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Remedial Design/Remedial Action Work Plan

Waste-Stream, Inc. Site
Potsdam, New York
Site No. 6-45-022

January 2014; Revised April 2014

ARCADIS

Certification

I, Jason D. Brien, certify that I am currently a New York State registered professional engineer and that this *Remedial Design/Remedial Action Wor kPlan* was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER *Technical Guidance for Site Investigation and Remediation* (DER-10).

Signature

4/24/14
Date

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Waste-Stream, Inc. Site
Potsdam, New York
Site No. 6-45-022

Prepared for:
WSI Group

Prepared by:
ARCADIS of New York, Inc.
6723 Towpath Road
P O Box 66
Syracuse
New York 13214-0066
Tel 315 446 9120
Fax 315 449 0017

Our Ref.:
B0031006 #10

Date:
January 2014; Revised April 2014

ARCADIS

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Acronyms and Abbreviations

AST	aboveground storage tank
ASTM	American Society for Testing and Materials
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, xylene
CAMP	Community Air Monitoring Plan
CERP	Community and Environmental Response Plan
CFR	Code of Federal Regulations
CKD	cement kiln dust
COC	constituent of concern
CQAP	Construction Quality Assurance Plan
DER	Division of Environmental Remediation
FSP	Field Sampling Plan
IDW	investigation-derived waste
HASP	Health and Safety Plan
LNAPL	light non-aqueous phase liquid
mg/kg	milligram per kilogram
NWP	Nationwide Permit
NYSDOH	New York State Department of Health
NYSDEC	New York State Department of Environmental Conservation
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PDI	pre-design investigation
PID	photoionization detector
POTW	publicly-owned treatment works
QAPP	Quality Assurance Project Plan
RCRA	Resource Conservation and Recovery Act
RD/RA	Remedial Design/Remedial Action
WSI	Waste Stream, Inc.
ROD	Record of Decision
SCG	standards, criteria, and guidance
SCO	soil cleanup objective
SDA	southern drainage area
SMP	site management plan
SPDES	State Pollutant Discharge Elimination System
SPT	standard penetration testing
SVOC	semi-volatile organic compound
SWPPP	Storm Water Pollution Prevention Plan
TAL	target analyte list
TCLP	toxicity characteristic leaching procedure
TDS	total dissolved solids
TOC	total organic carbon
TSCA	Toxic Substance Control Act
TSS	total suspended solids
ug/l	microgram per liter
USACE	United States Army Corp of Engineers
USEPA	United States Environmental Protection Agency
UST	underground storage tank
VOC	volatile organic compound
WMP	Waste Management Plan
WSMI	Waste Stream Management, Inc.

1. Introduction

This *Remedial Design/Remedial Action Work Plan* (RD/RA Work Plan) has been prepared by ARCADIS of New York, Inc. (ARCADIS) to present the proposed activities associated with the preparation of a remedial design for the New York State Department of Environmental Conservation- (NYSDEC-) selected remedy for the Waste-Stream, Inc. (WSI) Site (the site) located in Potsdam, New York (Site No. 6-45-022). This RD/RA Work Plan has been revised to address NYSDEC comments on the January 2014 RD/RA Work Plan, as presented in a February 24, 2014 letter provided to ARCADIS.

This RD/RA Work Plan has been prepared on behalf of the WSI Potentially Responsible Party (PRP) Group, pursuant to Order on Consent and Administrative Settlement # A6-0798-12-10 (RD/RA Order). The WSI PRP Group includes Casella Waste Systems, Inc. (Casella) and National Grid. The selected remedy to address environmental impacts identified at the site is presented in the June 2011 Record of Decision (ROD) (NYSDEC, 2011).

This RD/RA Work Plan has been prepared in accordance with the NYSDEC's *Technical Guidance for Site Investigation and Remediation* (DER-10) (NYSDEC, 2010b) and includes a work plan for conducting pre-design investigation (PDI) activities needed to support the remedial design, as well as the anticipated components of the remedial design.

1.1 RD/RA Work Plan Organization

This RD/RA Work Plan has been organized into sections as described in the following table.

Table 1.1 RD/RA Work Plan Organization

Section	Description
Section 1 – Introduction	Presents site background information, a summary of the remedial investigation, potentially applicable standards, criteria, and guidance (SCGs), remediation objectives, and a summary of the NYSDEC-selected remedy.
Section 2 – Pre-Design Investigation	Presents the scope and rationale for the PDI activities to be completed in support of the remedial design.

Section	Description
Section 3 – Remedial Design	Presents a description of the remedial design activities to be completed in support of implementing the remedial construction activities.
Section 4 – Permits and Approvals	Identifies the permits and approvals necessary to conduct the PID and to implement the remedial action.
Section 5 – Remedial Design Documents and Project Schedule	Identifies the remedial design documents to be prepared in support of the remedial action and presents the anticipated project schedule for implementing the PDI and preparing the remedial design.
Section 6 – Post-Construction Activities	Describes the activities to be completed following the remedial construction.
Section 7 – References	Presents a list of documents used to support the preparation of this RD/RA Work Plan.

1.2 Site Background

This section summarizes relevant site background information, including a description of the site location and physical setting, as well as a brief site history.

1.2.1 Site Location and Physical Setting

The WSI site consists of the WSI property (i.e., upland area), areas immediately adjacent to the WSI property, wetlands located northeast of the property (referred to as the northern drainage area), and a drainage swale that conveys storm water runoff from the WSI property to the northern drainage area. Note that in 2011, Casella purchased an approximately 58 acre portion of the northern drainage area from Potsdam Hardwood, Inc. Ownership of an approximately 14 acre portion of the northern drainage area (i.e., northern most portion) was transferred to Lavalley Realty, Inc. and the remaining 44 acres was retained by Casella.

The approximately 29.2 acre WSI property is located at 147 Outer Maple Street (U.S. Route 11) in the Town and Village of Potsdam, St. Lawrence County, New York (see Figure 1). The WSI property is comprised of two parcels occupied by several structures, including a scale house, vehicle maintenance building, office building,

storage barn, a solid waste transfer station and above ground fuel storage tank area, and various outbuildings. Various scrap processing equipment (e.g., large hydraulic shear, tin press, car crusher, etc.) are also located at the property.

The WSI property is bordered to the north by an industrial facility and undeveloped land to the east, Route 11 to the south, and a lightly developed property to the west. In addition, the Corporation Line between the Town of Potsdam and the Village of Potsdam extends along the eastern property boundary, and an active railroad right-of-way extends across the southern portion of site.

1.2.2 Site History

The WSI property is the location of metal recycling and scrap yard business that has operated since approximately 1957. The facility initially operated as Chet Bisnett, Inc., until the company merged with B&C Carting in 1987. The resulting company was renamed Waste Stream Management, Inc. (WSMI). WSMI was subsequently renamed WSI and has operated the site from 1987 until the present. In 1998, WSI became a wholly owned subsidiary of Casella Waste Systems, Inc.

Prior to the mid-1960s, operations were primarily conducted within the southern portion of the property. During the period between the mid-1960s and mid-1970s, facility operations expanded to the north (extending just north of the solid waste transfer station). Site activities conducted during this period reportedly included tin press operations, metal shearing, car crushing, and scrap metal processing. During this period, the facility reportedly processed electrical transformers that contained polychlorinated biphenyl- (PCB-) containing dielectric fluids (i.e., mineral oil). The transformers were reportedly drained for subsequent recycling/wire recovery. The transformer recycling/wire recovery activities were conducted in an area north of the tin press operation. During the period between the mid-1960s and mid-1970s, the facility also reportedly processed scrap manufacturing equipment that had fluid reservoirs with PCB-containing oils. The manufacturing equipment that was brought to the site during this period was staged and processed (including disassembly and cutting) in an area southwest of the vehicle maintenance building. Between the mid-1970s and the present, scrap yard operations expanded to the north into the current operating area. A municipal solid waste transfer station was constructed at the WSI property in the mid-1980s. The solid waste transfer station has not operated since November 2001.

Throughout the history of site operations, several aboveground and underground storage tanks (ASTs and USTs, respectively) have been in service at the facility.

Petroleum product storage at the site included fuel oil and kerosene for heating purposes and gasoline and diesel for vehicles and equipment. The USTs were reportedly closed prior to April 1991 and May 1996. The ASTs were reportedly closed in 1995 and 1996. In addition to the closed petroleum storage tanks listed above, a 20,000-gallon diesel AST and a 10,000-gallon gasoline AST were previously located near the northeast corner of the storage barn. These tanks were subsequently relocated into a secondary containment structure, south of the storage barn in the southeast corner of the property, where they are presently located. The 10,000 gallon gasoline tank was reportedly converted to diesel storage at the time the tank was relocated to the secondary containment structure.

Over the past several years, WSI has relocated the majority of operations from the site. Scrap handling operations were conducted in accordance with a Site Operations Plan that addressed worker health and safety during typical site operations. Other activities currently conducted at the site included periodic use of the vehicle maintenance building. Additionally, office and clerical staff continue to occupy the office building located in the southern portion of the site.

1.3 Standards, Criteria, and Guidelines

Chemical-, action-, and location-specific SCGs that are potentially applicable to the design and implementation of the NYSDEC-selected remedy are presented in Tables 1, 2, and 3, respectively. Primary SCGs that were considered during the development of this RD/RA Work Plan include the following:

- NYSDEC's DER-10 *Technical Guidance for Site Investigation and Remediation*.
- Soil cleanup objectives (SCOs) based on Title 6 of the New York Code of Rules and Regulations (NYCRR) Part 375-6 (6 NYCRR Part 375-6).
- Groundwater, drinking water, and surface water SCGs based on NYSDEC's *Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations* (TOGS 1.1.1) and Part 5 of the New York State Sanitary Code.
- Sediment SCGs based on the NYSDEC document titled *Technical Guidance for Screening Contaminated Sediments.*

- Resource Conservation and Recovery Act (RCRA) and New York State regulations regarding the identification and listing of hazardous wastes outlined in 40 CFR 261 and 6 NYCRR Part 371, respectively.

- Toxic Substance Control Act (TSCA) PCB regulations contained in 40 CFR Part 761 related to the handling, storage, and management of materials containing PCBs.

- Ambient water quality criteria set forth in the United States Environmental Protection Agency (USEPA) document titled, *Quality Criteria for Water – 1986* (USEPA, 1986).

- United State Army Corps of Engineers (USACE) Nationwide Permit (NWP) program promulgated under Section 404 of the Clean Water Act and NYSDEC Freshwater Wetlands Permit regulations (6 NYCRR Part 603).

1.4 Site Characterization Summary

This section presents an overall site characterization and a summary of the nature and extent of impacted media at the site based on the results obtained for the site investigation activities and remedial measures completed to date, which include the following:

- Remediation of scrap equipment and soils (1989-1992)

- NYSDEC sediment sampling (1992)

- Golder Associates – Due Diligence Site Assessment (1998)

- Spectra Engineering – Due Diligence Site Assessment (1998)

- InteGreyted – Focused RI/FS Study (1999)

- ARCADIS (formerly Blasland, Bouck & Lee, Inc. [BBL]) – Focused Remedial Investigation (2001/2002)

- ARCADIS – Supplemental Remedial Investigation (2005)

1.4.1 Site Topography and Drainage

Surface topography in the vicinity of the site is relatively flat, with elevations ranging from approximately 427 feet to 439 feet above mean sea level. Storm water from the property is conveyed from the WSI property to adjacent low-lying areas. Three drainage areas in the southwest-central portion of the site, referred to as southern drainage area (SDA)-1 through SDA-3, are the primary surface water features present at the property. SDA-2 and SDA-3 receive surface drainage from most of the central and southwest portions of the site. SDA-2 also receives drainage from areas located hydraulically upgradient (west) from the WSI property. Surface water from SDA-2 and SDA-3 is conveyed through a subsurface drainage pipe that extends from west to east beneath the southern portion of the WSI property. The pipe discharges to a drainage swale that coveys water to the northern drainage area, located approximately 450 feet northeast of the WSI property. At the location where drainage from SDA-2 flows into the pipe, the drainage pipe consists of a 24-inch diameter corrugated metal pipe. At some point along the pipe (prior to discharging into the drainage swale), the pipe diameter increases to 36-inches. The drainage pipe was reportedly installed at some point after 1975 within (or along the approximate path of) an open drainage ditch that previously conveyed surface drainage across the site.

1.4.2 Geology

The WSI site is located within the St. Lawrence Hills subdivision of the Champlain Lowland physiographic province. Subsurface conditions encountered at the site consist of approximately 30 to 50 feet of overburden overlying sandstone and limestone bedrock.

The overburden generally consists of a heterogeneous mixture of glacio-fluvial silts, sands, and gravels (fine sand unit). A finer-grained silty clay layer (silt and clay unit) was encountered below the fine sand unit across the majority of the site at depths of approximately 1.5 to 10 feet below grade, with a thickness ranging from approximately 2 to 6 feet. The silt and clay unit appears to be relatively continuous across the western and central portions of the site, though the silt and clay layer was not typically encountered in soil borings located along the eastern property boundary. Where present, the upper surface of the silt and clay layer is generally highest in the central portion of the site (near monitoring well MW-202) and slopes downward to the north-northeast and south-southeast, generally following the land surface contours.

Additionally, a sand and gravel unit was encountered below the silt and clay unit in the central and northern portion of the site. The top of the sand and gravel unit was encountered at depths of approximately 6 to 10 below grade.

1.4.3 Hydrogeology

Shallow groundwater is encountered at depths between one and six feet below grade. Additionally, a shallow groundwater mound was observed in the central portion of the site, near monitoring well MW-202, coinciding with the silt and clay layer (which is highest in this portion of the site). The low vertical permeability in the silt and clay layer suggests that groundwater flow above the silt and clay layer is predominately horizontal and downward groundwater is inhibited, causing the localized mounting.

The direction of shallow groundwater flow varies across the site largely due to the effects of the discontinuous silt and clay unit (described above) and influences of the drainage swale that conveys surface water from the southern drainage area to the north drainage areas. The high elevation of the silt and clay layer in the vicinity of MW-202 causes a shallow groundwater divide in this portion of the site. Groundwater flows towards the north-northeast and south-southeast from this area. A groundwater depression extends along the on-site drainage ditch (SDA-2) and the subsurface drainage pipe that extends across the southern portion of the property, which indicates that the drain ditch and culvert may potentially serve as a groundwater drain. Groundwater discharges towards the south-southeast direction (from the mounded groundwater near MW-202) and towards the north-northeast direction (from the area south of the drainage ditch). The average linear velocity for groundwater flowing in the north-northwest direction is 5.4×10^{-3} ft/day (2 ft/year) to 4.5×10^{-2} ft/day (16 ft/year). The average linear velocity for groundwater flowing in the south-southeast direction is 0.14 ft/day (50 ft/year).

Regional deep groundwater flow is generally to the north-northwest, toward the St. Lawrence River. Groundwater within deep overburden at the site flows towards the southeast with an estimated average linear velocity of approximately 2.3×10^{-3} ft/day (0.83 feet/yr). The WSI property does not overlie a primary or principal aquifer.

1.4.4 Nature and Extent of Impacts

PCBs are the primary constituent of concern (COC) in surface and subsurface soil and sediment at the site. Additional COCs include volatile organic compounds (VOCs) (in groundwater), semi-volatile organic compounds (SVOCs) (primarily polynuclear

aromatic hydrocarbons [PAHs]) and inorganic constituents. Individual COCs are listed in the following table.

Table 1.2 Constituents of Concern

Parameter Group	COCs
PCBs	PCBs
VOCs	benzene, toluene, ethylbenzene, xylene (mixed), 1,2-dichloroethane, vinyl chloride
SVOCs	anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, diebenz(a,h)anthracene, fluoranthene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, bis(2-ethylhexyl)phthalate
Inorganics	copper, lead, mercury

The nature and extent of these COCs in soil, groundwater, surface water and sediment at the site is summarized below.

1.4.4.1 Surface and Subsurface Soil

Soil sampling locations with corresponding analytical results for total PCBs are shown on Figures 4A, 4B, and 4C of the *Focused Remedial Investigation Report* (Focused RI Report) (ARCADIS, 2003). PCBs were detected at concentrations greater than the 1 milligram per kilogram (mg/kg) 6NYCRR Part 375-6 restricted use soil clean up objective for the protection of ecological resources at 162 out of 231 surface soil sampling locations and 62 out of 164 subsurface soil sampling locations. Distribution of these soils is widespread at the site. At 153 of the 162 soil sampling locations where PCBs were detected in soil at concentrations greater than 1 mg/kg, the impacted soil did not extend deeper than four feet below ground surface (bgs). The remaining nine sampling locations where PCBs were detected at a concentration greater than 1 mg/kg (at a depth deeper than four feet bgs) were located immediately west of the vehicle maintenance building (soil borings SB-320 and SB-324); near the former tin press (soil borings SB-259, SB-261 and SB-270, monitoring well MW-206, and test pits TP-222 and TP-223); and one isolated location in the western portion of the site near the tree line (test pit TP-207).

Soil samples collected at 15 of the 231 surface soil sampling locations and subsurface soil samples collected at 10 of the 164 sampling locations contained PCBs at concentrations greater than or equal to the 50 mg/kg Toxic Substance Control Act-TSCA-regulated/New York State hazardous waste regulatory level. The maximum detected PCB concentrations in surface and subsurface soil were detected at sampling locations SB-258(0-1') (404 mg/kg) and SB-253(1-3') (4,400 mg/kg), respectively. Both of these sampling locations are located north of the concrete slab that supported the former tin press used in metal scrapping operations. Soil sampling locations where PCBs were detected at concentrations greater than or equal to 50 mg/kg were grouped as follows:

- North of the former tin press – SB-257 (0-1')(97 mg/kg), SB-258 (0-1')(406 mg/kg), SB-259 (2-4')(53 mg/kg), SB-260 (0-1')(117 mg/kg), SB-262 (0-1')(303 mg/kg) and (2-3') (56.5), and MW-206 (4-6')(61.4 mg/kg).

- South, east, and west of the vehicle maintenance building - S-114 (0-1')(477 mg/kg), (1-2')(954 mg/kg), and (2-4')(59 mg/kg), SB-281 (0-1')(97 mg/kg), SB-311 (0-1')(150 mg/kg), SB-315 (0-1')(315 mg/kg), SB-317 (2-3')(75 mg/kg), SB-323 (0-1')(96 mg/kg), and MW-204 (0-1')(72 mg/kg)

- Southeast of a concrete slab in the northern portion of the scrap yard that supported a metal shear – SB-221 (1-3')(140 mg/kg), SB-222 (0-2')(71.6 mg/kg), SB-225 (0-1')(102 mg/kg), and SB-229 (0-1')(55 mg/kg)

SVOCs and inorganic constituents are also present in surface and subsurface soil at the site. In most instances, sampling locations where SVOCs or inorganic constituents were detected coincided with locations where PCBs were detected at concentrations greater than 1 mg/kg. One or more inorganic constituents were detected at a concentration greater than 6NYCRR Part 375-6 restricted use SCOs for the protection of ecological resources or residential future use (if a protection of ecological resource cleanup objective was not available) in samples collected at 27 of 37 surface soil sampling locations and 18 of 58 subsurface soil sampling locations. One or more individual SVOC was detected at a concentration greater than 6NYCRR Part 375-6 restricted use SCOs for the protection of ecological resources or residential future use (if a protection of ecological resource cleanup objective was not available) in samples collected at 21 of 25 surface soil sampling locations and 11 out of 60 subsurface soil sampling locations.

1.4.4.2 NAPL Distribution and Characterization

Light non-aqueous phase liquid (LNAPL) was initially encountered in monitoring well MW-207 during the 2003 groundwater sampling event. Approximately one gallon of LNAPL was removed from the well and submitted for laboratory analysis for total petroleum hydrocarbons. Laboratory analysis indicated that the LNAPL sample consisted of an unknown hydrocarbon that did not match the characteristics of fuel oil, gasoline, or lube oil. LNAPL has not been observed in monitoring well MW-207 or any other site monitoring wells to date since 2003.

1.4.4.3 Groundwater

Groundwater analytical results were compared to the New York State Class GA groundwater standards and guidance values presented in the NYSDEC Division of Water, Technical and Operational Guidance Series (TOGS 1.1.1) document titled, *Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations*, (NYSDEC, 1998).

During the June 2001 sampling event, PCBs were detected in groundwater at concentrations greater than the Class GA groundwater standard (i.e., 0.09 micrograms per liter [ug/l) at monitoring wells MW-202 (0.2 ug/l) located west of the former metal shear, MW-204 (0.68 ug/l) located immediately west of the vehicle maintenance garage and MW-206 (1.2 ug/l) located north of the former tin press. Because PCB concentrations in water are generally associated with PCBs sorbed to suspended solids in a water sample, each of these wells was re-sampled in February 2002 using low-flow sampling techniques. Analytical results for the follow-up sampling indicated detectable concentrations of PCBs at MW-206 only (1.2 ug/l). A third sampling event was conducted in April 2003 at monitoring well MW-206. During this sampling event both an unfiltered and filtered sample were collected and submitted for laboratory analysis. Results obtained for the analysis of the unfiltered and filtered sample collected at monitoring well MW-206 indicated PCB concentrations of 1.1 and 0.29 ug/l, respectively.

SVOCs were detected in groundwater at concentrations exceeding New York State Class GA standards and guidance values in samples collected from three groundwater monitoring wells during June 2001 [bis(2-ethylhexyl)phthalate at MW-206, pentachlorophenol at MW-207, and naphthalene at MW-209]. An additional sample was collected from MW-207 during April 2003 to further evaluate the presence of pentachlorophenol at this well location. Pentachlorophenol was detected in the April

2003 sample collected from MW-207 at a concentration that exceeded NYSDEC Class GA standards and guidance values. However, the concentration of pentachlorophenol detected in the April 2003 sample (18 ug/l) was much less than the result that was reported for the June 2001 sample (700 ug/l). Monitoring well MW-207 is located in close proximity to a treated wood pole which could potentially be a source for the pentachlorophenol detected at this location.

VOCs were detected at concentrations exceeding Class GA groundwater standards and guidance values in groundwater samples collected during 2001 from three shallow groundwater monitoring wells (i.e., MW-203, MW-204, and MW-209). Benzene, toluene, ethylbenzene and xylene compounds (collectively referred to as BTEX) were identified in groundwater samples collected at monitoring well MW-209 at concentrations exceeding NYSDEC Class GA standards and guidance values (suggesting the potential presence of petroleum-related subsurface impacts in the former AST area). 1,2-Dichloroethane was detected at MW-203 and vinyl chloride was detected at MW-204 at concentrations that were slightly greater than NYSDEC Class GA standards and guidance values. The source of the low concentrations of VOCs detected at MW-203 and MW-204 is not known. Eight temporary wells (TW-1 through TW-8) were installed in April 2003 in the vicinity of monitoring well MW-209 to further investigate the presence of VOCs in groundwater near the former AST area. BTEX compounds were detected in one of the temporary well points (TW-1). TW-1 was presumed to be an upgradient location based on surface topography. Although BTEX concentrations at TW-1 were slightly greater than the NYSDEC groundwater standards and guidance values, the results were much less than the concentrations detected in MW-209. The groundwater sampling results indicate that BTEX groundwater impacts are localized to the former AST area and do not extend beyond the WSI property to the east.

With the exception of typical mineral constituents, beryllium was the only Target Analyte List (TAL) inorganic constituent detected in groundwater at concentrations exceeding NYSDEC Class GA standards and guidance values. Beryllium was detected in the groundwater sample collected from monitoring well MW-208 (located in the southern portion of the site south of the Vehicle Maintenance Building at a concentration of 8 ug/l, which slightly exceeds the Glass GA groundwater guidance value of 3 ug/l. Inorganic constituents do not represent a concern in groundwater at the site.

1.4.4.4 Surface Water

PCBs were detected at concentrations exceeding the NYSDEC Class A surface water quality standard (i.e., 0.09 ug/l) in two surface water samples, including one sample collected at the outfall of the drainage pipe that extends beneath the site and one sample collected from the drainage swale near the point where the swale flows into the northern drainage area. VOCs and SVOCs were also detected at the downgradient surface water sampling location near the drainage pipe outfall (i.e., at the eastern property boundary) at concentrations that slightly exceeded NYSDEC Class A surface water standards and guidance values. As indicated above, PCBs do not readily dissolve in water and the detected PCB concentrations are likely associated with PCBs sorbed to suspended solids in the water.

1.4.4.5 Sediment

The sediment investigation results indicate that PCBs are the primary COC in sediment in the southern drainage areas SDA-1 through SDA-3, the drainage swale that flows to the northern drainage area, and within the northern drainage area. The highest concentrations of PCBs were detected in sediment within the drainage swale that flows to the northern drainage area. Analytical results for PCBs, SVOCs, and inorganic constituents detected in sediment samples are compared to NYSDEC sediment screening values presented in the NYSDEC document titled, *Technical Guidance for Screening Contaminated Sediments* (NYSDEC, 1999). Note that analytical results for SVOCs and inorganics that exceeded the sediment screening values were collocated with sampling locations containing PCBs at concentrations greater than screening values.

<u>Southern Drainage Areas</u>

Sediment samples were collected from a total of 35 sampling locations in the southern drainage areas. The most elevated concentration of PCBs in the southern drainage areas was at sampling location SED-236 (47 mg/kg) collected from SDA-3 located in the western portion of the property. Sediment samples collected from these areas contained PCBs at concentrations greater than the NYSDEC benthic aquatic life chronic toxicity and benthic aquatic life acute toxicity screening levels.

Sediment samples collected at four locations from the southern drainage areas were submitted for laboratory analysis for inorganic constituents and SVOCs. Samples collected from two of the four locations (SED-234 [lead and mercury] and SED-239

[copper]) indicated the presence of inorganic constituents at concentrations that slightly exceeded the lowest effect level presented in the NYSDEC sediment screening document. None of the samples contained SVOCs at concentrations greater than NYSDEC sediment screening levels.

Drainage Swale

Sediment samples were collected from a total of 10 sampling locations in the drainage swale. The drainage swale contained the most elevated PCB concentration of any of the sediment samples collected during the site investigation activities. Sediment samples collected at six of the sampling locations (SED-216B, SED-216C, SED-219A, SED-220B, SED-221A, and SED-222C) contained PCBs at concentrations greater than or equal to the 50 mg/kg TSCA-regulated/New York State hazardous waste regulatory level. The highest concentration of PCBs in the drainage swale was detected in sediment sample SED-221A (0-0.5') (3,400 mg/kg) located immediately east of the WSI property boundary. Sediment samples collected from these areas contained PCBs at concentrations greater than the NYSDEC benthic aquatic life chronic toxicity and benthic aquatic life acute toxicity screening levels.

Sediment samples collected from five locations within the drainage swale were submitted for laboratory analysis for inorganic constituents and SVOCs. Samples collected at three of the sampling locations (SED-219C, SED-222A, and SED-224B) indicated the presence of several inorganic constituents (i.e., copper, lead and mercury) at concentrations that exceed the severe effect level presented in the NYSDEC sediment screening document. The same samples contained SVOCs at concentrations exceeding human health and/or benthic sediment screening criteria.

Northern Drainage Area

Sediment samples were collected from a total of 55 sampling locations in the northern drainage area. The highest concentrations of PCBs in sediment within the northern drainage area generally coincide with areas of lower elevation and lower surface water velocity where PCB-containing suspended solids settled out of the water column.

Sediment samples collected at seven of the sampling locations (SED-200, SED-201, SED-204, SED-205, SED-259, SED-268, and SED-279) contained PCBs at concentrations greater than the 50 mg/kg TSCA/New York State hazardous waste regulatory level. These sampling locations are located immediately east of the drainage swale outlet to the northern drainage area and along low areas and pools within the

northern drainage area. Sediment samples collected from these areas contained PCBs at concentrations greater than the NYSDEC benthic aquatic life chronic toxicity and benthic aquatic life acute toxicity screening levels.

Samples collected from nine sediment sampling locations within the northern drainage area were submitted for laboratory analysis for inorganic constituents. Samples collected from two of the nine sampling locations (SED-279 and SED-281) contained inorganic constituents at concentrations that exceed the highest effect level presented in the NYSDEC sediment screening document. Sediment samples from four sampling locations were also submitted for laboratory analysis for SVOCs and none of the samples collected at these locations contained SVOCs at concentrations greater than the most conservative NYSDEC sediment screening levels.

1.5 Remediation Objectives

As presented in the NYSDEC ROD (NYSDEC, 2011), the selected remedy must eliminate or mitigate all significant threats to public health and/or the environment. To achieve this goal, the following remediation objectives have been established for the site.

Groundwater

- Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards.
- Prevent contact with, or inhalation of volatiles, from contaminated groundwater.
- Restore the groundwater aquifer to pre-disposal/pre-release conditions, to the extent practicable.
- Prevent the discharge of contaminants to surface water.
- Remove the source of groundwater or surface water contamination.

Soil

- Prevent ingestion/direct contact with contaminated soil.

- Prevent inhalation of or exposure from contaminants volatilizing from contaminants in soil.
- Prevent migration of contaminants that would result in groundwater or surface water contamination.
- Prevent impacts to biota from ingestion/direct contact with soil causing toxicity or impacts from bioaccumulation through the terrestrial food chain.

Surface Water

- Prevent ingestion of water impacted by contaminants.
- Prevent contact with contaminants from impacted water bodies.
- Prevent surface water contamination that may result in fish advisories.
- Restore surface water to ambient water quality criteria for the contaminant of concern.
- Prevent impacts to biota from ingestion/direct contact with surface water causing toxicity and impacts from bioaccumulation through the marine or aquatic food chain.

Sediment

- Prevent direct contact with contaminated sediments.
- Prevent surface water contamination which may result in fish advisories.
- Prevent releases of contaminant(s) from sediments that would result in surface water levels in excess of ambient water quality criteria.
- Prevent impacts to biota from ingestion/direct contact with sediments causing toxicity or impacts from bioaccumulation through the marine or aquatic food chain.
- Restore sediment to pre-release/background conditions, to the extent feasible.

1.6 Description of Selected Remedy

Major remedial components are shown on Figures 2 and 3. The NYSDEC-selected remedy for the site consists of the following:

- Excavating soil from off-site areas that contain VOCs, SVOCs, PCBs, or metals at concentrations greater than the lower of the ecological resource or residential use SCOs. Excavated soil will be consolidated on-site beneath a soil cover.

- Excavating soil from on-site and off-site locations that contain PCBs at concentrations greater than or equal to 50 mg/kg. Excavated soil will be disposed of at an approved off-site facility.

- Excavating sediment from the off-site northern drainage area and drainage swale that contains PCBs at concentrations greater than or equal to 50 mg/kg. Excavated sediment will disposed of at an approved off-site facility.

- Excavating sediment from both the on-site southern drainage areas and off-site northern drainage area that contains PCBs at concentrations between 1 and 50 mg/kg. Excavated sediment will be will be consolidated on-site beneath a soil cover.

- Backfilling on-site excavation areas with a minimum 24-inch layer of material that meets the lower of the 6NYCRR Part 375-6.7(d) protection of ecological resource or restricted-residential criteria for backfill. Backfilling off-site excavation areas with material that meets the lower of the 6NYCRR Part 375-6.7(d) protection of ecological resources or residential criteria for backfill. Excavations within 5 feet of the high groundwater elevation will be backfilled with material that meets 6NYCRR Part 375-6.8 SCOs for the protection of groundwater.

- Constructing a cover over soil and sediment that is consolidated on-site and over any remaining on-site soil that contains constituents at concentrations greater than ecological resource or restricted residential SCOs, whichever is lower. The cover will have a minimum thickness of 24 inches of clean soil that meets 6NYCRR Part 375-6.8(d) criteria and will consist of clean soil underlain by a demarcation layer. The top 6 inches of soil will be of sufficient quality to support vegetation. Soil and sediment placed in the consolidation area must be placed on a filter fabric (to limit migration of fine-grained materials and serves a bottom demarcation layer) at least 5 feet above the seasonally high groundwater table. Working areas including

roadways and parking lots, where constituents exceed the ecological resource SCOs will be covered by either pavement or concrete that is a minimum of 6 inches thick.

- Backfilling the southern drainage areas (SDA-1 and SDA-3) with rip-rap stone to prevent vegetation re-establishment and discourage wildlife habitation.

- Restoring southern drainage area SDA-2 and the northern drainage area via importation and placement of appropriate fill materials, topsoil, wetland seed mixtures, shrubs, and trees to create natural conditions.

- Decommissioning existing monitoring wells and installing new monitoring wells both upgradient and downgradient from areas containing dissolved phase impacts to evaluate the effectiveness of the soil excavation activities.

- Maintaining a site cover consisting of driveways, parking/staging areas and buildings that currently exist and to allow for the current use of the site. If the site is redeveloped in the future, a site-wide cover system (i.e., areas beyond those addressed by the site cover described above) will be established and will consist of either structures such as buildings, pavement, sidewalks included as part of the site development, or a soil cover in areas where the upper two feet of exposed surface soil (i.e., exposed following redevelopment) will exceed the applicable soil cleanup objectives. In areas where such a soil cover is required, it will consist of a minimum of 2 feet of soil that meets the SCOs for cover material, as set forth in 6NYCRR part 375-6.7(d) for restricted residential use. The soil cover will be placed over a demarcation layer, with the upper 6 inches of soil of sufficient quality to maintain a vegetative layer. Any fill material brought to the site shall meet the requirements for the identified site use, as set forth in 6NYCRR Part 375-6.7(d).

- Imposition of an institutional control in the form of an environmental easement that will require:

    - Limiting the use and development of the property to restricted residential use, which also permits industrial use

    - Compliance with a NYSDEC-approved site management plan (SMP)

    - Restricting the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the New York

State Department of Health (NYSDOH) and/or the St. Lawrence County Department of Health

- Prevention of current or future property owners from conducting activities that will potentially jeopardize the integrity of the soil cover

- Periodic sampling of the water supply wells to monitor water quality and continued supply of an alternative source of potable water to affected parties

- Preparing a periodic certification of institutional and engineering controls which will be submitted to the NYSDEC and NYSDOH.

- Developing a site management plan that will include the following institutional and engineering controls:

  - Management of the cover system to restrict excavation below the cover's demarcation layer, pavement, or buildings

  - Excavated soil will be tested, properly handled to protect the health and safety of workers and the nearby community, and will be properly managed in a manner acceptable to the NYSDEC

  - Continued evaluation of the potential for soil vapor intrusion for any new buildings development on the site, including provision for mitigation of any identified impacts

  - Periodic monitoring of groundwater, surface water, sediment, and wetland vegetation and restoration efforts

  - Biennial biota monitoring that includes submitting biota samples for PCBs and lipids content

  - Identification of any use restrictions on the site

  - Fencing to control site access

  - Provisions for the continued operation and maintenance of the selected remedy

- Providing periodic certification (by the property owner) of institutional and engineering controls, prepared and submitted by a professional engineer or such expert acceptable to NYSDEC, until NYSDEC notifies the property owner in writing that certification is no longer needed. This submittal will:

  - Contain certification that the institutional controls and engineering controls put in place are still in place and are either unchanged from the previous certification or are compliant with NYSDEC-modifications

  - Allow NYSDEC access to the site

  - State that nothing has occurred that will impair the ability of the control to protect public health or the environment or constitute a violation or failure to comply with the site management plan unless otherwise approved by NYSDEC

2. Pre-Design Investigation Activities

This section describes the PDI activities to be conducted at the site to address additional data needs necessary to support the development of the remedial design for the NYSDEC-selected remedy. PDI activities will include the following:

- PDI Task 1 – Soil/Upland Investigation
- PDI Task 2 – Sediment/Wetland Investigation
- PDI Task 3 – Water Treatability Sampling
- PDI Task 4 – Underground Drainage Pipe Inspection
- PDI Task 5 – Site Survey
- PDI Task 6 – Water Level Measurement

Methodologies and protocols to be followed during the completion of the PDI activities are presented in the *Field Sampling Plan* (FSP) included as Appendix A. Health and safety protocols to be followed by field personnel during investigation activities are presented in the *Health and Safety Plan* (HASP) included as Appendix B. The air monitoring activities to be conducted during the PDI are presented in the *Community Air Monitoring Plan* (CAMP) included as Appendix C. Analytical procedures and requirements to be followed for the laboratory analysis of samples collected during investigation activities are presented in the *Quality Assurance Project Plan* (QAPP) included as Appendix D.

A description of each task associated with the PDI is presented below.

2.1 PDI Task 1 – Soil/Upland Investigation

PDI Task 1 consists of conducting soil investigations to support the development of soil excavation plans and design of the on-site consolidation area. A description of the soil PDI components is presented in the following sections.

2.1.1 PDI Task 1a – Soil Delineation Sampling

As indicated in Section 1, the ROD requires excavation of on-site soil that contains PCBs at concentrations greater than or equal to 50 mg/kg and excavation of off-site soil that contains PCBs, VOCs, SVOCs, and/or metals at concentrations greater than applicable SCOs. The approximate extent of soil removal is defined in the NYSDEC ROD for this site and shown on Figure 2. Some additional soil investigation is necessary to accurately and fully delineate the extent of impacts:

- Further delineate the horizontal and vertical limits of on-site soil containing PCBs at concentrations greater than or equal to 50 mg/kg, and potentially reduce the previously identified soil removal volume.

- Further delineate the horizontal and vertical extent of off-site soil that contains PCBs, VOCs, SVOCs, and/or metals at concentrations greater than applicable SCOs.

Proposed locations for 25 soil borings (SB-400 through SB-424) are shown on Figure 2. Soil borings will be completed using direct push sampling methods. Soil samples will be collected continuously at each boring to the target depth (i.e., up to 9 feet below grade) using 4-foot long macro core samplers. Anticipated sample depths for each soil boring are presented in Table 4. An ARCADIS geologist will visually characterize each soil sample for soil type and the presence of visible staining, sheen, free product, and obvious odors. An ARCADIS geologist will collect samples from each soil boring at the 0-1 foot, 1-3 foot, 3-5 foot, and 5-7 foot intervals, etc., as appropriate. Soil samples will be selected for laboratory analysis for PCBs, VOCs, SVOCs, and/or inorganics to address the sampling objectives for each boring. Soil samples from select depth intervals will be extracted and archived by the laboratory for potential latter analysis based on the analytical results obtained for the soil samples that are initially analyzed.

For example, soil samples from boring SB-340 contained PCBs at concentrations greater than 50 mg/kg in the 1-3 foot interval, but deeper soil samples were not collected during the Remedial Investigation. Therefore, PDI soil boring SB-402 will be completed (at the same location as SB-340) to a depth of 7 feet bgs. Soil samples collected from the 0-1 foot and 1-3 foot intervals will not be submitted for laboratory analysis (because analytical data has already been generated for these intervals as part of the Remediation Investigation). The soil samples collected from the 3-5 foot and 5-7 foot intervals will be submitted for laboratory analysis; however, the soil sample from the 5-7 foot depth interval will be extracted, archived, and only analyzed if the soil sample from the 3-5 foot interval contains PCBs at a concentration greater than 50 mg/kg. Additionally, PDI soil borings SB-400, SB-401, and SB-402 will be completed near soil boring SB-340 to further delineate horizontal limits of soil containing PCBs at concentrations greater than or equal to 50 mg/kg. At these boring locations, soil samples collected from the 0-1 foot and 1-3 foot depth intervals and samples collected from the 3-5 foot and 5-7 foot depth intervals will be extracted, archived, and only analyzed if the soil sample from the 1-3 foot interval contains PCBs at a concentration greater than 50 mg/kg.

Soil cuttings will be staged on-site in an appropriate waste container (i.e., roll-off, drum). Soil cuttings will be field screened for the presence of volatile organic vapors using a photoionization detector (PID). Composite waste characterization samples from the investigation-derived waste (IDW) will be submitted for laboratory analysis for Toxic Characteristic Leaching Procedure (TCLP) VOCs, TCLP SVOCs, TCLP metals, PCBs, and RCRA waste characteristics (including reactivity, corrosivity, and ignitability). Soil cuttings (and other IDW) will be managed and disposed of in accordance with applicable rules and regulations.

2.1.2 PDI Task 1b – Geotechnical Soil Sampling

Geotechnical data is needed to facilitate the design off the on-site consolidation area. A total of four soil borings (SB-425 through SB-428) will be completed in the northern portion of the upland area (see Figure 2), in the location of the consolidation area. Geotechnical borings will be drilled to approximately 25 feet bgs using hollow-stem auger drilling methods. Soil sampling will be performed continuously at each boring using 2-inch diameter split spoon sampling devices. Standard Penetration Testing (SPT) will be conducted for most intervals following ASTM D1586. The field crew will attempt to collect up to three undisturbed samples using a thin-walled sampler (i.e., Shelby tube) of the silt and clay unit. Depending on subsurface conditions encountered at the geotechnical boring locations, select soil samples will be submitted for the following geotechnical testing:

- Visual description (ASTM 2487)
- Moisture content as a percentage of dry weight (ASTM 2216)
- Grain-size analysis with hydrometer (ASTM 422)
- Unit weight (ASTM 2937)
- Atterberg limits (ASTM 4318)
- UU tri-axial test (ASTM 2850)
- Consolidation (ASTM 2435)

The number of samples to be submitted for testing will be determined based on subsurface conditions encountered at the soil boring locations (to characterize subsurface stratigraphy) based on the judgment of the project geotechnical engineer upon completion of the drilling program.

2.2 PDI Task 2 – Sediment/Wetland Investigation

PDI Task 2 consists of activities to conduct a sediment investigation within the southern drainage areas, drainage ditch, and northern drainage area. The investigation will consist of delineating and characterizing on-site and off-site wetlands, further evaluating lateral/vertical extent of PCB-impacted sediments, obtaining geotechnical information to support the design of the sediment removal, and establishing baseline (i.e., pre-remediation) biota conditions, as required by DER-10 Section 5.1(d). A description of the sediment investigation components is presented in the following sections.

Note that work in or near water will not be performed in snowy and/or icy conditions. Working in such conditions could pose an unnecessary health and safety risk. It is anticipated that work in water will generally be conducted on foot, but a small boat or canoe will be utilized if water levels are too high or sediment is too soft to allow safe access for in-water work.

2.2.1 PDI Task 2a – Wetland Boundary Delineation and Characterization

Regulated wetlands present on and in the vicinity of the upland portion of the site (including the southern drainage area) and the Northern Drainage Area will likely be disturbed during remedial activities. The boundaries of the identified wetlands will be delineated and the vegetation of each wetland will be characterized to assist with the restoration design. The boundaries of site wetlands will be delineated based on observed characteristics of site vegetation, hydrology, and soils consistent with the requirements of the Routine Method presented in the 1987 U.S. Army Corps of Engineers (USACE) *Wetlands Delineation Manual* (Environmental Laboratory, 1987), the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region (USACE, 2012), and the New York State Freshwater Wetlands Delineation Manual (NYSDEC, 1995).

Field observations of vegetation, hydrology, and soils will be collected from paired upland and wetland data collection plots and documented on field data forms required by the USACE wetland delineation methodology. Sequentially numbered surveyor's flagging will be placed at eye level within sight of each other for subsequent instrument surveying. A wetland delineation report will be prepared to document the delineated wetland boundaries. The report will include copies of appropriate portions of state and federal wetland maps, topographic maps, and soil surveys; a photographic log of the delineated wetland boundaries; the completed field data forms; and a site plan

presenting the surveyed wetland boundaries. The report will be suitable for submission to the regulating agencies as part of a permit application or notification requirement.

In emergent wetlands, a meander survey will be performed to identify the dominant vegetative communities. Vegetative communities that change in response to hydrologic conditions will be characterized separately and classified by their dominant place species. The species and relative percent cover observed in each of the emergent wetland types identified will be recorded to assist in the selection of the most appropriate restoration seed mixes, such that observed communities and dominant species within each community can be restored.

In forested and scrub-shrub wetlands, the number, species, and size class (e.g., shrub, sapling, tree) will be determined to characterize the woody plant communities and assist in tree and shrub restoration design. In forested wetlands that total less than 1 acre in size, trees will be counted, speciated, and measured at breast height. Shrubs will be speciated and counted from two 30-foot by 30-foot subplots. In wetlands totaling more than 1 acre in size, tree and shrub density will be estimated from 30-foot by 30-foot sampling plots that will be established in representative wetland areas, at a density of 3 plots per acre. The data from these plots will be used to estimate the number and total diameters of trees and shrubs in the entire wetland utilizing the average plot density values from the sampling plots.

2.2.2 PDI Task 2b – Sediment Delineation Sampling

As indicated in Section 1, the ROD requires excavation of on-site and off-site sediment that contains PCBs at concentrations greater than 1 mg/kg. The approximate extent of sediment removal is defined in the NYSDEC ROD for this site. However, additional sediment investigation is necessary in order to accurately and fully delineate the extent of impacts:

- Further delineate the vertical and horizontal limits of sediment containing PCBs at concentrations greater than or equal to 50 mg/kg.

- Further delineate the horizontal limits (to potentially reduce the previously identified sediment removal volume) and establish designed soil removal vertical limits (i.e., depths) to confirm delineation of sediment containing PCBs at concentrations less than 1 mg/kg.

A total of 41 proposed sediment locations (SED-300 through SED-340) are shown on Figure 3. Note that sediment sampling locations may be modified or additional locations may be sampled based on the results of the wetland characterization (i.e., changes in vegetation type) and boundary delineation activities (completed under PDI Task 2a), as well as changes in topographic conditions. Sediment samples will be collected at each location to the target depth via manually driving (i.e., with a slide hammer) Lexan tubing or a Macrocore sampler. If sample tubing cannot be driven by hand to the target depth, a portable jack hammer will be used to advance 4-foot long Macrocore samplers, and if necessary, a track-mounted direct-push drill rig can also be used to advance sampling equipment. Anticipated sample depths for the sediment samples are presented in Table 5. For the purpose of preparing this RD/RA Work Plan, it has been assumed that sediment/substrate interface is located at 2 feet bgs. An ARCADIS geologist will collect samples from each location at the 0-0.5 foot, 0.5-2 foot (or top of substrate). At locations where a sediment substrate sample will be collected, a PVC pipe (or other appropriate material) will be used to case-off surrounding sediment and a sample of substrate will be recovered through the casing at a depth of 2-feet (or top of substrate) to 4-feet below sediment grade using a Macro-core or split spoon sampler. When sampling substrate material, an ARCADIS geologist will visually characterize each sediment sample for soil type and the presence of visible staining, sheen, free product, and obvious odors. Following receipt of analytical data and following completion of wetland survey activities (completed under PDI Task 5), ARCADIS will assess the location PCB detections relative to wetland surface/sediment elevations.

Similar to the soil sampling/analysis rationale described in Section 2.1.1, sediment analysis will be an iterative process. Sediment samples will initially be selected for laboratory analysis of PCBs and total organic carbon (TOC) based on the sampling objectives at each location. Select sediment samples will be extracted, and archived by the laboratory for potential later analysis based on the analytical results for the initial sediment samples, as appropriate. For example, samples collected at sediment sampling location SED-268 contained PCBs at concentrations greater than 1 mg/kg in the deepest interval (0.5-1.5 feet), immediately above sediment substrate. Therefore, samples will be collected from PDI sediment sampling location SED-334 (at the same location as SED-268). Sediment samples collected from the 0-0.5 foot and 0.5-1.5 foot intervals will not be submitted for laboratory analysis (because analytical data has already been generated for these intervals as part of the Remedial Investigation). Only the sediment substrate sample at this location will be submitted for laboratory analysis. Additionally, PDI sediment locations SED-332, SED-333, and SED-335 will be sampled to further delineate the vertical and horizontal limits of sediment containing PCBs at

concentrations greater than or equal to 50 mg/kg. At these locations, sediment samples will be collected only from the 0-0.5 foot and 0.5-1.5 foot (or top of substrate) depth intervals and both samples will be submitted for laboratory analysis.

IDW generated as part of the sediment delineation activities will be containerized, sampled, and disposed of as described for the soil investigation activities in Section 2.1.1.

2.2.3 PDI Task 2c – Sediment Characterization and Dewatering Analysis

Additional samples will be collected in conjunction with the sampling in PDI Task 2b to provide design information, including physical properties and treatability data. This information will be used to determine removal techniques, dewatering methods, stabilization material, and appropriate backfill materials to be specified in the remedial design.

A total of up to 13 samples will be collected to assess the physical properties of the sediment, 1 sample from each of the southern drainage areas and 10 samples from the northern drainage area. Samples will be collected in 8-ounce sample jars and submitted for the following analyses:

- Moisture content as a percentage of dry weight (ASTM D2216)
- Grain-size analysis with hydrometer (ASTM D422)
- Total organic carbon

A total of 5 samples will be collected for a treatability study, 1 composite sample from the southern drainage area and 4 from the northern drainage area. Samples will be collected in 5 gallon buckets and submitted to ARCADIS' treatability testing lab in Raleigh, North Carolina. The material samples will be analyzed alone and in combination with various blends of Portland cement and/or cement kiln dust (CKD). Sediment samples will be evaluated based on passing/failing the Paint Filter Test (USEPA Method 9095B). The results of this study will be used to specify the stabilization materials and sequencing in the remedial design.

2.2.4 PDI Task 2d – Baseline Biota Sampling

Fish samples will be collected from the northern drainage area wetland prior to remediation to establish baseline PCB concentrations in fish tissue. Post-remediation

fish monitoring results will be compared to baseline levels to evaluate trends in fish tissue PCB concentrations.

Previous sampling activities in ponded water of the northern drainage area identified the presence of small, forage-sized fish such as central mud minnow, fathead minnow, and golden shiner. These species will be targeted for sample collection under the baseline sampling program, but other forage fish species may be collected based on availability.

Samples will be collected using electrofishing equipment. In total, up to 5 samples of each of three fish species will be collected from the northern drainage area, for a total of up to 15 fish samples. Each sample will be processed as a composite of whole-body fish of the same species and up to 5 or more fish will be included in each sample to meet the weight requirements of the analytical program. Note that the proposed sample numbers are based on the availability of species in the wetland area. Samples will be soxhlet extracted (by USEPA Method 3541-Automated) and analyzed for PCB Aroclors (by USEPA Method 8082). Additionally, samples will be submitted for analysis for TAL metals (by USEPA ICP-MS Method 6020) and percent lipids using the gravimetric method.

2.3 PDI Task 3 – Water Treatability Sampling

This PDI task consists of collecting and submitting groundwater and surface water samples for laboratory analysis to support the design of a temporary water treatment system. ARCADIS anticipates the need for a temporary water treatment system to support soil excavation and wetland sediment removal activities. Groundwater and/or surface water samples will be collected from upland soil excavation areas, southern drainage areas, the drainage swale, and the northern drainage area to characterize water quality within the removal areas. Sampling procedures are described in the FSP (see Appendix B). Water samples will be submitted for the following treatability parameters:

- VOCs, SVOCs, and PCBs (including total and dissolved PCBs)
- TAL inorganics and cyanide (filtered and unfiltered samples)
- Total suspended solids (TSS)
- Total dissolved solids (TDS)
- Hardness
- pH

Analytical results will be used to evaluate and select components of a temporary water treatment system that will treat water removed from the soil excavation and sediment areas. Additional information regarding the design of the temporary water treatment system is discussed under RD Task 3.

