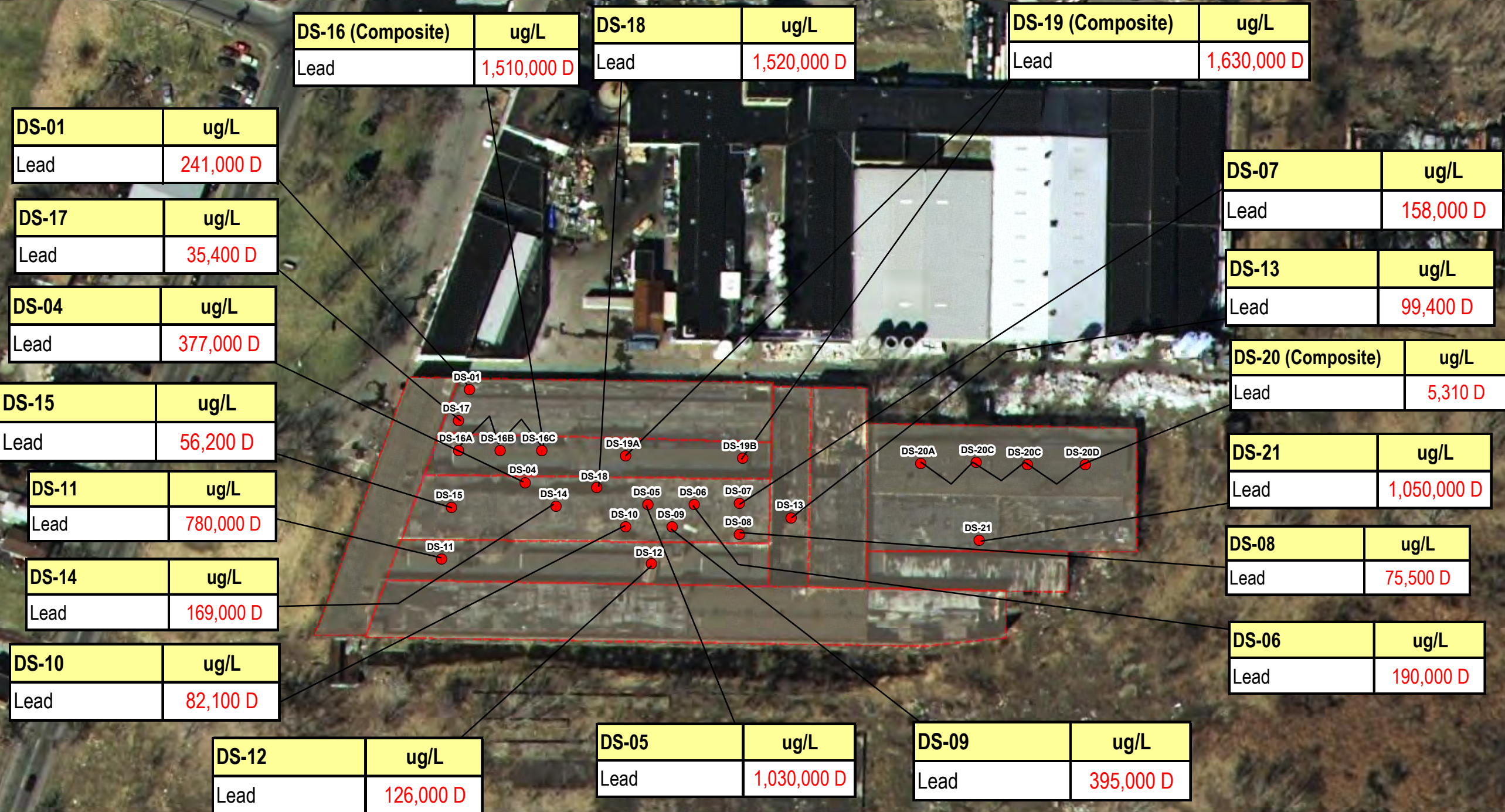
SCALE:
AS SHOWN

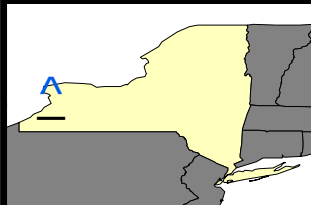
DATE:
MAY 2009

PROJECT NO:
14368.11

FILE NO:
...GIS/PROJECTS/
FIGURE8.MXD







Legend

- ! Interior Subsurface Soil Sample Location
- ! Exterior Subsurface Soil Sample Location
- Building Outline

0 50 100 200 Feet

Source: USGS EROS 2005



POWER CITY WAREHOUSE SITE (9-32-131)
SITE CHARACTERIZATION REPORT
NIAGARA FALLS, NEW YORK

FIGURE 10
Subsurface Soil
Sampling Locations

PROJECT MGR:
RSC

DESIGNED BY:
CJS

CREATED BY:
DCC

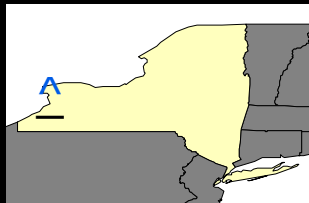
CHECKED BY:
RSC

SCALE:
AS SHOWN

DATE:
MAY 2009

PROJECT NO:
14368.11

FILE NO:
...GIS/PROJECTS/
FIGURE10.MXD



Legend

- ! VOC Subsurface Soil Sample Location
- [Red dashed box] Building Outline
- J Estimated Value

Values in **RED** indicate concentration is above the Part 375 Guidelines for unrestricted use, but below commercial use.

0 50 100 200 Feet

Source: USGS EROS 2005



POWER CITY WAREHOUSE SITE (9-32-131)
SITE CHARACTERIZATION REPORT
NIAGARA FALLS, NEW YORK

FIGURE 11
VOCs Detected above Unrestricted Use
SCGs in Subsurface Soil Samples

PROJECT MGR:
RSC

DESIGNED BY:
CJS

CREATED BY:
DCC

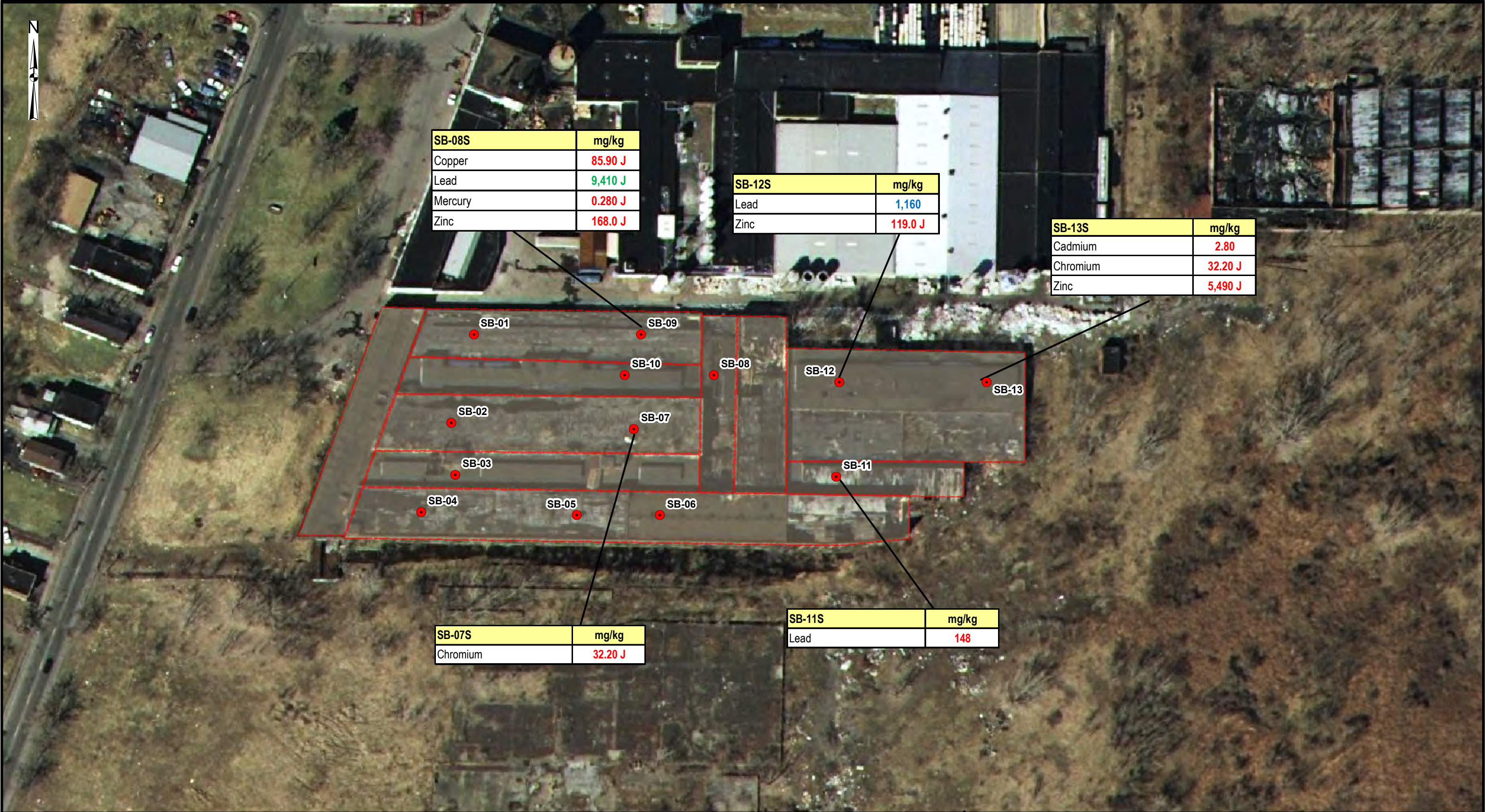
CHECKED BY:
RSC

SCALE:
AS SHOWN

DATE:
MARCH 2009

PROJECT NO:
14368.11

FILE NO:
...GIS/PROJECTS/
PowerCity_Figure11.MXD



SB-08S	mg/kg
Copper	85.90 J
Lead	9,410 J
Mercury	0.280 J
Zinc	168.0 J

SB-12S	mg/kg
Lead	1,160
Zinc	119.0 J

SB-13S	mg/kg
Cadmium	2.80
Chromium	32.20 J
Zinc	5,490 J

SB-07S	mg/kg
Chromium	32.20 J

SB-11S	mg/kg
Lead	148

Legend

- Building Outline
- Debris Sample Location
- mg/kg** Milligrams per kilogram
- J** Value is an estimate
- Values in **RED** indicate concentration is above the Part 375 Guidelines for unrestricted use, but below commercial use guidelines
- Values in **BLUE** indicate concentration is above commercial use guidelines, but below industrial use guidelines
- Values in **GREEN** indicate concentration is above industrial use guidelines

POWER CITY WAREHOUSE SITE (9-32-131)
SITE CHARACTERIZATION REPORT
NIAGARA FALLS, NEW YORK

PROJECT MGR: RSC	DESIGNED BY: CJS	CREATED BY: DCC	CHECKED BY: RSC	SCALE: AS SHOWN	DATE: MAY 2009	PROJECT NO: 14368.11	FILE NO: ...GIS/PROJECTS/ FIGURE12.MXD

FIGURE 12
TAL Metals Detected above SCGs
in Interior Subsurface Soil Samples

Source: USGS EROS 2005

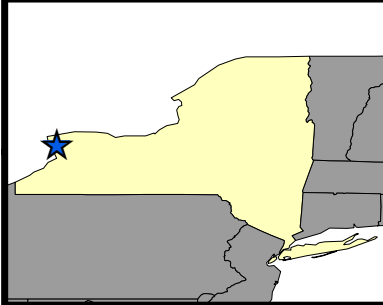


SB-14S	mg/kg
Chromium	32.20 J
Nickel	38.0 J

SB-21S	mg/kg
Lead	247.0
Zinc	252.0 J

SB-20S	mg/kg
Nickel	35.70
Zinc	309 J

SB-22S	mg/kg
Arsenic	40.40
Chromium	33.60
Copper	421.0
Lead	2,160
Mercury	0.270
Nickel	47.40 J
Zinc	688 J



Legend

Building Outline

Exterior Subsurface Soil Sample Location

mg/kg

Milligrams per kilogram

J

Value is an estimate

Values in RED indicate concentration is above the Part 375 Guidelines for unrestricted use, but below commercial use guidelines

Values in BLUE indicate concentration is above commercial use guidelines, but below industrial use guidelines

Values in GREEN indicate concentration is above industrial use guidelines

0

50

100

200

Feet

POWER CITY WAREHOUSE SITE (9-32-131)

SITE CHARACTERIZATION REPORT

NIAGARA FALLS, NEW YORK

PROJECT MGR: RSC	DESIGNED BY: CJS	CREATED BY: DCC	CHECKED BY: RSC	SCALE: AS SHOWN	DATE: MAY 2009	PROJECT NO: 14368.11	FILE NO: ...GIS/PROJECTS/ FIGURE13.MXD

FIGURE 13

TAL Metals Detected above SCGs
in Exterior Subsurface Soil Samples

Source: USGS EROS 2005



TABLE 1 SUMMARY OF VOLATILE ORGANIC COMPOUNDS DETECTED IN DEBRIS SAMPLES

Parameter List USEPA Method 8260B	Sample ID	9-32-131-DS09		9-32-131-DS-13		9-32-131-DS-14		9-32-131-DS-16		9-32-131-DS-19		9-32-131-DUP02		9-32-131-RB01		6 NYCRR Part 375 Industrial Use (mg/kg)
	Lab ID	F1308-05B		F1308-19B		F1308-12B		F1308-14B		F1308-17B		F1308-18B		F1311-02C		
	Sample Type	Debris Sample		Debris Sample		Debris Sample		Debris Sample		Debris Sample		Duplicate/QA/QC		Rinse Blank/QA/QC		
	Sample Date	9/12/2007		9/12/2007		9/12/2007		9/12/2007		9/12/2007		9/12/2007		9/12/2007		
Acetone	mg/kg		U	130			UJ	71		42		27			U	1,000
Carbon disulfide	mg/kg		U	38			UJ	7.6		9.8	J	8.5	J		U	---
1,3- Dichlorobenzene	mg/kg		U		U		UJ		UJ	4.9	J	5.1	J		U	560
2- Hexanone	mg/kg		U	3.3	J		UJ	2.4	J		U		U		U	---
4- Isopropyltoluene	mg/kg		U	9.4	J		UJ		UJ		U		U		U	---
Naphthalene	mg/kg		U	8.8	J		UJ	18		52		23			U	---
Toluene	mg/kg		U	4.2	J		UJ		UJ		U		U		U	1,000
1,2,4- Trichlorobenzene	mg/kg		U		U		UJ		R	12		8.4	J		U	380
1,2,4- Trimethylbenzene	mg/kg		U		U		UJ	3.1	J		U		U		U	380
Notes: USEPA = United States Environmental Protection Agency NYCRR = New York Code of Rules and Regulations J = Analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample. U = The analyte was analyzed for, but was not detected above the sample reporting limit. UJ = The analyte was not detected above the reporting limit and the reporting limit is appr QA/QC = Quality Assurance/Quality Control mg/kg = milligrams per kilogram (ppm) <i>9-32-131-DUP02 collected at 9-32-131-DS19</i> Analytical data results provided by Mitkem Corporation. Data Validation completed by Environmental Data Services, Inc. Only parameters that had at least one detection from the data set are shown.																

TABLE 2 SEMIVOLATILE ORGANIC COMPOUNDS DETECTED IN DEBRIS SAMPLES

Parameter List USEPA Method 8270C	Sample ID	9-32-131-DS-01		9-32-131-DS-04		9-32-131-DS-05		9-32-131-DS-06		9-32-131-DS-07		9-32-131-DS-08		9-32-131-DS09		6 NYCRR Part 375 Industrial Use (mg/kg)
	Lab ID	F1308-01A		F1308-11A		F1308-07A		F1308-08A		F1308-09A		F1308-10A		F1308-05B		
	Sample Type	Debris		Debris		Debris		Debris		Debris		Debris		Debris		
	Sample Date	9/12/2007		9/12/2007		9/12/2007		9/12/2007		9/12/2007		9/12/2007		9/12/2007		
Acenaphthene	mg/kg	3,800	JD	78,000		7,600	JD	280	J	8,900			U	280	JD	1,000
Acenaphthylene	mg/kg	1,000	JD	20,000		1,300	JD	350	J	1,600		160	J	290	JD	1,000
Anthracene	mg/kg	8,900	D	150,000	D	19,000	D	920	J	18,000	D		U	1,200	D	1,000
Benzo(a)anthracene	mg/kg	31,000	D	340,000	D	38,000	D	1,900		32,000	D		U	4,100	D	11
Benzo(a)pyrene	mg/kg	27,000	D	270,000	D	30,000	D	1,600		24,000	D		U	3,700	D	1.1
Benzo(b)fluoranthene	mg/kg	39,000	D	310,000	D	41,000	D	2,000		34,000	D	3,300	JD	5,200	D	11
Benzo(g,h,i)perylene	mg/kg	17,000	D	140,000	D	17,000	D	1,500		14,000	D		U	2,000	D	1,000
Benzo(k)fluoranthene	mg/kg	14,000	D	73,000		15,000	D	1,400		12,000			U	1,900	D	110
Bis(2-ethylhexyl)phthalate	mg/kg		U		U		U	640	J	830	J	160,000	D	170	JD	---
Carbazole	mg/kg	7,500	D	87,000	JD	10,000	D	480	J	11,000			U	460	JD	---
Chrysene	mg/kg	34,000	D	300,000	D	35,000	D	2,100		30,000	D	2,700	JD	4,100	D	110
Dibenzo(a,h)anthracene	mg/kg	5,100	JD	55,000		5,300	JD	320	J	4,300	JD		U	630	JD	1.1
Dibenzofuran	mg/kg	3,300	JD	73,000	JD	6,200	JD	270	J	8,300			U	260	JD	---
2,4- Dichlorophenol	mg/kg		U		U		U		U		U		U		U	---
2,4- Dimethylphenol	mg/kg		U	4,700	J		U		U	340	J		U		U	---
Di-n-butylphthalate	mg/kg		U		U		U	330	J	540	J		U		U	---
Di-n-octylphthalate	mg/kg		U		U		U		U		U		U		U	---
Fluoranthene	mg/kg	82,000	D	790,000	D	94,000	D	5,800		82,000	D	3,000	JD	10,000	D	1,000
Fluorene	mg/kg	3,400	JD	77,000		7,300	JD	280	J	9,100			U	300	JD	1,000
Hexachlorobenzene	mg/kg		U		U		U		U		U		U		U	---
Indeno(1,2,3-cd)pyrene	mg/kg	15,000	D	140,000	D	16,000	D	1,100	J	13,000	D		U	1,900	D	11
2- Methylnaphthalene	mg/kg	1,700	JD	58,000		4,100	JD	300	J	4,900		240	J	140	JD	---
2- Methylphenol	mg/kg		U	3,400	J		U		U	270	J		U		U	---
4- Methylphenol	mg/kg		U	9,900			U		U	820	J		U		U	---
Naphthalene	mg/kg	4,100	JD	110,000	D	7,000	JD	350	J	11,000		210	J	290	JD	1,000
Phenanthrene	mg/kg	55,000	D	690,000	D	73,000	D	2,900		79,000	D	1,900	JD	4,000	D	1,000
Phenol	mg/kg		U	4,000	J		U		U	380	J		U		U	1,000
Pyrene	mg/kg	48,000	D	520,000	D	55,000	JD	2,500		51,000	D	2,200	JD	5,600	D	1,000
1,2,4- Trichlorobenzene	mg/kg		U		U		U		U		U		U		U	---

NOTE: USEPA = United States Environmental Protection Agency
 NYCRR = New York Code of Rules and Regulations
 J = Analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
 U = The analyte was analyzed for, but was not detected above the sample reporting limit.
 D = Dilution
 mg/kg = milligrams per kilogram (ppm)
 Bold = Analyte detected above 6 NYCRR Part 375 guidelines for Protection of Public Health (Industrial Use)
 All analytical data results provided by Mitkem Corporation. Data Validation completed by Environmental Data Services, Inc.
 Only parameters that had at least one detection from the data set are shown.

TABLE 2 SEMIVOLATILES ORGANIC COMPOUNDS DETECTED IN DEBRIS SAMPLES

Parameter List USEPA Method 8270C	Sample ID	9-32-131-DS10		9-32-131-DS-11		9-32-131-DS12		9-32-131-DS-13		9-32-131-DS-14		9-32-131-DS-15		9-32-131-DS-16		6 NYCRR Part 375 Industrial Use (mg/kg)
	Lab ID	F1308-04A		F1308-02A		F1308-03A		F1308-19A		F1311-01A		F1308-13A		F1308-14A		
	Sample Type	Debris		Debris		Debris		Debris		Debris		Debris		Debris		
	Sample Date	9/12/2007		9/12/2007		9/12/2007		9/12/2007		9/12/2007		9/12/2007		9/12/2007		
Acenaphthene	mg/kg	130	J	53,000	D	160	J	310	J	78,000	JD	130	J	9,300	D	1,000
Acenaphthylene	mg/kg	250	J	3,200		570	J	970	J	12,000		1,400		730		1,000
Anthracene	mg/kg	770		110,000	D	890	J	1,500	J	150,000	D	2,900		20,000	D	1,000
Benzo(a)anthracene	mg/kg	2,700		180,000	D	3,600		5,200		280,000	D	9,300	D	28,000	D	11
Benzo(a)pyrene	mg/kg	2,600		140,000	D	3,200		3,100		210,000	D	8,100	D	22,000	D	1.1
Benzo(b)fluoranthene	mg/kg	3,600		160,000	D	4,400		6,000		280,000	D	10,000	D	28,000	D	11
Benzo(g,h,i)perylene	mg/kg	1,400		82,000	D	2,400		1,800		110,000	D	4,600		13,000	D	1,000
Benzo(k)fluoranthene	mg/kg	2,000		88,000	D	1,800		2,700		72,000		4,100		7,300	J	110
Bis(2-ethylhexyl)phthalate	mg/kg	170	J		U	310	J	870	J		U	110	J	3,000	J	---
Carbazole	mg/kg	260	J	64,000	D	300	J	800	J	95,000	JD	600		9,800	J	---
Chrysene	mg/kg	2,700		170,000	D	2,900		6,100		240,000	D	8,400	D	26,000	D	110
Dibenzo(a,h)anthracene	mg/kg	430		22,000		570	J	640	J	41,000		1,600		3,900	J	1.1
Dibenzofuran	mg/kg	120	J	36,000	D	150	J	460	J	88,000	JD	290	J	7,100	JD	---
2,4- Dichlorophenol	mg/kg		U		U		U	170	J		U		U		U	---
2,4- Dimethylphenol	mg/kg		U		U		U		U	6,000			U		U	---
Di-n-butylphthalate	mg/kg		U		U	990	J		U		U		U		U	---
Di-n-octylphthalate	mg/kg	80	J		U		U		U		U		U		U	---
Fluoranthene	mg/kg	6,100		640,000	D	6,000		18,000		690,000	D	18,000	D	85,000	D	1,000
Fluorene	mg/kg	130	J	51,000	D	190	J	380	J	78,000	JD	250	J	8,800	JD	1,000
Hexachlorobenzene	mg/kg		U		U		U		U		U		U		U	---
Indeno(1,2,3-cd)pyrene	mg/kg	1,300		73,000	D	2,200		1,800		110,000	D	4,800		12,000	JD	11
2- Methylnaphthalene	mg/kg	63	J	16,000			U	240	J	76,000		82	J	2,400		---
2- Methylphenol	mg/kg		U		U		U		U	4,500			U		U	---
4- Methylphenol	mg/kg		U	1,100	J		U	490	J	13,000		130	J	5,800	JD	---
Naphthalene	mg/kg	100	J	40,000	JD	170	J	320	J	140,000	D	190	J	5,800	J	1,000
Phenanthrene	mg/kg	2,200		570,000	D	2,200		8,200		730,000	D	6,300	D	79,000	JD	1,000
Phenol	mg/kg		U	960	J		U	290	J	5,600		81	J	120	J	1,000
Pyrene	mg/kg	3,700		410,000	D	4,000		7,400		440,000	D	14,000	D	56,000	JD	1,000
1,2,4- Trichlorobenzene	mg/kg		U		U		U		U		U		U		U	---

TABLE 2 SEMIVOLATILE ORGANIC COMPOUNDS DETECTED IN DEBRIS SAMPLES

Parameter List USEPA Method 8270C	Sample ID	9-32-131-DS-17		9-32-131-DS-18		9-32-131-DS-19		9-32-131-DS-20		9-32-131-DS-21		9-32-131-RB01		9-32-131-DUP01		9-32-131-DUP02		6 NYCRR Part 375 Industrial Use (mg/kg)
	Lab ID	F1308-15A		F1308-16A		F1308-17A		F1308-20A		F1311-01A		F1311-02B		F1308-06A		F1308-18A		
	Sample Type	Debris		Debris		Debris		Debris		Debris		Rinse Blank\QA\QC		Duplicate\QA\QC		Duplicate\QA\QC		
	Sample Date	9/12/2007		9/12/2007		9/12/2007		9/12/2007		9/12/2007		9/12/2007		9/12/2007		9/12/2007		
Acenaphthene	mg/kg		U	5,000	J	290,000	D	1,700	JD	160	J		U	120	J	350,000	D	1,000
Acenaphthylene	mg/kg	420	J	970	J	28,000			U		U		U	170	J	29,000		1,000
Anthracene	mg/kg	460	J	10,000		520,000	D	5,400	JD	380	J		U	500		660,000	D	1,000
Benzo(a)anthracene	mg/kg	880	J	24,000		820,000	D	15,000	D	1,300	J		U	1,400		950,000	D	11
Benzo(a)pyrene	mg/kg	660	J	19,000		570,000	D	14,000	D	1,000	J		U	1,300		640,000	D	1.1
Benzo(b)fluoranthene	mg/kg	780	J	24,000		700,000	D	20,000	D	1,600			U	2,700		810,000	D	11
Benzo(g,h,i)perylene	mg/kg	530	J	10,000		290,000	D	10,000	D	780	J		U	1,500		310,000	D	1,000
Benzo(k)fluoranthene	mg/kg	430	J	11,000		310,000	D	8,300	D	750	J		U	1,200		310,000	D	110
Bis(2-ethylhexyl)phthalate	mg/kg		U	1,400	J		U	2,200	JD	11,000			U	2,900	J		U	---
Carbazole	mg/kg		U	6,600	J	320,000	D	2,300	JD	290	J		U	320	J	380,000	D	---
Chrysene	mg/kg	740	J	21,000		680,000	D	16,000	D	1,600			U	2,300		770,000	D	110
Dibenzo(a,h)anthracene	mg/kg		U	3,300	J	99,000		2,300	JD	190	J		U	460		100,000	JD	1.1
Dibenzofuran	mg/kg		U	5,400	J	330,000	D	1,100	JD	270	J		U	270	J	380,000	D	---
2,4- Dichlorophenol	mg/kg		U		U		U		U		U		U		U		U	---
2,4- Dimethylphenol	mg/kg		U		U	26,000			U		U		U		U		U	---
Di-n-butylphthalate	mg/kg		U		U		U		U	1,600			U	620			U	---
Di-n-octylphthalate	mg/kg		U		U		U		U		U		U		U		U	---
Fluoranthene	mg/kg	2,000		62,000		2,100,000	D	38,000	D	5,400			U	4,500		2,300,000	D	1,000
Fluorene	mg/kg		U	4,700	J	300,000	D	1,700	JD	420	J		U	140	J	390,000	D	1,000
Hexachlorobenzene	mg/kg		U		U		U		U	380	J		U		U		U	---
Indeno(1,2,3-cd)pyrene	mg/kg	360	J	9,400		270,000	D	8,900	D	590	J		U	1,400		300,000	D	11
2- Methylnaphthalene	mg/kg		U	4,000	J	270,000	D		U	230	J		U	330	J	340,000	D	---
2- Methylphenol	mg/kg		U		U	21,000			U		U		U		U	33,000		---
4- Methylphenol	mg/kg		U		U	62,000			U	200	J		U		U	98,000		---
Naphthalene	mg/kg		U	7,800		570,000	D		U	330	J		U	460		740,000	D	1,000
Phenanthrene	mg/kg	930	J	50,000		2,500,000	D	22,000	D	3,500			U	2,100		2,800,000	D	1,000
Phenol	mg/kg		U		U	27,000			U		U		U	330	J	43,000		1,000
Pyrene	mg/kg	1,100	J	37,000		1,300,000	D	28,000	D	2,800		1	J	2,000		1,500,000	JD	1,000
1,2,4- Trichlorobenzene	mg/kg		U		U		U		U		U		U		U	2,600	J	---
NOTE: 9-32-131-DUP01 collected at 9-32-131-DS08 9-32-131-DUP02 collected at 9-32-131-DS19																		

TABLE 3 TAL METALS DETECTED IN DEBRIS SAMPLES

Parameter List USEPA Method 6010/7470	Sample ID	9-32-131-DS-01		9-32-131-DS-04		9-32-131-DS-05		9-32-131-DS-06		9-32-131-DS-07		9-32-131-DS-08		9-32-131-DS09		6 NYCRR Part 375 Industrial Use (mg/kg)
	Lab ID	F1307-01A		F1306-11A		F1306-07A		F1306-08A		F1306-09A		F1306-10A		F1306-05A		
	Sample Type	Debris		Debris		Debris		Debris		Debris		Debris		Debris		
	Sample Date	9/12/2007		9/12/2007		9/12/2007		9/12/2007		9/12/2007		9/12/2007		9/12/2007		
Aluminum	mg/kg	5,710	J	5,790	J	5,760	J	2,190	J	6,030	J	2,740	J	1,320	J	---
Antimony	mg/kg	3,090	J	692	J	417	J	720	J	407	J	1,040	J	104	J	---
Arsenic	mg/kg	216		153		291		139		537		184		125		16
Barium	mg/kg	2,920	J	2,200	J	540	J	3,060	J	1,340	J	2,570	J	2,570	J	10,000
Beryllium	mg/kg	0.53	J	0.72	J	0.45	J	0.1	J	0.17	J	0.094	J	0.013	J	2,700
Cadmium	mg/kg	22.6	J	7.6	J	16.3	J	11.9	J	29.5	J	22.5	J	13.4	J	60
Calcium	mg/kg	21,800	J	26,000	J	30,500	J	14,600	J	60,100	J	20,800	J	9,300	J	---
Chromium	mg/kg	158	J	48.8	J	87.9	J	66.2	J	55.7	J	60.3	J	37.8	J	7,600
Cobalt	mg/kg	15.7	J	15.7	J	33.1	J	13.2	J	33.2	J	25.5	J	20.4	J	---
Copper	mg/kg	648	J	165	J	329	J	120	J	209	J	6120	J	67.3	J	10,000
Iron	mg/kg	41,900	J	49,900	J	85,300	J	62,600	J	180,000	J	173,000	J	129,000	J	---
Lead	mg/kg	58,800	J	74,200	J	70,100	J	64,200	J	60,100	J	56,500	J	74,300	J	3,900
Magnesium	mg/kg	9,730	J	4,600		9,670		3,320		13,200		2,570		2,170		---
Manganese	mg/kg	586	J	738		873		336		782		606		565		10,000
Mercury	mg/kg	2.1	J	6.1	J	2.9	J	3.2	J	3	J	4.4	J	0.7	J	5.7
Nickel	mg/kg	138	J	39.3	J	73.9	J	42.1	J	39.1	J	57.3	J	23.7	J	10,000
Potassium	mg/kg	499	J	1,460	J	2,080	J	3,080	J	946	J	6,550	J	4,130	J	---
Selenium	mg/kg		UJ		UJ		UJ		UJ		UJ		UJ		UJ	6,800
Silver	mg/kg		R		R		R		R		R		R		R	6,800
Sodium	mg/kg	420	J	255	J	552	J	799	J	245	J	900	J	346	J	---
Thallium	mg/kg	8.7	J	11.3	J	13.5	J	10.7	J	15.9	J	18.8	J	20.2	J	---
Vanadium	mg/kg	44.5	J	31	J	25.3	J	10.1	J	19	J	17.6	J	12.9	J	---
Zinc	mg/kg	5,620		3,210		14,000		3,590		17,000		4,280		2,480		10,000

NOTE: USEPA = United States Environmental Protection Agency
 NYCRR = New York Code of Rules and regulations
 J = Analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
 U = The analyte was analyzed for, but was not detected above the sample reporting limit.
 R = Rejected.
 mg/kg = milligrams per kilogram (ppm)
 Bold = Analyte detected above 6 NYCRR Part 375 guidelines for Protection of Public Health (Industrial Use)
 All analytical data results provided by Mitkem Corporation. Data Validation completed by Environmental Data Services, Inc.
 Only parameters that had at least one detection from the data set are shown.

TABLE 3 TAL METALS DETECTED IN DEBRIS SAMPLES

Parameter List USEPA Method 6010/7470	Sample ID	9-32-131-DS10		9-32-131-DS-11		9-32-131-DS12		9-32-131-DS-13		9-32-131-DS-14		9-32-131-DS-15		9-32-131-DS-16		9-32-131-DS-17		6 NYCRR Part 375 Industrial Use (mg/kg)
	Lab ID	F1306-04A		F1306-02A		F1306-03A		F1306-19A		F1306-12A		F1306-13A		F1306-14A		F1306-15A		
	Sample Type	Debris		Debris		Debris		Debris		Debris		Debris		Debris		Debris		
	Sample Date	9/12/2007		9/12/2007		9/12/2007		9/12/2007		9/12/2007		9/12/2007		9/12/2007		9/12/2007		
Aluminum	mg/kg	1,770	J	3,610	J	9,880	J	1,340	J	7,420	J	6,560	J	2,890	J	5,170	J	---
Antimony	mg/kg	66	J	50	J	1,090	J	277	J	144	J	135	J	1,650	J	840	J	---
Arsenic	mg/kg	81.7		66.6		217		44.0		79.8		41.6		445		62		16
Barium	mg/kg	3,640	J	2,320	J	674	J	109	J	3,980	J	445	J	1,050	J	148	J	10,000
Beryllium	mg/kg	0.059	J	0.28	J	0.47	J		UJ	0.72	J	0.33	J	0.2	J	0.19	J	2,700
Cadmium	mg/kg	8.9	J	8.5	J	22.8	J	4	J	5.7	J	7.1	J	11	J	3.6	J	60
Calcium	mg/kg	19,000	J	25,500	J	9,330	J	33,900	J	38,900	J	78,800	J	18,900	J	67,100	J	---
Chromium	mg/kg	29.9	J	51.5	J	62.2	J	13.2	J	65.9	J	37	J	76	J	20	J	7,600
Cobalt	mg/kg	13.5	J	14.4	J	23.6	J	6.6	J	13.1	J	12	J	16	J	9.4	J	---
Copper	mg/kg	70.5	J	146	J	241	J	93.5	J	134	J	286	J	177	J	151	J	10,000
Iron	mg/kg	86,600	J	56,900	J	124,000	J	39,300	J	22,800	J	56,200	J	50,000	J	31,800	J	---
Lead	mg/kg	66,500	J	71,400	J	8,910	J	75,000	J	66,000	J	48,300	J	73,500	J	24,300	J	3,900
Magnesium	mg/kg	2,720		6,840		6,100		1,290		7,050		18,900		5,030		7,340		---
Manganese	mg/kg	384		415		692		96.1		565		430		459		498		10,000
Mercury	mg/kg	0.71	J	19.9	J	0.91	J	11.7	J	2.5	J	0.25	J	1.4	J	0.14	J	5.7
Nickel	mg/kg	26.8	J	33.6	J	32.8	J	12.4	J	48.7	J	28.3	J	55.8	J	24.9	J	10,000
Potassium	mg/kg	1,870	J	532	J	576	J	1,390	J	2,290	J	1,890	J	430	J	809	J	---
Selenium	mg/kg		UJ		UJ		UJ		UJ	3.2	J		UJ		UJ		UJ	6,800
Silver	mg/kg		R		R		R		R		R		R		R		R	6,800
Sodium	mg/kg	263	J	73.7	J	114	J	538	J	341	J	199	J	153	J	111	J	---
Thallium	mg/kg	15.4	J	14	J	13.9	J	8.1	J	6.7	J	8.3	J	12.3	J	3.4	J	---
Vanadium	mg/kg	9	J	20.3	J	41	J	14.4	J	32.6	J	14.8	J	18.4	J	15.9	J	---
Zinc	mg/kg	2,590		1,880		976		252		3,780		567		3,840		427		10,000

TABLE 3 TAL METALS DETECTED IN DEBRIS SAMPLES

Parameter List USEPA Method 6010/7470	Sample ID	9-32-131-DS-18		9-32-131-DS-19		9-32-131-DS-20		9-32-131-DS-21		9-32-131-DS-21		BSMT COMPOSITE		9-32-131-DUP01		9-32-131-DUP02		6 NYCRR Part 375 Industrial Use (mg/kg)
	Lab ID	F1306-16A		F1306-17A		F1306-20A		F1309-01A		F1309-01A		G1711-13A		F1306-06A		F1306-18A		
	Sample Type	Debris		Debris		Debris		Debris		Debris		Debris Sample		Duplicate/QA/QC		Duplicate/QA/QC		
	Sample Date	9/12/2007		9/12/2007		9/12/2007		9/12/2007		9/12/2007		10/1/2008		9/12/2007		9/12/2007		
Aluminum	mg/kg	660	J	8,890	J	693	J	1,450		1,450		4,580		3,420	J	6,810	J	---
Antimony	mg/kg	3,680	J	164	J	93.7	J	376		376		1,660	J	904	J	184	J	---
Arsenic	mg/kg	128		80.4		115		27.1		27.1		185		206		79.6		16
Barium	mg/kg	733	J	2,260	J	72.5	J	349		349		1,060		787	J	2,440	J	10,000
Beryllium	mg/kg		UJ	0.8	J	0.15	J	0.095	J	0.095	J	0.270	J	0.13	J	0.59	J	2,700
Cadmium	mg/kg	1.8	J	7.9	J	8.7	J	4.5		4.5		117		21.5	J	8.4	J	60
Calcium	mg/kg	7,060	J	34,300	J	63,500	J	3,990		3,990		24,400		14,200	J	22,800	J	---
Chromium	mg/kg	19	J	66.3	J	38.5	J	20.7		20.7		145		79.4	J	69.8	J	7,600
Cobalt	mg/kg	2.8	J	17.7	J	17.9	J	3.8		3.8		13.80	J	29.2	J	13.6	J	---
Copper	mg/kg	90	J	142	J	297	J	312		312		407		2,600	J	152	J	10,000
Iron	mg/kg	7,390	J	31,900	J	97,300	J	15,300		15,300		201,000		188,000	J	27,300	J	---
Lead	mg/kg	59,400	J	95,900	J	4,890	J	48,700		48,700		103,000		51,000	J	83,500	J	3,900
Magnesium	mg/kg	3,410		7,690		406		1,540		1,540		5,380		2,460		6,710		---
Manganese	mg/kg	84.5		598		147		92.9		92.9		959	J	876		468		10,000
Mercury	mg/kg	0.31	J	2	J	0.52	J	1.2		1.2		1.70		5.2	J	2.3	J	5.7
Nickel	mg/kg	44.7	J	47.8	J	11.8	J	19		19		129	J	77.9	J	54.8	J	10,000
Potassium	mg/kg	161	J	1,560	J	194	J	221		221		700		7,560	J	1,470	J	---
Selenium	mg/kg		UJ	1.6	J		UJ		U		U	2.30	J		UJ	4.6	J	6,800
Silver	mg/kg	6.4			R		R		U		U	18.80			R		R	6,800
Sodium	mg/kg	57.2	J	181	J	14,200	J		U		U	491		1,000	J	170	J	---
Thallium	mg/kg	7.9	J	7.4	J	9.9	J	4.1		4.1			U	20.1	J	9.3	J	---
Vanadium	mg/kg	3.2	J	32.6	J	23.4	J	10.2		10.2		16.10		17.6	J	38.7	J	---
Zinc	mg/kg	265		3,330		299		465		465		4,140	J	4,530		2,690		10,000
NOTE: 9-32-131-DUP01 collected at 9-32-131-DS08 9-32-131-DUP02 collected at 9-32-131-DS19																		

TABLE 4 TCLP METALS DETECTED IN DEBRIS SAMPLES

Parameter List USEPA Method 1311	Sample ID	9-32-131-DS-01		9-32-131-DS-04		9-32-131-DS-05		9-32-131-DS-06		9-32-131-DS-07		9-32-131-DS-08		9-32-131-DS09		USEPA TCLP Maximum Concentration (ug/L)
	Lab ID	F1307-01A		F1307-11A		F1307-07A		F1307-08A		F1307-09A		F1307-10A		F1307-05A		
	Sample Type	Debris		Debris		Debris		Debris		Debris		Debris		Debris		
	Sample Date	9/12/2007		9/12/2007		9/12/2007		9/12/2007		9/12/2007		9/12/2007		9/12/2007		
Arsenic	ug/L	176	J		U	81.3	J	26.1	J	93.7	J		U	35.6	J	5,000
Barium	ug/L	733	J	1,500	J	314	J	4,170	J	1,800	J	8,050	J	4,230	J	100,000
Cadmium	ug/L	154	J	46.2	J	100	J	65.2	J	105	J	87.2	J	32.8	J	1,000
Chromium	ug/L		U		U		U		U		U		U		U	5,000
Lead	ug/L	241,000	D	377,000	D	1,030,000	D	190,000	D	158,000	D	75,500	D	395,000	D	5,000
Mercury	ug/L		U		U		U		U		U		U		U	200
Selenium	ug/L	64.1	J	116	J		UD	141	J	212	J	199	J	153	J	1,000
Silver	ug/L		U		U		U		U		U		U		U	5,000
Parameter List USEPA Method 1311	Sample ID	9-32-131-DS10		9-32-131-DS-11		9-32-131-DS12		9-32-131-DS-13		9-32-131-DS-14		9-32-131-DS-15		9-32-131-DS-16		USEPA TCLP Maximum Concentration (ug/L)
	Lab ID	F1307-04A		F1307-02A		F1307-03A		F1307-19A		F1307-12A		F1307-13A		F1307-14A		
	Sample Type	Debris		Debris		Debris		Debris		Debris		Debris		Debris		
	Sample Date	9/12/2007		9/12/2007		9/12/2007		9/12/2007		9/12/2007		9/12/2007		9/12/2007		
Arsenic	ug/L		U		U		U	27.2	J		U		U		U	5,000
Barium	ug/L	1,050	J	1,540	J	855	J	17.9	J	1,860	J	127	J	1,280	J	100,000
Cadmium	ug/L	12.4	J	51.7	J	197	J	5.1	J	41.9	J	10.3	J	59.5	J	1,000
Chromium	ug/L		U		U		U		U		U		U		U	5,000
Lead	ug/L	82,100	D	780,000	D	126,000	D	99,400	D	169,000	D	56,200	D	1,510,000	D	5,000
Mercury	ug/L		U		U		U	0.12	J		U		U		U	200
Selenium	ug/L	127	J	89.4	J	144	J	217	J	149	J	168	J		U	1,000
Silver	ug/L		U		U		U		U		U		U		U	5,000
Parameter List USEPA Method 1311	Sample ID	9-32-131-DS-17		9-32-131-DS-18		9-32-131-DS-19		9-32-131-DS-20		9-32-131-DS-21		9-32-131-DUP01		9-32-131-DUP02		USEPA TCLP Maximum Concentration (ug/L)
	Lab ID	F1307-15A		F1307-16A		F1307-17A		F1307-20A		F1310-01A		F1307-06A		F1307-18A		
	Sample Type	Debris		Debris		Debris		Debris		Debris		Duplicate/QA/QC		Duplicate/QA/QC		
	Sample Date	9/12/2007		9/12/2007		9/12/2007		9/12/2007		9/12/2007		9/12/2007		9/12/2007		
Arsenic	ug/L		U	494	J	63.6	J		U	24.7			U	59.3	J	5,000
Barium	ug/L	495	J	476	J	3,240	J	26.9	J	443		6,620	J	3,460	J	100,000
Cadmium	ug/L	4.4	J	17	J	43.7	J		U	40.5		76.4	J	39.8	J	1,000
Chromium	ug/L		U		U	4	J	1.1	J				U	3.2	J	5,000
Lead	ug/L	35,400	D	1,520,000	D	1,630,000	D	5,310	D	1,050,000	D	56,100	D	1,710,000	D	5,000
Mercury	ug/L		U		U		U		U		U		U		U	200
Selenium	ug/L	242	J		U	56.2	J	279	J		U	151	J		J	1,000
Silver	ug/L		U		U		U		U		U		U		U	5,000
NOTE: USEPA = United States Environmental Protection Agency TCLP = Toxicity Characteristic Leaching Procedure J = Analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample. U = The analyte was analyzed for, but was not detected above the sample reporting limit. D = Dilution QA/QC = Quality Assurance/Quality Control ug/L = Micrograms per Liter (ppb) Bold = Analyte detected above EPA TCLP Hazardous Waste Charateristics All analytical data results provided by Mitkem Corporation. Data Validation completed by Environmental Data Services, Inc. 9-32-131-DUP02 collected at 9-32-131-DS19																

TABLE 5 DEBRIS VOLUME ESTIMATE

Sample Location	Type	Approximate Dimensions (ft)		Depth of Debris (ft)	Estimated Volume (Cubic Yards)
		Length	Width		
DS-01	Trench	10	2	0.67	0.50
DS-04	Trench	10	0.5	0.25	0.05
DS-05	Trench	35	2	0.33	0.86
DS-06	Trench	35	1.5	0.33	0.64
DS-07	Trench	35	1	0.25	0.32
DS-08	Trench	35	1	0.2	0.26
DS-09	Trench	25	1	0.67	0.62
DS-10	Trench	25	1	0.33	0.31
DS-12	Trench	20	2	0.67	0.99
DS-15	Trench	10	3	1	1.11
DS-17	Trench	5	1.5	1.5	0.42
DS-18	Trench	5	2	0.83	0.31
Volume Estimate-Floor Trenches					6.38
Sample Location	Type	Diameter (ft)	Number of Pits	Depth of Debris (ft)	Estimated Volume (Cubic Yards)
DS-11	Pit	3	1	1	0.26
DS-13	Pit	3	1	1.33	0.35
DS-14	Pit	3	1	1	0.26
DS-16	Pit	3	3	1	0.79
DS-19	Pit	3	2	1	0.52
DS-20	Pit	3	4	1	1.05
DS-21	Pit	3	1	1	0.26
Volume Estimate-Pits/Manholes					3.49
Basement Area	Basement	55	29	0.17	9.85
Volume Estimate-Basement					9.85
Total Volume Estimate					19.71
NOTE: Basement volume calculation included layer of sediment/debris observed on all drums, bricks, tubing/piping and along basement floors, walls, and stairs. Approximately 2 inches of sandy debris was observed on all materials following basement discharge.					

TABLE 6 SUMMARY OF DETECTED VOLATILE ORGANIC COMPOUNDS IN SUBSURFACE SOIL

Parameter List USEPA Method 8260B	Sample ID	9-32-131-SB-01D(6-8)		9-32-131-SB-06D(5-6)		9-32-131-SB-09D(6-7)		9-32-131-SB-12D(6-7)		9-32-131-SB-13D(6-7)		6 NYCRR Part 375 Unrestricted Use (mg/kg)
	Lab ID	G1710-02B		G1710-08B		G1710-13B		G1710-17B		G1710-19B		
	Sample Type	Subsurface Soil		Subsurface Soil		Subsurface Soil		Subsurface Soil		Subsurface Soil		
	Sample Date	9/30/2008		9/30/2008		9/30/2008		9/30/2008		9/30/2008		
Acetone	mg/kg	(<0.00640)	UR	0.150	J	0.0480	J	0.0130	J	0.0460	J	0.05
2- Butanone	mg/kg	(<0.00640)	UR	0.0280	J	(<6.30)	U	(<0.00610)	UR	0.0070	J	---
n- Butylbenzene	mg/kg	0.020	J	0.0220		0.0170		(<0.00610)	U	(<0.00650)	U	12
sec- Butylbenzene	mg/kg	0.00460	J	0.00530	J	0.00810		0.00260	J	(<0.00650)	U	---
Isopropylbenzene	mg/kg	(<0.00640)	U	0.010	J	0.00370	J	(<0.00610)	U	(<0.00650)	U	---
Methylene chloride	mg/kg	(<0.00640)	U	(<0.0130)	U	(<0.00810)	U	(<0.00610)	U	(<0.00650)	U	0.05
Naphthalene	mg/kg	(<0.00640)	U	0.0480		0.00630		(<0.00610)	U	(<0.00650)	U	---
n- Propylbenzene	mg/kg	(<0.00640)	U	0.0130		0.00480	J	(<0.00610)	U	(<0.00650)	U	3.9
Toluene	mg/kg	(<0.00640)	U	(<0.0130)	U	0.00550	J	(<0.00610)	U	0.00380	J	0.7
Trichloroethene	mg/kg	(<0.00640)	U	(<0.0130)	U	0.0120		0.00370	J	0.0120		0.47
1,2,4- Trimethylbenzene	mg/kg	0.10	J	0.10		0.0830		(<0.00610)	U	(<0.00650)	U	3.6
1,3,5- Trimethylbenzene	mg/kg	0.0740	J	0.0620		(<0.00810)	U	(<0.00610)	U	(<0.00650)	U	8.4
m,p- Xylene	mg/kg	0.00530	J	(<0.0130)	U	(<0.00810)	U	(<0.00610)	U	(<0.00650)	U	---
Xylene (Total)	mg/kg	0.00530	J	(<0.0130)	U	(<0.00810)	U	(<0.00610)	U	(<0.00650)	U	0.26
NOTE: USEPA = United States Environmental Protection Agency NYCRR = New York Code of Rules and regulations J = Analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample. U = The analyte was analyzed for, but was not detected above the sample reporting limit. R = Rejected. Bold = Analyte detected above 6 NYCRR Part 375 guidelines for Protetction of Public Health (Unrestricted Use) mg/kg = milligrams per kilogram (ppm) All analytical data results provided by Mitkem Corporation. Data Validation completed by Environmental Data Services, Inc. Only parameters that had at least one detection from the data set are shown												

TABLE 6 SUMMARY OF DETECTED VOLATILE ORGANIC COMPOUNDS IN SUBSURFACE SOIL

Parameter List USEPA Method 8260B	Sample ID	9-32-131-SB-17 (5-6)		9-32-131-SB-18(4-7)		9-32-131-SB-19 (4-7)		9-32-131-SB-23S (3-4)		DUPLICATE-01		6 NYCRR Part 375 Unrestricted Use (mg/kg)
	Lab ID	G1711-03B		G1711-04B		G1711-05B		G1711-12B		G1710-10B		
	Sample Type	Subsurface Soil		Subsurface Soil		Subsurface Soil		Subsurface Soil		Duplicate/QA/QC		
	Sample Date	10/1/2008		10/1/2008		10/1/2008		10/1/2008		9/30/2008		
Acetone	mg/kg	(<0.00650)	U	0.0450		0.10		0.00330	J	0.0130	J	0.05
2- Butanone	mg/kg	(<0.00650)	U	(<0.0130)	U	0.0220		(<0.00580)	U	(<0.00610)	UR	---
n- Butylbenzene	mg/kg	(<0.00650)	U	(<0.0130)	U	0.0120		(<0.00580)	U	(<0.00610)	U	12
sec- Butylbenzene	mg/kg	(<0.00650)	U	(<0.0130)	U	0.0080	J	(<0.00580)	U	(<0.00610)	U	---
Isopropylbenzene	mg/kg	(<0.00650)	U	(<0.0130)	U	0.00450	J	(<0.00580)	U	(<0.00610)	U	---
Methylene chloride	mg/kg	(<0.00650)	U	(<0.0130)	U	(<0.00810)	U	0.00160	J	(<0.00610)	U	0.05
Naphthalene	mg/kg	(<0.00650)	U	(<0.0130)	U	(<0.00810)	U	(<0.00580)	U	(<0.00610)	U	---
n- Propylbenzene	mg/kg	(<0.00650)	U	(<0.0130)	U	0.00410	J	(<0.00580)	U	(<0.00610)	U	3.9
Toluene	mg/kg	(<0.00650)	U	(<0.0130)	U	0.0160		0.00420	J	(<0.00610)	U	0.7
Trichloroethene	mg/kg	0.00860		(<0.0130)	U	0.0420		0.00510	J	0.00650		0.47
1,2,4- Trimethylbenzene	mg/kg	(<0.00650)	U	(<0.0130)	U	(<0.00810)	U	(<0.00580)	U	(<0.00610)	U	3.6
1,3,5- Trimethylbenzene	mg/kg	(<0.00650)	U	(<0.0130)	U	(<0.00810)	U	(<0.00580)	U	(<0.00610)	U	8.4
m,p- Xylene	mg/kg	(<0.00650)	U	(<0.0130)	U	(<0.00810)	U	(<0.00580)	U	(<0.00610)	U	---
Xylene (Total)	mg/kg	(<0.00650)	U	(<0.0130)	U	(<0.00810)	U	(<0.00580)	U	(<0.00610)	U	0.26
NOTE:	QA/QC = Quality Assurance/Quality Control DUPLICATE-01 collected at 9-32-131-SB12D(6-7)											

TABLE 7 SUMMARY OF DETECTED SEMIVOLATILE ORGANIC COMPOUNDS IN SUBSURFACE SOIL

Parameter List USEPA Method 8270C	Sample ID	9-32-131-SB-01D(6-8)		9-32-131-SB-06D(5-6)		9-32-131-SB-09D(6-7)		9-32-131-SB-12D(6-7)		9-32-131-SB-13D(6-7)		6 NYCRR Part 375 Unrestricted Use (mg/kg)
	Lab ID	G1710-02A		G1710-08A		G1710-13A		G1710-17A		G1710-19A		
	Sample Type	Subsurface Soil		Subsurface Soil		Subsurface Soil		Subsurface Soil		Subsurface Soil		
	Sample Date	9/30/2008		9/30/2008		9/30/2008		9/30/2008		9/30/2008		
Acenaphthene	mg/kg	(<0.440)	U	0.220	J	(<0.420)	U	(<0.410)	U	(<0.410)	U	20
Anthracene	mg/kg	(<0.440)	U	0.290	J	(<0.420)	U	(<0.410)	U	(<0.410)	U	100
Benzo(a)anthracene	mg/kg	(<0.440)	U	0.180	J	0.140	J	(<0.410)	U	(<0.410)	U	1
Benzo(a)pyrene	mg/kg	(<0.440)	U	0.10	J	0.120	J	(<0.410)	U	(<0.410)	U	1
Benzo(b)fluoranthene	mg/kg	(<0.440)	U	0.120	J	0.190	J	(<0.410)	U	(<0.410)	U	1
Bis(2-ethylhexyl)phthalate	mg/kg	(<0.440)	U	(<0.40)	U	0.130	J	(<0.410)	U	(<0.410)	U	---
Chrysene	mg/kg	(<0.440)	U	0.160	J	0.160	J	(<0.410)	U	0.140	J	1
Dibenzofuran	mg/kg	(<0.440)	U	0.160	J	(<0.420)	U	(<0.410)	U	(<0.410)	U	---
Fluoranthene	mg/kg	(<0.440)	U	0.520		0.300	J	(<0.410)	U	0.160	J	100
Fluorene	mg/kg	(<0.440)	U	0.260	J	(<0.420)	U	0.120	J	(<0.410)	U	30
2- Methyl naphthalene	mg/kg	0.10	J	0.480		(<0.420)	U	(<0.410)	U	(<0.410)	U	---
Naphthalene	mg/kg	(<0.440)	U	(<0.40)	U	(<0.420)	U	(<0.410)	U	(<0.410)	U	12
Phenanthrene	mg/kg	0.150	J	0.990		0.180	J	0.310	J	(<0.410)	U	100
Pyrene	mg/kg	(<0.440)	U	0.390	J	0.220	J	0.120	J	0.140	J	100

NOTE: USEPA = United States Environmental Protection Agency

NYCRR = New York Code of Rules and regulations

J = Analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but was not detected above the sample reporting limit.

mg/kg = milligrams per kilogram (ppm)

Bold = Analyte detected above 6 NYCRR Part 375 guidelines for Protection of Public Health (Unrestricted Use)

All analytical data results provided by Mitkem Corporation. Data Validation completed by Environmental Data Services, Inc.

