# TOWN OF WILLSBORO
# BLACK ASH POND
# ENVIRONMENTAL RESTORATION PROJECT
# SITE INVESTIGATION REPORT

**NOVEMBER 2006**

Prepared for:

NYSDEC
Division of Environmental Remediation
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Albany, N.Y. 12233-7015

Prepared by:

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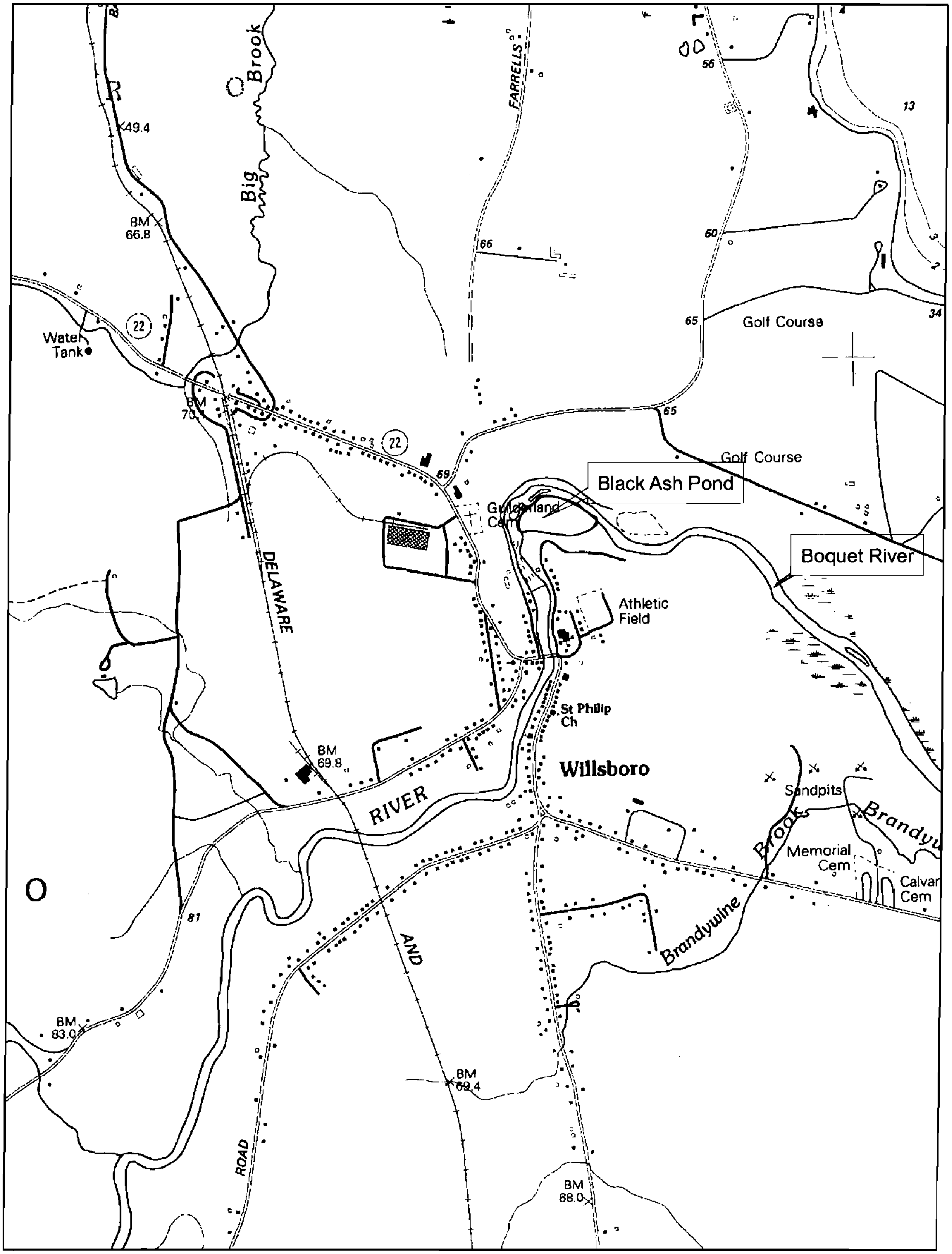



Figure 1
Willsboro Black Ash Pond
Site Location Map

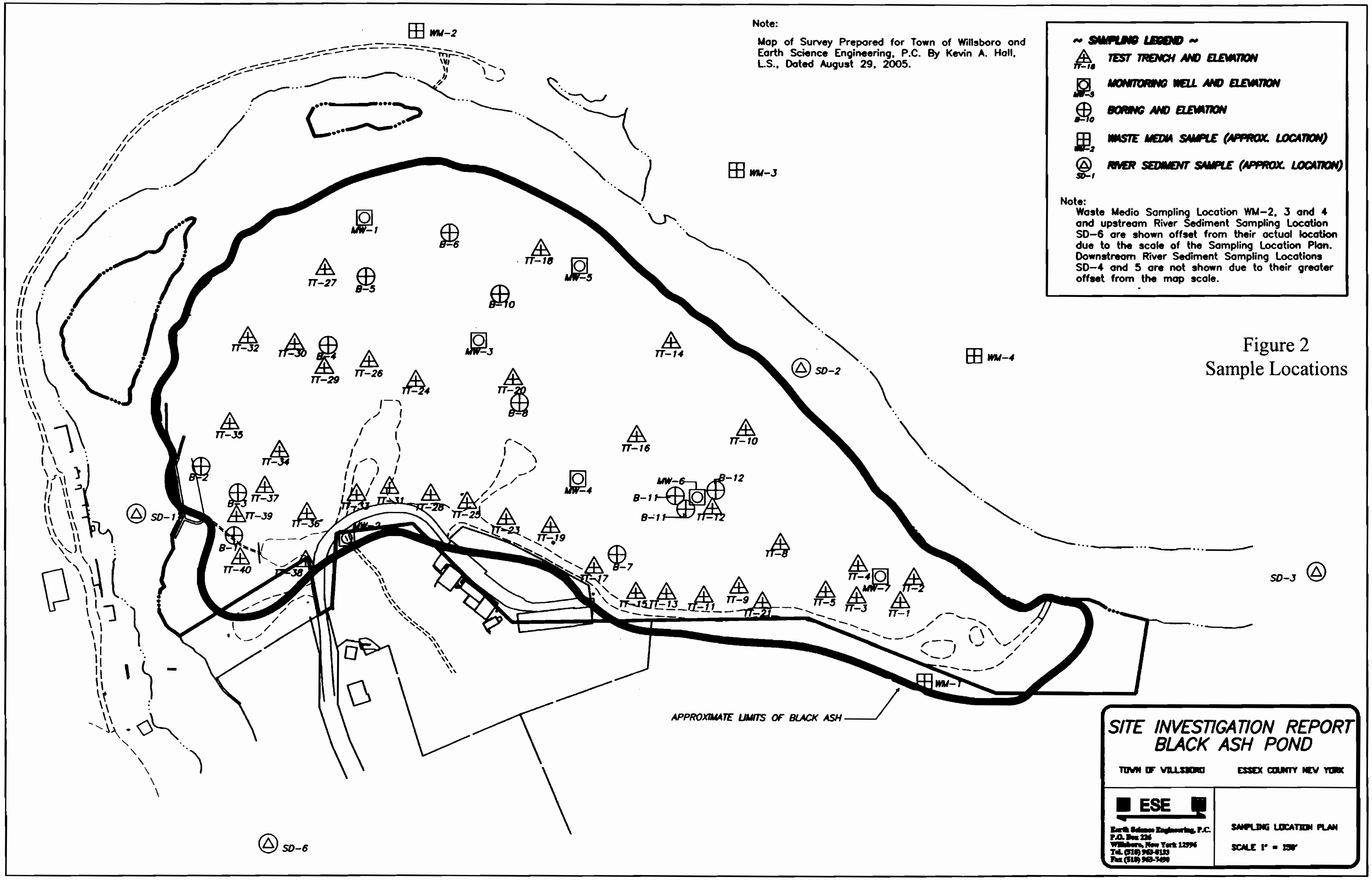



Figure 2
Sample Locations

Figure 2

Figure 3
Groundwater Flow Direction

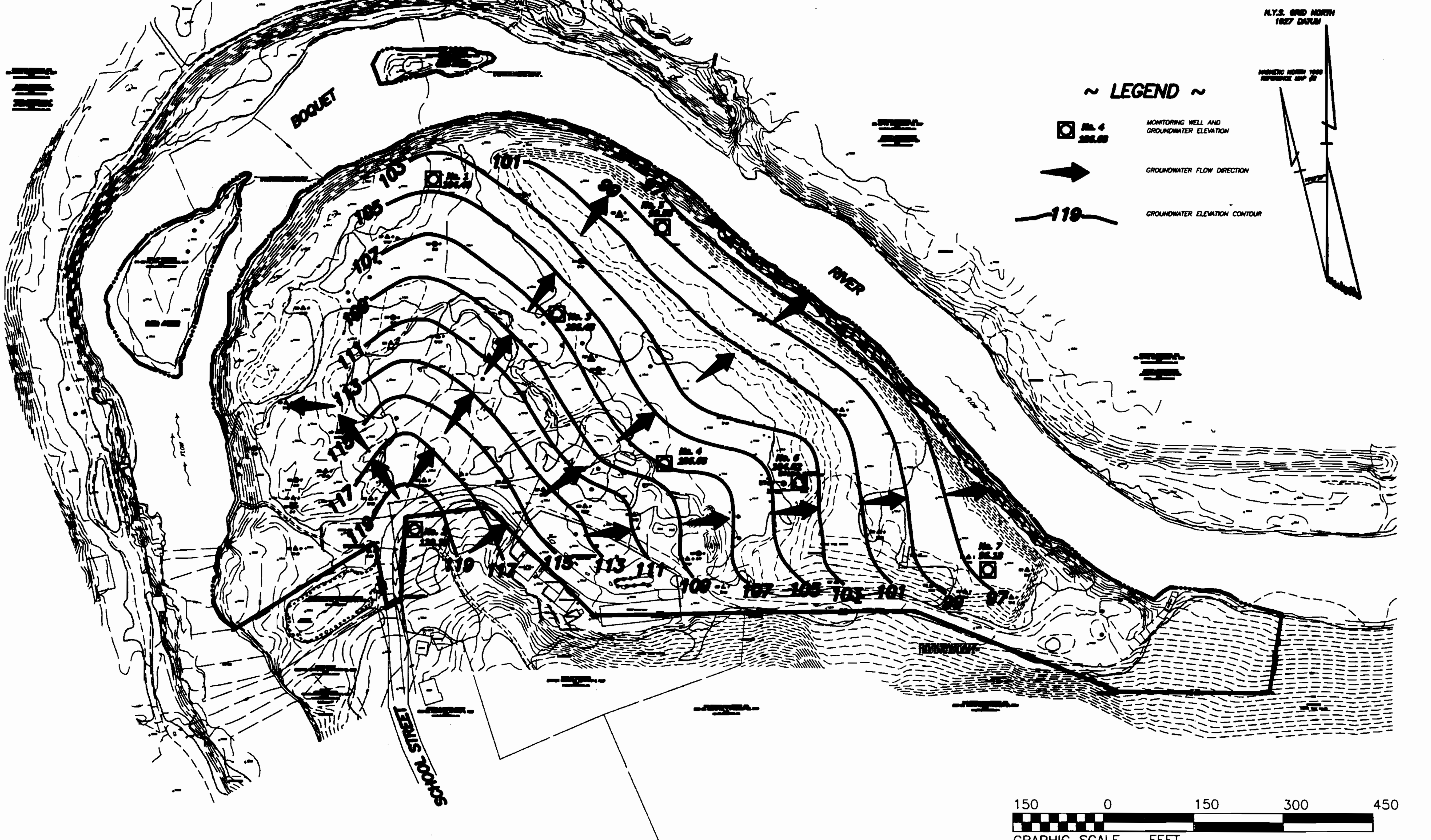



Figure 3

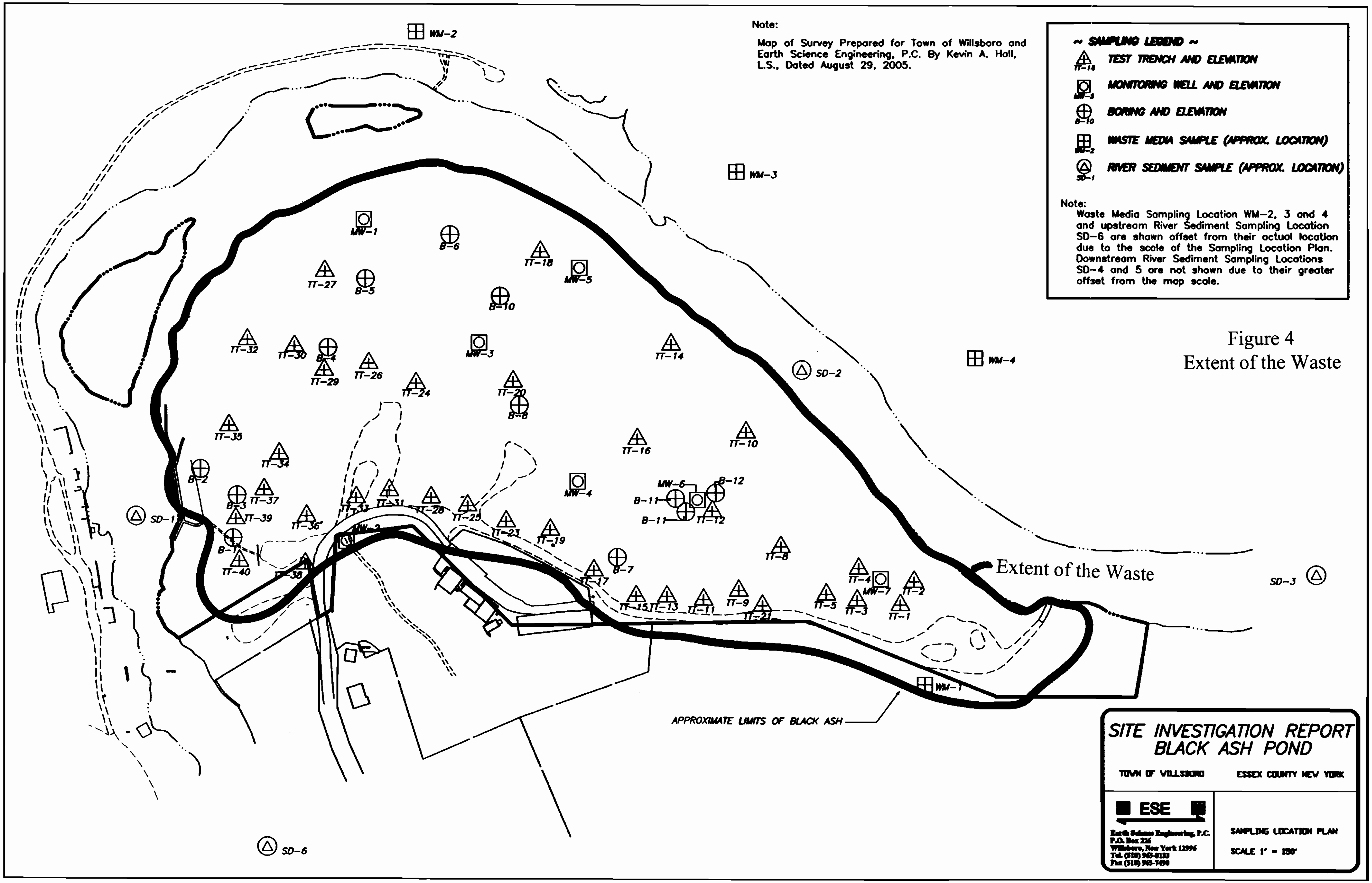
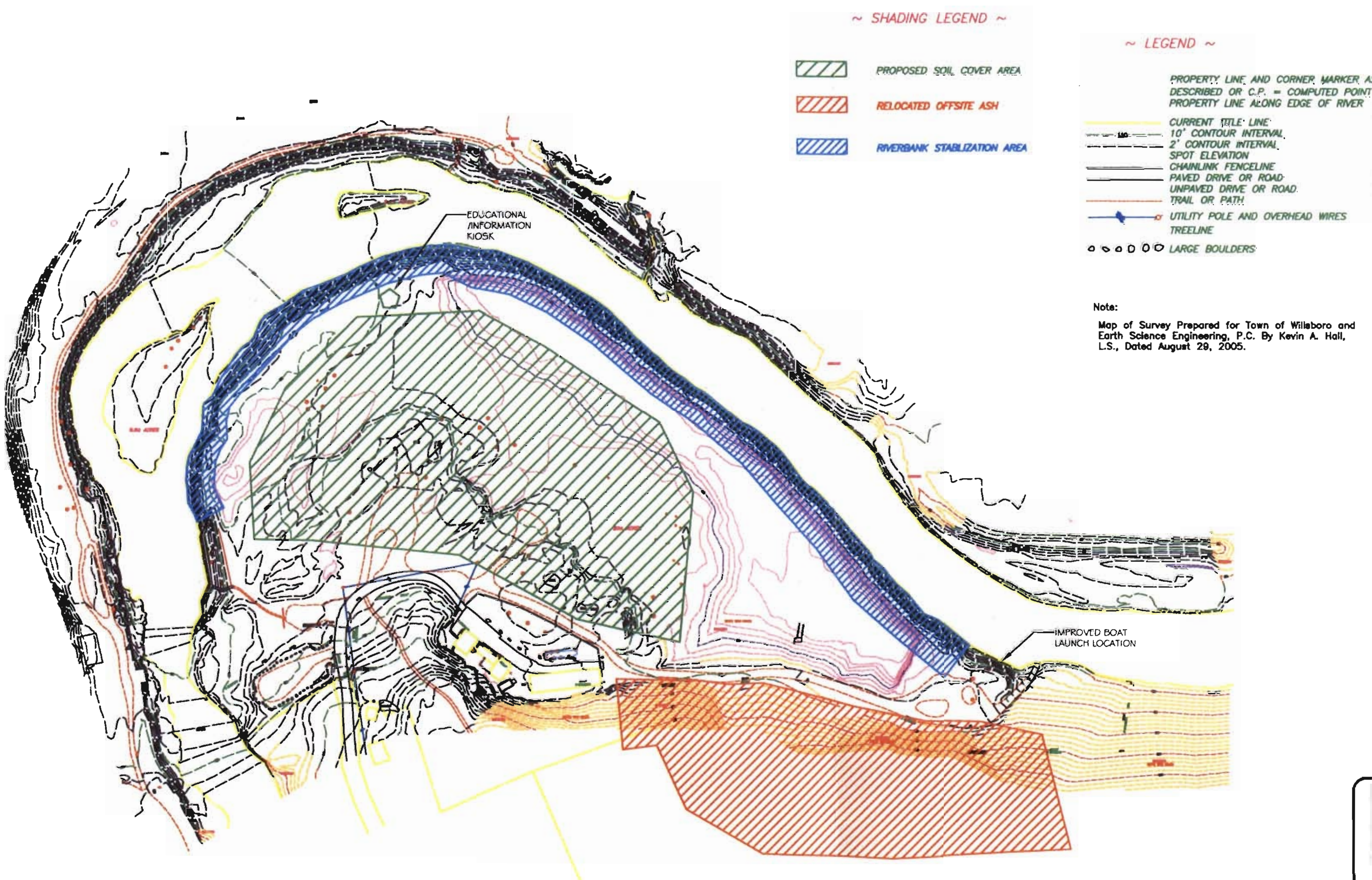

Note:
Map of Survey Prepared for Town of Willsboro and Earth Science Engineering, P.C. By Kevin A. Hall, L.S., Dated August 29, 2005.
~ SAMPLING LEGEND ~
TEST TRENCH AND ELEVATION
MONITORING WELL AND ELEVATION
BORING AND ELEVATION
WASTE MEDIA SAMPLE (APPROX. LOCATION)
RIVER SEDIMENT SAMPLE (APPROX. LOCATION)
Note:
Waste Media Sampling Location WM-2, 3 and 4 and upstream River Sediment Sampling Location SD-6 are shown offset from their actual location due to the scale of the Sampling Location Plan. Downstream River Sediment Sampling Locations SD-4 and 5 are not shown due to their greater offset from the map scale.
Figure 4
Extent of the Waste
Extent of the Waste
APPROXIMATE LIMITS OF BLACK ASH
SITE INVESTIGATION REPORT
BLACK ASH POND
TOWN OF WILLSBORO
ESSEX COUNTY NEW YORK
ESE
SAMPLING LOCATION PLAN
SCALE 1" = 150'

Figure 4

Figure 5




Note:

Map of Survey Prepared for Town of Willsboro and Earth Science Engineering, P.C. By Kevin A. Hall, L.S., Dated August 29, 2005.

ALTERNATIVE 4
CONCEPTUAL DESIGN
BLACK ASH POND

TOWN OF WILLSBORO — ESSEX COUNTY NEW YORK

ESE

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P.O. Box 226
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Tel. (518) 963-8133
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PLAN
DATE: 1/26/07
Scale: NTS

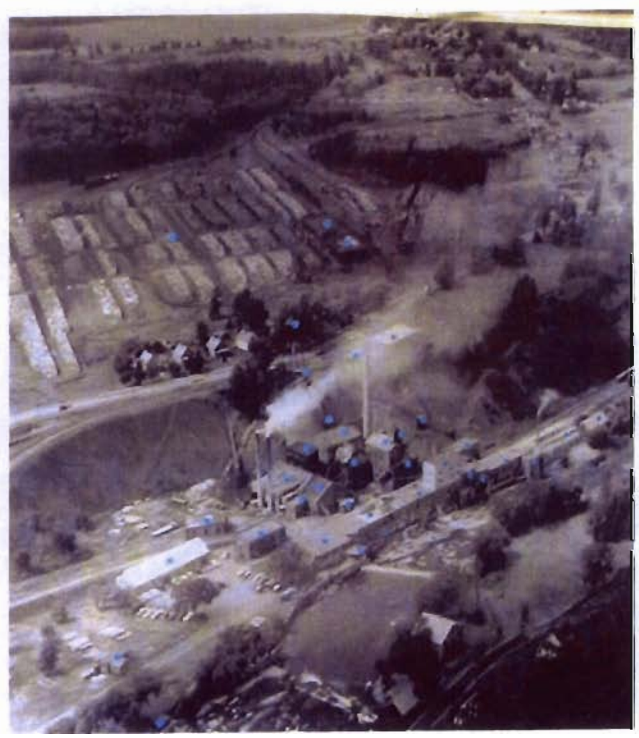
Figure 5

Photo Page 1

Black Ash Pond, looking west

Black Ash Pond and Sludge Lagoon, looking west

Town Waste Water Treatment Plant with Black Ash Pond in foreground



Former Pulp Mill

View from the river of the eroded bank

Black ash collapsing into the river

The Nature Conservancy of New York

# NEW YORK STATE OFFICE

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Albany, New York 12205
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FAX #: 518 963-7490 DATE: November 29, 2006

FROM: Jonathan C. Kaledin, Esq. PHONE:

RE:

CC:

MESSAGE: See attached

Received
ESE, P.C.
Date 11/29/06

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ESE

**Earth Science Engineering, P.C.**

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November 28, 2006

Mr. Jonathan Kaledin
State Counsel
The Nature Conservancy
195 New Karner Road
Albany, NY 12205

Re: Black Ash Pond
Willsboro, NY

Dear Mr. Kaledin:

The scope of the proposed project is for the Town of Willsboro (Town) to mobilize a 4-man crew to access the subject property from the south via the former Willsboro School property and perform an estimated total of 25 to 50 test pits with a small track-mounted excavator. The excavator will mostly weave along former haul roads, however, it will be necessary to cut small saplings (4 inches and smaller) to provide access to identify the areal extent and depth of black ash remaining on The Nature Conservancy property. The small saplings exist within a mature pine forest and will be cut at grade to access the crest of the former riverbank along The Nature Conservancy property.

The excavator will then relocate at the base of the embankment along the same property line to perform test pits. The Town's consultant will estimate the volume of black ash to be removed from the ANC property at the expense of the State of New York. All test pits will be backfilled after measurement of the black ash and these areas will be excavated next year as part of the State of New York's remedial effort at the Black Ash Pond. Furthermore, tracking from the excavator and any disturbance will be mitigated by the natural attenuation of winter and spring to restore areas mildly scarred by this intrusion.

We agree to indemnify and hold harmless The Nature Conservancy and its trustees, officers and employees with respect to any damages to persons or property that may result from the work done on the property described above by us or by persons whom we have hired to undertake such work.

3721 Main Street • P.O. Box 398 • Willsboro, NY 12996 • Telephone: 518-963-8133 • Fax: 518-963-7490
E-mail: zebmeo@willex.com

ESE

**Earth Science Engineering, P.C.**

Civil • Geotechnical • Environmental • Zebra Mussel Controls

Please sign below to show your acceptance of this proposal, and to authorize us to begin the work. If you have additional questions or if I can be of further assistance, please contact me. Thank you.

Sincerely,

*Earth Science Engineering, P.C.*
Douglas R. Ferris, P.E.

Signature The Nature Conservancy By: [signature] Date 11/29/06

Title State Counsel / Asst Secretary

DRF/meo

C: Mr. Robert A. Ashline, Supervisor, Town of Willsboro
Mr. Peter S. Paine
Mr. Victor Putman
Mr. Daniel J. Eaton

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# Section 1: Introduction

## 1.1 Site Location and General History

The Town of Willsboro Black Ash Pond encompasses approximately 25 acres and is located at the terminus of School Street in the Town of Willsboro (hereinafter "Town"), Essex County, New York. The site is a former industrial property bounded to the north and west by the Boquet River, to the east by lands owned by the Adirondack Nature Conservancy (ANC), and to the south by additional lands owned by the ANC and Town. The site was deeded to the Town in 1966 by Georgia-Pacific Corporation. There are no buildings or structures present on the site. The site was previously used for deposition and settling of combustion residue slurry (black ash). Phase I Environmental Site (ESA) Assessments for the parent parcel performed in 2001 and 2003, and a limited Phase II ESA conducted on the parent parcel in 2003, examined the black ash and discovered metals exceeding NYSDEC guidelines.

## 1.2 Physical Setting

The site location is shown on Sheet 1. The site lies at an elevation of approximately 50 ft above mean sea level contiguous to the Boquet River in the Town of Willsboro approximately two (2) miles west of Lake Champlain. Although a portion of the southern end of the parcel is fenced from the adjacent Town of Willsboro Wastewater Treatment Plant, access can be obtained directly from School Street and a NYSDEC fishing access parking area. The surface of the site is flat, with the topography slightly climbing to the south and west. No permanent structures exist on the property, however a municipal wastewater treatment plant occupies a contiguous 2.7 acre parcel along the southern border. The majority of the parcel is covered by black ash and a thin layer of topsoil at some locations. Topographically, the site is located within the Boquet River floodplain, with elevated uplands to the south and east of the site.

Consistent with the topography of the area, stormwater runoff percolates through the permeable black ash overburden and seeps into the Boquet River through a former dike/berm and eventually into Lake Champlain. According to US Department of Agriculture-Soil Conservation Service Soil Survey mapping for Essex County, the soils in the vicinity of the site are comprised primarily of mine spoil and urban land/fill. Review of surficial geologic mapping indicates that the unconsolidated soils in the vicinity of the site consist of a thin layer of lacustrine silt and clay, likely laminated and calcareous, overlain by riverine sandy loam, sands and gravels. The unconsolidated soils are probably underlain by glacial till.

The thickness of these types of unconsolidated deposits is typically variable in the immediate vicinity of the Boquet River. Regional bedrock geologic mapping indicates that bedrock underlying the site consists of Potsdam sandstone from the Pre-Cambrian Era. Consistent with the topographic setting of the site and reported observation of seeps from the Black Ash Pond into the river, shallow groundwater flow in the area of the site would be perceived to generally flow across the site from south to north.

Groundwater within the deeper bedrock generally occurs within fractures, joints, and bedding planes commonly enlarged due to dissolution of carbonates and evaporates. There are reportedly no private or municipal groundwater wells used to supply potable water within a two (2) mile radius of the site. The residents within a ¼ mile radius of the site receive their domestic water from the Town. The Town receives raw water from Lake Champlain via an intake within Willsboro Bay approximately two (2) miles north of the project site.

### 1.3 SI/RA Approach

<u>Site Investigation (SI)</u>

Initial SI efforts included numerous site reconnaissance walkovers to identify other potential areas of environmental concern at the site. Subsurface test trenches were completed within the site and Black Ash Pond to provide preliminary identification of subsurface areas of environmental concern. A series of subsurface soil borings was then focused upon areas of concern. Borings were completed to define the vertical limits of black ash and/or sludge deposition and corresponding potential environmental impacts, if any.

Groundwater monitoring wells were installed within a limited number of the borings to assess potential impacts to the shallow groundwater table that may have occurred as a result of black ash deposition. As part of the SI, media samples were collected from subsurface test trenches, soil borings, groundwater monitoring wells, Boquet River sediments, and related offsite subsurface soils for laboratory analysis. After receipt of laboratory test reports, a data usability review was performed to confirm the validity of the data. The laboratory data was utilized to prepare a site specific qualitative human health risk assessment. The results of site reconnaissance, field investigations, media sampling, laboratory analysis, data usability review, and qualitative human health risk assessment have been compiled and interpreted within this SI/RA Report.

As part of the Work Plan, a contingency for implementing one or more potential interim remedial measures (IRMs) was anticipated (though not specifically planned), in the event point source environmental impacts, wastes or waste disposal (i.e., drums, chemicals, etc.) were encountered during the SI. During the completion of the Black Ash Pond SI, no evidence of such discrete or point source significant environmental impacts or waste disposal was encountered. However, due to the confirmed heavy metals content of the ash, groundwater contamination and erosion/deposition of ash into the Boquet River ecosystem, it is recommended that IRMs be initiated to immediately arrest the continued erosion/sloughing of the ash dike surrounding the Black Ash Pond.

Additional Investigation

During the agency review of the information collected for this Site Investigation, several additional data points were suggested. Collection of these data points, generally surface water and sediment samples, will be completed and documented as an addendum to this report.

Development of Remedial Alternatives

As SI laboratory data reports were received, and areas of environmental concern identified, remedial alternative development efforts commenced concurrently. The first effort for this task was to identify remedial action objectives specifying remediation goals for contaminants, media of concern, and potential exposure pathways. Potential general remedial response actions, i.e., treatment, containment, excavation, extraction, disposal, and institutional actions have been generated, and suitable response action technologies for the remediation of contaminated media were conceptualized.

The respective response action technologies have been assembled into remedial alternatives and evaluated and screened based upon criteria including effectiveness (long-term and short-term), reliability, implementability, and cost, and a detailed remedial alternative evaluation conducted. The alternatives have been evaluated in accordance with specific criteria to determine a cost-effective and efficacious remedy. NYSDEC will additionally evaluate the alternatives based on community acceptance. The results of the remedial alternative development and evaluation are compiled within the Remedial Alternatives Report under separate cover.

## Section 2: Site Investigation Efforts and Methodologies

The primary task of the SI is site characterization. Site characterization included activities to determine the nature and extent of contamination at the site. For this project, site characterization included: 1) the collection and assessment of existing data and information; 2) subcontractor procurement; 3) the completion of field investigations; 4) the completion of a qualitative human health risk assessment; and 5) SI Report Preparation.

### 2.1 Review and Assessment of Existing Information

Prior to the initiation of active SI efforts, existing data were assembled and evaluated, as appropriate, to develop an understanding of the site history and characteristics. As part of this effort, existing files were obtained from sources within the Town of Willsboro and personal interviews were conducted with numerous residents.

The project site consists of a 25± acre parcel of land owned by the Town of Willsboro (hereinafter "Town") adjacent to the Boquet River, a designated Wild Scenic and Recreational River. The property was acquired by the Town on December 20, 1966, from Georgia-Pacific Corporation (GPC) at a time when GPC was liquidating real property assets in the community. The project area includes a pulp mill waste deposition lagoon constructed along the Boquet River, consisting of a large dike and decantation basin. Residual black ash was deposited to a depth of up to 15 ft in the basin over a large area of the property. A 2400 linear-ft containment dike constructed along the riverbank perimeter is extremely unstable, allowing black ash, sand, paper sludge and dike construction material to discharge into the river.

The project site was used as a deposition area for spent black liquor used in the making of paper pulp. The Champlain Fibre Company later known as the Willsboro Pulp Mill and most recently owned by GPC operated a pulp mill on the opposite side of the Boquet River from the black ash location from 1884 to 1965. The black liquor was a combination of soda ash, chemical lime, wood fiber and soft coal. The black ash is the residue of spent black liquor combustion dumped in a basin area approximately 900 ft long and 400 ft wide. Surface samples of the black ash earlier (c. 1988) analyzed by the New York State Department of Health characterized the black ash as 98 percent carbon and small quantities of lime. However, in 2003 additional scrutiny of the black ash revealed the ash may contain metals exceeding the New York State Department of Environmental Conservation (NYSDEC) TAGM 4046 guidelines.

The deposition lagoons were formed by constructing a crescent shaped, 12 to 15-ft-high dike along the course of the riverbank. Concrete pavement is still evident on portions of the dike that has not eroded into the Boquet River indicating the use of the berm as a wheeled vehicle access. A large pipe formerly protruded through the remainder of the structure into the river. The pipe, due to dike erosion, has since toppled into the river. Construction material for the dike appears to have been onsite material from the riverbank, black ash, logs, bricks and other available materials.

The recent testing of black ash material on adjacent properties indicating heavy metal contamination, combined with the fact that NYSDEC permits the Town to dump black ash into the Boquet River to facilitate the reduction of ice jams, has caused NYSDEC to desire a more comprehensive evaluation of the black ash pond and related pulp mill waste deposits.

The Boquet River is a major component of a NYSDEC salmonid restoration program in Lake Champlain and contains a fish ladder immediately upstream of the project site. The Willsboro Black Ash Pond Property contains a public access site for fishermen that routinely traverse the black ash pond and riverbanks to access this extremely important recreational resource. The site includes access to a large crib structure and fishing platform adjacent to a large pool at the base of a large dam where migrating salmon congregate. In addition, the meandering bend of the river and islands provide excellent wading and shore fishing opportunities. Unfortunately, a large portion of the riverbank is inaccessible due to severe erosion with steep slopes and dike instability. The erosion has also contributed to sedimentation within the river to the mouth of the Boquet River, more than a mile downstream. Recreational access is provided by a small boat launch is also located on the downstream portion of the site. The property is situated adjacent to tax map lot number 45.001 which is occupied by the Town's secondary wastewater treatment plant. The treatment plant discharge pipe is located on tax map lot 20.1 following the route of the existing access road to a surface discharge site between the boat launch and the eastern limits of the black ash pond. The Town intends to improve this property for a tertiary-wastewater treatment system.

Moreover, the Town is committed to utilizing the property as a public recreational resource incorporating fishermen, boater access and ecological education. Wastewater treatment system expansion and storage of equipment and supplies relating to public utility functions are also contemplated.

### 2.2 Field Investigations

As an integral part of the SI, the following various media field investigations were completed to determine the nature and extent of contamination at the site.

### *2.2.1 Preliminary Site Reconnaissance*

As part of preliminary SI efforts, preliminary site reconnaissance, including numerous site visits, were completed to identify areas of environmental concern. During site reconnaissance, planned locations of test trenches were identified and staked.

### *2.2.2 Subsurface Investigations*

During the weeks of May 9 and May 12, 2005, a total of thirty-seven (37) subsurface test trench excavations were completed at the Black Ash Pond to identify and characterize the presence of potential buried waste and/or evidence of contaminant releases within and adjacent to the site. Test trench excavations were completed utilizing Kobelco L70C excavator, with an accompanying ESE representative documenting trench observations and collecting soil samples for total organic vapor screening and separate laboratory analysis. Sheets 2 through 6 shows the locations of the test trench excavations.

As part of the test trench subsurface investigation, a total of ten (10) subsurface soil samples were collected for Target Compound List (TCL) parameter analysis, consistent with NYSDEC-ASP 2000 methodologies, including Contract Laboratory Protocol (CLP) organic laboratory methods (OLM 4.2) and CLP inorganic laboratory methods (ILM 4.0).

During the week of July 14, July 19, and July 25, 2005, a total of thirteen (13) subsurface soil borings were completed at the site to further assess the horizontal and vertical extent of the black ash and any abnormalities previously identified during test trench investigations. Sheets 2 through 6 identify the locations of the thirteen (13) subsurface soil borings completed. During the completion of soil borings, continuous sampling was performed to define the unconsolidated geology prior to boring advancement. Soil samples were field screened for the presence of volatile organic compounds using a MiniRAE 2000 photoionization detector (PID).

As part of the soil boring effort, three (3) boring soil samples and two (2) monitoring well boring soil samples were collected for TCL parameter analysis, consistent with NYSDEC-ASP 2000 methodologies, including CLP organic OLM 4.2 and CLP ILM 4.0. Soil sampling occurred above and below the water table as prescribed by NYSDEC.

During the completion of both test trench excavations and soil borings, qualitative (dust) air monitoring was completed, at one upwind and two downwind locations in order monitor potential airborne (dust related) contaminants release off-site.

### *2.2.3 Groundwater Investigations*

To assess the existence of potential shallow groundwater quality impacts at the site, seven (7) of the subsurface borings were completed within the site parcel as shallow groundwater monitoring wells (MW-1 through MW-7) shown on Sheets 2 through 6. Each of the monitoring well borings was completed using continuous split spoon sampling, consistent with ASTM D-1586-84, and advanced using a six-inch O.D. hollow stem auger without the use of air or drilling fluids. Continuous sampling was completed to define the unconsolidated geology prior to boring advancement. During the completion of shallow monitoring well borings, soil samples were field screened for the presence of volatile organic compounds using a PID.

Each of the monitoring wells was constructed of two-inch diameter PVC tri-lock jointed screen and riser, with a 4-inch diameter protective steel casing and locking caps. Consistent with the gravel, sand, and silt conditions identified at the site, 10-slot (0.01-inch) well screens and "0-grade" sandpack were utilized for monitoring well construction. Screens, risers and fittings were maintained in manufactured packaging until installation, and split spoons and downhole apparatus/tools were decontaminated (steam cleaned) between samples. Details regarding the specifications of each monitoring well installed at the site are listed in the following report table.

| **Well and Location** | **Groundwater Conditions/Screen Depth/Length** |
|---|---|
| MW-1: Downgradient Well – along dike due north of MW-2 | wet soils at 10 feet; screen 8 to 18 feet |
| MW-2: Upgradient Well – east of NYSDEC parking area | wet soils at 6 feet; screen 3 to 13 feet |
| MW-3: Downgradient Well – due north of waste water plant | wet soils at 7 feet; screen 6 to 16 feet |
| MW-4: Downgradient Well – due north of Town staging area | wet soils at 7 feet; screen 6 to 16 feet |
| MW-5: Downgradient Well – due north of MW-4 depression below dike | wet soils at 4 feet; screen 2 to 10 feet |
| MW-6: Downgradient Well – due east of MW-4 within treeline | wet soils at 7 feet; screen 6 to 16 feet |
| MW-7: Downgradient Well – due west of Town boat launch | wet soils at 4 feet; screen 2 to 12 feet |

A bentonite seal, at least two feet thick, was placed following the installation of the sand pack to minimize potential downward communication (or short-circuiting) of infiltrating surface waters to the local shallow groundwater regime. The balance of the hole was backfilled with a cement/bentonite grout. The placement of annular material was coordinated with the withdrawal of augers or casing to minimize caving around the well screen and riser pipe.

For each of the wells, the screen was installed so as to "straddle" the perceived groundwater surface. A vented steel casing with a locking cap was installed to surround each PVC well location to maintain well integrity. Each of the wells was finished by installing a concrete cap, sloped away from the respective well casing, to prevent stormwater runoff infiltration. The void between each steel casing and PVC riser was filled with heavy grade sand to prevent invasion by rodents and insects. A weep hole was drilled into each steel casing, just above the concrete cap. During the completion of subsurface drilling tasks, drill cuttings were visually inspected and screened with a PID. Drill cuttings which exhibited obvious evidence (staining, odors, elevated PID readings) were placed in drums and staged on-site.

On July 20, 2005, each of the monitoring well top of PVC riser elevations was surveyed to establish the horizontal location and elevation of the measuring point so that depth to water measurements could be utilized to calculate site specific groundwater elevations, contours, and flow direction. All elevations were referenced to the NGVD 1929 datum.

Each monitoring well was developed and purged using a low-flow pump attached to the drilling rig on July 28, 2005. During well development efforts, turbidity readings were found to improve to values between typically from a maxima of 511 to a minima or 19 NTUs during well development. In accordance with NYSDEC Policy, the development waters generated from the monitoring wells were discharged in the vicinity of each monitoring well. On September 5, 2005, groundwater samples were collected from each well for TCL parameters, consistent with NYSDEC-ASP 2000 methodologies, including CLP, OLM 4.2 and CLP ILM 4.0.

### *2.2.4 Boquet River Sediment and Seep Investigations*

In an effort to identify and assess potential waste related environmental impacts on the adjacent Boquet River, sediment samples were collected from two (2) depth intervals (6-inches and 18-inches) at two (2) upgradient and four (4) downgradient locations within the Boquet River.
As part of the preliminary reconnaissance effort, a search for known and potential waste-leachate seeps to the Boquet River was also completed. No significant leachate seeps were identified and (accordingly) no leachate seep samples were collected.

Each of the sediment samples were collected for TCL parameter analysis, consistent with NYSDEC-ASP 2000 methodologies, including CLP, OLM 4.2 and CLP ILM 4.0 in order to determine the nature and extent of related contamination within the river sediments.

### *2.2.5 Offsite Waste Media Investigations*

Related properties from the parent parcel, most notably the ANC parcel to the east and the former pulp mill sludge lagoons located north of the subject property across the Boquet River, were also investigated. Offsite investigations included the collection of six (6) waste media samples collected via hand auger twelve (12) to twenty-four (24) inches below existing grade (BEG) from the aforementioned sludge lagoons, and a single (1) sample of the naturally encapsulated black ash from the ANC's property adjacent to the boat launch parking lot at the eastern end of the parcel. Samples were submitted for TCL parameter analysis, consistent with NYSDEC-ASP 2000 methodologies, including CLP OLM 4.2 and CLP ILM 4.0.

## 2.3 Qualitative Human Health Risk Assessment

To assess potential site impacts on human health and the environment, a general qualitative human health risk assessment was completed, including a contaminant exposure and toxicity assessment. The results of this focused qualitative risk assessment were used to develop an overall characterization of risk to humans and the environment. The focused risk assessment included an evaluation of the following aspects, based on current and historic site specific analytical data: 1) contaminant identification and selection of indicator compounds and chemicals of concern; 2) exposure assessment to identify actual or potential exposure pathways and the extent or amount of exposure; 3) toxicity assessment and dose response information; and 4) risk characterization of the potential risks or adverse health or environment effects for each of the exposure scenarios.

## 2.4 Data Usability Review and SI Reporting

In order to provide adequate, compliant, and defensible data consistent with NYSDEC Guidance, the analytical data generated as part of the SI were reviewed by an ESE Senior Hydrogeologist. A general evaluation of field records and analytical data was performed to assess whether the data were accurate and defensible. The data usability review effort was completed for analytical data generated as part of the SI, consistent with NYSDEC-DUSR Guidance.

# Section 3: Site Investigation Results

## 3.1 Site Reconnaissance Observations

As part of the SI, a preliminary site reconnaissance was completed to identify areas of environmental concern. A layout of the site is shown in Sheets 2 through 6. During successive reconnaissance efforts, the following features were observed to divide the site into sectors:

1. Northern Area: The northern boundary of the Black Ash Pond borders the Boquet River. During site reconnaissance, an open cliff face of black ash and cinders was observed along the majority of the southern bank of the river. The open face cliff is the remains of the original containment dike, highly eroded; scoured by high water and ice floes. Sediment freely erodes into the River, and it has been reported that seeping dark plumes emanate from the base of the riverbank.The majority of this sector of the site consists of low lying woodlands atop ash that has seeped into the Boquet River.

2. Western Area: The western area of the Black Ash Pond borders NYSDEC Fisherman's Access Property. The Fisherman's Access has footpaths to a cribbed fishing pool at the base of the Boquet Falls. Fisherman traverse paths overlying black ash. This area was the former site of the piping that transported the black ash slurry and sludge into the Black Ash Pond. It is currently overgrown with brush and trees.

3. Central Area: The central area of the Black Ash Pond is bordered on the north by the dike segregating the Boquet River, the boat launch access road and wastewater treatment plant to the south. The central area consists of two main expanses of black ash surrounded and separated by a of poplar tree and brush growth.

4 Eastern Area: This is a depressed area abutting the boat launch site. It apparently contained leachate pipes previously documented as extending through the cinder/ash berm into the river. The surface consists of saturated humus. During the site reconnaissance, groundwater was discharging at the existing grade. The area is rimmed by fill on the east and south and by the ash cinder berm to the north. It appears to be a large sinkhole that hydraulically connected with the Boquet River, perhaps through the leachate pipes. Fine grained material in this area of the pond, could migrate to the river leaving the large sinkhole like depression. Some of the low lying areas had extremely high moisture contents yielding "quick" conditions. This posed difficulty for both test trench and soil boring activities as it was necessary to create corduroy roads to allow equipment access or abandon the designated location.

5. Southern Area: The southern area borders the boat launch access road and the municipal wastewater treatment plant. This area consists of large deposits of miscellaneous fill that have been placed, atop the former limits of the Black Ash Pond. The fill is from various construction projects or public works projects over time and provided a land reclamation process to provide staging areas for Town equipment and materials.

### 3.2 Subsurface Investigations

During the week of May 9, 2005, a total of thirty-seven (37) subsurface test trench excavations were completed at the Black Ash Pond site to identify and characterize the presence of potential buried waste and/or evidence of contaminant releases within and adjacent to the site. During the week of July 14, July 19, and July 25, 2005, a total of thirteen (13) subsurface soil borings were completed at the site to further assess the horizontal and vertical extent of the ash waste and abnormalities previously identified during test trench investigations. As part of the subsurface investigations, two (2) background soil samples were collected from a residential lawn directly contiguous to the waste wateer treatment plant, and and the former school playground approximately 1/8 mile south of the Black Ash Pond. Both samples were collected 12 inches BEG. The locations of the test trenching, subsurface borings, and background soil sampling location are shown on Sheets 2 through 6. A listing of the conditions encountered within each of the test trenches is included within the Test Trench Logs and Subsurface Boring Logs, shown in Appendices B and C of this report.

