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Site Management Plan

D.C. Rollforms Site
Jamestown, New York

December 6, 2008

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Site Management Plan

D.C.Rollforms Site
Jamestown, New York

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Abbreviations

AC - air compressor

ACF - activated clay filter

ACFM - actual cubic feet per minute

AFU - advanced filtration unit

AP - auto pump

AS - air stripper

ASP - Analytical Services Protocol

B - regenerative blower

bgs - below ground surface

bls - below land surface

BPU - Board of Public Utilities

BTEX - Benzene, Toluene, Ethylbenzene, and Xylenes

BV - ball valve

CF - cartridge filters

cfm - cubic feet per minute

CFP - chemical feed pump

cfs - cubic feet per second

CLP - Contract Laboratory Program

COMP - composited in laboratory

COPC - Chemical of Potential Concern

cy - cubic yards

D - deep

DCE - Dichloroethene

DER - Division of Environmental Remediation

DNAPL - Dense Non-aqueous Phase Liquid

DO - Dissolved Oxygen

DRO - Diesel Range Organics

Abbreviations (continued)

ELAP - Environmental Laboratory Approval Program

EPA - Environmental Protection Agency

FSL - low flow alarm

FSP - Field Sampling Plan

ft - feet

ft amsl - feet above mean sea level

GP - Geoprobe point

gph - gallons per hour

gpm - gallons per minute

GRO - Gasoline Range Organics

HASP - Health and Safety Plan

HDPE - High Density Polyethylene

hp - horsepower

HX - heat exchanger

INT - interceptor/equalization tank

IW - injection well

JBPU - Jamestown Board of Public Utilities

JURA - Jamestown Urban Renewal Agency

KT - knockout tank

LAH - high liquid level alarm

LAHH - high-high liquid level alarm

lbs - pounds

LCD - Liquid Crystal Display

LCP - Local Control Panel

LEL - Lower Explosive Limit

LPGOC - liquid phase granular organically modified clay

LSHH - high-high liquid level sensor

Abbreviations (continued)

MCP - Main Control Panel

mg/L - millograms per liter

mm - millimeter

MW - monitoring well

NAPL - Non-aqueous Phase Liquid

ND - non-detect

NYCRR - New York Codes, Rules and Regulations

NYSDEC - New York State Department of Environmental Conservation

NYSDOH - New York State Department of Health

NYSDOH ELAP - New York State Department of Health Environmental Laboratory Accreditation Program

NYSDOT - New York State Department of Transportation

O&G - Oil and Grease

O&M - Operation and Maintenance

OM&M - Operation, Maintenance and Monitoring

ORP - Oxidation/Reduction Potential

OW - observation well

OWS - oil/water separator

PAH - high pressure alarm

PAHH - high-high pressure alarm

PAHs - Polycyclic Aromatic Hydrocarbons

PAL - low pressure alarm

PCBs - Polychlorinated Benzenes

PDM - Personal Dust Meter

PID - Photo Ionization Detector

PLC - Programmable Logic Control

POTW - Publicly Owned Treatment Works

Abbreviations (continued)

ppb - parts per billion

ppm - parts per million

psi - pounds per square inch

PT - pressure sensor/transmitter

PVC - Polyvinyl Chloride

QA/QC - Quality Assurance/Quality Control

QAPP - Quality Assurance Project Plan

RAOs - Remedial Action Objectives

RCRA - Resource Conservation and Recovery Act

RD/RA - Remedial Design/Remedial Action

RDWP - Remedial Design Work Plan

RI - Remedial Investigation

ROD - Record of Decision

RW - recovery well

S - shallow

SCADA - Supervisory Control and Data Acquisition

SCFM - standard cubic feet per minute

sch - schedule

SCOs - Soil Cleanup Objectives

SDR - Standard Dimension Ratio

SMP - Site Management Plan

SP - sample port

SSALs - Site Specific Action Limits

ST - storage tank

SV - solenoid valve

SVE - Soil Vapor Extraction

SVOCs - Semi-volatile Organic Compounds

Abbreviations (continued)

TAGM - Technical Administrative Guidance Memorandum

TAL - Target Analyte List

TCE - Trichloroethene

TCL - Target Compound List

TP - transfer pump or test point

TPH - Total Petroleum Hydrocarbons

TSS - Total Suspended Solids

ug/kg - micrograms per kilogram

ug/m^3 - micrograms per cubic meter

USACOE - United States Army Corps of Engineers

USEPA - United States Environmental Protection Agency

VC - Vinyl Chloride

VEP - Vacuum Enhanced Pumping

VEPOW - Vacuum Enhanced Pumping observation well

VER - Vacuum Enhanced Recovery

VOCs - Volatile Organic Compounds

VPGAC - vapor phase granular activated carbon

1. Introduction

On behalf of Ingersoll Rand Company (Ingersoll Rand), ARCADIS of New York, Inc. (ARCADIS) has prepared this Site Management Plan (SMP) for the D.C. Rollforms inactive hazardous waste site in Jamestown, Chautauqua County, New York (see Figure 1).

The property subject to this SMP is approximately 2.38 acres, comprised of a vacant parcel currently owned by Jamestown Allenco, Inc (Figure 2). The SMP describes the site activities to be conducted during the operation and maintenance (O&M) phase of the remedial program. The Remedial Design/Remedial Action (RD/RA) Work Plan has been implemented pursuant to the Administrative Order on Consent and Record of Decision (ROD) for the site, and the as-built remedial construction for the remedy is described in the Final Engineering Construction Completion report (ARCADIS 2008).

The SMP has been organized in the following sections:

Section 2.0 – Site Conditions

Section 3.0 – Summary of Remedial Program

Section 4.0 – Access Agreements/Environmental Easements

Section 5.0 – Institutional Controls

Section 6.0 – Soils Management Plan

Section 7.0 – Construction Worker Protection

Section 8.0 – Notification

Section 9.0 – Reporting

Section 10.0 – References

The SMP is a portion of the overall remedial program which also addresses future disturbance of cover materials and any subsurface soil. The SMP is not intended to serve as a design document for any future construction activities.

2. Site Conditions

2.1 Site Background

2.1.1 Site Location and Description

The site is located at 583 Allen Street in Jamestown, Chautauqua County, New York (see Figure 1). The site is approximately 2.38 acres in size, and is owned by Jamestown Allenco (Figure 2). The adjacent northern parcel, which has been delisted from the site, is owned by Heavy Press and Tool, Inc. The site is bounded by Allen Street on the east, the Chadakoin River on the north and northwest, and the Webber Knapp and Jamestown Urban Renewal Agency properties on the south. The site is located in a mixed residential and commercial area, which is served by a public water supply.

2.1.2 Site Operational History

In 1964, Ingersoll Rand, as the Proto Tool Company, began manufacturing hand tools at the site. Site operations included processes such as forging, machining, heat-treat oil quench, sandblasting, polishing, punch-press operations, plastisol dipping of handles, painting, paint stripping, vapor degreasing, electroplating, and wastewater treatment in the southern portion of the site (as indicated on Figure 2).

In 1984, Ingersoll Rand initiated closure activities of the facility under the RCRA program. In 1985, Ingersoll-Rand donated the property to Jamestown Urban Renewal Agency (JURA). Most of the buildings were demolished in 1986. JURA sold the property to the current owner - Dowcraft Corporation - in 1987. In 1990 and 1991, a series of environmental investigations commissioned by Dowcraft determined that site groundwater was contaminated with solvents and oil.

2.1.3 Site Classification

This site was listed in the registry of Inactive Hazardous Waste Disposal Sites in New York State in 1994. The site is classified as Class 2 because hazardous wastes as defined in 6NYCRR Part 371 were discovered at the site. A Class 2 means that the

site poses a significant threat to the public health and environment and action is required.

2.2 Nature and Extent of Contamination

Sampling of soil and groundwater was conducted during multiple remedial investigations. A brief summary of the chemical constituents detected in each medium is provided below.

2.2.1 Surface Soil

Surface soil samples were collected during the RI at fifteen locations throughout the site. Volatile organic compounds (VOCs) were not detected in any of the surface soil samples. Analysis of semi-volatile organic compounds (SVOCs) indicated total SVOC concentrations ranged from 2,768 micrograms per kilogram (ug/kg) (parts per billion, ppb) to 88,961 ppb.

Polychlorinated Biphenyl's (PCBs) were detected in each sample ranging in concentration from 13 ppb (estimated) to 10,700 ppb.

Concentrations of metals in the surface soil samples varied considerably. The concentrations ranged for copper from 19.4 milligrams per kilogram (mg/kg) (parts per million, ppm) to 3,090 ppm; lead from 26.6 ppm to 210 ppm; nickel from 14.2 ppm in to 347 ppm; and, zinc from 58 ppm to 1840 ppm. Cyanide and cadmium were not detected in any of the surface soil samples.

2.2.2 Subsurface Soil

During the 1991 investigation, 8 test pits were excavated and subsurface soil samples were collected from locations where visual contamination was present. Analytical results indicated contamination of metals above the Technical Administrative Guidance Memorandum (TAGM-4046) levels for arsenic, cadmium, chromium, copper, mercury, nickel, and zinc over a widely dispersed area. No volatile organic compounds (VOCs) were detected in unsaturated sub-surface soil samples. Oil and grease varied from 0.21% to 7.1% while cyanide ranged from non-detect (ND) to 15.4 ppm.

Total VOCs in excess of the TAGM value of 10 ppm were identified in TP-11, TP-12, and TP-15. SVOCs concentrations ranged from ND to 79 ppm.

2.2.3 Groundwater

Fifteen groundwater monitoring wells and 27 Geoprobe were installed and sampled between 1997 and 2000. VOCs, including trichloroethene (TCE), dichloroethene (DCE), and vinyl chloride (VC) were reported in several groundwater samples with the highest concentrations reported in monitoring wells MW-8 S/D and Geoprobe GP-5. In October 1999, 5 additional Geoprobe temporary wells were installed and sampled to determine the extent of VOCs. Samples collected from these Geoprobe locations indicated elevated levels of VOCs ranging from ND to 40,000 ppb. Total SVOCs, consisting primarily of polycyclic aromatic hydrocarbons (PAHs), were present in most of the groundwater samples, with the highest concentrations detected in Geoprobe GP-5 (60,646 ppb) and in GP-6 (248,600 ppb).

Non-aqueous phase liquid (NAPL), consisting primarily of total petroleum hydrocarbons (TPHs), was observed in ESI-3, ESI-4, and MW-8.

2.2.4 Surface Water

Surface water samples collected from the Chadakoin River upstream and downstream of the site did not detect any VOCs, SVOCs, or PCBs. Further, surface water samples collected adjacent to the site indicated non-detectable concentrations to low concentrations of metals, typical of the ambient surface-water quality of the Chadakoin River based on the generally higher concentrations of metals in upstream samples.

2.2.5 Sediment

Sediment samples were collected during the RI and supplemental RI. A total of ten samples were collected at locations upstream, adjacent, and downstream of the site. Analytical results of samples indicated that metals were the primary chemical of potential concern (COPC) in sediments upstream, downstream and adjacent to the site.

2.2.6 Air

Air monitoring was performed during all intrusive field activities conducted during the RI. A photoionization detector (PID) and a MINIRAM particulate monitor were used to monitor air in the immediate vicinity of the boreholes and breathing zones during the drilling activities. No exceedences in action levels specified in the HASP were recorded during any of the field activities.

3. Summary of Remedial Program

The remedy implemented for the D.C. Rollforms site included the following elements:

- Installation of a vertical barrier wall (e.g., sheet-pile) along the riverbank of the Chadakoin River;
- Vacuum-Enhanced Pumping (VEP) to address NAPL and VOCs in groundwater;
- Excavation of the soil between the vertical barrier wall and backfilling with clean material;
- Removal of abandoned site storm water outfalls;
- Riverbank reconstruction/stabilization and restoration;
- Covering and reseeding any disturbed areas with clean soil;
- The removal of sediment from the Chadakoin River; and
- Fish habitat construction in the Chadakoin River (e.g., wingwall structure).

The remedial system layout is shown on the site plan in Figure 2. The groundwater collection system is designed to extract groundwater impacted by NAPL and VOCs consisting primarily of trichloroethene, cis-1,2 dichloroethene, and vinyl chloride. The extracted groundwater is treated via an oil/water separator, filtration, and air stripping prior to discharge to the POTW sanitary sewer under a permit from the Jamestown Board of Public Utilities (JBPU). The Operation, Maintenance and Monitoring (OM&M) Plan (ARCADIS 2008) (provided under separate cover) provides further details on the operation, maintenance, and performance monitoring activities associated with the groundwater collection and treatment system. Inspections and any maintenance required for the re-constructed riverbank and cover system at the site are outlined in the Soil Management Plan in Section 6.0.

4. Access Agreements

Ingersoll Rand is allowed access to the site under an access agreement with the property owner, Jamestown Allenco, Inc. The access agreement allows access to the site for the purpose of implementing the remedial program under the RD/RA Work Plan

and for long term operation, maintenance and monitoring (OM&M). The current signed access agreement is provided in Appendix A.

5. Institutional Controls

Institutional controls implemented as part of the Remedial Action are provided in Appendix B. The Declaration of Covenants and Restrictions dated June 2005 by Jamestown Allenco addresses prohibitions on the property. The prohibitions set forth in the declaration are summarized as follows:

- The property is prohibited from ever being used for purposes other than commercial or industrial;
- The use of groundwater underlying the property is prohibited without rendering it safe for drinking water or industrial/commercial purposes; and
- The owner of the property shall continue and not interfere with any institutional and engineering controls the New York State Department of Environmental Conservation (NYSDEC) required Ingersoll Rand to put into place and maintain.

The covenants and restrictions run with the land and are binding upon all future owners of the property.

6. Soils Management Plan

The Soils Management Plan outlines the inspection and maintenance activities for the re-constructed riverbank, surface cover materials/structures, and management of soil material during any future construction activities. The riverbank and approximate areal extent of the cover material are shown as Figure 2. This section provides guidelines for the management of soils/fill excavated at the site, and a schedule for inspections. Maintenance or repair/replacement of the cover system or riverbank during any future intrusive work which breaches the riverbank or cover system will be performed in accordance with the protocols provided below and documented in the Annual Monitoring Report.

In addition to inspection and maintenance activities during remediation of the site, soil disturbances may also occur as utilities and current or future property owners perform future maintenance, or other activities, during or following the remedial program.

The environmental guidelines are also provided for management of subsurface soils/fill and the long-term maintenance of the site during any future intrusive work that may occur in potentially impacted soils remaining onsite, including installation, repair or replacement of utilities. Other non-intrusive maintenance activities that do not involve excavation or contact with soils, such as sewer cleaning and inspections, should not be affected by any restrictions or other special procedures associated with the remedial action.

6.1 Management of Soils/Fill and Cover System Maintenance

The SMP includes the following conditions:

- Compliance with this SMP is solely the responsibility of Ingersoll Rand, the property owner or utility owner. Any and all project costs or delays that result from implementing this SMP will be borne solely by the property owner or utility owner performing work on rights-of-way.

- Future buildings that may be installed on the inactive hazardous waste site will require a soil vapor investigation. Based on the results, a sub-slab depressurization system may be required to address residual contamination. The designers shall contact NYSDEC to properly address these considerations.

- Soil that is excavated and is intended to be removed from the inactive hazardous waste site must be managed, characterized, and properly disposed of in accordance with NYSDEC regulations and directives. Soil excavated at the site may be reused as backfill material on-site but must be inspected for sheens and will be field screened for the presence of VOCs with a photoionization detector (PID). If the soils produce PID readings at concentrations greater than site background levels, they will be considered potentially contaminated and stockpiled on the property for further assessment as described in Section 6.2.1. If no sheens are present and the sustained PID readings remain at or below site background concentrations, the soil will be placed at a depth greater than 12 inches below the finished ground surface and covered with at least 12 inches of suitable material meeting the NYSDEC Soil Cleanup Objectives levels included in the 6NYCRR Part 375 residential cleanup levels. This is discussed in more detail in Section 6.2.

- Groundwater encountered during excavation activities may be contaminated and should be handled and disposed of in accordance with all local, state and federal regulations as described in Section 6.4.

- Any off-site fill material brought to the site for filling and grading purposes shall be from a permitted borrow source free of industrial and/or other potential sources of chemical or petroleum contamination. Off-site borrow sources should be subject to collection of one representative composite sample per source. The sample should be analyzed for Target Compound List (TCL) VOCs, SVOCs, pesticides, PCBs and Target Analyte List (TAL) metals plus cyanide. The soil shall be acceptable for use as cover material provided that all parameters meet the NYSDEC Soil Cleanup Objectives levels included in the 6NYCRR Part 375 residential cleanup levels.

- Prior to any construction activities at the site, workers are to be notified of the site conditions by the owner (or owner's representative) and will be provided with clear instructions regarding how the work is to proceed. In addition to this SMP, invasive work performed at the property must be performed in accordance with all applicable local, state, and federal regulations to protect worker health and safety.

- In the event that intrusive activities are necessary within the limits of the inactive hazardous waste site, the property owner, utility owner, or developer performing the intrusive work shall contact the NYSDEC at least 14 days prior to the start of activities:

  Mr. Jaspal S. Walia (or other)
  NYSDEC – Division of Environmental Remediation
  270 Michigan Avenue, Buffalo, NY 14203
  (716) 851-7220

6.2 Soil Excavation

During future construction activities at the Site, excavation of soil/fill material may be necessary for repairs/maintenance activities and potentially as part of construction by others that is not related to the remedial program. Sedimentation control measures and facilities, as necessary, will be employed during any future site construction activities. Prior to any construction activity, erosion and sediment control measures shall be installed and maintained. For excavation work below the cover system, a

Professional Engineer's representative with construction/remediation experience will monitor soil/fill excavations or disturbances. The Professional Engineer (P.E.) must also provide a stamped/signed certification that excavation work below the cover system and subsequent repair/replacement of the cover system was conducted in a manner consistent with this SMP. This P.E. certification must be included in the annual certification report.

If buried drums or underground storage tanks are encountered during soil excavation activities, excavation will cease and the NYSDEC will be immediately notified. All drums and/or underground storage tanks encountered will be evaluated and the Owner will submit an investigation/sampling plan for NYSDEC approval. Appropriately trained personnel will inspect all of the drums and/or underground storage tanks while following all applicable federal, state, and local regulations. The results of the investigation and sampling of the drums and/or underground storage tanks will be provided to the NYSDEC, with a recommendation for abandonment in place or removal in accordance with all applicable federal, state, and local regulations. Removed drums and underground storage tanks will be properly characterized and disposed off-site. The soil/fill surrounding the buried drums or underground storage tanks will be considered as potentially contaminated and will be stockpiled and characterized.

The soil/fill will be inspected for sheens and will be field screened for the presence of VOCs with a photoionization detector (PID). Excavated soil/fill may be used on-site as fill below the cover system. Soil/fill that is excavated which cannot be used as fill below the cover system will be further characterized as outlined below in Section 6.2.1, prior to transportation off-site for disposal at a permitted facility. Excavated soil/fill that has a sheen, or produces PID readings greater than site background levels will be considered potentially contaminated and stockpiled on the property for further assessment. The potentially contaminated soil/fill will be stockpiled on polyethylene sheeting and then sampled for reuse or disposal. The stockpiled, potentially contaminated soil/fill will also be completely covered using polyethylene sheeting to reduce the infiltration of precipitation and the migration of dust. Sampling and analysis will be completed to determine waste characteristics and disposal at a permitted waste management facility. The stockpiled soils will be profiled and disposed of within 30 days of completing the excavation activity.

Excavated soil/fill that has been characterized following the protocol below may be reused as subgrade or excavation subgrade backfill, if appropriate, with NYSDEC approval. On-site soil/fill may not be reused as backfill in landscaping berms to be used for the planting of trees and shrubs. If the analysis of the soil/fill samples reveals

unacceptably high levels of any analytes, the soil may not be used as backfill on-site and additional analyses will be necessary to further classify the material for disposal purposes.

6.2.1 Excavated and Stockpiled Soil/Fill Sampling and Disposal

Soil/fill material that is excavated as part of future site development, utility construction, or maintenance must be assessed for potential contamination and be handled accordingly to protect the environment and public health. A soil/fill characterization flow chart is shown on Figure 3. Soil/fill materials that cannot be used as fill at a depth greater than 12 inches below finished grade shall be further characterized prior to transportation and disposal off-site. For excavated soil/fill with visual evidence of contamination (i.e., staining or elevated measurements using a PID), one composite sample and a duplicate sample shall be collected for each 100 cubic yards of stockpiled soil/fill. For excavated soil/fill that does not exhibit visual evidence of contamination, one composite sample and a duplicate sample shall be collected for every 2,000 cubic yards of stockpiled soil, and a minimum of one sample shall be collected for volumes less than 2,000 cubic yards to determine whether soils may be reused or must be disposed of off-site.

The composite sample shall be collected from five locations within each stockpile. A duplicate composite sample shall also be collected. PID measurements shall be recorded for each of the five individual locations. One grab sample shall be collected from the individual location with the highest PID measurement. If none of the five individual sample locations exhibits PID readings, one location shall be selected at random. The composite sample shall be analyzed for the site-specific compounds by a New York State Department of Health Environmental Laboratory Accreditation Program (NYSDOH ELAP)-certified laboratory for:

- Volatile Organic Compounds (VOCs)
- Polyclyclic Aromatic Hydrocarbons (PAHs)
- Resource Conservation and Recovery Act (RCRA) Metals
- Polychlorinated biphenyls (PCBs)

The grab sample shall also be analyzed for BTEX.

Soil samples shall be composited by placing equal portions of fill/soil from each of the five composite sample locations into a pre-cleaned, stainless steel (or Pyrex glass) mixing bowl. The soil/fill shall be thoroughly homogenized using a stainless steel scope or trowel and transferred to pre-cleaned jars provided by the laboratory. Sample jars shall then be labeled and a chain-of-custody form shall be prepared.

Additional characterization sampling for off-site disposal may be required by the disposal facility. To potentially reduce off-site disposal requirements/costs, the utility owner or site developer may also choose to characterize each stockpile individually. If the analytical results indicate that concentrations exceed the standards for RCRA characteristics, the material shall be considered a hazardous waste and must be properly disposed of off-site at a permitted disposal facility within 90 days of excavation. If the analytical results indicate that the soil is not a hazardous waste, the material shall be properly disposed of off-site at a nonhazardous waste facility or other NYSDEC-approved destination. If the analytical results indicate that the soil are below 6NYCRR Part 375 residential soil cleanup objectives, the soils may be used as fill off-site, as approved in writing by NYSDEC. Stockpiled soil cannot be transported on or off-site until the analytical results are received.

6.2.2 Subgrade Material

Subgrade material used to backfill excavations or placed to increase sites grades or elevation must be approved in writing by NYSDEC and shall meet the following criteria: (see Figure 4)

- Excavated on-site soil/fill that appears to be visually impacted shall be sampled and analyzed. The soil/fill can be used as backfill on-site, upon approval by NYSDEC, if analytical results indicate that the contaminants, if any, are present at concentrations below the site-specific action limits (SSALs) or 6NYCRR Part 375 residential soil cleanup objectives and as follows:
    - Surface soil (1 – 12 inches BGS) must meet 6NYCRR Part 375 residential soil cleanup objectives requirements
    - Subsurface soil (greater than 12 inches bgs) must meet 6NYCRR Part 375 commercial soil cleanup objectives requirements. See Table 1 below for site specific parameters and action levels.

Table 1. Subsurface Soil Site Specific Parameters and Action Levels.

Site Specific Parameters	6NYCRR Part 375-6.8(b) Commercial SCOs
Volatile Organic Compounds (ppm)	
BTEX (total)	500
Benzene	44
Ethylbenzene	390
Toluene	500
Vinyl chloride	13
1,2-Dichloroethene (total)	500
Trichloroethene	500
Xylene (total)	500
PAHs (ppm)	50
Metals (ppm)	
Arsenic	16
Cadmium	9.3
Chromium, hexavalent	400
Copper	270
Mercury	2.8
Nickel	310
Lead	1000
Zinc	10,000
NAPL	ND

Definitions:
SCOs - Soil Cleanup Objectives
ppm - parts per million or micrograms per kilogram (mg/kg)
NAPL - Non-aqueous phase liquid
ND - Non-detect

- Any off-site fill material brought to the site for filling and grading purposes shall be from an acceptable borrow source free of industrial and/or other potential sources of chemical or petroleum contamination that meets 6NYCRR Part 375 residential soil cleanup objectives requirements.

- Off-site soils intended for use as site backfill cannot otherwise be defined as a solid waste in accordance with 6 NYCRR Part 360-1.2(a).

- If the utility owner, site developer, or contractor designates an off-site fill source as "virgin" soil, it shall be further documented in writing to be native soil material from areas not having supported any known prior industrial or commercial development or agricultural use.

- Off-site virgin soils should be subject to collection of one representative composite sample per source. The sample should be analyzed for TCL VOCs, SVOCs, pesticides, PCBs, arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver, and cyanide. The soil shall be acceptable for use as backfill provided that all parameters meet 6NYCRR Part 375 residential soil cleanup objectives.

- Off-site non-virgin soils shall be tested via collection of one composite sample per 500 cubic yards of material from each source area. If more than 1,000 cubic yards of soil are borrowed from a given off-site non-virgin soil source area and both samples of the first 1,000 cubic yards meet 6NYCRR Part 375 residential soil cleanup objectives, the sample collection frequency may be reduced to one composite for every 2,500 cubic yards of additional soils from the same source, up to 5,000 cubic yards. For borrow sources greater than 5,000 cubic yards, sampling frequency may be reduced to one sample per 5,000 cubic yards, provided all earlier samples met 6NYCRR Part 375 residential soil cleanup objectives.

6.2.3 Cover Material

The purpose of the surface cover is to eliminate the potential for human contact with fill material. Where excavation or disturbance of the cover material occurs during maintenance, repair, utility work or during site development, the cover shall be restored with clean soil and vegetation.

The cover soil material shall meet the following criteria (see Figure 5):

- Excavated on-site soil/fill shall not be used as cover material.

- Off-site borrow soils will be documented as having originated from locations having no evidence of disposal or release of hazardous, toxic or radioactive substances, wastes or petroleum products.

- Off-site soils intended for use as site cover cannot otherwise be defined as a solid waste in accordance with 6NYCRR Part 360-1.2(a).

- If the source is designated as "virgin" soil, it shall be further documented in writing to be native soil material from areas not having supported any known prior industrial or commercial development or agricultural use.

- Virgin soils should be subject to collection of one representative composite sample per source. The sample should be analyzed for TCL VOCs SVOCs pesticides, PCBs and TAL metals plus cyanide. The soil will be acceptable for use as cover material provided that all parameters meet the NYSDEC recommended soil cleanup objectives included in 6NYCRR Part 375 residential soil cleanup objectives.

- Non-virgin source area soils will be tested via collection of one composite sample per 500 cubic yards of material from each source area. If more than 1,000 cubic yards of soil are borrowed from a given off-site non-virgin soil source area and both samples of the first 1,000 cubic yards meet the 6NYCRR Part 375 residential soil cleanup objectives criteria, the sample collection frequency will be reduced to one composite for every 2,500 cubic yards of additional soils from the same source, up to 5,000 cubic yards. For borrow sources greater than 5,000 cubic yards, provided all earlier samples met the 6NYCRR Part 375 residential soil cleanup objectives criteria.

- To reduce the potential for disturbance of the soil cover material, berms or mounds composed of clean soil will be constructed in areas in which trees and shrubs will be planted.

6.3 Dust Control

The surface of unvegetated or disturbed soil/fill areas will be wetted with water or other dust suppressive agents to control dust during construction. Any subgrade material left exposed during extended interim periods (greater than 90 days) prior to placement of final cover shall be covered with a temporary cover system (i.e., tarps, spray type cover system, etc.) or planted with vegetation to control fugitive dust to the extent practicable.

Particulate monitoring will be performed along the downwind occupied perimeter of the subparcel during subgrade excavation, grading, and handling activities in accordance with the Community Air Monitoring Plan further detailed in Section 7.1 and in accordance with NYSDEC Technical and Administrative Guidance Memorandum (TAGM) 4031 (Fugitive Dust Suppression and Particulate Monitoring Program at Inactive Hazardous Waste Sites).

Dust suppression techniques will be employed at the Site in accordance with NYSDEC DER TAGM 4031. This TAGM describes guidance for dust monitoring, and includes a list of effective dust suppression techniques.

As per TAGM 4031, dust suppression techniques that may be used at the Site include applying water on roadways, wetting equipment, spraying water on buckets during excavation and dumping, hauling materials in properly covered or watertight containers, covering excavated areas and material after excavation activity ceases, establishing vegetative cover immediately after placement of cover soil, and reducing the excavation size and/or number of excavations. The use of atomizing sprays is recommended so that excessively wet areas will not be created but fugitive dust will be suppressed.

6.4 Construction Water Management

Pumping of water (i.e., ground water and/or storm water that has accumulated in an excavation) from excavations, if necessary, will be done in such a manner as to prevent the migration of particulates, soil/fill, or unsolidified concrete materials, and to prevent damage to the existing subgrade. Water pumped from excavations will be managed to prevent endangerment of public health, property, or any portion of the constructed remedy.

In areas where ground water may be contaminated, the ground water in excavations will be field screened for VOCs and observed for any noticeable sheen. Water in the excavations will not be discharged to the ground surface if:

- staining or PID measurements above background are observed in the excavation, or
- a sheen is present on the water surface.

If any of these conditions exist, the water pumped from the excavations will be containerized and analyzed in accordance with the Surface Water and Ground Water Quality Standards set forth in 6 NYCRR Part 703.5 and the JBPU sewer discharge permit. If the water meets the surface water and ground water quality standards, it may be discharged to the ground surface. If the water does not meet the surface water and ground water quality standards, it may be discharged to the local sewer under the JBPU discharge permit. If for any reason the water cannot be treated on-site via the treatment system, it will be transported off-site for proper disposal.

6.5 Access Controls

Access to soil/fill on the property must be controlled until final cover is placed to prevent direct contact with subgrade materials. Excavated subgrade material that is stockpiled on site must be temporarily covered to limit access to that material.

6.6 Inspections and Maintenance

As part of the site remedy, the following remedial design elements were constructed.

- Soil cover of 12 inches in areas disturbed during construction;
- Re-constructed riverbank and stabilization erosion controls;
- Riverbank plantings; and
- Recovery wells and monitoring wells

The location of these remedy elements are shown on Figure 2. Each of these areas will be inspected in accordance with the schedule below.

Frequency	Responsible Person	Actions
Quarterly	Project Engineer	Inspections
Annual	Professional Engineer	Inspection/Certification

The cover system, riverbank, and wingwall structure will be inspected for erosion, sloughing, settlement or other indication of loss of integrity. If the riverbank or wingwall shows any loss of integrity it shall be repaired to its originally constructed form. The riverbank plantings will be observed for any signs of distress or lack of growth. Any planting found in distress will be replaced with the same species. Recovery wells and monitoring wells will be inspected to observe to condition of the concrete surface seal,

and presence of a secure locking cap or bolt down road box. Site monitoring and inspection forms are provided in Appendix C.

All inspections will be documented, and any corrective actions or maintenance activities will be included in the Annual Monitoring report (see Section 9.0).

7. Construction Worker Protection

Any future work at the site involving subsurface construction or maintenance activities (e.g., excavation repairs and contractor utility workers) will be required to implement appropriate health and safety procedures. These procedures will involve, at a minimum, donning adequate personal protective equipment, performing appropriate air monitoring, and implementing other engineering controls as necessary to mitigate potential ingestion, inhalation and contact with residual constituents in the soils. The work will follow the health and safety procedures presented in the Site Health and Safety Plan (HASP) (ARCADIS 2008), and any addendums or Job Safety Analysis prepared for the work. An electronic copy of the HASP has been provided in Appendix D.

- Any third party Contractor shall follow the site HASP and have prepared a task specific HASP, written in accordance with 29 CFR 1926.65, prepared, signed and sealed by a safety professional; a safety professional and/or a trained safety representative(s) active on the job whenever the work is in progress; an effective and documented safety training program; and a safety work method check list system.

7.1 Community Air Monitoring Program

Air monitoring will be performed during any construction activities in accordance with HASP and the New York State Department of Health (NYSDOH) Generic Community Air Monitoring Plan.

All air monitoring readings will be recorded in a logbook and will be available for review.

All characterization samples collected during any future site work activities will be analyzed using the most recent NYSDEC Analytical Services Protocol (ASP), consistent with Section 2 of DER-10, the Technical Guidance for Site Investigation and Remediation.

The laboratory proposed to perform the analyses will be certified through the New York State Department of Health Environmental Laboratory Approval Program (ELAP) to perform Contract Laboratory Program (CLP) analysis and Solid Waste and Hazardous Waste Analytical testing on all media.

Procedures for chain of custody, laboratory instrumentation calibration, laboratory analyses, reporting of data, internal quality control, and corrective actions shall be followed as per the site Quality Assurance Project Plan (QAPP), NYSDEC ASP and as per the laboratory's Quality Assurance Plan.

Where appropriate, trip blanks, field blanks, field duplicates, and matrix spike, matrix spike duplicate shall be performed at a rate of 5% (1 per up to 20 samples) and will be used to assess the quality of the data. The laboratory's in-house QA/QC limits will be utilized whenever they are more stringent than those suggested by the Environmental Protection Agency (EPA) methods.

8. Notification

As noted in Section 4, the deed restrictions for the property prohibit the use of groundwater at the site. In addition, there shall be no construction, use or occupancy of the property by others which results in the disturbance or excavation of the property without prior approval by NYSDEC. In the event that site work threatens the integrity of the cover system or riverbank which would result in human exposure to contaminated soils, prior written approval by NYSDEC is required. Notification of any such work by at least 60 days, to allow time for review and any necessary revisions of a work plan, be followed by the property owner prior to and following site development, as appropriate.

9. Reporting

ARCADIS will prepare an Annual Monitoring Report to summarize the site inspections, document any repair or construction activities, and the operational and monitoring data generated during the remedial activities at the D.C. Rollforms Site. As described in the Operation, Monitoring and Maintenance Plan (provided under separate cover), the Annual Monitoring Report will include a summary of the remedial system operation and maintenance (O&M) and monitoring activities associated with the remedial system during the prior year including the extracted volumes of groundwater and vapor, extracted groundwater and vapor phase contaminant mass removal, analytical data, groundwater monitoring field parameters and analytical data, system operation and

maintenance, and any system modifications performed during the reporting period. Figures illustrating quality will also be included in the report.