2.4 PDI Task 4 – Underground Drainage Pipe Inspection

Surface water currently drains from Southern Drainage Area SDA-3 to the drainage swale (and subsequently to the northern drainage area) through an underground drainage pipe that transects the southern portion of the site. The upstream end of the pipe is located west of the vehicle maintenance building and the downstream end of the pipe is located east of the tin press area.

This PDI task consists of inspecting the underground drainage pipe to assess the pipe's condition. Inspection activities will consist of advancing a push-type camera into the pipe. Note that hydroflushing or other pipe cleaning activities are not proposed at this time, as a significant volume of water and sediment is anticipated to be generated by the cleaning activities (and would subsequently require on-site management). No significant amount of waste material (i.e., water or sediment) will be generated by the proposed inspection activities.

2.5 PDI Task 5 – Site Survey

PDI Task 5 consists of conducting a site survey to document the location of PDI sampling activities described in Section 2 and to facilitate preparation of the remedial design as described in Section 3. Survey activities will be completed to achieve the following:

- Identify the PDI sampling locations in both the upland and northern drainage area portions of the site
- Accurately locate the identified wetland boundaries
- Characterize the existing wetland topography

Topographic survey information will also be obtained in the upland area and northern drainage area to obtain a pre-construction baseline. Survey activities will be conducted using conventional methods.

In the upland portion of the site, a topographic survey will be completed to facilitate generation of 1-foot site contours. The survey will be used during the remedial design

process to evaluate pre-existing conditions (e.g., contours, drainage patterns, etc.) and evaluate the final site lines and grades to be constructed during implementation of the remedy.

In wetland areas, labeled flags will be hung/placed (during wetland delineation activities) to define the overall wetland boundary, as well as the boundaries of the individual vegetation-based plant communities. Topographic survey data will be collected from identified wetland areas to develop 0.5-foot contours, and to document the range of elevations across the wetland. These elevations will be used to guide the final grading of the restored wetland, which will create a range of hydrologic conditions to support the various wetland plant communities (as identified during wetland characterization activities).

Additionally, a property boundary survey will be conducted to evaluate the need for access agreements with neighboring properties to facilitate access to or remedial construction activities on non-owned property.

2.6 PDI Task 6 – Water Level Measurements

As indicated in Section 1, the ROD requires that the on-site consolidation area is constructed such that consolidated material is placed at least 5 feet above the seasonally high groundwater table. This PDI task consists of collecting a round of site-wide groundwater level measurements to evaluate the depth to groundwater. Groundwater level measurements will be collected from the existing monitoring well network, as well as three temporary piezometers to be installed in the northern portion of the upland area (i.e., anticipated location of the on-site consolidation area). Temporary piezometer locations are shown on Figure 2.

2.7 PDI Documentation

The results from the PDI will be documented in a PDI Summary Report. Those results, along with existing site information, will support the basis for the remedial design. The PDI Summary Report will include the following:

- A summary of the PDI activities including health and safety monitoring, field observations, sampling results, problems encountered, and other pertinent information necessary to document that the site activities were performed pursuant to this RD/RA Work Plan.

- Boring/sampling logs.
- Summary tables presenting the analytical testing results.
- An updated site plan(s) showing the locations of the soil borings, sediment sampling locations.
- Site drawing(s) depicting the proposed revised locations of soil excavation and soil removal (as necessary).
- An updated schedule for the completion of the remedial design.

3. Remedial Design Activities

This section presents a description of the remedial design activities to be completed to prepare the design for the selected site remedy. Work activities associated with preparing the remedial design will be conducted under the following tasks:

- RD Task 1 – Soil Excavation
- RD Task 2 – Sediment Removal
- RD Task 3 – Temporary Water Treatment System
- RD Task 4 – On-Site Consolidation Area
- RD Task 5 – Storm Water Management
- RD Task 6 – Site Restoration

A description of each task associated with the preparation of the remedial design is presented below. Note that additional supporting remediation tasks (e.g., site preparation, waste management, etc. will be developed as part of the remedial design). The remedial design will also present proposed locations for temporary remediation support structures (e.g., temporary water treatment system, staging areas, etc.), requirements for soil and sediment erosion control, and monitoring and mitigating procedures for dust, odor, and vapors.

3.1 RD Task 1 – Soil Excavation

As indicated in Section 2, soil investigation activities will be completed to refine the vertical and horizontal extent of soil requiring excavation. The remedial design will include the extent and approximate quantity of soil to be excavated, based on the results of the RI and PDI, to meet the appropriate SCOs, as stipulated in the ROD.

A majority of the soil excavation activities are anticipated to be conducted via open cut excavations with sloped and/or bench excavation sidewalls (as appropriate). Soil excavation activities are anticipated to be completed at depths up to 6 feet below grade near the southwest corner of the vehicle maintenance building and near the northeast corner of the storage barn. Based on the anticipated excavation depth near these structures, potential excavation support systems (e.g., trench boxes, slide rail shoring systems) will be evaluated as part of the remedial design. Additionally, the remedial design will describe the requirements for handling and off-site transportation/disposal of excavated soil.

The remedial design will also define the discrete element of the site remedy to be undertaken by NYSDEC utilizing General Motors (GM) settlement funds, as described in Paragraph VI.B.2 of the RD/RA Order. As of the date of this RD/RA Work Plan, it is anticipated that the NYSDEC will undertake the loading and off-site transportation and disposal of a portion of the TSCA-regulated material (i.e., material containing PCBs at concentrations greater than 50 mg/kg) generated by the site remedy. Material to be managed by NYSDEC will be staged and stockpiled separately from other wastes generated by the remedial activities.

3.2 RD Task 2 – Sediment Removal

The results of the RI and the PDI activities described in Section 2 will be used to prepare a remedial design and approach for sediment removal. The remedial design will describe the following:

- Removal strategy, including access, clearing, and erosion and sedimentation controls, as required by DER-10 Section 5.1(d)
- Backfill strategy, including material types and sequencing with removal
- Material handling requirements, including on-site transportation, stabilization, off-site transportation, and disposal.

The design will define the extent and approximate quantity of materials to be removed (i.e.,, to meet the appropriate SCOs, as stipulated in the ROD) and replaced (based on the results of the RI and PDI) as part of the remedial action. As indicated in the previous subsection, NYSDEC will undertake the off-site transportation and disposal of a portion of the TSCA-regulated material (i.e., material containing PCBs at concentrations greater than 50 mg/kg) generated by site remedy. Material to be managed by NYSDEC will be staged and stockpiled separately from other wastes generated by the remedial activities.

3.3 RD Task 3 – Temporary Water Treatment System

RD Task 3 will consist of designing a temporary water treatment system to treat water removed from the soil excavation areas and water generated as part of the sediment removal and dewatering activities. As indicated in Section 2, groundwater and surface water samples will be collected and submitted for laboratory analysis for various

treatability parameters to evaluate and select appropriate treatment system components.

The major temporary water treatment system components are anticipated to include an oil-water separator unit for removal of free-phase oils, sand filter and bag filter vessels for removal of suspended solids, an organoclay vessel for removal of residual oils, and granular activated carbon vessels for removal of organic constituents. Additionally, storage tanks (i.e., frac tanks) will be used to store water to facilitate pre-discharge sampling and to provide a backwash water supply. Post-treatment management of the water will also be evaluated under this RD task. Post-treatment water management options include the following:

- Discharge to the local publicly-owned treatment works (POTW) via a nearby sanitary sewer.

- Discharge to wetland under a NYSDEC-State Pollutant Discharge Elimination System (SPDES) permit equivalent.

- Containerization and transportation to a privately or publicly-owned treatment facility, although based on the anticipated volume of water to be generated, this alternative is not likely to be used in the remedial design.

The final discharge/treatment method will be selected based on the feasibility of implementing each option and a comparison of the relative costs for implementing the options and may include use of one or a combination of the above-identified options.

3.4 RD Task 4 – On-Site Consolidation Area

As indicated in the ROD, material placed within the on-site consolidation area will be underlain with a geotextile that serves as a demarcation layer and allows for water drainage. Consolidated material will be covered with a minimum of 24 inches of clean soil, with the top 6 inches capable of supporting vegetation. The consolidation area is anticipated to be constructed in the northern portion of the upland area. The geotechnical data and water level measurements collected as part of the PDI will be used to evaluate the need to construct a base layer for the on-site consolidation area (i.e., in addition to the geotextile demarcation layer).

Based on the anticipated soil/sediment removal volumes, consolidated material will be placed approximately 3 to 4 feet above the existing ground surface and covered with 2

feet of imported fill. The final location and dimensions (including lines and grades) of the consolidation area will be determined following the completion of the PDI activities (i.e., as part of the remedial design).

3.5 RD Task 5 – Storm Water Management

As indicated above, the on-site consolidation area will be constructed in the northern portion of the upland area, thereby altering the lines and grades of the site. Therefore, the need for additional storm water management features (e.g., retention ponds, drainage ditches, etc.) will be evaluated as part of the remedial design. Additionally, the underground drainage pipe inspection conducted as part of the PDI will be used to evaluate condition of the drainage pipe that transects the southern portion of the upland area. The remedial design will include details for pipe repair (e.g., slip lining) or replacement, as necessary.

3.6 RD Task 6 – Site Restoration

RD Task 6 consists of developing the final surface restorations to be completed at the site.

3.6.1 RD Task 6a – Upland Restoration

Following the completion of upland soil removal activities, excavation areas will be backfilled to facilitate installation of the site cover. Note that the ROD requires that excavation areas be backfilled with a minimum of 24 inches and requires that excavation areas are backfilled with material that meets the lower of 6NYCRR Part 375-6.7(d) protection of ecological resources or residential criteria and for excavations within 5 feet of the high groundwater elevation, material that meets 6NYCRR Part 375-6.8 SCOs for the protection of groundwater. However, some soil removal areas will only be excavated to a total depth of 1 foot bgs and therefore, only 1 foot of backfill material will be placed within the excavation area (i.e., where the water table is located greater than 5 feet below grade).

As indicated above, the on-site consolidation area will be capped with a vegetative soil cover. The southern portion of the upland area is anticipated to be paved in support of scrap metal transfer activities currently planned to be conducted at the site. Additional details regarding final surface restorations will be developed as part of the remedial design.

Additionally, as required by the ROD, existing monitoring wells will be decommissioned and new groundwater monitoring wells will be installed both upgradient and downgradient of the area where dissolved phase impacts were detected during the RI. Existing monitoring wells will be decommissioned in accordance with NYSDEC's guidance CP-43 *Groundwater Monitoring Well Decommissioning Policy* (NYSDEC, 2009). Additional details regarding monitoring well decommissioning and installation will be included in the remedial design.

3.6.2 RD Task 6b – Wetland and Northern Drainage Area Restoration

As indicated in the ROD, Southern Drainage Areas SDA-1 and SDA-3 will be backfilled with rip-rap stone to prevent vegetation re-establishment and discourage wildlife habitation. Remaining sediment removal areas in the wetlands of Southern Drainage Area SDA-2 and the northern drainage area are anticipated to be restored in-kind. Appropriate backfill (e.g., imported fill, topsoil, etc.) will be placed to restore the pre-construction lines and grades, as documented by the site survey conducted as part of the PDI. Wetland vegetation will be restored by seeding and planting based on the existing plant communities documented by the wetland characterization conducted as part of the PDI. Final wetland restoration details will be developed as part of the remedial design.

4. Permits and Approvals

The remedial design will be developed to meet applicable SCGs, permits and approvals. In addition to NYSDEC approval of the remedial design, permits and approvals will be necessary to conduct the PDI field activities and to implement the NYSDEC-selected remedy.

4.1 PDI Permits and Approvals

Permits and approvals necessary to complete PDI activities consist of the following:

- Access agreements to soil and sediment investigation activities on non-owned property. The WSI Group has already initiated and will secure access agreements with the owners of the properties prior to conducting the investigation.

- *Scientific License to Collect or Possess* – A license must be applied for and granted by NYSDEC prior to collecting biota samples as part of the PDI.

4.2 RD Permits and Approvals

Permits and approvals necessary to complete the remedial construction activities include (but are not limited to):

- *SPDES Permit Equivalent* –Groundwater will to be removed for excavation activities and surface water/groundwater will be generated during sediment removal/stabilization activities. Water will be treated via a temporary on-site treatment system. Treated water may be discharged to the northern drainage area under a SPDES Permit Equivalent.

- *Nationwide Permit #38 (NWP 38)* – A permit will be required for conducting the sediment removal activities in the southern drainage area and northern drainage area.

- *Section 401 Water Quality Certification* – A Water Quality Certification must be applied for and granted by the NYSDEC, indicating that the proposed remedial activities will not violate water quality standards.

- *Access Agreement* – Access agreements are anticipated to be required to facilitate access to and/or conduct remediation construction activities on non-owned properties. Potentially affected properties include:

    - 7676 U.S. Route 11 (Parcel ID 64.003-2-12.1)

A final list of permits necessary to implement the remedy will be identified in the remedial design.

5. Remedial Design Documents and Project Schedule

Consistent with the requirements set forth in DER-10 (NYSDEC, 2010b), the following remedial design submittals will be prepared:

- *Preliminary (50%) Remedial Design Report*
- *Final (100%) Remedial Design Report*

The contents of each remedial design document are presented below.

5.1 Preliminary (50%) Remedial Design Report

The *Preliminary (50%) Remedial Design Report* will generally include the following information:

- An introductory section that will provide a brief overview of the remedial design, site background information, design report objectives and report organization.
- A summary of the PDI activities, including the results obtained for the PDI activities.
- A summary of the remedy with a basis of design that describes the proposed remedial design and presents information used to develop the design and construction components of the project.
- A description of site controls for protecting the public health, safety, welfare and environment and to maintain the effectiveness of the remedial action.
- The regulatory and permitting requirements associated with implementing the remedial construction activities.
- A general description of the various components associated with completing the remedial construction activities, including the discrete element of the site remedy to be undertaken by NYSDEC described in Section 3.1.
- A set of engineering design drawings that represent an accurate identification of existing site conditions and an illustration of the work proposed. Each engineering design drawing will include a north arrow (where applicable), scale, legend,

definitions of all symbols and abbreviations and sheet number. The engineering design drawings are anticipated to include, at a minimum, the following:

- Title Sheet – to include at least the title of the project, key map, date prepared, sheet index and NYSDEC project identification.

- Existing Site Plan – to include pertinent property data including owners of record for all properties adjacent to the site (as necessary); site survey including the distance and bearing of all property lines that identify and define the project site; all easements, right-of-ways and reservations (as necessary); existing buildings and structures, wells, facilities and equipment; a topographic survey of existing contours and spot elevations within the project limits of disturbance, based on United States Geological Survey datum; all known existing underground and aboveground utilities; and location and identification of significant natural features, including, among other things, wooded areas, water courses, wetlands and flood hazard areas.

- General Soil Excavation Plan – to include limits of soil excavation to be completed in the upland area.

- General Sediment Removal Plan(s) – to include the limits of sediment removal to be completed in the southern drainage areas, drainage ditch, and northern drainage area.

- General Restoration Plan(s) – to include limits of the on-site consolidation area, final surface cover, location of new structures and/or wells, and other final restoration features, including general wetland restoration features.

- Miscellaneous Details – to include details related to the consolidation area, final surface cover, and surface water controls.

- Technical Specifications (table of contents only)

5.2 Final (100%) Remedial Design

In addition to the items identified for the *Preliminary (50%) Remedial Design Report*, the *Final (100%) Remedial Design Report* will include the following information:

- Revisions to the *Preliminary (50%) Remedial Design Report* based on NYSDEC comments, as appropriate.

- Remedial Action Schedule (preliminary), which presents the preliminary anticipated schedule for implementation of the remedial activities, including the discrete element of the site remedy to be undertaken by NYSDEC described in Section 3.1.

- A description of operation, maintenance, and monitoring activities to be undertaken after the NYSDEC has approved construction of the remedial design, including the number of years during which such activities will be performed.

- Final Engineering Design Drawings, including but not limited to the following, in addition to the design drawings prepared for the *Preliminary (50%) Remedial Design Report*:

    - Site Preparation Plan(s) – to include minimum requirements for temporary erosion and sedimentation controls; identification of other site features to be protected during remedial construction activities; site access roads and other improved areas; and site facilities (parking areas, decontamination area, equipment/material lay down areas). Separate plans are anticipated to be prepared for the upland and northern drainage area remedial construction activities.

    - Excavation Support Profile and Details (if necessary) – to include a profile of excavation support systems, structural details related to the type of support to be used, and other miscellaneous details related to the excavation support systems.

    - Final Site Grading Plan(s) – to illustrate the final lines and grades of the upland and northern drainage area.

    - Final Site Restoration Plan(s) – include the details of the final surface covers to be installed in the upland portion of the site and restoration details of the southern drainage areas and northern drainage area (including wetland areas).

    - Water Treatment System Details – to include temporary water treatment system specifications and a piping and instrumentation diagram.

  - Miscellaneous Details – to include details related to temporary erosion and sedimentation controls, temporary support facilities, material staging area(s), and decontamination area(s).

- Technical Specifications.

- A waste management plan (WMP) that describes the characterization, handling, treatment, and disposal requirements for various waste materials to be generated as a result of the remedial activities.

- A storm water pollution prevention plan (SWPPP) to provide a plan to minimize soil/sediment erosion in disturbed areas of the site and minimize the discharge of sediment in storm water runoff.

- A community air monitoring plan (CAMP) that describes the monitoring activities that will be conducted to detect potential airborne releases of constituents of concern during the implementation of remedial activities.

- A construction quality assurance plan (CQAP) that describes the materials, procedures, and testing necessary for proper construction, evaluation, and documentation during remedial activities.

- A community environmental response plan (CERP) that presents a summary of the site monitoring and work practices that will be completed to address potential short-term impacts to the surrounding community and/or environmental resources.

- A contingency plan that provides responses to potential emergencies that may arise as a result of the remediation activities that will be completed at the site.

- A Citizen Participation Plan which incorporates appropriate activities outlined in the NYSDEC's *Draft Citizen Participation Handbook for Remedial Programs* (DER-23) (NYSDEC, 2010a).

5.3 Remedial Design Schedule

The anticipated schedule for completing the PDI activities identified in this RD/RA Work Plan and a preliminary schedule for completion of the remedial design and construction of the selected remedy for the site is presented below.

Table 5.1 Preliminary Project Schedule

Schedule Component	Date
NYSDEC approval of this RD/RA Work Plan	April 2014
Conduct PDI activities	June-August 2014
Submit PDI Summary Letter Report	November 2014
Submit Preliminary (50%) Remedial Design Report to NYSDEC	March 2015
Receive NYSDEC comments	May 2015
Submit Draft Final (95%) Remedial Design Report to NYSDEC	October 2015
Receive NYSDEC comments	January 2016
Submit Final (100%) Remedial Design Report to NYSDEC	February 2016

This schedule for conducting PDI activities and preparing remedial design documents is dependent on receipt of NYSDEC comments on project submittals.

6. Post-Construction Activities

Following remedial construction activities, future site activities will be conducted in accordance with a *Site Management Plan* and institutional controls to be established for the site. The anticipated components of the SMP and institutional controls are presented below.

6.1 Site Management Plan

As indicated in the ROD (NYSDEC, 2011), the SMP will consist of the following:

- Management of the cover system to restrict excavation below the cover's demarcation layer, pavement, or buildings
- Excavated soil will be tested, properly handled to protect the health and safety of workers and the nearby community, and will be properly managed in a manner acceptable to the NYSDEC
- Continued evaluation of the potential for soil vapor intrusion for any new buildings development on the site, including provision for mitigation of any identified impacts
- Periodic monitoring of groundwater, surface water, sediment, and wetland vegetation and restoration efforts
- Biennial biota monitoring that includes submitting biota samples for PCBs and lipids content
- Identification of any use restrictions on the site
- Fencing to control site access
- Provisions for the continued operation and maintenance of the selected remedy

Additionally, the SMP will require that the property owner provides periodic certification that will achieve the following:

- Certify that the institutional controls and engineering controls put in place are still in place and are either unchanged from the previous certification or are compliant with NYSDEC-modifications

- Maintain continued access to the site for NYSDEC personnel

- Document that nothing has occurred that will impair the ability of the control to protect public health or the environment or constitute a violation or failure to comply with the site management plan unless otherwise approved by NYSDEC

6.2 Institutional Controls

As indicated in the ROD (NYSDEC, 2011), institutional controls in the form of an environmental easement will be established for the site to:

- Limit the use and development of the property to restricted residential use, which also permit industrial use

- Require compliance with a NYSDEC-approved SMP

- Restrict the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the NYSDOH and/or the St. Lawrence County Department of Health

- Prevent current or future property owners from conducting activities that will potentially jeopardize the integrity of the soil cover

- Require periodic sampling of the water supply wells to monitor water quality and continued supply of an alternative source of potable water to affected parties

- Prepare a periodic certification of institutional and engineering controls (as described above) for submittal to the NYSDEC and NYSDOH

7. References

ARCADIS, 2003. *Focused Remedial Investigation Report*, Waste-Stream, Inc. Site, Prepared for the WSI Group, Potsdam, New York (October, 2003).

ARCADIS, 2006. *Supplemental Remedial Investigation Report*, Waste-Stream, Inc. Site, Prepared for the WSI Group, Potsdam, New York, (March, 2006).

Environmental Laboratory, 1987. *Wetland Delineation Manual*, prepared for the U.S. Army Corp of Engineers, January 1987.

NYSDEC, 1995. *Freshwater Wetland Delineation Manual*, July 1995.

NYSDEC, 1998. Technical and Operational Guidance Series (TOGS) 1.1.1 – Ambient Water Quality Standards and Guidance Values, June, 1998.

NYSDEC, 1999. Technical Guidance for Screening Contaminated Sediments, Division of Fish, Wildlife, and Marine Resources, January, 1999.

NYSDEC, 2009. *CP-43 Groundwater Monitoring Well Decommissioning Policy*, November 2009.

NYSDEC. 2010a. *DER-23*, *Citizen Participation Handbook for Remedial Programs.* January, 2010.

NYSDEC, 2010b. DER-10 *Technical Guidance for Site Investigation and Remediation*, May 2010.

NYSDEC, 2011. *Record of Decision, WSI site*, Potsdam, St. Lawrence County, Site Number 6-45-022. June 2011.

USACE, 2012. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region*, January 2012.

USEPA, 1986. Quality Criteria for Water. United States Environmental Protection Agency, Office of Water Regulations and Standards, EPA 440/5-86-001. Washington, DC, May 1, 1986.

ARCADIS

Tables

Table 1
Summary of Chemical-Specific SCGs

Remedial Design/Remedial Action Work Plan
WSI Group - Waste Stream, Inc. Site - Potsdam, New York

Regulation	Citation	Potential Standard (S) or Guidance (G)	Summary of Requirements	Applicability to the Remedial Design/Remedial Action
Federal				
National Primary Drinking Water Standards	40 CFR Part 141	S	Establishes maximum contaminant levels (MCLs) which are health-based standards for public water supply systems.	These standards are potentially applicable if an action involves future use of ground water as a public supply source.
RCRA-Regulated Levels for Toxic Characteristics Leaching Procedure (TCLP) Constituents	40 CFR Part 261	S	These regulations specify the TCLP constituent levels for identification of hazardous wastes that exhibit the characteristic of toxicity.	Excavated materials may be sampled and analyzed for TCLP constituents prior to disposal to determine if the materials are hazardous based on the characteristic of toxicity.
Toxic Substances Control Act (TSCA)	40 CFR Part 761	S	Provides regulations for storage, handling, and disposal of materials containing PCBs.	Applicable for the removal and management of PCB-containing materials.
Universal Treatment Standards/Land Disposal Restrictions (UTS/LDRs)	40 CFR Part 268	S	Identifies hazardous wastes for which land disposal is restricted and provides a set of numerical constituent concentration criteria at which hazardous waste is restricted from land disposal (without treatment).	Applicable if waste is determined to be hazardous and for remedial alternatives involving off-site land disposal.
USEPA Water Quality Criteria	USEPA, 1986	S	Presents EPA's compilation of national recommended water quality criteria.	These criteria are applicable to surface water quality.
New York State				
NYSDEC Guidance on Remedial Program Soil Cleanup Objectives	6 NYCRR Part 375	G	Provides an outline for the development and execution of the soil remedial programs. Includes soil cleanup objective tables.	These guidance values are to be considered, as appropriate, in evaluating soil quality.
NYSDEC Ambient Water Quality Standards and Guidance Values	Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1 (6/98)	G	Provides a compilation of ambient water quality standards and guidance values for toxic and non-conventional pollutants for use in the NYSDEC programs.	These standards are to be considered in evaluating groundwater and surface water quality.
NYSDEC Technical Guidance for Screening Contaminated Sediments	Division of Fish, Wildlife and Marine Resources (January 1999)	G	Describes methodology for establishing sediment criteria for the purpose of identifying sediment that potentially may impact marine and aquatic ecosystems.	These criteria are applicable to sediment quality.
Identification and Listing of Hazardous Wastes	6 NYCRR Part 371	S	Outlines criteria for determining if a solid waste is a hazardous waste and is subject to regulation under 6 NYCRR Parts 371-376.	Applicable for determining if materials generated during implementation of remedial activities are hazardous wastes. These regulations do not set cleanup standards, but are considered when developing remedial alternatives.
New York State Surface Water and Groundwater Quality Standards	6 NYCRR Part 703	S	Establishes quality standards for surface water and groundwater.	Potentially applicable for assessing water quality at the site during remedial activities.

Table 2
Summary of Action-Specific SCGs

Remedial Design/Remedial Action Work Plan
WSI Group - Waste Stream, Inc. Site - Potsdam, New York

Regulation	Citation	Potential Standard (S) or Guidance (G)	Summary of Requirements	Applicability to the Remedial Design/Remedial Action
Federal				
Occupational Safety and Health Act (OSHA) - General Industry Standards	29 CFR Part 1910	S	These regulations specify the 8-hour time-weighted average concentration for worker exposure to various compounds. Training requirements for workers at hazardous waste operations are specified in 29 CFR 1910.120.	Proper respiratory equipment will be worn if it is not possible to maintain the work atmosphere below required concentrations. Appropriate training requirements will be met for remedial workers.
OSHA - Safety and Health Standards	29 CFR Part 1926	S	These regulations specify the type of safety equipment and procedures to be followed during site remediation.	Appropriate safety equipment will be on-site and appropriate procedures will be followed during remedial activities.
OSHA - Record-keeping, Reporting and Related Regulations	29 CFR Part 1904	S	These regulations outline record-keeping and reporting requirements for an employer under OSHA.	These regulations apply to the company(s) contracted to install, operate and maintain remedial actions at hazardous waste sites.
RCRA - Preparedness and Prevention	40 CFR Part 264.30 - 264.31	S	These regulations outline requirements for safety equipment and spill control when treating, handling and/or storing hazardous wastes.	Safety and communication equipment will be installed at the site as necessary. Local authorities will be familiarized with the site.
RCRA - Contingency Plan and Emergency Procedures	40 CFR Part 264.50 - 264.56	S	Provides requirements for outlining emergency procedures to be used following explosions, fires, etc. when storing hazardous wastes.	Emergency and contingency plans will be developed and implemented during remedial design. Copies of the plan will be kept on-site.
90 Day Accumulation Rule for Hazardous Waste	40 CFR Part 262.34	S	Allows generators of hazardous waste to store and treat hazardous waste at the generation site for up to 90 days in tanks, containers and containment buildings without having to obtain a RCRA hazardous waste permit.	Potentially applicable to remedial alternatives that involve the storing or treating of hazardous materials on-site.
Land Disposal Facility Notice in Deed	40 CFR Parts 264 and 265 Sections 116-119(b)(1)	S	Establishes provisions for a deed notation for closed hazardous waste disposal units, to prevent land disturbance by future owners.	The regulations are potentially applicable because closed areas may be similar to closed RCRA units.
RCRA - General Standards	40 CFR Part 264.111	S	General performance standards requiring minimization of need for further maintenance and control; minimization or elimination of post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated runoff, or hazardous waste decomposition products. Also requires decontamination or disposal of contaminated equipment, structures and soils.	Decontamination actions and facilities will be constructed for remedial activities and disassembled after completion.
Standards Applicable to Transporters of Applicable Hazardous Waste - RCRA Section 3003	40 CFR Parts 170-179, 262, and 263	S	Establishes the responsibility of off-site transporters of hazardous waste in the handling, transportation and management of the waste. Requires manifesting, recordkeeping and immediate action in the event of a discharge.	These requirements will be applicable to any company(s) contracted to transport hazardous material from the site.
United States Department of Transportation (USDOT) Rules for Transportation of Hazardous Materials	49 CFR Parts 107 and 171.1 - 172.558	S	Outlines procedures for the packaging, labeling, manifesting and transporting of hazardous materials.	These requirements will be applicable to any company(s) contracted to transport hazardous material from the site.
Clean Air Act-National Ambient Air Quality Standards	40 CFR Part 60	S	Establishes ambient air quality standards for protection of public health.	Remedial operations will be performed in a manner that minimizes the production of benzene and particulate matter.
USEPA-Administered Permit Program: The Hazardous Waste Permit Program	RCRA Section 3005; 40 CFR Part 270.124	S	Covers the basic permitting, application, monitoring and reporting requirements for off-site hazardous waste management facilities.	Any off-site facility accepting hazardous waste from the site must be properly permitted. Implementation of the site remedy will include consideration of these requirements.

Table 2
Summary of Action-Specific SCGs

Remedial Design/Remedial Action Work Plan
WSI Group - Waste Stream, Inc. Site - Potsdam, New York

Regulation	Citation	Potential Standard (S) or Guidance (G)	Summary of Requirements	Applicability to the Remedial Design/Remedial Action
Federal (Cont.)				
Land Disposal Restrictions	40 CFR Part 368	S	Restricts land disposal of hazardous wastes that exceed specific criteria. Establishes Universal Treatment Standards (UTSs) to which hazardous waste must be treated prior to land disposal.	Excavated materials that display the characteristic of hazardous waste or that are decharacterized after generation must be treated to 90% constituent concentration reduction capped at 10 times the UTS.
RCRA Subtitle C	40 U.S.C. Section 6901 et seq.; 40 CFR Part 268	S	Restricts land disposal of hazardous wastes that exceed specific criteria. Establishes UTSs to which hazardous wastes must be treated prior to land disposal.	Potentially applicable to remedial activities that include the disposal waste material from the site.
New York State				
NYSDEC's Monitoring Well Decommissioning Guidelines	CP-43	G	This guidance presents procedure for abandonment of monitoring wells at remediation sites.	This guidance is applicable for soil or groundwater alternatives that require the decommissioning of monitoring wells onsite.
Guidelines for the Control of Toxic Ambient Air Contaminants	DAR-1 (Air Guide 1)	G	Provides guidance for the control of toxic ambient air contaminants in New York State and outlines the procedures for evaluating sources of air pollution.	This guidance may be applicable for soil or groundwater alternatives that results in certain air emissions.
New York State Air Quality Classification System	6 NYCRR Part 256	G	Outlines the air quality classifications for different land uses and population densities.	Air quality classification system will be referenced during the treatment process design.
New York Air Quality Standards	6 NYCRR Part 257	G	Provides air quality standards for different chemicals (including those found at the site), particles, and processes.	Emissions from the treatment process will meet the air quality standards.
Discharges to Public Waters	New York State Environmental Conservation Law, Section 71-3503	S	Provides that a person who deposits gas tar, or the refuse of a gas house or gas factory, or offal, refuse, or any other noxious, offensive, or poisonous substances into any public waters, or into any sewer or stream running or entering into such public waters, is guilty of a misdemeanor.	During the remedial activities, impacted materials will not be deposited into public waters or sewers.
New York Hazardous Waste Management System - General	6 NYCRR Part 370	S	Provides definitions of terms and general instructions for the Part 370 series of hazardous waste management.	Hazardous waste is to be managed according to this regulation.
Identification and Listing of Hazardous Wastes	6 NYCRR Part 371	S	Outlines criteria for determining if a solid waste is a hazardous waste and is subject to regulation under 6 NYCRR Parts 371-376.	Applicable for determining if solid waste generated during implementation of remedial activities are hazardous wastes. These regulations do not set cleanup standards, but are considered when developing remedial alternatives.
Hazardous Waste Manifest System and Related Standards for Generators, Transporters, and Facilities	6 NYCRR Part 372	S	Provides guidelines relating to the use of the manifest system and its recordkeeping requirements. It applies to generators, transporters and facilities in New York State.	This regulation will be applicable to any company(s) contracted to do treatment work at the site or to transport or manage hazardous material generated at the site.
New York Regulations for Transportation of Hazardous Waste	6 NYCRR Part 372.3 a-d	S	Outlines procedures for the packaging, labeling, manifesting and transporting of hazardous waste.	These requirements will be applicable to any company(s) contracted to transport hazardous material from the site.
Waste Transporter Permits	6 NYCRR Part 364	S	Governs the collection, transport and delivery of regulated waste within New York State.	Properly permitted haulers will be used if any waste materials are transported off-site.
NYSDEC Technical and Administrative Guidance Memorandums (TAGMs)	NYSDEC TAGMs	G	TAGMs are NYSDEC guidance that are to be considered during the remedial process.	Appropriate TAGMs will be considered during the remedial process.
NYSDEC Technical Guidance for Site Investigation and Remediation	DER-10	G	Outlines the minimum technical activities DEC accepts for remedial projects administered under DER.	This guidance is applicable for the remedy selection process and remedial design process.
New York Regulations for Hazardous Waste Management Facilities	6 NYCRR Part 373.1.1 - 373.1.8	S	Provides requirements and procedures for obtaining a permit to operate a hazardous waste treatment, storage and disposal facility. Also lists contents and conditions of permits.	Any off-site facility accepting waste from the site must be properly permitted.

Table 2
Summary of Action-Specific SCGs

Remedial Design/Remedial Action Work Plan
WSI Group - Waste Stream, Inc. Site - Potsdam, New York

Regulation	Citation	Potential Standard (S) or Guidance (G)	Summary of Requirements	Applicability to the Remedial Design/Remedial Action
New York State (Cont.)				
Land Disposal of a Hazardous Waste	6 NYCRR Part 376	S	Restricts land disposal of hazardous wastes that exceed specific criteria.	New York defers to USEPA for UTS/LDR regulations.
National Pollutant Discharge Elimination System (NPDES) Program Requirements, Administered Under New York State Pollution Discharge Elimination System (SPDES)	40 CFR Parts 122 Subpart B, 125, 301, 303, and 307 (Administered under 6 NYCRR 750-758)	S	Establishes permitting requirements for point source discharges; regulates discharge of water into navigable waters including the quantity and quality of discharge.	Removal activities may involve treatment/disposal of water. If so, water generated at the site will be managed in accordance with NYSDEC SPDES permit requirements.

Table 3
Summary of Location-Specific SCGs

Remedial Design/Remedial Action Work Plan
WSI Group - Waste Stream, Inc. Site - Potsdam, New York

Regulation	Citation	Potential Standard (S) or Guidance (G)	Summary of Requirements	Applicability to the Remedial Design/Remedial Action
Federal				
National Environmental Policy Act Executive Orders 11988 and 11990	40 CFR 6.302; 40 CFR Part 6, Appendix A	S	Requires federal agencies, where possible, to avoid or minimize adverse impact of federal actions upon wetlands/floodplains and enhance natural values of such. Establishes the "no-net-loss" of waters/wetland area and/or function policy.	To be considered if remedial activities are conducted within the floodplain or wetlands.
Fish and Wildlife Coordination Act	16 USC 661; 40 CFR 6.302	S	Actions must be taken to protect fish or wildlife when diverting, channeling or otherwise modifying a stream or river.	Potentially applicable to remedial activities within and/or adjacent to the Hudson River.
Historical and Archaeological Data Preservation Act	16 USC 469a-1	S	Provides for the preservation of historical and archaeological data that might otherwise be lost as the result of alteration of the terrain.	The National Register of Historic Places website indicated no records present for historical sites in the immediate vicinity of the MGP site.
National Historic and Historical Preservation Act	16 USC 470; 36 CFR Part 65; 36 CFR Part 800	S	Requirements for the preservation of historic properties.	The National Register of Historic Places website indicated no records present for historical sites in the immediate vicinity of the WSI site.
Hazardous Waste Facility Located on a Floodplain	40 CFR Part 264.18(b)	S	Requirements for a treatment, storage and disposal (TSD) facility built within a 100-year floodplain.	Hazardous waste TSD activities (if any) will be designed to comply with applicable requirements cited in this regulation.
Endangered Species Act	16 USC 1531 et seq.; 50 CFR Part 200; 50 CFR Part 402	S	Requires federal agencies to confirm that the continued existence of any endangered or threatened species and their habitat will not be jeopardized by a site action.	The Fish and Wildlife Impact Analysis conducted during the Remedial Investigation does not indicate the presence of endangered species on the site.
Clean Water Act, Wetlands	Section 404 of the Clean Water Act	G	Establishes a program to regulate the discharge of dredged or fill material into waters of the United States, including wetlands.	Wetland remedial activities will require permits in accordance with Section 404.
Floodplains Management and Wetlands Protection	40 CFR 6 Appendix A	S	Activities taking place within floodplains and/or wetlands must be conducted to avoid adverse impacts and preserve beneficial value. Procedures for floodplain management and wetlands protection provided.	To be considered if remedial activities are conducted within the floodplain or wetlands.
New York State				
New York State Floodplain Management Development Permits	6 NYCRR Part 500	S	Provides conditions necessitating NYSDEC permits and provides definitions and procedures for activities conducted within floodplains.	Potentially applicable if remedial activities are conducted within a 100-year flood plain.
New York State Freshwater Wetlands Act	ECL Article 24 and 71; 6 NYCRR Parts 662-665	S	Activities in wetlands areas must be conducted to preserve and protect wetlands.	Does not appear to be applicable as the site is not located in a wetlands area.
Freshwater Wetland Permit Requirements	6 NYCRR Part 663	S	Provides the framework for NYSDEC's administration of the freshwater wetlands regulatory protection program.	Wetland remedial activities will require permits in accordance with Part 663.
New York State Parks, Recreation, and Historic Preservation Law	New York Executive Law Article 14	S	Requirements for the preservation of historic properties.	The National Register of Historic Places website indicated no records present for historical sites in the immediate vicinity of the MGP site.
Endangered & Threatened Species of Fish and Wildlife	6 NYCRR Part 182	S	Identifies endangered and threatened species of fish and wildlife in New York.	The Fish and Wildlife Impact Analysis conducted during the Remedial Investigation does not indicate the presence of endangered species on the site.
Floodplain Management Criteria for State Projects	6 NYCRR Part 502	S	Establishes floodplain management practices for projects involving state-owned and state-financed facilities.	Portions of the area to be remediated are located within the floodplain. Activities located in these areas would be performed in accordance with this regulation.
Local				
Local Building Permits	N/A	S	Local authorities may require a building permit for any permanent or semi-permanent structure, such as an on-site water treatment system building or a retaining wall.	Substantive provisions are potentially applicable to remedial activities that require construction of permanent or semi-permanent structures.

Table 4
PDI Soil Sampling Summary

Waste Stream, Inc. - Waste Stream, Inc. Site - Potsdam, New York

Proposed Sample ID	Rationale[1]	Analysis				Sample Depth[2]				
		PCBs	VOCs	SVOCs	Inorganics	0-1'	1-3'	3-5'	5-7'	7-9'
SB-400	2	X				X	X	X	X	
SB-401	2	X				X	X	X	X	
SB-402	1	X						X	X	
SB-403	2	X				X	X	X	X	
SB-404	2	X				X	X	X		
SB-405	2	X				X	X	X		
SB-406	4	X			X	X	X	X	X	
SB-407	4	X			X	X	X	X	X	
SB-408	1	X							X	X
SB-409	4				X	X	X			
SB-410	4				X	X	X			
SB-411	4		X	X	X	X	X	X	X	X
SB-412	4		X	X	X	X	X	X	X	X
SB-413	4			X	X	X	X	X	X	
SB-414	3,4	X				X	X	X	X	
SB-415	3	X		X	X	X	X	X		
SB-416	4	X		X	X	X	X			
SB-417	4			X	X	X	X			
SB-418	4	X		X	X	X	X			
SB-419	3	X		X	X		X	X		
SB-420	4	X		X	X	X	X	X		
SB-421	3	X					X	X		
SB-422	4	X				X	X	X		
SB-423	4				X	X	X	X		
SB-424	4				X	X	X	X		

Notes:

1. Sampling rationale:
   - 1 - Vertical delineation of on-site soil with PCBs > 50 mg/kg
   - 2 - Horizontal delineation of on-site soil with PCBs > 50 mg/kg
   - 3 - Vertical delineation of off-site soil with PCBs > 1 mg/kg
   - 4 - Horizontal delineation of off-site soil with PCBs, VOCs, SVOCs, and/or Inorganics at concentrations greater than SCOs
2. Samples collected at intervals highlighted in gray will be archived and only analyzed pending analytical results of shallower/adjacent samples.

Table 5
PDI Sediment Sampling Summary

Waste Stream, Inc. - Waste Stream, Inc. Site - Potsdam, New York

Proposed Sample ID	Rationale[1]	Sample Depth[2,3]		
		0-0.5'	0.5'-2'	2'-4'
SED-300	1		X	X
SED-301	1		X	X
SED-302	1		X	X
SED-303	1		X	X
SED-304	1		X	X
SED-305	1		X	X
SED-306	1		X	X
SED-307	1		X	X
SED-308	1		X	X
SED-309	1		X	X
SED-310	3	X	X	
SED-311	3	X	X	
SED-312	3	X	X	
SED-313	3	X	X	
SED-314	3	X	X	
SED-315	3	X	X	
SED-316	2	X	X	
SED-317	1			X
SED-318	3	X	X	
SED-319	3	X	X	
SED-320	1		X	X
SED-321	1			X
SED-322	1		X	X
SED-323	3	X	X	
SED-324	3	X	X	
SED-325	3	X	X	
SED-326	3	X	X	
SED-327	3	X	X	
SED-328	3	X	X	
SED-329	3	X	X	
SED-330	1			X
SED-331	2	X	X	
SED-332	2	X	X	
SED-333	3	X	X	
SED-334	3	X	X	
SED-335	1			X
SED-336	3	X	X	
SED-337	2	X	X	
SED-338	2	X	X	
SED-339	3	X	X	
SED-340	2	X	X	

Notes:

1. Sampling rationale:
   - 1 - Vertical delineation of sediment with PCBs > 1 mg/kg
   - 2 - Horizontal delineation of sediment with PCBs > 50 mg/kg
   - 3 - Vertical delineation of sediment with PCBs > 1 mg/kg
2. Samples collected at intervals highlighted in gray will be archived and only analyzed pending analytical results of shallower/adjacent samples.
3. Sample depth interval dependent on depth of soft sediment/soil substrate. 2-4' interval represents top of soil substrate. Sediment sampling intervals may be adjust based on field conditions encountered.
4. Sediment samples to be analyzed for Total PCBs and Total Organic Carbon.

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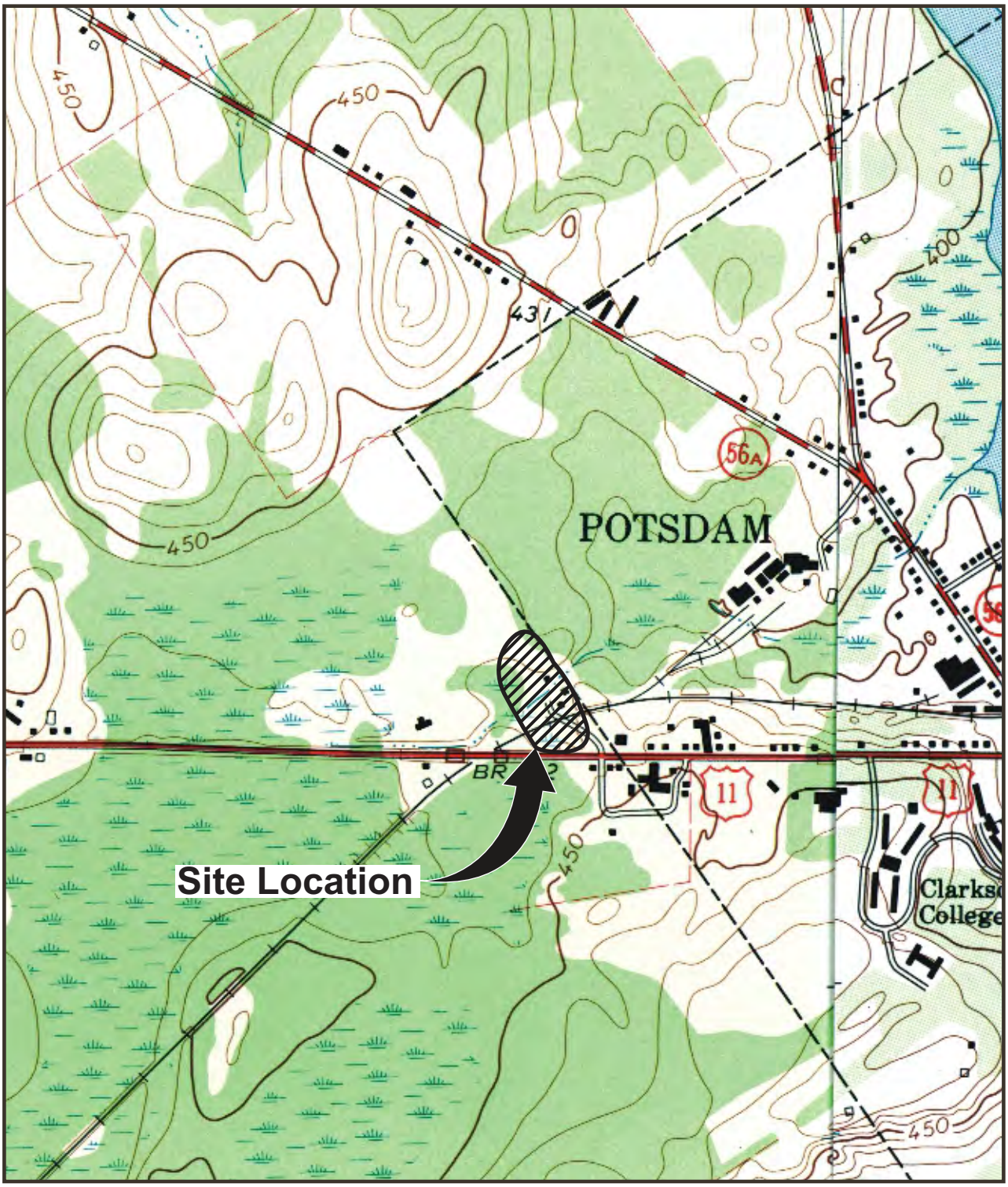
Figures



REFERENCE: BASE MAP SOURCE USGS 7.5 MINUTE QUAD. SERIES WEST POTSDAM AND POTSDAM, NEW YORK 1964.

1000' 0 1000'

Approximate Scale: 1" = 1000'

WASTE-STREAM, INC.
WASTE-STREAM, INC. SITE
POTSDAM, NEW YORK
REMEDIAL DESIGN/REMEDIAL ACTION WORK PLAN

SITE LOCATION MAP

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FIGURE
1

12/09/2013 SYRACUSE-141ENV-DJHOWES
G:\ENVCAD\SYRACUSE\ACTIC:B0031006\0003\000030\CDR\31006N01.CDR

PROPERTY BOUNDARY

SB-424 SB-423 SB-422 SB-420 SB-421 SB-418 SB-419 SB-417 SB-416 SB-415 SB-414 SB-413 SB-412 SB-411 SB-410 SB-409 SB-408 SB-407 SB-406 SB-405 SB-404 SB-403 SB-402 SB-401 SB-400 SB-425 SB-426 SB-427/PZ-02 SB-428 PZ-01 PZ-03

NORTHERN DRAINAGE AREA

SOUTHERN DRAINAGE AREA 3

SOUTHERN DRAINAGE AREA 2

SOUTHERN DRAINAGE AREA 1

Concrete Pad

Shear

Ramp (Conc. Pad)

Transfer Station (Conc. Pad)

Tin Press (Conc. Pad)

Vehicle Maintenance Building (Steel Frame Bldg)

Office

Shed

Northerly Railroad Right-of-Way

Southerly Railroad Right-of-Way

VILLAGE OF POTSDAM TOWN OF POTSDAM

WSI Main Office (Masonry Building)

JEFFORD'S STEEL & SPECIALTY CO. (STEEL FRAME BUILDING)

CONC. PAD

EXTERIOR CRANE (STEEL FRAME STRUCTURE)

DRAINAGE SWALE

CAP DETAIL
NOT TO SCALE

6" GRAVEL OR VEGETATED TOP SOIL

18" COMPACTED CLAY OR OTHER SUITABLE MATERIAL

NON-WOVEN GEOTEXTILE DEMARCATION LAYER

EXISTING SITE SOIL OR CONSOLIDATED MATERIAL

LEGEND:

- PCBs >50 PPM
- PCBs >1 AND <50 PPM OUTSIDE OF CAP LIMITS
- SVOCs/INORGANICS > 6 NYCRR PART 375 RESTRICTED USE SOIL CLEANUP OBJECTIVES FOR PROTECTION OF ECOLOGICAL RESOURCES OUTSIDE CAP LIMITS
- CAP LIMITS
- WETLAND DELINEATION
- APPROXIMATE CENTERLINE OF DRAINAGE SWALE
- PROPERTY BOUNDARY
- OVERHEAD UTILITIES
- VILLAGE CORPORATION LINE (PROPERTY BOUNDARY)
- EXISTING UTILITY POLE
- FORMER GROUNDWATER SUPPLY WELL
- SOIL SAMPLE LOCATION
- PROPOSED SOIL SAMPLE LOCATION
- PROPOSED PIEZOMETER LOCATION

NOTES:

1. BASE MAP DIGITIZED FROM UNTITLED GREYSTONE ENVIRONMENTAL, LLC DRAWING DATED FEBRUARY 10, 1997.
2. PROPOSED SAMPLING LOCATIONS ARE APPROXIMATE AND MAY BE MODIFIED BASED ON SITE CONDITIONS ENCOUNTERED.

0 80' 160'
GRAPHIC SCALE

WASTE STREAM, INC. SITE
POTSDAM, NEW YORK
REMEDIAL DESIGN / REMEDIAL ACTION WORK PLAN

PROPOSED UPLAND INVESTIGATION LOCATIONS

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FIGURE
2

NOTES:

1. BASE MAP DIGITIZED FROM UNTITLED GREYSTONE ENVIRONMENTAL, LLC DRAWING DATED FEBRUARY 10, 1997.
2. PROPOSED SAMPLING LOCATIONS ARE APPROXIMATE AND MAY BE MODIFIED BASED ON SITE CONDITIONS ENCOUNTERED.

0 80' 160'
GRAPHIC SCALE

WASTE STREAM, INC. SITE
POTSDAM, NEW YORK
REMEDIAL DESIGN / REMEDIAL ACTION WORK PLAN

PROPOSED SEDIMENT SAMPLING LOCATIONS

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FIGURE
3

Appendix A

Field Sampling Plan

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Infrastructure · Water · Environment · Buildings

Imagine the result

Field Sampling Plan

Waste-Stream, Inc. Site
Potsdam, New York
Site No. 6-45-022

January 2014; Revised April 2014

Field Sampling Plan

Waste-Stream, Inc. Site
Potsdam, New York
Site No. 6-45-022

Prepared for:
WSI Group

Prepared by:
ARCADIS of New York, Inc.
6723 Towpath Road
P O Box 66
Syracuse
New York 13214-0066
Tel 315 446 9120
Fax 315 449 0017

Our Ref.:
B0031006

Date:
January 2014; Revised April 2014

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1. Introduction

This *Field Sampling Plan* (FSP) has been prepared by ARCADIS on behalf of the Waste-Stream, Inc. (WSI) Group to support the performance of pre-design investigation (PDI) activities to be conducted at the WSI Site (the site) located in Potsdam, New York (Site No. 6-45-022). Details related to the proposed PDI activities are presented in the January 2014; Revised April 2014 *Remedial Design/Remedial Action Work Plan* (RD/RA Work Plan) (ARCADIS, 2014).