Only parameters that had at least one detection from the data set are shown.

TABLE 7 SUMMARY OF DETECTED SEMIVOLATILE ORGANIC COMPOUNDS IN SUBSURFACE SOIL

Parameter List USEPA Method 8270C	Sample ID	9-32-131-SB-17 (5-6)		9-32-131-SB-18(4-7)		9-32-131-SB-19 (4-7)		9-32-131-SB-23S (3-4)		DUPLICATE-01		6 NYCRR Part 375 Unrestricted Use (mg/kg)
	Lab ID	G1711-03A		G1711-04A		G1711-05A		G1711-12A		G1710-10A		
	Sample Type	Subsurface Soil		Subsurface Soil		Subsurface Soil		Subsurface Soil		Duplicate - QA/QC		
	Sample Date	10/1/2008		10/1/2008		10/1/2008		10/1/2008		9/30/2008		
Acenaphthene	mg/kg	(<0.440)	U	0.180	J	1.50		(<0.390)	U	(<0.440)	U	20
Anthracene	mg/kg	(<0.440)	U	0.150	J	1.20		(<0.390)	U	(<0.440)	U	100
Benzo(a)anthracene	mg/kg	(<0.440)	U	(<0.450)	U	0.40	J	(<0.390)	U	(<0.440)	U	1
Benzo(a)pyrene	mg/kg	(<0.440)	U	(<0.450)	U	0.210	J	(<0.390)	U	(<0.440)	U	1
Benzo(b)fluoranthene	mg/kg	(<0.440)	U	(<0.450)	U	0.230	J	(<0.390)	U	(<0.440)	U	1
Bis(2-ethylhexyl)phthalate	mg/kg	(<0.440)	U	(<0.450)	U	(<0.470)	U	(<0.390)	U	(<0.440)	U	---
Chrysene	mg/kg	(<0.440)	U	0.150	J	0.490		(<0.390)	U	(<0.440)	U	1
Dibenzofuran	mg/kg	(<0.440)	U	(<0.450)	U	0.290	J	(<0.390)	U	(<0.440)	U	---
Fluoranthene	mg/kg	(<0.440)	U	0.180	J	1.10		(<0.390)	U	0.160	J	100
Fluorene	mg/kg	(<0.440)	U	(<0.450)	U	1.70		(<0.390)	U	(<0.440)	U	30
2- Methylnaphthalene	mg/kg	(<0.440)	U	0.10	J	0.210	J	(<0.390)	U	(<0.440)	U	---
Naphthalene	mg/kg	(<0.440)	U	(<0.450)	U	0.450	J	(<0.390)	U	(<0.440)	U	12
Phenanthrene	mg/kg	(<0.440)	U	(<0.450)	U	1.10		(<0.390)	U	0.170	J	100
Pyrene	mg/kg	(<0.440)	U	0.220	J	1.30		(<0.390)	U	(<0.440)	U	100

TABLE 8 SUMMARY OF DETECTED TARGET ANALYTE LIST METALS IN SUBSURFACE SOIL

Parameter List USEPA Method 6010/7470	Sample ID	9-32-131-SB-01S		9-32-131-SB-02S		9-32-131-SB-03S		9-32-131-SB-04S		9-32-131-SB-05S		9-32-131-SB-06S		6 NYCRR Part 375 Unrestricted Use (mg/kg)	6 NYCRR Part 375 Commercial Use (mg/kg)	6 NYCRR Part 375 Industrial Use (mg/kg)
	Lab ID	G1710-01A		G1710-03A		G1710-04A		G1710-05A		G1710-06A		G1710-07A				
	Sample Type	Subsurface Soil		Subsurface Soil		Subsurface Soil		Subsurface Soil		Subsurface Soil		Subsurface Soil				
	Sample Date	9/30/2008		9/30/2008		9/30/2008		9/30/2008		9/30/2008		9/30/2008				
Aluminum	mg/kg	14,500	J	11,100	J	9,430	J	15,200	J	9,460	J	16,800	J	---	---	---
Antimony	mg/kg		UJ		UJ	0.270	UJ		UJ		UJ		UJ	---	---	---
Arsenic	mg/kg	4.60	J	3.30	J	3.30	J	4.70	J	4.40	J	4.10	J	13	16	16
Barium	mg/kg	110	J	90.80	J	63.60	J	102	J	61.40	J	94.90	J	350	400	10,000
Beryllium	mg/kg	0.750	J	0.50	J	0.440	J	0.740	J	0.480	J	0.720	J	7.2	590	2,700
Cadmium	mg/kg	0.210	J	0.130	J	0.130	J	0.180	J	0.130	J	0.250	J	2.5	9.3	60
Calcium	mg/kg	74,200		66,000		55,500		77,700		3,340		45,500		---	---	---
Chromium	mg/kg	22.60	J	16.30	J	12.90	J	21.50	J	13.40	J	20.50	J	31	1,900	7,600
Cobalt	mg/kg	26.40	J	8.80	J	9.00	J	8.90	J	10.20	J	11.70	J	---	---	---
Copper	mg/kg	27.60		19.30		33.90		28.70		20.80		24.30		50	270	10,000
Iron	mg/kg	31,900		27,100		23,400		29,000		22,400		29,000		---	---	---
Lead	mg/kg	34.0		6.0		45.0		20.70		5.60		18.0		63	1,000	3,900
Magnesium	mg/kg	11,200	J	9,090	J	9,130	J	11,200	J	4,540	J	10,200	J	---	---	---
Manganese	mg/kg	606	J	652	J	682	J	449	J	976	J	661	J	1,600	10,000	10,000
Mercury	mg/kg		U		U	0.0150	J		U		U		U	0.18	2.8	5.7
Nickel	mg/kg	25.90	J	19.90	J	17.70	J	22.20	J	21.40	J	23.80	J	30	310	10,000
Potassium	mg/kg	2,620	J	1,710	J	1,480	J	2,530	J	1,090	J	2,280	J	---	---	---
Sodium	mg/kg	161.00	J	137	J	125	J	168	J	91.0	J	155	J	---	---	---
Vanadium	mg/kg	30.60	J	20.70	J	19.40	J	30.80	J	19.90	J	28.90	J	---	---	---
Zinc	mg/kg	52.50	J	39.0	J	39.20	J	48.20	J	44.40	J	65.80	J	109	10,000	10,000
NOTE: USEPA = United States Environmental Protection Agency NYCRR = New York Code of Rules and regulations J = Analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample. U = The analyte was analyzed for, but was not detected above the sample reporting limit. mg/kg = milligrams per kilogram (ppm) Bold = Analyte detected above 6 NYCRR Part 375 guidelines for Protection of Public Health (Unrestricted Use) Bold Italic = Analyte detected above 6 NYCRR Part 375 guidelines for Protection of Public Health (Commercial Use) Highlighted = Analyte detected above 6 NYCRR Part 375 guidelines for Protection of Public Health (Industrial Use) All analytical data results provided by Mitkem Corporation. Data Validation completed by Environmental Data Services, Inc. Only parameters that had at least one detection from the data set are shown.																

TABLE 8 SUMMARY OF DETECTED TARGET ANALYTE LIST METALS IN SUBSURFACE SOIL

Parameter List USEPA Method 6010/7470	Sample ID	9-32-131-SB-07S		9-32-131-SB-08S		9-32-131-SB-09S		9-32-131-SB-10S		9-32-131-SB-11S		9-32-131-SB-12S		6 NYCRR Part 375 Unrestricted Use (mg/kg)	6 NYCRR Part 375 Commercial Use (mg/kg)	6 NYCRR Part 375 Industrial Use (mg/kg)
	Lab ID	G1710-09A		G1710-11A		G1710-12A		G1710-14A		G1710-15A		G1710-16A				
	Sample Type	Subsurface Soil		Subsurface Soil		Subsurface Soil		Subsurface Soil		Subsurface Soil		Subsurface Soil				
	Sample Date	9/30/2008		9/30/2008		9/30/2008		9/30/2008		9/30/2008		9/30/2008				
Aluminum	mg/kg	13,500	J	7,500	J	18,200	J	18,700	J	4,140	J	13,100	J	---	---	---
Antimony	mg/kg		UJ	30.90	J		UJ	2.20	J		UJ	8.30	J	---	---	---
Arsenic	mg/kg	5.40	J	9.50	J	5.0	J	4.90	J	4.30	J	4.40	J	13	16	16
Barium	mg/kg	141	J	90.10	J	133.0	J	151	J	80.40	J	71.70	J	350	400	10,000
Beryllium	mg/kg	0.60	J	0.850	J	1.0	J	0.920	J	0.50	J	0.510	J	7.2	590	2,700
Cadmium	mg/kg	0.290		0.590		0.130	J	0.240	J	0.260		0.430		2.5	9.3	60
Calcium	mg/kg	43,800		40,800	J	3,100		63,600		60,100		61,900		---	---	---
Chromium	mg/kg	32.20	J	10.10	J	24.70	J	28.30	J	2,060	J	9.80	J	31	1,900	7,600
Cobalt	mg/kg	8.30	J	6.20	J	11.0	J	12.40	J	62.00	J	7.30	J	---	---	---
Copper	mg/kg	28.30		85.90	J	27.20		27.40		43.90		25.60		50	270	10,000
Iron	mg/kg	25,100		31,000		34,600		38,000		5,970		28,000		---	---	---
Lead	mg/kg	55.0		9,410	J	9.90		52.50		148		1,160		63	1,000	3,900
Magnesium	mg/kg	7,930	J	4,320	J	5,840	J	11,400	J	25,400	J	10,900	J	---	---	---
Manganese	mg/kg	597.0	J	368.0	J	470	J	556	J	339	J	613	J	1,600	10,000	10,000
Mercury	mg/kg		U	0.280	J		U	0.094		0.10		0.0880		0.18	2.8	5.7
Nickel	mg/kg	19.70	J	9.80	J	28.30	J	31.30	J	58.30	J	12.40	J	30	310	10,000
Potassium	mg/kg	2,480	J	847	J	1,770	J	4,040	J	1,270	J	1,010	J	---	---	---
Selenium	mg/kg		U		U		U		U		U		U	3.9	1,500	6,800
Silver	mg/kg		U	0.150	J		U		U		U		U	2	1,500	6,800
Sodium	mg/kg	131	J	266	J	96.10	J	159	J	179	J	82.50	J	---	---	---
Thallium	mg/kg		U		U		U		U	0.670	J		U	---	---	---
Vanadium	mg/kg	23.50	J	12.90	J	33.90	J	36.50	J	25.70	J	14.40	J	---	---	---
Zinc	mg/kg	74.40	J	168.0	J	59.60	J	65.40	J	50.50	J	119	J	109	10,000	10,000

TABLE 8 SUMMARY OF DETECTED TARGET ANALYTE LIST METALS IN SUBSURFACE SOIL

Parameter List USEPA Method 6010/7470	Sample ID	9-32-131-SB-13S		9-32-131-SB-14S		9-32-131-SB-15S		9-32-131-SB-16S		9-32-131-SB-17S		9-32-131-SB-18S		6 NYCRR Part 375 Unrestricted Use (mg/kg)	6 NYCRR Part 375 Commercial Use (mg/kg)	6 NYCRR Part 375 Industrial Use (mg/kg)
	Lab ID	G1710-18A		G1710-20A		G1711-01A		G1711-02A		G1711-07A		G1711-08A				
	Sample Type	Subsurface Soil		Subsurface Soil		Subsurface Soil		Subsurface Soil		Subsurface Soil		Subsurface Soil				
	Sample Date	9/30/2008		9/30/2008		9/30/2008		9/30/2008		10/1/2008		10/1/2008				
Aluminum	mg/kg	13,300	J	24,500	J	22,300		11,300		11,000		8,330		---	---	---
Antimony	mg/kg		UJ		UJ		UJ		U		UJ		UJ	---	---	---
Arsenic	mg/kg	2.10	J	5.90	J	2.40		5.40		2.80		2.60		13	16	16
Barium	mg/kg	91.70	J	174	J	72.40		70.10		76.30		62.80		350	400	10,000
Beryllium	mg/kg	0.540	J	1.80	J	0.90		0.490		0.40		0.250	J	7.2	590	2,700
Cadmium	mg/kg	2.80		0.260			U		U		U		U	2.5	9.3	60
Calcium	mg/kg	93,600		2,790		31,400		55,500		2,670		1,320		---	---	---
Chromium	mg/kg	32.20	J	32.20	J	28.30		15.10		9.10		7.60		31	1,900	7,600
Cobalt	mg/kg	6.0	J	15.50	J	8.0	J	9.60	J	5.60	J	3.60	J	---	---	---
Copper	mg/kg	25.80		36.50		24.10		22.20		17.30		19.40		50	270	10,000
Iron	mg/kg	7,110		46,200		32,400		24,500		14,900		13,300		---	---	---
Lead	mg/kg	24.50		15.70		14.80		5.30		5.30		15.60		63	1,000	3,900
Magnesium	mg/kg	46,300	J	7,960	J	12,500		8,620		2,570		2,110		---	---	---
Manganese	mg/kg	510	J	601	J	311	J	859		762.0	J	239.0	J	1,600	10,000	10,000
Mercury	mg/kg	0.0770			U		U		U		U		U	0.18	2.8	5.7
Nickel	mg/kg	20.40	J	38.0	J	25.80		20.90	J	11.10	J	9.00	J	30	310	10,000
Potassium	mg/kg	1,060	J	2,860	J	3,700		2,000		806		642		---	---	---
Selenium	mg/kg	1.80	J		U		U		U		U		U	3.9	1,500	6,800
Silver	mg/kg		U		U		U		U		U		U	2	1,500	6,800
Sodium	mg/kg	88.40	J	77.90	J	230		140		43.50	J	33.70	J	---	---	---
Thallium	mg/kg		U		U		U		U		U		U	---	---	---
Vanadium	mg/kg	38.10	J	40.60	J	33.60		22.40		19.10		14.80		---	---	---
Zinc	mg/kg	5,490	J	86.90	J	60.30	J	42.30	J	30.30	J	45.0	J	109	10,000	10,000

TABLE 8 SUMMARY OF DETECTED TARGET ANALYTE LIST METALS IN SUBSURFACE SOIL

Parameter List USEPA Method 6010/7470	Sample ID	9-32-131-SB-20S		9-32-131-SB-21S		9-32-131-SB-22S		9-32-131-SB-23S		DUPLICATE -02		6 NYCRR Part 375 Unrestricted Use (mg/kg)	6 NYCRR Part 375 Commercial Use (mg/kg)	6 NYCRR Part 375 Industrial Use (mg/kg)			
	Lab ID	G1711-06A		G1711-10A		G1711-11A		G1711-15A		G1711-14A							
	Sample Type	Subsurface Soil		Subsurface Soil		Subsurface Soil		Subsurface Soil		QA/QC Duplicate							
	Sample Date	10/1/2008		10/1/2008		10/1/2008		10/1/2008		9/30/2008							
Aluminum	mg/kg	22,900		14,200		10,200		12,000		29,800		J	---	---	---		
Antimony	mg/kg		UJ		UJ	20.60		J		U		UJ	---	---	---		
Arsenic	mg/kg	6.30		3.70		40.40			4.70		4.60			13	16	16	
Barium	mg/kg	266		137		125			105		230			350	400	10,000	
Beryllium	mg/kg	1.20		0.630		0.50			0.530		1.40			7.2	590	2,700	
Cadmium	mg/kg	0.67		0.240		J	3.30				U	0.270	J	2.5	9.3	60	
Calcium	mg/kg	4,150		19,100			37,100			62,900		11,500		J	---	---	---
Chromium	mg/kg	29.80		17.30		33.60			16.50		32.0		J	31	1,900	7,600	
Cobalt	mg/kg	16.0		6.90		J	11.40		J	9.90		J	11.60	J	---	---	---
Copper	mg/kg	42.30		32.40		421			19.80		20.30		J	50	270	10,000	
Iron	mg/kg	41,900		18,500		78,900			24,600		39,300			---	---	---	
Lead	mg/kg	11.80		247		2,160			8.80		115.0		J	63	1,000	3,900	
Magnesium	mg/kg	7,380		5,650		6,870			10,200		7,800			---	---	---	
Manganese	mg/kg	272.0		496		J	862		J	789			J	1,600	10,000	10,000	
Mercury	mg/kg		U		U	0.270				U	0.0620			0.18	2.8	5.7	
Nickel	mg/kg	35.70			18.40	J	47.40		J	20.30		J	30.50	J	30	310	10,000
Potassium	mg/kg	3,430			1,420		1,510			2,430			2,280		---	---	---
Selenium	mg/kg		U		U			U		U		U	3.9	1,500	6,800		
Silver	mg/kg		U		U			U		U		U	2	1,500	6,800		
Sodium	mg/kg	77.20		145		326			144		176			---	---	---	
Thallium	mg/kg		U		U			U		U		U	---	---	---	---	
Vanadium	mg/kg	45.70		25.40		27.90			23.30		42.10		J	---	---	---	
Zinc	mg/kg	309		J	252	J	688		J	41.50			210	J	109	10,000	10,000
NOTE: QA/QC = Quality Assurance/Quality Control DUPLICATE-02 collected at 9-32-131-SB-08S																	

APPENDIX C

USEPA POLLUTION REPORTS



EPA to Begin Clean up in Power City Warehouse Buildings in Niagara Falls, New York

Community Update

April 2010

TIMELINE:

- EPA has fenced and secured the former Power City Warehouse and former Tract 2 buildings in Niagara Falls, New York. Securing activities started at both buildings in October 2009 and were completed in December 2009
- EPA cleaned up PCB contamination within the Tract 2 building, completing the work in February 2010
- Cleanup work will begin for the Power City Warehouse building in May 2010

OUR GOAL IS TO KEEP YOU INFORMED

Public participation is essential to the success of EPA's community involvement program. If you have any questions regarding EPA's cleanup activities at this site, please contact :

Mike Basile, EPA Community Involvement Coordinator, at (716) 551-4410, or by e-mail to:

basile.michael@epa.gov

INTRODUCTION

The U.S. Environmental Protection Agency (EPA) has begun clean up actions within the former Power City Warehouse building, located at 3123 Highland Avenue, Niagara Falls, New York.

CURRENT ACTIVITIES

EPA has obtained funding to clean up the former Power City Warehouse building. The clean up work will begin in May 2010 and will be completed in the fall of 2010. The cleanup work will involve the proper removal of asbestos, lead contaminated sediment and debris within the building, and removal of any containers of hazardous materials on the property. In addition, certain sections of collapsed building areas will be removed or stabilized. EPA will oversee the cleanup work and will monitor the air to ensure the cleanup is being performed in a safe manner for the community.

Project trailers will be brought to the site in May 2010. EPA will use the trailers to support the cleanup activities. Residents may visit the EPA project trailer to inquire about the cleanup actions that will occur.

PREVIOUS ACTIVITIES

EPA has completely secured both the Power City Warehouse and Tract 2 buildings. Warning signs are posted to prevent access. EPA also properly removed polychlorinated biphenyls (PCBs) within the Tract 2 building.

HISTORICAL BACKGROUND

The Power City Warehouse site is the location of a former battery manufacturer and is no longer in operation. The warehouse building is located at 3123 Highland Avenue and covers approximately 400,000 square feet. The City of Niagara Falls is the owner of this site building and with the New York State Department of Environmental Conservation (NYSDEC), requested that EPA secure the site and evaluate the need for a cleanup in the building.

The Tract 2 site is a the location of a former printing company and consists of an underground parking garage located at 3001 Highland Avenue and extends along the southern border of Beech Avenue and a building in the rear of the Power City Warehouse site. The City of Niagara Falls owns this property and along with the NYSDEC, requested that EPA secure the site and evaluate if a cleanup is needed within the former parking garage and rear building.



**United States Environmental Protection Agency
Region II
POLLUTION REPORT**

Date: Thursday, May 06, 2010

From: Kevin Matheis, OSC



Subject: Initial POLREP Power City Warehouse Cleanup Actions

Power City Warehouse

3123 Highland Avenue, Niagara Falls, NY

Latitude: 43.0659370

Longitude: -79.0247790

POLREP No.:	1	Site #:	A224
Reporting Period:	03/30/2010 - 05/06/2010	D.O. #:	084
Start Date:	5/5/2010	Response Authority:	CERCLA
Mob Date:	5/4/2010	Response Type:	Time-Critical
Demob Date:		NPL Status:	Non NPL
Completion Date:		Incident Category:	Removal Action
CERCLIS ID #:	NYC200400281	Contract #	EP-W-04-055
RCRIS ID #:	NYC200400281		

Site Description

The Power City Warehouse Site is located at 3123 Highland Avenue, Niagara Falls, New York. According to information provided by the NYSDEC and the City of Niagara Falls, the Power City Warehouse was used as a battery manufacturing facility. In or about 1910, U.S. Light and Heat began automotive, truck, and tractor battery manufacturing. The Prestolite Company acquired the facility in the mid-1960's and retooled the operation for manufacturing of hard rubber battery cases, filling of batteries with sulfuric acid, and subsequent battery charging.

Operations at the facility ceased in the mid-1980's; the Site has been vacant since that time. In October 1989, the City of Niagara Falls obtained ownership of the Site in a tax foreclosure.

Of the 4-acre Site, most of the property is covered by a site building. In May, 2009, The New York State Department of Environmental Conservation (NYSDEC) referred the Site to EPA for consideration of a cleanup. The subject of the NYSDEC referral was the threat posed by extremely high levels of lead contamination found in several building sumps, suspected asbestos found throughout the site building, and the overall poor building conditions that could contribute to a release of hazardous substances from the Site. The site building has multiple floors and covers approximately 400,000 square feet. This building is comprised of assorted construction types that are in various degrees of disrepair. The building exterior is constructed of brick with wooden roofs and trusses, all of which have deteriorated due to neglect and age. The central portion of the site building is constructed of concrete that is structurally sound. The roof over the area is intact and shows no evidence of structural stress.

As a result, EPA performed an assessment of the Site and approved funding in an Action Memorandum dated September 25, 2009 to secure the Site property for direct access. EPA initiated a fencing and security action at the site that was completed on November 19, 2009.

EPA approved a second Action Memorandum on March 30, 2010. This Action Memorandum provides funding to address the cleanup of lead, asbestos, and other hazardous substances within the Site building.

Current Activities

1. EPA mobilized its cleanup contractor to the Site on May 4, 2010. An on-site meeting was held with the cleanup contractor response manager on May 5, 2010, marking the start date for the cleanup.
2. EPA is in the process of establishing site command post and support operations. Site preparation for trailers, electric installation, and other support functions are underway. Trailers are expected to be on-site around May 14.
3. EPA participated in a public meeting held on April 26 in conjunction with the NYSDEC. The community was informed about EPA's forthcoming actions at the Site. EPA also mailed fact sheets to mailing lists provided by the NYSDEC. On May 6, 2010, EPA also went door-to-door to the surrounding community and delivered information sheets about the cleanup. Over 100 residences were provided with site information, in addition to the residents that received information sheets from EPA mailings. Key elected officials were also provided with EPA information sheets.
4. EPA met with the adjacent business to discuss cleanup and equipment logistics to ensure the business operations were not disrupted.

Planned Removal Actions

Actions approved in the March 30, 2010 Action Memorandum include the following:

- EPA will abate the asbestos. Asbestos abatement will involve the use of glove bags, containment structures, elevated boom lifts and asbestos encapsulant. EPA will remove asbestos that is in poor condition. In the event some of the asbestos is in good condition, EPA will consider the use of asbestos encapsulant. Use of encapsulant will seal and bind the asbestos fibers that are contained within the pipe wrap that may become friable. Encapsulation may be necessary when asbestos is in good condition so that cleanup resources can focus on the poor condition asbestos.
- EPA will remove the lead-contaminated debris impediments from within the site buildings in order to limit releases of hazardous substances and to facilitate access to other areas of the building. This removal will be accomplished by physical sweeping of the materials. Any movement of the material will be accomplished by wet sweeping techniques or using vacuums with High Efficiency Particulate Air (HEPA) filters as needed. Materials accumulated from the cleanup will be containerized, pending sampling and off-site disposal.
- Upon completion of the removal of lead contaminated debris from the floor areas, the sumps will then be excavated and cleaned of lead sediments and debris. Sumps that are flooded will be pumped and the water will be containerized or discharged directly into the sewer system, depending upon sampling results and coordination with the City of Niagara Falls Sewer Authority.
- The basement area will be pumped, water disposed as appropriate, and the lead contaminated debris will be removed from the floor areas.

- The collapsed building area will be wetted and debris will be excavated, sorted as appropriate, and disposed as ACM debris.
- Air monitoring for fugitive dust emissions will also be conducted within the site buildings during the lead and asbestos removal process.
- The building will be investigated for the presence of other drums and containers of hazardous materials that may be within the site buildings. These may include maintenance chemicals, paints, unknown materials within containers, empty drums and spent chemical containers. These materials will be placed into a consolidation area and separated by hazard classes. This container collection will also include PCB light ballasts, metal-halide bulbs and lamps, and any mercury-containing switches.
- EPA will sample the accumulated waste materials as necessary. Any sampling conducted will follow EPA Quality Assurance/Quality Control (QA/QC) protocol. Disposal will occur for these materials once the container collection is complete.
- Materials generated from the lead contaminated debris and sediment removal, waste water disposal, and the asbestos abatement will be sampled as appropriate, placed into Department of Transportation-approved shipping containers, and sent off-site for disposal at a facility in compliance with EPA's Off-Site Disposal Policy. EPA is anticipating the generation of over 1,000 cubic yards of asbestos waste, lead contaminated debris, and lead contaminated sediment.
- Upon completion of the cleanup, the Site will be secured and the appropriate City authorities will be notified of the completion of the cleanup.

Next Steps

1. EPA will continue with installation of electric and phone service to site trailers. Site security for after-hours work will begin when trailers and equipment are on-site.
2. Site support functions for cleanup personnel entering and exiting the building will begin. This will include decontamination areas, making a safe passage-way into the Site buildings for entry and exit, and securing of unsafe conditions within the site buildings. Unsafe conditions include openings in floor areas where sewer lids were removed, areas on second and third floors that have floor and wall openings that are unsecured, areas of collapsed building areas that are off-limits, and shoring of beams that are currently compromised.
3. Asbestos cleanup contractors will be contacted for potential subcontracting opportunities. Cleanup work for the asbestos abatement will begin after subcontractor selection and site preparatory work is completed. Most likely time-frame to begin asbestos abatement will be June.
4. EPA's technical contractor is preparing quality assurance project plans, procuring a laboratory for air sampling operations, and making preparations for independent oversight of asbestos cleanup operations.

Key Issues

None.

**United States Environmental Protection Agency
Region II
POLLUTION REPORT**

Date: Friday, June 11, 2010

From: Kevin Matheis, OSC



Subject: Phase 2 Actions

Power City Warehouse

3123 Highland Avenue, Niagara Falls, NY

Latitude: 43.0659370

Longitude: -79.0247790

POLREP No.:	2	Site #:	A224
Reporting Period:	05/06/10 - 06/11/10	D.O. #:	084 and 001
Start Date:	5/5/2010	Response Authority:	CERCLA
Mob Date:	5/4/2010	Response Type:	Time-Critical
Demob Date:		NPL Status:	Non NPL
Completion Date:		Incident Category:	Removal Action
CERCLIS ID #:	NYC200400281	Contract #	EP-W-04-055 and EP-S2-10-01
RCRIS ID #:	NYC200400281		

Site Description

See POLREP 1, dated 05/06/10

Current Activities

1. EPA's cleanup contractor (AECOM) mobilized personnel to begin site set-up operations. Site area was prepared, the area for support zone functions was fenced, and the electric was installed.
2. EPA's cleanup contractor (AECOM), provided personnel and equipment to enhance safety within the site building. Areas of open floor pits were covered, collapsed building sections were placed off-limits to personnel, several sagging beams were reinforced with posts, and site entry / exit areas were prepared.
3. EPA's cleanup contractor (AECOM), demolished a partial garage structure on the southwestern corner of the property. The concrete pad beneath the removed structure was the former shipping and receiving loading ramp, and will be used for site entry and exit.
4. During the demolition of the partial structure, EPA's technical contractor (Weston Solutions), provided air monitoring for asbestos and RCRA metals (which includes lead and arsenic). Air monitoring results were non-detect for the metals and asbestos. The structure did not contain asbestos, but data was collected for background purposes.
5. EPA's technical contractor also collected background samples inside of the site building and

around the site perimeter for RCRA metals (includes lead and arsenic), and for asbestos. All background samples were non-detect for metals and asbestos fibers. Background samples were collected when no activities were being performed in the site buildings.

6. EPA's cleanup contractor (AECOM), is a Region 2 contractor whose present contract expires with EPA on June 26, 2010. As a result, EPA has been transitioning to a new Region 2 EPA contractor (KEMRON).

7. EPA's cleanup contractor (KEMRON), is transitioning operations with AECOM, and all utilities and support functions are being put into the new contract.

8. Site security is in place at the site during hours that the cleanup contractor is non-working on-site.

Planned Removal Actions

1. Site asbestos abatement operations will begin the week on June 14. Operations will involve the setup of decontamination trailer, entry exit zones, and mobilization of equipment and supplies for abatement.

2. The week of June 21, asbestos abatement personnel will begin the removal of asbestos in the site buildings. EPA's technical contractor (Weston Solutions), will provide third-party asbestos air monitoring in accordance with New York State Department of Labor requirements, to the extent practical. Asbestos samples will be analyzed to monitor the contractor performance and daily reports will be prepared. In the unlikely event of any exceedances of site action levels for asbestos, additional engineering controls will be implemented to address problems immediately.

3. During the week of June 14, EPA's cleanup contractor (KEMRON) will mobilize personnel to begin lead cleanup operations in areas where asbestos is not present. EPA's technical contractor will provide air monitoring for appropriate RCRA metals. Lead and arsenic will be monitored in the work zones. In the unlikely event that site action levels are exceeded, then additional engineering controls will be implemented during the cleanup operations. Daily reports will also be prepared for air monitoring for metals.

Next Steps

Debris contaminated with lead and asbestos are being cleaned up by EPA's cleanup contractor with third-party technical oversight. Operations will continue until completed.

Key Issues

None

Estimated Costs *

	Budgeted	Total To Date	Remaining	% Remaining
Extramural Costs				
ERRS - Cleanup Contractor AECOM	\$500,000.00	\$80,000.00	\$420,000.00	84.00%
ERRS - Cleanup Contractor KEMRON	\$500,000.00	\$2,000.00	\$498,000.00	99.60%

RST Contractor - Weston Solutions	\$100,000.00	\$20,000.00	\$100,000.00	80.00%
Intramural Costs				
USEPA - Direct	\$100,000.00	\$10,000.00	\$90,000.00	90.00%
Total Site Costs	\$1,200,000.00	\$112,000.00	\$1,088,000.00	90.67%

* The above accounting of expenditures is an estimate based on figures known to the OSC at the time this report was written. The OSC does not necessarily receive specific figures on final payments made to any contractor(s). Other financial data which the OSC must rely upon may not be entirely up-to-date. The cost accounting provided in this report does not necessarily represent an exact monetary figure which the government may include in any claim for cost recovery.

www.epaosc.org/powercity

United States Environmental Protection Agency
Region II
POLLUTION REPORT

Date: Tuesday, July 20, 2010

From: Kevin Matheis, OSC



Subject: Phase 2 Actions

Power City Warehouse

3123 Highland Avenue, Niagara Falls, NY

Latitude: 43.0659370

Longitude: -79.0247790

POLREP No.:	3	Site #:	A224
Reporting Period:	06/11/10 - 07/20/10	D.O. #:	084 and 001
Start Date:	5/5/2010	Response Authority:	CERCLA
Mob Date:	5/4/2010	Response Type:	Time-Critical
Demob Date:		NPL Status:	Non NPL
Completion Date:		Incident Category:	Removal Action
CERCLIS ID #:	NYC200400281	Contract #	EP-W-04-055 and EP-S2-10-01
RCRIS ID #:	NYC200400281		

Site Description

See POLREP 1, dated 05/06/10

Current Activities

1. Cleanup of lead contaminated sediment and debris continues in the warehouse. Non-hazardous debris, which is an impediment to the cleanup of the lead contaminated debris and sediment, is being separated from the contaminated materials. The non-regulated debris is being placed into roll-off containers for disposal. A total of 60 cubic yards of debris has been shipped off-site for disposal to date. Debris is being removed from the site for disposal at Modern Disposal, located in Model City, New York.

2. An asbestos subcontractor was selected and work on asbestos abatement will begin the week of July 26. The abatement work will involve the removal of asbestos from floor areas, overhead piping, and asbestos that had fell to the ground. Asbestos will be encapsulated, wrapped, glove-bagged or the pipe will be cut intact. All asbestos will be labeled, double-bagged, and staged for future disposal. Asbestos work should be completed by the end of August.

3. The third-floor area has been completely cleaned, and work is progressing on the main floor and the second floor areas. A water sample has been collected from the basement area and submitted for disposal analysis. Based upon the sampling results, the water will be disposed. EPA has made contact with the City of Niagara Falls waste water treatment plant, and if the water is acceptable for discharge into the sewer system, EPA will obtain a permit for discharge.

4. During the cleanup work, EPA's technical contractor (Weston Solutions), continues to provide air monitoring for asbestos and lead. Air monitoring results to date have been essentially non-detect for lead and asbestos, and all other RCRA metals. Any detectable levels of metals have been well-below the site action levels. The data that is available is prepared in daily reports and are available in the EPA web site in the documents section at www.epaosc.net/powercity.

5. Several floor samples were collected from the floor areas to ensure asbestos was not present in the lead-debris cleanup areas. These samples were non-detect for asbestos.

6. The site transition to a new EPA contractor has been completed. Kemron is the EPA cleanup contractor.

8. Site security is in place at the site during hours that the cleanup contractor is non-working on-site.

Planned Removal Actions

1. Additional non-hazardous debris will be shipped for off-site disposal.

2. Lead contaminated debris will continue to be remediated and disposal of waste materials is forthcoming.

2. Asbestos abatement will continue and should be completed by the end of August. EPA will continue to provide a contractor for third-party air monitoring. EPA's technical contractor (Weston Solutions), will provide third-party asbestos air monitoring in accordance with New York State Department of Labor requirements, to the extent practical. Asbestos samples will be analyzed to monitor the contractor performance and daily reports will be prepared. In the unlikely event of any exceedances of site action levels for asbestos, additional engineering controls will be implemented to address problems immediately.

3. Based upon the sampling results of the basement water, the discharge and disposal of the basement water will commence. EPA anticipates obtaining a permit for discharge from the City of Niagara Falls sewer system.

Next Steps

Debris contaminated with lead and asbestos are being cleaned up by EPA's cleanup contractor with third-party technical oversight. Operations will continue until completed.

Key Issues

None

Estimated Costs *

	Budgeted	Total To Date	Remaining	% Remaining
Extramural Costs				
ERRS - Cleanup Contractor AECOM	\$500,000.00	\$80,000.00	\$420,000.00	84.00%
ERRS - Cleanup Contractor	\$500,000.00	\$200,000.00	\$300,000.00	60.00%

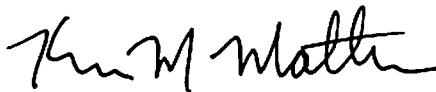
KEMRON				
RST Contractor - Weston Solutions	\$250,000.00	\$50,000.00	\$250,000.00	80.00%
Intramural Costs				
USEPA - Direct	\$100,000.00	\$25,000.00	\$75,000.00	75.00%
Total Site Costs	\$1,350,000.00	\$355,000.00	\$995,000.00	73.70%

* The above accounting of expenditures is an estimate based on figures known to the OSC at the time this report was written. The OSC does not necessarily receive specific figures on final payments made to any contractor(s). Other financial data which the OSC must rely upon may not be entirely up-to-date. The cost accounting provided in this report does not necessarily represent an exact monetary figure which the government may include in any claim for cost recovery.

www.epaosc.org/powercity

**United States Environmental Protection Agency
Region II
POLLUTION REPORT**

Date: Friday, August 13, 2010
From: Kevin Matheis, OSC



Subject: POLREP 4
Power City Warehouse
3123 Highland Avenue, Niagara Falls, NY
Latitude: 43.0659370
Longitude: -79.0247790

POLREP No.:	4	Site #:	A224
Reporting Period:	07/21/10 - 08/13/10	D.O. #:	084 and 001
Start Date:	5/5/2010	Response Authority:	CERCLA
Mob Date:	5/4/2010	Response Type:	Time-Critical
Demob Date:		NPL Status:	Non NPL
Completion Date:		Incident Category:	Removal Action
CERCLIS ID #:	NYC200400281	Contract #	EP-W-04-055 and EP-S2-10-01
RCRIS ID #:	NYC200400281		

Site Description

See POLREP 1, dated 05/06/10

Current Activities

1. Cleanup of lead contaminated sediment and debris continues in the warehouse. Non-hazardous debris, which is an impediment to the cleanup of the lead contaminated debris and sediment, is being separated from the contaminated materials. The non-regulated debris is being placed into roll-off containers for disposal. A total of 180 cubic yards of debris has been shipped off-site for disposal to date. Debris is being removed from the site for disposal at Modern Disposal, located in Model City, New York.
2. Asbestos abatement was completed on August 12. A total of 1294 linear feet of pipe insulation were abated. Floor areas contaminated with asbestos were also HEPA vacuumed and debris was bagged and wetted, per asbestos handling regulations. A total of 3 roll-off trucks of asbestos materials were shipped off-site for disposal at Republic landfill, located in Niagara Falls, NY.
3. Cleanup work on the second and third-floor production areas are complete. Cleanup work is proceeding in the main floor of the warehouse. Shipment of the accumulated lead waste and debris will occur when disposal facility approvals are received.
4. Analytical data from the sampling of the basement water has been received, and a permit for discharge into the Niagara Falls waste water treatment plant is being sought. Pending NYSDEC

and Niagara Falls approval, the basement water will be pumped and discharged in accordance with the permit.

5. During the cleanup work, EPA's technical contractor (Weston Solutions), continues to provide air monitoring for asbestos and lead. Air monitoring results to date have been essentially non-detect for lead and asbestos, and all other RCRA metals. Any detectable levels of metals have been well-below the site action levels. The data that is available is prepared in daily reports and are available in the EPA web site in the documents section at www.epaosc.net/powercity.

5. Several floor samples were collected from the building debris to better evaluate the asbestos content within area J of the main production building.

6. Site security is in place at the site during hours that the cleanup contractor is non-working on-site.

Planned Removal Actions

1. Additional non-hazardous debris will be shipped for off-site disposal.
2. Lead contaminated debris will continue to be remediated and disposal of waste materials is forthcoming.
3. Upon completion of the discharge of basement water, cleanup of the lead debris and sediment will commence.
4. Removal of the building debris containing asbestos is forthcoming. Disposal approvals at the facility are forthcoming.

Next Steps

Continue with the cleanup of the lead contaminated trenches and sumps, begin cleanup of the basement area once the water has been removed, and remove the asbestos contaminated collapsed building area.

Key Issues

The OSC attended a public meeting on August 4. The meeting was held at the Doris Jones Community Resource Center. The meeting was held to provide residents and concerned citizens with information about health affects of lead. The NYSDOH and Niagara County Health Department spoke to health issues. EPA spoke about the progress of the cleanup in the site building.

Estimated Costs *

	Budgeted	Total To Date	Remaining	% Remaining
Extramural Costs				
ERRS - Cleanup Contractor AECOM	\$500,000.00	\$80,000.00	\$420,000.00	84.00%
ERRS - Cleanup Contractor KEMRON	\$500,000.00	\$300,000.00	\$200,000.00	40.00%
RST Contractor - Weston				

Solutions	\$250,000.00	\$90,000.00	\$250,000.00	64.00%
Intramural Costs				
USEPA - Direct	\$100,000.00	\$40,000.00	\$60,000.00	60.00%
Total Site Costs	\$1,350,000.00	\$510,000.00	\$840,000.00	62.22%

* The above accounting of expenditures is an estimate based on figures known to the OSC at the time this report was written. The OSC does not necessarily receive specific figures on final payments made to any contractor(s). Other financial data which the OSC must rely upon may not be entirely up-to-date. The cost accounting provided in this report does not necessarily represent an exact monetary figure which the government may include in any claim for cost recovery.

www.epaosc.org/powercity

**United States Environmental Protection Agency
Region II
POLLUTION REPORT**

Date: Thursday, September 23, 2010

From: Kevin Matheis, OSC



Subject: POLREP 5

Power City Warehouse
3123 Highland Avenue, Niagara Falls, NY
Latitude: 43.0659370
Longitude: -79.0247790

POLREP No.:	5	Site #:	A224
Reporting Period:	08/14/10 - 09/22/10	D.O. #:	084 and 001
Start Date:	5/5/2010	Response Authority:	CERCLA
Mob Date:	5/4/2010	Response Type:	Time-Critical
Demob Date:		NPL Status:	Non NPL
Completion Date:		Incident Category:	Removal Action
CERCLIS ID #:	NYC200400281	Contract #	EP-W-04-055 and EP-S2-10-01
RCRIS ID #:	NYC200400281		

Site Description

See POLREP 1, dated 05/06/10

Current Activities

1. Cleanup of lead contaminated sediment and debris has been essentially completed. Non-hazardous debris was separated from the hazardous debris and soil and sent off-site in appropriate waste groups. A total of 340 cubic yards of debris has been shipped off-site for disposal to date. Debris is being removed from the site for disposal at Modern Disposal, located in Model City, New York.
2. The lead contaminated debris and soil was containerized and shipped off-site for stabilization and/or macroencapsulation for landfill disposal at a secure chemical disposal facility. A total of 60 cubic yard boxes were shipped off-site to EnviroSAFE, located in Oregon, Ohio.
3. Work is continuing in the area of the collapsed building debris containing asbestos. The non-hazardous debris was separated from the asbestos-containing building debris and shipped off-site for disposal. The ACM debris was loaded into lined and sealed roll-off containers for disposal at Modern Landfill, located in Model City, NY. A total of 240 cubic yards of asbestos containing debris has been shipped off-site to date.
4. Approval for discharge of the 100,000 gallons of flood water in the basement at the site was

authorized by the City of Niagara Falls POTW. The permit granted to EPA allows for discharge of 25,000 gallons per day. EPA has essentially completed the pumping as of September 22 and cleanup personnel are within the basement of the building performing a cleanup. If rainwater infiltrates the basement prior to the completion of the cleanup, additional pumping of the basement may be required.

5. The basement will be remediated by cleanup personnel. The sediment and debris from the basement will be staged in 55 gallon drums, pending disposal. The debris will be segregated and disposed with the appropriate debris disposal profile.

6. Asbestos abatement was completed on August 12. A total of 1294 linear feet of pipe insulation were abated. Floor areas contaminated with asbestos were also HEPA vacuumed and debris was bagged and wetted, per asbestos handling regulations. A total of 3 roll-off trucks of asbestos materials were shipped off-site for disposal at Republic landfill, located in Niagara Falls, NY.

5. During the cleanup work, EPA's technical contractor (Weston Solutions), continues to provide air monitoring for asbestos and lead. Air monitoring results to date have been essentially non-detect for lead and asbestos, and all other RCRA metals. Any detectable levels of metals have been well-below the site action levels. The data that is available is prepared in daily reports and are available in the EPA web site in the documents section at www.epaossc.net/powercity.

6. Site security is in place at the site during hours that the cleanup contractor is non-working on-site.

7. Paint-related materials, PCB light ballasts, batteries, and mercury switches from the facility have been containerized and are pending disposal.

Planned Removal Actions

1. Cleanup personnel will remove the sediment and debris from the lead-contaminated basement area.

2. Disposal of generated waste materials from basement will occur upon receipt of analytical testing and profiling into waste disposal facilities.

3. Limited asbestos abatement will be completed in areas that were previously inaccessible due to collapsed building structures, which have now been removed.

4. Trenches excavated from the cleanup will be filled with concrete to prevent falling hazards in the site building.

5. Site areas of poor condition buildings will be secured, fenced, and warning signs posted to prevent public access.

Key Issues

AECOM, the previous cleanup contractor, has nearly finished the billing EPA for the cleanup. A total of \$375,000 was de-obligated from the cleanup contract for the site.

An additional \$447,000 was obligated into the current cleanup contractor project ceiling.

Estimated Costs *

	Budgeted	Total To Date	Remaining	% Remaining
Extramural Costs				
ERRS - Cleanup Contractor AECOM	\$125,000.00	\$110,000.00	\$15,000.00	12.00%
ERRS - Cleanup Contractor KEMRON	\$997,000.00	\$650,000.00	\$347,000.00	34.80%
RST Contractor - Weston Solutions	\$250,000.00	\$110,000.00	\$140,000.00	56.00%
Intramural Costs				
USEPA - Direct	\$100,000.00	\$50,000.00	\$50,000.00	50.00%
Total Site Costs	\$1,472,000.00	\$920,000.00	\$552,000.00	37.50%

* The above accounting of expenditures is an estimate based on figures known to the OSC at the time this report was written. The OSC does not necessarily receive specific figures on final payments made to any contractor(s). Other financial data which the OSC must rely upon may not be entirely up-to-date. The cost accounting provided in this report does not necessarily represent an exact monetary figure which the government may include in any claim for cost recovery.

www.epaosc.org/powercity

**United States Environmental Protection Agency
Region II
POLLUTION REPORT**

Date: Monday, November 15, 2010

From: Kevin Matheis, OSC



Subject: POLREP 6

Power City Warehouse
3123 Highland Avenue, Niagara Falls, NY
Latitude: 43.0659370
Longitude: -79.0247790

POLREP No.:	6	Site #:	A224
Reporting Period:	09/23/10 - 11/12/10	D.O. #:	084 and 001
Start Date:	5/5/2010	Response Authority:	CERCLA
Mob Date:	5/4/2010	Response Type:	Time-Critical
Demob Date:	11/9/2010	NPL Status:	Non NPL
Completion Date:		Incident Category:	Removal Action
CERCLIS ID #:	NYC200400281	Contract #	EP-W-04-055 and EP-S2-10-01
RCRIS ID #:	NYC200400281		

Site Description

See POLREP 1, dated 05/06/10

Current Activities

1. All waste generated as a result of cleanup operations has been shipped off-site. On November 10, 21 drums of lead contaminated sludge was shipped to EQ, located in Detroit Michigan for treatment and disposal. This waste material was generated from the cleanup of the basement.
2. Trailers and site equipment have also been demobilized.
3. The basement cleanup operations involved the following operations - Sampling the water, submitting permit application to the City of Niagara Falls Water Treatment plant for permission to discharge the water, pumping the 100,000 of water into the system in accordance with the discharge permit, then removal of the contaminated debris, piping, and sediment from the basement.
4. Water was the basement was discharged under a the permit to discharge issued by the Niagara Falls Water Board. Approximately 25,000 gallons of water per day was discharged beginning September 21, and completed on September 29.
5. 20 cubic yards of lead contaminated piping and metal debris was removed from the basement. The contaminated piping was sent off-site to Michigan Disposal, located in Belleville,

Michigan for microencapsulation and landfill disposal.

6. Two additional waste groups of materials were removed from the basement. 35 drums of lead contaminated debris was shipped for stabilization and landfill at EnviroSafe, located in Oregon, Ohio. 21 drums of lead contaminated sludge was shipped for treatment and disposal at EQ, located in Detroit, Michigan.

7. Two drums of PCB light ballasts were shipped for disposal at CWM Chemical Services, located in Model City, NY.

8. One cubic yard box of waste paints were shipped for incineration at Ross Incineration, located in Grafton, Ohio.

9. The cleanup of the ACM debris has been completed. The adjacent building is in poor structural condition, but EPA cleanup personnel reached a point where additional building removal will only compound the problem with the structure of the building. The building has been fenced with warning signs, and the owner of the building (the City of Niagara Falls), has been notified and EPA met with Niagara Falls at the site to brief them about the situation.

10. EPA has completed repairs to the perimeter fencing and warning signs have been posted. Windows have been boarded up to accessible window entry areas to the site building.

11. The EPA-OSC held holding a site meeting / open house at the site on 10/20 with the TAG / EJ group from Niagara Falls. The OSC and Buffalo PAD distributed updated information sheets to the surrounding community and to key officials in the area.

11. A media availability session was held on November 4. Fact sheets and a summary of cleanup actions were distributed to attendees. A site tour was also provided.

Planned Removal Actions

1. None at this time.

Next Steps

1. None at this time.

Key Issues

The site task order for Kemron will remain open for several months. The OSC has informed the City of Niagara Falls about the availability of EPA to remove additional waste materials from the building if discovered, but Niagara Falls would need to demolish areas of the facility in order for EPA to further assist. This is due to the dangerous conditions of several building areas. Waste that may require additional cleanup could include additional PCB light ballasts, floor materials contaminated with lead, and friable asbestos materials, if discovered. The site will be closed out in the early summer of 2011.

Estimated Costs *

	Budgeted	Total To Date	Remaining	% Remaining
Extramural Costs				

ERRS - Cleanup Contractor AECOM	\$125,000.00	\$110,000.00	\$15,000.00	12.00%
ERRS - Cleanup Contractor KEMRON	\$997,000.00	\$709,000.00	\$288,000.00	28.89%
RST Contractor - Weston Solutions	\$250,000.00	\$130,000.00	\$120,000.00	48.00%
Intramural Costs				
USEPA - Direct	\$100,000.00	\$70,000.00	\$30,000.00	30.00%
Total Site Costs	\$1,472,000.00	\$1,019,000.00	\$453,000.00	30.77%

* The above accounting of expenditures is an estimate based on figures known to the OSC at the time this report was written. The OSC does not necessarily receive specific figures on final payments made to any contractor(s). Other financial data which the OSC must rely upon may not be entirely up-to-date. The cost accounting provided in this report does not necessarily represent an exact monetary figure which the government may include in any claim for cost recovery.

www.epaossc.org/powercity

APPENDIX D

HEALTH AND SAFETY PLAN

SITE-SPECIFIC HEALTH & SAFETY PLAN

Tract I Site
Niagara Falls, NY

Amec Project No.
3410110832

Prepared for:

Brightfields Inc.

Prepared by:

Amec E&I, Inc.
800 North Bell Ave., Suite 200
Carnegie, PA 15106

December 2011

SITE-SPECIFIC HEALTH & SAFETY PLAN (HASP)

Project Name: Niagara Falls: Tract I Site

Project Location: Niagara Falls, NY

Project No.: 3410110832

This HASP, which must be kept on site, addresses the health and safety hazards of each task conducted by Amec employees for this project, including the requirements and procedures for worker protection (per 29 CFR 1910.120 and the Amec ES&H Program 2.9.A - Hazardous Waste Operations and Emergency Response (HAZWOPER) Program) and the Occupational Safety and Health Administration (OSHA) lead standard (29 CFR 1926.62). The HASP was developed based on the hazards known or suspected to be present at the site, specifically as they relate to the work to be conducted by Amec employees. The hazards and controls within this HASP do not necessarily address all the hazards associated with subcontractor personnel. Subcontractors may adopt this HASP; however they will be responsible for reviewing and revising/amending the HASP to ensure that it addresses hazards unique to their operations.

The Site Health and Safety Officer (SHSO) can change or amend this document only with agreement from the Division Environmental Health and Safety Manager (DEHSM). The SHSO must initial any change made to the HASP at the relevant section and document the amendment date below.

Prepared by: Nicole Weiler

Amec Managing Office: Pittsburgh

Approved by: Greg Oslosky

SHSO Date

Eric Weiler

Field Lead Date

Robert Crowley

Project Manager Date

Date(s) of

Amendment(s):

All site workers shall read this HASP. A pre-entry briefing conducted by the SHSO shall be held prior to initiating this project. Items to be covered during the briefing can be found on the Site Safety Orientation form (Appendix F). All applicable sections of this HASP shall be reviewed during this briefing. The SHSO shall review the information covered in the pre-entry briefing meeting with any worker not in attendance at the initial meeting prior to commencing work. Brief meetings will be held at the beginning of each workday to discuss important safety and health issues concerning tasks performed on that day and documented on the Daily Safety Meeting checklist (Appendix G). After reading the HASP and attending a pre-entry briefing, workers shall sign the following acknowledgment statement:

[illegible]

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APPENDIX I	PERSONAL MONITORING EQUIPMENT MANUALS

1.0 SITE DESCRIPTION

The Tract I Site, also referred to as the Power City Warehouse site, is located northeast of the intersection of Highland Avenue and Beech Street at 3123 Highland Avenue, in the City of Niagara Falls, New York. The Tract I Site is located in a formerly industrial area and consists of 5.9 acres of relatively level land. The property is primarily developed with a warehouse building, referred to as the Power City Warehouse, with some small vegetated areas to the west and east of the building. Adjacent to the Tract I Site to the east and south is a property referred to as the Tract II Site, which is located at 3001 Highland Avenue. Figure 1 shows the location of the Tract I Site on a United States Geological Survey 7.5-minute topographic map. Figure 2 shows a plan view of the Site layout.

1.1 SITE HISTORY

The Tract I Site was historically used for the manufacture of lead/acid batteries. The Tract I Site, and the eastern portion of Tract II, were owned and operated in 1955 by The Prestolite/Autolite Company (predecessor of Electric Autolite Company), and later the Tract I Site was owned and operated by Eltra Corporation (successor to Electric Autolite Company). In the mid-1960s, the Eltra Corporation transferred the Site to the Niagara Falls Industrial Center. By the early 1970s, Niagara Falls Industrial Center had abandoned the Site and various portions of the property were in disrepair. At that time, the City of Niagara Falls acquired the Tract I Site and Tract II property via tax foreclosure. Portions of the Tract I Site were briefly owned by Power City Distributing, but by 1989, the city had reacquired these portions.