The annual report will also contain certification (Appendix E) that the institutional controls put in place, have not been altered and are still effective; and that the remedy and cover material have been maintained. If the cover system has been breached during the year covered by that Annual Report, the report will include the following:

- A certification that all work was performed in conformance with this SMP.
- Plans showing areas and depth of fill removal.
- Copies of inspection reports for soil-related issues.
- Description of erosion control measures, if required.
- A text narrative describing the excavation activities performed, health and safety monitoring performed (both site specified and Community Air Monitoring), quantities and locations of soil/fill excavated, disposal locations for the soil/fill, soil sampling locations and results, a description of any problems encountered, location and acceptability test results for backfill sources, and other pertinent information necessary to document that the site activities were carried out properly. If the disturbed area exceeds one acre, the following must also be included in the annual certification.
- Plans showing before and after survey elevations to document the thickness of the clean soil cover system.

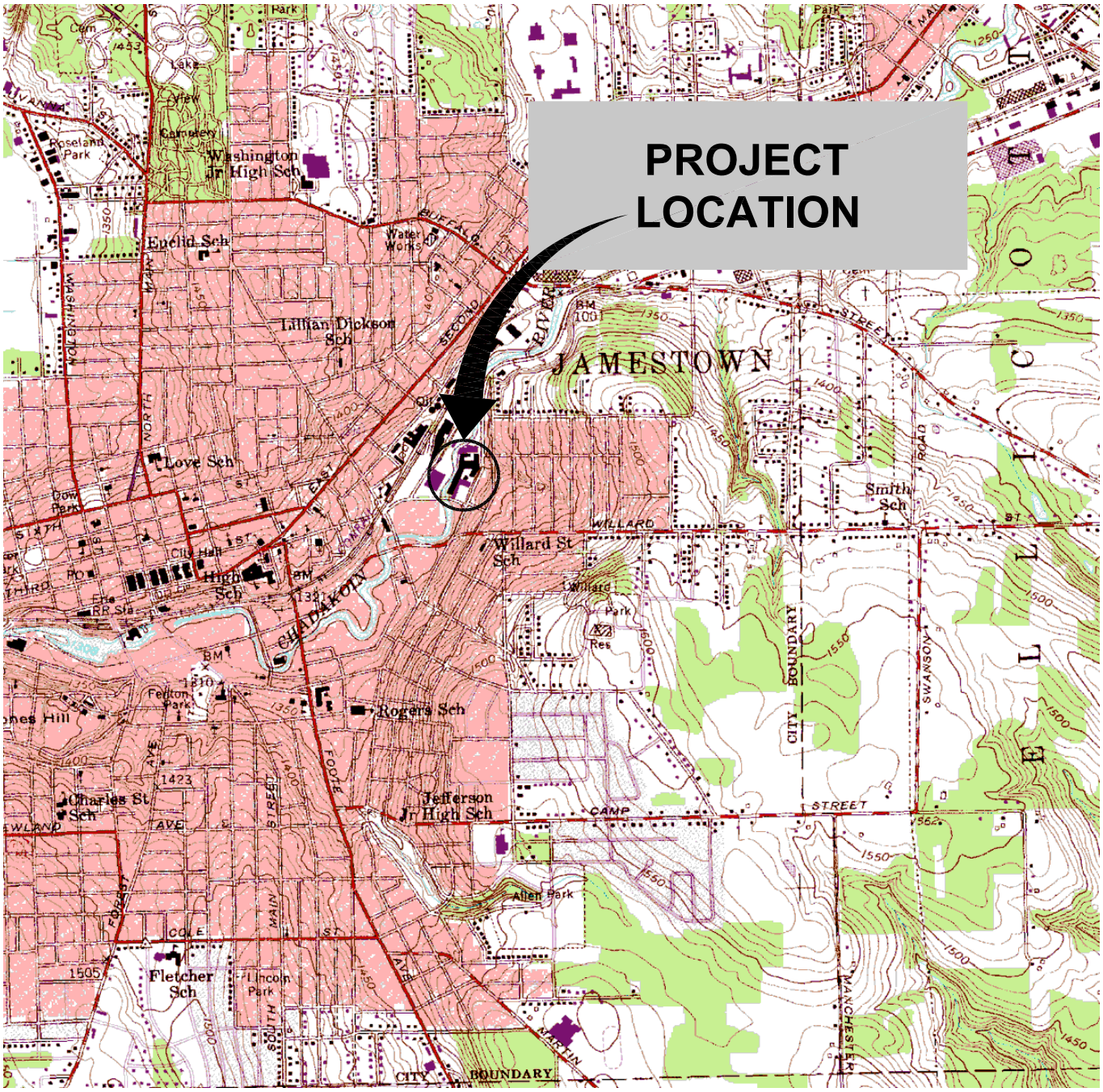
The Annual Monitoring report will be submitted to the NYSDEC by April 15th of each year.

10. References

ARCADIS. 2008. Final Engineering Construction Completion Report, D.C. Rollforms, Ingersoll Rand Site, Jamestown, New York, Site Code 907019, June 2008.

ARCADIS. 2006. RD/RA Work Plan, D.C. Rollforms, Ingersoll Rand Site, Jamestown, New York, Site Code 907019, August 2006.

Figures



REFERENCE: U.S. GEOLOGICAL SURVEY, 7.5 X 15 MINUTE QUADRANGLE., JAMESTOWN, NEW YORK, ALLEN STREET, 1954.

0 2000' 4000'

GRAPHIC SCALE

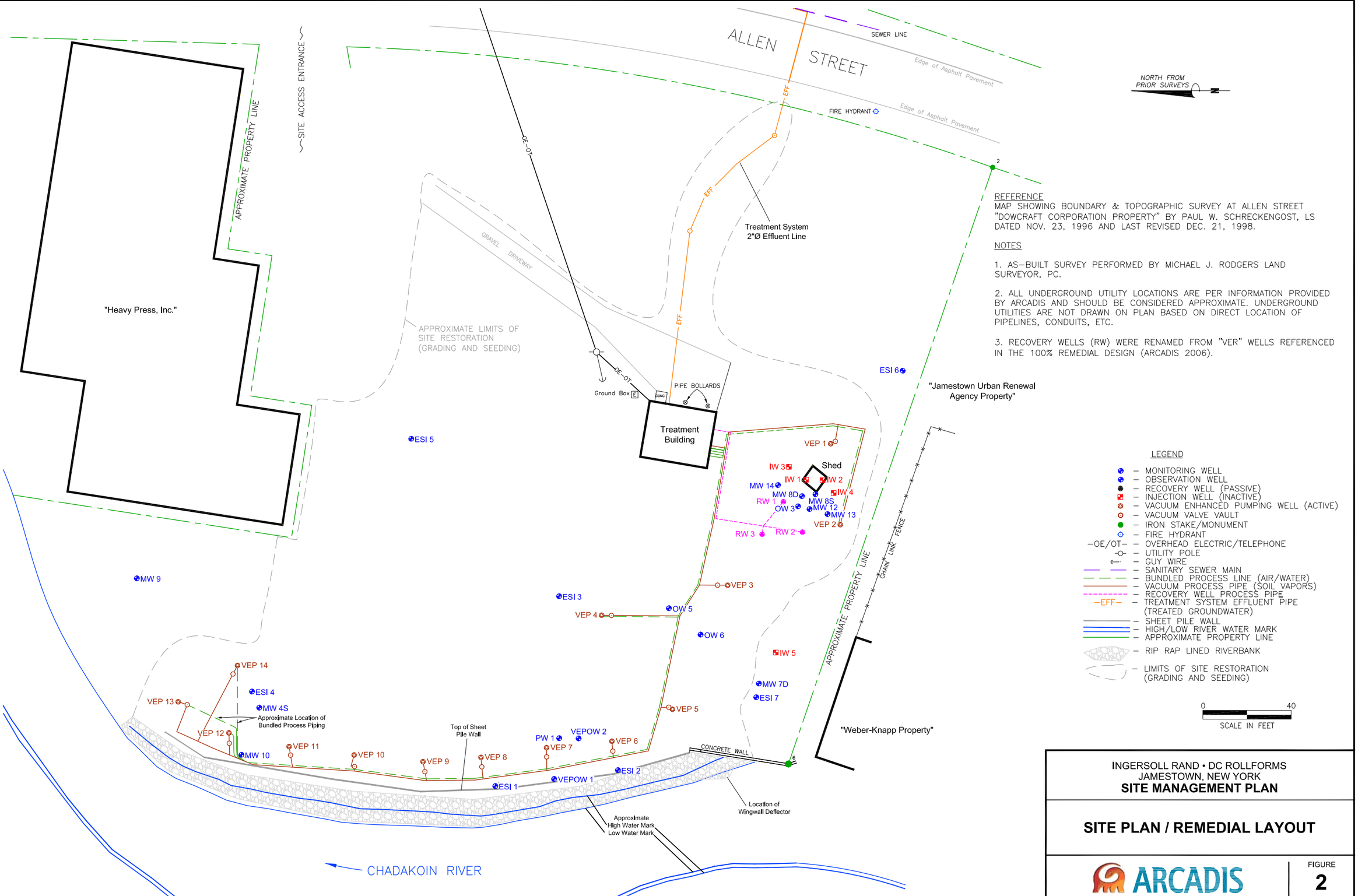
INGERSOLL RAND
JAMESTOWN, NEW YORK
SITE MANAGEMENT PLAN

SITE LOCATION

ARCADIS

FIGURE 1

CITY:(ALBANY) DIV/GROUP:(SER 1) DB:(TC) PIC:(M. SANFORD) PM:(M.SANFORD)
G:\APROJECT\INGERSOL\DC Rollforms\AY000219.0014 2008\Engineering Construction Completion Report\Report Figures
XREFS: IMAGES: PROJECTNAME: --



REFERENCE
MAP SHOWING BOUNDARY & TOPOGRAPHIC SURVEY AT ALLEN STREET "DOWCRAFT CORPORATION PROPERTY" BY PAUL W. SCHRECKENGOST, LS DATED NOV. 23, 1996 AND LAST REVISED DEC. 21, 1998.

NOTES

1. AS-BUILT SURVEY PERFORMED BY MICHAEL J. RODGERS LAND SURVEYOR, PC.

2. ALL UNDERGROUND UTILITY LOCATIONS ARE PER INFORMATION PROVIDED BY ARCADIS AND SHOULD BE CONSIDERED APPROXIMATE. UNDERGROUND UTILITIES ARE NOT DRAWN ON PLAN BASED ON DIRECT LOCATION OF PIPELINES, CONDUITS, ETC.

3. RECOVERY WELLS (RW) WERE RENAMED FROM "VER" WELLS REFERENCED IN THE 100% REMEDIAL DESIGN (ARCADIS 2006).

LEGEND

- MONITORING WELL
- OBSERVATION WELL
- RECOVERY WELL (PASSIVE)
- INJECTION WELL (INACTIVE)
- VACUUM ENHANCED PUMPING WELL (ACTIVE)
- VACUUM VALVE VAULT
- IRON STAKE/MONUMENT
- FIRE HYDRANT
- OVERHEAD ELECTRIC/TELEPHONE
- UTILITY POLE
- GUY WIRE
- SANITARY SEWER MAIN
- BUNDLED PROCESS LINE (AIR/WATER)
- VACUUM PROCESS PIPE (SOIL VAPORS)
- RECOVERY WELL PROCESS PIPE
- TREATMENT SYSTEM EFFLUENT PIPE (TREATED GROUNDWATER)
- SHEET PILE WALL
- HIGH/LOW RIVER WATER MARK
- APPROXIMATE PROPERTY LINE
- RIP RAP LINED RIVERBANK
- LIMITS OF SITE RESTORATION (GRADING AND SEEDING)

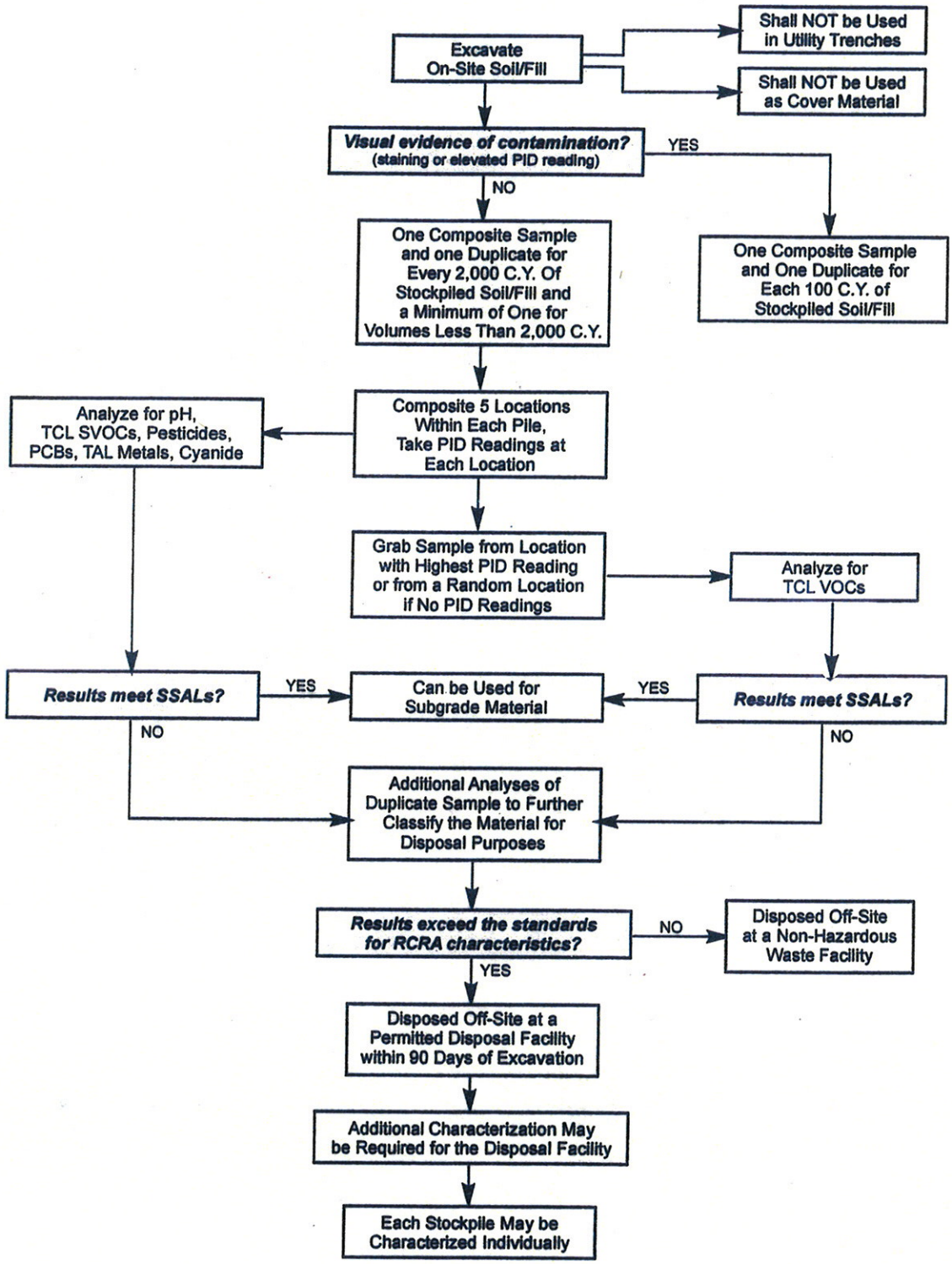
0 40
SCALE IN FEET

INGERSOLL RAND • DC ROLLFORMS
JAMESTOWN, NEW YORK
SITE MANAGEMENT PLAN

SITE PLAN / REMEDIAL LAYOUT

ARCADIS

FIGURE
2



NOTE: At any time individual stockpiles of volumes less than those stated may be characterized individually.

INGERSOLL RAND • DC ROLLFORMS
JAMESTOWN, NEW YORK

SITE MANAGEMENT PLAN

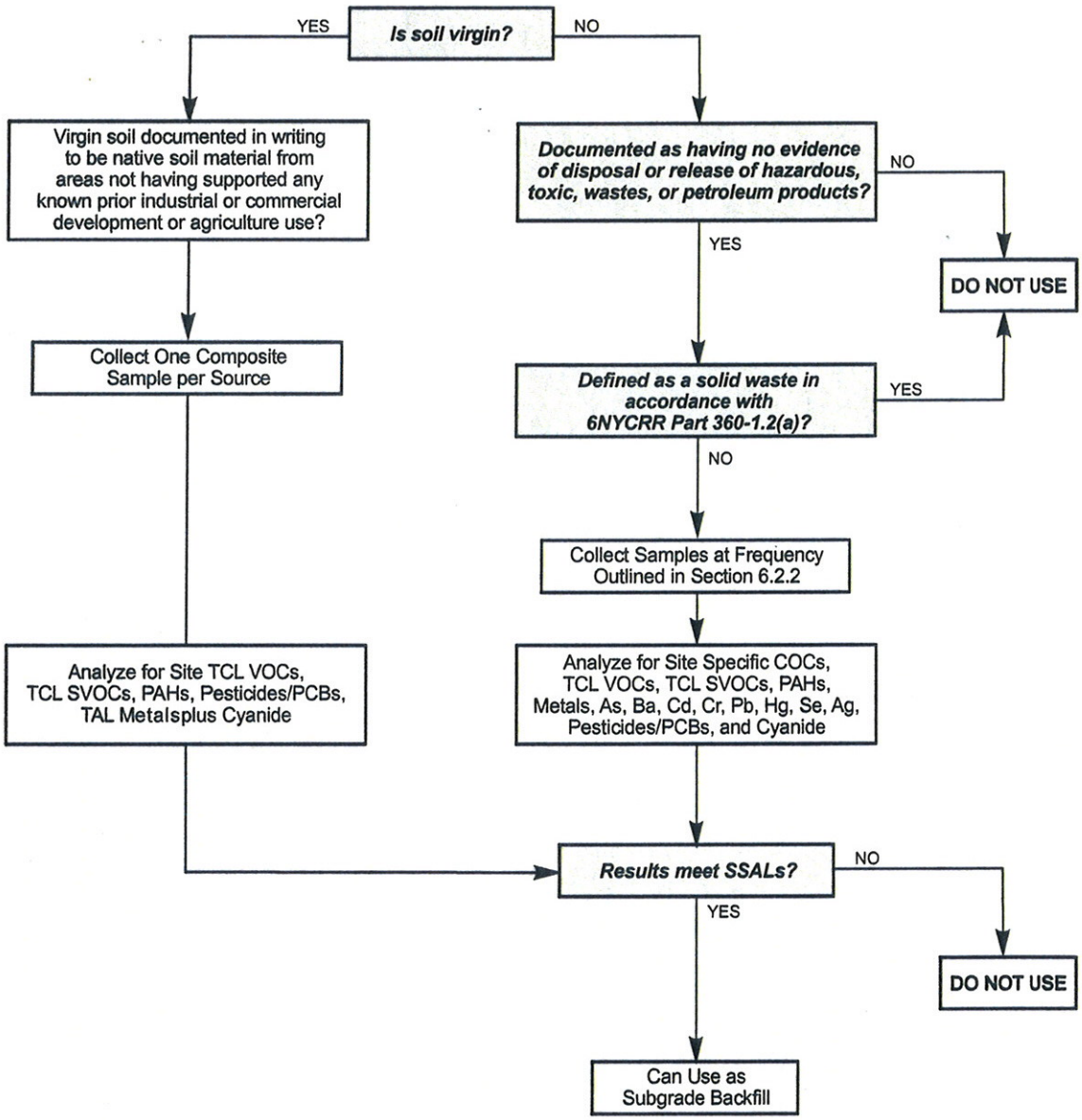
Soil/Fill Characterization Flow Chart

ARCADIS

FIGURE 3

PROJECT: AY000218.0012.00001

CITY:(KNOXVILLE) DIVGROUP:(ENV) DB:(B.ALTOM) PM:(M.SANFORD) TM:(C.DEVERN)
G:\ENV\AY\000219_IR-Jamestown\DLV\200809 Site Mgmt Plan\F3-5 AY000218-12_FCs.cdr SAVED: 18SEP7 2008



NOTE: At any time individual stockpiles of volumes less than those stated may be characterized individually.

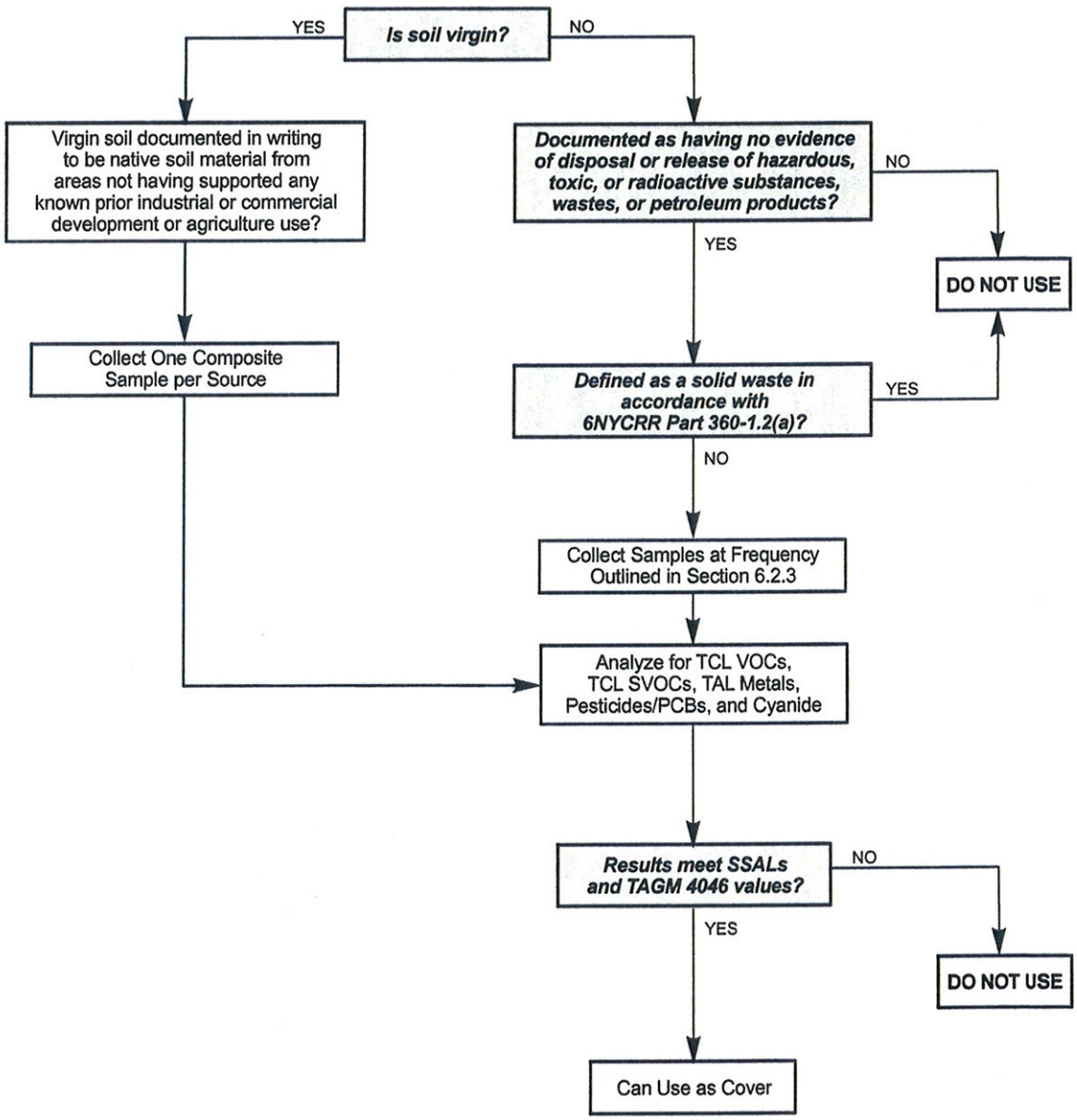
INGERSOLLRAND-DCROLLFORMS
JAMESTOWN,NEWYORK

SITE MANAGEMENT PLAN

Subgrade Material Flow Chart

ARCADIS

FIGURE 4



NOTE: At any time individual stockpiles of volumes less than those stated may be characterized individually.

INGERSOLLRAND-DCROLLFORMS
JAMESTOWN,NEWYORK

SITE MANAGEMENT PLAN

Cover Material Flow Chart

ARCADIS

FIGURE
5

Appendices

ARCADIS

Appendix A

Site Access Agreement

LUNDBERG & GUSTAFSON LLP
ATTORNEYS AT LAW
202 WEST FOURTH STREET
P. O. BOX 579
JAMESTOWN, NEW YORK 14702-0579
(716) 664-2346
FAX (716) 664-2439

DANA A. LUNDBERG *
KURT D. GUSTAFSON
MYRA V. BLASIUS

JOHN K. PLUMB
Of Counsel
CHARLES G. BECKSTROM *
Of Counsel

*ALSO ADMITTED IN PENNSYLVANIA

July 6, 2005

Aaron Kleinbaum, Esq.
Ingersoll-Rand Company
200 Chestnut Ridge Road
Woodcliff Lake, NJ 07675

Re: Access to Property of Jamestown Allenco, Inc.

Dear Mr. Kleinbaum:

I understand that, in the course of implementing the Remedial Action ("RA") at the property located at 583 Allen Street, Jamestown, Chautauqua County, New York, New York, State Registry of Inactive Hazardous Waste Disposal Site No. 907019 (the "Site"), Ingersoll-Rand Company ("I-R") may occasionally need to cross the property line between the Site and the property owned by Jamestown Allenco, Inc. ("JA") on Allen Street, in Jamestown, Chautauqua County, New York, ("Building Parcel") in the area depicted on the enclosed Site Plan as "A-2". I understand that the purpose of these occasional intrusions into the A-2 area would be for the purpose of manipulating equipment or vehicles necessary to the construction of the RA on the Site.

Please be advised that JA will permit I-R, its agents, consultants, employees, invitees and contractors such occasional and temporary access to the A-2 area for the purpose of facilitating such vehicle and equipment access to the Site in the vicinity of the A-2 area. This permission will be granted with the understanding that it may be revoked by JA at any time, for any reason, and shall be automatically revoked upon the sale of the Building Parcel. This permission is further granted with the understanding that I-R shall indemnify and hold JA, its officers, directors, employees, agents and invitees harmless from any claims that may arise as a result of I-R's use of the A-2 area, and that I-R shall be fully responsible for repairing any damage to the Building Parcel or anything located on the Building Parcel occasioned by I-R's use of the A-2 area.

If I-R is in agreement with the terms and conditions of this permission to enter the A-2 area, please so indicate by having the appropriate I-R corporate official sign the two copies of this letter that are enclosed and return the copies to me at your convenience. I will then have the appropriate JA corporate official sign the copies of this letter, and return one fully executed copy to you.

No access to the A-2 area is permitted until I return a fully executed copy of this letter to you.

Thank you.

Very truly yours,

LUNDBERG & GUSTAFSON LLP
By:

Dana A. Lundberg, Esq.

DAL/alb

cc: Jamestown Allenco, Inc.
Morgan Graham, Esq.

Acknowledged and accepted this 1st day of August, 2005,

by: Ingersoll-Rand Company

By: Barbara A Santoro
Secretary

ACCESS AGREEMENT

Ingersoll-Rand Company, a New Jersey corporation ("I-R") and Jamestown Allenco, Inc., a New York corporation ("property owner"), hereby agree as follows:

RECITALS

A. Property Owner is the record owner of a parcel of real property located at 583 Allen Street in Jamestown, Chautauqua County, New York. Said parcel is more fully depicted on the map attached as Exhibit A to this Agreement, and referred to in this Agreement as the "Property".

B. The Property is listed in the New York State Registry of Inactive Hazardous Waste Disposal Sites as Site No. 907019, and is classified as a Class 2 site. A Record of Decision ("ROD") was issued for the Property in March 2003 setting forth the Remedial Action ("RA") selected for the Property by the New York State Department of Environmental Conservation ("NYSDEC").

C. I-R will perform the RA on the Property pursuant to a Work Plan ("RA Work Plan") which will be incorporated into Order on Consent Index #B0-0446-94-01A that I-R has negotiated with the NYSDEC.

D. I-R has previously had access to the Property to conduct a soil and groundwater investigation on the property pursuant to a Focused Remedial Investigation and Feasibility Study Work Plan ("RIFS Work Plan"), which was incorporated into a prior Order on Consent with NYSDEC. Activity on the Property pursuant to that RIFS Work Plan included the installation of monitoring wells by I-R and the maintenance of monitoring wells installed by a previous owner of the Property.

E. In order to complete the activities required by the Order on Consent, RA Work Plan, or RIFS Work Plan, I-R must have access to the Property to: 1) expand and continue operation of the Enhanced Reductive Dechlorination process currently being used on the Property; 2) install permanent sheet piling along the shoreline of the Chadakoin River and on the Property approximately ten feet from the toe of the riverbank; 3) install a vacuum enhanced pumping system and vacuum enhanced recovery system and treatment system building on the Property; 4) excavate petroleum impacted soils; 5) remove contaminated sediment from the Chadakoin River; 6) construct a wing deflector; and, 7) monitor and measure the progress of the RA. This work will include, among other things, the continued maintenance of existing monitoring wells located on the Property.

F. Property Owner is willing to allow I-R to have access to and entry on the Property, including ingress and egress to the Chadakoin River, to conduct the RA Work as set forth above and in more detail in the RA Work Plan itself, subject to the terms and conditions set forth in this Agreement.

AGREEMENT

1. Property Owner hereby gives permission to I-R, its agents, consultants, employees, invitees and contractors to access and use the Property for the sole purpose of conducting the work set forth in the RA Work Plan which is finally incorporated into the Order on Consent and any revisions to the RA Work Plan and performing long-term groundwater monitoring. Access to the Property pursuant to this Agreement shall be solely by means of the driveway depicted on Exhibit A to this Agreement as "A-1".

2. I-R shall perform all activities on the Property under this Agreement in a manner so as not to interfere with or impair Property Owner's use and enjoyment of the Property or Owner's normal operations on the Property. I-R warrants, covenants and represents that all work done on the Property pursuant to this Agreement will be done in compliance with all federal, state and local laws. I-R shall provide Property Owner with a copy of the Order on Consent and Work Plan describing the activity to be performed, and a map or sketch showing the approximate location of any well or other facility to be installed on the Property, upon notification by NYSDEC that these documents have been accepted by NYSDEC for execution. Entry on and use of the Property may commence, upon written notice by Property Owner to I-R, at any time after Property Owner's receipt of the Order on Consent and Work Plan and written notification by I-R that these documents have been accepted by NYSDEC for execution, but in any event no later than fourteen (14) days after receipt by Property Owner of the aforementioned Order, Work Plan and notification.

3. I-R shall provide Property Owner with no less than seven (7) days written notice prior to entry onto the Property to conduct any activities under this Agreement, which notice shall also contain I-R's best estimate of the length of time I-R, or its agents, consultants, employees, invitees and contractors shall remain on the Property to conduct the activities, as well as the location and nature of the activities, and the names of those individuals who will be principally responsible for overseeing and conducting the work on the Property. One notification may cover multiple days of entry. One or more representatives of Property Owner may be present on the Property during any of I-R's activities under this Agreement, to observe such activities and any such representatives agree to comply with any applicable Health and Safety Plan during such observation.

4. I-R shall provide Property Owner with copies of information, correspondence, including conclusions, recommendations and discussions of all sampling and monitoring, and final reports that are generated as a result of the activities to be performed on the Property under this Agreement, and that are submitted to NYSDEC pursuant to the Order on Consent or otherwise, including raw sampling data, laboratory analytical data, slug and pumping test results, well and other water level measurements.

5. Prior to the termination of this Agreement, I-R shall, at I-R's expense: (a) properly abandon in conformity with applicable state and federal guidelines all of the monitoring wells on Property; (b) remove all of I-R's equipment and facilities, including any facilities or structures construed or installed on the Property pursuant to the RIFS Work Plan or the RA Work

Plan from the Property; and (c) otherwise restore the Property to the condition it was in prior to I-R's first entry on the Property to conduct the RIFS Work Plan activities, except where such abandonment, removal or restoration activities would be inconsistent with the Order on Consent, RA Work Plan, or RIFS Work Plan. In the event that I-R does not complete the foregoing abandonment, removal and restoration activities prior to the termination of this Agreement, Property Owner may do so itself at I-R's expense. Such restoration work shall include but not be limited to filling and leveling all holes, trenches, ditches, and/or depressions, and grouting any subsurface borings, made by I-R upon the Property. The concrete building slab currently located on the Property shall remain. Nothing in this Agreement is intended to or shall be construed as requiring Property Owner to locate or maintain or permit the location or maintenance of any facility, structure, well or other device on the Property beyond the term of this Agreement. In the event that I-R is required to conduct any further investigative or remedial activities on the Property and such activities require the maintenance of facilities, structures or monitoring wells beyond the term of this Agreement, or any extension thereof, Property Owner agrees to enter into good faith negotiations with I-R regarding the terms of an agreement by which those monitoring wells may remain and be accessible on the Property.

6. All notices, correspondence, or inquiries from I-R to Property Owner under this Agreement shall be directed to:

Dana A. Lundberg. Esq.
Lundberg & Gustafson LLP
202 West Fourth Street
Post Office Box 579
Jamestown, New York 14702-0579

and

Harry B. Nicholson, Jr.
President
Jamestown Allenco, Inc.
125 West Main Street
Falconer, New York 14733

All notices, correspondence, or inquiries from Property Owner to I-R under this Agreement shall be directed to:

Aaron Kleinbaum, Esq.
Ingersoll-Rand Company
155 ~~200~~ Chestnut Ridge Road
~~Woodcliff Lake, NJ 07675~~ Montvale, NJ 07645
Telephone: (201) 573-~~3102~~ 3233
Facsimile: (201) 573-3448

AK

7. All work performed by I-R or any representative of I-R pursuant to this Agreement, including the Work Plan, shall be at I-R's sole expense.