#### *3.2.1 Field Observations*

During the completion of test trenches, the predominant soils type encountered included a variably thick layer of black ash and cinders. At a number of test trench (TT) locations within the central area of the Black Ash Pond, i.e., TT-30, TT-20, TT-12, TT-8, an apparent non-native layer of sludge was encountered immediately below the black ash layer. The sludge layer was observed to be characterized by fine silts/clays and appeared to be relatively impermeable as saturated ash conditions persisted just above the sludge layer at the majority of these locations. The sludge appeared visually/manually the same material as within in the sludge lagoon on the north side of the river.

Intermixed or alternating layers of black ash and apparent (grey-white) sludge were encountered within test trenches, i.e., TT-39, TT-40, TT-37, TT-34, TT-29, TT-22, (extending from grade to 20 ft BEG). In general, some aspect of the layer of ash/sludge was present during every test trench. The presence of apparent native soils, primarily riverine sediments, was identified within some test trenches at depths ranging from 4 ft BEG (TT-40) to 20 ft BEG (B-3). Although wet soils (ash) were often first encountered at depths ranging between 4 to 10 ft BEG in the subsurface borings, the most saturated soil (ash) conditions were typically identified immediately above the less permeable (very fine grained) sludge layers.

Native soils (likely imported fills), including a thin layer of fine to coarse sand with little silt, overlying black ash was typically encountered along the western area of the Black Ash Pond, as during the completion of the thirteen (13) soil borings, ash was encountered at or very near the ground surface and typically extended to 4 to 12 ft BEG.

Intermixed or alternating layers of black ash and paper mill sludge were encountered within borings, i.e., B-1, B-3, B-6, (extending 12 to 20 ft BEG), though this same mixture of ash/sludge was not identified during the completion of all borings, i.e., B-5, B-4, MW-11, B-8, B-11, MW-6, B-12, MW-7. In general, the presence of apparent native soils, primarily riverine sediments, was identified within each boring at depths ranging from 4 ft BEG (MW-7) to 20 ft BEG (B-3). Although wet soils (ash) were often first encountered at depths ranging 4 to 10 ft BEG in the borings, the most saturated soil (ash) conditions and groundwater were typically identified at the ash/sludge interface.

Subsurface investigation of the northern area of the site revealed that along the shoreline of the Boquet River, the river bottom rises to a cinder/ash dike, that provides an enclosure for the Black Ash Pond or lagoon. The elevation of the dike dips rapidly to the south, as the inner rim of the dike for the Black Ash Pond has typically a lower elevation, possibly due to transmission of fines through the coarser grade ash/cinders. The subsurface profile typically consists of 12-inches of humus underlain by a 4-6-inch layer of the black ash. Beneath the black ash is a 2-ft layer of the tan white sludge before, finally, a riverine sediments are found.

The eastern area of the Black Ash Pond (i.e., TT-8, TT-4, MW-7) consists of a depressed triangular area terminating at the boat launch parking lot. This depressed area consists of a thin layer of humus, with some evidence of past citizens having used it as an informal dump, with groundwater at existing grade. The subsurface profile consists of a 4 to 11 ft layer of ash/sludge, followed by in-situ riverine sediments.

The central area of the Black Ash Pond consists of exposed ash to a thickness of 12 ft BEG, followed by to a 12 ft layer of sludge underlain by riverine sediments. The central area consists of two lagoons that were excavated to allow ash/sludge slurry mixtures to flow northerly, and easterly while settling and decanting.

The western section of the Black Ash Pond has a varied subsurface profile consisting of an assortment of clean fill imported from Town and NYSDEC municipal improvement projects, followed by cinder/ash for the berm, black ash, and sludge.

The southern area of the Black Ash Pond consists of land that has been reclaimed by miscellaneous fills from various municipal projects. The fill has been placed to expand staging areas for Town related construction projects, equipment, and material. The overburden is approximately 4 to 10 ft deep and lies atop the typical ash/sludge profile to a depth of 10 to 20 ft BEG.

Consistent with the previously listed findings, soil/ash media samples were collected from the following test trench, subsurface boring, and monitoring well locations for TCL parameter analysis, consistent with NYSDEC ASP 2000 incorporating CLP Organic Laboratory Methods (OLM) and Inorganic Laboratory Methods (ILM) to determine the nature and extent of any existing soil contamination.

**Summary of Subsurface Soil Samples Collected**
**Test Trench Samples**

| Sample | Location | Depth |
|---|---|---|
| TT-2-S-05-72 | Test Trench TT-2 | 72-inches |
| TT-12-S-05-30 | Test Trench TT-12 | 30-inches |
| TT-12-S-05-156 | Test Trench TT-12 | 156-inches |
| TT-16-S-05-0 | Test Trench TT-16 | at grade |
| TT-16-S-05-84 | Test Trench TT-16 | 84-inches |
| TT-16-S-05-90 | Test Trench TT-16 | 90-inches |
| TT-16-S-05-180 | Test Trench TT-16 | 180-inches |
| TT-17-S-05-30 | Test Trench TT-17 | 30-inches |
| TT-32-S-05-90 | Test Trench TT-32 | 90-inches |
| TT-39-S-05-48 | Test Trench TT-39 | 48-inches |

**Boring Samples**

| Sample | Location | Depth |
|---|---|---|
| B-11-SU-05 | Boring B-11 | 96-168 inches |
| B-12-SU-05 | Boring B-12 | 120-216 inches |
| B-13-SU-05 | Boring B-13 | 120-148 inches |
| MW-4-SU-05 | Well Boring MW-4 | 144-216 inches |
| MW-6-SU-05 | Well Boring MW-6 | 96-192 inches |

*3.2.2 Results of Media Sampling and Analysis*

The analytical results for the soil samples collected from the previously listed test trench excavations and subsurface borings are included within Appendix G and summarized in Tables 1 and 2. As shown in Tables 1 and 2, the elevated presence of volatile organic compounds was not identified within any of the test trench or soil boring samples collected as part of the subsurface investigation. Although trace/low-level concentrations of acetone and methylene chloride were identified within one or more of the soil samples, the presence of these parameters is typically associated with residual laboratory cross-contamination.

Similarly, although the soil sample collected from test trench TT-12 (30-inches BEG) exhibited trace concentrations of alpha-BHC (9.9 ug/kg) and methoxychlor (14 ug/kg estimated), the presence of PCBs or pesticides was not detected in any of the other test trench and boring soil samples.

In general, the detectable presence of semi-volatile organic compounds (VOCs) was not detected within ten (10) of sixteen (16) test trench and boring soil samples collected for analysis. Although estimated concentrations of bi-2-ethylhexyl-phthalate or di-n-butylphthalate were identified in four (4) of the test trench soil samples, most likely caused by residual laboratory cross-contamination. Of the sixteen (16) soil samples tested, the elevated presence of numerous semi-VOCs was only detected (at estimated concentrations) in the soil sample collected from TT-39 (48-inches BEG), as shown below.

**Summary of Semi-VOCs Detected in TT-39**
**(Soil Sample TT-39-S-05-48)**

| Parameter | Est. Concentration | Soil Cleanup Objective |
|---|---|---|
| naphthalene | 120 ug/kg | 13,000 ug/kg |
| 2-methylnaphthalene | 140 ug/kg | 36,400 ug/kg |
| phenanthrene | 100 ug/kg | 50,000 ug/kg |
| chrysene | 68 ug/kg | 400 ug/kg |
| benzo(b)fluoranthene | 81 ug/kg | 1,100 ug/kg |
| benzo(k)fluoranthene | 76 ug/kg | 1,100 ug/kg |
| **benzo(a)pyrene** | **84 ug/kg** | **61 ug/kg** |
| indeno(1,2,3-cd)pyrene | 150 ug/kg | 3,200 ug/kg |
| benzo(g,h,i)perylene | 160 ug/kg | 50,000 ug/kg |

Note: Bold = TAGM 4046 Recommended Soil Cleanup Objective Exceedance

As previously mentioned, in order to assess general background soil conditions proximate to the site, two background soil samples (BG1-S-05-12 and BG2-SU-05-12) were collected from an adjacent residence and behind the former Willsboro Central School , respectively, due south of the Black Ash Pond, outside the limits of previous ash deposition from a depth of 12-inches BEG. In general, organic compound analysis of the background soil samples did not reveal the detectable presence of any volatile organic, semi-volatile organic, pesticide, or PCB compounds. Similarly, metals analysis of the background soil samples revealed that metals, i.e., antimony (Sb), arsenic (As), barium (Ba), beryllium (Be), cadmium (Cd), chromium (Cr), cobalt (Co), lead (Pb), mercury (Hg), nickel (Ni), selenium (Se), silver (Ag), thallium (Tl), vanadium (V), and zinc (Zn) were either not detected or were detected at trace to low-level concentrations. Metals detected within the background soil samples are listed in the following report table:

**Summary of Metals Detected in Background Soil Samples**
**Concentration (mg/kg)**

| Metal | Sample BG-1 (12") | Sample BG-2 (12") |
|---|---|---|
| Aluminum (Al) | 9,030 mg/kg | 3,480 mg/kg |
| Antimony (Sb) | 5.2 mg/kg | <3.6 mg/kg |
| Barium (Ba) | 21.2 mg/kg | 15.7 mg/kg |
| Cadmium (Cd) | 0.064 mg/kg | <0.043 mg/kg |
| Calcium (Ca) | 2,420 mg/kg | 4,870 mg/kg |
| Chromium (Cr) | 7.8 mg/kg | 3.5 mg/kg |
| Cobalt (Co) | 4.8 mg/kg | 3.3 mg/kg |
| Copper (Cu) | 1.8 mg/kg | 3.1 mg/kg |
| Iron (Fe) | 9,840 mg/kg | 7,120 mg/kg |
| Magnesium (Mg) | 1,500 mg/kg | 2,870 mg/kg |
| Manganese (Mn) | 212 mg/kg | 180 mg/kg |
| Potassium (K) | 183 mg/kg | 291 mg/kg |
| Sodium (Na) | 121 mg/kg | 89.1 mg/kg |
| Vanadium (V) | 9.8 mg/kg | 6.6 mg/kg |
| Zinc (Zn) | 23.4 mg/kg | 17.6 mg/kg |

As shown in Tables 1 and 2, metals analysis of the test trench and boring soil samples consistently revealed non-detectable or only trace concentrations of some metals, e.g., As, Be, Hg, Se, and Tl. However, the predominant contaminants identified within the soil samples collected from the majority of test trench excavations and soil borings included numerous heavy metals, e.g., **Sb (5.2 to 21.1 mg/kg), Ba (15.7 to 85.2 mg/kg), Cd (not detected to 0.43 mg/kg), calcium (1,940 to 353,000 mg/kg), Cr (2 to 21.2 mg/kg), Cu (1.6 to 15.5 mg/kg), iron (749 to 70,400 mg/kg), Pb (1.1 to 11.5 mg/kg), magnesium (158 to 3,790 mg/kg), potassium (159 to 3,120 mg/kg), sodium (159 to 3,120 mg/kg), V (3.6 to 76.3 mg/kg), and Zn (6.3 to 217 mg/kg).**

**These metals were consistently identified within the test trench and boring soil samples at concentrations exceeding TAGM 4046 recommended soil cleanup objectives and/or site background conditions.** A comparative listing of the metals identified within the test trenches and soil borings at concentrations that exceeded TAGM 4046 recommended soil cleanup objectives and/or site background conditions is shown in Tables 1 and 2.

Although each of the ten (10) test trench soil samples collected for analysis were obtained from subsurface depths ranging from existing grade to 15 ft BEG, comparison of all test trench soil sample metals data did not reveal any general or obvious concentration trend with depth. Moreover, all soil/media samples collected from various depths (existing grade, 7 ft, 7.5 ft, 15 ft) at TT-16 showed elevated concentrations of Sb, Cd, calcium (Ca), Pb, potassium (K), sodium (Na), V, and Zn, but did not show any general or specific metals concentration trends with respect to depth.

In general, although the soil samples collected from soil borings B-11, B-12, B-13, B-62, MW-4, and MW-6 generally exhibited elevated concentrations of Ca, Cu, Pb, magnesium (Mg), K, and Na (similar to the test trench soil samples), overall comparison of the test trench and soil boring sample metals data reveals that concentrations of heavy metals, i.e., antimony, Ba, Cd, Cr, Cu, iron (Fe), Pb, Vd and Zn were generally lower in the soil samples collected (deeper depths) from the soil borings.

During the completion of test trench excavations and soil borings, qualitative (dust) air monitoring was completed, at one upwind and two downwind locations in order monitor potential airborne (fugitive dust related) contaminants release off-site. Although incidents of dust release and exceedance occurred during the completion of test trenching and soil boring efforts, it was realized that the occurrence of these events was directly related to dust releases caused by automobile traffic along the dirt/gravel roadway to/from the nearby boat launch area and not test trenching or soil boring efforts. During the completion of subsurface investigations at and near the site, the ESE representative reported that only minor dust releases occurred regularly in the immediate vicinity of each test trench or soil boring. Copies of the ambient dust monitoring results are included in Appendix G

### 3.3 Groundwater Investigations

*3.3.1 Field Observations*

As previously mentioned, as part of the SI, seven (7) shallow groundwater monitoring wells (MW-1, MW-2, MW-3, MW-4, MW-5, MW-6, and MW-7) were installed, during the week of July 20, 2005. The locations of the monitoring wells are shown on the Survey Maps provided by Kevin A. Hall, Land Surveyor. A detailed listing of the monitoring well drilling logs is included in Appendix C and is summarized below. MW-2 was installed upgradient along the southern perimeter of the site, while MW-1, MW-3, MW-4, MW-5, MW-6, and MW-7 were installed generally along the east-west axis or northern perimeter of the property, to serve as downgradient monitoring wells.

During monitoring well installation (including upgradient MW-2), a layer of black ash was encountered at or very near existing grade that typically extended to depths of 4 to 12 ft BEG. Alternating layers of black ash and sludge (tan-white-grey) were encountered within MW-1, MW-3, and MW-4 borings (8 to 16 feet BEG and were absent from MW-2, MW-5, MW-6, and MW-7 borings. In general, the presence of apparent native soils, primarily riverine sediments, was identified within each well boring at depths of 4 ft BEG (MW-7) to 16 ft BEG (MW-4). Although wet soils (ash) were often first encountered at depths 4 to 10 ft BEG in the well borings, the most saturated soil (ash) conditions were typically identified immediately above the less permeable (fine grained) sludge layers.

During the week of July 28, 2005, each monitoring well was developed by overpumping using a low-flow pump. As part of the well development and purging effort, approximately ten (10) well volumes of groundwater were removed from each well. During well development, turbidity readings were found to improve from a maxima of 511 to a minima of 19 NTUs over the duration of the low-flow pumping effort. During well development, MW-5 was pumped to near dryness several times in approximately 2 minutes over a 45 minute period.

Each well was allowed to recharge and equilibrate over a 4 to 6 hour period. On the morning of September 5, 2005, wells were purged five (5) well volumes, and during the afternoon groundwater samples were collected from each monitoring well for TCL parameter analysis. Groundwater samples were packed in ice filled coolers and express delivered to Adirondack Environmental Services, Inc.

### *3.3.2 Results of Groundwater Quality Sampling and Analysis*

Groundwater samples were analyzed for TCL parameters, in accordance with applicable 1995 NYSDEC- ASP (and EPA-CLP) methodologies. Groundwater sample analytical data results are included within Appendix G and are summarized in Table 3. In general, as shown in Table 3, the presence of VOCs was not detected within any of the groundwater samples.

In general, analysis of the groundwater samples did not reveal the detectable presence of semi-VOCs within the groundwater samples collected from MW-3, MW-4, MW-5, MW-6, and MW-7, although the groundwater samples collected from MW-1 and MW-2 did exhibit low-level concentrations of diethylphthalate, di-n-butylphthalate, and butylbenzylphthalate. However, plasticizer compounds such as these are often a result of sampling or laboratory cross-contamination.

As shown in Table 3, metals analysis of the groundwater samples generally revealed non-detectable to only trace or low-level concentrations of Be, Cd, Co, Cu, Hg, Ni, Se, Ag, and V. However, similar to the soil samples previously discussed, each groundwater sample exhibited elevated concentrations of Al (132 to 44,000 ug/L), Ba (19.1 to 460 ug/L), Ca (54,300 to 1,740,000 ug/L), K (4,180 to 18,900 ug/L), and Zn (non-detect to 741 ug/L). Consistent with the metals detected within the soil samples, the majority of groundwater samples also exhibited concentrations of Sb (22.3 to 109 ug/L), Mg (16,700 to 65,300 ug/L), Fe (2,030 to 63,500 ug/L), Manganese (71.4 to 2,270 ug/L), Na (19,400 to 83,100 ug/L) and Tl (8.3 to 21.6 ug/L) exceed applicable Class GA Groundwater Quality Standards or Guidance Values. The groundwater samples from MW-3, MW-4, and MW-5 also exhibited Class GA Groundwater Quality exceedances for As, while the groundwater samples from MW-1 and MW-6 also exhibited Class GA Groundwater Quality exceedances for Cr.

A summary of the metals detected within the groundwater samples exceeding Class GA Standards is listed below.

**GROUNDWATER SAMPLE ANALYTICAL DATA**
**SUMMARY OF ELEVATED METALS IDENTIFIED**

| | MONITORING WELL SAMPLES (Metal Concentrations in ug/L) | | | | | | |
|---|---|---|---|---|---|---|---|
| Metal (Class GA Standard) | MW-2 | MW-1 | MW-3 | MW-4 | MW-5 | MW-6 | MW-7 |
| Aluminum (100 ug/l) | **2,810** | **37,100** | **1,250** | **6,720** | **32,300** | **44,000** | **132** |
| Antimony (3 ug/l) | **31.2** | **22.3** | <16.5 | **39.8** | **109** | **29.8** | **32.6** |
| Chromium (50 ug/l) | 4.5 | **60.6** | <2.3 | 12.2 | 47.2 | **85.9** | <2.3 |
| Iron (300 ug/l) | **4,660** | **55,500** | **2,950** | **14,800** | **36,900** | **63,500** | **2,030** |
| Magnesium (35,000 ug/l) | 31,900 | 31,700 | **39,400** | 26,800 | **60,700** | **65,300** | 16,700 |
| Manganese (300 ug/l) | 179 | **1,110** | 71.4 | 540 | **2,270** | **1,490** | 99.6 |
| Sodium (20,000 ug/l) | **28,500** | **67,700** | **55,300** | **39,700** | **83,100** | **54,000** | 19,400 |
| Thallium (4 ug/l) | **15.6** | **18.5** | **21.6** | **11.1** | **16.1** | **16.8** | **8.3** |

A comparison of upgradient (MW-2) to downgradient groundwater quality metals data (MW-1, MW-3, MW-4, MW-5, MW-6, and MW-7), generally revealed the average downgradient concentrations of Al, Ba, Ca, Cr, Co, Cu, Fe, Pb, Ni, K, V and Zn were all significantly higher (double or greater) than the corresponding concentrations exhibited from MW-2. In addition, comparison of upgradient to downgradient average metals data revealed that Sb, As, Ba, Be, Cd, and Mg concentrations were slightly higher (less than 1 order of magnitude) downgradient.

### *3.3.3 Groundwater Flow Directions*

On December 12, 2005, depths to groundwater were measured within each of the monitoring wells. The monitoring well top of PVC riser elevations had been surveyed to establish the horizontal location and elevation of the measuring point, so that depth to water measurements could be utilized to calculate groundwater elevations, contours, and flow directions. All elevations were referenced to the 1929 NGVD datum. The depth to groundwater and calculated groundwater elevations for each of the site monitoring wells is summarized below.

**SUMMARY OF GROUNDWATER DEPTH AND ELEVATION MEASUREMENTS**
**September 5, 2005**

| Monitoring Well | PVC Elevation | Depth to Water | Groundwater Elevation |
|---|---|---|---|
| MW-1 | 120.25' | 15.85' | 104.40' |
| MW-2 | 128.59' | 8.20' | 120.39' |
| MW-3 | 116.63' | 10.20' | 106.43' |
| MW-4 | 118.68' | 12.00' | 106.68' |
| MW-5 | 105.63' | 7.05' | 98.58' |
| MW-6 | 116.22' | 12.20' | 104.02' |
| MW-7 | 104.68' | 8.50' | 96.18' |

As shown on Sheet 7, shallow groundwater flow at the site appears to trend generally from the highlands in the south toward the Boquet River over the majority of the site. Consistent with observations during test trenching, it is also likely that perched groundwater within the non-native fill material (ash and sludge) serves as a recharge zone for the site. As previously noted, during the completion of well development-purging efforts, well MW-5 were overpumped to dryness several times over a 45 minute period. Based on the rates of groundwater recovery observed at the wells it is estimated that the permeability of the black ash material ranges between $1 \times 10^{-8}$ to $1 \times 10^{-4}$ cm/sec.

### 3.4 Boquet River Sediment Investigations

#### *3.4.1 Field Observations*

As previously mentioned, sediment samples were collected from two (2) depth intervals (6-inches and 18-in) at two (2) upgradient locations (SD-1 and SD-2) and four (4) downgradient locations (SD-3, SD-4, SD-5, and SD-6) within the Boquet River. As part of the preliminary reconnaissance effort, a search for known and potential waste-leachate seeps to the Boquet River was also completed. A seep that had been previously reported was not visible during the course of the SI. Each of the twelve (12) sediment samples were collected for TCL parameter analysis, consistent with applicable CLP Organic Laboratory Methods (OLM) and Inorganic Laboratory Methods (ILM) in order to determine the nature and extent of related contamination within the river sediments. During the completion of sediment sampling within the Boquet River, evidence of significant erosion of black ash and cinders was observed along the majority of the southern bank of the Boquet River. The most significant areas of ash-cinder erosion were observed in the vicinity of MW-5 to MW-7, west to east, where layers of black ash as tall as 12 ft (ranging in thickness of 15 to 20 ft) immediately border the river.

#### *3.4.2 Results of Media Sampling and Analysis*

The analytical results of the riverine sediment samples collected as part of the SI are included within Appendix G and summarized within Table 4. As shown in Table 4, although the low-level presence of acetone was detected within 3 of 12 sediment samples, acetone was also within the trip blank, indicating the presence of this parameter occurred as an inadvertent result of laboratory cross-contamination. The presence of semi-VOCs was not identified within the majority of the sediment samples collected, with the exception of dimethylphthalate (1700 ug/kg) and 2,6-dinitrotoluene (540 ug/kg) within sample SD-4 (18-inches) and pyrene (57 ug/kg) within sample SD-6 (6-inches). Similar to acetone, phthalates are often identified within environmental media as a result of cross-contamination occurring during sampling and/or laboratory analysis. Acetone and phthalates are used in many analytical laboratory procedures and, as a result, can be found at low levels during testing. These detections are not indicative of the presence of the compounds in the sample.The presence of PCBs or pesticides was not identified within any of the twelve (12) sediment samples collected.

Metals analysis of the riverine sediments collected from the Boquet River generally revealed elevated concentrations of aluminum (1,530 to 2,810 mg/kg), Sb (6 to 68.5 mg/kg), Ba (5.3 to 14.5 mg/kg), Ca (941 to 6,310 mg/kg), Fe (3,640 to 8,360 mg/kg), Mg (640 to 1,750 mg/kg), manganese (44.4 to 113 mg/kg), K (43.3 to 164 mg/kg), Na (99.8 to 247 mg/kg), and Zn (7.4 to 17.9 mg/kg). In general, metals analysis of the sediments revealed either not-detectable or trace concentrations of Be, Cd, Cr, Cu, Co, Pb, Hg, Ni, Se, Ag, Th, and cyanide. Comparison of the sediment sample data collected from shallow depth (6-in) and intermediate depth (18 in) revealed that aluminum (Al), Sb, Ba, Ca, Cr, Cu, Fe, Mg, manganese (Mn), Ni, Na and Zn concentrations were generally more elevated within the intermediate depth samples.

A comparison of upstream sediment metals data (SD-1 and SD-2) was also completed with the downstream sediment metals data (SD-3, SD-4, SD-5, and SD-6). In general, this comparison revealed that the average downstream concentrations of Sb, Cr, Cu, Pb, Mg, Ni and Na were slightly to significantly higher (double or greater) than the corresponding average concentrations of metals exhibited by the upstream sediment samples. Of these metals, downstream sediment average Cu and Pb concentrations were 10 times greater than the corresponding average upstream sediment concentrations. Comparison of upstream vs. downstream concentrations of the remaining metals revealed no obvious trends. This may be due to the apparent variability of the sample media.

To assess the relative quality of the stream sediments, the parameters detected within the sediments samples were compared with the criterion listed within the Technical Guidance for Screening Contaminated Sediment (NYSDEC – Division of Fish and Wildlife Document dated November 1993, Reprinted January 1999). The sediment comparison includes an assessment of various inorganic and organic parameters versus specific aquatic, human health and wildlife criteria. With respect to the volatile organic and semi-VOCs that were detected as estimated or trace values within the majority of sediment samples, each of the respective parameters were identified at concentrations significantly below one or more of the three parameter specific sediment criteria categories listed within the Sediment Criteria Guidance Document.

As compared to the sediment metals criteria, the following sediment samples exhibited metals concentrations that exceeded the corresponding guidance lowest or severe effect level:

**Summary of Metals Detected Within Sediment Samples
Above Guidance Lowest or Severe Effect Level**

| Sample | Metal (Concentration) | Lowest Effect Level | Severe Effect Level |
|---|---|---|---|
| SD-5-SU-05-18" | Antimony **(68.5 mg/kg)** | 2.0 mg/kg | **25.0 mg/kg** |
| SD-2-SU-05-18" | Antimony **(7.2 mg/kg)** | **2.0 mg/kg** | 25.0 mg/kg |
| SD-4-SU-05-6" | Antimony **(16.5 mg/kg)** | **2.0 mg/kg** | 25.0 mg/kg |
| SD-4-SU-05-18" | Antimony **(6.0 mg/kg)** | **2.0 mg/kg** | 25.0 mg/kg |
| SD-5-SU-05-18" | Nickel **(16.6 mg/kg)** | **16.0 mg/kg** | 50.0 mg/kg |

## 3.5 Off-Site Waste Media Investigations

### *3.5.1 Field Observations*

Related properties from the original parent parcel of the former pulp mill, most notably the ANC parcel contiguous to the east and the former pulp mill sludge lagoons located north of the subject property (immediately north and across the Boquet River), were also investigated. Offsite Investigations included the collection of six (6) waste media samples collected via hand auger, twelve (12) to twenty-four (24) in BEG. A total of eight (8) samples of residual sludge were collected from the aforementioned sludge lagoons and a single (1) sample of the naturally encapsulated black ash from the ANC's property were obtained for TCL parameter analysis, consistent with applicable CLP Organic Laboratory Methods (OLM) and Inorganic Laboratory Methods (ILM). In general, during the completion of off-site soil sampling, the soils were hand augered to the appropriate sampling depth and sample media collected. The media (WM designation) consisted of the varied layers of the chalky tan-grey-white sludge characteristically found on both sides of the river. The samples were moist to wet, with increasing moisture content with depth. No obvious odors were discovered during sampling. The ash sample obtained from the ANC property appeared visually/manually consistent with the ash samples obtained from the Black Ash Pond itself.

### *3.5.2 Results of Media Sampling and Analysis*

The analytical results for the samples collected from the ANC property and the sludge/media samples collected from the former pulp mill sludge lagoons located north of the subject property across the Boquet River are included within Appendix D and are summarized in Table 5. As shown in Table 5, the confirmed (non-estimated) presence of VOCs, semi-VOCs, PCBs, or pesticides was not identified within the sample from the ANC property

Similarly, as also shown in Table 5 and as summarized in the report table below, the confirmed presence of VOCs, PCBs, or pesticides was not identified within the six (6) sludge-media samples collected from the former pulp mill sludge lagoons. Although semi-VOCs including; hexachlorobenzene (270 ug/kg), fluoranthene (79 ug/kg), bis-2-ethylhexylphthalate (110 ug/kg), and benzaldehyde (74 ug/kg) were estimated to be present in the waste media sample collected at location WM-4 (24-inches), the confirmed presence of semi-VOCs was not detected within any of the other waste media samples.

Metals analysis of the waste media samples consistently revealed non-detectable or trace concentrations of metals including As, Be, Se, and Tl. Although Cr and Hg were detected in the samples collected from the WM-1 (54-inch) location and Ag was detected at the WM-2 (12-inch) location, these metals were not detected within any other waste media samples.

Numerous heavy metals were consistently identified within the waste media samples at concentrations exceeding TAGM 4046 soil cleanup objectives. A listing of the waste media soil sample respective TAGM 4046 metal exceedances is summarized in the following table:

**OFF-SITE SOIL WASTE MEDIA SAMPLE ANALYTICAL DATA**
**SUMMARY OF ELEVATED METALS IDENTIFIED**

| Metal (Soil Cleanup Obj.) | WM-1(54) | WM-2(12) | WM-2(24) | WM-3(12) | WM-3(24) | WM-4(12) | WM-4 |
|---|---|---|---|---|---|---|---|
| Antimony **(5.2 ppm)** | **24.1** | **21** | **8** | <5.8 | <6.6 | <7.0 | **10.8** |
| Barium **(21.2 ppm)** | **192** | **53.6** | **28.5** | **55** | **37.2** | **50.7** | **74** |
| Cadmium **(0.064 ppm)** | **0.47** | **1.1** | **0.37** | **0.37** | **0.46** | **0.85** | **4.5** |
| Calcium **(2,420 ppm)** | **4,760** | **357,000** | **301,000** | **418,000** | **285,000** | **350,000** | **297,000** |
| Cobalt **(30 ppm)** | 7.9 | <1.9 | <1.4 | <1.4 | <1.6 | <1.7 | <1.5 |
| Copper **(1.8 ppm)** | **17.1** | **8.8** | 1.0 | **3.0** | **3.3** | **6.9** | **29.1** |
| Iron **(2,000 ppm)** | **10,500** | **3,430** | 1,430 | 1,660 | 1,450 | **3,930** | **2,040** |
| Lead **(site specific)** | <0.98 | 1.9 | <0.98 | 1.8 | 1.4 | 2.6 | 11.1 |
| Magnesium **(1,500 ppm)** | 509 | **4,670** | **4,100** | **3,860** | **5,770** | **5,250** | **3,300** |
| Mercury **(0.1 ppm)** | **0.5** | <0.12 | <0.088 | <0.088 | <0.099 | **<0.11** | <0.092 |
| Nickel **(<0.84 ppm)** | **6.7** | **19.9** | **9.7** | **12.8** | **4.2** | **13.2** | **16.3** |
| Potassium **(183 ppm)** | **434** | **247** | 161 | 103 | 66.4 | **297** | **195** |
| Sodium **(121 ppm)** | 96.6 | **2,700** | **4,490** | **6,220** | **5,200** | **4,350** | **2,260** |
| Vanadium **(<1.1 ppm)** | **22.9** | **8.6** | **3.8** | **6.1** | <3.9 | **16.5** | **16.4** |
| Zinc **(23.4 ppm)** | 22.7 | **425** | **1,020** | **490** | **385** | **522** | **205** |

As compared to the six (6) waste media samples collected from the former pulp mill sludge lagoons, the sample collected from the ANC property (WM-1-S-05-54) exhibited significantly more elevated concentrations of Sb, Ba, Be, Cu, Cr, Co, Fe, Mg, Hg, K, and V (see table), with all exceeding applicable TAGM 4046 soil cleanup objectives and/or non-industrial site related background conditions.

As compared to the metals exhibited in the samples from the Black Ash Pond, the media samples from the sludge lagoons exhibited generally more elevated concentrations of Ba, Cd, Ca, Cu, Mg, Ni and Zn and generally lower concentrations of Mn and K. In general, the Black Ash and sludge lagoon media samples exhibited similar concentrations of Al, Sb, Pb, Na, As, Be, Th, and Se.

## 3.6 Qualitative Human Health Risk Evaluation

A qualitative human health risk evaluation was completed as part of the SI. The procedure for performing the risk assessment was consistent with USEPA methodologies and the scope was developed in accordance with NYSDOH guidance. This qualitative risk assessment was basically a two-step process:

1. Contaminant identification and selection of contaminants of concern
2. Exposure assessment to identify actual or potential exposure pathways

### *3.6.1 Contaminant Identification and Exposure Assessment*

Data from the SI were used as the basis for the risk assessment. Sampling was conducted for surface soil, subsurface soil, groundwater, and river sediment. There was no surface water or quantitative air sampling performed as part of the SI. The qualitative exposure assessment consisted of two steps:

- Exposure Setting Characterization – Description of the physical characteristics of the site and populations near the site, including information such as soil types, geologic setting, and groundwater flow.
- Exposure Pathway Identification – Identification of potentially exposed populations and the associated exposure pathway. The exposure pathway consists of four elements:
  - The contaminant source (e.g., contaminated groundwater)
  - The transport medium (e.g., groundwater)
  - The exposure point (e.g., drinking of contaminated well water)
  - The exposure route (e.g., ingestion)

### *3.6.2 Site Specific Qualitative Assessment*

Contaminant Identification

Tables 1 through 5 of this report document the results of the sampling and analysis program that was conducted at the Black Ash Pond site. As shown in the table below, a limited number of organic compounds and numerous heavy metals were detected within the media collected during the SI.

| Parameter<br>Organic Parameters | Detected in: Subsurface soil | Groundwater | River Sediment |
|---|---|---|---|
| Naphthalene | X | | |
| 2-methylnaphthalene | X | | |
| Phenanthrene | X | | |
| Chrysene | X | | |
| Benzo(b)fluoranthene | X | | |
| Benzo(k)fluoranthene | X | | |
| Benzo(a)pyrene | X | | |
| Indeno(1,2,3-cd)pyrene | X | | |
| Benzo(g,h,I)perylene | X | | |
| Alpha-BHC | X | | |
| 2,6-dinitrotoluene | | | X |
| Pyrene | | | X |
| Dimethylphthalate | | | X |
| Various Phthalates | X | X | |

| Parameter<br>Inorganic Parameters | Detected in: Subsurface Soil | Groundwater | River Sediment |
|---|---|---|---|
| Aluminum | X | X | X |
| Arsenic | X | X | |
| Antimony | X | X | X |
| Barium | X | X | X |
| Calcium | X | X | X |
| Cadmium | X | | |
| Chromium | X | X | |
| Copper | X | X | |
| Iron | X | X | X |
| Lead | X | X | |
| Magnesium | X | X | X |
| Manganese | X | X | X |
| Nickel | X | X | X |
| Potassium | X | X | X |
| Silver | | | |
| Sodium | X | X | X |
| Vanadium | X | X | |
| Zinc | X | X | X |

### *3.6.3 Exposure Assessment*

Exposure Setting Characterization

The Black Ash Pond site is located adjacent to the Hamlet of Willsboro. The surrounding properties include a municipal wastewater treatment plant, commercial properties, ANC forest preserve property, and a sensitive river environment. The only nearby residences are to the south of the property, upgradient. Shallow groundwater in the vicinity of the site flows northeastly toward the Boquet River. Downgradient from the site, land usage includes forest preserve and sensitive river environment. Access to the property is unrestricted.

Current populations that could be affected by contaminants at the site are somewhat limited. Drinking water in the area is provided by a public water supply. The site and most adjacent sites (except the municipal wastewater treatment plant) are vacant, so there are no onsite workers. Access to the site is limited to a gravel road to a Town boat launch. No other public roads border the site. Contamination leaving the site occurs through erosion and runoff directly to the Boquet River. Accordingly, exposure to fauna, fishermen, boaters, canoeists, or swimmers in the river would be possible, as well as the downstream Town Beach (Noblewood) at the mouth of the river.

Based on this information, populations potentially affected would include the following:

- Pedestrian Trespassers – unauthorized visitors to and through the site may be exposed directly to contaminated ash and/or fugitive ash dust/particles
- Town workers – exposed to fugitive ash dust/particles and contaminated infiltration/inflow entering nearby sewers
- General public – pedestrians or vehicle passengers on the gravel access road and/or fishermen/boaters/canoeists/swimmers in the Boquet River
- Future on-site construction workers – workers involved in excavation of ash/soils in the areas of the site that are contaminated (note that this assessment excludes workers performing remedial activities as part of the project)

Exposure Pathway Identification

Exposure pathway identification consists of four steps:

- Contaminant source – Data from the sampling and analysis program identified various levels of contamination (predominantly elevated metals concentrations) in the ash, sludge and groundwater.
- Transport medium – The transport media for each contaminant source is identified in the table below. Consistent with the characteristics and location of the site, possible transport mediums could include ash solids/dust, stormwater or leachate, and groundwater.
- Exposure points – The exposure point is the point of potential human contact with the contaminated medium under reasonable current and future land uses. The exposure points for the Black Ash Pond site are shown in the table below.

| Contaminant Source | Transport Medium | Exposure Point |
|---|---|---|
| Groundwater | Groundwater | On-site construction workers |
| Stormwater and/or Leachate | Stormwater and/or Groundwater | Pedestrian trespassers; On-site construction workers |
| | Sanitary sewer | Sewer worker |
| Surface and Subsurface Ash | Ash-Solid Media | Pedestrian trespassers; On-site construction workers |
| | Groundwater | On-site construction worker |

- Exposure route – The routes of exposure for each potential exposure point identified above are discussed below:
  - Pedestrian trespasser exposure to ash solids (via direct contact or dust inhalation) is likely on a consistent basis as the site is located immediately adjacent to a fisherman's access site and boat launch area.
  - Although pedestrian trespasser exposure to contaminated groundwater, contaminated stormwater, and/or contaminated leachate seeps (via direct contact) is less likely, due to less frequent heavy precipitation/runoff events, such transport vectors will result in contaminant migration to the Boquet River.
  - Exposure of on-site or off-site workers to site contaminants is limited to the unlikely circumstance of workers involved with nearby sanitary sewers working at the same time that contaminants from the site were entering the sewer system that crosses the site. Typically, this would only occur during periods of significant precipitation and/or runoff. Exposure could occur via ingestion, inhalation, and/or dermal contact.
  - Exposure of on-site workers to surface and subsurface Black Ash media is possible should no remediation of the ash occur. Excavation into contaminated ash could result in exposure via ingestion, dermal contact, or inhalation of dust particles.
  - Exposure of on-site workers to contamination in groundwater is possible should no remediation of Black Ash occur. Excavation into contaminated ash below the water table could result in exposure via ingestion or dermal contact.

# Section 4: Interpretations and Conclusions

## 4.1 Review of Site History and Site Reconnaissance Observations

The project site was used as a deposition area for spent black liquor used in the making of paper pulp. The Champlain Fibre Company later known as the Willsboro Pulp Mill and most recently owned by GPC operated a pulp mill on the opposite side of the Boquet River from the black ash location from 1884 to 1965. The black liquor was a combination of soda ash, chemical lime, wood fiber and soft coal. The black ash is the residue of spent black liquor combustion dumped in a basin area approximately 900 ft long and 400 ft wide. Surface samples of the black ash earlier (c. 1988) analyzed by the New York State Department of Health characterized the black ash as 98 percent carbon and small quantities of lime. However, in 2003 additional scrutiny of the black ash revealed the ash may contain metals exceeding the New York State Department of Environmental Conservation (NYSDEC) TAGM 4046 guidelines.

The deposition lagoons were formed by constructing a crescent shaped, 12 to 15-ft-high dike along the course of the riverbank. Concrete pavement is still evident on portions of the dike that have not eroded into the Boquet River indicating the use of the berm as a wheeled vehicle access. A large pipe formerly protruded through the remainder of the structure into the river. The pipe documented the extent of dike erosion that had occurred, and has since fallen into the river and been swept away. Construction material for the dike appears to have been onsite material from the riverbank, black ash, logs, bricks and other available materials. Black ash layers can be seen along the face of the dike and a black cloudy discharge into the Boquet River shows evidence of offsite migration.

Due to the recent testing of black ash material on adjacent properties indicating heavy metal contamination, combined with the fact that NYSDEC had permitted the Town to dump black ash into the Boquet River to facilitate the reduction of ice jams, has caused NYSDEC to desire a more comprehensive evaluation of the black ash pond and related pulp mill waste deposits.

To the north of the site, across the Boquet River, sludge lagoons exist. This material was the cumulative chemical waste from the mill, whereas the ash was the spent liquor as noted above.

During the completion of the numerous site reconnaissance efforts, the site was categorized into five main areas:

1. Northern Area: A former dike dips precipitously southward and humus has accumulated such that scrub brush and small trees have been established. The exterior of the northern perimeter

facing the river is in a constant state of erosion and slope failure. Each year the sedimentary layers of ash and cinders fall into the river mixing with river sediments and carrying downstream.

2. Western Area: The western area of the Black Ash Pond abuts a NYSDEC fisherman's access area, parking area and fish pool, downstream from a NYSDEC fish ladder. The Boquet River is a major salmon spawning feature for Lake Champlain: The northern perimeter of the Black Ash Pond consists primarily of a cinder/ash berm/dike constructed to impound the black ash. As noted above, it contained leachate piping that has since fallen into the river. The perimeter berm drops in elevation salmon spawning feature for Lake Champlain, and fishermen come from out-of-state, in addition to local and area residents, for salmon. Fishermen wade along the entire perimeter of the Black Ash Pond for salmon and trout.
3. Central Area: The central area of the Black Ash Pond provides a glimpse of what the Black Ash Pond once was, an ashen surface with no plant growth atop loose, compressible fine grained ash that can be traversed by foot, or track machine, but a rubber tired vehicle would become embedded in the ash. The perimeter of the ash pond is slowly being overtaken by a gradual accumulation of humus and placement of fill from municipal projects
4. The Eastern Area: The eastern area of the Black Ash Pond where outfall pipes were formerly installed, allowed liquid ash to decant from west to east and overflow or leach into the river. It appears that in addition to ash, other soils and sediments have drained through the former leachate piping system into the river so that this is the lowest lying lands of the Black Ash Pond. At the eastern end, various generations of municipal fill have been placed to reclaim this area for a parking area and boat access ramp. ESE personnel discovered that the soils in this area are easily saturated and near a quick condition. Some of the borings and/or test trenches were abandoned due to inaccessibility because of the saturated condition of the soils. However, some in the vicinity were accessible due to on-site construction of corduroy roads to provide access for the track mounted excavator.
5. The Southern Area: The southern area of the site abuts the access road that curls around the wastewater treatment plant to the boat launch. This access road is built atop fill that has been placed over the ash and land reclaimed from the black ash as a staging area for Town materials and supplies. The sewer plant itself borders the southern perimeter of the Black Ash Pond and begins to abut into ledge rock that rises from north to south back towards the school and residential properties.

In general, traversing from south to north it is common to find an ash/fill atop a layer of fill anywhere from 2 to 10 ft thick atop mixed layers of sludge and ash. This ash layer can be 20 ft thick and is underlain by riverine sediments. Also, progressing north, the surface elevation drops approximately 20 ft across the site from the fill plateau along the southern perimeter to the base of the northern perimeter dike.

Traversing west to east, the elevation drops 20 ft going from the west end near the fishermen access area to the lowest point near the outfall leachate piping location. Typically, a 10 ft layer of ash and cinders is underlain by a 2 to 12 ft layer of sludge. The sludge lies atop of riverine sediments showing that this lagoon was originally used for the deposition of sludge before the practice of delivering the ash as a slurry was adopted.

Groundwater lies typically a few feet below existing grade. The water table occurred at the boundary between the porous ash and the less permeable sludge, ranging from 4 to 10 ft BEG.

**4.2 Soil and Waste Media Investigation Findings**

In general, test trench, soil boring and soil/waste media sampling investigations, the extent of black ash deposition was field determined to be pervasive throughout much of the investigated area (approximately 17.5 acres). From the results of test trench and soil boring investigations, the thickness of the black ash ranged from 4 ft along the perimeters of the site to nearly 20 ft within the interior. At TT-27, TT30, TT-20, TT-16, TT-12, TT-8, and B-5, B-4, MW-3, B-8, B-11, MW-6, B-12 a variable layer (typically 7 ft thick) of paper mill sludge was identified immediately below the black ash.

Of the sixteen (16) test trench soil samples analyzed, evidence of organic compound impacts, including detectable concentrations of numerous semi-VOCs was identified in the soil sample collected from TT-39 (48-inches BEG), where a significantly elevated concentration (above TAGM 4046 Soil Cleanup Objectives) of benzo(a)pyrene (84 ug/kg), and other detectable base-neutral semi-VOCs, was identified. Although the origin of such semi-VOC contamination cannot be verified, it is likely that previous waste deposition in the vicinity of TT-39 included some type of petroleum or coal tar related substance at this discrete location.

In general, although the results of soil/ash media sample analysis did not reveal the consistent presence of any other volatile organic, semi-volatile organic, or PCB/pesticide compounds, elevated concentrations (exceeding applicable TAGM 4046 recommended soil cleanup values and/or background soil conditions) of metals were consistently identified within the majority of black ash samples collected as part of the project. As previously mentioned, background soil samples were collected as part of the site investigation, one from a location just outside the limits of black ash fill deposition, near an adjacent residence, and the other at the former school playground. Although analysis of the background soil sample revealed slightly elevated concentrations of certain metals. The majority of metals were either not detected or detected at only trace to low-level concentrations in the background soil samples. Whereas, as shown in

Tables 1 and 2 , predominantly contaminants identified (at concentrations that exceeded metal specific TAGM 4046 recommended soil cleanup objectives and/or site background conditions) within the soil samples collected from the majority of test trenches and soil borings included Sb, As, Ba, Be, Cd, Cr, Co, Cu, Pb, Hg, Ni, Se, Ag, Tl, V, and Zn.