This FSP describes the field procedures and sample collection methods to be used during implementation of the PDI activities. The FSP should be used in conjunction with the RD/RA Work Plan, the *Quality Assurance Project Plan* (QAPP), and the *Health and Safety Plan* (HASP) that have been prepared for the site. The RD/RA Work Plan presents the site background and defines the scope of the PDI field activities. The QAPP presents the analytical methods and procedures to be used during PDI activities. The QAPP and HASP, as well as a Community Air Monitoring Plan (CAMP), are provided as appendices of the RD/RA Work Plan.

1.1 Project Objectives

The overall objective of the RD/RA Work Plan is to present the proposed activities associated with the preparation of the design for the selected site remedy. PDI activities will be conducted to address additional data needs necessary to support the remedial design.

1.2 Overview of PDI Activities

The proposed PDI activities to be conducted at the site generally include the following:

- Drilling soil borings and collecting soil samples
- Delineating and characterizing on-site and off-site wetlands
- Collecting sediment samples
- Collecting biota samples
- Collecting groundwater and surface water samples
- Conducting a video inspection of on-site underground drainage pipe
- Conducting topographic survey of the site

The sampling frequency and locations associated with the above-listed field activities are described in the RD/RD Work Plan, and therefore, are not described further in this FSP. A site location map and sampling locations are depicted on the figures included with the RD/RA Work Plan.

2. Field Sampling Procedures

As indicated in Section 1, PDI activities will be conducted to address additional data needs necessary to support the remedial design. As described in the following subsections, field sampling procedures generally include the following:

- Soil boring drilling
- Piezometer installation
- Hand driven/jack hammer sediment sampling
- Biota sampling
- Groundwater sampling
- Surface water sampling
- Site survey

Additionally, the following subsections also include details regarding:

- General equipment and data collection requirements
- Sampling labeling, packaging, and shipping
- Equipment decontamination
- Air monitoring

2.1 General Equipment and Data Collection Requirements

All underground utilities will be identified prior to any drilling or subsurface sampling. Public and privately owned utilities will be located by contacting responsible agencies by phone so that underground utilities can be marked at the site.

The following is a general list of equipment necessary for sample collection.

- stainless steel spoons and bowls for compositing soil samples
- appropriate sample containers provided by the laboratory (kept closed and in laboratory supplied coolers until the samples are collected)
- Reagent grade preservatives and pH paper (or pre-preserved sample containers) for aqueous samples
- chain-of-custody record forms
- log book, field sampling records, and indelible ink pens and markers
- laboratory grade soap (such as Alconox), reagent grade solvents, and distilled water to be used for decontaminating equipment between sampling stations
- buckets, plastic wash basins, and scrub brushes for decontaminating equipment

- digital camera
- stakes to identify sampling locations
- shipping labels and forms
- automatically retracting safety knife
- packing/shipping material for sample bottles, including insulated coolers with ice for preserving samples by chilling
- strapping tape
- clear plastic tape
- tape measure with accuracy of ± 0.01 foot
- duct tape
- aluminum foil
- re-closable plastic bags
- portable field instruments, including a photoionization detector (PID), water quality parameter meter, conductivity meter, and water-level indicator

Field log books will be maintained by the field team leader and other team members to provide a daily record of significant events, observations, and measurements during the field investigation.

Information pertinent to the field investigation and/or sampling activities will also be recorded in the log books. The books will be bound with consecutively numbered pages. Entries in the log book will include, at a minimum, the following information:

- name of author, date of entry, and physical/environmental conditions during field activity
- purpose of sampling activity
- location of sampling activity
- name of field crew members
- name of any site visitors
- sample media (soil, sediment, groundwater, etc.)
- sample collection method
- number and volume of sample(s) taken
- description of sampling point(s)
- volume of groundwater removed before sampling (where appropriate)
- preservatives used
- date and time of collection
- sample identification number(s)
- field observations

- any field measurements made, such as pH, temperature, conductivity, water-level, etc.

All original data recorded in field log books and Chain of Custody Records will be written with indelible ink. If an error is made on an accountable document assigned to one individual, that individual will make all corrections simply by crossing a single line through the error and entering the correct information. The erroneous information will not be erased. Any subsequent error discovered on an accountable document will be corrected by the person who made the entry. All subsequent corrections will be initialed and dated.

2.2 Soil Boring Drilling

In addition to equipment listed in Section 2.1, the following equipment list identifies materials that may be needed to drill hollow stem auger (HSA) or direct-push soil borings. Not all equipment listed below may be necessary for a specific activity. Additional equipment may be required, pending field conditions.

- Personal protective equipment (PPE), as required by the HASP
- drilling equipment required by the American Society for Testing and Materials (ASTM) D 1586
- plastic sheeting
- stainless steel spatulas or large putty knife
- dry-erase board with marker
- waterproof permanent markers

The following procedures will be used to collect soil samples:

- Don appropriate PPE.

- Maneuver the drill rig to the target sample location. Measure and record the sample location coordinates.

- Mark out target drilling locations with white paint.

- Place plastic sheeting near work area.

- Specify sample collection intervals and planned total depth of boring to drillers prior to initiation of drilling. Monitor drilling progress, including beginning and end depths of each sample run, auger flight, and rod run.

- Record boring log header information, including rig type, sampler, rod, auger, dimensions, driller name, and other equipment information.

- Record sampler details in the field logbook, including sampler type(s), sampler diameter(s) and length(s), and sampler material(s).

- Record drilling data as necessary to meet data objectives, including standard penetration test blow counts (HSA only), unusual drill rig behavior, and sampler type for each interval.

- Collect and log soil samples continuously. Remove soil from the auger/sampling core, carefully placing it on plastic sheeting. Record all details of sample collection and classify soil using United Soil Classification System nomenclature on a boring log.

- Collect a small volume (approximately 1 ounce) of soil representative of each sample run, or representative of soil segments based on differences in evidence of impacts, and place into re-closable bags. Perform PID headspace screening as follows:

    - Allow to equilibrate to ambient temperature for approximately 15 minutes.

    - Insert “sniffer” of PID into each zip-top bag and read PID until value spikes and then stabilizes.

    - Record the peak value displayed by the PID.

- Photo-document the entire length of each sample run to provide reference for post-processing questions regarding descriptions of color/staining, general texture, recovery, and other characteristics. Photos of the core will include a view of a dry-erase board marked with the core ID, depth interval shown in the photo, date, and time. The photo will also include a view of a tape measure, for scale.

- Log soil borings continuously.

- Collect soil samples for laboratory analysis as follows:

    - Homogenize samples in a decontaminated stainless steel bowl or disposable aluminum pan with a stainless steel mixing spoon until the soil is of uniform color.

    - Fill a pre-cleaned, laboratory-supplied sample jar with sample.

    - Fill out label and chain-of-custody form. Pack and store appropriately for transport to laboratory. Handle samples as described in Section 2.9.

- Place all disposable sampling materials (such as plastic sheeting, PPE, etc.) in appropriate containers.

2.3 Piezometer Installation

In addition to equipment listed in Section 2.1, the following equipment list identifies materials that may be needed to install temporary piezometers. Not all equipment listed below may be necessary for a specific activity. Additional equipment may be required, pending field conditions. The following materials will be available during sampling activities, as required:

- PPE, as required by the HASP
- plastic sheeting
- water-level or oil/water interface probe

The following procedures will be used to install piezometers:

- Don PPE

- Locate boring/well location, establish work zone, and set up sample equipment decontamination area.

- Advance soil boring to designated depth, collecting samples at specified intervals. Samples will be collected using dedicated, disposable, plastic liners. Record soil descriptions in the field notebook.

- Upon advancing the borehole to the desired depth, install the piezometer through the inner drill casing, if possible. The piezometer will be constructed of 1-inch ID

schedule 40 PVC riser equipped with a 0.010-inch slot PVC screen. An appropriate sized sand pack will be placed in the annulus surrounding the screen and extending approximately two feet above the top of the screen. A hydrated bentonite seal will be placed above the sand pack and will extend to the ground surface

- The well will be protected/sealed at the surface by placing an expandable locking J-plug into the top of the riser pipe which should extend approximately 2.5 feet above the ground surface. In order to maintain accurate water level readings the piezometer will be vented by drilling a small-diameter (1/8 inch) hole near the top of the riser pipe or through the locking J-plug.

- During well installation, record construction details and tabulate materials used (e.g., screen and riser footages; bags of bentonite and sand) in the field notebook.

2.4 Hand Driven/Jack Hammer Sediment Sampling

In addition to equipment listed in Section 2.1, the following equipment list identifies materials that may be needed to conduct hand driven/jack hammer sediment sampling. Not all equipment listed below may be necessary for a specific activity. Additional equipment may be required, pending field conditions. The following materials will be available during sampling activities, as required:

- PPE, as required by the HASP
- long-handled steel shovel
- slide hammer
- jack hammer
- generator
- appropriate sediment sampling equipment (e.g., stainless steel spatulas, scoop, knife)

The following procedures will be used to collect sediment samples:

- Don PPE

- Measure and record the sample location coordinates.

- Place plastic sheeting near work area.

- Collect sediment grab sample using slide hammer and sample tubing, jack hammer, stainless steel spatulas, scoop, and/or shovel as appropriate.

- Characterize each sediment sample for color, texture, and visual staining/odors. Place each sediment sample into the appropriate laboratory-supplied sample containers.

- Collect a small volume (approximately 1 ounce) of sediment representative of each sample run based on evidence of impacts, and place into re-closable bags. Perform PID headspace screening as follows:

    - Allow to equilibrate to ambient temperature for approximately 15 minutes.

    - Insert “sniffer” of PID into each zip-top bag and read PID until value spikes and then stabilizes.

    - Record the peak value displayed by the PID.

- Photo-document the entire sample run to provide reference for post-processing questions regarding descriptions of color/staining, general texture, recovery, and other characteristics. Photos of the sample will include a view of a dry-erase board marked with the sample ID, depth interval shown in the photo, date, and time. The photo will also include a view of a tape measure, for scale.

- Label, handle, pack, and ship samples using the chain-of-custody procedures in accordance with the Section 2.9.

- Place all disposable sampling materials (such as plastic sheeting, PPE, etc.) in appropriate containers.

2.5 Biota Sampling

In addition to equipment listed in Section 2.1, the following equipment list identifies materials that may be needed to conduct biota sampling. Not all equipment listed below may be necessary for a specific activity. Additional equipment may be required, pending field conditions. The following materials will be available during sampling activities, as required:

The following materials will be available during biota sampling activities, as required:

- electrofishing equipment
- trap, fyke, or gill nets
- chest waders
- landing nets
- live well
- fish measuring board
- suspended-weight or top-loading spring balance
- top-loading electronic balance
- mesh bags, trays, or other containers suitable for holding fish to be weighed
- fillet knife and cutting board
- forceps/scalpel/pliers

Staff assigned the responsibility of collecting fish from a specified site will be provided with the following site-specific information:

- water body name
- location
- site identification number
- species to be collected
- number of each species to be collected
- length or size requirements (age class) of each species to be collected (Note: different age classes of the same species should not be composited into single samples, but composited as separate samples, if ample quantities area collected)
- special instructions (if any)
- fish collection checklist
- fish collection procedure – NYSDEC Draft *Procedures for Collection and Preparation of Aquatic Biota for Contaminant Analysis* (NYSDEC, 2002) (included as Attachment A)
- sampling permit

Fish collection activities at the site will include the use of electrofishing, and possibly netting (e.g., trap, fyke, or gill nets). Only target species will be retained for chemical analysis. All target species outside of the preferred size range and non-target species will be released back into the water unharmed. Biota sampling will be conducted as follows:

- Collect fish using electrofishing and netting techniques in locations provided in the RD/RA Work Plan. Collect fish by applying current to the water by closure of the

dead-man's switch while the generator and control equipment are operative. Collect fish in dip nets when seen.

- Minimize, as possible, the natural variability within the target population. Measurements of environmental contaminants in biota typically exhibit a wide range due to natural variations in the samples. Therefore, specimens of comparable size and age will be collected whenever possible so as to minimize this variation.

- Hold samples live in well prior to initiation of field processing (filleting, stomach removal, removal of spines and otoliths). After sampling at given location is complete for the day, the live well will be drained and the fish will be sorted by species and transferred to a clean cooler for storage on ice until field processing to remove fillets, stomachs, and aging structures.

- For each fish sample retained for chemical analyses, the following information will be recorded in the field notebook:

  - date
  - time
  - waterbody name
  - sampling method
  - sampling location (including estimated area fished)
  - sample number
  - species
  - total length (mm)
  - weight (g)
  - gender (if discernible)
  - sample type (fillet/whole body, individual/composite)
  - sampling personnel (including oversight personnel)

- Record observations of physiological condition and any photographs taken in the field notebook. Prior to processing, each fish will be examined for gross external anomalies (i.e., diseases, lesions, tumors, parasites, lacerations, and other deformities) and photographed.

- Ship samples to a field processing laboratory where fish will be processed. Forage fish should be analyzed on a whole-body basis without the removal of any organs, scales, etc. Edible-size fish samples should be prepared for analysis in

accordance with NYSDEC Draft *Procedures for Collection and Preparation of Aquatic Biota for Contaminant Analysis* (NYSDEC, 2002) (Attachment A), except that rib bones will be removed from the fillets to avoid the potential for sample contamination from internal organs. Appropriate aging structures will be removed from each adult fish sample during the fillet process. All fish samples will be wrapped in aluminum foil and placed into properly labeled watertight polyethylene freezer bags. Samples will be held on wet ice in insulated coolers prior to and during shipment to the analytical laboratory. All fillet samples will arrive at the analytical laboratory within 48 hours of collection.

- Place all disposable sampling materials (such as plastic sheeting, PPE, etc.) in appropriate containers.

2.6 Groundwater Sampling

In addition to equipment listed in Section 2.1, the following equipment list identifies materials that may be needed to conduct groundwater sampling. Not all equipment listed below may be necessary for a specific activity. Additional equipment may be required, pending field conditions. The following materials will be available during sampling activities, as required:

The following materials shall be available, as required, during groundwater sampling:

- PPE, as required by the HASP
- monitoring well construction logs and historical water level information, if available
- plastic sheeting or other clean surface to prevent sample contact with the ground
- if bailers are to be used in sampling:
  - appropriate bottom-loading, bottom-emptying bailers (i.e., polyvinyl chloride [PVC], Teflon, or stainless steel)
  - polypropylene rope
- if submersible pumps are to be used in sampling:
  - dedicated tubing and other equipment necessary for purging
  - generator or battery for operation of pumps, if required
  - a pump
- graduated buckets to measure purge water
- water-level or oil/water interface probe
- conductivity/temperature/pH meter
- down-hole dissolved oxygen meter, oxidation reduction potential meter, and/or turbidity meter

- filter, as needed, in accordance with the analytical method and parameter
- appropriate blanks (trip blank supplied by the laboratory)
- groundwater sampling logs
- site map with well locations and groundwater contour maps
- keys to wells and contingent bolt cutters for rusted locks and replacement keyed-a-like locks
- drums or other containers for purge water

The following procedures will be used to collect groundwater samples:

- Don appropriate PPE.

- Record site and monitoring well identification on the groundwater sampling log, along with date, arrival time, and weather conditions. Also identify the personnel present, equipment utilized, and other relevant data requested on the log.

- Label all sample containers with indelible ink.

- Place plastic sheeting adjacent to the well for use as a clean work area, if conditions allow. Otherwise, prevent sampling equipment from contacting the ground or other surface that could compromise sample integrity.

- Remove lock from well and if rusted or broken, replace with a new brass keyed alike lock.

- Unlock and open the well cover while standing upwind of the well. Remove well cap and place on the plastic sheeting.

- Set the sampling device, meters, and other sampling equipment on the plastic sheeting. If a dedicated sampling device stored in the well is to be used, this may also be set temporarily on the plastic sheeting, for convenience. However, if a dedicated sampling device is stored below the water table, removing it may compromise water-level data, so water level measurements should be taken prior to removing the device.

- Obtain a water-level depth and bottom-of-well depth using an electric well probe and record on the groundwater sampling log using indelible ink. Clean the probe(s) after each use in accordance with Section 2.10.

- Calculate the number of gallons of water in the well using the length of water column (in feet). Record the well volume on the groundwater sampling log using indelible ink.

- Remove the required purge volume of water from the well (measure purge water volume in measuring buckets). The required purge volume will be three to five well volumes (the water column in the well screen and casing) unless the well runs dry, in which case, the water that comes into the well will be sampled. In any case, the pumping rate will be decreased during sampling to limit the potential for volatilization of organics potentially present in the groundwater.

- Field parameter measurements will be periodically collected. The typical time intervals of field parameter measurement are (1) after each well volume removed, and (2) before sampling. If the field parameters are being measured above-ground (rather than with a downhole probe), then the final pre-sampling parameter measurement should be collected at the reduced flow rate to be used during sampling. The physical appearance of the purged water should be noted on the groundwater sampling log. In addition, water level measurements should be collected and recorded to verify that the well purging is in accord with the guidelines set forth in the previous step.

- Unless otherwise specified by the applicable regulatory agencies, all purge water will be contained.

- After the appropriate purge volume of groundwater in the well has been removed, or if the well has been bailed dry and allowed to recover, obtain the groundwater sample needed for analysis with the dedicated bailer or from the dedicated sampling tubing, pour the groundwater directly from the sampling device into the appropriate container in the order of volatilization sensitivity of the parameters sampled, and tightly screw on the cap (snug, but not too tight). The suggested order for sample parameter collection, based on volatilization sensitivity, is presented below:

    - volatile organic compounds (VOCs)
    - semi-volatile organic compounds (SVOCs)
    - PCB
    - metals
    - wet chemistry

- When sampling for volatiles, water samples will be collected directly from the bailer or dedicated tubing into 40 milliliters (mL) vials with Teflon-lined septa.

- For other analytical samples, sample containers for each analyte type should be filled in the order specified above. If a bailer is used, then the sample for dissolved metals and/or filtered PCBs should either be placed directly from the bailer into a pressure filter apparatus or pumped directly from the bailer with a peristaltic pump, through an in-line filter, into the pre-preserved sample bottle. If dedicated sample tubing is used, then the filter should be installed in-line just prior to filtered sample collection.

- For sampling total and filtered metals and/or PCBs, a filtered and unfiltered sample will be collected. Sample filtration for the filtered sample will be performed in the field utilizing a pump prior to preservation. Attach (clamp) a new 1.0-, 0.45-, or 0.1-micron filter to the discharge tubing of the pump (note the filter flow direction). Turn the pump on and allow 100 mL (or manufacturer recommended amount) of fluid through the filter before sample collection. Dispense the filtered liquid directly into the laboratory sample bottles. If bailers are used for purging and sampling, a proper volume of purge water will be placed in a disposable or decontaminated polyethylene container and pumped through the filter and into the sample container using a peristaltic pump.

- Place the custody seal around the cap and the sampler container, if required. Note the time on the sample label. Secure with packing material and maintain at approximately 4°C on wet ice contained in double Ziploc-type freezer bags during storage in an insulated, durable transport container.

- Replace the well cap and lock well, or install a new lock if needed.

- Record the time sampling procedures were completed on the appropriate field logs (using indelible ink).

- Complete the procedures for chain-of-custody, handling, packing, and shipping as indicated in Section 2.9.

- Place all disposable sampling materials (such as plastic sheeting, disposable tubing or bailers, and health and safety equipment) in appropriate containers.

2.7 Surface Water Sampling

In addition to equipment listed in Section 2.1, the following equipment list identifies materials that may be needed to conduct surface water sampling. Not all equipment listed below may be necessary for a specific activity. Additional equipment may be required, pending field conditions. The following materials will be available during sampling activities, as required:

- PPE, as required by the HASP
- waders or boots as appropriate
- conductivity meter
- pH meter
- Water Sampling Log
- Pyrex cup
- thermometer

The following procedures will be used to collect surface water samples:

- Don appropriate PPE.
- Establish work area and place plastic sheeting near work area.
- Select appropriate sample bottles and place them ready for use.
- If samples cannot be obtained from the bank, enter from a downstream location.
- Submerge a laboratory prepared sample container into the water upstream of the sampler's position. With the bottle held at or below the mid-depth of the water column, uncap the sample container, collect the sample, and then re-seal the container. If preservative is required it will be added after sample collection is complete to avoid flushing by the surface water.
- Submerge a clean Pyrex cup into the water to collect a sample for measurement of conductivity, pH and temperature. Record information on Water Sampling Log.
- Complete the procedures for chain-of-custody, handling, packing, and shipping as indicated in Section 2.9.

2.8 Site Survey

In addition to equipment listed in Section 2.1, the following equipment list identifies materials that may be needed to conduct the site survey. Not all equipment listed below may be necessary for a specific activity. Additional equipment may be required, pending field conditions. The following materials will be available during sampling activities, as required:

- PPE, as required by the HASP
- global positioning system (GPS) equipment (Leica GS-15, 1200 Series or equivalent)
- map(s) with locations of known benchmark(s) in the appropriate coordinate system
- field laptop
- survey level
- survey rod
- wooden stakes or pin flags
- survey flagging
- PK nails
- hammer

All survey field activities will be documented by the survey team in a bound survey field book dedicated to the project. The field log book will document the chronology of all survey activities each day and will contain at a minimum:

- name and location of site
- sample location and identification; date and time of arrival/departure of staff or visitors
- names and roles of team members
- description of equipment preparation procedures (e.g., health and safety meetings, PPE level, field equipment/vehicles onsite)
- description of surveying procedures (e.g., equipment type/model/serial number, location coordinates, measurements taken)
- changes to the original scope (e.g., location changes)

All survey coordinates will be electronically stored on the GPS memory card (PC Card) and downloaded each day.

Setup of GPS Equipment

- Before starting the GPS survey, the GPS equipment will be set up according to the manufacturer's instructions outlined in the equipment user's manual.
- Prior to beginning any survey activities, verify that all power sources have been properly charged.
- The Real-Time Kinematic (RTK) GPS base station will be setup over a known survey control point in order to provide real time corrections to the RTK rover unit.
- The position format will be set to the state plane coordinate system and the distance and elevation units will be set to feet. The height, or HI, of the base station unit will be measured, entered into the GPS base station controller, and recorded in the survey field book for each RTK session.
- Daily quality control checks into reference survey control points will be performed at the beginning and end of the day (or setup) to ensure confidence that positioning (0.1') and elevation (0.2') accuracy was achieved for all points collected.

Survey Controls

- National Geodetic Survey (NGS) control points will be researched and identified within a maximum range of 3 to 4 miles from the project site.
- Known control points will be occupied with the GPS equipment and a (RTK) check will be performed to verify the integrity of those control points.
- If survey control points are not available in proximity to the project site the survey field technician will establish the appropriate survey control using Static GPS survey procedures. This procedure will require setting a new control point on site, setting the GPS base station over this point, and collecting sufficient GPS data to allow for a solution to be computed using NGS – Online Positioning User Service (OPUS). For elevation accuracy, every attempt will be made to establish site

elevation control points using NGS vertical benchmarks by completing a level run into established site control points

Location Data Collection

- All sample locations will be clearly marked in the field with a wooden stake with survey flagging or a pin flag. Location identifications will be clearly marked on the location stake/flag.

- All locations will be surveyed at the time of sample collection to account for any locations being moved due to subsurface obstructions or proximity of utilities.

- The RTK GPS rover unit will occupy each sample location for a minimum of 1 epoch of GPS data to accurately collect the position and elevation of the sample location. A minimum of 5 satellites must be tracked in order to obtain proper RTK lock. Satellite positioning will be maintained with a geometric dilution of precision (GDOP) of no more than 8.0.

- The GPS has quality control features that are built into the system. The system will not allow measurements to be taken if there are not enough satellites available to provide accurate readings, if the satellite geometry is not conducive to the survey, and if any signals are lost.

- The GPS system maintains quality control records during a survey that contain information about the quality of the GPS position. These records can be accessed at any time during or after a survey in order to assure that the necessary quality standards are achieved.

- Data of the sample locations will be logged into the GPS survey controller, downloaded each day, and forwarded along with field notes to the office for appropriate processing and secondary quality control checks.

2.9 Sample Labeling, Packaging, and Shipping

Each sample will be given a unique identification. With this type of identification, no two samples will have the same label. Samples will be promptly labeled upon collection with the following information:

- project number and site
- unique sample identification
- analysis required
- date and time sampled
- sample type (composite or grab)
- preservative, if applicable.

Clear tape will be secured over the sample label and the chain-of-custody will be initiated. Appropriate sample containers, preservation methods, and laboratory holding times for each sample type will be applied as identified in the QAPP. If samples are to be shipped by commercial carrier (e.g., Federal Express), sample bottles/jars will be packed in coolers containing the following:

- a drain plug (if present) that has been sealed with duct tape
- one to two inches of vermiculite or bubble wrap on the bottom of the cooler
- water ice packaged in re-sealable plastic bags
- sufficient vermiculite or bubble wrap to fill in the remaining area
- the completed chain-of-custody in a re-sealable plastic bag, taped in place on the inside cover of the cooler

The cooler will then be sealed with tape. Appropriate shipping labels, such as "this-end-up" and "fragile" stickers will be affixed to the cooler. Samples will be hand delivered or delivered by an express carrier within 48 hours of sample collection (or less depending on laboratory hold time requirements). The express carrier will not be required to sign the chain-of-custody form; however, the shipping receipt should be retained by the sampler, and forwarded to the project files.

2.10 Equipment Decontamination

2.10.1 Drill Rig Decontamination

A decontamination pad will be lined with plastic sheeting on a surface sloped to a sump. The sump must also be lined and of sufficient volume to contain approximately 20 gallons of decontamination water. All drilling equipment including rear-end of drilling rig, augers, bits, rods, tools, split spoon samplers, and tremie pipe will be cleaned on the decontamination pad with a high pressure hot water "steam cleaner" unit and scrubbed with a wire brush, as needed, to remove dirt, grease, and oil before beginning work in the project area. If heavy accumulations of oils are present on the downhole tools, a citrus-based cleaner (e.g., Citra-Solv®) may be used to aid in

equipment cleaning. Tools, drill rods, and augers will be placed on sawhorses, decontaminated pallets, or polyethylene plastic sheets following steam cleaning. Direct contact with the ground will be avoided. All down-hole drilling tools will be decontaminated between each drilling location according to the above procedures. Decontamination water will be contained in a dedicated plastic tank or 55-gallon open-top drums located on site. All open-top drums will remain closed when not in use.

Following decontamination of all heavy site equipment, the decontamination pad will be decommissioned. The decommissioning will be completed by:

- transferring the bulk of the remaining liquids and solids into the drums, tanks, or roll-offs to be provided by the drilling subcontractor for these materials.

- rolling the sheeting used in the decontamination pad onto itself to prevent discharge of the remaining materials to the ground surface. Once rolled up, the polyethylene sheeting will be placed in the roll-off or drums used for disposal of PPE and disposable equipment.

2.10.2 Sampling Equipment Decontamination

Prior to every entry into each borehole, all non-dedicated bowls, spoons, hand augers, bailers, and filtering equipment will be washed with potable water and a detergent (such as Alconox). Decontamination may take place at the sampling location as long as all liquids are contained in pails, buckets, etc. The sampling equipment will then be rinsed with potable water, followed by a 10 percent “pesticide-grade” methanol rinse, and finally a distilled water rinse. When sampling for inorganic constituents in an aqueous phase, an additional rinse step will be added prior to the rinse with methanol. The rinse step will entail a rinse with a 10 percent “ultra pure-grade” nitric acid followed by a distilled water rinse. Between rinses, equipment will be placed on polyethylene sheets or aluminum foil if necessary. At no time will washed equipment be placed directly on the ground. Equipment will be either be used immediately or wrapped in plastic or aluminum foil for storage or transportation from the designated decontamination area to the sampling location.

2.11 Air Monitoring

Air monitoring will be conducted with a PID and dust monitor during all land based intrusive activities. The PID will be used to monitor organic vapors in the breathing zone and borehole and to screen samples for analysis. The dust monitoring will be

used to monitor particulate concentration in the breathing zone for particulates less than 10 microns in diameter. In addition, air monitoring during the PDI activities will be consistent with the New York State Department of Health's (NYSDOH's) community air monitoring plan, as described in the HASP.

The PID and dust monitor readings will be recorded in the field book during land-based soil boring drilling activities. The instruments will be calibrated at least once each day and more frequently, if needed.

3. Field Instrumentation

All field-screening equipment will be calibrated immediately prior to each day's use and more frequently, if required. The calibration procedures will conform to the manufacturer's standard instructions. Records of all instrument calibration will be maintained by the field personnel. Copies of all of the instrument manuals will be maintained on site by the field personnel.

3.1 Portable Photoionization Detector

The PID will be a MiniRae (or equivalent), equipped with a 10.6 electron volt (eV) lamp. The MiniRae is capable of ionizing and detecting compounds with an ionization potential of less than 10.6 eV. This accounts for up to 73 percent of the VOCs on the Target Compound List.

3.2 Dust Monitor

The dust monitor will be an MIE DataRAM (or equivalent) and will be calibrated at the start of each day of use. Calibration and maintenance of the dust monitor will be conducted in accordance with the manufacturer’s specifications. The calibration data will be recorded in field notebooks.

3.3 pH Meter

The pH meter will be calibrated at the start of each day of use and after very high or low readings, as required by this FSP. National Institute of Standards and Technology traceable standard buffer solutions that bracket the expected pH range will be used. The standards will most likely be a pH of 7.0 and 10.0 standard units. The pH calibration and slope knobs will be used to set the meter to display the value of the standard being checked. The calibration data will be recorded in field notebooks.

3.4 Specific Conductivity Meter

Calibration checks using the appropriate conductivity standard for the meter will be performed at the start of each day of use and after very high or low readings, as required by this FSP. Readings must be within 5 percent to be acceptable. The thermometer of the meter will be calibrated against the field laboratory thermometer on a weekly basis.

3.5 Dissolved Oxygen Meter

The DO meter will be calibrated and the condition of the DO sensor will checked at the start of each day of use. Calibration and maintenance of the DO meter will be conducted in accordance with the manufacturer's specifications. The calibration data will be recorded in field notebooks.

3.6 Water-Level Meter

The water-level cable will be checked once to a standard to assess if the meter has been correctly calibrated by the manufacturer or vendor. If the markers are incorrect, the meter will be sent back to the manufacturer or vendor.

3.7 Turbidity Meter

The turbidity meter will be calibrated daily prior to use. Calibration and maintenance will be conducted in accordance with the manufacturer's specifications. Calibration and maintenance information will be recorded in the field notebook.

3.8 Oxidation-Reduction Potential Meter

The Oxidation-Reduction Potential Meter (ORP meter) will be calibrated at the start of each day of use. Calibration and maintenance of the ORP meter will be conducted in accordance with the manufacturer's specifications. The calibration data will be recorded in the field notebook.

4. References

ARCADIS, 2014. Remedial Design/Remedial Action Work Plan, Waste-Stream, Inc. Site, Potsdam, New York.

NYSDEC, 2002. Draft *Procedures for Collection and Preparation of Aquatic Biota for Contaminant Analysis*, October 2002.

ARCADIS

Appendix B

Health and Safety Plan

ARCADIS
Infrastructure · Water · Environment · Buildings

Site Specific Health and Safety Plan

Revision 11 11/30/2013

Project Name: Waste-Stream, Inc. Site
Potsdam, New York
Site No. 6-45-022

Project Number: B0031006
Client Name: WSI Group
Date: January 2014
Revision: 0

Approvals:

HASP Developer: David Rodriguez

HASP Reviewer: Robert Gang

Project Manager: Jason Brien, P.E.

Emergency Information

Site Address: 147 Outer Maple Street (U.S. Route 11)
Potsdam, New York 13676

Emergency Phone Numbers:

Emergency (fire, police, ambulance)		911
Emergency (facility specific, if applicable):		
Emergency Other (specify)		
Client Contact	J. Morgan, K. Flanders	315.428.3101 / 607.435.9996
WorkCare (non-lifethreatening injury/illness)		1-800-455-6155
Project H&S	Chuck Webster	315.672.9657
Task Manager	Jason Golubski	315.671.9437
Project Manager	Jason Brien	315.671.9114
Corporate H&S Specialist	Julie Santaniello	978.322.4515
Corporate H&S Director	Balcer Denis	614.985.9114

Hospital Name and Address: Canton-Potsdam Hospital
50 Leroy Street
Potsdam, NY 13676

Hospital Phone Number: 315.265.3300

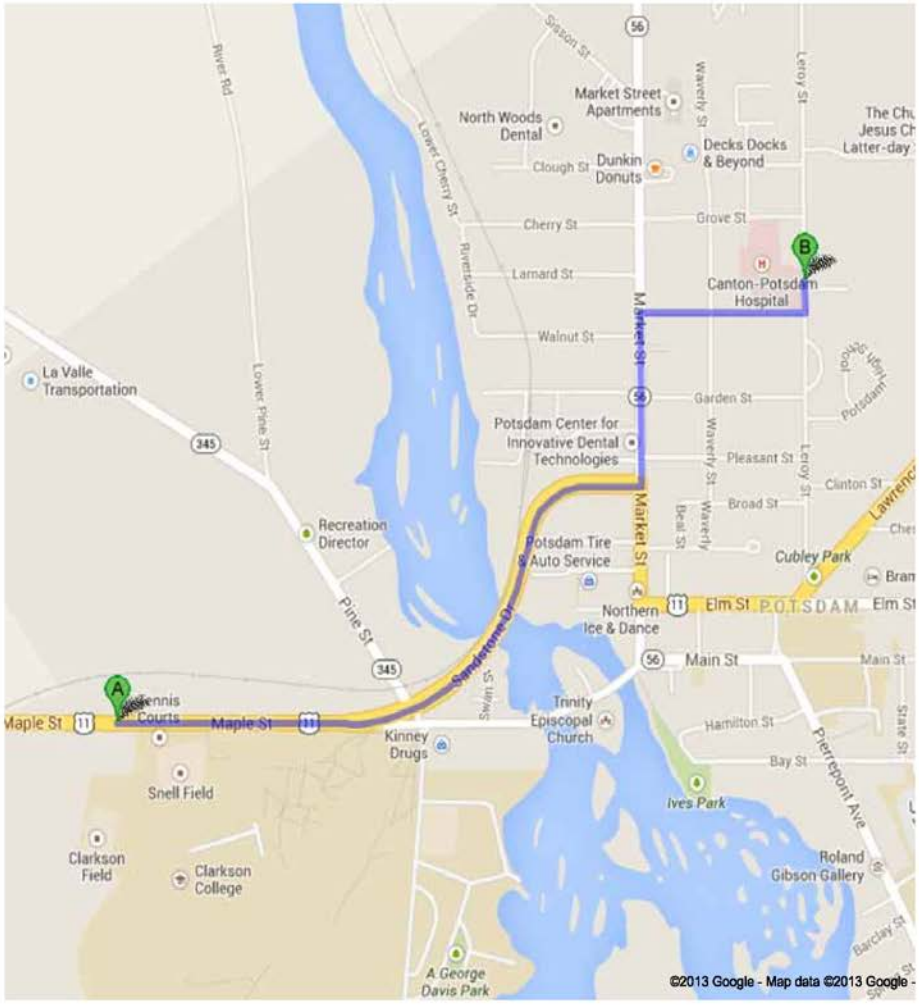
Incident Notification Process

1	Dial 911/Facility Emergency Number/WorkCare as applicable	
2	Contact PM/Supervisor	Jason Brien
3	Contact Corporate H&S	Balcer Denis
4	Contact Client	J. Morgan, K. Flanders

Route to the Hospital

Google

Directions to 50 Leroy St, Potsdam, NY 13676
1.6 mi – about **4 mins**



A 147 New York State Bicycle Route 11, Potsdam, NY 13676

1.	Head **east** on **Maple St** toward **Sandstone Dr**	go 0.4 mi total 0.4 mi
2.	Continue onto **Sandstone Dr** About 1 min	go 0.6 mi total 1.0 mi
3.	Turn left onto **Market St** About 46 secs	go 0.3 mi total 1.3 mi
4.	Turn right onto **Cottage St** About 56 secs	go 0.3 mi total 1.6 mi
5.	Turn left onto **Leroy St** Destination will be on the left	go 256 ft total 1.6 mi

B 50 Leroy St, Potsdam, NY 13676

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.

Directions weren't right? Please find your route on maps.google.com and click "Report a problem" at the bottom left.

General Information

Site Type (select all applicable where work will be conducted):

- [x] Active
- [ ] Bridge
- [x] Buildings
- [ ] Commercial
- [ ] Construction
- [ ] Government
- [ ] Inactive
- [x] Industrial
- [ ] Landfill
- [ ] Marine
- [ ] Mining
- [ ] Parking Lot/Private Roadway
- [x] Railroad
- [ ] Remote Area
- [ ] Residential
- [ ] Retail
- [ ] Roadway (public, inlcuing right-of-way)
- [x] Secure
- [ ] Unknown
- [x] Unsecured
- [x] Utility
- [x] Other (specify): Wetland

Surrounding Area and Topography (select one):

- [x] Surrounding area and topography are presented in the project work plan
- [ ] Surrounding area and topography (*briefly describe*):

Site Background (select one):

- [x] Site background is presented in the project work plan
- [ ] Site background (*briefly describe)* :

Project Tasks
The following tasks are identified for this project:

Examples: "Drilling/soil sampling", "Surveying", "General Inspections", "Construction Management/Inspections"

1 Soil/Upland Investigation - Drilling/soil sampling
2 Sediment/Wetland Investigation - Probing/sediment sampling
3 Water Treatability Sampling - groundwater sampling
4 Underground Drainage Pipe Inspection - video inspection
5 Site Survey

☐ Subcontractor H&S information is attached ☐ ARCADIS Standards apply to augment JSA

☑ Utility clearance required. *Utility Clearance Standard - ARC HSFS019*

☑ ARCADIS Field H&S Handbook sections apply *(list below)*

Comments:
II.H - Stop Work Authority; III.A - Daily Safety Meetings, III.B - DOT - Hazardous Materials Transportation/Dangerous goods, III.E - Heavy Equipment, III.L - Noise, III.R - Personal Protective Equipment; III.II Drums an Material Storage and Use, III.MM - Utility Location

Roles and Responsibilities

	Name	*Role*	*Additional Responsibilities (Describe)*
1	Jason Brien	PM	Overall management of project
2	Jason Golubski	TM	Coordinate all field work
3	TBD	Field Lead	
4	TBD	SSO	
5			
6			

Training

All ARCADIS employees are required to have the following training:	*Selected ARCADIS employees are required to have the following additional training:*	Names or Numbers from above
☑ 40 hr HAZWOPER w current refresh.	☐ Not applicable	
☐ 24 hr HAZWOPER	☑ First aid/CPR/BBP	TBD - all on-site personnel
☐ 10 hr Construction	☐ 30 hr Construction	
☐ HazMat #1 (Ground/Air/MOT)	☐ 10 hr Construction	
☐ HazMat #4 (MOT)	☑ HazMat #1 (Gr./Air/MOT)	TBD - all on-site personnel
☐ HazCom/Emergency Action Plan	☐ HazMat #4 (MOT)	
☑ H&S Orientation (classroom); or	☐ Confined space entrant	
☐ H&S Orientation (on-line)	☐ Confined space rescue	
☑ PPE	☐ Excavation CP	
☐ Respiratory protection	☐ Electrical (NFPA 70E)	
☐ MSHA	☐ Lockout/Tagout	
☑ Smith System (on-line)	☐ H&S Orientation (class)	
☐ OTS/eRailsafe	☐ OTS/eRailsafe	
☐ Client specific:	☐ Smith Sys. (hands on)	
	☐ Boating safety	
☐ Other:	☐ Other:	

Hazard Analysis

Risk Assessment Matrix		Likelihood Ratings** (likelihood that incident would occur)			
Consequences Ratings*		A	B	C	D
People	Property	0 Almost impossible	1 Possible but unlikely	2 Likely to happen	3 Almost certain to happen
1 - Slight or no health	Slight or no damage	0 - Low	1 - Low	2 - Low	3 - Low
2 - Minor health effect	Minor damage	0 - Low	2 - Low	4 - Medium	6 - Medium
3 - Major health effect	Local damage	0 - Low	3 - Low	6 - Medium	9 - High
4 - Fatalities	Major damage	0 - Low.	4 - Medium.	8 - High	12 - High

Division
Environment

Business Unit
REM

Task 1: Soil/Upland Investigation - Drilling/soil sampling

Hazardous Activity #1

Field-Ambient environment - exposure heat, cold, sun, weather, etc

Hazard Types (unmitigated ranking H-High, M-Medium, L-Low):

Biological	-	Chemical	-	Driving	M	Electrical	L
Environmental	L	Gravity	H	Mechanical	-	Motion	L
Personal Safety	M	Pressure	-	Radiation	-	Sound	-

Overall Unmitigated Risk: Medium Mitigated Risk: Medium if utilizing:
Primary Controls: TRACK PPE (see HASP "PPE" section) Field H&S Handbook

Secondary Controls: H&S Standards Engineering Controls Admin. Controls Specialized Equipment

Hazardous Activity #2

Field-Equipment - working on ground in the vicinity of heavy equipment

Hazard Types (unmitigated ranking H-High, M-Medium, L-Low):

Biological	-	Chemical	-	Driving	M	Electrical	-
Environmental	-	Gravity	H	Mechanical	H	Motion	H
Personal Safety	M	Pressure	-	Radiation	-	Sound	M

Overall Unmitigated Risk: Medium Mitigated Risk: Low if utilizing:
Primary Controls: TRACK JSAs Job Briefing/Site Awareness Site Awareness

Secondary Controls: HASP H&S Standards Field H&S Handbook Engineering Controls Admin. Controls Specialized Equipment Inspections

Hazardous Activity #3

Field-Drilling - Mechanical method (drill rig, DPT, etc)

Hazard Types (unmitigated ranking H-High, M-Medium, L-Low):

Biological	-	Chemical	L	Driving	-	Electrical	M
Environmental	-	Gravity	H	Mechanical	H	Motion	H
Personal Safety	-	Pressure	M	Radiation	-	Sound	H

Overall Unmitigated Risk: High Mitigated Risk: Medium if utilizing:
Primary Controls: TRACK Engineering Controls Admin. Controls PPE (see HASP "PPE" section) JSAs Inspections

Secondary Controls: Job Briefing/Site Awareness H&S Standards Cont/Emerg. Planning

Hazardous Activity #4

Field-Sampling - manual soil sampling (hand auger, trowel, etc)

Hazard Types (unmitigated ranking H-High, M-Medium, L-Low):

Biological	-	Chemical	M	Driving	-	Electrical	-
Environmental	L	Gravity	L	Mechanical	-	Motion	M
Personal Safety	-	Pressure	-	Radiation	-	Sound	-

Overall Unmitigated Risk: Medium Mitigated Risk: Low if utilizing:
Primary Controls: TRACK JSAs PPE (see HASP "PPE" section) Job Rotation Job Briefing/Site Awareness

Secondary Controls: Inspections Specialized Equipment

Risk Assessment Matrix		Likelihood Ratings** (likelihood that incident would occur)			
Consequences Ratings*		A	B	C	D
People	Property	0 Almost impossible	1 Possible but unlikely	2 Likely to happen	3 Almost certain to happen
1 - Slight or no health	Slight or no damage	0 - Low	1 - Low	2 - Low	3 - Low
2 - Minor health effect	Minor damage	0 - Low	2 - Low	4 - Medium	6 - Medium
3 - Major health effect	Local damage	0 - Low	3 - Low	6 - Medium	9 - High
4 - Fatalities	Major damage	0 - Low.	4 - Medium.	8 - High	12 - High

Task 2: Sediment/Wetland Investigation - Probing/sediment sampling

Hazardous Activity #1

Field-Ambient environment - exposure heat, cold, sun, weather, etc

Hazard Types (unmitigated ranking H-High, M-Medium, L-Low):

Biological	-	Chemical	-	Driving	M	Electrical	L
Environmental	L	Gravity	H	Mechanical	-	Motion	L
Personal Safety	M	Pressure	-	Radiation	-	Sound	-

Overall Unmitigated Risk: Medium Mitigated Risk: Medium if utilizing:

Primary Controls: TRACK PPE (see HASP "PPE" section) Field H&S Handbook

Secondary Controls: H&S Standards Engineering Controls Admin. Controls Specialized Equipment

Hazardous Activity #2

Field-Walking - uneven or slippery terrain

Hazard Types (unmitigated ranking H-High, M-Medium, L-Low):

Biological	-	Chemical	-	Driving	-	Electrical	-
Environmental	-	Gravity	M	Mechanical	-	Motion	-
Personal Safety	-	Pressure	-	Radiation	-	Sound	-

Overall Unmitigated Risk: Medium Mitigated Risk: Medium if utilizing:

Primary Controls: TRACK PPE (see HASP "PPE" section)

Secondary Controls: Housekeeping

Hazardous Activity #3

Field-Wetland delineation

Hazard Types (unmitigated ranking H-High, M-Medium, L-Low):

Biological	L	Chemical		Driving		Electrical	
Environmental	M	Gravity		Mechanical		Motion	
Personal Safety	L	Pressure		Radiation		Sound	

Overall Unmitigated Risk: Low Mitigated Risk: Low if utilizing:

Primary Controls: TRACK, JSA, Field H&S HandbookPPE (see HASP "PPE" section

Secondary Controls:

Hazardous Activity #4

Field-Biological - wildlife collection/sampling using electrofishing methods

Hazard Types (unmitigated ranking H-High, M-Medium, L-Low):

Biological	L	Chemical		Driving		Electrical	H
Environmental	M	Gravity		Mechanical		Motion	
Personal Safety	M	Pressure		Radiation		Sound	

Overall Unmitigated Risk: Medium Mitigated Risk: Medium if utilizing:

Primary Controls: TRACK, JSA, Field H&S HandbookPPE (see HASP "PPE" section

Secondary Controls:

Risk Assessment Matrix		Likelihood Ratings** (likelihood that incident would occur)			
Consequences Ratings*		A	B	C	D
People	Property	0 Almost impossible	1 Possible but unlikely	2 Likely to happen	3 Almost certain to happen
1 - Slight or no health	Slight or no damage	0 - Low	1 - Low	2 - Low	3 - Low
2 - Minor health effect	Minor damage	0 - Low	2 - Low	4 - Medium	6 - Medium
3 - Major health effect	Local damage	0 - Low	3 - Low	6 - Medium	9 - High
4 - Fatalities	Major damage	0 - Low.	4 - Medium.	8 - High	12 - High

Task 3: Water Treatability Sampling - groundwater sampling

Hazardous Activity #1

Field-Ambient environment - exposure heat, cold, sun, weather, etc

Hazard Types (unmitigated ranking H-High, M-Medium, L-Low):

Biological	-	Chemical	-	Driving	M	Electrical	L
Environmental	L	Gravity	H	Mechanical	-	Motion	L
Personal Safety	M	Pressure	-	Radiation	-	Sound	-

Overall Unmitigated Risk: Medium Mitigated Risk: Medium if utilizing:

Primary Controls: TRACK PPE (see HASP "PPE" section) Field H&S Handbook

Secondary Controls: H&S Standards Engineering Controls Admin. Controls Specialized Equipment

Hazardous Activity #2

Field-Walking - uneven or slippery terrain

Hazard Types (unmitigated ranking H-High, M-Medium, L-Low):

Biological	-	Chemical	-	Driving	-	Electrical	-
Environmental	-	Gravity	M	Mechanical	-	Motion	-
Personal Safety	-	Pressure	-	Radiation	-	Sound	-

Overall Unmitigated Risk: Medium Mitigated Risk: Medium if utilizing:

Primary Controls: TRACK PPE (see HASP "PPE" section)

Secondary Controls: Housekeeping

Hazardous Activity #3

Field-Sampling - monitoring well sampling with electric, pneumatic or other non-manual pump

Hazard Types (unmitigated ranking H-High, M-Medium, L-Low):

Biological	-	Chemical	L	Driving	-	Electrical	L
Environmental	-	Gravity	L	Mechanical	-	Motion	M
Personal Safety	-	Pressure	-	Radiation	-	Sound	-

Overall Unmitigated Risk: Low Mitigated Risk: Low if utilizing:

Primary Controls: TRACK JSAs Engineering Controls PPE (see HASP "PPE" section) Inspections

Secondary Controls: Job Briefing/Site Awareness

Hazardous Activity #4

Field-Surface water - working over or near water bodies

Hazard Types (unmitigated ranking H-High, M-Medium, L-Low):

Biological	-	Chemical	-	Driving	L	Electrical	-
Environmental	-	Gravity	M	Mechanical	-	Motion	-
Personal Safety	L	Pressure	-	Radiation	-	Sound	-

Overall Unmitigated Risk: Low Mitigated Risk: Low if utilizing:

Primary Controls: TRACK Engineering Controls PPE (see HASP "PPE" section) JSAs

Secondary Controls: Job Briefing/Site Awareness Cont/Emerg. Planning

Risk Assessment Matrix		Likelihood Ratings** (likelihood that incident would occur)			
Consequences Ratings*		A	B	C	D
People	Property	0 Almost impossible	1 Possible but unlikely	2 Likely to happen	3 Almost certain to happen
1 - Slight or no health	Slight or no damage	0 - Low	1 - Low	2 - Low	3 - Low
2 - Minor health effect	Minor damage	0 - Low	2 - Low	4 - Medium	6 - Medium
3 - Major health effect	Local damage	0 - Low	3 - Low	6 - Medium	9 - High
4 - Fatalities	Major damage	0 - Low.	4 - Medium.	8 - High	12 - High

Task 4: Underground Drainage Pipe Inspection - video inspection

Hazardous Activity #1

Field-Ambient environment - exposure heat, cold, sun, weather, etc

Hazard Types (unmitigated ranking H-High, M-Medium, L-Low):

Biological	-	Chemical	-	Driving	M	Electrical	L
Environmental	L	Gravity	H	Mechanical	-	Motion	L
Personal Safety	M	Pressure	-	Radiation	-	Sound	-

Overall Unmitigated Risk: Medium Mitigated Risk: Medium if utilizing:

Primary Controls: TRACK PPE (see HASP "PPE" section) Field H&S Handbook

Secondary Controls: H&S Standards Engineering Controls Admin. Controls Specialized Equipment

Hazardous Activity #2

Field-Walking - uneven or slippery terrain

Hazard Types (unmitigated ranking H-High, M-Medium, L-Low):

Biological	-	Chemical	-	Driving	-	Electrical	-
Environmental	-	Gravity	M	Mechanical	-	Motion	-
Personal Safety	-	Pressure	-	Radiation	-	Sound	-

Overall Unmitigated Risk: Medium Mitigated Risk: Medium if utilizing:

Primary Controls: TRACK PPE (see HASP "PPE" section)

Secondary Controls: Housekeeping

Hazardous Activity #3

Field-Inspections - sewer by external means (video camera, dye, noise)

Hazard Types (unmitigated ranking H-High, M-Medium, L-Low):

Biological	-	Chemical	L	Driving	-	Electrical	-
Environmental	-	Gravity	M	Mechanical	-	Motion	H
Personal Safety	-	Pressure	-	Radiation	-	Sound	-

Overall Unmitigated Risk: Medium Mitigated Risk: Low if utilizing:

Primary Controls: TRACK JSAs Engineering Controls Specialized Equipment Work Plan

Secondary Controls: Housekeeping Inspections

Hazardous Activity #4

Field-Traffic - working on or adjacent to roadways

Hazard Types (unmitigated ranking H-High, M-Medium, L-Low):

Biological	-	Chemical	-	Driving	M	Electrical	-
Environmental	-	Gravity	-	Mechanical	-	Motion	H
Personal Safety	-	Pressure	-	Radiation	-	Sound	-

Overall Unmitigated Risk: Medium. Mitigated Risk: Medium if utilizing:

Primary Controls: TRACK Traffic Control Plan (TCP) Engineering Controls PPE (see HASP "PPE" section) Engineering Judgement Employee Required

Secondary Controls: H&S Standards Job Briefing/Site Awareness Admin. Controls Specialized Equipment

Risk Assessment Matrix		Likelihood Ratings** (likelihood that incident would occur)			
Consequences Ratings*		A	B	C	D
People	Property	0 Almost impossible	1 Possible but unlikely	2 Likely to happen	3 Almost certain to happen
1 - Slight or no health	Slight or no damage	0 - Low	1 - Low	2 - Low	3 - Low
2 - Minor health effect	Minor damage	0 - Low	2 - Low	4 - Medium	6 - Medium
3 - Major health effect	Local damage	0 - Low	3 - Low	6 - Medium	9 - High
4 - Fatalities	Major damage	0 - Low.	4 - Medium.	8 - High	12 - High

Task 5: Site Survey

Hazardous Activity #1

Field-Ambient environment - exposure heat, cold, sun, weather, etc

Hazard Types (unmitigated ranking H-High, M-Medium, L-Low):

Biological	-	Chemical	-	Driving	M	Electrical	L
Environmental	L	Gravity	H	Mechanical	-	Motion	L
Personal Safety	M	Pressure	-	Radiation	-	Sound	-

Overall Unmitigated Risk: Medium Mitigated Risk: Medium if utilizing:

Primary Controls: TRACK PPE (see HASP "PPE" section) Field H&S Handbook

Secondary Controls: H&S Standards Engineering Controls Admin. Controls Specialized Equipment

Hazardous Activity #2

Field-Walking - uneven or slippery terrain

Hazard Types (unmitigated ranking H-High, M-Medium, L-Low):

Biological	-	Chemical	-	Driving	-	Electrical	-
Environmental	-	Gravity	M	Mechanical	-	Motion	-
Personal Safety	-	Pressure	-	Radiation	-	Sound	-

Overall Unmitigated Risk: Medium Mitigated Risk: Medium if utilizing:

Primary Controls: TRACK PPE (see HASP "PPE" section)

Secondary Controls: Housekeeping

Hazardous Activity #3

Field-Equipment - working on ground in the vicinity of heavy equipment

Hazard Types (unmitigated ranking H-High, M-Medium, L-Low):

Biological	-	Chemical	-	Driving	-	Electrical	-
Environmental	-	Gravity	H	Mechanical	H	Motion	H
Personal Safety	-	Pressure	-	Radiation	-	Sound	M

Overall Unmitigated Risk: High Mitigated Risk: Medium. if utilizing:

Primary Controls: TRACK JSAs Job Briefing/Site Awareness Site Awareness

Secondary Controls: HASP H&S Standards Field H&S Handbook Engineering Controls Admin. Controls Specialized Equipment Inspections

Hazardous Activity #4

None

Hazard Types (unmitigated ranking H-High, M-Medium, L-Low):

Biological		Chemical		Driving		Electrical	
Environmental		Gravity		Mechanical		Motion	
Personal Safety		Pressure		Radiation		Sound	

Overall Unmitigated Risk: Not Ranked Mitigated Risk: Not Ranked if utilizing:

Primary Controls:

Secondary Controls:

Hazard Communication (HazCom)/Global Harmonization System (GHS)

☐ HAZCOM/GHS for this project is managed by the client or general contractor

List the chemicals anticipated to be used by ***ARCADIS*** *on this project per HazCom/GHS requirements.*
(Modify quantities as needed)

	Acids/Bases	Qty
☐	Not applicable	
☐	Hydrochloric acid	<500 ml
☑	Nitric acid	<500 ml
☐	Sulfuric acid	<500 ml
☐	Sodium hydroxide	<500 ml
☐	Zinc acetate	<500 ml
☐	Ascorbic acid	<500 ml
☐	Acetic acid	<500 ml
☐	Other:	
	_____	
	_____	
	_____	

	Decontamination	Qty
☐	Not applicable	
☑	Alconox	≤ 5 lbs
☐	Liquinox	≤ 1 gal
☐	Acetone	≤ 1 gal
☑	Methanol	≤ 1 gal
☐	Hexane	≤ 1 gal
☐	Isopropyl alcohol	≤ 4 gal
☐	Nitric acid	≤ 1 L
☐	Other:	
	_____	
	_____	
	_____	

	Calibration	Qty.
☐	Not applicable	
☑	Isobutylene/air	1 cyl
☐	Methane/air	1 cyl
☐	Pentane/air	1 cyl
☐	Hydrogen/air	1 cyl
☐	Propane/air	1 cyl
☐	Hydrogen sulfide/air	1 cyl
☐	Carbon monoxide/air	1 cyl
☐	pH standards (4,7,10)	≤ 1 gal
☐	Conductivity standards	≤ 1 gal
☐	Other:	
	_____	

	Fuels	Qty.
☑	Not applicable	
☐	Gasoline	≤ 5 gal
☐	Diesel	≤ 5 gal
☐	Kerosene	≤ 5 gal
☐	Propane	1 cyl
☐	Other:	
	_____	

	Kits	Qty.
☑	Not applicable	
☐	Hach (specify):	_____ 1 kit
☐	DTECH (specify):	_____ 1 kit
☐	EPA 5035 Soil (specify kit):	_____ 1 kit
☐	Other:	
	_____	_____
	_____	_____

	Remediation	Qty.
☑	Not applicable	
☐	_____	
☐	_____	
☐	_____	
☐	_____	
☐	_____	

	Other:	Qty.
☐	Not applicable	
☑	Spray paint	≤ 6 cans
☐	WD-40	≤ 1 can
☐	Pipe cement	≤ 1 can
☐	Pipe primer	≤ 1 can
☐	Mineral spirits	≤ 1 gal

	Qty.
☐	_____
☐	_____
☐	_____
☐	_____
☐	_____
☐	_____

Material safety data sheets (MSDSs)/Safety Data Sheets (SDSs) must be available to field staff.
Indicate below how MSDS information will be provided:

☐ Not applicable
☑ Printed copy in company vehicle
☐ Printed copy in the project trailer/office
☑ Printed copy attached
☐ Electronic copy on field computer

☐ Contractor MSDSs/SDSs are not applicable
☐ Contractor MSDSs/SDSs are attached
☐ Contractor MSDSs/SDSs will be on site and located:
_____

☐ Bulk quantities of the following materials will be stored: _____

Contact the project H&S contact for information in determining code and regulatory requirements associated with bulk storage of materials.