8. The rights and obligations of the parties to this Agreement shall be binding upon and inure to the benefit of the parties and their successors and assigns. The Property Owner agrees to allow access and use of the Property by any duly designated employee, consultant, contractor, or agent of NYSDEC or any state agency for purposes of inspection, sampling and testing as related to I-R's activities under the Order on Consent and ensuring I-R's compliance with the Order on Consent. If Property Owner proposes to convey the whole or any part of its ownership interest in the Property, the Property Owner shall, not fewer than 60 days before the date of conveyance, notify I-R of same, and the identity of the transferee and of the nature and

proposal date of conveyance, and shall notify the transferee in writing, with a copy to I-R, of the applicability of this Agreement. Nothing contained in this Agreement is intended to or shall be construed as interfering in any way with the right of the Property Owner to alienate its interest or any part thereof in the Property.

9. This Agreement supercedes any and all previous agreements between I-R and Property Owner concerning access to and use of the Property. This Agreement may be amended or added to only in writing and with the written consent of the parties to this Agreement.

10. The term of this Agreement shall be ten (10) years and may be extended upon mutual agreement of the Property and I-R.

11. Following the effective date of this Agreement, I-R shall indemnify, defend and hold Property Owner and any director, officer, employee, shareholder or agent of Property Owner harmless against Covered Claims arising from or in connection with I-R's entry upon the Property or I-R's performance of any activities on the Property pursuant to this Agreement, except to the extent any such Covered Claim arises from or is in connection with the negligent acts or omissions of Property Owners or any of its directors, officers, employees, shareholders, agents, contractors or representatives. Covered Claims are defined to include: (1) any loss, claim, demand, cause of action, expense, or liability of any kind asserted by any third party or any employee or agent of I-R or any employee or agent of Property Owner; (2) any damage to the Property; and, (3) any cost (including attorneys' fees) incurred by Property Owner. Further,

as to claims asserted by third parties against I-R directly, I-R covenants not to sue Property Owner or any director, officer, employee, shareholder or agent of Property Owner for any loss, claim, demand, cause of action, expense, or liability of any kind (hereinafter "Loss") arising from or in connection with I-R's entry upon the Property or any activity performed on the Property pursuant to this Agreement, except to the extent any such Loss arises from or in connection with the negligent acts or omissions of Property Owner or any of its directors, officers, shareholders, agents, contractors or representatives. The Property Owner agrees that it will not seek, pursuant to the foregoing, any attorneys' or contractor or consultant fees or costs it has or will incur in negotiating this Agreement or in monitoring I-R's activities under this Agreement or in reviewing the information contemplated by Paragraph 4 hereof or as otherwise related to the implementation of the work required by the Order on Consent and Work Plan, unless such fees or costs arise from or are incurred in relation to a claim against Property Owner.

12. The indemnity and covenant not to use set forth in paragraph 11 shall survive the termination of this Agreement or any extension thereof for a period not to exceed ten (10) years.

13. This Agreement is deemed to be effective as of the date of execution of the Agreement by the last party executing this Agreement.

14. During the terms of this Agreement, I-R's consultants who shall perform and/or oversee the implementation of the work required by the Order on Consent and Work Plan shall maintain in full force and effect policies of insurance at the levels reflected in the Certificates of

Insurance annexed hereto as Exhibit B. Property Owner shall be named as an additional insured on each Certificate of Insurance. Sufficient proof of such insurance shall be provided to Property Owner before any work may commence on the Property.

15. This Agreement shall be governed by the laws of the State of New York, and any action brought to enforce this Agreement or as a result of its breach shall be brought in the appropriate state or federal court located in the counties of Erie or Chautauqua, New York. I-R consents to jurisdiction in the United State District Court for the Western District of New York or the Eighth Judicial District of the State of New York, as the case may be, as related to any such action brought to enforce this Agreement or as a result of its breach.

INGERSOLL-RAND COMPANY, a New Jersey Corporation,

By: Barbara A Santoro
Title: Secretary

STATE OF NEW JERSEY }
ss
COUNTY OF BERGEN }

The foregoing instrument was acknowledged before me this 1st day of August, 2005, by Barbara A. Santoro as Secretary of Ingersoll-Rand Company, a New Jersey Corporation.

Witness by hand and seal.

My commission expires: Jan 19, 2006

Meryl J. Miller
Notary Public

MERYL J. MILLER
Notary Public of New Jersey
My Commission Expires Jan. 19, 2006

JAMESTOWN ALLENCO, INC., a
New York Corporation,

By: Harry B. Nicholson
Title: President

STATE OF NEW YORK }
ss
COUNTY OF CHAUTAUQUA }

The foregoing instrument was acknowledged before me this 19th day of July, 2005, by Harry B. Nicholson, Jr. as President of Jamestown Alleco, Inc. a New York Corporation.

Witness by hand and seal.

My commission expires: April 16, 2007

DANA A. LUNDBERG #02LU6057427
NOTARY PUBLIC, State of New York
Qualified in Chautauqua County
My Commission Expires April 16, 2007

Notary Public

EXHIBIT A

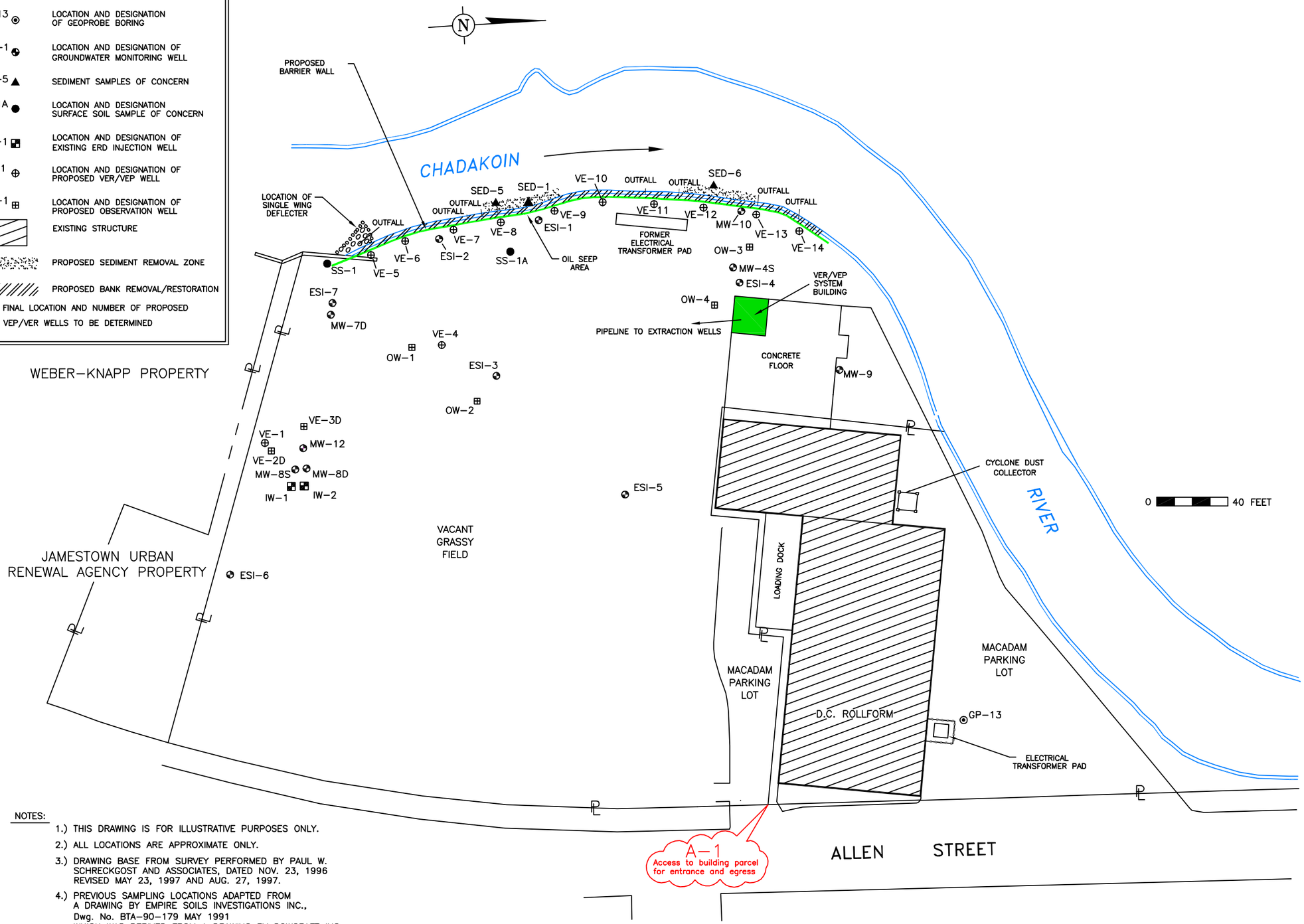
PROPERTY SITE PLAN

LEGEND

GP–13 ⊙	LOCATION AND DESIGNATION OF GEOPROBE BORING
ESI–1 ◕	LOCATION AND DESIGNATION OF GROUNDWATER MONITORING WELL
SED–5 ▲	SEDIMENT SAMPLES OF CONCERN
SS–1A ●	LOCATION AND DESIGNATION SURFACE SOIL SAMPLE OF CONCERN
IW–1 ⊡	LOCATION AND DESIGNATION OF EXISTING ERD INJECTION WELL
VE–1 ⊕	LOCATION AND DESIGNATION OF PROPOSED VER/VEP WELL
OW–1 ⊞	LOCATION AND DESIGNATION OF PROPOSED OBSERVATION WELL
	EXISTING STRUCTURE
	PROPOSED SEDIMENT REMOVAL ZONE
	PROPOSED BANK REMOVAL/RESTORATION

FINAL LOCATION AND NUMBER OF PROPOSED VEP/VER WELLS TO BE DETERMINED

WEBER–KNAPP PROPERTY



NOTES:

1.) THIS DRAWING IS FOR ILLUSTRATIVE PURPOSES ONLY.

2.) ALL LOCATIONS ARE APPROXIMATE ONLY.

3.) DRAWING BASE FROM SURVEY PERFORMED BY PAUL W. SCHRECKGOST AND ASSOCIATES, DATED NOV. 23, 1996 REVISED MAY 23, 1997 AND AUG. 27, 1997.

4.) PREVIOUS SAMPLING LOCATIONS ADAPTED FROM A DRAWING BY EMPIRE SOILS INVESTIGATIONS INC., Dwg. No. BTA–90–179 MAY 1991 WHICH WAS DERIVED FROM A DRAWING BY DOWCRAFT INC.

ENGINEERING DESIGN:
ALL PROFESSIONAL ENGINEERING SERVICES ON THIS DRAWING HAVE BEEN PERFORMED FOR ARCADIS G&M INC. BY ARCADIS ENGINEERS & ARCHITECTS OF NEW YORK, P.C. A PROFESSIONAL CORPORATION QUALIFIED TO PERFORM SUCH SERVICES IN THE STATE OF NEW YORK.

DRAWING CONFIDENTIAL:
ALL INFORMATION CONTAINED THEREON IS AND SHALL REMAIN THE PROPERTY OF ARCADIS. AS AN INSTRUMENT OF PROFESSIONAL SERVICE. THIS INFORMATION SHALL NOT BE USED IN WHOLE OR IN PART WITHOUT THE FULL KNOWLEDGE AND PRIOR WRITTEN CONSENT OF ARCADIS.

NO.	DATE	REVISION DESCRIPTION	BY CKD

ARCADIS
441 New Karner Rd., Suite 4
Albany, New York 12205
Tel: 518/452–7826 Fax: 518/452–4398

ACCESS POINT ACCORDING TO ACCESS AGREEMENT

D.C. ROLLFORMS/INGERSOLL–RAND
JAMESTOWN, NEW YORK

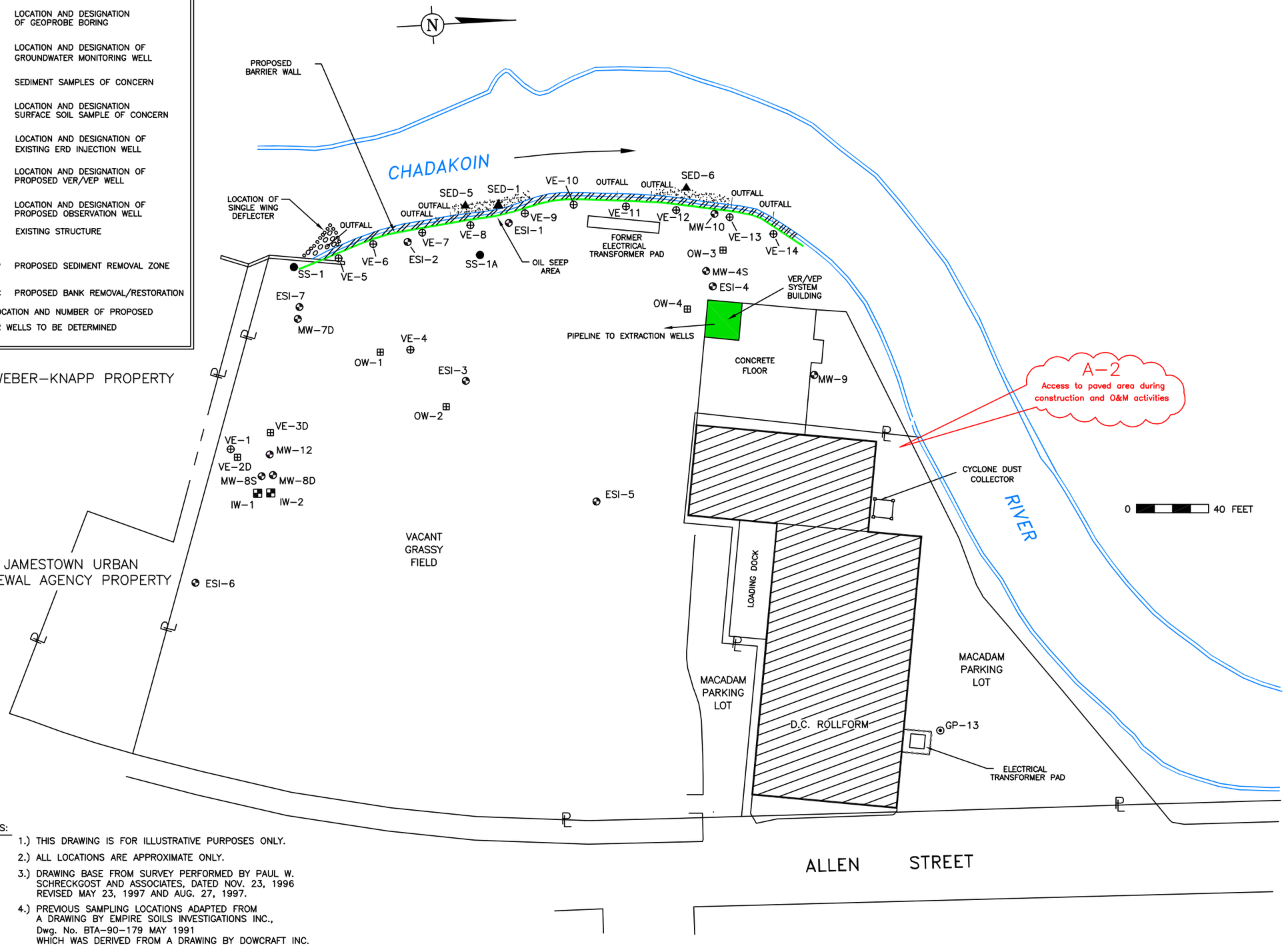
PROJECT MANAGER M. SANFORD	DRAWING NUMBER G319J
LEAD DESIGN PROF.	PROJECT NUMBER AY0002190008
CHECKED BY M. CHARLES	FIGURE NUMBER 1
DATE DRAWN 04–11–05	

LEGEND

GP-13 ⊙	LOCATION AND DESIGNATION OF GEOPROBE BORING
ESI-1 ⊕	LOCATION AND DESIGNATION OF GROUNDWATER MONITORING WELL
SED-5 ▲	SEDIMENT SAMPLES OF CONCERN
SS-1A ●	LOCATION AND DESIGNATION SURFACE SOIL SAMPLE OF CONCERN
IW-1 ⊞	LOCATION AND DESIGNATION OF EXISTING ERD INJECTION WELL
VE-1 ⊕	LOCATION AND DESIGNATION OF PROPOSED VER/VEP WELL
OW-1 ⊞	LOCATION AND DESIGNATION OF PROPOSED OBSERVATION WELL
	EXISTING STRUCTURE
	PROPOSED SEDIMENT REMOVAL ZONE
	PROPOSED BANK REMOVAL/RESTORATION

FINAL LOCATION AND NUMBER OF PROPOSED VEP/VER WELLS TO BE DETERMINED

WEBER-KNAPP PROPERTY



NOTES:

1.) THIS DRAWING IS FOR ILLUSTRATIVE PURPOSES ONLY.

2.) ALL LOCATIONS ARE APPROXIMATE ONLY.

3.) DRAWING BASE FROM SURVEY PERFORMED BY PAUL W. SCHRECKGOST AND ASSOCIATES, DATED NOV. 23, 1996 REVISED MAY 23, 1997 AND AUG. 27, 1997.

4.) PREVIOUS SAMPLING LOCATIONS ADAPTED FROM A DRAWING BY EMPIRE SOILS INVESTIGATIONS INC., Dwg. No. BTA-90-179 MAY 1991 WHICH WAS DERIVED FROM A DRAWING BY DOWCRAFT INC.

ENGINEERING DESIGN:
ALL PROFESSIONAL ENGINEERING SERVICES ON THIS DRAWING HAVE BEEN PERFORMED FOR ARCADIS G&M INC. BY ARCADIS ENGINEERS & ARCHITECTS OF NEW YORK, P.C. A PROFESSIONAL CORPORATION QUALIFIED TO PERFORM SUCH SERVICES IN THE STATE OF NEW YORK.

NO.	DATE	REVISION DESCRIPTION	BY
			CKD

ARCADIS
441 New Karner Rd., Suite 4
Albany, New York 12205
Tel: 518/452-7826 Fax: 518/452-4398

ACCESS POINT ACCORDING TO LETTER AGREEMENT

D.C. ROLLFORMS/INGERSOLL-RAND
JAMESTOWN, NEW YORK

PROJECT MANAGER M. SANFORD	DRAWING NUMBER G319J.1
LEAD DESIGN PROF.	PROJECT NUMBER AY0002190008
CHECKED BY M. CHARLES	FIGURE NUMBER 2
DATE DRAWN 04-11-05	

EXHIBIT B

CERTIFICATE OF INSURANCE

ACORD™ CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY) 01/05/2009

PRODUCER
Aon Risk Services South, Inc.
Franklin TN Office
501 Corporate Centre Drive
Suite 300
Franklin TN 37067 USA

PHONE - (866) 283-7122 FAX - (847) 953-5390

INSURED
ARCADIS of New York, Inc.
6723 Towpath Road
Syracuse NY 13214 USA

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW.

INSURERS AFFORDING COVERAGE		NAIC #
INSURER A:	Greenwich Insurance Company	22322
INSURER B:	XL Specialty Insurance Co	37885
INSURER C:		
INSURER D:		
INSURER E:		

COVERAGES SIR applies per terms and conditions of the policy

THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. AGGREGATE LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

LIMITS SHOWN ARE AS REQUESTED

INSR LTR	ADD'L INSRD	TYPE OF INSURANCE	POLICY NUMBER	POLICY EFFECTIVE DATE(MM\DD\YY)	POLICY EXPIRATION DATE(MM\DD\YY)	LIMITS	
A		GENERAL LIABILITY [X] COMMERCIAL GENERAL LIABILITY [ ] CLAIMS MADE [X] OCCUR [X] Contractual Liability Include [ ] GEN'L AGGREGATE LIMIT APPLIES PER: [ ] POLICY [X] PRO-JECT [X] LOC	GEC001076107 General Liability	01/01/09	01/01/10	EACH OCCURRENCE	$1,000,000
						DAMAGE TO RENTED PREMISES (Ea occurence)	$1,000,000
						MED EXP (Any one person)	$10,000
						PERSONAL & ADV INJURY	$1,000,000
						GENERAL AGGREGATE	$2,000,000
						PRODUCTS - COMP/OP AGG	$2,000,000
B		AUTOMOBILE LIABILITY [X] ANY AUTO [ ] ALL OWNED AUTOS [ ] SCHEDULED AUTOS [X] HIRED AUTOS [X] NON OWNED AUTOS [ ] [ ]	AEC001075807 Auto (AOS)	01/01/09	01/01/10	COMBINED SINGLE LIMIT (Ea accident)	$1,000,000
B			AEC001719505 Mass Auto	01/01/09	01/01/10	BODILY INJURY (Per person)	
						BODILY INJURY (Per accident)	
						PROPERTY DAMAGE (Per accident)	
		GARAGE LIABILITY [ ] ANY AUTO [ ] [ ]				AUTO ONLY - EA ACCIDENT	
						OTHER THAN AUTO ONLY: EA ACC	
						AGG	
A		EXCESS /UMBRELLA LIABILITY [X] OCCUR [ ] CLAIMS MADE [ ] DEDUCTIBLE [X] RETENTION $10,000	UEC001075907 Umbrella	01/01/09	01/01/10	EACH OCCURRENCE	$1,000,000
						AGGREGATE	$2,000,000
B		WORKERS COMPENSATION AND EMPLOYERS' LIABILITY	RWD943516303 Workers Compensation	01/01/09	01/01/10	[X] WC STATU-TORY LIMITS [ ] OTH-ER	
B		ANY PROPRIETOR / PARTNER / EXECUTIVE OFFICER/MEMBER EXCLUDED?	RWR943516703 State of Wisconsin	01/01/09	01/01/10	E.L. EACH ACCIDENT	$1,000,000
		If yes, describe under SPECIAL PROVISIONS below				E.L. DISEASE-EA EMPLOYEE	$1,000,000
						E.L. DISEASE-POLICY LIMIT	$1,000,000
		OTHER					

DESCRIPTION OF OPERATIONS/LOCATIONS/VEHICLES/EXCLUSIONS ADDED BY ENDORSEMENT/SPECIAL PROVISIONS

For services performed for the Ingersoll-Rand, Jamestown, NY site.
Ingersoll-Rand is named as an Additional Insured as respects to the General Liability as required by written contract but limited to the operations of the Insured under said contract, and always subject to the policy terms,

CERTIFICATE HOLDER

Arcadis G&M, Inc.
441 New Karner Rd.
Albany NY 12205 USA

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, THE ISSUING INSURER WILL ENDEAVOR TO MAIL 30 DAYS WRITTEN NOTICE TO THE CERTIFICATE HOLDER NAMED TO THE LEFT, BUT FAILURE TO DO SO SHALL IMPOSE NO OBLIGATION OR LIABILITY OF ANY KIND UPON THE INSURER, ITS AGENTS OR REPRESENTATIVES.

AUTHORIZED REPRESENTATIVE *Aon Risk Services, Inc. of Tennessee*

Holder Identifier :

Certificate No : 570032322923

Attachment to ACORD Certificate for ARCADIS of New York, Inc.

The terms, conditions and provisions noted below are hereby attached to the captioned certificate as additional description of the coverage afforded by the insurer(s). This attachment does not contain all terms, conditions, coverages or exclusions contained in the policy.

INSURED

ARCADIS of New York, Inc.
6723 Towpath Road
Syracuse NY 13214 USA

INSURER
INSURER
INSURER
INSURER
INSURER

ADDITIONAL POLICIES If a policy below does not include limit information, refer to the corresponding policy on the ACORD certificate form for policy limits.

INSR LTR	ADD'L INSRD	TYPE OF INSURANCE	POLICY NUMBER POLICY DESCRIPTION	POLICY EFFECTIVE DATE	POLICY EXPIRATION DATE	LIMITS	

DESCRIPTION OF OPERATIONS/LOCATIONS/VEHICLES/EXCLUSIONS ADDED BY ENDORSEMENT/SPECIAL PROVISIONS

conditions and exclusions.
Cancellation Provision shown herein is subject to shorter or longer time periods depending on the jurisdiction of, and reason for, the cancellation.

Certificate No : 570032322923

ARCADIS

Appendix B

Declaration of Covenants and Restrictions

DECLARATION OF COVENANTS AND RESTRICTIONS

THIS COVENANT is made the 19th day of July, 2005 by **JAMESTOWN ALLENCO, INC.** a corporation organized and existing under the laws of the State of New York and having an office for the transaction of business at 125 West Main Street, Falconer, New York 14733.

WHEREAS, Jamestown Allenco, Inc., is the owner of an inactive hazardous waste disposal site that is listed in the Registry of Inactive Hazardous Waste Disposal Sites in New York State as Site Number 907019, located at 583 Allen Street in the City of Jamestown, County of Chautauqua, State of New York, which is part of lands conveyed by Dowcraft Corporation to Jamestown Allenco, Inc. by deed dated January 31, 2001, and recorded in the Chautauqua County Clerk's office on February 1, 2001, in Book 2460 of Deeds at page 0524, and being more particularly described in Appendix A, attached to this Declaration and made a part hereof, and hereinafter referred to as "the Property"; and

WHEREAS, the Property is the subject of a Consent Order to be issued by the New York State Department of Environmental Conservation to Ingersoll-Rand Company;

WHEREAS, the New York State Department of Environmental Conservation set forth a remedy to eliminate or mitigate all significant threats to the environment presented by hazardous waste disposal at the Site in a Record of Decision ("ROD") dated March 31, 2003, and such ROD or the Work Plan for the implementation of the ROD required that the Property be subject to restrictive covenants.

NOW, THEREFORE, Jamestown Allenco, Inc., for itself and its successors and/or assigns, covenants that:

First, the Property subject to this Declaration of Covenants and Restrictions is as shown on a map attached to this Declaration as Appendix B and made a part hereof and consists of approximately 3.23 acres of land, more or less.

Second, unless prior written approval by the New York State Department of Environmental Conservation or, if the Department shall no longer exist, any New York State agency or agencies subsequently created to protect the environment of the state and the health of the state's citizens, hereinafter referred to as "the Relevant Agency", is first obtained, no person shall engage in any activity that will, or that reasonably is anticipated to, prevent or interfere significantly with any proposed, ongoing, or completed program at the Property or that will, or is reasonably foreseeable to, expose the public health or the environment to a significantly increased threat of harm or damage.

Third, the owner of the Property shall prohibit the Property from ever being used for purposes other than for commercial or industrial without the express written waiver of such prohibition by the Relevant Agency.

Fourth, the owner of the Property shall prohibit the use of the groundwater underlying the Property without treatment rendering it safe for drinking water or industrial / commercial purposes, as appropriate, unless the user first obtains permission to do so from the Relevant Agency.

Fifth, the owner of the Property shall continue and not interfere with any institutional and engineering controls the Department required Respondent to put into place and maintain without first obtaining the Relevant Agency's permission.

Sixth, the Declaration is and shall be deemed a covenant that shall run with the land, shall be binding upon all future owners of the Property, and shall provide that the owner, and its successors and assigns, consents to the enforcement by the Relevant Agency to the prohibitions and restrictions that Paragraph X of the Order requires to be recorded and covenants not to contest the authority of the Department to seek enforcement.

Seventh, any deed of conveyance of the Property, or any portion thereof, shall recite, unless the Relevant Agency has consented to the termination of such covenants and restrictions, that said conveyance is subject to this Declaration of Covenants and Restrictions.

IN WITNESS WHEREOF, the undersigned has executed this instrument the date first above written.

JAMESTOWN ALLENCO, INC.

By Harry B. Nicholson

Its President

STATE OF NEW YORK }
} ss
COUNTY OF CHAUTAUQUA }

On the 19th day of July, in the year 2005, before me, the undersigned, a Notary Public in and for said state, personally appeared Harry B. Nicholson, Jr., personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name(s) is(are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies) and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.

DANA A. LUNDBERG #02LU6057427
NOTARY PUBLIC, State of New York
Qualified in Chautauqua County
My Commission Expires April 16, 2007

Notary Public

APPENDIX A

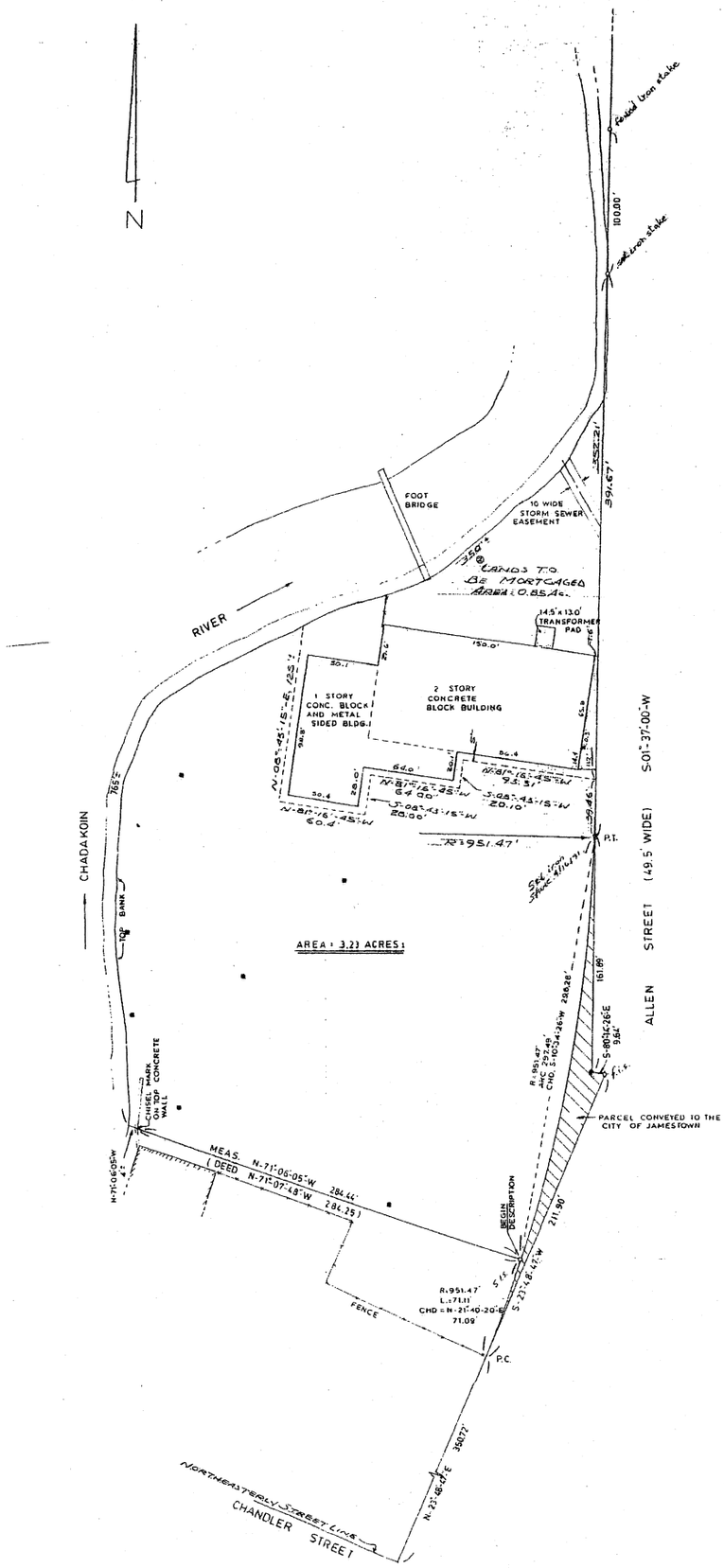
ALL THAT TRACT OR PARCEL OF LAND, situate in the City of Jamestown, County of Chautauqua and State of New York, being part of Lot 26, Township 2, Range 11 of the Holland Land Company's Survey, and further bounded and described as follows:

COMMENCING at a point at the intersection of the northeasterly line of Chandler Street and the northwesterly line of Allen Street; thence North 23° 48' 47" East along the northwesterly line of Allen Street, 350.72 feet to a point of curvature; thence northeasterly along the new northwesterly line of Allen Street as formed by a conveyance from Jamestown Urban Renewal Agency to the City of Jamestown, along a curve to the left having a radius of 951.47 feet, an arc length of 71.11 feet, and a chord of North 21° 40' 20" East, 71.09 feet to an iron stake at the principal point or place of beginning of the parcel of land hereinafter described; thence North 71° 06' 05" West, 284.44 feet to a chisel mark cut into the top of a concrete wall; thence continuing along the same line North 71° 06' 05" West, 4 feet more or less to the shore of the Chadakoin River; thence northerly and northeasterly along the shore of the Chadakoin River, 415 feet more or less to a point, said point being on the extension northerly of a line that is 5 feet westerly and parallel to the westerly wall of a one (1) story concrete block and metal sided building; thence South 08° 43' 15" West parallel to said westerly wall, and 5 feet measured at right angles thereto, 125 feet to a point; thence South 81° 16' 45" East, 60.4 feet to a point; thence North 08° 43' 15" East, 28.00 feet to a point; thence South 81° 16' 45" East, 64.00 feet to a point; thence North 08° 43' 15" East, 20.10 feet to a point; thence South 81° 16' 45" East, 93.31 feet to a point in the westerly line of Allen Street; thence South 01° 37' 00" West, 39.46 feet to an iron stake at a point of tangent; thence southwesterly along the westerly line of Allen Street along a curve to the right, having a radius of 951.47 feet, an arc length of 297.49 feet, and a chord of South 10° 34' 26" West, 296.28 feet to the iron stake at the point or place of beginning, containing 2.38 acres.

According to a survey and plat prepared for Dowcraft Corporation by Jerome E. Erickson, P.E. and L.L.S., plat dated June 24, 1988, as revised June 10, 1991, and designated as Job No. 10-88-6A.

BFLO Doc. # 1512505.1
SAgi

APPENDIX "B"



CERTIFIED TO:

1. NEW YORK JOB DEVELOPMENT AUTHORITY
2. LAWYERS TITLE INSURANCE CORPORATION
3. DOWCRAFT CORPORATION

Jerome E. Erickson July 12, 1988

① I HEREBY CERTIFY TO TICOR TITLE GUARANTEE COMPANY, MARINE MIDLAND BANK, N.A., ITS SUCCESSORS AND ASSIGNS, AND DOWCRAFT CORPORATION, THAT THIS SURVEY WAS PREPARED IN ACCORDANCE WITH THE CURRENT CODE OF PRACTICE FOR LAND SURVEYS ADOPTED BY THE NEW YORK STATE ASSOCIATION OF PROFESSIONAL LAND SURVEYORS, THAT ALL OF THE IMPROVEMENTS ARE WITHIN THE BOUNDARY LINES OF THE PREMISES, EXCEPT AS SHOWN.