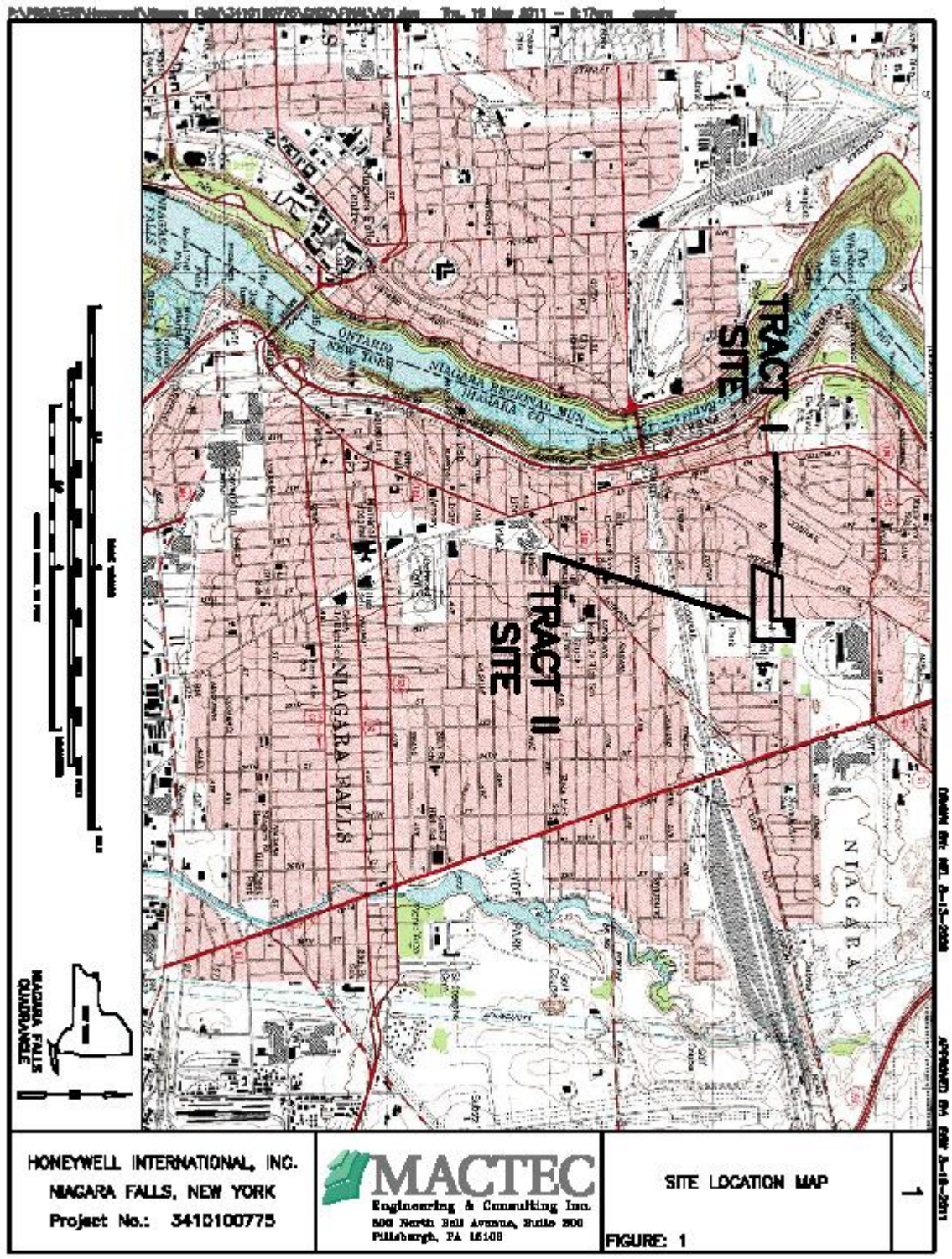
Remedial investigations at the Tract I Site were conducted in 1999 by Ecology and Environment Engineering, P.C. (Ecology and Environment) under grants from the New York State Department of Environmental Conservation (NYSDEC), and in 2009 by EA Engineering. The 1999 investigation consisted of the collection of samples from inside of the building as well as in areas of exposed soil to the east of the building. Analysis of the samples indicated that elevated lead concentrations were present inside the building and in soil near the east end of the property. Asbestos containing materials (ACM) were also identified inside of the building. Lead contained in soil and debris is the major constituent of concern on the Tract I Site. The United States Environmental Protection Agency (USEPA) funded a cleanup of the interior of the Tract I building, removing the lead and some of the ACM, in 2009-2010.

1.2 PROPOSED REMEDIAL ACTIONS

The preferred remedy identified for the Tract I Site is excavation and off-site disposal of soil with concentrations of lead exceeding the Toxicity Characteristic Leaching Procedure (TCLP) standard of 5 milligrams per liter (mg/L). Additionally, a demarcation layer and a minimum of six-inches of clean soil will be placed over remaining soil with concentrations of lead exceeding NYSDEC's Soil Cleanup Objectives (SCOs) commercial standard of 1,000 milligrams per kilogram. The remedial activities will also include the demolition of a portion of the warehouse building. The floor slab of the remaining portion of the building will be left in place and that outside of the remaining building will be removed. In locations where lead exists in concentrations above the commercial standard beneath the slab to be removed, the soil will be covered with a demarcation layer and soil or rock cover until new buildings are constructed. The portion of the Power City Warehouse building that remains standing will be reused.

1.3 SCOPE OF WORK

The scope of work for this project includes oversight and direction of excavation and backfilling activities, the collection of soil samples, and the screening of soils using an X-Ray Fluorescence (XRF) instrument for lead concentrations.





The following tasks are to be performed at the site.

Amec	Sub	Task(s)	JHA Developed	Initial Level of PPE
☒	☒	▪ Mobilization/Demobilization and Site Preparation	☒	D
☒	☐	▪ Locate and Mark Excavation Areas	☒	D
☒	☒	▪ Excavation and Backfilling Oversight/Direction	☒	Modified D
☒	☒	▪ Excavated Soil Staging Oversight/Direction	☒	Modified D
☒	☐	▪ Hand Augering	☒	D
☒	☐	▪ Soil Sampling	☒	D
☒	☒	▪ Air Monitoring	☒	D
☒	☒	▪ Decontamination	☒	D

Expected start date: 4-2-2012

Expected duration of project: 8 months

Expected average number of workers on site per day: 1.5

2.0 KEY PERSONNEL AND HEALTH AND SAFETY RESPONSIBILITIES

Figure 2.1 shows the project organizational chart. Table 2.1 describes health and safety responsibilities for key project personnel.

Figure 2.1 - Project Organization Chart

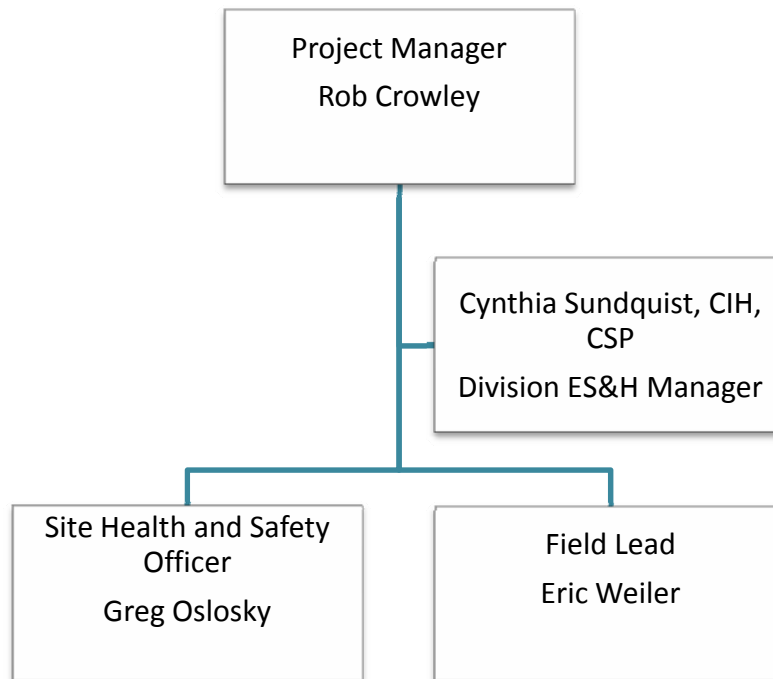


TABLE 2.1
KEY PERSONNEL HEALTH AND SAFETY RESPONSIBILITIES

DIVISION ENVIRONMENTAL HEALTH AND SAFETY MANAGER Cindy Sundquist, CIH, CSP	FIELD LEAD (FL) Eric Weiler	SITE HEALTH & SAFETY OFFICER (SHSO) Greg Oslosky	PROJECT PERSONNEL Sean Condie
▪ Implement appropriate corporate health and safety policies, or environmental projects ▪ Approve HASP and Amendments ▪ Maintain exposure monitoring records ▪ Notify Corporate ES&H Manager in the event of an emergency situation ▪ Verify that corrective actions recommended on Incident Analysis Forms have been implemented	▪ See that personnel receive this plan, are aware of its provisions, and are aware of the potential hazards associated with site operations, are instructed in safe work practices, and are familiar with emergency procedures, and these actions are documented ▪ Determine that appropriate monitoring and personnel protective equipment are available ▪ Monitor the Field Logbooks to ensure the health and safety work practices are employed ▪ Coordinate with SHSO so that emergency response procedures are implemented ▪ Ensure corrective actions recommended on Incident Analysis Forms are implemented	▪ Implement project HASP; report to the Project Manager for action if any deviations from the anticipated conditions exist; and authorize the cessation of work at site investigations if necessary ▪ Confirm that prior to a hazardous waste site visit, site personnel meet the proper medical requirements and have the health and safety training to qualify them to perform their assigned tasks. Identify all site personnel with special medical conditions. ▪ Conduct pre-entry briefing and tailgate safety meetings. Document meetings on Daily Tailgate Safety Meeting Checklist (See Appendix G) ▪ Verify that all monitoring equipment and personal protective equipment is operating correctly according to manufacturer's instructions and such equipment is utilized by on-site personnel. Calibrate or verify calibration of all monitoring equipment and record results. ▪ Conduct weekly inspections of jobsite using the Weekly Site Safety And Health Checklist (See Appendix H) ▪ Implement site emergency and follow-up procedures	▪ Be familiar with and abide by the HASP ▪ Notify the SHSO of any special medical conditions (e.g., allergies) ▪ Immediately report any accidents and/or unsafe conditions to the SHSO ▪ No individual shall go on site where he/she does not have the required safety training

3.0 WORKER TRAINING

Upon designation of a specific project team, Table 3.1 will be completed to summarize the training experience of the project team with respect to 29 Code of Federal Regulations (CFR) 1910.120(e), 29 CFR 1910.38, and 29 CFR 1910.1200, 29 CFR 1926.62 and Amec ES&H Programs and Procedures: Environment, Safety and Health (ESH) 2.9.A – Hazardous Waste Operations and Emergency Response Program and ESH 2.9.E – Hazard Communication Program.

In addition, due to Site specific conditions, all workers must undergo training and medical monitoring in compliance with 29 CFR 1926.62, which concerns lead exposure within the construction industry. A copy of the OSHA lead standard regulations is included in Appendix A.

4.0 MEDICAL SURVEILLANCE

Upon designation of a specific project team, Table 3.1 will be completed to indicate the workers who participate in the company's Medical Surveillance Program (Amec ESH 2.13.1, 29 CFR 1910.120(f)). All workers who could potentially be exposed to concentrations of contaminants above the Occupational Safety and Health Administration (OSHA) Permissible Exposure Limits (PELs) for 30 days per year or more must be included in the Medical Surveillance Program. Any site-specific medical surveillance conducted for site workers will also be listed on the table.

In addition, Amec requires drug and alcohol testing for certain Contractors prior working at a site. Contractors performing, and those individuals that provide direct supervision (means and methods) of the following work activities shall comply with Amec's Substance Abuse and Prevention Policy:

- The use of heavy, construction-type equipment including, but may not be limited to, excavator, cranes of any type, drilling equipment, including Geoprobe, compactor, etc.;
- Operations and maintenance at treatment plant-treatment systems facilities;
- Safety sensitive/at-risk work such as, but may not be limited to, confined space entry, lockout/tagout, dredging operations, hot work activities, etc.;
- Other work activities not listed can be assessed on a case-specific basis by the PM of the Alliance/Non-Alliance Firm and/or the certified safety and health professional approving the HASP for such activity to determine applicability to the policy.

The policy prohibits the use, manufacture, sale, possession, or transfer of illegal drugs, alcohol, and controlled substances on sites. The Substance Abuse and Prevention Policy is included in Amec contracts. Contract documents contain specific details regarding the requirements of the Substance Abuse and Prevention Policy. As an overview, the policy includes the following elements:

- Contractor's drug screening program and reporting shall comply with and be in accordance with Parts 382 and 40 of the Federal Motor Carrier Safety Regulations, Department of Transportation;
- Pre-assignment screening for illegal/unauthorized substances (alcohol, marijuana, cocaine, opiates, amphetamines and phencyclidine) must occur not more than two (2) weeks prior to their initial assignment for work at the site. Contractor personnel who are in a continuous random drug-testing program are not required to be screened for subsequent work activities at the same site, except for alcohol testing. If contractor does not have a random monthly screen rate of 10 percent, contractor is required to be drug and alcohol screened on a monthly basis for long-term projects (projects greater than 30 days) and be retested each time they begin a work at any site.

4.1 PERSONAL MONITORING

Personal monitoring will be undertaken to characterize the personal exposure of high-risk employees to the hazardous substances they may encounter on-site. Personal monitoring will be conducted on a representative basis and personnel who are represented by the sampling will be noted in field logs.

The following personal monitoring equipment will be used at the site. Refer to Appendix I of this HASP for information on the maintenance and calibration of the equipment.

- (1) PDR-100AN personal dataram particulate monitoring device.
- (2) Personal Sampling Pump, with 37 mm two or three piece, mixed cellulose ester cassettes with 0.8-micron pore size.

Personal monitoring will be undertaken to characterize the worker exposure to lead through the monitoring of representative employees. Employee selection will be based on work task and duration of exposure. Sampling will be representative of a full shift and will include at least one sample for each job classification in each area. Sampling and analysis will be done in accordance with NIOSH methodology that is summarized below. Contact Cindy Sundquist, CIH, CSP, Division EH&S Manager, prior to sampling.

1. One worker per task per job classification will be selected. The worker selected will be the one thought to have the greatest exposure for the longest duration (if two workers have equal exposures, personal monitoring can be rotated if sampling is to be conducted on more than one day). The exposures to all other workers will be assumed to be the same as the chosen individual, or lower. Record the name, social security number, job classification, and company of all workers for whom the sample represents plus record the date(s), number, duration, and location, of each of the samples taken, including a description of the sampling procedure used to determine representative employee exposure where applicable. Record the type of respiratory protection devices worn, if any, and any environmental variables (e.g., rain, mist, snow, wind, temperature) that could affect the measurement of employee exposure.
2. Full shift (at least 7 hours) breathing zone samples will be conducted using personal sampling pumps, calibrated before and after each use, and set at 2 liters per minute. Minimum sample volume is 200 liters. Two or three piece mixed cellulose-ester filters with 0.8-micrometer pore size and 37 mm diameter will be used to collect the samples.
3. Collect samples, closed face, and ship together along with one open and one closed blank. Open blanks are filter cassettes that are handled in the same manner that the samples are, except that no air is drawn through them (e.g., remove the end plugs and store until sampling is complete, then replace the plugs.) Closed blanks are media blanks to ensure that the cassettes were not contaminated prior to sampling. Samples should be analyzed using NIOSH method 7082 (Atomic Absorption).
4. At least one sample per task per site location will be taken in the initial monitoring phase. If the results show lead levels below 0.03 mg/m^3 , no further testing will be required in that area for that task. If levels are found to be above 0.03 mg/m^3 , repeat testing may be needed if task duration is longer than 3 months. If conditions or tasks change that may result in new or additional exposures to lead, additional samples will be taken.
5. Notify all affected workers (both Amec and subcontractor personnel), in writing, of the results of the analysis within 5 working days of their receipt. Affected workers include not only the worker wearing the pump and filter, but also the others working in the same general area as well.

OTHER REQUIREMENTS IN REGARDS TO LEAD STANDARD

Engineering controls (i.e.-water spraying device to add moisture), whenever feasible, shall be used.

Respirators:

Full face, cartridge respirators with an N, P or R 100 filter shall be used if there is a potential for lead levels to be above the PEL. If organics are present which require upgrade to level C PPE, use a cartridge also capable of filtering organics as well.

Worst-case exposure modeling was conducted. As a result, the potential for lead levels in the breathing zone to be above the OSHA action limit of 0.03 mg/m^3 could not be ruled out. Based on the levels known to be present at the site, an action limit of 0.09 mg/m^3 on the respirable dust meter is required to upgrade to Level C PPE for work associated with test pit MTP-01; an action limit of 0.34 mg/m^3 is applicable to work associated with the proposed Geoprobe borings as well as MTP-02. These action limits are based on prior sampling that resulted in soil concentrations of 140,000 mg/kg and 37,000 mg/kg for areas in close proximity to MTP-01 and MTP-02/Geoprobe borings, respectively. An uncertainty (safety) factor of 4 was used in the calculations.

Upgrade to level B PPE is required when respirable dust readings reach or exceed 0.9 mg/m^3 for work associated with test pit MTP-01 or 3.4 mg/m^3 for work associated with the proposed Geoprobe borings and test pit MTP-02. It is at these respective levels where there is a potential for lead levels to exceed the OSHA maximum use concentration for lead when using a full-face cartridge respirator.

All workers who wear a cartridge respirator must have been fit-tested within the last year.

Monitoring:

A PDR-1000AN personal dataram particulate monitoring device will be utilized by one worker per task per job classification to assess concentrations of dust within the breathing zone. Refer to the concentrations discussed above within the “*Respirators*” section or within Tables 7.1 and 7.2 for site-specific actions levels. In addition, the PDR-100AN personal monitoring device instruction manual is included as Appendix I.

Decontamination:

Place a sign near the decontamination station is and/or where equipment is decontaminated that states **CAUTION: CLOTHING CONTAMINATED WITH LEAD. DO NOT REMOVE DUST BY BLOWING OR SHAKING. DISPOSE OF LEAD CONTAMINATED WASH WATER IN ACCORDANCE WITH APPLICABLE LOCAL, STATE, OR FEDERAL REGULATIONS.**

All workers **MUST** shower at the end of the workday if there is a potential for lead levels to be above the PEL (Level C PPE is worn).

Training:

All workers with a potential for exposure to lead at any level must receive the following training:

1. Lead exposures according to the requirements of the Hazard Communication Standard in Construction (29 CFR 1926.62), including warning signs and labels, MSDSs, and employee information and training.

All workers with a potential exposure to lead at or above the action limit of 0.03 mg/m^3 must receive the following training:

1. The contents of the standard (29 CFR 1926.62) and its appendices.

2. The specific nature of the operations that could result in exposure to lead above the action limits.
3. The purpose of the medical surveillance program in regards to monitoring for lead. Information must include the adverse health effects associated with excessive exposure to lead (especially reproductive effects).
4. Engineering controls (if any) and work practices (e.g., wetting soil to control dust) to be used at the site.
5. Instructions that chelating agents should not be used to remove lead from their bodies except under the direction of a licensed physician. (NOTE: Chelating agents remove metals from the body by binding to the metal, making it soluble so that it can be excreted in the urine. The problem with them is that they are indiscriminate and remove essential metals from the body as well. Chelation is a last resort to be used only when extremely high lead levels are found in the blood.)
6. Inform workers that copies of the standard and its appendices are available to them if interested.
7. The contents of any compliance plan.
8. The employees right of access to records under 29 CFR 1926.62.

Signs:

The following sign must be posted at the entrance to areas with a potential for lead levels exceeding the PEL.

**WARNING
LEAD WORK AREA
POISON
NO SMOKING OR EATING**

Recordkeeping:

Amec is required to maintain records of all monitoring conducted in regards to lead, therefore, a copy of the results of the monitoring must be placed in the employee file and also a copy sent to Cindy Sundquist. In addition to the results, the following information must also be provided:

1. Dates, number, duration, location and results of each of the samples taken. Included with this must be a description of the sampling procedures used to determine representative employee exposure where applicable.
2. A description of the sampling and analytical methods used and evidence of their accuracy.
3. The type of respiratory protective devices worn, if any.
4. The Name, social security number, company, and job classification of the employees monitored and all other employees (or subcontractors) for whom the sample represents.
5. The environmental variables that could affect the measurement of employee exposure (e.g., cold weather, ground frozen, no wind; vs. warm day, soil dry, windy)

NOTE: These records will be maintained for duration of employment plus 30 days. Medical surveillance records will also be maintained for the same duration.

All records will be made available to associates, upon request.

TABLE 3.1

TRAINING/MEDICAL SURVEILLANCE/RESPIRATORY PROTECTION RECORDS

Role:	Required?	Names of Field Team Members					
		Project Manager:	Field Operations Lead:	Site Health and Safety Officer:	Field Personnel:		
		Rob Crowley	Eric Weiler	Greg Oslosky	Sean Condie		
Training/Medical		Dates	Dates	Dates	Dates	Dates	Dates
Medical Surveillance			12-2011	5-28-2010	10-2011		
Site Specific Medical Testing: Blood Lead Levels			7-8-2011	7-8-2011			
40-Hour Initial	X	4-16-1988	6-17-2005	6-2004	8-15-2010		
8-Hour Supervisor ¹		5-3-1991		1-27-2007			
8-Hour Refresher	X	1-25-2011	1-25-2011	1-25-2011	1-25-2011		
First Aid/CPR ^{1,2}							
Respirator Fit Test ¹			7-8-2011	7-8-2011	9-30-2010		
Respirator Brand ¹			MSA	MSA	MSA		
Hazard Communication	X	1-25-2011	1-25-2011	1-25-2011	1-25-2011		
Confined Space Entry ¹		3-29-1994					
Ladder Safety ¹							
Biological Hazards ¹							
Excavation Safety ¹							
Client Required ¹							
Lead Standards (29 CFR 1926.62)	X	7-7-2011	7-7-2011	7-7-2011			
DOT Hazardous Materials Shipping	X	4-9-2009	4-9-2009				

¹ If Applicable² At least one worker must be trained in First Aid/CPR and have received Bloodborne Pathogen training.³ Required if acting as LF or SSHO

5.0 SITE CONTROL

Site control procedures, as required by 29 CFR 1910.120(d) and Amec ESH 2.9.A - Hazardous Waste Operations and Emergency Response Program, will be implemented before the start of site tasks to control worker exposures to contaminants.

5.1 WORK ZONES

Work zones are to be determined at the Tract I Site by the SHSO. At this time, it is anticipated that the work zones will be defined relative to the location of the work activity. The Exclusion Zone is considered the area within a 10-foot diameter of an active work area (Geoprobe, open excavation, sampling location). The Contamination Reduction Zone is considered to be the area within a 20-foot diameter of an active work area (Geoprobe, open excavation, sampling location). The decontamination zone will be located upwind of the work area. Work zones will be maintained through the use of:

- ☒ Warning Tape
- ☒ Cones and/or Barricades
- ☒ Visual Observations

5.2 BUDDY SYSTEM

When required by contract or when conditions exist that could be dangerous to life and health, a buddy system shall be implemented.

Yes No

☒ ☐ Buddy System required?

5.3 SITE ACCESS

Access to the site will be controlled using the following method(s):

- ☒ Sign in/sign out log ☐ Guard
- ☐ Identification badges ☐ Other: _____

5.4 GENERAL SAFE WORK PRACTICES

General safe work practices to be implemented during work activities at this site are included in Table 5.1.

TABLE 5.1
GENERAL SAFE WORK PRACTICES

- Minimize contact with excavated or contaminated materials. Plan work areas, decontamination areas, and procedures accordingly. Do not place equipment or drums on the ground. Do not sit on drums or other materials. Do not sit or kneel on the ground in the Exclusion Zone or CRZ. Avoid standing in or walking through puddles or stained soil.
- Smoking, eating, or drinking after entering the work zone and before decontamination will not be allowed. Use of illegal drugs and alcohol are prohibited.
- Practice good housekeeping. Keep everything orderly and out of potentially harmful situations.
- In an unknown situation, always assume the worst conditions.
- Be observant of your immediate surroundings and the surroundings of others. It is a team effort to notice and warn of impending dangerous situations. Withdrawal from a hazardous situation to reassess procedures is the preferred course of action.
- Conflicting situations may arise concerning safety requirements and working conditions and must be addressed and resolved rapidly by the SHSO, Field Lead and Project Manager to relieve any motivations or pressures to circumvent established safety policies.
- Unauthorized breaches of specified safety protocol will not be allowed. Workers unwilling or unable to comply with the established procedures will be discharged.

6.0 HAZARD ANALYSIS

6.1 CONTAMINANTS OF CONCERN

Pertinent site information (e.g. records of chemicals used, records of disposal) and previous sampling data (e.g. groundwater, soil, sediment) have been reviewed to determine the contaminants of concern for this project. The known or suspected contaminants for the site are:

Contaminants of Concern (Attach Fact Sheets)	Maximum Concentrations		PEL/TLV
	Soil (mg/kg)	Water/Groundwater (µg/l)	
Lead within Geoprobe Borings and Test Pit MTP-02	37000		0.05 mg/m ³
Lead with Test Pit MTP-01	140000		0.05 mg/m ³

Appendix A contains Contaminant Fact Sheets for each of these contaminants of concern.

Health hazards shall be evaluated using air monitoring equipment (Section 7.0) and controlled by implementing personal protective equipment (Section 8.0).

6.2 JOB HAZARD ANALYSIS

Job Hazard Analyses (JHA) have been conducted for each task associated with this project in compliance with the Amec ESH 2.9.1 – Risk Assessment and Job Hazard Analysis Procedure. The following JHAs can be found in Appendix B.

JHAs:

Activity Specific JHAs:

☒	Mobilization/Demobilization and Site Preparation
☒	Field Work - General
☒	Field Work - Oversight
☒	Soil Sampling
☒	Locate and Mark Excavation Areas
☒	Hand Augering
☒	Excavation and Backfilling Oversight/Direction
☒	Excavated Soil Staging Oversight/Direction
☒	Air Monitoring
☒	Decontamination

Hazard Specific JHAs:

☒	Poisonous Plants
☒	Insect Stings and Bites
☒	Handling Compressed Gas Cylinders
☐	
☐	
☐	
☐	
☐	
☐	
☐	

7.0 AIR MONITORING

NOTE: Section 6.1 lists the known and suspected contaminant of concern at the site. Table 7-1 table lists the monitoring instruments and upgrade/action limits that will be used at the site:

**Table 7-1
Action Levels per Monitoring Instrument**

			Upgrade/Action Levels			
	Meter		Level D	Level C	Level B	Action
☒	Photoionization Detector ¹					
	☒	10.0-10.6 eV	< 4 ppm	≥ 4 ppm	≥ 75 ppm	
	☐	11.0-11.7 eV				
☐	Flame Ionization Detector ¹					
☐	Detector Tubes ¹					
	☐		< 0.5 ppm	≥ 0.5 ppm	≥ 5 ppm	
	☐		< 0.5 ppm	< 0.5 ppm	> 0.5 ppm	
☒	Dust Meter ¹					
	☒	Test Pit MTP-01	< 0.09 mg/m ³	≥ 0.09 mg/m ³	≥ 0.90 mg/m ³	
	☒	Test Pit MTP-02 and Geoprobe Borings	< 0.34 mg/m ³	≥ 0.34 mg/m ³	≥ 3.4 mg/m ³	
☒	LEL/O ₂ Meter					
	☒	LEL ²				> 10% back off
	☒	Oxygen ¹	19.5% - 23.5%	19.5% - 23.5%	< 19.5% or > 23.5%	
☐	Hydrogen Sulfide Meter ¹		< 5 ppm	< 5 ppm	≥ 5 ppm	
☐	Carbon Monoxide ¹		< 12 ppm	< 12 ppm	≥ 12 ppm	
☐						

¹ Monitor breathing zone

² Monitor source (e.g., well, cuttings, borehole, etc.)

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

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

Excavation Areas will be screened using the Photoionization Detector (PID) to give an indication of the potential for the presence of organic vapor. Action guides regarding the screening of the breathing zone and the required PPE are presented in the Table 7-2.

If sustained PID readings exceed 5 ppm work will be stopped, the area evacuated, and the SSHO notified. If work is stopped due to elevated PID readings, then consideration will be given to proceeding with the work using Level B PPE.

All monitoring equipment will be calibrated before each day of use. Results will be documented in the Field Logbook.

Areas of airborne dust and odor should be avoided. Skin contact with soil, sediment, surface water and groundwater should be avoided.

8.0 PERSONAL PROTECTIVE EQUIPMENT

The initial level of protection required for each task is provided in Section 1.0 and Table 9-1. The individual PPE required for each task is listed in the JHAs. Table 9-1 summarizes the PPE required for all tasks to be conducted by Amec workers. The level of protection may be upgraded or downgraded according to the action guidelines provided in Section 7.0. Level of PPE used each day shall be indicated in the Field Logbook. When using PPE, workers must adhere to the company's Personal Protective Equipment Program (ESH Program 2.9.D) and OSHA regulations (29 CFR 1910.120[g] and 29 CFR 1910 Subpart I).

If respirators are worn, workers must adhere to the company's Respiratory Protection Program (ESH Program 2.9.C) and OSHA regulations (29 CFR 1910.134). Table 3.1 provides a record of the site workers' last annual fit test. Beards (e.g., facial hair interfering with the respirator seal) are not allowed when respirators are worn.

Table 7-2
Air Monitoring Action Level Summary
THE ACTION LEVELS BELOW ARE FOR THE CONTAMINANTS OF CONCERN IDENTIFIED ABOVE. ADJUST FOR THE
SPECIFIC CONTAMINANTS AT YOUR SITE

PID/FID Reading^{1,2}	Dust Meter (Test Pit MTP-01)	Dust Meter (Test Pit-MTP-02 and Geoprobe Borings)	LEL²/O₂¹	Action	Level of PPE
< 0.5 ppm ²	< 0.09 mg/m ³	< 0.34 mg/m ³		Continue to monitor with PID and dust meter.	Level D / Modified Level D
≥ 0.5 ppm ¹	< 0.09 mg/m ³	< 0.34 mg/m ³		Begin monitoring breathing zone with PID and dust meter.	Level D / Modified Level D
0.5 – 4 ppm ¹	< 0.09 mg/m ³	< 0.34 mg/m ³		Continue to monitor with PID and dust meter.	Level D / Modified Level D
≥ 4 ppm ¹ to 75 ppm	≥ 0.09 mg/m ³	≥ 0.34 mg/m ³		Continue to monitor with PID and dust meter.	Level C
≥ 75 ppm ¹	≥ 0.90 mg/m ³	≥ 3.4 mg/m ³		Stop work and evacuate area, Notify SSHO	Level B
			> 10% LEL ²	Stop work. Evacuate area. If action levels continue to be exceeded, contact SHSO, consider return with ventilation system and spark proof/intrinsically safe equipment.	Back Off
			< 19.5% O ₂ ¹ > 23.5% O ₂ ¹	Stop work and evacuate area, Notify SSHO	Level B

¹ Monitor breathing zone

² Monitor source (e.g., well, cuttings, borehole, etc.)

Table 8-1
PPE and Monitoring Requirements Summary

Initial Level of PPE *					
☒ Level D	☐ Modified Level D	☐ Level C	☐ Level B	☐ Level A	
Standard PPE					
☒ Hard Hat	☒ Safety shoes	☒ Safety glasses	☐ Boot Covers	☐ Rubber Boots	☐ Aprons
☒ High Visibility Vest					
Eye and Face Protection					
☐ Welding glasses	☐ Welding helmet	☐ Face shield	☐ Chemical goggles	☐ Welding screens	
Hearing Protection					
☒ Ear plugs	☐ Ear Muffs	☐ Ear plugs and muffs	☐ Other _____		
Respiratory Protection					
☐ None	☒ Upgrade Only	☒ Full Face APR	☐ Half Face APR	Cart. Type:	☐ PAPR
☐ Airline respirator	☐ SCBA	☐ Dust mask	☐ _____		
Protective Clothing					
☒ Tyvek® coveralls	☐ Poly-coated Tyvek®	☐ Saranex® Coveralls	☐ Fully encapsulating suit		
☐ Cotton coveralls	☐ Modesty Clothing	☐ Fire resistant clothing	☐ Other _____		
Hand Protection					
☐ None	☐ Cotton gloves	☒ Leather gloves	☐ Cut-resistant gloves	☐ Glove liners	
<u>Outer Gloves</u>					
☒ Nitrile	☐ Viton®	☐ Butyl	☐ Neoprene	☐ Other _____	
<u>Inner Gloves</u>					
☒ Nitrile	☐ Vinyl	☐ Latex	☐ Other _____		
Monitoring Requirements					
☐ Oxygen	☐ Flammable gases/vapors	☐ Toxic Gas/vapors	☐ Hydrogen Sulfide	Carbon Monoxide	
☐ Asbestos	☐ Full time IH coverage	☐ Part time IH coverage	☒ Be, Hg, Cr, Pb		
☒ Metals Specify: <u>Lead within Dust (Utilize PDR-1000AN dust monitoring device)</u>					
☒ Organic Vapors Specify: <u>Utilize PID monitoring device and O2/LEL monitor</u>					
☐ None	☐ TLD required	☐ CAM	☐ Radon		
☐ Full time RCT coverage	☐ Part time RCT coverage	☐ Radioactive air particulates	☐ Other _____		
☒ Other <u>Pre and Post Lead Blood Level Screening</u>		☒ Other: <u>Particulates</u>			

9.0 DECONTAMINATION

PPE shall be decontaminated as per 29 CFR 1910.120(k) and Amec ESH 2.9.A. The decontamination procedures, equipment, and decontamination solution required for each task are provided in Appendix C and the JHA – Decontamination.

Reusable safety gear will be washed with soap and water prior to reuse or removing from the work zone. Sampling tools, etc. will be decontaminated as described in the *Work Plan*, or as directed by the SHSO. All drilling fluids and cuttings will be handled in accordance with the *Work Plan*. The disposition of this material and disposable safety gear will be the responsibility of the site owner. Safety gear that cannot be decontaminated will be disposed of as an investigative derived waste (IDW) in accordance with the *Work Plan*.

10.0 EMERGENCY RESPONSE

The following emergency response information is provided as per 29 CFR 1910.120(j), Amec ESH 2.9.A – Hazardous Waste Operations an Emergency Response Program.

10.1 HOSPITALS/CLINICS

A nearby Hospital (for emergency injuries needing immediate treatment) and a clinic (for non-emergency injuries) have been identified.

The hospital to be used for emergency treatment is (See Figure 11.1 for Route Map to Hospital):

Niagara Falls Memorial Medical Center
621 10th Street, Niagara Falls, NY 14301-1890
716-278-4000

The clinic to be used for non-emergency treatment is (See Figure 11.1 for Route Map to Clinic):

Niagara Falls Memorial Medical Center
621 10th Street, Niagara Falls, NY 14302
716-278-4000

10.2 EMERGENCY CONTACTS

A list of contacts and telephone numbers for the applicable local off-site emergency responders is provided in Table 11.1. The nature of the site work and contaminants of concern should be reviewed and the ability of off-site responders to respond to reasonably anticipated emergencies should be confirmed. If there are any concerns with off-site responsibilities, they should be contacted directly.

10.3 EMERGENCY RESPONSE EQUIPMENT

The following emergency response equipment is required for this project and shall be readily available.

- ☒ Field First Aid Kit (including Bloodborne Pathogen kit/supplies)
- ☒ Fire Extinguisher
- ☐ Type A (Combustible materials)

- ☒ Type B (Flammable liquids and gases)
☐ Type C (Doesn't conduct electricity – to be used on electrical equipment)
☐ Type ABC
☐ Eyewash (Note: 15 minutes of free-flowing fresh water)
☐ SCBA
☐ Shower
☒ Other: Respirator

TABLE 11.1
EMERGENCY CONTACTS

			DATE OF PRE-EMERGENCY
Fire Department:	911		
Hospital:	716-278-4000		
Police Department:	911		
Amec Triage Program – AllOne Health	1-800-350-4511		
Site Health And Safety Officer: Greg Oslosky	Office: 412-279-6661	Cell: 561-214-1396	
Client Contact: Rich Galloway	Office: 973-455-4640	Cell:	
Project Manager: Rob Crowley	Office: 412-279-6661	Cell: 724-747-2866	
Division ES&H Manager: Cindy Sundquist	Office: 207-828-3309	Home: 207-892-4402 Cell:	
OTHER: Ambulance	911		

10.4 COMMUNICATIONS

On-site communications will be conducted through the use of:

- ☒ Verbal
☐ Two-way radio
☒ Cellular telephone
-

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

Off-site communications will be conducted through the use of:

- ☒ Cellular telephone
- ☐ Landline/Pay phone - location: _____
- ☐ Other: _____

10.5 EMERGENCY RESPONSE PROCEDURES

In the event that an on-site emergency develops, the procedures delineated in Table 11.2 are to be immediately followed.

TABLE 11.2
EMERGENCY PROCEDURES

- The SHSO (or alternate) should be immediately notified via the on-site communication system. The SHSO assumes control of the emergency response.
- The SHSO notifies the Project Manager and client contact of the emergency. The SHSO shall then contact the Northern Division Environment, Health, and Safety (ES&H) Manager who will then contact the Corporate Director of ES&H.
- If applicable, the SHSO shall notify off-site emergency responders (e.g. fire department, hospital, police department, etc.) and shall inform the response team as to the nature and location of the emergency on-site.
- If applicable, the SHSO evacuates the site. Site workers should move to the predetermined evacuation point (See Site Map).
- For small fires, flames should be extinguished using the fire extinguisher. Large fires should be handled by the local fire department.
- In an unknown situation or if responding to toxic gas emergencies, appropriate PPE, including SCBAs, should be donned.
- If chemicals are accidentally spilled or splashed into eyes or on skin, use eyewash and/or shower.
- Before continuing site operations after an emergency involving toxic gases, the SHSO shall don a Self Contained Breathing Apparatus (SCBA) and utilize appropriate air monitoring equipment to verify that the

site is safe.

- An injured worker shall be decontaminated appropriately.
- After the response, the SHSO shall follow-up with the required company reporting procedures, including the Incident Analysis Forms (Appendix D).

Injuries requiring medical treatment beyond first aid (as well as work-related vehicle incidents) will require the employee to submit a post incident drug test. It is the responsibility of the Supervisor/PM to ensure that the employee who has had an on-the-job incident as defined in Amec Human Resource Policy HR4-02B, Drug and Alcohol-Free Workplace Policy for Employees (in Section 3.2), submits to this required testing. The policy is located on the Amec Intranet under Human Resources for further information. The *Procedures for Post Accident and Reasonable Suspicion Testing* may be found on the Intranet (via the Incident Reporting Procedures link under “Medical Treatment”). Contact Cindy Sundquist, NDIV ES&H Manager, at (207) 828-3309, or Collette Myers at 770-360-0607, if you have any questions on incident-related drug testing.

10.5.1 Amec Triage Program

If the emergency involves an injury to an Amec employee, the LHSR or Field Lead are to implement the Amec Triage program. Employees whose injuries are true emergencies and who need immediate medical attention will bypass this program and are to be immediately sent/taken to the hospital identified in Section 10.1.

For non-emergency injuries, the Supervisor (Field Lead or PM if on site) and the injured employee will contact the Amec Triage Management and Reporting Line at **1-800-350-4511** “Report an Injury for Amec” at AllOne Health (AOH) and speak to a nurse case manager. The nurse case manager will perform the intake process and ask for information including the following:

- Description of injury and details of incident
- Pertinent employee contact information and job information

From this, a collaborative decision will be made between the nurse and employee on the most appropriate place for treatment; either the hospital (see the hospital identified in section 11.1), a clinic (see clinic identified in section 11.1) or onsite first aid.

If the employee is to be sent to a clinic or hospital, the nurse will call ahead to explain the situation, the need for testing, and advises options to avoid OSHA recordable & considerations for return to work & transitional/modified duty. The Nurse will also arrange for drug and alcohol testing to be conducted at the hospital/clinic. If the employee is to be treated on site (First Aid), the Nurse will advise the employee to call if injury gets worse. Figure 11.3 is a flow diagram that describes this procedure.

Within 24 hours after any emergency response, the Incident Analysis Report (and Vehicle Incident Report if vehicle incident), provided in Appendix D, shall be completed and returned to the Division ES&H Manager, who will forward a copy to the Corporate ES&H Manager and General Counsel.

In addition to internal reporting requirements, the project requires all incidents (adverse events) to be investigated and based on the severity, requires notification of the incident within specified timelines. Adverse events are divided into three tiers: Tier 1 events are the most significant and serious events, followed by Tier 2, which are significant events but not as serious as Tier 1 events, and Tier 3 events are essentially all other events that do not meet the criteria for Tier 1 or Tier 2 events. Tier 1 events are to be reported within 2 hours, Tier 2 events are to be reported within 24 hours, and Tier 3 events are to be reported when possible.

Adverse events include the following:

Tier 1:

- A release to air, water, or soil that has an actual or potential off site adverse environmental impact;
- Any work-related fatality;
- Any work-related admission (employee, contractor, or visitor) to a hospital, beyond observation only;
- Any off site fatalities, injuries, or harmful exposures resulting from Site products or operations;
- Fire, explosion, or other type of catastrophic failure that is reasonably expected to result in more than \$250,000 on site property damage or more than 2 days production stoppage;
- Government representatives alleging or suggesting criminal non-compliance of any kind;
- The receipt or notice of any regulatory agency directive or other type of injunctive device designed to curtail or restrict operations;
- Actual or likely adverse media coverage from an RES site-related event; and,
- Product transportation-related events that result in Tier 1 impacts.

Tier 2:

- Employee or contractor lost workday injuries/illnesses;
- Employee, contractor or visitor recordable injuries/illnesses;
- Agency, customer, or published reports of negative health/safety effects of operations/products;
- A release to air, water, or soil that is associated with subsequently diagnosed community injuries or illnesses;
- Environmental complaints from neighbors;
- Allegations of previously unknown health/environmental effects caused by products, processes, emissions, or discharges;
- Fire, explosion, or other catastrophic equipment failure that reasonably is expected to result in up to \$250,000 onsite property damage or 1 day production stoppage;
- Written notification from a governmental agency alleging non-compliance of any kind;
- Proposal or imposition of an HSER fine, penalty, or corrective action;
- Receipt of a non-routine request for information from a governmental agency;
- A non-routine regulatory agency inspection;
- Significant community activism or adverse media coverage not associated with an episodic event;
- A product recall imposed by a regulatory agency; and,
- Transportation-related event that results in Tier 2 impacts.

Tier 3:

- Any other event which a contractor wishes to record in the system, utilizing the system as a management tool.

Adverse events must be reported to the PM, the construction manager, the RM, and Brightfields as soon as possible following the event. All Tier 1 and Tier 2 adverse events must be investigated and a written investigation report must be prepared and submitted to Amec and Brightfields.

10.6 BLOODBORNE PATHOGENS

In the absence of an infirmary, clinic, hospital, or physician, that is reasonably accessible in terms of time and distance to the worksite, a person who has a valid certificate in first-aid training shall be available at the worksite to render first aid or CPR. Provisions shall be made, prior to commencement of the project, for prompt medical attention in case of serious injury. All employees who work on a site where bloodborne pathogens are known to be present or who have been designated, as a part of their work duties at the site, to respond to all first aid injuries, will have received bloodborne pathogen training at the time of initial assignment and annually thereafter.

10.6.1 Universal Precautions

Universal precautions is a method of infection control, which operates on the assumption that all human blood and bodily fluids are to be treated as if they are known to be infectious for Human immunodeficiency Virus, Hepatitis B virus, Hepatitis C virus, or other bloodborne pathogens. Universal Precautions will be observed to prevent contact with blood or other potentially infectious materials. All body fluids are to be considered potentially infectious materials.

Universal precautions consist of the following practices:

- All workers will protect their skin and mucous membranes against contact with blood or other bodily fluids. At a minimum, gloves and safety glasses shall be donned prior to administering first aid or otherwise touching blood and body fluids, mucous membranes, or non-intact skin and for handling items or surfaces contaminated with blood or bodily fluids. Note: the gloves selected for use at this site to protect against chemical exposure will also protect against bloodborne pathogens.
- All first aid procedures involving blood or other potentially infectious materials will be performed in such a manner as to minimize splashing, spraying, spattering, and generation of droplets and aerosols of these substances.
- When there is a risk of exposure to the eyes, nose and mucous membranes from the generation of droplets of blood or other body fluids, masks and face shields shall be worn.
- Uncoated or polycoated Tyvek (or the suits provided in some bloodborne pathogen kits, shall be worn during procedures that are likely to generate splashes of blood or other body fluids.
- Hands and other skin surfaces shall be washed immediately and thoroughly if contaminated with blood or other bodily fluids. Flush mucous membranes with water immediately or as soon as feasible following contact of such body areas with blood or other potentially infectious materials.
- Hands must be washed with soap and water immediately or as soon as feasible after removal of gloves or other PPE used to perform first aid. When provision of hand washing facilities is not feasible, use appropriate antiseptic hand cleanser in conjunction with clean cloth/paper towels or antiseptic towelettes. When antiseptic hand cleansers or towelettes are used, hands shall be washed with soap and running water as soon as feasible.
- CPR masks or other ventilation devices will be available for use in areas in which the need for resuscitation is foreseeable.

All site first aid kits shall include bloodborne pathogen kits or supplies. These kits typically include, at a minimum, the CPR mask, gloves, safety glasses, and a red bag.

10.6.2 Decontamination/Laundry

If a garment(s) is penetrated by blood or other potentially infectious materials, the garment(s) shall be removed immediately or as soon as feasible. All PPE shall be removed prior to leaving the work area. When PPE is removed it shall be placed in an appropriately designated area or container for storage, washing, decontamination or disposal. In many States where waste is incinerated, if the blood doesn't drip from a material when

compressed or if there is no risk of it flaking off during handling, the materials can be disposed of in the regular trash and does not need to be handled as bio-hazardous materials.

If personal clothing should become contaminated with blood or other body fluids, it shall be collected, bagged or containerized and appropriately labeled. Contaminated laundry shall be handled as little as possible with a minimum of agitation.

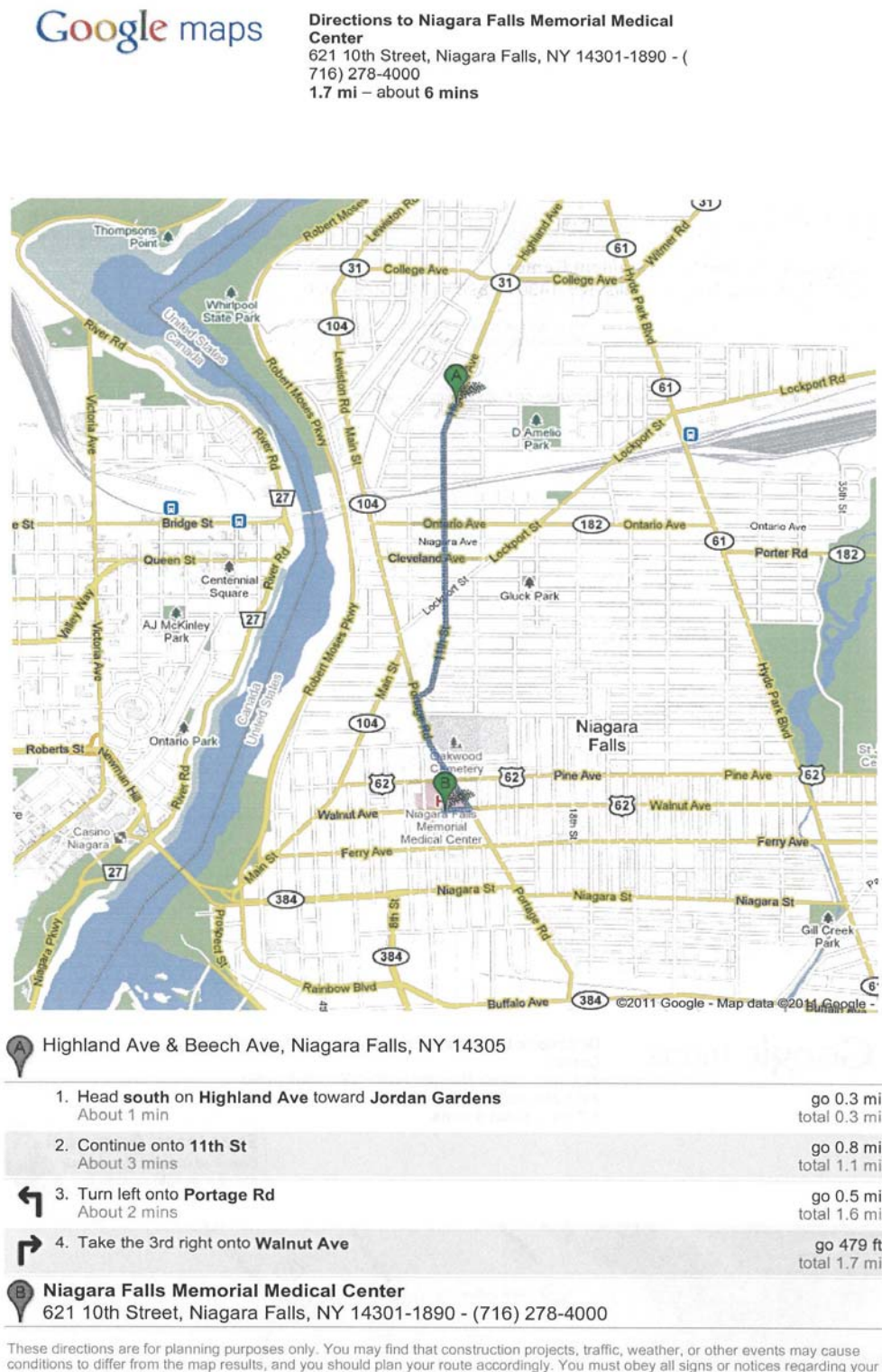
All equipment and environmental/working surfaces shall be cleaned and decontaminated with an appropriate disinfectant immediately after contact with blood or other potentially infectious materials or as soon as feasibly possible. A solution of one part bleach to nine parts water can be mixed and used as a disinfectant to clean/wipe down equipment and other surfaces.

Broken glassware or other sharps which may be contaminated shall not be picked up directly with the hands. It shall be cleaned up using mechanical means, such as a brush and dust pan, tongs, or forceps and disposed of in a sturdy container.

10.6.3 Vaccines, Evaluation, Follow-Up

Hepatitis B vaccines will be available to all Amec employees who may have an occupational exposure. Post-exposure evaluation and follow-up will be conducted on all employees who have had an exposure incident.

FIGURE 11.1

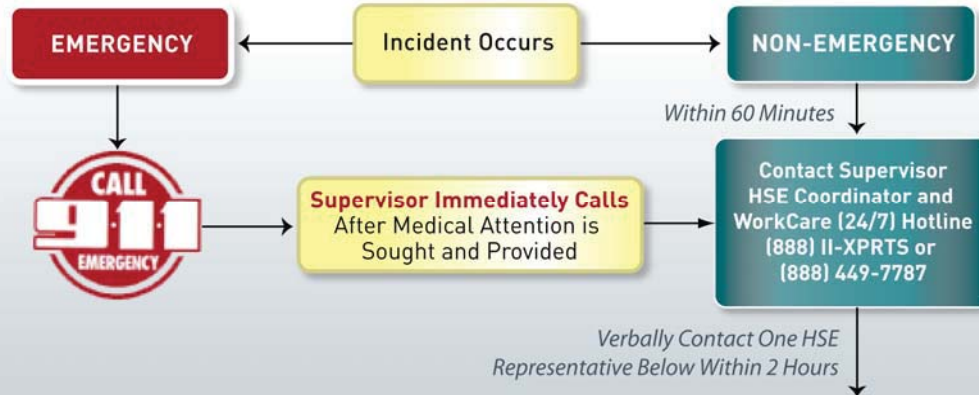


INCIDENT FLOW CHART



Incident Flow Chart

Call Within 60 Minutes



E&I Corporate HSE Department Contacts List

Name/E-Mail	Office Location	Contact Information
Bruce Voss bruce.voss@amec.com	Cathedral City, CA	760.202.3737 [office] 951.897.6381 [cell]
Chad Barnes chad.barnes@amec.com	Tempe, AZ	480.940.2320 [office] 480.495.9846 [cell]
Cindy Sundquist cynthia.sundquist@amec.com	Portland, ME	207.828.3309 [office] 207.650.7593 [cell] 207.892.4402 [home]
Don Kubik don.kubik@amec.com	Oakland, CA	510.663.4100 [office] 510.368.6433 [cell]
Gabe Sandholm gabe.sandholm@amec.com	Minneapolis, MN	612.252.3785 [office] 425.698.9156 [cell]
Howard Gordon howard.gordon@amec.com	Golden, CO	303.273.5041 [office] 303.888.3233 [cell]
John Mazur john.mazur@amec.com	Wilmington, NC	910.452.1185 x 16 [office] 910.431.2330 [cell] 910.681.0538 [home]
Lori Dowling lori.dowling@amec.com	Prince George, BC	250.564.3243 [office]
Philip Neville philip.neville@amec.com	Thorold, ON	905.687.6616 [office] 905.380.4465 [cell]
Tim Kihn tim.kihn@amec.com	Edmonton, AB	780.944.6363 [office] 780.717.5058 [cell]
Vlad Ivensky (can call 24/7) vladimir.ivensky@amec.com	Plymouth Meeting, PA	610.877.6144 [office] 484.919.5175 [cell] 215.947.0393 [home]

*High potential near misses, subcontractor incidents, regulatory inspections, spills, and property damage greater than \$1000, should be reported within 60 minutes to one of the above HSE Representatives.

Version Date: July 27, 2011

11.0 CONFINED SPACE ENTRYYes No☐ ☒ The task(s) for this project involve confined space entry.

If yes, see applicable JHA in Appendix B.

12.0 SPILL CONTAINMENTYes No☐ ☒ The task(s) for this project involve drum/tank/container sampling, excavation, transportation, etc.**13.0 HAZARD COMMUNICATION**

The following procedures shall be followed for all chemicals brought on site (e.g., decontamination solution, sample preservatives, etc.):

- Chemical containers (primary and secondary) shall be correctly and clearly labeled with the name of the chemical and the hazard(s) associated with that chemical (e.g. flammable, corrosive, etc.).
- If chemicals are transferred to a secondary container, that container will be labeled with the name of the chemical and the hazard warnings.
- Workers will have received training on the hazards of these chemicals as indicated in Table 3.1.
- A Material Safety Data Sheet (MSDS) for each chemical listed below is included in Appendix E.

Lead	

When chemicals are used on site, workers must adhere to the company's Hazard Communications Program (ESH Program 2.9.E) and the OSHA regulation (29 CFR 1910.1200).