**Overall, from the results of metals analysis of the solid media samples collected from various test trenches and soil borings, it has been documented that the black ash deposited in the subject area exhibits significantly elevated concentrations of specific non-native heavy metals, some exceeding applicable NYSDEC TAGM 4046 recommended soil cleanup objectives. Considering the significant volume of black ash media present at the site, and since the black ash media exists in direct contact with the ground surface, local hydrologic regime (Boquet River) and local shallow groundwater regime, it is concluded that associated risks to both human health and the local environment persist at the subject site. Consistent with the fine grain size of the black ash media, it is interpreted that potential risks to human health and the adjacent hydrologic environment (i.e., ash erosion and transport) are likely variable (based on seasonal weather conditions) and persistent.**

### 4.3 Groundwater Investigation Findings

From the results of subsurface borings and monitoring wells completed as part of the SI, wet soils (indicative of the local water table) were encountered within the black ash media, at depths typically ranging from 4 to 10 ft BEG. Shallow groundwater flow at the site was calculated to trend toward the Boquet River (from the south and southwest to the northeast).

Although an intermixed layer of black ash and pulp mill sludge was encountered within MW-1, MW-3, MW-4, and MW-6 borings (extending from 8 to 16 ft BEG), this layer of ash/sludge was not identified during the completion of MW-2, MW-5, and MW-7 borings. The presence of apparent native soils, primarily riverine sediments, was identified within each well boring at depths ranging from 4 ft BEG (MW-7) to 16 ft BEG (MW-4). Although wet soils (ash) were often first encountered at depths ranging between 4 to 10 ft BEG in the well borings, the most saturated soil (ash) conditions were typically identified at the black ash/sludge interface.

Although an intensive effort was implemented to develop each of the monitoring wells using low-flow overpumping techniques, the extract groundwaters were characterized by significant quantities of black ash, which was reduced over 30-60 minutes of development to a dull-black tint. Accordingly, and consistent with the fine grained characteristics of the black ash media, it appears that some fractions of the black ash media exhibit the characteristic of solubility when immersed.

Although estimated or trace levels of various pesticides and semi-volatile organic compounds (including; 4,4-DDE, diethylphthalate, di-n-butylphthalate, and butylbenzylphthalate) were detected in the groundwater samples collected from MW-1 and/or MW-2, the elevated presence of volatile organic, semi-volatile organic, PCB or pesticide compounds was not detected within any of the seven groundwater samples.

Similar to the soil samples collected at the site, each of the seven monitoring well groundwater samples exhibited elevated concentrations of Al, Ba, Ca, K and Zn. Consistent with the metals detected within the soil/ash media samples and the apparent partial solubility of specific black ash media fractions, the majority of well groundwater samples also exhibited elevated concentrations of Sb, Mg, Fe, Mn, Na, and Tl exceeding applicable Class GA Groundwater Quality Standards or Guidance Values. The groundwater samples collected from MW-3, MW-4, and MW-5 also exhibited Class GA Groundwater Quality exceedances for As, while the groundwater samples collected from MW-1 and MW-6 also exhibited Class GA Groundwater Quality exceedances for Cr.

Comparison of the upgradient (MW-2) with downgradient groundwater quality metals data (wells MW-1, MW-3, MW-4, MW-5, MW-6, and MW-7) generally revealed that average downgradient concentrations of aluminum, Ba, Ca, Cr, Co, Cu, Fe, Pb, Ni, K, V and Zn were all significantly higher (ten times or greater) than the corresponding concentrations metals exhibited by the sample collected from upgradient monitoring well MW-2. In addition, comparison of upgradient vs. downgradient average metals data revealed that Sb, As, Ba, Be, Ca, and Mg concentrations were slightly higher (less than 1 order of magnitude) in the downgradient monitoring well samples.

Based on comparison of the upgradient vs. downgradient groundwater sample data and comparison of the groundwater data with black ash (solid) sample results, it was documented that elevated concentrations of the same non-native metals that persist within the black ash media (including Sb, Ba, Cd, Cr, Co, Cu, Fe, Pb, Ni, V and Zn) are leaching to the local shallow groundwater regime. Since the majority of these metals were identified within a number of the downgradient groundwater samples at concentrations exceeding the respective Class GA Groundwater Quality Standards or Guidance Values, it is apparent that the leaching of specific metals to the local shallow groundwaters has resulted in metals contamination of the shallow groundwater regime proximate to the site.

Since the results of groundwater flow calculations indicate that the Boquet River is a "gaining stream" (receiving local shallow groundwaters discharge), it also can be interpreted that such elevated metals concentrations are discharging to the river. It can be concluded that such contaminant transport and migration will continue to occur because the majority of the Black Ash Pond is open to the surface environment for surface water percolation(where erosion is ongoing) and also exists in direct contact with both the local shallow groundwaters and the adjacent river.

**4.4 Boquet River Sediment Investigation Findings**

During the completion of the Boquet River sediment sampling significant erosion of black ash and cinders was observed along the majority of the southern bank of the Boquet River. The most significant areas of ash-cinder erosion were observed in the vicinity of MW-5 east to the unofficial boat launch, where layers of black ash (ranging in thickness of 8 to 12 ft) immediately border the river and are steadily eroding and collapsing into the river.

Although estimated or trace levels of various semi-VOCs (including; dimethylphthalate, 2,6-dinitrotoluene, and pyrene) were detected in two (2) of the sediment samples, the presence of these compounds was not detected in the sediment samples consistently. The elevated presence of volatile organic, semi-volatile organic, PCB or pesticide compounds was not detected within any of the twelve (12) sediment samples collected as part of the project.

Metals analysis of the sediments collected from the Boquet River generally revealed elevated concentrations of Al, Sb, Ba, Ca, Fe, Mg, Mn, K, Na, and Zn. Comparison of the upstream sediment metals data (samples SD-1 and SD-2) with the downstream sediment metals data (samples SD-3, SD-4, SD-5, and SD-6) revealed that the average downstream concentrations of Sb, Cr, Cu, Pb, Mg, Ni, and Na were slightly to significantly higher (ten times or greater) than the corresponding average concentrations of metals exhibited by the upstream sediment samples. Of these metals, downstream sediment average Cu and Pb concentrations were ten times greater or higher than the corresponding upstream sediment average Cu and Pb concentrations. Comparison of the sediment sample data collected from shallow depth (6-inches) and intermediate depth (18 inches) revealed that Al, Sb, Ba, Ca, Cr, Cu, Fe, Mg, Mn, Ni, Na, and Zn concentrations were generally more elevated within the intermediate depth samples.

As previously detailed, comparison of the parameters detected within the sediment samples with the criterion for those parameters listed within the Technical Guidance for Screening Contaminated Sediment (NYSDEC – Division of Fish and Wildlife Document dated November 1993, Reprinted January 1999), revealed two downstream samples that exceeded the Lowest Effect Level Guidance Value for Sb, one downstream samples that exceeded the Severe Effect Level Guidance Value for Sb, and one downstream sample that exceeded the Lowest Effect Level Guidance Value for Ni.

Although Sb was detected in the off-site background soil sample and one of four upstream sediment samples, the presence of this metal was identified at more elevated concentrations within the majority of black ash media samples, downgradient groundwater samples, and downstream sediment samples. Consistent with the presence of Sb in the majority of soil and groundwater samples collected as part of the investigation, it appears possible that the elevated presence of Sb in the river sediments could have occurred from erosion and deposition of the black ash media in the river. In order to fully assess the presence of Sb within the river sediments, supplemental sediment sampling along the black ash pond river bank and along the cross-section of the river bottom would likely be needed via a barge mounted drill rig. Considering the complexity of apparent sediment contamination and the potential impacts that may be occurring from the black ash pond site to the adjacent river environment, subsequent consultation with specific NYSDEC Fish and Wildlife personnel has resulted in their input on this issue as documented in Appendix F.

### 4.5 Off-Site Waste Media Investigation Findings

A total of eight (8) samples of residual sludge were collected from the aforementioned sludge lagoons and a single (1) sample of the naturally encapsulated black ash from the ANC's property were obtained for TCL parameter analysis, consistent with applicable CLP Organic Laboratory Methods (OLM) and Inorganic Laboratory Methods (ILM).

The analytical results for the samples collected from the ANC property and the sludge/media samples collected from the former pulp mill sludge lagoons located north of the subject property across the Boquet River are included within Appendix D and are summarized in Table 5. As shown in Table 5, the confirmed (non-estimated) presence of VOCs, semi-VOCs, PCBs, or pesticides was not identified within the sample from the ANC property

Similarly, the confirmed presence of VOCs, PCBs, or pesticides was not identified within the six (6) sludge-media samples collected from the former pulp mill sludge lagoons. Although semi-VOCs including; hexachlorobenzene (270 ug/kg), fluoranthene (79 ug/kg), bis-2-ethylhexylphthalate (110 ug/kg), and benzaldehyde (74 ug/kg) were estimated to be present in the waste media sample collected at location WM-4 (24-inches), the confirmed presence of semi-VOCs was not detected within any of the other waste media samples.

Metals analysis of the waste media samples consistently revealed non-detectable or trace concentrations of metals including As, Be, Se, and Tl. Although Cr and Hg were detected in the samples collected from the WM-1 (54-inch) location and Ag was detected at the WM-2 (12-inch) location, these metals were not detected within any other waste media samples.

The predominant contaminants identified within the waste media samples included numerous heavy metals, e.g., Sb, Ba, Cd, Ca, Cr, Cu, Fe, Pb, Mg, Ni, K, Na, V, and Zn were consistently identified within the waste media samples at concentrations exceeding TAGM 4046 recommended soil cleanup objectives and/or non-industrial site related background conditions.

As compared to the six (6) waste media samples collected from the former pulp mill sludge lagoons, the sample collected from the ANC property (WM-1-S-05-54) exhibited significantly more elevated concentrations of Sb (24.1 mg/kg), Ba (192 mg/kg), Be (1.6 mg/kg), Cu (0.47 mg/kg), Cr (12.9 mg/kg), Co (7.9 mg/kg), Fe (10,500 mg/kg), Mg (480- mg/kg), Hg (0.5 mg/kg), K (424 mg/kg), and V (22.9 mg/kg), with all exceeding applicable TAGM 4046 soil cleanup objectives and/or non-industrial site related background conditions.

As compared to the metals exhibited in the samples from the Black Ash Pond, the media samples from the sludge lagoons exhibited generally more elevated concentrations of Ba, Cd, Ca, Cu, Mg, Ni and Zn and generally lower concentrations of Mn and K. In general, the Black Ash and sludge lagoon media samples exhibited similar concentrations of Al, Sb, Pb, Na, As, Be, Th, and Se.

**Overall, from the results of metals analysis of the waste media samples collected it has been documented that the waste media deposited in the subject area exhibits significantly elevated concentrations of specific non-native heavy metals, some exceeding applicable NYSDEC TAGM 4046 recommended soil cleanup objectives. Considering the significant volume of black ash and sludge present at the respective sites, and since the waste media exists in direct contact with the ground surface, local hydrologic regime (Boquet River) and local shallow groundwater regime, it is concluded that associated risks to both human health and the local environment persist.**

### 4.6 Qualitative Human Health Risk Assessment

As previously discussed, a qualitative human health risk evaluation was completed as part of the SI. The procedure for performing the risk assessment was consistent with USEPA methodologies and the scope was developed in accordance with NYSDOH guidance. As part of a two-step process, the qualitative risk assessment included: 1) contaminant identification and selection of contaminants of concern and 2) exposure assessment to identify actual or potential exposure pathways

Based on the characteristics of the Black Ash Pond, the results of investigation sample analyses, the site setting, and the demographics of the local community, populations potentially affected by contamination from the site were interpreted to include the following:

- Pedestrian Trespassers – unauthorized visitors to and through the site may be exposed directly to contaminated ash solids and/or to fugitive ash dust/particles
- Town workers – exposed to fugitive ash dust/particles and contaminated infiltration/inflow entering nearby sewers.
- General public – pedestrians or vehicle passengers on the gravel access road and/or fisherman/boaters/canoists/swimmers in the Boquet River:
- Future on-site construction workers – workers involved in excavation of ash/soils in the areas of the site that are contaminated (note that this assessment excludes workers performing remedial activities as part of the project).

Exposure pathway identification included review and interpretation of 1) Contaminant source; 2) Transport medium; 3) Exposure Points; and 4) Exposure Routes. Potential exposure points for the Black Ash Pond were listed as follows:

| Contaminant Source | Transport Medium | Exposure Point |
|---|---|---|
| Groundwater | Groundwater | On-site construction workers |
| Stormwater and/or Leachate | Stormwater and/or Groundwater | Pedestrian trespassers; On-site construction workers |
| | Sanitary sewer | Sewer worker |
| Surface and Subsurface Ash | Ash-Solid Media | Pedestrian trespassers; On-site construction workers |
| | Ground water | On-site construction worker |

Potential Black Ash Pond routes of exposure for each potential exposure point listed above were interpreted to include:

- Pedestrian trespasser exposure to ash solids (via direct contact or dust inhalation) is likely on a consistent basis as the site is located immediately adjacent to a fisherman's access site and boat launch area.

- Although pedestrian trespasser exposure to contaminated groundwater, contaminated stormwater, and/or contaminated leachate seeps (via direct contact) is less likely, due to less frequent heavy precipitation/runoff events, such transport vectors result in contaminant migration to the Boquet River.
- Exposure of on-site or off-site workers to site contaminants is limited to the unlikely circumstance of workers involved with nearby sanitary sewers working at the same time that contaminants from the site were entering the sewer system that crosses the site. Typically, this would only occur during periods of significant precipitation and/or runoff. Exposure could occur via ingestion, and/or dermal contact.
- Exposure of on-site workers to surface and subsurface ash media is possible in the case if no remediation of ash media takes place. Excavation into contaminated ash could result in exposure via ingestion, dermal contact, or inhalation.
- Exposure of on-site workers to contamination in groundwater is possible in the case if no remediation of ash media takes place. Excavation into contaminated ash that is below the water table could result in exposure via ingestion or dermal contact.

### 4.7 Supplemental Investigation and Interim Remedial Measures (IRMs) Recommendations

Considering the overall results of the SI, it appears that the horizontal and vertical extent of black ash deposition at the site was satisfactorily defined. Although analysis of the black ash related samples revealed elevated concentrations of various non-native metals (some exceeding NYSDEC recommended soil cleanup objectives), in general, it appears that the type, presence and extent of such metals contamination was consistent for all black ash media (solids) samples collected as part of the project. Furthermore, since analysis of the black ash related samples revealed only discrete locations of organic compounds contamination (i.e., test trench TT-39 semi-VOCs) or the trace/low-level presence of common laboratory cross-contaminants (i.e., acetone, methylene chloride), it does not appear that a significant supplemental round of Black Ash Pond solids media will be warranted.

Since the solid media sample collected from the specific ANC property exhibited significantly elevated concentrations of various metals, a supplemental ANC property subsurface investigation effort should be planned to identify the extent and degree of ash and underlying soil contamination in this separate area. It is estimated that such supplemental investigations include a one-day test trenching effort and the collection of 4 to 8 soil/ash samples. Although the results of groundwater investigations completed as part of this project appear to have adequately identified the presence of metals contamination within the shallow groundwater regime, it is recommended that at least one additional round of groundwater monitoring be completed, during the upcoming spring months to quantify the presence of metals during periods of high groundwater.

Based on the results of river sediment investigations completed as part of this project, it appears that the some of the same non-native metals that are pervasive within the black ash media and adjacent shallow groundwaters of the site are also present within the sediments of the adjacent Boquet River. In order to fully assess the presence of such metals of concern (i.e., Sb and Ni) within the river sediments, based on consultation with NYSDEC Fish and Wildlife, it is proposed that an invertebrate study be performed to determine if the metals have entered the food chain.

Based on the findings of the SI coupled with the known and identifiable erosion of the Black Ash Pond, it is obvious that continued erosion of the black ash into the Boquet River has affected the river sediments and river water quality. The NYSDEC Division of Fish, Wildlife & Marine Resources have cited this area, and utilize this area, as "an integral site critical to our efforts in establishing native landlocked Atlantic salmon to the Lake Champlain basin" and "the most popular area for trout and salmon anglers is within the river section by the old pulp mill site." Moreover, the New York Natural Heritage program further cites this area as habitat for rare species and the Wildlife Conservation Society wishes to utilize it as spawning habitat for endangered turtle species. All of these sources cite the stabilization and containment of the pulp mill waste lagoon s as a key element of restoring and maintaining an optimum ecosystem. Therefore, it is our opinion that the erosion of the banks of the Boquet River needs to be terminated as soon as practical and consideration should be given to providing Interim Remedial Measures (IRMs) to design and construct streambank stabilization for the 2,400 ft length of streambank contributing to the contamination of the Boquet River.

### 4.8 SI Final Conclusions and Preliminary Remedial Approach

From the results of the SI, it has been documented that consistent elevated concentrations of specific non-native metals are persistent within the black ash at the site. Similarly, the results of groundwater investigations completed as part of the project revealed that elevated concentrations of the same non-native metals that persist within the black ash media are leaching to the local shallow groundwater regime. Since the majority of these metals were identified within a number of the downgradient groundwater samples at concentrations exceeding the respective Class GA Groundwater Quality Standards or Guidance Values, it is apparent that leaching of specific metals to the local shallow groundwaters has resulted in metals contamination of the shallow groundwater regime proximate to the site. Consistent with the results of project specific river sediment investigations, it appears that local stormwater runoff and erosion has contributed elevated concentrations of specific heavy metals to the sediments of the adjacent Boquet River. It is concluded that such contaminant transport and migration will continue to occur because the majority of the Black Ash Pond is open to the surface environment (where erosion is ongoing) and also exists in direct contact with both the local shallow groundwaters and the adjacent river.

Consistent with applicable NYSDEC Environmental Restoration Project Guidance and the Town's preliminary plans for site re-development, it is planned that the remedial alternatives evaluation and report include a comparison of the No-Action Alternative to available and applicable remedial alternatives that will minimize and/or reduce potential human health risks and environmental impacts associated with the black ash solids media and related impacted media. The purpose of the Remedial Alternative Report (RAR) is to identify remedial technologies and screen those technologies such that a range of remedial alternatives that protect human health and the environment are developed. A range of remedial alternatives is developed to attain site or project specific remedial response objectives. The range of remedial response objectives developed reflects the goals of the NYSDEC to address the principal environmental threats through treatment, and considering engineering controls to address low level contaminated material and wastes for which treatment is not practical. Institutional controls are considered primarily as supplements to engineering controls.

A range of alternatives are developed to attain the remedial response objectives. The range developed reflects the goals of the NYSDEC Technical and Administrative Guidance Memorandum (TAGM) Number 4030 "Selection of Remedial Actions at Inactive Hazardous Waste Sites" (NYSDEC, May 1990). The Development of General Response Actions, identifies contaminated media and volumes or areas of concern, outlines the remedial action objectives, and describes general response actions. The first step in developing remedial alternatives is to identify areas or volumes of media to which general response actions might be applied. These areas or volumes are identified considering acceptable exposure levels, potential exposure routes, the nature and extent of contamination, and other site conditions.

The second step is to establish remedial action objectives. The remedial action objectives specify the contaminants and media of concern, potential exposure pathways, and remediation goals. The remedial action objectives are a general description of what the remedial action is intended to accomplish. Remediation goals are a subset of the remedial action objectives and consist of acceptable contaminant levels or a range of levels for each exposure route. The goals specify both a contaminant level and an exposure route, rather than contaminant levels alone, because protection may be achieved by reducing exposure (such as capping an area or limiting access) as well as by reducing contaminant levels. After the remedial action objectives have been established, general response actions for each medium of interest are developed.

General response actions include: treatment, containment, excavation, or other actions that may be taken to satisfy the remedial action objectives for the site. After general response objectives are developed, available remedial technologies are reviewed and evaluated for applicability. The first step in identifying technologies is to identify technology types and technology process options associated with each general response action. Technology types refer to general categories of technologies and technology process options refer to specific processes within each specific technology type. Technology types such as capping, disposal, immobilization and thermal treatment are among those described. Process options available for each of the technologies are then described.

After the technologies and associated process options are identified, those remedial technologies and process options that cannot be implemented technically, or are deemed not viable or impractical, are screened out. At this stage of the evaluation, specific process options or entire technology types are eliminated from further consideration. Technologies and process options are evaluated and screened using the criteria of Implementability and Effectiveness. The implementability screening considers the technical feasibility of implementing the technology and is used to eliminate technologies or process options that are clearly ineffective or unworkable considering the site-specific conditions and the remedial response objectives. The effectiveness screening considers the effectiveness of the specific technology or process option and is used to eliminate technologies that are not effective in handling the site specific contaminants or areas and volumes of waste considering the remediation goals, the potential impacts to human health and the environment while implementing the technologies, and the reliability of the process with respect to the contaminants and conditions at the site.

Remedial alternatives are then developed by combining the various technologies that passed the technology screening into alternatives to achieve the remedial response objectives. Only a limited number of remedial alternatives which represent the most viable remedial actions and have a significant potential of being implemented will be developed. A no action alternative is typically developed to use as a basis for comparison with other alternatives. These remedial alternatives then undergo a detailed analysis which consists of an assessment of each individual alternative against seven evaluation criteria. An analysis is then conducted on each remedial alternative comparing the following criteria:

- Short-term impacts and effectiveness

- Long-term effectiveness and performance
- Reduction of toxicity, mobility, or volume
- Implementability
- Compliance with Standards, Criteria and Guidance (SCGs)
- Overall protection of human health and the environment
- Cost

Each of the seven evaluation criteria is further divided into specific factors and a relative weight is assigned to each factor to allow a thorough analysis of the alternatives.

# TABLE 1

# TEST TRENCH SUBSURFACE SOIL SAMPLE

# ANALYTICAL DATA SUMMARY

# Black Ash Pond - ERP: Site Investigation Analytical Data Summary

Test Trench Soil Samples

| Volatile Organic Compounds | NYSDEC RSCOs (ppb) | SAMPLES BG1-S-05-12 | TT-2-S-05-72 | TT-12-S-05-30 | TT-12-S-05-156 | TT-16-S-05-0 | TT-16-S-05-84 | TT-16-S-05-90 | TT-16-S-05-180 | TT-17-S-05-30 | TT-32-S-05-90 | TT-39-S-05-48 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| chloromethane | | <11 | <16 | <80 | <22 | <260 | <36 | <23 | <13 | <11 | <19 | <19 |
| bromomethane | | <11 | <16 | <80 | <22 | <260 | <36 | <23 | <13 | <11 | <19 | <19 |
| vinyl chloride | | <11 | <16 | <80 | <22 | <260 | <36 | <23 | <13 | <11 | <19 | <19 |
| chloroethane | | <11 | <16 | <80 | <22 | <260 | <36 | <23 | <13 | <11 | <19 | <19 |
| methylene chloride | 100 | 7J | <16 | 75J | <22 | <260 | <36 | <23 | <13 | <11 | <19 | <19 |
| acetone | 200 | <11 | 51 | 170 | <22 | 430 | 38 | <23 | <13 | <11 | <19 | <19 |
| carbon disulfide | | <11 | <16 | <80 | <22 | <260 | <36 | <23 | <13 | <11 | <19 | <19 |
| 1,1-dichloroethene | | <11 | <16 | <80 | <22 | <260 | <36 | <23 | <13 | <11 | <19 | <19 |
| 1,1-dichloroethane | | <11 | <16 | <80 | <22 | <260 | <36 | <23 | <13 | <11 | <19 | <19 |
| 1,2-dichloroethene-trans | | <11 | <16 | <80 | <22 | <260 | <36 | <23 | <13 | <11 | <19 | <19 |
| 1,2-dichloroethene-cis | | <11 | <16 | <80 | <22 | <260 | <36 | <23 | <13 | <11 | <19 | <19 |
| chloroform | | <11 | <16 | <80 | <22 | <260 | <36 | <23 | <13 | <11 | <19 | <19 |
| 1,2-dichloroethane | | <11 | <16 | <80 | <22 | <260 | <36 | <23 | <13 | <11 | <19 | <19 |
| 2-butanone | | <11 | <16 | <80 | <22 | <260 | <36 | <23 | <13 | <11 | <19 | <19 |
| 1,1,1-trichloroethane | | <11 | <16 | <80 | <22 | <260 | <36 | <23 | <13 | <11 | <19 | <19 |
| carbon tetrachloride | | <11 | <16 | <80 | <22 | <260 | <36 | <23 | <13 | <11 | <19 | <19 |
| bromodichloromethane | | <11 | <16 | <80 | <22 | <260 | <36 | <23 | <13 | <11 | <19 | <19 |
| 1,2-dichloropropane | | <11 | <16 | <80 | <22 | <260 | <36 | <23 | <13 | <11 | <19 | <19 |
| cis-1,3-dichloropropene | | <11 | <16 | <80 | <22 | <260 | <36 | <23 | <13 | <11 | <19 | <19 |
| trichloroethene | | <11 | <16 | <80 | <22 | <260 | <36 | <23 | <13 | <11 | <19 | <19 |
| dibromochloromethane | | <11 | <16 | <80 | <22 | <260 | <36 | <23 | <13 | <11 | <19 | <19 |
| 1,1,2-trichloroethane | | <11 | <16 | <80 | <22 | <260 | <36 | <23 | <13 | <11 | <19 | <19 |
| benzene | | <11 | <16 | <80 | <22 | <260 | <36 | <23 | <13 | <11 | <19 | <19 |
| trans-1,3-dichloropropene | | <11 | <16 | <80 | <22 | <260 | <36 | <23 | <13 | <11 | <19 | <19 |
| bromoform | | <11 | <16 | <80 | <22 | <260 | <36 | <23 | <13 | <11 | <19 | <19 |
| 4-methyl-2-pentanone | | <11 | <16 | <80 | <22 | <260 | <36 | <23 | <13 | <11 | <19 | <19 |
| 2-hexanone | | <11 | <16 | <80 | <22 | <260 | <36 | <23 | <13 | <11 | <19 | <19 |
| terachloroethene | | <11 | <16 | <80 | <22 | <260 | <36 | <23 | <13 | <11 | <19 | <19 |
| 1,1,2,2-tetrachloroethane | | <11 | <16 | <80 | <22 | <260 | <36 | <23 | <13 | <11 | <19 | <19 |
| toluene | | <11 | <16 | <80 | <22 | <260 | <36 | <23 | <13 | <11 | <19 | <19 |
| chlorobenzene | | <11 | <16 | <80 | <22 | <260 | <36 | <23 | <13 | <11 | <19 | <19 |
| ethylbenzene | | <11 | <16 | <80 | <22 | <260 | <36 | <23 | <13 | <11 | <19 | <19 |
| styrene | | <11 | <16 | <80 | <22 | <260 | <36 | <23 | <13 | <11 | <19 | <19 |
| m,p-xylenes | | <11 | <16 | <80 | <22 | <260 | <36 | <23 | <13 | <11 | <19 | <19 |
| o-xylene | | <11 | <16 | <80 | <22 | <260 | <36 | <23 | <13 | <11 | <19 | <19 |
| methyl t-butyl ether | | <11 | <16 | <80 | <22 | <260 | <36 | <23 | <13 | <11 | <19 | <19 |
| dichlorodifluoromethane | | <11 | <16 | <80 | <22 | <260 | <36 | <23 | <13 | <11 | <19 | <19 |
| methyl acetate | | <11 | <16 | <80 | <22 | <260 | <36 | <23 | <13 | <11 | <19 | <19 |
| freon 113 | | <11 | <16 | <80 | <22 | <260 | <36 | <23 | <13 | <11 | <19 | <19 |
| trichlorofluoromethane | | <11 | <16 | <80 | <22 | <260 | <36 | <23 | <13 | <11 | <19 | <19 |
| cyclohexane | | <11 | <16 | <80 | <22 | <260 | <36 | <23 | <13 | <11 | <19 | <19 |
| methylcyclohexane | | <11 | <16 | <80 | <22 | <260 | <36 | <23 | <13 | <11 | <19 | <19 |
| 1,2-dibromoethane | | <11 | <16 | <80 | <22 | <260 | <36 | <23 | <13 | <11 | <19 | <19 |
| 1,3-dichlorobenzene | | <11 | <16 | <80 | <22 | <260 | <36 | <23 | <13 | <11 | <19 | <19 |
| isopropylbenzene | | <11 | <16 | <80 | <22 | <260 | <36 | <23 | <13 | <11 | <19 | <19 |
| 1,4-dichlorobenzene | | <11 | <16 | <80 | <22 | <260 | <36 | <23 | <13 | <11 | <19 | <19 |
| 1,2-dichlorobenzene | | <11 | <16 | <80 | <22 | <260 | <36 | <23 | <13 | <11 | <19 | <19 |
| 1,2-dibromo-3-chloro-propane | | <11 | <16 | <80 | <22 | <260 | <36 | <23 | <13 | <11 | <19 | <19 |
| 1,2,4-trichlorobenzene | | <11 | <16 | <80 | <22 | <260 | <36 | <23 | <13 | <11 | <19 | <19 |

# Black Ash Pond - ERP: Site Investigation Analytical Data Summary

**Test Trench Soil Samples**

| Semi-Vol. Organic Compounds | NYSDEC RSCOs (ppb) | SAMPLES BG1-S-05-12 | TT-2-S-05-72 | TT-12-S-05-30 | TT-12-S-05-156 | TT-16-S-05-0 | TT-16-S-05-84 | TT-16-S-05-90 | TT-16-S-05-180 | TT-17-S-05-30 | TT-32-S-05-90 | TT-39-S-05-48 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| phenol | | <370 | <540 | <1300 | <720 | <880 | <1200 | <780 | <430 | <380 | <640 | <630 |
| bis(2-chloroethyl)ether | | <370 | <540 | <1300 | <720 | <880 | <1200 | <780 | <430 | <380 | <640 | <630 |
| 2-chlorophenol | | <370 | <540 | <1300 | <720 | <880 | <1200 | <780 | <430 | <380 | <640 | <630 |
| 2-methylphenol | | <370 | <540 | <1300 | <720 | <880 | <1200 | <780 | <430 | <380 | <640 | <630 |
| bis(2-chloroisopropyl)ether | | <370 | <540 | <1300 | <720 | <880 | <1200 | <780 | <430 | <380 | <640 | <630 |
| 4-methylphenol | | <370 | <540 | <1300 | <720 | <880 | <1200 | <780 | <430 | <380 | <640 | <630 |
| n-Nitroso-di-n-propylamine | | <370 | <540 | <1300 | <720 | <880 | <1200 | <780 | <430 | <380 | <640 | <630 |
| hexachloroethane | | <370 | <540 | <1300 | <720 | <880 | <1200 | <780 | <430 | <380 | <640 | <630 |
| nitrobenzene | | <370 | <540 | <1300 | <720 | <880 | <1200 | <780 | <430 | <380 | <640 | <630 |
| isophorone | | <370 | <540 | <1300 | <720 | <880 | <1200 | <780 | <430 | <380 | <640 | <630 |
| 2-nitrophenol | | <370 | <540 | <1300 | <720 | <880 | <1200 | <780 | <430 | <380 | <640 | <630 |
| 2,4-dimethylphenol | | <370 | <540 | <1300 | <720 | <880 | <1200 | <780 | <430 | <380 | <640 | <630 |
| bis(2-chloroethoxy)methane | | <370 | <540 | <1300 | <720 | <880 | <1200 | <780 | <430 | <380 | <640 | <630 |
| 2,4-dichlorophenol | | <370 | <540 | <1300 | <720 | <880 | <1200 | <780 | <430 | <380 | <640 | <630 |
| naphthalene | 13000 | <370 | <540 | <1300 | <720 | <880 | <1200 | <780 | <430 | <380 | <640 | 120j |
| 4-chloroaniline | | <370 | <540 | <1300 | <720 | <880 | <1200 | <780 | <430 | <380 | <640 | <630 |
| hexachlorobutadiene | | <370 | <540 | <1300 | <720 | <880 | <1200 | <780 | <430 | <380 | <640 | <630 |
| 4-chloro-3-methylphenol | | <370 | <540 | <1300 | <720 | <880 | <1200 | <780 | <430 | <380 | <640 | <630 |
| 2-methylnaphthalene | 36400 | <370 | <540 | <1300 | <720 | <880 | <1200 | <780 | <430 | <380 | <640 | 140j |
| hexachlorocyclopentadiene | | <370 | <540 | <1300 | <720 | <880 | <1200 | <780 | <430 | <380 | <640 | <630 |
| 2,4,6-trichlorophenol | | <370 | <540 | <1300 | <720 | <880 | <1200 | <780 | <430 | <380 | <640 | <630 |
| 2,4,5-trichlorophenol | | <370 | <540 | <1300 | <720 | <880 | <1200 | <780 | <430 | <380 | <640 | <630 |
| 2-chloronaphthalene | | <370 | <540 | <1300 | <720 | <880 | <1200 | <780 | <430 | <380 | <640 | <630 |
| 2-nitroaniline | | <1900 | <2700 | <6700 | <3600 | <4400 | <6000 | <3900 | <2100 | <1900 | <3200 | <3100 |
| dimethylphthalate | | <370 | <540 | <1300 | <720 | <880 | <1200 | <780 | <430 | <380 | <640 | <630 |
| acenaphthylene | | <370 | <540 | <1300 | <720 | <880 | <1200 | <780 | <430 | <380 | <640 | <630 |
| 2,6-dinitrotoluene | | <370 | <540 | <1300 | <720 | <880 | <1200 | <780 | <430 | <380 | <640 | <630 |
| 3-nitroaniline | | <1900 | <2700 | <6700 | <3600 | <4400 | <6000 | <3900 | <2100 | <1900 | <3200 | <3100 |
| acenaphthene | | <370 | <540 | <1300 | <720 | <880 | <1200 | <780 | <430 | <380 | <640 | <630 |
| 2,4-dinitrophenol | | <1900 | <2700 | <6700 | <3600 | <4400 | <6000 | <3900 | <2100 | <1900 | <3200 | <3100 |
| 4-nitrophenol | | <1900 | <2700 | <6700 | <3600 | <4400 | <6000 | <3900 | <2100 | <1900 | <3200 | <3100 |
| dibenzofuran | | <370 | <540 | <1300 | <720 | <880 | <1200 | <780 | <430 | <380 | <640 | <630 |

# Black Ash Pond - ERP: Site Investigation Analytical Data Summary

Test Trench Soil Samples

| Semi-Vol. Organic Compounds | NYSDEC RSCOs (ppb) | SAMPLES BG1-S-05-12 | TT-2-S-05-72 | TT-12-S-05-30 | TT-12-S-05-156 | TT-16-S-05-0 | TT-16-S-05-84 | TT-16-S-05-90 | TT-16-S-05-180 | TT-17-S-05-30 | TT-32-S-05-90 | TT-39-S-05-48 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2,4-dinitrotoluene | | <370 | <540 | <1300 | <720 | <880 | <1200 | <780 | <430 | <380 | <640 | <630 |
| diethylphthalate | | <370 | <540 | <1300 | <720 | <880 | <1200 | <780 | <430 | <380 | <640 | <630 |
| 4-chlorophenyl-phenylether | | <370 | <540 | <1300 | <720 | <880 | <1200 | <780 | <430 | <380 | <640 | <630 |
| fluorene | | <370 | <540 | <1300 | <720 | <880 | <1200 | <780 | <430 | <380 | <640 | <630 |
| 4-nitroaniline | | <1900 | <2700 | <6700 | <3600 | <4400 | <6000 | <3900 | <2100 | <1900 | <3200 | <3100 |
| 4,6-dinitro-2-methylphenol | | <1900 | <2700 | <6700 | <3600 | <4400 | <6000 | <3900 | <2100 | <1900 | <3200 | <3100 |
| n-nitrosodiphenylamine | | <370 | <540 | <1300 | <720 | <880 | <1200 | <780 | <430 | 57j | <640 | <630 |
| 4-bromophenyl-phenylether | | <370 | <540 | <1300 | <720 | <880 | <1200 | <780 | <430 | <380 | <640 | <630 |
| hexachlorobenzene | | <370 | <540 | <1300 | <720 | <880 | <1200 | <780 | <430 | <380 | <640 | <630 |
| pentachlorophenol | | <1900 | <2700 | <6700 | <3600 | <4400 | <6000 | <3900 | <2100 | <1900 | <3200 | <3100 |
| phenanthrene | 50000 | <370 | <540 | <1300 | <720 | <880 | <1200 | <780 | <430 | <380 | <640 | 100j |
| anthracene | | <370 | <540 | <1300 | <720 | <880 | <1200 | <780 | <430 | <380 | <640 | <630 |
| carbazole | | <370 | <540 | <1300 | <720 | <880 | <1200 | <780 | <430 | <380 | <640 | <630 |
| di-n-butylphthalate | 8100 | <370 | <540 | <1300 | <720 | <880 | 130j | <780 | <430 | <380 | <640 | <630 |
| fluoranthene | | <370 | <540 | <1300 | <720 | <880 | <1200 | <780 | <430 | <380 | <640 | <630 |
| pyrene | | <370 | <540 | <1300 | <720 | <880 | <1200 | <780 | <430 | <380 | <640 | <630 |
| butylbenzylphthalate | | <370 | <540 | <1300 | <720 | <880 | <1200 | <780 | <430 | <380 | <640 | <630 |
| 3,3'-dichlorobenzidine | | <750 | <1100 | <2700 | <1400 | <1800 | <2400 | <1600 | <850 | <770 | <1300 | <1300 |
| benzo(a)anthracene | | <370 | <540 | <1300 | <720 | <880 | <1200 | <780 | <430 | <380 | <640 | <630 |
| chrysene | | <370 | <540 | <1300 | <720 | <880 | <1200 | <780 | <430 | <380 | <640 | 68j |
| bis(2-ethylehexyl)phthalate | 50000 | <370 | <540 | 140j | <720 | 190j | <1200 | <780 | 50j | <380 | <640 | <630 |
| di-n-octylphthalate | | <370 | <540 | <1300 | <720 | <880 | <1200 | <780 | <430 | <380 | <640 | <630 |
| benzo(b)fluoranthene | 1100 | <370 | <540 | <1300 | <720 | <880 | <1200 | <780 | <430 | <380 | <640 | 81j |
| benzo(k)fluoranthene | 1100 | <370 | <540 | <1300 | <720 | <880 | <1200 | <780 | <430 | <380 | <640 | 76j |
| benzo(a)pyrene | 61 | <370 | <540 | <1300 | <720 | <880 | <1200 | <780 | <430 | <380 | <640 | 84j |
| indeno(1,2,3-cd)pyrene | 3200 | <370 | <540 | <1300 | <720 | <880 | <1200 | <780 | <430 | <380 | <640 | 150j |
| bibenzo(a,h)anthracene | | <370 | <540 | <1300 | <720 | <880 | <1200 | <780 | <430 | <380 | <640 | <630 |
| benzo(g,h,i)perylene | 50000 | <370 | <540 | <1300 | <720 | <880 | <1200 | <780 | <430 | <380 | <640 | 160j |
| benzaldehyde | | <370 | <540 | <1300 | <720 | <880 | <1200 | <780 | <430 | <380 | <640 | <630 |
| acetophenone | | <370 | <540 | <1300 | <720 | <880 | <1200 | <780 | <430 | <380 | <640 | <630 |
| caprolactam | | <370 | <540 | <1300 | <720 | <880 | <1200 | <780 | <430 | <380 | <640 | <630 |
| biphenyl | | <370 | <540 | <1300 | <720 | <880 | <1200 | <780 | <430 | <380 | <640 | <630 |
| atrazine | | <370 | <540 | <1300 | <720 | <880 | <1200 | <780 | <430 | <380 | <640 | <630 |

# Black Ash Pond - ERP: Site Investigation Analytical Data Summary

**Test Trench Soil Samples**

| PCBs/Pesticides | NYSDEC RSCOs (ppb) | SAMPLES BG1-S-05-12 | TT-2-S-05-72 | TT-12-S-05-30 | TT-12-S-05-156 | TT-16-S-05-0 | TT-16-S-05-84 | TT-16-S-05-90 | TT-16-S-05-180 | TT-17-S-05-30 | TT-32-S-05-90 | TT-39-S-05-48 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| alpha-BHC | 110 | <1.9 | <2.7 | 9.9 | <3.6 | <4.4 | <6.0 | <3.9 | <2.1 | <1.9 | <3.2 | <3.1 |
| beta-BHC | | <1.9 | <2.7 | <6.7 | <3.6 | <4.4 | <6.0 | <3.9 | <2.1 | <1.9 | <3.2 | <3.1 |
| delta-BHC | | <1.9 | <2.7 | <6.7 | <3.6 | <4.4 | <6.0 | <3.9 | <2.1 | <1.9 | <3.2 | <3.1 |
| gamma-BHC (Lindane) | | <1.9 | <2.7 | <6.7 | <3.6 | <4.4 | <6.0 | <3.9 | <2.1 | <1.9 | <3.2 | <3.1 |
| heptachlor | | <1.9 | <2.7 | <6.7 | <3.6 | <4.4 | <6.0 | <3.9 | <2.1 | <1.9 | <3.2 | <3.1 |
| aldrin | | <1.9 | <2.7 | <6.7 | <3.6 | <4.4 | <6.0 | <3.9 | <2.1 | <1.9 | <3.2 | <3.1 |
| heptachlor epoxide | | <1.9 | <2.7 | <6.7 | <3.6 | <4.4 | <6.0 | <3.9 | <2.1 | <1.9 | <3.2 | <3.1 |
| endosulfan I | | <1.9 | <2.7 | <6.7 | <3.6 | <4.4 | <6.0 | <3.9 | <2.1 | <1.9 | <3.2 | <3.1 |
| dieldrin | | <3.7 | <5.4 | <13.3 | <7.2 | <8.8 | <11.9 | <7.8 | <4.3 | <3.8 | <6.4 | <6.3 |
| 4,4'-DDE | | <3.7 | <5.4 | <13.3 | <7.2 | <8.8 | <11.9 | <7.8 | <4.3 | <3.8 | <6.4 | <6.3 |
| endrin | | <3.7 | <5.4 | <13.3 | <7.2 | <8.8 | <11.9 | <7.8 | <4.3 | <3.8 | <6.4 | <6.3 |
| endosulfan II | | <3.7 | <5.4 | <13.3 | <7.2 | <8.8 | <11.9 | <7.8 | <4.3 | <3.8 | <6.4 | <6.3 |
| 4,4'-DDD | | <3.7 | <5.4 | <13.3 | <7.2 | <8.8 | <11.9 | <7.8 | <4.3 | <3.8 | <6.4 | <6.3 |
| endosulfan sulfate | | <3.7 | <5.4 | <13.3 | <7.2 | <8.8 | <11.9 | <7.8 | <4.3 | <3.8 | <6.4 | <6.3 |
| 4,4'-DDT | | <3.7 | <5.4 | <13.3 | <7.2 | <8.8 | <11.9 | <7.8 | <4.3 | <3.8 | <6.4 | <6.3 |
| methoxychlor | | <19 | <27 | 14J | <36 | <44 | <60 | <39 | <21 | <19 | <32 | <31 |
| endrin ketone | | <3.7 | <5.4 | <13.3 | <7.2 | <8.8 | <11.9 | <7.8 | <4.3 | <3.8 | <6.4 | <6.3 |
| endrin aldehyde | | <3.7 | <5.4 | <13.3 | <7.2 | <8.8 | <11.9 | <7.8 | <4.3 | <3.8 | <6.4 | <6.3 |
| alpha chlordane | | <1.9 | <2.7 | <6.7 | <3.6 | <4.4 | <6.0 | <3.9 | <2.1 | <1.9 | <3.2 | <3.1 |
| gamma chlordane | | <1.9 | <2.7 | <6.7 | <3.6 | <4.4 | <6.0 | <3.9 | <2.1 | <1.9 | <3.2 | <3.1 |
| toxaphene | | <37 | <54 | <130 | <72 | <88 | <120 | <78 | <43 | <38 | <64 | <63 |
| Aroclor 1016 | | <37 | <54 | <130 | <72 | <88 | <120 | <78 | <43 | <38 | <64 | <63 |
| Aroclor 1221 | | <75 | <110 | <270 | <140 | <180 | <240 | <160 | <85 | <77 | <130 | <130 |
| Aroclor 1232 | | <37 | <54 | <130 | <72 | <88 | <120 | <78 | <43 | <38 | <64 | <63 |
| Aroclor 1242 | | <37 | <54 | <130 | <72 | <88 | <120 | <78 | <43 | <38 | <64 | <63 |
| Aroclor 1248 | | <37 | <54 | <130 | <72 | <88 | <120 | <78 | <43 | <38 | <64 | <63 |
| Aroclor 1254 | | <37 | <54 | <130 | <72 | <88 | <120 | <78 | <43 | <38 | <64 | <63 |
| Aroclor 1260 | | <37 | <54 | <130 | <72 | <88 | <120 | <78 | <43 | <38 | <64 | <63 |