Jerome E. Erickson, APR. 19, 1991
Jerome E. Erickson June 10, 1991

① NOTE:
ALL PROPERTY CORNERS WERE FOUND AND MARKED ON APRIL 16, 1991. ALL IMPROVEMENTS TO THE PROPERTY THAT EXISTED ON THAT DATE HAVE BEEN SHOWN.

① ■ — INDICATES TEST WELL

PLAT REVISED ON APRIL 19, 1991 BY:

JEROME E. ERICKSON, P.E. & L.L.S.
PROFESSIONAL ENGINEER
LICENSED LAND SURVEYOR
336 E. 5th ST., P.O. BOX 3008
JAMESTOWN, NEW YORK 14702-3008
TELEPHONE: 716-488-2803

PREPARED FOR:
DOWCRAFT CORPORATION
ALLEN STREET — CITY OF JAMESTOWN
BEING PART OF L. 26-T. 2-R.11 OF THE HOLLAND LAND CO'S SURVEY
COUNTY OF CHAUTAUQUA — STATE OF NEW YORK

PREPARED BY:
JEROME E. ERICKSON P.E. AND L.L.S.
PROFESSIONAL ENGINEER AND LICENSED LAND SURVEYOR
P.O. BOX 3008 110 EAST FOURTH STREET JAMESTOWN, N.Y. 14702 - 3008

WARNING: IT IS A VIOLATION, UNLESS IT IS PROVIDED IN SECTION 7209 OF THE EDUCATION LAW OF NEW YORK STATE TO ALTER ANY ITEM ON THIS DOCUMENT

JOB NO.	DATE
10-88-6A	6-24-88
NOTE REF.	SCALE
BK. 39-P. 40	1"=40

SUBJECT TITLE: BOUNDARY LINE AND LOCATION SURVEY

REVISIONS:
① APRIL 19, 1991
② June 10, 1991

DRAWN BY: E.A. OLSON
CHECKED BY: J.E. CUSSATT

STATE OF NEW YORK — JEROME E. ERICKSON — 049 — LICENSED LAND SURVEYOR

ARCADIS

Appendix C

Site Monitoring and Inspection Forms

Site Cover and Riverbank Inspection Checklist

DC Rollforms Site, Jamestown, New York

Section 1: General Information

Figure Reference:	Weather:
Date / Time Monitoring Performed:	

Cover material(s)	□ Soil	□ Vegetated Topsoil	□ Rip Rap Stone

Section II. Observations

Observation	Yes	No	N/A	Provide Comments As Necessary (use additional space below if needed)
Erosion and Sedimentation Controls				
Are erosion and sedimentation (E&S) controls present? If yes:				
Are they functioning as intended?				
Are they still required (i.e., has a healthy stand of vegetation been established)?				
Vegetated Topsoil Isolation Cover				
Are there areas of scour?				
Is any geotextile fabric exposed?				
Is vegetation effectively covering the intended area? Provide percent growth for seeded areas.				
Is there any sign of distressed vegetation?				
Do any areas require seeding?				
Photograph Numbers (if applicable)				
Rip Rap Stone Cover				
Are there areas of scour?				
Is any geotextile fabric exposed?				
Photograph Numbers (if applicable)				
Wing Wall Deflector				
Are there areas of scour?				
Is 30” dia. Rip Rap in place?				
Photograph Numbers (if applicable)				
Riverbank Plantings				
Are the live stake cuttings thriving?				
Photograph Numbers				
Chadakoin River (USGS)				
Discharge, Cubic Feet Per Second?				
Gage Height, Feet?				

Other Observations: Describe any other relevant observations noted during this monitoring period.

Performed by:	Signature:	Date:

Recovery and Monitoring Well DTW/DTP and Inspection Log
DC Rollforms, Jamestown, New York

Date: _____
Time: _____
Technician: _____

Well ID	DTW	DTP	Bolted/ Locked yes/no	Gripper Plug yes/no	Notes
Recovery Wells (Active)					
VEP-1					
VEP-2					
VEP-3					
VEP-4					
VEP-5					
VEP-6					
VEP-7					
VEP-8					
VEP-9					
VEP-10					
VEP-11					
VEP-12					
VEP-13					
VEP-14					
Monitoring Wells					
RW-1					
RW-2					
RW-3					
ESI-1					
ESI-2					
ESI-3					
ESI-4					
ESI-5					
ESI-6					
ESI-7					
IW-1					
IW-2					
IW-3					
IW-4					
IW-5					
MW-4S					
MW-7D					
MW-8S					
MW-8D					
MW-9					
MW-10					
MW-12					
MW-13					
MW-14					
OW-1					
OW-2					
OW-3					
OW-4					
OW-5					
OW-6					
OW-7					
PW-1					

Definitions: DTW - depth to water
DTP - depth to product

ARCADIS

Appendix D

Health and Safety Plan

ARCADIS

Infrastructure, environment, facilities

DC ROLLFORMS SITE
SITE-SPECIFIC HEALTH AND SAFETY PLAN

INGERSOLL RAND COMPANY

FEBRUARY 21, 2008

DC ROLLFORMS Site
Site-Specific Health
and Safety Plan

Prepared for:
Ingersoll-Rand Company

Prepared by:
ARCADIS
465 New Karner Road, First Floor
Albany, New York 12205

Our Ref.:
AY000219.0014

Date:
February 21, 2008

Review and Approval

Site Name: IR/D.C. Rollforms Site, Jamestown, New York

Marc Sanford Project Manager	Signature	Date
Todd Carignan Construction, Site, or Task Manager	Signature	Date
Todd Carignan Site Health and Safety Officer	Signature	Date
Dave Patterson Project Health and Safety Manager	Signature	Date
Jeff Bonsteel Designated H&S Plan Writer	Signature	Date
Todd Carignan Designated H&S Plan Reviewer	Signature	Date

Employee Acknowledgement

The employee's signature below indicates his/her understanding, acceptance, and compliance with the requirements of this Health and Safety Plan ("HASP").

Site Name: IR/DC Rollforms Site, Jamestown, New York

Name	Signature	Date
Name	Signature	Date
Name	Signature	Date
Name	Signature	Date
Name	Signature	Date
Name	Signature	Date
Name	Signature	Date
Name	Signature	Date
Name	Signature	Date

Subcontractor Acknowledgement of receipt of this Health and Safety Plan

ARCADIS claims no responsibility for the use of this HASP by others although subcontractors working at the Site may use this HASP as a guidance document. In any event, ARCADIS does not guarantee the health and/or safety of any person entering this Site. Strict adherence to the health and safety guidelines provided herein will reduce, but not eliminate, the potential for injury at this Site. To this end, health and safety becomes the inherent responsibility of personnel working at the Site.

Client: Ingersoll Rand Company

Site Name: DC Rollforms Site

Project Name: IR/DC Rollforms Site

Project Number: AY000219.0014

Start Date:

End Date:

Subcontractor Name and Representative	Signature	Date
Subcontractor Name and Representative	Signature	Date
Subcontractor Name and Representative	Signature	Date
Subcontractor Name and Representative	Signature	Date
Subcontractor Name and Representative	Signature	Date
Subcontractor Name and Representative	Signature	Date
Subcontractor Name and Representative	Signature	Date
Subcontractor Name and Representative	Signature	Date

Table of Contents

Tables

Figures

Appendices

Attachments

Introduction

The provisions of this Site Health and Safety Plan (HASP) are mandatory for all ARCADIS personnel involved in the Project. This HASP also provides the specification for the minimum acceptable requirements for all subcontractor organizations, and notification of the chemical and physical hazards known to be associated with the project activities addressed in this document.

Operational changes to this HASP that could affect the health or safety of personnel, the community, or the environment will not be made without prior approval of the ARCADIS Project Manager and the cognizant ARCADIS Project Health and Safety Manager (PHSM). This plan meets the requirements for health and safety protection and planning as required by Occupational Safety and Health Administration (OSHA) requirements in Title 29 Code of Federal Regulation, Part 1910 and 1926 as applicable.

ARCADIS subcontractors will be given copies of this plan and will be required, at a minimum, to follow the procedures described herein. Subcontractors will also be required to develop more extensive health and safety plans for the activities for which they are responsible. The subcontractor's H&S plan shall meet at a minimum the ARCADIS G&M H&S plan. The subcontractor shall review the ARCADIS H&S plan and in the event that there are any inconsistencies, deviations or other differences between the Subcontractor's plan and the ARCADIS H&S plan such inconsistencies, deviation or other differences shall be identified by the subcontractor. The ARCADIS SSO shall review the subcontractor's plan. However, such review or failure to object to the subcontractor's plan shall not in any manner be a representation tat the subcontractor's plan is sufficient for the subcontractor's work and ARCADIS does not by its review assume any liability for any deficiency in subcontractor's plan.

To the extent possible, subcontractors and the ARCADIS H&S staff will work together to develop adequate procedures where inconsistencies, deviations, or other differences occur prior to the initiation of that activity. ARCADIS claims no responsibility for the use of this HASP by others although other subcontractors working at the Site may use this HASP as a guidance document. In any event, ARCADIS does not guarantee the health and/or safety of any person entering this Site. Strict adherence to the health and safety guidelines provided herein will reduce, but not eliminate, the potential for injury at this Site. To this end, health and safety becomes the inherent responsibility of personnel working at the Site.

ARCADIS Policy

As a company, we will operate in compliance with all federal, state, and local regulations regarding health and safety. Senior management is responsible for ensuring that adequate resources are available to comply with health and safety regulations. Senior management is responsible for developing health and safety programs that comply with health and safety regulations.

Regional and local management is responsible for implementing and fostering a positive and proactive regard for company health and safety programs and policies. Employees are responsible for complying with company health and safety policies and programs to ensure their own safety as well as the safety of their coworkers.

1. Emergency Planning

1.1 Emergency and Project Telephone Numbers

In the event of a situation or unplanned occurrence requiring assistance, the appropriate contact(s) should be made from the list on the following pages. The SSO will post the Emergency Contact page at the project as a ready reference. Where mobile telephones are used for emergency communications, active cellular service will be confirmed from the Site before the initiation of daily work activities.

In the event of any emergency situation, Site personnel will immediately notify the SSO who will initiate emergency response actions. The SSO will determine the need for off-site emergency response assistance. If the SSO determines that on-site personnel can adequately respond and control the situation, the SSO will oversee the response and ensure Site personnel are properly protected and use proper procedures. If not, the SSO will contact appropriate emergency response personnel per the phone list and other personnel as required by the client for assistance. Personal injury or heat/cold exposure requiring immediate medical help, personal medical emergency, or hazardous chemical exposure situations will require the SSO to immediately call the appropriate emergency number for medical assistance (See the emergency phone list).

Potential emergencies may include**:**

- Excavation cave-ins
- Personal injury

- Personal exposure
- Fire
- Vehicle accidents
- Disturbance of utilities
- Severe weather

The SSO will conduct regular site inspections to identify any potential emergency situations for the purposes of avoiding those emergency situations.

1.2 First-Aid Kits

A First Aid kit will be available to all employees and subcontractors working at the Site. The First Aid Kit will be protected from the weather, available at the Site at all times, and inspected and restocked as necessary.

1.3 Eyewash Bottles

Eyewash bottles offer a short-term, immediate rinse for personnel who get contamination in their eyes, specifically particulates. Once the eyewash bottle has been used though, personnel should find a plumbed eyewash station or other device (such as a garden hose) to provide continuous flushing to the eyes. Eyewash bottles should be stored protected from direct sunlight and high temperatures. Additionally, eyewash bottles should be checked frequently to ensure that the liquid has not expired.

1.4 Fire Extinguisher

At a minimum, a 10-pound fire extinguisher capable of extinguishing Class A, B, and C fires will be available for use at the Site at all times. The actual number, size, and type of fire extinguishers will be determined by the SSO. Project personnel will be readily aware of the location of the fire extinguisher and will be trained on when and how to use a fire extinguisher. On project Sites where electrical equipment and components may be vulnerable to corrosive ABC extinguishing agents, extinguishers with non-corrosive agents such as carbon dioxide, may be located in the vicinity of this equipment for use in emergencies.

POST THIS PAGE IN APPROPRIATE LOCATIONS ON SITE

The Site Safety Officer will coordinate the entry and exit of response personnel during an emergency and make emergency contacts as necessary from the following list. After immediate notifications are made, the SSO will contact the Project Manger.

Emergency Contact	Phone Numbers {*delete what doesn't apply}*
Local Police	911 or 716.483.7536
Local Ambulance	911
Local Fire Department	911 or 716.483.7599
Local Hospital – WCA Hospital	911 or 716.487.0141
National Response Center (all spills in reportable quantities)	800.424.8802
U.S. Coast Guard (spills to water)	804.441.3516
Project Manager – Marc Sanford	518.452.7826
Client Contact – Dave Sordi	860.496.6290

Hospital Route

Hospital Name: See Map to Hospital – Figure 1

First Aid, Fire Protection, and Response Equipment Locations

First Aid Kit: Inside treatment building.

Eye Wash (Bottle): Inside treatment building.

Eye Wash Station: NA

Safety Shower: NA

Fire Extinguisher: Inside treatment building.

The Project Manager will make the following notifications:

Name	Phone Numbers
Corporate Health & Safety Director – Mike Thomas	720.344.3835 (O) 720.308.2147 (C)
Corporate Health & Safety Manager – Pat Vollertsen	720.344.3779 (O)
Regional Health & Safety Manager – Mija Coppola	614.764.2310
Area Health & Safety Representative – Jeff Bonsteel	518.452.7826
Project Physician or Local Physician (if required or requested by client or project contract)	
Subcontractor's Office Company: Name:	
Phone Number at Project Site	NA

The following authorities were contacted and briefed about our activities and the potential hazards:

Name: _____

Agency: _____

Date: _____

Name: _____

Agency: _____

Date: _____

Name: _____

Agency: _____

Date: _____

2. Organization and Responsibilities

2.1 ARCADIS Personnel

The following personnel are designated to carry out H&S job functions on the Site. Their responsibilities and the tasks they will be carrying out on the Site are listed below. The same person may fill more than one role.

ARCADIS Project Team	Responsibility and Tasks
Marc Sanford	**Project or Task Manager** § Initiates HASP development, and reviews and signs the HASP. § Obtains Site-specific health and safety information. § Communicates with the Site Safety Officer (SSO) on Site health and safety issues. § Allocates resources for correction of identified unsafe work conditions. § Communicates with the client on health and safety issues. § Ensures ARCADIS Site workers have all training necessary for the project (see Appendix B for training & Site specific safety orientation information). § Finalizes PM Checklist. § Reports all injuries, illnesses and near-misses to the Corporate H&S Manager and Area H&S Representative, assists with incident investigation, and ensures that any recommendations made are implemented. § Communicates H&S program and a copy of the ARCADIS H&S Plan to all subcontractors and receives their acknowledgement of the receipt of such information.
Todd Carignan	**Site Safety Officer (SSO)** § Reviews and works in accordance with the components of this HASP. § Ensures that the HASP is available to and reviewed by all Site personnel and reviews that subcontractors have appropriately communicated H&S information. § Ensures that necessary Site-specific training is performed (both initial and “tailgate” safety briefings – Use tailgate form in Attachment C.) § Ensures that site visitors have been informed of the hazards related to ARCADIS work and precautions to take, and have

ARCADIS Project Team	Responsibility and Tasks
	signed the Site Visitors Log found in Attachment B. § Ensures that work is performed in a safe manner and has authority to stop work when necessary to protect workers and/or the public. § Coordinates activities during emergency situations. § Ensures that all necessary permits and safety information provided by the client is disseminated to other Site personnel and is maintained in an organized manner. § Communicates with the PHSM and the PM on health and safety issues. § Report all injuries, illnesses and near-misses to the PM and PHSM. § Maintains injury/illness reports and other H&S data as required by the client or regulatory agency (e.g., MSHA Quarterly Report). § Ensures that necessary safety equipment is maintained and used at the Site.
Todd Carignan Katie Arnold Gretchen Miles	**Site Workers** § Read and work in accordance with the components of this HASP. § Report all unsafe working conditions to the SSO. § Report all injuries, no matter how trivial, to the SSO. § Work in a safe manner. § Sign the acceptance log at the beginning of this HASP.
Dave Patterson	**Project Health and Safety Manager (PHSM)** The designated PHSM is responsible for overseeing all aspects of the Site safety program, and preparing any Site-specific health and safety guidance documents or addenda to this plan. The PHSM does not report to the Project Manager, and is separately accountable to the ARCADIS project team senior management for Site health and safety. The PHSM acts as the sole contact to regulatory agencies on matters of safety and health. Other responsibilities include: § Overall authority for Health and Safety compliance and HASP conformance for the project. § General health and safety program administration. § Conducts project health and safety audits as warranted. § Determines the level of personnel protection required.

ARCADIS Project Team	Responsibility and Tasks
	§ Updates equipment or procedures based on information obtained during Site operations. § Establishes air-monitoring parameters based on expected contaminants. § Assists in injury, illness and near-miss investigation and follow-up.
	Add additional team members and responsibilities as necessary

2.2 Subcontractors

All ARCADIS subcontractors are responsible for assigning specific work tasks to their employees, providing qualified employees, allocating sufficient time, materials and equipment to safely complete assigned tasks, and equipping its personnel with any required personnel protective equipment.

ARCADIS considers each subcontractor to be an expert in all aspects of the work operations for which they are tasked to provide, and each subcontractor is responsible for compliance with those regulatory requirements which pertain to those services. While the ARCADIS H&S Plan will be the minimum H&S requirements for the work completed by ARCADIS and its subcontractors, each subcontractor, in coordination with ARCADIS H&S personnel, is expected to perform its operations in accordance with its own H&S plans, policies and procedures unique to the subcontractor's work to ensure that hazards associated with the performance of the work activities are properly controlled. Copies of any required safety documentation for a subcontractor's work activities will be provided to ARCADIS for review by the PHSM and SSO prior to the start of on-site activities. Operators of heavy equipment will be required to complete a Heavy Equipment Certification form or similar document.

In the event that the subcontractor's procedures/requirements conflict with requirements specified in this HASP, the more stringent guidance will be adopted after discussion and agreement between the subcontractor and ARCADIS project H&S personnel. Hazards not listed in this HASP, but known to the subcontractor or known to be associated with the subcontractor's services, must be identified and addressed to the ARCADIS Project or Task Manager and SSO prior to beginning work operations.

The Task or Project Manager (or authorized representative) has the authority to halt the subcontractor's operations and to remove the subcontractor or subcontractor employee from the

Site for failure to comply with established health and safety procedures or for operating in an unsafe manner.

Subcontractor and Representative Name	Responsibility	H&S Info on File?

3. Project Description

3.1 Project Types and Activities

X	Type	Start Date	X	Activities	Start Date
X	Remediation			Geophysical Survey	
	Site Assessment/Investigation		X	Site Visit	
	Phase I Site Assessment			Drum Sampling	
	Regulatory Compliance Audit			Surveying	
	Compliance Program		X	Excavation	
	Property Decommission		X	Soil Sampling	
	Demolition		X	Groundwater Sampling	
X	Decontamination			Surface Water Sampling	
	Industrial Hygiene Study			Sediment Sampling	
X	Construction/System Installation			Air Sampling	
	Phase 2 Site Assessment		X	Drilling	
	Risk Assessment			Desk Work	
X	Site Observations and Inspections		X	Other: Molasses Injections/Product recovery	

3.2 List of Project Tasks

- Task 1: Drilling/Monitoring Well Installation
- Task 2: Molasses Injections/Product Recovery
- Task 3: Groundwater Sampling/Water Level Measurements
- Task 4: Soil Excavation/Removal/River Bank Restoration
- Task 5: System Installation
- Task 6: System O&M

4. Site Information

Site Name & Address: Ingersol Rand/DC Rollforms Site
583 Allen Street, Jamestown, NY 14701

Client Safety and Health Contact: Dawn Horst

Site Contact Name: NA

Operational Description of Site: Groundwater remediation via enhanced reductive dechlorination.

Current Site Status: ____ Active __X__ Inactive ____ Industrial

____ Commercial ____ Retail ____ Undeveloped

____ Other (describe) _____

Topography and General Environmental Setting: Site is generally flat, located in a mixed industrial and residential area

Accessible by: ___Major Highway ____Main Road __X__ 2-Lane Road ____Dirt Road

5. Hazard Evaluation and Control

5.1 Project Hazard Analysis

The Project Hazard Analysis below identifies the hazards that are anticipated to be encountered by the project team.

Physical Hazards Present: ☐ None	☒ Heat ☒ Cold ☒ Noise ☒ Walking/working surfaces (includes slip/trip/fall & floor/wall openings) ☒ Visible Dust ☐ LASER ☐ Other:	☒ Holes/Pits ☐ Ionizing radiation ☐ Non-ionizing radiation ☒ Electricity ☒ Severe Weather ☐ Poor lighting ☐ Overhead Hazards ☒ Other: Surface water
Chemical Hazards Present: ☐ None	☐ Flammable/combustible ☐ Compressed gas ☐ Explosive ☐ Organic peroxide ☐ Oxidizer ☐ Water reactive ☐ Unstable reactive ☒ Dust/Fumes/Airborne Particulates	☒ Corrosive ☐ Toxic ☐ Highly toxic ☐ Irritant ☐ Sensitizer ☒ Carcinogen ☐ Mutagen ☒ Other: Chlorinated VOCs
Environmental/Equipment Hazards Present: ☐ None	☒ Heavy machinery ☒ Trenching/excavation ☐ Docks – marine operations ☐ Docks – loading ☐ Diving operations ☒ Drilling ☐ Forklifts ☒ Water operations work ☐ Elevated heights (includes fall protection) ☒ Overhead/Underground utilities ☐ Confined spaces	☒ Power tools ☒ Cranes/Hoists/Rigging ☐ Ladders ☐ Scaffolding ☐ Manlifts ☐ Welding ☐ Gas cylinders ☐ Roadway work ☐ Railroad work ☒ Energized equipment (LO/TO) ☐ Drums and containers ☐ Other:
Biological Hazards Present: ☐ None	☐ Animal/human fluids or blood ☐ Animal/human tissue(s) ☒ Poisonous/irritating plants ☐ Other:	☐ Contaminated needles ☐ Live bacterial cultures ☒ Insects/rodents/snakes ☐ Other:
Ergonomic Hazards Present: ☐ None	☒ Repetitive motion ☒ Awkward position ☒ Heavy lifting ☒ Frequent lifting ☐ Other:	☒ Limited movement ☒ Forceful exertions ☐ Vibration ☐ Other: ☐ Other:

Personal Safety/Security: ☐ None	☒ Personal safety ☐ Security issue ☐ Project site in isolated area ☒ Employees working alone ☐ Other:	☒ Employees working early/late ☐ Potentially dangerous wildlife ☐ Guard or stray dogs in area ☐ No/limited cell phone service ☐ Other:
Training Required: ☐ None	☒ 40-hour HAZWOPER ☐ 24-hour HAZWOPER ☐ HAZWOPER site supervisor ☒ OSHA 30-hour Construction ☐ OSHA 10-hour Construction ☐ PPE ☒ Respiratory protection ☐ Chemical hygiene ☐ Hazard communication ☐ Hazardous waste ☐ First-aid/CPR ☐ DOT/IATA hazmat transportation ☐ Diving ☐ Other:	☐ Bloodborne pathogens ☐ Confined space ☒ Lockout/tagout ☐ Electricity ☐ Fire extinguishers ☐ Fall protection ☐ Noise exposure ☐ Forklifts ☐ Asbestos ☐ Lead ☐ Cadmium ☐ SPCC ☐ Radiation safety ☐ Client specific
Medical Screening	☒ Medical Surveillance Exam (HAZWOPER) ☐ Client required drug and/or alcohol testing	☐ Blood and/or urine screening for other hazardous substances

5.2 Chemical Hazard Information

As summary of the chemical hazards, exposure routes, and permitted exposure levels is provided in Table 1. Material Safety Data Sheets (MSDS) for the chemicals listed in Table 1 are available in Attachment D. Additional health and safety information can be obtained from your PHSM.

5.3 Task Hazards and Control

A general summary of the hazards associated with each task and an evaluation of those hazards are presented in Table 2. More detailed control procedures are provided in the appendices to this plan for each of the identified hazards.

6. Air Monitoring

This section specifies the monitoring equipment to be used on Site and the action levels to upgrade to higher levels of personal protection. All monitoring equipment will be maintained and calibrated in accordance with manufacturer recommendations. All pertinent monitoring data will

be logged on the Real Time Air Monitoring Data Form (Attachment E) and maintained on Site for the duration of project activities. Calibration of all monitoring equipment will be conducted **daily** and logged on the same form.

Monitoring Equipment	Monitoring Frequency	Action Level		
		D • C	C • B	Stop Work
Photoionization Detector (PID)	Continuous during intrusive activities	1 ppm for 5 min.		50 ppm for 5 minutes
Organic Vapor Analyzer (FID)	NA			
Colorimetric Tubes (*Insert type)*	NA			
Explosimeter	NA			
Combustible Gas Indicator	Continuous during intrusive activities			10 % of LEL
Carbon Monoxide Meter	NA			
Hydrogen Sulfide Meter	NA			
Oxygen Meter	NA			
Particulate Monitor	Continuous during intrusive activities			Downwind level is 150 ug/m^3 greater than upwind
Personal Sampling Pumps (Insert compounds and media)	NA			

7. General Site Safety

The following general requirements apply to all on-site activities.

7.1 Site Access and Control

The SSO will coordinate access and control security at the work Site. The SSO will establish a work area perimeter. Only authorized personnel will be allowed beyond the perimeter. Other site workers and visitors to the Site should be kept out of the work Site. If visitors need access to the Site, the SSO, or his/her designee, will escort the visitor at all times. All visitors will log in and out with the SSO. Visitor log sheets are included in Attachment B.

If Level C PPE or greater is required on-site, the SSO will establish control boundaries for the Exclusion Zone, Contamination Reduction Zone, and the Support Zone. See Figure 2. The zones will be designated by traffic cones, barricades, signs, caution tape, or other means effective in identifying the different areas. The zones will be identified by the SSO during tailgate meetings. Entrance and exit to the Exclusion Zone will only be through controlled access points established for each work area.

7.2 Hazard Communication (HazCom)

All project required chemicals will be handled in accordance with OSHA 29 CFR 1910.1200 and ARCADIS-required procedures. The SSO will act as the HazCom Program Coordinator for the Site and will maintain the Master Inventory List (MIL) of hazardous chemicals kept on the job Site. The SSO will maintain Material Safety Data Sheets (MSDS) on Site for all chemicals. MSDS will be located inside the treatment shed. The SSO will communicate the location of the MSDS and the hazards associated with these chemicals to all project Site ARCADIS employees and subcontractors during the safety orientation. This information will be reviewed during tailgate briefings, especially if new chemicals or materials are introduced on Site.

The SSO will ensure that all containers of chemicals (including drums, bags, pails, tanks, vessels, etc.), are labeled appropriately: The contents of the container, the proper name of the chemical, associated hazards and appropriate hazard warnings, and the name and address of the manufacturer/importer. Chemicals will not be accepted or allowed on Site that are not properly labeled. If transferred to a secondary container, the new container will be labeled as described.

The SSO will ensure that the PPE necessary for work around the particular chemical is available and that project Site employee have been trained in its use.

The Project Manager will ensure that all project personnel have received Hazard Communication training as required in OSHA 29 CFR 1910.1200 (h).

7.3 Personal Hygiene

Field personnel should avoid contact with potentially contaminated substances, such as puddles, pools, mud, etc. Monitoring equipment should not be placed on a potentially contaminated surface, including the ground surface.

Smoking, eating and drinking will not be permitted within any controlled work area at any time. Field workers will wash their hands and face after leaving any controlled work area prior to eating or drinking. Consumption of alcoholic beverages is prohibited at the Site.

7.4 Site Awareness

All field crewmembers should remain alert for any indications of potentially dangerous situations, (e.g., strong, irritating, or nauseating odors; heavy equipment; conditions of an excavation; etc.).

Field crew members will be familiar with the physical characteristics and requirements of the work Site, including:

- Accessibility to equipment and vehicles
- Communication (i.e., methods, restrictions, or limitations)
- Hot zones (areas of known or suspected contamination)
- Site access
- Emergency procedures and evacuation assembly points
- Activities of other contractors and personnel on Site that may affect or be affected by tasks being performed
- Location of protective and emergency equipment and relevant first-aid procedures.

The number of personnel and equipment in controlled work areas should be minimized, consistent with Site operations. The SSO will review this information during the Site orientation and periodically during the tailgate meetings.

7.5 Buddy System

All on-site personnel will operate using the buddy system whenever possible. If ARCADIS personnel must work alone, refer to the Personal Safety Module in Appendix C.

7.6 Housekeeping

During Site activities work areas will be continuously policed for identification of excess trash and unnecessary debris. Excess debris and trash will be collected and stored in an appropriate container (e.g., plastic trash bags, garbage can, roll-off bin) prior to disposal. At no time will debris or trash be intermingled with waste PPE or contaminated materials. Additionally, project equipment and supplies will be kept in an orderly manner so as not to create a trip hazard.

7.7 Communication

Effective communication is essential to safe working conditions and the successful completion of field projects. During on-site activities, cellular phones will be used by ARCADIS Site personnel to maximize communications with emergency response units. Active cellular telephone service will be confirmed from the Site prior to the initiation of work activities. In the event of a catastrophic event, any notice to evacuate will be given verbally by the SSO and via air horn or radio as appropriate. Communication details will be provided at the Site safety orientation.

Personnel in the project work area will attempt to remain in communication or within sight of the ARCADIS SSO or designee. The ARCADIS SSO will indicate the need to evacuate the Site by verbal command or through radio or telephone communication.

8. Personal Protective Equipment

This section lists the equipment that must be present on the Site and used during the specified protection level. This checklist is used when preparing for the field, and is completed with the type of equipment to be worn based on the hazards present. **R** = Equipment required to be present on the Site. **O** = Optional equipment. Subcontractors must have the same equipment listed here as a minimum.

Description (Put Specific Material or Type in Box)	Level Of Protection		
	D	C	B
Body			
Coveralls	O	R	R
Chemical Protective Suit (include type in cell, e.g., Tyvek, Saranex, PVC, etc.)	O	O	R
Splash Apron	O	O	O
Rain Suit	O	O	O
Traffic Safety Vest (reflective)	O	O	O
Head			
Hard Hat (if does not create other hazard)	R	R	R
Head Warmer (depends on temperature and weather conditions)	O	O	O
Eyes & Face			
Safety Glasses (incorporate sun protection as necessary)	R	R	R
Goggles (based on hazard)	O	O	O
Splash Guard (based on hazard)	O	O	O
Ears			

Description (Put Specific Material or Type in Box)	Level Of Protection		
	D	C	B
Ear Plugs (depends on task)	O	O	O
Ear Muffs	O	O	O
Hands and Arms			
Outer Chemical Resistant Gloves (When coming in contact with contaminated media)	R	R	R
Inner Chemical Resistant Gloves (specify the type of glove based on chemical hazard)	O	O	R
Insulated Gloves	O	O	O
Work Gloves	R	R	R
Foot			
Safety Boots (steel toe and shank)	R	R	R
Rubber, Chemical Resistant Boots	O	O	R
Rubber Boots	O	O	O
Disposable Boot Covers	O	R	O
Respiratory Protection (indicate cartridge type where applicable)			
1/2 Mask APR	NA		
Full Face APR	NA	O	O
Dust Protection	O	NA	NA
Full Face Canister APR	NA	R	R
Powered APR	NA	O	O
Air Line/SCBA	NA	NA	R
Other Supplies			
First Aid Kit	R	R	R
Fire Extinguisher	R	R	R
Mobile Phone	R	R	R
Walkie Talkies	O	O	O
Water or Other Fluid Replenishment	R	R	R
Eye Wash Station	O	O	R
Eye Wash Bottle	R	R	R
Wash and Dry Novelettes	R	R	R
Sunscreen (SPF 15 or higher)	R	O	O
Insect Repellant	O	O	O

9. Decontamination Procedures

Personnel and equipment leaving the Exclusion Zone will be decontaminated. Level D decontamination protocol will be used with the following decontamination stations

Level C Decontamination Steps		Level D Decontamination Steps	
1	Equipment Drop	1	Equipment Drop
2	Outer Garment, Boots, and Glove Wash and Rinse	2	Glove and Boot Wash and Rinse
3	Disposable Garment, Boots, and Glove Removal	3	Disposable Garment, Outer Boot, and Glove Removal
4	Cartridge Change (if necessary)	4	Field Wash
5	Remove Respiratory Protection		
6	Field Wash		

Place an X by all decontamination equipment that is required at the Site.

Decontamination Equipment Checklist			
X	Scrub Brushes	X	Garbage Bags
X	Waste Containers	X	Paper Towels
X	Soap		Isopropyl Alcohol
	Plastic Tubs	X	Pump Spray Bottles
	Plastic Drop Cloths	X	Pump Spray Bottles (water)

Tables

Table 1. Chemical Constituents of Potential Concern and Health and Safety Information, IR Aro Site, Cheektowaga, New York

		OSHA PEL (ppm)	IDLH (ppm)	Potential Exposure Route	UEL/LEL	Potential Carcinogen[a]
VOCs						
	cis-1,2-dichloroethylene	200	1,000	Inh, Ing, Con	12.8%/5.6%	NC
	Trichloroethylene[b]	100	1,000	Inh, Abs, Ing, Con	10.5%/8%	Yes
	Vinyl Chloride[c]	1	NL	Inh	33%/3.6%	Yes
	Tetrachloroethylene	100	150	Inh, Abs, Ing, Con	NA/NA	Yes
Other						
	PCBs	0.5	5	Inh, Abs, Ing, Con	NA/NA	Yes
	Lead	0.05	100	Inh, Ing, Con	NA	NC

Unk Unknown.
UEL Upper Explosive Limit.
LEL Lower Explosive Limit.
PEL Permissible exposure limit, established by OSHA and based on an 8 Hour Time-Weighted Average (TWA).
ppm Part Per Million in air (generally expressed in milligrams per cubic meter [mg/m^3]).
Abs Skin Absorption.
Ing Ingestion.
Con Skin or Eye Contact.
Inh Inhalation.
NA Not applicable.
OSHA Occupational Safety and Health Administration.
C Ceiling concentration, not to be exceeded.
IDLH Immediately Dangerous to Life or Health. In the event of respirator failure, an individual would need to escape within 30 minutes or fewer or irreversible health effects could occur.
a. NIOSH has recommended that the substance be treated as a potential human carcinogen.
Sources:
(1) National Institute for Occupational Safety and Health (NIOSH), "Pocket Guide to Hazardous Chemicals",1997.
NL No listing in available published guidance.
NC Compound is either not a carcinogen or there is insufficient toxicological data to demonstrate it is a potential carcinogen.