14.0 RECORDKEEPING

At the end of the project, the following items shall be maintained in the project file:

- ☒ HASP
- ☒ Incident Analysis/Vehicle Incident Forms (if applicable)
- ☒ Industrial Hygiene/Air Monitoring information (results and documentation - send copies to C. Sundquist)
- ☒ Log notebooks

APPENDIX A
CONTAMINANT FACT SHEETS/APPLICABLE CFRs

APPENDIX A

 CONTAMINANT FACT SHEET Chemical Name: <u>Lead</u> CAS Number: 7439-92-1 Synonyms: <u>Lead Metal, Plumbum</u>					HEALTH HAZARD DATA							
					Color: <u>Gray</u>		Carcinogen: OSHA _____		Source	TWA (units)	STEL (units)	C (units)
					Physical State: Solid <u>X</u>		IARC <u>X</u>					
					Liquid _____		NTP _____					
					Gas _____		ACGIH <u>X</u>					
Odor: <u>NA</u>		NIOSH _____										
Odor Threshold <u>NA</u>		Skin absorbable: <u>NO</u>										
Vapor Density: <u>NA</u>		Skin corrosive: <u>NO</u>										
Ionization Potential (IP): <u>NA</u>		Signs/Symptoms of Acute Exposure:										
IDLH: <u>100 mg/m3</u>		Weak, insomnia, facial pallor, anorexia, low weight, constipation, abdominal pain, anemia, paralysis, (wrist and ankle), kidney disease, eye irritant, hypotension		OSHA PELs	0.05 mg/m3							
				ACGIH TLVs	0.05 mg/m3							
				NIOSH RELs	0.05 mg/m3							

AIR MONITORING					PERSONAL PROTECTIVE EQUIPMENT		FIRE/REACTIVITY DATA	
Type	Brand/Model No.	Calibrations Method/Media	Relative Resonse or Conversion Factor	Meter Specific Action Level	Recommended Protective Clothing Materials:		Flash Point: <u>NA</u>	
Dust Meter **Action Limit based on soil concentration. Contact C. Sundquist for action limits	Any		N/A	**	Suits <u>Uncoated Tyveks</u> <u>Polycoated Tyveks</u>		LEL/UEL: <u>NA</u>	
					Gloves <u>Any Chemical resistant Gloves</u>		Fire Extinguishing Media:	
					Boots <u>Any Chemical resistant Boots</u>		Dry Chemical _____ Foam _____	
					Service Limit Concentration (ppm): <u>NA</u>		Water Spray _____ CO ₂ _____	
					MUC 1/2 Mask APR = TWA x 10 = <u>**0.25 mg/m3</u>		Incompatibilities:	
					MUC Full-Face APR = TWA x *50 = <u>**0.25 mg/m3</u>		Strong Oxidizers, hydrogen peroxide, acid	
Checked by: _____					Date: _____			
					*If quantitative fit testing is conducted, otherwise, use protection factor of 10			
					**Action limit will be based on soil concentrations. Contact C. Sundquist for action limits			

APPENDIX B

JOB HAZARD ANALYSIS PER TASK(S)

JOB HAZARD ANALYSIS FORM

JHA No.: JHA - 3410 - 11 - 0832-

Job Title: Mobilization/Demobilization, Site Preparation **Date of Analysis:** 6-7-2011

Job Location: Niagara Falls, NY **Team Leader:** Eric Weiler

Applicable ES&H Procedures:

- 2.9.A - Hazardous Waste Operations and Emergency Response Program
- 2.9.B - Hearing Conservation Program
- 2.9.C - Respiratory Protection Program
- 2.9.D - Personal Protective Equipment Program
- 2.9.E - Hazard Communication Program
- 2.5.1 - Operation of Company Vehicles and Use of Personal Vehicles on Company Business
- 2.5.1 - Heavy Equipment
- 2.13.1 - Medical Surveillance

Key Work Steps	Hazards/Potential Hazards	Safe Practices
1. Prepare for Site Visit	1A) N/A	1A) Prior to leaving for site - Obtain and review HASP prior to site visit, if possible - Determine PPE needs – bring required PPE to the site, if not otherwise being provided at the site (e.g., steel toed boots) - Determine training and medical monitoring needs and ensure all required Health and Safety training and medical monitoring has been received and is current - Ensure all workers are fit for duty (alert, well rested, and mentally and physically fit to perform work assignment) - If respiratory protection is required/potentially required, ensure that training and fit-testing has occurred within the past year. - Familiarize yourself with route to the site
	1B) Vehicle defects	1B) Inspect company owned/leased vehicle for defects such as: - Flat tires - Windshield wipers worn or torn - Oil puddles under vehicle - Headlights, brake lights, turn signals not working
	1C) Insufficient emergency equipment, unsecured loads	1C) Insufficient emergency equipment, unsecured loads - Ensure vehicle has first aid kit and that all medications are current (if first aid kits are not provided at the site) - Ensure vehicle is equipped with warning flashers and/or flares and that the warning flashers work - Cell phones are recommended to call for help in the event of an emergency - Vehicles carrying tools must have a safety cage in place. All tools must be properly secured - Vehicles must be equipped with chocks if the vehicle is to be left running, unattended. - Ensure sufficient gasoline is in the tank

Key Work Steps	Hazards/Potential Hazards	Safe Practices
2. Operating vehicles – general	2A) Collisions, unsafe driving conditions	2A) Drive Defensively! ▪ Seat belts must be used at all times when operating any vehicle on company business. ▪ Drive at safe speed for road conditions ▪ Do not use cell phone while operating vehicle ▪ Maintain adequate following distance ▪ Pull over and stop if you have to look at a map ▪ Try to park so that you don't have to back up to leave. ▪ If backing in required, walk around vehicle to identify any hazards (especially low level hazards that may be difficult to see when in the vehicle) that might be present. Use a spotter if necessary
3. Driving to the jobsite	3A) Dusty, winding, narrow roads	3A) Dusty, winding, narrow roads ▪ Drive confidently and defensively at all times. ▪ Go slow around corners, occasionally clearing the windshield.
	3B) Rocky or one-lane roads	3B) Rocky or one-lane roads ▪ Stay clear of gullies and trenches, drive slowly over rocks. ▪ Yield right-of-way to oncoming vehicles---find a safe place to pull over.
	3C) Stormy weather, near confused tourists	3C) Stormy weather, near confused tourists ▪ Inquire about conditions before leaving the office. ▪ Be aware of oncoming storms. ▪ Drive to avoid accident situations created by the mistakes of others.
	3D) When angry or irritated	3D) When angry or irritated ▪ Attitude adjustment; change the subject or work out the problem before driving the vehicle. ▪ Let someone else drive.
	3E) Turning around on narrow roads	3E) Turning around on narrow roads ▪ Safely turn out with as much room as possible. ▪ Know what is ahead and behind the vehicle. ▪ Use a backer if available.
	3F) Sick or medicated	3F) Sick or medicated ▪ Let others on the crew know you do not feel well. ▪ Let someone else drive.
	3G) On wet or slimy roads	3G) On wet or slimy roads ▪ Drive slow and safe, wear seatbelts.
	3H) Animals on road	3H) Animals on road ▪ Drive slowly, watch for other animals nearby. ▪ Be alert for animals darting out of wooded areas
4. Gain permission to enter site	4A) Hostile landowner, livestock, pets	4A) Hostile landowner, livestock, pets ▪ Talk to land owner, be courteous and diplomatic ▪ Ensure all animals have been secured away from work area

Key Work Steps	Hazards/Potential Hazards	Safe Practices
5. Mobilization/ Demobilization of Equipment and Supplies	5A) Struck by Heavy Equipment/Vehicles	5A) Struck by heavy equipment - Be aware of heavy equipment operations. - Keep out of the swing radius of heavy equipment. - Ground personnel in the vicinity of heavy equipment operations will be within the view of the operator at all times - Employees shall wear a high visibility vest or T-shirt (reflective vest required if working at night). - Ground personnel will be aware of the counterweight swing and maintain an adequate buffer zone. - Ground personnel will not stand directly behind heavy equipment when it is in operation.
	5B) Struck by Equipment/Supplies	5B) Struck by Equipment/Supplies - Workers will maintain proper space around their work area, if someone enters it, stop work. - When entering another worker's work space, give a verbal warning so they know you are there.
	5C) Overexertion Unloading/Loading Supplies	5C) Overexertion Unloading/Loading Supplies - Train workers on proper body mechanics, do not bend or twist at the waist while exerting force or lifting. - Tightly secure all loads to the truck bed to avoid load shifting while in transit.
	5D) Caught in/on/between	5D) Caught in/on/between Do not place yourself between two vehicles or between a vehicle and a fixed object.
	5E) Slip/Trip/Fall	5E) 1E). Slip/Trip/Fall - Mark all holes and low spots in area with banner tape. Instruct personnel to avoid these areas. - Drivers will maintain 3 point contact when mounting/dismounting vehicles/equipment. - Drivers will check surface before stepping, not jumping down.
	5F) Vehicle Incident	5F) Vehicle accident Employees should follow Amec vehicle operation policy and be aware of all stationary and mobile vehicles.
6. Site Preparation	6A) Slip/Trip/Fall	6A) Slip/Trip/Fall Mark all holes and low spots in area with banner tape. Instruct personnel to avoid these areas
	6B) Overexertion	6B) Overexertion - Workers will be trained in the proper method of lifting items. - Do not bend and twist at the waist while lifting or exerting force.
	6C) Struck by Equipment/Supplies	6C) Struck by Equipment/Supplies - Workers will maintain proper space around their work area, if someone enters it, stop work. - When entering another worker's work space, give a verbal warning so they know you are there.
7. Driving back from the jobsite	7A) See hazards listed under item #3	7A) See safe work practices under item #3

Identify Hazards and PPE

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

Standard Hazards							
☐ Falling Objects	☒ Slips and trips	☐ Pinch points	☐ Rotating equipment				
☐ Falls	☐ Power equipment/tools	☐ Elevated work surfaces	☐ _____				
Eye Hazards							
☒ Particulates	☐ Liquid splashes	☐ Welding Arc	☐ _____				
Hearing Hazards							
☐ None	☐ Impact noise	☐ High frequency noise	☒ High ambient noise				
Respiratory Hazards							
☒ None	☐ Dust/particulates	☐ Organic Vapors	☐ Acid Gases	☐ Radon	☐ Asbestos	☐ Be, Hg, Cr, Pb	
☐ Oxygen deficient	☐ Welding fumes	☐ Aerosols/Particulates	☐ _____				
Chemical Hazards							
☒ None	☐ Organic solvents	☐ Reactive metals	☐ PCBs				
☐ Acids / bases	☐ Oxidizers	☐ Volatiles / Semi-volatiles	☐ _____				
Environmental Hazards							
☐ None	☐ Cold Stress	☒ Heat Stress	☐ Wet location	☐ Explosive vapors	☐ Confined space	☐ Engulfment Hazard	
☒ Bio hazards (poisonous plants, insects, snakes, bird/mouse droppings, fungus, etc.)			☐ _____				
Electrical Hazards							
☒ None	☐ Overhead utilities	☐ Underground utilities	☐ Hidden utilities	☐ Energized equip/circuits	☐ Wet location		
Fire Hazards							
☒ None	☐ Cutting, welding, or grinding generated sparks or heat sources			☐ Flammable materials present	☐ Oxygen enriched location		
Ergonomic Hazards							
☐ None	☒ Lifting	☒ Bending	☐ Twisting	☒ Pulling/tugging	☐ Repetitive motion		
Computer Use in the:	☐ Office	☐ Field	☐ _____				
Radiological Hazards							
☒ None	☐ Loose contamination	☐ Fixed Contamination	☐ Airborne contamination	☐ Radiation	☐ Radon		
☐ Alpha	☐ Beta	☐ Gamma/X-rays	☐ Neutron	☐ EMF	☐ Criticality	☐ Tritium	☐ TRU
☐ Depleted Uranium	☐ Enriched Uranium	☐ _____		☐ _____			
Other Hazards							
☐							

Completed by: Sean Condie Date: 6-7-2011

PPE and Monitoring Requirements

Standard PPE					
☒ Hard Hat	☒ Safety shoes	☒ Safety glasses	☐ Boot Covers	☐ Rubber Boots	☒ High Visibility Vest
Eye and Face Protection					
☐ Welding glasses	☐ Welding helmet	☐ Face shield	☐ Chemical goggles	☐ Welding screens	
Hearing Protection					
☒ Ear plugs	☐ Ear Muffs	☐ Ear plugs and muffs	☐ Other _____		
Respiratory Protection					
☒ None	☐ Upgrade Only	☒ Full Face APR	☐ Half Face APR	Cart. Type _____	☐ PAPR
☐ Airline respirator	☐ SCBA	☐ Dust mask	☐ _____		
Protective Clothing					
☐ Tyvek® coveralls	☐ Poly-coated Tyvek® Coveralls	☐ Saranex® Coveralls	☐ Fully encapsulating suit		
☐ Cotton coveralls	☐ Modesty Clothing	☐ Fire resistant clothing	☐ Other _____		
Hand Protection					
☒ None	☐ Cotton gloves	☐ Leather gloves	☐ Cut-resistant gloves	☐ Glove liners	
Outer Gloves					
☐ Nitrile	☐ Viton®	☐ Butyl	☐ Neoprene	☐ Other _____	
Inner Gloves					
☒ Nitrile	☐ Vinyl	☐ Latex	☐ Other _____		
Monitoring Requirements					
☐ Oxygen	☐ Flammable gases/vapors	☐ Toxic Gas/vapors	☐ Hydrogen Sulfide	Carbon Monoxide	
☐ Asbestos	☐ Full time IH coverage	☐ Part time IH coverage	☐ Be, Hg, Cr, Pb		
☐ Metals Specify: Lead _____					
☐ Organic Vapors Specify: _____					
☐ None	☐ TLD required	☐ CAM	☐ Radon		
☐ Full time RCT coverage	☐ Part time RCT coverage	☐ Radioactive air particulates	☐ Other _____		
☐ Other _____		☐ Other _____			

PPE and monitoring requirements completed by: Sean Condie

Date: 6-7-2011

JOB HAZARD ANALYSIS FORM
JHA No.: JHA - 3410 - 11 - 0832 -

Job Title: Field Work – General

Date of Analysis: 6-7-2011

Job Location: Niagara Falls, NY

Team Leader: Eric Weiler

Applicable ES&H Procedures:

- 2.9.A - Hazardous Waste Operations and Emergency Response Program
- 2.9.B - Hearing Conservation Program
- 2.9.C - Respiratory Protection Program
- 2.9.D - Personal Protective Equipment Program
- 2.9.E - Hazard Communication Program
- 2.5.1 - Operation of Company Vehicles and Use of Personal Vehicles on Company Business
- 2.5.1 - Heavy Equipment
- 2.9.7 - Overhead and Underground Utilities
- 2.9.8 - Permit-Required Confined Space
- 2.9.16 - Thermal Stress
- 2.9.19 - Electrical Safety
- 2.9.20 - Lockout / Tagout
- 2.9.21 - Power and Hand Tools
- 2.13.1 - Medical Surveillance

Key Work Steps	Hazards/Potential Hazards	Safe Practices
1. Mobilization/ Demobilization and Site Preparation	1A) See Mobilization / Demobilization and Site Preparation JHA	1A) See Mobilization/Demobilization and Site Preparation JHA
2. Communication	2A) Safety, crew unity	2A) Talk to each other. - Log all workers and visitor on and off the site. - Let other crewmembers know when you see a hazard. - Avoid working near known hazards. - Always know the whereabouts of fellow crewmembers. - Carry a radio and spare batteries or cell phone - Review Emergency Evacuation Procedures (see below).
3. Walking and working in the field	3A) Falling down, twisted ankles and knees, poor footing	3A) Always watch your footing. - Horseplay is strictly prohibited - Slow down and use extra caution around logs, rocks, and animal holes. - Extremely steep slopes (>50%) can be hazardous under wet or dry conditions; consider an alternate route. - Wear laced boots with a minimum 8" high upper and non-skid Vibram-type soles for ankle support and traction.
	3B) Falling objects	3B) Protect head against falling objects. - Wear your hardhat for protection from falling limbs and pinecones, and from tools and equipment carried by other crewmembers. - Stay out of the woods during extremely high winds.

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	3C) Chemical/Toxicological Hazards	3C) Chemical/Toxicological Hazards - See HASP for appropriate level of PPE - Use monitoring equipment, as outlined in HASP, to monitor breathing zone - Read MSDSs for all chemicals brought to the site - Be familiar with hazards associated with site contaminants. - Ensure that all containers are properly labelled - Decon thoroughly prior to consumption of food, beverage or tobacco.
	3D) Damage to eyes	3D) Protect eyes: - Watch where you walk, especially around trees and brush with limbs sticking out. - Exercise caution when clearing limbs from tree trunks. Advise wearing eye protection. - Ultraviolet light from the sun can be damaging to the eyes; look for sunglasses that specify significant protection from UV-A and UV-B radiation. If safety glasses require, use one's with tinted lenses
	3E) Bee and wasp stings	3E) See JHA for Insect Stings and Bites
	3F) Ticks and infected mosquitos	3F) See JHA for Insect Stings and Bites
	3G) Wild Animals/Snakes	3G) Wild Animals - Avoid physical contact with wild animals - Do not threaten and/or corner animals - Make noise to get the animal to retreat. - Stay in or return to vehicle/equipment if in danger - Wear boots and long pants - Do not engage any snakes and back away slowly - Step on and then over a log not on either side of a fallen log
	3H) Contact with poisonous plants or the oil from those plants:	3H) Contact with poisonous plants or the oil from those plants: - Look for signs of poisonous plants and avoid. - Ensure all field workers can identify the plants. Mark identified poisonous plants with spray paint if working at a fixed location. - Do not allow plant to touch any part of your body/clothing. - Wear PPE as described in the HASP and wear Tyveks, gloves and boot covers if contact with plant is likely - Always wash gloves before removing them. - Discard PPE in accordance with the HASP. - Use commercially available products such as Ivy Block or Ivy Wash as appropriate. - See the JHA for Poisonous Plants
		   POISON IVY (Rhus toxicodendron L.) POISON OAK (Rhus diversiloba) POISON SUMAC (Rhus toxicodendron vernix)

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	3I) Back Injuries	3I) Back Injuries - Site personnel will be instructed on proper lifting techniques. - Mechanical devices should be used to reduce manual handling of materials. - Split heavy loads in to smaller loads - Team lifting should be utilized if mechanical devices are not available. - Make sure that path is clear prior to lift.
	3J) Shoveling	3J) Shoveling - Select the proper shovel for the task. A long handled, flat bladed shovel is recommend for loose material - Inspect the handle for splinters and/or cracks - Ensure that the blade is securely attached to the handle - Never be more than 15 inches from the material you are shoveling - Stand with your feet about hip width for balance and keep the shovel close to your body. - Bend from the knees (not the back) and tighten your stomach muscles as you lift. - Avoid twisting movements. If you need to move the load to one side reposition your feet to face the direction the load will be going. - Avoid lifting large shoveling too much at once. When lifting heavy material, pick up less to reduce the weight lifted. - Pace yourself to avoid getting out of breath and becoming fatigued too soon. - Be alert for signs of stress such as pain, numbness, burning and tingling. Stop immediately if you feel any of these symptoms.
	3K) Slips/Trips/Falls	3K) Slips/Trips/Falls - Maintain work areas safe and orderly; unloading areas should be on even terrain; mark or repair possible tripping hazards. - Site SHSO inspect the entire work area to identify and mark hazards. - Maintain three points of contact when climbing ladders or onto/off of equipment
	3L) Overhead Hazards	3L) Overhead Hazards - Personnel will be required to wear hard hats that meet ANSI Standard Z89.1. - All ground personnel will stay clear of suspended loads. - All equipment will be provided with guards, canopies or grills to protect the operator from falling or flying objects. - All overhead hazards will be identified prior to commencing work operations.
	3M) Dropped Objects	3M) Dropped Objects Steel toe boots meeting ANSI Standard Z41 will be worn.
	3N) Noise	3N) Noise Hearing protection will be worn with a noise reduction rating capable of maintaining personal exposure below 85 dBA (ear muffs or plugs); all equipment will be equipped with manufacturer's required mufflers. Hearing protection shall be worn by all personnel working in or near heavy equipment.
	3O) Eye Injuries	3O) Eye Injuries Safety glasses meeting ANSI Standard Z87 will be worn.

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	3P) Heavy Equipment (overhead hazards, spills, struck by or against)	3P) Heavy Equipment - All operators will be trained and qualified to operate equipment - Equipment will have seat belts. - Operators will wear seat belts when operating equipment. - Do not operate equipment on grades that exceed manufacturer's recommendations. - Equipment will have guards, canopies or grills to protect from flying objects. - Ground personnel will stay clear of all suspended loads. - Personel are prohibited from riding on the buckets, or elsewhere on the equipment except for designated seats with proper seat belts or lifts specifically designed to carry workers. - Ground personnel will wear high visibility vests - Spill and absorbent materials will be readily available. - Drip pans, polyethylene sheeting or other means will be used for secondary containment. - Ground personnel will stay out of the swing radius of excavators. - Eye contact with operators will be made before approaching equipment. - Operator will acknowledge eye contact by removing his hands from the controls. - Equipment will not be approached on blind sides. - All equipment will be equipped with backup alarms and use spotters when significant physical movement of equipment occurs on-site, (i.e., other than in place excavation or truck loading). - Inspect rigging prior to each use.
	3Q) Struck by vehicle/equipment	3Q) Struck by vehicle/equipment - Be aware of heavy equipment operations. - Keep out of the swing radius of heavy equipment. - Ground personnel in the vicinity of vehicles or heavy equipment operations will be within the view of the operator at all times. - Ground personnel will be aware of the counterweight swing and maintain an adequate buffer zone. - Ground personnel will not stand directly behind heavy equipment when it is in operation. - Drivers will keep workers on foot in their vision at all times, if you lose sight of someone, Stop! - Spotters will be used when backing up trucks and heavy equipment and when moving equipment. - High visibility vests will be worn when workers are exposed to vehicular traffic at the site or on public roads.
	3R) Struck/cut by tools	3R) Struck/cut by tools - Cut resistant work gloves will be worn when dealing with sharp objects. - All hand and power tools will be maintained in safe condition. - Do not drop or throw tools. Tools shall be placed on the ground or worksurface or handed to another employee in a safe manner. - Guards will be kept in place while using hand and power tools.
	3S) Caught in/on/between	3S) Caught in/on/between - Workers will not position themselves between equipment and a stationary object. - Workers will not wear long hair down (place in pony-tail and tuck into shirt) or jewelry if working with tools/machinery.

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	3T) Contact with Electricity/Lightning	3T) Contact with Electricity/Lighting - All electrical tools and equipment will be equipped with GFCI. - Electrical extension cords will be of the "Hard" or "Extra Hard" service type. - All extension cords shall have a three-blade grounding plug. - Personnel shall not use extension cords with damaged outer covers, exposed inner wires, or splices. - Electrical cords shall not be laid across roads where vehicular traffic may damage the cord without appropriate guarding. - All electrical work will be conducted by a licensed electrician. - All equipment will be locked out and tagged out and rendered in a zero energy state prior to commencing any operation that may exposed workers to electrical, mechanical, hydraulic, etc. hazards. - All utilities will be marked prior to excavation activities. - All equipment will stay a minimum of 10 feet from overhead energized electrical lines (50 kV). This distance will increase by 4 inches for each 10 kV above 50 kV. Rule of Thumb: Stay 10 feet away from all overhead powerlines known to be 50 kV or less and 35 feet from all others.) - Outdoor site operations will halt whenever lightning is visible, outdoor work will not resume until 30 minutes after the last sighting of lightning.
	3U) Equipment failure	3U) Equipment failure All equipment will be inspected before use. If any safety problems are noted, the equipment should be tagged and removed from service until repaired or replaced.
	3V) Hand & power tool usage.	3V) Hand & power tool usage - Daily inspections will be performed. - Ensure guards are in place and are in good condition. - Remove broken or damaged tools from service. - Use the tool for its intended purpose. - Use in accordance with manufacturers instructions. - No tampering with electrical equipment is allowed (e.g., splicing cords, cutting the grounding prong off plug, etc.) - See JHA for Power Tool Use - Electrical and Power Tool Use - Gasoline
	3W) Fire Protection	3W) Fire Protection - Ensure that adequate number and type of fire extinguishers are present at the site - Inspect fire extinguishers on a monthly basis – document - All employees who are expected to use fire extinguishers will have received training on an annual basis. - Obey no-smoking policy - Open fires are prohibited - Maintain good housekeeping. Keep rubbish and combustibles to a minimum. - Keep flammable liquids in small containers with lids closed or a safety can. - When dispensing flammable liquids, do in well vented area and bond and ground containers.

Key Work Steps	Hazards/Potential Hazards	Safe Practices						
	3X) Lead Dust	3X) Lead Dust - Avoid creating dust; work slowly and carefully. - Monitor dust concentrations utilizing PDR-1000AN dust monitoring device (refer to section 4.1 Personal Monitoring). - Move upwind of any dust created. - Stop work if dust is a continued issue. - Refer to tables 7.1 and 7.2 for action levels concerning lead dust onsite. - Do not use compressed air or dry sweeping to clean lead dust.						
4. Environmental health considerations	4A) Heat Stress	4A) Take precautions to prevent heat stress - Remain constantly aware of the four basic factors that determine the degree of heat stress (air temperature, humidity, air movement, and heat radiation) relative to the surrounding work environmental heat load. - Know the signs and symptoms of heat exhaustion, heat cramps, and heat stroke. Heat stroke is a true medical emergency requiring immediate emergency response action. NOTE: The severity of the effects of a given environmental heat stress is decreased by reducing the work load, increasing the frequency and/or duration of rest periods, and by introducing measures which will protect employees from hot environments. - Maintain adequate water intake by drinking water periodically in small amounts throughout the day (flavoring water with citrus flavors or extracts enhances palatability). - Allow approximately 2 weeks with progressive degrees of heat exposure and physical exertion for substantial acclimatization. - Acclimatization is necessary regardless of an employee's physical condition (the better one's physical condition, the quicker the acclimatization). Tailor the work schedule to fit the climate, the physical condition of employees, and mission requirements. - A reduction of work load markedly decreases total heat stress. - Lessen work load and/or duration of physical exertion the first days of heat exposure to allow gradual acclimatization. - Alternate work and rest periods. More severe conditions may require longer rest periods and electrolyte fluid replacement.						
	4B) Wet Bulb Globe Temperature (WBGT) Index	4B) WBGT - Curtail or suspend physical work when conditions are extremely severe (see attached Heat Stress Index). - Compute a Wet Bulb Globe Temperature Index to determine the level of physical activity (take WBGT index measurements in a location that is similar or closely approximates the environment to which employees will be exposed).						
		WBGT THRESHOLD VALUES FOR INSTITUTING PREVENTIVE MEASURES						
		<table><tr><td>80-90 degrees F</td><td>Fatigue possible with prolonged exposure and physical activity.</td></tr><tr><td>90-105 degrees F</td><td>Heat exhaustion and heat stroke possible with prolonged exposure and physical activity.</td></tr><tr><td>105-130 degrees F</td><td>Heat exhaustion and heat stroke are likely with prolonged heat exposure and physical activity.</td></tr></table>	80-90 degrees F	Fatigue possible with prolonged exposure and physical activity.	90-105 degrees F	Heat exhaustion and heat stroke possible with prolonged exposure and physical activity.	105-130 degrees F	Heat exhaustion and heat stroke are likely with prolonged heat exposure and physical activity.
80-90 degrees F	Fatigue possible with prolonged exposure and physical activity.							
90-105 degrees F	Heat exhaustion and heat stroke possible with prolonged exposure and physical activity.							
105-130 degrees F	Heat exhaustion and heat stroke are likely with prolonged heat exposure and physical activity.							

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

Relative Humidity (%) furnished by National Weather Service Gray, ME

Air Temperature	°F	40	45	50	55	60	65	70	75	80	85	90	95	100
	110	136												
	108	130	137											
	106	124	130	137										
	104	119	124	131	137									
	102	114	119	124	130	137								
	100	109	114	118	124	129	136							
	98	105	109	113	117	123	128	134						
	96	101	104	108	112	116	121	126	132					
	94	97	100	103	106	110	114	119	124	129	135			
	92	94	96	99	101	105	108	112	116	121	126	131		
	90	91	93	95	97	100	103	106	109	113	117	122	127	132
	88	88	89	91	93	95	98	100	103	106	110	113	117	121
	86	85	87	88	89	91	93	95	97	100	102	105	108	112
	84	83	84	85	86	88	89	90	92	94	96	98	100	103
	82	81	82	83	84	84	85	86	88	89	90	91	93	95
80	80	80	81	81	82	82	83	84	84	85	86	86	87	

Heat Index
(Apparent
Temperature)

With Prolonged Exposure
and/or Physical Activity

Extreme Danger

Heat stroke or sunstroke
highly likely

Danger

Sunstroke, muscle cramps,
and/or heat exhaustion likely

Extreme Caution

Sunstroke, muscle cramps,
and/or heat exhaustion possible

Caution

Fatigue possible



Wind Chill Chart



Temperature (°F)

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

Frostbite Times

30 minutes

10 minutes

5 minutes

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

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

Effective 11/01/01

Identify Hazards and PPE

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

Standard Hazards							
☒ Falling Objects	☒ Slips and trips	☒ Pinch points	☐ Rotating equipment				
☐ Falls	☒ Power equipment/tools	☐ Elevated work surfaces	☐ _____				
Eye Hazards							
☒ Particulates	☐ Liquid splashes	☐ Welding Arc	☐ _____				
Hearing Hazards							
☐ None	☐ Impact noise	☐ High frequency noise	☒ High ambient noise				
Respiratory Hazards							
☐ None	☒ Dust/particulates	☒ Organic Vapors	☐ Acid Gases	☐ Radon	☐ Asbestos	☒ Be, Hg, Cr, Pb	
☐ Oxygen deficient	☐ Welding fumes	☐ Aerosols/Particulates	☒ Lead Dust _____				
Chemical Hazards							
☐ None	☒ Organic solvents	☐ Reactive metals	☐ PCBs				
☐ Acids / bases	☐ Oxidizers	☒ Volatiles / Semi-volatiles	☐ _____				
Environmental Hazards							
☐ None	☐ Cold Stress	☒ Heat Stress	☒ Wet location	☐ Explosive vapors	☐ Confined space	☐ Engulfment Hazard	
☒ Bio hazards (poisonous plants, insects, animals, fungus, etc.)			☐ _____				
Electrical Hazards							
☐ None	☒ Overhead utilities	☒ Underground utilities	☐ Hidden utilities	☐ Energized equip/circuits	☐ Wet location		
Fire Hazards							
☐ None	☐ Cutting, welding, or grinding generated sparks or heat sources		☒ Flammable materials present			☐ Oxygen enriched location	
Ergonomic Hazards							
☐ None	☒ Lifting	☒ Bending	☒ Twisting	☒ Pulling/tugging	☐ Repetitive motion		
Computer Use in the:		☐ Office		☐ Field		☐ _____	
Radiological Hazards							
☒ None	☐ Loose contamination	☐ Fixed Contamination	☐ Airborne contamination	☐ Radiation	☐ Radon		
☐ Alpha	☐ Beta	☐ Gamma/X-rays	☐ Neutron	☐ EMF	☐ Criticality	☐ Tritium	☐ TRU
☐ Depleted Uranium		☐ Enriched Uranium		☐ _____		☐ _____	
Other Hazards							
☐							

Completed by: Sean Condie

Date: 6-7-2011

PPE and Monitoring Requirements

Standard PPE					
☒ Hard Hat	☒ Safety shoes	☒ Safety glasses	☐ Boot Covers	☐ Rubber Boots	☒ High Visibility Vest
Eye and Face Protection					
☐ Welding glasses	☐ Welding helmet	☐ Face shield	☐ Chemical goggles	☐ Welding screens	
Hearing Protection					
☒ Ear plugs	☐ Ear Muffs	☐ Ear plugs and muffs	☐ Other _____		
Respiratory Protection					
☐ None	☒ Upgrade Only	☒ Full Face APR	☐ Half Face APR	Cart. Type: <u>MSA GMC or Equivalent</u>	
☐ Airline respirator	☐ SCBA	☐ Dust mask	☐ _____		
Protective Clothing					
☒ Tyvek® coveralls	☐ Poly-coated Tyvek® Coveralls	☐ Saranex® Coveralls	☐ Fully encapsulating suit		
☐ Cotton coveralls	☐ Modesty Clothing	☐ Fire resistant clothing	☐ Other _____		
Hand Protection					
☐ None	☐ Cotton gloves	☐ Leather gloves	☐ Cut-resistant gloves	☐ Glove liners	
Outer Gloves					
☒ Nitrile	☐ Viton®	☐ Butyl	☐ Neoprene	☐ Other _____	
Inner Gloves					
☐ Nitrile	☒ Vinyl	☐ Latex	☐ Other _____		
Monitoring Requirements					
☐ Oxygen	☒ Flammable gases/vapors	☒ Toxic Gas/vapors	☐ Hydrogen Sulfide	Carbon Monoxide	
☐ Asbestos	☐ Full time IH coverage	☐ Part time IH coverage	☒ Be, Hg, Cr, Pb		
☒ Metals Specify: <u>Lead Dust (Utilize PDR-1000AN dust monitoring device)</u>					
☐ Organic Vapors Specify: _____					
☒ None	☐ TLD required	☐ CAM	☐ Radon		
☐ Full time RCT coverage	☐ Part time RCT coverage	☐ Radioactive particulates	air	☐ Other _____	
☒ Other - Lead Blood Levels prior and Post work activities		☐ Other _____			

PPE and monitoring requirements completed by: Sean Condie

Date: 6-7-2011

JOB HAZARD ANALYSIS - HASP FORMAT**Job Title:** Field Work: Oversight**Date of Analysis:** 6-7-2011

Key Work Steps	Hazards/Potential Hazards	Safe Practices
1. Prepare for site visit	1A) N/A	▪ Obtain and review HASP prior to site visit, if possible ▪ Determine PPE needs – bring required PPE to the site, if not otherwise being provided at the site (e.g., steel toed boots) ▪ Determine training and medical monitoring needs and ensure all required Health and Safety training and medical monitoring has been received and is current ▪ Complete site specific/ client required training ▪ Ensure all workers are fit for duty (alert, well rested, and mentally and physically fit to perform work assignment) ▪ First aid kits shall be available at the work site and on each transport vehicle. ▪ Familiarize yourself with route to the site ▪ Check weather forecast. Pack appropriate clothing and other items (e.g., sunscreen) for anticipated weather conditions ▪ Verify that subsurface utilities have been identified.
2. Traveling to the site by vehicle	2A) See JHA for Mobilization, Demobilization and Site Preparation	▪ See JHA for Mobilization, Demobilization and Site Preparation
3. Initial Arrival - Assess Site Conditions	3A) Communication with subcontractor and other site personnel	▪ Develop communication methods (agree on hand signals, warning alarms) ▪ Log all workers and visitor on and off the site. ▪ Let other crewmembers know when you see a hazard. ▪ Avoid working near known hazards. ▪ Always know the whereabouts of fellow crewmembers. ▪ Carry a radio and spare batteries or cell phone ▪ Hold and document Safety tailgate meetings ▪ Establish work zones, evacuation routes and rally locations.

JOB HAZARD ANALYSIS - HASP FORMAT
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	3B) Insect Bites and Stings	▪ Discuss the types of insects expected at the Site and be able to identify them. ▪ Look for signs of insects. ▪ Inform crewmembers if allergic to insects and what to do if you need assistance. ▪ Avoid wearing heavy fragrances. ▪ Carry first aid and sting relief kits. ▪ Carry identification of known allergies and necessary emergency medication. ▪ Spray clothing with insect repellent as a barrier. ▪ Wear light colored clothing that fits tightly at the wrists, ankles, and waist. ▪ Cover trouser legs with high socks or boots. ▪ Tuck in shirttails.
	3C) Poisonous plants	▪ Wear long sleeves, long pants and boots ▪ Ensure all field workers can identify the plants. Mark identified poisonous plants with high visibility spray paint if working at a fixed location. ▪ Look for signs of poisonous plants and demark area to aid in avoiding plant. ▪ Do not touch any plant part to any part of your body/clothing. ▪ Use commercially available products such as Ivy Block or Ivy Wash as appropriate.
	3D) Vermin, leaches, animal borne disease	▪ Survey the area for dens, nests, etc. ▪ Identify areas where biological hazards may be present. ▪ Wear long sleeve shirt and full length pants ▪ Be aware of your surroundings. ▪ Wear appropriate footwear (snake boots, etc.) ▪ Avoid high grass areas if possible ▪ Do not put hand/arm into/under an area that you cannot see into/under clearly ▪ Perform routine inspections for ticks, leaches, etc. of yourself and co-workers.
	3E) Chemical Hazards	▪ Wear chemical resistant PPE as identified in the HASP ▪ Use monitoring equipment, as outlined in HASP, to monitor breathing zone ▪ Read MSDSs for all chemicals brought to the site ▪ Be familiar with hazards associated with site contaminants. ▪ Ensure that all containers are properly labeled
	3F) Overhead Power Lines	▪ Identify the location of all overhead power lines at the site. ▪ Maintain clearances depending on voltage - All equipment will stay a minimum of 10 feet from overhead energized electrical lines (50 kV or less). This distance will increase by 4 inches for each 10 kV above 50 kV. Rule of Thumb: Stay 10 feet away from all overhead power lines known to be 50 kV or less and 35 feet from all others.) ▪ Re-locate work so it is not close to power lines ▪ Avoid storing materials under overhead power lines

JOB HAZARD ANALYSIS - HASP FORMAT

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	3G) Underground Utilities	- All utilities will be marked prior to excavation activities - For areas where utility locations cannot be verified, workers must hand dig for the first 3 feet - Use lineman's gloves when locating underground power lines - Work at adequate offsets from utility locations - Immediately cease work if unknown utility markings are discovered.
	3H) Cold Stress	- Dress in layers with wicking garments (those that carry moisture away from the body – e.g., cotton) and a weatherproof slicker. A wool outer garment is recommended. - Take layers off as you heat up; put them on as you cool down. - Wear head protection that provides adequate insulation and protects the ears. - Maintain your energy level. Avoid exhaustion and over-exertion which causes sweating, dampens clothing, and accelerates loss of body heat and increases the potential for hypothermia. - Acclimate to the cold climate to minimize discomfort. - Maintain adequate water/fluid intake to avoid dehydration. - Be aware of signs of hypothermia, its prevention, detection and treatment. - Have extra protection available, in case of an emergency such as blankets and heating devices. - Don't work under extremely adverse weather conditions - Stay in tune to current weather and extended forecasts.
	3I) Heat Stress	- Remain constantly aware of the four basic factors that determine the degree of heat stress (air temperature, humidity, air movement, and heat radiation) relative to the surrounding work environmental heat load. - Know the signs and symptoms of heat exhaustion, heat cramps, and heat stroke. Heat stroke is a true medical emergency requiring immediate emergency response action. - Maintain adequate water intake by drinking water periodically in small amounts throughout the day (flavoring water with citrus flavors or extracts enhances palatability). - Lessen work load and/or duration of physical exertion the first days of heat exposure to allow gradual acclimatization. - Alternate work and rest periods. More severe conditions may require longer rest periods and electrolyte fluid replacement.
	3J) Lightning and Thunder	- Monitor weather channels to determine if electrical storms are forecasted. - Plan ahead and identify safe locations to be in the event of a storm. (e.g., sturdy building, vehicle, etc.) - Suspend all field work at the first sound of thunder. You should be in a safe place when the time between the lightning and thunder is less than 30 seconds. - Suspend work for 30 minutes after last lightning sighting.
	3K) Severe Weather	- Watch for clouds and incoming weather. - Monitor weather forecasts. - Train workers about weather and appropriate precautions. - Identify a shelter and a safe place in event of tornado etc

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	3L) Sun	- Keep body protected - Wear sunscreen, wide brimmed hat or hardhat. - Schedule work for cool part of day. - Take breaks in the shade.
	3M) High Crime Areas	- Do not enter areas where threats are present. - Contract security where applicable. Use the buddy system. - Maintain contact with support such as radio or cell phone - Do not work after dark.
	3N) Remote Locations	- Carry a two-way radio and know how to use it. - Work in teams. Account for all at the end of the work day. - Make sure someone on crew is certified in first aid. - Carry a first aid kit.
	3O) Set up Decon Station	- Refer to MSDS for specific hazards associated with decon solutions - Monitor breathing zone for decon solutions (e.g., methanol, hexane, etc.), if appropriate (see HASP) - Removal of PPE will be performed by the following tasks in the listed order: - Gross boot wash and rinse and removal - Outer glove removal - Suit removal - Respirator removal (if worn). - Inner glove removal - Contaminated PPE is to be placed in the appropriate, provided receptacles. - Employees will wash hands, face, and any other exposed areas with soap and water. - Portable eyewash stations and showers will be available should employees come into direct contact with contaminated materials. - Decon solutions will be disposed of according to the work plan.
	3P) Lead Dust	- Avoid creating dust; work slowly and carefully. - Monitor dust concentrations utilizing PDR-1000AN dust monitoring device (refer to section 4.1 Personal Monitoring). - Move upwind of any dust created. - Stop work if dust is a continued issue. - Refer to tables 7.1 and 7.2 for action levels concerning lead dust onsite. - Do not use compressed air or dry sweeping to clean dust
4. Walk around the Site	4A) Poisonous plants	See section 3C above
	4B) Vermin, leaches, animal borne disease	- See Section 3 D above

JOB HAZARD ANALYSIS - HASP FORMAT
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	4C) Chemical Hazards	See Section 3 E above
	4D) Slips/Trips/Falls	- Wear slip resistant footwear preferably laced boots with a minimum 8" high upper and non-skid soles for ankle support and traction. - Pay attention to where you place your feet - Slow down and use extra caution around logs, rocks, and animal holes. - Extremely steep slopes (>50%) can be hazardous under wet or dry conditions; consider an alternate route. - Site SHSO will inspect the entire work area to identify and mark hazards. - Clear area of trip hazards; mark or barricade those that cannot be moved; - Use caution when walking around excavated areas - Stay back at least 5 feet from excavated areas - Use caution when walking on or around loose soil. - Be aware of surroundings. Avoid muddy areas if possible. - Keep work area clean of tools and debris.
5. Oversight during drilling, or construction operations	5A) Heavy Equipment/Vehicles	- Spotters will be used when backing up trucks and heavy equipment and when moving equipment. - Ground personnel in the vicinity of vehicles or heavy equipment operations will be within the view of the operator at all times. - Ground personnel will be aware of the swing radius and maintain an adequate buffer zone. - Ground personnel will not stand directly behind heavy equipment when it is in operation. - Personnel are prohibited from riding on the buckets, or elsewhere on the equipment except for designated seats with proper seat belts or lifts specifically designed to carry workers. Ground personnel will stay clear of all suspended loads. - Ground personnel will wear high visibility vests - Eye contact with operators will be made before approaching equipment.
	5B) Eye Injury	- Wear appropriate safety glasses (tinted for sun). - Watch where you walk, especially around trees and brush with protruding limbs.
	5C) Foot Injury	- Wear steel toed boots - Wear insulated steel toed boots during winter - Ensure shoes/boots have good traction - Pay attention to where you place your feet, especially when walking on uneven terrain
	5D) Head Injury	- Wear hardhat - Do not walk or work under scaffolding or other elevated work unless there are guardrails and toeboards in place - Flag or mark protruding objects at head level - Do not walk/stand under suspended loads.

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	5E) Chemical Hazards	- See Section 3E above - Wash hands and face prior to consumption of food, beverage or tobacco. - Do not eat within work zone.
	5F) Dust - particulates (respiratory)	- Use dust suppression methods - Stand upwind of point of dust generation
	5G) Overhead Power Lines	See Section 3F above.
	5H) Underground Utilities	See Section 3G above
	5I) Standing/Static Posture	- Change posture on a frequent basis - Stretch prior to any physical activity
	5J) Slips/Trips/Falls	See Section 4D above
	5K) Noise	- Hearing protection will be worn with a noise reduction rating capable of maintaining personal exposure below 85 dBA (ear muffs or plugs). - All equipment will be equipped with manufacturer's required mufflers. - Hearing protection shall be worn by all personnel working in or near heavy equipment. - Hearing protection will be worn when workers need to shout when standing two feet away from each other. - Segregate noisy equipment from the operators - Use sound dampening around noisy equipment
	5L) Moving Equipment	- Clear area of obstructions and communicate with all workers involved that drilling is beginning - Do not exceed manufacturer's recommended speed, force, torque, or other specifications. and penetrate the ground slowly with hands on the controls for at least the first foot of soil to minimize chance of auger kick-out - Stay clear of rotating auger - Use long-handled shovel to clear away cuttings when auger has stopped - Do not wear loose clothing - Wear appropriate PPE including leather gloves and steel-toed boots (See HASP)
6. Sampling Oversight	6A) Chemical Hazards	- See Section 3E above - Wash hands and face prior to consumption of food, beverage or tobacco. - Calibrate meters in a clean, well ventilated area - Store calibration gases in well-vented area. Ensure chemical labels and warnings are legible.

JOB HAZARD ANALYSIS - HASP FORMAT**Job Title:** Field Work: Oversight**Date of Analysis:** 6-7-2011

	6B) Personnel Decontamination	▪ Refer to MSDS for specific hazards associated with decon solutions ▪ Monitor breathing zone for decon solutions (e.g., methanol, hexane, etc.), if appropriate (see HASP) ▪ Removal of PPE will be performed by the following tasks in the listed order: ○ Gross boot wash and rinse and removal ○ Outer glove removal ○ Suit removal ○ Respirator removal (if worn). ○ Inner glove removal ▪ Contaminated PPE is to be placed in the appropriate, provided receptacles. ▪ Employees will wash hands, face, and any other exposed areas with soap and water. ▪ Portable eyewash stations and showers will be available should employees come into direct contact with contaminated materials. ▪ Decon solutions will be disposed of according to the work plan.
	6C) Lifting	▪ Good lifting techniques (lift with legs not back) ▪ Mechanical devices (e.g., hand truck, cart, forklift, etc.) should be used to reduce manual handling of materials and drums. ▪ Team lifting should be utilized if mechanical devices are not available. (mandatory for items over 50 lbs) ▪ Split heavy loads in to smaller loads ▪ Make sure that path is clear prior to lift. ▪ Redesign work area to avoid low lifts ▪ Stretch prior to lifting ▪ Maintain a healthy life style and level of physical fitness.
	6D) Hand Tools	▪ Cut resistant work gloves will be worn when dealing with sharp objects. ▪ All hand and power tools will be maintained in safe condition. ▪ Do not drop or throw tools. Tools shall be placed on the ground or work surface or handed to another employee in a safe manner. ▪ Guards will be kept in place while using hand and power tools. ▪ Daily inspections will be performed. ▪ Remove broken or damaged tools from service and tag out as defective ▪ No tampering with electrical equipment is allowed (e.g., splicing cords, cutting the grounding prong off plug, etc.) ▪ Do not use excessive force or impact ▪ Do not use tool improperly. Ensure all workers are trained
	6E) Slips/Trips/Falls	▪ See Section 4D above.

JOB HAZARD ANALYSIS - HASP FORMAT
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	6F) Struck by Vehicle	- Ground personnel in the vicinity of vehicles operations will be within the view of the operator at all times. - Ground personnel will not stand directly behind vehicles when it is in operation - Drivers will keep workers on foot in their vision at all times, if you lose sight of someone, Stop! - High visibility vests will be worn when workers are exposed to vehicular traffic at the site or on public roads. - Try to park so that you don't have to back up to leave. - If backing in required, walk around vehicle to identify any hazards (especially low level hazards that may be difficult to see when in the vehicle) that might be present. Use a spotter if necessary - Place cones in the front and rear of the vehicle - Prior to driving off, walk around vehicle to collect cones and identify any hazards - especially low level hazards that may be difficult to see when in the vehicle. - Set up "Workers in the Road" or similar warning signs and cones to alert traffic. - Use emergency flashers and roof top flashing light (recommended) to alert oncoming vehicular traffic. - Remain alert at all times as to the traffic outside the vehicle. Step to the side of the road when distracted by by-standers. Keep unofficial personnel out of the work area. - Exit vehicle with caution. - Wear High Visibility Vest when outside the vehicle. - Utilize vehicle as a shield from oncoming traffic, as practical
7. IDW pickup oversight	7A) Foot Injury	See Section 5C above.
	7B) Chemical Hazards	See Section 3E above.
	7C) Lifting	See Section 6C above.
	7D) Slips/Trips/Falls	See Section 4D above
8. Return to office/home	8A) See Mobilization/ Demobilization and Site Preparation JHA	See Mobilization/ Demobilization and Site Preparation JHA

JOB HAZARD ANALYSIS - HASP FORMAT

Job Title: Soil Sampling

Date of Analysis: 6-7-2011

Minimum Recommended PPE*: High visibility vest, hard hat, steel-toed boots, safety glasses, hearing protection

*See HASP for all required PPE

Key Work Steps	Hazards/Potential Hazards	Safe Practices
1. Prepare for sampling event	1A) Chemical exposure	1A) Chemical Exposure Read HASP and determine air monitoring and PPE needs.
2. Mobilization	2A) See JHA Mobilization/Demobilization/Site Preparation	2A) See JHA Mobilization/Demobilization/Site Preparation
3. General Site Hazards	3A) See JHA Field Work - General	3A) See JHA Field Work - General
4. Carrying equipment to site location	4A) Back or muscle strain	4A) Back or muscle strain - Use proper lifting techniques when lifting pumps or generators - Use mechanical aids if available - Use 2 person lift for heavy items
5. Calibrate monitoring equipment	5A) Exposure to calibration gases	5A) Exposure to calibration gases - Review equipment manuals - Calibrate in a clean, well ventilated area
6. Preparing sampling location	6A) Contact with poisonous plants or the oil from poisonous plants	6A) Contact with poisonous plants or the oil from those plants: - Look for signs of poisonous plants and avoid. - Wear PPE as described in the HASP. - Do not touch anything part of your body/clothing. - Always wash gloves before removing them. - Discard PPE in accordance with the HASP.
	6B) Contact with biting insects (i.e., spiders, bees, etc.)	6B) Contact with stinging/biting insects - Discuss the types of insects expected at the Site and be able to identify them. - Look for signs of insects in and around the well. - Wear Level of PPE as described in the HASP. At a minimum, follow guidelines in the JHA "Insects Stings and Bites." - If necessary, wear protective netting over your head/face. - Avoid contact with the insects if possible. - Inform your supervisor and the Site Health and Safety Supervisor if you have any allergies to insects and insect bites. Make sure you have identification of your allergies with you at all times and appropriate response kits if applicable. - Get medical help immediately if you are bitten by a black widow or brown recluse, or if you have a severe reaction to any spider bite or bee sting.
	6C) Exposure to hazardous Inhalation and contact with hazardous substances (VOC contaminated soil); flammable atmospheres.	6C) Exposure to hazardous substances - Wear PPE as identified in HASP. - Review hazardous properties of site contaminants with workers before sampling operations begin - Monitor breathing zone air in accordance with HASP to determine levels of contaminants present. - When decontaminating equipment wear additional eye/face protection over the safety glasses such as a face shield.

JOB HAZARD ANALYSIS - HASP FORMAT

Job Title: Soil Sampling

Date of Analysis: 6-7-2011

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	6D) Back strain due to lifting or moving equipment to sampling locations	6D) Back strain - Use mechanical aids when possible, if mechanical aids are not available, use two person lifts for heavy items. - Use proper lifting techniques
	6E) Foot injuries from dropped equipment	6E) Foot Injuries - Be aware when moving objects, ensure you have a good grip when lifting and carrying objects. - Do not carry more than you can handle safely - Wear steel toed boots
7. Collecting soil samples	7A) Working around drill rigs	7A) See JHA - Geoprobe
	7B) Encountering underground or overhead utilities	7B) Have all utilities located.
	7C) Fire/Explosion/Contamination hazard from refueling generators	7C) Fire/Explosion/Contamination hazard from refueling generators - Turn the generator off and let it cool down before refueling - Segregate fuel and other hydrocarbons from samples to minimize contamination potential - Transport fuels in approved safety containers. The use of containers other than those specifically designed to carry fuel is prohibited - See JHA for Gasoline use
	7D) Electrocution	7D) Electrocution - A ground fault circuit interrupter (GFCI) device must protect all AC electrical circuits. - Use only correctly grounded equipment. Never use three-pronged cords which have had the third prong broken off. - Make sure that the electrical cords from generators and power tools are not allowed to be in contact with water - Do not stand in wet areas while operating power equipment - Always make sure all electrically-powered sampling equipment is in good repair. Report any problems so the equipment can be repaired or replaced. - When unplugging a cord, pull on the plug rather than the cord. - Never do repairs on electrical equipment unless you are both authorized and qualified to do so.
	7E) Exposure to contaminants	7E) Exposure to Contaminants - Stand up wind when sampling - Monitor breathing zone with appropriate monitoring equipment (see HASP) - Wear chemical resistant PPE as identified in HASP - See section 4C) under Safe Practices above
	7F) Exposure to preservatives	7F) Exposure to preservatives - Work in a well ventilated area, upwind of samples - Wear chemical resistant PPE as identified in HASP - Review MSDSs
	7G) Slips/trips/falls	7G) Slips/trips/falls - Ground can become wet/muddy - Wear good slip resistant footwear



JOB HAZARD ANALYSIS - HASP FORMAT

Job Title: Soil Sampling

Date of Analysis: 6-7-2011

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	7H) Lifting Injury	7H) Lifting injury - Use proper lifting techniques when carrying quantities of samples - Use proper ergonomics when hand digging for samples
	7I) Eye injury	7I) Eye Injury Wear eye protection when using picks or similar devices to loosen soil
	7J) Fire	7J) Fire - When using gas powered auger, maintain fire watch whenever fueling or otherwise handling gasoline - See JHA - Gasoline
	7K) Lead Dust	7K) Lead Dust - Avoid creating dust; work slowly and carefully. - Monitor dust concentrations utilizing PDR-1000AN dust monitoring device (refer to section 4.1 Personal Monitoring). - Move upwind of any dust created. - Stop work if dust is a continued issue. - Refer to tables 7.1 and 7.2 for action levels concerning lead dust onsite.
8. Soil sampling using floor corer	8A) Back injury	8A) Back Injury - Use proper lifting techniques when moving floor corer and generator - Use mechanical aids if available - Use two person lift for heavy items.
	8B) Electric Shock	8B) Electric Shock - Use electric cords free from defects - Keep cords out of water - Ensure all electrical equipment is properly grounded - Use GFCI
	8C) Hearing	8C) Hearing Wear hearing protection
	8D) Fire	8D) Fire - When using generator, maintain fire watch whenever refueling or otherwise handling gasoline - See JHA - Gasoline
	8E) Contamination	8E) Contamination - Use appropriate PPE for the contaminants of concern (see HASP). - Minimize sample contact - Label sample in accordance with procedures - Monitor breathing zone levels.