Monitoring

☐ Chemical air monitoring is not required for this project.

For projects requiring air monitoring, list the relevant constituents representing a hazard to site workers.

Constituent	Max. Conc.	Units	TWA	Units	STEL	Units	IDLH	Units	LEL/UEL (%)	VD Air=1	VP (mm Hg)	IP (eV)
PCBs	500	mg/kg	0.5	m,s	NA	-	5	m,N	NA/NA	NA	0.001	NA
None	10	ppm	9999	-	0	-	0	-	0	0	0	0
None			9999	-	0	-	0	-	0	0	0	0
None			9999	-	0	-	0	-	0	0	0	0
None			9999	-	0	-	0	-	0	0	0	0
None	10	ppm	9999	-	0	-	0	-	0	0	0	0

Notes: TWAs are ACGIH 8 hr-TLVs unless noted.
p-ppm m-mg/m3 c2- ceiling (2 hr) se-sensitizer "#N/A" -Constituent is not in database, manually enter information
s- skin c-ceiling "9999" - NA O-OSHA PEL
r- resipirable i-inhalable N-NIOSH 10 hr REL

Monitoring Equipment and General Protocols

Air monitoring is required for any task or activity where employees have potential exposure to vapors or particulates above the TWA. Action levels below are appropriate for most situations. Contact the project H&S contact for all stop work situations. Select monitoring frequency and instruments to be used.

Monitoring Frequency:	15 Minute intervals
Indicator Tube/Chip Frequency:	Indicator tube/chip monitoring not required

	Instrument	Action Levels	Actions
☑	Photoionization Detector	< 4999.5	Continue work
		4999.5 - 9999.0	Sustained >5 min. continuous monitor, review eng. controls and PPE, proceed with caution
	Lamp (eV): 10.6	> 9999.0	Sustained >5 min. stop work, contact SSO
☐	Flame Ionization Detector (FID)	< 0.0	Continue work
		0.0 - 0.0	Sustained >5 min. continuous monitor, review eng. controls and PPE, use caution
		> 0.0	Sustained >5 min. stop work, contact SSO
☐	LEL/O2 Meter	0-5% LEL	Continue work
		>5-10% LEL	Continuous monitor, review eng. controls, proceed with caution
		>10% LEL	Stop work, evacuate, contact SSO
		19.5%-23.5% O2	Normal, continue work
		<19.5% O2	O2 deficient, stop work, evacuate, cont. SSO
		>23.5% O2	O2 enriched, stop work, evacuate, contact SSO
☐	Indicator: ☐tube ☐chip	≤PEL/TLV	Continue work
		>PEL/TLV	Stop work, review eng. controls and PPE,
	Compound(s):		contact SSO
☑	Particulate Monitor (mists, aerosols, dusts in mg/m^3)	< 2.500	Continue work
		2.5 - 5.00	Use engineering controls, monitor continuously
		> 5.00	Stop work, review controls, contact SSO
☐	Other:	Specify:	Specify:

One or more consituents above is listed with a skin notation. Avoid conditions where dusts, mists, or aerosols are created. Avoid skin contact with impacted media.

Personal Protective Equipment (PPE)

See JSA for the task being performed for PPE requirements. *If the work is not conducted under a JSA, refer to the governing document for PPE requirements. At a minimum, the following checked PPE is required for* *all tasks during field work* *not covered by a JSA on this project:*

Level D or Level D Modified:

☑	Hard hat	☐	Snake chaps/guards	☐	Coveralls:
☑	Safety glasses	☐	Briar chaps	☐	Apron:
☐	Safety goggles	☐	Chainsaw chaps	☑	Chem. resistant gloves: Nitrile
☐	Face shield	☐	Sturdy boot	☐	Gloves other:
☑	Hearing protection	☑	Steel toe boot	☐	Chemical boot:
☐	Rain suit	☐	Metatarsal boot	☐	Boot other:
☐	Other:			☑	Traffic vest: Class II or III
				☐	Life vest:

Specify Type:

Task specific PPE:

Comments:

Medical Surveillance (*check all that apply*)

- ☐ Medical Surveillance is not required for this project.
- ☑ HAZWOPER medical surveillance applies to all ARCADIS site workers on the project.
- ☐ HAZWOPER medical surveillance applies to all subcontractors on the project.
- ☐ HAZWOPER medical surveillance applies to all site workers on the project except:

- ☐ Other medical surveillance required (describe type and who is required to participate):

- ☐ Client drug and/or alcohol testing required.

Hazardous Materials Shipping and Transportation (*check all that apply*)

- ☐ Not applicable, no materials requiring a Shipping Determination will be transported or shipped
- ☐ A Shipping Determination has been reviewed and provided to field staff
- ☑ A Shipping Determination is attached
- ☐ All HazMat will be transported under Materials of Trade by ARCADIS
- ☐ Other (specify):

Roadway Work Zone Safety (*check all that apply*)

- ☑ Not applicable for this project
- ☐ All or portions of the work conducted under a TCP
- ☐ All or portions of the work conducted under a STAR Plan
- ☐ TCP or STAR Plan provided to field staff
- ☐ TCP or STAR Plan attached
- ☐ Other (specify):

WARNING - SELECTION CONFLICTS WITH YOUR HAZARD ANALYSIS CONTROL REQUIRING TCP!

ARCADIS Commercial Motor Vehicles (CMVs)

This section is applicable to ARCADIS operated vehicles only

- ☑ This project will **not** utilize CMV drivers
- ☐ This project will utilize CMV drivers

Site Control (*check all that apply*)

- ☐ Not applicable for this project.
- ☐ Site control protocols are addressed in JSA or other supporting document (attach)
- ☑ Maintain an exclusion zone of 50 ft. around the active work area
- ☐ Site control is integrated into the STAR Plan or TCP for the project
- ☐ Level C site control - refer to Level C Supplement attached
- ☐ Other (specify):

Decontamination (*check all that apply*)

- ☐ Not applicable for this project.
- ☑ Decontamination protocols are addressed in JSA or other governing document (attach)
- ☐ Level D work- wash hands and face prior to consuming food, drink or tobacco.
- ☐ Level D Modified work- remove coveralls and contain, wash hands and face prior to consuming food, drink or tobacco. Ensure footwear is clean of site contaminants
- ☐ Level C work - refer to the Level C supplement attached.
- ☐ Other (specify):

Sanitation *(check all that apply)*

- ☐ Mobile operation with access to off-site restrooms and potable water
- ☑ Restroom facilities on site provided by client or other contractor
- ☐ Project to provide portable toilets (1 per 20 workers)
- ☐ Potable water available on site
- ☐ Project to provide potable water (assume 1 gal./person/day)
- ☐ Project requires running water (hot and cold, or tepid) with soap and paper towels

Safety Briefings (*check all that apply*)

- ☑ Safety briefing required daily
- ☐ Safety briefing required twice a day
- ☐ Safety briefings required at the following frequency: _____
- ☐ Subcontractors to participate in ARCADIS safety briefings
- ☐ ARCADIS to participate in client/contractor safety briefings
- ☐ Other (specify):

Safety Equipment and Supplies

***Safety equipment/supply requirements are addressed in the JSA for the task being performed**. If work is not performed under a JSA, the following safety equipment is required to be present on site in good condition (Check all that apply):*

- ☑ First aid kit
- ☐ Bloodborne pathogens kit
- ☐ Fire extinguisher
- ☐ Eyewash (ANSI compliant)
- ☑ Eyewash (bottle)
- ☑ Drinking water
- ☐ Other: _____

- ☑ Insect repellent
- ☑ Sunscreen
- ☐ Air horn
- ☑ Traffic cones
- ☐ 2-way radios
- ☐ Heat stress monitor

_____

H&S Program (*check all that apply*)

- ☐ H&S metrics are provided on the account level, refer to account guidance
- ☑ TIP required at the following frequency on this project:
  Select One: _____ mhrs 3 time(s) _____ Define: _____
- ☐ H&S Field Assessment required at the following frequency on this project:
  Select One: _____ mhrs _____ time(s) _____ Define: _____
- ☐ Other (specify):

List tasks anticipated for TIP activity:

Drilling/Soil Sampling
Sediment Sampling
Groundwater/Surface water Sampling

Signatures

I have read, understand and agree to abide by the requirements presented in this health and safety plan. I understand that I have the absolute right to stop work if I recognize an unsafe condition affecting my work until corrected.

Printed Name	Signature	Date

Add additional sheets if necessary

- ☑ Subcontractor Acknowledgement Form attached

You have an absolute right to STOP WORK if unsafe conditions exist!

ARCADIS

Attachments

ARCADIS

Job Safety Analyses

Job Safety Analysis

General

JSA ID	10572	**Status**	(2) Review
Job Name	Environmental-Electrofishing - Backpack mounted	**Created Date**	1/29/2014
Task Description	Electrofishing, Backpack Mounted	**Completed Date**	
Template	False	**Auto Closed**	False

Client / Project

Client	WSI GROUP
Project Number	B00310060004
Project Name	WSI Potsdam Scrap Yard
PIC	
Project Manager	BRIEN, JASON

User Roles

Role	Employee	Due Date	Completed Date	Supervisor	Active
Developer	Rodriguez Alcocer, David	2/13/2014	1/30/2014	Brien, Jason	☑
HASP Reviewer	Gang, Bob	2/13/2014		Cullen, Lucas	☑

Job Steps

Job Step No.	Job Step Description		Potential Hazard	Critical Action	H&S Reference
1	Pre-field inspection and assembly	1	Non/malfunctioning equipment may cause injury to user	Review manufacturer's instruction manual prior to operating for proper use. Review manufacturer safety warnings and precautions. Any damaged, worn, or improper tool must be immediately removed from service until it is repaired or replaced.	
2	Carrying electroshocker to body of water	1	Weight (including battery weight) and bulkiness of electroshocker may cause awkward body positions leading to muscle strain	Use proper lifting techniques, bending legs, and position device close to the body.	
		2	Entanglement of electroshocker components in vegetation may cause slip, trips and falls.	Keep all wiring secure. Plan route and do not hurry through task, maintain awareness of tree limbs and other vegetation that might catch the electroshocking device.	
3	Access, egress, and working in water.	1	Wet surfaces causing slip fall hazards on bank of water body.	Select area with easy access. Take short, concentrated steps near slippery surfaces. Take small shuffling steps, feeling ahead with your feet.	
		2	Drowning hazard when near or in water	Chest waders and dry suits made from non-conductive material provide a useful means of staying dry but they must not be used without protecting against their potential hazards with respect to drowning. If the average depth of water is too deep for operators to wade at less than thigh depth for the majority of the fishing exercise, then fishing should be carried out from a boat.	
		3	Drowning hazard when near or in water (continued)	Water deeper than hip height must never be waded due to the risk of partial buoyancy causing a loss of footing. All employees wearing hip waders must be trained on what to do should the waders begin to fill with water. All employees entering the water or within 5 feet will wear personal floatation devices	
4	Using the Electroshocker	1	Shock hazards to operator, co-workers (the unit operates off of a 24-volt, rechargeable battery)	The Buddy System must be used whenever using the electroshocker. One person must remain out of the water as a watch at all times (this person to have current training in first aid CPR and must know how to swim and have basic knowledge of lifesaving techniques). Do not touch the electrodes together even when wearing rubber gloves as this may cause a painful shock.	

4	Using the Electroshocker	2	(continued) Shock hazards to operator, co-workers (the unit operates off of a 24-volt, rechargeable battery)	Do not use the electroshocker during electrical storms or rain storms. Use 30/30 rule for lightning (within 30 seconds lightning to hearing thunder stop work, resume after not seeing any lightning for 30 minutes). Clothing should not have buttons or buckles that could snag on cables and landing nets or have metallic zips that could conduct electricity.	
		3	(continued) Shock hazards to operator, co-workers (the unit operates off of a 24-volt, rechargeable battery)	Rubber gloves and electrically insulated waders with slip resistant footing is required to be worn to prevent electrocution and slips/falls. Equipment such as buckets, landing net handles and fish containers, must be made of non-conducting material as far as is reasonably practicable.	
		4	Shock hazards to the public	No other people or animals should be in the water upstream or downstream of the sample site with the exception of the bucket tender who should have the same safety gear on as the electroshocker operator.	

PPE — Personal Protective Equipment

Type	Personal Protective Equipment	Description	Required
Eye Protection	safety goggles		Required
Foot Protection	boots	insulated	Required
	steel-toe boots	to get to site	Required
Hand Protection	insulated gloves	electrical insulated	Required
Head Protection	hard hat		Required
Miscellaneous PPE	other	non conductive waders	Required
	personal flotation device		Required
	traffic vest--Class II or III		Required

Supplies

Type	Supply	Description	Required
Miscellaneous	first aid kit	with universal precautions kit	Required
Personal	insect repellant		Recommended
	sunscreen		Recommended

Job Safety Analysis

General

JSA ID	10578	**Status**	(3) Completed
Job Name	Environmental-Groundwater Sampling and free product recovery	**Created Date**	1/29/2014
Task Description	Groundwater Sampling	**Completed Date**	01/30/2014
Template	False	**Auto Closed**	False

Client / Project

Client	WSI GROUP
Project Number	B00310060004
Project Name	WSI Potsdam Scrap Yard
PIC	
Project Manager	BRIEN, JASON

User Roles

Role	Employee	Due Date	Completed Date	Supervisor	Active
Developer	Rodriguez Alcocer, David	2/13/2014	1/30/2014	Brien, Jason	☑
HASP Reviewer	Gang, Bob	2/13/2014	1/30/2014	Cullen, Lucas	☑

Job Steps

Job Step No.	Job Step Description		Potential Hazard	Critical Action	H&S Reference
1	Working outdoors.	1	Heat/cold stress, sunburn, severe weather, lighting, biological hazards.	Avoid/stop work in extreme weather conditions or if extreme weather is imminent; seek shelter as needed; take breaks and consume fluids as needed; use sunscreen and or bug spray and wear appropriate clothing to cover body for protection.	
2	Stage at pre-determined sampling location and set up work zone and sampling equipment	1	Personnel could be hit by vehicular traffic	Set up cones and establish work area. Position vehicle so that field crew is protected from site traffic. Unload as close to work area as safely possible.	
		2	Sampling equipment, tools and monitoring well covers can cause tripping hazard	Keep equipment picked up and use TRACK to assess changes.	
3	Open wells to equilibrate and gauge wells	1	When squatting, personnel can be difficult to see by vehicular traffic.	Wear class II traffic vest if wells are located proximal to vehicular traffic. Use tall cones and the buddy system if practicable.	
		2	Pinchpoints on well vault can pinch or lacerate fingers	Use a wrench to open well vault/cap. Wear leather gloves when removing well vault lids, and chemical protective gloves while gauging. Wear proper PPE including safety boots, knee pads and safety glasses.	
		3	Lifting sampling equipment can cause muscle strain	Unload as close to work area as safely possible; use proper lifting and reaching techniques and body positioning; don't carry more than you can handle, and get help moving heavy or awkward objects.	
		4	Pressure can build up inside well causing cap to release under pressure	Keep head away from well cap when removing. If pressure relief valves are on well use prior to opening well	
4	Begin Purging Well and Collecting Parameter Measurements	1	Electrical shock can occur when connecting/disconnecting pump from the battery.	Make sure equipment is turned off when connecting/disconnecting. Wear leather gloves. Use GFCIs when using powered tools and pumps. Do not use in the rain or run electrical cords through wet areas.	
		2	Purge water can spill or leak from equipment	Stop purging activities immediately, stop leakage and block any drainage grate with absorbent pads. Call PM to notify them of any reportable spill.	
		3	Water spilling on the ground can cause muddy/slippery conditions	Be careful walking in work area when using plastic around well to protect from spillage	

4	Begin Purging Well and Collecting Parameter Measurements	4	Hand lacerations can occur when cutting materials such as plastic tubing	When cutting tubing, use tubing cutter. No open fixed blades should ever be used. When possible wear work gloves, leather type.	
		5	Purge water can splash into eyes	Pour water slowly into buckets/drums to minimize splashing. Wear safety glasses.	
5	Collect groundwater sample	1	Working with bailer rope can cause rope burns on hands.	Slowly raise and lower the rope or string for the bailer. Wear leather work and nitrile gloves for the task.	
		2	Sample containers could break or leak preservative	Discard any broken sampleware or glass properly. Do not overtighten sample containers. Wear chemical protective and cut II resistant gloves.	
6	Staging of Well Purge water	1	Muscle strains can occur when moving purge water or drums	If using buckets, do not fill buckets up to the top. Always keep lid on buckets when traveling or moving them to another location. Only half fill buckets so when dumping the buckets weigh less. See drum handling JSA for movement of drums.	Drum handling JSA
7	Clean site/demobilize	1	Vehicle traffic. Lifting hazards and back strain.	Use buddy system, as necessary, when removing traffic control. Leave site clean of refuse and debris. Use proper lifting techniques.	
8	Package and ship samples to laboratory for analysis	1	Bottle breakage. Injury from broken/leaking sample bottle (cuts and/or acid burn)/ Dermal exposure to chemical hazards. Back strain when lifting samples. Leaking coolers.	Handle and package bottle(s) carefully (bubble wrap bags, if available). Use proper lifting techniques. Double-bag ice. Wrap potential leak points on coolers with duct/packaging tape. Follow AUS Sample Shipping SOP. Use nitrile and cut II resistant gloves.	

PPE — Personal Protective Equipment

Type	Personal Protective Equipment	Description	Required
Dermal Protection	long sleeve shirt/pants		Required
Eye Protection	safety glasses		Required
Foot Protection	steel-toe boots		Required
Hand Protection	chemical resistant gloves (specify type)	Nitrile	Required
	work gloves (specify type)	leather or Cut II resistant gloves	Required
Head Protection	hard hat		Required
Hearing Protection	ear plugs		Recommended
Miscellaneous PPE	other	Knee pads	Required

Supplies

Type	Supply	Description	Required
Communication Devices	mobile phone		Required
Decontamination	Decon supplies (specify type)	alconox, DI water, spray bottle	Required
Miscellaneous	first aid kit		Required
	flashlight		Required
Personal	eye wash (specify type)	bottle	Required
	insect repellant		Recommended
	sunscreen		Recommended
Traffic Control	barricades		Recommended
	traffic cones		Required

Review Comments

Reviewer		Comments
Employee: **Role** **Review Type** **Completed Date**	Gang, Bob HASP Reviewer Revise 1/30/2014	3.2 - define correct tools Someone think a screw drive will work Section 4.2 laceration to what? Section 5.1 define glove type Section 5.2 chemical gloves will not protect against broken glass, add Cut II Resistant gloves Section 8.1 - add Cut II resistant gloves
Employee: **Role** **Review Type** **Completed Date**	Gang, Bob HASP Reviewer Approve 1/30/2014	nice job!!

Job Safety Analysis

General

JSA ID	10585	**Status**	(3) Completed
Job Name	Environmental-Sediment sampling	**Created Date**	1/29/2014
Task Description	Hand Driven/Jack Hammer Sediment Sampling	**Completed Date**	01/30/2014
Template	False	**Auto Closed**	False

Client / Project

Client	WSI GROUP
Project Number	B00310060004
Project Name	WSI Potsdam Scrap Yard
PIC	
Project Manager	BRIEN, JASON

User Roles

Role	Employee	Due Date	Completed Date	Supervisor	Active
Developer	Rodriguez Alcocer, David	2/13/2014	1/30/2014	Brien, Jason	☑
HASP Reviewer	Gang, Bob	2/13/2014	1/30/2014	Cullen, Lucas	☑

Job Steps

Job Step No.	Job Step Description		Potential Hazard	Critical Action	H&S Reference
1	Placement of boat for sediment sampling	1	Slip/trip/falls can occur when accessing or egressing boat	Wear anti-slip footwear with ankle support. Plan route onto and off of boat, do not hurry through task.	Field H&S Handbook V(G)
		2	Clutter and equipment on boat can cause tripping hazard including location and placement of equipment cables, ropes, or chains.	Maintain good housekeeping and aisle space. Secure objects to prevent shifting or movement that could impair walkway. Keep materials clear of designated walkways, cover if practical.	
		3	Boat can be damaged from encountering objects and other protuberances in water during boat operation.	Use qualified boat operator, and use spotters if navigating in areas with shallow depths, felled trees in water or rock hazards, use depth finders as appropriate.	
		4	Muscle strains from moving jack hammer or other equipment onto or off of boat.	Use proper techniques by keeping back straight, use buddy system for large or bulky items, avoid awkward twisting or stooping.	
2	Setup/demobilize of probing sampling device	1	Pinch/crush hazards while erecting tripod, placing spuds (if equipped).	Wear protective gloves that maintain dexterity. Identify and keep hands clear, do not hurry through task or take shortcuts,	
		2	Wet surfaces on boat can cause slipping	Wear anti-slip footwear with ankle support. Do not hurry through task. Ensure adequate illumination if working in non-daylight hours	
		3	Muscle strain from lifting barrel, tripod or moving other equipment.	Use buddy system to lift bulky objects or objects weighing more than what you are capable of lifting alone. Team lift items greater than 50 lbs.	
		4	Hand injuries can be caused from rough edges on equipment, metal sheeting or during the cutting of rope	Wear leather work or cut resistant gloves that maintain dexterity. Identify and keep hands clear, do not hurry through task or take shortcuts, take the time to correct/protect protruding or sharp edges	
3	Collection of Sediment samples	1	Wet surfaces can cause slipping	Wear anti-slip footwear with ankle support. Do not hurry through task. Ensure adequate illumination if working in non-daylight hours	
		2	Hand injury including cuts and lacerations can occur when extracting samples	Wear leather work or cut resistant gloves, do not reach into nose of devices with cutting edges or teeth, do not hurry or takes shortcuts during extraction. If cutting liners, use a self retractable utility knife for the job.	
		3	Muscle strain can occur when lifting barrel, or large volume of sample	See above. Break sample volume down into manageable portions if large volume of sediment is collected.	

3	Collection of Sediment samples	4	Chemical exposure can occur from contact with potentially impacted media	Wear protective clothing prescribed by HASP. Avoid conditions that create splashing.	
4	Sediment sample management and logging	1	Awkward bending for prolong periods can cause muscle strain.	Take the time to setup preparation/logging area where neutral body positions can be maintained (work at waist height when possible) keep sample coolers and equipment out of areas that promote work to be performed in awkward positions.	
		2	Hands and knees can become sore or stiff when kneeling and working with equipment for extended periods of time.	See neutral positions above, if kneeling required use knee pads or padding, do not rest body weight on hands for extended periods.	
		3	Tripping hazards from equipment and IDW.	Maintain good housekeeping , keep used mixing bowls and similar devices organized and out of walkways. Keep garbage controlled and secure. Ensure sample coolers are out of designated walkways	
5	Sediment sampling from shoreline or wading	1	Slips/Trips/ Falls from walking on wet surfaces near shoreline.	Wear anti-slip footwear with ankle support. Wear boots with good tread and avoid heavily muddied areas.Plan route into and out of water, do not hurry through task or stand on wet surfaces.	
		2	Muscle strains from carrying equipment to sampling locations.	Make multiple trips if necessary. Do not overfill backpacks.	
		3	Water entering boots can increase the chance for blisters and other skin issues with feet/ankles.	Wear rubber outer boots when appropriate. Waders should be worn when wading into deeper water.	
		4	Falling into water can cause injury/drowning.	Wear a Coast Guard Approved personal flotation device within 10ft of water. TRACK water conditions every day as rain/snow thaw can cause water conditions to worsen. Person walking through water should minimize what they are carrying so they can maintain balance.	

PPE — Personal Protective Equipment

Type	Personal Protective Equipment	Description	Required
Dermal Protection	long sleeve shirt/pants		Required
Eye Protection	safety glasses		Required
Foot Protection	boots		Required
Hand Protection	chemical resistant gloves (specify type)	nitrile	Required
	work gloves (specify type)	leather or cut resistant	Required
Head Protection	hard hat		Required
Miscellaneous PPE	personal flotation device	Coast Guard Approved	Required

Supplies

Type	Supply	Description	Required
Communication Devices	mobile phone		Required
Decontamination	Decon supplies (specify type)		Required
Miscellaneous	first aid kit		Required
	flashlight		Required
Personal	eye wash (specify type)		Required

Review Comments

Reviewer		Comments
Employee: **Role** **Review Type** **Completed Date**	Gang, Bob HASP Reviewer Revise 1/30/2014	Section 2.3 and 3.2 define proper gloves Section 3.2 define proper tool for cutting liners 5.4 add "Coast Guard Approved" to PDF
Employee: **Role** **Review Type** **Completed Date**	Gang, Bob HASP Reviewer Approve 1/30/2014	

Job Safety Analysis

General

JSA ID	10580	**Status**	(3) Completed
Job Name	Environmental-Drilling, soil sampling, well installation	**Created Date**	1/29/2014
Task Description	Soil Boring/Soil Sampling	**Completed Date**	01/31/2014
Template	False	**Auto Closed**	False

Client / Project

Client	WSI GROUP
Project Number	B00310060004
Project Name	WSI Potsdam Scrap Yard
PIC	
Project Manager	BRIEN, JASON

User Roles

Role	Employee	Due Date	Completed Date	Supervisor	Active
Developer	Rodriguez Alcocer, David	2/13/2014	1/30/2014	Brien, Jason	☑
HASP Reviewer	Gang, Bob	2/13/2014	1/31/2014	Cullen, Lucas	☑

Job Steps

Job Step No.	Job Step Description		Potential Hazard	Critical Action	H&S Reference
1	Set up necessary traffic and public access controls	1	Struck by vehicle due to improper traffic controls	Use a buddy system for placing site control cones and/or signage. Position vehicle so that you are protected from moving traffic. Wear Class II traffic vest if in traffic area.	
2	Utility Clearance	1	Potential to encounter underground or above ground utilities while drilling.	Complete utility clearance in accordance with the ARCADIS Utility Clearance H&S Standard.	ARCADIS H&S Standard ARCHSFS019
3	General drill rig operation	1	Excessive noise is generated by rig operation.	When the engine is used at high RPMs or soil samples are being collected, use hearing protection.	Utility Clearance H&S Standard
		2	During drill rig operation, surfaces will become hot and cause burns if touched, and COCs in the soils more readily vaporize generating airborne contaminates.	Due to friction and lack of a drilling fluid, heat will be produced during this method. Mainly drill augers. Be careful handling split spoons. Wear leather or heat insulated gloves. When soils and parts become heated, the COC could volatilize. Air monitoring should always be performed in accordance with the HASP.	
		3	Moving parts of the drilling rig can pull you in causing injury. Pinch points on the rig and auger connections can cause pinching or crushing of body parts.	Stay at least 5 feet away from moving parts of the drill rig. Know where the kill switch is, and have the drillers test it to verify that it is working. Do not wear loose clothing, and tie long hair back. Avoid wearing jewelry while drilling. Cone off the work area to keep general public away from the drilling rig.	
		4	Dust and debris can cause eye injury and soil cuttings and/or water could contain COCs.	Wear safety glasses and stay as far away from actual drilling operation as practicable. Wear nitrile gloves to protect from COCs.	
		5	Drilling equipment laying on the ground (i.e. augers, split spoons, decon equipment, coolers, etc), create a tripping hazard. Water from decon buckets generate mud and cause a slipping hazard.	Keep equipment and trash picked up, and store away from the primary work area.	
		6	The raised derrick can strike overhead utilities, tree limbs or other elevated items	Never move the rig with the derrick up. Ensure there is proper clearance to raise the derrick, and that you are far enough away from overhead power lines.	
4	Hollow stem auger drilling	1	All hazards in step 3 apply. Additionally,The raised derrick can strike overhead utilities, tree limbs or other elevated items	Never move the rig with the derrick up. Ensure there is proper clearance to raise the derrick, and that you are far enough away from overhead power lines.	Utility Location H&S Policy and Procedure

4	Hollow stem auger drilling	2	Hands or fingers can get caught and crushed if trying to clean by hand or with tools while the auger is still turning.	Auger should always be stopped and clutch disengaged prior to cleaning.	
5	Direct push drilling	1	The drill rods will be handled by workers most of the time rather than the rig doing it, therefore pinch points can cause lacerations and crushing of fingers/body parts.	Keep a minimum of 5 feet away from drill rig operation and moving parts.	
		2	The direct push rigs are usually meant to fit in spaces where larger rig can't. Tight spaces can pin workers.	Do not put yourself between the rig and a fixed object. Use Spotters or a tape measure to ensure clearances in tight areas. Pre-plan equipment movement from one location to the next.	
		3	Some direct push equipment is controlled by wireless devices. These controls can fail and equipment can strike workers or cause damage to property.	The drill rig should be used in a large open area to test wireless controls prior to moving to boring locations. The operator of the rig will test the kill switch with wireless remote prior to use. Operator will stay in range of rig while moving so that wireless signal will not be too weak and cause errors to the controls.	
		4	Sampling sleeves must be cut to obtain access to soil. Cutting can cause lacerations.	It's preferable to let the driller cut the sleeves open. Many drillers have holders for the sleeve to allow for stability when cutting. If you cut the sleeves, use a hook blade, change blade regularly, and cut away from the body.	
		5	Soil cores may contain contaminated media.	Wear nitrile gloves and saftey glasses for protection from contaminated media when logging soil borings.	
6	Sample collection and processing	1	Injuries can result from pinch points on sampling equipment, and from breakage of sample containers.	Care should be taken when opening sampling equipment. Look at empty containers before picking them up, and do not over-tighten container caps. Use dividers to store containers in the cooler so they do not break. Check sample containers for breakage and dispose of any broken glass.	Sample Cooler Handling JSA
		2	Lifting heavy coolers can cause back injuries.	Use two people to move heavy coolers. Use proper lifting techniques.	
7	Soil cutting and purge water management	1	Moving full drums can cause back injury, or pinching/crushing injury.	Preferably have the drilling contractor move full drums with their equipment. If this is not practicable, use lift assist devices such as drum dollies, lift gates, etc. Employ proper lifting techniques, and perfrom TRACK to identify pinch/crush points. Wear leather work gloves, and clear all walking and work areas of debris prior to moving a drum.	Drum Handling JSA

PPE	**Personal Protective Equipment**		
Type	**Personal Protective Equipment**	**Description**	**Required**
Dermal Protection	long sleeve shirt/pants		Required
Eye Protection	safety glasses		Required
Foot Protection	steel-toe boots		Required
Hand Protection	chemical resistant gloves (specify type)	Nitrile	Required
	insulated gloves	Heat insulated gloves	Recommended
	work gloves (specify type)	leather	Required
Head Protection	hard hat		Required
Hearing Protection	ear plugs		Required
Miscellaneous PPE	traffic vest--Class II or III		Required
Respiratory Protection	dust mask		Recommended

Supplies

Type	Supply	Description	Required
Communication Devices	mobile phone		Required
Decontamination	Decon supplies (specify type)	Driller to provide and manage	Recommended
Miscellaneous	first aid kit		Required
Personal	eye wash (specify type)	bottle	Required
	water/fluid replacement		Recommended
Traffic Control	traffic cones		Required

Review Comments

Reviewer		Comments
Employee: **Role** **Review Type** **Completed Date**	Gang, Bob HASP Reviewer Revise 1/30/2014	Sections 3.2 and 3.4, define proper work gloves Section 6.1, add "check sample containers for breakage and dispose of any broken glass"
Employee: **Role** **Review Type** **Completed Date**	Gang, Bob HASP Reviewer Approve 1/31/2014	

Job Safety Analysis

General

JSA ID	10579	**Status**	(3) Completed
Job Name	Environmental-Geophysical survey	**Created Date**	1/29/2014
Task Description	Geophysical Survey	**Completed Date**	01/30/2014
Template	False	**Auto Closed**	False

Client / Project

Client	WSI GROUP
Project Number	B00310060004
Project Name	WSI Potsdam Scrap Yard
PIC	
Project Manager	BRIEN, JASON

User Roles

Role	Employee	Due Date	Completed Date	Supervisor	Active
Developer	Rodriguez Alcocer, David	2/13/2014	1/30/2014	Brien, Jason	☑
HASP Reviewer	Gang, Bob	2/13/2014	1/30/2014	Cullen, Lucas	☑

Job Steps

Job Step No.	Job Step Description		Potential Hazard	Critical Action	H&S Reference
1	Working outdoors	1	Heat/cold stress, sunburn, severe weather, lighting, biological hazards.	Avoid/stop work in extreme weather conditions or if extreme weather is imminent; seek shelter as needed; take breaks and consume fluids as needed; use sunscreen and or bug spray and wear appropriate clothing to cover body for protection.	
2	Mobilization of equipment to survey area	1	Lifting hazards (heavy or bulky equipment)	Use TRACK to plan lifts and routes to work location. Use proper lifting techniques.	
		2	Awkward body positions and twisting	Plan activity to avoid twisting of body or awkward body positions. Use buddy system or job rotation to reduce exposure to conditions that cannot be avoided.	
		3	Trip and fall hazards from uneven ground or restricted view when carrying equipment	Break loads down to manageable size that does not obstruct view of ground. Plan route and use TRACK, wear footwear with good tread and ankle support. Use buddy system for large or bulky items when carrying.	
3	Set up survey grid and control	1	Slip trip and fall hazards from wet, uneven ground or over vegetation.	See step one controls.	
		2	Crush hazard or contact stress to hands/fingers from inserting pins or stakes.	Wear leather gloves when inserting pins, flagging, or stakes into the ground. Do not hurry task if hammering.	
		3	Struck by hazards by vehicles if working in traffic area.	Use a buddy system for placing site control cones and/or signage. Position vehicle so that you are protected from moving traffic. Wear Class II traffic vest if in traffic area.	
		4	Repetitive stress from repeated bending or squatting during grid construction	Use job rotation when hazard exists, stretch before performing work activity. Use paint device that allows employee to stand up while spraying.	
		5	Chemical exposure from using spray paint	Stand up wind of paint spraying activities	
4	Performing survey	1	Slips trips and falls on wet, uneven or steep sloped surfaces	See step one controls.	
		2	Scrapes or cuts to hands, arms or legs from equipment or vegetation in area.	Wear leather or cut resistant gloves when performing survey, wear long pants, wear heavy long sleeve shirt if arm hazard exists.	
		3	Noise hazards from survey equipment using percussion devices	Wear hearing protection, keep unnecessary workers away from devices when activated.	

4	Performing survey	4	Ergonomic injury form improper or prolonged use of carried devices that are long or bulky.	Use job rotation to reduce potential for injury.	
5	Demobilization and clean up	1	Muscle strain from removing pins or stakes	Use devices that maintain neutral body positions to remove pins when practical. Do not bend at waist when removing.	
		2	Pinch hazards to fingers from equipment cases	Identify hazard and avoid, pack equipment properly so that no wires or cables protrude from case requiring fingers to push into case when closing.	
		3	Lifting hazards from demobilizing equipment from work area	See step one controls.	
		4	Slip, trip and falls carrying equipment that obstructs view or on wet or uneven surfaces.	See step one controls.	
6	Preparation and return shipment of equipment	1	Cuts to hands and forearms from cutting strapping tape	Do not hurry during package preparation. Use TRACK. Use cutting tools with self retracting blades.	
		2	Pinch hazards to fingers from equipment cases and placement of equipment in boxes	See step 4 controls.	
		3	Lifting hazards from completed shipping packages	See step 1 controls	
		4	Fire hazard form improperly packed spare batteries	Cover battery terminals or keep in original packaging when shipping, protect batteries from other metal objects in packages, perform shipping determination for number of spare batteries permitted to be shipped in package or consignment.	

PPE — Personal Protective Equipment

Type	Personal Protective Equipment	Description	Required
Dermal Protection	long sleeve shirt/pants		Required
Eye Protection	safety glasses		Required
Foot Protection	boots	Supportive with good tread	Required
	steel-toe boots		Recommended
Hand Protection	work gloves (specify type)	leather or cut resistant	Required
Head Protection	hard hat		Recommended

Supplies

Type	Supply	Description	Required
Communication Devices	mobile phone		Required
Miscellaneous	first aid kit		Required
Personal	insect repellant		Recommended
	sunscreen		Recommended
Traffic Control	traffic cones		Recommended

Review Comments

Reviewer		Comments
Employee: **Role** **Review Type** **Completed Date**	Gang, Bob HASP Reviewer Revise 1/30/2014	Section 3.3 - Establish Traffic control, be specific about how you want this done. I.e., use cones, a spotter, a flagger Section 4.2 define what suitable gloves are. Do not leave this to the employee Section 6.1 - define the correct cutting tool. Do not leave it to the discretion of the employee
Employee: **Role** **Review Type** **Completed Date**	Gang, Bob HASP Reviewer Approve 1/30/2014	

Job Safety Analysis

General

JSA ID	10587	**Status**	(3) Completed
Job Name	Environmental-Other	**Created Date**	1/29/2014
Task Description	Wetland Delineation	**Completed Date**	01/30/2014
Template	False	**Auto Closed**	False

Client / Project

Client	WSI GROUP
Project Number	B00310060004
Project Name	WSI Potsdam Scrap Yard
PIC	
Project Manager	BRIEN, JASON

User Roles

Role	Employee	Due Date	Completed Date	Supervisor	Active
Developer	Rodriguez Alcocer, David	2/13/2014	1/30/2014	Brien, Jason	☑
HASP Reviewer	Gang, Bob	2/13/2014	1/30/2014	Cullen, Lucas	☑

Job Steps

Job Step No.	Job Step Description		Potential Hazard	Critical Action	H&S Reference
1	Preparation	1	Slip, trip, fall hazards from uneven terrain.	Be aware of uneven terrain. Obtain a clear path when loading and unloading. Avoid slick areas if possible. Never carry objects that are awkward or unstable. Drive vehicle as near as possible to set up location.	
		2	Hand lacerations.	Employees should wear leather work gloves when unloading equipment from vehicle and checking proper operation of auger along with any other equipment.	
		3	Hand pinch points from carrying equipment.	Wear leather work gloves when loading and unloading equipment.	
		4	Strains and sprains from lifting.	Use hand protection (leather gloves) and proper lifting techniques (bent knees, keep back straight) and body positioning. If an object weighs over 50 lbs. or is awkward, get help with the lift. Avoid lifting and twisting. Keep loads close to body, avoid twisting torso and use legs not back to lift loads. Do not carry more then you can handle, ask for assistance to carry heavy equipment. Do not obscure vision with load.	
		5	Inspect boots/waders.	Inspect boots and waders for leaks prior to use in field. Bring backup socks and boots in case leak develops in field.	
2	Working Outdoors/Accessing sample locations	1	Environmental hazards: sun, heat, cold, wind.	Avoid work in severe weather conditions; stop work if severe weather is imminent. Evaluate work area for windfall hazards, be aware of wind speed and potential for falling branches/trees. Monitor for heat and cold stress.	
		2	Biological hazards: insects (ticks,bees) and plants (thorns, poison ivy).	Be able to identify poisonous plants and insects before surveying the area-always wear protective gloves if unsure. Wear appropriate clothes: light colored clothing, long sleeves, pants and leather work gloves in overgrown areas; hat, sunscreen and insect repellant as needed. Use unscented deodorant. Check with field staff for allergies prior to entering the field. Check for ticks frequently.	
		3	Slips, trips and falls, fatigue, walking with equipment.	Use caution along steep slopes and rocky, uneven or loose terrain. Use a stick to investigate footing in inundated areas. Use appropriate footwear. Take rest and water breaks as needed. Always keep auger head pointed down. Walk slowly and choose footing carefully.	

3	Survey and identify vegetation	1	Muscle strains from ripping tape or reaching for overhanging vegetation.	Avoid awkward positions when hanging flags on vegetation.	
		2	Contact with biological hazards (poisonous plants, thorns, stinging insects, snakes and spiders).	Be able to identify poisonous plants before surveying vegetation. Wear leather work gloves, safety glasses and snake chaps, at all times.	
		3	Slips, trips and falls from tall vegetation or vines and soft sediments.	Use slow, deliberate steps when walking through tall vegatation or vines and soft sediments. Establish footing while walking through the vegetation. When possible walk on dry soil.	
		4	Contact with biological hazards (i.e. snakes, bees).	Avoid all biological hazards. If biological hazards are present in work area, leave the work area immediately and change to different location. Do not attempt to make contact with any biological hazards. All personnel walking through suspected or prone to have snake activity areas must be aware of the potential for encountering snakes and need to avoid actions which would increase the risk of such an encounter (e.g. turning over logs).	
4	Demobilization	1	Slips trips and falls. Lifting hazards and back strain. Vehicle traffic and accidents. Loss of equipment/supplies.	Follow critical actions outlined for Job Step 1. Check work area for equipment and supplies prior to leaving site.	

PPE — Personal Protective Equipment

Type	Personal Protective Equipment	Description	Required
Dermal Protection	long sleeve shirt/pants	pants	Required
Eye Protection	faceshield		Required
	safety glasses	Clear glasses when working inside	Required
Foot Protection	Other	waders	Required
	steel-toe boots		Required
Hand Protection	work gloves (specify type)	Leather or cut resistant material	Required
Head Protection	hard hat		Required
Miscellaneous PPE	personal flotation device		Required

Supplies

Type	Supply	Description	Required
Communication Devices	mobile phone		Required
Miscellaneous	first aid kit		Required
	flashlight		Required
Personal	insect repellant		Required
	sunscreen		Required

Review Comments

Reviewer		Comments
Employee: **Role** **Review Type** **Completed Date**	Gang, Bob HASP Reviewer Revise 1/30/2014	Section 1.2, add "Hands" to Lacerations Alway specify what you are talking about so that the employees does not have to guess Section 1.3, add "Hands" to pinchpoints Sections 2.2 and 3.2, define what proper gloves are otherwise looks good
Employee: **Role** **Review Type** **Completed Date**	Gang, Bob HASP Reviewer Approve 1/30/2014	

ARCADIS

Material Safety Data Sheets

Safety Data Sheet
according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), and GHS

Printing date 25.05.2012 Revision: 24.05.2012

1 Identification of the substance/mixture and of the company/undertaking

· **1.1 Product identifier**

· **Trade name: ALCONOX**
· **Application of the substance / the preparation** Cleaning material/ Detergent

· **1.3 Details of the supplier of the Safety Data Sheet**
· **Manufacturer/Supplier:**
Alconox, Inc.
30 Glenn St., Suite 309
White Plains, NY 10603
Phone: 914-948-4040

· **Further information obtainable from:** Product Safety Department
· **1.4 Emergency telephone number:**
ChemTel Inc.
(800)255-3924, +1 (813)248-0585

2 Hazards identification

· **2.1 Classification of the substance or mixture**
· **Classification according to Regulation (EC) No 1272/2008**


GHS05 corrosion

Eye Dam. 1 H318 Causes serious eye damage.


GHS07

Skin Irrit. 2 H315 Causes skin irritation.

· **Classification according to Directive 67/548/EEC or Directive 1999/45/EC**

Xi; Irritant

R38-41: Irritating to skin. Risk of serious damage to eyes.
· **Information concerning particular hazards for human and environment:**
The product has to be labelled due to the calculation procedure of the "General Classification guideline for preparations of the EU" in the latest valid version.
· **Classification system:**
The classification is according to the latest editions of the EU-lists, and extended by company and literature data.

· **2.2 Label elements**
· **Labelling according to Regulation (EC) No 1272/2008**
The product is classified and labelled according to the CLP regulation.
· **Hazard pictograms**


GHS05

· **Signal word** Danger

· **Hazard-determining components of labelling:**
Benzenesulfonic Acid, Sodium Salts

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· **Hazard statements**
H315 Causes skin irritation.
H318 Causes serious eye damage.
· **Precautionary statements**

P280	Wear protective gloves/protective clothing/eye protection/face protection.
P264	Wash thoroughly after handling.
P305+P351+P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P310	Immediately call a POISON CENTER or doctor/physician.
P321	Specific treatment (see on this label).
P362	Take off contaminated clothing and wash before reuse.
P332+P313	If skin irritation occurs: Get medical advice/attention.
P302+P352	IF ON SKIN: Wash with plenty of soap and water.