Table 2. Potential Physical and Chemical Hazards Associated with the Planned Field Activities, IR/DC Rollforms Site, Jamestown, New York.

		Physical Hazards										Chemical Hazards		Hazzard Potential
		Struck By/Against	Slips and Falls	Noise	Fire	Heat/Cold Stress	Hand/power tools	Mechanized equipment	Lockout/ tagout	Heavy Lifting	Skin and Eye Contact	Inhalation	Accidental Ingestion	
Task 1:	Drilling/Monitoring Well Installation	X	X	X	X	X	X	X		X	X	X	X	Med.
Task 2:	Molases Injection		X			X				X	X	X	X	Low
Task 3:	GW Sampling/Water Levels		X	X		X	X	X		X	X	X	X	Low
Task 4:	Soil Excavation/Removal River Bank Restoration	X	X	X	X	X	X	X		X	X	X	X	Med.
Task 5:	System Installation	X	X	X	X	X	X	X		X	X	X	X	Med.
Task 6:	System O&M		X	X		X	X	X	X	X	X	X	X	Low

Figures

N

Point A: Site
583 Allen Street
Jamestown, NY 14701

Point B: WCA Hospital
207 Foote Avenue
Jamestown, NY 14701

Source: Google Maps

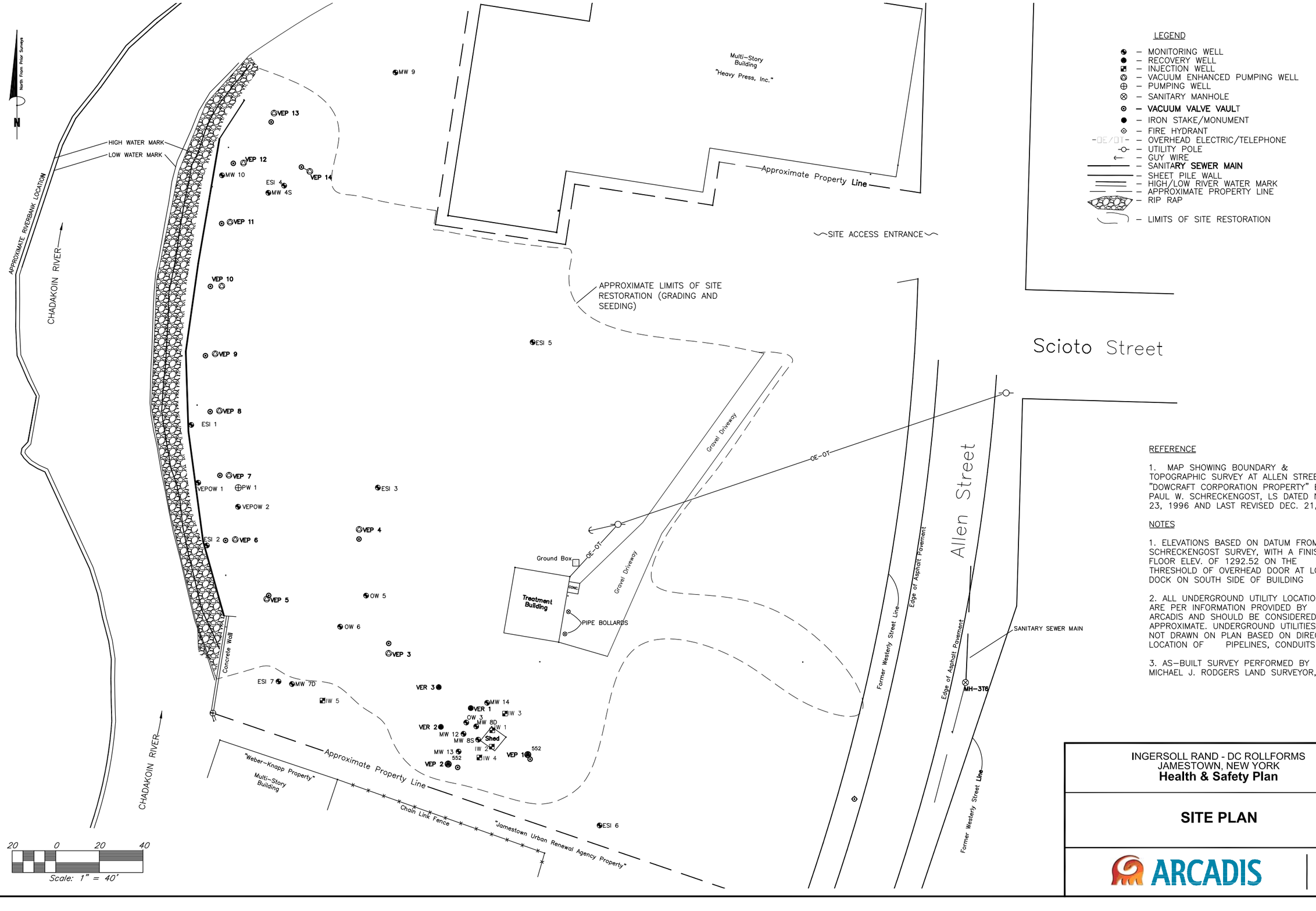
ARCADIS

465 New Karner Road, 1st Floor.
Albany, New York, 12205
Tel: 518-452-7826 Fax: 518-452-4398

Route to Hospital

IR DC ROLLFORMS SITE
JAMESTOWN, NEW YORK

PROJECT MANAGER M. SANFORD	DRAWING BY T. CARIGNAN
CHECKED BY T. CARIGNAN	PROJECT NUMBER AY000219.0014
DATE DRAWN FEBRUARY 19, 2008	FIGURE NUMBER 1



LEGEND

- MONITORING WELL
- RECOVERY WELL
- INJECTION WELL
- VACUUM ENHANCED PUMPING WELL
- PUMPING WELL
- SANITARY MANHOLE
- VACUUM VALVE VAULT
- IRON STAKE/MONUMENT
- FIRE HYDRANT
- OVERHEAD ELECTRIC/TELEPHONE
- UTILITY POLE
- GUY WIRE
- SANITARY SEWER MAIN
- SHEET PILE WALL
- HIGH/LOW RIVER WATER MARK
- APPROXIMATE PROPERTY LINE
- RIP RAP
- LIMITS OF SITE RESTORATION

REFERENCE

1. MAP SHOWING BOUNDARY & TOPOGRAPHIC SURVEY AT ALLEN STREET "DOWCRAFT CORPORATION PROPERTY" BY PAUL W. SCHRECKENGOST, LS DATED NOV. 23, 1996 AND LAST REVISED DEC. 21, 1998

NOTES

1. ELEVATIONS BASED ON DATUM FROM SCHRECKENGOST SURVEY, WITH A FINISH FLOOR ELEV. OF 1292.52 ON THE THRESHOLD OF OVERHEAD DOOR AT LOADING DOCK ON SOUTH SIDE OF BUILDING

2. ALL UNDERGROUND UTILITY LOCATIONS ARE PER INFORMATION PROVIDED BY ARCADIS AND SHOULD BE CONSIDERED APPROXIMATE. UNDERGROUND UTILITIES ARE NOT DRAWN ON PLAN BASED ON DIRECT LOCATION OF PIPELINES, CONDUITS, ETC.

3. AS-BUILT SURVEY PERFORMED BY MICHAEL J. RODGERS LAND SURVEYOR, PC

INGERSOLL RAND - DC ROLLFORMS
JAMESTOWN, NEW YORK
Health & Safety Plan

SITE PLAN

ARCADIS

FIGURE
2

CITY:(ALBANY) DIV/GROUP:(SER 1) DB:(TC) PIC:(M.SANFORD) PM:(M.SANFORD)
G:\PROJECT\INGERSOLL\DC Rollforms\AY000219.0014 2008\Engineering Construction Completion Report\Report Figures
XREFS: IMAGES: PROJECTNAME: ---

Appendix A

Definitions

Term or Acronym	Definition
Confined space	Any enclosed area not designed for human occupancy that has a limited means of entry and egress.
DOT	Department of Transportation – specifies the proper and legal methods of shipping and transporting hazardous materials by highway, railway, and by sea in the USA.
HASP	Health and Safety Plan
IATA	International Air Transportation Association - specifies the proper shipment of hazardous materials by air internationally. Many of these regulations are incorporated by reference in the US DOT regulations.
Ionizing radiation	Any one of several types of particles and rays given off by radioactive material, high-voltage equipment, and nuclear reactions. The types that are normally important to your health are alpha particles, beta particles, x rays, and gamma rays.
Level B	A level of protection that requires personal protective equipment including chemically resistant body coverings and supplied air respiratory protective equipment
Level C	A higher level of protection than Level D, requiring some sort of air purifying respirator
Level D	The minimum amount of personal protective equipment ensemble to be worn on a project Site. It does not include respiratory protection.
LO/TO	Lockout/Tagout – a procedure which isolates equipment from energy sources, such as electricity or stored pneumatic energy, by locking and tagging out energy isolating devices.
Mutagen	A chemical that causes changes in the genetic material of living cells.
Nonionizing Radiation	Electromagnetic energy such as ultraviolet, laser, infrared, microwave, and radio.
Oxidizer	A material that releases oxygen and supports combustion.
PEL	Permissible Exposure Limit – an airborne exposure limit set by the U.S. Occupational Safety and Health Administration
PHSM	Project Health and Safety Manager
PPE	Personal Protective Equipment
Sensitizer	A material which, upon exposure, causes a bodily response (i.e. irritation) that increases in severity upon each subsequent exposure.
SPCC	Spill Prevention, Control, and Countermeasures – EPA rule that attempts to prevent oil from entering the national waterways.
SSO	Site Safety Officer
TLV	Threshold Limit Value – an airborne exposure limit set by the American Conference of Governmental Industrial Hygienists

Appendix B

Training and Orientation

Training and Safety Orientation

Training Requirements

For information on training requirements, please refer to the Health and Safety Training Matrix located on the Health and Safety page of "The Resource".

Site Specific Safety Orientation

Health and safety orientation will be an on-going activity during the project and will consist of a variety of techniques to ensure that every member of the ARCADIS team is fully aware of and understands the health and safety mission, goals, and targets and all applicable H&S procedures. These techniques include:

- Initial Project H&S Orientation
- Daily Tailgate Safety Briefings, Safety Huddles or Tool Box talks
- Weekly H&S Reviews
- Visitor H&S Orientation
- Other H&S sessions as necessary

All project team members will be required to attend the Initial Project H&S Orientation which will include a review of the project activities, H&S Plan, Emergency procedures, Site procedures, Site security (if applicable), project organization and communications, personal protective equipment, and Site work areas. This orientation will be presented by the Project H&S Manager and the Project Manager with all other project management staff in attendance. All participants will be required to sign in to show proof of their attendance. Any new team member will be required to attend this orientation prior to beginning work on the Site.

At the start of each day, each project team supervisor and H&S officer will lead a safety huddle, tailgate briefing (see Attachment C) or tool box talk which will include, as applicable:

- Review the day's activities;
- Review of the hazards associated with the work;
- Protective controls required for the day's activities;
- Review of the equipment, permits, and air monitoring requirements for the planned activities; and

- Other critical information the project H&S manager and other H&S team members feel is required.

Participants will all be required to sign in for these sessions to ensure they record their attendance and understanding.

Weekly H&S reviews will be held with team members to review the previous week's activities and H&S performance, and this meeting will take the place of that day's safety huddle, tailgate or toolbox meeting. During this meeting, the project team will have open discussions about the previous week's activities, the effectiveness of the H&S plan, changes to H&S procedures, a review of the week's planned activities, an analysis of the hazards associated with those activities, and a review of the procedures established to control those hazards. All attendees will be required to sign in to record their attendance and understanding.

All visitors who are authorized to enter the Site, will be required to attend a visitor orientation session which will be presented by the SSO. While all visitors will be escorted by a trained, designated ARCADIS team member, visitors will be oriented to Site procedures regarding hazard control, emergency procedures, Site work zones and prohibited areas, and other information specific to the reasons the visit is being made.

The Project H&S Manager or Project Manager has the authority to call safety meetings or orientation at any time. The subject of these sessions will vary based on the reasons resulting in the meeting. However, all of these sessions will be documented in meeting minutes with a full list of attendees and signatures.

Appendix C

Safety Modules

Biological Hazards

Biological hazards are any virus, bacteria, fungus, parasite or any living organism that can cause disease in human beings. Diseases can be transmitted from animals and insects to humans and from exposure to contaminated water and people. The biological hazards present at the site are common for all work tasks and may include the following:

Poisonous Plants

Perhaps the most common biological hazard is contact with poisonous plants including poison ivy, poison oak, and poison sumac. These plants can cause mild to severe skin irritation upon contact depending upon the individual, and in extreme cases may require medical evaluation.

- Poison ivy may be found as a low-growing plant, shrub, or vine which grows in sunny and shaded areas. It has three shining green leaflets usually with coarse teeth. During the fall months, leaves turn a bright red, then yellow.

- Poison oak is a close relative to poison ivy and has three, five or seven lobed leaflets which are hairy underneath. Poison oak is not shade tolerant.

- Poison sumac is a tall shrub or small tree with 6-12 leaflets arranged in pairs. It is most likely found in peat bogs in the north and some southern swamps. Unlike other varieties of sumac, poison sumac has leaflets which are smooth and grow in a V-shape from the midrib.

To avoid contact:

- Learn to recognize these plants;

- Wear long pants;

- Wear long sleeves whenever possible;

- Wear a hat; and

- Wear gloves if cutting or handling vegetation.

If contact is made with these plants, the individual should wash exposed skin immediately with cold water and as soon as possible with soap and water. Clothing should be washed as soon as possible and all gear and equipment should be washed in hot, soapy water.

Insects

Care will be taken by all site workers to avoid stinging or biting insects such as ticks, spiders, bees, wasps, hornets, and yellow jackets. Workers allergic to any particular insect sting or bite should seek medical attention if stung or bitten and may need to carry emergency medicine prescribed by their doctor.

Care should always be taken to avoid these insects and increased vigilance is necessary:

- During high infestation seasons;

- When opening protective casings of monitor wells; and

- When walking through areas of heavy vegetation or areas known to be infested.

To minimize the chance of bites/stings:

- Wear appropriate PPE:

- Light colored clothing so you can see insects;

  - Long pants and boots with pants tucked into boots;
  - Long sleeves when possible;
  - A hat; and
  - Gloves if you are cutting brush or need to handle or move vegetation.

- Check your body and clothing for insects, shower after work and wash/dry clothes at as high temperature as possible.

- Don't swat at insects and don't eat in areas where there are insects.

- Avoid sweet smelling personal hygiene products and, unless contraindicated by the work being performed (e.g., sampling, data collection); and

- Wear EPA approved repellants such as those containing DEET.

Spider bites generally cause only localized reactions such as swelling, pain, and redness. However, bites from a Black Widow or Brown Recluse or if you are allergic to spiders, can cause more serious symptoms. If nausea, vomiting, difficulty breathing or swallowing occurs, medical attention should be sought immediately. Otherwise, clean the bite area with soap and water or alcohol and place a cold pack over the bite area.

Ticks are common, especially in the warmer weather months and may carry diseases such as Rocky Mountain Spotted Fever and Lyme Disease. If a tick is found on the body:

- Use a fine tipped tweezers, grasp tick firmly as close to skin as possible and pull the body away from skin. Avoid crushing the body and don't twist.

- If tick mouth parts remain in skin, don't be alarmed as the mouth will dislodge as skin sloughs off.

- Wash the area with soap and water and apply antiseptic or antibiotic ointment to prevent infection.

- If unexplained symptoms develop such as severe headaches, fever, or rash within 10 days of the bite, seek medical attention.

Mosquitoes are common, especially in areas with standing water and in damp, humid environments in the warmer months, and generally appear between dusk and dawn.

Snakes

Leave snakes alone – many people are bitten because they try to kill a snake or get a closer look at it. If you see a snake, even if you know it's not poisonous, walk away quietly giving it a wide berth (at least 6 feet).

- Be especially cautious when opening monitoring well casings and other enclosed field objects;
- The use of a heavy high-top work boot, denim work pants, etc., will help reduce the severity if bitten; and
- Whenever possible:

  - Stay out of tall grass;
  - Remain on paths as much as possible;
  - Keep hands and feet out of areas you can't see; and
  - Don't pick up rocks, timber or other vegetation.

If bitten by a poisonous snake, the following is recommended:

- Seek medical attention immediately.
- Wash area with soap and water.
- Stay calm and remain as motionless as possible.
- Keep the bite area below the heart, if possible.
- Do not use cold packs or ice on the bite area.
- Do not make incisions or try to suck the venom out.

Rodents and Diseases

Rodents can carry a variety of diseased that can be transmitted to humans via saliva, body fluids or droppings. Hantavirus a disease which is transmitted from infected rodents via saliva or excretion. Symptoms include sudden onset of fever, aching, bleeding of internal organs, shock, and renal syndrome.

Field personnel can protect themselves from disease by donning appropriated PPE, avoiding contact with rodents and rodent/animal droppings. If contact is made, decontaminating or disposing of PPE and frequently washing hands and face thoroughly is recommended.

Bloodborne Pathogens

Bloodborne pathogens (BBP) include such disease as Hepatitis B and C or HIV, and they can be transmitted to another human through exposure to infected blood or other body fluid. Exposure can be a concern at a job site for employees who have been designated to render first aid must do so and body fluid is present.

If field personnel are designated to provide first aid, an Exposure Control Plan will be developed and implemented. In additional, these employees will be offered the Hepatitis B vaccination series and trained in accordance to 29 CFR 1910.1030, Occupational Exposure to Blood borne Pathogens; and

To avoid occupational exposure, all on-site personnel who are designated to provide first aid will consider any body fluid as contaminated when rendering first aid and will wear, at a minimum, gloves and eye protection. Gloves will also be worn when handling contaminated first aid supplies and the supplies will be discarded as directed in the Exposure Control Plan.

Cold Stress

The four environmental conditions that cause cold-related stress are low temperatures, high/cool winds (wind chill), dampness or cold water. One, all or a combination of these factors can cause cold-related hazards. Cold stress, including frostbite and hypothermia, can result in severe health effects. Exposed skin is highly susceptible to wind chill and low temperatures.

Engineering controls should be utilized whenever possible to protect workers from cold related hazards. For example, on-site heat sources, heated shelter, work areas shielded from drafty or windy conditions, and the use of thermal insulating material on equipment handles.

Effects arising from cold exposure will be minimized by the following control measures:

- Personnel will be trained to recognize cold stress symptoms.
- Field activities will be curtailed or halted if the equivalent chill temperature is below 20° F.
  - As much as possible, work that exposes personnel to the cold will be done during the warmest hours of the day.
  - Inactivity in cold conditions will be kept to a minimum.
- Frequent short breaks in warm, dry shelters will be taken.
- Vehicles will be equipped with supplies in case the vehicle becomes inoperable (e.g., blanket, dry clothing, water, food, a shovel, etc.).

The following PPE will be provided during work in cold environments

- Workers will be provided with insulated dry clothing when the equivalent chill temperature is less the 30° F.
- Feet, hands, the face, and the head should be protected (40% of the body's heat can be lost when the head is exposed).
  - Foot and hand wear may also need to be waterproof.
- Clothing should be layered so that adjustments can be made to changing environmental temperatures and conditions. For example, an outer layer to break the wind, a middle layer that will absorb sweat and retain insulation when wet, and an inner layer that allows ventilation.

Cold-Related Illnesses

Hypothermia: Hypothermia occurs when the body temperature falls to a level where normal muscular and cerebral functions are impaired. Although it usually occurs in freezing air and water temperatures, it can occur in any climate if a person's temperature falls below normal. Symptoms should not be ignored and a supervisor, or whomever is available, should be notified as soon as hypothermia is suspected.

Initially, symptoms may include shivering, an inability to do complex motor functions, sluggishness and mild confusion as the body temperature drops to around 95° F. As the body temperature falls, speech may become slurred and behavior may be irrational, simple motor functions may be difficult to do and a state of "dazed consciousness" may exist. In severe states (below 90° F), heart rate, blood flow and breathing will slow. Unconsciousness and full heart failure can occur.

First Aid:

On land:

- Call for emergency help and move the victim (unless other injuries prohibit their being moved) to a warm, dry area and replace wet clothing with warm, dry clothing or a blanket. Move the person carefully because movement can increase the irritability of the heart.
- If the person is conscious and lucid, warm liquids can be provided but **not** alcohol or caffeinated drinks. If possible, have them to move their arms and legs to create muscle heat.
- If the person is unconscious or unable to assist, place warm bottles/packs in the person's arm pits, groin, neck and head areas.
- **Do not** rub the person's body or place them in warm water.

In water (the body loses heat up to 25 times faster than on land):

- Call for emergency help and get the victim out of the water. Move the person carefully because movement can increase the irritability of the heart.
- **Do not** remove clothing- button, buckle, zip and tighten collars, cuffs, shoes and hoods as the water trapped next to the body provides a layer of insulation that may slow the loss of heat.
- If it is you in the water, **do not** swim unless a floating object or person can be reached quickly as swimming uses the body's heat and reduces survival time by about 50%.
    - If you are in the water and is not possible to get out, conserve body heat by folding arms across
    - the chest, keeping thighs together, bending knees and crossing ankles. If another person is in the water with you, huddle together.

Frostbite: Frostbite occurs when the skin actually freezes, and deep frostbite can affect deeper tissues such as tendons and muscles. Frostbite usually occurs when temperatures drop below 30° F, but wind chill effects can cause frostbite at above-freezing temperatures. The ears, fingers, toes, cheeks and nose are the most commonly affected body parts.

Initially, symptoms include an uncomfortable sensation of coldness. Tingling, stinging or an aching feeling of the exposed area is followed by numbness. Frostbitten areas appear white and cold to the touch and with deeper frostbite, the area becomes numb, painless and hard and can turn black.

First Aid:

- Seek medical attention as soon as possible and treat any existing hypothermia first.
- Warm liquid can be provided, but **not** alcohol or caffeinated drinks such as tea and coffee.
- **Do not** rub the affected areas, but cover them with dry, sterile gauze or soft, clean bandages.
- **Do not try rewarming the affected area if you have not been specifically trained to do so** and/or if there is a chance the affected area will get cold again.

Trench Foot: Trench Foot is caused by a continuous exposure to a wet, cold environment. Symptoms include tingling and/or itching sensation, burning pain and swelling and, in more extreme cases, blisters.

First Aid:

- Seek medical attention as soon as possible and move the victim to a warm, dry area.
- Affected tissue can be treated with careful washing and drying, slight elevation. **Do not try rewarming the affected area if you have not been specifically trained to do so.**

Cold Stress Monitoring

Monitoring for cold stress is difficult and will be completed by the SSO by monitoring for symptoms and the weather conditions on a daily basis. The following table may be used as a guideline for establishing a work/rest regimen.

TABLE THRESHOLD LIMIT VALUES WORK/WARM-UP SCHEDULE FOR FOUR-HOUR SHIFT

Air Temperature-Sunny Sky		No Noticeable Wind		5 mph Wind		10 mph Wind		15 mph Wind		20 mph Wind	
°C (approx.)	°F (approx.)	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks
-26° to -28°	-15° to -19°	Normal	1	Normal	1	75 min	2	55 min	3	40 min	4
-29° to -31°	-20° to -24°	Normal	1	75 min	2	55 min	3	40 min	4	30 min	5
-32° to -34°	-25° to –29°	75 min	2	55 min	3	40 min	4	30 min	5	Non-emergency work should cease	
-35° to -37°	-30° to -34°	55 min	3	40 min	4	30 min	5	Non-emergency work should cease			
-38° to -39°	-35° to -39°	40 min	4	30 min	5	Non-emergency work should cease					
-40° to -42°	-40° to -44°	30 min	5	Non-emergency work should cease							
-43° & below	-45° & below	Non-emergency work should cease									

CRANES, HOISTING AND RIGGING

Cranes and Derricks

A Crane is a movable machine used for lifting or moving heavy weights by means of a movable projecting arm or boom.

A Derrick is a fixed machine used for lifting or moving heavy weights by means of a movable projecting arm or boom.

- Cranes and Derricks having ratings that vary with boom length; radius (outreach) or other variables shall have a durable rating chart visible to the operator covering the complete range of manufacture's capacity ratings.
- The rating chart shall include all operating radii for all-permissible boom lengths and jib lengths and optional ratings for optional equipment affecting such ratings. Precautions or warnings specified by the owner or manufacturer shall be included along with the chart.
- The Crane or Derrick shall be equipped with a boom angle or radius indicator, visible to the operator, when the rated load varies with the boom radius.
- All lifting devices will be used to hoist material and equipment only. Personnel shall not ride this equipment.
- All equipment will be maintained and operated in accordance with manufacturer-specified procedures; and limits regarding maximum load, height restrictions, etc. shall be adhered to without exception.
- Designated persons shall visually inspect each crane or derrick and lifting devices on each day of use for defects or damage. Any defects found shall be reported and the device or equipment taken out of service until repaired by a competent repair person or replaced.
- A qualified person shall thoroughly inspect all functional components and accessible structural features of each crane or device at monthly intervals.
- A record of monthly inspections shall be maintained for six months in or on the crane or derrick and a copy kept at the field office.
- No Crane or Derrick with a known or visible defect that affects the safe operation shall be used.
- No Crane or Derrick shall be used in a manner that exerts sideloading stresses upon the boom.
- Designated work loads shall not be increased beyond the manufacturer's ratings or original design limitations unless such increase receives the manufacturer's approval. When the manufacturer's services are not available or when the equipment is of foreign manufacture, engineering design analysis shall be performed or approved by a person accredited for certificating the equipment. A registered professional engineer competent in the field of Cranes and Derricks shall perform engineering design analysis. Any structural changes necessitated by the change in rating shall be carried out.
- Personnel will not work or otherwise be located beneath suspended loads, to protect against injury resulting from equipment failure. Additionally, workers will use hard hats and safety-toed boots when lifting equipment is in operation
- The area where the lift or lifts are to be made shall be roped off with proper warning devices.

- When two or more cranes are used together to hoist a load in unison, a designated person shall direct the operation and instruct all personnel in positioning, rigging and movement of the load being lifted.

- Accessible areas within the swing radius of the body of a revolving crane shall be physically guarded during operations to prevent an employee from being caught between the body of the crane and any fixed structure or between parts of the Crane.

- When possible, electrical distribution and transmission lines are to be de-energized and visibly grounded at the point of work unless insulating barriers not part or attached to the crane have been erected to prevent physical contact with the lines.

- When working around live power distribution lines the following clearances are to be followed: For lines rated 50kV, minimum clearance between the lines and any part of the crane or shall be 10 feet (3.05 m); for lines rated over 50 kV, a minimum clearance between the lines and any part of the crane or load shall be either 10 feet (3.05 m) plus 0.4 inches (10.16 mm) for each 1 kV over 50 kV, or twice the length of the line insulator.

- While in transit, with no load on the equipment and the boom lowered, the clearance between the crane and power line shall be a minimum of 4 feet (1.22 m).

- All material hoists should conform to the most current requirements of ANSI, Safety Requirements for Material Hoists.

- A sign stating "No Riders Allowed" should be posted on the car frame. Employees are prohibited from riding material hoist except for authorized purposes of inspection and maintenance.

Hoisting and Rigging

All hoisting and rigging equipment utilized must conform and be operated to the standards for hoisting equipment in 29 CFR 1926.550. Additionally, the following safety procedures will be adhered to:

- All lifting devices will be used to hoist material and equipment only. Personnel shall not ride this equipment.

- All equipment will be maintained and operated in accordance with manufacturer-specified procedures; and limits regarding maximum load, height restrictions, etc. shall be adhered to without exception.

- Personnel will not work or otherwise be located beneath suspended loads, to protect against injury resulting from equipment failure. Additionally, workers will use hard hats and safety-toed boots when lifting equipment is in operation

- Cranes, hoists, ropes, rigging, etc, shall be inspected at least daily for damage, if evidence of wear or if breakage is suspected. If such conditions are noted, equipment will be placed out of service until the equipment is repaired or replaced.

Hoist, Material and Personnel

- Hoist should comply with the manufacturer's specifications and limitations.

- Rated load capacities, recommended operating speeds, and special hazard warnings or instructions should be posted on cars and platforms.

- Hoistway entrances of material hoists should be protected by substantial full wide gates or bars.

- Hoistway doors or gates of personnel hoist should be not less than 6 feet 6 inches high, and be protected with mechanical locks which cannot be operated from the landing side and are accessible only to persons on the car.

- Overhead protective coverings should be provided on the top of the hoist cage or platform.

- All material hoists should conform to the most current requirements of ANSI, Safety Requirements for Material Hoists.

- Prior to placing a hoist into service, functions and safety devices should be tested thoroughly under the supervision of the manufacturer's representative or other similarly qualified person. At minimums established by law, a full inspection and test must be made by the manufacturer's representative or other qualified individual. Records of such inspections and tests should be kept on the jobsite.
- A sign stating "No Riders Allowed" should be posted on the car frame. Employees are prohibited from riding material hoist except for authorized purposes of inspection and maintenance.

Drilling Safety

The following are minimum requirements that must be met before commencing drilling activities at all sites:

Utility Location

- Public and/or private utility companies and site personnel (e.g., plant engineer or site superintendent) shall be contacted regarding the presence of underground utilities at proposed boring locations prior to site activities.
- ARCADIS personnel should arrive onsite prior to the drilling crew, and locate all borings and verify utility clearance (see Utility Clearance module).

Drilling Safety Precautions

- Drilling shall cease immediately if lightning is seen. Drilling shall not begin again until no lightning is seen for 20 consecutive minutes.
- Under no circumstances shall drilling be performed before dawn or after sunset unless adequate artificial lighting is provided.
- If drilling is performed inside a building, adequate ventilation of exhaust fumes shall be provided.
- All personnel working in the vicinity of the rig shall wear reasonably tight-fitting clothing to prevent clothing from contacting the drilling equipment. Long hair shall be tied back.
- Only the drilling foreman or laborer shall operate machinery and mechanized equipment. Only the drilling foreman and laborer shall work directly behind, and within five feet of the rig. All other site personnel should work in an area at least 15 feet away from the rig (if practicable). An appropriate barrier shall be installed so that the general public can not approach closer than within 30 feet of the rig.
- The drilling rig shall be equipped with a kill switch, fire extinguisher, and first aid kit, the locations of which shall be communicated to all site workers.
- The presence of physical hazards (e.g., rig "pinchpoints", overhead power lines, or uneven ground) shall be assessed and appropriate steps taken to eliminate the threats they pose.
- There shall be no eating, drinking, or smoking while drilling activities are being performed.

Drilling Subcontractor Management

- ARCADIS personnel should verify that the drilling subcontractor has a Health and Safety Plan addressing hazards associated with the tasks they will be performing.
- Prior to drilling, a brief safety meeting shall be convened with the drilling crew and revisited on a daily basis.
- The drilling foreman shall inspect drill rigs and related support equipment and vehicles on a daily basis. All knobs on the control panel of the rig shall be rubber or rubber-capped. The knob of the kill switch shall be rubber or rubber-capped.
- The drilling foreman shall not position the outriggers of the rig until he has verified that the ground surface is solid and reasonably level. A block of wood or metal plate shall be placed under the outrigger(s) if necessary.
- Drilling activities shall not be performed unless both the drilling foreman and laborer are present behind the rig. The drilling rig shall be shut off, or the transmission shifted into neutral, if the drilling foreman, the laborer, or both, leave the rig for whatever reason or whatever length of time.
- For truck-mounted rigs, under no circumstances shall the truck be left running while the rig is in operation. The truck engine shall be shut off and the emergency brake shall be put on.
- The drilling foreman and laborer shall use the appropriate tools for the task being performed (e.g., a wrench shall not be used as a hammer).

- If a hydraulic wrench is used to break drill rods, the drilling foreman shall not use the wrench until site personnel have been cautioned.
- Only a long-handled shovel shall be used to move soil cuttings. Under no circumstances shall the cuttings be moved by hand or foot.
- The drill stem (augers or casing) shall not be touched while they are spinning. If it is necessary to remove mud or other debris from the drill stem, the rig shall first be turned off or the transmission shifted into neutral.
- The drilling mast must be lowered prior to moving the rig. The drilling foreman shall ensure that loose pieces of equipment or other debris do not fall from the rig or the mast while the mast is being raised or lowered.
- Under no circumstances shall gasoline be added to the tank on the rig if the rig is hot. Gasoline that splashes onto the manifold could ignite.

Dusts, Fumes, and Mists

Many materials can become airborne and create hazards when they are inhaled, when they contact the skin or mucous membranes, or when they settle out of the air onto surfaces that people come into contact with or onto food or other items from which we ingest the materials. It is important that these hazards are controlled to avoid these routes of exposure. Below is a detailed discussion of each.

Dust

A **dust** is small particles of dry matter. Dusts can be generated by handling, crushing, grinding, rapid impact, detonation, and breakdown of certain organic or inorganic materials, such as rocks, ore, metal, coal, wood and grains. Under certain conditions, such as wind, disturbances such as driving, drilling, earth moving, etc. these dusts can become airborne. The hazards associated with the dust greatly depend on the size of the dust particles, and their content. Dusts laden with metals such as lead, cadmium, arsenic, or chromium, or dusts that have semivolatile compounds adsorbed on to them such as PCB, pesticides or others increase the hazards above inert materials. It is important to understand the potential contaminants and their concentrations in the source from which the dust is being formed.

Dust particles may be small enough that they are **respirable**, capable of being drawn deep into the lungs when inhaled. Some dusts, such as certain forms of asbestos, chrystalline silica, cotton dust, wood dust, metal dusts, and coal dust, remain lodged deep inside the lungs where they can eventually cause cancer or other chronic health effects such as emphysema, pneumoconiosis and bronchitis. At the very least, most dusts are respiratory irritants. They can also cause mucous membrane irritation in the eyes and nose. Dusts that are not respirable can lead to hazards associated with skin contact and ingestion and cause physical hazards from visibility problems, equipment deterioration or malfunction, complaints from neighbors of the site, or regulatory compliance issues.