JOB HAZARD ANALYSIS - HASP FORMAT

Job Title: Locate and Mark Areas

Date of Analysis: 6-7-2011

Minimum Recommended PPE*: High visibility vest, hard hat, steel-toed boots, safety glasses, hearing protection

*See HASP for all required PPE

Key Work Steps	Hazards/Potential Hazards	Safe Practices
1. Locate and Mark Excavation Area	1A) Slip/Trip/Fall	▪ Clear area of trip hazards; mark or barricade those that cannot be moved; ▪ Use caution when walking around excavated areas ▪ Stay back at least 5 feet from excavated areas ▪ Use caution when walking on or around loose soil
	1B) Place Pin Flags or use Marking Paint	▪ With the use of a map locate the area to be marked and place a flag ▪ Do not bend or twist awkwardly ▪ Marking paint can also be used to designate boundary excavation lines ▪ Point marking paint directly at ground approximately 4 to 8 inches from ground surface
	1C) Chemical Exposures-Especially Lead Dust	▪ Avoid direct contact with potentially contaminated media ▪ Wear appropriate PPE if there is the potential for exposure to contaminated media ▪ Monitor air in breathing zone per the HASP. ▪ Move upwind of any dust created.
	1D) Exposure to poisonous plants and insects	See JHA for Poisonous Plants See JHA for Insect Stings and Bites



JOB HAZARD ANALYSIS - HASP FORMAT

Job Title: Hand Auguring

Date of Analysis: 6-7-2011

Minimum Recommended PPE*: Steel toed boots, work gloves, hard hat

*See HASP for all required PPE

Key Work Steps	Hazards/Potential Hazards	Safe Practices
1. Going to site, work preparation	1A) Mobilization / Demobilization and Site Preparation	1A) See JHA for Mobilization Demobilization and Site Preparation
2. Working at the site	2A) General Field Work – Walking and working in the field, Environmental conditions, communication	2A) See JHA for General Field Work
3. Hand Auguring Test Holes	3A) Back injury from lifting and twisting equipment	3A) Back injury from lifting and twisting equipment Use proper lifting and bending techniques.
	3B) Arm and Wrist injury from torque placed on hand auger	3B) Arm and Wrist injury from torque placed on hand auger - Be aware of subsurface conditions/obstructions - Use team approach to reduce fatigue
	3C) Injuries from transporting equipment to site i.e. stumbling or falling	3C) Injuries from transporting equipment to site i.e. stumbling or falling - Ensure surround are clear of personnel and obstacles as you approach the test site. - Transport equipment in sections, beginning with equipment nearest tailgate of truck. - Use 2 person lift for heavy items - Assure pathway is clear
	3D) Injuries while adding extensions	3D) Injuries while adding extensions - Ensure that PPE is used. - Lift and connect extension with care. - Use proper lifting procedures.
	3E) Lead Dust	3E) Lead Dust - Avoid creating dust; work slowly and carefully. - Keep area moist; utilize water spraying device if necessary. - Monitor dust concentrations utilizing PDR-1000AN dust monitoring device (refer to section 4.1 Person Monitoring). - Utilize Personal Sampling Pump pump for personal sampling to assess exposure. (refer to section 4.1 Personal Monitoring). - Move upwind of any dust created. - Stop work if dust is a continued issue. - Refer to tables 7.1 and 7.2 for action levels concerning lead dust onsite
4. Removal of Auger From Hole	4A) Injury to others as equipment is removed	4A) Injury to others as equipment is removed Assure that others are standing at a safety distance before removing equipment
	4B) Fingers injuries	4B) Fingers injuries - Assure fingers are clear as equipment is extracted - Wear PPE (gloves, eye protection, etc). - Be aware of the type of material being removed from test hole and handle appropriately
5. Awareness of Auguring Site	5A) Underground Power lines, gas pipes, other obstructions, etc.	5A) Underground Power lines, gas pipes, etc. - Ensure that all underground utilities have been identified. If not sure ASK - Be aware of subsurface conditions and make sure that proper equipment/tools are available



JOB HAZARD ANALYSIS - HASP FORMAT

Job Title: Excavation and Backfilling Oversight/Direction

Date of Analysis: 6-7-2011

Minimum Recommended PPE*: High visibility vest, hard hat, steel-toed boots, safety glasses, hearing protection

*See HASP for all required PPE

Key Work Steps	Hazards/Potential Hazards	Safe Practices
1. Identify location of underground utilities	1A) Encountering electrical, gas, communications, water, or other underground utility lines	1A) Identify utility locations prior to mobilizing: - Contact "Dig Safe" and obtain a permit (or one call center) to have underground utilities located and marked prior to any subsurface work on site. - Use facility engineers and/or employ a private utility locator for utilities on private property
2. Excavation of soils	2A) Underground utilities	2A) Underground utilities - Work at adequate offsets from utility locations - For areas where utility locations cannot be verified, workers must hand dig for the first 3 feet - Immediately cease work if unknown utility markings are discovered. - Conform to utility clearances based on voltage of lines. For powerlines of 50 KV or less stay at least 10 feet away. For powerlines of > 50 KV, add an additional 0.4 inches per KV over 50 KV. Rule of thumb: Stay 10 feet away if powerline <u>known</u> to be 50 KV or less. Stay 35 feet away for lines > 50 KV or if voltage is unknown.
	2B) Lead Dust	2B) Lead Dust - Avoid creating dust; work slowly and carefully. - Keep area moist; utilize water spraying device if necessary. - Monitor dust concentrations utilizing PDR-1000AN dust monitoring device (refer to section 4.1 Personal Monitoring). - Utilize Personal Sampling Pump pump for personal sampling to assess exposure. (refer to section 4.1 Personal Monitoring). - Move upwind of any dust created. - Stop work if dust is a continued issue. - Refer to tables 7.1 and 7.2 for action levels concerning lead dust onsite
	2C) Odors	2C) Odors Implement odor control mitigation in accordance with the Site Management Plan.
	2D) Heavy Equipment	2D) Heavy Equipment See General Site Hazards
	2E) Cave-ins	2E) Cave-ins Excavation work must be conduct in accordance with OSHA 1926 Subpart P (650-652) Excavations including but not limited to: - Designate a competent person to inspect, decide soil classification, proper sloping, the correct shoring, or sheeting for the excavation - Walls and faces of trenches 5 feet or more deep, and all excavations in which employees may be exposed to danger from moving ground or cave-in shall be guarded by a shoring system, sloping of the ground, or some other equivalent means. - Cordon-off the perimeter of the excavation to delineate cave-in hazard area. - Construct diversion ditches or dikes to prevent surface water from entering excavation and provide good drainage of the areas



JOB HAZARD ANALYSIS - HASP FORMAT

Job Title: Excavation and Backfilling Oversight/Direction

Date of Analysis: 6-7-2011

Key Work Steps	Hazards/Potential Hazards	Safe Practices
		surrounding the excavation. ▪ Collect ground water/rain water from excavation and dispose of properly ▪ Store spoils, materials and equipment at least 2 feet from the edge of the excavation; prevent excessive loading of the excavation face. ▪ Inspect excavations (when personnel entry is required) daily, any time conditions change and document the inspection.
	2F) Slips/Trips/Falls	2F) Slips/Trips/Falls ▪ Provide sufficient egress (stairs, ladders, or ramps) when workers enter excavations over 4 feet in depth, and place these structures so that workers travel no more than 25 feet to reach ladders. Provide at least two means of exit for personnel working in excavations. ▪ Maintain minimum safe distance from the excavation and only approach the excavation on the short side.
	2G) Site Security	2G) Site Security ▪ Fill in excavation prior to leaving the site or provide barricades or fencing (able to withstand 200 lbs. of vertical pressure) to protect the excavation from the public and place warning signs on fence/barricade. ▪ Consider hiring a security guard ▪ If cover excavation with plywood or other material, ensure cover is labeled with the words "cover" or "hole."
3). Backfilling of Soils	3A) Heavy Equipment	3A) Heavy Equipment ▪ See General Site Hazards (Heavy Equipment)
	3B) Cave-ins	3B) Cave-ins ▪ See 2E above.

**JOB HAZARD ANALYSIS - HASP FORMAT****Job Title:** Excavation and Backfilling Oversight/Direction**Date of Analysis:** 6-7-2011**Identify Hazards and PPE**

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

Standard Hazards							
☒ Falling Objects	☒ Slips and trips	☒ Pinch points	☒ Rotating equipment				
☐ Falls	☒ Power equipment/tools	☐ Elevated work surfaces	☐ _____				
Eye Hazards							
☒ Particulates	☐ Liquid splashes	☐ Welding Arc	☐ _____				
Hearing Hazards							
☐ None	☒ Impact noise	☒ High frequency noise	☒ High ambient noise				
Respiratory Hazards							
☐ None	☒ Dust/particulates	☒ Organic Vapors	☐ Acid Gases	☐ Radon	☐ Asbestos	☒ Be, Hg, Cr, Pb	
☐ Oxygen deficient	☐ Welding fumes	☐ Aerosols/Particulates	☐ _____				
Chemical Hazards							
☐ None	☒ Organic solvents	☐ Reactive metals	☐ PCBs				
☐ Acids / bases	☐ Oxidizers	☒ Volatiles / Semi-volatiles	☐ _____				
Environmental Hazards							
☐ None	☐ Cold Stress	☒ Heat Stress	☐ Wet location	☐ Explosive vapors	☐ Confined space	☐ Engulfment Hazard	
☒ Bio hazards (poisonous plants, insects, animals, fungus, etc.)				☐ _____			
Electrical Hazards							
☐ None	☒ Overhead utilities	☒ Underground utilities	☒ Hidden utilities	☐ Energized equip/circuits	☐ Wet location		
Fire Hazards							
☐ None	☐ Cutting, welding, or grinding generated sparks or heat sources		☒ Flammable materials present		☐ Oxygen enriched location		
Ergonomic Hazards							
☐ None	☒ Lifting	☒ Bending	☒ Twisting	☒ Pulling/tugging	☐ Repetitive motion		
Computer Use in the:		☐ Office	☐ Field	☐ _____			
Radiological Hazards							
☒ None	☐ Loose contamination	☐ Fixed Contamination	☐ Airborne contamination	☐ Radiation	☐ Radon		
☐ Alpha	☐ Beta	☐ Gamma/X-rays	☐ Neutron	☐ EMF	☐ Criticality	☐ Tritium	☐ TRU
☐ Depleted Uranium		☐ Enriched Uranium		☐ _____	☐ _____		
Other Hazards							
☐							

Completed by: Sean CondieDate: 6-7-2011

**JOB HAZARD ANALYSIS - HASP FORMAT**Job Title: Excavation and Backfilling Oversight/DirectionDate of Analysis: 6-7-2011**PPE and Monitoring Requirements**

Standard PPE					
☒ Hard Hat	☒ Safety shoes	☒ Safety glasses	☐ Boot Covers	☐ Rubber Boots	☒ High Visibility Vest
Eye and Face Protection					
☐ Welding glasses	☐ Welding helmet	☐ Face shield	☐ Chemical goggles	☐ Welding screens	
Hearing Protection					
☒ Ear plugs	☐ Ear Muffs	☐ Ear plugs and muffs	☐ Other _____		
Respiratory Protection					
☐ None	☒ Upgrade Only	☐ Full Face APR	☐ Half Face APR	Cart. Type: <u>MSA GMC or Equivalent</u>	☐ PAPR
☐ Airline respirator	☐ SCBA	☐ Dust mask	☐ _____		
Protective Clothing					
☐ Tyvek® coveralls	☐ Poly-coated Tyvek® Coveralls	☐ Saranex® Coveralls	☐ Fully encapsulating suit		
☐ Cotton coveralls	☐ Modesty Clothing	☐ Fire resistant clothing	☐ Other _____		
Hand Protection					
☐ None	☐ Cotton gloves	☒ Leather gloves	☐ Cut-resistant gloves	☐ Glove liners	
Outer Gloves					
☒ Nitrile	☐ Viton®	☐ Butyl	☐ Neoprene	☐ Other _____	
Inner Gloves					
☒ Nitrile	☒ Vinyl	☐ Latex	☐ Other _____		
Monitoring Requirements					
☐ Oxygen	☒ Flammable gases/vapors	☒ Toxic Gas/vapors	☐ Hydrogen Sulfide	Carbon Monoxide	
☐ Asbestos	☐ Full time IH coverage	☐ Part time IH coverage	☒ Be, Hg, Cr, Pb		
☒ Metals Specify: <u>Lead Dust (Utilize PDR-1000AN dust monitoring device)</u>					
☒ Organic Vapors Specify: <u>PID</u>					
☒ None	☐ TLD required	☐ CAM	☐ Radon		
☐ Full time RCT coverage	☐ Part time RCT coverage	☐ Radioactive particulates	air	☐ Other _____	
☐ Other _____		☐ Other _____			

Completed by: Sean CondieDate: 6-7-2011



JOB HAZARD ANALYSIS - HASP FORMAT

Job Title: Direction of Excavated Soil Staging

Date of Analysis: 6-7-2011

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

Key Work Steps	Hazards/Potential Hazards	Safe Practices
1. Soil Excavation	1A) Heavy Equipment Operation Oversight	- Establish hand signals with equipment operator - Identify excavator swing radius and stay outside of swing area while excavator is running - Maintain eye contact with equipment operator - Avoid crush hazards such as the area between the excavator and roll off boxes or other large structures - Have operator identify all blind spots before beginning site work. - Do not stand/walk in operator blind spots.
	1B) Excessive Noise	Wear hearing protection in accordance with the HASP
	1C) Slip/Trip/Fall	- Clear area of trip hazards; mark or barricade those that cannot be moved - Use caution when walking around excavated areas - Stay back at least 5 feet from excavated areas - Use caution when walking on or around loose soil
	1D) Lead Dust	- Avoid creating dust; work slowly and carefully. - Keep area moist; utilize water spraying device if necessary. - Monitor dust concentrations utilizing PDR-1000AN dust monitoring device (refer to section 4.1 Person Monitoring). - Move upwind of any dust created. - Stop work if dust is a continued issue. - Refer to tables 7.1 and 7.2 for action levels concerning lead dust onsite
	1E) Exposure to poisonous plants and insects	See JHA for Poisonous Plants See JHA for Insect Stings and Bites
2. Soil Staging	2A) Chemical Runoff	- Place soils onto plastic in a location that will not pond in the event of rainfall - Cover soils on all sides with plastic to keep out rain

Job Title: Air Monitoring
Date of Analysis: 6-7-2011

Key Work Steps	Hazards/Potential Hazards	Safe Practices
1. Work preparation	1A) N/A	- Charge pumps - Receive site specific training, if required - Calibrate pumps
2. Lifting and carrying various items	2A) Strains (overexertion)	- Determine whether item is too heavy or bulky for one person to carry; get help - Make two trips if necessary - Use proper lifting techniques
	2B) Falls	Always be able to see where you are going and what might be an obstacle in your path
3. Place pumps in work zone for area samples	3A) Slips, trips, falls	- Wear proper footwear for site conditions - Watch placement of feet - Do not use furniture as stepladders to reach high places, use a step stool or step ladder - Position area pumps and pump stands out of walking area and from blocking doorways, if possible. Use warning barriers and tape for awareness.
	3B) Strain (overexertion)	- Take care when carrying equipment (pumps, tripod or other item to be used to position pump at breathing zone level) - Get help or make two trips if required
4. Start pumps and record time. Periodically monitor pumps to ensure operating correctly.	4A) Slips, trips, falls	- Wear proper footwear for site conditions - Watch placement of feet - Do not use furniture as stepladders to reach high places, use a stepstool or stepladder
5. Using various chemicals, such as charcoal, dessicant, etc.	5A) Contact with materials that causes irritation, allergic response, or skin problems	- Read and follow all instructions regarding proper use - If allergic reaction or irritation occurs, report to supervisor so chemical can be replaced with safer material - Keep MSDS sheets on hand - Wear proper eyewear, masks, and gloves when using certain chemicals
	5B) Spills	- Have clean-up plan for spills - Keep water on hand for rinsing off skin

Minimum Recommended PPE*: Long sleeved shirt and pants, light colored clothing

*See HASP for all required PPE

Key Work Steps	Hazards/Potential Hazards	Safe Practices
1) Mobilization	1A) See JHA Mobilization/Demobilization/Site Preparation	1A) See JHA Mobilization/Demobilization/Site Preparation
2) Preparation	2A) Training – Identifying Poisonous Plants	2A) Provide training on identifying the specific poisonous plants that could be present at the site
		
	2B) Poison Ivy 	2B) Poison Ivy: Grows everywhere in United States except Hawaii and Alaska. In the East, Midwest, and the South, it grows as a vine. In the Northern and Western United States, it grows as a shrub. Each leaf has three leaflets. Leaves are green in the summer and red in the fall. In the late summer and fall, white berries may grow from the stems.
	2C) Poison Oak 	2C) Poison Oak: Oak-like fuzzy leaves in clusters of three. It has two distinct kinds: Eastern poison oak (New Jersey to Texas) grows as a low shrub. Western poison oak (Pacific Coast) grows to six-foot-tall clumps or vines up to 30 feet long. It may have clusters of yellow berries.
	2D) Poison Sumac 	2D) Poison Sumac Grows in standing water in peat bogs in the Northeast and Midwest and in swampy areas in parts of the Southeast. Each leaf has clusters of seven to 13 smooth-edged leaflets. The plants can grow up to 15 feet tall. The leaves are orange in spring, green in summer and red, and orange or yellow in fall. There may be clumps of pale yellow or cream-colored berries.

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	2E) Giant Hogweed  Giant Hogweed  Giant Hogweed Flower (clusters may reach up to 2.5 feet across)  Giant Hogweed Flower Leaves  Giant Hogweed Stem Thick stem with coarse hairs, Blistery dark purple splotches.	2E) Giant Hogweed Hogweed is a public health hazard. Its clear, watery sap has toxins that cause photo-dermatitis. Skin contact followed by exposure to sunlight produces painful, burning blisters that may develop into purplish or blackened scars. Contact with the eyes can cause temporary or permanent blindness. Since its introduction into North America, this plant has become established in rich moist soils along roadsides, stream banks and waste ground. In the eastern US, it is known to occur in Maine, New York, Pennsylvania, Connecticut, and now Massachusetts. A biennial or perennial herb growing 8 to 15 feet tall, giant hogweed usually has a taproot or occasionally fibrous root. The hollow stems are 2 to 4 inches in diameter with dark reddish-purple splotches and coarse white hairs. The deeply incised compound leaves grow up to 5 feet in width. Hairs on the underside of the leaf are stiff, dense and stubby. The large umbrella-shaped flower heads are up to 2 1/2 feet in diameter across a flat top with numerous small flowers produced in mid-May through July. Some plants die after flowering; others flower for several years. The plant produces flattened, 3/8 inch long, oval dry fruits that have a broadly rounded base and broad marginal ridges. Plants sprout in the early spring (or late winter in mild years) from the roots or from seed. Grows in standing water in peat bogs in the Northeast and Midwest and in swampy areas in parts of the Southeast. Each leaf has clusters of seven to 13 smooth-edged leaflets. The plants can grow up to 15 feet tall. The leaves are orange in spring, green in summer and red, and orange or yellow in fall. There may be clumps of pale yellow or cream-colored berries.



JOB HAZARD ANALYSIS - HASP FORMAT

Potential Hazard: Poisonous Plants

Date of Analysis: 6-7-2011

Key Work Steps	Hazards/Potential Hazards	Safe Practices
3A) Contact with poisonous plants	3A) Hand Contact	3A) Hand Contact Apply IvyX (or similar product) to hands, forearms and other potentially exposed parts of the body, prior to starting work in the morning and again right after lunch. Leather Gloves must be worn at all times when digging, screening or carrying field equipment. Leather gloves should be of sufficient length to cover the entire wrist and cuff of the shirt. Carefully remove gloves, without touching the exterior surface, when taking notes and prior to lunch or restroom breaks. Gloves that become worn should be replaced immediately. Do not scratch or rub the face or other exposed skin while wearing gloves. Workers will apply Tecnu (or similar product) to the hands and forearms immediately after removing their gloves, prior to lunch and again at the end of the day. Tecnu will help cleanse the urushiol oil from the skin before it can be absorbed. Sensitive individuals can also apply prior to showering in the evening.
	3B) Arm Contact	3B) Arm Contact Apply IvyX (or similar product) to hands, forearms and other potentially exposed parts of the body, prior to starting work in the morning and again right after lunch. Wear light weight, long sleeved shirts as the sleeves will provide a physical barrier between the skin and any urushiol oil encountered. Disposable gauntlets may be worn over arms to keep oil from clothing as well. Have the sleeves pulled down to the base of the hand, covering the forearm and wrist (all exposed skin). Workers will apply Tecnu (or similar product) to the hands and forearms immediately after removing their gloves, prior to lunch and again at the end of the day. Tecnu will help cleanse the urushiol oil from the skin before it can be absorbed. Sensitive individuals can also apply prior to showering in the evening.
	3C) Leg Contact	3C) Leg Contact Wear long pants and boots. Assume boots are contaminated with the urushiol oil and only handle with gloved hands.



JOB HAZARD ANALYSIS - HASP FORMAT

Potential Hazard: Poisonous Plants

Date of Analysis: 6-7-2011

Key Work Steps	Hazards/Potential Hazards	Safe Practices
4) Handling Contaminated Equipment and Clothing	4A) Exposure from Handling Contaminated Equipment	4A) Exposure from Handling Contaminated Equipment Do not handle any field equipment that may have come in contact with poison ivy/oak/sumac without gloves. Decontaminate all equipment at the end of each workday with a solution of water and dish soap. Scrub all surfaces of the screens and shovels with a brush. Rinse with cool water using a portable garden sprayer.
	4B) Exposure from Handling Contaminated Clothing	4B) Exposure from Handling Contaminated Clothing Wash clothing potentially contaminated with urushiol oil prior to wearing again. Handle contaminated clothing with gloves as the oil can remain on environmental surfaces for up to 5 years.

Potential Hazard: Insect Stings and Bites
Date of Analysis: 6-7-2011
Minimum Recommended PPE*: Long sleeved shirt and pants, light colored clothing

*See HASP for all required PPE

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



JOB HAZARD ANALYSIS - HASP FORMAT

Potential Hazard: Handling Compressed Gas Cylinders

Date of Analysis: 6-7-2011

Minimum Recommended PPE*: Steel toed boots

*See HASP for all required PPE

Key Work Steps	Hazards/Potential Hazards	Safe Practices
1. Moving full gas cylinder to work area or to vehicle.	1A) Projectile hazard (if cylinder falls and neck shears off)	1A) Projectile Hazard - Use cylinder cart to transport gas cylinders. - Cylinders are to be secured to the cart - Move gas cylinders only with the protective cap in place. - Move gas cylinders in an upright position - Do not allow cylinders to drop or strike against each other or against hard objects.
	1B) Foot injury	1B) Foot injury Wear steel toed boots
2. Transporting a gas cylinder in a vehicle.	2A) Asphyxiation and/or chemical exposure	2A) Asphyxiation and/or chemical exposure - All gases can create an asphyxiation hazard. Some may also be toxic and/or flammable - Ensure cylinder is NOT leaking (use soapy water to check), valve is tightly closed, regulator removed and cap is secured to cylinder. - Gas cylinders should NOT be transported in the passenger compartment of a vehicle. Cylinders should be transported in a pickup bed, or trailer. - Do not transport with incompatibles
	2B) Fire hazard	2B) Fire hazard - Do not leave cylinders in vehicles – especially in extreme temperatures. - Secure in vehicles – away from flammable/combustible materials and ignition sources. - Ensure cylinder is NOT leaking (use soapy water to check), valve is tightly closed, regulator removed and cap is secured to cylinder.
	2C) Projectile hazard	2C) Projectile hazard - Secure cylinders tightly to vehicle. - Do not allow cylinders to roll around loosely in vehicle
3. Securing a gas cylinder in the field	3A) Back or muscle strain.	3A) Back or muscle strain. - Use mechanical aid (e.g., cart) to move large cylinder, if possible. - If lifting and manual handling is unavoidable, use proper lifting techniques. Protect your back from strain and twisting. - Use two people to handle large cylinders
	3B) Projectile hazard	3B) Projectile hazard - Ensure tanks are secured tightly to wall of trailer, to a cart, or to a tree, post or other sturdy object, in an upright position. - Do not lay cylinder on it's side.
	3C) Fire hazard	3C) Fire hazard - Store flammable gases away from combustible materials (wood, paper, dried grasses, etc.) - Store away from ignition sources



JOB HAZARD ANALYSIS - HASP FORMAT

Potential Hazard: Handling Compressed Gas Cylinders

Date of Analysis: 6-7-2011

	3D) Chemical exposure	3D) Chemical exposure ▪ Ensure label on cylinder is legible ▪ Ensure valves are tightly closed when not in use ▪ Store away from incompatibles ▪ Review MSDS ▪ Wear PPE as identified in HASP.
4. Using gas cylinders	4A) Projectile hazard.	4A) Projectile hazard ▪ Ensure cylinder is secured tightly before removing protective cap.
	4B) Cylinder may fall when changing cylinders.	4B) Cylinder may fall when changing cylinders. ▪ Ensure BOTH cylinders are secured tightly to the wall or the transport cart.
	4C) Leaking Cylinders	4C) Leaking Cylinders ▪ Move all leaking cylinders outdoors, into a well ventilated area
	4D) High pressure gas release	4D) High pressure gas release ▪ Use proper procedures to open and close a cylinder with a regulator attached: ▪ Open cylinder valves slowly and do not open valves all the way. ▪ Open so nozzle is facing away from person ▪ Open valves only by hand unless the cylinder is specifically designed to be opened with a hand tool (keep hand tool with cylinder)
5. Returning "empty" gas cylinder to vendor	5A) High pressure gas	5A) High pressure gas ▪ Replace protective cap on the empty gas cylinder before transporting to vendor.

JOB HAZARD ANALYSIS FORM

JHA No.: JHA - 3410 - 11 - 0832 -

Job Title: Decontamination Date of Analysis: 6-7-2011

Job Location: Niagara Falls, NY Team Leader: Rob Crowley

Applicable ES&H Procedures:

- 2.9.A - Hazardous Waste Operations and Emergency Response Program
- 2.9.C - Respiratory Protection Program
- 2.9.D - Personal Protective Equipment Program
- 2.9.E - Hazard Communication Program
- 2.5.1 - Heavy Equipment
- 2.9.16 - Thermal Stress
- 2.9.21 - Power and Hand Tools

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

Key Work Steps	Hazards/Potential Hazards	Safe Practices
		- If not in the vehicle, obtain eye contact with the driver, so he is aware of your presence and location in the CRZ. - If you are driving the vehicle, be aware of personnel in the CRZ and maintain communication with the identified personnel.
	3B) Exposure to contaminants	3B) Exposure to contaminants - Use safety glasses or goggles, Polycoated Tyvek (if level of contamination poses dermal hazard or to keep work clothes dry), high visibility vest (if high visibility Tyveks are not used) hard hats, steel toe boots, and gloves while cleaning contaminated materials. - Do not doff PPE until decontamination of the vehicle is complete and a decontamination certificate has been issued by the HSO. - Conduct air monitoring (see HASP). - See MSDSs for hazards associated with the decon solutions (if other than water alone is used).
	3C) Slips/Trips/Falls	3C) Slips/Trips/Falls - Be cautious as ground/plastic can become slippery - Use boots or boot covers with good traction
4. Equipment and Sample Decontamination	4A) Chemical exposure when handling contaminated sample jars and equipment	4A) Chemical exposure - Wear PPE. - Refer to MSDS for specific hazards associated with decon solutions - Monitor breathing zone for contaminants - Monitor breathing zone for decon solutions (e.g., methanol, hexane, etc.) if appropriate (see HASP)
	4B) Materials Handling related injuries	4B) Materials Handling related injuries - Use proper lifting techniques when lifting heavy equipment - Use two person lift for heavy coolers
5. Personal Decontamination	5A) Exposure to contaminants	5A) Exposure to contaminants - Avoid bringing contaminated materials via shoes and clothing into the CRZ by examining such prior to exiting the EZ. - Removal of PPE will be performed by the following tasks in the listed order: - Gross boot wash and rinse and removal - Outer glove removal - Suit removal - Respirator removal (if worn). - Inner glove removal - Contaminated PPE is to be placed in the appropriate, provided receptacles. - Respirators will be removed and decontaminated at a specified location within the CRZ by a designated technician, then placed in storage bag. - Employees will wash hands, face, and any other exposed areas with soap and water. - Portable eyewash stations and showers will be available should employees come into direct contact with contaminated materials. - See MSDSs for hazards associated with the decontamination solutions used. - Decon solutions will be disposed of according to the work plan.

Identify Hazards and PPE

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

Standard Hazards							
☐ Falling Objects	☒ Slips and trips	☐ Pinch points	☐ Rotating equipment				
☐ Falls	☐ Power equipment/tools	☐ Elevated work surfaces	☐ _____				
Eye Hazards							
☐ Particulates	☒ Liquid splashes	☐ Welding Arc	☐ _____				
Hearing Hazards							
☐ None	☐ Impact noise	☐ High frequency noise	☐ High ambient noise				
Respiratory Hazards							
☐ None	☒ Dust/particulates	☐ Organic Vapors	☐ Acid Gases	☐ Radon	☐ Asbestos	☒ Be, Hg, Cr, Pb	
☐ Oxygen deficient	☐ Welding fumes	☐ Aerosols/Particulates	☐ _____				
Chemical Hazards							
☐ None	☒ Organic solvents	☐ Reactive metals	☐ PCBs				
☐ Acids / bases	☐ Oxidizers	☐ Volatiles / Semi-volatiles	☐ _____				
Environmental Hazards							
☐ None	☐ Cold Stress	☐ Heat Stress	☒ Wet location	☐ Explosive vapors	☐ Confined space	☐ Engulfment Hazard	
☐ Bio hazards (poisonous plants, insects, animals, fungus, etc.)				☐ _____			
Electrical Hazards							
☒ None	☐ Overhead utilities	☐ Underground utilities	☐ Hidden utilities	☐ Energized equip/circuits	☐ Wet location		
Fire Hazards							
☒ None	☐ Cutting, welding, or grinding generated sparks or heat sources			☐ Flammable materials present	☐ Oxygen enriched location		
Ergonomic Hazards							
☐ None	☒ Lifting	☒ Bending	☐ Twisting	☒ Pulling/tugging	☐ Repetitive motion		
Computer Use in the:		☐ Office		☐ Field		☐ _____	
Radiological Hazards							
☒ None	☐ Loose contamination	☐ Fixed Contamination	☐ Airborne contamination	☐ Radiation	☐ Radon		
☐ Alpha	☐ Beta	☐ Gamma/X-rays	☐ Neutron	☐ EMF	☐ Criticality	☐ Tritium	☐ TRU
☐ Depleted Uranium		☐ Enriched Uranium		☐ _____		☐ _____	
Other Hazards							
☐							

Completed by: Sean Condie

Date: 6-7-2011

PPE and Monitoring Requirements

Standard PPE					
☒ Hard Hat	☒ Safety shoes	☒ Safety glasses	☐ Boot Covers	☐ Rubber Boots	☒ High Visibility Vest
Eye and Face Protection					
☐ Welding glasses	☐ Welding helmet	☐ Face shield	☐ Chemical goggles	☐ Welding screens	
Hearing Protection					
☐ Ear plugs	☐ Ear Muffs	☐ Ear plugs and muffs	☐ Other _____		
Respiratory Protection					
☐ None	☒ Upgrade Only	☒ Full Face APR	☐ Half Face APR	Cart. Type: <u>MSA GMC or Equivalent</u>	☐ PAPR
☐ Airline respirator	☐ SCBA	☐ Dust mask	☐ _____		
Protective Clothing					
☐ Tyvek® coveralls	☒ Poly-coated Tyvek® Coveralls	☐ Saranex® Coveralls	☐ Fully encapsulating suit		
☐ Cotton coveralls	☐ Modesty Clothing	☐ Fire resistant clothing	☐ Other _____		
Hand Protection					
☐ None	☐ Cotton gloves	☐ Leather gloves	☐ Cut-resistant gloves	☐ Glove liners	
Outer Gloves					
☒ Nitrile	☐ Viton®	☐ Butyl	☐ Neoprene	☐ Other _____	
Inner Gloves					
☐ Nitrile	☒ Vinyl	☐ Latex	☐ Other _____		
Monitoring Requirements					
☐ Oxygen	☐ Flammable gases/vapors	☒ Toxic Gas/vapors	☐ Hydrogen Sulfide	Carbon Monoxide	
☐ Asbestos	☐ Full time IH coverage	☐ Part time IH coverage	☒ Be, Hg, Cr, Pb		
☒ Metals Specify: <u>Lead Dust (utilize dust monitoring device)</u>					
☐ Organic Vapors Specify: _____					
☒ None	☐ TLD required	☐ CAM	☐ Radon		
☐ Full time RCT coverage	☐ Part time RCT coverage	☐ Radioactive air particulates	☐ Other _____		
☐ Other _____		☐ Other _____			

PPE and monitoring requirements completed by: Sean Condie

Date: 6-7-2011

APPENDIX C
DECONTAMINATION PROCEDURES & EQUIPMENT
PER TASK(S)

APPENDIX C1**DECONTAMINATION PROCEDURES & EQUIPMENT****Task(s): All Tasks****Decontamination Solution: Detergent and Water**

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

APPENDIX C2

DECONTAMINATION PROCEDURES & EQUIPMENT

Task(s): Any Tasks Requiring Upgrade to Modified Level D or C

Decontamination Solution: Detergent and Water

MODIFIED LEVEL D & LEVEL C		
Station 1:	Equipment Drop	Deposit equipment used on-site (tools, sampling devices and containers, monitoring instruments, radios, etc. on plastic drop cloths. Segregation at the drop reduces the probability of cross contamination. During hot weather operations, a cool-down station may be set up within this area.
Station 2:	Outer Garment, Boots, and Gloves Wash and Rinse	Scrub outer boots, outer gloves, and splash suit with decon solution or detergent water. Rinse off using copious amounts of water.
Station 3:	Outer Boot and Glove Removal	Remove outer boots and gloves. Deposit in container with plastic liner.
Station 4: (Level C only)	Canister or Mask Change	If worker leaves exclusion zone to change canister (or mask), this is the last step in the decontamination procedure. Worker's canister is exchanged, new outer gloves and boot covers are donned, joints are taped, and worker returns to duty.
Station 5:	Boot, Gloves and Outer Garment Removal	Boots, chemical resistant splash suit, and inner gloves are removed and deposited in separate containers lined with plastic.
Station 6: (Level C only)	Face Piece Removal	Facepiece is removed. Avoid touching face with fingers. Facepiece is deposited on plastic sheet.
Station 7:	Field Wash	Hands and face are thoroughly washed. Shower as soon as possible.

APPENDIX C3

DECONTAMINATION PROCEDURES AND EQUIPMENT

Task(s): Any Tasks Requiring Upgrade to Level B
Decontamination Solution: Detergent and Water

LEVEL B		
Station 1:	Equipment Drop	Deposit equipment used on site (tools, sampling devices and containers, monitoring instruments, radios, etc.) on plastic drop cloths. Segregation at the drop reduces the probability of cross contamination. During hot weather operations, a cool-down station may be set up within this area.
Station 2:	Outer Garment, Boots, and Gloves Wash and Rinse	Scrub outer boots, outer gloves, and splash suit with decon solution or detergent water. Rinse off using copious amounts of water.
Station 3:	Outer Boot and Glove Removal	Remove outer boots and gloves. Deposit in container with plastic liner.
Station 4:	Tank Change	If worker leaves exclusion zone to change air tank, this is the last step in the decontamination procedure. Worker's air tank is exchanged, new outer gloves and boot covers are donned, joints are taped, and worker returns to duty.
Station 5:	SCBA Backpack, Boot, Gloves and Outer Garment Removal	SCBA backpack is removed and placed on plastic sheets. Boots, chemical resistant splash suit, and inner gloves are removed and deposited in separate containers lined with plastic.
Station 6:	Face Piece Removal	SCBA facepiece is removed. Avoid touching face with fingers. Facepiece is deposited on plastic sheet.
Station 7:	Field Wash	Hands and face are thoroughly washed. Shower as soon as possible.

APPENDIX D
INCIDENT ANALYSIS FORMS

CORPORATE HSE PROCEDURE



Issued: 4/5/11 Effective: 4/11/11 ESH-2.0.1 REVISION 3
Owner: H.J. Gordon Approver: A. E. Massey PAGE 1 OF 2

Check one

Initial Report: ☐
Update: ☐
Final Report: ☐

ATTACHMENT 1

Check one

Category C: ☐
Category B: ☐
Category A: ☐

INCIDENT ANALYSIS REPORT

Attorney-Client Work Product Prepared in Anticipation of Litigation

(Review instructions on page 13 and 16 prior to completing this form)

Local Office ID Number:

To: Office of the General Counsel

This information has been prepared at your request and under your direction in anticipation of litigation so that you may provide appropriate legal advice to the undersigned and the management of the Company.

Section 1 – General Information

Incident Date: _____
Report Date: _____
Employee Name: _____ Sex: ☐ M | ☐ F Time of incident: ☐ AM | ☐ PM
Job Title: _____ Hire Date: _____ Time employee began work: ☐ AM | ☐ PM
Business Line: _____ Department: _____ Project Manager: _____ Client: _____
Office where employee works from: _____ Immediate Supervisor: _____ Hours employee worked during last 7 days: _____ hrs
Location where incident occurred: _____ Is this a Company controlled work site: ☐ Yes ☐ No

Section 2 – Incident Type (mark all that apply)

A. Type of incident being reported:

- ☐ Near Miss ☐ First-aid case ☐ Medical treatment ☐ Hospitalization ☐ Fatality
☐ Day Away Case ☐ Restricted/Transfer Case ☐ Vehicle Incident
☐ Environmental Release ☐ Regulatory Inspection ☐ Notice of Violation
☐ Other (please describe): _____

B. If an **injury or illness**: describe the part of the body that was affected and how it was affected:

C. If an **environmental release**: describe the quantity and name and CAS# of material released into the environment:

D. If an **inspection by a regulatory agency**, what agency, who were the inspectors, inspector contact information:

Section 3 – Incident Description

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

- A. List the names of all persons involved in the incident, and employer information:
B. List the names of any witnesses, their employer, and a local/company telephone number or address:
C. What was the employee(s) doing just prior to the incident:
D. Explain in **detail** what happened:
E. Explain in **detail** what object or substance directly harmed the employee:
F. List any damaged equipment or property (other than motor vehicles) model and serial number **and** estimated costs to repair/replace damaged equipment or property, if applicable:

CORPORATE HSE PROCEDURE

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Section 4 - Incident Analysis

- A. Was a Job Hazard Analysis (JHA) completed for the work being performed? YES ☐ | NO ☐ Who prepared the JHA?:
- B. When and who was the last safety officer (i.e. LHSR, supervisor, Division ES&H Manager, etc.) at the site of the incident:
- C. When and what safety training directly related to the incident has the person(s) involved had?

Section 5 - Incident Investigation Results

#	Causal Factors (Attach and number any additional pages as needed to completely address this section)				
1					
2					
3					
4					
5					
Root Cause(s) Analysis (The below items represents major root cause categories which have been determined to be Less Than Adequate (LTA). A more detailed determination of the root cause will be facilitated, if needed, by the applicable Regional ES&H Manager)					
1. Equipment Reliability Program Implementation 2. Administrative / Management Systems 3. Procedures 4. Human Factors Engineering			5. Training 6. Immediate Supervision 7. Communications 8. Personal Performance		
Root Cause #	Corrective Actions to be taken (Attach additional pages as needed to completely address this section)	Responsible Person	Proposed Completion Date	Closed on Date	Verified by and Date Verified

Section 6 – Notifications, Certification & Approvals

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

Auto Lessor: ☐ | **Insurer:** ☐ | **Workers' Compensation Administrator:** ☐
Post-incident Substance Abuse Testing Has Been Performed: ☐

Incident investigated by:	
Employee (s): Date:	Employee's Supervisor: Date:
LHSR/Project/Office Manager: Date:	Regional ES&H Manager: Date:

Please insert additional information or pictures in this field.

CORPORATE HSE PROCEDURE



Issued: 4/5/11 Effective: 4/11/11 ESH-2.0.1 REVISION 3
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ATTACHMENT 2

VEHICLE INCIDENT REPORT

Attorney-Client Work Product Prepared in Anticipation of Litigation

(Review instructions on page 15 prior to completing this form)

Section 1 - General Information

Date of Incident: _____ Time incident occurred: _____ ☐ AM | ☐ PM
Illumination: ☐ Dark | ☐ Dusk | ☐ Light Road Condition: ☐ Dry | ☐ Wet | ☐ Icy/snow
Were police summoned to scene?: ☐ Yes | ☐ No Police Department and Location: _____
Report #: _____ Officer's Name and Badge Number: _____

Section 2 - Company Driver and Vehicle

Driver's name: _____ D/L #: _____ State: ____
Driver's home office address: _____ Driver's Phone #: _____
Company Vehicle #: _____ Year: _____ Model: _____ License #: _____ State: ____
Company car?: ☐ Yes | ☐ No Owned by employee?: ☐ Yes | ☐ No
Leased/rented from _____
Passenger/Witness Name(s): _____ Address: _____ Telephone: _____
Passenger/Witness Name(s): _____ Address: _____ Telephone: _____

Damage to vehicle: _____

Injuries to employee(s): _____

Injuries to others: _____

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

Towed: ☐ Yes | ☐ No By Whom: _____ To Where: _____

Section 3 - Other Driver and Vehicle Information

Driver's name: _____ D/L #: _____ State: ____
Current Address: _____ City: _____ State: ____
Telephone: _____ Work: _____ Cell: _____
Registered Owner's Name: _____ Address: _____ City: _____ State: ____
(verify registration document)
The Other Vehicle: Make: _____ Model: _____ Year: _____ License #: _____ State: ____

CORPORATE HSE PROCEDURE

Issued: 4/5/11 Effective: 4/11/11 ESH-2.0.1 REVISION 3
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Insurance company name: _____ Address: _____ Phone #: _____
Policy No.: _____ Contact Person: _____ Phone #: _____
Passenger/Witness Name(s): _____ Address: _____ Telephone: _____
Passenger/Witness Name(s): _____ Address: _____ Telephone: _____

Damage: (Make note of pre-existing damage and take pictures if possible. Attach additional pages as needed): _____

Injuries to other driver/passengers: _____

Section 4 – Approvals (signatures required)

Form completed by: _____ Signature: _____ Date: _____
Please Print

Office/Project Manager: _____ Signature: _____ Date: _____
Please Print

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

1. Most important: **STOP**.
2. **Call 911 if there are injuries.**
3. Call for an officer if the incident occurred on public property (streets, highways or roads). Disputes often arise between the parties involved as to who was at fault; therefore, a police report is important. If an officer is unable to attend the scene of the accident, a counter police report may be filed at most stations. Insurance companies rely on police reports to determine liability.
4. Complete the Incident Investigation Report and the Vehicle Incident Report forms. It is important that both these forms are completed in detail. Include a diagram of the incident on the provided sheet. Incomplete information may lead to delays in processing associated claims and in helping to prevent this type of incident from occurring again.
5. Express no opinion as to who was at fault. This is for the insurance companies to determine.
6. Give only information that is required by the authorities or as directed by AMEC contractual requirements.
7. Sign only those statements required by the authorities or as directed by AMEC contractual requirements. Do not sign away your rights or the company's rights.
8. If you are injured or think you were injured, tell your supervisor and see a physician. Your supervisor will notify AMEC's Worker's Compensation insurance carrier, your Regional HSE Manager and the Corporate Director of HSE by phone, email or fax. For additional instructions on what to do, go to AMEC's HSE website on the intranet at:
<http://am.amecnet.com/fn/SHE/167.aspx>
9. Your supervisor will forward both completed incident reports immediately to your Regional HSE Manager

Please insert additional information or pictures in this field.

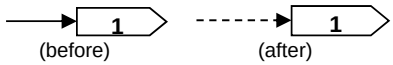
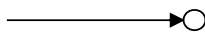
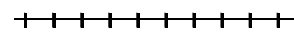
CORPORATE ES&H PROCEDURE

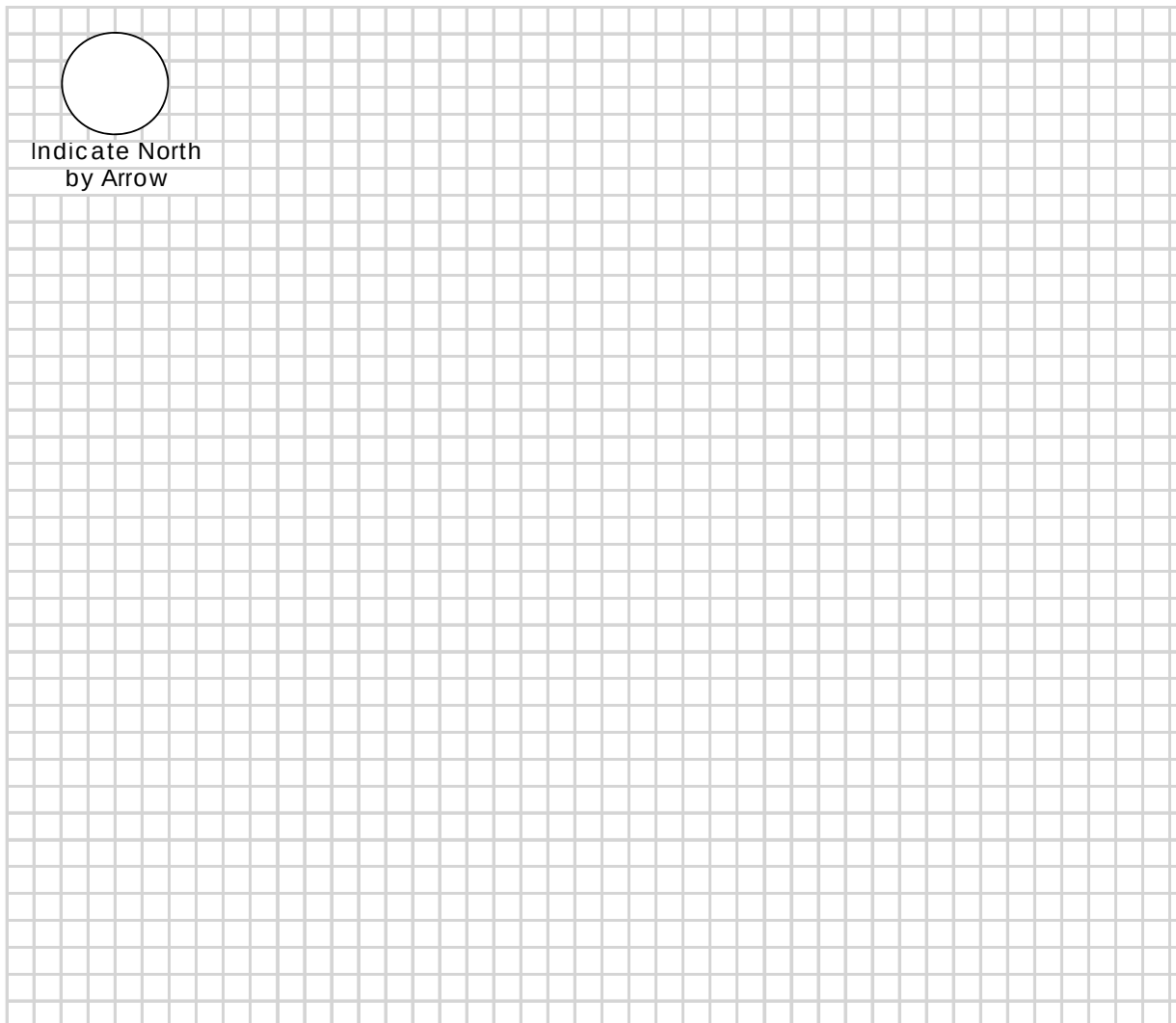
Issued: 4/5/11 Effective: 4/11/11 ESH-2.0.1 REVISION 3
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Vehicle Incident Diagram

(This or a similar diagram must be completed with all VIRs)

Instructions:

1. Number each vehicle and show directions 
2. Use a solid line to show path before incident and use a dotted line to show path after incident

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



Prepared by: _____ Date: _____

APPENDIX E
MATERIAL SAFETY DATA SHEETS

LIQUINOX MSDS

Section 1 : MANUFACTURER INFORMATION

Supplier: Same as manufacturer.

Manufacturer: Alconox, Inc.
30 Glenn St.
Suite 309
White Plains, NY 10603.

Manufacturer emergency 800-255-3924.

phone number: 813-248-0585 (outside of the United States).

Manufacturer: Alconox, Inc.
30 Glenn St.
Suite 309
White Plains, NY 10603.

Supplier MSDS date: 2005/02/24

D.O.T. Classification: Not regulated.

Section 2 : HAZARDOUS INGREDIENTS

C.A.S.	CONCENTRATION %	Ingredient Name	T.L.V.	LD/50	LC/50
25155-30-0	10-30	SODIUM DODECYLBENZENESULFONATE	NOT AVAILABLE	438 MG/KG RAT ORAL 1330 MG/KG MOUSE ORAL	NOT AVAILABLE

Section 3 : PHYSICAL / CHEMICAL CHARACTERISTICS

Physical state: Liquid.

Appearance & odor: Odourless.
Pale yellow.

Odor threshold (ppm): Not available.

Vapour pressure @ 20°C (68°F):
(mmHg): 17

Vapour density (air=1): >1

Volatiles (%)

By volume: Not available.

Evaporation rate (butyl acetate = 1): < 1.

Boiling point (°C): 100 (212F)
Freezing point (°C): Not available.
pH: 8.5
Specific gravity @ 20 °C: (water = 1).
1.083
Solubility in water (%): Complete.
Coefficient of water\oil dist.: Not available.
VOC: None

Section 4 : FIRE AND EXPLOSION HAZARD DATA

Flammability: Not flammable.
Conditions of flammability: Surrounding fire.
Extinguishing media: Carbon dioxide, dry chemical, foam.
Water
Water fog.
Special procedures: Self-contained breathing apparatus required.
Firefighters should wear the usual protective gear.
Use water spray to cool fire exposed containers.
Auto-ignition temperature: Not available.
Flash point (°C), method: None
Lower flammability limit (% vol): Not applicable.
Upper flammability limit (% vol): Not applicable.
Not available.
Sensitivity to mechanical impact: Not available.
Hazardous combustion products: Oxides of carbon (COx).
Hydrocarbons.
Rate of burning: Not available.
Explosive power: Containers may rupture if exposed to heat or fire.

Section 5 : REACTIVITY DATA

Chemical stability: Product is stable under normal handling and storage conditions.
Conditions of instability: Extreme temperatures.
Hazardous polymerization: Will not occur.
Incompatible substances: Strong acids.
Strong oxidizing agents.
Hazardous decomposition products: See hazardous combustion products.

Section 6 : HEALTH HAZARD DATA

Route of entry: Skin contact, eye contact, inhalation and ingestion.

Effects of Acute

Exposure

Eye contact: May cause irritation.

Skin contact: Prolonged and repeated contact may cause irritation.

Inhalation: May cause headache and nausea.

Ingestion: May cause vomiting and diarrhea.
May cause gastric distress.

Effects of chronic exposure: See effects of acute exposure.

LD50 of product, species & route: > 5000 mg/kg rat oral.

LC50 of product, species & route: Not available.

Exposure limit of material: Not available.

Sensitization to product: Not available.

Carcinogenic effects: Not listed as a carcinogen.

Reproductive effects: Not available.

Teratogenicity: Not available.

Mutagenicity: Not available.

Synergistic materials: Not available.

Medical conditions aggravated by exposure: Not available.

First Aid

Skin contact: Remove contaminated clothing.
Wash thoroughly with soap and water.
Seek medical attention if irritation persists.

Eye contact: Check for and remove contact lenses.
Flush eyes with clear, running water for 15 minutes while holding eyelids open: if irritation persists, consult a physician.

Inhalation: Remove victim to fresh air.
If irritation persists, seek medical attention.

Ingestion: Do not induce vomiting, seek medical attention.
Dilute with two glasses of water.
Never give anything by mouth to an unconscious person.

Section 7 : PRECAUTIONS FOR SAFE HANDLING AND USE

Leak / Spill: Contain the spill.
Prevent entry into drains, sewers, and other waterways.
Wear appropriate protective equipment.
Small amounts may be flushed to sewer with water.
Soak up with an absorbent material.
Place in appropriate container for disposal.
Notify the appropriate authorities as required.

Waste disposal: In accordance with local and federal regulations.

Handling procedures and equipment: Protect against physical damage.
Avoid breathing vapors/mists.
Wear personal protective equipment appropriate to task.

Wash thoroughly after handling.
Keep out of reach of children.
Avoid contact with skin, eyes and clothing.
Avoid extreme temperatures.
Launder contaminated clothing prior to reuse.

Storage requirements: Store away from incompatible materials.
Keep containers closed when not in use.

Section 8 : CONTROL MEASURES

Precautionary Measures

Gloves / Type:



Wear appropriate gloves.

Respiratory / Type: None required under normal use.

Eye / Type:



Safety glasses recommended.

Footwear / Type: Safety shoes per local regulations.

Clothing / Type: As required to prevent skin contact.

Other / Type: Eye wash facility should be in close proximity.
Emergency shower should be in close proximity.

Ventilation requirements: Local exhaust at points of emission.

ALCONOX MSDS

Section 1 : MANUFACTURER INFORMATION

Product name: Alconox

Supplier: Same as manufacturer.

Manufacturer: Alconox, Inc.
30 Glenn St.
Suite 309
White Plains, NY 10603.

Manufacturer emergency 800-255-3924.

phone number: 813-248-0585 (outside of the United States).

Manufacturer: Alconox, Inc.
30 Glenn St.
Suite 309
White Plains, NY 10603.

Supplier MSDS date: 2009/04/20

D.O.T. Classification: Not regulated.

Section 2 : HAZARDOUS INGREDIENTS

C.A.S.	CONCENTRATION %	Ingredient Name	T.L.V.	LD/50	LC/50
25155-30-0	10-30	SODIUM DODECYLBENZENESULFONATE	NOT AVAILABLE	438 MG/KG RAT ORAL 1330 MG/KG MOUSE ORAL	NOT AVAILABLE
497-19-8	7-13	SODIUM CARBONATE	NOT AVAILABLE	4090 MG/KG RAT ORAL 6600 MG/KG MOUSE ORAL	2300 MG/M3/2H RAT INHALATION 1200 MG/M3/2H MOUSE INHALATION
7722-88-5	10-30	TETRASODIUM PYROPHOSPHATE	5 MG/M3	4000 MG/KG RAT ORAL 2980 MG/KG MOUSE ORAL	NOT AVAILABLE
7758-29-4	10-30	SODIUM PHOSPHATE	NOT AVAILABLE	3120 MG/KG RAT ORAL 3100 MG/KG MOUSE ORAL >4640 MG/KG RABBIT DERMAL	NOT AVAILABLE

Section 2A : ADDITIONAL INGREDIENT INFORMATION

Note: (supplier).

CAS# 497-19-8: LD50 4020 mg/kg - rat oral.

CAS# 7758-29-4: LD50 3100 mg/kg - rat oral.

Section 3 : PHYSICAL / CHEMICAL CHARACTERISTICS

Physical state: Solid

Appearance & odor: Almost odourless.
White granular powder.

Odor threshold (ppm): Not available.

Vapour pressure (mmHg): Not applicable.

Vapour density (air=1): Not applicable.

By weight: Not available.

Evaporation rate (butyl acetate = 1): Not applicable.

Boiling point (°C): Not applicable.

Freezing point (°C): Not applicable.

pH: (1% aqueous solution).
9.5

Specific gravity @ 20 °C: (water = 1).
0.85 - 1.10

Solubility in water (%): 100 - > 10% w/w

Coefficient of water/oil dist.: Not available.

VOC: None

Section 4 : FIRE AND EXPLOSION HAZARD DATA

Flammability: Not flammable.

Conditions of flammability: Surrounding fire.

Extinguishing media: Carbon dioxide, dry chemical, foam.
Water
Water fog.

Special procedures: Self-contained breathing apparatus required.
Firefighters should wear the usual protective gear.

Auto-ignition temperature: Not available.

Flash point (°C), method: None

Lower flammability limit (% vol): Not applicable.

Upper flammability limit (% vol): Not applicable.

Not available.

Sensitivity to mechanical impact: Not applicable.

Hazardous combustion products: Oxides of carbon (COx).
Hydrocarbons.

Rate of burning: Not available.

Explosive power: None

Section 5 : REACTIVITY DATA

Chemical stability: Stable under normal conditions.

Conditions of instability: None known.

Hazardous polymerization: Will not occur.

Incompatible substances: Strong acids.
Strong oxidizers.

Hazardous decomposition products: See hazardous combustion products.

Section 6 : HEALTH HAZARD DATA

Route of entry: Skin contact, eye contact, inhalation and ingestion.

Effects of Acute Exposure

Eye contact: May cause irritation.

Skin contact: Prolonged contact may cause irritation.

Inhalation: Airborne particles may cause irritation.

Ingestion: May cause vomiting and diarrhea.
May cause abdominal pain.
May cause gastric distress.

Effects of chronic exposure: Contains an ingredient which may be corrosive.

LD50 of product, species & route: > 5000 mg/kg rat oral.

LC50 of product, species & route: Not available for mixture, see the ingredients section.

Exposure limit of material: Not available for mixture, see the ingredients section.

Sensitization to product: Not available.

Carcinogenic effects: Not listed as a carcinogen.

Reproductive effects: Not available.

Teratogenicity: Not available.

Mutagenicity: Not available.

Synergistic materials: Not available.

Medical conditions aggravated by exposure: Not available.

First Aid

Skin contact: Remove contaminated clothing.
Wash thoroughly with soap and water.
Seek medical attention if irritation persists.

Eye contact: Check for and remove contact lenses.
Flush eyes with clear, running water for 15 minutes while holding eyelids open: if irritation persists, consult a physician.

Inhalation: Remove victim to fresh air.
Seek medical attention if symptoms persist.

Ingestion: Dilute with two glasses of water.
Never give anything by mouth to an unconscious person.
Do not induce vomiting, seek immediate medical attention.

Section 7 : PRECAUTIONS FOR SAFE HANDLING AND USE

Leak / Spill: Contain the spill.
Recover uncontaminated material for re-use.
Wear appropriate protective equipment.
Contaminated material should be swept or shoveled into appropriate waste container for disposal.

Waste disposal: In accordance with municipal, provincial and federal regulations.

Handling procedures and equipment: Protect against physical damage.
Avoid breathing dust.
Wash thoroughly after handling.
Keep out of reach of children.
Avoid contact with skin, eyes and clothing.
Launder contaminated clothing prior to reuse.

Storage requirements: Keep containers closed when not in use.
Store away from strong acids or oxidizers.
Store in a cool, dry and well ventilated area.

Section 8 : CONTROL MEASURES

Precautionary Measures

Gloves / Type:



Neoprene or rubber gloves.

Respiratory / Type:



If exposure limit is exceeded, wear a NIOSH approved respirator.

Eye / Type:



Safety glasses with side-shields.

Footwear / Type: Safety shoes per local regulations.

Clothing / Type: As required to prevent skin contact.

Other / Type: Eye wash capability should be in close proximity.

Ventilation requirements: Local exhaust at points of emission.

APPENDIX F
SITE SAFETY ORIENTATION FORM

SITE SAFETY ORIENTATION

Project: _____ Niagara Falls Site: _____ Tract I
Project Number: _____ 3410110832 Date: _____

All applicable items listed below are to be reviewed on the first day of site activities and when new workers arrive on site. Training provider, please initial each item covered in the training, or note "NA" as applicable.