# Black Ash Pond - ERP: Site Investigation Analytical Data Summary

**Test Trench Soil Samples**

| Metals (mg/kg) | East US Site Background (SB) | NYSDEC RSCOs | Background BG1-S-05-12 | TT-2-3-05-72 | TT-12-S-05-30 | TT-12-S-05-156 | TT-16-S-05-0 | TT-16-S-05-84 | TT-16-S-05-90 | TT-16-S-05-180 | TT-17-S-05-30 | TT-32-S-05-90 | TT-39-S-05-48 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| aluminum | 33,000 | SB | 9030 | 6110 | 922 | 2170 | 710 | 2940 | 1520 | 4660 | 7030 | 1510 | |
| antimony | not avail. | SB | 5.2 | | <13.2 | <7.2 | | | | | <3.8 | <0.64 | <6.3 |
| arsenic | 3 - 12 | 7.5 or SB | <0.88 | <1.3 | <3.1 | <1.7 | <2.0 | <2.8 | <1.8 | <0.99 | <0.90 | | <1.5 |
| barium | 15 - 600 | 300 or SB | 21.2 | | | | 17 | | 18.9 | 18.8 | | 19.2 | |
| beryllium | 0 - 1.75 | 0.16 or SB | 0.12 | <0.13 | <0.32 | <0.18 | <0.21 | <0.29 | <0.18 | <0.10 | <0.09 | <0.15 | |
| cadmium | 0.1 - 1 | 1 or SB | 0.064 | <0.065 | | | | | | <0.051 | <0.05 | | <0.08 |
| calcium | 130 - 35,000 | SB | 2420 | | 1960 | | 1940 | | | | | | |
| chromium | 1.5 - 40 | 10 or SB | 7.8 | | 4.9 | 4.7 | 3.6 | 6.2 | 2.5 | 7 | | 2 | |
| cobalt | 2.5 - 60 | 30 or SB | 4.8 | 4.1 | <3.3 | <1.8 | <2.1 | <2.9 | <1.9 | 4.2 | 4.8 | <1.6 | |
| copper | 1 - 50 | 25 or SB | 1.8 | 1.6 | | | | | 1.8 | <0.51 | | <0.77 | |
| iron | 2,000 - 555,000 | 2,000 or SB | 9840 | 7840 | 982 | 1120 | 1100 | 1550 | 865 | 8030 | | 749 | |
| lead | 4-61r; 200-500 u | SB | <0.63 | <0.90 | | | | | | <0.71 | <0.65 | | <1.1 |
| magnesium | 100 - 5,000 | SB | 1500 | | 158 | | 598 | 1120 | 888 | | | 1140 | |
| manganese | 50 - 5,000 | SB | 212 | 125 | 37.8 | 41 | 53.8 | 61.5 | 54.7 | 83.3 | | 23.7 | 129 |
| mercury | 0.001 - 0.2 | 0.1 | <0.056 | <0.081 | <0.2 | <0.11 | <0.13 | <0.18 | <0.12 | <0.064 | <0.058 | <0.096 | <0.095 |
| nickel | 0.5 - 25 | 13 or SB | <0.84 | <1.2 | <3.0 | <1.6 | <1.9 | <2.6 | <1.7 | <0.94 | <0.85 | <1.4 | <1.4 |
| potassium | 8,500 - 43,000 | SB | 183 | | | | | | | | | 159 | |
| selenium | 0.1 - 3.9 | 2 or SB | <1.0 | <1.5 | <3.7 | <2.0 | <2.4 | <3.3 | <2.1 | <1.2 | <1.1 | <1.8 | <1.7 |
| silver | not avail. | SB | <0.61 | <0.87 | <2.2 | <1.2 | <1.4 | <1.9 | <1.2 | <0.69 | <0.62 | <1.0 | <1.0 |
| sodium | 6,000 - 8,000 | SB | 121 | | | | | | | | | | |
| thallium | not avail. | SB | <1.1 | <1.6 | <3.8 | <2.1 | <2.5 | <3.4 | <2.2 | <1.2 | <1.1 | <1.9 | <1.8 |
| vanadium | 1 - 300 | 150 or SB | 9.8 | | | 7.5 | 8 | | | 7 | | | |
| zinc | 9 - 50 | 20 or SB | 23.4 | 22.6 | | 17.2 | | | 28.7 | 16.7 | 217 | 6.3 | 104 |
| cyanide (mg/kg) | | | <0.11 | <0.13 | <0.38 | <0.19 | <0.26 | <0.36 | <0.23 | <0.097 | <0.099 | <0.16 | <0.16 |

# TABLE 2

# SOIL BORING SUBSURFACE SOIL SAMPLE

# ANALYTICAL DATA SUMMARY

# Black Ash Pond - ERP: Site Investigation Analytical Data Summary

Soil Boring Subsurface Soil Samples

| Volatile Organic Compounds | NYSDEC RSCOs (ppb) | SAMPLES B-11 | B-12 | B-13 | B-62 | MW-4 soil | MW-6 soil |
|---|---|---|---|---|---|---|---|
| chloromethane | | <25 | <18 | <12 | <11 | <17 | <21 |
| bromomethane | | <25 | <18 | <12 | <11 | <17 | <21 |
| vinyl chloride | | <25 | <18 | <12 | <11 | <17 | <21 |
| chloroethane | 1900 | <25 | <18 | <12 | <11 | 10j | <21 |
| methylene chloride | 100 | <25 | <18 | <12 | <11 | 30b | <21 |
| acetone | 200 | <25 | 19 | 18 | <11 | <17 | <21 |
| carbon disulfide | | <25 | <18 | <12 | <11 | <17 | <21 |
| 1,1-dichloroethene | | <25 | <18 | <12 | <11 | <17 | <21 |
| 1,1-dichloroethane | | <25 | <18 | <12 | <11 | <17 | <21 |
| 1,2-dichloroethene-trans | | <25 | <18 | <12 | <11 | <17 | <21 |
| 1,2-dichloroethene-cis | | <25 | <18 | <12 | <11 | <17 | <21 |
| chloroform | | <25 | <18 | <12 | <11 | <17 | <21 |
| 1,2-dichloroethane | | <25 | <18 | <12 | <11 | <17 | <21 |
| 2-butanone | | <25 | <18 | <12 | <11 | <17 | <21 |
| 1,1,1-trichloroethane | | <25 | <18 | <12 | <11 | <17 | <21 |
| carbon tetrachloride | | <25 | <18 | <12 | <11 | <17 | <21 |
| bromodichloromethane | | <25 | <18 | <12 | <11 | <17 | <21 |
| 1,2-dichloropropane | | <25 | <18 | <12 | <11 | <17 | <21 |
| cis-1,3-dichloropropene | | <25 | <18 | <12 | <11 | <17 | <21 |
| trichloroethene | | <25 | <18 | <12 | <11 | <17 | <21 |
| dibromochloromethane | | <25 | <18 | <12 | <11 | <17 | <21 |
| 1,1,2-trichloroethane | | <25 | <18 | <12 | <11 | <17 | <21 |
| benzene | | <25 | <18 | <12 | <11 | <17 | <21 |
| trans-1,3-dichloropropene | | <25 | <18 | <12 | <11 | <17 | <21 |
| bromoform | | <25 | <18 | <12 | <11 | <17 | <21 |
| 4-methyl-2-pentanone | | <25 | <18 | <12 | <11 | <17 | <21 |
| 2-hexanone | | <25 | <18 | <12 | <11 | <17 | <21 |
| terachloroethene | | <25 | <18 | <12 | <11 | <17 | <21 |
| 1,1,2,2-tetrachloroethane | | <25 | <18 | <12 | <11 | <17 | <21 |
| toluene | | <25 | <18 | <12 | <11 | <17 | <21 |
| chlorobenzene | | <25 | <18 | <12 | <11 | <17 | <21 |
| ethylbenzene | | <25 | <18 | <12 | <11 | <17 | <21 |
| styrene | | <25 | <18 | <12 | <11 | <17 | <21 |
| m,p-xylenes | | <25 | <18 | <12 | <11 | <17 | <21 |
| o-xylene | | <25 | <18 | <12 | <11 | <17 | <21 |
| methyl t-butyl ether | | <25 | <18 | <12 | <11 | <17 | <21 |
| dichlorodifluoromethane | | <25 | <18 | <12 | <11 | <17 | <21 |
| methyl acetate | | <25 | <18 | <12 | <11 | <17 | <21 |
| freon 113 | | <25 | <18 | <12 | <11 | <17 | <21 |
| trichlorofluoromethane | | <25 | <18 | <12 | <11 | <17 | <21 |
| cyclohexane | | <25 | <18 | <12 | <11 | <17 | <21 |
| methylcyclohexane | | <25 | <18 | <12 | <11 | <17 | <21 |
| 1,2-dibromoethane | | <25 | <18 | <12 | <11 | <17 | <21 |
| 1,3-dichlorobenzene | | <25 | <18 | <12 | <11 | <17 | <21 |
| isopropylbenzene | | <25 | <18 | <12 | <11 | <17 | <21 |
| 1,4-dichlorobenzene | | <25 | <18 | <12 | <11 | <17 | <21 |
| 1,2-dichlorobenzene | | <25 | <18 | <12 | <11 | <17 | <21 |
| 1,2-dibromo-3-chloro-propane | | <25 | <18 | <12 | <11 | <17 | <21 |
| 1,2,4-trichlorobenzene | | <25 | <18 | <12 | <11 | <17 | <21 |

# Black Ash Pond - ERP: Site Investigation Analytical Data Summary

Soil Boring Subsurface Soil Samples

| Semi-Vol. Organic Compounds | NYSDEC RSCOs (ppb) | SAMPLES B-11 | B-12 | B-13 | B-62 | MW-4 soil | MW-6 soil |
|---|---|---|---|---|---|---|---|
| phenol | | <830 | <580 | <420 | <360 | <560 | <690 |
| bis(2-chloroethyl)ether | | <830 | <580 | <420 | <360 | <560 | <690 |
| 2-chlorophenol | | <830 | <580 | <420 | <360 | <560 | <690 |
| 2-methylphenol | | <830 | <580 | <420 | <360 | <560 | <690 |
| bis(2-chloroisopropyl)ether | | <830 | <580 | <420 | <360 | <560 | <690 |
| 4-methylphenol | | <830 | <580 | <420 | <360 | <560 | <690 |
| n-Nitroso-di-n-propylamine | | <830 | <580 | <420 | <360 | <560 | <690 |
| hexachloroethane | | <830 | <580 | <420 | <360 | <560 | <690 |
| nitrobenzene | | <830 | <580 | <420 | <360 | <560 | <690 |
| isophorone | | <830 | <580 | <420 | <360 | <560 | <690 |
| 2-nitrophenol | | <830 | <580 | <420 | <360 | <560 | <690 |
| 2,4-dimethylphenol | | <830 | <580 | <420 | <360 | <560 | <690 |
| bis(2-chloroethoxy)methane | | <830 | <580 | <420 | <360 | <560 | <690 |
| 2,4-dichlorophenol | | <830 | <580 | <420 | <360 | <560 | <690 |
| naphthalene | | <830 | <580 | <420 | <360 | <560 | <690 |
| 4-chloroaniline | | <830 | <580 | <420 | <360 | <560 | <690 |
| hexachlorobutadiene | | <830 | <580 | <420 | <360 | <560 | <690 |
| 4-chloro-3-methylphenol | | <830 | <580 | <420 | <360 | <560 | <690 |
| 2-methylnaphthalene | | <830 | <580 | <420 | <360 | <560 | <690 |
| hexachlorocyclopentadiene | | <830 | <580 | <420 | <360 | <560 | <690 |
| 2,4,6-trichlorophenol | | <830 | <580 | <420 | <360 | <560 | <690 |
| 2,4,5-trichlorophenol | | <830 | <580 | <420 | <360 | <560 | <690 |
| 2-chloronaphthalene | | <830 | <580 | <420 | <360 | <560 | <690 |
| 2-nitroaniline | | <4200 | <2900 | <2100 | <1800 | <2800 | <3500 |
| dimethylphthalate | | <830 | <580 | <420 | <360 | <560 | <690 |
| acenaphthylene | | <830 | <580 | <420 | <360 | <560 | <690 |
| 2,6-dinitrotoluene | | <830 | <580 | <420 | <360 | <560 | <690 |
| 3-nitroaniline | | <4200 | <2900 | <2100 | <1800 | <2800 | <3500 |
| acenaphthene | | <830 | <580 | <420 | <360 | <560 | <690 |
| 2,4-dinitrophenol | | <4200 | <2900 | <2100 | <1800 | <2800 | <3500 |
| 4-nitrophenol | | <4200 | <2900 | <2100 | <1800 | <2800 | <3500 |
| dibenzofuran | | <830 | <580 | <420 | <360 | <560 | <690 |

# Black Ash Pond - ERP: Site Investigation Analytical Data Summary

**Soil Boring Subsurface Soil Samples**

| Semi-Vol. Organic Compounds | NYSDEC RSCOs (ppb) | SAMPLES B-11 | B-12 | B-13 | B-62 | MW-4 soil | MW-6 soil |
|---|---|---|---|---|---|---|---|
| 2,4-dinitrotoluene | | <830 | <580 | <420 | <360 | <560 | <690 |
| diethylphthalate | | <830 | <580 | <420 | <360 | <560 | <690 |
| 4-chlorophenyl-phenylether | | <830 | <580 | <420 | <360 | <560 | <690 |
| fluorene | | <830 | <580 | <420 | <360 | <560 | <690 |
| 4-nitroaniline | | <4200 | <2900 | <2100 | <1800 | <2800 | <3500 |
| 4,6-dinitro-2-methylphenol | | <4200 | <2900 | <2100 | <1800 | <2800 | <3500 |
| n-nitrosodiphenylamine | | <830 | <580 | <420 | <360 | <560 | <690 |
| 4-bromophenyl-phenylether | | <830 | <580 | <420 | <360 | <560 | <690 |
| hexachlorobenzene | | <830 | <580 | <420 | <360 | <560 | <690 |
| pentachlorophenol | | <4200 | <2900 | <2100 | <1800 | <2800 | <3500 |
| phenanthrene | | <830 | <580 | <420 | <360 | <560 | <690 |
| anthracene | | <830 | <580 | <420 | <360 | <560 | <690 |
| carbazole | | <830 | <580 | <420 | <360 | <560 | <690 |
| di-n-butylphthalate | | <830 | <580 | <420 | <360 | <560 | <690 |
| fluoranthene | | <830 | <580 | <420 | <360 | <560 | <690 |
| pyrene | | <830 | <580 | <420 | <360 | <560 | <690 |
| butylbenzylphthalate | | <830 | <580 | <420 | <360 | <560 | <690 |
| 3,3'-dichlorobenzidine | | <1700 | <1200 | <830 | <720 | <1100 | <1400 |
| benzo(a)anthracene | | <830 | <580 | <420 | <360 | <560 | <690 |
| chrysene | | <830 | <580 | <420 | <360 | <560 | <690 |
| bis(2-ethylehexyl)phthalate | | <830 | <580 | <420 | <360 | <560 | <690 |
| di-n-octylphthalate | | <830 | <580 | <420 | <360 | <560 | <690 |
| benzo(b)fluoranthene | | <830 | <580 | <420 | <360 | <560 | <690 |
| benzo(k)fluoranthene | | <830 | <580 | <420 | <360 | <560 | <690 |
| benzo(a)pyrene | 61 | <830 | <580 | 630 | <360 | <560 | <690 |
| indeno(1,2,3-cd)pyrene | | <830 | <580 | <420 | <360 | <560 | <690 |
| bibenzo(a,h)anthracene | | <830 | <580 | <420 | <360 | <560 | <690 |
| benzo(g,h,i)perylene | | <830 | <580 | <420 | <360 | <560 | <690 |
| benzaldehyde | | <830 | <580 | <420 | <360 | <560 | <690 |
| acetophenone | | <830 | <580 | <420 | <360 | <560 | <690 |
| caprolactam | | <830 | <580 | <420 | <360 | <560 | <690 |
| biphenyl | | <830 | <580 | <420 | <360 | <560 | <690 |
| atrazine | | <830 | <580 | <420 | <360 | <560 | <690 |

## Black Ash Pond - ERP: Site Investigation Analytical Data Summary

**Soil Boring Subsurface Soil Samples**

| PCBs/Pesticides | NYSDEC RSCOs (ppb) | SAMPLES B-11 | B-12 | B-13 | B-62 | MW-4 soil | MW-5 soil |
|---|---|---|---|---|---|---|---|
| alpha-BHC | | <4.2 | <2.9 | <2.1 | <1.8 | <2.8 | <3.5 |
| beta-BHC | | <4.2 | <2.9 | <2.1 | <1.8 | <2.8 | <3.5 |
| delta-BHC | | <4.2 | <2.9 | <2.1 | <1.8 | <2.8 | <3.5 |
| gamma-BHC (Lindane) | | <4.2 | <2.9 | <2.1 | <1.8 | <2.8 | <3.5 |
| heptachlor | | <4.2 | <2.9 | <2.1 | <1.8 | <2.8 | <3.5 |
| aldrin | | <4.2 | <2.9 | <2.1 | <1.8 | <2.8 | <3.5 |
| heptachlor epoxide | | <4.2 | <2.9 | <2.1 | <1.8 | <2.8 | <3.5 |
| endosulfan I | | <4.2 | <2.9 | <2.1 | <1.8 | <2.8 | <3.5 |
| dieldrin | | <8.3 | <5.8 | <4.2 | <3.6 | <5.6 | <6.9 |
| 4,4'-DDE | | <8.3 | <5.8 | <4.2 | <3.6 | <5.6 | <6.9 |
| endrin | | <8.3 | <5.8 | <4.2 | <3.6 | <5.6 | <6.9 |
| endosulfan II | | <8.3 | <5.8 | <4.2 | <3.6 | <5.6 | <6.9 |
| 4,4'-DDD | | <8.3 | <5.8 | <4.2 | <3.6 | <5.6 | <6.9 |
| endosulfan sulfate | | <8.3 | <5.8 | <4.2 | <3.6 | <5.6 | <6.9 |
| 4,4'-DDT | | <8.3 | <5.8 | <4.2 | <3.6 | <5.6 | <6.9 |
| methoxychlor | | <42 | <29 | <21 | <18 | <28 | <35 |
| endrin ketone | | <8.3 | <5.8 | <4.2 | <3.6 | <5.6 | <6.9 |
| endrin aldehyde | | <8.3 | <5.8 | <4.2 | <3.6 | <5.6 | <6.9 |
| alpha chlordane | | <4.2 | <2.9 | <2.1 | <1.8 | <2.8 | <3.5 |
| gamma chlordane | | <4.2 | <2.9 | <2.1 | <1.8 | <2.8 | <3.5 |
| toxaphene | | <83 | <58 | <42 | <36 | <56 | <69 |
| Aroclor 1016 | | <83 | <58 | <42 | <36 | <56 | <69 |
| Aroclor 1221 | | <170 | <120 | <83 | <72 | <110 | <140 |
| Aroclor 1232 | | <83 | <58 | <42 | <36 | <56 | <69 |
| Aroclor 1242 | | <83 | <58 | <42 | <36 | <56 | <69 |
| Aroclor 1248 | | <83 | <58 | <42 | <36 | <56 | <69 |
| Aroclor 1254 | | <83 | <58 | <42 | <36 | <56 | <69 |
| Aroclor 1260 | | <83 | <58 | <42 | <36 | <56 | <69 |

# Black Ash Pond - ERP: Site Investigation Analytical Data Summary

**Soil Boring Subsurface Soil Samples**

| Metals (mg/kg) | East US Site Background (SB) | NYSDEC RSCOs | SAMPLES B-11 | B-12 | B-13 | B-62 | MW-4 soil | MW-6 soil |
|---|---|---|---|---|---|---|---|---|
| aluminum | 33,000 | SB | 1300 | 2619 | 5440 | 3480 | 2170 | 2010 |
| antimony | not avail. | SB | <8.2 | <5.8 | <4.1 | <3.6 | <5.5 | |
| arsenic | 3 - 12 | 7.5 or SB | <2.0 | <1.4 | <0.98 | <0.85 | <1.3 | 1.6 |
| barium | 15 - 600 | 300 or SB | 18.7 | 20 | | 15.7 | 17.3 | |
| beryllium | 0 - 1.75 | 0.16 or SB | <0.20 | <0.14 | | | <0.13 | <0.17 |
| cadmium | 0.1 - 1 | 1 or SB | <0.10 | <0.070 | <0.050 | <0.043 | <0.067 | <0.083 |
| calcium | 130 - 35,000 | SB | | | | | | |
| chromium | 1.5 - 40 | 10 or SB | 2.4 | 3.4 | 5.8 | 3.5 | 2.7 | 4 |
| cobalt | 2.5 - 60 | 30 or SB | <2.1 | 2 | 3.6 | 3.3 | 1.9 | <1.7 |
| copper | 1 - 50 | 25 or SB | | | 1.7 | | | |
| iron | 2,000 - 555,000 | 2,000 or SB | 1050 | 4040 | 6770 | 7120 | 4230 | 3290 |
| lead | 4-61r; 200-500 u | SB | | | <0.70 | <0.61 | | |
| magnesium | 100 - 5,000 | SB | | | 1440 | | | |
| manganese | 50 - 5,000 | SB | 43.6 | 80.2 | 72 | 180 | 85.5 | 106 |
| mercury | 0.001 - 0.2 | 0.1 | <0.12 | <0.088 | <0.062 | <0.054 | <0.083 | <0.10 |
| nickel | 0.5 - 25 | 13 or SB | <1.8 | 2.4 | 5.8 | 4.4 | 2 | 2.3 |
| potassium | 8,500 - 43,000 | SB | | | 177 | | | |
| selenium | 0.1 - 3.9 | 2 or SB | <2.3 | <1.6 | <1.2 | <1.0 | <1.5 | <1.9 |
| silver | not avail. | SB | <1.4 | <0.95 | <0.68 | <0.59 | <0.90 | <1.1 |
| sodium | 6,000 - 8,000 | SB | | | | 89.1 | | |
| thallium | not avail. | SB | <2.4 | <1.7 | <1.2 | <1.0 | <1.6 | <2.0 |
| vanadium | 1 - 300 | 150 or SB | <4.9 | 3.6 | 7 | 6.6 | 4.1 | <4.1 |
| zinc | 9 - 50 | 20 or SB | | 14.4 | 15.2 | 17.6 | 13.4 | 21.7 |
| cyanide (mg/kg) | | | <0.24 | <0.17 | <0.11 | <0.11 | <0.14 | <0.16 |

# TABLE 3

# GROUNDWATER SAMPLE

# ANALYTICAL DATA SUMMARY

# Black Ash Pond - ERP: Site Investigation Analytical Data Summary

Groundwater Samples

| Volatile Organic Compounds | Class GA Stds. | Upgradient Well MW-2 | Downgradient Well MW-1 | Downgradient Well MW-3 | Downgradient Well MW-4 | Downgradient Well MW-5 | Downgradient Well MW-6 | Downgradient Well MW-7 |
|---|---|---|---|---|---|---|---|---|
| chloromethane | | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| bromomethane | | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| vinyl chloride | | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| chloroethane | | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| methylene chloride | | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| acetone | | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| carbon disulfide | | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| 1,1-dichloroethene | | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| 1,1-dichloroethane | | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| 1,2-dichloroethene-trans | | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| 1,2-dichloroethene-cis | | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| chloroform | | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| 1,2-dichloroethane | | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| 2-butanone | | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| 1,1,1-trichloroethane | | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| carbon tetrachloride | | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| bromodichloromethane | | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| 1,2-dichloropropane | | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| cis-1,3-dichloropropene | | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| trichloroethene | | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| dibromochloromethane | | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| 1,1,2-trichloroethane | | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| benzene | | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| trans-1,3-dichloropropene | | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| bromoform | | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| 4-methyl-2-pentanone | | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| 2-hexanone | | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| terachloroethene | | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| 1,1,2,2-tetrachloroethane | | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| toluene | | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| chlorobenzene | | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| ethylbenzene | | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| styrene | | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| m,p-xylenes | | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| o-xylene | | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| methyl t-butyl ether | | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| dichlorodifluoromethane | | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| methyl acetate | | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| freon 113 | | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| trichlorofluoromethane | | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| cyclohexane | | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| methylcyclohexane | | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| 1,2-dibromoethane | | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| 1,3-dichlorobenzene | | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| isopropylbenzene | | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| 1,4-dichlorobenzene | | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| 1,2-dichlorobenzene | | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| 1,2-dibromo-3-chloro-propane | | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| 1,2,4-trichlorobenzene | | <10 | <10 | <10 | <10 | <10 | <10 | <10 |

## Black Ash Pond - ERP: Site Investigation Analytical Data Summary

Groundwater Samples

| Semi-Vol. Organic Compounds | Class GA Stds. | Upgradient Well MW-2 | Downgradient Well MW-1 | Downgradient Well MW-3 | Downgradient Well MW-4 | Downgradient Well MW-5 | Downgradient Well MW-6 | Downgradient Well MW-7 |
|---|---|---|---|---|---|---|---|---|
| phenol | | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| bis(2-chloroethyl)ether | | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| 2-chlorophenol | | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| 2-methylphenol | | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| bis(2-chloroisopropyl)ether | | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| 4-methylphenol | | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| n-Nitroso-di-n-propylamine | | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| hexachloroethane | | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| nitrobenzene | | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| isophorone | | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| 2-nitrophenol | | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| 2,4-dimethylphenol | | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| bis(2-chloroethoxy)methane | | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| 2,4-dichlorophenol | | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| naphthalene | | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| 4-chloroaniline | | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| hexachlorobutadiene | | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| 4-chloro-3-methylphenol | | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| 2-methylnaphthalene | | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| hexachlorocyclopentadiene | | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| 2,4,6-trichlorophenol | | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| 2,4,5-trichlorophenol | | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| 2-chloronaphthalene | | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| 2-nitroaniline | | <25 | <25 | <25 | <25 | <25 | <25 | <25 |
| dimethylphthalate | | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| acenaphthylene | | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| 2,6-dinitrotoluene | | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| 3-nitroaniline | | <25 | <25 | <25 | <25 | <25 | <25 | <25 |
| acenaphthene | | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| 2,4-dinitrophenol | | <25 | <25 | <25 | <25 | <25 | <25 | <25 |
| 4-nitrophenol | | <25 | <25 | <25 | <25 | <25 | <25 | <25 |
| dibenzofuran | | <5 | <5 | <5 | <5 | <5 | <5 | <5 |

# Black Ash Pond - ERP: Site Investigation Analytical Data Summary

Groundwater Samples

| Semi-Vol. Organic Compounds | Class GA Stds. | Upgradient Well MW-2 | Downgradient Well MW-1 | Downgradient Well MW-3 | Downgradient Well MW-4 | Downgradient Well MW-5 | Downgradient Well MW-6 | Downgradient Well MW-7 |
|---|---|---|---|---|---|---|---|---|
| 2,4-dinitrotoluene | | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| diethylphthalate | - 50 | 14 | 5 | <5 | <5 | <5 | <5 | <5 |
| 4-chlorophenyl-phenylether | | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| fluorene | | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| 4-nitroaniline | | <25 | <25 | <25 | <25 | <25 | <25 | <25 |
| 4,6-dinitro-2-methylphenol | | <25 | <25 | <25 | <25 | <25 | <25 | <25 |
| n-nitrosodiphenylamine | | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| 4-bromophenyl-phenylether | | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| hexachlorobenzene | | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| pentachlorophenol | | <25 | <25 | <25 | <25 | <25 | <25 | <25 |
| phenanthrene | | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| anthracene | | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| carbazole | | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| di-n-butylphthalate | 30 | 15 | 12 | <5 | <5 | <5 | <5 | <5 |
| fluoranthene | | 2j | <5 | <5 | <5 | <5 | <5 | <5 |
| pyrene | 50 | 2j | <5 | <5 | <5 | <5 | <5 | <5 |
| butylbenzylphthalate | | 13 | 13 | <5 | <5 | <5 | <5 | <5 |
| 3,3'-dichlorobenzidine | | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| benzo(a)anthracene | | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| chrysene | | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| bis(2-ethylehexyl)phthalate | 50 | 8j | 2j | <5 | <5 | <5 | <5 | <5 |
| di-n-octylphthalate | | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| benzo(b)fluoranthene | | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| benzo(k)fluoranthene | | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| benzo(a)pyrene | | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| indeno(1,2,3-cd)pyrene | | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| bibenzo(a,h)anthracene | | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| benzo(g,h,i)perylene | | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| benzaldehyde | | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| acetophenone | | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| caprolactam | | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| biphenyl | | <5 | <5 | <5 | <5 | <5 | <5 | <5 |
| atrazine | | <5 | <5 | <5 | <5 | <5 | <5 | <5 |

## Black Ash Pond - ERP: Site Investigation Analytical Data Summary

**Groundwater Samples**

| PCBs/Pesticides | Class GA Stds. | Upgradient Well MW-2 | Downgradient Well MW-1 | Downgradient Well MW-3 | Downgradient Well MW-4 | Downgradient Well MW-5 | Downgradient Well MW-6 | Downgradient Well MW-7 |
|---|---|---|---|---|---|---|---|---|
| alpha-BHC | | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| beta-BHC | | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| delta-BHC | | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| gamma-BHC (Lindane) | | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| heptachlor | | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| aldrin | | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| heptachlor epoxide | | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| endosulfan I | | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| dieldrin | | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 |
| 4,4'-DDE | | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 |
| endrin | | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 |
| endosulfan II | | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 |
| 4,4'-DDD | | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 |
| endosulfan sulfate | | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 |
| 4,4'-DDT | | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 |
| methoxychlor | | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 |
| endrin ketone | | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 |
| endrin aldehyde | | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 |
| alpha chlordane | | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| gamma chlordane | | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| toxaphene | | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Aroclor 1016 | | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Aroclor 1221 | | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 |
| Aroclor 1232 | | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Aroclor 1242 | | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Aroclor 1248 | | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Aroclor 1254 | | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Aroclor 1260 | | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |

## Black Ash Pond - ERP: Site Investigation Analytical Data Summary

Groundwater Samples

| Metals (ug/L) | Class GA Stds. | Upgradient Well MW-2 | Downgradient Well MW-1 | Downgradient Well MW-3 | Downgradient Well MW-4 | Downgradient Well MW-5 | Downgradient Well MW-6 | Downgradient Well MW-7 |
|---|---|---|---|---|---|---|---|---|
| aluminum | | 2810 | 37100 | 1250 | 6720 | 32300 | 44000 | 132 |
| antimony | 3 | | | <16.5 | | | | |
| arsenic | 2.5 | <3.9 | <3.9 | | | | <3.9 | <3.9 |
| barium | 1000 | 110 | 360 | 26 | 76.8 | 460 | 406 | 19.1 |
| beryllium | 3 | <0.40 | 0.56 | <0.40 | <0.40 | 1.2 | 0.54 | <0.40 |
| cadmium | 5 | <0.20 | <0.20 | <0.20 | <0.20 | 1.7 | <0.20 | <0.20 |
| calcium | | 90500 | 175000 | 172000 | 270000 | 256000 | 1740000 | 54300 |
| chromium | 50 | 4.5 | | <2.3 | 12.2 | 47.2 | | <2.3 |
| cobalt | | <4.1 | 26.5 | <4.1 | 4.8 | 21.4 | 36.5 | <4.1 |
| copper | 200 | 6.8 | 37.9 | 3.6 | 9.7 | 74.6 | 79 | <2.0 |
| iron | 300 | | | | | | | |
| lead | 25 | <2.8 | <2.8 | <2.8 | 9.9 | 32 | | <2.8 |
| magnesium | 35000 | 31900 | 31700 | | 26800 | | | 16700 |
| manganese | 300 | 179 | | 71.4 | | | | 99.6 |
| mercury | 0.0007 | <0.10 | 0.1 | <0.10 | <0.10 | <0.10 | 0.21 | <0.10 |
| nickel | 100 | <3.7 | 36.4 | <3.7 | <3.7 | 42.2 | 44.7 | <3.7 |
| potassium | | 7060 | 14000 | 10900 | 9230 | 18300 | 18800 | 4180 |
| selenium | 10 | <4.6 | <4.6 | <4.6 | <4.6 | <4.6 | <4.6 | <4.6 |
| silver | 50 | <2.7 | <2.7 | <2.7 | <2.7 | <2.7 | <2.7 | <2.7 |
| sodium | 20000 | | | | | | | |
| thallium | 0.5 | | | | | | | |
| vanadium | | <9.8 | 47.6 | <9.8 | 14.9 | 172 | 68.7 | <9.8 |
| zinc | 2000 | <1.3 | 114 | <1.3 | 31.4 | 741 | 278 | <1.3 |
| cyanide (ug/l) | 200 | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| pH | 6.5-8.5 | 7.4 | 6.8 | 6.6 | 6.7 | 6.9 | | 6.2 |
| turbidity | | 90 | 840 | 59 | 440 | 410 | 350 | 14 |

# TABLE 4

# RIVER SEDIMENT SAMPLE

# ANALYTICAL DATA SUMMARY

# Black Ash Pond - ERP: Site Investigation Analytical Data Summary

River Sediment Samples

| Volatile Organic Compounds | SD-1-SU-05-6 | SD-1-SU-05-18 | SD-2-SU-05-6 | SD-2-SU-05-18 | SD-3-SU-05-6 | SD-3-SU-05-18 | SD-4-SU-05-6 | SD-4-SU-05-18 | SD-5-SU-05-6 | SD-5-SU-05-18 | SD-6-SU-05-6 | SD-6-SU-05-18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| chloromethane | <11 | <12 | <13 | <11 | <12 | <12 | <13 | <13 | <13 | <13 | <12 | <11 |
| bromomethane | <11 | <12 | <13 | <11 | <12 | <12 | <13 | <13 | <13 | <13 | <12 | <11 |
| vinyl chloride | <11 | <12 | <13 | <11 | <12 | <12 | <13 | <13 | <13 | <13 | <12 | <11 |
| chloroethane | <11 | <12 | <13 | <11 | <12 | <12 | <13 | <13 | <13 | <13 | <12 | <11 |
| methylene chloride | <11 | <12 | <13 | <11 | <12 | <12 | <13 | <13 | <13 | <13 | <12 | <11 |
| acetone | <11 | <12 | <13 | <11 | <12 | <12 | 9bj | 11j | 9bj | <13 | <12 | <11 |
| carbon disulfide | <11 | <12 | <13 | <11 | <12 | <12 | <13 | <13 | <13 | <13 | <12 | <11 |
| 1,1-dichloroethene | <11 | <12 | <13 | <11 | <12 | <12 | <13 | <13 | <13 | <13 | <12 | <11 |
| 1,1-dichloroethane | <11 | <12 | <13 | <11 | <12 | <12 | <13 | <13 | <13 | <13 | <12 | <11 |
| 1,2-dichloroethene-trans | <11 | <12 | <13 | <11 | <12 | <12 | <13 | <13 | <13 | <13 | <12 | <11 |
| 1,2-dichloroethene-cis | <11 | <12 | <13 | <11 | <12 | <12 | <13 | <13 | <13 | <13 | <12 | <11 |
| chloroform | <11 | <12 | <13 | <11 | <12 | <12 | <13 | <13 | <13 | <13 | <12 | <11 |
| 1,2-dichloroethane | <11 | <12 | <13 | <11 | <12 | <12 | <13 | <13 | <13 | <13 | <12 | <11 |
| 2-butanone | <11 | <12 | <13 | <11 | <12 | <12 | <13 | <13 | <13 | <13 | <12 | <11 |
| 1,1,1-trichloroethane | <11 | <12 | <13 | <11 | <12 | <12 | <13 | <13 | <13 | <13 | <12 | <11 |
| carbon tetrachloride | <11 | <12 | <13 | <11 | <12 | <12 | <13 | <13 | <13 | <13 | <12 | <11 |
| bromodichloromethane | <11 | <12 | <13 | <11 | <12 | <12 | <13 | <13 | <13 | <13 | <12 | <11 |
| 1,2-dichloropropane | <11 | <12 | <13 | <11 | <12 | <12 | <13 | <13 | <13 | <13 | <12 | <11 |
| cis-1,3-dichloropropene | <11 | <12 | <13 | <11 | <12 | <12 | <13 | <13 | <13 | <13 | <12 | <11 |
| trichloroethene | <11 | <12 | <13 | <11 | <12 | <12 | <13 | <13 | <13 | <13 | <12 | <11 |
| dibromochloromethane | <11 | <12 | <13 | <11 | <12 | <12 | <13 | <13 | <13 | <13 | <12 | <11 |
| 1,1,2-trichloroethane | <11 | <12 | <13 | <11 | <12 | <12 | <13 | <13 | <13 | <13 | <12 | <11 |
| benzene | <11 | <12 | <13 | <11 | <12 | <12 | <13 | <13 | <13 | <13 | <12 | <11 |
| trans-1,3-dichloropropene | <11 | <12 | <13 | <11 | <12 | <12 | <13 | <13 | <13 | <13 | <12 | <11 |
| bromoform | <11 | <12 | <13 | <11 | <12 | <12 | <13 | <13 | <13 | <13 | <12 | <11 |
| 4-methyl-2-pentanone | <11 | <12 | <13 | <11 | <12 | <12 | <13 | <13 | <13 | <13 | <12 | <11 |
| 2-hexanone | <11 | <12 | <13 | <11 | <12 | <12 | <13 | <13 | <13 | <13 | <12 | <11 |
| terachloroethene | <11 | <12 | <13 | <11 | <12 | <12 | <13 | <13 | <13 | <13 | <12 | <11 |
| 1,1,2,2-tetrachloroethane | <11 | <12 | <13 | <11 | <12 | <12 | <13 | <13 | <13 | <13 | <12 | <11 |
| toluene | <11 | <12 | <13 | <11 | <12 | <12 | <13 | <13 | <13 | <13 | <12 | <11 |
| chlorobenzene | <11 | <12 | <13 | <11 | <12 | <12 | <13 | <13 | <13 | <13 | <12 | <11 |
| ethylbenzene | <11 | <12 | <13 | <11 | <12 | <12 | <13 | <13 | <13 | <13 | <12 | <11 |
| styrene | <11 | <12 | <13 | <11 | <12 | <12 | <13 | <13 | <13 | <13 | <12 | <11 |
| m,p-xylenes | <11 | <12 | <13 | <11 | <12 | <12 | <13 | <13 | <13 | <13 | <12 | <11 |
| o-xylene | <11 | <12 | <13 | <11 | <12 | <12 | <13 | <13 | <13 | <13 | <12 | <11 |
| methyl t-butyl ether | <11 | <12 | <13 | <11 | <12 | <12 | <13 | <13 | <13 | <13 | <12 | <11 |
| dichlorodifluoromethane | <11 | <12 | <13 | <11 | <12 | <12 | <13 | <13 | <13 | <13 | <12 | <11 |
| methyl acetate | <11 | <12 | <13 | <11 | <12 | <12 | <13 | <13 | <13 | <13 | <12 | <11 |
| freon 113 | <11 | <12 | <13 | <11 | <12 | <12 | <13 | <13 | <13 | <13 | <12 | <11 |
| trichlorofluoromethane | <11 | <12 | <13 | <11 | <12 | <12 | <13 | <13 | <13 | <13 | <12 | <11 |
| cyclohexane | <11 | <12 | <13 | <11 | <12 | <12 | <13 | <13 | <13 | <13 | <12 | <11 |
| methylcyclohexane | <11 | <12 | <13 | <11 | <12 | <12 | <13 | <13 | <13 | <13 | <12 | <11 |
| 1,2-dibromoethane | <11 | <12 | <13 | <11 | <12 | <12 | <13 | <13 | <13 | <13 | <12 | <11 |
| 1,3-dichlorobenzene | <11 | <12 | <13 | <11 | <12 | <12 | <13 | <13 | <13 | <13 | <12 | <11 |
| isopropylbenzene | <11 | <12 | <13 | <11 | <12 | <12 | <13 | <13 | <13 | <13 | <12 | <11 |
| 1,4-dichlorobenzene | <11 | <12 | <13 | <11 | <12 | <12 | <13 | <13 | <13 | <13 | <12 | <11 |
| 1,2-dichlorobenzene | <11 | <12 | <13 | <11 | <12 | <12 | <13 | <13 | <13 | <13 | <12 | <11 |
| 1,2-dibromo-3-chloro-propane | <11 | <12 | <13 | <11 | <12 | <12 | <13 | <13 | <13 | <13 | <12 | <11 |
| 1,2,4-trichlorobenzene | <11 | <12 | <13 | <11 | <12 | <12 | <13 | <13 | <13 | <13 | <12 | <11 |

# Black Ash Pond - ERP: Site Investigation Analytical Data Summary

**River Sediment Samples**

| Semi-Volatile Organic Compounds | SD-1-SU-05-6 | SD-1-SU-05-18 | SD-2-SU-05-6 | SD-2-SU-05-18 | SD-3-SU-05-6 | SD-3-SU-05-18 | SD-4-SU-05-6 | SD-4-SU-05-18 | SD-5-SU-05-6 | SD-5-SU-05-18 | SD-6-SU-05-6 | SD-6-SU-05-18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| phenol | <360 | <410 | <430 | <350 | <410 | <420 | <420 | <430 | <430 | <430 | <400 | <370 |
| bis(2-chloroethyl)ether | <360 | <410 | <430 | <350 | <410 | <420 | <420 | <430 | <430 | <430 | <400 | <370 |
| 2-chlorophenol | <360 | <410 | <430 | <350 | <410 | <420 | <420 | <430 | <430 | <430 | <400 | <370 |
| 2-methylphenol | <360 | <410 | <430 | <350 | <410 | <420 | <420 | <430 | <430 | <430 | <400 | <370 |
| bis(2-chloroisopropyl)ether | <360 | <410 | <430 | <350 | <410 | <420 | <420 | <430 | <430 | <430 | <400 | <370 |
| 4-methylphenol | <360 | <410 | <430 | <350 | <410 | <420 | <420 | <430 | <430 | <430 | <400 | <370 |
| n-Nitroso-di-n-propylamine | <360 | <410 | <430 | <350 | <410 | <420 | <420 | <430 | <430 | <430 | <400 | <370 |
| hexachloroethane | <360 | <410 | <430 | <350 | <410 | <420 | <420 | <430 | <430 | <430 | <400 | <370 |
| nitrobenzene | <360 | <410 | <430 | <350 | <410 | <420 | <420 | <430 | <430 | <430 | <400 | <370 |
| isophorone | <360 | <410 | <430 | <350 | <410 | <420 | <420 | <430 | <430 | <430 | <400 | <370 |
| 2-nitrophenol | <360 | <410 | <430 | <350 | <410 | <420 | <420 | <430 | <430 | <430 | <400 | <370 |
| 2,4-dimethylphenol | <360 | <410 | <430 | <350 | <410 | <420 | <420 | <430 | <430 | <430 | <400 | <370 |
| bis(2-chloroethoxy)methane | <360 | <410 | <430 | <350 | <410 | <420 | <420 | <430 | <430 | <430 | <400 | <370 |
| 2,4-dichlorophenol | <360 | <410 | <430 | <350 | <410 | <420 | <420 | <430 | <430 | <430 | <400 | <370 |
| naphthalene | <360 | <410 | <430 | <350 | <410 | <420 | <420 | <430 | <430 | <430 | <400 | <370 |
| 4-chloroaniline | <360 | <410 | <430 | <350 | <410 | <420 | <420 | <430 | <430 | <430 | <400 | <370 |
| hexachlorobutadiene | <360 | <410 | <430 | <350 | <410 | <420 | <420 | <430 | <430 | <430 | <400 | <370 |
| 4-chloro-3-methylphenol | <360 | <410 | <430 | <350 | <410 | <420 | <420 | <430 | <430 | <430 | <400 | <370 |
| 2-methylnaphthalene | <360 | <410 | <430 | <350 | <410 | <420 | <420 | <430 | <430 | <430 | <400 | <370 |
| hexachlorocyclopentadiene | <360 | <410 | <430 | <350 | <410 | <420 | <420 | <430 | <430 | <430 | <400 | <370 |
| 2,4,6-trichlorophenol | <360 | <410 | <430 | <350 | <410 | <420 | <420 | <430 | <430 | <430 | <400 | <370 |
| 2,4,5-trichlorophenol | <360 | <410 | <430 | <350 | <410 | <420 | <420 | <430 | <430 | <430 | <400 | <370 |
| 2-chloronaphthalene | <360 | <410 | <430 | <350 | <410 | <420 | <420 | <430 | <430 | <430 | <400 | <370 |
| 2-nitroaniline | <1800 | <2100 | <2100 | <1800 | <2000 | <2100 | <2100 | <2100 | <2100 | <2200 | <2000 | <1800 |
| dimethylphthalate | <360 | <410 | <430 | <350 | <410 | <420 | <420 | 1700 | <430 | <430 | <400 | <370 |
| acenaphthylene | <360 | <410 | <430 | <350 | <410 | <420 | <420 | <430 | <430 | <430 | <400 | <370 |
| 2,6-dinitrotoluene | <360 | <410 | <430 | <350 | <410 | <420 | <420 | 540 | <430 | <430 | <400 | <370 |
| 3-nitroaniline | <1800 | <2100 | <2100 | <1800 | <2000 | <2100 | <2100 | <2100 | <2100 | <2200 | <2000 | <1800 |
| acenaphthene | <360 | <410 | <430 | <350 | <410 | <420 | <420 | <430 | <430 | <430 | <400 | <370 |
| 2,4-dinitrophenol | <1800 | <2100 | <2100 | <1800 | <2000 | <2100 | <2100 | <2100 | <2100 | <2200 | <2000 | <1800 |
| 4-nitrophenol | <1800 | <2100 | <2100 | <1800 | <2000 | <2100 | <2100 | <2100 | <2100 | <2200 | <2000 | <1800 |
| dibenzofuran | <360 | <410 | <430 | <350 | <410 | <420 | <420 | <430 | <430 | <430 | <400 | <370 |