Some dusts can form explosive mixtures in air. Grain dust or flour are combustible materials that can be reduced to a dust that has an extremely high surface area and can burn quite rapidly. When the concentrations of air and dust fall within the explosive limits and are ignited fire and explosion occur. Essentially any material that can burn can explode as a dust.

OSHA and ACGIH exposure levels for dusts are as follows (several other compounds have PELs and TLVs - see the respective reference for more details). If the dusts generated on the site have any of these hazardous constituents, additional procedures and requirements may apply, and these constituents should be further identified and assessed.

Type of Dust	OSHA PEL 8-Hour TWA (mg/m^3)	ACGIH TLV 8-Hour TWA (mg/m^3)
Inert Dust or Particulates Not Otherwise Regulated (PNOR)	15	
Respirable Inert Dust or PNOR	5	
Lead	0.050 (PEL) 0.030 (AL)	
Silica	See note below	
Cotton	Ranges from 0.2 to 0.75 depending on type	
Cadmium	0.005 (PEL) 0.0025 (AL)	
Arsenic (inorganic)	0.010 (PEL) 0.005 (AL)	
Calcium carbonate	15 for total, 5 for respirable	
Coal	See note below	
Portland Cement	15 for total, 5 for respirable	
Aluminum Metal	15 for total, 5 for respirable	
Boron oxide	15 for total	
Calcium hydroxide	15 for total, 5 for respirable	
Calcium sulfate	15 for total, 5 for respirable	
Copper dust	1	
Grain dust	10	
Gypsum	15 for total, 5 for respirable	
Limestone	15 for total, 5 for respirable	
Malathion	15	
Starch	15 for total, 5 for respirable	
Sucrose	15 for total, 5 for respirable	

Notes: PEL – Permissible Exposure Level based on an 8-hour Time Weighted Average
AL – Action level where specific regulatory requirements are applicable
Silica – The PEL is calculated from the % of chrystalline silica in the material (See Table Z-3 of OSHA 1910.1000)
Mppcf – Millions of particles per cubic foot of air
Coal – Depends on the amount of chrystalline silica – See Table Z-3

By calculating the ratio of total dust to the content of specific compounds in the soil or dust producing media, the measurement of airborne total dust can provide some rough estimates of the airborne concentrations of those particular compounds without having to complete laboratory analysis. However, it still may be necessary to conduct sampling to determine actual exposure or measurements of airborne contaminants based on regulatory, client, and project requirements.

Control of dust at its source is the most appropriate means of controlling the hazard. This may include wetting the source with water or surfactant, covering it, or removing it. Based on site conditions including weather and site activities, the SSHO and the PM will determine the most appropriate control process.

Appropriate personal protective equipment (PPE) is outlined in the PPE section of this plan.

Fume

Fumes refers to small particulate or liquid droplets given off by a substance as a result of a chemical transformation such as reaction, heating, explosion or detonation. The term applies particularly to very fine solid or liquid particles as a suspension in air. Activities that can create fumes include welding, soldering, brazing, and other activities that generally convert a solid material to a vapor stage for a short period of time with condensation taking place to convert the vapor back to a solid, very small particle in a very short period of time. Often fume is made up of a metal like lead, arsenic, cadmium and others. Chemical reactions can result in a fume of hydrochloric acid or other corrosive compound. The hazards associated with fumes are similar to that of dusts, however, the fume is smaller, which means it can get deeper into the lungs, and is generally more concentrated with the material from which it was formed.

The hazard controls for fumes will greatly depend on the make up of the fume and should be addressed elsewhere in this plan. There are OSHA PELs and ACGIH TLVs that have been developed for certain types of fumes. For example, copper has a PEL for both dust and fume and they are different reflecting the different points of exposure that can occur from the two.

Mists

Mists are small, airborne droplets of liquid and could be made up of one or several compounds. Typically, these liquids become airborne through some type of mechanical force that aerosolizes the liquid. These droplets can coagulate forming larger droplets and fall out of the air. However, they can also remain suspended and become an exposure issue via inhalation or dermal contact. The specific hazards will be dependent on the compounds making up the mist. Those hazards are identified in other sections of this HASP.

Heat Stress

Heat stress can be a significant hazard, especially for workers wearing protective clothing. Depending on the ambient conditions and the work being performed, heat stress can occur very rapidly, within as little as 15 minutes. Site personnel will be instructed in the identification of a heat stress victim, the first-aid treatment procedures for the victim and the prevention of heat stress incidents. Workers will be encouraged to immediately report any heat-related problems that they experience or observe in fellow workers.

During breaks, workers should be encouraged to drink plenty of water or other liquids to replace lost fluids and to help cool off.

Any worker exhibiting signs of heat stress and exhaustion should be made to rest in a cool location and drink plenty of water. Emergency help by a medical professional is required immediately for anyone exhibiting symptoms of heat stroke, such as red, dry skin, confusion, delirium or unconsciousness. Heat stroke is a life threatening condition that must be treated by competent medical authority.

Prevention

Whenever possible or within the control of ARCADIS, engineering controls should be utilized to protect workers from heat related hazards. For example, isolation from the heat source, ventilation such as open windows, fans or other methods of creating air flow, and heat shielding such as awnings or umbrellas.

Appropriate work practices can also lessen the chances of heat related hazards. Some of these include:

- Water intake should be about equal to the amount of sweat produced (i.e., drinking 5-7 ounces of water every 15-20 minutes).
  - Electrolyte fluids may also be necessary.
- Whenever possible, gradual exposure to heat is preferred.
- Whenever possible, adjust the work schedule. For example, postpone nonessential or heavier work to another day or a cooler part of the day.
- Whenever possible, rotate personnel.
- Increase the number and/or duration of rest breaks, but do not increase individual work periods when longer and/or more rest breaks periods are given.
  - Whenever possible, rest break areas should be in a cool area and as close to the work Area as is feasible.

PPE is available, such as thermally conditioned clothing including self-contained air conditioning in a backpack and plastic jackets/vests with pockets that can be filled with dry ice or ice. However, the type of work being done, other required PPE, and where the work is being done may prohibit or make the use of this PPE impossible or impractical.

Heat-Related Illnesses

The following guidance can be used in the identification and treatment of heat related illness.

Heat Stress: This is the mildest heat-related illness, but prompt action may prevent a more severe heat-related illness. Symptoms include irritability, lethargy, significant sweating, headache or nausea.

First Aid:

- Take the victim to a protected (e.g., shaded) area, remove any excess protective clothing, and provide cool fluids.
- If an air-conditioned spot is available, this is an ideal break location.

- Once the victim shows improvement he/she may resume working, however the work pace and practices (e.g., does fluid intake need to be increased) should be moderated to prevent recurrence of the symptoms.

Heat Exhaustion: Usually begins with muscular weakness, dizziness, nausea, and a staggering gait. Symptoms include pale, clammy skin, and profuse sweating, vomiting, and the bowels may move involuntarily. The pulse is weak and fast, breathing is shallow. Fainting can occur.

First Aid:

- Immediately remove the victim from the work area to a shady or cool area with good air circulation (avoid drafts or sudden chilling – you do not want the victim to shiver).
- Call a physician or emergency service, or transport the victim to medical care.
- Remove all protective outerwear.
- If the victim is conscious, it may be helpful to give him/her sips of water.

Heat Stroke: Heat stoke is a severe medical condition requiring first aid and emergency treatment by a medical professional as death can occur without appropriate care. Heat Stroke represents the collapse of the body's cooling mechanisms. As a result, body temperatures often rise to between 105°-110°F. As the victim progresses toward heat stroke symptoms include hot and usually dry, red and spotted skin, headache, dizziness, nausea, mental confusion, delirium, possible convulsions and loss of consciousness.

First Aid:

- Immediately remove the victim from the work area to a shady or cool area with good air circulation (avoid drafts or sudden chilling - you do not want the victim to shiver).
- Summon emergency medical help to provide on-site treatment and transportation to a medical facility.
- Remove all protective outerwear and loosen personal clothing.
- Give no stimulants or hot drinks.
- Apply cool wet towels, ice bags, etc. to the head, armpits, and thighs. Sponge off the bare skin with cool water or rubbing alcohol, if available, or even place the victim in a tub of cool water.
  - The main objective is to cool without chilling the victim or causing him/her to shiver.

Skin Hazards

Sunburn and prickly heat are both symptoms of skin irritation/damage produced through exposure to sunlight and operating in hot work environments.

- Protect exposed skin with an appropriate sunscreen. A sunscreen with a sun protection factor (SPF) of 15 or greater is required for work in the sun with reapplication at breaks and lunch.
- Heat rash, also known as prickly heat, can be prevented by the application of a hydrophobic, water repellent barrier cream such as Kerodex 71.

Heat Stress Monitoring

The prevention of heat stress-related illnesses is best performed through continuous observation of employees and routine heat stress awareness training. Although heat stress monitoring can be accomplished using one of the techniques discussed below, any results obtained from monitoring techniques should be used as guidance only.

To properly mitigate the effects of heat stress, it is necessary to establish a work routine that incorporates adequate rest periods to allow workers to remove protective clothing, drink fluids (vital when extreme sweating

is occurring), rest, and recover. The frequency and length of such work breaks must be determined by the Task Manager and SSO based upon factors such as the ambient temperature and sunshine, the amount of physical labor being performed, the physical condition of the workers, and protective clothing being used. Breaks must be sufficient to prevent workers from manifesting symptoms of heat stress regardless of monitoring results.

Evaluation of heat stress using the methods below, to determine appropriate work/rest cycles, is performed, at the discretion of the SSO and PHSM whenever fieldwork activities are occurring.

Basic Instrument Measurements Method: Used at the discretion of the SSO and/or PHSM to monitor heat stress where workers **are not** using chemically protective clothing. The Wet Bulb Globe Temperature (WBGT) value will be determined using a WBGT meter (Reuter-Stokes 214 DL or equivalent), and compared with the values shown in Table 1 to determine appropriate work/rest cycles.

Table 1 WBGT Values for Level D Work/Rest Cycles*

Work-Rest Regimen	°F –WBGT		
	Light Work	Moderate Work	Heavy Work
Continuous Work	86	80	77
75% Work – 25% Rest	87	82	78
50% Work – 50% Rest	89	85	82
25% Work – 75% Rest	90	88	86

*Re-printed from ACGIH's 1999 Threshold Limit Values for Chemical Substances and Physical Agents

Modified Instrument Measurements Method: This method will be used whenever personnel use chemically protective clothing. The WBGT value will be determined as above with the measured value then be compared with the values shown in Table 2 to determine the appropriate work/rest cycle.

Table 2 WBGT Values for CPC Work/Rest Cycles*

Work-Rest Regimen	°F –WBGT		
	Light Work	Moderate Work	Heavy Work
Continuous Work	75	69	66
75% Work – 25% Rest	76	71	67
50% Work – 50% Rest	78	74	71
25% Work – 75% Rest	79	77	75

Modified from ACGIH's 1999 Threshold Limit Values for Chemical Substances and Physical Agents

Direct Observation: This method can be used as a substitute for the Modified Instrument Measurements Method and can be used whenever personnel use chemically protective clothing. At the start of the workday, each worker's baseline pulse will be determined by counting the number of beats per minute (bpm) and then pulses taken at the beginning and end of each break period.

- Start of Break: As recommended by the ACGIH, each worker's maximum heart rate at the start of any break should be less than 180 minus workers age bpm (e.g., a worker is 40 so their pulse should be less than 120bpm). If this value is exceeded for any worker, the duration of the following work period will be decreased by at least 10 minutes.

- End of Break: At the end of each break, all workers heart rates must have returned to within +10% of the baseline pulse rate. If any worker's pulse rate exceeds this value, the break period will be extended for at least 5 minutes with the pulse rates will be re-measured and the end-of-break criteria again applied.

HEAVY MACHINERY AND CERTIFICATION REQUIREMENTS

Purpose

The purpose of this procedure is to present the minimum safety performance requirements for the operation of heavy equipment on ARCADIS project sites. Project Managers are responsible for ensuring all equipment used on an ARCADIS site is certified and that equipment owners have submitted the attached Machinery and Mechanized Equipment form.

General Requirements

All equipment shall comply with all applicable requirements for motor vehicles and material handling heavy equipment contained in 29 CFR 1926 Subpart O. Heavy equipment includes, but is not limited to, drill rigs, front-end loaders, backhoes, track hoes, bulldozers, forklifts, cranes, derricks and similar equipment used for the implementation of the project Statement of Work.

Equipment Safety Inspections

The following presents general guidelines for certifying equipment is in safe operating condition before activities commence at the site and during site operations. The following guidelines are not meant to be all-inclusive.

- All machinery and mechanized equipment will be certified to be in safe operating condition by a competent individual, (using the attached form), within seven days of initial onsite operation.

  - Certification is valid for one year.

- Equipment will be inspected on a daily basis by the owner/operator and daily logs will be maintained. All discrepancies shall be corrected prior to placing the equipment in service.

- Inspections shall include, but are not limited to: all hydraulic lines and fittings for wear and damage, all cable systems and pull ropes for damage and proper installation, exhaust systems, brake systems, and drill controls, etc.

- The driller in charge on a daily basis shall inspect drill rigs and related support equipment and vehicles. These inspections shall be recorded/documented.

- Preventive maintenance shall be conducted for all equipment according to manufacturer recommendations and/or established internal policies, schedules, and equipment SOPs.

- Only designated qualified persons shall operate machinery and mechanized equipment.

- Records of tests and inspections shall be maintained at the site by the operating contractor, and shall be made available upon request of the designated authority, and shall become part of the official project file.

- Equipment not found to be in safe operating condition, or when a deficiency affecting the safe operation of the equipment is identified, the equipment shall immediately be taken out of service and its use prohibited until safe conditions have been corrected.

- All equipment shall be kept in the exclusion zone until work or the shift has been completed. Equipment will be decontaminated within designated decontamination areas. Note: this not typical for construction sites. It would be for remediation sites.

- All Equipment must have an audible alarm that sounds when equipment is moving in reverse.

HEAVY EQUIPMENT CERTIFICATION REQUIREMENTS

Initial Equipment Inspection Checklist

TO: DATE:

FROM:

Project Name:

Project Location:

1. This form provides certification of machinery and mechanized equipment to be used on the referenced project for the following work:

Description of equipment work:	
Project Site:	
Owner of equipment: Address:	
Dates (duration) of equipment work:	

2. Inspection and certification of machinery and mechanized equipment, as required by ARCADIS Project Team has been made prior to, but within seven calendar days advance of, use on the project site. Re-certification will be required for equipment that is used on the project site for more than one year.

	Identification of equipment (make, model, serial no.)	Date of Certification
1		
2		
3		

3. The above listed equipment has been inspected and tested as indicated above, and is CERTIFIED TO BE IN SAFE OPERATING CONDITION BY THE FOLLOWING COMPETENT INDIVIDUAL:

Name		Title	
Company			
Signature		Date	

4. If there are any questions regarding this certification, please contact the following ARCADIS Project Team representative: _____.

Daily Inspection Form

DAILY HEAVY EQUIPMENT INSPECTION CHECKLIST

EQUIPMENT I.D. NO:_____

EQUIPMENT NAME: _____

DATE: ____/____/_____ PROJECT #: _____ CONTRACT #: _____

ITEM INSPECTED	Inspectors Initials
Falling Object Protective Structure (FOP)	
Roll-Over Protective Structure (ROP)	
Seat Belts	
Operators Seat Bar(s)	
Side Shields, Screens or Cabs	
Lift Arm Restraining Device	
Grab Handles	
Back Up Alarm(s) – Working	
Lights	
Guards	
Horn	
Anti-Skid Tread Steps Clear of Mud	
Safety Signs (Counterbalance swing area)	
Fire Extinguisher (arrow in green, monthly inspection)	
General Condition	
Fuel Condition	
Oil (Full, No Leaks)	
Clear of Extra Materials	
Controls Function Properly	
Damaged Parts	
Hydraulic System (Full, No Leaks)	
Parking Brake	
Lift Arm and Bucket	
Tires/Tracks	
Steering	
Hours at Time of Inspection	
Time Inspected	
Site Name	
Inspectors Name (Printed)	

INSTRUCTIONS – Inspect all applicable items indicated each shift prior to use.
Note any unsatisfactory conditions on the back of this sheet and bring to the attention of the supervisor immediately. Operators are required to sign in on this sheet the first time that they operator the equipment each day.

Personal Safety

If there are issues of personal safety at a project site, resources such as the client, local law enforcement officials, Park or Wildlife Service, and Animal Control will be utilized as necessary to ensure the safest possible work environment. Some general guidelines are provided here, but each situation is different and actions must be taken based on the specifics of each.

Personal Safety

If it is deemed that a work site is in an area where an employee's personal safety may be at risk from potential criminal acts, the PM or SSO will work with the client and local law enforcement officials to evaluate the risk and determine what steps can be taken to minimize the risk. For example, can local law enforcement be present or make frequent drive-bys while the work is being done, should outside security be hired, should work only occur during certain times of the day, or should work not proceed at all.

In areas of risk such as this and if work proceeds, employees will not work alone and will have the ability to communicate with local law enforcement and the PM through cell phones or 2-way radios. Employees will check-in with the PM (or other specific individual) at predetermined times throughout each work day, and if employees do not call in, the PM will attempt to contact the team. If unsuccessful, the PM will notify local law enforcement.

If while on the project site and despite the other precautions set forth, an employee feels that their personal safety is at risk from potential criminal acts, the employee should leave the site immediately if possible and report their concerns to the PM or SSO so that appropriate steps can be taken as described above

Project Site In Isolated Area and Employees Working Alone

Whenever possible, employees will not work alone in isolated areas.

If the isolated area involves hiking/walking into areas that are unmarked or if there is potential to become directionally disoriented (e.g., no trails, unmarked trails, forested or highly vegetated areas), employees will be trained on the use of a compass and trail/topography maps and, if necessary, will take wilderness safety training. The PM or SSO will work with the Park/Wildlife service on what emergency planning is necessary (e.g., unexpected weather, animal attack, and search/rescue).

Communication through cell phones or 2-Way Radios will be utilized whenever possible. In addition, if employees are unable to check in on a daily basis because of the project location and cell phones or 2-Way Radios do not work, consider the use of some type of transponder or GPS locator device that can be used to locate the team if necessary.

Employees will check-in with the PM (or other specific individual) at predetermined times throughout each work day and if employees do not call in, the PM will attempt to contact the team. If unsuccessful, the PM will notify the appropriate authorities. In addition, and especially if communication is not possible during the day, the PM will know the planned start and estimated finish times and employees will check in with the PM at the end of the work day.

If employees will be moving from isolated area to isolated area, for each day that this will occur:

- There will be established beginning and ending locations;
- Planned start and estimated finish times; and
- Planned routes that will be followed throughout the day.

Employees will not deviate from this schedule without first contacting the PM. It may also be appropriate and necessary to notify the client, law enforcement or Park/Wildlife officials of these schedules.

The PM should also check with local authorities in regard to any hunting season that may be in session and if it is possible that hunters may be present in the area in which ARCADIS personnel will be working. If so, employees will wear brightly colored hardhats/hats and reflective vests, will not work before dusk and work will end 30 minutes before dusk, and employees will be advised to make lots of noise by talking loudly at regular intervals or carrying a radio to help ensure that they aren't mistaken for an animal/bird.

Employees Working Late/Early Hours

Whenever possible, employees will not work before dusk and work will be completed before dark. If this is not possible, employees will wear appropriate reflective apparel and have appropriate lighting, such as portable lighting, flashlights, or headlamps as appropriate for the activity being conducted. Personal security will be assessed and measures taken as discussed above if appropriate.

No or Limited Cell Phone Service

The PM will assess if any other type of communication such as 2-Way Radios is appropriate for the area. If not, the PM will know the planned start and estimated finish times and employees will check in with the PM at the end of the work day. In addition, if employees are unable to check in on a daily basis because of the project location and 2-Way Radios do not work, consider the use of some type of transponder or GPS locator device that can be used to locate the team if necessary.

If employees will be moving from area to area within a day or over several days, each time the crew moves, the team will:

- Establish beginning and ending locations;
- Plan start and estimated finish times; and
- Plan routes that will be followed throughout the period.

Employees will not deviate from the schedule or planned route without first contacting the PM. It may also be appropriate and necessary to notify the client, law enforcement or Park/Wildlife officials of these schedules and routes.

Potentially Dangerous Wildlife

The local Park or Wildlife Service should be contacted to verify what type of potentially dangerous wildlife may be in or around the work site, to provide their recommendations on avoiding contact and, if contact is made, how to react appropriately. If the chance for contact with potentially dangerous wildlife is high, it may be necessary to work with the Park/Wildlife Service to have a member of their staff on site while work is being performed, and/or to have personnel receive additional training on avoiding and reacting to the particular animal/animals. Protection from wildlife may require specific protection devices like pepper spray, bear-proof canisters, or other devices as recommended by wildlife experts.

Guard or Stray Dogs

If the client utilizes guard dogs at the site, the PM or SSO will work with the client each day to ensure that the dogs are unable to gain access to any area in which ARCADIS personnel will or could be working. ARCADIS personnel will also carry Pepper Spray or similar product that can be used to protect themselves in case a guard dog does come into the work area.

If stray dogs are known to be in an area in which ARCADIS personnel will be working, the PM or SSO will work with local animal control to have the dogs removed from the area. ARCADIS personnel will carry Pepper spray or similar product as recommended Animal Control that can be used to protect themselves from a dog that may become aggressive.

Hand And Power Tool Safety

The use of hand and portable power tools during site activities is a potential source of accidents. A fundamental program of using the right tool in a correct manner together with proper maintenance and storage is necessary to prevent personal injury and property damage.

The following procedures should be used when performing operations involving portable hand and power tools:

- Portective eyewear will be worn.
- Guards are not to be removed or rendered inoperative, unless written permission is obtained from the Health and Safety Professional.
- Only personnel who have been appropriately trained in the use, operation and proper handling of hand and portable power tools will be permitted to do so.
    - The SSO will ensure that only trained personnel perform work activities with portable hand and power tools.
- Each type of portable hand or power-operated tool should be operated using the manufacturers recommended operating procedures.
    - Where the manufacturer has not developed specific operating procedures, only personnel familiar with the safe operating procedures of that equipment should be permitted to operate it.
- The SSO should conduct periodic inspection of hand and portable power tools that are used at the PROJECT. Inspections should include both powered and non-powered equipment.
- Any damaged, worn, or improper tool should be removed from service immediately and remain out of service until it is repaired or replaced.

Severe Weather

[[insert information here as to the season/seasons that will occur during the duration of the project; e.g., winter and severe cold, or spring to summer giving rise to changes from cold to extreme heat, lightening and hail]].

During threatening weather, the SSO will monitor radio weather forecasts and heed any warnings. In addition, in the event of lightning in the vicinity of the site, the SSO will stop all activities and have site personnel take cover. Other severe weather such as high winds, hail or heavy rain will be evaluated by the SSO, PHSM and the Task Manager to determine how site activities should proceed.

Site Control And Work Zones

Control zones shall be established by the SSO to cover a large enough area to accommodate work operations where required for the contaminants as outlined by the HAZWOPER regulations. The zones, demarcated as described next, shall be clearly communicated to all PROJECT workers.

HAZWOPER requires the development of a site map, with enough detail included to ensure adequate identification of the zones in relation to other site features. These zones are defined as:

- Exclusion Zone (EZ): area where contaminated materials exist
- Contamination Reduction Zone (CRZ): area where decontamination procedures are performed
- Support Zone (SZ): uncontaminated area designated with Access Control Points (ACP) for entry/exit points across the hotline into and out of the work operations

The hotline is the line of demarcation where the EZ ends and the CRZ begins.

Within the ACP, between those two lines, decontamination of personnel and equipment will take place.

The area that lies outside of the CRZ, is the SZ and can be considered uncontaminated for the purposes of workers performing support duties there.

The SSO will determine extent of each zone and will communicate that information to workers during tailgate briefings. Physical demarcation of zones on the site will be determined by the SSO using a variety of methods including but not limited to signs, tape, flags, etc.

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Trenching and Excavation Safety

All trenching and excavation operations will be accomplished in accordance with requirements of 29 CFR 1926.650. The following safe operating guidelines apply to open trenches or excavations exceeding four (4) feet in depth **or** of any depth if in unstable soil conditions, as required by 29 CFR 1926.650. An excavation is any man-made cut, cavity, trench, or depression in an earth surface, formed by earth removal; a trench is a narrow excavation (in relation to its length) made below the surface of the ground.

Excavation Construction Guidelines

The following requirements are minimum requirements and must be met before any personnel are permitted to enter any excavation.

- Excavated materials will be stored and retained at least 2 feet from the edge of the excavation (Note: This procedure must be observed even when excavation/trench entry will not occur).
- Trees, boulders, and other surface encumbrances that create a hazard will be removed or made safe before excavation is begun.
- Special precautions will be taken in sloping or shoring the sides of excavations adjacent to a previously backfilled excavation.
- Except in hard rock, excavations below the level of the base of the footing of any foundation or retaining wall will not be permitted unless the wall is underpinned and all other precautions have been taken to ensure the stability of the adjacent walls.
- All ladders used in excavation operations will be in accordance with the requirements of 29 CFR 1926 Subpart L.
- Excavations will be inspected at least daily, or more often as conditions warrant, by a competent person to ensure that changes in temperature, precipitation, shallow groundwater, overburden, nearby building weight, vibrations, or nearby equipment operation has not caused weakening of sides, faces, and flows. The SSO will accompany the competent person and document this inspection in the daily safety log.
- Diversion ditches, dikes, or other suitable means will be used to prevent water from entering an excavation and for drainage of the excavation.
- When mobile equipment is used or allowed adjacent to excavations, stop logs or barricades will be installed. The grade will always be away from the excavation.
- Dust conditions during excavation will be kept to a minimum. Wetting agents shall be used upon the direction of the SSO.
- Field personnel shall not enter any excavation, without specific direction, for any reason except to rescue injured individuals who have fallen into the excavated area.
- All excavations will be marked and protected at all times to ensure site personnel, visitors, or unauthorized personnel do not enter without permission or fall into the trench.
- Personnel will work in pairs when working around an excavation of 2' or more.

Trench Entry Requirements

The following requirements must be met before any personnel are permitted to enter any excavation.

- Expected hazardous ground movement areas and banks more than four (4) feet high (or less if soil is deemed unstable by the competent person) shall be shored, laid back to a stable slope, shielded, or equivalent.
- Sides of trenches or excavations in unstable or soft material four (4) feet or more in depth (or less if soil is deemed unstable by the competent person) shall be shored, sheeted, braced, sloped, or equivalent.

- Sides of excavations in hard compact soil, including embankments, are shored or otherwise supported when the trench is four (4) feet or more in depth (less if soil is deemed unstable by the qualified person).

- Materials used for sheeting, sheet piling, bracing, shoring, and underpinning shall be in good, serviceable condition.

- A means of egress (ladder, ramps, stairways, etc.) shall be accessible at any location inside the excavation without requiring more than 25 feet of lateral travel distance.

- Additional precautions by way of shoring and bracing shall be taken to prevent slides or cave-ins when the competent person subjects excavations to vibrations as deemed necessary.

Atmosphere & Testing

Also, before an employee enters an excavation greater than four (4) feet in depth (or less if soil is deemed unstable by the competent person), the atmosphere must be tested to ensure that an oxygen deficient or hazardous atmosphere does not exist. If the concentration of any airborne contaminant exceeds one-half its permissible exposure limit (PEL) or other applicable occupational exposure limit (OEL), the airborne oxygen concentration is less than 19.5 percent, or explosivity exceeds ten percent of the lower explosive limit (LEL), then no personnel shall be permitted to enter the excavation until such engineering controls or other hazard controls are instituted to eliminate or control hazard.

Underground and Above Ground Utilities

Various forms of underground and aboveground utility lines or pipes (carrying water, wastewater, gas and or electricity) may be encountered during work activities. Prior to the start of intrusive operations activities, all utilities must be located and measures must be instituted to avoid contact with these structures. All utility line and or piping will be identified and rendered controlled (through lockout/tagout procedures) or protected from damage.

Should any operations cause equipment to come into contact with utility lines, the SSO and the PHSM will be notified immediately and an Incident Report will be completed. Work will be suspended until the appropriate actions for the particular situations can be taken.

Work involving machinery with high extensions (backhoes, etc.) in vicinity of overhead power lines shall not be conducted within the limits prescribed in the table below. The distance may be lengthened if directed by the client or the electric company and any specified distances will be strictly followed.

Safe distances from overhead power lines are as follows:

TABLE

Voltage range (phase to phase, RMS)	Approach distance (inches)
300 V and less	Avoid contact
Over 300V, not over 750V	12
Over 750V not over 2 kV	18
Over 2 kV, not over 15 kV	24
Over 15 kV, not over 37 kV	36
Over 37 kV, not over 87.5 kV	42
Over 87.5 kV, not over 121 kV	48
Over 121 kV, not over 140 kV	54

From 1910.238(b)(7)(iii)

A utilities location checklist is attached and may be used to verify that all utilities have been marked.

UTILITIES AND STRUCTURES CHECKLIST

Project:	Prepared By:
Location:	Date:

Instructions. This checklist may be used as a safety measure to insure that all underground utility lines, other underground structures as well as above-ground power lines are clearly marked out in the area selected for boring or excavation. **DRILLING OR EXCAVATION WORK MAY NOT PROCEED UNTIL LINES ARE MARKED AND THIS CHECKLIST HAS BEEN COMPLETED.**

Arrangements for underground utility markouts are best made at the time of the preliminary site visit to allow client and/or utility company sufficient time. Keep completed checklist and maps on site; send copy to Project Manager.

Assignment of Responsibility. Client is responsible for having underground utilities and structures located and marked. Preferably, the utilities themselves should mark out the lines.

Drilling or Excavation Sites. Attach a map of the property showing the proposed drilling or excavation site (or if sites are widely separated, several maps) clearly indicating the area(s) checked for underground utilities or underground structures and the location of above-ground power lines.

Utilities and Structures

Type	Not Present	Present	How Marked (flags, paint, wooden stakes, etc.)
Petroleum products line			
Natural gas line			
Steam line			
Water line			
Sewer line			
Storm drain			
Telephone cable			
Electric power line			
Product tank			
Septic tank/drain field			
Overhead power line			

Name and affiliation of person who marked out underground lines or structures

Name	Organization	Phone

Visable Dust Suppression

In the event that airborne concentrations of dust and dust-laden chemical contaminants are found to exceed established action levels, the SSO will implement appropriate mitigation measures to include water-suppression techniques. If mitigation measures are found to be inadequate (contaminant concentrations cannot be reduced below HASP requirements), the SSO will halt on-site operations until effective control can be achieved.

Attachment 1

HASP Addendum

Addendum Page

This form should be used to document any changes required to this HASP. These changes may be a result of changes to the scope of services, changes in field conditions, new hazards identified on the Site, higher or lower hazards than anticipated, etc. Please complete this form prior to the next work day once the changes have been identified. Review the modifications with all Site staff, including subcontractors, during the daily tailgate briefing, and complete the tailgate briefing form as required. Attach a copy of the addendum to all copies of the HASP including the Site copy.

Date of Changed Conditions: _____ Date of Addendum: _____

Description of Change that Results in Modifications to HASP:

_____

_____

_____

_____

_____

_____

Describe in Detail the Changes Required to the HASP:

_____

_____

_____

_____

_____

_____

_____

Signed: _____ Signed: _____

Project Manager Site Safety Officer

Signed: _____ Signed: _____

Project H&S Manager H&S Plan Reviewer

Make additional copies of this form as necessary.

Attachment 2

Visitor Sign-In Log

HASP Acceptance and Site Visitor Log

By signing below, I waive, release and discharge the Owner of the Site and ARCADIS G&M, Inc. and their employees from any future claims for bodily and personal injuries which may result from my presence at, entering, or leaving the Site and in any way arising from or related to any and all known and unknown conditions on the Site.

Name	Company	Reason for Visit	Date/Time On Site	Date/Time Off Site

Make additional copies of this form as necessary.

Attachment 3

Site Activities Tailgate Safety Briefing Sign-In Log

ARCADIS			
Site Activities Tailgate Safety Briefing Sign-in Log			
Project Number:		Project Name:	
Date:		Time:	
Briefing Conducted by:	Signature:	Company:	

This sign-in log documents the tailgate briefing conducted in accordance with the HASP. Personnel who perform work operations on Site are required to attend each briefing and to acknowledge receipt of each briefing, daily.

TOPICS COVERED (check all those covered):

☐ General PPE Usage	☐ Confined Space	☐ Excavation Safety
☐ Hearing Conservation	☐ Slips, Trips, Falls	☐ Confined Space
☐ Respiratory Protection	☐ Heat Stress	☐ Traffic Safety
☐ Personal Hygiene	☐ Thermal Stresses	☐ Changes to the HASP
☐ Exposure Guidelines	☐ Site Control	☐ Initial Review of Hazard Evaluation
☐ Decon Procedures	☐ Work Zones	☐ Other (specify):
☐ Emergency Procedures (include route to hospital)	☐ Lockout/Tagout	☐ Other (specify):

Personnel Sign-in List

Printed Name	Signature	Company Name

Make additional copies of this form as necessary.

Attachment 4

Material Safety Data Sheets

NIOSH Publication No. 2005-149:

September 2005

NIOSH Pocket Guide to Chemical Hazards

Trichloroethylene

CAS 79-01-6

$ClCH=CCl_2$

RTECS KX4550000

Synonyms & Trade Names
Ethylene trichloride, TCE, Trichloroethene, Trilene

DOT ID & Guide
1710 160

Exposure Limits
NIOSH REL: Ca See Appendix A See Appendix C
OSHA PEL†: TWA 100 ppm C 200 ppm 300 ppm (5-minute maximum peak in any 2 hours)

IDLH Ca [1000 ppm] See: 79016

Conversion 1 ppm = 5.37 mg/m^3

Physical Description
Colorless liquid (unless dyed blue) with a chloroform-like odor.

MW: 131.4	BP: 189°F	FRZ: -99°F	Sol(77°F): 0.1%
VP: 58 mmHg	IP: 9.45 eV		Sp.Gr: 1.46
Fl.P: ?	UEL(77°F): 10.5%	LEL(77°F): 8%	

Combustible Liquid, but burns with difficulty.