· **Hazard description:**
· **WHMIS-symbols:**
D2B - Toxic material causing other toxic effects

· **NFPA ratings (scale 0 - 4)**

Health = 1
Fire = 0
Reactivity = 0

· **HMIS-ratings (scale 0 - 4)**

Health = 1
Fire = 0
Reactivity = 0

· **2.3 Other hazards**
· **Results of PBT and vPvB assessment**
· **PBT:** Not applicable.
· **vPvB:** Not applicable.

3 Composition/information on ingredients

· **3.2 Mixtures**
· **Description:** Mixture of substances listed below with nonhazardous additions.

· **Dangerous components:**		
CAS: 68081-81-2	Benzenesulfonic Acid, Sodium Salts Xi R38-41 Eye Dam. 1, H318 Skin Irrit. 2, H315	10-25%
CAS: 497-19-8 EINECS: 207-838-8 Index number: 011-005-00-2	sodium carbonate Xi R36 Eye Irrit. 2, H319	2,5-10%

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CAS: 7722-88-5 EINECS: 231-767-1	tetrasodium pyrophosphate substance with a Community workplace exposure limit	2,5-10%
CAS: 151-21-3 EINECS: 205-788-1	sodium dodecyl sulphate Xn R21/22; Xi R36/38	2,5-10%
	Acute Tox. 4, H302; Acute Tox. 4, H312; Skin Irrit. 2, H315; Eye Irrit. 2, H319	

· **Additional information:** For the wording of the listed risk phrases refer to section 16.

4 First aid measures

· **4.1 Description of first aid measures**
· **After inhalation:** Supply fresh air; consult doctor in case of complaints.
· **After skin contact:**
Immediately wash with water and soap and rinse thoroughly.
If skin irritation continues, consult a doctor.
· **After eye contact:**
Remove contact lenses if worn.
Rinse opened eye for several minutes under running water. If symptoms persist, consult a doctor.
· **After swallowing:**
Do not induce vomiting; call for medical help immediately.
Rinse out mouth and then drink plenty of water.
· **4.2 Most important symptoms and effects, both acute and delayed**
No further relevant information available.
· **4.3 Indication of any immediate medical attention and special treatment needed**
No further relevant information available.

5 Firefighting measures

· **5.1 Extinguishing media**
· **Suitable extinguishing agents:**
CO2, powder or water spray. Fight larger fires with water spray or alcohol resistant foam.
· **5.2 Special hazards arising from the substance or mixture**
No further relevant information available.
· **5.3 Advice for firefighters**
· **Protective equipment:**
Wear self-contained respiratory protective device.
Wear fully protective suit.

6 Accidental release measures

· **6.1 Personal precautions, protective equipment and emergency procedures**
Product forms slippery surface when combined with water.
· **6.2 Environmental precautions:** Do not allow to enter sewers/ surface or ground water.
· **6.3 Methods and material for containment and cleaning up:**
Pick up mechanically.
Clean the affected area carefully; suitable cleaners are:
Warm water
· **6.4 Reference to other sections**
See Section 7 for information on safe handling.

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See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.

7 Handling and storage

· **7.1 Precautions for safe handling**
Prevent formation of dust.
Keep receptacles tightly sealed.
· **Information about fire - and explosion protection:** No special measures required.

· **7.2 Conditions for safe storage, including any incompatibilities**
· **Storage:**
· **Requirements to be met by storerooms and receptacles:** No special requirements.
· **Information about storage in one common storage facility:** Not required.
· **Further information about storage conditions:** Protect from humidity and water.
· **7.3 Specific end use(s)** No further relevant information available.

8 Exposure controls/personal protection

· **Additional information about design of technical facilities:** No further data; see item 7.

· **8.1 Control parameters**

· **Ingredients with limit values that require monitoring at the workplace:**	
7722-88-5 tetrasodium pyrophosphate	
REL (USA)	5 mg/m³
TLV (USA)	TLV withdrawn
EV (Canada)	5 mg/m³

· **Additional information:** The lists valid during the making were used as basis.

· **8.2 Exposure controls**
· **Personal protective equipment:**
· **General protective and hygienic measures:**
Keep away from foodstuffs, beverages and feed.
Immediately remove all soiled and contaminated clothing
Wash hands before breaks and at the end of work.
Avoid contact with the skin.
Avoid contact with the eyes and skin.
· **Respiratory protection:**
In case of brief exposure or low pollution use respiratory filter device. In case of intensive or longer exposure use self-contained respiratory protective device.
· **Protection of hands:**

Protective gloves

The glove material has to be impermeable and resistant to the product/ the substance/ the preparation.
Due to missing tests no recommendation to the glove material can be given for the product/ the preparation/ the chemical mixture.
Selection of the glove material on consideration of the penetration times, rates of diffusion and the degradation

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· **Material of gloves**
Butyl rubber, BR
Nitrile rubber, NBR
Natural rubber, NR
Neoprene gloves
The selection of the suitable gloves does not only depend on the material, but also on further marks of quality and varies from manufacturer to manufacturer. As the product is a preparation of several substances, the resistance of the glove material can not be calculated in advance and has therefore to be checked prior to the application.
· **Penetration time of glove material**
The exact break through time has to be found out by the manufacturer of the protective gloves and has to be observed.
· **Eye protection:**

Safety glasses

· **Body protection:** Protective work clothing

9 Physical and chemical properties

· **9.1 Information on basic physical and chemical properties**	
· **General Information**	
· **Appearance:**	
Form:	Powder
Colour:	White
· **Odour:**	Odourless
· **Odour threshold:**	Not determined.
· **pH-value (10 g/l) at 20°C:**	9,5 (- NA for Powder form)
· **Change in condition**	
Melting point/Melting range:	Undetermined.
Boiling point/Boiling range:	Undetermined.
· **Flash point:**	Not applicable.
· **Flammability (solid, gaseous):**	Not determined.
· **Ignition temperature:**	
Decomposition temperature:	Not determined.
· **Self-igniting:**	Product is not selfigniting.
· **Danger of explosion:**	Product does not present an explosion hazard.
· **Explosion limits:**	
Lower:	Not determined.
Upper:	Not determined.
· **Vapour pressure:**	Not applicable.
· **Density at 20°C:**	1,1 g/cm³
· **Relative density**	Not determined.
· **Vapour density**	Not applicable.

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· **Evaporation rate**	Not applicable.
· **Solubility in / Miscibility with water:**	Soluble.
· **Segregation coefficient (n-octanol/water):**	Not determined.
· **Viscosity:**	
Dynamic:	Not applicable.
Kinematic:	Not applicable.
· **Solvent content:**	
Organic solvents:	0,0 %
Solids content:	100 %
· **9.2 Other information**	No further relevant information available.

10 Stability and reactivity

· **10.1 Reactivity**
· **10.2 Chemical stability**
· **Thermal decomposition / conditions to be avoided:**
No decomposition if used according to specifications.
· **10.3 Possibility of hazardous reactions**
Reacts with acids.
Reacts with strong alkali.
Reacts with strong oxidizing agents.
· **10.4 Conditions to avoid** No further relevant information available.
· **10.5 Incompatible materials:** No further relevant information available.
· **10.6 Hazardous decomposition products:**
Carbon monoxide and carbon dioxide
Phosphorus compounds
Sulphur oxides (SOx)

11 Toxicological information

· **11.1 Information on toxicological effects**
· **Acute toxicity:**
· **Primary irritant effect:**
· **on the skin:** Irritant to skin and mucous membranes.
· **on the eye:** Strong irritant with the danger of severe eye injury.
· **Sensitization:** No sensitizing effects known.
· **Additional toxicological information:**
The product shows the following dangers according to the calculation method of the General EU Classification Guidelines for Preparations as issued in the latest version:
Irritant
Swallowing will lead to a strong caustic effect on mouth and throat and to the danger of perforation of esophagus and stomach.

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12 Ecological information

· **12.1 Toxicity**
· **Aquatic toxicity:** No further relevant information available.
· **12.2 Persistence and degradability** No further relevant information available.
· **12.3 Bioaccumulative potential** Not worth-mentioning accumulating in organisms
· **12.4 Mobility in soil** No further relevant information available.
· **Additional ecological information:**
· **General notes:**
Water hazard class 2 (German Regulation) (Self-assessment): hazardous for water
Do not allow product to reach ground water, water course or sewage system.
Danger to drinking water if even small quantities leak into the ground.
· **12.5 Results of PBT and vPvB assessment**
· **PBT:** Not applicable.
· **vPvB:** Not applicable.
· **12.6 Other adverse effects** No further relevant information available.

13 Disposal considerations

· **13.1 Waste treatment methods**
· **Recommendation**
Smaller quantities can be disposed of with household waste.
Small amounts may be diluted with plenty of water and washed away. Dispose of bigger amounts in accordance with Local Authority requirements.
The surfactant used in this product complies with the biodegradability criteria as laid down in Regulation (EC) No. 648/2004 on detergents. Data to support this assertion are held at the disposal of the competent authorities of the Member States and will be made available to them, at their direct request or at the request of a detergent manufacturer.

· **Uncleaned packaging:**
· **Recommendation:** Disposal must be made according to official regulations.
· **Recommended cleansing agents:** Water, if necessary together with cleansing agents.

14 Transport information

· **14.1 UN-Number**	
· **DOT, ADR, ADN, IMDG, IATA**	N/A
· **14.2 UN proper shipping name**	
· **DOT, ADR, ADN, IMDG, IATA**	N/A
· **14.3 Transport hazard class(es)**	
· **DOT, ADR, ADN, IMDG, IATA**	
· **Class**	N/A
· **14.4 Packing group**	
· **DOT, ADR, IMDG, IATA**	N/A
· **14.5 Environmental hazards:**	
· **Marine pollutant:**	No

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· **14.6 Special precautions for user**	Not applicable.
· **14.7 Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code**	Not applicable.
· **UN "Model Regulation":**	N/A

15 Regulatory information

· **15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture**
· **United States (USA)**
· **SARA**

· **Section 355 (extremely hazardous substances):**
None of the ingredients is listed.

· **Section 313 (Specific toxic chemical listings):**
None of the ingredients is listed.

· **TSCA (Toxic Substances Control Act):**
All ingredients are listed.

· **Proposition 65 (California):**

· **Chemicals known to cause cancer:**
None of the ingredients is listed.

· **Chemicals known to cause reproductive toxicity for females:**
None of the ingredients is listed.

· **Chemicals known to cause reproductive toxicity for males:**
None of the ingredients is listed.

· **Chemicals known to cause developmental toxicity:**
None of the ingredients is listed.

· **Carcinogenic Categories**

· **EPA (Environmental Protection Agency)**
None of the ingredients is listed.

· **TLV (Threshold Limit Value established by ACGIH)**
None of the ingredients is listed.

· **NIOSH-Ca (National Institute for Occupational Safety and Health)**
None of the ingredients is listed.

· **OSHA-Ca (Occupational Safety & Health Administration)**
None of the ingredients is listed.

· **Canada**

· **Canadian Domestic Substances List (DSL)**
All ingredients are listed.

· **Canadian Ingredient Disclosure list (limit 0.1%)**
None of the ingredients is listed.

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· **Canadian Ingredient Disclosure list (limit 1%)**	
497-19-8	sodium carbonate
7722-88-5	tetrasodium pyrophosphate
151-21-3	sodium dodecyl sulphate

· **15.2 Chemical safety assessment:** A Chemical Safety Assessment has not been carried out.

16 Other information

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

· **Relevant phrases**
H302 Harmful if swallowed.
H312 Harmful in contact with skin.
H315 Causes skin irritation.
H318 Causes serious eye damage.
H319 Causes serious eye irritation.

R21/22 Harmful in contact with skin and if swallowed.
R36 Irritating to eyes.
R36/38 Irritating to eyes and skin.
R38 Irritating to skin.
R41 Risk of serious damage to eyes.

· **Abbreviations and acronyms:**
ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
IMDG: International Maritime Code for Dangerous Goods
DOT: US Department of Transportation
IATA: International Air Transport Association
GHS: Globally Harmonized System of Classification and Labelling of Chemicals
ACGIH: American Conference of Governmental Industrial Hygienists
NFPA: National Fire Protection Association (USA)
HMIS: Hazardous Materials Identification System (USA)
WHMIS: Workplace Hazardous Materials Information System (Canada)

GAS INNOVATIONS

MATERIAL SAFETY DATA SHEET (MSDS) ISOBUTYLENE

PRODUCT IDENTIFICATION	▪D.O.T. SHIPPING NAME	Isobutylene
	▪SYNONYM (S)	Liquefied Petroleum Gas, Isobutene, 2 Methylpropene
	▪D.O.T. I.D. NUMBER	UN-1055
	▪D.O.T. HAZZARD CLASS	2.1 Flammable Gas
	▪D.O.T. LABEL (S)	Flammable Gas
	▪C.A.S. NUMBER	115-11-7
	▪CHEMICAL FORMULA	C_4H_8 or $(CH_3)_2C{:}CH_2$
PHYSICAL DATA	▪MOLECULAR WEIGHT	56.108
	▪FREEZING POINT	-140.4°C, -220.6°F
	▪BOILING POINT	-6.9°C, 19.6°F
	▪VAPOR PRESSURE	168 kPa (gauge), 24.3 psig @21.1°C
	▪SPECIFIC VOLUME	0.418m_3/kg, 6.7 ft_3/lb @ 1 atm, 21.1°C
	▪RELATIVE DENSITY, (air=1)	1.947 @ 1 atm, 25°C
	▪SOLUBILITY IN WATER	Negligible
	▪DESCRIPTION	At room temperature and atmospheric pressure isobutene is a colorless, flammable gas, with an unpleasant odor. It is shipped as a liquefied gas under its own vapor pressure.
FIRE AND EXPLOSION HAZARD DATA	▪FLAMMABLE LIMITS IN AIR	1.8 – 9.6 % by volume
	▪AUTO-IGNITION TEMPERATURE	465°C, 869°F
	▪ FIRE FIGHTING PROCEDURES	The only safe way to extinguish an isobutylene fire is to stop the flow of gas. If the flow cannot be stopped, let the fire burn out while cooling the cylinder and the surroundings using a water spray. Personnel may have to wear approach type protective suits and positive pressure self-contained breathing apparatus. Firefighters' turnout gear may be inadequate. Small secondary fires may be brought under control by using carbon dioxide or a dry chemical fire extinguisher and stopping the flow.

Date prepared: September 7, 2007

18005 E. Hwy 225 La Porte, TX 77571 www.gasinnovations.com Ph: 281-471-2200 Fax: 281-471-2201

	▪UNUSUAL HAZARDS	1. Cylinders exposed to fire may rupture with violent force. Extinguish surrounding fire and keep cylinders cool by applying water from a maximum possible distance with a water spray. 2. Flammable gases may spread from a spill after the fire is extinguished and be subject to re-ignition.
HEALTH HAZARD DATA	▪ PERMISSIBLE EXPOSURE LIMITS	OSHA TWA None established. ASGIH TWA None established.
	▪ ACCUTE EFFECTS OVEREXPOSURE	Isobutylene is a simple asphyxiant. Inhalation of high concentrations may cause rapid respiration, dizziness, fatigue, and nausea. Massive exposure may cause unconsciousness and death. Contact with the liquid phase or with the cold has escaping from a cylinder may cause frostbite.
	▪ CHRONIC EFFECTS OF OVEREXPOSURE	None known.
FIRST AID INFORMATION	▪ INHALATION	Move victim to fresh air. If not breathing, give artificial respiration, preferably mouth-to-mouth. If breathing is difficult, give oxygen. Call a physician.
	▪ CONTACT	Treat for frostbite.
REACTIVITY DATE	▪ STABILITY	(X) Stable. ( ) Unstable.
	▪ INCOMPATIBILITY	Oxidizing materials and compounds that can add across double bonds.
	▪ HAZARDOUS DECOMPOSITION/ OXIDATION PRODUCTS	Carbon monoxide, carbon dioxide.
	▪ POLYMERIZATION	(X) Will not occur ( ) May occur
SPILL OR LEAKAGE PROCEDURE	Shut off all ignition sources and ventilate the area. For controlling large flow, personnel may have to wear approach-type protective suits and positive pressure self-contained breathing apparatus.	

Date prepared: September 7, 2007

PRECAUTIONS

▪ STORAGE RECOMMENDATIONS	Cylinders should be stored and used in dry, cool, well-ventilated areas away from sources of heat or ignition. Do not store with oxidizers
▪ PERSONAL PROTECTIVE EQUIPMENT	1. Eye protection – Safety glasses should be worn. 2. Respiratory protection – Approved respiratory equipment must be worn when airborne concentrations exceed safe levels. 2. Skin protection – No specific equipment is required. Gloves are recommended for cylinder handling.
▪ BEFORE USING THE GAS	1. Secure the cylinder to prevent it from failing or being Knocked over. 2. Leak check the lines and equipment. 3. Have an emergency plan covering steps to be taken in the event of an accidental release.

DISCLAIMER

The information, recommendations, and suggestions herein were compiled form reference material and other sources believed to be reliable. However, the MSDS's accuracy or completeness is not guaranteed by Gas Innovations or its affiliates, nor is any responsibility assumed or implied for any loss or damage resulting from inaccuracies or omissions. Since conditions of use are beyond our control, no warranties of merchantability or fitness for a particular purpose are expressed or implied. This MSDS is not intended as a license to operate under, or recommendation to infringe on, any patents. Appropriate warnings and safe handling procedures should be provided to handlers and users.

Date prepared: September 7, 2007

Material Safety Data Sheet

Methanol

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: Methanol

OTHER/GENERIC NAMES: Methyl Alcohol, Carbinol, Wood Alcohol

PRODUCT USE: Solvent

MANUFACTURER: Honeywell
1953 South Harvey Street
Muskegon, MI 49442

DISTRIBUTOR: VWR International
1310 Goshen Parkway
West Chester, PA 19380

FOR MORE INFORMATION CALL:
(Monday-Friday, 8:00am-5:00pm)
1-800-932-5000

IN CASE OF EMERGENCY CALL:
(24 Hours/Day, 7 Days/Week)
1-800-424-9300 (USA Only)
For Transportation Emergencies:
1-800-424-9300 (CHEMTREC - Domestic)
1-613-996-6666(CANUTEC- Canada)

NOTE: Emergency telephone numbers are to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure, or accident involving chemicals. All non-emergency questions should be directed to customer service.

2. COMPOSITION/INFORMATION ON INGREDIENTS

INGREDIENT NAME	CAS NUMBER	WEIGHT %
Methanol	67-56-1	100

Component Information/Information on Non-Hazardous Components
This product is considered to be hazardous according to the criteria specified in 29 CFR 1910.1200 (Hazard Communication Standard) and the Canadian Controlled Product Regulations.

Trace impurities and additional material names not listed above may also appear in Section 15 toward the end of the MSDS. These materials may be listed for local "Right-To-Know" compliance and for other reasons.

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: This product is a clear, volatile, flammable liquid. Has a slight alcoholic odor. Highly flammable. Vapours may form explosive mixtures with air. The product causes irritation of eyes, skin and mucous membranes. Toxic by inhalation, in contact with skin and if swallowed. Methanol can cause blindness. Causes headache, drowsiness or other effects to the central nervous system. Do not allow product to contact skin, eyes and clothing. Do not breathe vapours.

POTENTIAL HEALTH HAZARDS

SKIN: Toxic in contact with skin. Skin absorption may cause toxic effects similar to those described for inhalation. Repeated or extended contact may cause erythema (reddening of the skin) or dermatitis, resulting from a defatting action on tissue.

EYES: Irritating to eyes. Symptoms include itching, burning, redness and tearing. Prolonged or acute contact may cause eye damage. This product may cause blindness if it is swallowed.

INHALATION: Toxic by inhalation. May cause blindness if inhaled. Vapours may cause drowsiness and dizziness. Inhalation of high vapour concentrations can cause CNS-depression and narcosis. Severe overexposure may produce more serious symptoms, including coma and risk of liver damage.

INGESTION: Toxic if swallowed. May be fatal or cause blindness if swallowed. Ingestion of this product may result in central nervous system effects including headache, sleepiness, dizziness, slurred speech and blurred vision.

DELAYED EFFECTS: Repeated or prolonged exposure may cause damage to the liver and central nervous system. This product may cause adverse reproductive effects. Methyl alcohol can produce damage to the optic nerve and central and motor nerves.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Pre-existing liver dysfunctions, or eye, skin and/or central nervous system disorders may be aggravated by exposure.

Ingredients found on one of the OSHA designated carcinogen lists are listed below.

INGREDIENT NAME	NTP STATUS	IARC STATUS	OSHA LIST

No component of this product at levels greater than or equal to 0.1% is identified as a carcinogen by ACGIH, IARC, NTP or OSHA.

4. FIRST AID MEASURES

SKIN: Wash off immediately with soap and plenty of water. Take off contaminated clothing and shoes immediately. Wash contaminated clothing before re-use. Call a physician immediately.

EYES: Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Call a physician immediately.

INHALATION: Move to fresh air in case of accidental inhalation of vapours. If not breathing, give artificial respiration. If breathing is difficult, give oxygen, provided a qualified operator is available. Call a physician immediately.

INGESTION: DO NOT induce vomiting. Immediate medical attention is required.

ADVICE TO PHYSICIAN: Treat symptomatically.

5. FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES

FLASH POINT: 52°F (11°C)
FLASH POINT METHOD: Closed Cup
AUTOIGNITION TEMPERATURE: 867°F (464°C)
UPPER FLAME LIMIT (volume % in air): 36
LOWER FLAME LIMIT (volume % in air): 6
FLAME PROPAGATION RATE (solids): Not applicable
OSHA FLAMMABILITY CLASS: Class 1B Flammable Liquid

EXTINGUISHING MEDIA:

Use alcohol-resistant foam, carbon dioxide (CO2) or dry chemical.

UNUSUAL FIRE AND EXPLOSION HAZARDS:

Highly flammable. Vapours may form explosive mixtures with air. Vapours are heavier than air and may travel along the ground to some distant source of ignition and flash back. Suppress (knock down) gases/vapours/mists with a water spray jet.

Hazardous combustion products may include carbon monoxide, formaldehyde, and carbon dioxide (CO2).

SPECIAL FIRE FIGHTING PRECAUTIONS/INSTRUCTIONS:

Water may be ineffective. Do not use a solid water stream as it may scatter and spread fire. Fire or intense heat may cause violent rupture of packages. Fire-fighters should wear self-contained, NIOSH-approved breathing apparatus and full protective clothing. In the event of fire, cool tanks with water spray. After fire, flush area with water to prevent re-ignition. Do not allow run-off from fire fighting to enter drains or water courses.

6. ACCIDENTAL RELEASE MEASURES

IN CASE OF SPILL OR OTHER RELEASE:

Containment Procedures: Use personal protective equipment. Ensure adequate ventilation. Remove all sources of ignition. Stop flow of material, if this is without risk.

Cleanup Procedures: Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust). Shovel into suitable container for disposal. Do not use sparking tools. Do not allow product to enter sewer or waterways.

Evacuation Procedures: Keep unnecessary people away. Isolate area.

Special Procedures: Use personal protective equipment. Remove all sources of ignition.

Spills and releases may have to be reported to Federal and/or local authorities. See Section 15 regarding reporting requirements.

7. HANDLING AND STORAGE

NORMAL HANDLING: (Always wear recommended personal protective equipment.)

Ensure all equipment is electrically grounded before beginning transfer operations. Ensure adequate ventilation. Do not allow product to contact skin, eyes and clothing. Do not breathe vapours. Keep away from fire, sparks and heated surfaces. Keep container tightly closed in a dry and well-ventilated place. Not for human consumption.

STORAGE RECOMMENDATIONS:

Keep in a well-ventilated place. Empty containers may retain product residue including Flammable or Explosive vapours. Do not cut, drill, grind, or weld near full, partially full, or empty product containers. Keep away from heat and sources of ignition. Store away from incompatible substances. Re-open used containers with caution. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Store in area designed for storage of flammable liquids. Protect from physical damage.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS:

Provide local and general exhaust ventilation to effectively remove and prevent buildup of any vapours or mists generated from the handling of this product or use product in closed system. Local exhaust ventilation is preferred. Prevent electrostatic charge build-up by using common bonding and grounding techniques.

PERSONAL PROTECTIVE EQUIPMENT

SKIN PROTECTION:

Wear impervious gloves and impervious flame retardant antistatic protective clothing. Gloves must be inspected prior to use. For leak, spills, or other emergency, use full protective equipment.

EYE PROTECTION:

Wear chemical goggles and face shield. Remove contact lenses.

RESPIRATORY PROTECTION:

When workers are facing concentrations above the exposure limit they must use appropriate certified respirators.

ADDITIONAL RECOMMENDATIONS:

Provide eyewash stations and quick-drench shower facilities. High standards of skin care and personal hygiene should be exercised at all times.

EXPOSURE GUIDELINES

Component Exposure Limits
Methanol (67-56-1)

ACGIH:	200 ppm TWA 250 ppm STEL Skin - potential significant contribution to overall exposure by the cutaneous route
OSHA (Final):	200 ppm TWA; 260 mg/m3 TWA
OSHA (Vacated):	200 ppm TWA; 260 mg/m3 TWA 250 ppm STEL; 325 mg/m3 STEL Prevent or reduce skin absorption
NIOSH:	200 ppm TWA; 260 mg/m3 TWA 250 ppm STEL; 325 mg/m3 STEL Potential for dermal absorption
Alberta:	200 ppm TWA; 262 mg/m3 TWA 250 ppm STEL; 328 mg/m3 STEL Substance may be readily absorbed through intact skin
British Columbia:	200 ppm TWA 250 ppm STEL Skin notation
Manitoba:	200 ppm TWA; 260 mg/m3 TWA 250 ppm STEL; 310 mg/m3 STEL
New Brunswick:	200 ppm TWA; 262 mg/m3 TWA 250 ppm STEL; 328 mg/m3 STEL Skin - potential for cutaneous absorption
Northwest Territories:	200 ppm TWA; 262 mg/m3 TWA 250 ppm STEL; 328 mg/m3 STEL Skin notation
Nova Scotia:	200 ppm TWA 250 ppm STEL Skin - potential significant contribution to overall exposure by the cutaneous route
Nunavut:	200 ppm TWA; 262 mg/m3 TWA 250 ppm STEL; 328 mg/m3 STEL Skin notation
Ontario:	200 ppm TWAEV; 260 mg/m3 TWAEV 250 ppm STEV; 325 mg/m3 STEV Absorption through skin, eyes, or mucous membranes
Quebec:	200 ppm TWAEV; 262 mg/m3 TWAEV 250 ppm STEV; 328 mg/m3 STEV Skin designation
Saskatchewan:	262 mg/m3 TWA; 200 ppm TWA 328 mg/m3 STEL; 250 ppm STEL
Yukon:	200 ppm TWA; 260 mg/m3 TWA 250 ppm STEL; 310 mg/m3 STEL Skin notation

MATERIAL SAFETY DATA SHEET

Methanol

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE:	Clear, colorless liquid
PHYSICAL STATE:	Liquid
MOLECULAR WEIGHT:	34.04
CHEMICAL FORMULA:	CH_3OH
ODOR:	Slight alcohol
SPECIFIC GRAVITY (water = 1.0):	0.792 gm/c3
SOLUBILITY IN WATER (weight %):	~100%
pH:	Not applicable
BOILING POINT:	145.8°F (64.7°C)
MELTING POINT:	Not applicable
VAPOUR PRESSURE:	97 mm Hg
VAPOUR DENSITY (air = 1.0):	1.11
EVAPORATION RATE:	~5 **COMPARED TO:** Butyl Acetate = 1
% VOLATILES:	~95%
FLASH POINT:	52°F (11°C)

(Flash point method and additional flammability data are found in Section 5.)

10. STABILITY AND REACTIVITY

NORMALLY STABLE? (CONDITIONS TO AVOID):

Stable under recommended storage conditions.
Avoid: Heat, flames and sparks. Incompatible products.

INCOMPATIBILITIES:

Avoid strong oxidizers, plastics, rubber and coatings. May react with metallic aluminum and generate hydrogen gas.

HAZARDOUS DECOMPOSITION PRODUCTS:

Hazardous decomposition products include carbon monoxide, formaldehyde, and carbon dioxide (CO2).

HAZARDOUS POLYMERISATION:

Hazardous polymerisation does not occur.

11. TOXICOLOGICAL INFORMATION

Component Analysis - LD50/LC50
Methanol (67-56-1)
Rat: LD50 – Route: Inhalation; Dose: 83.2 mg/L/4H
LD50 – Route: Inhalation; Dose: 64000 ppm/4H
LD50 – Route: Oral; Dose: 5628 mg/kg
Rabbit: LD50 – Route: Dermal; Dose: 15800 mg/kg

IMMEDIATE (ACUTE) EFFECTS:

The product causes irritation of eyes, skin and mucous membranes. Toxic by inhalation, in contact with skin and if swallowed. Methanol can cause blindness. Causes headache, drowsiness or other effects to the central nervous system.

DELAYED (SUBCHRONIC AND CHRONIC) EFFECTS:

In human methanol poisoning, the transformation of methanol to formaldehyde and formic acid can cause metabolic acidosis and ocular injury. Repeated exposure to airborne concentrations in the range of 200 to 375 ppm have been associated with headaches, and at 1200 to 8300 ppm with damaged vision. Neurological damage, giving rise to permanent motor dysfunction may follow methanol poisoning. Repeated skin contact can cause defatting dermatitis with dryness and cracking.

Repeated inhalation exposures to rats caused central nervous system and behavioral effects, and changes to the spleen. Repeated oral exposures to rats caused liver toxicity, central nervous system effects and behavioral changes.

Inhalation exposure of pregnant rats to very high concentrations of methanol in air, 7 hr/day on gestation days 1-19, produced fetotoxic effects (10,000 ppm) and birth defects (20,000 ppm), as well as maternal toxicity. No adverse effects were seen at 5,000 ppm.
Pregnant rats administered methanol orally at very high dose levels (20-35 g/kg) on gestation day 10 produced fetotoxic effects, as well as maternal toxicity.

OTHER DATA:

This material is not known or reported to be carcinogenic by any reference source including IARC, OSHA, NTP, or EPA.

12. ECOLOGICAL INFORMATION

Prevent from entering sewer or waterway. This material may be slightly toxic to aquatic life.
Component Analysis - Ecotoxicity - Aquatic Toxicity

Methanol (67-56-1)

Test & Species		**Conditions**
96 Hr LC50 fathead minnow (28 days old)	29400 mg/L	flow-through
96 Hr LC50 rainbow trout (fingerling)	13 mg/L	
48 Hr LC50 trout	8000 mg/L	
5 min EC50 Photobacterium phosphoreum	43000 mg/L	
15 min EC50 Photobacterium phosphoreum	40000 mg/L	
25 min EC50 Photobacterium phosphoreum	39000 mg/L	

When released into the soil, water or air, this material is expected to readily biodegrade. Methanol is not expected to bioaccumulate.

13. DISPOSAL CONSIDERATIONS

WASTE INFORMATION: U154. This product is a D001 ignitable waste in supplied form. Dispose of as special waste in compliance with local and national regulations. Waste codes should be assigned by the user based on the application for which the product was used. Incineration of waste material in an EPA-approved facility is recommended, allowing a solid, inert residue to form.

OTHER DISPOSAL CONSIDERATIONS: Observe all Federal, State, and Local Environmental regulations.

The information offered here is for the product as shipped. Use and/or alterations to the product such as mixing with other materials may significantly change the characteristics of the material and alter the RCRA classification and the proper disposal method.

14. TRANSPORT INFORMATION

Domestic:
US DOT PROPER SHIPPING NAME: Methanol
US DOT HAZARD CLASS: 3 **PACKING GROUP:** II
US DOT ID NUMBER: UN1230
International:
US DOT PROPER SHIPPING NAME: Methanol
US DOT HAZARD CLASS: 3, (6.1) **PACKING GROUP:** II
US DOT ID NUMBER: UN1230

TDG PROPER SHIPPING NAME: Methanol
TDG HAZARD CLASS: 3, (6.1) **PACKING GROUP:** II
TDG ID NUMBER: UN1230

North American Emergency Response Guide (ERG) Number: 131

For additional information on shipping regulations affecting this material, contact the information number found in Section 1.

15. REGULATORY INFORMATION

TOXIC SUBSTANCES CONTROL ACT (TSCA)

TSCA INVENTORY STATUS: All components are on the U.S. EPA TSCA Inventory List.
OTHER TSCA ISSUES: Additional TSCA information may exist. Contact VWR if you have questions regarding your application or use of this product.

SARA TITLE III/CERCLA

"Reportable Quantities" (RQs) and/or "Threshold Planning Quantities" (TPQs) exist for the following ingredients.

INGREDIENT NAME	SARA/CERCLA RQ (lb)	SARA EHS TPQ (lb)
Methanol (67-56-1)	5000	None

Spills or releases resulting in the loss of any ingredient at or above its RQ requires immediate notification to the National Response Center [(800) 424-8802] and to your Local Emergency Planning Committee.

SECTION 311 HAZARD CLASS: Immediate. Delayed. Fire.

SARA 313 TOXIC CHEMICALS:
The following ingredients are SARA 313 "Toxic Chemicals". CAS numbers and weight percents are found in Section 2.

INGREDIENT NAME	COMMENT
Methanol (67-56-1)	1.0 % de minimis concentration

STATE RIGHT-TO-KNOW

In addition to the ingredients found in Section 2, the following are listed for state right-to-know purposes.

INGREDIENT NAME	WEIGHT %	COMMENT
Methanol (67-56-1)	100	CA, MA, MN, NJ, PA, RI

ADDITIONAL REGULATORY INFORMATION:

None.

WHMIS CLASSIFICATION (CANADA):

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all information required by CPR.

WHMIS Classification:
B2- Flammable Liquid
D1B- Very Toxic Material
D2A- Chronic Toxic Effects
D2B- Toxic Material

MATERIAL SAFETY DATA SHEET

Methanol

FOREIGN INVENTORY STATUS:
Component Analysis - Inventory

Component	CAS #	TSCA	CAN	EEC	AUST	PHIL	MITI	KOREA	CHINA
Methanol	67-56-1	Yes	DSL	EINECS	Yes	Yes	Yes	Yes	Yes

16. OTHER INFORMATION

CURRENT ISSUE DATE: January 9, 2006
PREVIOUS ISSUE DATE: New MSDS.

CHANGES TO MSDS FROM PREVIOUS ISSUE DATE ARE DUE TO THE FOLLOWING:
New MSDS.

OTHER INFORMATION: As per the OSHA Hazard Communication Standard, 1910.1200, the information contained within this MSDS must be given to those persons using this material. For laboratory use only. Not for food or drug use. Do not store with foodstuffs.

KEY/LEGEND: ACGIH = American Conference of Governmental Industrial Hygienists; CAS = Chemical Abstracts Service; CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act; CFR = Code of Federal Regulations; CPR = Controlled Products Regulations; DOT = Department of Transportation; DSL = Domestic Substances List; EINECS = European Inventory of Existing Commercial Chemical Substances; EPA = Environmental Protection Agency; IARC = International Agency for Research on Cancer; IATA = International Air Transport Association; mg/Kg = milligrams per Kilogram; mg/L = milligrams per Liter; mg/m3 = milligrams per Cubic Meter; MSHA = Mine Safety and Health Administration; NA = Not Applicable or Not Available; NIOSH = National Institute for Occupational Safety and Health; NJTSR = New Jersey Trade Secret Registry; NTP = National Toxicology Program; OSHA = Occupational Safety and Health Administration; SARA = Superfund Amendments and Reauthorization Act; TDG = Transport Dangerous Goods; TSCA = Toxic Substances Control Act; WHMIS = Workplace Hazardous Materials Information System.

End of Sheet #BDH-130

Material Safety Data Sheet

Nitric Acid

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name: Nitric Acid

Synonyms/Generic Names: Aqua Fortis, Azotic acid, Hydrogen nitrate.

Product Use: Industrial, Manufacturing or Laboratory use

Manufacturer: Columbus Chemical Industries, Inc.
N4335 Temkin Rd. Columbus, WI. 53925

For More Information Call: 920-623-2140
(Monday – Friday 8:00-4:30)

IN CASE OF EMERGENCY CALL: CHEMTREC
(24 Hours/Day, 7 Days/Week) 800-424-9300

2. COMPOSITION/INFORMATION ON INGREDIENTS

Weight %	Component	CAS #	EINECS# / ELINCS#	Classification*
68 - 70%	Nitric Acid	7697-37-2	231-714-2	O; R8 -C; R35, **

*Symbol and R phrase according to EC Annex1
** Subject to the reporting requirements of SARA Title III Section 313

3. HAZARDS IDENTIFICATION

Clear, colorless to yellow solution with caustic odor.

R35 – Causes severe burns.
R8 – Contact with combustible material may cause fire.

S1/2, S23, S26, S36, S45

Routes of Entry: Skin, eyes, inhalation and ingestion.

Ingredients found on carcinogen lists:

INGREDIENT NAME	NTP STATUS	IARC STATUS	OSHA LIST	ACGIH
Nitric Acid	Not Listed	Not Listed	Not Listed	Not Listed

4. FIRST AID INFORMATION

Inhalation: Inhalation of mists can cause corrosive action on mucous membranes. Symptoms include burning, choking, coughing, wheezing, laryngitis, shortness of breath, headache or nausea. Move casualty to fresh air and keep at rest. May be fatal if inhaled, may cause delayed pulmonary edema. Get medical attention.

Eyes: Contact rapidly causes severe damage. Symptoms include eye burns, watering eyes. Permanent damage to cornea may result. In case of eye contact, rinse with plenty of water and seek medical attention immediately.

Skin: Severe and rapid corrosion from contact. Extent of damage depends on duration of contact. Symptoms include burning, itching, redness, inflammation and/or swelling of exposed tissues. harmful if absorbed through skin. Immediately flush with plenty of water for at least 15 minutes while removing contaminated clothing and wash using soap. Get medical attention immediately.

Ingestion: **Do Not Induce Vomiting!** Severe and rapid corrosive burns of the mouth, gullet and gastrointestinal tract will result if swallowed. Symptoms include burning, choking, nausea, vomiting and severe pain. Wash out mouth with water and give a glass of water or milk. Get medical attention immediately.

5. FIRE-FIGHTING MEASURES

FLAMMABLE PROPERTIES:

Flash Point:	Not Flammable
Flash Point method:	Not Applicable
Autoignition Temperature:	Not Applicable
Upper Flame Limit (volume % in air):	Not Applicable
Lower Flame Limit (volume % in air):	Not Applicable

Extinguishing Media: Product is not flammable. Use appropriate media for adjacent fire. Use flooding quantities of water to cool containers, keep away from common metals.

Special fire-fighting procedures: Wear self-contained, approved breathing apparatus and full protective clothing, including eye protection and boots. Material can react violently with water (spattering and misting) and react with metals to produce flammable hydrogen gas.

Hazardous combustion products: Emits toxic fumes under fire conditions. (See also Stability and Reactivity section).

Unusual fire and explosion hazards: Strong Oxidizer! Contact with organic material may cause fire. Material will react with metals to produce flammable hydrogen gas.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions: See section 8 for recommendations on the use of personal protective equipment.

Environmental precautions: Cleanup personnel need personal protection from inhalation and skin/eye contact. Evacuate and ventilate the area. Prevent spillage from entering drains. Cautiously add water to spill, taking care to avoid splashing and spattering. Neutralize diluted spill with soda ash or lime. Absorb neutralized spill with vermiculite or other inert absorbent material, then place in a suitable container for disposal. Clean surfaces thoroughly with water to remove residual contamination. Any release to the environment may be subject to federal/national or local reporting requirements. Dispose of all waste or cleanup materials in accordance with local regulations. Containers, even when empty, will retain residue and vapors.

7. HANDLING AND STORAGE

Normal handling: See section 8 for recommendations on the use of personal protective equipment. Use with adequate ventilation. Wash thoroughly after using. Keep container closed when not in use.

Storage: Store in cool, dry well ventilated area. Keep away from incompatible materials (see section 10 for incompatibilities). Drains for storage or use areas for this material should have retention basins for pH adjustment and dilution of spills.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Occupational exposure controls: (consult local authorities for acceptable exposure limits)

Chemical name	Regulatory List	Value and type
Nitric Acid	UK OES	5 mg/m^3 TWA
	STEL	10 mg/m^3 (10 minutes)
	USA OSHA PEL	5 mg/m^3 TWA
	STEL	10 mg/m^3 (15 minutes)
	USA ACGIH	5 mg/m^3 TLV
	USA NIOSH	5 mg/m^3 REL
	STEL	10 mg/m^3 (15 minutes)
	USA OSHA - IDLH	25 ppm
	VME France	5 mg/m^3 TWA 8 hr
	VLE France (STEL)	10 mg/m^3 (15 minutes)

TWA: Time Weighted Average over 8 hours of work.
TLV: Threshold Limit Value over 8 hours of work.
REL: Recommended Exposure Limit
STEL: Short Term Exposure Limit during x number of minutes.
IDLH: Immediately Dangerous to Life or Health

Ventilation: Provide local exhaust, preferably mechanical.

Respiratory protection: If necessary use an approved respirator with acid vapor cartridges.

Eye protection: Wear chemical safety glasses with a face shield for splash protection.

Skin and body protection: Wear neoprene or rubber gloves, apron and other protective clothing appropriate to the risk of exposure.

Other Recommendations: Provide eyewash stations, quick-drench showers and washing facilities accessible to areas of use and handling. Have supplies and equipment for neutralization and running water available.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	Clear, colorless to slight brown liquid
Physical state:	Liquid
Odor:	Acrid, suffocating odor
Odor Threshold:	Unknown
Specific Gravity:	1.4200
pH:	1
Melting Point/Freezing Point:	-42°C (-44°F)
Boiling Point/Range:	122°C (252°F)
Flammability:	Not Flammable (See section 5)
Flash point:	Not Flammable (See section 5)
Evaporation Rate (Butyl Acetate =1):	Not Available
Explosive Limits:	Not Explosive (See section 5)
Vapor Pressure (at 25ºC):	10 mmHg
Vapor Density (air =1):	2.5
Solubility:	Completely soluble in water
Partition coefficient/n-octanol/water:	-2.3 @ 25 ºC
% Volatile:	Not Available
Autoignition Temperature:	See section 5

10. STABILITY AND REACTIVITY

Stability: Stable

Conditions to avoid: Uncontrolled addition of water, contact with combustible materials.

Incompatibility: Moisture, bases, organic material, metals, hydrogen sulfide, carbides, alcohols, organic solvents, carbides, cyanides, sulfides.

Hazardous decomposition products: Oxides of nitrogen.

Hazardous polymerization: Will not occur.

11. TOXICOLOGICAL INFORMATION

Acute Effects: See section 4 for symptoms of exposure and effects. Likely routes of exposure are skin, eyes and inhalation.
Target organs: Teeth, eyes, skin, respiratory system.

Acute Toxicity Data:

Nitric acid	LC_{50} (rat): 0.8 mg/L

Chronic Effects: Not Available

Teratogenicity: None found
Mutagenicity: None found
Embryotoxicity: None found
Synergistic Products/Effects: Not Available

12. ECOLOGICAL INFORMATION

Ecotoxicity (aquatic and terrestrial): Aquatic fish; LC50 (96 hrs): 72 mg/l (Gambusia affinis)

Persistence and Degradability: Not Available

Bioaccumulative Potential: Not Available

Mobility in Soil: Not Available

Other Adverse Effects: Not Available

13. DISPOSAL CONSIDERATIONS

RCRA:

Hazardous waste? Yes RCRA ID number: DOO2

Waste Residues: Carefully dilute with water, neutralize per spill procedures in section 6. Neutralized material may be flushed to sewer (REGULATIONS PERMITTING!) or disposed of through a licensed contractor. Users should review their operations in terms of the applicable federal/nation or local regulations and consult with appropriate regulatory agencies before discharging or disposing of waste material.

Product containers: Containers, if thoroughly cleaned, preferably by rinsing three times and handling the rinse water as waste residues, may be disposed of or recycled as non-hazardous waste. Users should review their operations in terms of the applicable federal/national or local regulations and consult with appropriate regulatory agencies before discharging or disposing of waste material.

The information offered in section 13 is for the product as shipped. Use and/or alterations to the product may significantly change the characteristics of the material and alter the waste classification and proper disposal methods.

14. TRANSPORTATION INFORMATION

DOT: UN2031, Nitric Acid, 8, pg II

TDG: UN2031, Nitric Acid, 8, pg II

PIN: Not Available

IDMG: UN2031, Nitric Acid, 8, pg II
Marine Pollutant: No

IATA/ICAO: UN2031, Nitric Acid, 8, pg II

RID/ADR: Class 8, Item 2(b), corrosive

15. REGULATORY INFORMATION

TSCA Inventory Status: All ingredients are listed on the TSCA inventory.

Federal and State Regulations:
Pennsylvania RTK: Nitric Acid
Massachusetts RTK: Nitric Acid

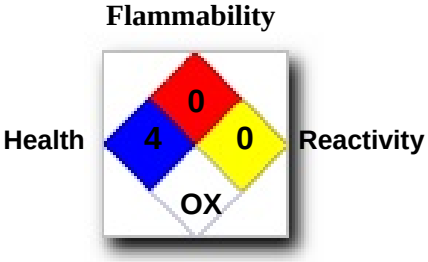
SARA 302/304/311/312 extremely hazardous substances: Nitric Acid
SARA 313 toxic chemical notification and release reporting: Nitric Acid
CERCLA: Hazardous Substances: Nitric Acid 1000 lbs

California Proposition 65: No.
WHMIS Canada: Class E - corrosive liquid.
DSCL (EEC): R35 – Causes severe burns, R8 - Contact with combustible material may cause fire.

HMIS (U.S.A.)

Health Hazard	3
Fire Hazard	0
Reactivity	2

National Fire Protection Association (U.S.A.)



Protective Equipment:

ADR (Europe):

TDG (Canada):

DSCL (Europe):

1. OTHER INFORMATION

Current Issue Date: November 30, 2005
Previous Issue Date: N/A
Prepared by: Sherry Brock (920) 623-2140

ARCADIS

Utility Checklist

ARCADIS
Infrastructure · Water · Environment · Buildings

Utilities and Structures Checklist

Project: _____
Project Number: _____
Date: _____
Work locations applicable to this clearance checklist:

Pre-Field Work

One Call or "811" notified 48-72 hours in advance of work? ☐ Yes ☐ No
Utility companies notified during the One Call process ☐ See attached ticket

_____ _____ _____ _____
_____ _____ _____ _____
_____ _____ _____ _____

List any other utilities requiring notification: ☐ None

_____ _____ _____ _____

Client provided utility maps or "as built" drawings showing utilities? ☐ Yes ☐ No

Field Work

Markings present: ☐ Paint ☐ Pin flags/stakes ☐ Other ☐ None

Subsurface Utility Lines of Evidence Used (3 Minimum):

☐ One Call/"811"
☐ Client Provided Maps/Drawings **OR** ☐ Maps/Drawings requested but not provided
☐ Client Clearance
☐ Interviews: Name(s)/Affiliation(s) _____
_____
_____

Did persons interviewed indicate depths of any utilities in the subsurface?
☐ Yes, depths provided:

☐ Did not know or refused to answer

Comments:

☐ Site Inspection
☐ GPR
☐ Air-Knife
☐ Hydro-Knife
☐ Public Records/Maps
☐ Radiofrequency
☐ Metal Detector
☐ Handauger
☐ Potholing
☐ Probing
☐ Private Locator: Name and Company: _____
☐ Marine Locator: Name and Company: _____
☐ Other:

_____
_____

Tips for Successful Utility Location:
1. No excessive turning or downward force of handaugers/shovels, etc.
2. No hammering- no pickaxes-no digging bars-no hurrying or shortcutting
3. Select alternate/backup locations for clearance
4. Utilities may run directly under asphalt/concrete or be > 5 ft depth
5. Be on site when utilizing private utility locators

T R A C K

ARCADIS
Infrastructure · Water · Environment · Buildings

Site Inspection

During inspections look for the following ("YES" requires follow up investigation):

		Utility color codes		
a)	Natural gas line present (evidence of a gas meter)?	Yellow	☐ Yes	☐ No
b)	Evidence of subsurface electric lines :	Red		
	i) Conduits to ground from electric meter?		☐ Yes	☐ No
	ii) Overhead electric lines absent		☐ Yes	☐ No
	iii) Light poles, electric devices with no overhead lines?		☐ Yes	☐ No
c)	Evidence of water lines:	Blue		
	i) Water meter on site?		☐ Yes	☐ No
	ii) Fire hydrants in vicinity of work?		☐ Yes	☐ No
	iii) Irrigation systems?		☐ Yes	☐ No
d)	Evidence of sewers or storm drains:	Green		
	i) Restrooms or kitchen on site?		☐ Yes	☐ No
	ii) Gutter down spouts going into ground		☐ Yes	☐ No
	iii) Grates in ground in work area		☐ Yes	☐ No
e)	Evidence of telecommunication lines:	Orange		
	i) Fiber optic warning signs in areas?		☐ Yes	☐ No
	ii) Lines from cable boxes running into ground?		☐ Yes	☐ No
	iii) Conduits from power poles running into ground?		☐ Yes	☐ No
	iv) Aboveground boxes or housings in work area?		☐ Yes	☐ No
f)	Underground storage tanks:			
	i) Tank pit present?		☐ Yes	☐ No
	ii) Product lines running to dispensers/buildings?		☐ Yes	☐ No
	iii) Vent present away from tank pit?		☐ Yes	☐ No
g)	Proposed excavation markings in work area?	White	☐ Yes	☐ No
h)	Other:			
	i) Evidence of linear asphalt or concrete repair		☐ Yes	☐ No
	ii) Evidence of linear ground subsidence or change in vegetation?		☐ Yes	☐ No
	iii) Manholes or valve covers in work area?		☐ Yes	☐ No
	iv) Warning signs ("Call Before you Dig", etc) on or adjacent to site?		☐ Yes	☐ No
	v) Utility color markings not illustrated in this checklist?		☐ Yes	☐ No
i)	Aboveground lines in or near the work area:			
	i) < 50 kV within 10 ft of work area?		☐ Yes	☐ No
	ii) >50 - 200 kV within 15 ft of work area?		☐ Yes	☐ No
	iii) >200-350 kV within 20 ft of work area?		☐ Yes	☐ No
	iv) >350-500 kV within 25 ft of work area?		☐ Yes	☐ No
	v) >500-750 kV within 35 ft or work area?		☐ Yes	☐ No
	vi) >750-1000 kV within 45 ft of work area?		☐ Yes	☐ No

Comments:

Do not initiate intrusive work if utilities are suspected to be present in area and are not located, markings are over 14 days old, or if clearance methods provide incomplete or conflicting information. Do not perform intrusive work within 30 inches of a utility marking without hand clearing.