General Supervisor:
Site Health and Safety Supervisor (SHSS):
Employees' direct supervisor:
Location of HASP and MSDS on site:
Review of Contents of HASP
HazCom labeling system if different from Local Operation:
Site-specific medical surveillance requirements:
Site control measures (location of exclusion zone, etc.):
Safety and health hazards on site:
The Level of Protection and specific PPE to be used:
Work practices to be used on site to minimize exposure:
Decontamination procedures:
How to effectively use site/task engineering controls:
Applicable elements of the site emergency response plan:
Any other site-specific health and safety related requirements:

Participating employees must print and sign their name in the spaces provided below:

_____	_____
_____	_____
_____	_____
_____	_____

APPENDIX G

DAILY TAILGATE SAFETY MEETING CHECKLIST

Amec ENGINEERING AND CONSULTING, INC.

DAILY TAILGATE SAFETY MEETING CHECKLIST

Project: <u>3410110832</u>	Site: <u>Tract I</u>
Date: _____	Location: <u>Niagara Falls, NY</u>

To be reviewed on the first day of site activities and when new workers arrive on site:

Alternate for Health & Safety:	
Location of on-site HASP:	
Site training requirements:	<u>See HASP</u>
Specific medical surveillance requirements:	<u>See HASP</u>

Agenda:

During the project, one or more of the agenda items could be selected for the required daily site training.

Check-off:
Date

1. Planned work for this day (discuss)	☐	☐	☐	☐	☐
2. Physical hazards and controls (discuss/review)	☐	☐	☐	☐	☐
3. Chemical hazards and controls (discuss/review)	☐	☐	☐	☐	☐
4. Biological hazards and controls (discuss/review)	☐	☐	☐	☐	☐
5. Personal protective equipment <u>Modified D</u>	☐	☐	☐	☐	☐
6. Personal protective equipment required per the hazard assessment:	☐	☐	☐	☐	☐
SPECIFY TYPE					
Protective coveralls					
Safety glasses/goggles	<u>ANSI approved</u>				
Hard hat	<u>ANSI approved</u>				
Foot protection	<u>Safety toe boots & overboots</u>				
Work gloves					
Chemical gloves	<u>Neoprene outer, nitrile inner</u>				
Hearing protection					
Other					
7. Review inspection, decontamination, and maintenance procedures and the limitations of the above stated PPE.	☐	☐	☐	☐	☐
8. Decontamination procedure (discuss/review)	☐	☐	☐	☐	☐
9. Exclusion zone maintained	☐	☐	☐	☐	☐
10. Site emergency response plan (discuss/review)	☐	☐	☐	☐	☐
11. Signs and symptoms of overexposure to chemicals anticipated on site	☐	☐	☐	☐	☐
12. General health and safety rules	☐	☐	☐	☐	☐
13. Specific health and safety requirements relating to site activities including: (discuss/review)	☐	☐	☐	☐	☐
14. Drilling/boring	☐	☐	☐	☐	☐
15. UST	☐	☐	☐	☐	☐
16. Excavations (including UG utility locations)	☐	☐	☐	☐	☐
17. Heavy equipment	☐	☐	☐	☐	☐
18. Slips, trips, and falls	☐	☐	☐	☐	☐
19. Lockout/tagout	☐	☐	☐	☐	☐
20. Working in temperature extremes	☐	☐	☐	☐	☐
21. Rain or other weather advisories	☐	☐	☐	☐	☐
22. Other health & safety issues (discuss/note)	☐	☐	☐	☐	☐

Amec ENGINEERING AND CONSULTING, INC.

DAILY TAILGATE SAFETY MEETING CHECKLIST

I have participated in the daily safety meeting discussing the topics indicated on the reverse and fully understand my responsibility for complying with all health and safety requirements. I have had the opportunity to have my questions on site health and safety issues and procedures answered.

Employee Name

Employee Signature

Date

_____	_____	_____
_____	_____	_____
_____	_____	_____
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_____	_____	_____
_____	_____	_____
_____	_____	_____

Name and Signature of person conducting training

Date

APPENDIX H

WEEKLY HEALTH AND SAFETY CHECKLIST

Site: _____ Date: _____

Project Number: _____ Project Manager: _____

Conducted by: _____

Names of Amec employee's onsite: _____

	Y	N	NA
HASP, Training and Documentation:			
1. Are emergency phone numbers posted?	☐	☐	☐
2. Are directions to the nearest emergency medical care posted?	☐	☐	☐
3. Is the OSHA Poster posted?	☐	☐	☐
4. Is there a SSHP at the site?	☐	☐	☐
a. Is it current and address all tasks?	☐	☐	☐
b. Does it address all know/suspected hazards?	☐	☐	☐
c. Are JHAs included for <u>all</u> tasks?	☐	☐	☐
d. Are employees following the procedures as outlined in the JHAs?	☐	☐	☐
e. Is it approved?	☐	☐	☐
f. Have all field members signed off that they have read it?	☐	☐	☐
5. Are there MSDSs for required materials/chemicals brought to the site?	☐	☐	☐
6. Are all containers properly labeled, as to content, hazard?	☐	☐	☐
7. Is there list of chemicals brought to the site? Do the names on the list match the name on the label and MSDS?	☐	☐	☐
8. Do applicable workers have their 40-hour initial training and are current in their refreshers?	☐	☐	☐
9. Do the Field Lead and Health and Safety Officer have Supervisory training?	☐	☐	☐
10. Are all applicable workers current in their physicals?	☐	☐	☐
11. Are Tailgate Safety Meetings taking place and documented?	☐	☐	☐
12. Are there means to minimize heat or cold stress on-site?	☐	☐	☐
13. Is eating, drinking, smoking, etc. only done in areas free from toxic materials?	☐	☐	☐
14. Are two people used to lift equipment or materials weighting more than 50 lbs.?	☐	☐	☐
15. Are the locations of electrical power lines and other utilities identified prior to digging or drilling?	☐	☐	☐
PPE and Monitoring Instruments:			
16. Does the PPE being worn match what is required in the HASP and JHAs?	☐	☐	☐
17. Is hearing protection worn when noise makes conversation difficult at a distance of 2 feet?	☐	☐	☐
18. Are approved respirators and cartridges worn when needed?	☐	☐	☐
a. Are cartridges changed daily, unless specified otherwise in the HASP?	☐	☐	☐
b. Are cartridges appropriate for the contaminants at the site?	☐	☐	☐
19. Are <u>all</u> air monitoring instruments identified in the HASP being used and calibrated daily, as required?	☐	☐	☐
a. Do employees know upgrade/downgrade action levels?	☐	☐	☐
First Aid:			
20. Are there eyewash bottles on-site? Solution not expired?	☐	☐	☐
21. Are first aid kits on-site and adequately stocked (including bloodborne pathogen equipment)?	☐	☐	☐
22. Is there always at least one person on site current in their first aid/CPR training?	☐	☐	☐
Fire Safety:			
23. Is there a charged fire extinguisher on-site?	☐	☐	☐
a. Have Amec workers, who would use extinguishers, received fire extinguisher training in past year?	☐	☐	☐
b. Are fire extinguishers visually inspected monthly and are the inspections documented?	☐	☐	☐
c. Have fire extinguishers been professionally inspected within the past year?	☐	☐	☐
24. Are flammable liquids (e.g., gasoline) being stored safety (e.g., in safety cans and 20 feet from combustibles)?	☐	☐	☐
25. Are flammable liquid dispensing systems bonded (metal to metal)?	☐	☐	☐
Compressed Gas:			
26. Are cylinders stored in a secure manner, with caps on, upright and protected from damage?	☐	☐	☐
27. Are cylinders protected from snow, rain, etc.?	☐	☐	☐
28. Are cylinder caps in place before cylinders are moved?	☐	☐	☐
29. Are fuel gas and oxygen cylinders stored a minimum of 20 feet apart?	☐	☐	☐
30. Are propane cylinders stored and used only outside of buildings?	☐	☐	☐
Vehicles:			
31. Are employees wearing their seat belts and not talking on cell phones while car is in motion?	☐	☐	☐
32. Do Company vehicles have the "How's my Driving" decals?	☐	☐	☐

	Y	N	NA
33. Are vehicles parked in a safe manner? Are traffic cones used, if required?	☐	☐	☐
34. Are company vehicle inspected weekly and the inspections documented?	☐	☐	☐
35. Are materials stored in vehicles in a neat, orderly and secure manner so that they won't become a distraction to the driver, become a projectile hazard in the event of a sudden stop or crash or fall from the vehicle when in transport?	☐	☐	☐
Electrical:			
36. Is at least a 10 foot clearance maintained between equipment and power lines?	☐	☐	☐
37. Are all electrically operated tools grounded?	☐	☐	☐
38. Are GFCI's used?	☐	☐	☐
39. Are exposed wiring and cords in good condition (not frayed or deteriorated)?	☐	☐	☐
40. Do extension cords have a grounding conductor?	☐	☐	☐
41. Are extension cords only used in one continuous length (not daisy chained)?	☐	☐	☐
42. Are extension cords kept out of wet areas?	☐	☐	☐
43. Has a lockout/tagout system been established, if required?	☐	☐	☐
Hand and Power Tools:			
44. Are tools and equipment used by employees in good condition or tagged out of service?	☐	☐	☐
45. Are guards and safety devices in place on power tools?	☐	☐	☐
Walking and Working Surfaces:			
46. Do stairways into trailers/buildings that have 4 steps or more, have hand rails?	☐	☐	☐
47. Is good housekeeping being maintained at the site?	☐	☐	☐
48. Are all ladders in good condition, stored against damage and properly secured when in use?	☐	☐	☐
49. Are approved manlifts provided for the lifting of personnel (e.g., cherry pickers, scissor lifts, etc.)?	☐	☐	☐
50. Are personnel in manlifts wearing approved fall protection devices when required?	☐	☐	☐
51. Is fall protection used when working at elevations greater than 6 feet?	☐	☐	☐
52. Are ladders inspected prior to use?	☐	☐	☐
53. Are all ladders in good condition and defective ladders tagged out of service?	☐	☐	☐
Scaffolding:			
54. Is scaffolding placed on a flat, firm surface?	☐	☐	☐
55. Are scaffold planks free of mud, ice, grease, etc.?	☐	☐	☐
56. On scaffolds where platforms are overlapped, is planking overlapped a minimum of 12 inches?	☐	☐	☐
57. Does scaffold planking extend over end supports between 6 to 18 inches (dependent upon platform length)?	☐	☐	☐
58. Are employees restricted from working on scaffolds during storms and high winds?	☐	☐	☐
59. Is required perimeter guarding (top rail, mid rail, and toe board) present?	☐	☐	☐
60. Has a competent person been designated to oversee scaffold construction and inspect daily?	☐	☐	☐
Excavations:			
61. Has entrance into excavations greater than 4 feet deep prohibited unless the following precautions are taken?	☐	☐	☐
a. The sides of excavations sloped or shored to prevent cave ins if over 5 feet deep?	☐	☐	☐
b. Excavations greater than 4 feet deep been monitored for hazardous atmospheres (i.e., LEL/O2)?	☐	☐	☐
c. Ladders or ramps used in excavations over 4 feet deep?	☐	☐	☐
d. Means of egress available so as to require no more than 25 feet of lateral travel?	☐	☐	☐
e. Excavation inspected daily by competent persons and documented?	☐	☐	☐
62. Is excavated material placed a minimum of 24 inches from the excavation?	☐	☐	☐
Heavy Equipment:			
63. Is heavy equipment shut down for fueling and maintenance?	☐	☐	☐
64. Are backup alarms installed and working on mobile equipment?	☐	☐	☐
65. Are riders prohibited on heavy equipment?	☐	☐	☐
66. Are guards and safety appliances in place and used?	☐	☐	☐
67. Are operators using the "three point" system when mounting/dismounting equipment?	☐	☐	☐
Confined Space Entry:			
68. Are there confined spaces at the site that Amec will be entering? If yes:	☐	☐	☐
a. Is the permit completely filled out and approved prior to entry?	☐	☐	☐
b. Are confined spaces thoroughly emptied of the hazardous substances prior to entry?	☐	☐	☐
c. Is ventilation provided prior to entry?	☐	☐	☐
d. Is air within the confined space tested for oxygen deficiency, LEL and toxic substances in that order?	☐	☐	☐
e. Is there an assigned safety standby outside the space who is adequately trained?	☐	☐	☐
f. Has a rescue plan been established?	☐	☐	☐
g. Is an entry supervisor present at each permit-required entry?	☐	☐	☐



MACTEC, Inc.

WEEKLY SITE SAFETY AND HEALTH CHECKLIST

h. Are required extraction/fall protection devices being used?

Y	N	NA
☐	☐	☐

Decontamination:

69. Are decontamination stations set up on site?

70. Is decontamination water properly contained and disposed of?

☐ ☐ ☐

71. Are all pieces of equipment inspected for proper decontamination before leaving the site?

Working on or Near Water:

72. Has a float plan been filed if working from a boat?

73. Are personal floatation devices available and being used?

74. Are Coast Guard requirements being followed when boating on navigable waters?

□ □ □

[illegible]

Findings	Corrected on
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	
11.	

APPENDIX I

PERSONAL MONITORING EQUIPMENT MANUALS

For Sales & Service Contact

geotech

2650 E. 40th Ave. • Denver, CO 80205
Phone 303-320-4764 • Fax 303-322-7242

1-800-833-7958

www.geotechenv.com

MODELS

PDR-1000AN & PDR-1200S

PERSONAL DATARAM PARTICULATE MONITORING

INSTRUCTION MANUAL
P/N (tba)

THERMO ELECTRON CORPORATION
ENVIRONMENTAL INSTRUMENTS
27 FORGE PARKWAY FRANKLIN MASSACHUSETTS 02038

(866) 282-0430 Toll Free
(508) 520-0430 International
(508) 520-1460 Fax

www.thermo.com/ih

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ORIGIN: APRIL 2000

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1.0 GENERAL DESCRIPTION

The MIE *personalDataRAM*[™] (for Personal Data-logging Real-time Aerosol Monitor) is a technologically advanced instrument designed to measure the concentration of airborne particulate matter (liquid or solid), providing direct and continuous readout as well as electronic recording of the information.

The *personalDataRAM* is available in two versions: model *pDR-1000AN* and model *pDR-1200*. The model *pDR-1000AN* operates as a passive air sampler whereas the model *pDR-1200* uses active air sampling. The user can convert from one to the other of these two versions by means of optional conversion kits offered by MIE, Inc. (see Sections 4.2 and 15.0 of this manual).

The model *pDR-1000AN* samples passively (i.e., without a pump) the air surrounding the monitor; air accesses freely the sensing chamber of the instrument by means of convection, diffusion, and adventitious air motion. The model *pDR-1200*, on the other hand, requires a separate air driver (not included) such as a personal-type pump for its operation.

In addition, the model *pDR-1200* includes a particle size-selective inlet cyclone which permits size segregated measurements (i.e., PM₁₀, PM_{2.5}, respirable, etc.) as well as enables the user to perform aerodynamic particle sizing by varying the sampling flow rate. The model *pDR-1200* incorporates, downstream of its photometric sensing stage, a standard 37-mm filter holder on which all sampled particles are collected for subsequent analysis or gravimetric referencing/calibration, if so desired.

The *personalDataRAM* is the result of many years of field experience acquired with thousands of units of its well known predecessor, the MIE MINIRAM, and embodies many technological advances made possible by the latest electronic hardware and software. The *personalDataRAM* is also a worthy miniaturized companion to the MIE DataRAM, a recognized paragon of portable aerosol monitors.

The *personalDataRAM* is a high sensitivity nephelometric (i.e. photometric) monitor whose light scattering sensing configuration has been optimized for the measurement of the respirable fraction of airborne dust, smoke, fumes and mists in industrial and other indoor environments.

The *personalDataRAM* is an ultra-compact, rugged and totally self-contained instrument designed for hand-held, belt-worn, as well as unattended operation. It is powered either by its internal replaceable battery, or by an optional attachable rechargeable battery pack, or by an AC supply (included as standard accessory). For the model *pDR-1200*, power to an adjunct pump must be provided separately.

Zeroing is accomplished by means of a hand-inflatable “zero air” pouch included with the model *pDR-1000AN*, and by an inlet filter cartridge provided with the model *pDR-1200*. In addition, the instrument automatically checks agreement with

its original factory calibration by checking its optical background during the zeroing sequence.

The *personal*DataRAM covers a wide measurement range: from 0.001 mg / m³ (1 µg / m³) to 400 mg / m³, a 400,000-fold span, corresponding to very clean air up to extremely high particle levels.

In addition to the auto-ranging real-time concentration readout, the *personal*DataRAM offers the user a wide range of information by scrolling its two-line LCD screen, such as run start time and date, time averaged concentration, elapsed run time, maximum and STEL values with times of occurrence, etc.

Operating parameters selected and diagnostic information displays are also available. Furthermore, the *personal*DataRAM features complete, large capacity internal data logging capabilities with retrieval through an externally connected computer. The stored information (up to 13,000 data points) includes average concentration values, maximum and STEL values with time information as well as tag numbers.

Selectable alarm levels with built-in audible signal and switched output, a RS-232 communications port, and a programmable analog concentration output (voltage and current) are all part of this versatile instrument.

A custom software package is provided with the *personal*DataRAM to program operating/logging parameters (e.g. logging period, alarm level, concentration display averaging time, etc.) as well as to download stored or real-time data to a PC or laptop for tabular and/or graphic presentation. If required, the data can also be imported to standard spreadsheet packages (e.g. Microsoft Excel™, Lotus 1-2-3™, etc.).

2.0 SPECIFICATIONS

- Concentration measurement range (auto-ranging)¹: 0.001 to 400 mg / m³
- Scattering coefficient range: 1.5 x 10⁻⁶ to 0.6 m⁻¹ (approx.) @ λ = 880 nm
- Precision / repeatability over 30 days (2-sigma)²:
± 2% of reading or ±0.005 mg / m³, whichever is larger, for 1-sec. averaging time
±0.5% of reading or ±0.0015 mg / m³, whichever is larger, for 10-sec. averaging time
±0.2% of reading or ±0.0005 mg / m³, whichever is larger, for 60-sec. averaging time
- Accuracy¹: ±5% of reading ±precision
- Resolution: 0.1% of reading or 0.001 mg / m³, whichever is larger
- Particle size range of maximum response: 0.1 to 10 µm
- Flow rate range (model pDR-1200 only): 1 to 10 liters / minute (external pump required)
- Aerodynamic particle sizing range (model pDR-1200 only): 1.0 to 10 µm
- Concentration display updating interval: 1 second
- Concentration display averaging time³: 1 to 60 seconds
- Alarm level adjustment range³: selectable over entire measurement range
- Alarm averaging time³: real-time (1 to 60 seconds), or STEL (15 minutes)
- Datalogging averaging periods³: 1 second to 4 hours
- Total number of data points that can be logged in memory: 13,391
- Number of data tags (data sets): 99 (maximum)
- Logged data:
 - ◇ Each data point: average concentration, time / date, and data point number
 - ◇ Run summary: overall average and maximum concentrations, time / date of maximum, total number of logged points, start time / date, total elapsed time (run duration), STEL concentration and time / date of occurrence, averaging (logging) period, calibration factor, and tag number.

- Elapsed time range: 0 to 100 hours (resets to 0 after 100 hours)
- Time keeping and data retention: > 10 years
- Readout display: LCD 16 characters (4 mm height) x 2 lines
- Serial interface: RS-232, 4,800 baud
 - ◇ Computer requirements: IBM-PC compatible, 486 or higher, Windows™ '95 or higher, ≥ 8 MB memory, hard disk drive, 3.5" floppy, VGA or higher resolution monitor
- Outputs:
 - ◇ Real-time digital signal (1 sec⁻¹): concentration, 16-character code
 - ◇ Real-time analog signal: 0 to 5 V and 4 to 20 mA. Selectable full scale ranges of ³: 0 - 0.1, 0 - 0.4, 0 - 1.0, 0 - 4.0, 0 - 10, 0 - 40, 0 - 100, and 0 - 400 mg / m³.
 - ◇ Minimum load impedance for voltage output: 200 kΩ.
 - ◇ Maximum load impedance for current output: 300 Ω (when powered by A C power supply)
 - ◇ Alarm output: 1 Hz square wave, 5 V peak-to-peak amplitude. Load impedance > 100 kΩ
- Internal battery: 9V alkaline, 20-hour run time (typical)
- Current consumption: 15 to 25 mA (in Run Mode); 10 to 20 mA (in Ready Mode)
- AC source: universal voltage adapter (included) 100-250 V~, 50-60 Hz (CE marked)
- Optional battery pack: model pDR-BP, rechargeable NiMH, 72-hour run time (typical)
- Operating environment: -10° to 50° C (14° to 122° F), 10 to 95% RH, non-condensing
- Storage environment: -20° to 70° C (-4° to 158° F)
- Dimensions (max. external):
 - ◇ Model pDR-1000AN: 153 mm (6.0 in) H x 92 mm (3.6 in) W x 63 mm (2.5 in) D
 - ◇ Model pDR-1200 (including cyclone and filter holder): 160 mm (6.3 in) H x 205 mm (8.1in) W x 60 mm (2.4 in) D

- Weight:
 - ◇ Model *p*DR-1000AN: 0.5 kg (18 oz)
 - ◇ Model *p*DR-1200: 0.68 kg (24 oz)
- Cyclone (included in model *p*DR-1200 only): BGI model GK 2.05
- Filter holder (included in model *p*DR-1200 only): Millipore type MAWP 037 AO (with 0.8 μm pore size filter)

¹ Referred to gravimetric calibration with SAE Fine (ISO Fine) test dust (mmd = 2 to 3 μm , $s_g = 2.5$, as aerosolized)

² At constant temperature and full battery voltage

³ User selectable

3.0 USER GUIDELINES

3.1 Handling Instructions

The *personalDataRAM* is a sophisticated optical / electronic instrument and should be handled accordingly. Although the *personalDataRAM* is very rugged, it should not be subjected to excessive shock, vibration, temperature or humidity. As a practical guideline, the *personalDataRAM* should be handled with the same care as a portable CD player.

If the *personalDataRAM* has been exposed to low temperatures (e.g. in the trunk of a car during winter) for more than a few minutes, care should be taken to allow the instrument to return near room temperature before operating it indoors. This is advisable because water vapor may condense on the interior surfaces of the *personalDataRAM* causing temporary malfunction or erroneous readings. Once the instrument warms up to near room temperature, such condensation will have evaporated. If the *personalDataRAM* becomes wet (e.g. due to exposure to water sprays, rain, etc.), allow the unit to dry thoroughly before operating.

Whenever the *personalDataRAM* is shipped care should be taken in placing it in its carrying case and repackaging it with the original cardboard box with the factory provided padding.

3.2 Safety Instructions

- Read and understand all instructions in this manual.
- Do not attempt to disassemble the instrument. If maintenance is required, return unit to the factory for qualified service.
- The *personalDataRAM* should be operated only from the type of power sources described in this manual.
- When replacing the internal 9-V battery, follow the instructions provided on the back panel of the unit.
- Shut off *personalDataRAM* and any external devices (e.g. PC) before connecting or disconnecting them.
- Shut off *personalDataRAM* before replacing the internal battery, or when plugging in or disconnecting the AC power supply or the optional rechargeable battery pack.

3.3 Handling and Operation

3.3.1 Model *pDR-1000AN*

The model *pDR-1000AN* can be operated in any position or orientation. Exposure to high intensity fluctuating light of the interior of the sensing chamber, through the front and back slotted air openings (see Section 5.5), should be avoided. Such large intensity transients may cause erroneous

readings. Direct access of sunlight to the sensing chamber should be prevented.

Typical modes of instrument support/handling include:

- Hand-held. Do not obstruct or cover the sensing chamber opening slots on front and back of unit.
- Belt attached. Use belt clip provided as standard accessory. The unit can be worn on a waist belt, or with optional shoulder belt (model *pDR-SS*) for breathing zone monitoring.
- Tabletop operation. The *pDR-1000AN* can be placed on a table either in an upright position (i.e., resting on its lower protective bumper), or on its back (i.e., resting on the rear edges of its two protective bumpers).
- Tripod mounted. The unit can be attached to any standard tripod using the threaded bushing on the bottom of the monitor (see Figure 3).
- Fixed point operation. The model *pDR-1000AN* can be mounted at a fixed location (e.g., wall or post) using the optional wall-mounting bracket, model *pDR-WB*.

3.3.2 Model *pDR-1200*

The *pDR-1200* requires an external air suction device, such as a small diaphragm pump (e.g., model *pDR-PU*) for its sampling operation. The inlet of the pump must be connected by means of tubing to the hose fitting on the *pDR-1200* filter holder attached to sensing chamber (see Figure 2).

The inlet metal tube of the cyclone can be oriented in any desired direction (i.e., upward, forward, downward or backward) by rotating the cyclone body within its holder cup on the right side of the sensing chamber (see Figure 2).

Always ensure unobstructed access to the cyclone inlet when sampling directly the air in the instrument's vicinity. Alternatively, tubing can be connected to the cyclone inlet in order to extract a sample stream from a duct, chamber or other enclosed volume.

Typical modes of instrument support/handling include:

- Hand-held. For example, using a personal type pump, clipped to the belt and using a tubing connection to the *pDR-1200*.
- Belt attached. Use belt clip kit provided as standard accessory. The unit can be worn on a waist belt, or with the optional shoulder belt (model *pDR-SS*) for breathing zone monitoring. A personal pump can then be belt-worn as well.
- Tabletop operation. The *pDR-1200* can be placed on a table either in an upright position (i.e. resting on its lower protective bumper), or on its back (i.e. resting on its backside).

- Tripod mounted. The unit can be attached to any standard tripod using the threaded opening on the bottom base (see accessory attachment fitting on Fig. 4).
- Wall mounted for fixed point monitoring. Use optional wall mounting bracket, model *pDR-WB*, either in combination with model *pDR-PU* pump module and model *pDR-AC* power supply (powering both the *pDR-1200* and the *pDR-PU*), or with a separate pump.

3.4 Air Sampling Guidelines

Although the *personalDataRAM* is designed primarily for intramural use, i.e. for indoor air quality, in-plant, or mining environment monitoring, its active sampling version (model *pDR-1200*) also makes it compatible with extramural use (i.e. ambient monitoring). General ambient monitoring applications, however, are performed preferentially using an appropriate inlet configuration, in order to ensure representative particle sampling under conditions of variable wind speed and direction. Consult with MIE for such outdoor applications.

For typical area monitoring applications, the *personalDataRAM* should be placed and operated centrally within the area to be monitored, away from localized air currents due to fans, blowers, ventilation intakes/exhausts, etc. This is to ensure representative sampling within the area to be assessed.

3.5 Environmental Constraints and Certifications

The *personalDataRAM* is designed to be reasonably dust and splash resistant, however, it is not weatherproof. To operate the unit outdoors provisions should be made to protect it from environmental extremes outside its specified range, and from any exposure to precipitation.

The *personalDataRAM* is certified for compliance with the electromagnetic radiation limits for a Class A digital device, pursuant to part 15 of the FCC Rules. The unit also complies and is marked with the CE (European Community) approval for both immunity to electromagnetic radiation and absence of excessive emission interference.

4.0 ACCESSORIES

4.1 Standard Accessories

The *personalDataRAM* is provided to the user with the following standard accessories:

- Soft-shell carrying case (MIE model *pDR-CC-1*)
- Digital communications cable (MIE model *pDR-DCC*)
- Analog signal / alarm output cable (MIE model *pDR-ANC*)
- Communications software disk (MIE model *pDR-COM*)

- Z-Pouch zeroing kit (MIE model *pDR-ZP*)(for use with *pDR-1000AN* only)
- Zeroing filter cartridge and tubing (MIE model *pDR-ZF*)(for use with *pDR-1200* only)
- Belt clip kit (MIE model *pDR-CA*)
- AC power supply (and charger for optional MIE model *pDR-BP*) (MIE model *pDR-AC*)
- Metal cyclone (MIE model *pDR-GK2.05*)(for use with *pDR-1200* only)
- 37-mm filter holder and hose fitting (MIE model *pDR-FH*)(for use with *pDR-1200* only)
- Instruction manual

4.2 Optional Accessories

The following optional accessories are available from MIE for use with the *personalDataRAM*:

- Rechargeable battery module (MIE model *pDR-BP*)
- Shoulder strap (MIE model *pDR-SS*)
- Remote alarm unit (MIE model *pDR-RA*)
- Wall mounting bracket (MIE model *pDR-WB*)
- Active sampling kit to convert model *pDR-1000AN* to model *pDR-1200* (MIE model *pDR-ASC*)
- Upper bumper kit to convert model *pDR-1200* to model *pDR-1000AN* (MIE model *pDR-UB*)
- Attachable pump unit (MIE model *pDR-PU*)(for use with *pDR-1200* only)

5.0 INSTRUMENT LAYOUT

The user should become familiar with the location and function of all externally accessible controls, connectors and other features of the *personalDataRAM*. Refer to Figures 1 through 6.

All user related functions are externally accessible. All repair and maintenance should be performed by qualified MIE personnel. Please contact the factory if any problem should arise. Do not attempt to disassemble the *personalDataRAM*, except as described in Section 12.0 (Maintenance), **otherwise voiding of instrument warranty will result.**

5.1 Front Panel

Refer to Figures 1 (for model *pDR-1000AN*) or 2 (for model *pDR-1200*) for location of controls and display.

The front panel contains the four touch switches (keys) and the LCD screen required for the operation of the *personalDataRAM*.

The four touch switches provide tactile ("popping") feedback when properly actuated.

The ON/OFF key serves only to turn on the unit (while it is in the off state), and to turn it off (when it is operating).

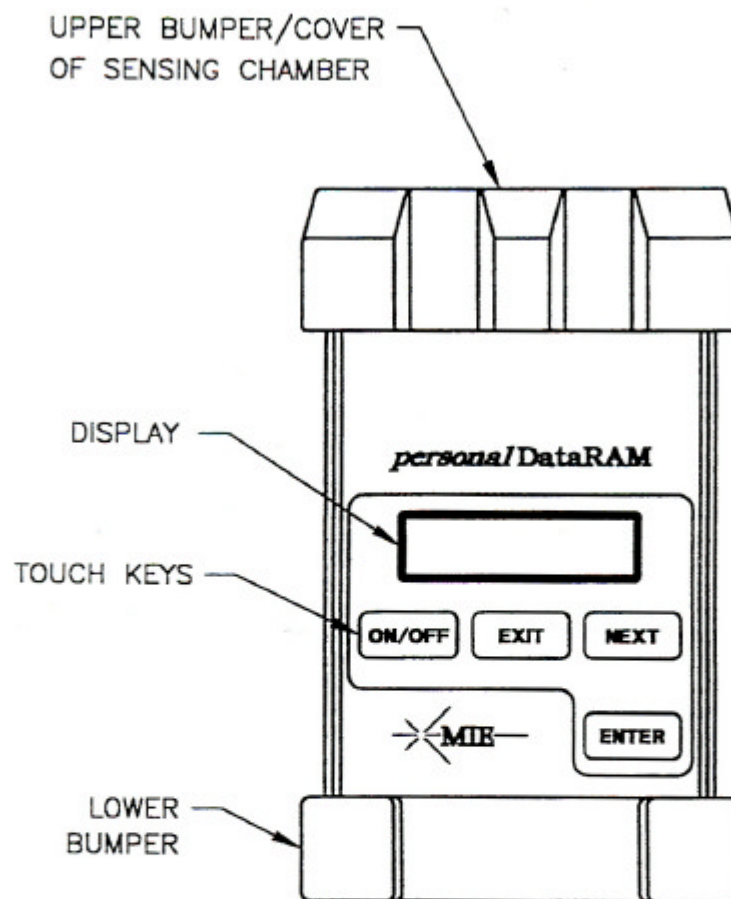


Figure 1 — FRONT PANEL (MODEL pDR-1000AN)

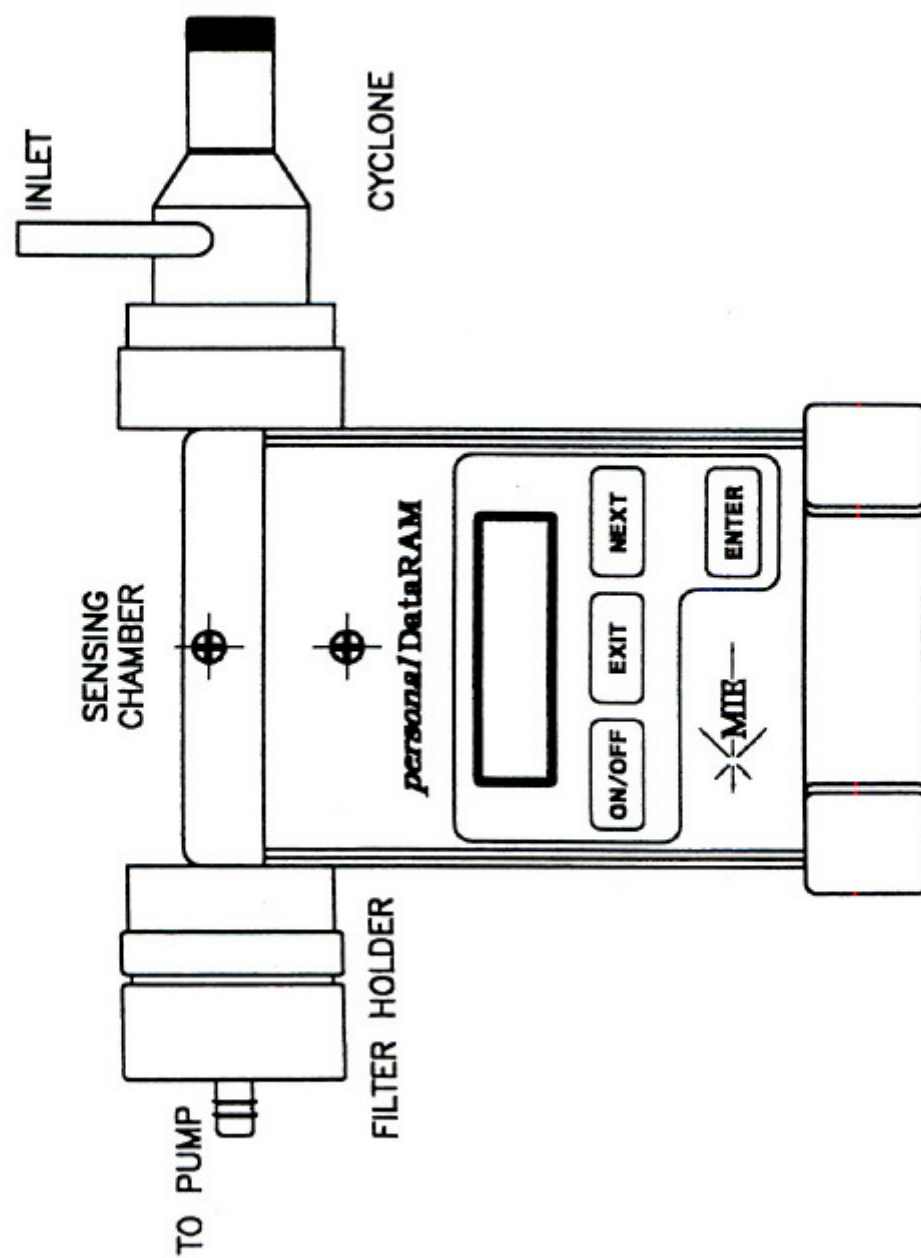


Figure 2. MODEL pDR-1200 WITH CYCLONE & 37MM FILTER HOLDER

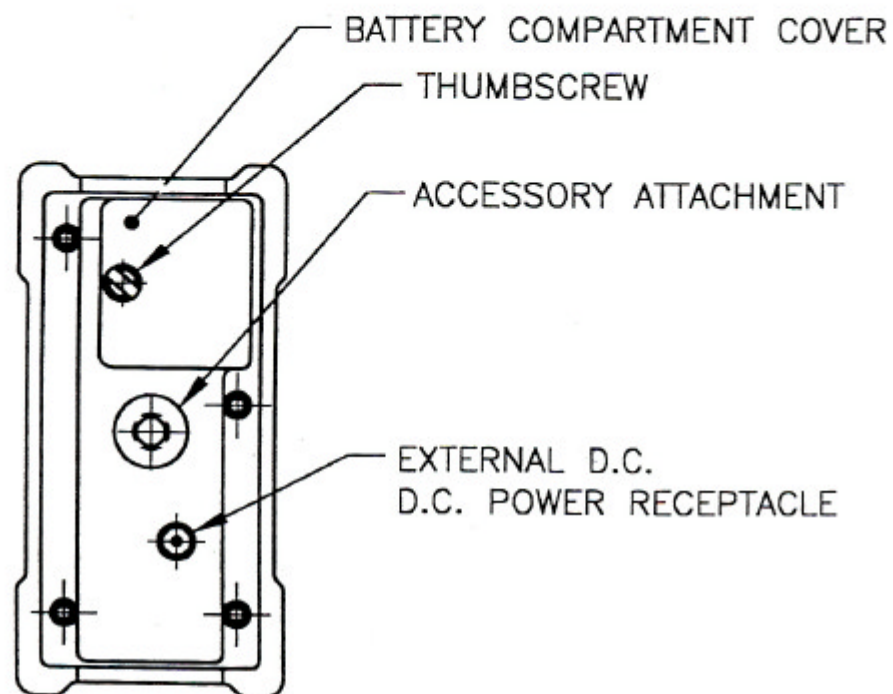


Figure 3 — BOTTOM BASE (MODEL pDR-1000AN)

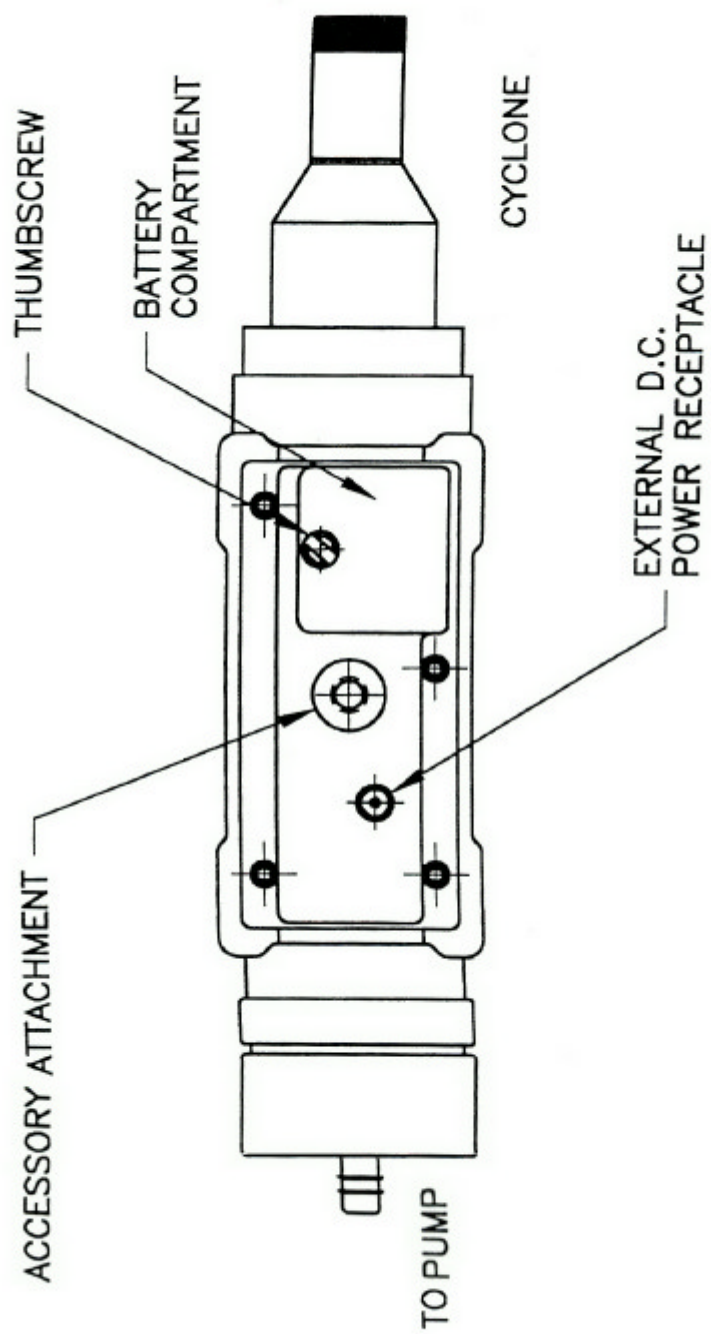


Figure 4 - BOTTOM VIEW (MODEL pDR-1200)

The EXIT and ENTER keys serve to execute specific commands that may be indicated on the screen, and the NEXT key generally serves to scroll the displayed information, e.g. to review the operating parameters that have been programmed, display maximum / STEL values, diagnostic values, etc.

If an incorrect command is keyed (e.g. ENTER when the *personalDataRAM* displays real-time concentration) a beep is heard to alert the user.

The two-line, 16-character per line LCD indicates either measured values of concentration (instantaneous and time averaged on the same screen), elapsed run time, maximum and STEL (short term excursion limit) values, operating and logging parameters, diagnostics, or other messages.

The acoustic alarm transducer is located directly behind the center of the MIE arrow logo on the front panel.

5.2 Bottom Base

Refer to Figures 3 (for model *pDR-1000AN*) or 4 (for model *pDR-1200*). The base of the *personalDataRAM* contains the following: a) internal battery compartment cover, b) external DC power input receptacle, and c) threaded bushing for the attachment of optional battery pack, tripod, or other mounting / support hardware.

Only the internal battery compartment cover should be opened by the user, for removal and replacement of the on-board 9-V battery. Removal of the base plate could result in voiding of instrument warranty.

5.3 Right Side Panel

Refer to Figures 5 (for model *pDR-1000AN*) or 6 (for model *pDR-1200*) which shows the manner of attachment of the belt clip assembly (belt clip should be attached only if required by the user). The right side panel (as viewed from front panel) contains the 6-contact modular jack connector receptacle for digital (RS-232) communications and analog signal output. This connector also provides the alarm output control for a remote / auxiliary alarm signal. The contacts (from top to bottom) are:

- 1: 4 – 20 mA analog output (positive)
- 2: Alarm output
- 3: Digital data transmission
- 4: Digital input
- 5: Common ground (signal returns)
- 6: 0 to 5 V analog output (positive)

The digital communications cable provided as a standard accessory is to be inserted into this receptacle for interconnection to a computer (for data downloading or to

reprogram parameters). The analog output cable is provided with flying leads for interconnection with other data processing and/or control systems.

WARNING: The modular jack receptacle on the side of the *personalDataRAM* should be used only for communications with computers and alarm circuitry. **Do not, under any circumstance, connect any communications equipment (e.g., telephone) to this receptacle.**

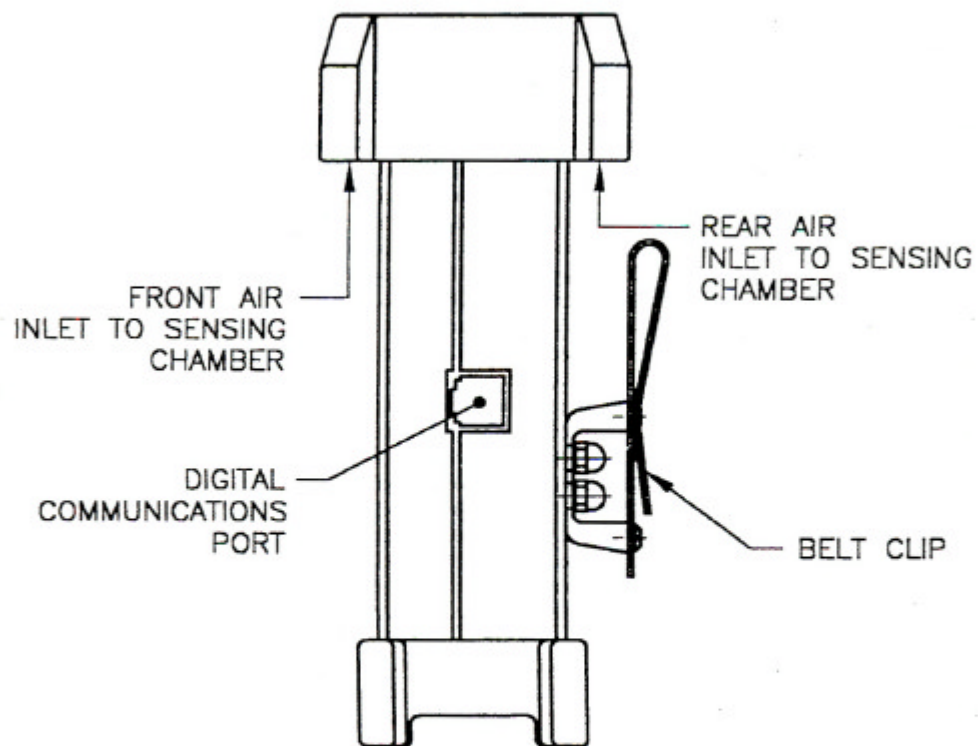


Figure 5 – RIGHT SIDE PANEL (MODEL pDR-1000AN)
(SHOWN WITH BELT CLIP ATTACHED)

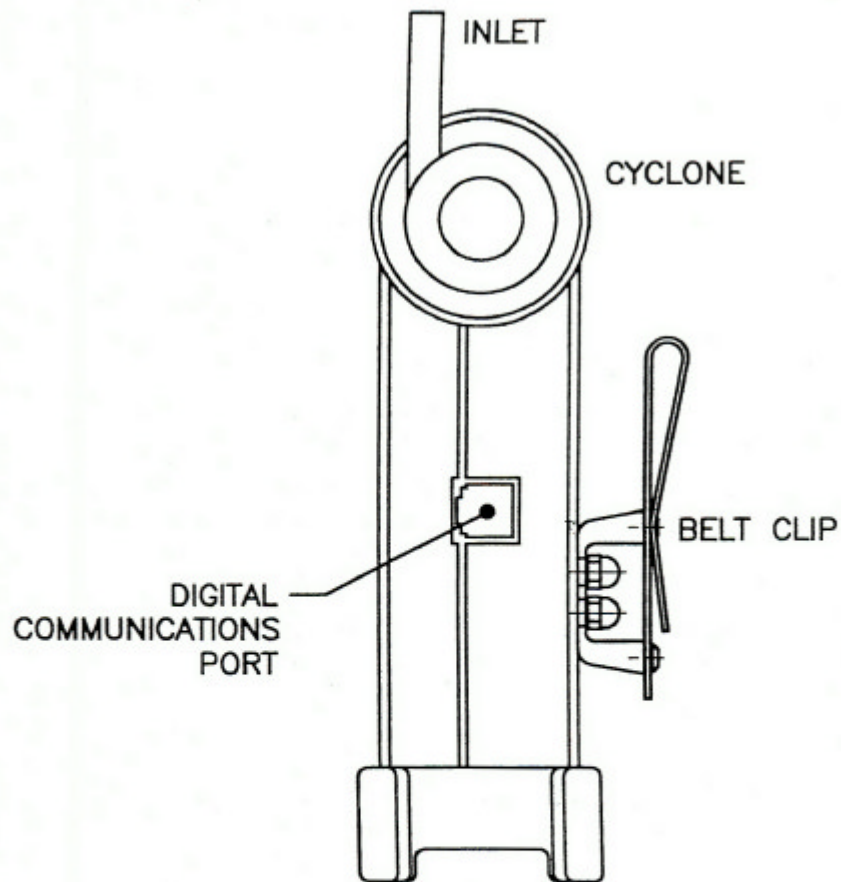


Figure 6 — RIGHT SIDE VIEW (MODEL pDR-1200)
(SHOWN WITH BELT CLIP ATTACHED)

5.4 Back Panel and Belt Clip

The back panel consists of a label with important user information on safety procedures and certifications, model and serial numbers, etc.

The back panel is provided with mounting hardware for the attachment of the belt clip kit (see Figures 5 or 6 for mounting configuration of the belt clip).

5.5 Sensing Chamber

Referring to Figure 1 or 2, the upper mid-section of the *personalDataRAM* contains the optical sensing chamber. This chamber is the only internal section that the user should access for maintenance purposes (see Section 12.2).

On the model *pDR-1000AN*, air enters the sensing chamber through the two slot shaped inlets (one on the front and other on the back) under the protective bumper. During instrument operation those two openings should remain unobstructed in order to ensure free access of the surrounding air. When the model *pDR-1000AN* is used as personal monitor, i.e., clipped to a person's belt, the rear air inlet opening may be partially obstructed, but care should be exercised in ensuring that the front air inlet remains free of any obstructions.

On the model *pDR-1200*, air enters the sensing chamber through the opening in the cyclone receptacle cup (black cup on right side of sensing chamber), passes through the photometric stage, and exits through the opening in the filter holder receptacle cup (black cup on left side of sensing chamber), after which the air passes through the filter.

6.0 PREPARATION FOR OPERATION

6.1 Battery Installation

When shipped from the factory, the *personalDataRAM* will arrive without its replaceable 9V battery installed. Two fresh alkaline batteries are factory packed separately in the carrying case, one of which should be installed in the *personalDataRAM* when preparing it for operation.

NOTE: Whenever the *personalDataRAM* is to be left unused for an extended time (i.e. longer than a month), the 9V battery should be removed from the unit.

Removing the battery will lose neither the program, time / date keeping, nor stored data.

To install the battery proceed as follows:

- Hold the *personalDataRAM* upside down.
- Loosen thumbscrew that secures the battery compartment cover (see Figure 3 or 4), and remove that cover.
- Observe battery polarity and the back panel battery orientation pattern (the negative battery terminal is the one closer to the side of the instrument).
- Insert the battery by sliding it in until it bottoms out. It should protrude slightly above the bottom surface of the instrument.
- Place battery compartment cover over battery and, while pushing down the cover firmly (taking care that the cover seats flush on the bottom surface of the *personalDataRAM*), tighten thumbscrew securely.

6.2 Battery Replacement

Normally, only alkaline type 9V batteries (type 1604A, or equivalent) should be used with the *personalDataRAM*.

Only fresh batteries should be used in order to ensure the maximum operating time. The *personalDataRAM* shuts itself off whenever the battery voltage falls below 6 volts (while retaining all programming and data). A fresh 9V alkaline battery, at room temperature, should provide typically 20 hours of continuous operation (please note that not all manufacturers produce batteries of equal capacity). Intermittent operation should extend the total running time because of partial battery recovery effects.

The approximate remaining battery capacity is indicated by the *personalDataRAM* (see Section 8.2) in increments of 1%, starting from 99%. If the remaining battery capacity is 40% or less, immediate restarting after shut off is automatically inhibited to prevent incomplete runs. If, nevertheless, a new run is to be initiated with low remaining battery capacity, do not shut off the *personalDataRAM* at the end of the previous run (i.e., remain in the Ready Mode, see section 7.0).

When significantly extended operating times are required (beyond the typical 20 hours), the use of either lithium or zinc-air batteries can be considered. The use of such alternative battery types can provide about 2 to 3 times longer operation than alkaline batteries.

6.3 AC Power Supply

A universal line voltage AC to DC power supply (MIE model *pDR-AC*) is provided as standard accessory with the *personalDataRAM*. This power supply can be used with any line with a voltage between 100 and 240 VAC (50 to 60 Hz). When using that power supply, its output plug should be inserted into the external DC receptacle at the base of the *personalDataRAM* (see Figure 3 or 4). Insertion of that connector automatically disables the internal 9V battery of the instrument. Removal of the *pDR-AC* plug from the instrument automatically re-connects the internal 9V battery.

NOTE: Before plugging in or unplugging the external power supply, the *personalDataRAM* must be shut off.

6.4 Rechargeable Battery Module

A rechargeable battery pack (MIE model *pDR-BP*) is available as an optional accessory. This unit attaches directly to the base of the *personalDataRAM*.

The *pDR-BP* contains a sealed nickel-metal-hydride battery, which provides typically 72 hours of continuous operation between successive charges (for 3-hour charging).

The use of the *personalDataRAM*, in combination with the *pDR-BP* connected to the a.c. power line ensures totally uninterruptible operation over indefinitely long time. In this operating mode, line power interruptions lasting up to 72 hours have no effect on measurement run continuity.

To attach the *pDR-BP* to the *personalDataRAM*, the instrument should be shut off. Carefully plug the *pDR-BP* into the external DC RECEPTACLE on the *personalDataRAM*. Rotate the large thumbscrew at the opposite end of the *pDR-BP* tightening it firmly. The *pDR-BP* can be recharged by means of the AC power supply of the *personalDataRAM*.

Detailed instructions for the use of the rechargeable battery module are furnished with that accessory.

6.5 Zeroing the *personalDataRAM*

One of the most important steps to be performed by the user before initiating a measurement run with the *personalDataRAM* is to zero the instrument. This is required to ensure maximum accuracy of concentration measurements, especially at low levels, i.e. below about 0.1 mg/m³.

During the 2-minute pre-run automatic zeroing sequence (see Section 8.1), the *personalDataRAM* registers its own optical background, stores that level in its memory, and then subtracts that background from all measured concentration values, until the zero is updated again by the user.

Although zeroing can be performed as often as desired (e.g., before every run), in practice it should not be necessary to do so more than once-a-month or even less frequently, except if average particulate concentrations should exceed about 0.5 mg/m³.

6.5.1 Zeroing the model *pDR-1000AN*

Zeroing of the model *pDR-1000AN* requires a particle-free environment such as a clean room, clean bench, duct or area directly downstream of a HEPA filter, or the *pDR-1000AN* Z-Pouch (standard accessory). In some cases, a very clean, well air-conditioned office may offer a sufficiently low particle concentration environment (i.e., $\leq 5 \mu\text{g}/\text{m}^3$) for zeroing, as determined by another monitor (e.g., MIE DataRAM).

To zero the model *pDR-1000AN* by means of its Z-Pouch, proceed as follows:

- Wipe the outside surfaces of the *pDR-1000AN* to remove as much dust from those surfaces as possible before placing the instrument inside the Z-Pouch.
- In a reasonably clean environment, open the zipper of the Z-Pouch and place the *pDR-1000AN* inside it. Close the zipper shut.
- Open the small nipple on the Z-Pouch, and insert the fitting of the hand pump/in-line filter unit into the nipple.
- Start pumping the hand-pump until the Z-Pouch begins to bulge, and proceed with the steps in Section 8.1, pressing the keys of the instrument through the wall of the Z-Pouch. Then continue pumping.
- After completing the zeroing (step 2. of Section 8.1) procedure, open the Z-Pouch zipper and remove the *pDR-1000AN*. Close the zipper and flatten the Z-Pouch while plugging its nipple, in order to prevent dust contamination of the interior of the Z-Pouch.
- The *pDR-1000AN* is now zeroed and ready for a measurement run.

6.5.2 Zeroing the model *pDR-1200*

To provide the particle-free air required to zero the *pDR-1200*, either of two methods can be used: a) place the instrument on a clean-air bench or in a clean room, or b) connect to the cyclone inlet the green zeroing filter cartridge supplied with the *pDR-1200*. In either case, proceed as follows:

- After implementing either of the two methods, above, run the attached pump for at least one minute (e.g., at 4 liters/minute), and then proceed as described in Section 8.1 of this instruction manual, while continuing to run the pump (or leaving the unit in the clean air environment).
- Once the CALIBRATION: OK message appears on the *pDR-1200* display, stop the pump and disconnect the zeroing filter cartridge from the cyclone inlet (or remove *pDR-1200* from clean bench/room).
- The *pDR-1200* is now zeroed and ready for a measurement run.

Note: While the *pDR-1200* is used to monitor high dust concentrations (³ 0.5 mg/m³), the flow through its sensing chamber should not be stopped before purging it, which can be done by connecting the green zeroing filter to the cyclone inlet and continuing to run the pump for about 2 minutes before shutting it off. This is to prevent dust contamination of the sensing chamber.