Incompatibilities & Reactivities
Strong caustics & alkalis; chemically-active metals (such as barium, lithium, sodium, magnesium, titanium & beryllium)

Measurement Methods
NIOSH 1022, 3800; OSHA 1001
See: NMAM or OSHA Methods

Personal Protection & Sanitation (See protection)
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet or contaminated
Change: No recommendation
Provide: Eyewash, Quick drench

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape:
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus
Important additional information about respirator selection

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin; headache, visual disturbance, lassitude (weakness, exhaustion), dizziness, tremor, drowsiness, nausea, vomiting; dermatitis; cardiac arrhythmias, paresthesia; liver injury; [potential occupational carcinogen]

Target Organs Eyes, skin, respiratory system, heart, liver, kidneys, central nervous system

Cancer Site [in animals: liver & kidney cancer]

See also: INTRODUCTION See ICSC CARD: 0081 See MEDICAL TESTS: 0236

NIOSH Publication No. 2005-149:
September 2005

NIOSH Pocket Guide to Chemical Hazards

1,2-Dichloroethylene

CAS 540-59-0

ClCH=CHCl

RTECS KV9360000

Synonyms & Trade Names
Acetylene dichloride, cis-Acetylene dichloride, trans-Acetylene dichloride, sym-Dichloroethylene

DOT ID & Guide
1150 130P

Exposure Limits
NIOSH REL: TWA 200 ppm (790 mg/m^3)
OSHA PEL: TWA 200 ppm (790 mg/m^3)

IDLH 1000 ppm See: 540590

Conversion 1 ppm = 3.97 mg/m^3

Physical Description
Colorless liquid (usually a mixture of the cis & trans isomers) with a slightly acrid, chloroform-like odor.

MW: 97.0	BP: 118-140°F	FRZ: -57 to -115°F	Sol: 0.4%
VP: 180-265 mmHg	IP: 9.65 eV		Sp.Gr(77°F): 1.27
Fl.P: 36-39°F	UEL: 12.8%	LEL: 5.6%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Strong oxidizers, strong alkalis, potassium hydroxide, copper [Note: Usually contains inhibitors to prevent polymerization.]

Measurement Methods
NIOSH 1003; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation (See protection)
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet (flammable)
Change: No recommendation

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 1000 ppm:
(APF = 25) Any supplied-air respirator operated in a continuous-flow mode^E
(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)^E
(APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister
(APF = 50) Any self-contained breathing apparatus with a full facepiece
(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape:
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus
Important additional information about respirator selection

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, respiratory system; central nervous system depression

Target Organs Eyes, respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0436

NIOSH Publication No. 2005-149:
September 2005

NIOSH Pocket Guide to Chemical Hazards

Vinyl chloride

CAS 75-01-4

CH_2=CHCl

RTECS KU9625000

Synonyms & Trade Names
Chloroethene, Chloroethylene, Ethylene monochloride, Monochloroethene, Monochloroethylene, VC, Vinyl chloride monomer (VCM)

DOT ID & Guide
1086 116P (inhibited)

Exposure Limits
NIOSH REL: Ca See Appendix A
OSHA PEL: [1910.1017] TWA 1 ppm C 5 ppm [15-minute]

IDLH Ca [N.D.] See: IDLH INDEX

Conversion 1 ppm = 2.56 mg/m^3

Physical Description
Colorless gas or liquid (below 7°F) with a pleasant odor at high concentrations. [Note: Shipped as a liquefied compressed gas.]

MW: 62.5	BP: 7°F	FRZ: -256°F	Sol(77°F): 0.1%
VP: 3.3 atm	IP: 9.99 eV	RGasD: 2.21	
Fl.P: NA (Gas)	UEL: 33.0%	LEL: 3.6%	

Flammable Gas

Incompatibilities & Reactivities
Copper, oxidizers, aluminum, peroxides, iron, steel [Note: Polymerizes in air, sunlight, or heat unless stabilized by inhibitors such as phenol. Attacks iron & steel in presence of moisture.]

Measurement Methods
NIOSH 1007; OSHA 4, 75
See: NMAM or OSHA Methods

Personal Protection & Sanitation (See protection)
Skin: Frostbite
Eyes: Frostbite
Wash skin: No recommendation
Remove: When wet (flammable)
Change: No recommendation
Provide: Frostbite wash

First Aid (See procedures)
Eye: Frostbite
Skin: Frostbite
Breathing: Respiratory support

Respirator Recommendations (See Appendix E) NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape:
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/Any appropriate escape-type, self-contained breathing apparatus
Important additional information about respirator selection

Exposure Routes inhalation, skin, and/or eye contact (liquid)

Symptoms Lassitude (weakness, exhaustion); abdominal pain, gastrointestinal bleeding; enlarged liver; pallor or cyanosis of extremities; liquid: frostbite; [potential occupational carcinogen]

Target Organs Liver, central nervous system, blood, respiratory system, lymphatic system

Cancer Site [liver cancer]

See also: INTRODUCTION See ICSC CARD: 0082 See MEDICAL TESTS: 0241

NIOSH Publication No. 2005-149:
September 2005

NIOSH Pocket Guide to Chemical Hazards

Benzene

CAS 71-43-2

C_6H_6

RTECS CY1400000

Synonyms & Trade Names
Benzol, Phenyl hydride

DOT ID & Guide
1114 130

Exposure Limits
NIOSH REL: Ca TWA 0.1 ppm ST 1 ppm See Appendix A
OSHA PEL: [1910.1028] TWA 1 ppm ST 5 ppm See Appendix F

IDLH Ca [500 ppm] See: 71432

Conversion 1 ppm = 3.19 mg/m^3

Physical Description
Colorless to light-yellow liquid with an aromatic odor. [Note: A solid below 42°F.]

MW: 78.1	BP: 176°F	FRZ: 42°F	Sol: 0.07%
VP: 75 mmHg	IP: 9.24 eV		Sp.Gr: 0.88
Fl.P: 12°F	UEL: 7.8%	LEL: 1.2%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Strong oxidizers, many fluorides & perchlorates, nitric acid

Measurement Methods
NIOSH 1500, 1501, 3700, 3800; OSHA 12, 1005
See: NMAM or OSHA Methods

Personal Protection & Sanitation (See protection)
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet (flammable)
Change: No recommendation
Provide: Eyewash, Quick drench

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash immediately
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations (See Appendix E) NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape:
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus
Important additional information about respirator selection

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, respiratory system; dizziness; headache, nausea, staggered gait; anorexia, lassitude (weakness, exhaustion); dermatitis; bone marrow depression; [potential occupational carcinogen]

Target Organs Eyes, skin, respiratory system, blood, central nervous system, bone marrow

Cancer Site [leukemia]

See also: INTRODUCTION See ICSC CARD: 0015 See MEDICAL TESTS: 0022

NIOSH Publication No. 2005-149:
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NIOSH Pocket Guide to Chemical Hazards

o-Xylene

CAS 95-47-6

$C_6H_4(CH_3)_2$

RTECS ZE2450000

Synonyms & Trade Names
1,2-Dimethylbenzene; ortho-Xylene; o-Xylol

DOT ID & Guide
1307 130

Exposure Limits
NIOSH REL: TWA 100 ppm (435 mg/m^3) ST 150 ppm (655 mg/m^3)
OSHA PEL†: TWA 100 ppm (435 mg/m^3)

IDLH 900 ppm See: 95476

Conversion 1 ppm = 4.34 mg/m^3

Physical Description
Colorless liquid with an aromatic odor.

MW: 106.2	BP: 292°F	FRZ: -13°F	Sol: 0.02%
VP: 7 mmHg	IP: 8.56 eV		Sp.Gr: 0.88
Fl.P: 90°F	UEL: 6.7%	LEL: 0.9%	

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

Incompatibilities & Reactivities
Strong oxidizers, strong acids

Measurement Methods
NIOSH 1501, 3800; OSHA 1002
See: NMAM or OSHA Methods

Personal Protection & Sanitation (See protection)
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet (flammable)
Change: No recommendation

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 900 ppm:
(APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*
(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*
(APF = 10) Any supplied-air respirator*
(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape:
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus
Important additional information about respirator selection

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis

Target Organs Eyes, skin, respiratory system, central nervous system, gastrointestinal tract, blood, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 0084 See MEDICAL TESTS: 0243

NIOSH Publication No. 2005-149:
September 2005

NIOSH Pocket Guide to Chemical Hazards

m-Xylene

CAS 108-38-3

$C_6H_4(CH_3)_2$

RTECS ZE2275000

Synonyms & Trade Names
1,3-Dimethylbenzene; meta-Xylene; m-Xylol

DOT ID & Guide
1307 130

Exposure Limits
NIOSH REL: TWA 100 ppm (435 mg/m^3) ST 150 ppm (655 mg/m^3)
OSHA PEL†: TWA 100 ppm (435 mg/m^3)

IDLH 900 ppm See: 95476

Conversion 1 ppm = 4.34 mg/m^3

Physical Description
Colorless liquid with an aromatic odor.

MW: 106.2	BP: 282°F	FRZ: -54°F	Sol: Slight
VP: 9 mmHg	IP: 8.56 eV		Sp.Gr: 0.86
Fl.P: 82°F	UEL: 7.0%	LEL: 1.1%	

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

Incompatibilities & Reactivities
Strong oxidizers, strong acids

Measurement Methods
NIOSH 1501, 3800; OSHA 1002
See: NMAM or OSHA Methods

Personal Protection & Sanitation (See protection)
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet (flammable)
Change: No recommendation

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 900 ppm:
(APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*
(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*
(APF = 10) Any supplied-air respirator*
(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape:
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus
Important additional information about respirator selection

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis

Target Organs Eyes, skin, respiratory system, central nervous system, gastrointestinal tract, blood, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 0085 See MEDICAL TESTS: 0243

NIOSH Publication No. 2005-149:
September 2005

NIOSH Pocket Guide to Chemical Hazards

p-Xylene

CAS 106-42-3

$C_6H_4(CH_3)_2$

RTECS ZE2625000

Synonyms & Trade Names
1,4-Dimethylbenzene; para-Xylene; p-Xylol

DOT ID & Guide
1307 130

Exposure Limits
NIOSH REL: TWA 100 ppm (435 mg/m^3) ST 150 ppm (655 mg/m^3)
OSHA PEL†: TWA 100 ppm (435 mg/m^3)

IDLH 900 ppm See: 95476

Conversion 1 ppm = 4.41 mg/m^3

Physical Description
Colorless liquid with an aromatic odor. [Note: A solid below 56°F.]

MW: 106.2	BP: 281°F	FRZ: 56°F	Sol: 0.02%
VP: 9 mmHg	IP: 8.44 eV		Sp.Gr: 0.86
Fl.P: 81°F	UEL: 7.0%	LEL: 1.1%	

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

Incompatibilities & Reactivities
Strong oxidizers, strong acids

Measurement Methods
NIOSH 1501, 3800; OSHA 1002
See: NMAM or OSHA Methods

Personal Protection & Sanitation (See protection)
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet (flammable)
Change: No recommendation

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 900 ppm:
(APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*
(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*
(APF = 10) Any supplied-air respirator*
(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape:
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus
Important additional information about respirator selection

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis

Target Organs Eyes, skin, respiratory system, central nervous system, gastrointestinal tract, blood, liver, kidneys

See also: INTRODUCTION. See ICSC CARD: 0086 See MEDICAL TESTS: 0243

NIOSH Publication No. 2005-149: **September 2005**

NIOSH Pocket Guide to Chemical Hazards

NPG Home | Introduction | Synonyms & Trade Names | Chemical Names | CAS Numbers | RTECS Numbers | Appendices | Search

Lead

CAS 7439-92-1

Pb

RTECS OF7525000

Synonyms & Trade Names
Lead metal, Plumbum

DOT ID & Guide

Exposure Limits

NIOSH REL*: TWA (8-hour) 0.050 mg/m^3 See Appendix C [*Note: The REL also applies to other lead compounds (as Pb) -- see Appendix C.]

OSHA PEL*: [1910.1025] TWA 0.050 mg/m^3 See Appendix C [*Note: The PEL also applies to other lead compounds (as Pb) -- see Appendix C.]

IDLH 100 mg/m^3 (as Pb) See: 7439921

Conversion

Physical Description
A heavy, ductile, soft, gray solid.

MW: 207.2	BP: 3164°F	MLT: 621°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 11.34
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid in bulk form.

Incompatibilities & Reactivities
Strong oxidizers, hydrogen peroxide, acids

Measurement Methods
NIOSH 7082, 7105, 7300, 7301, 7303, 7700, 7701, 7702, 9100, 9102, 9105; OSHA ID121, ID125G, ID206
See: NMAM or OSHA Methods

Personal Protection & Sanitation (See protection)
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: Daily
Remove: When wet or contaminated
Change: Daily

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap flush promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations (See Appendix E) NIOSH/OSHA

Up to 0.5 mg/m^3:
(APF = 10) Any air-purifying respirator with an N100, R100, or P100 filter (including N100, R100, and P100 filtering facepieces) except quarter-mask respirators. Click here for information on selection of N, R, or P filters.
(APF = 10) Any supplied-air respirator

Up to 1.25 mg/m^3:
(APF = 25) Any supplied-air respirator operated in a continuous-flow mode
(APF = 25) Any powered, air-purifying respirator with a high-efficiency particulate filter

Up to 2.5 mg/m^3:
(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter. Click here for information on selection of N, R, or P filters.
(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode
(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter
(APF = 50) Any self-contained breathing apparatus with a full facepiece
(APF = 50) Any supplied-air respirator with a full facepiece

Up to 50 mg/m^3:
(APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode

Up to 100 mg/m^3:
(APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

NIOSH Publication No. 2005-149: **September 2005**

NIOSH Pocket Guide to Chemical Hazards

NPG Home | Introduction | Synonyms & Trade Names | Chemical Names | CAS Numbers | RTECS Numbers | Appendices | Search

Chlorodiphenyl (42% chlorine)

CAS 53469-21-9

$C_6H_4ClC_6H_3Cl_2$ (approx)

RTECS TQ1356000

Synonyms & Trade Names
Aroclor® 1242, PCB, Polychlorinated biphenyl

DOT ID & Guide
2315 171

Exposure Limits	NIOSH REL*: Ca TWA 0.001 mg/m^3 See Appendix A [*Note: The REL also applies to other PCBs.]
	OSHA PEL: TWA 1 mg/m^3 [skin]

IDLH Ca [5 mg/m^3] See: 53469219 **Conversion**

Physical Description
Colorless to light-colored, viscous liquid with a mild, hydrocarbon odor.

MW: 258 (approx)	BP: 617-691°F	FRZ: -2°F	Sol: Insoluble
VP: 0.001 mmHg	IP: ?		Sp.Gr(77°F): 1.39
Fl.P: NA	UEL: NA	LEL: NA	

Nonflammable Liquid, but exposure in a fire results in the formation of a black soot containing PCBs, polychlorinated dibenzofurans & chlorinated dibenzo-p-dioxins.

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH 5503; OSHA PV2089
See: NMAM or OSHA Methods

Personal Protection & Sanitation (See protection)
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet or contaminated
Change: Daily
Provide: Eyewash, Quick drench

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash immediately
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape:
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having an N100, R100, or P100 filter. Click here for information on selection of N, R, or P filters./Any appropriate escape-type, self-contained breathing apparatus
Important additional information about respirator selection

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes; chloracne; liver damage; reproductive effects; [potential occupational carcinogen]

Target Organs Skin, eyes, liver, reproductive system

Cancer Site [in animals: tumors of the pituitary gland & liver, leukemia]

See also: INTRODUCTION See MEDICAL TESTS: 0175

NIOSH Publication No. 2005-149: **September 2005**

NIOSH Pocket Guide to Chemical Hazards

NPG Home | Introduction | Synonyms & Trade Names | Chemical Names | CAS Numbers | RTECS Numbers | Appendices | Search

Chlorodiphenyl (54% chlorine)

CAS 11097-69-1

$C_6H_3Cl_2C_6H_2Cl_3$ (approx)

RTECS TQ1360000

Synonyms & Trade Names
Aroclor® 1254, PCB, Polychlorinated biphenyl

DOT ID & Guide
2315 171

Exposure Limits

NIOSH REL*: Ca TWA 0.001 mg/m^3 See Appendix A [*Note: The REL also applies to other PCBs.]

OSHA PEL: TWA 0.5 mg/m^3 [skin]

IDLH Ca [5 mg/m^3] See: IDLH INDEX

Conversion

Physical Description
Colorless to pale-yellow, viscous liquid or solid (below 50°F) with a mild, hydrocarbon odor.

MW: 326 (approx)	BP: 689-734°F	FRZ: 50°F	Sol: Insoluble
VP: 0.00006 mmHg	IP: ?		Sp.Gr(77°F): 1.38
Fl.P: NA	UEL: NA	LEL: NA	

Nonflammable Liquid, but exposure in a fire results in the formation of a black soot containing PCBs, polychlorinated dibenzofurans, and chlorinated dibenzo-p-dioxins.

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH 5503; OSHA PV2088
See: NMAM or OSHA Methods

Personal Protection & Sanitation (See protection)
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet or contaminated
Change: Daily
Provide: Eyewash, Quick drench

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash immediately
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape:
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having an N100, R100, or P100 filter. Click here for information on selection of N, R, or P filters./Any appropriate escape-type, self-contained breathing apparatus
Important additional information about respirator selection

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, chloracne; liver damage; reproductive effects; [potential occupational carcinogen]

Target Organs Skin, eyes, liver, reproductive system

Cancer Site [in animals: tumors of the pituitary gland & liver, leukemia]

See also: INTRODUCTION See ICSC CARD: 0939 See MEDICAL TESTS: 0176

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape:
(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter. Click here for information on selection of N, R, or P filters./Any appropriate escape-type, self-contained breathing apparatus
Important additional information about respirator selection

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Lassitude (weakness, exhaustion), insomnia; facial pallor; anorexia, weight loss, malnutrition; constipation, abdominal pain, colic; anemia; gingival lead line; tremor; paralysis wrist, ankles; encephalopathy; kidney disease; irritation eyes; hypotension

Target Organs Eyes, gastrointestinal tract, central nervous system, kidneys, blood, gingival tissue

See also: INTRODUCTION See ICSC CARD: 0052 See MEDICAL TESTS: 0127

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ARIES CHEMICAL
Water Treatment Specialists

ARIES 2925

PRODUCT BULLETIN

DESCRIPTION AND USES

Aries 2925 is designed for the protection of groundwater treatment systems from deposits and scale. Aries 2925 is a concentrated blend of organic polymers, sequestrants and dispersants that is designed for systems treating groundwater with high iron concentrations. This formulation also effectively descales systems with calcium carbonate, calcium sulfate, calcium phosphate, magnesium silicate and iron deposits. Aries 2925 is very effective in controlling iron deposits and fouling in groundwater treatment systems. Aries 2925 is stable when used in conjunction with halogen based biocide programs.

APPLICATION AND DOSAGE

Aries 2925 application rate will vary depending upon water quality. Aries Chemical can provide laboratory analysis of your system to determine optimum dosage. Your service representative will recommend the specific treatment rate to optimize your system. Biocides may be required to control organic growths.

SAFETY AND HANDLING

Aries 2925 is non-hazardous. Do not take internally. Avoid contact with eyes, skin and clothing. Wash thoroughly after handling. As always, before handling this or any other chemical, please consult the MSDS.

PACKAGING

Aries 2925 is available in bulk tankers, 275 gallons totes, 55 gallon drums or 5 gals pails.

REGULATORY STATUS

Aries 2925 is environmentally friendly as it contains no chromates, heavy metals, nitrites or zinc.

PB2925806

■ PO Box 519 ■ Beaver Falls, NY 13305 ■ Tel: 315-346-1489 ■ Fax: 315-346-1658 ■
■ E-mail: aries@arieschem.com ■

ARIES CHEMICAL INCORPORATED
6604 DEPOT ST., P.O. BOX 519
BEAVER FALLS, NEW YORK 13305
315-346-1489 FAX: 315-346-1658

Origination Date: 11-06-03
Revision Date: 06-27-07

2925

SECTION I - GENERAL INFORMATION

TRADE NAME:
Aries 2925

EMERGENCY PHONE NO:
INFOTRAC #800-535-5053

CHEMICAL NAME:
Groundwater Sequestrant

DISTRIBUTOR'S D-U-N-S NO:
14-861-3045

HAZARDOUS MATERIAL DESCRIPTION: Non hazardous
EMERGENCY RESPONSE GUIDE #: NA
SHIPPING NUMBER: NA
REPORTABLE QUANTITY: NA

SYNONYMS:

FORMULA: Mixture

CHEMICAL FAMILY:
Sequestrant

MOLECULAR WEIGHT:
N/A

SECTION 2 - HAZARDOUS INGREDIENTS

INGREDIENTS	% BY WT.	CAS NO.	TWA OSHA	TWA ACGIH

No permissible exposure limits (PEL/TLC) have been established by OSHA or ACGIH for this product.

HAZARD RATING	HEALTH	1	REACTIVITY	0
	FIRE	0	SPECIAL	B

SECTION 3 - PHYSICAL AND CHEMICAL PROPERTIES

SPECIFIC GRAVITY:
1.08-1.14

pH:
5 to 6

BOILING POINT:
>212

SOLUBILITY IN WATER:
Complete

VAPOR PRESSURE:
N/A

PERCENT VOLATILE BY VOLUME:
65 - 75

EVAPORATION RATE:
Same as water.

APPEARANCE AND ODOR: Amber colored liquid, odorless.

SECTION 4 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT:
N/A

FLAMMABLE LIMITS:
LEL: N/A UEL: N/A

AUTO IGNITION TEMPERATURE: N/A

EXTINGUISHING MEDIA: Treat surrounding fire. Use water spray, foam or carbon dioxide. Use water spray to cool nearby containers.

SPECIAL FIRE FIGHTING PROCEDURES: Wear self-contained breathing apparatus when fighting fire.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Thermal decomposition may release oxides of carbon, phosphorus, nitrogen and sodium.

SECTION 5 - HEALTH HAZARD DATA

EFFECTS OF EXPOSURE: Caution eye and skin irritant

INGESTION: Do not induce vomiting. Give copious quantities of water or milk. Immediately seek medical assistance.

SKIN CONTACT: Wash affected area with water. Remove contaminated clothing. Seek medical assistance if irritation persists

EYE CONTACT: Flush with copious quantities of water for 30 minutes, lifting eye lids often. Seek medical assistance.

INHALATION: Remove individual to fresh air. Initiate artificial respiration and CPR if necessary. Seek medical assistance.

CARCINOGENICITY: Not a carcinogen.

SECTION 6 - REACTIVITY DATA

STABILITY:
Stable

HAZARDOUS POLYMERIZATION:
Will not occur.

CONDITIONS TO AVOID: Store away from sources of heat.

MATERIALS TO AVOID: Strong acids and oxidizing agents.

HAZARDOUS DECOMPOSITION OR BY-PRODUCTS: Thermal decomposition may release oxides of carbon, phosphorus, nitrogen and sodium.

SECTION 7 - SPILL OR LEAK PROCEDURE

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED:
Full protective clothing and SCBA are recommended. Dike and dam spill area with inert material. Sweep material into DOT approved containers for disposal as below. Flush remainder with water.

WASTE DISPOSAL METHODS: Dispose according to local, state and federal regulations.

ENVIRONMENTAL TOXICITY DATA: 96 hr: LC50 for Fathead Minnow (Pimephales promelas) = 1,516 mg/l.; 48 hr LC50 for Ceriodaphnia dubia – 1,414 mg/l.

HAZARDOUS WASTE 40CFR261: N/A

HAZARDOUS WASTE NO: N/A

CONTAINER DISPOSAL: Returnable

SECTION 8 - SPECIAL PROTECTIVE EQUIPMENT

RESPIRATORY PROTECTION: Wear full face, positive pressure NIOSH approved respirators or SCBA if mists are present.

EYE PROTECTION: Chemical splash goggles or full-face shield.

PROTECTION CLOTHING: Rubber gloves and apron. Long sleeve shirt and trousers.

VENTILATION: Good dilution ventilation is highly recommended.

OTHER: Eyewash and emergency shower should be located nearby.

SECTION 9 - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE:
Store away from sources of heat, acids and oxidizing agents. Emergency eyewash and safety shower should be located nearby.

OTHER PRECAUTIONS: Wash thoroughly after handling this material.

SECTION 10 - REGULATORY INFORMATION

SECTION 313 - SUPPLIER NOTIFICATION

THIS PRODUCT DOES NOT CONTAIN ANY TOXIC CHEMICALS SUBJECT TO THE REPORTING REQUIREMENTS OF SECTION 313 OF THE EMERGENCY PLANNING AND COMMUNITY RIGHT-TO-KNOW ACT OF 1986 (40 CFR 372).

BIOMIN Inc.

Makers of OilSorb™ and Other State-of-the-Art Filtration Media

P.O. Box 20028
Ferndale, MI 48220
(248) 544-2552

HEALTH	
FLAMMABILITY	
REACTIVITY	
PERSONAL PROTECTION	E

MATERIAL SAFETY DATA SHEET

An explanation of the terms used herein maybe found in OSHA 29 CFR 1910. 1200, available from OSHA regional or area offices.
(Essentially similar to U.S. Department of Labor Form OSHA-20 and generally accepted in Canada for information purposes.)
Do Not Duplicate This Form. Request an Original.

DATE OF PREPARATION	Emergency Telephone No.	(248) 544-2552
3/25/04	Information Telephone No.	(248) 544-2552

SECTION I – PRODUCT IDENTIFICATION

PRODUCT NUMBER		CAS NO. 68911-87-5
PRODUCT NAME	OilSorb™ Organoclay	
PRODUCT CLASS	EC-100, EC-200, EC-150	

SECTION II – HAZARDOUS INGREDIENTS

INGREDIENT	PERCENT	OCCUPATIONAL EXPOSURE LIMITS	VAPOR PRESSURE
Quaternary Amine	2	TLV 0.1 PEL 0.1 mg/m3	
Anthrazite, Bentonite, Quartz			
None			

SECTION III – PHYSICAL DATA

BOILING RANGE	Not Applicable	VAPOR DENSITY	Not Applicable
EVAPORATION RATE	Not Applicable	% VOLATILE WEIGHT	<2.5%
Black and tan speckled granules		WT/GAL	6

SECTION IV – FIRE AND EXPLOSION HAZARD DATA

FLAMMABILITY CLASSIFICATION OSHA _____ FLASH POINT LEL *0.07 oz/ft^3

DOT _____ Not Applicable

EXTINGUISHING MEDIA:

FOAM "ALCOHOL" FOAM CO_2 DRY CHEMICAL WATER FOG OTHER

UNUSUAL FIRE AND EXPLOSION HAZARDS does not normally present a fire or explosion hazard, but dust concentrations greater than 0.07 oz/ft^3 may ignite at 510°C or when exposed to a spark or other ignition source.

SPECIAL FIREFIGHTING PROCEDURES Thin film temperature is 190°C. Flood with water if ignites. Normal precautions for flammable dusts should be followed.

SECTION V – HEALTH HAZARD DATA

EFFECTS OF OVER-EXPOSURE No known effects.

MEDICAL CONDITIONS PRONE TO AGGRAVATION BY EXPOSURE

Continued exposure to dust to skin and/or mucous membranes may cause drying of exposed areas. Avoid chronic inhalation of dust.

PRIMARY ROUTE(S) OF ENTRY DERMAL INHALATION INGESTION

EMERGENCY AND FIRST AID PROCEDURES

No special procedures.

SECTION VI – REACTIVITY DATA

STABILITY UNSTABLE STABLE

HAZARDOUS POLYMERIZATION MAY OCCUR WILL NOT OCCUR

HAZARDOUS DECOMPOSITION PRODUCTS None

CONDITIONS TO AVOID

Avoid exposure of dust aerosol to spark or open flame.

INCOMPATIBILITY (MATERIALS TO AVOID) None

SECTION VII – SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

Spilled powder may be collected by shoveling or sweeping provided respirator and eye protection are worn. Care should be exercised to prevent high dust concentrations in the air.

WASTE DISPOSAL

Solid waste disposal. Suitable for incineration.

SECTION VIII – SAFE HANDLING AND USE INFORMATION

RESPIRATORY PROTECTION Dust mask required

VENTILATION Adequate dust collection system should be used to avoid formation of dust aerosol.

PROTECTIVE GLOVES Recommended.

EYE PROTECTION	Goggles or safety glasses.
OTHER PROTECTIVE EQUIPMENT	None
HYGIENIC PRACTICES	Avoid breathing dust.

SECTION IX – SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING

Precautions for finely divided, flammable dust should be followed. Avoid high dust concentrations. Use adequate dust collection equipment. Insure all equipment is properly grounded to prevent static discharge. Keep dust away from open flame, heat, sparks, electrical equipment.

OTHER PRECAUTIONS None

Attachment 5

Air Monitoring Records

Real Time Air Monitoring Data Collection Form

Document all air monitoring conducted on the Site below based on Section E of the HASP. Keep this form with the project files.

Site Name: _____ Date: _____

Instrument: _____ Model: _____ Serial #: _____

Calibration Method: (material used, settings, etc.)	
Calibration Results:	
Calibrated By:	

Activity Being Monitored	Compounds Monitored	Time	Reading	Action Required? Y/N

Describe Any Actions Taken as a Result of this Air Monitoring and Why:

_____

_____

_____

_____

_____

Signed: _____

Site Safety Officer

Attachment 6

Loss Prevention Observation

ARCADIS

Loss Prevention Observation

Date and Time	2/18/2008 9:00 AM
LPO Type	LPO Form - Multi-Task
Project No.	
Division	ENR1AYE1 - EN:R1:AY:E1 - ENV SER GROUP 1 - ALBANY, NY

Observer	Carignan, Todd M.
Observer's Positive Comments	

Site Location	
Equipment On Site	
Personnel On Site	
Weather Conditions	
Unusual Conditions	
Observee's Supervisor	User ID not Found ()

Conclusion (Detail of Why the Questionable Item(s) Occurred).

Explanation of Root Cause(s) Analysis Numbers (RCA No):

1	Lack of SKILL or KNOWLEDGE	5	Lack of or inadequate operational PROCEDURES or work standards
2	Doing the job according to procedures or acceptable practices takes more TIME or EFFORT	6	Inadequate COMMUNICATION OF EXPECTATIONS regarding procedures or acceptable practices
3	Short-cutting procedures or acceptable practices is POSITIVELY REINFORCED or TOLERATED, rewarded or appreciated	7	Inadequate TOOLS or EQUIPMENT
4	IN THE PAST, did not follow procedures or acceptable practices and NO INCIDENT occurred	8	EXTERNAL factors

Item No	RCA No	Solution(s): How to Prevent Questionable Behavior From Reocurring	Person Responsible	Due Date	Completed	Verified / Validated

Results of Solution Verification & Validation

Feedback Conducted By	Date and Time

Reviewed By	Position/Title	Date

DQR Performed By	Position/Title	Date	Action

Initial - 02/18/2008 09:05 AM EST

	Pre-Task Preparation	Correct	Questionable	Comments
1	WORK AUTHORIZATION AND DOCUMENTATION - HASP, permits, training records, utilty clearance, client or management authorization			
2	JSA, procedure or other work standard reviewed			
3	SPSA performed prior to beginning work/task			
4	PPE - Hand Protection			
5	PPE - Eye Protection			
6	PPE - Head Protection			
7	PPE - Body Protection/Clothing/Tyvek			
8	PPE - Reflective Vest/High Visibility Clothing			
9	PPE - Respiratory Protection			
10	Other PPE (Specify)			
	Performing Task			
11	COMMUNICATION - communicating with coworkers, giving and following instructions and signals, buddy system			
12	SPSA performed when task or conditions change			
13	STOP WORK AUTHORITY used when needed to address potential hazards			
14	CHEMICAL/BIO/RAD PROTECTION- Decontamination, exclusion zones, air monitoring, contamination prevention and control			
15	LIFTING/PULLING/PUSHING - BODY POSITION - no awkward positions or postures, no twisting or excessive reaching			
16	LIFTING/PULLING/PUSHING - EXERTION - no excessive weight or force, no straining, load under control, stability			
17	SLIP/TRIP PREVENTION (other than housekeeping) - selecting path, eyes on path, speed, footing			
18	FALL PREVENTION (elevated work) - 3 points of contact, ladders, stairs, mounting or dismounting equipment, fall arrest			
19	PINCH POINTS/LACERATIONS - hands and body clear or protected from being caught between objects or equipment, and striking or contacting sharp edges			
20	STRUCK BY/LINE OF FIRE - Protection or exposure control from traffic, heavy equipment, falling or flying objects, mechanical			

	equipment			
21	TOOLS AND EQUIPMENT - selection, inspection and use of hand and power tools, electrical cords, hand augers, pumps, hoses, etc.			
22	HEAVY EQUIPMENT AND DRILLING - set-up, inspection, operation, safe work practices, eyes on task			
23	OVERHEAD AND UNDERGROUND UTILITIES - protecting and protection from; mark out, clearance distances, hand clearing, spotters			
24	TRENCHING AND EXCAVATION - inspection, shoring, sloping, ladders, protection of structures, fall prevention			
25	WORKING IN, ON OR NEAR WATER - work practices, boating safety, flotation devices			
26	ENERGY CONTROL - equipment shutdown, lockout, depressurizing, isolating, securing			
27	FLORA AND FAUNA - protection from poison ivy, bees, dogs, ticks, thorns, snakes, mosquitoes			
28	HOUSEKEEPING AND WASTE DISPOSAL - walking and working areas, storage, cleaning, waste storage and disposal			
29	Other (Specify)			
	Total			

Initial - 02/18/2008 09:05 AM EST

Attachment 7

Job Safety Analysis

ARCADIS

JOB SAFETY ANALYSIS

SECTION 1

JSA Type: Environmental Cleaning and Sampling

JSA No: JSA001134

Date: 12/11/2007

Work Type: Environmental - Decontamination of Small Sampling Equipment

Work Activity: Decontamination of Field Equipment

Project No.: 000001410000 - HEALTH & SAFETY (HEALTH & SAFETY)

SECTION 2

Development Team	Position/Title	PC	Reviewed By	Position/Title	Date
Stahl, Bridget C.	Staff Scientist	☑	Bullock, David M.	Southeast Regional Health and Safety Specialist	12/13/2007
			Thalman, Katherine L.	Office Health and Safety Coordinator	12/12/2007

SECTION 3

Job Steps	Potential Hazard (s)	Critical Action(s)	SOP Reference
Prepare decontamination area	Selection of appropriate decontamination area; site hazards; back strains; slips, trips, and falls	Situate decontamination area in a location designated by the site supervisor or health and safety supervisor; check the decontamination area for uneven surfaces. Utilize appropriate PPE including work boots and leather work gloves.	
Decontamination of small, non-disposable, sampling equipment (e.g., parastaltic pump, YSI, submersible pump, turbidy meter, hand auger, trowels, etc.)	Ingestion, inhalation, and absorption of decontamination fluids; slips, trips, and falls; hand, eye, and foot injuries (cuts); lifting hazards; sprains and strains	Perform decontamination activities in an area designed to prevent spillage or leakage of decontamination fluids. Utilize appropriate PPE. Handle equipment carefully using correct bending and lifting techniques. Use proper decontamination techniques as per the sampling task. Use caution if walking on wet plastic sheeting. Establish decontamination boundaries to keep unauthorized personnel away from area.	
Decontamination of large sampling equipment	Ingestion, inhalation, and absorption of decontamination fluids; slips, trips, and falls; hand, eye, and foot injuries (cuts); lifting hazards; sprains and strains	Perform decontamination activities in an area designed to prevent spillage or leakage of decontamination fluids. Utilize appropriate PPE with a splash shield. Handle equipment carefully using correct bending and lifting techniques. Use proper decontamination techniques as per the sampling task. Use caution while working with high pressure washing equipment including avoiding the hot surfaces of steam cleaners and water jet blast of sprayers. Use caution if walking on wet plastic	

		sheeting. Establish decontamination boundaries to keep unauthorized personnel away from area.
Collection of decontamination fluids	Spillage of decontamination fluids	Utilize nitrile gloves. Handle equipment and containers carefully. Material Safety Data Sheets, absorbent materials, an eye wash station, and a first aid kit will be available.