Name and signature of person completing the checklist:

Name: _____

Signature: _____

Date: _____

ARCADIS

Shipping Determination Form

HAZARDOUS MATERIALS SHIPPING/TRANSPORTATION DETERMINATION FORM Revision 3, 11/25/2013

Date:	12/20/2013
Project Name:	WSI Scrapyard
Project Number:	B0031006
Supplemental Information:	None

Description of the Material to be Transported or Shipped:

Soil/sludge with ppb or low ppm concentrations of volatile constituents with no sheens or odors

PCBs

- ☐ This material is mixed with water, soil or other inert material
- ☑ This material will be shipped on wet or blue ice
- ☐ This material will be shipped on dry ice

This material is: Not Restricted/Not Regulated for transportation purposes

Complete for Hazardous Materials:

UN Number:	3432	Hazard Class:	NA	Packing Group:	NA
		Sub. Class:	NA		
Shipping Name:	NA				

* Shipping names with star symbol (IATA) or a "G" (DOT) require a technical name

☐ Use ChemTel 24/7 Emergency Phone and Contract Number for this shipment:
1-800-255-3924 (ChemTel #MIS0007883)
Register this shipment with ChemTel: http://arcadis.chemtel.net/

This material is a: No additional criteria applies to this material

Complete for all Shipments: The Following Packaging will be Used:

Packaging Type:	Single Package - Non-Bulk			
Inner Packaging:	Bag- plastic			
Number of Inners:	10	Net Quantity Each Inner:	8	oz
Intermediate Packaging:	Plastic bag/liner			
Outer Packaging:	Non-specification box- plastic (sample cooler)			
Other:	None			

This material will be shipped (mode of transport):

Road as a non-regulated/restricted consignment

If using an exception/exemption, list the exception/exemption below:

None

Carrier/Transporter information:

FedEx Ground

- ☐ ARCADIS Shipping Guide US-001 attached
- ☐ Other package closure information attached

1) Air shipments requiring a Shipper's Declaration or ground shipments requiring shipping papers (with red hatchings) must be prepared using carrier approved software.
2) When required to present the UN Number on outside of the package, the UN Number must be 12 mm in height. Use Arial regular 48 pt font to type the UN Number. The Proper Shipping Name is not subject to this size requirement.

Special Instructions:

None

References and Rationale for the Determination:

Environmental samples are not anticipated to contain free product. Samples will only contain low concentrations of PCB compounds that do not meet DOT regulations/restrictions.

Determination performed by: Jason Golubski

Determination QA/QC performed by: Jason Brien

ARCADIS

HASP Forms

ARCADIS

Document Control Number:TGM - _____

TGM + *project number plus date as follows: xxxxxxxx.xxxx.xxxxx - dd/mm/year*

TAILGATE HEALTH & SAFETY MEETING FORM

This form documents the tailgate meeting conducted in accordance with the Project HASP. Personnel who perform work operations on-site during the day are required to attend this meeting and to acknowledge their attendance, at least daily.

Project Name:			**Project Location:**
Date:	**Time:**	**Conducted by:**	**Signature/Title:**
Client:		**Client Contact:**	**Subcontractor companies:**

TRACKing the Tailgate Meeting

Think through the Tasks (list the tasks for the day):

1 _____ 3 _____ 5 _____

2 _____ 4 _____ 6 _____

Other Hazardous Activities - Check the box if there are any other ARCADIS, Client or other party activities that may pose hazards to ARCADIS operations ☐ If there are none, write "None" here: _____

If yes, describe them here: _____

How will they be controlled? _____

Prework Authorization - check activities to be conducted that require permit issuance or completion of a checklist or similar before work begins:

	Doc #		Doc #		Doc #
☐ Not applicable		☐ Working at Height		☐ Confined Space	
☐ Energy Isolation (LOTO)		☐ Excavation/Trenching		☐ Hot Work	
☐ Mechanical Lifting Ops		☐ Overhead & Buried Utilities		☐ Other permit	

Discuss following questions (for some review previous day's post activities). **Check if yes :**

☐ Incidents from day before to review?	☐ Lessons learned from the day before?	☐ Any Stop Work Interventions yesterday?
☐ Any corrective actions from yesterday?	☐ Will any work deviate from plan?	☐ If deviations, notify PM & client
☐ JLAs or procedures are available?	☐ Field teams to "dirty" JLAs, as needed?	☐ All equipment checked & OK?
☐ Staff has appropriate PPE?	☐ Staff knows Emergency Plan (EAP)?	☐ Staff knows gathering points?

Comments: _____

Recognize the hazards (check all those that are discussed) (Examples are provided) and **A**ssess the Risks (Low, Medium, High - circle risk level) - Provide an overall assessment of hazards to be encountered today and briefly list them under the hazard category.

☐ Gravity (i.e., ladder, scaffold, trips) (L M H)	☐ Motion (i.e., traffic, moving water) (L M H)	☐ Mechanical (i.e., augers, motors) (L M H)
☐ Electrical (i.e., utilities, lightning) (L M H)	☐ Pressure (i.e., gas cylinders, wells) (L M H)	☐ Environment (i.e., heat, cold, ice) (L M H)
☐ Chemical (i.e., fuel, acid, paint) (L M H)	☐ Biological (i.e., ticks, poison ivy) (L M H)	☐ Radiation (i.e., alpha, sun, laser) (L M H)
☐ Sound (i.e., machinery, generators) (L M H)	☐ Personal (i.e. alone, night, not fit) (L M H)	☐ Driving (i.e. car, ATV, boat, dozer) (L M H)

Continue TRACK Process on Page 2

TAILGATE HEALTH & SAFETY MEETING FORM - Pg. 2

Control the hazards (Check all and discuss those methods to control the hazards that will be implemented for the day): Review the HASP, applicable JLAs, and other control processes. Discuss and document any additional control processes.

- [X] **STOP WORK AUTHORITY** (Must be addressed in every Tailgate meeting - (*See statements below*)

[ ] Elimination	[ ] Substitution	[ ] Isolation
[ ] Engineering controls	[ ] Administrative controls	[ ] Monitoring
[ ] General PPE Usage	[ ] Hearing Conservation	[ ] Respiratory Protection
[ ] Personal Hygiene	[ ] Exposure Guidelines	[ ] Decon Procedures
[ ] Emergency Action Plan (EAP)	[ ] Fall Protection	[ ] Work Zones/Site Control
[ ] JLA to be developed/used ***(specify)***	[ ] LPO conducted ***(specify job/JLA)***	[ ] Traffic Control
[ ]	[ ]	[ ] Other ***(specify)***
[ ]	[ ]	[ ]

Signature and Certification Section - Site Staff and Visitors

Name/Company/Signature	Initial & Sign in Time	Initial & Sign out Time	I have read and understand the HASP

Important Information and Numbers

All site staff should arrive fit for work. If not, they should report to the supervisor any restrictions or concerns.

In the event of an injury, employees will call WorkCare at 1.800.455.6155 and then notify the field supervisor who will, in turn, notify Corp H&S at 1.720.344.3844.

In the event of a motor vehicle accident, employees will notify the field supervisor who will then notify Corp H&S at 1.720.344.3844 and then Corp Legal at 1.720.344.3756.

In the event of a utility strike or other damage to property of a client or 3rd party, employees will immediately notify the field supervisor, who will then immediately notify Corp Legal at 1.678.373.9556 and Corp H&S at 1.720.344.3500

Visitor Name/Co - not involved in work

In	Out
In	Out
In	Out
In	Out

I will STOP the job any time anyone is concerned or uncertain about health & safety or if anyone identifies a hazard or additional mitigation not recorded in the site, project, job or task hazard assessment.

I will be alert to any changes in personnel, conditions at the work site or hazards not covered by the original hazard assessments.

If it is necessary to **STOP THE JOB,** I will perform **TRACK**; and then amend the hazard assessments or the HASP as needed.

I will not assist a subcontractor or other party with their work unless it is absolutely necessary and then only after I have done TRACK and I have thoroughly controlled the hazard.

Post Daily Activities Review - Review at end of day or before next day's work (Check those applicable and explain:)

- [ ] Lessons learned and best practices learned today: _____
- [ ] Incidents that occurred today: _____
- [ ] Any Stop Work interventions today? _____
- [ ] Corrective/Preventive Actions needed for future work: _____
- [ ] Any other H&S issues: _____

Keep H&S 1st in all things

WorkCare - 1.800.455.6155
Near Loss Hotline - 1.866.242.4304

Real Time Exposure Monitoring Data Collection Form

Document all air monitoring conducted on the Site below. Keep this form with the project file.

Site Name: _____ Date: _____

Instrument: _____ Model: _____ Serial #: _____

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

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

Describe Any Actions Taken as a Result of this Air Monitoring and Why (does it match Table 5-1):

_____

_____

Employee Signature Form

I certify that I have read, understand, and will abide by the safety requirements outlined in this HASP.

Printed Name	Signature	Date

Subcontractor Acknowledgement: Receipt of HASP Signature Form

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.

Printed Name	Company	Signature	Date

Visitor Acknowledgement and Acceptance of HASP Signature Form

By signing below, I waive, release and discharge the owner of the site and ARCADIS 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

Hazardous Materials Transportation Form

	Vehicle (place X in box)	Type (pick-up, car, box truck, etc.)
Personal		
Rental		
ARCADIS owned/leased		
Government owned		
Trailer		

Materials Transported	Quantity	Storage/Transport Container

List Trained Drivers:

_____

_____

Hazardous Materials Shipment Form

Material Description and Proper Shipping Name (per DOT or IATA)	Shipment Quantity	DOT Hazard Classification	Shipment Method (air/ground)

List Shipper (i.e., who we are offering the shipment to):

_____

_____

List Trained Employee(s):

_____

_____

ARCADIS

Appendix C

Community Air Monitoring Plan

ARCADIS
Infrastructure · Water · Environment · Buildings

Imagine the result

Community Air Monitoring Plan

Waste-Stream, Inc. Site
Potsdam, New York
Site No. 6-45-022

January 2014; Revised April 2014

Community Air Monitoring Plan

Waste-Stream, Inc. Site
Potsdam, New York
Site No. 6-45-022

Prepared for:
WSI Group

Prepared by:
ARCADIS of New York, Inc.
6723 Towpath Road
P O Box 66
Syracuse
New York 13214-0066
Tel 315 446 9120
Fax 315 449 0017

Our Ref.:
B0031006

Date:
January 2014; Revised April 2014

ARCADIS

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Attachment

1 NYSDOH G-CAMP

1. Introduction

This *Community Air Monitoring Plan* (CAMP) has been prepared by ARCADIS of New York, Inc. (ARCADIS) on behalf of the Waste-Stream, Inc. (WSI) Group to support the performance of pre-design investigation (PDI) activities to be conducted at the WSI Site (the site) located in Potsdam, New York (Site No. 6-45-022). Details related to the proposed PDI activities are presented in the January 2014; Revised April 2014 *Remedial Design/Remedial Action Work Plan* (RD/RA Work Plan) (ARCADIS, 2014).

This CAMP fulfills the general requirements set forth by the New York State Department of Health (NYSDOH) *Generic Community Air Monitoring Plan* (G-CAMP) (NYSDOH, 2002) (included as Attachment 1). The intent of this CAMP is to provide a measure of protection for downwind communities from potential airborne releases of constituents of concern during subsurface work activities at the site. As such, this CAMP identifies potential air emissions, and describes air monitoring procedures, monitoring schedule, data collection, and reporting requirements for the PDI activities.

1.1 Site Location and Description

The WSI site consists of the WSI property (i.e., upland area), areas immediately adjacent to the WSI property, and wetlands located northeast of the property (referred to as the northern drainage area), and a drainage swale that conveys storm water runoff from the WSI property to the northern drainage area. Note that in 2011, Casella purchased an approximately 58 acre portion of the northern drainage area from Potsdam Hardwood, Inc. Ownership of an approximately 14 acre portion of the northern drainage area (i.e., northern most portion) was transferred to Lavalley Realty, Inc. and the remaining 44 acres was retained by Casella..

The approximately 29.2 acre WSI property is located at 147 Outer Maple Street (U.S. Route 11) in the Town and Village of Potsdam, St. Lawrence County, New York. The WSI property is occupied by several structures, including a scale house, vehicle maintenance building, office building, storage barn, a former solid waste transfer station and above ground fuel storage tank area, and various outbuildings. Various scrap processing equipment (e.g., large hydraulic shear, tin press, car crusher, etc.) are also located at the property.

The WSI property is bordered to the north by an industrial facility and undeveloped land to the east, Route 11 to the south and a lightly developed property to the west. In addition, the Corporation Line between the Town of Potsdam and the Village of

Potsdam extends along the eastern boundary of the WSI property, and an active railroad right-of-way extends across the southern portion of site.

1.2 Site History

The WSI property operated as a metal recycling facility and scrap yard starting in approximately 1957. The facility initially operated as Chet Bisnett, Inc. until the company merged with B&C Carting in 1987 and the resulting company was renamed Waste Stream Management, Inc. (WSMI). WSMI was subsequently renamed WSI and has operated the site from 1987 until the present. In 1998, WSI became a wholly owned subsidiary of Casella Waste Systems, Inc.

In addition to tin press operations, metal shearing, car crushing, and scrap metal processing, during the period between mid-1960s and mid-1970s, the facility reportedly processed electrical transformers that contained polychlorinated biphenyl- (PCB-) containing dielectric fluids (i.e., mineral oil). Additionally, the facility also reportedly processed scrap manufacturing equipment that had fluid reservoirs with PCB-containing oils.

Throughout the history of site operations, several above ground and underground storage tanks (ASTs and USTs, respectively) have been in service at the facility. Petroleum product storage at the site included fuel oil and kerosene for heating purposes and gasoline and diesel for vehicles and equipment. The USTs were reportedly closed prior to April 1991 and May 1996. The ASTs were reportedly closed in 1995 and 1996. In addition to the closed petroleum storage tanks listed above, a 20,000-gallon diesel AST and a 10,000-gallon gasoline AST were previously located near the northeast corner of the storage barn. These tanks were subsequently relocated into a secondary containment structure, south of the storage barn in the southeast corner of the property, where they are presently located. The 10,000 gallon gasoline tank was reportedly converted to diesel storage at the time the tank was relocated to the secondary containment structure.

Over the past several years, WSI has relocated the majority of operations from the site. Scrap handling operations were conducted in accordance with a Site Operations Plan that addressed worker health and safety during typical site operations. Other activities currently conducted at the site included periodic use of the vehicle maintenance building. Additionally, office and clerical staff continue to occupy the office building located in the southern portion of the site.

1.3 Summary of PDI Activities

The proposed PDI activities to be conducted at the site generally include the following:

- Drilling soil borings and collecting soil samples
- Delineating and characterizing on-site and off-site wetlands
- Collecting sediment samples
- Collecting biota sampling
- Collecting groundwater and surface water samples
- Conducting a video inspection of on-site underground drainage pipe
- Conducting topographic survey of the site

Additional details regarding the proposed PDI activities are provided in the RD/RA Work Plan. Note that community air monitoring will only be performed when drilling soils borings.

1.4 Potential Air Emissions Related to PDI Activities

As defined in the New York State Department of Health (NYSDOH) Generic CAMP (G-CAMP) (included as Attachment 1), intrusive remedial activities to be performed at the site have the potential to generate localized impacts to air quality. Intrusive PDI activities to be conducted at the site that have the potential to generate localized impacts to air quality include completing soil borings.

1.5 Air/Odor Emissions and Control Measures

Air emissions control and fugitive dust suppression techniques will be used during the PDI activities, as necessary, to limit the potential for organic vapor and dust emissions from the site. Air monitoring for the specific purpose of protecting the community from PDI activity impacts (and verification thereof) will take place during intrusive activities.

Odor and dust control measures will be available at the site during the investigation activities and will be used when necessary. Polyethylene sheeting will be used to control nuisance odors, dust, and volatile organic compound (VOC) emissions, as needed. Odor and dust control measures will be implemented based on visual or olfactory observations, and the results of airborne particulate and VOC monitoring (described in Section 2). In event that airborne particulate and VOC monitoring indicates criteria exceedances, all staged and drummed materials will be covered with polyethylene sheeting and/or drum covers, as appropriate.

2. Air Monitoring Procedures

Real-time air monitoring will be implemented during PDI activities for VOCs, and particulate matter less than 10 microns in diameter (PM_{10}). However, particulate monitoring will not be performed during precipitation events. Upwind and downwind monitoring locations will be determined through visual observation (wind vane, windsock, or similar technique).

2.1 Monitoring Location Selection and Deployment

VOC and PM_{10} monitoring locations will be determined based on visual observation of wind direction. A single upwind location will be selected daily where both VOC and PM_{10} will be recorded. This upwind location will be established at the start of the workday before PDI activities are initiated. Monitoring activities will continue in a downwind direction throughout the day. If wind direction shifts radically during the workday (i.e., greater than approximately +/- 60 degrees from original upwind direction), new upwind and downwind monitoring locations will be established. Any monitoring location changes will be documented in the field logbook.

2.2 VOC Monitoring

As required by the NYSDOH guidance for community air monitoring, VOCs will be monitored continuously during ground intrusive activities (e.g., soil boring drilling) with instrumentation that is equipped with electronic data-logging capabilities. Because real-time monitors for polycyclic aromatic hydrocarbons (PAHs) are not available, the real-time VOC monitors will also serve as surrogate indicators for emissions (if any) of PAHs during the performance of PDI activities. A real-time VOC monitor equipped with either a photoionization detector (PID) or a flame ionization detector will be used to conduct the monitoring for VOCs. A MiniRAE 2000 (or equivalent) will be used to conduct the real-time VOC monitoring. All 15-minute readings shall be recorded via the data logging function of the monitoring equipment. All periodic, instantaneous readings, including readings taken to facilitate activity decisions, will be recorded in the field logbook.

2.3 PM_{10} Monitoring

As required by the NYSDOH guidance, real-time particulate matter will be monitored continuously during intrusive PDI activities using instrumentation equipped with electronic data-logging capabilities. A MIE DataRAM (or equivalent) will be used to

conduct the real-time PM_{10} monitoring. All 15-minute readings shall be recorded via the data logging function of the monitoring equipment. All periodic, instantaneous readings, including readings taken to facilitate activity decisions, will be recorded in the field logbook.

Fugitive dust migration will be visually assessed during all work activities, and reasonable dust suppression techniques will be used during any PDI activities that may generate fugitive dust (see Section 1.4).

2.4 Action Levels

The action levels provided below are to be used to initiate response actions, if necessary, based on real-time monitoring.

2.4.1 Action Levels for VOCs

As outlined in the NYSDOH G-CAMP, if the ambient air concentration for total VOCs exceeds 5 parts per million (ppm) above background (upwind location) for the 15-minute average, intrusive PDI activities will be temporarily halted while monitoring continues. If the total VOC concentration readily decreases (through observation of instantaneous readings) below 5 ppm above background, then intrusive PDI activities can resume with continuous monitoring.

If the ambient air concentrations for total VOCs persist at levels in excess of 5 ppm above background but less than 25 ppm above background, intrusive PDI activities will be halted, the source of the elevated VOC concentrations identified, corrective actions to reduce or abate the emissions undertaken, and air monitoring will be continued. Once these actions have been implemented, intrusive PDI activities can resume provided the following two conditions are met:

- The 15-minute average VOC concentrations remain below 5 ppm above background; and

- The VOC level 200 feet downwind of the monitoring location or half the distance to the nearest potential receptor or residential/commercial structure (whichever is less but in no case less than 20 feet) is below 5 ppm over background for the 15-minute average.

If the ambient air concentrations for total VOCs exceed 25 ppm above background, the intrusive PDI activities must cease, and emissions control measures must be implemented.

2.4.2 Action Levels for PM_{10}

As required by the NYSDOH guidance, if the ambient air concentration for PM_{10} at the monitoring downwind monitoring location is noted at levels in excess of 100 micrograms per cubic meter ($\mu g/m^3$) above the background (upwind location), or if airborne dust is observed leaving the work area, intrusive PDI activities will be temporarily halted. The source of the elevated PM_{10} concentration is to be identified, corrective actions to reduce or abate the emissions will be undertaken, and air monitoring will continue. Work may continue following the implementation of dust suppression techniques provided the PM_{10} levels do not exceed 150 $\mu g/m^3$ above background.

If, after implementation of dust suppression techniques, PM_{10} levels are greater than 150 $\mu g/m^3$ above background (upwind), work must be stopped and PDI activities must be re-evaluated. Work may only resume provided that the dust suppression measures and other controls are successful in reducing PM_{10} levels less than 150 $\mu g/m^3$ above background and in preventing visible dust from leaving the work area.

If the ambient air concentration of PM_{10} is 150 $\mu g/m^3$ above background, the intrusive PDI activities must cease and emission control measures must be implemented. The PM_{10} concentrations will be recorded in accordance with Section 2.3 above.

2.5 Meteorological Monitoring

Wind direction is the only meteorological information considered relevant for the PDI activities and CAMP. Meteorological monitoring will be conducted periodically at the site using a windsock, wind vane, or other appropriate equipment. Wind direction will be established at the start of each work day and may be re-established at any time during the work day if a significant shift in wind direction is noted. Wind direction will be recorded in the field activity logbook.

2.6 Instrument Calibration

Calibration of the VOC and PM_{10} instrumentation will occur in accordance with each of the equipment manufacturer's calibration and quality assurance requirements. The VOC and PM_{10} monitors will be calibrated at least daily, and calibrations will be recorded in the field activity logbook.

3. Monitoring Schedule, Data Collection, and Reporting

The following identifies the monitoring schedule and data collection and reporting requirements.

3.1 Monitoring Schedule

Real-time VOC and PM_{10} monitoring will be performed continuously throughout the intrusive PDI activities. Wind direction will be determined at the start of each day and at any other appropriate time during PDI activities.

3.2 Data Collection and Reporting

Air monitoring data will be collected continuously from VOC and PM_{10} monitors during intrusive PDI activities by an electronic data-logging system. The data management software will be set up so that instantaneous observed readings would be recorded by the electronic data acquisition system and averaged over 15-minute time periods. In addition to the above, VOC readings will be collected periodically during non-intrusive PDI activities. All readings will be recorded and archived for review by NYSDOH and NYSDEC personnel, as necessary.

Attachment 1

NYSDOH G-CAMP

Appendix 1A
New York State Department of Health
Generic Community Air Monitoring Plan

Overview

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

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

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

Community Air Monitoring Plan

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

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

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. APeriodic@ monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or

overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

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

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

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

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

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

Particulate Monitoring, Response Levels, and Actions

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

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

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

3. All readings must be recorded and be available for State (DEC and NYSDOH) and County Health personnel to review.

December 2009

Appendix 1B
Fugitive Dust and Particulate Monitoring

A program for suppressing fugitive dust and particulate matter monitoring at hazardous waste sites is a responsibility on the remedial party performing the work. These procedures must be incorporated into appropriate intrusive work plans. The following fugitive dust suppression and particulate monitoring program should be employed at sites during construction and other intrusive activities which warrant its use:

1. Reasonable fugitive dust suppression techniques must be employed during all site activities which may generate fugitive dust.

2. Particulate monitoring must be employed during the handling of waste or contaminated soil or when activities on site may generate fugitive dust from exposed waste or contaminated soil. Remedial activities may also include the excavation, grading, or placement of clean fill. These control measures should not be considered necessary for these activities.

3. Particulate monitoring must be performed using real-time particulate monitors and shall monitor particulate matter less than ten microns (PM10) with the following minimum performance standards:

(a) Objects to be measured: Dust, mists or aerosols;
(b) Measurement Ranges: 0.001 to 400 mg/m3 (1 to 400,000 :ug/m3);
(c) Precision (2-sigma) at constant temperature: +/- 10 :g/m3 for one second averaging; and +/- 1.5 g/m3 for sixty second averaging;
(d) Accuracy: +/- 5% of reading +/- precision (Referred to gravimetric calibration with SAE fine test dust (mmd= 2 to 3 :m, g= 2.5, as aerosolized);
(e) Resolution: 0.1% of reading or 1g/m3, whichever is larger;
(f) Particle Size Range of Maximum Response: 0.1-10;
(g) Total Number of Data Points in Memory: 10,000;
(h) Logged Data: Each data point with average concentration, time/date and data point number
(i) Run Summary: overall average, maximum concentrations, time/date of maximum, total number of logged points, start time/date, total elapsed time (run duration), STEL concentration and time/date occurrence, averaging (logging) period, calibration factor, and tag number;
(j) Alarm Averaging Time (user selectable): real-time (1-60 seconds) or STEL (15 minutes), alarms required;
(k) Operating Time: 48 hours (fully charged NiCd battery); continuously with charger;
(l) Operating Temperature: -10 to 50^{o} C (14 to 122^{o} F);
(m) Particulate levels will be monitored upwind and immediately downwind at the working site and integrated over a period not to exceed 15 minutes.

4. In order to ensure the validity of the fugitive dust measurements performed, there must be appropriate Quality Assurance/Quality Control (QA/QC). It is the responsibility of the remedial party to adequately supplement QA/QC Plans to include the following critical features: periodic instrument calibration, operator training, daily instrument performance (span) checks, and a record keeping plan.

5. The action level will be established at 150 ug/m3 (15 minutes average). While conservative,

this short-term interval will provide a real-time assessment of on-site air quality to assure both health and safety. If particulate levels are detected in excess of 150 ug/m3, the upwind background level must be confirmed immediately. If the working site particulate measurement is greater than 100 ug/m3 above the background level, additional dust suppression techniques must be implemented to reduce the generation of fugitive dust and corrective action taken to protect site personnel and reduce the potential for contaminant migration. Corrective measures may include increasing the level of personal protection for on-site personnel and implementing additional dust suppression techniques (see paragraph 7). Should the action level of 150 ug/m3 continue to be exceeded work must stop and DER must be notified as provided in the site design or remedial work plan. The notification shall include a description of the control measures implemented to prevent further exceedances.

6. It must be recognized that the generation of dust from waste or contaminated soil that migrates off-site, has the potential for transporting contaminants off-site. There may be situations when dust is being generated and leaving the site and the monitoring equipment does not measure PM10 at or above the action level. Since this situation has the potential to allow for the migration of contaminants off-site, it is unacceptable. While it is not practical to quantify total suspended particulates on a real-time basis, it is appropriate to rely on visual observation. If dust is observed leaving the working site, additional dust suppression techniques must be employed. Activities that have a high dusting potential--such as solidification and treatment involving materials like kiln dust and lime--will require the need for special measures to be considered.

7. The following techniques have been shown to be effective for the controlling of the generation and migration of dust during construction activities:

(a) Applying water on haul roads;
(b) Wetting equipment and excavation faces;
(c) Spraying water on buckets during excavation and dumping;
(d) Hauling materials in properly tarped or watertight containers;
(e) Restricting vehicle speeds to 10 mph;
(f) Covering excavated areas and material after excavation activity ceases; and
(g) Reducing the excavation size and/or number of excavations.

Experience has shown that the chance of exceeding the 150ug/m3 action level is remote when the above-mentioned techniques are used. When techniques involving water application are used, care must be taken not to use excess water, which can result in unacceptably wet conditions. Using atomizing sprays will prevent overly wet conditions, conserve water, and provide an effective means of suppressing the fugitive dust.

8. The evaluation of weather conditions is necessary for proper fugitive dust control. When extreme wind conditions make dust control ineffective, as a last resort remedial actions may need to be suspended. There may be situations that require fugitive dust suppression and particulate monitoring requirements with action levels more stringent than those provided above. Under some circumstances, the contaminant concentration and/or toxicity may require additional monitoring to protect site personnel and the public. Additional integrated sampling and chemical analysis of the dust may also be in order. This must be evaluated when a health and safety plan is developed and when appropriate suppression and monitoring requirements are established for protection of health and the environment.

ARCADIS

Appendix D

Quality Assurance Project Plan

ARCADIS
Infrastructure, environment, buildings

Imagine the result

Quality Assurance Project Plan

Waste-Stream, Inc. Site
Potsdam, New York
Site No. 6-45-022

January 2014; Revised April 2014

ARCADIS

Quality Assurance Project Plan

Waste-Stream, Inc. Site
Potsdam, New York
Site No. 6-45-022

Prepared for:
WSI Group

Prepared by:
ARCADIS
6723 Towpath Road
PO Box 66
Syracuse
New York 13214-0066
Tel 315.446.9120
Fax 315.449.0017

Our Ref.:
B0031006

Date:
January 2014; Revised April 2014

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1 Sample Chain of Custody Form

Acronyms

ASP	Analytical Services Protocol
AST	aboveground storage tank
Casella	Casella Waste Systems, Inc.
CLP	Contract Laboratory Program
COC	chain of custody
DQO	data quality objective
EDD	electronic data deliverable
FSP	*Field Sampling Plan*
GC	gas chromatography
GC/MS	gas chromatography/mass spectrometry
HASP	*Health and Safety Plan*
IDW	investigation-derived waste
LCS	laboratory control sample
mg/kg	milligram per kilogram
MRL	method reporting limit
MS/MSD	matrix spike/matrix spike duplicate
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
OSHA	Occupational Safety and Health Administration
PAH	polynuclear aromatic hydrocarbon
PCB	polychlorinated biphenyl
PDI	Pre-Design Investigation
PID	photoionization detector
QA/QC	quality assurance/quality control
QAM	Quality Assurance Manager
QAPP	*Quality Assurance Project Plan*
RD/RA	Remedial Design/Remedial Action
ROD	Record of Decision
RPD	relative percent difference
SCO	soil cleanup objective
SDG	sample delivery ground
SVOC	semivolatile organic compound
TAL	target analyte list
TDS	total dissolved solids
TOC	total organic carbon
TSCA	Toxic Substances Control Act
TSS	total suspended solids

USEPA	United States Environmental Protection Agency
UST	underground storage tank
VOC	volatile organic compound
WSI	Waste-Stream, Inc.

ARCADIS

Preface

This *Quality Assurance Project Plan* (QAPP) presents the analytical methods and procedures that will be used during implementation of the New York State Department of Environmental Conservation (NYSDEC) selected remedy at the Waste-Stream, Inc. (WSI) site located in Potsdam, New York (Site No. 6-45-022). This QAPP has been prepared on behalf of the WSI Group, including Casella Waste Systems, Inc. (Casella) and National Grid. The selected remedy to address environmental impacts identified at the site is presented in the June 2011 Record of Decision (ROD) (NYSDEC, 2011).

This QAPP was prepared in a manner consistent with the following reference and guidance documents:

- United States Environmental Protection Agency's (USEPA's) *Test Methods for Evaluating Solid Waste, SW-846* (USEPA, 1996)

- The USEPA's guidance document entitled *EPA Requirements for Quality Assurance Project Plans for Environmental Operations, EPA-QA/R-5* (USEPA, 2001), which replaces QAMS-005/80 *Interim Guidance and Specifications for Preparing Quality Assurance Project Plans* (USEPA, 1980)

- The National Enforcement Investigations Center *Policies and Procedures Manual* (USEPA, 1978, Revised 1991)

Information contained in this QAPP has been organized into the following sections:

Section	Content
Project Management	
1	Project Organization and Responsibilities
2	Project Background
3	Project Description
4	Quality Objectives and Criteria for Measurement Data
5	Special Training Requirements/Certification
6	Documentation and Records
Measurement/Data Acquisition	
7	Sampling Process Design
8	Sampling Method Requirements
9	Sample Handling and Custody Requirements

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10	Analytical Procedures
11	Quality Control Requirements
12	Instrument/Equipment Testing, Inspection, and Maintenance Requirements
13	Instrument Calibration and Frequency
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17	Assessment and Response Actions
18	Reports to Management
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19	Data Review, Validation, and Verification
20	Validation and Verification Methods
21	Reconciliation with User Requirements
22	References

Details are provided in the subsequent sections. This document also contains pertinent information from the *Remedial Design/Remedial Action (RD/RA) Work Plan* related to the measurements and evaluation of the analytical data.

1. Project Organization and Responsibilities

1.1 Project Organization

The site will require integration of personnel from the organizations identified below, collectively referred to as the project team. A detailed description of the responsibilities of each member of the project team is presented in Section 1.2.

1.1.1 Overall Project Management

ARCADIS, on behalf of the WSI Group, has overall technical responsibility for site investigation activities. ARCADIS personnel will perform the tasks and subtasks presented in Section 3 and will be responsible for evaluating investigation data and preparing the deliverables specified in the RD/RA Work Plan. A listing of project management personnel and their responsibilities is provided below.

Company/ Organization	Title	Name	Phone Number
NYSDEC	Project Manager	Benjamin McPherson	315.785.2516
National Grid	Lead Senior Environmental Engineer	James F. Morgan	315.428.3101
Casella	Director of Landfill Gas to Energy & Renewables Development	Jerry Leone	607.435.9996
ARCADIS	Principal in Charge	Terry W. Young	315.671.9478
	Project Manager	Jason Brien	315.671.9114
	Field Activities Manager	Jason Golubski	315.671.9437
	Quality Assurance Coordinator	Dennis Capria	315.671.9299

Company/ Organization	Title	Name	Phone Number
Lab – Accutest (soil, sediment, and water sampling)	Project Manager	Matt Morrell	508.481.6200
	Quality Assurance Manager	Robert Treggiari	508.481.6200
Lab – Pace Analytical (biota sampling)	Project Manager	Tod Noltemeyer	608.232.3300
	Quality Assurance Manager	Kate Grams	608.232.3300

1.2 Team Member Responsibilities

This section of the QAPP discusses the responsibilities and duties of the project team members.

1.2.1 WSI Group

- Overall direction of the investigation
- Oversight and review of the ARCADIS work products
- Provide ARCADIS approval for major project deliverables

1.2.2 ARCADIS

Project Manager

- Management and coordination of all aspects of the project as defined in the RD/RA Work Plan with an emphasis on adhering to the project objectives.
- Reviews investigation results reports and all documents prepared by ARCADIS.
- Confirms that corrective actions are taken for deficiencies cited during audits of the field activities.

Field Activities Manager

- Oversight of field efforts.
- Oversight of collection of soil, sediment, water, and biota samples.
- Oversight of field analysis and collection of quality assurance (QA) samples.
- Reduction of field data calibration and maintenance.
- Review of the field instrumentation, maintenance, and calibration to maintain quality data.
- Preparation of draft reports and other key documents.
- Maintenance of field files of notebooks, logs, and calculations.
- Instruction of field staff.
- Coordination of field and laboratory schedules.

Field Personnel

- Perform field procedures associated with the tasks and subtasks presented in Section 3.
- Perform field analyses and collect QA samples.
- Calibrate, operate, and maintain field equipment.
- Reduce field data.
- Maintain sample custody.
- Prepare field records and logs.

Quality Assurance Manager

- Review laboratory data packages.

- Oversee and interface with the analytical laboratories.
- Coordinate field QA/quality control (QC) activities with task managers, including audits of field activities, concentrating on field analytical measurements and practices to meet data quality objectives (DQOs).
- Review field reports.
- Review audit reports.
- Prepare a QA/QC report that includes an evaluation of field and laboratory data and data validation reports.

1.2.3 Laboratory Subcontractor

General responsibilities and duties include:

- Perform sample analyses.
- Supply sample containers and shipping cartons.
- Maintain laboratory custody of samples.
- Strictly adhere to laboratory protocols.

Laboratory Project Manager

- Serve as primary communication link between ARCADIS and laboratory staff.
- Monitor workloads and confirm availability of resources.
- Oversee preparation of analytical reports.
- Supervise in-house chain of custody.

Quality Assurance Officer

- Supervise technical staff in QA/QC procedures.
- Conduct audits of all laboratory activities.

2. Project Background

The following summarizes background information for the facility. Additional information can be found in the RD/RA Work Plan.

2.1 Site Location and Description

The WSI site consists of the WSI property (i.e., upland area), areas immediately adjacent to the WSI property, wetlands located northeast of the property (referred to as the northern drainage area), and a drainage swale that conveys storm water runoff from the WSI property to the northern drainage area. Note that in 2011, Casella purchased an approximately 58 acre portion of the northern drainage area from Potsdam Hardwood, Inc. Ownership of an approximately 14 acre portion of the northern drainage area (i.e., northern most portion) was transferred to Lavalley Realty, Inc. and the remaining 44 acres was retained by Casella.

The approximately 29.2 acre WSI property is located at 147 Outer Maple Street (New York State (NYS) Route 11) in the Town and Village of Potsdam, St. Lawrence County, New York. The property is bordered to the north by an industrial facility and undeveloped land to the east, Route 11 to the south, and a lightly developed property to the west. In addition, the Corporation Line between the Town of Potsdam and the Village of Potsdam extends along the eastern property boundary, and an active railroad right-of-way extends across the southern portion of the site.

2.2 Site History

The WSI property operated as a metal recycling facility and scrap yard starting in approximately 1957. Prior to the mid-1960s, operations were primarily conducted within the southern portion of the property. During the period between the mid-1960s and mid-1970s, facility operations expanded to the north. Site activities conducted during this period reportedly included tin press operations, metal shearing, car crushing, and scrap metal processing. During this period, the facility reportedly processed electrical transformers that contained polychlorinated biphenyl (PCB) containing dielectric fluids (e.g., mineral oil). The transformers were reportedly drained for subsequent recycling/wire recovery operation. The facility also reportedly processed scrap manufacturing equipment that had fluid reservoirs with PCB-containing oils. The manufacturing equipment that was brought to the site during this period were staged and processed in an area southwest of the maintenance shop. Between the mid-1970s and the present, scrap yard operations shifted to the north into the current operating

area. A municipal solid waste transfer station was constructed at the WSI property in the mid-1980s.

Throughout the history of site operations, several aboveground storage tanks (ASTs) and underground storage tanks (USTs) have been in service. Petroleum product storage at the site included fuel oil and kerosene for heating purposes and gasoline and diesel for vehicles and equipment. The USTs were reportedly closed prior to April 1991 and May 1996. The ASTs were reportedly closed in 1995 and 1996. A 20,000-gallon diesel AST and a 10,000-gallon gasoline AST were previously located near the northeast corner of the storage barn. These tanks were relocated into a secondary containment structure located south of the storage barn in the southeast corner of the property, where they are presently located. The 10,000-gallon gasoline AST was reportedly converted to diesel storage at the time the tank was relocated to the secondary containment structure.

Over the past several years, WSI has relocated the majority of operations from the site. Activities currently conducted at the site include periodic use of the vehicle maintenance building. Office and clerical staff continue to occupy the office building located in the southern portion of the site.

2.3 Project Objectives

The purpose of the pre-design investigation (PDI) activities is to gather additional data to complete the remedial design of the NYSDEC-selected soil remedy. The data collected during the PDI will be used with existing data from previous investigations. As presented in the NYSDEC ROD (NYSDEC, 2011), the selected remedy must eliminate or mitigate all significant threats to public health and/or the environment. To achieve this goal remediation objectives have been established for soil, groundwater, surface water, and sediment. The NYSDEC-selected remedy consists of the following elements relevant to the scope of this QAPP:

- Excavating soil from off-site areas that contain volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), PCBs, or metals at concentrations greater than the lower of the 6NYCRR Part 375-6 ecological resource or residential use soil cleanup objectives (SCOs). Additional soil investigation activities are necessary prior to remedial design to further delineate the horizontal and vertical extent of soil exceeding the SCOs for PCBs, VOCs, SVOCs, and/or metals.

- Excavating soil from on-site and off-site locations that contain PCBs at concentrations greater than or equal to 50 milligrams per kilogram (mg/Kg) (i.e., the Toxic Substances Control Act (TSCA) regulated/New York State hazardous waste regulatory level). Additional soil investigation activities are necessary prior to remedial design to confirm the extent of soil exceeding the regulatory level, potentially reduce the previously identified soil removal volume, and establish the soil removal vertical limits such that excavation bottoms contain PCBs at concentrations less than 50 mg/kg.

- Excavating sediment from the off-site northern drainage area and drainage swale that contains concentrations of PCBs at concentrations greater than or equal to 1 mg/kg. Additional sediment investigation activities are necessary prior to remedial design to delineate the vertical and horizontal extent of sediment containing PCBs at concentrations greater than or equal to 50 mg/kg.

- Excavating sediment from both the on-site southern drainage areas that contains PCBs at concentrations greater than 1 mg/kg. Additional sediment investigation activities are necessary prior to remedial design to further delineate the horizontal and vertical limits and to potentially reduce the previously identified sediment removal volumes.

- Biota samples (i.e., fish) will be collected from the northern drainage area wetland and the wetlands of the southern drainage areas prior to remedial construction to establish baseline PCB, metals, and percent lipids concentrations in fish tissue. Post-remediation fish monitoring results will be compared to baseline levels to evaluate trends in fish tissue PCB, metals, and percent lipids concentrations.

- In supporting of implementing the NYSDEC-selected remedy, surface water and groundwater samples will be collected to characterize groundwater and surface water quality in the upland soil excavation areas, southern drainage areas, and the northern drainage areas to support the design of a temporary water treatment system.

3. Quality Objectives and Criteria for Measurement Data

The data quality objective (DQO) process, as described in the EPA QA/G-4 QAPP instructions document, is intended to provide a "logical framework" for planning field investigations. The following addresses, in turn, each of the seven sequential steps in the EPA QA/G-4 QAPP DQO process.

Step 1: State the Problem

The WSI property has operated as a metal recycling facility and scrap yard since approximately 1957. Historically, the handling, cutting, and processing of scrap and machinery led to the release of fluids containing VOCs, SVOCs, metals, and PCBs. The dismantling of hydraulic equipment and transformers were the predominant source of the PCB contamination. Historical site operations resulted in areas of soil, sediment, surface water, and groundwater affected by the PCBs, VOCs, SVOCs (primarily polynuclear aromatic hydrocarbons [PAHs]), and metals at concentrations greater than the applicable Federal and/or State screening levels.

Step 2: Identify the Goal of the Study

The goal of the PDI is the collect soil and sediment samples to further delineate the excavation requirements for on-site and off-site areas. Surface water and groundwater samples will be collected to characterize water quality in the soil and sediment removal areas to assist in the design of a temporary water treatment system. Biota samples will be collected prior to remedial construction activities to establish baseline PCB, metals, and percent lipids concentrations in fish tissue.

Step 3: Identify Information Inputs

Data collection will be conducted in accordance with the RD/RA Work Plan. The objective of the data collection activities is to obtain additional information necessary to complete the remedial design. Soil, sediment, groundwater/surface water, and biota samples will be collected and analyzed for the constituents summarized in Tables 1a, 1b, and 1c. The data will be evaluated for completeness, general conformance with requirements of this QAPP, and consistency among data sets and with historical data, as appropriate.

Step 4: Define the Boundaries of the Study

The WSI site is located on the west end of the Village of Potsdam in St. Lawrence County. The site is approximately 27 acres in size and is located at 147 Outer Maple Street (NYS Route 11). The main site consists of an active scrap yard, weigh stations, and offices. The site also included a municipal waste transfer station. Sampling will be conducted from on-site and off-site locations, including on-site drainage swales and a regulated wetland area northeast of the site. The wetland area eventually drains to the Raquette River, located approximately 0.6 miles east of the site.

Step 5: Developing the Analytical Approach

Soil, sediment, groundwater, surface water, and biota samples will be collected and analyzed as described in the RD/RA Work Plan and this QAPP. Laboratory method reporting limits (MRLs) will be set to less than the applicable screening levels as shown on Tables 1a, 1b, and 1c. All analytical data will be validated to ensure QA/QC limits are met in accordance with this QAPP. The decision on whether data can be used will be based on the validation results. Following validation, the data will be flagged, as appropriate, and any use restrictions noted. The sampling plan has been devised so that the loss of any single data point will not hinder description of the distribution of constituents of concern. Given this, a reasonable decision rule would be that 90% of the data points not be rejected and deemed unusable.

Step 6: Specify Performance or Acceptance Criteria

Results will be compared to the applicable screening levels as shown on Tables 1a, 1b, and 1c, and laboratory quality control limits as shown on Table 4. Acceptance criteria for soil, sediment, water, and biota samples include successful collection of samples from the designated locations, and analysis of samples by the project laboratory with MRLs below the screening levels and with acceptable QA/QC sample analysis resulting in usable data. The sampling and analysis program has been developed based on a review of previous site data and knowledge of present site conditions. Corrective actions are described elsewhere in the document. The representative nature of the sampling design has been assured by discussions among professionals familiar with the site and the appropriate government agencies.

Step 7: Develop the Plan for Obtaining Data

Sampling and analysis design are detailed in the RD/RA Work Plan and this QAPP. The overall QA objective is to develop and implement procedures for field sampling, field and laboratory chain of custody (COC), laboratory analysis, and reporting that will provide results to support the evaluation of the site data consistent with project requirements. Specific procedures for sampling, COC, laboratory instrument calibration, laboratory analysis, data reporting, internal quality control, audits, preventive maintenance of field equipment, and corrective action are described in other sections of this QAPP.

A DQO summary for the sampling efforts is presented in the subsequent section. The summary consists of stated DQOs relative to data uses, data types, data quantity, sampling and analytical methods, and data measurement performance criteria.

3.1 Data Categories

Three data categories have been defined to address various analytical data uses and the associated QA/QC effort and methods required to achieve the desired levels of quality. These categories are:

Screening Data: Screening data affords a quick assessment of site characteristics or conditions. This objective for data quality is applicable to data collection activities that involve rapid, non-rigorous methods of analysis and QA. This objective is generally applied to physical and/or chemical properties of samples, degree of contamination relative to concentration differences, and preliminary health and safety assessment.

Screening Data with Definitive Confirmation: Screening data allows rapid identification and quantitation, although the quantitation can be relatively imprecise. This objective for data quality is available for data collection activities that require qualitative and/or quantitative verification of a select portion of sample findings (10 percent or more). This objective can also be used to verify less rigorous laboratory-based methods.

Definitive Data: Definitive data are generated using analytical methods, such as approved USEPA reference methods. Data are analyte-specific, with confirmation of analyte identity and concentration. Methods produce raw data (e.g., chromatograms, spectra, digital values) in the form of paper printouts or computer-generated electronic files.

It is anticipated that both the screening and definitive data categories will be used during the investigation. Screening techniques will include air monitoring for VOCs and particulate matter. All remaining parameters will be determined using definitive techniques.

For this project, three levels of data reporting have been defined. They are as follows:

Level 1 – Minimal Reporting: Minimal or "results only" reporting is used for analyses that, either due to their nature (i.e., field monitoring) or the intended data use (i.e., preliminary screening), do not generate or require extensive supporting documentation.

Level 2 – Modified Reporting: Modified reporting is used for analyses that are performed following standard USEPA-approved methods and QA/QC protocols and that, based on the intended data use, require some supporting documentation but not, however, full "Contract Laboratory Program-type" (CLP-type) reporting.

Level 3 – Full Reporting: Full "CLP-type" reporting is used for those analyses that, based on intended data use, require full documentation. This reporting level would include Analytical Services Protocol (ASP) Superfund and Category B reporting.

The analytical methods to be used during the investigation activities will be USEPA SW-846, USEPA Methods for Chemical Analysis of Water and Waste and Standard Methods for Water and Wastewater methods with NYSDEC ASP Revision 2005, QA/QC requirements, and Category B reporting deliverables. A summary of the testing methods is provided in Tables 1a, 1b, and 1c.

3.2 Field Activities

To obtain information necessary to meet the objectives stated above in Section 2.3, the following tasks will be performed: (Note: only tasks that require collection and analysis of environmental samples or collecting field measurements are listed below. Refer to the RD/RA Work Plan for a description of the tasks and subtasks.)

- PDI Task 1a – Soil Delineation Sampling
- PDI Task 2b – Sediment Delineation Sampling
- PDI Task 2d – Baseline Biota Sampling
- PDI Task 3 – Water Treatability Sampling

A description of the DQOs is presented in the following subsections.

3.2.1 Data Quality Objectives for PDI Task 1a – Soil Delineation Sampling

As described in the RD/RA Work Plan, soil borings will be completed to (1) confirm the extent of soils impacted with VOCs, SVOCs, PCBs, and metals in off-site areas and (2) to confirm the extent of soils impacted with PCBs at on-site locations. Each soil sample will be visually characterized for soil type and the presence of visible staining, sheen, free product, and obvious odors.

The number of soil samples that will be collected, including QA/QC samples, is summarized in Table 2. Table 1a presents the parameters to be analyzed under each of the methods described above with the laboratory quantitation limits. Samples will be submitted to Accutest Laboratories, located in Marlborough, Massachusetts, for analysis.

3.2.2 Data Quality Objectives for PDI Task 2b – Sediment Delineation Sampling

As described in the RD/RA Work Plan, a sediment investigation within the off-site northern drainage area and drainage swale, and the on-site southern drainage area will be conducted. The investigation will consist of identifying the extent of PCB-impacted sediment. Sediment samples will be visually characterized for color, composition, and presence/absence of PCB-related impacts (e.g., staining or odors).

The number of sediment samples that will be collected, including QA/QC samples, is summarized in Table 2. Table 1a presents the parameters to be analyzed under each of the methods described above with the laboratory quantitation limits. Samples will be submitted to Accutest Laboratories, located in Marlborough, Massachusetts, for analysis.

3.2.3 Data Quality Objectives for PDI Task 2d – Baseline Biota Sampling

As described in the RD/RA Work Plan, fish samples will be collected in the wetlands of the northern drainage area and southern drainage areas prior to remediation to establish baseline PCB, metals, and percent lipid concentrations in fish tissue. Future fish sampling results will be compared to the baseline levels to evaluate trends in fish tissue PCB, metals, and percent lipid concentrations following the completion of remedial construction activities.

The number of biota samples that will be collected, including QA/QC samples, is summarized in Table 2. Table 1c presents the parameters to be analyzed under each

of the methods described above with the laboratory quantitation limits. Note that samples for PCB analysis will be extracted using the soxhlet method (i.e., compliant with SW-846 3541C). Samples will be submitted to Pace Analytical, located in Green Bay, Wisconsin, for analysis.

3.2.4 Data Quality Objectives for Task 3 – Water Treatability Sampling

The PDI involves the collection and submitting water samples for laboratory analysis in support of characterizing the water quality within the soil and sediment removal areas for the design of a temporary water treatment system. Analytical results will be used to evaluate and select components of the temporary water treatment system.

The number of water samples that will be collected, including QA/QC samples, is summarized in Table 2. Table 1b presents the parameters to be analyzed under each of the methods described above with the laboratory quantitation limits. Samples will be submitted to Accutest Laboratories, located in Marlborough, Massachusetts, for analysis.

4. Special Training Requirements/Certification

Compliant with the Occupational Safety and Health Administration's (OSHA's) final rule, *Hazardous Waste Operations and Emergency Response*, 29 Code of Federal Regulations Part 1910.120(e), all personnel performing remedial activities at the site will have completed the requirements for OSHA 40-hour Hazardous Waste Operations and Emergency Response training. Persons in field supervisory positions will have also completed the additional OSHA 8-hour Supervisory Training.

5. Documentation and Records

5.1 General

Samples of the various media will be collected, as described in the RD/RA Work Plan. Detailed descriptions of the documentation and reporting requirements are presented below.

5.2 Sample Designation System

Samples will be identified with a unique designation system that will facilitate sample tracking. The sample designation system to be employed during the sampling activities will be consistent, yet flexible enough to accommodate unforeseen sampling events and conditions. An alpha-numeric system is considered appropriate and will be used by field personnel to assign each sample with a unique sample identification number. The sample identification number will begin with a prefix indicating the sample type and two digits indicating the sequential sample number collected from the location.

The samples types (if applicable) will be designated using the following codes:

- Subsurface (Soil boring) Soil Sample – "SB"
- Surface Water Sample – "SW"
- Groundwater Sample – "GW"
- Sediment Sample – "SD"
- Biota Sample – "BI"
- Trip Blank Sample – "TB"
- Field Duplicate Sample – "DUP"
- Equipment Blank Sample – "EB"
- Matrix Spike and Matrix Spike Duplicate – "MS" and MSD"

The location code will follow the sample type code. For subsurface and surface soil samples, the designation will also consist of the sample depth in feet. For example, a subsurface soil sample collected form a depth of 2 to 4 feet from SB-02 would be designated SB-02 (2-4). For sediment, water, and biota samples, the sample code will be a six-digit number indicating the month, day, and year the sample was obtained. For example, a groundwater sample collected from monitoring well MW-2 on January 19, 2014 will be designated MW-2-011914.