6.6 *pDR-1200* Filter Holder Installation

The 37-mm filter holder provided with the *pDR-1200* must be installed before operation of the instrument, in order to connect a sampling pump. To install the filter holder, remove protective cover, and insert the open collar over the black attachment cup with the external o-ring, on the left side of the *pDR-1200* sensing chamber. Ensure complete insertion.

To replace the membrane filter separate the two sections of the plastic holder prying them apart with screwdriver or a coin. Make sure to place backing under the membrane filter before rejoining the two plastic rings.

7.0 OPERATING MODES

The *personalDataRAM* has several different operating modes which will be described in what follows. The specific commands and displays within each of these operating modes will be explained in detail in Section 8.0. A complete flow chart of keystrokes and screens is provided in Section 16.0.

7.1 Start-Up Mode

The *personalDataRAM* enters the Start-Up Mode as soon as the instrument is switched on. The user then has the choice to:

- a) Wait before proceeding;
- b) Zero the instrument and check its readiness; or
- c) Proceed directly to the Ready Mode.

7.2 Ready Mode

Once the *personalDataRAM* is in the Ready Mode, the user is presented with the following alternatives:

- a) Start a run immediately, or after any of the subsequent steps;
- b) Review (by scrolling the display) all operating parameters, status and diagnostic data;
- c) Activate or deactivate the logging function; activate, select (instantaneous or STEL), or deactivate alarm;
- d) Program parameters or output logged data through a computer.

7.3 Run and Logging Mode

The Run Mode is the measurement/logging mode. The user can operate the *personalDataRAM* in this mode either with or without data logging. For example, the instrument may be used first as a survey monitor without logging, for walk-through assessment of an industrial plant, before deciding where to set up the unit for continuous monitoring and logging.

7.3.1 Data Logging

In order to activate the logging function, the unit must be in (or returned to) the Ready Mode (see Section 8.2).

If data logging has been enabled, the data will be logged in the next free (unrecorded) tag or data set. For example, if data had been recorded previously in tags # 1, 2 and 3 then, when a new run is initiated, the new data will be stored in tag #4. The data can be separated into number of sets (tags) up to a total of 99.

Any number of individual data points can be stored in a given tag, i.e. up to a maximum of 13,000 points (i.e. the total memory capacity of the *personalDataRAM*) assuming that no other data had been logged in other tags. This means that the total memory capacity of 13,000 data points can be grouped into any number of the available 99 data sets (tags).

7.3.2 Clearing of Memory

Data recorded in the *personalDataRAM* memory can be erased either through an external PC command using the MIE *pDR-COM* Custom Communications software provided as a standard accessory, or resetting the instrument (see Section 8.5). The PC method permits to erase the data in any number of selected tags, whereas the resetting method results in the deletion of all data stored in the *personalDataRAM*.

7.3.3 Run Mode Display and Commands

When a measurement run has been initiated (see Section 8.3), the user has the following display choices:

- a) Instantaneous and time-averaged concentrations (both on the same screen);
- b) Elapsed run time, and run start time and date (both on the same screen);
- c) Maximum displayed concentration from run start, and time/date at which current maximum occurred;
- d) Short term excursion limit (STEL) from run start, and time/date at which current STEL occurred;
- e) Remaining battery charge, and (if logging function is enabled) remaining free memory.
- f) Analog output concentration range (if enabled)

The user can command the termination of the run at any time returning it to the Ready Mode. To download logged data into a PC, the *personalDataRAM* must be in

the Ready Mode. No changes in the program parameters or operating conditions can be made while in the Run Mode.

The *personalDataRAM* can be shut off from any of the three operating modes. Even if shut off while in the Run Mode, the instrument will save all stored data.

8.0 OPERATION

8.1 Start-Up

	KEY	DISPLAY	NOTES
1.	ON/OFF	START ZERO:ENTER GO TO RUN: NEXT	Before starting a run with the <i>personalDataRAM</i> , zero it (see Section 6.5) and key ENTER while the unit is exposed to particle-free air. Alternatively, key NEXT to go to RUN / READY mode. If ENTER is keyed:
2.	ENTER	ZEROING V2.00	Keep clean air flowing while ZEROING is displayed* for 1.1 min., followed by one of these screens:
		CALIBRATION: OK	or,
		BACKGROUND HIGH	or,
		MALFUNCTION	If CALIBRATION: OK, then go to step 3. If one of the other two screens is displayed, consult Section 12.0.
3.	NEXT	START RUN: ENTER READY: NEXT	To start a measurement run key ENTER (Section 8.3, step 1). To set up for a run and scroll logging / operating parameters, key NEXT (see Section 8.2).
4.	ON/OFF	TURN OFF PDR? Y:ENTER N:NEXT	Keying ON/OFF while the unit is operating will elicit this message to prevent accidental shut off. To confirm shut down, key ENTER . To continue operation, key NEXT .

*The number following the V on the screen refers to the installed firmware version.

8.2 Setting Up For A Run (Ready Mode)

	KEY	DISPLAY	NOTES
1.	NEXT	LOGGING DISABLED	This screen indicates the logging status. To enable the logging function , key ENTER . Toggling of the on / off logging status can be done by keying ENTER .
2.	ENTER	LOG INTRVL 600s TAG#: 4	<u>This message indicates that logging is enabled.</u> Example is for 10-min log period, selected through the PC (see Section 9.0), and next free tag is #4.
3.	NEXT	ALARM: OFF	This screen indicates the alarm status. Keying ENTER repeatedly toggles through the 3 alarm modes:
4.	ENTER	ALARM: INSTANT LEVEL:1.50 mg / m3	This enables the alarm based on the real-time concentration. The level (e.g. 1.50 mg / m3) must be set on the PC.
5.	ENTER	ALARM: STEL LEVEL:0.50 mg / m3	This enables the alarm based on the 15-min STEL value. The level (e.g. 0.50 mg / m3) must be set on the PC.
6.	NEXT	ANALOG OUTPUT: DISABLED	This screen indicates the analog signal output status. Keying ENTER will enable the analog output. Toggling the analog output on / off can be done by keying ENTER :
7.	ENTER	ANALOG OUTPUT: 0 – 0.400 mg / m3	This enables the analog output. The concentration range (e.g., 0 – 0.400 mg / m ³) must be set on the PC.
8.	NEXT	CAL FACTOR: 1.00 DIS AVG TIME 10s	This screen displays the calibration factor and the display averaging time. Both values can be edited via PC.

9.	NEXT	BATTERY LEFT 83% MEMORY LEFT 96%	This screen displays the remaining battery charge, and the remaining percentage of free memory.
10.	NEXT	CONNECT TO PC	When this screen has been selected, the operating parameters can be edited and / or the logged data can be downloaded via the PC (see Section 9.0). If NEXT is keyed again, the screen returns to RUN / READY:
11.	NEXT	START RUN: ENTER READY: NEXT	The instrument is now ready to run following the procedure in section 8.3.

8.3 Measurement Run Procedure

	KEY	DISPLAY	NOTES
1.	ENTER	LOGGING DISABLED LOG INTRVL 600s TAG #: 4 CONC*0.047 mg / m3 TWA 0.039 mg / m3	or, if logging was enabled: <u>Logging status will be displayed for 3 seconds.</u> <u>After a 3-second delay, the concentration screen appears (values shown here are examples). CONC is the real-time and TWA is the time-averaged concentration. The * appears only if logging has been enabled.</u>
2.	EXIT	TERMINATE RUN? Y:ENTER N:EXIT	To terminate the current run and return to the Ready Mode, key ENTER . To continue the run, key EXIT .
3.	EXIT	CONC*0.047 mg / m3 TWA 0.039 mg / m3	Keying NEXT successively scrolls the display to show various run values (elapsed run time, maximum, STEL, etc.). Keying EXIT from any of those screens returns to the concentration display.

4.	NEXT	ET 06:12:49 ST 08:18:26MAY15	This screen shows the elapsed run time (ET) and the run start time / date (ST).
5.	NEXT	MAX: 0.113 mg / m3 T 10:08:44 MAY15	This screen shows the maximum concentration of current run and time / date of occurrence.
6.	NEXT	STEL:0.058 mg / m3 T 09:59:22 MAY15	This screen shows the 15-min STEL value of the current run and the time / date of occurrence.
7.	NEXT	BATTERY LEFT 83% BATTERY LEFT 83% MEMORY LEFT 96%	or, if logging was enabled: This screen shows the amount of usable charge left in the battery and, if logging has been enabled, the overall amount of free memory left.
8.	NEXT	ANALOG OUTPUT: 0 – 0.400 mg / m3	This screen shows the status of the analog signal output, and the range, if this output has been enabled.
9.	NEXT	CONC*0.047 mg / m3 TWA 0.039 mg / m3	The last NEXT command returns the display to the concentration screen.
10.	EXIT	TERMINATE RUN? Y:ENTER N:NEXT	As indicated in step 2, to end current run, key ENTER , to return to the Ready Mode:
11.	ENTER	START RUN: ENTER READY: NEXT	This keystroke terminates the current run and returns the unit to the Ready Mode.

If during a run the instrument memory is filled completely, or if all 99 tags have been used, the run is automatically terminated and the display will indicate:

RUN TERMINATED
FULL MEMORY

If a new run is initiated after the memory has been filled, the *personalDataRAM* can be operated only as a monitor without logging. The memory must then be cleared (see Section 7.3.2) first before logging can be enabled again.

8.4 Abbreviated Run Start/Stop Instructions

To power-up and start a measurement run without zeroing and without logging, proceed as follows:

- Key sequentially **ON/OFF**, **NEXT** and **ENTER**.

To terminate run and shut down, proceed as follows starting from the concentration screen (otherwise key **EXIT** first):

- Key sequentially **EXIT**, **ENTER**, **ON/OFF** and **ENTER**.

8.5 Resetting Procedure

The *personalDataRAM* memory can be reset through commands entered on its own keypad (i.e. without requiring a PC).

Resetting accomplishes the following:

- Erases all stored data from memory;
- Resets all parameters and operating conditions to their default values and conditions; and
- Cancels the zero correction offset.

WARNING: THE RESET TEST WILL ERASE ALL DATA STORED IN MEMORY AND SET ALL PARAMETERS TO FACTORY DEFAULT SETTINGS. Download any data before the reset procedure.

The procedure to reset the instrument is as follows:

Starting with the unit shut off, press the EXIT and ENTER keys at the same time, and while holding down those two keys, press ON. The screen will then indicate:

PDR SELF-TEST... and several diagnostic screens will appear in rapid sequence (see Section 16.0, Resetting/Electronics Checking Mode), ending in the message TESTING COMPLETE. The unit will shut off. When turned on again, the *personalDataRAM* memory will have been reset, as described above.

The **default** values and operating conditions of the *personalDataRAM* are:

- Logging period (LOG INTRVL): 60 seconds
- Logging status: disabled (LOGGING DISABLED)
- Alarm level: 1 mg / m³
- Alarm status: disabled (ALARM: OFF)
- Analog output: 0 to 4 mg / m³
- Analog output status: disabled (ANALOG OUTPUT :DISABLED)
- Real-time display averaging time (DIS AVG TIME): 10 seconds

- Calibration factor (CAL FACTOR): 1.00

When turning on the *personalDataRAM* after resetting the instrument, it should be zeroed (see steps 1. and 2. of Section 8.1) before a run is initiated. Otherwise, its internal optical background level will not be subtracted from the indicated concentration readings. Alternatively, if the instrument is not zeroed after resetting, it will indicate its unsubtracted optical background when run under particle free conditions.

9.0 COMMUNICATIONS WITH COMPUTER

9.1 Hardware and Software Requirements

The computer requirements to install the software provided with the *personalDataRAM* (MIE *pDR-COM*) are the following:

- IBM-PC compatible
- 486 or better processor
- Minimum operating system: Windows 95™ or better
- ≥ 8 MB of RAM
- 2 MB hard disk drive
- 3.5" floppy drive
- VGA or higher resolution monitor

NOTE: When large files are logged in the *personalDataRAM* in one single tag, a faster computer speed is required to handle the data. For example, if all 13,000 data points are logged in one tag, a Pentium I or II processor with a minimum speed of 166 MHz will be required. If, however, the maximum number of data points per tag is 1,000 or below, a 33 MHz, 486 DX processor will suffice.

MIE custom hardware and software (provided as standard accessories):

- Digital communications cable (MIE model *pDR-DCC*)
- Software floppy disk (3.5", MIE model *pDR-COM*)

9.2 Software Installation Procedure

To install the MIE provided software in the computer, proceed as follows:

1. Insert the 3.5" disk labeled "*pDR-COM*" into computer.
2. For Windows 95™ users, select **Start** and then **Run**. For Windows 3.1 and 3.11 users, from Program Manager select **File** and then **Run**.
3. Type in on the **Command Line:** **a: install** (or **b: install**, as required).
4. The message "**Do you wish to install *pDR-COM*?**" will appear. Click **OK** to continue, or **Cancel**.
5. A message appears allowing the option to change the default directory:

- "C:\PDRCOM"**. It is advisable to leave the default directory (unless you address the hard drive by a different letter), and select **OK**.
6. After a successful installation, the message "**Installation Complete!**" will appear.

9.3 Communication Between *personalDataRAM* and Computer

To effect the communication between the *personalDataRAM* (via the *pDR-COM* software installed in the computer as described in the preceding section) and the PC, proceed as follows:

1. Connect the *personalDataRAM* to one of the computer's serial ports using the *pDR-DCC* cable provided by MIE. This cable has a 9-pin female connector for the computer port.
2. Key **ON** the *personalDataRAM* and then key **NEXT** repeatedly until **CONNECT TO PC** is displayed on the *personalDataRAM*.
3. On the computer, double click on the **pDR-COM** icon. A four-tabbed notebook display should appear. Click on the **Com Port Select** and select the port to which the *pDR-DCC* cable has been connected.
4. From the four-tabbed notebook displayed on the computer screen select the tab with the desired option. The options are:
 - **Main:** This page allows the user to input the *personalDataRAM* serial number (or any other desired label), and select the Serial Com Port.
 - **Logged data:** This page allows the user to download, tabulate, print data, or transfer to a CSV file the data stored in the *personalDataRAM*. This page also serves to display real-time numerical data when the computer is connected to the *personalDataRAM* in the Run Mode.
 - **Graph data:** This page enables the downloading and graphing of stored data to the computer screen and to a printer. In the Run Mode, this page displays the real-time data in graphic format.
 - **Configure pDR:** This screen allows the user to edit the operating/logging parameters. Click on the item to be edited and select or type in the new value. To review the parameter values currently programmed into the *personalDataRAM*, click on **Get configuration**. After editing the parameters, click on **Set configuration** to input the new values into the *personalDataRAM* program.

Most operations within *pDR-COM* are self-evidently labeled, including fly-over dialog boxes. In addition, instructions may be found in the On-line Help files by selecting **H**elp and then **C**ontents.

The following operating/logging parameters of the *personalDataRAM* are selected (edited) via the computer:

- Current date (month and day of the month)

- Current time (hour, minute and second)
- Display averaging time (1 to 60 seconds, in 1-second increments)
- Calibration factor (0.01 to 9.99, in 0.01 increments)
- Logging interval (1 to 14,400 seconds, in 1-second increments)
- Analog output full scale concentration (0.1, 0.4, 1, 4, 10, 40, 100, or 400 mg / m³)
- Analog output status (enabled, or disabled) (can also be selected directly through *personalDataRAM* keyboard, see Section 8.2)
- Alarm level (0.001 to 409.599 mg / m³, in 1-µg / m³ increments)
- Alarm mode (Off, Instantaneous, or STEL) (can also be selected directly through *personalDataRAM* keyboard, see Section 8.2)

The serial number of the *personalDataRAM* is transferred automatically to the PC and displayed on its screen.

In addition, the user can input any other identification for the instrument (up to 20 characters).

Note: The year is entered as a two-digit number; year 2000 is treated correctly as a leap year (*personalDataRAM* version 1.70 or higher).

9.4 Real-Time RS-232 Output

During the RUN mode, the *personalDataRAM* can communicate real-time concentration data through its serial port via the *pDR-COM* software package. This software application decodes the data and displays it on the computer screen in both graphical and tabulated form.

In order to use this output with some other application, the following information will enable the user to decipher the encoded output signal.

The communication settings for the digital output of the *personalDataRAM* are:

- Baud rate: 4800 bps or 9600 bps
- Data bits: 8
- Stop bits: 1
- Parity: none
- Flow control: Xon / Xoff

Every second during a run, the *personalDataRAM* serial port will output a sixteen-character code. It consists of two brackets with 14 hexadecimal digits between them, representing sum check (2 digits), sensed concentration (8 digits), and calibration factor (%, 4 digits). The concentration in µg / m³ is obtained by multiplying the sensed concentration times the calibration factor and dividing by 100.

10.0 ANALOG SIGNAL OUTPUT

10.1 Analog Output Description

The *personalDataRAM* incorporates the capability to provide both a voltage and a current signal output directly proportional to the sensed concentration of airborne particulates. Both these analog signal outputs are concurrently available. These outputs are provided, principally, for fixed-point applications with hard-wired installations, such as for continuous HVAC monitoring and control.

The particulate concentration range corresponding to the output voltage and current ranges (0 to 5 V and 4 to 20 mA) can be user selected (via a PC). The most sensitive range available is 0 to 0.100 mg/m³, and the least sensitive range is 0 to 400 mg/m³. For example, if the user selects the analog output range of 0 to 0.400 mg/m³ then the analog output signal levels, at a concentration of 0.200 mg/m³, would be 2.5 V and 12 mA.

Selection of the concentration range of the analog output must be performed on the PC. This range is independent of the digital display, data logging and real-time digital output range which are controlled automatically (auto-ranging).

Enabling the analog output increases the current consumption from the power source (battery or power supply) of the *personalDataRAM* by typically 5 mA when no load is connected to the analog signal current output. If such a load is connected then the current consumption of the *personalDataRAM* further increases by the magnitude of the output signal current (up to a maximum increment of 20 mA). Therefore, when not using the analog output, it is advisable to disable that output (see Section 8.2) in order to minimize power consumption (this is important only when powering the *personalDataRAM* from a battery source).

10.2 Analog Output Connection

The *personalDataRAM* is provided with a cable (model *pDR-ANC*) which has a 6-contact plug at one end and flying leads at the other. There are 4 leads for the analog and alarm outputs. The additional two contacts of the connector are used only for digital communication with a PC, for which a separate cable (model *pDR-DCC*) is provided.

Counting from top to bottom on the *personalDataRAM* connector receptacle, contact #1 is the positive 4 – 20 mA analog output, contact #2 is the alarm output, contact #5 is the common ground (return for all signals), and contact #6 is the positive 0 – 5 V analog output.

For the 0 – 5 V output signal, the externally connected load must have an impedance of more than 200 kilo-ohms. For the 4 – 20 mA output signal, the externally connected load must have an impedance of less than 200 ohms when powering the

personalDataRAM with a battery, or less than 300 ohms when using the its AC supply.

Since both voltage and current outputs are present at the same time, both can be used concurrently, if so required.

The accuracy of the analog output signals is better than 1% of the reading with respect to the digital reading.

11.0 ALARM

11.1 Alarm Description and Operation

The *personalDataRAM* alarm function is provided both as an audible signal as well as an electrical output. The audible alarm consists of a series of beeps generated by an on-board piezo-transducer. The electrical output, available at the digital communications port, consists of a 1 Hz square wave signal which can be used to trigger/activate other equipment through an appropriate interface (consult with the factory).

The alarm function can be enabled/disabled by the user through the *personalDataRAM* keyboard (see Section 8.2). Setting of the alarm level must be performed on the PC (see Section 9.0).

The alarm is triggered whenever the preset alarm level is exceeded based either on :
a) the displayed real-time concentration, if ALARM: INSTANT was selected (see Section 8.2), or b) a 15-minute running average concentration, if ALARM: STEL was selected. When the concentration falls below that level the alarm condition stops. While the alarm is on the user can stop it (i.e. silence the alarm) by pressing any key of the *personalDataRAM*. If the concentration continues to exceed the set alarm level after 10 seconds, however, the alarm restarts.

11.2 Alarm Output

A pulsed voltage output is available on the *personalDataRAM* in synchronism with the audible signal. This signal consists of a 1 Hz square wave with an amplitude level of 5 V pp. An externally connected load should have an impedance of no less than 100 kilo-ohms. This alarm output signal is available at pins 2 and 5 (counting from top to bottom) of the 6-contact output/communications port on the side of the *personalDataRAM* (see Figure 5 or 6).

11.3 Remote Alarm Unit

An alarm relay unit (MIE model *pDR-RA*) is available as an optional accessory for the *personalDataRAM*. The *pDR-RA*, when connected to the alarm output of the *personalDataRAM*, provides a switched output triggered by the alarm signal of the monitor. This switched output (up to 8 amperes, 250 volts) can be used to activate or

deactivate other equipment (e.g. ventilation systems, machinery, etc.), or to control remotely located (by wire connection) alarm indicators (e.g. buzzers, lights, etc.).

12.0 MAINTENANCE

12.1 General Guidelines

The *personalDataRAM* is designed to be repaired at the factory. Access to the internal components of the unit by others than authorized personnel voids warranty. The exception to this rule is the occasional cleaning of the optical sensing chamber.

Unless a MALFUNCTION message is displayed, or other operational problems occur, the *personalDataRAM* should be returned to the factory once every two years for routine check out, test, cleaning and calibration check.

12.2 Cleaning of Optical Sensing Chamber

Continued sampling of airborne particles may result in gradual build-up of contamination on the interior surfaces of the sensing chamber components. This may cause an excessive rate of increase in the optical background. If this background level becomes excessive, the *personalDataRAM* will alert the user at the completion of the zeroing sequence, as indicated in Section 8.1, by the display of a BACKGROUND HIGH message. If this message is presented, the *personalDataRAM* can continue to be operated providing accurate measurements. However, it is then advisable to clean the interior of the sensing chamber at the first convenient opportunity, proceeding as indicated below.

12.2.1 Model *pDR-1000AN*

- Remove the two screws on the top of the large protective bumper that covers the sensing chamber (see Figure 1);
- Remove the large protective bumper by lifting it firmly upwards and away from the sensing chamber;
- Remove the socket-head screws on the front and back black covers that were exposed by removal of the large top bumper. Lift away the freed front and back covers of the sensing chamber; set them aside carefully and such that they can be reattached in the same position as they were previously; avoid touching the dull black side of these plates;
- Using filtered (particle-free) pressurized air, blow the inside of the sensing chamber taking great care in not marring or scratching any of the exposed surfaces;
- Reposition the two sensing chamber cover plates in the same location (front and back) as they had been originally. Insert and tighten socket head screws firmly making sure that the two plates are aligned perfectly with the top of the sensing chamber;

- Reposition large protective bumper over sensing chamber pushing down until properly seated. Insert the two top screws holding down the bumper and tighten gently (do not over-tighten);
- Check optical background by zeroing the *pDR-1000AN* as indicated in Section 8.1. If the sensing chamber cleaning was performed correctly, the message CALIBRATION: OK should be displayed at the end of the zeroing period.

12.2.2 Model *pDR-1200*

- Remove the two screws (one in the front and one in the back) holding the front and back gasketed covering plates of the sensing chamber, and set these plates aside, such that they may be reattached in the same location as they were previously.
- Using filtered (particle-free) pressurized air, blow the inside of sensing chamber taking great care in not marring or scratching any of the exposed surfaces.
- Reposition the two sensing chamber cover plates in the same location (front and back) as they had been originally. Insert and tighten socket head screws firmly making sure that the two plates are aligned perfectly with the top of the sensing chamber.
- Check optical background by zeroing the *pDR-1200* as indicated in Section 8.1. If the sensing chamber cleaning was performed correctly, the message CALIBRATION: OK should be displayed at the end of the zeroing period.

12.3 Cyclone Cleaning (Model *pDR-1200* only)

The cyclone will require occasional cleaning. It is advisable to do so whenever the sensing chamber of the *pDR-1200* is cleaned (see above). To clean the cyclone, remove it from its black attachment cup on the sensing chamber, and unscrew the grit pot (narrower knurled end). Use clean pressurized air to blow out the grit pot and through all openings of cyclone body. Reattach grit pot to cyclone body and insert cyclone body into attachment cup making sure it is fully inserted.

13.0 CALIBRATION

13.1 Factory Calibration

Each *personalDataRAM* is factory calibrated against a set of reference monitors that, in turn, are periodically calibrated against a gravimetric standard traceable to the National Institute of Standards and Testing (NIST).

The primary factory reference method consists of generating a dust aerosol by means of a fluidized bed generator, and injecting continuously the dust into a mixing chamber from which samples are extracted concurrently by two reference filter collectors and by two master real-time monitors (MIE DataRAMs) that are used for the routine calibration of every *personalDataRAM*.

The primary dust concentration reference value is obtained from the weight increase of the two filters due to the dust collected over a measured period of time, at a constant and known flow rate. The two master real-time monitors are then adjusted to agree with the reference mass concentration value (obtained from averaging the measurements of the two gravimetric filters) to within $\pm 1\%$.

Three primary, NIST traceable, measurements are involved in the determination of the reference mass concentration: the weight increment from the dust collected on the filter, the sampling flowrate, and the sampling time. Additional conditions that must be met are: a) suspended dust concentration uniformity at all sampling inlets of the mixing chamber; b) identical sample transport configurations leading to reference and instrument under calibration; and c) essentially 100% collection efficiency of filters used for gravimetric reference for the particle size range of the test dust.

The test dust used for the MIE factory calibration of the *personalDataRAM* is SAE Fine (ISO Fine) supplied by Powder Technology, Inc. It has the following physical characteristics (as dispersed into the mixing chamber):

- Mass median aerodynamic particle diameter: 2 to 3 μm
- Geometric standard deviation of lognormal size distribution: 2.5
- Bulk density: 2.60 to 2.65 g/cm^3
- Refractive index: 1.54

13.2 Field Gravimetric Calibration

If desired, the *personalDataRAM* can be calibrated gravimetrically for a particular aerosol (dust, smoke, mist, etc.) under field conditions (actual conditions of use). To effect such calibration in the particle environment of interest, proceed as indicated below.

For field calibration of the model *pDR-1000AN*, a personal type filter sampler is placed side-by-side (collocated) to the *pDR-1000AN* to be calibrated, and the two units should be started simultaneously. For the model *pDR-1200*, its own filter and attached pump can be conveniently used for the same purpose.

- Weigh and load into filter holder a fresh membrane filter.
- Start pump.
- Immediately turn on *personalDataRAM* and start a run such that the pump and the *personalDataRAM* are started nearly simultaneously.

The duration of this comparison run should be sufficient to collect a mass of at least 1 mg on the reference filter (in order to permit accurate weighing of the collected mass by means of an analytical balance). The time-weighted average (TWA) reading of the *personalDataRAM* can be used to estimate the required sampling time to collect the above-mentioned mass on the filter. To estimate the required sampling time (ET as measured on the *personalDataRAM*) in minutes, read the TWA value (see Section 8.3)

after an elapsed time (ET) of one minute or more, and apply the following relationship:

$$ET \geq 500 / TWA$$

For example, if $TWA = 2.5 \text{ mg} / \text{m}^3$, then $ET \geq 200$ minutes (approximately 3 hours). If the TWA value changes significantly as the run proceeds, recalculate the required ET accordingly.

At the end of the run (after time ET has elapsed), record TWA, ET and the flow rate Q used to sample the air. Weigh the filter on an analytical balance and obtain Δm , the mass increment due to the collected particles.

Calculate the average gravimetric concentration C, as follows:

$$C = 1000 \Delta m / ET \times Q$$

Compare the recorded value of TWA and the calculated value C, and calculate the calibration factor to be programmed into the *personalDataRAM* (see Section 9.0) as follows:

$$CAL \text{ FACTOR} = C / TWA$$

For example, if C was found to be $3.2 \text{ mg} / \text{m}^3$, and TWA had been determined to be $2.5 \text{ mg} / \text{m}^3$, the CAL FACTOR equals 1.28. Select this value on the PC, as described in Section 9.0. This completes the gravimetric calibration of the *personalDataRAM* for a specific aerosol.

13.3 Scattering Coefficient Calibration

Users interested in using the *personalDataRAM* for scattering coefficient measurements (e.g., for atmospheric visibility monitoring) should contact the factory. A special primary Rayleigh scattering calibration for such purpose can be performed by the factory.

13.4 Internal Span Check

The zeroing procedure (see Section 8.1) and the resulting normal diagnostic display of "CALIBRATION: OK" (step 2) informs the user that the instrument's calibration agrees with the original factory setting. This is an internal span check that consists of an automatic comparison between the initial (factory) optical background of the *personalDataRAM* (registered in its non-volatile memory), and the current optical background sensed during the zeroing sequence.

14.0 PARTICLE SIZE CLASSIFICATION (model pDR-1200 only)

The particle size selective cyclone of the *pDR-1200* provides the user with two important capabilities: a) to measure the particulate matter concentration of a specific aerodynamic size fraction, and b) to determine the mass median size of a particle population. These two applications will be discussed in what follows. For both these applications, a variable measured flow rate pump is required, such as the model *pDR-PU* (for which a separate instruction manual is provided).

14.1 Size Fractionated Monitoring

The *pDR-1200* can be used to monitor a specific particle size fraction below a selectable cut off equivalent aerodynamic diameter. The particle size cut point can be selected by adjustment of the sampling flow rate. The higher this flow rate through the cyclone the smaller the cut off particle diameter. Figure 7 is a graph showing the dependence of the particle cut off size in micrometers as a function of the sampling flow rate in liters per minute. The cut off size is the particle aerodynamic diameter at which the collection efficiency of the cyclone is 50%, or conversely, the size at which the cyclone transmission is 50%. For example, to obtain a particle size cut off of 2.5 μm (i.e., $\text{PM}_{2.5}$), the required sampling flow rate is 4 liters/minute. At that flow rate only particles smaller than (approximately) 2.5 μm are allowed to pass into the *pDR-1200* sensing stage, to be monitored and then to be collected on the filter.

As can be seen on Fig. 7, the lowest particle size cut for the GK 2.05 cyclone included with the *pDR-1200* is about 1 μm , and the largest is about 12 μm . For particle size classification outside this range, consult with the factory.

14.2 Particle Sizing

The selectable particle size capability of the cyclone, in combination with the concentration measuring capability of the photometric system of the *pDR-1200* permits the user to determine the mass median aerodynamic particle diameter of an aerosol, i.e., of the airborne particle population being sampled.

One simple procedure to determine the median particle size is as follows (please refer to the graph of Fig. 7):

- Remove cyclone from its black attachment cup and set cyclone aside
- Start pump and sample aerosol at a flow rate between 2 and 4 liters / minute
- Press **ON** key on *pDR-1200* panel and after about one minute key **NEXT** and then **ENTER**
- After an elapsed time (ET) of about one minute, read and note TWA concentration
- Shut off pump

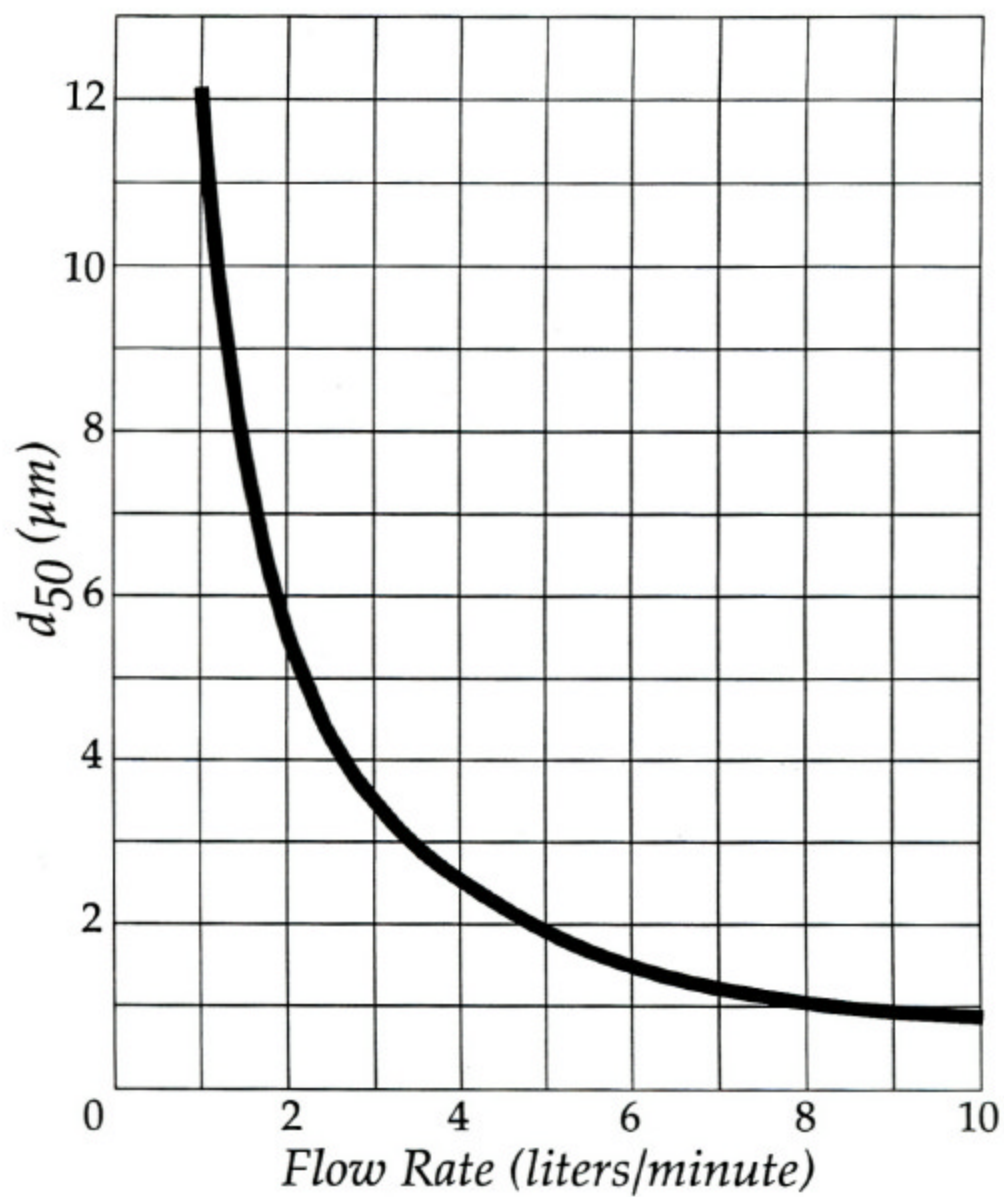


Figure 7. GK 2.05 Cyclone Cut Point (d_{50}) as a Function of Flow Rate

- Plug in cyclone into its attachment cup
- Start pump and run at about 1 liter / minute. Observe real-time concentration (CONC) reading
- Increase flow rate very slowly and gradually until CONC reading is one-half of the initial concentration measured without the cyclone. Continue sampling at this flow rate for about one minute and confirm that TWA reading is about one-half of the initial one. Otherwise readjust flow rate. Note final flow rate at which the TWA value has decreased to one-half the value noted without the cyclone.
- Enter the final flow rate for which the TWA value is one-half of the initial value into the graph of Fig. 7 and read the corresponding d₅₀ particle size in micrometers. This represents the mass median particle diameter of the aerosol.

For example, if the TWA value without the cyclone was 0.8 mg / m³, and the flow rate (with the cyclone attached) required to reduce the TWA to 0.4 mg / m³ is 2 liters / minute, the mass median particle size (as obtained from the curve of Fig. 7) is approximately 5.5 µm.

15.0 CONVERSION BETWEEN *personalData*RAM VERSIONS

The *personalData*RAM user has the option to convert from a model *pDR*-1000AN to a model *pDR*-1200 or vice versa using the appropriate conversion kit. To convert from a *pDR*-1000AN to a *pDR*-1200 (i.e., from a passive air sampling configuration to an active one), the user requires the model *pDR*-ASC conversion kit. To convert from a *pDR*-1200 to a *pDR*-1000AN (i.e., from an active air sampling configuration to a passive one), the user requires the model *pDR*-UB conversion kit.

15.1 Conversion Procedure From *pDR*-1000AN to *pDR*-1200

To effect this conversion, use model *pDR*-ASC conversion kit. As you remove parts from the *pDR*-1000AN, in order to attach the conversion kit components, store these parts carefully for possible future re-conversion. Proceed as follows:

- Remove the two screws on the top of the large protective bumper that covers the sensing chamber (see Figure 1). This bumper is not used on the *pDR*-1200;
- Remove the large protective bumper by lifting it firmly upwards and away from the sensing chamber;
- Reinsert in the upper two threaded holes and tighten the two screws that had held the protective bumper;
- Remove the socket-head screws on the front and back black covers that were exposed by removal of the large top bumper. Lift away the freed front and back covers of the sensing chamber; store them carefully for future use, ensuring that their surfaces are not scratched or marred;

- Position one of the two gasketed (soft rubber) sensing chamber cover plates provided in the conversion kit on the front side of the sensing chamber. Insert and tighten the included socket head screw firmly making sure that the plate is aligned perfectly with the top of the sensing chamber. Similarly, attach the other cover plate on the back side of the sensing chamber;
- Identify the two black cups of the *pDR*-ASC conversion kit. One of them has an external o-ring (filter holder cup), and the other has no o-ring (cyclone cup); refer to Figures 2 and 4 for the location of these cups on the *pDR*-1200 sensing chamber. These cups can be installed on either side of the sensing chamber, i.e., the cyclone can be either on the left or the right side of the sensing chamber (Figure 2 shows the case where the cyclone is on the right side);
- Attach one cup to the left side of the sensing chamber using the two black socket head screws. Tighten screws firmly. Similarly, attach the other cup to the right side of the sensing chamber;
- Take the cyclone / filter holder unit provided as part of the conversion kit, and separate the 37-mm plastic filter holder from the metal cyclone by firmly pulling the two units apart;
- Carefully slide the large open end of the plastic filter holder over the cup with the external o-ring, previously attached to the sensing chamber. Ensure that the cup is fully inserted into the filter holder;
- Carefully insert the large diameter open end of the metal cyclone into the other cup on the opposite side of the sensing chamber. The cyclone inlet (small short metal tube on side of cyclone) can be oriented as desired (upwards, as shown in Figure 2, sideways, downwards, etc.). Ensure that the cyclone is fully inserted into the cup;
- When ready to operate, connect a length of tubing between the barbed fitting at the downstream end of the plastic filter holder and the pump to be used in combination with the *pDR*-1200.
- Perform a zeroing sequence (see Sections 6.5.2 and 8.1) before starting a run. This completes the conversion of the *pDR*-1000AN to the *pDR*-1200.

15.2 Conversion Procedure from *pDR*-1200 to *pDR*-1000AN

To effect this conversion use model *pDR*-UB conversion kit. As you remove parts from the *pDR*-1200, in order to attach the conversion kit components, store these parts carefully for possible future re-conversion. Proceed as follows:

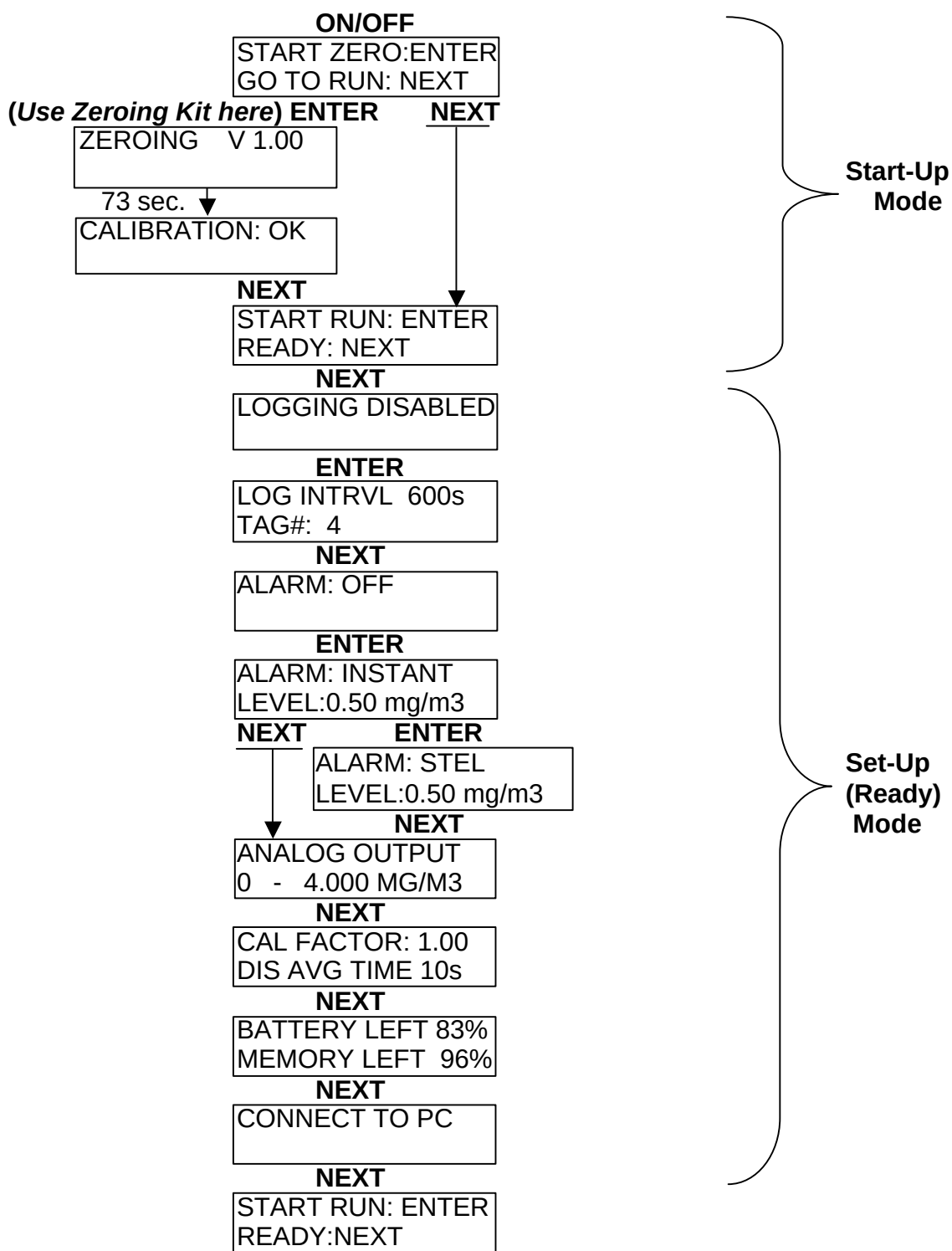
- Pull off both the cyclone and the filter holder from their respective cups on the two sides of the sensing chamber;
- Loosen the two screws that hold each of the two cups on the sides of the sensing chamber (total of 4 screws), and remove the two side cups;
- Loosen the single screw on each of the two (front and back) gasketed sealing covers enclosing the sensing chamber, and remove the two covers;

- Identify the two flat sensing chamber cover plates provided in the conversion kit; one face of each of these two plates has a dull black finish (antireflective); avoid touching those surfaces;
- Position one of the two sensing chamber cover plates over the open front of the sensing chamber with the dull surface on the inside, and such that the hole in the plate is aligned with the corresponding threaded mounting hole on the upper wall of the sensing chamber. Insert and tighten firmly black socket head screw provided with the conversion kit, making sure that the plate is aligned perfectly with the top of the sensing chamber. Similarly, attach the other cover plate to the rear of the sensing chamber, with the dull surface facing inward;
- Loosen and remove the two small screws on the top surface of the sensing chamber;
- Position large protective bumper (provided in the conversion kit) over sensing chamber pushing down until properly seated. Insert the two top screws (two shiny Phillips-head screws provided in the conversion kit) into the two holes in the bumper while holding down the bumper, and tighten gently (do not over-tighten) making sure that the heads of these screws are well inside their cavities in the bumper;
- Perform a zeroing sequence (see Sections 6.5.1 and 8.1) before starting a run. This completes the conversion from a *pDR-1200* to a *pDR-1000AN*.

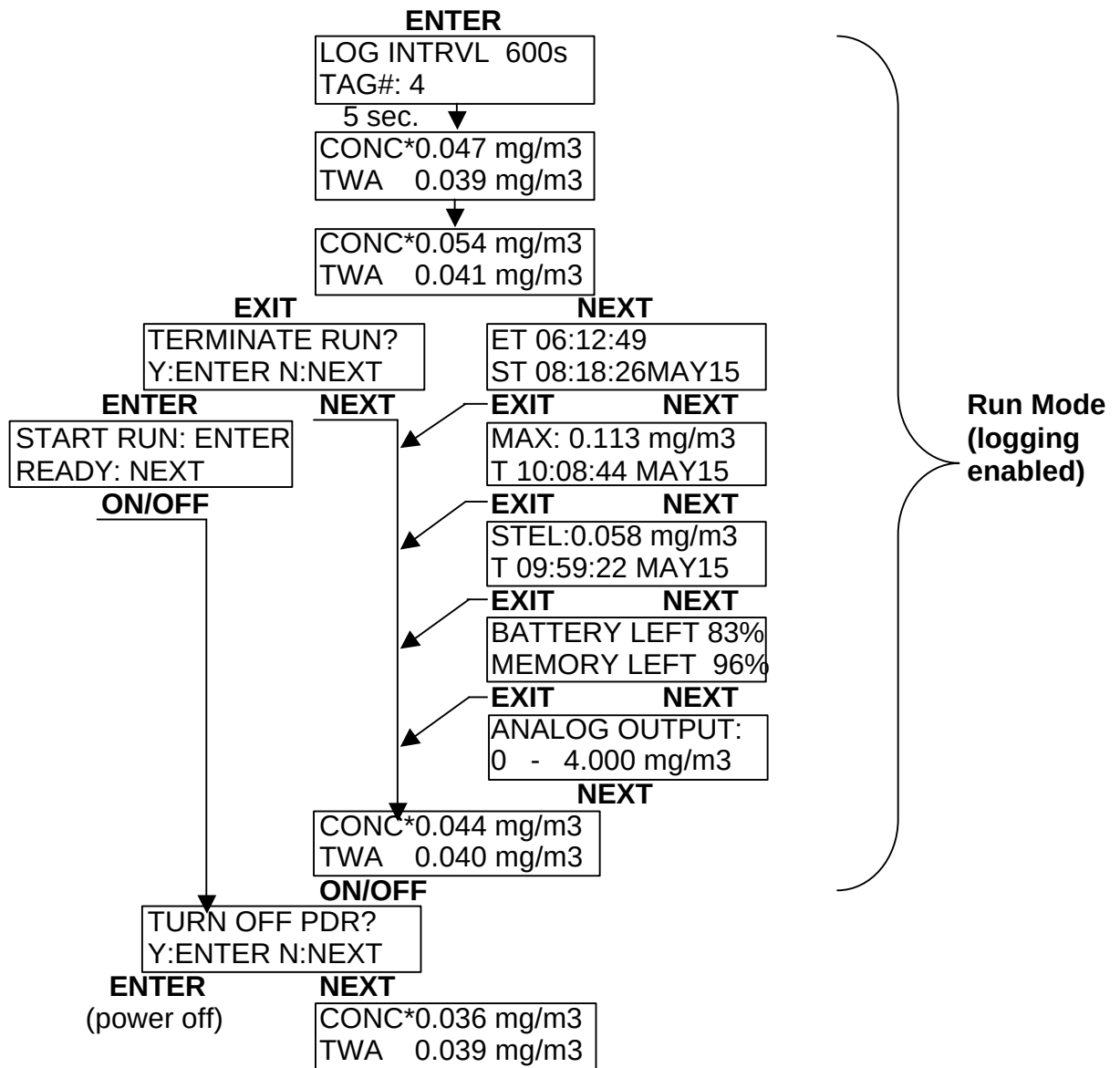
Start-Up and Survey Run Mode (Without Data Logging)



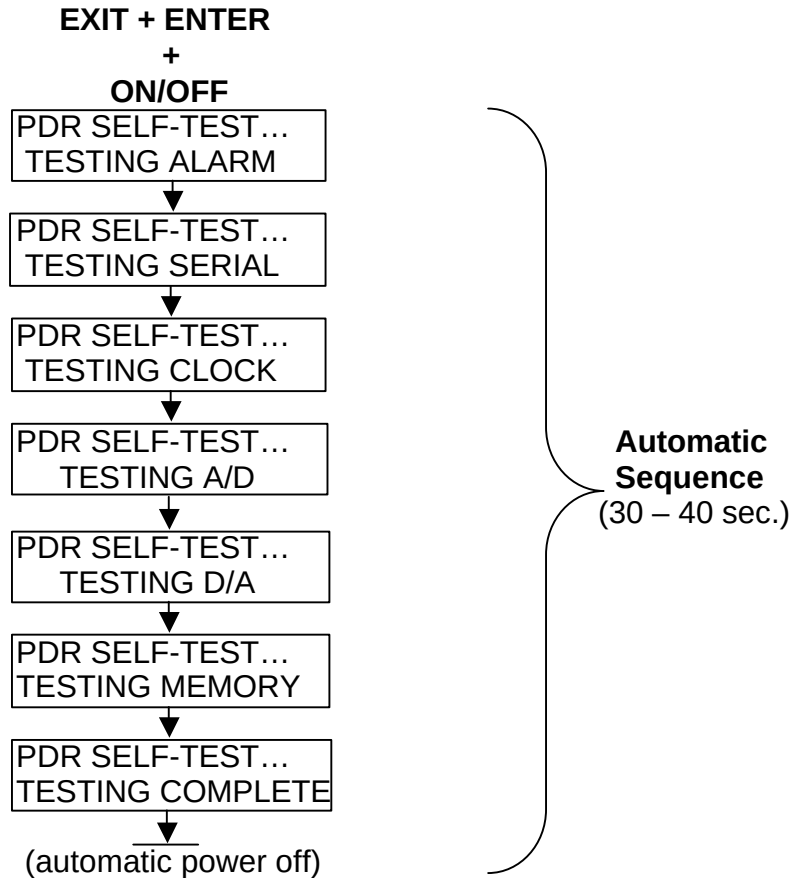
Start-Up, Set-Up and Run Mode (With Data Logging)



(Continues on next page)



Resetting/Electronic Checking Mode



NOTE: After the preceding resetting sequence, the instrument should be zeroed; otherwise its optical background will remain unsubtracted.

When the Error Message “Malfunction” displays

In the event that the PDR series instrument displays the error message “Malfunction” here are two steps that should be taken by the owner/ operator. With unit attached to the computer, proceed as follows:

Check the minimum background of the unit. To do this you need to utilize pDR-COM software (**PDRCOM.EXE**) loaded into your computer. Click on ‘Configure pDR’. Click on ‘Get Configuration’. Press both the “ALT” key and the letter “B” key of the computer keyboard and the following message will be displayed:

Warning! Consult the manufacturer before editing MinBG, MaxBG or the Serial Number.

Click on the ‘OK’ box and you should see S/N, MinBG, MaxBG boxes. Set the MinBG to 100 and click on ‘Set Configuration’. Click on ‘OK’ then exit program. Now try zeroing the pDR. Alternatively try to Reset as outlined in section 8.5 of this manual.

Product Overview

All these applications
in one small unit

- Indoor air quality monitoring
- Walk-through surveys
- Personal exposure monitoring
- Time & motion studies
- Workplace & plant monitoring
- Fixed-point continuous monitoring
- Remediation personal surveillance
- Remote alarming
- Mobile monitoring in vehicles & aircraft
- Toxicology & epidemiology studies
- Emergency response
- Testing air filtration efficiency



personalDataRAM™ Series

Measures airborne particulate concentration in real time

- pDR-1000AN
For passive air sampling applications
- pDR-1200
For active air sampling applications

Measure airborne particulate concentration in real-time

The *personal*DataRAM (pDR-1000AN) measures mass concentrations of dust, smoke, mists, and fumes in real time, and sounds an audible alarm whenever the user-defined level is exceeded. Conventional filter-based monitoring methods cannot indicate dangerous, real-time dust levels. In contrast, the pDR-1000AN alerts you to a problem within seconds, allowing you to take immediate action. With the datalogging enabled, the instrument automatically tags and time stamps the data collected, and stores it for subsequent retrieval, printing, or graphing through a computer.

Highest performance of any real-time personal particulate monitor

With a measurement range from 0.001 to 400 mg/m³ (auto-ranging), and an optical feedback stabilized sensing system, the pDR-1000AN sets the standard for sensitivity, long-term stability and reliability.

The palm-sized pDR-1000AN weighs only 18 oz (0.5 kg) for easy portability and attachment to a belt or a shoulder strap. The absence of any moving parts, such as pumps, motors and valves, and the use of low-power semiconductors housed in a ruggedized case ensures long life and dependable operation.

High correlation with gravimetric measurement

The pDR-1000AN is a light-scattering photometer (i.e., nephelometer) incorporating a pulsed, high output, near-infrared light emitting diode source, a silicon detector/hybrid preamplifier, and collimating optics and a source reference feedback PIN silicon detector. The intensity of the light scattered over the forward angle of 50° to 90° by airborne particles passing through the sensing chamber is linearly proportional to their concentration. This optical configuration produces optimal response to particles in the size range of 0.1-10 µm, achieving high correlation with standard gravimetric measurements of the respirable and thoracic fractions.

Simple zeroing and calibration

The pDR-1000AN arrives practically ready to use after the easy zeroing step. The unit comes gravimetrically calibrated in mg/m³ (NIST traceable) using standard SAE Fine test dust (ISO Fine). Zeroing with particle-free air is accomplished quickly and effectively under field conditions using the zeroing kit included with the instrument. Internal firmware controls an automatic calibration check. To maximize efficiency in the field, gravimetric calibration can be performed by comparison with a filter sampler and programming of the calibration constant.

Standard Accessories

- Universal voltage power supply
- PC communications software
- Zeroing kit
- Belt clip kit
- Instruction manual
- Carrying case
- Signal output cables

Optional Accessories

- Rechargeable battery pack (NiMH)
- Active sampling kit (converts pDR-1000AN to pDR-1200)
- Portable pump unit
- Shoulder strap
- Remote alarm interface
- Wall mounting bracket



pDR-1200

Active aerosol monitor/datalogger, plus aerodynamic sizing

Designed for active particulate monitoring applications

The *personalDataRAM*™ (model pDR-1200) performs active sampling applications and aerosol sizing. The pDR-1200 requires a vacuum pump module to perform particle size selective measurements under field conditions. The separate pump (not included) is required for active sampling and aerosol sizing. With optional inlet accessories, the pDR-1200 is excellent for ambient air measurements under variable wind and high humidity conditions. It is ideal for respirable, thoracic, and PM_{2.5} monitoring, as well as continuous emission and test chamber monitoring. With an isokinetic sampling set, the pDR-1200 can be used for stack and duct extractive sampling monitoring. Membrane filters can be used to capture particles for subsequent laboratory analysis.

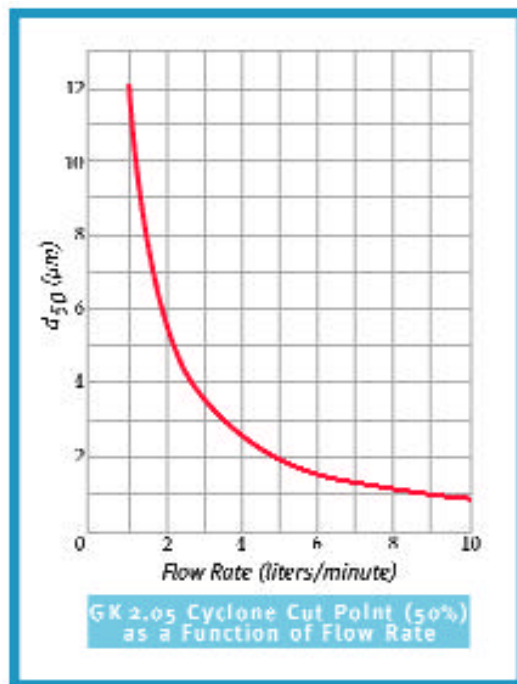
Aerodynamic particle sizing

The pDR-1200 incorporates an optimally designed metal cyclone (BGI Model GK 2.05) or the optional low flow cyclone (BGI Model Triplex SCC1.062-CUST) especially selected for PM_{2.5} collection at 1.5 LPM.