SECTION 4

Personal Protective Equipment (PPE):

Hard Hat

Level D

Protective Gloves - nitrile, leather

Safety Glasses

Safety Shoes

Required and/or Recommended Equipment and Supplies:
Company identification card and FRA Training card must be kept on site at all times
CSXT Contractor handbook must be kept on site at all times
DI water, Isopropyl alcohol, Water/Liquinox mixture
ANSI Level II Vest
Sunscreen
Insect repellant
2-way radio/cell phones
First Aid Kit
Rain gear/ inclement weather clothing

JSA001134 - Closed - Current - 02/15/2008 02:42 PM EST

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JOB SAFETY ANALYSIS

SECTION 1

JSA Type: Environmental Cleaning and Sampling

JSA No: JSA001137

Date: 12/11/2007

Work Type: Environmental - Ground Water Sampling

Work Activity: Ground Water Sampling

Project No.: 000001410000 - HEALTH & SAFETY (HEALTH & SAFETY)

SECTION 2

Development Team	Position/Title	PC	Reviewed By	Position/Title	Date
Stahl, Bridget C.	Staff Scientist	☑	Bullock, David M.	Health and Safety Specialist	12/13/2007
			Thalman, Katherine L.	Tampa Health and Safety Coordinator	12/12/2007

SECTION 3

Job Steps	Potential Hazard (s)	Critical Action(s)	SOP Reference
Load required PPE, sampling equipment, and supplies into vehicle.	Lifting hazards and back strain. Appropriate PPE not on site.	Review HASP/JSA for necessary PPE. employ safe lifting techniques such as lifting at the knees (not at the waist) and reducing twisting/ side to side motion. Request assistance when lifting heavy objects (>50lbs).	
Driving	Vehicle traffic. Damage to vehicle from decommissioning debris (flat tire, etc.). Construction or other activities on site, on-site personnel.	Be aware of surroundings. Perform TRACK. Obtain proper passes, stickers, identification, and track protection (if required) to work on site. Stop and look in all directions before crossing tracks.Follow all client specific health and safety regulations/procedures.	See Driving JSA for mobilization/demobilization from site.
Set up necessary traffic control (if necessary)	Struck by vehicle during placement. Vehicle accident as a result of improper traffic control equipment placement.	Use buddy system for placing traffic control. Reference traffic control plan section of HASP.	
Set up exclusion zone (s)	Struck by vehicle. Slip and fall hazards to workers.	Face incoming traffic. Implement exclusion zone set-up (barricades, caution tape, cones, etc.). Set up work area free of trip hazards.	
		Select a safe area to stage equipment - modify as work	

Stage at the first pre-determined sampling location and set up the sampling equipment	Slip, trips and falls from uneven land surface and hidden holes. Vehicle and equipment movements. Unloading/ loading equipment.	conditions change. Walk/survey the work area first. Observe walking surfaces carefully, walk in traversable areas when possible. Alter routes to wells if a safer, less restrictive route can be selected. Unload as close to work area as safely possible, but walk farther vs. taking risks driving closer to remote well location's. Use proper lifting and reaching techniques (bend knees, keep back straight) and body positioning, keep loads close to body, avoid twisting torso, and use legs, not back, to lift loads. Don't carry more than you can handle, and get help moving heavy or awkward objects. Stay outside of safety taped areas.
Preparing well to gauge and sample groundwater.	Biological hazards, pinchpoints, sharp objects, exposure to affected ground water. Injuries from slip, trip and fall. Muscle strain.Pressure build up inside wells, well cap becomes projectile.	Use correct tools to open well vault/cap. Set up work area and materials to reduce tripping hazards. Maintain good housekeeping. Wear proper PPE including safety boots, knee pads and safety glasses. Use proper lifting and body positioning. Wear chemical protective gloves while collecting the sample. When lifting, keep loads close to body, avoid twisting torso, and use legs, not back, to lift loads.Stand with face away from well cap.
Gauge the well	Chemical exposure to affected ground water, cross contamination.	Wear PPE including safety glasses and nitrile gloves, decontaminate equipment in between wells.
Well purging	Lifting hazard. Muscle strain, pinch point between tubing and well casing while lowering pump or bailers.	Inspect pumping equipment setup prior to use. Wear protective gloves. Use proper lifting techniques when moving equipment, lift with legs and arms, not back. Use two people if necessary; take breaks as needed. Wear safety glasses and gloves.
Store purge water in 5-gallon buckets with lids.	Splashing, Exposure to chemical hazards, Back strain, Spills from tailgate of truck.	1) Use PPE and proper equipment to transport water (containers/lids, drum dollies, etc.). Label storage containers properly and locate in isolated area away from traffic and other site functions. 2) Use proper lifting techniques when loading containers into vehicle. 3) Verify that lids are sealed tightly on containers. Place containers in vehicle so they will not slide around.
		Make sure glass sample

Containerize ground water samples. Prepare Chain of Custody. Pack and/or move ice chests.	Cuts to hand and potential contact with hazardous chemicals. Splash or struck while completing labels and COC. Back strain from lifting full ice chests.	container is not cracked or broken. Ensure proper PPE is used to prevent dermal exposure. Note hazard of surroundings and complete COC in a safe location away from hazards or distractions. When lifting, keep loads close to body, avoid twisting torso, and use legs, not back, to lift loads. Get help when moving heavy or awkward loads.	
Decontaminate the sampling equipment	Chemical exposure to affected ground water, cross contamination, release to environment, contact with chemicals used for decontamination of equipment.	Wear appropriate PPE as referenced in HASP/JSA. Establish a decon area, thoroughly decontaminate tools and equipment after each sample is collected.	See Decontamination JSA for more guidance
Site Clean-up	Lifting hazards, back strain, fatgue	Review HASP/ JSA for proper PPE; Employ safe lifting techniques such as bending from the knees (not at the waist) and reducing twisting/side to side motion. Request assistance when lifting heavy objects (>50 lbs).	
Empty five gallon buckets into staged onsite tank or drums.	Splashing. Exposure to chemical hazards. Back strain.	Use PPE and proper equipment to transport water (containers/lids, drum dollies, etc.). Use proper lifting techniques when unloading containers from vehicle.	
Package and deliver samples to lab	Bottle breakage, back strain.	Handle and pack bottles carefully (bubble wrap bags are helpful). Use proper lifting techniques.	

SECTION 4

Personal Protective Equipment (PPE):

Hard Hat

Level D

Protective Gloves - Nitrile, Leather

Safety Glasses

Safety Shoes

Required and/or Recommended Equipment and Supplies:
ANSI Level II Safety vests required
Portable eye wash station
First Aid Kit
sunscreen
nsect repellant
rain gear/ inclement weather clothing
2-way radio/ cell phones

JSA001137 - Closed - Current - 02/15/2008 02:43 PM EST

ARCADIS

JOB SAFETY ANALYSIS

SECTION 1

JSA Type: Treatment System OM&M

JSA No: JSA000389

Date: 10/9/2006

Work Type: O&M - Bag Filter Change Out

Work Activity:

Project No.: B00380310000 - GREAT NECK REMEDIAL (GREAT NECK REMEDIAL)

SECTION 2

Development Team	Position/Title	PC	Reviewed By	Position/Title	Date
Morris, Scott A.	PM	☑	Decarr, Wayne K.	Sr Op	11/2/2007
			Decesare, Scott D.	Sr Op	9/21/2007

SECTION 3

Job Steps	Potential Hazard(s)	Critical Action(s)	SOP Reference
Do all H&S pre-work activities before starting work.	Injury may result from improper planning, procedures forgotten or done incorrectly.	Refresh yourself with applicable sections of HASP, review JSA, make sure all supplies (filters) and tools are available, and do SPSA before starting work.	
Shut water flow off to bag filter. Open drain valve to bleed off pressure.	Injury do to fluid under pressure. Discharge spray contact with eyes.	Wear PPE, nitrile gloves, steel toed shoes. All inlet valves must be off. All drain valves must be open.	
Put on hearing protection before going into the blower room.	Hearing damage	Wear hearing protection when performing this task, since the bag filter in in the same room as the blower. And sound measurements indicate that the noise from the blower is greater than 85 db, which is the threshold where the site safety plan says hearing protection is required.	
Remove lid of bag filter unit once unit has '0' pressure.	Back strain. Slip/trip/fall hazard.	Use proper body positioning when removing lib bolts. Don not reach accross lid to loosen bolts. Lift by keeping feet shoulder width apart, back straight, bend legs at the knees. Wear PPE, nitrile gloves, steel toed shoes, Mop and let area dry before and after filling. Place wet floor signage when wet. Keep feet on non-slip surface. Keep eyes on task.	
Remove used filter bags.	Back strain. Slip/trip/fall hazard.	Postion your body directly in front of bag to be removed. Lift by keeping feet shoulder width apart, back straight, bend legs at the knees. Do not reach across filter to remove bags. Wear PPE, nitrile gloves and steel toed shoes. Mop and let area dry before and after filling. Place wet floor signage when wet. Keep feet on non-slip surface such as grates. Keep eyes on task.	
Insert new filter	Slip/trip/fall	Wear PPE, nitrile gloves and steel toed shoes. Mop and let area dry before and after	

bags.	hazard.	filling. Place wet floor signage when wet. Keep feet on non-slip surface. Keep eyes on task.
Replace lid and secure eye bolts.	Pinch points. Back strain. Slip/trip/fall hazard.	Focus on hand placement. Do not reach across filter to tighten bolts. Wear PPE, nitrile gloves and steel toed shoes. Mop and let area dry before and after filling. Place wet floor signage when wet. Keep feet on non-slip surface. Keep eyes on task.
Open inlet valves and allow unit to fill with water. Place back unit back on line.	Slip/trip/fall hazard. Back strain.	Ensure area is dry before closing valves. Use proper body position when opening valves. Wear PPE, nitrile gloves and steel toed shoes.

SECTION 4

Personal Protective Equipment (PPE):

Protective Gloves - Nitrile

Safety Shoes

Required and/or Recommended Equipment and Supplies:

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JOB SAFETY ANALYSIS

SECTION 1

JSA Type: Environmental Operations

JSA No: JSA000934

Date: 10/2/2007

Work Type: Environmental - Surveying

Work Activity: Surveying

Project No.: TF0008650717 - CSXTRANS /W JAX 2007 GW MONITORING & O&M (CSXTRANS /W JAX 2007 GW MONITORING & O&M)

SECTION 2

Development Team	Position/Title	PC	Reviewed By	Position/Title	Date
			Bullock, David M.	Southeast Regional Health and Safety Manager	10/2/2007
			Thalman, Katherine L.	Area Health and Safety Representative	10/2/2007
			Wilson, Janette D.	Senior Scientist	10/2/2007

SECTION 3

Job Steps	Potential Hazard(s)	Critical Action(s)	SOP Reference
Load required PPE, sampling equipment, and supplies into vehicle.	Lifting hazards, back strain, appropriate PPE not on site.	Review HASP/ JSA for proper PPE; Employ safe lifting techniques such as bending from the knees (not at the waist) and reducing twisting/side to side motion. Request assistance when lifting heavy objects (>50 lbs).	
Driving	Vehicle traffic/ Train traffic on site, damge to vehicle from decomissioning debris (flat tire, etc.), construction, heavy machinery, personnel on site.	Be aware of surroundings, perform TRACK, obtain proper passes, stickers, identification, and track protection (if required) to work on site. Stop and look in all directions before crossing tracks. Follow all client specific health and safety regulations/procedures.	
Conduct Tailgate Safety Meeting	General Site Hazards: Train traffic/Vehicle traffic, sun, heat, cold, insects, hazardous plants; fatigue; and slips, trips, and falls, Vehicle/train traffic	Hydrate often; Wear sunscreen on exposed skin in sunny conditions; Take shelter in nearest vehicle in the event of lightening or heavy rain; Inspect the area for hazardous plants/wild animals/snakes/insects. If present, stop work and report to site safety officer (SSO) for alternate work plans. Wear appropriate clothing for the area: long sleeves and gloves in overgrown areas; Monitor for heat stress; Wear hearing protection as needed during drilling operations; Review HASP/JSA especially for chemical and site hazards; Follow all client specific health and safety regulations/procedures.	
Surveying	Slips/trips/falls, pinch points from survey equipment, cuts, bodily injury from hand tools	Handle tripods and surveying rod carefully when unloading and setting up. Use leather gloves when setting up survey equipment and during hand tool use if applicable. When using cutting devices, do not cut toward the body (stand to the side). Keep all cutting tools sharp. When tools are not in use, store so cutting edges are not exposed. Inspect all tools for condition prior to use. Do not use tools with loose handles. Use safety cones to identify any potential trip hazards such as holes or pits.	

Site Clean-up	Lifting hazards, back strain, appropriate PPE	Review HASP/ JSA for proper PPE; Employ safe lifting techniques such as bending from the knees (not at the waist) and reducing twisting/side to side motion. Request assistance when lifting heavy objects (>50 lbs).

SECTION 4

Personal Protective Equipment (PPE):

Hard Hat

Protective Gloves - Nitrile, and leather or heavy cotton gloves

Safety Glasses

Safety Shoes

Required and/or Recommended Equipment and Supplies:
ANSI Level II Safety Vest required
Identification card , FRA Training card, and CSXT Contractor Handbook required on-site
Portable eye wash station
First Aid Kit
Rain gear/inclement weather clothing
sunscreen
Insect repellant
2-way radio/cell phones

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JOB SAFETY ANALYSIS

SECTION 1	
JSA Type:	Environmental Operations
JSA No:	JSA000770
Date:	8/10/2007
Work Type:	Environmental - Monitoring Well/Piezometer Installation
Work Activity:	Monitoring well, piezomiter installation
Project No.:	000000100000 - GENERAL OVERHEAD (GENERAL OVERHEAD)

SECTION 2

Development Team	Position/Title	PC	Reviewed By	Position/Title	Date
Petrosky, Nicole .	scientist	☑	Petrosky, Nicole .	scientist	8/10/2007
			Richardson, Kenneth W.	program manager	11/26/2007

SECTION 3

Job Steps	Potential Hazard(s)	Critical Action(s)	SOP Reference
Gather necessary equipment including appropriate PPE, mobilize to the site.	Lifting hazards and back strain. Hurriedness in preparing for the task may result in not obtaining proper PPE/equipment for the task. Traffic hazards and accidents, automotive trouble/breakdowns.	Use proper lifting techniques, request assistance when lifting heavy equipment. Utilize the driving JSA (safe driving practices, 3 second rule, use caution, wear a seat belt)	
Driving vehicle on site.	Potential for vehicular damage while driving on site, including but not limited to flat/punctured tires due to debris on site. Potential pedestrians, construction activities, obstructions on site.	Be aware of surroundings. Keep a look out for pedestrians, vehicles, and workers. Follow site regulations including speed limit and traffic patterns. Obtain proper passes/stickers if necessary for site entry. Park vehicle in a safe place, back into parking space, using a spotter in available.	
Conduct the tailgate safety meeting.	General site hazards included but not limited to traffic, heat stroke, dehydration, and severe weather conditions (lightning/ hail/ heavy rains). Potential for poisonous snakes, insects, animals, and plants.	Ensure the vehicle is parked in a safe area where everyone can participate. Conduct the safety meeting in a safe and protected area. Review the HASP for chemical and site hazards, applicable JSAs and work activities, emergency ingress/egress, safe refuge, emergency signals, hospital/emergency care specific to the site. Advise other contractors on site (if applicable) of Arcadis and subcontractor planned work activity, and determine their operations. Assign persons responsible for critical actions for each job task. Discuss proper hydration, what to do in the event of a lightning strike, and lightning strike stop work procedures. Scan	

		the area for potential poisonous snakes, animals, plants, etc.	
Set-up work and de-con area. Stage at the first drilling location.	Being struck by a vehicle. Slips/trips and falls from uneven and or wet terrain, pinched fingers from moving drums, and various equipment. Strain from lifting.	Secure work and de-con area with cones. Scan the ground ahead of the walking/driving path for debris/obstacles. Wear leather gloves when handling equipment and materials. Lift with legs.	
Locate drilling areas.	Hit by a vehicle, slips and falls from uneven terrain. Vehicular maneuvering problems.	Use ground guide when going off road to scout the path of ingress to drilling location. Use a spotter when backing up. Ensure back up alarm is functioning - if applicable. Use alternate route when conditions appear to be hazardous.	
Set up drill rig.	Electric shock from overhead power lines. Pinches from moving hydraulics, contact with hydraulic fluid from a broken hose. Can not stop rig during an emergency, unlevel ground may cause drill rig to roll over.	Minimum distance from power lines is included in the HASP. Visually inspect hydraulic hoses for signs of leaks, wear and tear. Keep hands, feet, and clothing clear of leveling jacks, raising mast, etc. Check that the kill switch is operational at the beginning of the day. Set parking brake, chock wheels, level drill rig. Visually scan the location to identify potential areas that are soft or where the rig could get stuck. wear appropriate PPE.	
Clear bore hole.	Back strain, heat exhaustion, contact with underground utilities.	Use rod extensions as needed in order to keep work in zone between lower things and chest. take breaks and switch borers as needed. Sub-surface clearance is required, do not bore until subsurface protocol is completed. Wear appropriate PPE.	
Core sampling (if applicable)	Cuts from sharp metal objects, sleeve liners, cutting knife. Contact with COCs.	Wear appropriate PPE. Maintain established core handling process to keep from dropping or hitting each other with cores. Cut away from self, and use appropriate cutting table. Maintain a safe distance from others when cutting, never hold a core with a hand while cutting. Use the appropriate tool designed for the job (no pocket knives), and wear leather and nitrile gloves.	
Drilling	injuries included but not limited to sprains, strains, cuts, bruises from advancing drill rods, handling augers, and soil cuttings. Hitting persons with equipment. Slips, trips, falls, contact with COCs. Getting clothing, body parts caught in spinning augers. Shock or injury from sub surface utilities. Damage to	Identify and avoid pinch points and sharp edges. Use two men for loading and unloading drill rods. Keep clear of the hole when positioning or pulling augers. With the exception of the driller and the first man, all others should maintain a 15 foot clearance from the drill rig. Keep feet of the rig on the ground, do not raise rig off of the ground by using excessive force on rods. When containing soils, take small shovel fulls- slowly and deliberately place them into drums. Practice good house keeping (pick up tools, debris, etc.) wear appropriate PPE when operating equipment. Wait until rods have stopped spinning before adding sections or cleaning rods. Stop	

	hearing. Fire. Spills.	work immediately if conditions change or subsurface utilities are suspected. Wear hearing protection during drill rig/geoprobe operation. Maintain stocked spill kit, fire extinguisher, first aid kit and emergency eye wash station on drill rig and in Arcadis vehicle.	
Well construction and development	Injury from cutting pipe, strains from handling sand bags, bentonite, and portland cement. Strains from well pad completion. Contact with COCs during well development.	Stay up wind when pouring. If visible dust is present, and cant stay out of the way of the dust plume, wear dust masks. Use a pipe cutter. Use two men for lifting items over 50 lbs. Wear leather and nitrile gloves as conditions require.	
Decontamination activities and site cleanup.	Injuries including but not limited to : bruises, cuts, injection from pressure washer, strains, sprains, burns.	Appropriate PPE required. Only one man in de-con pit while spraying with pressure washing. Two man lift while handling augers/drill rods, or epuipment weighing 50+ lbs. Make sure no debris (sand bags, grout, etc) are left on site. Clean up site to condition it was before arrival (or better)	
Equipment loading, demobilization.	lifting, pinch points, traffic hazards.	Use knees to lift - do not rely on your back. Stay clear of possible pinch points. Wear leather gloves when moving equipment, rods, machinery. Be aware of surroundings and practice safe driving habits. Refer to the driving JSA for specific safe driving procedures.	

SECTION 4
Personal Protective Equipment (PPE):
Ear plugs
Hard Hat
Level D
orange traffic safety vest
Protective Gloves - leather and nitrile
Respiratory Protection - dust mask if applicable
Safety Glasses
Safety Shoes
Required and/or Recommended Equipment and Supplies: ** This JSA is to be considered a working document. As conditions change, or new situations arise, this JSA is to be modified/updated accordingly.

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Appendix E

Annual Certification Form

ENCLOSURE 1
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
INSTITUTIONAL AND ENGINEERING CONTROLS CERTIFICATION FORM

SITE DETAILS

SITE NO. X-XX-XXX

SITE NAME

SITE ADDRESS: ZIP CODE: XXXXX

CITY/TOWN:

COUNTY:

CURRENT USE:

CURRENT CERTIFICATION FREQUENCY: EVERY __ YEAR(S)

VERIFICATION OF SITE DETAILS

		YES	NO
1.	Are the SITE DETAILS above, correct?	☐	☐
	If NO, are changes handwritten above or included on a separate sheet?	☐	
2.	Has some or all of the site property been sold, subdivided, merged, or undergone a tax map amendment since the initial/last certification?	☐	☐
	If YES, is documentation or evidence that documentation has been previously submitted included with this certification?	☐	
3.	Have any federal, state, and/or local permits (e.g., building, discharge) been issued for or at the property since the initial/last certification?	☐	☐
	If YES, is documentation or evidence that documentation has been previously submitted included with this certification?	☐	
4.	Has a change-of-use occurred since the initial/last certification?	☐	☐
	If YES, is documentation or evidence that documentation has been previously submitted included with this certification?	☐	
5.	Has any new information come to your attention to indicate that assumptions made in the qualitative exposure assessment for offsite contamination are no longer valid (applies to non-significant threat sites subject to ECL 27-1415.7(c))?	☐	☐
	If YES, is the new information or evidence that new information has been previously submitted included with this certification?	☐	
6.	Are the assumptions in the qualitative exposure assessment still valid (must be certified every five years for non-significant threat sites subject to ECL 27-1415.7(c))?	☐	☐
	If NO, are changes in the assessment included with this certification?	☐	

SITE NO. X-XX-XXX

Description of Institutional/Engineering Control	Control Certification	
	YES	NO
ENVIRONMENTAL EASEMENT	☐	☐
Type in Restriction here	☐	☐

CONTROL CERTIFICATION STATEMENT

For each institutional or engineering control listed above, I certify by checking "Yes" that all of the following statements are true:

(a) the institutional control and/or engineering control employed at this site is unchanged from the date the control was put in-place, or last approved by the Departiment;

(b) nothing has occurred that would impair the ability of such control to protect public health and the environment;

(c) nothing has occurred that would constitute a violation or failure to comply with any Site Management Plan for this control; and

(d) access to the site will continue to be provided to the Department to evaluate the remedy, including access to evaluate the continued maintenance of this control.

(e) if a financial assurance mechanism is required under the remedial work plan for the site, the mechanism remains valid and sufficient for their intended purpose under the work plan.

SITE OWNER OR DESIGNATED REPRESENTATIVE SIGNATURE

I certify that all information and statements in this certification form are true. I understand that a false statement made herein is punishable as a Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law.

I _____(print name), _____

(print business address), am certifying as _____ (Owner or Owner's Designated Site Representative (if the site consists of multiple properties, I have been authorized and designated by all site owners to sign this certification) for the Site named in the Site Details section of this form.

_____ _____
Signature of Site Owner or Representative Rendering Certification Date

QUALIFIED ENVIRONMENTAL PROFESSIONAL (QEP) SIGNATURE

I certify that all information and statements in this Certification form are true. I understand that a false statement made herein is punishable as a Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law.

I _____(print name), _____

(print business address), am certifying as a Qualified Environmental Professional for the_____

_____ (Owner or Owner's Representative) for the Site named in the Site Details section of this form.

_____ _____ _____
Signature of Qualified Environmental Professional, for the Owner or the Owner's Representative, Rendering Certification Stamp (if Required) Date

Enclosure 2

Certification of Institutional Controls/ Engineering Controls (ICs/ECs) Step-by-Step Instructions, Certification Requirements and Definitions

The Site owner, or site owner's representative, and when necessary, a Professional Engineer (P.E.), or the Qualified Environmental Professional (QEP), must review and complete the IC/EC Certification Form, sign it, and return it, along with the Periodic Site Management Report, within 45 days of the date of this notice.

Institutional Controls (defined below) are organized into 4 categories: Governmental Controls (e.g., groundwater-use restrictions), Proprietary Controls (e.g., Environmental Easements), Enforcement and Permit Tools (e.g., Consent Orders), and Informational Devices (e.g., State Registries of Inactive Hazardous Waste Sites). The Certification Form shows the Control information the Department has for this Site. Please use the following instructions to complete the IC/EC Certification.

I. Verification of Site Details (First and Second Boxes):

1. Verify the accuracy of information in the **Site Details** section by answering the 6 questions. If necessary, you and/or your P.E. or QEP may handwrite changes and submit supporting documentation.

II. Verification of Institutional / Engineering Controls (Third and Fourth Boxes)

1. Review the listed Institutional / Engineering Controls and select "YES" or "NO" for **Control Certification** for each IC/EC, based on Sections (a)-(d) of the **Control Certification Statement**.

2. If you cannot certify "Yes" for each Control, please continue to complete the remainder of this **Control Certification** form. Attach supporting documentation that explains why the **Control Certification** cannot be rendered, as well as a statement of proposed corrective measures, and an associated schedule for completing the corrective measures. Note that this **Control Certification** form must be submitted even if an IC or EC cannot be certified; however, the certification process will not be considered complete until corrective action is conducted.

   If the Department concurs with the explanation, the corrective measures, and the proposed schedule, a letter authorizing the implementation of those corrective measures will be issued. If the Department has any questions or concerns regarding the completion of the certification, the Project Manager will contact you.

III. Certification by Signature (Fifth and Sixth Boxes):

1. WHY IC/EC Certification is required:
   The Section of the New York Environmental Conservation Law that includes the requirement of a periodic certification of IC(s) and EC(s) is as follows:

   For Environmental Restoration Projects: N.Y. Envtl Conserv.Law Section 56-0503 (Environmental restoration projects; state assistance)

   For State Superfund Projects: Envtl Conserv.Law Section 27-1318. (Institutional and engineering controls)

   For Brownfields Cleanup Program Projects: Envtl Conserv.Law Section 27-1415. (Remedial program requirements)

   Voluntary Cleanup Program: Applicable program guidance.

2. To determine WHO signs the **Control Certification,** please use the following table:

Signature Requirements for IC/EC Certification Form		
Type of Control	**Example of IC/EC**	**Required Signatures**
IC	Environmental Easement Deed Restriction.	Site Owner or their designated representative, e.g., a Property Manager.
EC with no treatment system, or engineered caps.	Fence, Clean Soil Cover.	Site Owner or their designated representative, and QEP. (P.E. license not required)
EC that includes treatment systems, or engineered caps.	Pump & Treat System providing hydraulic control of a plume, Part 360 Cap.	Site Owner or his designated representative, and QEP with P.E. License.

3. WHERE to mail the signed Certification Form within 45 days of the date of the notice:

New York State Department of Environmental Conservation
Division of Environmental Remediation
address
City, New York zipcode
Attn: xxxx xxxxx, Project Manager

Please note that extra postage may be required.

IV. Definitions:

"Engineering Control" (EC), means any physical barrier or method employed to actively or passively contain, stabilize, or monitor any hazardous waste or petroleum waste to ensure the long-term effectiveness of an inactive site remedial program or brownfield site remedial program or environmental restoration project, or to eliminate potential exposure pathways to any such hazardous waste or petroleum waste. Engineering Controls include, but are not limited to: pavement, caps, covers, subsurface barriers and slurry walls; building ventilation systems; fences, other barriers and access controls; and provision of alternative water supplies via connection to an existing public water supply, addition of treatment technologies to an existing public water supply, and installation of filtration devices on an existing private water supply.

"Institutional Control" (IC), means any non-physical means of enforcing a restriction on the use of real property, that limits human or environmental exposure to any hazardous waste or petroleum waste, restricts the use of groundwater; provides notice to potential owners, operators, or members of the public; or prevents actions that would interfere with the effectiveness of an inactive site remedial program or brownfield site remedial program or environmental restoration project, or with the effectiveness and/or integrity of Site Management activities at or pertaining to any site.

"Professional Engineer" means a person, including a firm headed by such a person, who holds a current New York State Professional Engineering license or registration, and has the equivalent of three (3) years of full-time relevant experience in site investigation and remediation of the type detailed in this Control Certification.

"Property Owner" means, for purposes of an IC/EC certification, the actual owner of a property. If the site has multiple properties with different owners, the Department requires that the owners be represented by a single representative to sign the certification.

"Oversight Document" means any document the Department issues pursuant to each Remedial Program (see below) to define the role of a person participating in the investigation and/or remediation of a site or area(s) of concern. Examples for the various programs are as follows:

BCP (after approval of the BCP application by DEC) - Brownfield Site Cleanup Agreement.
ERP (after approval of the ERP application by DEC) - State Assistance Contract.
Federal Superfund Sites - Federal Consent Decrees, Administrative Orders on Consent or Unilateral Orders issued pursuant to CERCLA.
Oil Spill Program - Order on Consent, or Stipulation pursuant to Article 12 of the Navigation Law (and the New York Environmental Conservation Law).
State Superfund Program - Administrative Consent Order.
VCP (after approval of the VCP application by DEC) - Voluntary Cleanup Agreement.
RCRA Corrective Action Sites- Federal Consent Decrees, Administrative Orders on Consent or permit conditions issued pursuant to RCRA.

"Qualified Environmental Professional" (QEP), means a person, including a firm headed by such a person, who possesses sufficient specific education, training, and experience necessary to

exercise professional judgment, to develop opinions and conclusions regarding the presence of releases or threatened releases to the surface or subsurface of a property or off-site areas, sufficient to meet the objectives and performance factors for the areas of practice identified by this guidance (DER10 Technical Guide).

1. Such a person must:
   i. Hold a current Professional Engineering or a Professional Geologist license or registration, and have the equivalent of three (3) years of full-time relevant experience in site investigation and remediation of the type detailed in this guidance; or
   ii. Be a site remediation professional licensed or certified by the federal government, a state; or a recognized, accrediting agency, to perform investigation or remediation tasks identified by this guidance, and have the equivalent of three (3) years of full-time relevant experience. Examples of such license or certification include, but are not limited to, the following titles:
      - Licensed Site Professional, by the State of Massachusetts
      - Licensed Environmental Professional, by the State of Connecticut
      - Qualified Environmental Professional, by the Institute of Professional Environmental Practice
      - Certified Hazardous Materials Manager, by the Institute of Hazardous Materials Management

2. The definition of QEP provided above does not preempt State Professional licensing or registration requirements such as those for a Professional Geologist, Engineer, or Site Remediation Professional. Before commencing work, a person should determine the applicability of State professional licensing or registration laws to the activities to be undertaken pursuant to section 1.5 (DER10 Technical Guide).

3. A person who does not meet the above definition of a QEP under the foregoing definition may assist in the conduct of all appropriate investigation or remediation activities in accordance with this document if such person is under the supervision or responsible charge of a person meeting the definition provided above.

"Remedial Party" means any person or persons, as defined in 6NYCRR 375, who executes, or is otherwise subject to, an oversight document (State Superfund, BCP, ERP or VCP Program). For purposes of this guidance, remedial party also includes:

1. Any person or persons who is performing the investigation and/or remediation, or has control over the person (for example, contractor or consultant) who is performing the investigation and/or remediation, including, without limitation, an owner, operator or volunteer; and

2. The DER for State-funded investigation and/or remediation activities.

"Site Management" (SM) means the activities included in the last phase of the remediation of a site, in accordance with a Site Management Plan, which continue until the remedial action objectives for the project are met and the site can be closed-out. Site Management includes the

management of the institutional and engineering controls required for a site, as well as the implementation of any necessary long-term monitoring and/or operation and maintenance of the remedy. (Formerly referred to as Operation and Maintenance (O&M)).

"Site Management Plan" (SMP) means a document which details the steps necessary to assure that the institutional and engineering controls required for a site are in-place, and any physical components of the remedy are operated, maintained and monitored to assure their continued effectiveness, developed pursuant to Section 6 (DER10 Technical Guide).

"Site Owner" means the actual owner of a site. If the site has multiple owners of multiple properties with ICs and/or ECs, the Department requires that the owners designate a single representative for IC/EC Certification activities.

"Site Owner's Designated Representative" means a person, including a firm headed by such a person, who has been designated in writing by the Site Owner(s) to complete and sign the Institutional and Engineering Controls Certification Form.