# Black Ash Pond - ERP: Site Investigation Analytical Data Summary

River Sediment Samples

| Semi-Volatile Organic Compounds | SD-1-SU-05-6 | SD-1-SU-05-18 | SD-2-SU-05-6 | SD-2-SU-05-18 | SD-3-SU-05-6 | SD-3-SU-05-18 | SD-4-SU-05-6 | SD-4-SU-05-18 | SD-5-SU-05-6 | SD-5-SU-05-18 | SD-6-SU-05-6 | SD-6-SU-05-18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2,4-dinitrotoluene | <360 | <410 | <430 | <350 | <410 | <420 | <420 | <430 | <430 | <430 | <400 | <370 |
| diethylphthalate | <360 | <410 | <430 | <350 | <410 | <420 | <420 | <430 | <430 | <430 | <400 | <370 |
| 4-chlorophenyl-phenylether | <360 | <410 | <430 | <350 | <410 | <420 | <420 | <430 | <430 | <430 | <400 | <370 |
| fluorene | <360 | <410 | <430 | <350 | <410 | <420 | <420 | <430 | <430 | <430 | <400 | <370 |
| 4-nitroaniline | <1800 | <2100 | <2100 | <1800 | <2000 | <2100 | <2100 | <2100 | <2100 | <2200 | <2000 | <1800 |
| 4,6-dinitro-2-methylphenol | <1800 | <2100 | <2100 | <1800 | <2000 | <2100 | <2100 | <2100 | <2100 | <2200 | <2000 | <1800 |
| n-nitrosodiphenylamine | <360 | <410 | <430 | <350 | <410 | <420 | <420 | <430 | <430 | <430 | <400 | <370 |
| 4-bromophenyl-phenylether | <360 | <410 | <430 | <350 | <410 | <420 | <420 | <430 | <430 | <430 | <400 | <370 |
| hexachlorobenzene | <360 | <410 | <430 | <350 | <410 | <420 | <420 | <430 | <430 | <430 | <400 | <370 |
| pentachlorophenol | <1800 | <2100 | <2100 | <1800 | <2000 | <2100 | <2100 | <2100 | <2100 | <2200 | <2000 | <1800 |
| phenanthrene | <360 | <410 | <430 | <350 | <410 | <420 | <420 | <430 | <430 | <430 | <400 | <370 |
| anthracene | <360 | <410 | <430 | <350 | <410 | <420 | <420 | <430 | <430 | <430 | <400 | <370 |
| carbazole | <360 | <410 | <430 | <350 | <410 | <420 | <420 | <430 | <430 | <430 | <400 | <370 |
| di-n-butylphthalate | <360 | <410 | <430 | <350 | <410 | <420 | <420 | <430 | <430 | <430 | <400 | <370 |
| fluoranthene | <360 | <410 | <430 | <350 | <410 | <420 | <420 | <430 | <430 | <430 | <400 | <370 |
| pyrene | <360 | <410 | <430 | <350 | <410 | <420 | <420 | <430 | <430 | <430 | 57J | <370 |
| butylbenzylphthalate | <360 | <410 | <430 | <350 | <410 | <420 | <420 | <430 | <430 | <430 | <400 | <370 |
| 3,3'-dichlorobenzidine | <710 | <820 | <850 | <710 | <810 | <830 | <840 | <850 | <850 | <870 | <800 | <740 |
| benzo(a)anthracene | <360 | <410 | <430 | <350 | <410 | <420 | <420 | <430 | <430 | <430 | <400 | <370 |
| chrysene | <360 | <410 | <430 | <350 | <410 | <420 | <420 | <430 | <430 | <430 | <400 | <370 |
| bis(2-ethylehexyl)phthalate | <360 | <410 | <430 | <350 | <410 | <420 | <420 | <430 | <430 | <430 | <400 | <370 |
| di-n-octylphthalate | <360 | <410 | <430 | <350 | <410 | <420 | <420 | <430 | <430 | <430 | <400 | <370 |
| benzo(b)fluoranthene | <360 | <410 | <430 | <350 | <410 | <420 | <420 | <430 | <430 | <430 | <400 | <370 |
| benzo(k)fluoranthene | <360 | <410 | <430 | <350 | <410 | <420 | <420 | <430 | <430 | <430 | <400 | <370 |
| benzo(a)pyrene | <360 | <410 | <430 | <350 | <410 | <420 | <420 | <430 | <430 | <430 | <400 | <370 |
| indeno(1,2,3-cd)pyrene | <360 | <410 | <430 | <350 | <410 | <420 | <420 | <430 | <430 | <430 | <400 | <370 |
| bibenzo(a,h)anthracene | <360 | <410 | <430 | <350 | <410 | <420 | <420 | <430 | <430 | <430 | <400 | <370 |
| benzo(g,h,i)perylene | <360 | <410 | <430 | <350 | <410 | <420 | <420 | <430 | <430 | <430 | <400 | <370 |
| benzaldehyde | <360 | <410 | <430 | <350 | <410 | <420 | <420 | <430 | <430 | <430 | <400 | <370 |
| acetophenone | <360 | <410 | <430 | <350 | <410 | <420 | <420 | <430 | <430 | <430 | <400 | <370 |
| caprolactam | <360 | <410 | <430 | <350 | <410 | <420 | <420 | <430 | <430 | <430 | <400 | <370 |
| biphenyl | <360 | <410 | <430 | <350 | <410 | <420 | <420 | <430 | <430 | <430 | <400 | <370 |
| atrazine | <360 | <410 | <430 | <350 | <410 | <420 | <420 | <430 | <430 | <430 | <400 | <370 |

# Black Ash Pond - ERP: Site Investigation Analytical Data Summary

River Sediment Samples

| PCBs/Pesticides | SD-1-SU-05-6 | SD-1-SU-05-18 | SD-2-SU-05-6 | SD-2-SU-05-18 | SD-3-SU-05-6 | SD-3-SU-05-18 | SD-4-SU-05-6 | SD-4-SU-05-18 | SD-5-SU-05-6 | SD-5-SU-05-18 | SD-6-SU-05-6 | SD-6-SU-05-18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| alpha-BHC | <1.8 | <2.1 | <2.1 | <1.8 | <2.0 | <2.1 | <2.1 | <2.1 | <2.1 | <2.2 | <2.0 | <1.9 |
| beta-BHC | <1.8 | <2.1 | <2.1 | <1.8 | <2.0 | <2.1 | <2.1 | <2.1 | <2.1 | <2.2 | <2.0 | <1.9 |
| delta-BHC | <1.8 | <2.1 | <2.1 | <1.8 | <2.0 | <2.1 | <2.1 | <2.1 | <2.1 | <2.2 | <2.0 | <1.9 |
| gamma-BHC (Lindane) | <1.8 | <2.1 | <2.1 | <1.8 | <2.0 | <2.1 | <2.1 | <2.1 | <2.1 | <2.2 | <2.0 | <1.9 |
| heptachlor | <1.8 | <2.1 | <2.1 | <1.8 | <2.0 | <2.1 | <2.1 | <2.1 | <2.1 | <2.2 | <2.0 | <1.9 |
| aldrin | <1.8 | <2.1 | <2.1 | <1.8 | <2.0 | <2.1 | <2.1 | <2.1 | <2.1 | <2.2 | <2.0 | <1.9 |
| heptachlor epoxide | <1.8 | <2.1 | <2.1 | <1.8 | <2.0 | <2.1 | <2.1 | <2.1 | <2.1 | <2.2 | <2.0 | <1.9 |
| endosulfan I | <1.8 | <2.1 | <2.1 | <1.8 | <2.0 | <2.1 | <2.1 | <2.1 | <2.1 | <2.2 | <2.0 | <1.9 |
| dieldrin | <3.6 | <4.1 | <4.3 | <3.5 | <4.1 | <4.2 | <4.2 | <4.3 | <4.3 | <4.3 | <4.0 | <3.7 |
| 4,4'-DDE | <3.6 | <4.1 | <4.3 | <3.5 | <4.1 | <4.2 | <4.2 | <4.3 | <4.3 | <4.3 | <4.0 | <3.7 |
| endrin | <3.6 | <4.1 | <4.3 | <3.5 | <4.1 | <4.2 | <4.2 | <4.3 | <4.3 | <4.3 | <4.0 | <3.7 |
| endosulfan II | <3.6 | <4.1 | <4.3 | <3.5 | <4.1 | <4.2 | <4.2 | <4.3 | <4.3 | <4.3 | <4.0 | <3.7 |
| 4,4'-DDD | <3.6 | <4.1 | <4.3 | <3.5 | <4.1 | <4.2 | <4.2 | <4.3 | <4.3 | <4.3 | <4.0 | <3.7 |
| endosulfan sulfate | <3.6 | <4.1 | <4.3 | <3.5 | <4.1 | <4.2 | <4.2 | <4.3 | <4.3 | <4.3 | <4.0 | <3.7 |
| 4,4'-DDT | <3.6 | <4.1 | <4.3 | <3.5 | <4.1 | <4.2 | <4.2 | <4.3 | <4.3 | <4.3 | <4.0 | <3.7 |
| methoxychlor | <18 | <21 | <21 | <18 | <20 | <21 | <21 | <21 | <21 | <22 | <20 | <19 |
| endrin ketone | <3.6 | <4.1 | <4.3 | <3.5 | <4.1 | <4.2 | <4.2 | <4.3 | <4.3 | <4.3 | <4.0 | <3.7 |
| endrin aldehyde | <3.6 | <4.1 | <4.3 | <3.5 | <4.1 | <4.2 | <4.2 | <4.3 | <4.3 | <4.3 | <4.0 | <3.7 |
| alpha chlordane | <1.8 | <2.1 | <2.1 | <1.8 | <2.0 | <2.1 | <2.1 | <2.1 | <2.1 | <2.2 | <2.0 | <1.9 |
| gamma chlordane | <1.8 | <2.1 | <2.1 | <1.8 | <2.0 | <2.1 | <2.1 | <2.1 | <2.1 | <2.2 | <2.0 | <1.9 |
| toxaphene | <36 | <41 | <43 | <35 | <41 | <42 | <42 | <43 | <43 | <43 | <40 | <37 |
| Aroclor 1016 | <36 | <41 | <43 | <35 | <41 | <42 | <42 | <43 | <43 | <43 | <40 | <37 |
| Aroclor 1221 | <71 | <82 | <85 | <71 | <81 | <83 | <84 | <85 | <85 | <87 | <80 | <74 |
| Aroclor 1232 | <36 | <41 | <43 | <35 | <41 | <42 | <42 | <43 | <43 | <43 | <40 | <37 |
| Aroclor 1242 | <36 | <41 | <43 | <35 | <41 | <42 | <42 | <43 | <43 | <43 | <40 | <37 |
| Aroclor 1248 | <36 | <41 | <43 | <35 | <41 | <42 | <42 | <43 | <43 | <43 | <40 | <37 |
| Aroclor 1254 | <36 | <41 | <43 | <35 | <41 | <42 | <42 | <43 | <43 | <43 | <40 | <37 |
| Aroclor 1260 | <36 | <41 | <43 | <35 | <41 | <42 | <42 | <43 | <43 | <43 | <40 | <37 |

# Black Ash Pond - ERP: Site Investigation Analytical Data Summary

River Sediment Samples

| Metals (ug/L) | Guidance Lowest Effect Level (ppm) | Guidance Severe Effect Level (ppm) | SD-1-SU-05-6 | SD-1-SU-05-18 | SD-2-SU-05-6 | SD-2-SU-05-18 | SD-3-SU-05-6 | SD-3-SU-05-18 | SD-4-SU-05-6 | SD-4-SU-05-18 | SD-5-SU-05-6 | SD-5-SU-05-18 | SD-6-SU-05-6 | SD-6-SU-05-18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| aluminum | | | 2160 | 2240 | 1530 | 2290 | 1810 | 1750 | 1950 | 2240 | 2160 | 2810 | 1680 | 1700 |
| antimony | 2 | 25 | <3.5 | <4.1 | <4.2 | [redacted] | <4.0 | <4.1 | [redacted] | [redacted] | <4.2 | [redacted] | <4.0 | <3.7 |
| arsenic | 6 | 33 | <0.83 | <0.96 | <1.0 | <0.83 | <0.95 | <0.98 | <0.99 | <1.0 | <1.0 | <1.0 | <0.94 | <0.87 |
| barium | | | 8.2 | 9 | 5.4 | 14.5 | 7.2 | 5.3 | 6.9 | 8.6 | 7.4 | 9.4 | 6 | 7.5 |
| beryllium | | | <0.085 | <0.099 | <0.10 | 0.23 | <0.098 | <0.10 | <0.10 | <0.10 | <0.10 | <0.10 | <0.096 | <0.089 |
| cadmium | 0.5 | 9 | <0.043 | <0.049 | <0.051 | <0.043 | <0.049 | <0.050 | <0.051 | <0.051 | <0.051 | <0.052 | <0.048 | <0.044 |
| calcium | | | 2420 | 6310 | 941 | 1130 | 1970 | 2950 | 1280 | 2400 | 1270 | 1220 | 2070 | 1870 |
| chromium | 26 | 110 | 3 | 1.1 | 1.9 | 1.4 | <0.56 | 2.5 | 1.7 | 2.9 | 2.5 | 4.4 | 2.3 | 1.1 |
| cobalt | | | 2.4 | 1.8 | 1.5 | 2.5 | 1.8 | 1.5 | 2.1 | 2.2 | 2.2 | 2.8 | 1.8 | 1.7 |
| copper | 16 | 110 | <0.43 | <0.49 | 0.62 | 0.67 | 0.66 | <0.50 | 0.59 | 0.71 | 0.92 | 0.62 | <0.48 | 15.4 |
| iron | 20000 | 40000 | 5590 | 4200 | 3640 | 8360 | 4360 | 3810 | 4910 | 5660 | 5170 | 8030 | 4010 | 5040 |
| lead | 31 | 110 | <0.60 | <0.69 | <0.72 | <0.60 | <0.68 | <0.70 | <0.71 | <0.72 | 3.3 | <0.73 | <0.67 | 7.5 |
| magnesium | | | 1700 | 1170 | 687 | 1100 | 1390 | 1750 | 1220 | 1440 | 1070 | 1390 | 737 | 640 |
| manganese | 460 | 1100 | 86.6 | 73.1 | 49.7 | 113 | 48.6 | 44.4 | 54.8 | 70.1 | 59.8 | 79.7 | 50.3 | 48.8 |
| mercury | 0.15 | 1.3 | <0.053 | <0.062 | <0.064 | <0.053 | <0.061 | <0.062 | <0.063 | <0.064 | <0.064 | <0.065 | <0.060 | <0.056 |
| nickel | 16 | 50 | 2.7 | 1.9 | 1.5 | <0.79 | 1.5 | 1.8 | 1.9 | 2.7 | 2.5 | [redacted] | 1.9 | 0.97 |
| potassium | | | 72.3 | 104 | 44.1 | 164 | 122 | 54.6 | 57.2 | 71.2 | 72.5 | 55 | 52.5 | 43.3 |
| selenium | | | <0.98 | <1.1 | <1.2 | <0.98 | <1.1 | <1.2 | <1.2 | <1.2 | <1.2 | <1.2 | <1.1 | <1.0 |
| silver | 1 | 2.2 | <0.57 | <0.67 | <0.69 | <0.57 | <0.66 | <0.68 | <0.68 | <0.69 | <0.69 | <0.70 | <0.65 | <0.60 |
| sodium | | | 139 | 184 | 199 | 151 | 200 | 193 | 203 | 203 | 243 | 247 | 112 | 99.8 |
| thallium | | | <1.0 | <1.2 | <1.2 | <1.0 | <1.2 | <1.2 | <1.2 | <1.2 | <1.2 | <1.2 | <1.2 | <1.1 |
| vanadium | | | 5.1 | 3.8 | 3.2 | 4.7 | 3.8 | 3.2 | 3.9 | 4.3 | 4.1 | 6.4 | 3.6 | 2.8 |
| zinc | 120 | 270 | 16 | 9.2 | 10.2 | 17.9 | 10.6 | 7.4 | 12.4 | 13 | 15.1 | 15.8 | 11.3 | 17.4 |
| cyanide (mg/kg) | | | <0.11 | <0.12 | <0.11 | <0.10 | <0.11 | <0.12 | <0.09 | <0.08 | <0.11 | <0.12 | <0.09 | <0.09 |

# TABLE 5

# WASTE MEDIA SAMPLE

# ANALYTICAL DATA SUMMARY

# Black Ash Pond - ERP: Site Investigation Analytical Data Summary

**Waste Media Solid Samples**

| Volatile Organic Compounds | NYSDEC RSCOs (ppb) | WM-1-S-05-54 | WM-2-S-05-12 | WM-2-S-05-24 | WM-3-S-05-12 | WM-3-S-05-24 | WM-4-S-05-12 | WM-4-S-05-24 |
|---|---|---|---|---|---|---|---|---|
| chloromethane | | <88 | <23 | <18 | <18 | <20 | <21 | <18 |
| bromomethane | | <88 | <23 | <18 | <18 | <20 | <21 | <18 |
| vinyl chloride | | <88 | <23 | <18 | <18 | <20 | <21 | <18 |
| chloroethane | | <88 | <23 | <18 | <18 | <20 | <21 | <18 |
| methylene chloride | | <88 | <23 | <18 | <18 | <20 | <21 | <18 |
| acetone | | <88 | <23 | <18 | <18 | <20 | <21 | <18 |
| carbon disulfide | | <88 | <23 | <18 | <18 | <20 | <21 | <18 |
| 1,1-dichloroethene | | <88 | <23 | <18 | <18 | <20 | <21 | <18 |
| 1,1-dichloroethane | | <88 | <23 | <18 | <18 | <20 | <21 | <18 |
| 1,2-dichloroethene-trans | | <88 | <23 | <18 | <18 | <20 | <21 | <18 |
| 1,2-dichloroethene-cis | | <88 | <23 | <18 | <18 | <20 | <21 | <18 |
| chloroform | | <88 | <23 | <18 | <18 | <20 | <21 | <18 |
| 1,2-dichloroethane | | <88 | <23 | <18 | <18 | <20 | <21 | <18 |
| 2-butanone | | <88 | <23 | <18 | <18 | <20 | <21 | <18 |
| 1,1,1-trichloroethane | | <88 | <23 | <18 | <18 | <20 | <21 | <18 |
| carbon tetrachloride | | <88 | <23 | <18 | <18 | <20 | <21 | <18 |
| bromodichloromethane | | <88 | <23 | <18 | <18 | <20 | <21 | <18 |
| 1,2-dichloropropane | | <88 | <23 | <18 | <18 | <20 | <21 | <18 |
| cis-1,3-dichloropropene | | <88 | <23 | <18 | <18 | <20 | <21 | <18 |
| trichloroethene | | <88 | <23 | <18 | <18 | <20 | <21 | <18 |
| dibromochloromethane | | <88 | <23 | <18 | <18 | <20 | <21 | <18 |
| 1,1,2-trichloroethane | | <88 | <23 | <18 | <18 | <20 | <21 | <18 |
| benzene | | <88 | <23 | <18 | <18 | <20 | <21 | <18 |
| trans-1,3-dichloropropene | | <88 | <23 | <18 | <18 | <20 | <21 | <18 |
| bromoform | | <88 | <23 | <18 | <18 | <20 | <21 | <18 |
| 4-methyl-2-pentanone | | <88 | <23 | <18 | <18 | <20 | <21 | <18 |
| 2-hexanone | | <88 | <23 | <18 | <18 | <20 | <21 | <18 |
| terachloroethene | | <88 | <23 | <18 | <18 | <20 | <21 | <18 |
| 1,1,2,2-tetrachloroethane | | <88 | <23 | <18 | <18 | <20 | <21 | <18 |
| toluene | | <88 | <23 | <18 | <18 | <20 | <21 | <18 |
| chlorobenzene | | <88 | <23 | <18 | <18 | <20 | <21 | <18 |
| ethylbenzene | | <88 | <23 | <18 | <18 | <20 | <21 | <18 |
| styrene | | <88 | <23 | <18 | <18 | <20 | <21 | <18 |
| m,p-xylenes | | <88 | <23 | <18 | <18 | <20 | <21 | <18 |
| o-xylene | | <88 | <23 | <18 | <18 | <20 | <21 | <18 |
| methyl t-butyl ether | | <88 | <23 | <18 | <18 | <20 | <21 | <18 |
| dichlorodifluoromethane | | <88 | <23 | <18 | <18 | <20 | <21 | <18 |
| methyl acetate | | <88 | <23 | <18 | <18 | <20 | <21 | <18 |
| freon 113 | | <88 | <23 | <18 | <18 | <20 | <21 | <18 |
| trichlorofluoromethane | | <88 | <23 | <18 | <18 | <20 | <21 | <18 |
| cyclohexane | | <88 | <23 | <18 | <18 | <20 | <21 | <18 |
| methylcyclohexane | | <88 | <23 | <18 | <18 | <20 | <21 | <18 |
| 1,2-dibromoethane | | <88 | <23 | <18 | <18 | <20 | <21 | <18 |
| 1,3-dichlorobenzene | | <88 | <23 | <18 | <18 | <20 | <21 | <18 |
| isopropylbenzene | | <88 | <23 | <18 | <18 | <20 | <21 | <18 |
| 1,4-dichlorobenzene | | <88 | <23 | <18 | <18 | <20 | <21 | <18 |
| 1,2-dichlorobenzene | | <88 | <23 | <18 | <18 | <20 | <21 | <18 |
| 1,2-dibromo-3-chloro-propane | | <88 | <23 | <18 | <18 | <20 | <21 | <18 |
| 1,2,4-trichlorobenzene | | <88 | <23 | <18 | <18 | <20 | <21 | <18 |

## Black Ash Pond - ERP: Site Investigation Analytical Data Summary

**Waste Media Solid Samples**

| Semi-Vol. Organic Compounds | NYSDEC RSCOs (ppb) | WM-1-S-05-54 | WM-2-S-05-12 | WM-2-S-05-24 | WM-3-S-05-12 | WM-3-S-05-24 | WM-4-S-05-12 | WM-4-S-05-24 |
|---|---|---|---|---|---|---|---|---|
| phenol | | <580 | <780 | <580 | <580 | <670 | <710 | <610 |
| bis(2-chloroethyl)ether | | <580 | <780 | <580 | <580 | <670 | <710 | <610 |
| 2-chlorophenol | | <580 | <780 | <580 | <580 | <670 | <710 | <610 |
| 2-methylphenol | | <580 | <780 | <580 | <580 | <670 | <710 | <610 |
| bis(2-chloroisopropyl)ether | | <580 | <780 | <580 | <580 | <670 | <710 | <610 |
| 4-methylphenol | | <580 | <780 | <580 | <580 | <670 | <710 | <610 |
| n-Nitroso-di-n-propylamine | | <580 | <780 | <580 | <580 | <670 | <710 | <610 |
| hexachloroethane | | <580 | <780 | <580 | <580 | <670 | <710 | <610 |
| nitrobenzene | | <580 | <780 | <580 | <580 | <670 | <710 | <610 |
| isophorone | | <580 | <780 | <580 | <580 | <670 | <710 | <610 |
| 2-nitrophenol | | <580 | <780 | <580 | <580 | <670 | <710 | <610 |
| 2,4-dimethylphenol | | <580 | <780 | <580 | <580 | <670 | <710 | <610 |
| bis(2-chloroethoxy)methane | | <580 | <780 | <580 | <580 | <670 | <710 | <610 |
| 2,4-dichlorophenol | | <580 | <780 | <580 | <580 | <670 | <710 | <610 |
| naphthalene | | <580 | <780 | <580 | <580 | <670 | <710 | <610 |
| 4-chloroaniline | | <580 | <780 | <580 | <580 | <670 | <710 | <610 |
| hexachlorobutadiene | | <580 | <780 | <580 | <580 | <670 | <710 | <610 |
| 4-chloro-3-methylphenol | | <580 | <780 | <580 | <580 | <670 | <710 | <610 |
| 2-methylnaphthalene | | <580 | <780 | <580 | <580 | <670 | <710 | <610 |
| hexachlorocyclopentadiene | | <580 | <780 | <580 | <580 | <670 | <710 | <610 |
| 2,4,6-trichlorophenol | | <580 | <780 | <580 | <580 | <670 | <710 | <610 |
| 2,4,5-trichlorophenol | | <580 | <780 | <580 | <580 | <670 | <710 | <610 |
| 2-chloronaphthalene | | <580 | <780 | <580 | <580 | <670 | <710 | <610 |
| 2-nitroaniline | | <2900 | <3900 | <2900 | <2900 | <3300 | <3500 | <3000 |
| dimethylphthalate | | <580 | <780 | <580 | <580 | <670 | <710 | <610 |
| acenaphthylene | | <580 | <780 | <580 | <580 | <670 | <710 | <610 |
| 2,6-dinitrotoluene | | <580 | <780 | <580 | <580 | <670 | <710 | <610 |
| 3-nitroaniline | | <2900 | <3900 | <2900 | <2900 | <3300 | <3500 | <3000 |
| acenaphthene | | <580 | <780 | <580 | <580 | <670 | <710 | <610 |
| 2,4-dinitrophenol | | <2900 | <3900 | <2900 | <2900 | <3300 | <3500 | <3000 |
| 4-nitrophenol | | <2900 | <3900 | <2900 | <2900 | <3300 | <3500 | <3000 |
| dibenzofuran | | <580 | <780 | <580 | <580 | <670 | <710 | <610 |

# Black Ash Pond - ERP: Site Investigation Analytical Data Summary

**Waste Media Solid Samples**

| Semi-Vol. Organic Compounds | NYSDEC RSCOs (ppb) | WM-1-S-05-54 | WM-2-S-05-12 | WM-2-S-05-24 | WM-3-S-05-12 | WM-3-S-05-24 | WM-4-S-05-12 | WM-4-S-05-24 |
|---|---|---|---|---|---|---|---|---|
| 2,4-dinitrotoluene | | <580 | <780 | <580 | <580 | < 670 | <710 | <610 |
| diethylphthalate | | <580 | <780 | <580 | <580 | <670 | <710 | <610 |
| 4-chlorophenyl-phenylether | | <580 | <780 | <580 | <580 | <670 | <710 | <610 |
| fluorene | | <580 | <780 | <580 | <580 | <670 | <710 | <610 |
| 4-nitroaniline | | <2900 | <3900 | <2900 | <2900 | <3300 | <3500 | <3000 |
| 4,6-dinitro-2-methylphenol | | <2900 | <3900 | <2900 | <2900 | <3300 | <3500 | <3000 |
| n-nitrosodiphenylamine | | <580 | <780 | <580 | <580 | <670 | <710 | <610 |
| 4-bromophenyl-phenylether | | <580 | <780 | <580 | <580 | <670 | <710 | <610 |
| hexachlorobenzene | 410 | <580 | <780 | <580 | <580 | <670 | <710 | 270J |
| pentachlorophenol | | <2900 | <3900 | <2900 | <2900 | <3300 | <3500 | <3000 |
| phenanthrene | | <580 | <780 | <580 | <580 | <670 | <710 | <610 |
| anthracene | | <580 | <780 | <580 | <580 | <670 | <710 | <610 |
| carbazole | | <580 | <780 | <580 | <580 | <670 | <710 | <610 |
| di-n-butylphthalate | 8100 | <580 | <780 | <580 | <580 | <670 | 79J | <610 |
| fluoranthene | 50000 | <580 | <780 | <580 | <580 | <670 | <710 | 79J |
| pyrene | | <580 | <780 | <580 | <580 | <670 | <710 | <610 |
| butylbenzylphthalate | | <580 | <780 | <580 | <580 | <670 | <710 | <610 |
| 3,3'-dichlorobenzidine | | <1200 | <1600 | <1200 | <1200 | <1300 | <1400 | <1200 |
| benzo(a)anthracene | | <580 | <780 | <580 | <580 | <670 | <710 | <610 |
| chrysene | | <580 | <780 | <580 | <580 | <670 | <710 | <610 |
| bis(2-ethylehexyl)phthalate | 50000 | <580 | <780 | <580 | <580 | <670 | <710 | 110J |
| di-n-octylphthalate | | <580 | <780 | <580 | <580 | <670 | <710 | <610 |
| benzo(b)fluoranthene | | <580 | <780 | <580 | <580 | <670 | <710 | <610 |
| benzo(k)fluoranthene | | <580 | <780 | <580 | <580 | <670 | <710 | <610 |
| benzo(a)pyrene | | <580 | <780 | <580 | <580 | <670 | <710 | <610 |
| indeno(1,2,3-cd)pyrene | | <580 | <780 | <580 | <580 | <670 | <710 | <610 |
| bibenzo(a,h)anthracene | | <580 | <780 | <580 | <580 | <670 | <710 | <610 |
| benzo(g,h,i)perylene | | <580 | <780 | <580 | <580 | <670 | <710 | <610 |
| benzaldehyde | | <580 | <780 | <580 | <580 | <670 | <710 | 74J |
| acetophenone | | <580 | <780 | <580 | <580 | <670 | <710 | <610 |
| caprolactam | | <580 | <780 | <580 | <580 | <670 | <710 | <610 |
| biphenyl | | <580 | <780 | <580 | <580 | <670 | <710 | <610 |
| atrazine | | <580 | <780 | <580 | <580 | <670 | <710 | <610 |

## Black Ash Pond - ERP: Site Investigation Analytical Data Summary

**Waste Media Solid Samples**

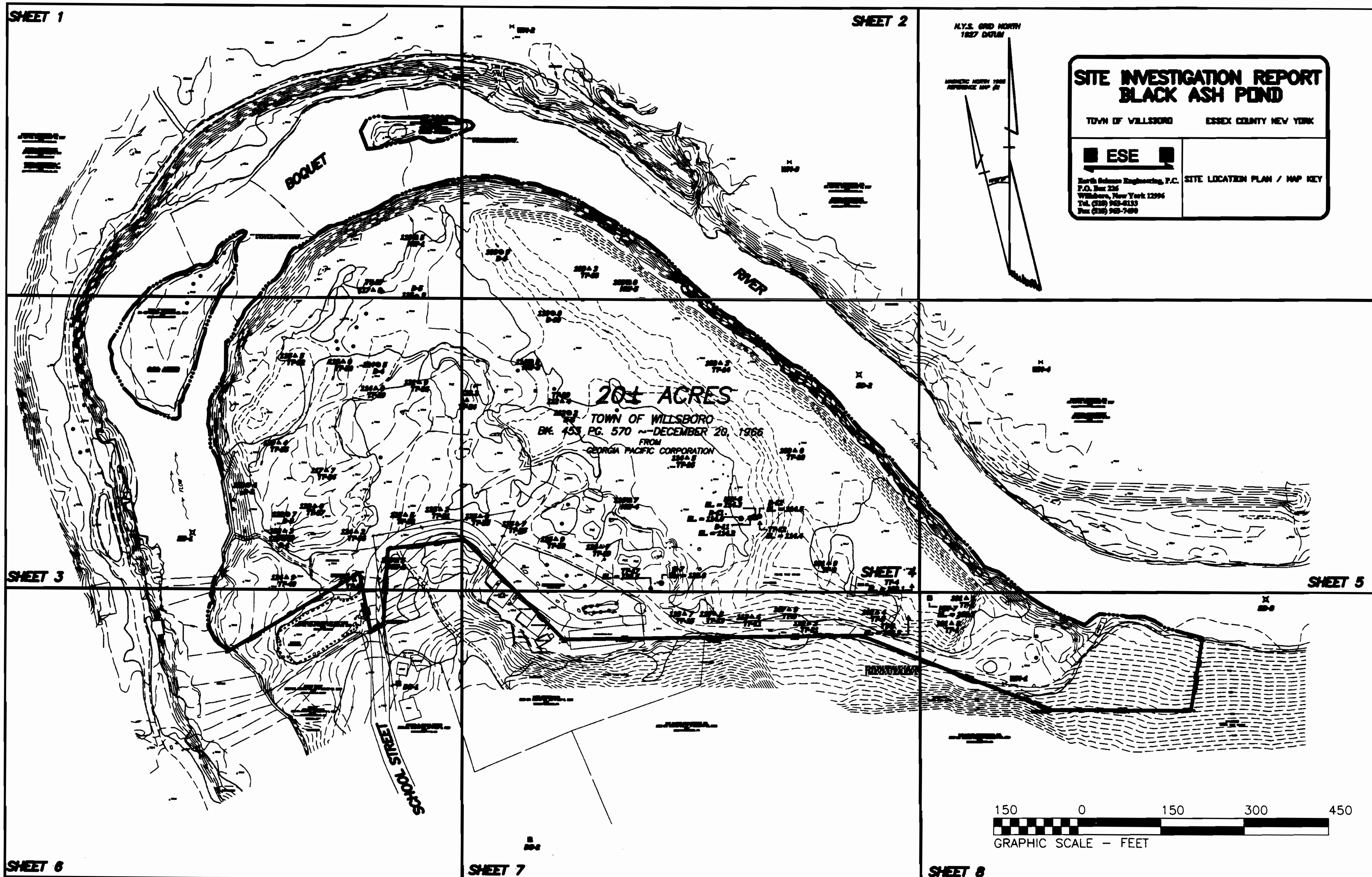
| PCBs/Pesticides | NYSDEC RSCOs (ppb) | WM-1-S-05-54 | WM-2-S-05-12 | WM-2-S-05-24 | WM-3-S-05-12 | WM-3-S-05-24 | WM-4-S-05-12 | WM-4-S-05-24 |
|---|---|---|---|---|---|---|---|---|
| alpha-BHC | | <2.9 | <3.9 | <2.9 | <2.9 | <3.3 | <3.5 | <3.0 |
| beta-BHC | | <2.9 | <3.9 | <2.9 | <2.9 | <3.3 | <3.5 | <3.0 |
| delta-BHC | | <2.9 | <3.9 | <2.9 | <2.9 | <3.3 | <3.5 | <3.0 |
| gamma-BHC (Lindane) | | <2.9 | <3.9 | <2.9 | <2.9 | <3.3 | <3.5 | <3.0 |
| heptachlor | | <2.9 | <3.9 | <2.9 | <2.9 | <3.3 | <3.5 | <3.0 |
| aldrin | | <2.9 | <3.9 | <2.9 | <2.9 | <3.3 | <3.5 | <3.0 |
| heptachlor epoxide | | <2.9 | <3.9 | <2.9 | <2.9 | <3.3 | <3.5 | <3.0 |
| endosulfan I | | <2.9 | <3.9 | <2.9 | <2.9 | <3.3 | <3.5 | <3.0 |
| dieldrin | | <5.8 | <7.8 | <5.8 | <5.8 | <6.7 | <7.1 | <6.1 |
| 4,4'-DDE | 2100 | <5.8 | 3.7jp | <5.8 | <5.8 | <6.7 | <7.1 | <6.1 |
| endrin | | <5.8 | <7.8 | <5.8 | <5.8 | <6.7 | <7.1 | <6.1 |
| endosulfan II | | <5.8 | <7.8 | <5.8 | <5.8 | <6.7 | <7.1 | <6.1 |
| 4,4'-DDD | | <5.8 | <7.8 | <5.8 | <5.8 | <6.7 | <7.1 | <6.1 |
| endosulfan sulfate | | <5.8 | <7.8 | <5.8 | <5.8 | <6.7 | <7.1 | <6.1 |
| 4,4'-DDT | | <5.8 | <7.8 | <5.8 | <5.8 | <6.7 | <7.1 | <6.1 |
| methoxychlor | | <29 | <39 | <29 | <29 | <33 | <35 | <30 |
| endrin ketone | | <5.8 | <7.8 | <5.8 | <5.8 | <6.7 | <7.1 | <6.1 |
| endrin aldehyde | | <5.8 | <7.8 | <5.8 | <5.8 | <6.7 | <7.1 | <6.1 |
| alpha chlordane | | <2.9 | <3.9 | <2.9 | <2.9 | <3.3 | <3.5 | <3.0 |
| gamma chlordane | | <2.9 | <3.9 | <2.9 | <2.9 | <3.3 | <3.5 | <3.0 |
| toxaphene | | <58 | <78 | <58 | <58 | <67 | <71 | <61 |
| Aroclor 1016 | | <58 | <78 | <58 | <58 | <67 | <71 | <61 |
| Aroclor 1221 | | <120 | <160 | <120 | <120 | <130 | <140 | <120 |
| Aroclor 1232 | | <58 | <78 | <58 | <58 | <67 | <71 | <61 |
| Aroclor 1242 | | <58 | <78 | <58 | <58 | <67 | <71 | <61 |
| Aroclor 1248 | | <58 | <78 | <58 | <58 | <67 | <71 | <61 |
| Aroclor 1254 | | <58 | <78 | <58 | <58 | <67 | <71 | <61 |
| Aroclor 1260 | | <58 | <78 | <58 | <58 | <67 | <71 | <61 |

# Black Ash Pond - ERP: Site Investigation Analytical Data Summary

**Waste Media Solid Samples**

| Metals (mg/kg) | East US Site Background (SB) | NYSDEC RSCOs | WM-1-S-05-54 | WM-2-S-05-12 | WM-2-S-05-24 | WM-3-S-05-12 | WM-3-S-05-24 | WM-4-S-05-12 | WM-4-S-05-24 |
|---|---|---|---|---|---|---|---|---|---|
| aluminum | 33,000 | SB | 6640 | 3560 | 2270 | 2090 | 2880 | 4410 | 3290 |
| antimony | not avail. | SB | | | | <5.8 | <6.6 | <7.0 | |
| arsenic | 3 - 12 | 7.5 or SB | <1.4 | <1.8 | <1.4 | <1.4 | <1.6 | <1.7 | <1.4 |
| barium | 15 - 600 | 300 or SB | | | | | | | |
| beryllium | 0 - 1.75 | 0.16 or SB | | <0.19 | <0.14 | <0.14 | <0.16 | <0.17 | <0.15 |
| cadmium | 0.1 - 1 | 1 or SB | | | | | | | |
| calcium | 130 - 35,000 | SB | | | | | | | |
| chromium | 1.5 - 40 | 10 or SB | | 2.4 | 2.7 | 2.3 | 3.1 | 2.1 | 2.5 |
| cobalt | 2.5 - 60 | 30 or SB | | <1.9 | <1.4 | <1.4 | <1.6 | <1.7 | <1.5 |
| copper | 1 - 50 | 25 or SB | | | 1 | | | | |
| iron | 2,000 - 550,000 | 2,000 or SB | | | 1430 | 1660 | 1450 | | |
| lead | 4-61r; 200-500 u | SB | <0.98 | | <0.98 | | | | |
| magnesium | 100 - 5,000 | SB | 509 | | | | | | |
| manganese | 50 - 5,000 | SB | | 116 | 44.9 | 47.2 | 56.7 | 149 | 192 |
| mercury | 0.001 - 0.2 | 0.1 | | <0.12 | <0.088 | <0.088 | <0.099 | <0.11 | <0.092 |
| nickel | 0.5 - 25 | 13 or SB | | | | | | | |
| potassium | 8,500 - 43,000 | SB | | | 161 | 103 | 66.4 | | |
| selenium | 0.1 - 3.9 | 2 or SB | <1.6 | <2.1 | <1.6 | <1.6 | <1.8 | <2.0 | <1.7 |
| silver | not avail. | SB | <0.94 | | <0.95 | <0.95 | <1.1 | <1.1 | <1.0 |
| sodium | 6,000 - 8,000 | SB | 96.6 | | | | | | |
| thallium | not avail. | SB | <1.7 | <2.2 | <1.7 | <1.7 | <1.9 | <2.0 | <1.8 |
| vanadium | 1 - 300 | 150 or SB | | 8.6 | 3.8 | 6.1 | <3.9 | | |
| zinc | 9 - 50 | 20 or SB | 22.7 | | | | | | |
| cyanide (mg/kg) | | | 0.28 | <0.22 | <0.17 | <0.17 | <0.18 | <0.21 | <0.18 |

# FIGURE SHEETS


SHEET 1
SHEET 2
SHEET 3
SHEET 4
SHEET 5
SHEET 6
SHEET 7
SHEET 8
N.Y.S. GRID NORTH
1927 DATUM
SITE INVESTIGATION REPORT
BLACK ASH POND
TOWN OF WILLSBORO
ESSEX COUNTY NEW YORK
ESE
Earth Science Engineering, P.C.
SITE LOCATION PLAN / MAP KEY
BOQUET
RIVER
20± ACRES
TOWN OF WILLSBORO
BK. 453 PG. 570 ~ DECEMBER 20, 1966
FROM
GEORGIA PACIFIC CORPORATION
SCHOOL STREET
FLOW
150
0
150
300
450
GRAPHIC SCALE - FEET

## ~ ELEVATION DATA ~

| BORING No. | ELEVATION |
|---|---|
| B-1 | 123.1 |
| B-2 | 122.4 |
| B-3 | 122.7 |
| B-4 | 114.5 |
| B-5 | 115.9 |
| B-6 | 108.9 |
| B-7 | 122.0 |
| B-8 | 112.2 |
| B-9 | 114.2 |
| B-10 | 110.8 |
| B-11 | 114.0 |
| B-12 | 114.5 |

| TRENCH No. | ELEVATION | TRENCH No. | ELEVATION |
|---|---|---|---|
| TT-1 | 101.8 | TT-21 | 119.3 |
| TT-2 | 101.3 | TT-22 | 104.8 |
| TT-3 | 103.5 | TT-23 | 126.9 |
| TT-4 | 102.1 | TT-24 | 123.2 |
| TT-5 | 102.4 | TT-25 | 125.7 |
| TT-6 | 102.7 | TT-26 | 121.9 |
| TT-7 | 107.6 | TT-27 | 117.8 |
| TT-8 | 101.9 | TT-28 | 125.0 |
| TT-9 | 107.9 | TT-29 | 114.0 |
| TT-10 | 103.0 | TT-30 | 118.0 |
| TT-11 | 113.4 | TT-31 | 125.2 |
| TT-12 | 114.4 | TT-32 | 115.5 |
| TT-13 | 115.8 | TT-33 | 125.5 |
| TT-14 | 103.3 | TT-34 | 117.7 |
| TT-15 | 118.7 | TT-35 | 119.4 |
| TT-16 | 114.5 | TT-36 | 124.2 |
| TT-17 | 122.5 | TT-37 | 122.0 |
| TT-18 | 103.3 | TT-38 | 127.7 |
| TT-19 | 126.7 | TT-39 | 122.3 |
| TT-20 | 112.4 | TT-40 | 124.9 |

| MONITORING WELL No. | ELEVATION |
|---|---|
| MW-1 | 118.5 |
| MW-2 | 126.5 |
| MW-3 | 114.5 |
| MW-4 | 116.7 |
| MW-5 | 103.0 |
| MW-6 | 114.3 |
| MW-7 | 102.3 |

## ~ SAMPLING LEGEND ~

103 ▲ 3
TT-18 — TEST TRENCH AND ELEVATION

103 ◙ 0
MW-5 — MONITORING WELL AND ELEVATION

110 ⊕ 8
B-10 — BORING AND ELEVATION

SD-1 — RIVER SEDIMENT SAMPLE

BG-1 — BACKGROUND SAMPLE

WM-1 — WASTE MEDIA SAMPLE

## ~ MAP REFERENCES ~

#1. MAP OF SURVEY SHOWING PREMISES CONVEYED BY THE NEW YORK & PENNSYLVANIA CO., INC. TO CHAMPLAIN MILLS PROPERTIES, INC. BY BY SPENCER J. JOHNSTON, L.S., AND FREDERICK W. VOLKMANN, L.S., SHEET No. 2 OF 3, DATED SEPTEMBER 11, 1962.

#2. MAP OF SURVEY SHOWING PARCEL SET OFF FROM LANDS OF GEORGIA PACIFIC CORPORATION TO BE CONVEYED TO THE TOWN OF WILLSBORO BY SPENCER J. JOHNSTON, L.S., AND DATED SEPTEMBER 16, 1966. FILED IN THE ESSEX CO. CLERK'S OFFICE AS MAP #2042.

#3. MAP OF SURVEY SHOWING "GRIST MILL PARCEL" SET OFF FROM LANDS OWNED BY GEORGIA PACIFIC CORPORATION, BY SPENCER J. JOHNSTON, L.S. SURVEY COMPLETED SEPTEMBER 16, 1966.

#4. MAP OF LANDS TO BE ACQUIRED BY THE STATE OF NEW YORK DEPARTMENT OF ENVIRONMENTAL CONSERVATION, BY KENNETH F. YOUSEY, L.S. SURVEY COMPLETED MARCH 1982, FILED IN THE ESSEX CO. CLERK'S OFFICE AS MAP #3196.

#5. MAP OF SURVEY PREPARED FOR THE TOWN OF WILLSBORO, BY KEVIN A. HALL, L.S., DATED NOVEMBER 2, 1992.

#6. MAP OF SURVEY PREPARED FOR TOWN OF WILLSBORO AND EARTH SCIENCE ENGINEERING, P.C. BY KEVIN A. HALL, L.S., DATED AUGUST 29, 2005.

## ~ LEGEND ~

- C.P. PROPERTY LINE AND CORNER MARKER AS DESCRIBED OR C.P. = COMPUTED POINT
- PROPERTY LINE ALONG EDGE OF RIVER
- CURRENT TITLE LINE
- 110 10' CONTOUR INTERVAL
- 2' CONTOUR INTERVAL
- + 116.3 SPOT ELEVATION
- CHAINLINK FENCELINE
- PAVED DRIVE OR ROAD
- UNPAVED DRIVE OR ROAD
- TRAIL OR PATH
- UTILITY POLE AND OVERHEAD WIRES
- TREELINE
- LARGE BOULDERS

## ~ SAMPLING NOTES ~

#1 MONITORING WELL ELEVATIONS TAKEN ON CONCRETE BELOW LOCK PORTION OF CAP.

#2 BORING AND TEST TRENCH ELEVATIONS TAKEN AT STAKE.

#3 RIVER SEDIMENT SAMPLING LOCATIONS APPROXIMATED

## ~ NOTES ~

#1 UNAUTHORIZED ALTERATION OR ADDITION TO A SURVEY MAP BEARING A LICENSED LAND SURVEYOR'S SEAL IS A VIOLATION OF SECTION 7209, SUBDIVISION 2, OF THE NEW YORK STATE EDUCATION LAW.

#2 ONLY COPIES FROM THE ORIGINAL OF THIS SURVEY, SIGNED AND DATED IN RED INK AND MARKED WITH THE LAND SURVEYOR'S EMBOSSED SEAL SHALL BE CONSIDERED TO BE VALID TRUE COPIES.

#3 "ASSUMED ROAD BOUNDS" INDICATES THAT LIMITED WORK HAS BEEN DONE TO ATTEMPT TO DETERMINE THE TRUE LEGAL BOUNDS OF THE ROAD SHOWN HEREON.

#4 WETLANDS, IF ANY, NOT SHOWN HEREON.

#5 UNDERGROUND UTILITIES NOT SHOWN HEREON.