QA/QC samples will be designated by a three-letter code followed by the six-digit sample collection date. For field and equipment blanks, a two letter sample type code will precede the blank designation to indicate which medium the blank was intended to represent. For example, a field blank collected on January 19, 2014 during surface soil samples collection would be designated SS-FB1-011914. The sampling point associations for field duplicates must be recorded in the field log.

5.3 Field Documentation

Field personnel will provide comprehensive documentation covering all aspects of field sampling, field analysis, and sample chain of custody. This documentation constitutes a record that allows reconstruction of all field events to aid in the data review and interpretation process. All documents, records, and information relating to the performance of the field work will be retained in the project file.

The various forms of documentation to be maintained throughout the action include:

- *Daily Production Documentation* – A field notebook consisting of a waterproof, bound notebook that will contain a record of all activities performed at the site.

- *Sampling Information* – Detailed notes will be made as to the exact site of sampling, physical observations, and weather conditions (as appropriate).

- *Sample Chain of Custody* – Chain of custody forms will provide the record of responsibility for sample collection, transport, and submittal to the laboratory. Chain of custody forms will be filled out at each sampling site, at a group of sampling sites, or at the end of each day of sampling by ARCADIS field personnel designated to be responsible for sample custody. In the event that the samples are relinquished by the designated sampling person to other sampling or field personnel, the chain of custody form will be signed and dated by the appropriate personnel to document the sample transfer. The original chain of custody form will accompany the samples to the laboratory, and copies will be forwarded to the project files. A sample chain of custody form is included in Attachment 1.

  Persons will have custody of samples when the samples are in their physical possession, in their view after being in their possession, or in their physical possession and secured so they cannot be tampered with. In addition, when samples are secured in a restricted area accessible only to authorized personnel, they will be deemed to be in the custody of such authorized personnel.

- *Field Equipment, Calibration, and Maintenance Logs* – To document the calibration and maintenance of field instrumentation, calibration and maintenance logs will be maintained for each piece of field equipment that is not factory calibrated.

5.4 Laboratory Documentation

5.4.1 Laboratory Project Files

The laboratory will establish a file for all pertinent data. The file will include all correspondence, faxed information, phone logs, and chain of custody forms. The laboratory will retain all project files and data packages for a period of 5 years.

5.4.2 Laboratory Logbooks

Workbooks, bench sheets, instrument logbooks, and instrument printouts will be used to trace the history of samples through the analytical process and document and relate important aspects of the work, including the associated QC samples. As such, all logbooks, bench sheets, instrument logs, and instrument printouts will be part of the permanent record of the laboratory.

Each page or entry will be dated and initialed by the analyst at the time of entry. Errors in entry will be crossed out in indelible ink with a single stroke, corrected without the use of whiteout or by obliterating or writing directly over the erroneous entry, and initialed and dated by the individual making the correction. Pages of logbooks that are not used will be completed by lining out unused portions.

Information regarding the sample, analytical procedures performed, and the results of the testing will be recorded on laboratory forms or personal notebook pages by the analyst. These notes will be dated and will also identify the analyst, the instrument used, and the instrument conditions.

Laboratory notebooks will be periodically reviewed by the laboratory group leaders for accuracy, completeness, and compliance to this QAPP. All entries and calculations will be verified by the laboratory group leader. If all entries on the pages are correct, then the laboratory group leader will initial and date the pages. Corrective action will be taken for incorrect entries before the laboratory group leader signs.

5.4.3 Computer Tape and Hard Copy Storage

All electronic files will be maintained on CD-ROM for 5 years; hard copy data packages will be maintained in files for 5 years.

5.5 Data Reporting Requirements

5.5.1 Field Data Reporting

Information collected in the field through visual observation, manual measurement, and/or field instrumentation will be recorded in field notebooks or data sheets and/or on forms. Such data will be reviewed by the appropriate Task Manager for adherence to the RD/RA Work Plan and for consistency. Concerns identified as a result of this review will be discussed with the field personnel, corrected if possible, and, as necessary, incorporated into the data evaluation process.

Where appropriate, field data forms and calculations will be processed and included in appendices to the PDI Summary Report. The original field logs, documents, and data reductions will be kept in the project file at the ARCADIS office in Syracuse, New York.

5.5.2 Laboratory Data Reporting

Analytical results will be provided by the laboratory in a digital format. The data packages will be examined to insure that the correct analyses were performed for each sample submitted and that all of the analyses requested on the chain of custody form were performed. If discrepancies are noted, the Quality Assurance Coordinator will be notified and will promptly follow up with the laboratory to resolve any issues.

Each data package will be validated in accordance with the procedures presented in this QAPP. Data that do not meet the specified standards will be flagged pending resolution of the issue. The flag will not be removed from the data until the issue associated with the sample results is resolved. Although flags may remain for certain data, the use of that data may not necessarily be restricted.

Following completion of the data validation, the data review will be used to populate the appropriate database tables. This format specifies one data record for each constituent and each sample analyzed. Specific fields include:

- Sample identification number
- Date sampled
- Date analyzed
- Parameter name
- Analytical result
- Units
- Detection limit
- Qualifier(s)

The individual electronic data deliverables (EDDs) supplied by the laboratory in Equis 5 format and defined four file Equis format value in a Microsoft Excel worksheet. Analytical data that cannot be provided by the laboratory in electronic format will be entered manually. Hand-keyed data will be reviewed for accuracy. After entry into the database, the EDD data will be compared to the field information previously entered into the database to confirm that all requested analytical data were received.

The laboratory is responsible for preparing ASP Category B data packages for all soil, sediment, water, and biota samples.

All data reports for all parameters will include, at a minimum, the following items:

Narrative – Summary of activities that took place during the course of sample analysis, including the following information:

- Laboratory name and address
- Date of sample receipt
- Cross reference of laboratory identification number to contractor sample identification
- Analytical methods used
- Deviations from specified protocol
- Corrective actions taken

Included with the narrative will be any sample handling documents, including field and internal chain of custody forms, air bills, and shipping tags.

Analytical Results – Reported according to analysis type, including the following information, as acceptable:

- Sample ID
- Laboratory ID
- Date of collection
- Date of receipt
- Date of extraction
- Date of analysis
- Detection limits

Sample results on the report forms will be corrected for dilutions. Soil samples will be reported on a dry weight basis. Unless otherwise specified, results will be reported uncorrected for blank contamination.

The data for all analyses will be expanded to include all supporting documentation necessary to provide a Category B package. This additional documentation will include, but is not limited to, all raw data required to recalculate any result, including printouts, chromatograms, and quantitation reports. The report also will include standards used in calibration and calculation of analytical results; sample extraction, digestion, and other preparation logs; standard preparation logs; instrument run logs; and moisture content calculations.

5.6 Project File

Project documentation will be placed in project files according to ARCADIS' protocol for document management at the ARCADIS office in Syracuse, New York. Project files typically consist of the following components:

1. Agreements/proposals (filed chronologically).

2. Change orders/purchase orders (filed chronologically).

3. Invoices (filed chronologically).

4. Project management (filed by topic).

5. Correspondence (filed chronologically).

6. Notes and data (filed by topic).

7. Public relations information (filed by topic).

8. Regulatory documents (filed chronologically).

9. Marketing documents (filed chronologically).

10. Final reports/presentations (filed chronologically).

11. Draft reports/presentations (filed chronologically).

12. Documents prepared by others (filed chronologically).

Final reports (including QA Reports) are filed in a designated folder within the project file. Analytical laboratory documentation (when received) and field data will also be filed in a designated folder within the project file. Filed materials may be removed and signed out by authorized personnel on a temporary basis only.

6. Sampling Process Design

Information regarding the sampling design and rationale and associated sampling locations can be found in the RD/RA Work Plan.

7. Sampling Method Requirements

Water, sediment, soil, and biota samples will be collected, as described in the RD/RA Work Plan and Field Sampling Plan (FSP). The approximate sample quantities and field quality control samples are shown in Table 2. The procedures that will be followed to handle, package, and ship collected samples is provided in Section 8.

7.1 PDI Task 1a – Soil Delineation Sampling

Proposed locations for soil borings are shown on Figure 2 of the RD/RA Work Plan. Soil borings will be drilled using direct push methods to the target depth of up to nine feet below grade using macro core sampling sleeves. Each soil sample will be visually characterized for soil type and the presence of visible staining, sheen, free product, and obvious odors. Samples will be collected from each boring at the 0-1 foot, 1-3 foot, 3-5 foot intervals, etc., as appropriate.

Soil cuttings will be staged on-site in an appropriate container (i.e., roll-off, drum) and will be field screened for the presence of volatile organic vapors using a photoionization detector (PID). Composite samples of the investigation-derived waste (IDW) will be submitted for laboratory analysis for waste characterization/disposal purposes. IDW will be managed and disposed of in accordance with applicable rules and regulations.

7.2 PDI Task 2b – Sediment Delineation Sampling

Proposed locations for sediment sampling locations are shown on Figure 3 of the RD/RA Work Plan. Sample locations may be modified or additional locations may be sampled based on the results of the wetland boundary delineation activities. Sediment samples will be collected at each location to the target depth of up to seven feet below grade via manual driving and Lexan or Macrocore tubing. Each soil sample will be visually characterized for soil type and the presence of visible staining, sheen, free product, and obvious odors. Samples will be collected from location at the 0-0.5 foot, 0.5-2 foot (or top of substrate). At locations where a sediment substrate sample will be collected, substrate will be recovered at a depth of 2-feet (or top of substrate) to 4-feet below sediment surface.

IDW generated as part of the sediment delineation activities will be handled as described for the soil investigation activities.

7.3 PDI Task 2d – Baseline Biota Sampling

Previous sampling activities in ponded water of the northern drainage area and southern drainage area ditches identified the presence of small, forage-sized fish such as central mudminnow, fathead minnow, and golden shiner. These species will be targeted for sample collection under the baseline sampling program, but other forage fish species may be collected based on availability.

Samples will be collected using electrofishing equipment. Up to five samples of each of three fish species will be collected from the southern drainage area and associated ditches and the northern drainage area, for a total of up to 30 fish samples. The number of fish included in each sample may vary in order to meet the weight requirements of the analytical program. Likewise, the proposed sample numbers are based on the availability of species in the wetland areas.

7.4 PDI Task 3 – Water Treatability Sampling

Groundwater and surface water samples will be collected to support the design of a temporary water treatment system. Samples will be collected from upland soil excavation areas, southern drainage areas, and northern drainage area to characterize water quality within the removal areas. Sampling procedures are described in the FSP.

8. Sample Handling and Custody Requirements

8.1 Sample Containers and Preservation

Appropriate sample containers, preservation methods, and laboratory holding times for the samples are shown in Table 3.

The analytical laboratory will supply appropriate sample containers and preservatives, as necessary. The bottles will be purchased pre-cleaned to USEPA Office of Solid Waste and Emergency Response Directive 9240.05A requirements. The field personnel will be responsible for properly labeling containers and preserving samples (as appropriate).

8.2 Packing, Handling, and Shipping Requirements

Sample packaging and shipment procedures are designed to confirm that the samples will arrive at the laboratory, with the chain of custody intact.

Samples will be packaged for shipment as outlined below:

- Confirm that all sample containers have the sample labels securely affixed to the container with clear packing tape.
- Check the caps on the sample containers to confirm that they are properly sealed.
- Wrap the sample container cap with clear packing tape to prevent it from becoming loose.
- Complete the chain of custody form with the required sampling information and confirm that the recorded information matches the sample labels. (Note: If the designated sampler relinquishes the samples to other sampling or field personnel for packing or other purposes, the sampler will complete the chain of custody prior to this transfer. The appropriate personnel will sign and date the chain of custody form to document the sample custody transfer.)
- Using duct tape, secure the outside drain plug at the bottom of the cooler.
- Wrap sample containers in bubble wrap or other cushioning material.

- Place 1 to 2 inches of cushioning material at the bottom of the cooler.
- Ice layer.
- Place the sealed sample containers into the cooler.
- Place ice in plastic bags and seal. Place loosely in the cooler.
- Fill the remaining space in the cooler with cushioning material.
- Place chain of custody forms in a plastic bag and seal. Tape the forms to the inside of the cooler lid.
- Close the lid of the cooler, lock, and secure with duct tape.
- Wrap strapping tape around both ends of the cooler at least twice.
- Mark the cooler on the outside with the following information: shipping address, return address, “Fragile” labels, and arrows indicating “this side up.” Cover the labels with clear plastic tape. Place a signed custody seal over the cooler lid.

All samples will be packaged by field personnel and transported as low-concentration environmental samples. The samples will be hand-delivered or delivered by an express carrier within 48 hours of the time of collection. All shipments will be accompanied by the chain of custody form identifying the contents. The original form will accompany the shipment; copies will be retained by the sampler for the sampling office records. If the samples are sent by common carrier, a bill of lading should be used. Receipts or bills of lading will be retained as part of the permanent project documentation. Commercial carriers are not required to sign off on the chain of custody form, as long as the forms are sealed inside the sample cooler and the custody seals remain intact.

Sample custody seals and packing materials for filled sample containers will be provided by the analytical laboratory. The filled, labeled, and sealed containers will be placed in a cooler on ice and carefully packed to eliminate the possibility of container breakage. Trip blank(s) of analyte-free water will be provided by the laboratory and included in each cooler containing aqueous samples to be analyzed for VOCs.

8.3 Field Custody Procedures

The objective of field sample custody is to confirm that samples are not tampered with from the time of sample collection through the time of transport to the analytical laboratory. Persons will have "custody of samples" when the samples are in their physical possession, in their view after being in their possession, or in physical possession and secured so they cannot be tampered with. In addition, when samples are secured in a restricted area accessible only to authorized personnel, they will be deemed to be in the custody of such authorized personnel.

Field custody documentation consists of both field logbooks and field chain of custody forms.

8.3.1 Field Logbooks

Field logbooks will provide the means of recording data collecting activities performed. As such, entries will be described in as much detail as possible so that persons going to the site could reconstruct a particular situation without reliance on memory.

Field logbooks will be bound field survey books or notebooks. Logbooks will be assigned to field personnel, but will be stored in a secure location when not in use. Each logbook will be identified by the project-specific document number. The title page of each logbook will contain the following:

- Person to whom the logbook is assigned
- Logbook number
- Project name
- Project start date
- End date

Entries into the logbook will contain a variety of information. At the beginning of each entry, the date, start time, weather, names of all sampling team members present, level of personal protection being used, and the signature of the person making the entry will be entered. The names of visitors to the site, field sampling or investigation team personnel, and the purpose of their visit will also be recorded in the field logbook.

Measurements made and samples collected will be recorded. All entries will be made in ink, and no erasures will be made. If an incorrect entry is made, the information will be crossed out with a single strike mark. Whenever a sample is collected or a

measurement is made, a detailed description of the location of the station shall be recorded. The number of the photographs taken of the station, if any, will also be noted. All equipment used to make measurements will be identified, as well as with the date of calibration.

Samples will be collected following the sampling procedures documented in the RD/RA Work Plan. The equipment used to collect samples will be noted, as well as with the time of sampling, sample description, depth at which the sample was collected, volume, and number of containers. Sample identification numbers will be assigned prior to sample collection. Field duplicate samples, which will receive an entirely separate sample identification number, will be noted under sample description.

8.3.2 Sample Labeling

Preprinted sample labels will be affixed to sample bottles prior to delivery at the sampling site. The following information is required in each sample label.

- Project
- Date collected
- Time collected
- Location
- Sampler
- Analysis to be performed
- Preservative
- Sample number

8.3.3 Field Chain of Custody Forms

Completed chain of custody forms will be required for all samples to be analyzed. Chain of custody forms will be initiated by the sampling crew in the field. The chain of custody forms will contain the sample's unique identification number, sample date and time, sample description, sample type, preservation (if any), and analyses required. The original chain of custody form will accompany the samples to the laboratory. Copies of the chain of custody will be made prior to shipment (or multiple copy forms used) for field documentation. The chain of custody forms will remain with the samples at all times. The samples and signed chain of custody forms will remain in the possession of the sampling crew until the samples are delivered to the express carrier (e.g., FedEx) or hand delivered to a mobile or permanent laboratory, or placed in secure storage.

Sample labels will be completed for each sample using waterproof ink. The labels will include sample information, such as sample number and location, type of sample, date and time of sampling, sampler's name or initials, preservation, and analyses to be performed. The completed sample labels will be affixed to each sample bottle and covered with clear tape.

Whenever samples are collocated with a source or government agency, a separate Sample Receipt will be prepared for those samples and marked to indicate with whom the samples are being collocated. The person relinquishing the samples to the facility or agency should request the representative's signature, acknowledging sample receipt. If the representative is unavailable or refuses, this is noted in the "Received By" space.

8.4 Management of Investigation-Derived Materials and Wastes

Disposable equipment, debris, and decontamination rinsate (e.g., tap and distilled water containing small amounts of solvent) will be containerized during the sampling events and labeled for appropriate disposal.

8.5 Laboratory Custody Procedures

8.5.1 General

Upon sample receipt, laboratory personnel will be responsible for sample custody. A field chain of custody form will accompany all samples requiring laboratory analysis. Samples will be kept secured in the laboratory until all stages of analysis are complete. All laboratory personnel having samples in their custody will be responsible for maintaining sample integrity.

8.5.2 Sample Receipt and Storage

Upon sample receipt, the laboratory sample custodian will verify the package seal, open the package, verify the sample integrity, and compare the contents against the field chain of custody. If a sample container is broken, the sample is in an inappropriate container, has not been preserved by appropriate means, or if there is a discrepancy between the chain of custody and the sample shipment, ARCADIS will be notified. The laboratory sample custodian will then log the samples in, assign a unique laboratory identification number to each, and label the sample bottle with the laboratory identification number. The project name, field sample code, date sampled, date

received, analysis required, storage location and date, and action for final disposition will be recorded in the laboratory information management system.

8.5.3 Sample Chain of Custody and Documentation

Laboratory chain of custody and documentation will follow procedures consistent with Exhibit F of the NYSDEC ASP 2005.

8.5.4 Sample Analysis

Analysis of an acceptable sample will be initiated by worksheets that contain all pertinent information for analysis. The analyst will sign and date the laboratory chain of custody form when removing the samples from storage.

Samples will be organized into sample delivery groups (SDGs) by the laboratory. An SDG may contain up to 20 field samples (field duplicates, trip blanks, and rinse blanks are considered field samples for the purposes of SDG assignment). All field samples assigned to a single SDG shall be received by the laboratory over a maximum of 7 calendar days, and must be processed through the laboratory (preparation, analysis, and reporting) as a group. Every SDG must include a minimum of one site-specific matrix/matrix spike duplicate (MS/MSD) pair, which shall be received by the laboratory at the start of the SDG assignment.

Each SDG will be self-contained for all of the required QC samples. All parameters within an SDG will be extracted and analyzed together in the laboratory. At no time will the laboratory be allowed to run any sample (including QC samples) at an earlier or later time than the rest of the SDG. These rules for analysis will confirm that the QC samples for an SDG are applicable to the field samples of the same SDG and that the best possible comparisons can be made.

8.5.5 Sample Storage Following Analysis

The remaining samples will be maintained by the laboratory for 1 month after the final report is delivered to ARCADIS. After this period, the samples will be disposed of in accordance with applicable rules and regulations.

9. Analytical Procedures

9.1 Field Analytical Procedures

Field analytical procedures anticipated during the PDI may include the measurement of VOCs and particulate matter in air. Specific field measurement protocols are provided in the FSP and Health and Safety Plan (HASP).

9.2 Laboratory Analytical Procedures

Laboratory analytical requirements presented in the subsections below include a general summary of requirements, specifics related to each sample medium that may be analyzed, and details of the methods to be used for this project. SW-846 methods, USEPA Methods for the Chemical Analysis of Water and Wastes and Standard Methods for Water and Wastewater with NYSDEC, ASP, 2005 Revision, QA/QC and reporting deliverables requirements will be used for all analytes.

9.2.1 General

The following tables (attached at the end of this QAPP) summarize general analytical requirements:

Table	Title
Table 1a	Parameters, Methods, and Target Reporting Limits – Soil and Sediment Samples
Table 1b	Parameters, Methods, and Target Reporting Limits – Water Samples
Table 1c	Parameters, Methods, and Target Reporting Limits – Biota Samples
Table 2	Sample Quantities and Quality Control Frequencies
Table 3	Sample Containers, Preservation Methods, and Holding Times
Table 4	Analytical Quality Control Limits

9.2.2 Sample Metrics

9.2.2.1 Soil and Sediment

Analyses in this category will relate to soil and sediment samples. Analyses will be performed following the methods listed in Table 1a and quality control frequencies

listed in Table 2. Results will be reported as dry weight. Moisture content will be reported separately.

The primary sources to describe the analytical methods to be used during the investigation are provided in USEPA SW-846 Test Methods for Evaluating Solid Waste, Third Edition and USEPA Methods for Chemical Analysis of Water and Waste with NYSDEC ASP 2005 Revision, QA/QC and reporting deliverables requirements. Detailed information regarding QC procedures, including MS/MSD, laboratory control sample (LCS), and surrogate recoveries is provided in NYSDEC, ASP 2005 Revision, Exhibit E.

9.2.2.2 Water

Analyses in this category will relate to water samples. Analyses will be performed following the methods listed in Table 1b and quality control frequencies listed in Table 2. Results will be reported in units presented in Table 1b.

The primary sources to describe the analytical methods to be used during the investigation are provided in USEPA SW-846 Test Methods for Evaluating Solid Waste, Third Edition and USEPA Methods for Chemical Analysis of Water and Waste with NYSDEC ASP 2005 Revision, QA/QC and reporting deliverables requirements. Detailed information regarding QC procedures, including MS/MSD, LCS, and surrogate recoveries is provided in NYSDEC, ASP 2005 Revision, Exhibit E.

9.2.2.3 Biota

Analyses in this category will relate to biota samples. Analyses will be performed following the methods listed in Table 1c and quality control frequencies listed in Table 2. Results will be reported in units presented in Table 1c.

The primary sources to describe the analytical methods to be used during the investigation are provided in USEPA SW-846 Test Methods for Evaluating Solid Waste, Third Edition and USEPA Methods for Chemical Analysis of Water and Waste with NYSDEC ASP 2005 Revision, QA/QC and reporting deliverables requirements. Detailed information regarding QC procedures, including MS/MSD, LCS, and surrogate recoveries is provided in NYSDEC, ASP 2005 Revision, Exhibit E.

10. Quality Control Requirements

10.1 Quality Assurance Indicators

The overall QA objective for this QAPP is to develop and implement procedures for sampling, chain of custody, laboratory analysis, instrument calibration, data reduction and reporting, internal QC, audits, preventive maintenance, and corrective action such that valid data will be generated. These procedures are presented or referenced in the following sections of the QAPP. Specific QC checks are discussed in Sections 10.3 and 10.4.

QA indicators are generally defined in terms of five parameters:

1. representativeness
2. comparability
3. completeness
4. precision
5. accuracy

Each parameter is defined below. Specific objectives for the site actions are set forth in other sections of this QAPP, as referenced below.

10.1.1 Representativeness

Representativeness is the degree to which sampling data accurately and precisely represent site conditions, and is dependent on sampling and analytical variability. The investigation activities have been designed to assess the presence of the constituents at the time of sampling. The RD/RA Work Plan presents the rationale for sample quantities and location. The RD/RA Work Plan and this QAPP present field sampling methodologies and laboratory analytical methodologies. The use of the prescribed field and laboratory analytical methods with associated holding times and preservation requirements are intended to provide representative data.

10.1.2 Comparability

Comparability is the degree of confidence with which one data set can be compared to another. Comparability between this investigation, and to the extent possible, with existing data will be maintained through consistent sampling and analytical methodology set forth in the RD/RA Work Plan and this QAPP, SW-846 analytical

methods with NYSDEC ASP Revision 2005 QA/QC requirements and Category B reporting deliverables, and through use of QA/QC procedures and appropriately trained personnel.

10.1.3 Completeness

Completeness is defined as a measure of the amount of valid data obtained from an event and/or investigation compared to the amount that was expected to be obtained under normal conditions. This will be determined upon assessment of the analytical results, as discussed in Section 17.

10.1.4 Precision

Precision is the measure of reproducibility of sample results. The goal is to maintain a level of analytical precision consistent with the project objectives. To maximize precision, sampling and analytical procedures will be followed. All work for this investigation will adhere to established protocols presented in the RD/RA Work Plan. Checks for analytical precision will include the analysis of MSDs, laboratory duplicates, and field duplicates. Checks for field measurement precision will include obtaining duplicate field measurements. Further discussion of precision QC checks is provided in Sections 10.4.

10.1.5 Accuracy

Accuracy is the deviation of a measurement from the true value of a known standard. Both field and analytical accuracy will be monitored through initial and continuing calibration of instruments. In addition, internal standards, MS, blank spikes, and surrogates compounds will be used to assess the accuracy of the laboratory analytical data. Further discussion of these QC samples is provided in Section 10.4.

10.2 Decision Rule

The decision on whether data can be used will be based on the validation results. Following validation, the data will be flagged, as appropriate, and any use restrictions noted. The sampling plan has been devised so that the loss of any single data point will not hinder description of the distribution of potential constituents of concern. Given this, a reasonable decision rule would be that 90% of the data points not be rejected and deemed unusable.

10.3 Field Quality Control Checks

10.3.1 Field Measurements

To verify the quality of data using field instrumentation, duplicate measurements will be obtained and reported for all field analytical measurements.

10.3.2 Sample Containers

Certified, clean sample containers in accordance with Exhibit I of the NYSDEC ASP Revision 2005 (Eagle Picher pre-cleaned containers or equivalent) will be supplied by the laboratory.

10.3.3 Field Duplicates

Field duplicates will be collected from the different site materials to verify the reproducibility of the sampling methods. For soils, field duplicates will be prepared by placing well homogenized aliquots from the same sample location into individual sample containers, which are submitted blind to the laboratory. In general, field duplicates will be analyzed at a 5% frequency (every 20 samples) for the chemical constituents. Field duplicates collected for VOC analysis will be collected as discrete samples from the same location. Table 2 provides an estimated number of field duplicates to be prepared for each applicable parameter and matrix.

10.3.4 Rinse Blanks

Rinse blanks are used to monitor the cleanliness of the sampling equipment and the effectiveness of the cleaning procedures. Rinse blanks will be prepared and submitted for analysis at a frequency of 1 per day (when sample equipment cleaning occurs) or once for every 20 samples collected, whichever is less. Rinse blanks will be prepared by filling sample containers with analyte-free water (supplied by the laboratory), which has been routed through a cleaned sampling device. When dedicated sampling devices are used or sample containers are used to collect the samples, rinse blanks will not be necessary. Table 2 provides an estimated number of rinse blanks collected during the investigation activities.

10.3.5 Trip Blanks

Trip blanks will be used to assess whether site samples have been exposed to non-site-related volatile constituents during storage and transport. Trip blanks will be analyzed at a frequency of once per day, per cooler containing groundwater samples to be analyzed for VOCs. A trip blank will consist of a container filled with analyte-free water (supplied by the laboratory), which remains unopened with field samples throughout the sampling event. Trip blanks will only be analyzed for aqueous VOCs. Table 2 provides an estimated number of trip blanks collected for each matrix and parameter during the investigation activities.

10.4 Analytical Laboratory Quality Control Checks

Internal QC procedures are specified in the analytical methods. These specifications include the types of QC checks required (method blanks, reagent/preparation blanks, MS/MSDs, calibration standards, internal standards, surrogate standards, the specific calibration check standards, laboratory duplicate/replicate analysis), compounds and concentrations to be used, and the QC acceptance criteria.

10.4.1 Method Blanks

Sources of contamination in the analytical process, whether specific analyses or interferences, need to be identified, isolated, and corrected. The method blank is useful in identifying possible sources of contamination within the analytical process. For this reason, it is necessary that the method blank is initiated at the beginning of the analytical process and encompasses all aspects of the analytical work. As such, the method blank would assist in accounting for any potential contamination attributable to glassware, reagents, instrumentation, or other sources which could affect sample analysis. One method blank will be analyzed with each analytical series associated with no more than 20 samples.

10.4.2 Matrix Spike/Matrix Spike Duplicates

MS/MSDs will be used to measure the accuracy of analyte recovery from the sample matrices and will be site-specific. MS/MSD pairs will be analyzed at a 5% frequency.

When MS recoveries are outside quality control limits, associated LCS and surrogate spike recoveries will be evaluated, as applicable, to attempt to verify the reason for the

deviation and determine the effect on the reported sample results. Table 2 presents an estimated number of MS and MSD analyses for each applicable parameter.

10.4.3 Surrogate Spikes

Surrogates are compounds which are unlikely to occur under natural conditions that have properties similar to the analytes of interest. This type of control is primarily used for organic samples analyzed by gas chromatography/mass spectrometry (GC/MS) and gas chromatography (GC) methods and is added to the samples prior to purging or extraction. The surrogate spike is utilized to provide broader insight into the proficiency and efficiency of an analytical method on a sample-specific basis. This control reflects analytical conditions that may not be attributable to sample matrix.

If surrogate spike recoveries exceed specified quality control limits, the analytical results need to be evaluated thoroughly in conjunction with other control measures. In the absence of other control measures, the integrity of the data may not be verifiable and reanalysis of the samples with additional control may be necessary.

Surrogate spike compounds will be selected utilizing the guidance provided in the analytical methods.

10.4.4 Laboratory Duplicates

For inorganics, laboratory duplicates will be analyzed to assess laboratory precision. Laboratory duplicates are defined as a separate aliquot of an individual sample that is analyzed as a separate sample. Table 2 presents an estimated number of laboratory duplicates for each applicable parameter.

10.4.5 Calibration Standards

Calibration check standards analyzed within a particular analytical series provide insight regarding the instruments' stability. A calibration check standard will be analyzed at the beginning and end of an analytical series, or periodically throughout a series containing a large number of samples.

In general, calibration check standards will be analyzed after every 12 hours or more frequently, as specified in the applicable analytical method. In analyses where internal standards are used, a calibration check standard will only be analyzed in the beginning of an analytical series. If results of the calibration check standard exceed specified

tolerances, then all samples analyzed since the last acceptable calibration check standard will be reanalyzed.

Laboratory instrument calibration standards will be selected utilizing the guidance provided in the analytical methods, as summarized in Section 12.

10.4.6 Internal Standards

Internal standard areas and retention times will be monitored for organic analyses performed by GC/MS methods. Method-specified internal standard compounds will be spiked into all field samples, calibration standards, and quality control samples after preparation and prior to analysis. If internal standard areas in one or more samples exceed the specified tolerances, the cause will be investigated, the instrument will be recalibrated if necessary, and all affected samples may be reanalyzed.

The acceptability of internal standard performance will be determined using the guidance provided within the analytical methods.

10.4.7 Laboratory Control Samples

LCS are standards of known concentration and independent in origin from the calibration standards. The intent of LCS analysis is to provide insight into the analytical proficiency within an analytical series. This includes the preparation of calibration standards, the validity of calibration, sample preparation, instrument set up, and the premises inherent in quantitation. One LCS will be analyzed with each analytical series associated with no more than 20 samples.

10.5 Data Precision Assessment Procedures

Field precision is difficult to measure because of temporal variations in field parameters. However, precision will be controlled through the use of experienced field personnel, properly calibrated meters, and duplicate field measurements. Field duplicates will be used to assess precision for the entire measurement system, including sampling, handling, shipping, storage, preparation, and analysis.

Laboratory data precision for organic analyses will be monitored through the use of MSDs, laboratory duplicate, and field duplicates as identified in Table 2.

The precision of data will be measured by calculation of the relative percent differences (RPDs) of duplicate sample sets.

The RPD can be calculated by the following equation:

$$RPD = \frac{(A-B)}{(A+B)/2} \times 100$$

Where:

A = analytical result from one of two duplicate measurements

B = analytical result from the second measurement

Precision objectives for MSD and laboratory duplicate analyses are identified in the NYSDEC ASP Revision 2005.

10.6 Data Accuracy Assessment Procedures

The accuracy of field measurements will be controlled by experienced field personnel, properly calibrated field meters, and adherence to established protocols. The accuracy of field meters will be assessed by review of calibration and maintenance logs.

Laboratory accuracy will be assessed via the use of MSs, surrogate spikes, internal standards, and LCS. Where available and appropriate, quality assurance performance standards will be analyzed periodically to assess laboratory accuracy. Accuracy will be calculated in terms of percent recovery as follows:

$$\% \text{ Recovery} = \frac{A-X}{B} \times 100$$

Where:

A = value measured in spiked sample or standard

X = value measured in original sample

B = true value of amount added to sample or true value of standard

This formula is derived under the assumption of constant accuracy over the original and spiked measurements. If any accuracy calculated by this formula is outside of the acceptable levels, data will be evaluated to determine whether the deviation represents unacceptable accuracy, or variable, but acceptable accuracy. Accuracy objectives for MS recoveries and surrogate recovery objectives are identified in the NYSDEC ASP, 2005 Revision.

10.7 Data Completeness Assessment Procedures

Completeness of a field or laboratory data set will be calculated by comparing the number of samples collected or analyzed to the proposed number.

$$\text{Completeness} = \frac{\text{No. Valid Samples Collected or Analyzed}}{\text{No. Proposed Samples Collected or Analyzed}} \times 100$$

As general guidelines, overall project completeness is expected to be at least 90 percent. The assessment of completeness will require professional judgment to determine data usability for intended purposes.

11. Instrument/Equipment Testing, Inspection, and Maintenance Requirements

Preventive maintenance schedules have been developed for both field and laboratory instruments. A summary of the maintenance activities to be performed is presented below.

11.1 Field Instruments and Equipment

Prior to any field sampling, each piece of field equipment will be inspected to confirm that it is operational. If the equipment is not operational, it must be serviced prior to use. All meters that require charging or batteries will be fully charged or have fresh batteries. If instrument servicing is required, it is the responsibility of the Field Activities Task Manager to follow the maintenance schedule and arrange for prompt service.

Field instrumentation to be used in this study is related to air quality. VOCs in air will be monitored using a MiniRAE 2000 (or equivalent) and real-time particulate matter will be monitored using a MIE DataRAM (or equivalent). A logbook will be kept for each field instrument. Each logbook contains records of operation, maintenance, calibration, and any problems and repairs. The Field Activities Task Manager will review calibration and maintenance logs.

Field equipment returned from a site will be inspected to confirm it is in working order. This inspection will be recorded in the logbook or field notebooks as appropriate. It will also be the obligation of the last user to record any equipment problems in the logbook.

Non-operational field equipment will be either repaired or replaced. Appropriate spare parts will be made available for field meters.

11.1.1 Equipment Maintenance

All measuring and test equipment to be used in support of the PDI activities that directly affect the quality of the analytical data shall be subject to preventative maintenance measures that minimize equipment downtime. Equipment will be examined to certify that it is in operating condition. This includes checking the manufacturer's operating manual to ensure that all maintenance requirements are being observed. Field notes from previous sampling events will be reviewed to ensure that any prior equipment problems are not overlooked and that any necessary repairs to equipment have been carried out.

Field equipment returned from a site will be inspected to confirm that it is in working order. The inspection will be recorded in the field logbook, as appropriate. It will also be the obligation of the last user to record any equipment problems in the logbook. Non-operational field equipment will either be repaired or replaced. Appropriate spare parts will be made available for field meters.

Consultant-/subcontractor-owned or leased equipment maintenance shall be in accordance with the manufacturer's instructions.

11.2 Laboratory Instruments and Equipment

Laboratory instrument and equipment documentation procedures include details of any observed problems, corrective measure(s), routine maintenance, and instrument repair (which will include information regarding the repair and the individual who performed the repair).

Preventive maintenance of laboratory equipment generally will follow the guidelines recommended by the manufacturer. A malfunctioning instrument will be repaired immediately by in-house staff or through a service call from the manufacturer.

11.2.1 Instrument Maintenance

Maintenance schedules for laboratory equipment adhere to the manufacturer's recommendations. Records reflect the complete history of each instrument and specify the time frame for future maintenance. Major repairs or maintenance procedures are performed through service contracts with manufacturer or qualified contractors. Paperwork associated with service calls and preventative maintenance calls will be kept on file by the laboratory.

Laboratory Systems Managers are responsible for the routine maintenance of instruments used in the particular laboratory. Any routine preventative maintenance carried out is logged into the appropriate logbooks. The frequency of routine maintenance is dictated by the nature of samples being analyzed, the requirements of the method used, and/or the judgment of the Laboratory Systems Manager.

All major instruments are backed up by comparable (if not equivalent) instrument systems in the event of unscheduled downtime. An inventory of spare parts is also available to minimize equipment/instrument downtime.

11.2.2 Equipment Monitoring

On a daily basis, the operation of balances, incubators, ovens, refrigerators, and water purification systems will be checked and documented. Any discrepancies will be immediately reported to the appropriate laboratory personnel for resolution.

12. Instrument Calibration and Frequency

12.1 Field Equipment Calibration Procedures and Frequency

Calibration checks of field equipment will be performed daily when used. Field equipment operation, calibration, and maintenance procedures are provided in the equipment operation manuals.

12.2 Laboratory Equipment Calibration Procedures and Frequency

Instrument calibration will follow the specifications provided by the instrument manufacturer or specific analytical method used. The analytical methods for target constituents are identified separately below.

Volatile Organics

Equipment calibration procedures will follow guidelines presented in NYSDEC ASP 2005 Revision, Exhibit E, Part II, Sections 1 and 2.

Semivolatile Organics

Equipment calibration procedures will follow guidelines presented in NYSDEC ASP 2005 Revision, Exhibit E, Part II, Section 3.

Pesticides

Equipment calibration procedures will follow guidelines presented in NYSDEC ASP 2005 Revision, Exhibit E, Part II, Section 4.

PCBs

Equipment calibration procedures will follow guidelines presented in NYSDEC ASP 2005 Revision, Exhibit E, Part II, Section 5.

Metals and Cyanide

Equipment calibration procedures will follow guidelines presented in NYSDEC ASP 2005 Revision, Exhibit E, Part III.

Supplemental Parameters

Additional parameters [total suspended solids (TSS), total dissolved solids (TDS), hardness, pH, and total organic carbon (TOC)] will be calibrated according to their respective methods, following the guidance presented in NYSDEC ASP 2005, Exhibit E, Part III.

13. Inspection/Acceptance Requirements for Supplies and Consumables

All supplies to be used in the field and laboratory will be available when needed. They will be free of target chemicals and interferences. All reagents will be tested prior to use with site samples. All standards will be verified against a second source standard. The laboratory will follow a "first in first out" procedure for the storage and use of all consumables to minimize the risk of contamination and degradation.

14. Data Management

The purpose of data management is to confirm that all of the necessary data are accurate and readily accessible to meet the analytical and reporting objectives of the project. The field investigations will encompass a large number of samples and a variety of sample matrices and analytes from a large geographic area. From the large amount of resulting data, the need arises for a structured, comprehensive, and efficient program for management of data.

The data management program established for the project includes field documentation and sample QA/QC procedures, methods for tracking and managing the data, and a system for filing all site-related information. More specifically, data management procedures will be employed to efficiently process the information collected such that the data are readily accessible and accurate. These procedures are described in detail in the following section.

The data management plan has five elements:

1. Sample Designation System

2. Field Activities

3. Sample Tracking and Management

4. Data Management System

5. Document Control and Inventory

14.1 Sample Designation System

A concise and easily understandable sample designation system is an important part of the project sampling activities. It provides a unique sample number that will facilitate both sample tracking and easy resampling of select locations to evaluate data gaps, if necessary. The sample designation system to be employed during the sampling activities will be consistent, yet flexible enough to accommodate unforeseen sampling events or conditions. A combination of letters and numbers will be used to yield a unique sample number for each field sample collected.

14.2 Field Activities

Field activities designed to gather the information necessary to make decisions regarding the off-site areas require consistent documentation and accurate record keeping. During site activities, standardized procedures will be used for documentation of field activities, data security, and QA. These procedures are described in further detail in the following subsections.

14.2.1 Field Documentation

Complete and accurate record keeping is a critical component of the field investigation activities. When interpreting analytical results and identifying data trends, investigators realize that field notes are an important part of the review and validation process. To confirm that all aspects of the field investigation are thoroughly documented, several different information records, each with its own specific reporting requirements, will be maintained, including:

- Field logs.
- Instrument calibration records.
- Chain of custody forms.

A description of each of these types of field documentation is provided below.

Field Logs

The personnel performing the field activities will keep field logs that detail all observations and measurements made during the remedial investigation. Data will be recorded directly into site-dedicated, bound notebooks, with each entry dated and signed. To confirm at any future date that notebook pages are not missing, each page will be sequentially numbered. Erroneous entries will be corrected by crossing out the original entry, initialing it, and then documenting the proper information. In addition, certain media sampling locations will be surveyed to accurately record their locations. The survey crew will use their own field logs and will supply the sampling location coordinates to the File Custodian.

Instrument Calibration Records

As part of data quality assurance procedures, field monitoring and detection equipment will be routinely calibrated. Instrument calibration confirms that equipment used is of the proper type, range, accuracy, and precision to provide data compatible with the specified requirements and desired results. Calibration procedures for the various types of field instrumentation are described in Section 13.1. In order to demonstrate that established calibration procedures have been followed, calibration records will be prepared and maintained to include, as appropriate, the following:

- Calibration date and time.
- Type and identification number of equipment.
- Calibration frequency and acceptable tolerances.
- Identification of individual(s) performing calibration.
- Reference standards used.
- Calibration data.
- Information on calibration success or failure.

The calibration record will serve as a written account of monitoring or detection equipment QA. All erratic behavior or failures of field equipment will be subsequently recorded in the calibration log.

Chain of Custody Forms

Chain of custody forms are used as a means of documenting and tracking sample possession from time of collection to the time of disposal. A chain of custody form will accompany each field sample collected, and one copy of the form will be filed in the field office. All field personnel will be briefed on the proper use of the chain of custody procedure.

14.2.2 Data Security

Measures will be taken during the field investigation to confirm that samples and records are not lost, damaged, or altered. When not in use, all field notebooks will be stored at the field office in a locked, fireproof cabinet. Access to these files will be limited to the field personnel who utilize them.

14.3 Sample Management and Training

A record of all field documentation, as well as analytical and QA/QC results, will be maintained to confirm the validity of data used in the site analysis. To effectively execute such documentation, carefully constructed sample tracking and data management procedures will be used throughout the sampling program.

Sample tracking will begin with the completion of chain of custody forms, as described in Section 8.3.3. On a daily basis, the completed chain of custody forms associated with samples collected that day will be faxed from the project office to the QA Manager (QAM). Copies of all completed chain of custody forms will be maintained in the field office. On the following day, the QAM will telephone the laboratory to verify receipt of samples.

When analytical data are received from the laboratory, the QAM will review the incoming analytical data packages against the information on the chains of custody to confirm that the correct analyses were performed for each sample and that results for all samples submitted for analysis were received. Any discrepancies noted will be promptly followed-up by the QAM.

14.4 Data Management System

In addition to the sample tracking system, a data management system may be implemented. The central focus of the data management system will be the development of a personal computer-based project database. The project database, to be maintained by the Database Administrator, will combine pertinent geographical, field, and analytical data. Information that will be used to populate the database will be derived from three primary sources: surveying of sampling locations, field observations, and analytical results. Each of these sources is discussed in the following sections.

14.4.1 Computer Hardware

If required, the database will be constructed on Pentium®-based personal computer work stations connected through a network server. The network will provide access to various hardware peripherals, such as, but not limited to, laser printers, backup storage devices, image scanners, and modems. Computer hardware will be upgraded to industrial and corporate standards, as necessary, in the future.

14.4.2 Computer Software

If required, the database will be written in Microsoft Access, running in a Windows operating system.

14.4.3 Surveying Information

In general, each location sampled will be surveyed to confirm that accurate documentation of sample locations for mapping and geographic information system purposes (if appropriate) to facilitate the resampling of select sample locations during future monitoring programs, if needed, and for any potential remediation activities. The surveying activities that will occur in the field will consist of the collection of information that will be used to compute a northing and easting in state plane coordinates for each sample location and the collection of information to compute elevations relative to the National Geodetic Vertical Datum of 1988 for select sample locations, as appropriate. All field books associated with the surveying activities will be stored as a record of the project activities.

Conventional surveying techniques will be used to gather information, such as the angle and distance between the sample location and the control monument, as well as point attributes. Control monuments will be established using global positioning system techniques. The surveying software allows the rapid computation of a location's state plane coordinates.

Differential leveling techniques will be used to gather information to be used to compute a sample location's (or top-of-casing for groundwater monitoring wells) elevation. During the differential leveling process, which includes at least one benchmark of known elevation, detailed field notes will be kept in a field book.

14.4.4 Field Observations

An important part of the information that will ultimately reside in the data management system for use during the project will originate in the observations that are recorded in the field.

Following each sampling event, a status memorandum may be prepared by the field personnel who performed the sampling activities. The purpose of the status memo is to present a summary and a record of the sampling event. Topics to be discussed include the locations sampled, the sampling methodologies used, QA/QC procedures, blind duplicate and MS/MSD sample identification numbers, equipment decontamination procedures, personnel involved in the activity, and any other noteworthy events that occurred.

Tables are typically attached to the memorandum and are used to summarize measurements that were recorded in the field books. It is anticipated that these tables will be developed using a personal computer spreadsheet program to reduce possible transcription error and to facilitate the transfer of information to the data management system. For example, for soil samples, the table would present the sampling date and time, soil depth, depth of soil recovered in a given core, the depth increment submitted for analysis, and a description of the lithology.

Status memos are valuable tools to keep project personnel informed on the details of the field activities and are also invaluable during the development of the final report. Each status memo will be reviewed for accuracy and completeness by the respective sampling activity manager. Following the approval and finalization of each memo, the status memo will be used to transfer field observations into the data management system.

All pertinent field data will be manually entered into the appropriate database tables from the chain of custody forms and field notebooks.

14.4.5 Analytical Results

Analytical results provided by the laboratory will generally be available in both a digital and a hard copy format. Upon receipt of each analytical package, the original chain of custody form will be placed in the project files. The data packages will be examined to confirm that the correct analyses were performed for each sample submitted and that all of the analyses requested on the chain of custody form were performed. If

discrepancies are noted, the QAM will be notified and will promptly follow up with the laboratory to resolve any issues.

The data packages will be validated in accordance with the procedures presented in Section 20. Any data that does not meet the specified standards will be flagged pending resolution of the issue. The flag will not be removed from the data until the issue associated with the sample results is resolved. Although flags may remain for certain data, the use of that data may not necessarily be restricted.

Following completion of the data validation, the digital files of analytical data will be processed to populate the appropriate database tables. Specific fields include:

- Sample identification number
- Date sampled
- Date analyzed
- Parameter name
- Analytical result
- Units
- Detection limit
- Qualifier(s)

The individual electronic data deliverables (EDDs) supplied by the laboratory in either an ASCII comma separated value format or in a Microsoft Excel worksheet, will be loaded into the appropriate database table. Any analytical data that cannot be provided by the laboratory in electronic format will be entered manually.

After entry into the database, the EDD data will be compared to the field information previously entered into the database to confirm that all requested analytical data have been received.

14.4.6 Data Analysis and Reporting

The database management system will have several functions to facilitate the review and analysis of the data. Data entry screens will be developed to assist in the keypunching of field observations. Routines will also be developed to permit the user to scan analytical data from a given site for a given media. Several output functions that have been developed by ARCADIS will be appropriately modified for use in the data management system.

A valuable function of the data management system will be the generation of tables of analytical results from the project databases. The capability of the data management system to directly produce tables reduces the redundant manual entry of analytical results during report preparation and precludes transcription errors that may occur otherwise. This data management system function creates a digital comma-delimited ASCII file of analytical results and qualifiers for a given media. The ASCII file is then processed through a spreadsheet, which transforms the comma-delimited file into a table of rows and columns. Tables of analytical data will be produced as part of data interpretation tasks, the reporting of data, and the generation of the PDI Summary Report.

Another function of the data management system will be to create digital files of analytical results and qualifiers suitable for transfer to mapping/presentation software. A function has been created by ARCADIS that creates a digital file consisting of sample location number, state plane coordinates, sampling date, and detected constituents and associated concentrations and analytical qualifiers. The file is then transferred to a Visualization work station, where another program has been developed to plot a location's analytical data in a "box" format at the sample location (represented by the state plane coordinates). This routine greatly reduces the redundant keypunching of analytical results and facilitates the efficient production of interpretative and presentation graphics.

The data management system also has the capability of producing a digital file of select parameters that exists in one or more of the databases. This type of custom function is accomplished on an interactive basis and is best used for transferring select information into a number of analysis tools, such as statistical or graphing programs.

14.5 Document Control and Inventory

ARCADIS maintains project files at its Syracuse, New York office as discussed in Section 5.6.

15. Assessment and Response Actions

Performance and systems audits will be completed in the field and the laboratory during the investigation activities, as described below.

15.1 Field Audits

The following field performance and systems audits will be completed during this project.

15.1.1 Performance Audits

The appropriate Task Manager will monitor field performance. Field performance audit summaries will contain an evaluation of field measurements and field meter calibrations to verify that measurements are taken according to established protocols. The ARCADIS QAM will review all field reports and communicate concerns to the ARCADIS Project Manager and/or Task Managers, as appropriate. In addition, the ARCADIS QAM will review the rinse and trip blank data to identify potential deficiencies in field sampling and cleaning procedures.

15.1.2 Internal Systems Audits

A field internal systems audit is a qualitative evaluation of all components of field QA/QC. The systems audit compares scheduled QA/QC activities from this document with actual QA/QC activities completed. The appropriate Task Manager will periodically confirm that work is being performed consistent with the RD/RA Work Plan, QAPP, FSP, and HASP.

15.2 Laboratory Audits

The laboratory will perform internal audits consistent with NYSDEC ASP, 2005 Revision, Exhibit E.

In addition to the laboratory's internal audits and participation in state and federal certification programs, the laboratory sections at the laboratory are audited by representatives of the regulatory agency issuing certification. Audits are usually conducted on an annual basis and focus on laboratory conformance to the specific program protocols for which the laboratory is seeking certification. The auditor reviews sample handling and tracking documentation, analytical methodologies, analytical

supportive documentation, and final reports. The audit findings are formally documented and submitted to the laboratory for corrective action, if necessary.

ARCADIS reserves the right to conduct an on-site audit of the laboratory prior to the start of analyses for the project. Additional audits may be performed during the course of the project, as deemed necessary.

15.3 Corrective Action

Corrective actions are required when field or analytical data are not within the objectives specified in this QAPP or the RD/RA Work Plan. Corrective actions include procedures to promptly investigate, document, evaluate, and correct data collection and/or analytical procedures. Field and laboratory corrective action procedures are described below.

15.3.1 Field Procedures

When conducting the field work, if a condition is noted that would have an adverse effect on data quality, corrective action will be taken so as not to repeat this condition. Condition identification, cause, and corrective action implemented will be documented on a Corrective Action Report Form and reported to the appropriate ARCADIS Project Manager and Task Manager.