By operating the pump at specific sampling flow rates, the pDR-1200 cyclone preseparator provides precisely defined particle size cuts.

Primary calibration and particle samples by filter collection

An integral filter holder directly downstream of the photometric sensing stage accepts 37 mm filters. The calibration constant of the pDR-1200 is simply adjusted to coincide with the filter-determined concentration. Primary gravimetric calibration of the instrument concentration readout is easily accomplished under actual field conditions by means of this integral filter. Use membrane filters for chemical analysis or concurrent gravimetric measurements.



pDR-PU Attachable Pump Module

This optional accessory is designed for use with the *personalDataRAM* Model pDR-1200. It incorporates a dual-chamber diaphragm pump, a volumetric flow sensing, and control unit. The pump module operates from either an optional, rechargeable NiMH battery pack or from AC line current using the power supply/charger supplied with the *personalDataRAM*. The pDR-PU is designed as a modular unit that can be used in various combinations.

- Flow rate (user adjustable): 1 to 4 liters/minute
- Typical Conditions: 2 LPM @ 10 in H₂O (25 mbar) for up to 4 hours
- Maximum Conditions: 2 LPM @ 30 in H₂O
- Precision of constant flow rate control: $\pm 2\%$
- Power: 9 VDC, 200 mA at 4 liters/minute (approximate)
- Dimensions:
 - 4 in (100 mm) H x
 - 3.6 in (90 mm) W x
 - 1.8 in (45 mm) D
- Weight: 1 lb (0.45 kg)

personalDataRAM™ Series

At last,
a compact,
versatile,
real-time
aerosol monitor

Specifications

Concentration Measurement Range (auto-ranging)

Referred to gravimetric calibration with SAE
Fine test dust ($mmd = 2$ to 3 mm $sg = 2.5$, as aerosolized)
0.001 to 400 mg/m^3

Scattering Coefficient Range

1.5×10^{-6} to 0.6 m^{-1} (approx) @
 $\lambda = 880\text{ nm}$

Precision/Repeatability Over 30 Days (2-sigma at constant temperature and full battery voltage)

- $\pm 2\%$ of reading or $\pm 0.005\text{ mg/m}^3$, whichever is larger, for 1 second averaging time
- ± 0.5 of reading or $\pm 0.0015\text{ mg/m}^3$, whichever is larger, for 10 second averaging time
- $\pm 0.2\%$ of reading or $\pm 0.0005\text{ mg/m}^3$, whichever is larger, for 60 second averaging time

Accuracy

Referred to gravimetric calibration with SAE
Fine test dust ($mmd = 2$ to 3 mm , $sg = 2.5$, as aerosolized)
 $\pm 5\%$ of reading $\pm$ precision

Resolution

0.1% of reading or 0.001 mg/m^3 , whichever is larger

Particle Size Range of Maximum Response

0.1 to $10\text{ }\mu\text{m}$

Flow Rate Range (model pDR-1200)

1-10 liters/min (external pump required)

Aerodynamic Particle Sizing Range

1.0 to $10\text{ }\mu\text{m}$ (pDR-1200 only)

Concentration Display Updating Interval

1 second

Concentration Display Averaging Time (user selectable)

1 to 60 seconds

Alarm Level Adjustment Range (user selectable)

Selectable over entire measurement range

Alarm Averaging Time (user selectable)

Real-time (1 to 60 seconds) or STEL (15 minutes)

Datalogging Averaging Periods (user selectable)

1 second to 4 hours

Total Number of Data Points That Can Be Logged in Memory

More than 13,300

Number of Data Tags (data sets)

99 (maximum)

Logged Data

- Each data point: average concentration, time/date, and data point number
- Run summary: overall average and maximum concentrations, time/data of maximum, total number of logged points, start time/date, total elapsed time (run duration), STEL concentration, and time/date of occurrence, averaging (logging) period, calibration factor, and tag number

Analog Signal Output

0 to 5 V and 4 to 20 mA, with selectable full scale ranges between 0.1 and 400 mg/m^3

Power

- Internal battery 9 V alkaline, 20 hour run time (typical)

- Internal battery 9 V lithium, 40 hour run time (typical)
- AC source universal voltage adapter (included) 100-250 volts, 50-60 Hz (CE marked)
- Optional battery pack rechargeable NiMH, 72 hour run time typical (pDR-BP)

Readout Display

LCD 16 characters (4 mm height) x 2 lines

Serial Interface

RS232, 4800 baud

Computer Requirements

PC compatible, 486 or higher, Windows 95® or higher

Storage Environment

-20°C to 70°C (-4°F to 158°F)

Operating Environment

-10°C to 50°C (14°F to 122°F), 10 to 95% RH, non-condensing

Dimensions (max external)

153 mm (6.0 in) H x 92 mm (3.6 in) W x 63 mm (2.5 in) D (pDR-1000AN)
160 mm (6.3 in) H x 205 mm (8.1 in) W x 60 mm (2.4 in) D (pDR-1200 including cyclone and filter holder)

Weight

0.5 kg (18 oz) (pDR-1000AN)
0.68 kg (24 oz) (pDR-1200)

Approvals

- Intrinsic safety approval by US Mine Safety & Health Administration (MSHA) coal-mining environments containing methane gas (the pDR-PU pump is not approved by MSHA)
- US FCC Rules (Part 15)
- CE certified

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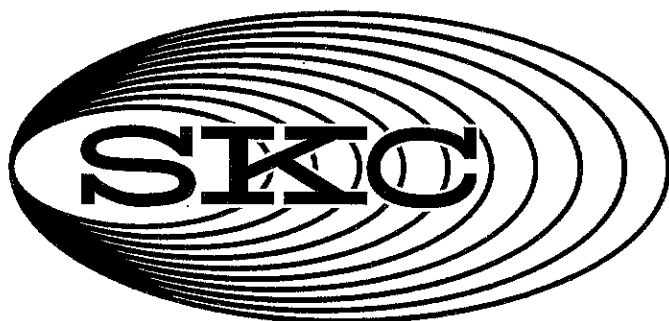
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LITPERSONALDATARAMSERIES 4.03

Analyze • Detect • Measure • Control™

Thermo
ELECTRON CORPORATION



Operating Instructions

AirChek[®] 52

Catalog No. 224-52

**SKC Inc.
863 Valley View Road
Eighty Four, PA 15330**

Form #37714 Rev 1001

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Indicates a warning or caution.

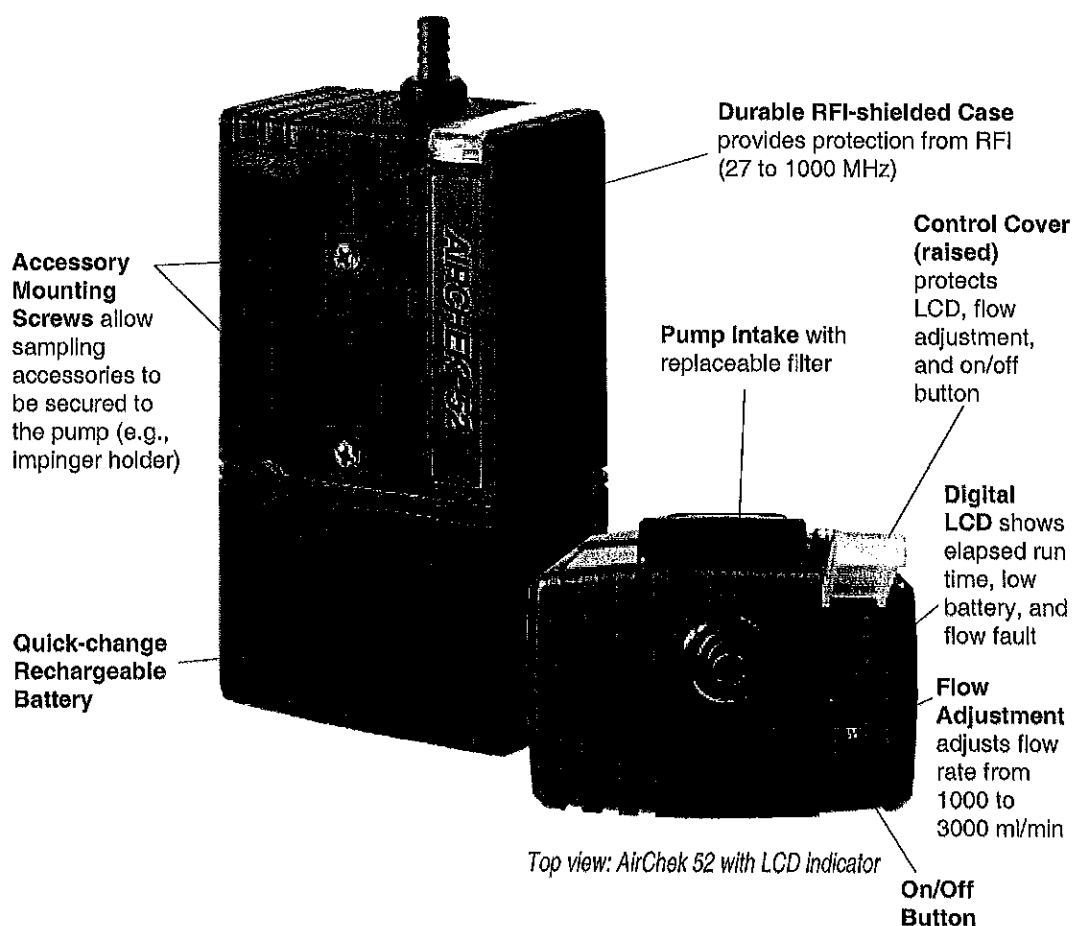


Indicates a premier feature of the pump.

Notice: This operating instruction may not address all safety concerns (if any) associated with this product and its use. The user is responsible for determining and following the appropriate safety and health practices and regulatory limitations (if any) before using the product. The information contained in this document should not be construed as legal advice, opinion, or as a final authority on legal or regulatory procedures.

Description

The AirChek 52 Personal Sample Pump is designed for rugged industrial use at flows from 5 to 3000 ml/min. Ideal for on-worker applications, use the AirChek 52 for short-term or full-shift sampling with sorbent tubes, impingers, size-selective samplers, or filter cassettes.



AirChek 52 Sample Pump

Performance Profile

Flow Range: 1000 to 3000 ml/min
(5 to 500 ml/min requires low flow accessories, *see page 22.*)

Flow Control: Holds constant flow to $\pm 5\%$ of set-point after calibration

Compensation Range: 1000 ml/min up to 25 ins water back pressure
2000 ml/min up to 25 ins water back pressure
2500 ml/min up to 20 ins water back pressure
3000 ml/min up to 15 ins water back pressure

Typical Back Pressure of Sampling Media (*inches water*)

Flow Rate (L/min)	1.0	1.5	2.0	2.5
Filter/Pore Size (μm)				
25-mm MCE/0.8	6	9	12	15
25-mm MCE/0.45	14	22	28	35
37-mm MCE/0.8	2	3	4	5
37-mm PVC/5.0	1	1	2	2

Compare the information in this table to pump compensation range to determine appropriate applications.

Run Time: **NiCad Battery:** 8 hrs minimum at above compensation ranges; dependent on media used. *See Table 1 on page 4.*
NiMH Battery: 12 hrs minimum at 2000 ml/min and up to 25 inches water back pressure; dependent on media used. *See Table 2 on page 4.*
Battery Eliminator: Pump provides extended runs.

Power Supply: **Rechargeable 4.8-V nickel metal hydride (NiMH) battery pack,** 3.3 Ah capacity or
Rechargeable 4.8-V nickel cadmium (NiCad) battery pack, 1.8-Ah capacity
A **battery eliminator** is available (see Optional Accessories); use voids the UL Listing for intrinsic safety.

Battery Charging Time: 6 to 8.5 hrs with PowerFlex® charger
(*varies with battery capacity and level of discharge*)

Temperature: Operating: 32 to 113 F (0 to 45 C)
Storage: -4 to 113 F (-20 to 45 C)
Charging: 50 to 113 F (10 to 45 C)

Humidity: 0 to 95% non-condensing

 **Protect sample pump from weather when in use outdoors.**

Flow Fault: If the pump is unable to compensate for longer than 15 seconds due to excessive back pressure, the pump enters flow fault. During flow fault, the pump stops, the fault icon appears on the display, and elapsed time remains on the display. Auto-restart is attempted up to 5 times. **Elapsed time information will be lost on restart.**

Low Battery Fault:	LCD displays low battery icon and pump shuts down. LCD remains on.
Time Display:	LCD shows elapsed pump run time in minutes up to 99,999.
LCD Indicator:	LCD always remains on. Displayed elapsed run time information resets when pump is started.
Noise Level:	62.5 dBA* - pump without case 55 dBA* - pump housed in noise-reducing case (optional accessory Cat. No. 224-96C, <i>see page 24</i>) * <i>Measured 3 ft (1 m) distance from pump operating at 2 L/min with a 37-mm, 0.8-µm MCE filter cassette</i>
RFI/EMI Shielding:	27 to 1000 MHz
Intrinsic Safety:	UL Listed for Intrinsic Safety: Class I, Division 1 and 2, Groups A, B, C, D; Class II, Division 1 and 2, Groups E, F, G; and, Class III, Temperature Code T3C. <i>ATEX-approved models available. Contact SKC.</i>
Dimensions:	5 x 3 x 1.75 ins (12.7 x 7.6 x 4.4 cm)
Weight:	20 oz (567 gm)
Multiple-tube Sampling:	Requires additional accessories to sample with up to four sorbent tubes simultaneously at flows from 5 to 500 ml/min. <i>See Optional Accessories on page 24.</i>



CE marked



UL Listed for intrinsic safety



ATEX-approved models available

Table 1. AirChek 52 Run Time in Hours with NiCad Battery

Following are typical run times achieved when using a fully charged nickel-cadmium (NiCad) battery pack. Data is sorted by type of sample media. All run times are listed in hours. Results are obtained using a new pump and new fully charged battery. Pump performance may vary.

Mixed Cellulose (MCE) filter, 0.8- μ m pore size

Flow Rate (L/min)	Filter Diameter	
	37 mm	25 mm
2.0	24.5	16.5
2.5	22.9	12.7
3.0	18.9	**

Polyvinyl Chloride (PVC) filter, 5.0- μ m pore size

Flow Rate (L/min)	Filter Diameter	
	37 mm	25 mm
2.0	25.8	24.9
2.5	24.3	21.1
3.0	25.1	18.6

** Filter back pressure exceeded pump capability during testing.

Note: Increases in back pressure during sampling due to buildup of sample on the filter can decrease battery life.

Table 2. Pump Run Time in Hours with NiMH Battery

Following are typical run times achieved when using a fully charged nickel-metal hydride (NiMH) battery pack. Data is sorted by type of sample media. All run times are listed in hours. Results are obtained using a new pump and new fully charged battery. Pump performance may vary.

Mixed Cellulose (MCE) filter, 0.8- μ m pore size

Flow Rate (L/min)	Filter Diameter	
	37 mm	25 mm
2.0	40	37
2.5	38	29
3.0	34	25

Polyvinyl Chloride (PVC) filter, 5.0- μ m pore size

Flow Rate (L/min)	Filter Diameter	
	37 mm	25 mm
2.0	56	47
2.5	48	41
3.0	42	38

Note: Increases in back pressure during sampling due to buildup of sample on the filter can decrease battery life.

Setup

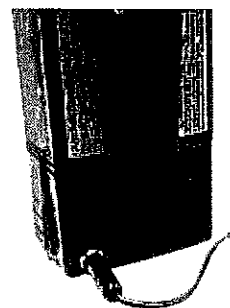
Installing the Battery Pack

1. Align arms on top half of case with slots on either side of the battery pack housing. Ensure the back of the battery pack with the charging jack is on the same side as the belt clip.
2. Slide battery pack up until arms click into place.
3. Push each security screw into the battery pack housing and tighten.
4. Completely charge battery before use (*see Charging the Battery Pack*).

Charging the Battery Pack

For proper maintenance of battery packs, SKC offers a charger (*see Accessories on page 24*) that conditions the battery for optimum performance in 6 to 8.5 hours.

1. For optimum charge, ensure pump is **not** running.
2. Insert the charging plug into the sampler's charging jack.
3. Charge battery pack completely before use.



Plug the SKC PowerFlex® charger cable into the jack on the back of the battery pack (*see charger operating instructions*).

- ❗ **After charging the battery pack, it is good practice to run the pump for approximately 5 minutes before calibrating. This ensures the battery is in more steady-state conditions and improves the agreement in pre and post-sampling calibrations.**
- ❗
 - **To comply with intrinsic safety regulations, do not charge or operate the pump from the charger in hazardous locations.**
 - **Using a non-approved charger voids any warranty.**
 - **Use of a repaired or rebuilt battery pack voids any warranty and the UL Listing for intrinsic safety.**
 - **Use of any device other than the approved battery pack to power the pump voids the UL Listing for intrinsic safety and any warranty.**
 - **Ensure proper orientation of charging cable before plugging it into the charging jack. Improper orientation/contact will short-circuit the battery and voids any warranty.**
 - **Short-circuiting the battery pack will render it immediately inoperative.**
 - **Failure to follow warnings and cautions voids any warranty.**

For information on SKC pump battery packs, visit <http://www.skcinc.com/instructions/1756.pdf>.

Operation

High Flow Applications (1000 to 3000 ml/min)

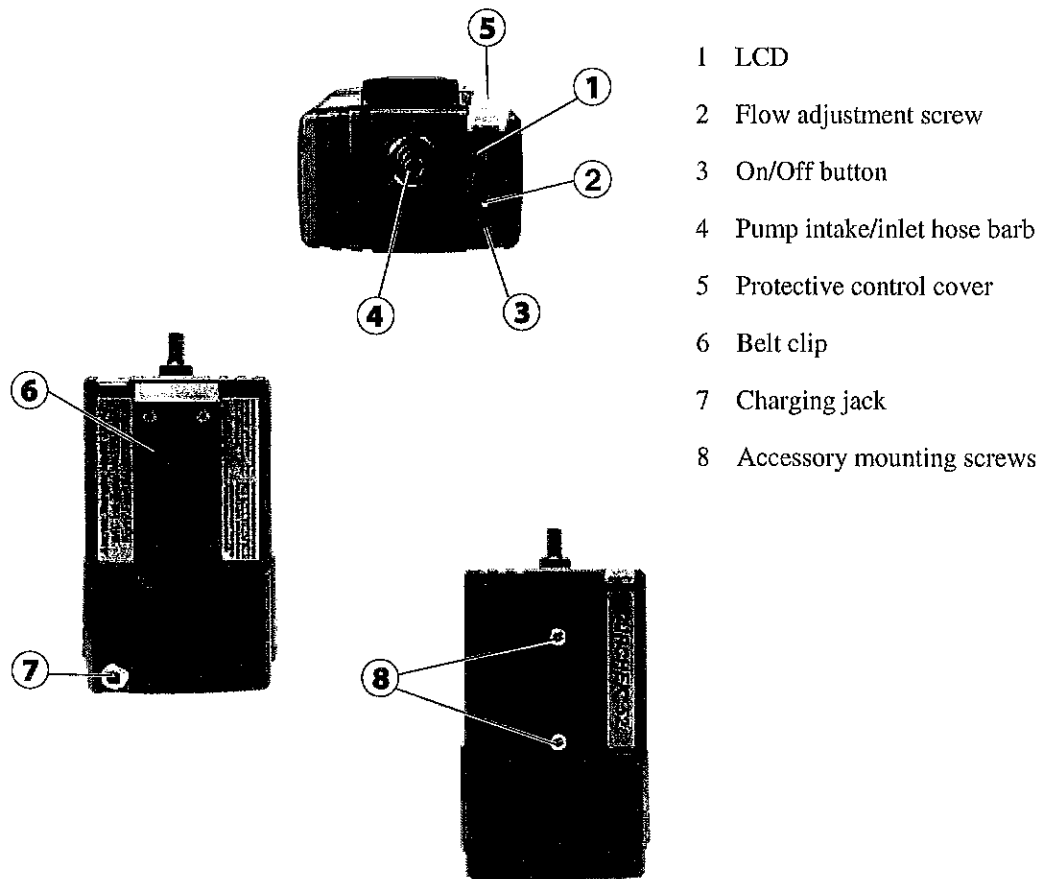


Figure 1

Front, back, and top views of AirChek 52 Sampler

For additional drawings, see pages 21 and 23.

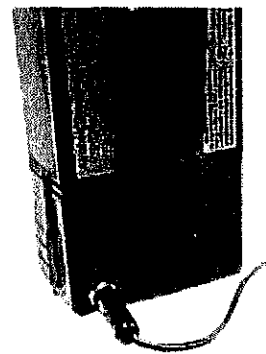
Setup

Ensure that the battery is fully charged before sampling. *See page 5 for details.*

1



After charging the battery pack, it is good practice to run the pump for approximately 5 minutes before calibrating. This ensures the battery is in more steady-state conditions and improves the agreement in pre and post-sampling calibrations.



Charger and battery connected

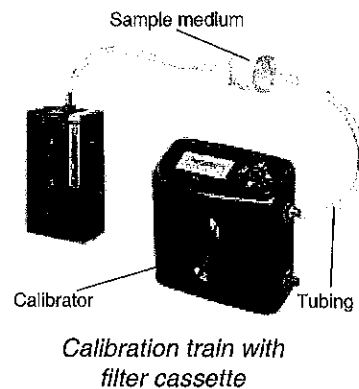
2

Setting or Verifying Flow Rate

Ensure pump has run for 5 minutes before calibrating.

Using 1/4-inch Tygon® tubing, connect the sample medium to the pump intake (Figure 1, #4).

Lift the control cover (Figure 1, #5). Start the pump using the on/off button (Figure 1, #3).



Connect a calibrator to the intake of the sample medium.

Adjust flow by using a screwdriver to turn the flow adjustment screw (Figure 1, #2), clockwise to increase or counterclockwise to decrease flow, until the calibrator indicates the desired flow rate. Use proper calibration technique.

When the flow rate is set, press the on/off button to turn off the pump and disconnect the calibrator.

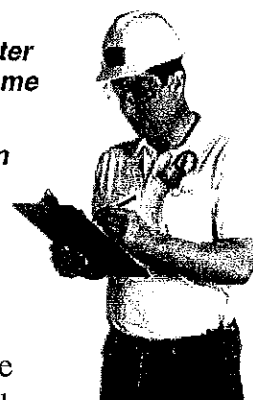
Replace the sample medium used for calibration with an unexposed medium for sample collection.

3

Sampling

- ⚠ ***Before use, allow pump to equilibrate after moving it from one temperature extreme to another***
- ⚠ ***Protect sample pump from weather when in use outdoors.***
- ⚠ ***Use of any device other than the approved battery pack to power the pump voids the UL Listing for intrinsic safety and any warranty.***

For personal sampling, clip the sample collection medium to the worker in the breathing zone and the pump to the worker's belt using the belt clip.



Clip sample medium to worker and pump to belt.

Press the on/off button to clear the elapsed time display and to start sampling. Record the start time. The LCD will automatically track elapsed pump run time.

At the end of the sampling period, press the on/off button and record stop time.

continued on page 8

3

cont'd

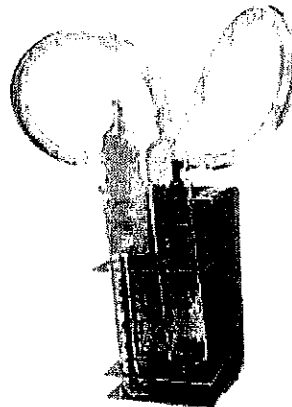
Possible Displays During Sampling

Flow or Battery Fault Shutdown - If the pump is unable to compensate due to excessive back pressure or a low battery condition exists, the sampler will shut down and timing functions will pause. Either a battery-shaped icon or a flow fault icon (→I) will display on the LCD depending on the cause of the shutdown. Upon flow fault, the pump will attempt to restart up to 5 times. To restart from flow fault, correct the blockage and press the on/off button twice. **Elapsed time display will reset to 0 when pump is restarted.** If the battery icon is displayed, recharge the battery before sampling.

Displayed Elapsed Run Time - Elapsed run time is displayed continuously on the LCD. For elapsed times after 999 minutes, the display still shows elapsed time, but alternates displaying the first two digits of the elapsed time and the last three digits. For example, a pump that has run for 1,440 minutes would display first "01" and then "440." The display maximum is 99 999, which is 99,999 minutes.

Sampling with Impingers

Place an in-line trap between the pump and the impinger. The impinger and trap can be mounted to the sampler using the accessory mounting screws (Figure 1, #8) or placed in a holster at the worker's waist.



Impinger holder on pump with impinger and trap

! *Impinger sampling requires an in-line trap (SKC Cat. No. 225-22 or 225-22-01) to prevent fumes from accidentally being drawn into the sampler. Single or dual impinger/trap holders (SKC Cat. No. 225-20-01 or 225-20-02) may be mounted directly to the face of the sampler using the accessory mounting screws.*

! *Failure to use an appropriate in-line trap during impinger sampling voids any warranty.*

! *Protect sample pump from weather when in use outdoors.*

! *Use of any device other than the approved battery pack to power the pump voids the UL Listing for intrinsic safety and any warranty.*

Low Flow Applications (5 to 500 ml/min)

Using a CPC and Single Adjustable Low Flow Holder

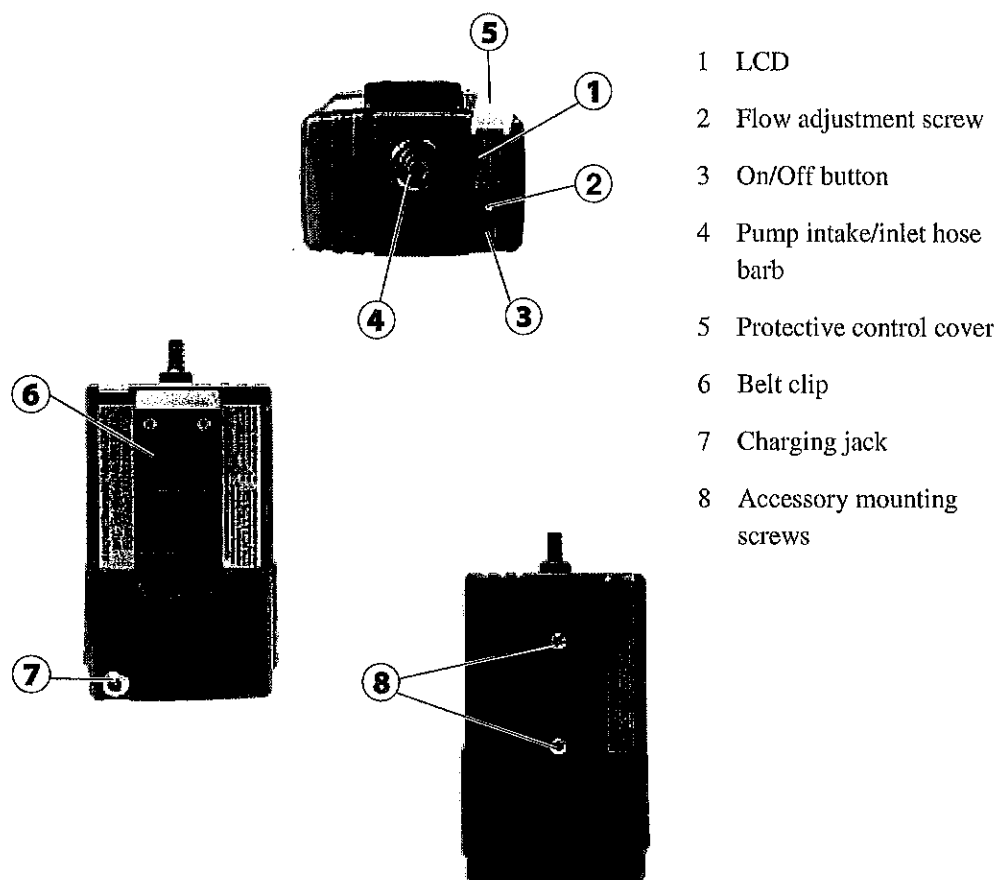


Figure 1

Front, back, and top views of AirChek 52 Sampler
For additional drawings, see pages 21 and 23.

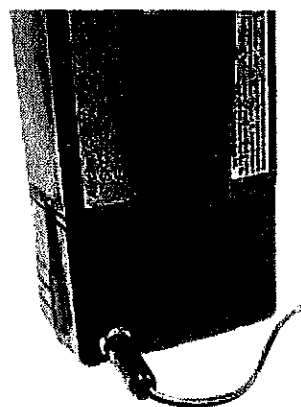
Setup - Low Flow

Ensure that the battery is fully charged before sampling. *See page 5 for details.*

1



After charging the battery pack, it is good practice to run the pump for approximately 5 minutes before calibrating. This ensures the battery is in more steady-state conditions and improves the agreement in pre and post-sampling calibrations.



Charger and battery connected

Setting or Verifying Flow Rate - Low Flow

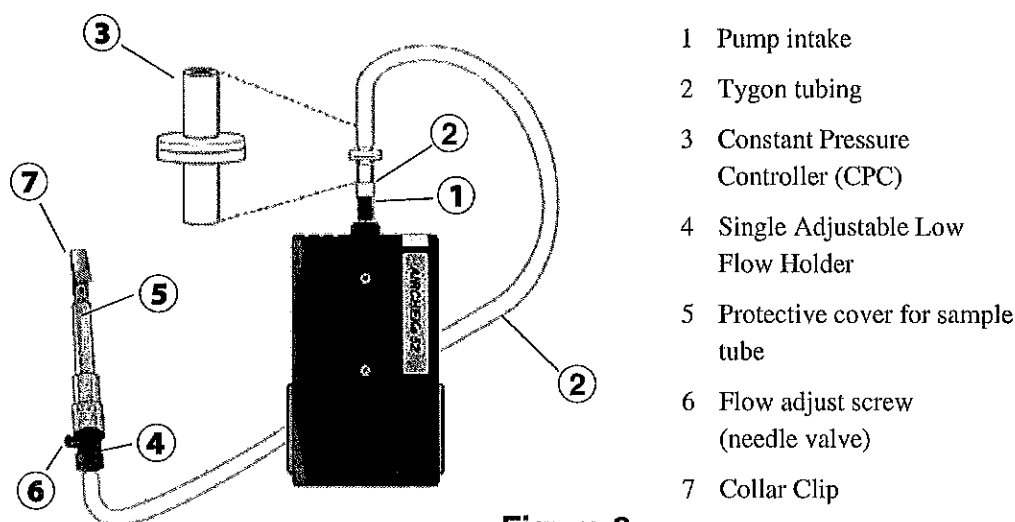


Figure 2

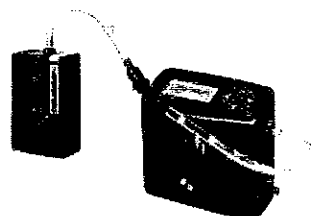
Single Adjustable Low Flow Holder attached to AirChek 52

Ensure pump has run for 5 minutes before calibrating. Set the pump flow rate at approximately 1.5 L/min (*see Setting or Verifying Flow Rate for High Flow Applications on page 7*).

Connect a constant pressure controller (CPC) (Figure 2, #3) to the pump intake (Figure 2, #1) using 1/4-inch Tygon tubing.

Using 1/4-inch tubing, connect the intake of the CPC to the outlet of a single adjustable low flow holder (Figure 2, #4).

Insert an opened sorbent tube into the holder's rubber sleeve with the arrow on the tube pointing toward the holder.

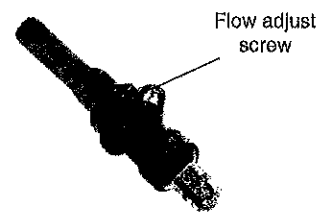


Calibration train with tube in low flow holder

Connect a calibrator to the exposed end of the sorbent tube.

Loosen the brass flow adjust screw on the low flow holder. Activate the pump by pressing the on/off button (Figure 1, #3).

Adjust the flow rate by turning the flow adjust screw (Figure 2, #6) on the adjustable low flow holder until the calibrator indicates the desired flow.



Turn screw to adjust flow.

! *Do not adjust the flow on the pump. Adjust the flow only by using the flow adjust screw on the low flow holder.*

continued on page 11

2

2

cont'd

When the desired flow is set, turn off the pump by pressing the on/off button. Disconnect the calibrator.

Replace the sorbent tube used for setting the flow with a new unexposed sorbent tube for sample collection.

Place the appropriate size tube cover over the tube (Figure 2, #5), and screw it into place on the low flow holder.

Sampling - Low Flow



Before use, allow pump to equilibrate after moving it from one temperature extreme to another



Protect sample pump from weather when in use outdoors.



Use of any device other than the approved battery pack to power the pump voids the UL Listing for intrinsic safety and any warranty.



Clip holder to worker and pump to belt.

3

For personal sampling, clip the low flow holder to the worker in the breathing zone and the pump to the worker's belt.

Press the on/off button to clear the elapsed time display and to start sampling. Record the start time. The LCD will automatically track elapsed pump run time.

At the end of the sampling period, press the on/off button and record stop time.

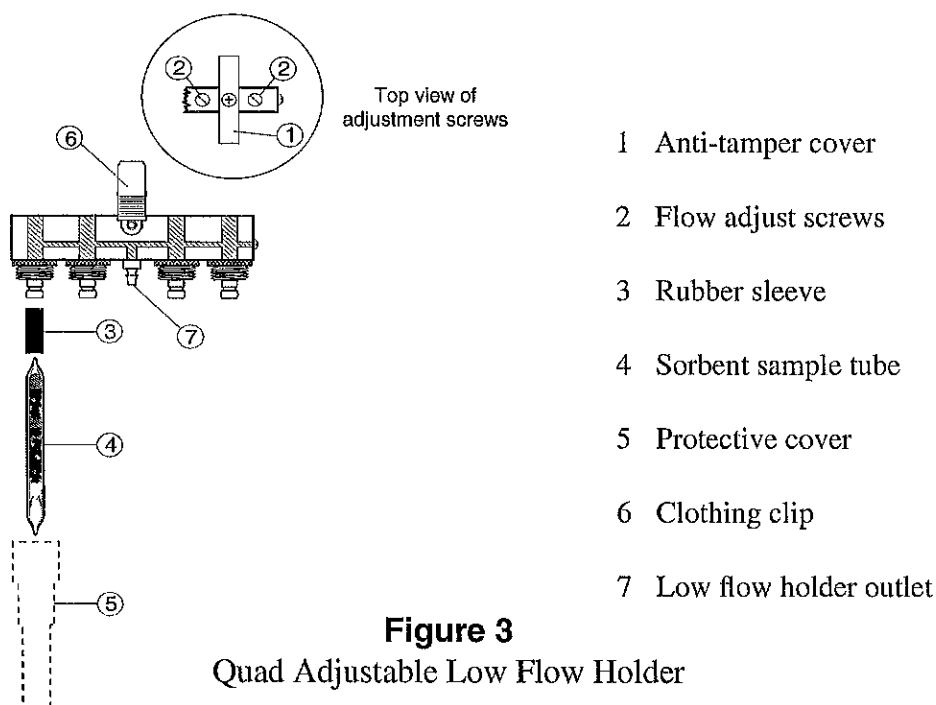
To return to high flow, remove the CPC and low flow holder.

For possible displays during sampling, see page 8.

Low Flow Applications (5 to 500 ml/min)

Using CPC & Multiple-tube Adjustable Low Flow Holder

Accessories



Setup - Multiple Tube

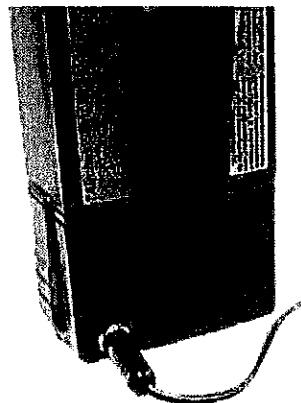
For a diagram of the pump, see Figure 1, page 9.

Ensure that the battery is fully charged before sampling. See page 5 for details.

1



After charging the battery pack, it is good practice to run the pump for approximately 5 minutes before calibrating. This ensures the battery is in more steady-state conditions and improves the agreement in pre and post-sampling calibrations.



Charger and battery connected

2

Setting or Verifying Flow Rate - Multiple Tube

- ⚠ **When performing multiple-tube sampling using an adjustable low flow holder (dual, tri, or quad), ensure the pump flow rate is set at 1.5 L/min. The maximum flow rate through any one tube is 500 ml/min*. Calculate the sum of all tube flow rates. If the sum is ≤ 1000 ml/min, proceed with calibration and sampling without any further adjustment to the pump flow rate. If the sum is >1000 ml/min, set the pump flow rate 15% higher than the sum of tube flow rates.**

* Back pressure across some sample tubes can be higher than average. In these instances, the maximum flow rate of 500 ml/min per tube may not be achieved.

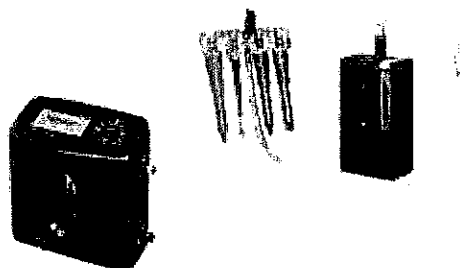
- ⚠ **Before use, allow pump to equilibrate after moving it from one temperature extreme to another.**

Set pump flow rate to 1.5 L/min. Connect a constant pressure controller (CPC) (Figure 2, page 10) to the pump intake (Figure 2, #1) using 1/4-inch Tygon tubing.

Using 1/4-inch tubing, connect the intake of a CPC (Figure 2, #3) to the outlet of a multiple-tube adjustable low flow holder (Figure 3, #7).

Insert an opened sorbent tube into each rubber sleeve of the low flow holder (Figure 3, #3 and 4) with the arrow on the tube pointing toward the holder.

- ⚠ **If sampling with fewer tubes than number of ports, insert unopened sorbent tubes in the empty ports to seal them.**



Connect CPC to pump intake, holder to CPC, and tube inlet to calibrator.

Note the flow rates specified by each sampling method and add them together. If the sum is ≤ 1000 ml/min, proceed to the next step. If the sum is >1000 ml/min, multiply the total tube flow rate by 1.15 and set the pump for that flow rate.

continued on page 14

2

cont'd

Connect a calibrator to the exposed end of a sorbent tube, loosen the screw on the appropriate port of the low flow holder, and activate the pump by pressing the on/off button.

Turn the brass flow adjust screw (Figure 3, #2) on the low flow holder until the desired flow rate is achieved. Turn clockwise to decrease flow.



Do not adjust the flow on the pump. Adjust the flow only by using the flow adjust screw on the low flow holder. Observe tube flow rate on calibrator.

When the desired flow is set on the initial tube, turn off the pump by pressing the on/off button. Remove the calibrator from the tube and connect to the exposed end of the next sorbent tube. Press the pump's on/off button and repeat the flow adjust process until all tubes are flow calibrated. Changing the flow on one tube will not affect the flow rate through the remaining tubes.

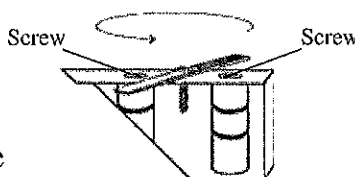


Figure 4 -
Cut-away of Tri/Quad Low Flow Holder

For tri and quad models, first rotate each anti-tamper cover (Figures 3 [on page 12] and 4) to expose the flow adjust screw, then adjust until calibrator indicates the desired flow.

When the flow rate is set for each tube, press the pump's on/off button and disconnect the calibrator.

Replace the sampling media used for calibration with unexposed media for sample collection. Use a protective tube cover to prevent tube breakage.

3

Sampling - Multiple Tube

- ❗ *Before use, allow pump to equilibrate after moving it from one temperature extreme to another*
- ❗ *Protect sample pump from weather when in use outdoors.*
- ❗ *Use of any device other than the approved battery pack to power the pump voids the UL Listing for intrinsic safety and any warranty.*



For personal sampling, clip the low flow holder to the worker in the breathing zone and the pump to the worker's belt.

Clip holder to worker and pump to belt.

Press the on/off button to clear the elapsed time display and to start sampling. Record the start time. The LCD will automatically track elapsed pump run time.

At the end of the sampling period, press the on/off button and record stop time.

To return to high flow, remove the CPC and low flow holder.

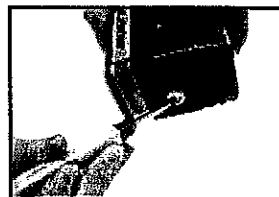
For possible displays during sampling, see page 8.

Maintenance

Pump Inlet Filter

The AirChek 52 Sampler is fitted with a filter/trap just below the pump intake. This prevents particles from being drawn into the pump mechanism. The filter should be replaced periodically. Follow this procedure:

1. Grip the inlet hose barb (Figure 1, #4 on page 9) and unscrew it counterclockwise.
2. Holding the pump upside down, use a small flathead screwdriver or tweezers to remove filter.
3. Place a new filter in the intake. Ensure the rubber gasket inside the inlet hose barb is still in place.
4. Screw the inlet hose barb back into place.

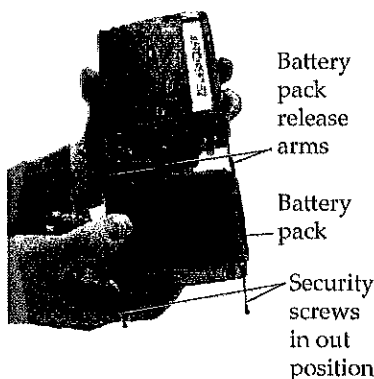


Replacing the Battery Pack



To enhance battery life, SKC ships battery packs separate from the pump (see *Charging the Battery Pack* on page 5). Once installed, completely charge the battery pack before operating the pump. It may be necessary to charge the battery a few times before maximum battery capacity is achieved.

1. Loosen two security screws on bottom of pump case and allow them to fall to the out position.
2. Pinch battery pack release arms and pull the bottom half of the pump case away from the top half.
3. Align arms on top half of case with slots on either side of the new battery pack housing. Ensure the back of the battery pack with the charging jack is on the same side as the belt clip.
4. Slide battery pack up until arms click into place.
5. Push each security screw into the battery pack housing and tighten.



Use of a repaired or rebuilt battery pack voids any warranty and the UL Listing for Intrinsic safety.

For information on SKC pump battery packs, visit <http://www.skcinc.com/instructions/1756.pdf>.

Battery Eliminator

The Battery Eliminator is an accessory that converts alternating current (AC) to direct current (DC) from which the pump can be operated for extended runs. **The Battery Eliminator should be used in non-hazardous locations only.** *See page 24 for ordering.*

To use the Battery Eliminator, the battery pack must be removed from the pump (*see Maintenance, Replacing the Battery Pack*). The Battery Eliminator is comprised of two pieces, (1) a wall cube that converts AC voltage to DC voltage and (2) a power adapter that reduces DC voltage. The wall cube fits into a standard wall outlet and its plug end is inserted into the power adapter. The power adapter is fitted on the pump in place of the battery pack.



Use of the battery eliminator to power the pump voids the UL Listing for intrinsic safety.

Service Policy

To return products to SKC for servicing:

1. Call 800-752-8472 (724-941-9701 for international customers) to obtain a Return Materials Authorization (RMA) number and Product Decontamination Form.
2. Carefully package the product. Mark the RMA number on any correspondence relating to the return and on the outside of the package.
3. Ship to SKC, freight prepaid, to the following address:

SKC Inc.
National Service Center
863 Valley View Road
Eighty Four, PA 15330

Package product carefully to prevent damage during transit. Include a contact name, phone number, shipping address, RMA number, and a brief description of the problem. For nonwarranty repairs, a purchase order number and billing address are also required. The Service Department will contact nonwarranty customers with an estimate before proceeding with repairs.

Note: *SKC Inc. will accept for repair any SKC product that is not contaminated with hazardous materials. Products determined to be contaminated will be returned unserviced.*

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Replacement Parts

Internal Stack Parts

No.	Description	Cat. No.
1A-C*	Stack Screws	P51891
2	Inlet/Hose Connect	P20106
2A	Replacement Inlet Filter (pk/10)	P40370
3	Pulsation Dampener	P2010802
4	Stack Plate	N/A
5A-B*	Valve Plates (Top and Bottom)	P213201
6	Diaphragm/Yoke Assembly	P2129B
7	Pump Body	P22417G
8	Motor/Eccentric	P518803
9	Pump Base Plate	P20102
	Full Stack without Motor	P20102A

**Multiple sections of stack included (as indicated in drawing)*

Parts not indicated in illustration

N/A	PC Board	P79592
N/A	Screw and O-ring Set (complete for one pump)	P22402



Use only SKC-approved parts to ensure reliable performance. Failure to do so voids any warranty.



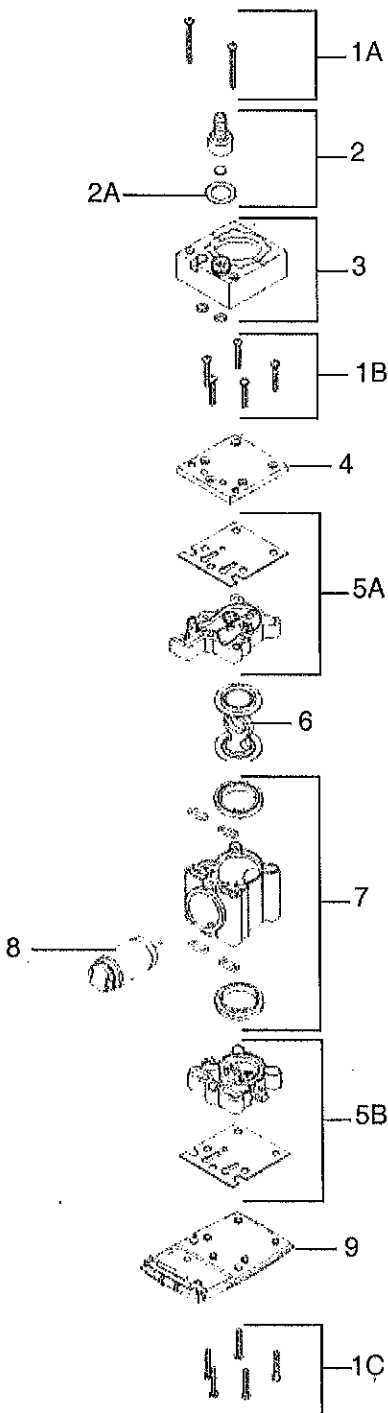
Failure to follow warnings and cautions voids any warranty.

See page 21 for drawing.

Replacement Parts

Internal Stack

See parts listing on page 20



Replacement Parts

External Case Parts

No.	Description	Cat. No.
1	Battery Pack, NiCad or Battery Pack, NiMH	P78011A P78011AMH
2	Battery Pack Release Arms	N/A
3	Battery Pack Security Screws	N/A
4	Compensation Pot A	N/A
5	Compensation Pot B	N/A
6	Power Plug for Battery Pack (pk/5)	P20107
7	Charging Jack (on rear of battery pack)	N/A
8	Impinger Holder Mounting Screws	N/A
9	Inlet	P20106
10	Control Cover	P20105
11	Flow Adjustment Screw	N/A
12	Power Switch (on/off)	N/A
13	Belt Clip (not shown)	P20104
14	LCD	P72391
15	External Case	P2010003



Use only SKC-approved parts to ensure reliable performance. Failure to do so voids the UL Listing for intrinsic safety and any warranty.



Use of a repaired or rebuilt battery pack voids any warranty and the UL Listing for intrinsic safety.



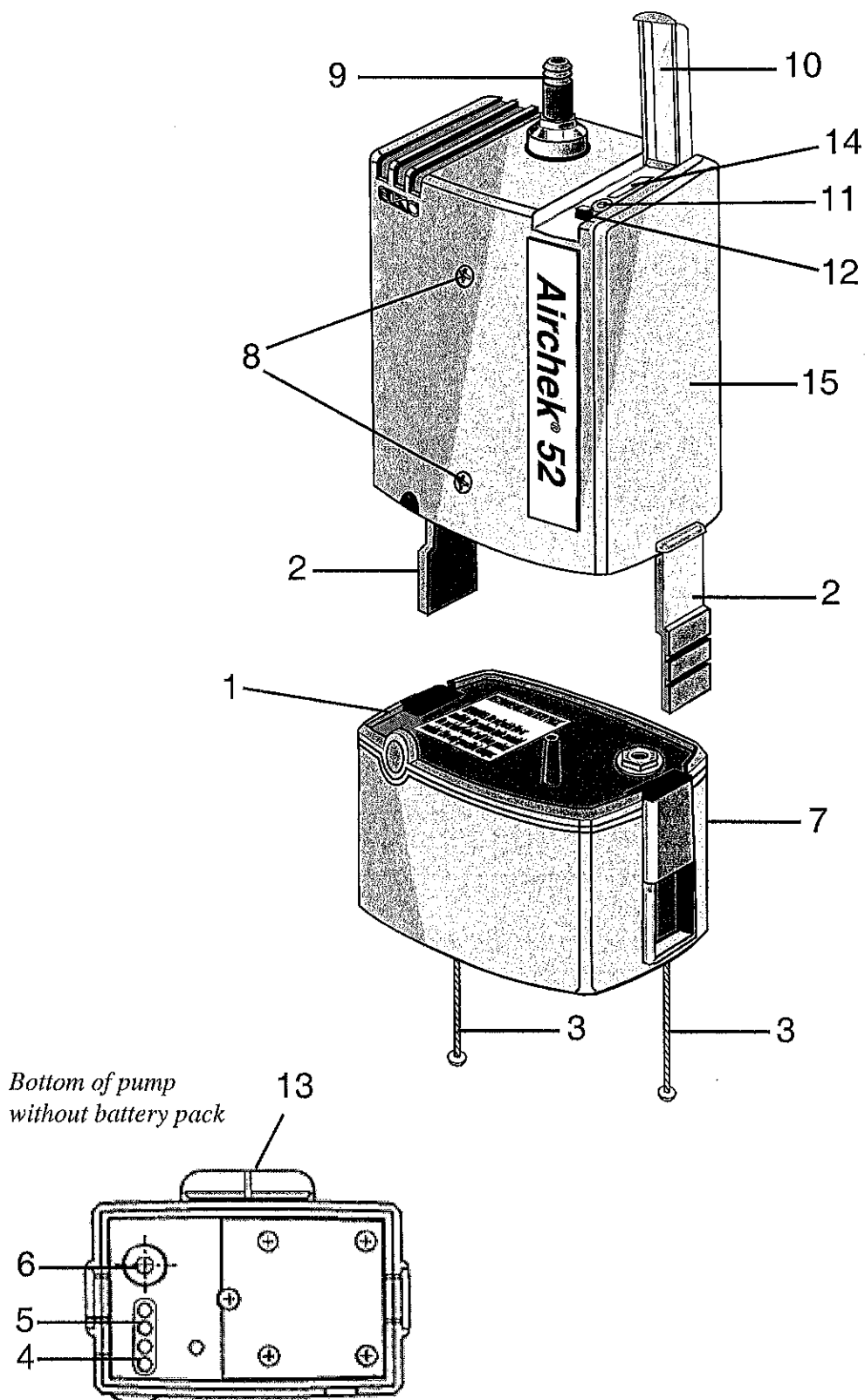
Failure to follow warnings and cautions voids any warranty.

See page 23 for drawing.

Replacement Parts

External Case Parts

See parts listing on page 22



Optional Accessories

Calibrator

Defender Primary Standard Calibrator,
50 to 5000 ml/min, includes battery,
charger (100-240 V), software, and
serial cable

Cat. No.

717-510M

Low Flow Sampling Accessories:

Single Holder (*included in Low Flow Kit below*)

Dual Holder

Tri Holder

Quad Holder

Constant Pressure Controller (CPC)

(*included in Low Flow Kit below*)

Low Flow (5 to 500 ml/min) Adapter Kit

includes CPC, single adjustable low flow

holder, and Type A tube cover

Cat. No.

224-26-01

224-26-02

224-26-03

224-26-04

224-26-CPC

210-500



Protective Sample Tube Covers:

Type For tubes up to:

A 70 mm long (standard charcoal)

(*included in Low Flow Kit above*)

B 110 mm long (large charcoal)

C 150 mm long

D 220 mm long

Cat. No.

224-29A

224-29B

224-29C

224-29D



Battery Maintenance:

PowerFlex Charging System

5-station, 100-240 V

Single, 100-240 V

PowerFlex Cable for AirChek 52

Battery Eliminator, for sampling using

line voltage, *use voids the UL Listing*

for intrinsic safety

Replacement Battery Pack, NiCad

Replacement Battery Pack, NiMH

Cat. No.

223-1000

223-2000

223-1004

223-300

P78011A

P78011AMH

Pump Accessories:

Screwdriver Set (included with pump)

Protective Nylon Pouch with belt and

shoulder strap, available in:

Black

High-profile Red

Noise reducing, Black

Cat. No.

224-11

224-88

224-96A

224-96C



Protective
Nylon Pouch



Use of a repaired or rebuilt battery pack voids any warranty and the UL Listing for intrinsic safety.



Failure to follow warnings and cautions voids any warranty.

SKC INC.

LIMITED ONE YEAR WARRANTY

1. SKC warrants that its instruments provided for industrial hygiene, environmental, gas analysis, and safety and health applications are free from defects in workmanship and materials under normal and proper use in accordance with operating instructions provided with said instruments. The term of this warranty begins on the date the instrument is delivered to the buyer and continues for a period of one (1) year.

This warranty does not cover claims due to abuse, misuse, neglect, alteration, accident, or use in application for which the instrument was neither designed nor approved by SKC Inc. This warranty does not cover the buyer's failure to provide for normal maintenance, or improper selection or misapplication. This warranty shall further be void if changes or adjustments to the instrument are made by other than an employee of the seller, or if the operating instructions furnished at the time of installation are not complied with.

2. SKC Inc. hereby disclaims all warranties either expressed or implied, including any implied warranties of merchantability or fitness for a particular purpose, and neither assumes nor authorizes any other person to assume for it any liability in connection with the sale of these instruments. No description of the goods being sold has been made a part of the basis of the bargain or has created or amounted to an express warranty that the goods will conform to any such description. Buyer shall not be entitled to recover from SKC Inc. any consequential damages, damages to property, damages for loss of use, loss of time, loss of profits, loss of income, or other incidental damages. Nor shall buyer be entitled to recover from SKC Inc. any consequential damages resulting from defect of the instrument including, but not limited to, any recovery under section 402A of the Restatement, Second of Torts.

3. This warranty extends only to the original purchaser of the warranted instrument during the term of the warranty. The buyer may be required to present proof of purchase in the form of a paid receipt for the instrument.

4. This warranty covers the instrument purchased and each of its component parts.

5. In the event of a defect, malfunction, or other failure of the instrument not caused by any misuse or damage to the instrument while in possession of the buyer, SKC Inc. will remedy the failure or defect without charge to the buyer. The remedy will consist of service or replacement of the instrument. SKC Inc. may elect refund of the purchase price if unable to provide replacement and repair is not commercially practicable.

6. (a) To obtain performance of any obligation under this warranty, the buyer shall return the instrument, freight prepaid, to SKC Inc., at the following address:

SKC Inc., National Service Center
863 Valley View Road
Eighty Four, PA 15330 USA

(b) To obtain return authorization information or for further information on the warranty performance you may telephone 724-941-9701 at the above address. See Service Policy section in operating manual (if applicable).

7. This warranty shall be construed under the laws of the Commonwealth of Pennsylvania which shall be deemed to be the situs of the contract for purchase of SKC Inc. instruments.

8. No other warranty is given by SKC Inc. in conjunction with this sale.