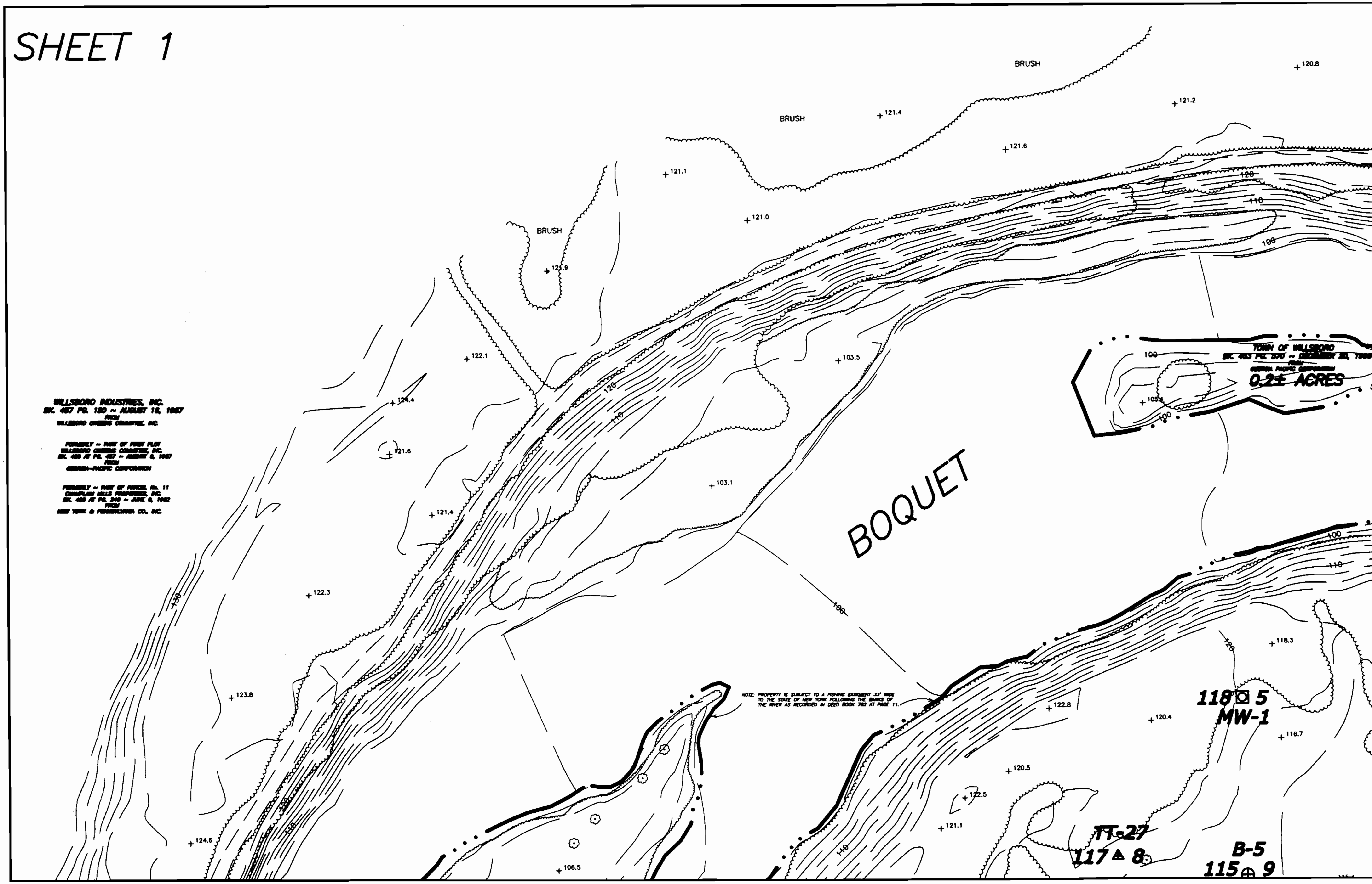
#6 ACREAGE IS SHOWN TO THE BANK OF THE BOQUET RIVER. TITLE TO THE BED OF THE RIVER MAY BE IN THE STATE. OWNERSHIP OF THE RIVER BED IS SUBJECT TO A LEGAL INTERPRETATION NOT UNDERTAKEN AS A PART OF THIS SURVEY.

#7 MAPPING COMPILED BY TVGA CONSULTANTS(TVGA) USING PHOTOGRAMMETRIC METHODS. AERIAL PHOTOGRAPHY FLOWN 30 NOV 2004. THIS MAPPING COMPILED IN ACCORDANCE WITH (NMAS) NATIONAL MAP ACCURACY STANDARDS FOR MAPS AT 1 INCH EQUALS 30 FT. SCALE.

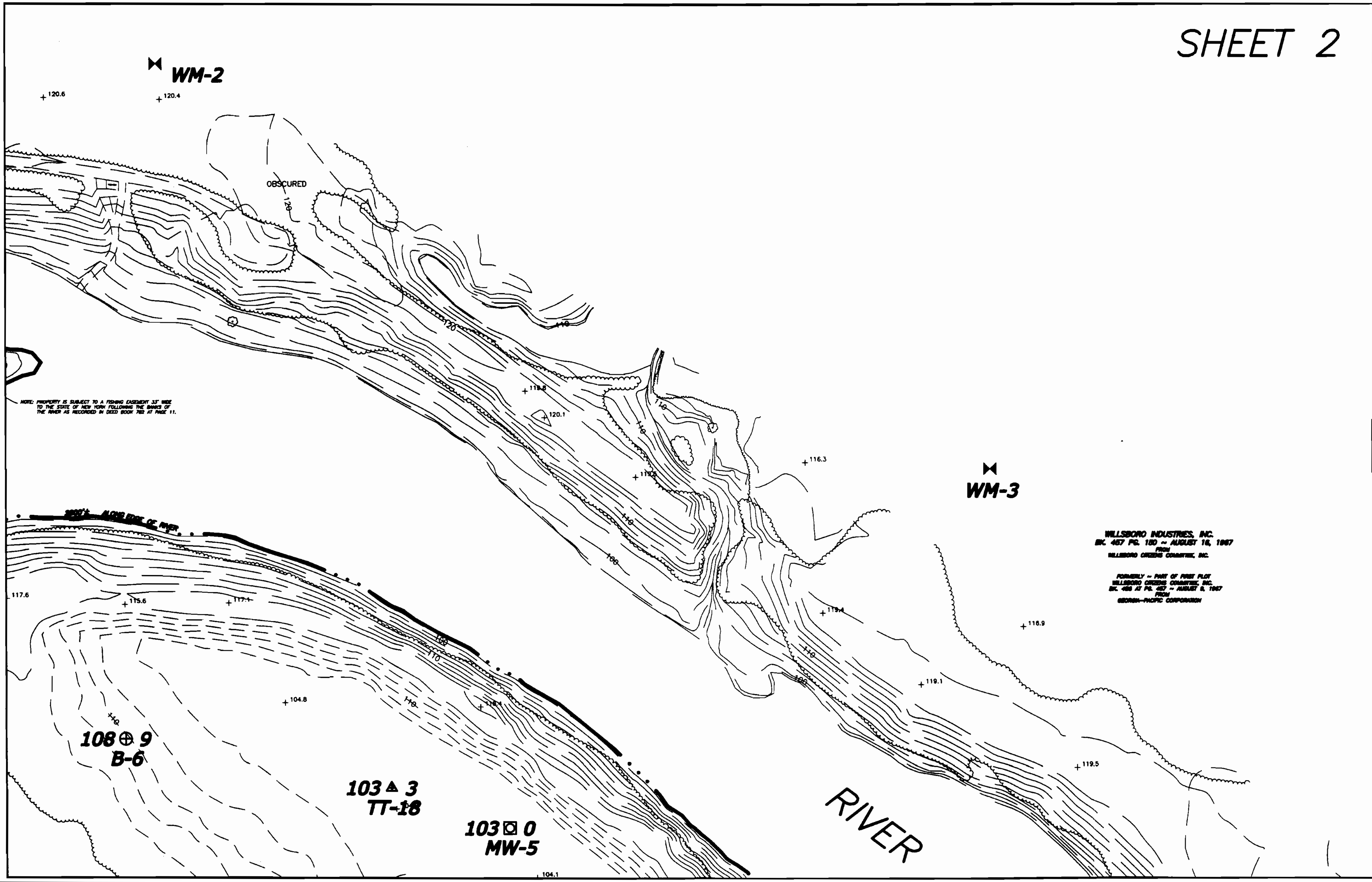
#8 THE INFORMATION DEPICTED ON THIS MAP REPRESENTS THE RESULTS OF AERIAL MAPPING AND CAN ONLY BE CONSIDERED AS INDICATING THE GENERAL CONDITION EXISTING ON THE DATE OF PHOTOGRAPHY.

#9 AREAS OF DENSE VEGETATION, SHADOWS OR SNOW MAY NOT MEET NATIONAL MAP ACCURACY STANDARDS (NMAS) AND WILL BE IDENTIFIED BY AN "OBSCURED" OUTLINED AND/OR DASHED CONTOURS. A FIELD CHECK MUST BE COMPLETED PRIOR TO ENGINEERING DESIGN AND/OR COMPUTATIONS.

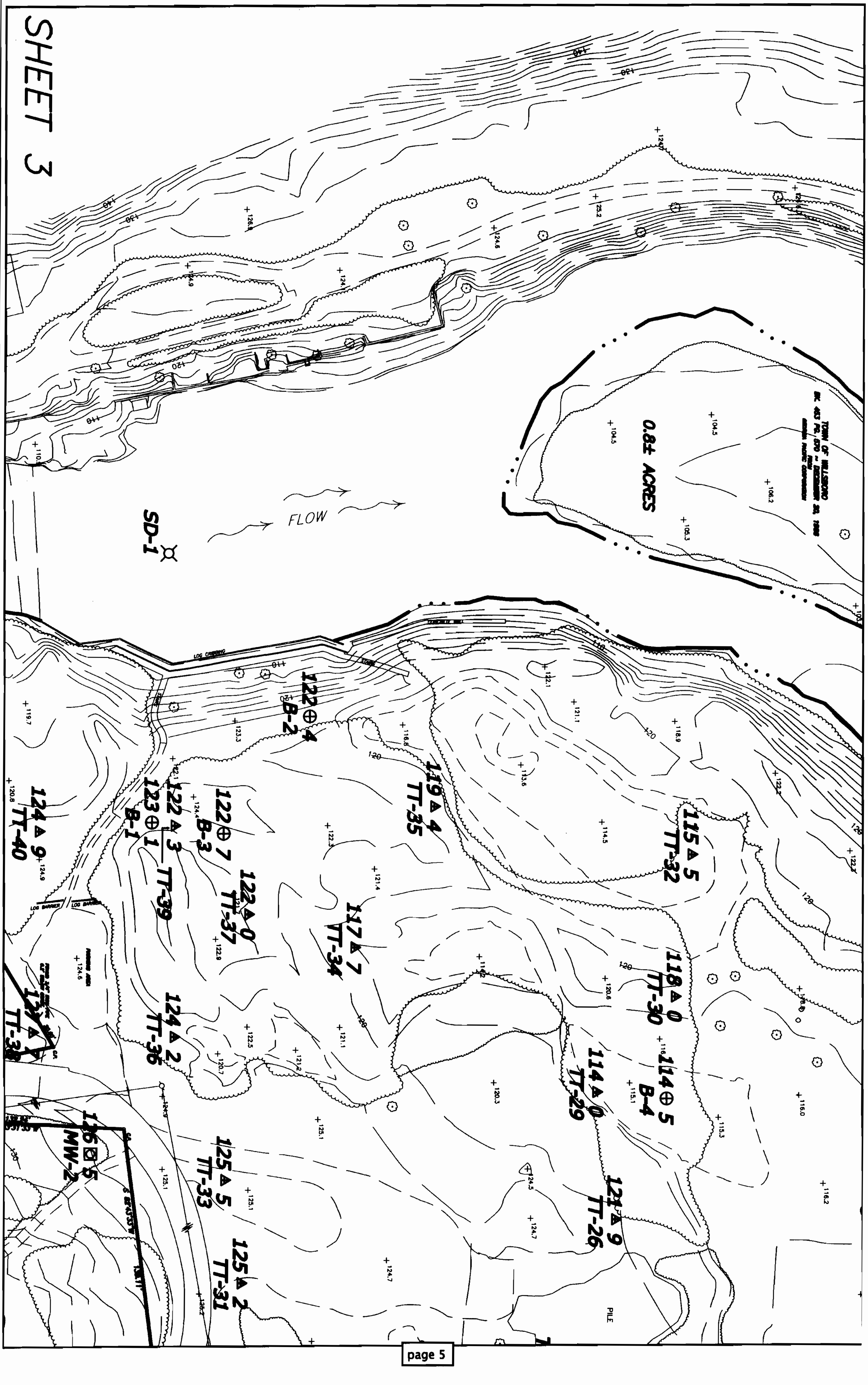

| PAGE No. | CONTENTS |
|---|---|
| 1 | SITE LOCATION PLAN AND MAP KEY ~ 1" = 150' |
| 2 | ELEVATION DATA, LEGENDS, NOTES AND MAP REFERENCES |
| 3 | SHEET 1 ~ 1" = 50' |
| 4 | SHEET 2 ~ 1" = 50' |
| 5 | SHEET 3 ~ 1" = 50' |
| 6 | SHEET 4 ~ 1" = 50' |
| 7 | SHEET 5 ~ 1" = 50' |
| 8 | SHEET 6 ~ 1" = 50' |
| 9 | SHEET 7 ~ 1" = 50' |
| 10 | SHEET 8 ~ 1" = 50' |
| 11 | GROUNDWATER CONTOURS / FLOW DIRECTIONS ~ 1" = 150' |

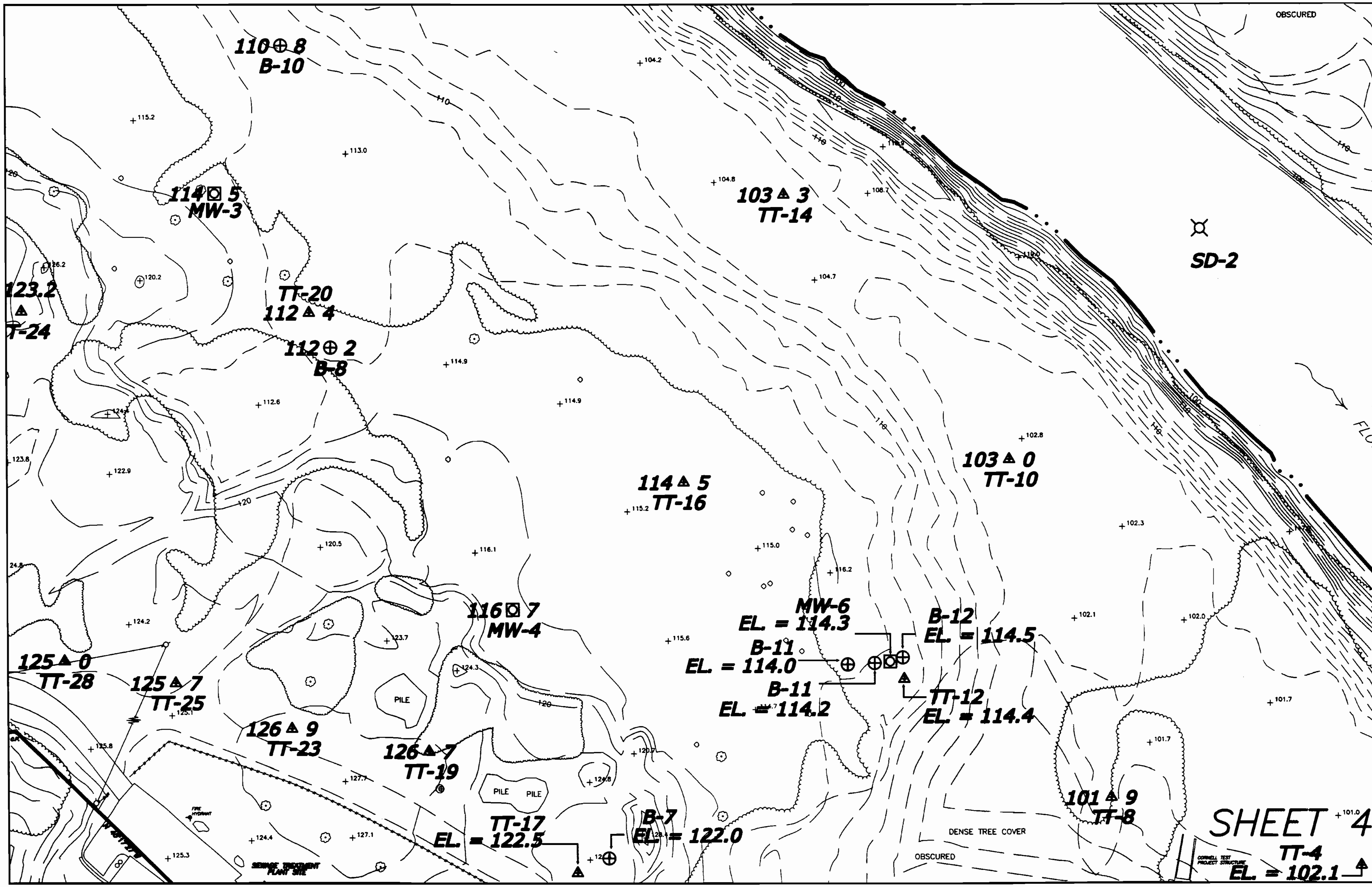


SHEET 1
BRUSH
BRUSH
BRUSH
WILLSBORO INDUSTRIES, INC.
BOQUET
TOWN OF WILLSBORO
0.2± ACRES
NOTE: PROPERTY IS SUBJECT TO A FISHING EASEMENT 33' WIDE
TO THE STATE OF NEW YORK FOLLOWING THE BANKS OF
THE RIVER AS RECORDED IN DEED BOOK 782 AT PAGE 11.
TT-27
117 ▲ 8
118 ▣ 5
MW-1
B-5
115 ⊕ 9

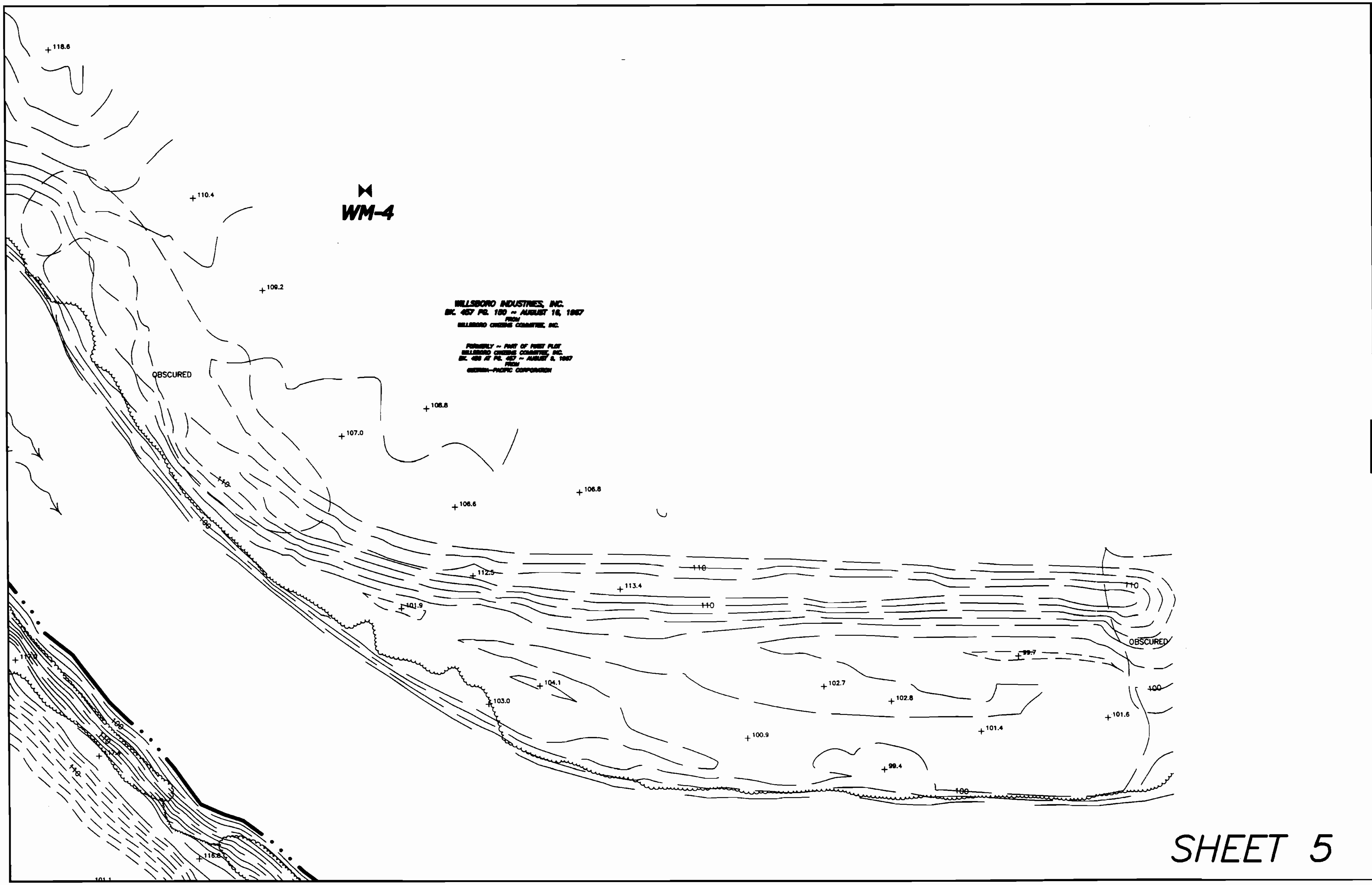


SHEET 2
WM-2
WM-3
120.6
120.4
OBSCURED
120
110
100
119.8
120.1
116.3
119.4
116.9
119.1
119.5
117.6
115.6
117.1
104.8
104.1
108 ⊕ 9
B-6
103 ▲ 3
TT-18
103 ◘ 0
MW-5
RIVER
ALONG EDGE OF RIVER
NOTE: PROPERTY IS SUBJECT TO A FISHING EASEMENT 33' WIDE
TO THE STATE OF NEW YORK FOLLOWING THE BANKS OF
THE RIVER AS RECORDED IN DEED BOOK 782 AT PAGE 11.
WILLSBORO INDUSTRIES, INC.
BK. 457 PG. 180 ~ AUGUST 18, 1967
FROM
WILLSBORO CITIZENS COMMITTEE, INC.
FORMERLY ~ PART OF FIRST PLOT
WILLSBORO CITIZENS COMMITTEE, INC.
FROM
GEORGIA-PACIFIC CORPORATION

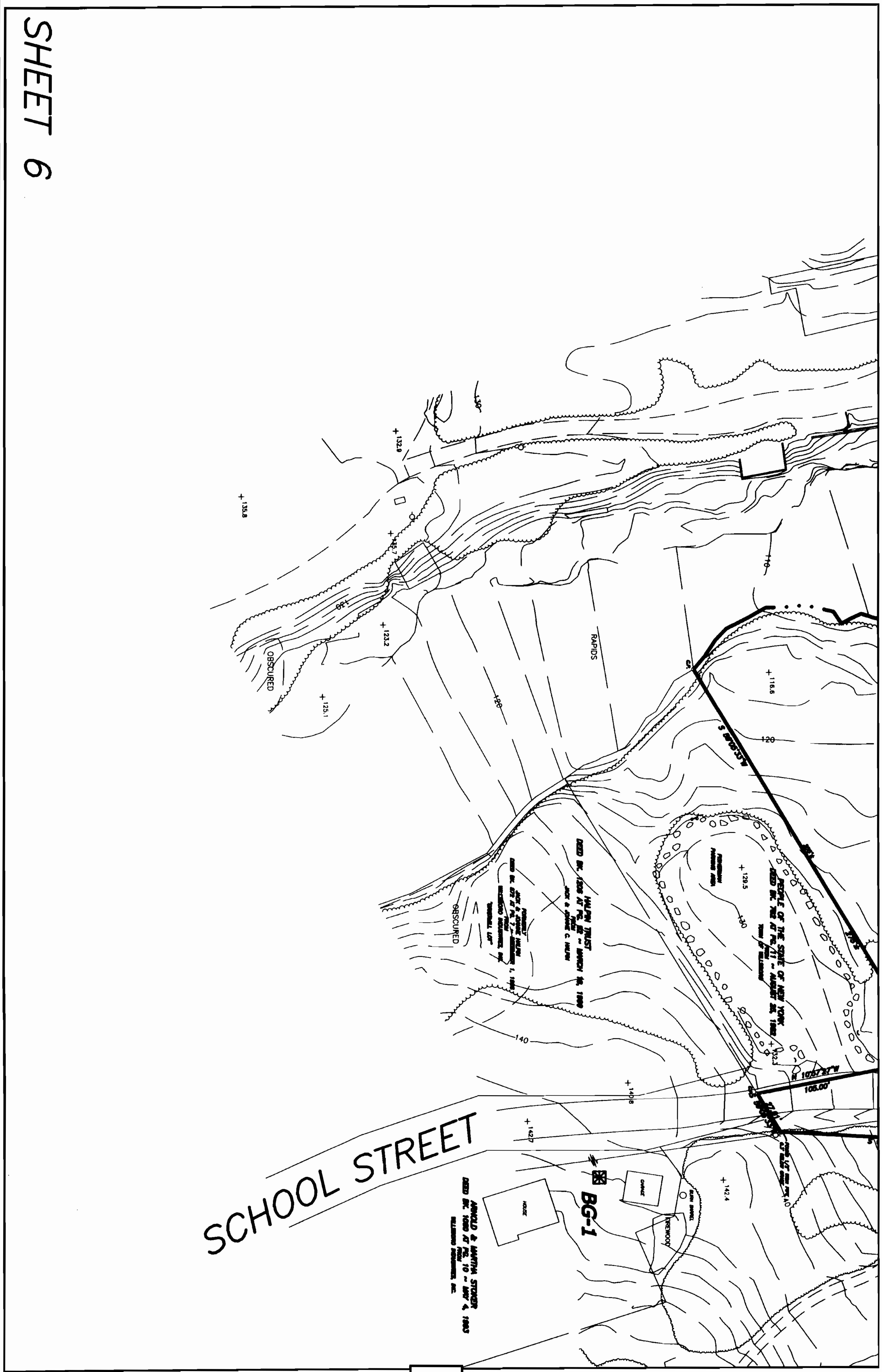

SHEET 3
FLOW
SD-1
0.8± ACRES
122⊕4
B-2
119▲4
TT-35
115▲5
TT-32
124▲9
TT-40
123⊕1
B-1
122▲3
TT-39
122⊕7
B-3
122▲0
TT-37
117▲7
TT-34
118▲0
TT-30
124▲2
TT-36
114▲0
TT-29
114⊕5
B-4
126⊠5
MW-2
125▲5
TT-33
121▲9
TT-26
125▲2
TT-31
LOG BARRIER
PILE

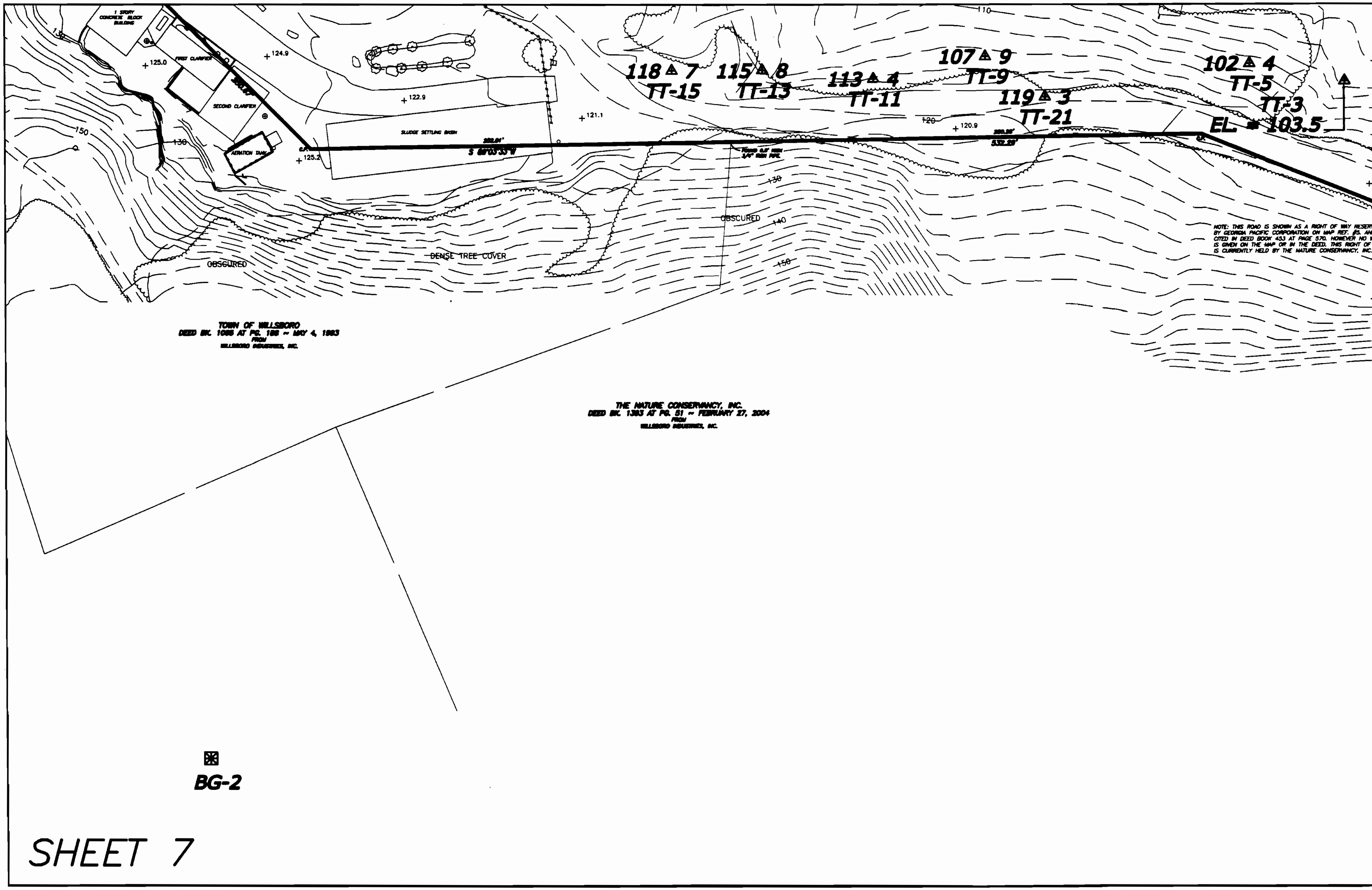


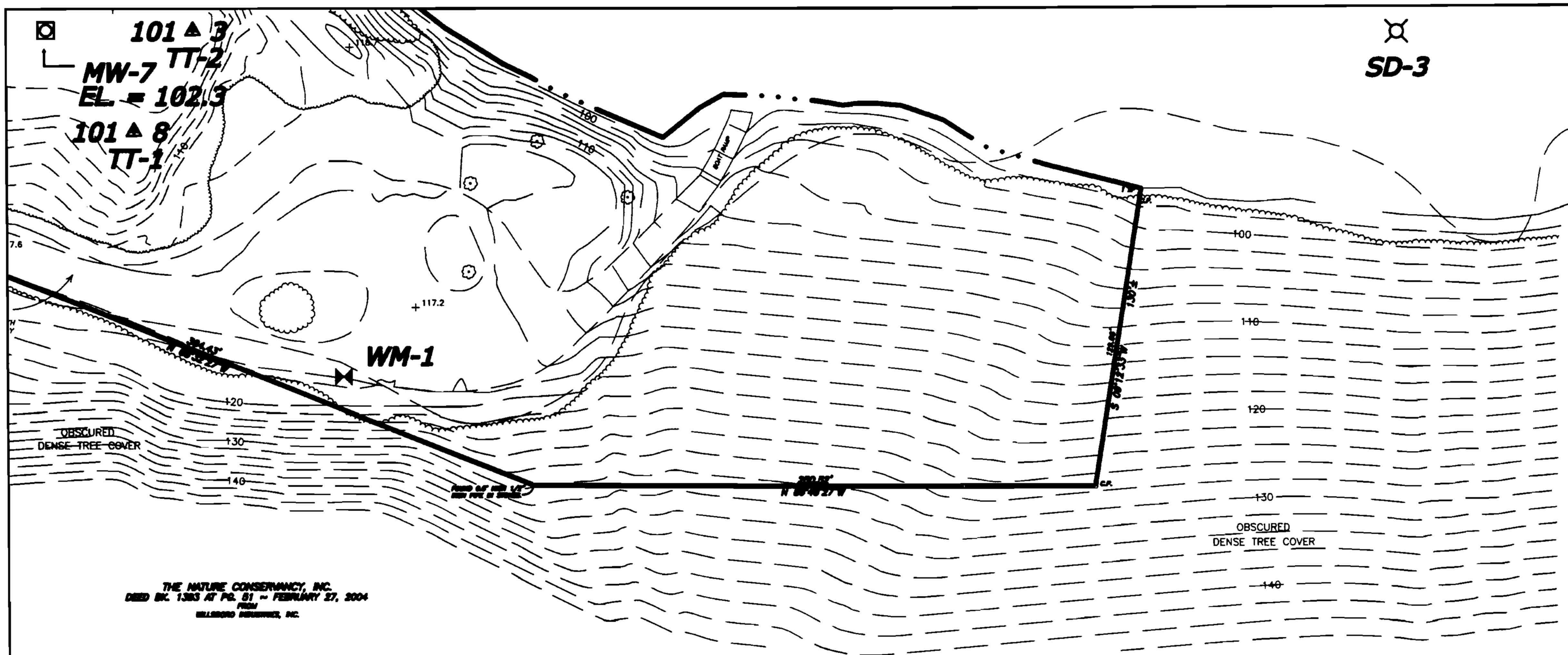
SHEET 4
110 ⊕ 8 B-10
114 ◘ 5 MW-3
TT-20 112 ▲ 4
112 ⊕ 2 B-8
123.2 ▲ TT-24
103 ▲ 3 TT-14
SD-2
114 ▲ 5 TT-16
103 ▲ 0 TT-10
116 ◘ 7 MW-4
MW-6 EL. = 114.3
B-11 EL. = 114.0
B-11 EL. = 114.2
B-12 EL. = 114.5
TT-12 EL. = 114.4
125 ▲ 0 TT-28
125 ▲ 7 TT-25
126 ▲ 9 TT-23
126 ▲ 7 TT-19
TT-17 EL. = 122.5
B-7 EL. = 122.0
101 ▲ 9 TT-8
TT-4 EL. = 102.1
PILE
DENSE TREE COVER
OBSCURED
SEWAGE TREATMENT PLANT SITE
FIRE HYDRANT


WM-4
WILLSBORO INDUSTRIES, INC.
BK. 457 PG. 150 ~ AUGUST 16, 1967
FROM
OBSCURED
118.6
110.4
109.2
107.0
106.8
106.8
106.6
112.5
113.4
110
110
110
101.9
104.1
103.0
100.9
102.7
102.8
99.4
101.4
99.7
101.6
100
100
OBSCURED
116.8

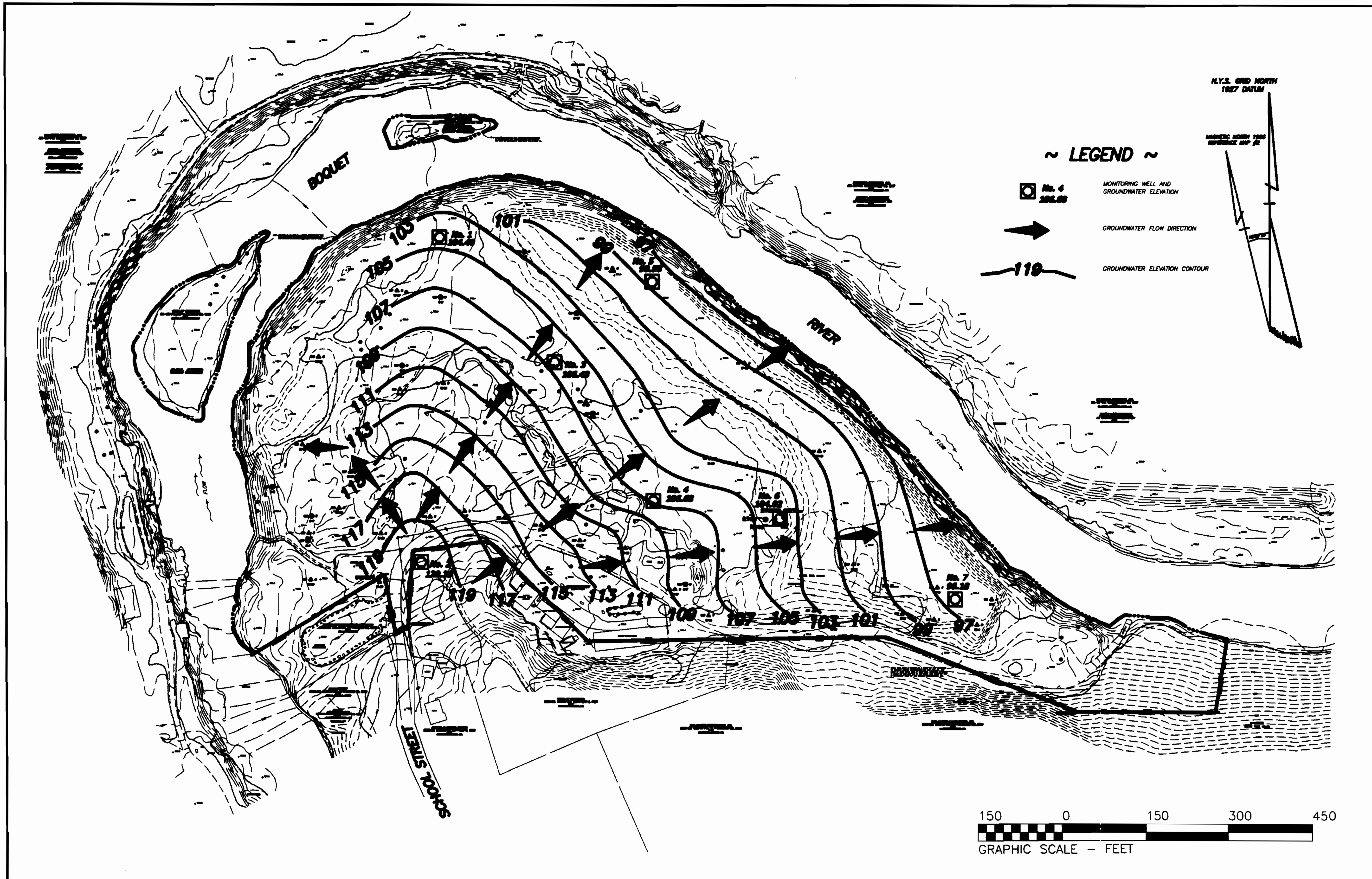

SHEET 5


SHEET 6
SCHOOL STREET
BG-1
RAPIDS
OBSCURED
OBSCURED
HALPIN TRUST
PEOPLE OF THE STATE OF NEW YORK
120
140
110
130
135.8
132.9
123.2
125.1
116.6
129.5
142.4
105.00'


1 STORY CONCRETE BLOCK BUILDING
FIRST CLARIFIER
SECOND CLARIFIER
AERATION TANK
SLUDGE SETTLING BASIN
S 89°03'33" W
118 ▲ 7
TT-15
115 ▲ 8
TT-13
113 ▲ 4
TT-11
107 ▲ 9
TT-9
119 ▲ 3
TT-21
102 ▲ 4
TT-5
TT-3
EL. = 103.5
OBSCURED
DENSE TREE COVER
OBSCURED
NOTE: THIS ROAD IS SHOWN AS A RIGHT OF WAY RESERVE
BY GEORGIA PACIFIC CORPORATION ON MAP REF. #3, AND
CITED IN DEED BOOK 453 AT PAGE 570. HOWEVER NO WID
IS GIVEN ON THE MAP OR IN THE DEED. THIS RIGHT OF W
IS CURRENTLY HELD BY THE NATURE CONSERVANCY, INC.
TOWN OF WILLSBORO
DEED BK. 1088 AT PG. 188 ~ MAY 4, 1993
FROM
WILLSBORO INDUSTRIES, INC.
THE NATURE CONSERVANCY, INC.
DEED BK. 1383 AT PG. 51 ~ FEBRUARY 27, 2004
FROM
WILLSBORO INDUSTRIES, INC.
BG-2
SHEET 7


101 ▲ 3
TT-2
MW-7
EL = 102.3
101 ▲ 8
TT-1
SD-3
WM-1
117.2
OBSCURED
DENSE TREE COVER
THE NATURE CONSERVANCY, INC.
DEED BK. 1393 AT PG. 81 ~ FEBRUARY 27, 2004

SHEET 8



~ LEGEND ~
No. 4 166.68
MONITORING WELL AND GROUNDWATER ELEVATION
GROUNDWATER FLOW DIRECTION
119
GROUNDWATER ELEVATION CONTOUR
N.Y.S. GRID NORTH 1927 DATUM
BOQUET
RIVER
SCHOOL STREET
FLOW
150 0 150 300 450
GRAPHIC SCALE - FEET

# APPENDIX A

# HISTORIC SITE CORRESPONDENCE

BOQUET RIVER ASSOCIATION, INC.
Elizabethtown, New York 12932
(518) 873-6301

August 26, 1991

Dr. Nancy Kim, Director
Division of Environmental Assessment
NYS Department of Health
2 University Place
Albany, NY 12203

Dear Dr. Kim:

The Boquet River Association, Inc. (BRASS) is concerned about the composition and possible leaching properties of the "black ash" in Willsboro, Essex County. BRASS has designed a public park along the Boquet River on town owned property just downstream of the dam and salmon fishway. Because trail, stair, picnic area, and handicap rampway construction, as well as eventual public use, will mean movement of--and contact with--the "black ash," BRASS would like assurances that this waste from a former paper company will in no way endanger or pose health risks to workers and public, or after disturbance cause potential pollution runoff into the Boquet River. For these reasons, BRASS seeks a written determination of the site from your office before continuing work on the park with the Town of Willsboro.

A single <u>surface</u> sample of the "black ash" was taken in April of '89 by John Sheehan and David Holland (DOH, Saranac Lake) and analyzed in the fall of '89 at the inorganic analytical chemistry lab in Albany. (Results took a long time since the black ash acted like charcoal, holding onto any organic matter and "eating up lab chemicals.")

John Sheehan suggested to me, in a recent phone conversation, that I find out exactly what processes were used to generate the waste at the paper mill. I knew from a written paper by school children at the Paine Memorial Library in Willsboro that two former employees still lived in town: Wayne Benedict (963-4555) and Festus Smith (963-4102), the last superintendent of the mill and a chemist. I called both of them. Wayne Benedict spoke about the soda process whereby soda ash and chemical lime was made into a cooking mash to soften the wood fibers. Festus Smith talked about the same caustic "black liquor" high in BTU content that was then burned in a rotary incinerator. Cinder from the soft coal, used for burning, was mixed into the resultant powder. Sodium carbonate was leached out with hot water.

When this "black ash" was dumped into "lagoons" along the south bank of the Boquet River, it was still hot. Old residents speak about the "red glow at night" from the hot ash. Wayne Benedict said sometimes the black ash would start burning again. "When it was dumped, it was burnt off. But it would re-burn again."

The wood pulp at the mill was later bleached with chlorine. Kerosene--"never mercury"--was used as a foam deterrent.

The Champlain Fibre Company, later known simply as the Willsboro Pulp Mill, began in 1884. It had a production capacity of about 10 tons of dry chemical fibre every 24 hours, and was in operation day and night. It used the caustic soda process to make pulp until the mill closed in 1965.

I give you this information because it was suggested of me by John Sheehan. It makes me uncomfortable, however. I am not a chemist. Nor do I know the appropriate questions. Festus Smith, however, has a residence on Middle Road in Willsboro, and his mailing address is RFD Box 66, Willsboro, NY 12996.

BRASS looks forward to an investigation and determination of this site by your office. We are anxious to continue our park plans and funding arrangements.

Sincerely,

Robin Ulmer

Robin Ulmer, director

c.c. J. Sheehan, DOH
D. Holland, DOH
E. Coonrod, Supervisor, Willsboro
J. Owens, landscape designer

New York State Department of Environmental Conservation
Ray Brook, NY 12977
(518) 891-1370

Thomas C. Jorling
Commissioner

March 20, 1989

RECEIVED
MAR 22 1989
NYS DEPT. OF HEALTH
SARANAC LAKE DISTRICT

Mrs. Edna Coonrod, Supervisor
Town of Willsboro
Willsboro, New York 12996

RE: Black Ash Lagoons
Willsboro (T), Essex County

Dear Mrs. Coonrod and Board Members:

I recently reviewed a copy of a letter sent to you and the Town Board members by Mr. David A. Holland of the New York State Department of Health District Office in Saranac Lake, dated March 9, 1989. The subject of Mr. Holland's letter was the Black Ash Lagoons in Willsboro.

There is a statement in the letter that the New York State Department of Environmental Conservation is advocating the use of the Black Ash Lagoons as a filtering media. It should be understood that the Department of Environmental Conservation is not advocating the use of the Black Ash Lagoon but rather entertaining the proposal to use them as presented in the Facility Planning Report prepared by the Town's consultant, Tisdel Associates in February, 1982 and approved by this Department July 30, 1983.

The remainder of the letter is a discussion of the potential environmental hazard associated with the lagoons. There have been several pieces of correspondence on this subject between the Department and the interested public which regrettably were not relayed to you and the Town board members. The Department's assessment, based on samples collected by the Department to date, is that there is no apparent environmental contamination problem associated with the lagoons. We also had planned to collect additional samples similar to those collected by the Health Department to confirm our belief. Since the Department of Health has collected similar samples we will use them to complete our assessment. We will notify you of the findings when the assessment is complete.

The District Director of the Department of Health and I discusssed this and agreed that the lead for resolution of this matter should remain with the Department of Environmental Conservation through the office of the Regional Water Engineer, Mr. Wiley Lavigne.

If you have any questions, please feel free to contact me or Mr. Lavigne at (518) 891-1370.

Sincerely,

D. A. Corliss, P.E.
Regional Engineer

By: Daniel L. Steenberge, P.E.
Regional Remediation Engineer

GAS:DLS:bl

cc: D. Corliss
W. Lavigne
C. Goddard
J. Sheehan
D. Holland

3/24/89

**** CONTINUED ON NEXT PAGE ****

COPIES SENT TO: CO(2), RO(2), LPHE(2), FED( ), INFO-P( ), INFO-L( )

NEW YORK STATE DEPARTMENT OF HEALTH
SARANAC LAKE DISTRICT OFFICE
P.O. BOX 389 11-15 ST. BERNARD STREET
SARANAC LAKE, N.Y. 12983

SUBMITTED BY: SHEEHAN

0385

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER FOR LABORATORIES AND RESEARCH

PAGE 2 RESULTS OF EXAMINATION FINAL REPORT(REV)

SAMPLE ID: 881009432 SAMPLE RECEIVED: 88/10/04/11 CHARGE: 8.20
POLITICAL SUBDIVISION: WILLSBORO COUNTY: ESSEX
LOCATION: WILLSBORO BLACK ASH LAGOONS FORMER PAPER MILL
TIME OF SAMPLING: 88/09/23 15:00 DATE PRINTED: 89/02/15

REVISION DATE 89/01/24, FOLLOWING PARAMETERS ADDED AFTER SAMPLE REPORTED

FOLLOWING PARAMETERS NOT PART OF TEST PATTERN

| PARAMETER | RESULT |
|---|---|
| CARBON, TOT ORGANIC-DRY SOLIDS | INTERF [NA] |

**** END OF REPORT ****

RECEIVED
FEB 17 1989
NYS DEPT. OF HEALTH
SARANAC LAKE DISTRICT

HYDROLOGIC INFORMATION

**Flood Zone Data:** This data, available in select counties across the country, was obtained by EDR in 1999 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

**NWI:** National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002 from the U.S. Fish and Wildlife Service.

HYDROGEOLOGIC INFORMATION

**AQUIFLOW[R] Information System**

Source: EDR proprietary database of groundwater flow information

EDR has developed the AQUIFLOW Information System (AIS) to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted to regulatory authorities at select sites and has extracted the date of the report, hydrogeologically determined groundwater flow direction and depth to water table information.