Examples of situations that would require corrective actions are provided below:

1. Protocols, as defined by this QAPP, the FSP, and the RD/RA Work Plan, have not been followed.

2. Equipment is not in proper working order or properly calibrated.

3. QC requirements have not been met.

4. Issues resulting from performance or systems audits.

Project personnel will continuously monitor ongoing work performance in the normal course of daily responsibilities.

15.3.2 Laboratory Procedures

In the laboratory, when a condition is noted to have an adverse effect on data quality, corrective action will be taken so as not to repeat this condition. Condition identification, cause, and corrective action to be taken will be documented and reported to the appropriate Project Manager and Task Manager.

Corrective action may be initiated, at a minimum, under the following conditions:

1. Specific laboratory analytical protocols have not been followed.

2. Predetermined data acceptance standards are not obtained.

3. Equipment is not in proper working order or calibrated.

4. Sample and test results are not completely traceable.

5. QC requirements have not been met.

6. Issues resulting from performance or systems audits.

Laboratory personnel will continuously monitor ongoing work performance in the normal course of daily responsibilities.

16. Reports to Management

16.1 Internal Reporting

The analytical laboratory will submit analytical reports to ARCADIS for review. ARCADIS will, in turn, submit the reports to the data validator for review. Supporting data (i.e., historic data, related field or laboratory data) will also be reviewed to evaluate data quality, as appropriate. The ARCADIS QAM will incorporate results of the data validation reports and assessments of data usability into a summary report that will be submitted to the ARCADIS Project Manager and appropriate Task Managers. If required, this QAPP will be filed in the project file at ARCADIS' office and will include the following:

1. Assessment of data accuracy, precision, and completeness for both field and laboratory data.

2. Results of the performance and systems audits.

3. Significant QA/QC problems, solutions, corrections, and potential consequences.

4. Analytical data validation report.

16.2 Reporting

Upon receipt of the ASP – Category B Data Package from the laboratory, the ARCADIS QAM will determine if the data package has met the required DQOs. The analytical data package will be incorporated into the reports.

17. Data Review, Validation, and Verification

After field and laboratory data are obtained, the data will be subject to the following:

1. Reduction, or manipulation mathematically, or otherwise into meaningful and useful forms.

2. Review.

3. Organization, interpretation, and reporting.

4. Data validation.

17.1 Field Data Reduction, Validation, and Reporting

17.1.1 Field Data Reduction

Information that is collected in the field through visual observation, manual measurement, and/or field instrumentation will be recorded in field notebooks, log sheets, and/or other appropriate forms. Such data will be reviewed by the appropriate Task Manager for adherence to the RD/RA Work Plan and consistency of data. Any concerns identified as a result of this review will be discussed with the field personnel, corrected if possible, and, as necessary, incorporated into the data evaluation process.

17.1.2 Field Data Review

Field data calculations, transfers, and interpretations will be conducted by the field personnel and reviewed for accuracy by the appropriate Task Manager and the QAM. Task Managers will recalculate at least 5 percent of all data reductions. Field documentation and data reduction prepared by field personnel will be reviewed by the appropriate Task Manager and QAM. All logs and documents will be checked for:

1. General completeness.

2. Readability.

3. Usage of appropriate procedures.

4. Appropriate instrument calibration and maintenance.

5. Reasonableness in comparison to present and past data collected.

6. Correct sample locations.

7. Correct calculations and interpretations.

17.1.3 Field Data Reporting

Where appropriate, field data forms and calculations will be processed and included in appendices to the reports. The original field logs, documents, and data reductions will be kept in the project file at the ARCADIS office in Syracuse, New York.

17.2 Laboratory Data Reduction, Review, and Reporting

17.2.1 Laboratory Data Reduction

The calculations used for data reduction will be specified in each of the analytical methods referenced previously. Whenever possible, analytical data will be transferred directly from the instrument to a computerized data system. Raw data will be entered into permanently bound laboratory notebooks. The data entered are sufficient to document all factors used to arrive at the reported value.

Concentration calculations for chromatographic analyses will be based on response factors. Quantitation will be performed using either internal or external standards.

Total cyanide analyses will be based on regression analysis. Regression analysis is used to fit a curve through the calibration standard data. The sample concentrations will be calculated using the resulting regression equations. Non-aqueous values will be reported on a dry-weight basis. Unless otherwise specified, all values will be reported uncorrected for blank contamination.

17.2.2 Laboratory Data Review

All data will be subject to multi-level review by the laboratory. The group leader will review all data reports prior to release for final data report generation, and the laboratory director will review a cross section of the final data reports. All final data reports are reviewed by the laboratory QAM prior to shipment to ARCADIS.

If discrepancies or deficiencies exist in the analytical results, then corrective action will be taken, as discussed in Section 15. Deficiencies discovered as a result of internal data review, as well as the corrective actions to be used to rectify the situation, will be documented on a Corrective Action Form. This form will be submitted to the ARCADIS Project Manager.

18. Validation and Verification Methods

Data validation entails a review of the QC data and the raw data to verify that the laboratory was operating within required limits, the analytical results are correctly transcribed from the instrument, and which, if any, environmental samples are related to any out-of-control QC samples. The objective of data validation is to identify any questionable or invalid laboratory measurements.

Data validation will consist of data screening, checking, reviewing, editing, and interpreting to document analytical data quality and determine if the quality is sufficient to meet the DQOs.

The data validator will use the most recent versions of the USEPA functional guidelines for data validation with NYSDEC ASP 2005 Revision, QA/QC and reporting deliverables requirements available at the time of project initiation and for the entire duration of the project, as guidance, where appropriate.

The data validator will verify reduction of laboratory measurements and laboratory reporting of analytical parameters are in accordance with the procedures specified for each analytical method (i.e., perform laboratory calculations in accordance with the method-specific procedure).

Upon receipt of the laboratory data, the following reduction, validation, and reporting scheme will be executed by the data validator:

1. Laboratory data will be screened to confirm that the necessary QC procedures (e.g., detection limit verification, initial calibration, continuing calibration, duplicates, spikes, blanks) have been performed. QC information not included or of insufficient frequency will be identified in the validation report, including a discussion of the implications.

2. QC supporting information will subsequently be screened to identify QC data outside established control limits. If out-of-control data are discovered, documentation of appropriate corrective action will be reviewed. Out-of-control data without appropriate corrective action shall result in designation of the affected data as qualified or rejected, as appropriate.

It should be noted that the existence of qualified results does not automatically invalidate data. This point is repeatedly emphasized in the USEPA functional

guidelines for data validation and is inherently acknowledged by the very existence of the data validation/flagging guidelines. The goal to produce the best possible data does not necessarily mean producing data without QC qualifiers. Qualified data can provide useful information.

Resolution of any issues regarding laboratory performance or deliverables will be handled between the data validator, laboratory Project Manager, and the ARCADIS Project Manager.

Upon completion of the data validation (if required), a data usability summary report addressing the following topics will be prepared.

1. Assessment of the data package.
2. Description of any protocol deviations.
3. Failures to reconcile reported and/or raw data.
4. Assessment of any compromised data.
5. Laboratory case narrative.
6. Overall appraisal of the analytical data.
7. Table of site name, sample quantities, data submitted to the laboratory, year of protocol used, matrix, and fractions analyzed.

19. Reconciliation with User Requirements

The data results will be examined to determine the performance that was achieved for each data usability criteria. The performance will then be compared with the project objectives. Of particular note will be samples at or near action levels. All deviations from objectives will be noted. Additional action may be warranted when performance does not meet performance objectives for critical data. Action options may include any or all of the following:

- Retrieval of missing information.
- Request for additional explanation or clarification.
- Reanalysis of sample from extract (when appropriate).
- Recalculation or reinterpretation of results by the laboratory.

These actions may improve the data quality, reduce uncertainty, and may eliminate the need to qualify or reject data.

If these actions do not improve the data quality to an acceptable level, the following actions may be taken:

- Extrapolation of missing data from existing data points.
- Use of historical data.
- Evaluation of the critical/noncritical nature of the sample.

If the data gap cannot be resolved by these actions, an evaluation of the data bias and potential for false negatives and positives can be performed. If the resultant uncertainty level is unacceptable, then the following action must be taken:

- Additional sample collection and analysis.

20. References

American Society for Testing and Materials. Annual Book of ASTM Standards. American Society for Testing and Materials. West Conshohochkton, PA. (1996).

United States Environmental Protection Agency. *Contract Laboratory Program National Functional Guidelines for Inorganic Data Review*. EPA-540/R-94-013. (February 1994a).

United States Environmental Protection Agency. *Contract Laboratory Program National Functional Guidelines for Organic Data Review*. EPA-540/R-94-012. (February 1994b).

United States Environmental Protection Agency. *NEIC Policies and Procedures Manual*. EPA-330/9-78-001R. National Enforcement Investigations Center. (May 1978, Revised August 1991).

United States Environmental Protection Agency. *Interim Guidance and Specifications for Preparing Quality Assurance Project Plans*. QAMS-005/80. Office of Research and Development. (December 1980).

United States Environmental Protection Agency. *Methods for Chemical Analysis of Water and Waste*. EPA-600/4-79-020, Revised. EMSL-Cincinnati. (March, 1983).

United States Environmental Protection Agency. *Test Methods for Evaluating Solid Waste*. SW-846 3rd Edition, Update 3. Office of Solid Waste (December 1996).

United States Environmental Protection Agency. *EPA Requirements for Quality Assurance Project Plans for Environmental Operations*. EPA-QA/R-5. Quality Assurance Division. (March 2001).

ARCADIS

Tables

TABLE 1a

PARAMETERS, METHODS, AND TARGET REPORTING LIMITS - SOIL AND SEDIMENT SAMPLES

QUALITY ASSURANCE PROJECT PLAN
WASTE STREAM INC., POTSDAM, NEW YORK

Analyte	CAS Number	Soil Screening Criteria[1,2]	Sediment Screening Criteria[3]	Soil/Sediment Reference Limits[4]	
				Laboratory MDL[5]	Laboratory RL[6]
Volatile Organic Compounds (8260)[7] (ug/kg)					
1,1,1-Trichloroethane	71-55-6	NS	NA	0.18	2
1,1,2,2-Tetrachloroethane	79-34-5	NS	NA	0.29	2
1,1,2-Trichloroethane	79-00-5	NS	NA	0.35	2
1,1-Dichloroethane	75-34-3	NS	NA	0.33	2
1,1-Dichloroethene	75-35-4	NS	NA	0.52	2
1,2,3-Trichlorobenzene	87-61-6	NS	NA	0.43	5
1,2,4-Trichlorobenzene	120-82-1	NS	NA	0.36	5
1,2-Dibromo-3-chloropropane	96-12-8	NS	NA	2	5
1,2-Dibromoethane	106-93-4	NS	NA	0.57	2
1,2-Dichlorobenzene	95-50-1	NS	NA	0.21	2
1,2-Dichloroethane	107-06-2	10,000	NA	0.54	2
1,2-Dichloropropane	78-87-5	NS	NA	0.42	2
1,3-Dichlorobenzene	541-73-1	NS	NA	0.22	2
1,3-Dichloropropene	542-75-6	NS	NA	0.29	2
1,4-Dichlorobenzene	106-46-7	20,000	NA	0.2	2
1,4-Dioxane	123-91-1	100	NA	21	25
2-Butanone (MEK)	78-93-3	100,000	NA	3.1	5
2-Hexanone	591-78-6	NS	NA	2.4	5
4-Methyl-2-pentanone (MIBK)	108-10-1	NS	NA	1.8	5
Acetone	67-64-1	2,200	NA	3.9	10
Benzene	71-43-2	70,000	NA	0.25	0.5
Bromochloromethane	74-97-5	NS	NA	0.58	5
Bromodichloromethane	75-27-4	NS	NA	0.36	2
Bromoform	75-25-2	NS	NA	0.29	2
Bromomethane	74-83-9	NS	NA	0.97	2
Carbon disulfide	75-15-0	NS	NA	0.15	5
Carbon tetrachloride	56-23-5	NS	NA	1.2	2
Chlorobenzene	108-90-7	40,000	NA	0.27	2
Chloroethane	75-00-3	NS	NA	0.6	5
Chloroform	67-66-3	12,000	NA	0.29	2
Chloromethane	74-87-3	NS	NA	1.2	5
cis-1,2-Dichloroethene	156-59-2	NS	NA	0.51	2
Dibromochloromethane	124-48-1	NS	NA	0.43	2
Dichlorodifluoromethane	75-71-8	NS	NA	1.1	2
Ethylbenzene	100-41-4	NS	NA	0.18	2
Isopropylbenzene	98-82-8	NS	NA	0.28	5
Methyl Tert Butyl Ether	1634-04-4	NS	NA	0.4	2
Methylene chloride	75-09-2	12,000	NA	1.5	2
Styrene	100-42-5	NS	NA	0.21	5
Tetrachloroethene	127-18-4	2,000	NA	0.44	2
Toluene	108-88-3	36,000	NA	0.24	5
trans-1,2-Dichloroethene	156-60-5	NS	NA	0.45	2
Trichloroethene	79-01-6	2,000	NA	0.47	2
Trichlorofluoromethane	75-69-4	NS	NA	1	2
Vinyl chloride	75-01-4	NS	NA	0.57	2
Xylene (total)	1330-20-7	260	NA	0.2	2

TABLE 1a

PARAMETERS, METHODS, AND TARGET REPORTING LIMITS - SOIL AND SEDIMENT SAMPLES

QUALITY ASSURANCE PROJECT PLAN
WASTE STREAM INC., POTSDAM, NEW YORK

Analyte	CAS Number	Soil Screening Criteria[1,2]	Sediment Screening Criteria[3]	Soil/Sediment Reference Limits[4]	
				Laboratory MDL[5]	Laboratory RL[6]
Semivolatile Organic Compounds (8270)[7] (ug/kg)					
2,4,5-Trichlorophenol	95-95-4	NS	NA	13	500
2,4,6-Trichlorophenol	88-06-2	NS	NA	12	500
2,4-Dichlorophenol	120-83-2	NS	NA	14	500
2,4-Dimethylphenol	105-67-9	NS	NA	81	500
2,4-Dinitrophenol	51-28-5	NS	NA	130	1000
2,4-Dinitrotoluene	121-14-2	NS	NA	33	500
2,6-Dinitrotoluene	606-20-2	NS	NA	13	500
2-Chloronaphthalene	91-58-7	NS	NA	14	250
2-Chlorophenol	95-57-8	NS	NA	11	250
2-Methylnaphthalene	91-57-6	NS	NA	13	100
2-Methylphenol	95-48-7	NS	NA	20	500
2-Nitroaniline	88-74-4	NS	NA	13	500
2-Nitrophenol	88-75-5	NS	NA	13	500
3&4-Methylphenol	108-39-4/106-44-5	NS	NA	24	500
3,3'-Dichlorobenzidine	91-94-1	NS	NA	25	250
3-Nitroaniline	99-09-2	NS	NA	27	500
4,6-Dinitro-o-cresol	534-52-1	NS	NA	63	500
4-Bromophenyl phenyl ether	101-55-3	NS	NA	13	250
4-Chloro-3-methyl phenol	59-50-7	NS	NA	13	500
4-Chloroaniline	106-47-8	NS	NA	13	500
4-Chlorophenyl phenyl ether	7005-72-3	NS	NA	15	250
4-Nitroaniline	100-01-6	NS	NA	13	500
4-Nitrophenol	100-02-7	NS	NA	94	1000
Acenaphthene	83-32-9	20,000	NA	13	100
Acenaphthylene	208-96-8	NS	NA	10	100
Anthracene	120-12-7	NS	NA	12	100
Benzo(a)anthracene	56-55-3	NS	NA	13	100
Benzo(a)pyrene	50-32-8	2,600	NA	11	100
Benzo(b)fluoranthene	205-99-2	NS	NA	13	100
Benzo(g,h,i)perylene	191-24-2	NS	NA	10	100
Benzo(k)fluoranthene	207-08-9	NS	NA	15	100
bis(2-Chloroethoxy)methane	111-91-1	NS	NA	12	250
bis(2-Chloroethyl)ether	111-44-4	NS	NA	15	250
bis(2-Chloroisopropyl)ether	108-60-1	NS	NA	18	250
bis(2-Ethylhexyl)phthalate	117-81-7	NS	NA	9.2	250
Butyl benzyl phthalate	85-68-7	NS	NA	10	250
Carbazole	86-74-8	NS	NA	12	100
Chrysene	218-01-9	NS	NA	12	100
Dibenzo(a,h)anthracene	53-70-3	NS	NA	12	100
Dibenzofuran	132-64-9	NS	NA	14	100
Diethyl phthalate	84-66-2	NS	NA	12	250
Dimethyl phthalate	131-11-3	NS	NA	14	250
Di-n-butyl phthalate	84-74-2	NS	NA	26	250
Di-n-octyl phthalate	117-84-0	NS	NA	7.8	250
Fluoranthene	206-44-0	NS	NA	14	100
Fluorene	86-73-7	30,000	NA	13	100
Hexachlorobenzene	118-74-1	NS	NA	16	250
Hexachlorobutadiene	87-68-3	NS	NA	14	250
Hexachlorocyclopentadiene	77-47-4	NS	NA	130	500
Hexachloroethane	67-72-1	NS	NA	12	250
Indeno(1,2,3-cd)pyrene	193-39-5	NS	NA	11	100
Isophorone	78-59-1	NS	NA	12	250
Naphthalene	91-20-3	NS	NA	16	100
Nitrobenzene	98-95-3	NS	NA	14	250
N-Nitroso-di-n-propylamine	621-64-7	NS	NA	14	250
N-Nitrosodiphenylamine	86-30-6	NS	NA	15	250
Pentachlorophenol	87-86-5	800	NA	35	500
Phenanthrene	85-01-8	NS	NA	14	100
Phenol	108-95-2	30,000	NA	14	250

TABLE 1a

PARAMETERS, METHODS, AND TARGET REPORTING LIMITS - SOIL AND SEDIMENT SAMPLES

QUALITY ASSURANCE PROJECT PLAN
WASTE STREAM INC., POTSDAM, NEW YORK

Analyte	CAS Number	Soil Screening Criteria[1,2]	Sediment Screening Criteria[3]	Soil/Sediment Reference Limits[4]	
				Laboratory MDL[5]	Laboratory RL[6]
Pyrene	129-00-0	NS	NA	12	100
PCB (8082)[7] (ug/kg)					
Aroclor-1016	12674-11-2	NS	NS	15	33
Aroclor-1221	11104-28-2	NS	NS	20	33
Aroclor-1232	11141-16-5	NS	NS	16	33
Aroclor-1242	53469-21-9	NS	NS	16	33
Aroclor-1248	12672-29-6	NS	NS	15	33
Aroclor-1254	11097-69-1	NS	NS	24	33
Aroclor-1260	11096-82-5	NS	NS	17	33
Total Aroclors	NA	1,000	1,000	24	33
Inorganics (6010/7000/9012)[7] (mg/kg)					
Arsenic	7440-38-2	13	NA	0.21	1.0
Barium	7440-39-3	433	NA	0.073	5.0
Beryllium	7440-41-7	10	NA	0.024	0.40
Cadmium	7440-43-9	4	NA	0.042	0.40
Chromium	16065-83-1	41	NA	0.95	1.0
Copper	7440-50-8	50	NA	0.56	2.5
Lead	7439-92-1	63	NA	0.17	1.0
Manganese	7439-96-5	1,600	NA	0.040	1.5
Mercury	7439-97-6	0.18	NA	0.0097	0.033
Nickel	7440-02-0	30	NA	0.44	4.0
Selenium	7782-49-2	3.9	NA	0.35	1.0
Silver	7440-22-4	2	NA	0.13	0.50
Zinc	7440-66-6	109	NA	0.16	2.0
Conventional Chemistry[8] (mg/Kg)					
Total Organic Carbon	NA	NA	NS	15	100

TABLE 1a

PARAMETERS, METHODS, AND TARGET REPORTING LIMITS - SOIL AND SEDIMENT SAMPLES

QUALITY ASSURANCE PROJECT PLAN
WASTE STREAM INC., POTSDAM, NEW YORK

Analyte	CAS Number	Soil Screening Criteria[1,2]	Sediment Screening Criteria[3]	Soil/Sediment Reference Limits[4]	
				Laboratory MDL[5]	Laboratory RL[6]
Waste Characterization (mg/L)					
TCLP VOCs (1311/8260)[7]					
Benzene	71-43-2	0.5	NA	0.045	0.1
2-Butanone	78-93-3	200	NA	0.16	1
Carbon tetrachloride	56-23-5	0.5	NA	0.062	0.2
Chlorobenzene	108-90-7	100	NA	0.048	0.2
Chloroform	67-66-3	6	NA	0.05	0.2
1,2-Dichloroethane	107-06-2	0.5	NA	0.035	0.2
1,1-Dichloroethene	75-35-4	0.7	NA	0.067	0.2
Tetrachloroethene	127-18-4	0.7	NA	0.062	0.2
Trichloroethene	79-01-6	0.5	NA	0.045	0.2
Vinyl chloride	75-01-4	0.2	NA	0.061	0.2
TCLP SVOCs (1311/8270)[7]					
1,4-Dichlorobenzene	106-46-7	7.5	NA	0.025	0.5
2,4-Dinitrotoluene	121-14-2	0.13	NA	0.068	1
Hexachlorobenzene	118-74-1	0.13	NA	0.03	0.5
Hexachlorobutadiene	87-68-3	0.5	NA	0.029	0.5
Hexachloroethane	67-72-1	3	NA	0.044	0.5
2-Methylphenol	95-48-7	200	NA	0.13	1
3&4-Methylphenol	108-39-4/106-44-5	200	NA	0.2	1
Nitrobenzene	98-95-3	2	NA	0.025	0.5
Pentachlorophenol	87-86-5	100	NA	0.13	1
Pyridine	110-86-1	25	NA	0.052	1
2,4,5-Trichlorophenol	95-95-4	400	NA	0.057	1
2,4,6-Trichlorophenol	88-06-2	2	NA	0.032	1
TCLP Metals (1311/6010/7470)[7]					
Arsenic	7440-38-2	5	NA	2.9	10
Barium	7440-39-3	100	NA	0.81	500
Cadmium	7440-43-9	1	NA	0.50	4.0
Chromium	16065-83-1	5	NA	1.4	10
Lead	7439-92-1	5	NA	1.7	10
Mercury	NA	0.2	NA	0.000067	0.0002
Selenium	7782-49-2	1	NA	4.8	25
Silver	7440-22-4	5	NA	1.0	5.0
Ignitabilty (1010/Chapter 7)[7]	NA	NS	NA	NA	140°
Corrosivity (9045/Chapter 7)[7]	NA	NS	NA	NA	0.1
Reactivie Cyanide (Chapter 7)[7] mg/kg	NA	NS	NA	NA	1.5
Reactive Sulfide (Chapter 7)[7] mg/kg	NA	NS	NA	NA	50

Abbreviations:
RL = reporting limit
MDL = method detection limit
ug/kg = micrograms per kilogram
mg/kg = milligrams per kilogram
PCB = polychlorinated biphenyl
NA = not applicable
NS = not specified

Notes:
1. Soil screening criteria reflect Soil Cleanup Objectives for protection of ecological resources as presented in Title 6 of the New York Codes, Rules, and Regulations (6 NYCRR) Part 375-6.8(b).
2. Waste characterization screening criteria reflect 40 CFR 261, Appendix II, 1993 ed., as amended by 58 FR 46040, August 31, 1993.
3. Sediment screening criteria reflect value required by the NYSDEC ROD for the site.
4. The listed MDL and RL are based on the laboratory-provided limits at the time of this document. The RL and MDL are updated periodically by the laboratory and the current limits at the time of analysis will be reported.
5. Concentrations detected less than the RL but greater than the MDL must be reported with the appropriate qualifier.
6. The target reporting limits are based on wet weight. Actual reporting limits will vary based on sample weight and moisture content.
7. USEPA. Office of Solid Waste and Emergency Response. *Test Methods for Evaluating Solid Waste SW-846 3rd ed.* Washington, DC. 1996.
8. USEPA Region 2 Lloyd Kahn method.

TABLE 1b

PARAMETERS, METHODS, AND TARGET REPORTING LIMITS - WATER SAMPLES

QUALITY ASSURANCE PROJECT PLAN
WASTE STREAM INC., POTSDAM, NEW YORK

Analyte	CAS Number	Groundwater Screening Criteria[1]	Surface Water Screening Criteria[2]	Water Reference Limits[3]	
				Laboratory MDL [4]	Laboratory RL
Volatile Organic Compounds (8260)[5] (ug/L)					
1,1,1-Trichloroethane	71-55-6	5	5	0.94	1
1,1,2,2-Tetrachloroethane	79-34-5	5	NS	0.42	0.5
1,1,2-Trichloroethane	79-00-5	1	1	0.49	1
1,1-Dichloroethane	75-34-3	5	5	0.37	1
1,1-Dichloroethene	75-35-4	5	NS	0.67	1
1,2,3-Trichlorobenzene	87-61-6	5	5	0.76	5
1,2,4-Trichlorobenzene	120-82-1	5	5	0.45	5
1,2-Dibromo-3-chloropropane	96-12-8	0.04	0.04	1.7	5
1,2-Dibromoethane	106-93-4	NS	NS	0.38	2
1,2-Dichlorobenzene	95-50-1	3	3	0.35	1
1,2-Dichloroethane	107-06-2	0.6	0.6	0.35	1
1,2-Dichloropropane	78-87-5	1	1	0.45	2
1,3-Dichlorobenzene	541-73-1	3	3	0.3	1
1,4-Dichlorobenzene	106-46-7	3	3	0.26	1
1,4-Dioxane	123-91-1	NS	NS	16	25
2-Butanone (MEK)	78-93-3	50	NS	1.6	5
2-Hexanone	591-78-6	50	NS	2.3	5
4-Methyl-2-pentanone (MIBK)	108-10-1	NS	NS	1.3	5
Acetone	67-64-1	50	NS	2.8	10
Benzene	71-43-2	1	1	0.45	0.5
Bromochloromethane	74-97-5	5	5	0.64	5
Bromodichloromethane	75-27-4	50	NS	0.33	1
Bromoform	75-25-2	50	NS	0.42	1
Bromomethane	74-83-9	5	5	1.5	2
Carbon disulfide	75-15-0	NS	60	0.59	5
Carbon tetrachloride	56-23-5	5	NS	0.62	1
Chlorobenzene	108-90-7	5	5	0.48	1
Chloroethane	75-00-3	5	NS	0.84	2
Chloroform	67-66-3	7	7	0.5	1
Chloromethane	74-87-3	NS	NS	1.4	2
cis-1,2-Dichloroethene	156-59-2	5	5	0.54	1
cis-1,3-Dichloropropene	10061-01-5	0.4	0.4	0.22	0.5
Dibromochloromethane	124-48-1	50	NS	0.33	1
Dichlorodifluoromethane	75-71-8	5	NS	1.2	2
Ethylbenzene	100-41-4	5	5	0.38	1
Isopropylbenzene	98-82-8	5	NS	0.64	5
Methyl Tert Butyl Ether	1634-04-4	NS	NS	0.43	1
Methylene chloride	75-09-2	5	5	0.41	2
Styrene	100-42-5	930	50	0.49	5
Tetrachloroethene	127-18-4	5	NS	0.61	1
Toluene	108-88-3	5	5	0.46	1
trans-1,2-Dichloroethene	156-60-5	5	5	0.54	1
trans-1,3-Dichloropropene	10061-02-6	0.4	0.4	0.29	0.5
Trichloroethene	79-01-6	5	5	0.45	1
Trichlorofluoromethane	75-69-4	5	5	0.61	1
Vinyl chloride	75-01-4	2	NS	0.61	1
Xylene (total)	1330-20-7	5	5	0.41	1
Semi-Volatile Organic Compounds (8270)[5] (ug/L)					
2,4,5-Trichlorophenol	95-95-4	2	NS	0.57	10
2,4,6-Trichlorophenol	88-06-2	2	NS	0.32	10
2,4-Dichlorophenol	120-83-2	2	0.3	0.33	10
2,4-Dimethylphenol	105-67-9	2	1000	1.1	10
2,4-Dinitrophenol	51-28-5	2	400	2.5	20

TABLE 1b

PARAMETERS, METHODS, AND TARGET REPORTING LIMITS - WATER SAMPLES

QUALITY ASSURANCE PROJECT PLAN
WASTE STREAM INC., POTSDAM, NEW YORK

Analyte	CAS Number	Groundwater Screening Criteria[1]	Surface Water Screening Criteria[2]	Water Reference Limits[3]	
				Laboratory MDL [4]	Laboratory RL
2,4-Dinitrotoluene	121-14-2	5	NS	0.68	10
2,6-Dinitrotoluene	606-20-2	5	NS	0.64	10
2-Chloronaphthalene	91-58-7	10	10	0.92	5
2-Chlorophenol	95-57-8	NS	NS	0.38	5
2-Methylnaphthalene	91-57-6	NS	NS	0.39	2
2-Methylphenol	95-48-7	NS	NS	1.3	10
2-Nitroaniline	88-74-4	5	NS	0.28	10
2-Nitrophenol	88-75-5	2	NS	0.5	10
3&4-Methylphenol	108-39-4/106-44-5	NS	NS	2	10
3,3'-Dichlorobenzidine	91-94-1	5	NS	0.5	5
3-Nitroaniline	99-09-2	5	NS	0.5	10
4,6-Dinitro-o-cresol	534-52-1	2	NS	1.2	10
4-Bromophenyl phenyl ether	101-55-3	NS	NS	0.2	5
4-Chloro-3-methyl phenol	59-50-7	NS	NS	0.49	10
4-Chloroaniline	106-47-8	5	NS	0.25	10
4-Chlorophenyl phenyl ether	7005-72-3	NS	NS	0.2	5
4-Nitroaniline	100-01-6	5	NS	4.3	10
4-Nitrophenol	100-02-7	2	NS	0.58	20
Acenaphthene	83-32-9	20	20	0.23	2
Acenaphthylene	208-96-8	NS	NS	0.56	2
Anthracene	120-12-7	50	NS	0.21	2
Benzo(a)anthracene	56-55-3	NS	NS	0.21	2
Benzo(a)pyrene	50-32-8	ND	NS	0.21	2
Benzo(b)fluoranthene	205-99-2	0.002	NS	0.23	2
Benzo(g,h,i)perylene	191-24-2	NS	NS	0.25	2
Benzo(k)fluoranthene	207-08-9	0.002	NS	0.27	2
bis(2-Chloroethoxy)methane	111-91-1	5	NS	0.21	5
bis(2-Chloroethyl)ether	111-44-4	1	NS	0.23	5
bis(2-Chloroisopropyl)ether	108-60-1	NS	NS	0.13	5
bis(2-Ethylhexyl)phthalate	117-81-7	5	5	0.49	2
Butyl benzyl phthalate	85-68-7	50	NS	0.85	5
Carbazole	86-74-8	NS	NS	0.21	2
Chrysene	218-01-9	0.002	NS	0.2	2
Dibenzo(a,h)anthracene	53-70-3	NS	NS	0.21	2
Dibenzofuran	132-64-9	NS	NS	0.16	2
Diethyl phthalate	84-66-2	50	NS	0.5	5
Dimethyl phthalate	131-11-3	50	NS	0.5	5
Di-n-butyl phthalate	84-74-2	NS	NS	0.39	5
Di-n-octyl phthalate	117-84-0	50	NS	0.43	5
Fluoranthene	206-44-0	50	NS	0.22	2
Fluorene	86-73-7	50	NS	0.24	2
Hexachlorobenzene	118-74-1	0.04	0.04	0.3	5
Hexachlorobutadiene	87-68-3	0.5	0.5	0.29	5
Hexachlorocyclopentadiene	77-47-4	5	0.45	2.5	10
Hexachloroethane	67-72-1	5	5	0.44	5
Indeno(1,2,3-cd)pyrene	193-39-5	0.002	NS	0.27	2
Isophorone	78-59-1	50	NS	0.2	5
Naphthalene	91-20-3	10	10	0.17	2
Nitrobenzene	98-95-3	0.4	0.4	0.25	5
N-Nitroso-di-n-propylamine	621-64-7	NS	NS	0.81	5
N-Nitrosodiphenylamine	86-30-6	NS	NS	0.54	5
Pentachlorophenol	87-86-5	2	2	1.3	10
Phenanthrene	85-01-8	50	NS	0.21	2
Phenol	108-95-2	2	2	0.51	5
Pyrene	129-00-0	50	NS	0.22	2

TABLE 1b

PARAMETERS, METHODS, AND TARGET REPORTING LIMITS - WATER SAMPLES

QUALITY ASSURANCE PROJECT PLAN
WASTE STREAM INC., POTSDAM, NEW YORK

Analyte	CAS Number	Groundwater Screening Criteria[1]	Surface Water Screening Criteria[2]	Water Reference Limits[3]	
				Laboratory MDL [4]	Laboratory RL
PCBs (8082)[5] (ug/L)					
Aroclor 1016	12674-11-2	NS	NS	0.069	0.25
Aroclor 1221	11104-28-2	NS	NS	0.072	0.25
Aroclor 1232	11141-16-5	NS	NS	0.17	0.25
Aroclor 1242	53469-21-9	NS	NS	0.1	0.25
Aroclor 1248	12672-29-6	NS	NS	0.15	0.25
Aroclor 1254	11097-69-1	NS	NS	0.073	0.25
Aroclor 1260	11096-82-5	NS	NS	0.062	0.25
Total Aroclors	NA	0.09	0.09	0.1	0.25
Metals (6010/7470)[5] (ug/L)					
Aluminum	7429-90-5	2000	NS	40	200
Antimony	7440-36-0	6	3	1.9	6.0
Arsenic	7440-38-2	50	50	2.9	4.0
Barium	7440-39-3	2000	1,000	0.81	50
Beryllium	7440-41-7	3	11	0.25	4.0
Cadmium	7440-43-9	10	5	0.05	4.0
Calcium	7440-70-2	NS	NS	38	5000
Chromium	7440-47-3	100	50	1.4	10
Cobalt	7440-48-4	NS	5	0.4	50
Copper	7440-50-8	1000	200	7	25
Iron	7439-89-6	600	300	20	100
Lead	7439-92-1	50	50	1.7	5.0
Magnesium	7439-95-4	35000	35,000	59	5000
Manganese	7439-96-5	600	300	0.81	15
Mercury	7439-97-6	1.4	0.7	0.067	0.200
Nickel	7440-02-0	200	100	0.57	40
Potassium	7440-09-7	NS	NS	160	5000
Selenium	7782-49-2	20	10	4.8	10
Silver	7440-22-4	100	50	1	5.0
Sodium	7440-23-5	NS	NS	60	5000
Thallium	7440-28-0	0.5	8	1.9	5
Vanadium	7440-62-2	NS	14	2.8	10
Zinc	7440-66-6	5000	5,000	0.5	20
Conventional Chemistry[5,6] (mg/L)					
Cyanide (9012)	NA	400	200	0.0023	0.01
Total Suspended Solids (SM 2540D)	NA	NS	NS	1.7	4.0
Total Dissolved Solids (SM 2540C)	NA	NS	500	3.5	10
Hardness (SM2340C)	NA	NS	NS	1.2	4.0
pH (SM4500H)	NA	6.5<pH>8.5	6.5<pH>8.5	NA	0.1

Abbreviations:
RL = reporting limit
MDL = method detection limit
mg/L = milligrams per liter
ug/L = micrograms per liter
NA = not applicable
NS = not specified
ND = not detected

Notes:
1. Groundwater screening criteria correspond to the NYSDEC's Division of Water, Technical and Operational Guidance Series (TOGS) 1.1.1, Class GA Standards.
2. Surface water screening criteria correspond to the NYSDEC's Surface Water Quality Standards, Part 703, Class A Standards.
3. The listed MDL and RL are based on the laboratory-provided limits at the time of this document. The RL and MDL are updated periodically by the laboratory and the current limits at the time of analysis will be reported.
4. Concentrations detected less than the RL but greater than the MDL must be reported with the appropriate qualifier.
5. USEPA. Office of Solid Waste and Emergency Response. *Test Methods for Evaluating Solid Waste SW-846 3rd ed.* Washington, DC. 1996.
6. Standard Methods for the Analysis of Water and Wastewater, APHA

TABLE 1c

PARAMETERS, METHODS, AND TARGET REPORTING LIMITS - BIOTA SAMPLES

QUALITY ASSURANCE PROJECT PLAN
WASTE STREAM INC., POTSDAM, NEW YORK

Analyte	CAS Number	Biota Screening Criteria	Biota Reference Limits[2]	
			Laboratory MDL	Laboratory RL
PCB (3541/8082)[1] (ug/kg)				
Aroclor-1016	12674-11-2	NS	12.5	25
Aroclor-1221	11104-28-2	NS	12.5	25
Aroclor-1232	11141-16-5	NS	12.5	25
Aroclor-1242	53469-21-9	NS	12.5	25
Aroclor-1248	12672-29-6	NS	12.5	25
Aroclor-1254	11097-69-1	NS	12.5	25
Aroclor-1260	11096-82-5	NS	12.5	25
Aroclor-1262	37324-23-5	NS	12.5	25
Aroclor-1268	11100-14-4	NS	12.5	25
Total Aroclors	NA	NS	12.5	25
Percent Lipids (gravimetric method)				
Percent Lipids	NA	NS	NA	NA
Inorganics (6020/7471)[1] (mg/kg)				
Arsenic	7440-38-2	NS	0.0136	0.1
Barium	7440-39-3	NS	0.03162	0.1
Beryllium	7440-41-7	NS	0.0295	0.1
Cadmium	7440-43-9	NS	0.00853	0.1
Chromium	16065-83-1	NS	0.0326	0.1
Copper	7440-50-8	NS	0.04175	0.2
Lead	7439-92-1	NS	0.01163	0.1
Manganese	7439-96-5	NS	0.07321	0.5
Mercury	7439-97-6	NS	0.00134	0.01
Nickel	7440-02-0	NS	0.02825	0.1
Selenium	7782-49-2	NS	0.08031	0.2
Silver	7440-22-4	NS	0.00399	0.05
Zinc	7440-66-6	NS	0.07836	2

Abbreviations:
RL = reporting limit
MDL = method detection limit
ug/kg = micrograms per kilogram
NS = not specified

Notes:
1. USEPA. Office of Solid Waste and Emergency Response. *Test Methods for Evaluating Solid Waste SW-846 3rd ed.* Washington, DC. 1996.
2. The listed MDL and RL are based on the laboratory-provided limits at the time of this document. The RL and MDL are updated periodically by the laboratory and the current limits at the time of analysis will be reported.

TABLE 2
SAMPLE QUANTITIES AND QUALITY CONTROL FREQUENCIES

QUALITY ASSURANCE PROJECT PLAN
WASTE STREAM INC., POTSDAM, NEW YORK

	Estimated Environ. Sample Quantity [1]	Archive Sample Quantity [1,2]	Field QC Analyses						Laboratory QC Sample						Total[4]
			Trip Blank		Rinse Blank [3]		Field Duplicate		Matrix Spike		Matrix Spike Duplicate		Lab Duplicate		
			Freq.	No.	Freq.	No.	Freq.	No.	Freq.	No.	Freq.	No.	Freq.	No.	
Sediment															
PCBs (SW-846 8082)	36	42	NA	--	1/20	4	1/20	4	1/20	4	1/20	4	NA	--	94
TOC (Lloyd Kahn)	36	42	NA	--	1/20	4	1/20	4	NA	--	NA	--	1/20	4	90
Soil															
VOCs (SW-846 8260)	8	2	NA	--	1/20	2	1/20	2	1/20	2	1/20	2	NA	--	18
SVOCs (SW-846 8270)	18	10	NA	--	1/20	2	1/20	2	1/20	2	1/20	2	NA	--	36
Metals (SW-846 6010/7471)	28	18	NA	--	1/20	2	1/20	2	1/20	2	1/20	2	NA	--	54
PCBs (SW-846 8082)	26	25	NA	--	1/20	2	1/20	3	1/20	3	1/20	3	NA	--	62
Water (Groundwater and Surface Water)															
VOCs (SW846 8260)	10	NA	1/day	1	1/20	1	1/20	1	1/20	1	1/20	1	NA	--	15
SVOCs (SW846 8270)	10	NA	NA	--	1/20	1	1/20	1	1/20	1	1/20	1	NA	--	14
PCBs (SW846 8082)	10	NA	NA	--	1/20	1	1/20	1	1/20	1	1/20	1	NA	--	14
TAL Metals and Mercury (SW846 6010/7470)	10	NA	NA	--	1/20	1	1/20	1	1/20	1	1/20	1	NA	--	14
Cyanide (SW846 9012)	10	NA	NA	--	1/20	1	1/20	1	1/20	1	1/20	1	NA	--	14
TSS (SM2540D)	10	NA	NA	--	1/20	1	1/20	1	NA	--	NA	--	1/20	1	13
TDS (SM2540C)	10	NA	NA	--	1/20	1	1/20	1	NA	--	NA	--	1/20	1	13
Hardness (SM2340C)	10	NA	NA	--	1/20	1	1/20	1	NA	--	NA	--	1/20	1	13
pH (SM4500H)	10	NA	NA	--	1/20	1	1/20	1	NA	--	NA	--	1/20	1	13
Waste Characterization (Soil and Water)															
Corrosivity, Reactivity, and Ignitability (SW-846 Chapter 7,1020)	4	NA	NA	--	NA	--	NA	--	NA	--	NA	--	NA	--	4
TCLP VOCs (SW-846 1311/8260)	4	NA	NA	--	NA	--	NA	--	NA	--	NA	--	NA	--	4
TCLP SVOCs (SW-846 1311/8270)	4	NA	NA	--	NA	--	NA	--	NA	--	NA	--	NA	--	4
TCLP Metals (SW-846 1311/6010/7470)	4	NA	NA	--	NA	--	NA	--	NA	--	NA	--	NA	--	4
PCBs (SW-846 8082)	4	NA	NA	--	NA	--	NA	--	NA	--	NA	--	NA	--	4
Biota															
PCBs (SW-846 3541/8082)	10	NA	NA	--	NA	--	NA	--	NA	--	NA	--	NA	--	10
Percent Lipids (gravimetric method)	10	NA	NA	--	NA	--	NA	--	NA	--	NA	--	NA	--	10
Metals (SW-846 6010/7471)	10	NA	NA	--	NA	--	NA	--	NA	--	NA	--	NA	--	10

Notes:

1. All sample quantities are an approximation.
2. Archive samples will be analyzed as necessary based on the results of the initial samples.
3. Rinse blanks collected at a frequency of 1 per day or 1 per 20 samples, whichever is more frequent. Rinse blanks not required when dedicated sampling equipment is used.
4. Total number of samples includes all archive samples.

Freq = Frequency.
No. = Number.

TABLE 3
SAMPLE CONTAINERS, PRESERVATION, AND HOLDING TIMES

QUALITY ASSURANCE PROJECT PLAN
WASTE STREAM INC., POTSDAM, NEW YORK

Parameter	Method	Bottle Type	Preservation	Holding Time [3]
Soil and Sediment				
VOCs	8260 [1]	3-EnCore™ samplers One 40-ml glass vial	Cool to <6°C	48 hours to preservation 14 days to analysis
SVOCs	8270 [1]	One 8-oz glass jar with Teflon®-lined lid	Cool to <6°C	14 days to extraction 40 days to analysis
PCBs	8082 [1]	One 8-oz glass jar with Teflon®-lined lid	Cool to <6°C	14 days to extraction 40 days to analysis
Metals	7471 [1]	One 8-oz glass jar with Teflon®-lined lid	Cool to <6°C	28 days to analysis
	6010 [1]			180 days to analysis
TOC	Lloyd Kahn	One 2-oz glass jar with Teflon®-lined lid	Cool to <6°C	14 days to analysis
Water (Groundwater and Surface Water)				
VOCs	8260 [1]	Three 40-ml glass vial	Cool to <6°C	14 days to analysis
SVOCs	8270 [1]	Two 1-L amber glass bottle with Teflon®-lined lid	Cool to <6°C	7 days to extraction 40 days to analysis
PCBs	8082 [1]	Two 1-L amber glass bottle with Teflon®-lined lid	Cool to <6°C	7 days to extraction 40 days to analysis
TAL Metals	6010 [1] 7470 [1]	One 500ml plastic bottle	HNO_3 to pH<2, Cool to <6°C	180 days to analysis 28 days to analysis
Cyanide	9012 [1]	One 250ml plastic bottle	NaOH to pH>12, Cool to <6°C	14 days to analysis
TDS	2540C [2]	One 1-L plastic bottle	Cool to <6°C	7 days to analysis
TSS	2540D [2]			7 days to analysis
pH	4500H [2]			As soon as possible
Hardness	2340 [2]	One 250ml plastic bottle	HNO_3 to pH<2, Cool to <6°C	180 days to analysis
Waste Characterization				
TCLP VOCs	1311/8260 [1]	One 4-oz glass jar with Teflon®-lined lid	Cool to <6°C	14 days to TCLP extraction 14 days to analysis
TCLP SVOCs	1311/8270 [1]	One 4-oz glass jar with Teflon®-lined lid	Cool to <6°C	14 days to TCLP extraction, 7 days until extraction 40 days to analysis
PCBs	8082 [1]	One 4-oz glass jar with Teflon®-lined lid	Cool to <6°C	14 days to extraction 40 days to analysis
TCLP Metals (except Mercury)	1311/6010 [1]	One 4-oz glass jar with Teflon®-lined lid	Cool to <6°C	180 days to TCLP extraction 180 days to analysis
TCLP Mercury	1311/7470[1]			28 days to TCLP extraction 28 days to analysis
Ignitibility	1010/Chapter 7[1]	One 8-oz glass jar with Teflon®-lined lid	Cool to <6°C	14 days to analysis
Corrosivity	9045 [1]			14 days to analysis
Reactive Cyanide Reactive Sulfide	Chapter 7[1]			14 days to analysis
Biota				
PCBs	3541/8082 [1]	NA; at least 20g of fish required	Freeze	Up to 1 year if kept frozen
Percent Lipids	Gravimetric methods	NA; at least 20g of fish required	Freeze	Up to 1 year if kept frozen
Metals	6010/7471[1]	NA; at least 5g of fish required	Freeze	Up to 6 months if kept frozen

Notes:

1. USEPA. Office of Solid Waste and Emergency Response. *Test Methods for Evaluating Solid Waste SW-846.* 3rd ed. Washington, DC. 1996.
2. Standard Methods for the Analysis of Water and Wastewater, APHA
3. All holding times are measured from date of collection except where noted.

°C = Degrees Celsius.
ml = Milliliter
oz = Ounce
L = Liter
g = Gram
VOCs = Volatile organic compounds
SVOCs = Semi-volatile organic compounds
PCB = Polychlorinated biphenyl.
TDS = Total dissolved solid.
TSS = Total suspended solid.

TABLE 4
LABORATORY QUALITY CONTROL LIMITS [1]
QUALITY ASSURANCE PROJECT PLAN
WASTE STREAM INC., POTSDAM, NEW YORK

Parameter	Accuracy - % Recovery			Precision - RPD			
	Surrogate	MS/MSD	LCS	MS/MSD	LCS/LCSD	Lab Duplicate	Field Duplicate
Soil and Sediment							
Volatile Organics	70-130	70-130	70-130	30	30	--	50
Semivolatile Organics	30-130	Acid Extractables: 30-130 Base Neutrals: 40-140	Acid Extractables: 30-130 Base Neutrals: 40-140	30	30	--	50
PCBs	30-150	40-140	40-140	50	50	--	50
Metals	--	75-125	80-120	30	--	30	50
TOC	--	--	--	--	--	20	50
Water (Groundwater and Surface Water)							
Volatile Organics	70-130	70-130	70-130	30	30	--	35
Semivolatile Organics	30-130	Acid Extractables: 30-130 Base Neutrals: 40-140	Acid Extractables: 30-130 Base Neutrals: 40-140	30	30	--	35
PCBs	30-150	40-140	40-140	50	50	--	35
Metals	--	75-125	80-120	30	--	--	35
Cyanide	--	75-125	80-120	30	--	30	35
Hardness	--	75-125	80-120	--	--	20	35
pH	--	--	--	--	--	5	35
TDS	--	--	--	--	--	5	35
TSS	--	--	--	--	--	5	35
Waste Characterization							
TCLP Volatile Organics	70-130	70-130	70-130	30	30	--	--
TCLP Semivolatile Organics	30-130	Acid Extractables: 30-130 Base Neutrals: 40-140	Acid Extractables: 30-130 Base Neutrals: 40-140	20	20	--	--
PCBs	30-150	40-140	40-140	50	50	--	--
TCLP Metals	--	75-125	80-120	30	--	30	--
Ignitability	--	--	80-120	--	--	30	--
Reactivity	--	--	80-120	--	--	30	--
Corrostivity	--	--	80-120	--	--	30	--
Biota							
PCBs	Decachlorobiphenyl: 55-130 Tetrachloro-m-xylene: 45-130	48-130	56-130	25	20	--	--
Percent lipids	--	--	--	--	--	20	--
Metals	--	75-125	80-120	30	--	30	--

Notes:

1. The listed QC limits are based on the laboratory-provided limits at the time of this document. The limits are updated periodically by the laboratory and the current limits at the time of analysis will be reported.

ARCADIS

Attachment 1

Sample Chain-of-Custody Form

ARCADIS
Infrastructure, environment, facilities

ID#:

CHAIN OF CUSTODY & LABORATORY ANALYSIS REQUEST FORM

Page ___ of ___

Lab Work Order #

Send Results to:

Contact & Company Name:	Telephone:
Address:	Fax:
City State Zip	E-mail Address:
Project Name/Location (City, State):	Project #:
Sampler's Printed Name:	Sampler's Signature:

Preservative								
Filtered (✓)								
# of Containers								
Container Information								

PARAMETER ANALYSIS & METHOD

Keys

Preservation Key:
A. H_2SO_4
B. HCL
C. HNO_3
D. NaOH
E. None
F. Other: _____
G. Other: _____
H. Other: _____

Container Information Key:
1. 40 ml Vial
2. 1 L Amber
3. 250 ml Plastic
4. 500 ml Plastic
5. Encore
6. 2 oz. Glass
7. 4 oz. Glass
8. 8 oz. Glass
9. Other: _____
10. Other: _____

Matrix Key:
SO - Soil | SE - Sediment | NL - NAPL/Oil
W - Water | SL - Sludge | SW - Sample Wipe
T - Tissue | A - Air | Other: _____

Sample ID	Collection Date	Collection Time	Type (✓) Comp	Type (✓) Grab	Matrix								**REMARKS**

Special Instructions/Comments:

☐ **Special QA/QC Instructions(✓):**

Laboratory Information and Receipt		**Relinquished By**	**Received By**	**Relinquished By**	**Laboratory Received By**
Lab Name:	Cooler Custody Seal (✓)	Printed Name:	Printed Name:	Printed Name:	Printed Name:
☐ Cooler packed with ice (✓)	☐ Intact ☐ Not Intact	Signature:	Signature:	Signature:	Signature:
Specify Turnaround Requirements:	Sample Receipt:	Firm:	Firm/Courier:	Firm/Courier:	Firm:
Shipping Tracking #:	Condition/Cooler Temp: _____	Date/Time:	Date/Time:	Date/Time:	Date/Time:

Distribution: **WHITE – Laboratory returns with results** **YELLOW – Lab copy** **PINK – Retained by ARCADIS**