GEOLOGIC INFORMATION

**Geologic Age and Rock Stratigraphic Unit**

Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - A digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

**STATSGO:** State Soil Geographic Database

The U.S. Department of Agriculture's (USDA) Soil Conservation Service (SCS) leads the national Cooperative Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps.

ADDITIONAL ENVIRONMENTAL RECORD SOURCES

**FEDERAL WATER WELLS**

**PWS:** Public Water Systems

Source: EPA/Office of Drinking Water

Telephone: 202-564-3750

Public Water System data from the Federal Reporting Data System. A PWS is any water system which provides water to at least 25 people for at least 60 days annually. PWSs provide water from wells, rivers and other sources.

**PWS ENF:** Public Water Systems Violation and Enforcement Data

Source: EPA/Office of Drinking Water

Telephone: 202-564-3750

Violation and Enforcement data for Public Water Systems from the Safe Drinking Water Information System (SDWIS) after August 1995. Prior to August 1995, the data came from the Federal Reporting Data System (FRDS).

**USGS Water Wells:** In November 1971 the United States Geological Survey (USGS) implemented a national water resource information tracking system. This database contains descriptive information on sites where the USGS collects or has collected data on surface water and/or groundwater. The groundwater data includes information on more than 900,000 wells, springs, and other sources of groundwater.

# PHYSICAL SETTING SOURCE RECORDS SEARCHED

**STATE RECORDS**

**New York Public Water Wells**
Source: New York Department of Health
Telephone: 518-458-6731

**New York Facility and Manifest Data**
Source: NYSDEC
Telephone: 518-457-6585
Facility and manifest data. Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a tsd facility.

**RADON**

**New York Radon Basement Screening Results**
Source: New York Department of Health
Telephone: 518-402-7556

**Area Radon Information**
Source: USGS
Telephone: 303-202-4210
The National Radon Database has been developed by the U.S. Environmental Protection Agency (USEPA) and is a compilation of the EPA/State Residential Radon Survey and the National Residential Radon Survey. The study covers the years 1986 - 1992. Where necessary data has been supplemented by information collected at private sources such as universities and research institutions.

**EPA Radon Zones**
Source: EPA
Telephone: 202-564-9370
Sections 307 & 309 of IRAA directed EPA to list and identify areas of U.S. with the potential for elevated indoor radon levels.

**OTHER**

**Epicenters:** World earthquake epicenters, Richter 5 or greater
Source: Department of Commerce, National Oceanic and Atmospheric Administration

STATE OF NEW YORK
DEPARTMENT OF HEALTH
District Office P.O. Box 389, 11-15 St. Bernard Street Saranac Lake, New York 12983
(518) 891-1800

David Axelrod, M.D.
*Commissioner*

OFFICE OF PUBLIC HEALTH
Linda A. Randolph, M.D., M.P.H.
*Director*
William R. Amberman, P.E.
*District Director*

March 9, 1989

Mrs. Edna Coonrod, Supervisor
Town of Willsboro
Willsboro, New York 12996

Re: Black Ash Lagoons
Willsboro T., Essex Co.

Dear Mrs. Coonrod and Board Members:

Per your request, Mr. John Sheehan of this department and I conducted an investigation of the Black Ash Lagoons, Willsboro, New York. On September 23, 1988, we met with you to investigate the lagoons.

The Black Ash Lagoons are the remains of the waste materials (liquor) used in the processing of wood pulp from paper mills located along the Boquet River. These lagoons are approximately 900' long, 400' wide and are of undetermined depth. Mr. Sheehan collected a surface soil/sediment sample of the lagoon's material for analysis. A copy of these results is enclosed. The sample results were within the maximum contaminant level at the time of sampling. The organic samples analysis has not been completed.

Further analysis (leachate, pore sampling, ground sediment, etc.) must be completed to determine the status of this site. This department will continue its investigation in the spring.

It has come to our attention that the New York State Department of Environmental Conservation is advocating the use of the Black Ash Lagoons as a filtering media for the proposed communal sewage disposal system. This is not recommended at this time. The potential hazard of using the lagoons could severely effect the Town of Willsboro financially, legally and environmentally.

The results of our investigation will be presented to the town when completed.

<u>Any information you have pertaining to the operations and processes of the wood pulp mills is essential to our investigation.</u>

If you have any questions or information, feel free to contact me.

Very truly yours,

David A. Holland

David A. Holland
Sanitarian

Enc.

RESULTS OF EXAMINATION

FINAL REPORT(REV)

SAMPLE ID: 881009432 SAMPLE RECEIVED:88/10/04/11 CHARGE: 8.20
PROGRAM: 106:BUREAU OF ENVIRONMENTAL EXPOSURE INVESTIGATION
SOURCE ID: DRAINAGE BASIN:10 GAZETTEER CODE:1566
POLITICAL SUBDIVISION:WILLSBORO COUNTY:ESSEX
LATITUDE: . LONGITUDE: . Z DIRECTION:
LOCATION: WILLSBORO BLACK ASH LAGOONS FORMER PAPER MILL
DESCRIPTION:SURFACE SAMPLE - NEAR POINT OFF THE DIRT ROAD
REPORTING LAB: 10:LABORATORY OF INORGANIC ANALYTICAL CHEMISTRY - ALBAN
TEST PATTERN: 10-035:METALS IN SOLID MATERIAL
SAMPLE TYPE: 630:DRIED SLUDGE
TIME OF SAMPLING: 88/09/23 15:00 DATE PRINTED:89/02/15

| PARAMETER | RESULT | |
|---|---|---|
| SOLIDS, DRY | 26. PERCENT | |
| ARSENIC IN DRY SOLIDS | < 1. MCG/G | micro gram / gram |
| MERCURY IN DRY SOLIDS | < 0.04 MCG/G | |
| SELENIUM IN DRY SOLIDS | < 0.5 MCG/G | 1 part per million |
| BERYLLIUM IN DRY SOLIDS | < 0.4 MCG/G | |
| SILVER IN DRY SOLIDS | < 4. MCG/G | |
| BARIUM IN DRY SOLIDS | 23. MCG/G | |
| CADMIUM IN DRY SOLIDS | < 2. MCG/G | |
| COBALT IN DRY SOLIDS | < 2. MCG/G | |
| CHROMIUM IN DRY SOLIDS | 2.0 MCG/G | |
| COPPER IN DRY SOLIDS | 5.8 MCG/G | |
| IRON IN DRY SOLIDS | 951. MCG/G | |
| MANGANESE IN DRY SOLIDS | 105. MCG/G | |
| NICKEL IN DRY SOLIDS | 3.0 MCG/G | |
| STRONTIUM IN DRY SOLIDS | 24. MCG/G | |
| TITANIUM IN DRY SOLIDS | 41. MCG/G | |
| VANADIUM IN DRY SOLIDS | 18. MCG/G | |
| ZINC IN DRY SOLIDS | 191. MCG/G | |
| MOLYBDENUM IN DRY SOLIDS | < 8. MCG/G | |
| LEAD IN DRY SOLIDS | [NA] | not analyzed |
| ANTIMONY IN DRY SOLIDS | < 20. MCG/G | |
| TIN IN DRY SOLIDS | < 20. MCG/G | |
| THALLIUM IN DRY SOLIDS | < 10. MCG/G | |
| ALUMINUM IN DRY SOLIDS | 1210. MCG/G | |
| DIGESTION OF SOLIDS FOR METALS | DONE | |
| DIGESTION OF SOLIDS FOR HG | DONE | |

RECEIVED
FEB 17 1989
NYS DEPT. OF HEALTH
SARANAC LAKE DISTRICT

FOLLOWING PARAMETERS NOT PART OF TEST PATTERN

| PARAMETER | RESULT |
|---|---|
| IN DRY SOLIDS | 3.7 MCG/G |

BOQUET RIVER ASSOCIATION, INC.
Elizabethtown, New York 12932
(518) 873-6301

August 26, 1991

Dr. Nancy Kim, Director
Division of Environmental Assessment
NYS Department of Health
2 University Place
Albany, NY 12203

Dear Dr. Kim:

The Boquet River Association, Inc. (BRASS) is concerned about the composition and possible leaching properties of the "black ash" in Willsboro, Essex County. BRASS has designed a public park along the Boquet River on town owned property just downstream of the dam and salmon fishway. Because trail, stair, picnic area, and handicap rampway construction, as well as eventual public use, will mean movement of--and contact with--the "black ash," BRASS would like assurances that this waste from a former paper company will in no way endanger or pose health risks to workers and public, or after disturbance cause potential pollution runoff into the Boquet River. For these reasons, BRASS seeks a written determination of the site from your office before continuing work on the park with the Town of Willsboro.

A single <u>surface</u> sample of the "black ash" was taken in April of '89 by John Sheehan and David Holland (DOH, Saranac Lake) and analyzed in the fall of '89 at the inorganic analytical chemistry lab in Albany. (Results took a long time since the black ash acted like charcoal, holding onto any organic matter and "eating up lab chemicals.")

John Sheehan suggested to me, in a recent phone conversation, that I find out exactly what processes were used to generate the waste at the paper mill. I knew from a written paper by school children at the Paine Memorial Library in Willsboro that two former employees still lived in town: Wayne Benedict (963-4555) and Festus Smith (963-4102), the last superintendent of the mill and a chemist. I called both of them. Wayne Benedict spoke about the soda process whereby soda ash and chemical lime was made into a cooking mash to soften the wood fibers. Festus Smith talked about the same caustic "black liquor" high in BTU content that was then burned in a rotary incinerator. Cinder from the soft coal, used for burning, was mixed into the resultant powder. Sodium carbonate was leached out with hot water.

When this "black ash" was dumped into "lagoons" along the south bank of the Boquet River, it was still hot. Old residents speak about the "red glow at night" from the hot ash. Wayne Benedict said sometimes the black ash would start burning again. "When it was dumped, it was burnt off. But it would re-burn again."

The wood pulp at the mill was later bleached with chlorine. Kerosene--"never mercury"--was used as a foam deterrent.

The Champlain Fibre Company, later known simply as the Willsboro Pulp Mill, began in 1884. It had a production capacity of about 10 tons of dry chemical fibre every 24 hours, and was in operation day and night. It used the caustic soda process to make pulp until the mill closed in 1965.

I give you this information because it was suggested of me by John Sheehan. It makes me uncomfortable, however. I am not a chemist. Nor do I know the appropriate questions. Festus Smith, however, has a residence on Middle Road in Willsboro, and his mailing address is RFD Box 66, Willsboro, NY 12996.

BRASS looks forward to an investigation and determination of this site by your office. We are anxious to continue our park plans and funding arrangements.

Sincerely,

Robin Ulmer

Robin Ulmer, director

c.c. J. Sheehan, DOH
D. Holland, DOH
E. Coonrod, Supervisor, Willsboro
J. Owens, landscape designer

New York State Department of Environmental Conservation
Ray Brook, NY 12977
(518) 891-1370

Thomas C. Jorling
*Commissioner*

March 20, 1989

RECEIVED
MAR 22 1989
NYS DEPT. OF HEALTH
SARANAC LAKE DISTRICT

Mrs. Edna Coonrod, Supervisor
Town of Willsboro
Willsboro, New York 12996

RE: Black Ash Lagoons
Willsboro (T), Essex County

Dear Mrs. Coonrod and Board Members:

I recently reviewed a copy of a letter sent to you and the Town Board members by Mr. David A. Holland of the New York State Department of Health District Office in Saranac Lake, dated March 9, 1989. The subject of Mr. Holland's letter was the Black Ash Lagoons in Willsboro.

There is a statement in the letter that the New York State Department of Environmental Conservation is advocating the use of the Black Ash Lagoons as a filtering media. It should be understood that the Department of Environmental Conservation is not advocating the use of the Black Ash Lagoon but rather entertaining the proposal to use them as presented in the Facility Planning Report prepared by the Town's consultant, Tisdel Associates in February, 1982 and approved by this Department July 30, 1983.

The remainder of the letter is a discussion of the potential environmental hazard associated with the lagoons. There have been several pieces of correspondence on this subject between the Department and the interested public which regrettably were not relayed to you and the Town board members. The Department's assessment, based on samples collected by the Department to date, is that there is no apparent environmental contamination problem associated with the lagoons. We also had planned to collect additional samples similar to those collected by the Health Department to confirm our belief. Since the Department of Health has collected similar samples we will use them to complete our assessment. We will notify you of the findings when the assessment is complete.

The District Director of the Department of Health and I discusssed this and agreed that the lead for resolution of this matter should remain with the Department of Environmental Conservation through the office of the Regional Water Engineer, Mr. Wiley Lavigne.

If you have any questions, please feel free to contact me or Mr. Lavigne at (518) 891-1370.

Sincerely,

D. A. Corliss, P.E.
Regional Engineer

By: Daniel L. Steenberge, P.E.
Regional Remediation Engineer

GAS:DLS:bl

cc: D. Corliss
W. Lavigne
C. Goddard
J. Sheehan
D. Holland ✓
3/24/89

STATE OF NEW YORK
DEPARTMENT OF HEALTH

District Office P.O. Box 389, 11-15 St. Bernard Street Saranac Lake, New York 12983
(518) 891-1800

David Axelrod, M.D.
*Commissioner*

OFFICE OF PUBLIC HEALTH
Linda A. Randolph, M.D., M.P.H.
*Director*
William R. Amberman, P.E.
*District Director*

March 9, 1989

Mrs. Edna Coonrod, Supervisor
Town of Willsboro
Willsboro, New York 12996

Re: Black Ash Lagoons
Willsboro T., Essex Co.

Dear Mrs. Coonrod and Board Members:

Per your request, Mr. John Sheehan of this department and I conducted an investigation of the Black Ash Lagoons, Willsboro, New York. On September 23, 1988, we met with you to investigate the lagoons.

The Black Ash Lagoons are the remains of the waste materials (liquor) used in the processing of wood pulp from paper mills located along the Boquet River. These lagoons are approximately 900' long, 400' wide and are of undetermined depth. Mr. Sheehan collected a surface soil/sediment sample of the lagoon's material for analysis. A copy of these results is enclosed. The sample results were within the maximum contaminant level at the time of sampling. The organic samples analysis has not been completed.

Further analysis (leachate, pore sampling, ground sediment, etc.) must be completed to determine the status of this site. This department will continue its investigation in the spring.

It has come to our attention that the New York State Department of Environmental Conservation is advocating the use of the Black Ash Lagoons as a filtering media for the proposed communal sewage disposal system. This is not recommended at this time. The potential hazard of using the lagoons could severely effect the Town of Willsboro financially, legally and environmentally.

The results of our investigation will be presented to the town when completed.

Any information you have pertaining to the operations and processes of the wood pulp mills is essential to our investigation.

If you have any questions or information, feel free to contact me.

Very truly yours,

David A. Holland

David A. Holland
Sanitarian

Enc.

RESULTS OF EXAMINATION

FINAL REPORT(REV)

SAMPLE ID: 881009432 SAMPLE RECEIVED:88/10/04/11 CHARGE: 8.20
PROGRAM: 106:BUREAU OF ENVIRONMENTAL EXPOSURE INVESTIGATION
SOURCE ID: DRAINAGE BASIN:10 GAZETTEER CODE:1566
POLITICAL SUBDIVISION:WILLSBORO COUNTY:ESSEX
LATITUDE: . LONGITUDE: . Z DIRECTION:
LOCATION: WILLSBORO BLACK ASH LAGOONS FORMER PAPER MILL
DESCRIPTION:SURFACE SAMPLE - NEAR POINT OFF THE DIRT ROAD
REPORTING LAB: 10:LABORATORY OF INORGANIC ANALYTICAL CHEMISTRY - ALBAN
TEST PATTERN: 10-035:METALS IN SOLID MATERIAL
SAMPLE TYPE: 630:DRIED SLUDGE
TIME OF SAMPLING: 88/09/23 15:00 DATE PRINTED:89/02/15

| ----------PARAMETER---------- | ----------RESULT---------- |
|---|---|
| SOLIDS, DRY | 26. PERCENT |
| ARSENIC IN DRY SOLIDS | < 1. MCG/G |
| MERCURY IN DRY SOLIDS | < 0.04 MCG/G |
| SELENIUM IN DRY SOLIDS | < 0.5 MCG/G |
| BERYLLIUM IN DRY SOLIDS | < 0.4 MCG/G |
| SILVER IN DRY SOLIDS | < 4. MCG/G |
| BARIUM IN DRY SOLIDS | 23. MCG/G |
| CADMIUM IN DRY SOLIDS | < 2. MCG/G |
| COBALT IN DRY SOLIDS | < 2. MCG/G |
| CHROMIUM IN DRY SOLIDS | 2.0 MCG/G |
| COPPER IN DRY SOLIDS | 5.8 MCG/G |
| IRON IN DRY SOLIDS | 951. MCG/G |
| MANGANESE IN DRY SOLIDS | 105. MCG/G |
| NICKEL IN DRY SOLIDS | 3.0 MCG/G |
| STRONTIUM IN DRY SOLIDS | 24. MCG/G |
| TITANIUM IN DRY SOLIDS | 41. MCG/G |
| VANADIUM IN DRY SOLIDS | 18. MCG/G |
| ZINC IN DRY SOLIDS | 191. MCG/G |
| MOLYBDENUM IN DRY SOLIDS | < 8. MCG/G |
| LEAD IN DRY SOLIDS | [NA] |
| ANTIMONY IN DRY SOLIDS | < 20. MCG/G |
| TIN IN DRY SOLIDS | < 20. MCG/G |
| THALLIUM IN DRY SOLIDS | < 10. MCG/G |
| ALUMINUM IN DRY SOLIDS | 1210. MCG/G |
| DIGESTION OF SOLIDS FOR METALS | DONE |
| DIGESTION OF SOLIDS FOR HG | DONE |

micro gram / gram

1 part per million

not analyzed



FOLLOWING PARAMETERS NOT PART OF TEST PATTERN

| ----------PARAMETER---------- | ----------RESULT---------- |
|---|---|
| IN DRY SOLIDS | 3.7 MCG/G |

**** CONTINUED ON NEXT PAGE ****

COPIES SENT TO: CO(2), RO(2), LPHE(2), FED( ), INFO-P( ), INFO-L( )

NEW YORK STATE DEPARTMENT OF HEALTH
SARANAC LAKE DISTRICT OFFICE
P.O. BOX 389 11-15 ST. BERNARD STREET SUBMITTED BY:SHEEHAN
SARANAC LAKE,N.Y. 12983

0385 NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER FOR LABORATORIES AND RESEARCH

PAGE 2 RESULTS OF EXAMINATION FINAL REPORT(REV)

SAMPLE ID: 881009432 SAMPLE RECEIVED:88/10/04/11 CHARGE: 8.20
POLITICAL SUBDIVISION:WILLSBORO COUNTY:ESSEX
LOCATION: WILLSBORO BLACK ASH LAGOONS FORMER PAPER MILL
TIME OF SAMPLING: 88/09/23 15:00 DATE PRINTED:89/02/15

REVISION DATE 89/01/24, FOLLOWING PARAMETERS ADDED AFTER SAMPLE REPORTED

FOLLOWING PARAMETERS NOT PART OF TEST PATTERN

| ----------PARAMETER---------- | ----------RESULT---------- |
|---|---|
| CARBON, TOT ORGANIC-DRY SOLIDS | INTERF [NA] |

**** END OF REPORT ****

RECEIVED
FEB 17 1989
NYS DEPT. OF HEALTH
SARANAC LAKE DISTRICT

# APPENDIX B

# TEST TRENCH EXCAVATION LOGS

**BLACK ASH POND ENVIRONMENTAL RESTORATION PROJECT**

**WILLSBORO, NY**

## TEST TRENCH LOGS

**TT-1**

| DEPTH (in.) | COLOR | TEXTURE | PID (ppm) | | | COMMENTS |
|---|---|---|---|---|---|---|
| | | | B/G | PEAK | AVE | |
| 0-72 | Black | c-mf+ SAND; little SILT (BLACK ASH) with C&D DEBRIS | | | | |
| 72 | Gray | c-mf SAND; trace SILT | 0.0 | 2.2 | 0.0 | Sampled @ 72 in. |

**TT-2**

| DEPTH (in.) | COLOR | TEXTURE | PID (ppm) | | | COMMENTS |
|---|---|---|---|---|---|---|
| | | | B/G | PEAK | AVE | |
| 0-72 | Black | c-mf+ SAND; little SILT (BLACK ASH) | | | | |
| 72 | Gray | c-mf SAND; trace SILT | | | | |

**TT-3**

| DEPTH (in.) | COLOR | TEXTURE | PID (ppm) | | | COMMENTS |
|---|---|---|---|---|---|---|
| | | | B/G | PEAK | AVE | |
| 0-72 | Black | c-mf+ SAND; little SILT (BLACK ASH) | | | | |
| 72 | Gray | c-mf SAND; trace SILT | | | | |

**TT-4**

| DEPTH (in.) | COLOR | TEXTURE | PID (ppm) | | | COMMENTS |
|---|---|---|---|---|---|---|
| | | | B/G | PEAK | AVE | |
| 0-72 | Black | c-mf+ SAND; little SILT (BLACK ASH) | | | | Water level @ grade |
| 72 | Gray | c-mf SAND; trace SILT | 0.0 | 3.7 | 0.0 | Sewer-like odor<br>Sampled @ 72 in. |

### TT-5

| DEPTH (in.) | COLOR | TEXTURE | PID (ppm) B/G | PID (ppm) PEAK | PID (ppm) AVE | COMMENTS |
|---|---|---|---|---|---|---|
| 0-72 | Black | c-mf+ SAND; little SILT (BLACK ASH) | | | | Water level @ grade |
| 72 | Gray | c-mf SAND; trace SILT | 0.0 | 3.3 | 0.0 | Sampled @ 72 in. |

### TT-8

| DEPTH (in.) | COLOR | TEXTURE | PID (ppm) B/G | PID (ppm) PEAK | PID (ppm) AVE | COMMENTS |
|---|---|---|---|---|---|---|
| 0-132 | Black/white/ gray | ASH/SLUDGE/ SAND | 0 | 2.3 | 0.1 | Water level @ grade Sampled riverine sediments below ASH/SLUDGE layers |

### TT-9

| DEPTH (in.) | COLOR | TEXTURE | PID (ppm) B/G | PID (ppm) PEAK | PID (ppm) AVE | COMMENTS |
|---|---|---|---|---|---|---|
| 0-60 | Black | c-mf+ SAND; little SILT (BLACK ASH) | | | | |
| 60-96 | Gray/Brown | c-mf+ SAND; trace SILT; trace f GRAVEL | | | | Possible ledge at 96 in. Groundwater @ 84 in. |

### TT-10

| DEPTH (in.) | COLOR | TEXTURE | PID (ppm) B/G | PID (ppm) PEAK | PID (ppm) AVE | COMMENTS |
|---|---|---|---|---|---|---|
| 0-72 | Black | c-mf+ SAND; little SILT (BLACK ASH) | 0.0 | 5.3 | 2.3 | Sampled @ 72 in. |

**TT-11**

| DEPTH (in.) | COLOR | TEXTURE | PID (ppm) | | | COMMENTS |
|---|---|---|---|---|---|---|
| | | | B/G | PEAK | AVE | |
| 0-90 | Black | Topsoil/ORGANICS/ BLACK ASH | 0.0 | 2.3 | 0.0 | Water level @ 80 in. below grade |
| 90-102 | Gray/brown | c-mf+ SAND; trace SILT; trace f GRAVEL | | | | Possible ledge @ 102 in. |

**TT-12**

| DEPTH (in.) | COLOR | TEXTURE | PID (ppm) | | | COMMENTS |
|---|---|---|---|---|---|---|
| | | | B/G | PEAK | AVE | |
| 120 | Black | c-mf+ SAND; little SILT (BLACK ASH) | 0.0 | 3.3 | 2.0 | |
| 120-216 | White/Gray | SLUDGE | 0.0 | 4.4 | 0.0 | |
| 216 | Gray | c-mf SAND; trace SILT | 0.0 | 5.8 | 2.3 | |

**TT-13**

| DEPTH (in.) | COLOR | TEXTURE | PID (ppm) | | | COMMENTS |
|---|---|---|---|---|---|---|
| | | | B/G | PEAK | AVE | |
| 0-24 | Black | TOPSOIL/ORGANICS/BLACK ASH | | | | |
| 24-48 | Gray/Black | CINDERS | | | | |
| 48-180 | Black | c-mf+ SAND; little SILT (BLACK ASH) | | | | Groundwater @ 84 in. |

**TT-14**

| DEPTH (in.) | COLOR | TEXTURE | PID (ppm) | | | COMMENTS |
|---|---|---|---|---|---|---|
| | | | B/G | PEAK | AVE | |
| 0-84 | Black | c-mf+ SAND; little SILT (BLACK ASH) | | | | Water level @ grade |
| 84 | Gray | c-mf SAND; trace SILT | 0.0 | 0.6 | 0.6 | Sampled @ 84 in. |

**TT-15**

| DEPTH (in.) | COLOR | TEXTURE | PID (ppm) B/G | PEAK | AVE | COMMENTS |
|---|---|---|---|---|---|---|
| 0-30 | Brown | cmf GRAVEL and c-mf+ SAND; little SILT (FILL) | | | | |
| 30-54 | Gray/black | CINDERS | | | | |
| 54-180 | Black | c-mf+ SAND; little SILT (BLACK ASH) | | | | Water level @ 112 in. |

**TT-16**

| DEPTH (in.) | COLOR | TEXTURE | PID (ppm) B/G | PEAK | AVE | COMMENTS |
|---|---|---|---|---|---|---|
| 0-96 | Black | c-mf+ SAND; little SILT (BLACK ASH) | | | | Roots @ 0-24 in. and 48-96 in. |
| 96-168 | White/gray | SLUDGE | | | | |
| 168 | Gray | c-mf SAND; trace SILT | 0 | 0.2 | 1.3 | Sampled @ 168 in. |

**TT-17**

| DEPTH (in.) | COLOR | TEXTURE | PID (ppm) B/G | PEAK | AVE | COMMENTS |
|---|---|---|---|---|---|---|
| 0-50 | Brown | cmf GRAVEL and c-mf+ SAND; little SILT (FILL) with C&D DEBRIS | 0.0 | 0.3 | 0.0 | Sampled @ 30 in. |
| 50-60 | Black | c-mf+ SAND; little SILT (BLACK ASH) | | | | |

**TT-18**

| DEPTH (in.) | COLOR | TEXTURE | PID (ppm) B/G | PEAK | AVE | COMMENTS |
|---|---|---|---|---|---|---|
| 0-84 | Black | c-mf+ SAND; little SILT (BLACK ASH) | | | | |
| 84 | Gray | c-mf SAND; trace SILT | 0.0 | 4.0 | 0.1 | |

**TT-19**

| DEPTH (in.) | COLOR | TEXTURE | PID (ppm) | | | COMMENTS |
|---|---|---|---|---|---|---|
| | | | B/G | PEAK | AVE | |
| 0-102 | Brown | c-mf+ SAND; trace SILT; trace f GRAVEL, with COBBLES | | | | |
| 102-128 | Black | c-mf+ SAND; little SILT (BLACK ASH) | | | | |

**TT-20**

| DEPTH (in.) | COLOR | TEXTURE | PID (ppm) | | | COMMENTS |
|---|---|---|---|---|---|---|
| | | | B/G | PEAK | AVE | |
| 0-48 | Black | c-mf+ SAND; little SILT (BLACK ASH) | | | | Groundwater @ 48 in. |
| 48-156 | White/gray | SLUDGE | | | | |
| 156 | Gray | f SAND; little SILT | 0 | 1.0 | 0.2 | Sampled sludge @ bottom |

**TT-21**

| DEPTH (in.) | COLOR | TEXTURE | PID (ppm) | | | COMMENTS |
|---|---|---|---|---|---|---|
| | | | B/G | PEAK | AVE | |
| 0-80 | Black | c-mf+ SAND; little SILT (BLACK ASH) | | | | |
| 80-144 | Gray | c-mf SAND; trace SILT | | | | |

**TT-23**

| DEPTH (in.) | COLOR | TEXTURE | PID (ppm) | | | COMMENTS |
|---|---|---|---|---|---|---|
| | | | B/G | PEAK | AVE | |
| 0-60 | Brown | c-mf+ SAND; trace SILT; trace f GRAVEL, with COBBLES | | | | |
| 60-96 | Black | c-mf+ SAND; little SILT (BLACK ASH) | | | | |

**TT-24**

| DEPTH (in.) | COLOR | TEXTURE | PID (ppm) B/G | PID (ppm) PEAK | PID (ppm) AVE | COMMENTS |
|---|---|---|---|---|---|---|
| 0-108 | Brown | cmf GRAVEL and c-mf+ SAND; little SILT (FILL) | | | | |
| 108-120 | Black | c-mf+ GRAVEL; cmf SAND; little SILT (likely BERM material) | | | | |

**TT-25**

| DEPTH (in.) | COLOR | TEXTURE | PID (ppm) B/G | PID (ppm) PEAK | PID (ppm) AVE | COMMENTS |
|---|---|---|---|---|---|---|
| 0-60 | Brown | c-mf+ SAND; trace SILT; trace f GRAVEL, with COBBLES | | | | Tree roots |
| 60-80 | Black | c-mf+ SAND; little SILT (BLACK ASH) | | | | |

**TT-26**

| DEPTH (in.) | COLOR | TEXTURE | PID (ppm) B/G | PID (ppm) PEAK | PID (ppm) AVE | COMMENTS |
|---|---|---|---|---|---|---|
| 0-108 | Brown | cmf GRAVEL and c-mf+ SAND; little SILT (FILL) | | | | |
| 108-120 | Black | c-mf+ GRAVEL; cmf SAND; little SILT (likely BERM material) | | | | |

### TT-27

| DEPTH (in.) | COLOR | TEXTURE | PID (ppm) | | | COMMENTS |
|---|---|---|---|---|---|---|
| | | | B/G | PEAK | AVE | |
| 0-108 | Black | c-mf+ GRAVEL; cmf SAND; little SILT (likely BERM material) | | | | Groundwater @ 108 in. |
| 108-156 | White/ gray | SLUDGE | 0 | 1.3 | 0.6 | Sampled @ 132 in. |
| 156-168 | Gray | SILT; some CLAY | 0 | 1.0 | 0.2 | Sampled @ 156 in. |

### TT-28

| DEPTH (in.) | COLOR | TEXTURE | PID (ppm) | | | COMMENTS |
|---|---|---|---|---|---|---|
| | | | B/G | PEAK | AVE | |
| 0-24 | Gray/ Brown | c-mf+ SAND; trace SILT; trace f GRAVEL | | | | |
| 24-44 | Orange-brown | c-mf+ SAND; trace SILT; trace f GRAVEL | | | | |
| 44-66 | Black | c-mf+ SAND; little SILT (BLACK ASH) | | | | |

### TT-29

| DEPTH (in.) | COLOR | TEXTURE | PID (ppm) | | | COMMENTS |
|---|---|---|---|---|---|---|
| | | | B/G | PEAK | AVE | |
| 0-3 | Dark Brown | TOPSOIL | | | | |
| 3-72 | Black | c-mf+ GRAVEL; cmf SAND; little SILT (likely BERM material) | | | | Root systems; Groundwater @ 36 in. |
| 72 | White/ gray | SLUDGE | 0 | 0.3 | 0 | Sampled @ 72 in. |

Note: Profuse groundwater @ 36 in.

**TT-30**

| DEPTH (in.) | COLOR | TEXTURE | PID (ppm) B/G | PID (ppm) PEAK | PID (ppm) AVE | COMMENTS |
|---|---|---|---|---|---|---|
| 0-96 | Black | c-mf+ GRAVEL; cmf SAND; little SILT (likely BERM material) | | | | Root systems |
| 96-120 | White/ gray | SLUDGE | 0 | 0.6 | 0 | Sampled @ 108 in. |

Note: Caved, groundwater @ 108 in.

**TT-31**

| DEPTH (in.) | COLOR | TEXTURE | PID (ppm) B/G | PID (ppm) PEAK | PID (ppm) AVE | COMMENTS |
|---|---|---|---|---|---|---|
| 0-54 | Light Brown | c-mf+ SAND; trace SILT; trace f GRAVEL, with COBBLES | | | | No sample taken |
| 54-68 | Black | c-mf+ SAND; little SILT (BLACK ASH) | | | | |

**TT-32**

| DEPTH (in.) | COLOR | TEXTURE | PID (ppm) B/G | PID (ppm) PEAK | PID (ppm) AVE | COMMENTS |
|---|---|---|---|---|---|---|
| 0-72 | Black | c-mf+ GRAVEL; cmf SAND; little SILT (likely BERM material) | 0 | 1.3 | 0.2 | Sampled @ 42 in.; root systems |
| 72-108 | White/ gray | SLUDGE | 0 | 1.9 | 1.0 | Sampled @ 90 in. |

**TT-33**

| DEPTH (in.) | COLOR | TEXTURE | PID (ppm) B/G | PID (ppm) PEAK | PID (ppm) AVE | COMMENTS |
|---|---|---|---|---|---|---|
| 0-24 | Tan-Brown | c-mf+ SAND; trace SILT; trace f GRAVEL | | | | |
| 24-88 | Dark Brown | cmf GRAVEL and c-mf+ SAND; little SILT (FILL) | | | | |
| 88-92 | Black | c-mf+ SAND; little SILT (BLACK ASH) | | | | |

**TT-34**

| DEPTH (in.) | COLOR | TEXTURE | PID (ppm) B/G | PID (ppm) PEAK | PID (ppm) AVE | COMMENTS |
|---|---|---|---|---|---|---|
| 0-119 | Black | c-mf+ GRAVEL; cmf SAND; little SILT (likely BERM material) | 0 | 1.5 | 0 | Seep @ 36 in.; Sample @ 42 in. |
| 119 | Gray | mf+ SAND; some SILT | 0 | 1.8 | 0.3 | Sampled @ 119 in. |

**TT-35**

| DEPTH (in.) | COLOR | TEXTURE | PID (ppm) B/G | PID (ppm) PEAK | PID (ppm) AVE | COMMENTS |
|---|---|---|---|---|---|---|
| 0-36 | Black | c-mf+ GRAVEL; cmf SAND; little SILT (likely BERM material) | 0 | 1.8 | 0.3 | Sampled @ 36 in.; Roots throughout |
| 36-144 | Black | c-mf+ GRAVEL; cmf SAND; little SILT (likely BERM material) | 0 | 2.6 | 0 | Sampled @ 144 in. |

Note: Caved.

**TT-36**

| DEPTH (in.) | COLOR | TEXTURE | PID (ppm) B/G | PID (ppm) PEAK | PID (ppm) AVE | COMMENTS |
|---|---|---|---|---|---|---|
| 0-3 | Dark Brown | TOPSOIL | | | | |
| 3-54 | Brown | c-mf GRAVEL; and cmf SAND; trace SILT (fill) | | | | |
| 54-108 | Black | c-mf+ SAND; little SILT (BLACK ASH) | 0 | 2.2 | 0.2 | Sampled @ 72 in. |
| 108-144 | Gray-Brown | mf+ SAND; some SILT | 0 | 3.0 | 1.6 | Sampled @ 120 in. |

Note: Misc. gravel fill atop ash, in-situ silty loam beneath ash, did not enter pit. Sampled from ash and silt spoil piles

**TT-37**

| DEPTH (in.) | COLOR | TEXTURE | PID (ppm) B/G | PEAK | AVE | COMMENTS |
|---|---|---|---|---|---|---|
| 0-132 | Black | c-mf+ GRAVEL; cmf SAND; little SILT (likely BERM material) | 0 | 1.9 | 0.5 | Seeping @ 36 in. (Sampled) |
| 132-156 | Gray-brown | mf+ SAND; some SILT | 0 | 1.4 | 0.5 | Stabilized groundwater @ 144 in. (Sampled) |

Caved in.

**TT-38**

| DEPTH (in.) | COLOR | TEXTURE | PID (ppm) B/G | PEAK | AVE | COMMENTS |
|---|---|---|---|---|---|---|
| 0-3 | Dark Brown | Topsoil | | | | |
| 3-20 | Black | c-mf+ SAND; little SILT (BLACK ASH) | | | | |
| 20-36 | Orange-Brown | c-mf+ SAND; trace SILT; trace f GRAVEL | 0.0 | 0.5 | - | Sampled @ 26 in. |

**TT-39**

| DEPTH (in.) | COLOR | TEXTURE | PID (ppm) B/G | PEAK | AVE | COMMENTS |
|---|---|---|---|---|---|---|
| 0-156 | Black | c-mf+ GRAVEL; c-mf SAND; little SILT (likely BERM material) | 0 | 2.4 | 0.9 | Seeping @ 36 in.; Sample @ 48 in. |
| 156-192 | Gray-Brown | mf+ SAND; some SILT | 0 | 1.6 | 0 | Sampled @168 in. |

**TT-40**

| DEPTH (in.) | COLOR | TEXTURE | PID (ppm) B/G | PEAK | AVE | COMMENTS |
|---|---|---|---|---|---|---|
| 0-48 | Black | c-mf+ GRAVEL;cmf SAND; little SILT; (likely BERM material) | 0 | 2.6 | 1.6 | Sampled @ 12 in. |
| 48-84 | Orange-Brown | c-mf+ SAND; trace SILT; trace f GRAVEL | 0 | 3.0 | 0.4 | Sampled @ 66 in. |

# APPENDIX C

# SOIL BORING AND

# MONITORING WELL LOGS

N T S
# Northern Technical Services, LLC

2328 NYS Rt. 11B, Bangor, NY 12966
Phone: (518) 481-5008 Fax: (518) 483-2932

August 5, 2005

Earth Science Engineering, P.C.
24 South Main Street
PO Box 226
Willsboro, NY 12996

ATTN: Mr. Dale Ferris

RE: Subsurface Investigation Report
Black Ash Pond
Willsboro, New York
NTS Report No. 540-1-8-05

Received
ESE, P.C.
Date 8/10/05

Ladies/Gentlemen:

In accordance with your request a subsurface exploration program consisting of thirteen Soil Borings and seven Groundwater Monitor Wells was performed in connection with the referenced project during the period of July 13, 2005 through August 4, 2005.

All soil borings were advanced using 3 ¼-inch I.D. hollow stem augers. Monitor wells were advanced using 4 ¼-inch I.D. augers to facilitate installation of 2-inch diameter groundwater monitor wells. Soil samples were obtained and standard penetration testing was performed utilizing a 2-inch O.D. split barrel sampler in accordance with ASTM D-1586. All soil and rock samples were field classified by a representative of Northern Technical Services using the Burmister Soil Classification System (see "Classification of Material" on the Soil Boring Logs). The soil classifications are based on visual and manual observations and should be considered approximate.

All samples collected in conjunction with the soil boring and monitor well installation work were retained by representatives of Earth Science Engineering, P.C..

Attached are thirteen Soil Boring Logs, seven Monitor Well Boring Logs, and seven Groundwater Monitor Well Installation Details. Please call our office should you have any questions or comments on the enclosed, or if we may be of any further assistance.

Sincerely,
**NORTHERN TECHNICAL SERVICES, LLC**

Richard L. Lucey, P.E.
Project Manager

RLL/bvn

NORTHERN TECHNICAL SERVICES

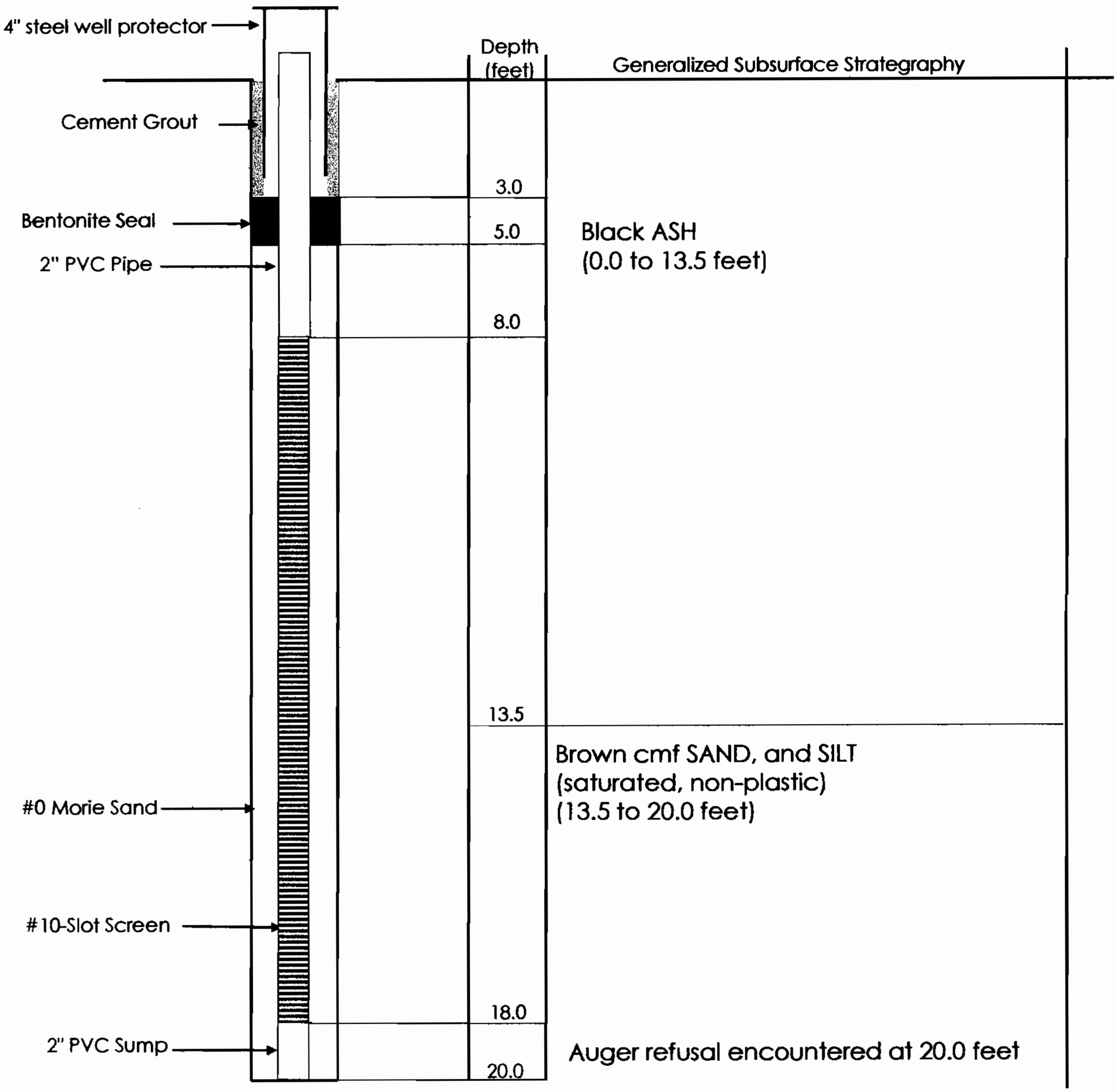
2328 NYS Route 11B, North Bangor, NY 12966

# MONITOR WELL INSTALLATION DETAIL

CLIENT: Earth Science Engineering, PC
Willsboro, New York

PROJECT: Black Ash Pond
Willsboro, New York

WELL NO.: MW-1
REPORT No. 540-1-4-05
Sheet: 1 of 1
Date: 7/21/05
Drillers: C. Wheeler, T. Martin



# NORTHERN TECHNICAL SERVICES

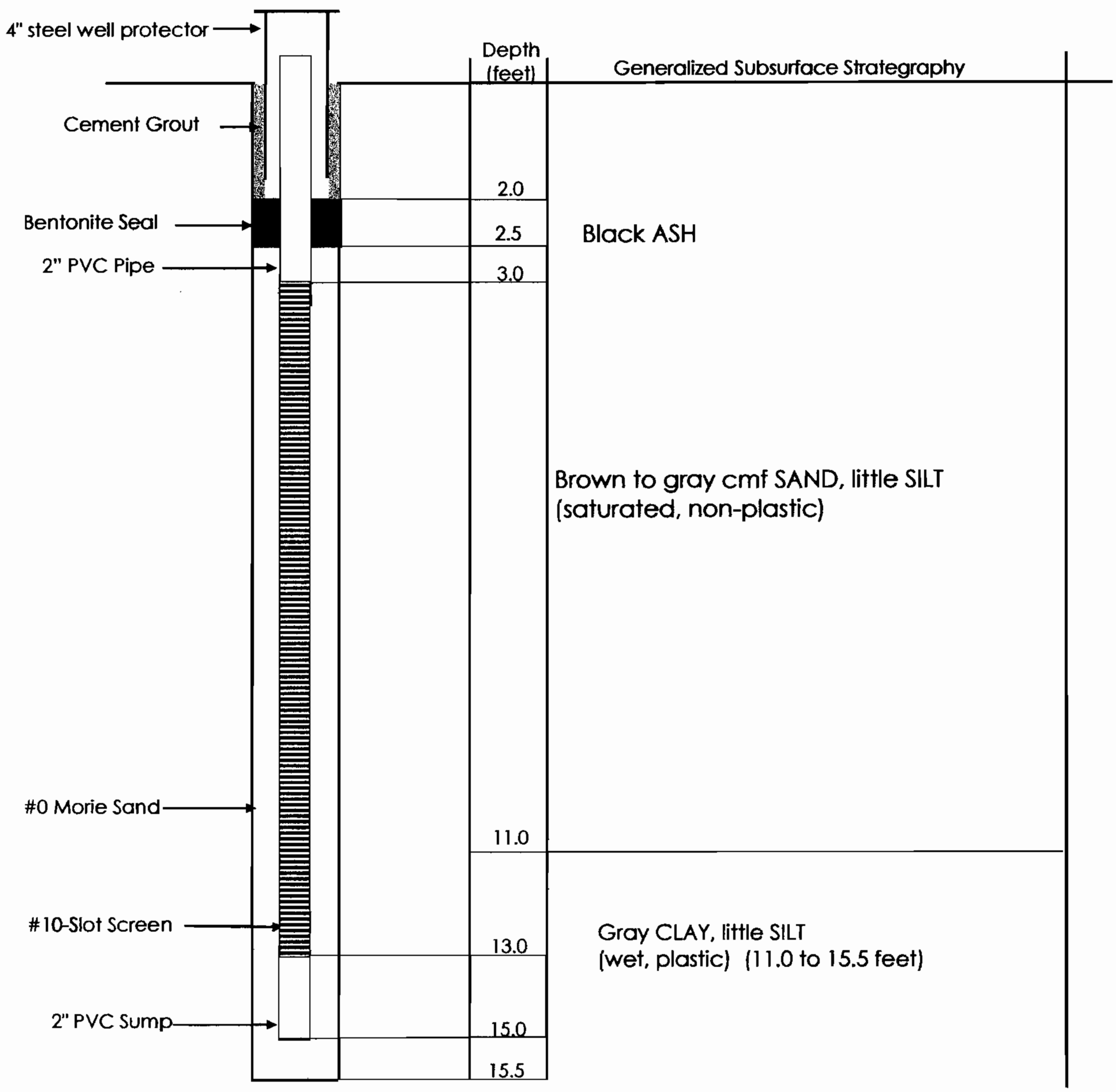
2328 NYS Route 11B, North Bangor, NY 12966

## MONITOR WELL INSTALLATION DETAIL

CLIENT: Earth Science Engineering, PC
Willsboro, New York

PROJECT: Black Ash Pond
Willsboro, New York

WELL NO.: MW-2
REPORT No. 540-1-4-05
Sheet: 1 of 1
Date: 7/21/05
Drillers: C. Wheeler, T. Martin



# NORTHERN TECHNICAL SERVICES

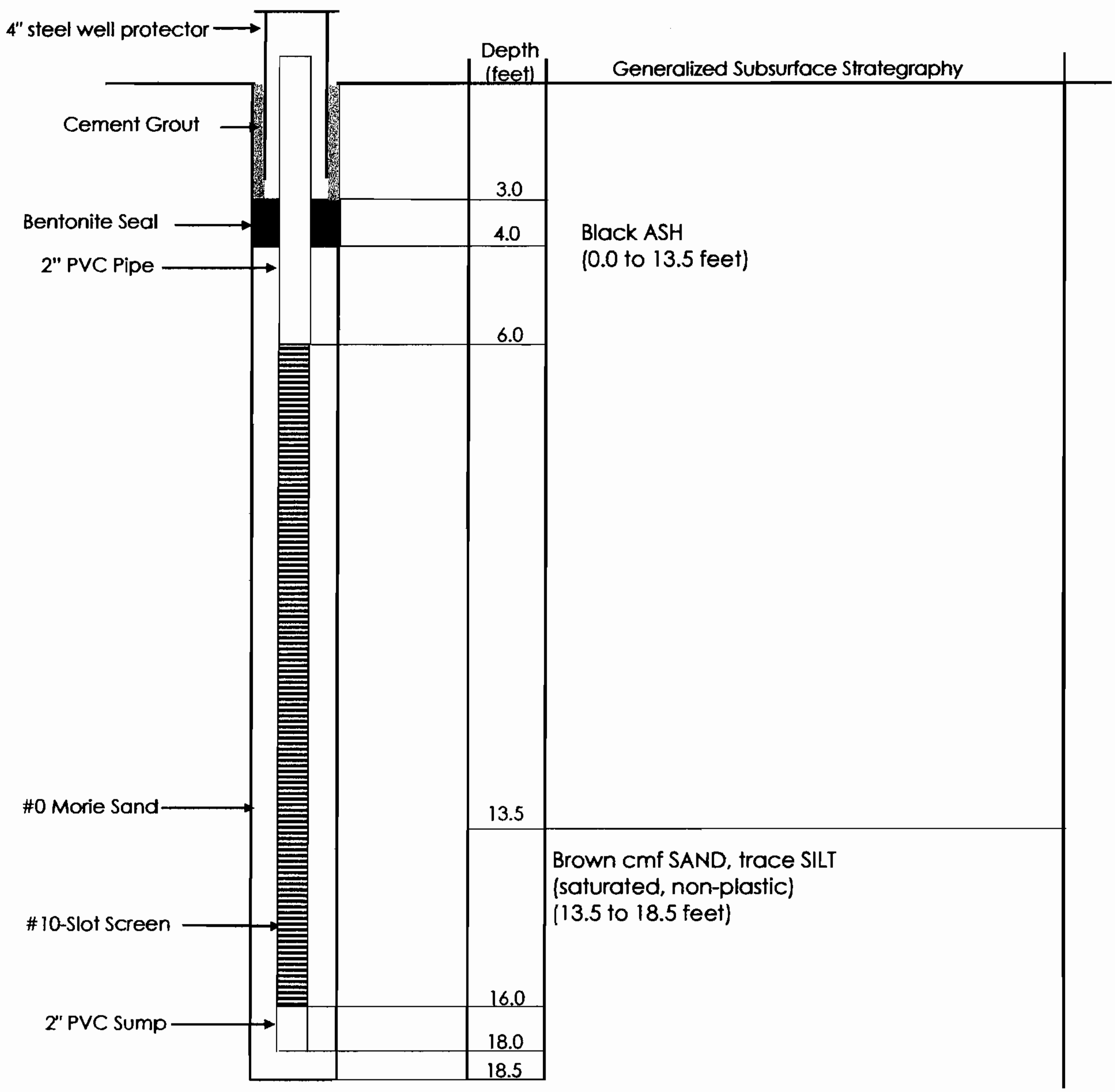
2328 NYS Route 11B, North Bangor, NY 12966

## MONITOR WELL INSTALLATION DETAIL

CLIENT: Earth Science Engineering, PC
Willsboro, New York

PROJECT: Black Ash Pond
Willsboro, New York

WELL NO.: MW-3
REPORT No. 540-1-4-05
Sheet: 1 of 1
Date: 7/22/05
Drillers: C. Wheeler, T. Martin



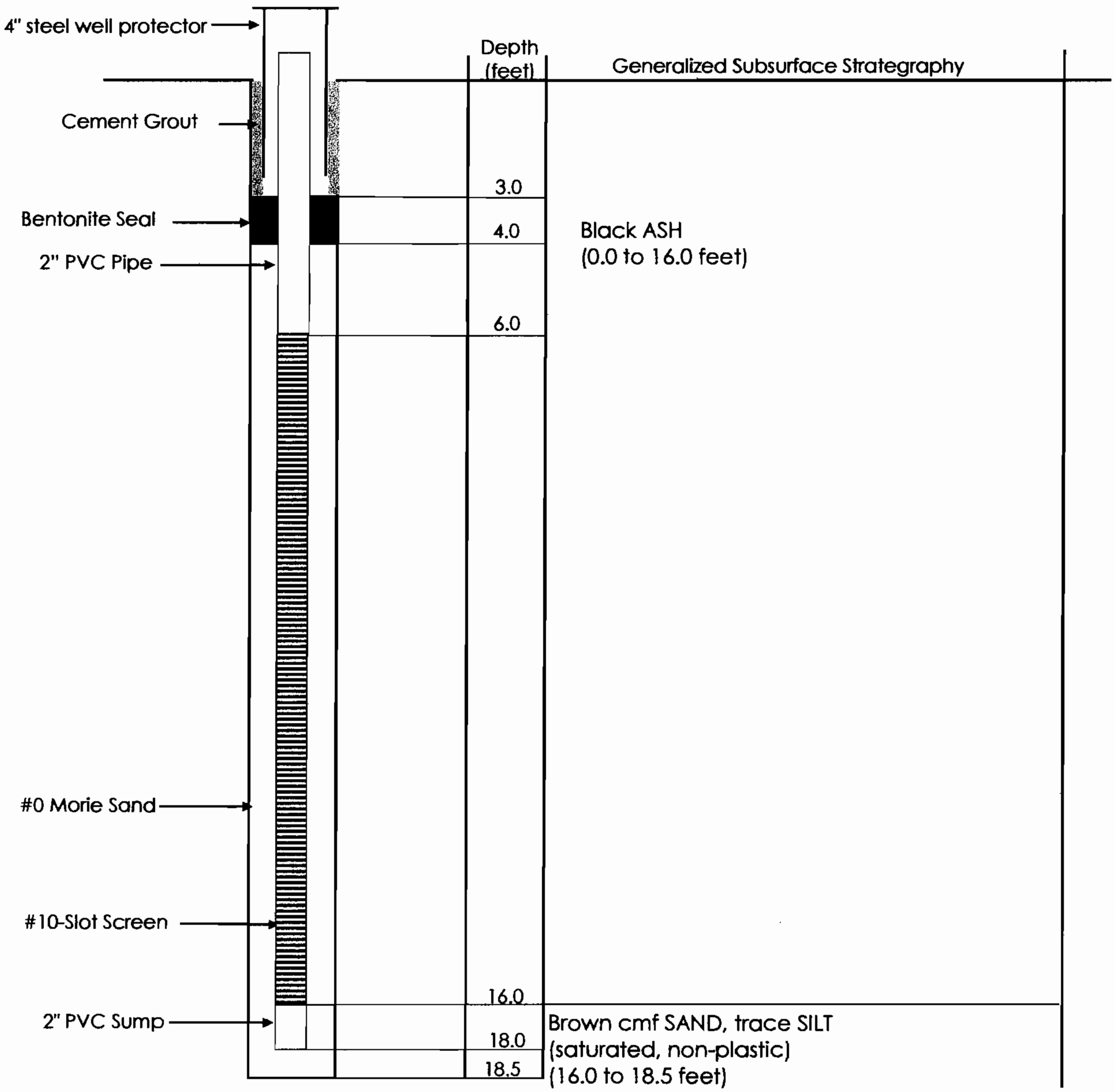
NORTHERN TECHNICAL SERVICES
2328 NYS Route 11B, North Bangor, NY 12966

# MONITOR WELL INSTALLATION DETAIL

CLIENT: Earth Science Engineering, PC
Willsboro, New York

PROJECT: Black Ash Pond
Willsboro, New York

WELL NO.: MW-4
REPORT No. 540-1-4-05
Sheet: 1 of 1
Date: 7/25/05
Drillers: C. Wheeler, T. Martin



# NORTHERN TECHNICAL SERVICES

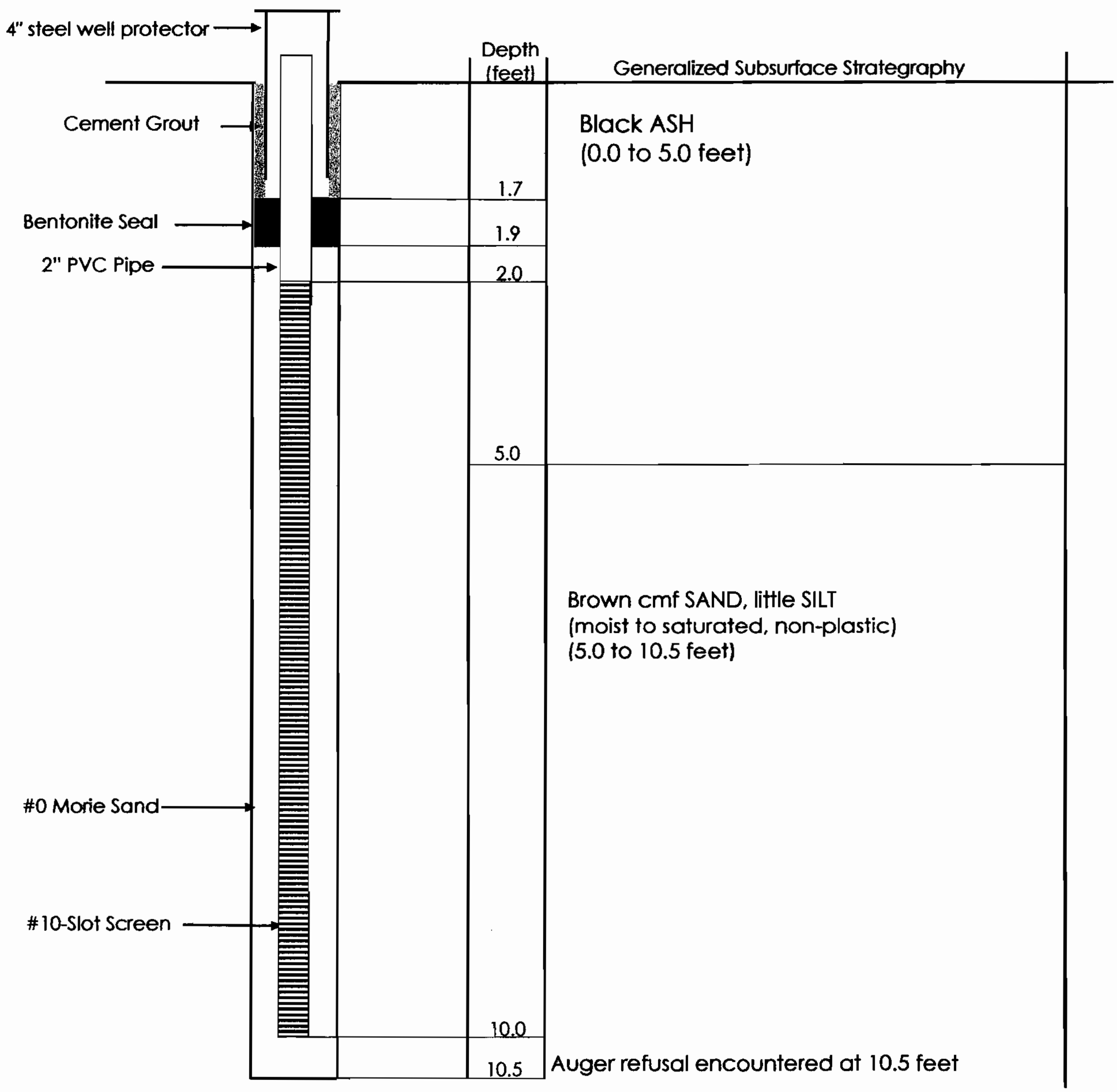
2328 NYS Route 11B, North Bangor, NY 12966

## MONITOR WELL INSTALLATION DETAIL

CLIENT: Earth Science Engineering, PC
Willsboro, New York

PROJECT: Black Ash Pond
Willsboro, New York

WELL NO.: MW-5
REPORT No. 540-1-4-05
Sheet: 1 of 1
Date: 7/25/05
Drillers: C. Wheeler, T. Martin



# NORTHERN TECHNICAL SERVICES

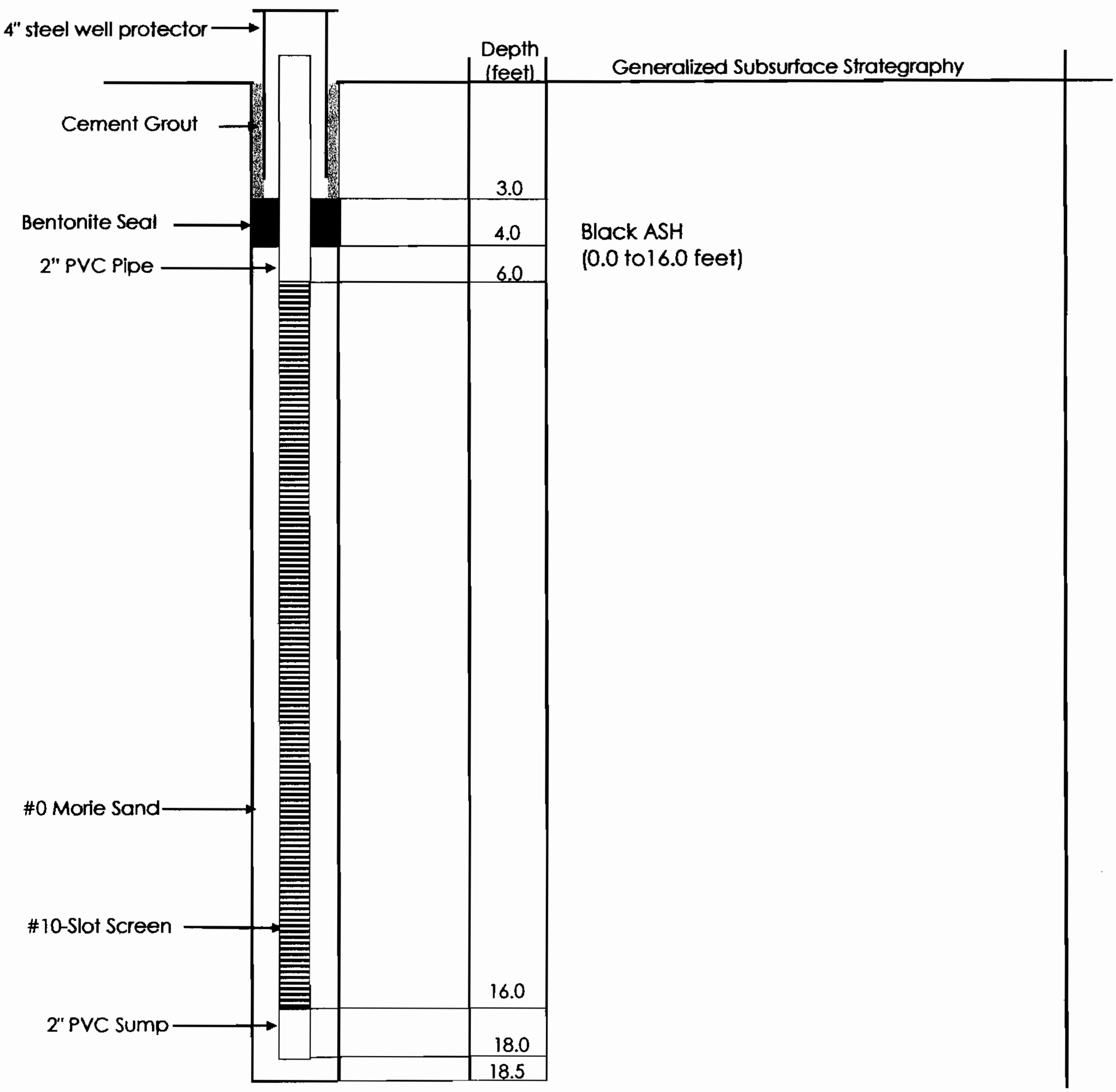
2328 NYS Route 11B, North Bangor, NY 12966

## MONITOR WELL INSTALLATION DETAIL

CLIENT: Earth Science Engineering, PC
Willsboro, New York

PROJECT: Black Ash Pond
Willsboro, New York

WELL NO.: MW-6
REPORT No. 540-1-4-05
Sheet: 1 of 1
Date: 7/26/05
Drillers: C. Wheeler, T. Martin



NORTHERN TECHNICAL SERVICES

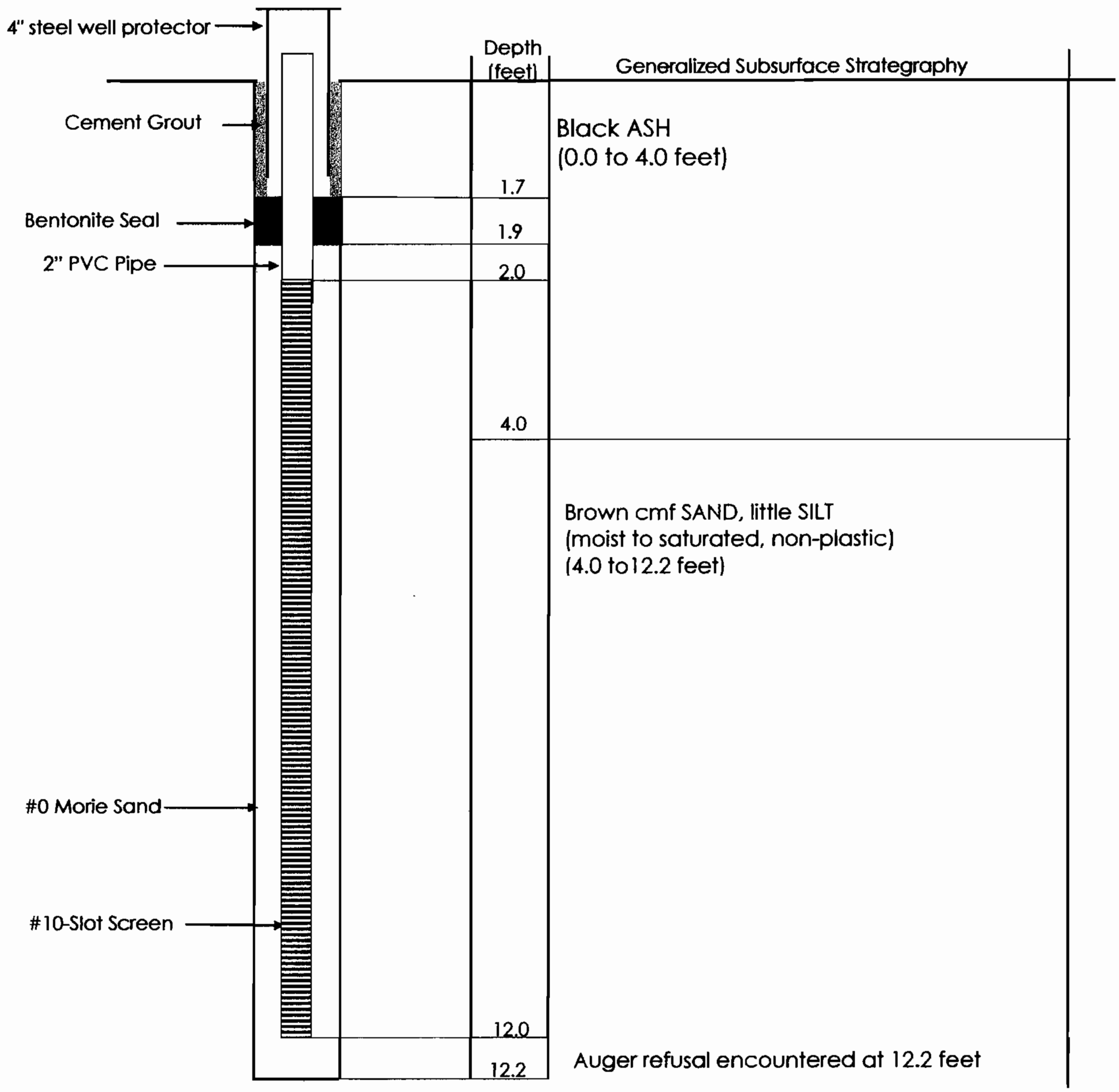
2328 NYS Route 11B, North Bangor, NY 12966

# MONITOR WELL INSTALLATION DETAIL

CLIENT: Earth Science Engineering, PC
Willsboro, New York

PROJECT: Black Ash Pond
Willsboro, New York

WELL NO.: MW-7
REPORT No. 540-1-4-05
Sheet: 1 of 1
Date: 7/25/05
Drillers: C. Wheeler, T. Martin



# Northern Technical Services, LLC

(518) 481-5008

## SOIL BORING LOG

CLIENT: Earth Science Engineering, PC
Willsboro, New York

PROJECT: Black Ash Pond
Willsboro, New York

Boring No. MW-1 Sheet 1 of 1
Date Start: 7/21/05 Finish 7/21/05
NTS Report No. JN 540-1-4-05
Location of Boring: As Staked
Ground Elevation:

NTS DRILLERS: C. Wheeler T. Martin

Casing ____
H.S. Auger 4 1/4"

Sampler Hammer
Wt. 140 lbs.
Fall 30 in.

Ground Water Observations

| Date | Time | Depth | Casing at |
|---|---|---|---|
| | | | |
| | | | |

| CASING TYPE | DEPTH | SAMPLE NO. | DEPTH OF SAMPLE (Ft.) From | To | SAMPLE TYPE | BLOWS ON SAMPLER PER 6" DROP (2" O.D. SAMPLER) | DEPTH OF CHANGE | CLASSIFICATION OF MATERIAL (f - fine, m - medium, c - coarse; and - 35-50%, some - 20-35%, little - 10-20%, trace - 0-10%) | STANDARD PENETRATION RESISTANCE (N) |
|---|---|---|---|---|---|---|---|---|---|
| H S AUGER | | | 0.0 | 6.0 | Auger | | | Black ASH (moist, non-plastic) | |
| | | 1 | 6.0 | 8.0 | SS | WOH | | Black ASH (moist, non-plastic) | 0 |
| | | 2 | 8.0 | 10.0 | SS | WOH | | Black ASH (moist, non-plastic) | 0 |
| | | 3 | 10.0 | 12.0 | SS | WOH | | Black ASH, with sludge (saturated, non-plastic) | 0 |
| | | 4 | 12.0 | 14.0 | SS | WOH, WOH, 1, 0 | 13.5 | Black ASH to 13.5 feet (saturated, non-plastic); Brown cmf SAND (saturated, non-plastic) | 1 |
| | | 5 | 14.0 | 16.0 | SS | WOH | | Grayish cmf SAND, and SILT (saturated, non-plastic) | 0 |
| | | 6 | 16.0 | 18.0 | SS | WOH, WOH, 2, 3 | | Grayish cmf SAND, and SILT (saturated, non-plastic) | 2 |

NOTES:
1) WOH denotes sampler was advanced by the weight of the hammer.
2) Auger refusal encountered at 20.0 feet.
3) Groundwater observation well installed in completed bore hole.

SS-Split Spoon Sample NX-Rock Core U-Undisturbed Sample P-Piston Type Sample

# Northern Technical Services, LLC

(518) 481-5008

## SOIL BORING LOG

CLIENT: Earth Science Engineering, PC
Willsboro, New York

PROJECT: Black Ash Pond
Willsboro, New York

NTS DRILLERS: C. Wheeler T. Martin

Casing ____
H.S. Auger 4 1/4"

Sampler Hammer
Wt. 140 lbs.
Fall 30 in.

Boring No. MW-2 Sheet 1 of 1
Date Start: 7/21/05 Finish 7/21/05
NTS Report No. JN 540-1-4-05
Location of Boring: As Staked
Ground Elevation: ____

Ground Water Observations

| Date | Time | Depth | Casing at |
|---|---|---|---|
| | | | |
| | | | |

| CASING TYPE | DEPTH | SAMPLE NO. | DEPTH OF SAMPLE (Ft.) From | To | SAMPLE TYPE | BLOWS ON SAMPLER PER 6" DROP (2" O.D. SAMPLER) | DEPTH OF CHANGE | CLASSIFICATION OF MATERIAL (f - fine, m - medium, c - coarse; and - 35-50%, some - 20-35%, little - 10-20%, trace - 0-10%) | STANDARD PENETRATION RESISTANCE (N) |
|---|---|---|---|---|---|---|---|---|---|
| HS AUGER | | | 0.0 | 6.0 | Auger | | | Black ASH (moist, non-plastic) | |
| | | 1 | 6.0 | 8.0 | SS | 8, 9, 9, 11 | | Brown cmf SAND, little SILT (wet, non-plastic) | 18 |
| | | 2 | 8.0 | 10.0 | SS | 6, 7, 8, 6 | | Gray cmf SAND, some SILT (saturated, non-plastic) | 15 |
| | | 3 | 10.0 | 12.0 | SS | 3, 4, 4, 5 | 11.0 | Similar Soils to 11.0 feet (saturated, non-plastic); Gray CLAY, little SILT (wet, plastic) | 8 |
| | | 4 | 12.0 | 14.0 | SS | 3, 4, 4, 6 | | Gray CLAY, little SILT (wet, plastic) | 8 |

NOTES:
1) Boring was terminated at 15.5 feet.
2) Groundwater observation well installed in completed bore hole.

SS-Split Spoon Sample NX-Rock Core U-Undisturbed Sample P-Piston Type Sample

# Northern Technical Services, LLC

(518) 481-5008

## SOIL BORING LOG

CLIENT: Earth Science Engineering, PC
Willsboro, New York

PROJECT: Black Ash Pond
Willsboro, New York

NTS DRILLERS: C. Wheeler T. Martin

Casing ______
H.S. Auger 4 1/4"

Sampler Hammer
Wt. 140 lbs.
Fall 30 in.

Boring No. MW-3 Sheet 1 of 1
Date Start: 7/22/05 Finish 7/22/05
NTS Report No. JN 540-1-4-05
Location of Boring: As Staked
Ground Elevation: ______

Ground Water Observations

| Date | Time | Depth | Casing at |
|---|---|---|---|
| | | | |
| | | | |

| CASING TYPE | DEPTH | SAMPLE NO. | DEPTH OF SAMPLE (Ft.) From | To | SAMPLE TYPE | BLOWS ON SAMPLER PER 6" DROP (2" O.D. SAMPLER) | DEPTH OF CHANGE | CLASSIFICATION OF MATERIAL (f - fine, m - medium, c - coarse; and - 35-50%, some - 20-35%, little - 10-20%, trace - 0-10%) | STANDARD PENETRATION RESISTANCE (N) |
|---|---|---|---|---|---|---|---|---|---|
| H.S. AUGER | | | 0.0 | 6.0 | Auger | | | Black ASH (moist, non-plastic) | |
| | | 1 | 6.0 | 8.0 | SS | 1, 0, 0, 0 | | Black ASH (saturated, non-plastic) | 0 |
| | | 2 | 8.0 | 10.0 | SS | 1, 0, 1, 0 | | Black ASH, some sludge (saturated, non-plastic) | 1 |
| | | 3 | 10.0 | 12.0 | SS | 1, 0, 1, 0 | | Black ASH, some sludge (saturated, non-plastic) | 1 |
| | | 4 | 12.0 | 14.0 | SS | 1, 0, 0, 0 | 13.5 | Black ASH, with sludge to 13.5 feet<br>Brownish cmf SAND (saturated, non-plastic) | 0 |
| | | 5 | 14.0 | 16.0 | SS | 2, 3, 3, 5 | | Brownish gray cmf SAND, trace SILT (saturated, non-plastic) | 6 |

NOTES:
1) Boring was terminated at 18.5 feet.
2) Groundwater observation well installed in completed bore hole.

SS-Split Spoon Sample NX-Rock Core U-Undisturbed Sample P-Piston Type Sample

# Northern Technical Services, LLC

(518) 481-5008

## SOIL BORING LOG

CLIENT: Earth Science Engineering, PC
Willsboro, New York

PROJECT: Black Ash Pond
Willsboro, New York

Boring No. MW-4 Sheet 1 of 1
Date Start: 7/21/05 Finish 7/21/05
NTS Report No. JN 540-1-4-05
Location of Boring: As Staked
Ground Elevation: ______

NTS DRILLERS: C. Wheeler T. Martin

Casing ______
H.S. Auger 4 1/4"

Sampler Hammer
Wt. 140 lbs.
Fall 30 in.

Ground Water Observations

| Date | Time | Depth | Casing at |
|---|---|---|---|
| | | | |
| | | | |

| CASING TYPE | DEPTH | SAMPLE NO. | DEPTH OF SAMPLE (Ft.) From | To | SAMPLE TYPE | BLOWS ON SAMPLER PER 6" DROP (2" O.D. SAMPLER) | DEPTH OF CHANGE | CLASSIFICATION OF MATERIAL (f - fine, m - medium, c - coarse; and - 35-50%, some - 20-35%, little - 10-20%, trace - 0-10%) | STANDARD PENETRATION RESISTANCE (N) |
|---|---|---|---|---|---|---|---|---|---|
| HS AUGER | | | 0.0 | 6.0 | Auger | | | Black ASH (moist, non-plastic) | |
| | | 1 | 6.0 | 8.0 | SS | WOH | | Black ASH (wet to 7.5 feet then saturated, non-plastic) | 0 |
| | | 2 | 8.0 | 10.0 | SS | WOH | | Black ASH, with white sludge (saturated, non-plastic) | 0 |
| | | 3 | 10.0 | 12.0 | SS | WOH | | Similar Material (saturated, non-plastic) | 0 |
| | | 4 | 12.0 | 14.0 | SS | WOH | | Black ASH, with white sludge (saturated, non-plastic) | 0 |
| | | 5 | 14.0 | 16.0 | SS | WOH / WOH / 1 / 1 | 16.0 | Similar Material (saturated, non-plastic) | 1 |
| | | 6 | 16.0 | 18.0 | SS | WOH / WOH / 2 / 3 | | Grayish cmf SAND, trace SILT – black tint (saturated, non-plastic) | 2 |

NOTES:
1) WOH denotes sampler was advanced by the weight of the hammer.
2) Boring was terminated at 18.5 feet.
3) Groundwater observation well installed in completed bore hole.

SS-Split Spoon Sample NX-Rock Core U-Undisturbed Sample P-Piston Type Sample

# Northern Technical Services, LLC

(518) 481-5008

## SOIL BORING LOG

CLIENT: Earth Science Engineering, PC
Willsboro, New York

PROJECT: Black Ash Pond
Willsboro, New York

Boring No. MW-5 Sheet 1 of 1
Date Start: 7/25/05 Finish 7/25/05
NTS Report No. JN 540-1-4-05
Location of Boring: As Staked
Ground Elevation: ______

NTS DRILLERS: C. Wheeler T. Martin

Casing ______
H.S. Auger 4 1/4"

Sampler Hammer
Wt. 140 lbs.
Fall 30 in.

Ground Water Observations

| Date | Time | Depth | Casing at |
|---|---|---|---|
| | | | |
| | | | |

| CASING TYPE | DEPTH | SAMPLE NO. | DEPTH OF SAMPLE (Ft.) From | To | SAMPLE TYPE | BLOWS ON SAMPLER PER 6" DROP (2" O.D. SAMPLER) | DEPTH OF CHANGE | CLASSIFICATION OF MATERIAL (f - fine, m - medium, c - coarse; and - 35-50%, some - 20-35%, little - 10-20%, trace - 0-10%) | STANDARD PENETRATION RESISTANCE (N) |
|---|---|---|---|---|---|---|---|---|---|
| HS AUGER | | | 0.0 | 4.0 | Auger | | | Black ASH<br>(moist, non-plastic) | |
| | | | | | | | 4.0 | | |
| | | 1 | 4.0 | 6.0 | SS | 1 | | Brownish cmf SAND, little SILT<br>(saturated, non-plastic) | |
| | | | | | | 1 | | | 2 |
| | | | | | | 1 | | | |
| | | | | | | 1 | | | |
| | | 1 | 6.0 | 8.0 | SS | 2 | | Brown cmf SAND – tinted black<br>(saturated, non-plastic) | |
| | | | | | | 3 | | | 5 |
| | | | | | | 2 | | | |
| | | | | | | 3 | | | |

NOTES:
1) Auger refusal encountered at 10.5 feet
2) Groundwater observation well installed in completed bore hole.

SS-Split Spoon Sample NX-Rock Core U-Undisturbed Sample P-Piston Type Sample

# Northern Technical Services, LLC

(518) 481-5008

## SOIL BORING LOG

CLIENT: Earth Science Engineering, PC
Willsboro, New York

PROJECT: Black Ash Pond
Willsboro, New York

Boring No. MW-6 Sheet 1 of 1
Date Start: 7/26/05 Finish 7/26/05
NTS Report No. JN 540-1-4-05
Location of Boring: As Staked
Ground Elevation: ______

NTS DRILLERS: C. Wheeler T. Martin

Casing ______
H.S. Auger 4 1/4"

Sampler Hammer
Wt. 140 lbs.
Fall 30 in.

Ground Water Observations

| Date | Time | Depth | Casing at |
|---|---|---|---|
| | | | |
| | | | |

| CASING TYPE | DEPTH | SAMPLE NO. | DEPTH OF SAMPLE (Ft.) From | To | SAMPLE TYPE | BLOWS ON SAMPLER PER 6" DROP (2" O.D. SAMPLER) | DEPTH OF CHANGE | CLASSIFICATION OF MATERIAL (f - fine, m - medium, c - coarse; and - 35-50%, some - 20-35%, little - 10-20%, trace - 0-10%) | STANDARD PENETRATION RESISTANCE (N) |
|---|---|---|---|---|---|---|---|---|---|
| HS AUGER | | | 0.0 | 6.0 | Auger | | | Black ASH (moist, non-plastic) | |
| | | 1 | 6.0 | 8.0 | SS | WOH | | No Recovery | 0 |
| | | 2 | 8.0 | 10.0 | SS | WOH | | Black ASH (wet, non-plastic) | 0 |
| | | 3 | 10.0 | 12.0 | SS | WOH | | No Recovery | 0 |
| | | 4 | 12.0 | 14.0 | SS | WOH | | Black ASH, with sludge, some wood fragments and layers of f GRAVEL | 0 |
| | | 5 | 14.0 | 16.0 | SS | WOH / WOH / WOH / 4 | | Similar Material | 0 |

NOTES:
1) Boring was terminated at 18.5 feet.
2) Groundwater observation well installed in completed bore hole.

SS-Split Spoon Sample NX-Rock Core U-Undisturbed Sample P-Piston Type Sample

# Northern Technical Services, LLC

(518) 481-5008

## SOIL BORING LOG

CLIENT: Earth Science Engineering, PC
Willsboro, New York

PROJECT: Black Ash Pond
Willsboro, New York

Boring No. MW-7 Sheet 1 of 1
Date Start: 7/25/05 Finish 7/25/05
NTS Report No. JN 540-1-4-05
Location of Boring: As Staked
Ground Elevation: ______

NTS DRILLERS: C. Wheeler T. Martin

Casing ______
H.S. Auger 4 1/4"

Sampler Hammer
Wt. 140 lbs.
Fall 30 in.

Ground Water Observations

| Date | Time | Depth | Casing at |
|---|---|---|---|
| | | | |
| | | | |

| CASING TYPE | DEPTH | SAMPLE NO. | DEPTH OF SAMPLE (Ft.) From | To | SAMPLE TYPE | BLOWS ON SAMPLER PER 6" DROP (2" O.D. SAMPLER) | DEPTH OF CHANGE | CLASSIFICATION OF MATERIAL<br>f - fine, m - medium, c - coarse<br>and - 35-50%, some - 20-35%, little - 10-20%, trace - 0-10% | STANDARD PENETRATION RESISTANCE (N) |
|---|---|---|---|---|---|---|---|---|---|
| H S AUGER | | | 0.0 | 4.0 | Auger | | 4.0 | Black ASH (moist, non-plastic) | |
| | | 1 | 4.0 | 6.0 | SS | 2 | | Brown cmf SAND, little SILT (saturated, non-plastic) | 6 |
| | | | | | | 3 | | | |
| | | | | | | 3 | | | |
| | | | | | | 4 | | | |
| | | 1 | 6.0 | 8.0 | SS | 2 | | Gray cmf SAND – black tint (saturated, non-plastic) | 5 |
| | | | | | | 3 | | | |
| | | | | | | 2 | | | |
| | | | | | | 3 | | | |

NOTES:
1) Auger refusal encountered at 12.2 feet.
2) Monitor well installed in completed bore hole.

SS-Split Spoon Sample NX-Rock Core U-Undisturbed Sample P-Piston Type Sample

# Northern Technical Services, LLC

(518) 481-5008

## SOIL BORING LOG

CLIENT: Earth Science Engineering, PC
Willsboro, New York

PROJECT: Black Ash Pond
Willsboro, New York

Boring No. B-1 Sheet 1 of 1
Date Start: 7/13/05 Finish 7/13/05
NTS Report No. JN 540-1-4-05
Location of Boring: As Staked
Ground Elevation: ______

NTS DRILLERS: C. Wheeler T. Martin

Sampler Hammer
Casing ________ Wt. 140 lbs.
H.S. Auger 3 1/4" Fall 30 in.

Ground Water Observations

| Date | Time | Depth | Casing at |
|---|---|---|---|
| 7/13/05 | | 14.0 | OUT |
| | | | |

| CASING TYPE | DEPTH | SAMPLE NO. | DEPTH OF SAMPLE (Ft.) From | To | SAMPLE TYPE | BLOWS ON SAMPLER PER 6" DROP (2" O.D. SAMPLER) | DEPTH OF CHANGE | CLASSIFICATION OF MATERIAL (f - fine, m - medium, c - coarse; and - 35-50%, some - 20-35%, little - 10-20%, trace - 0-10%) | STANDARD PENETRATION RESISTANCE (N) |
|---|---|---|---|---|---|---|---|---|---|
| H.S. AUGER | | 1 | 0.0 | 2.0 | SS | 3 / 3 / 4 / 3 | | Brown cmf SAND, some ORGANIC material, some Black ASH material (moist, non-plastic) | 7 |
| | | 2 | 2.0 | 4.0 | SS | 3 / 4 / 2 / 2 | | Black ASH, with ORGANIC material (moist, non-plastic) | 6 |
| | | 3 | 4.0 | 6.0 | SS | 2 / 2 / 1 / 1 | | Similar Material (moist, non-plastic) | 3 |
| | | 4 | 6.0 | 8.0 | SS | 1 / 1 / 1 / 1 | | Black ASH (moist, non-plastic) | 2 |
| | | 5 | 8.0 | 10.0 | SS | 1 / 1 / 1 / 1 | | Similar Material (moist, non-plastic) | 2 |
| | | 6 | 10.0 | 12.0 | SS | 1 / 1 / 1 / 8 | 12.0 | Similar Material (moist, non-plastic) | 2 |
| | | 7 | 12.0 | 14.0 | SS | 110 / 53 / 17 / 15 | | Brown cmf SAND, trace mf GRAVEL, mixed with Black ASH (moist, plastic) | 70 |
| | | 8 | 14.0 | 16.0 | SS | 1 / 1 / 0 / 0 | | Sludge mixed with Black ASH (saturated, plastic) | 1 |
| | | 9 | 16.0 | 18.0 | SS | 1 / 63 / 34 / 17 | 18.0 | Black ASH (saturated, plastic) | 97 |
| | | 10 | 18.0 | 20.0 | SS | 21 / 15 / 16 / 17 | | Brownish cmf SAND, some SILT, little mf GRAVEL, mixed with black coloring (saturated, plastc) | 31 |
| | | | | | | | | NOTES: 1) Boring was terminated at 20.0 feet. 2) Bore hole was backfilled upon completion. | |

SS-Split Spoon Sample NX-Rock Core U-Undisturbed Sample P-Piston Type Sample

# Northern Technical Services, LLC

(518) 481-5008

## SOIL BORING LOG

CLIENT: Earth Science Engineering, PC
Willsboro, New York

PROJECT: Black Ash Pond
Willsboro, New York

NTS DRILLERS: C. Wheeler T. Martin

Casing ____________
H.S. Auger 3 1/4"

Sampler Hammer
Wt. 140 lbs.
Fall 30 in.

Boring No. B-2 Sheet 1 of 2
Date Start: 7/13/05 Finish 7/13/05
NTS Report No. JN 540-1-4-05
Location of Boring: As Staked
Ground Elevation: ______

Ground Water Observations

| Date | Time | Depth | Casing at |
|---|---|---|---|
| 7/13/05 | | 12.0' | OUT |
| | | | |

| CASING TYPE | DEPTH | SAMPLE NO. | DEPTH OF SAMPLE (Ft.) From | To | SAMPLE TYPE | BLOWS ON SAMPLER PER 6" DROP (2" O.D. SAMPLER) | DEPTH OF CHANGE | CLASSIFICATION OF MATERIAL (f - fine, m - medium, c - coarse; and - 35-50%, some - 20-35%, little - 10-20%, trace - 0-10%) | STANDARD PENETRATION RESISTANCE (N) |
|---|---|---|---|---|---|---|---|---|---|
| HS AUGER | | 1 | 0.0 | 2.0 | SS | 5 / 6 / 21 / 16 | 2.0 | Brown cmf SAND, some cmf GRAVEL, little SLT (moist, non-plastic) | 27 |
| | | 2 | 2.0 | 4.0 | SS | 6 / 4 / 3 / 3 | | Black ASH (moist, non-plastic) | 7 |
| | | 3 | 4.0 | 6.0 | SS | 2 / 2 / 1 / 1 | | Brown cmf SAND, and Black ASH (moist, non-plastic) | 3 |
| | | 4 | 6.0 | 8.0 | SS | 1 / 1 / 1 / 1 | | Black ASH (saturated, non-plastic) | 2 |
| | | 5 | 8.0 | 10.0 | SS | WOH | | Similar Material (saturated, non-plastic) | 0 |
| | | 6 | 10.0 | 12.0 | SS | WOH | | Similar Material (saturated, non-plastic) | 0 |
| | | 7 | 12.0 | 14.0 | SS | 1 blow for 2.0 feet | | Black ASH, mixed with layers of sludge (saturated, non-plastic) | 0 |
| | | 8 | 14.0 | 16.0 | SS | 1 blow for 2.0 feet | 16.0 | Similar Material (saturated, non-plastic) | 0 |
| | | 9 | 16.0 | 18.0 | SS | 3 / 6 / 5 / 6 | 18.0 | Brown cmf SAND, little mf GRAVEL, mixed with sludge, and black ASH (saturated, non-plastic) | 11 |

SS-Split Spoon Sample NX-Rock Core U-Undisturbed Sample P-Piston Type Sample

# Northern Technical Services, LLC

(518) 481-5008

## SOIL BORING LOG

CLIENT: Earth Science Engineering, PC
Willsboro, New York

PROJECT: Black Ash Pond
Willsboro, New York

Boring No. B-2 Sheet 2 of 2

Date Start: 7/13/05 Finish 7/13/05

NTS Report No. JN 540-1-4-05

| CASING TYPE | DEPTH | SAMPLE NO. | DEPTH OF SAMPLE (Ft.) From | To | SAMPLE TYPE | BLOWS ON SAMPLER PER 6" DROP (2" O.D. SAMPLER) | DEPTH OF CHANGE | CLASSIFICATION OF MATERIAL (f - fine, m - medium, c - coarse; and - 35-50%, some - 20-35%, little - 10-20%, trace - 0-10%) | STANDARD PENETRATION RESISTANCE (N) |
|---|---|---|---|---|---|---|---|---|---|
| HS AUGER | | 10 | 18.0 | 20.0 | SS | 16 | | Blackish gray cmf SAND, and cmf GRAVEL, trace SILT (saturated, non-plastic) | |
| | | | | | | 20 | | | 41 |
| | | | | | | 21 | | | |
| | | | | | | 26 | | | |

NOTES:
1) WOH denotes sampler was advanced by the weight of the hammer.
2) Boring was terminated at 20.0 feet.
3) Bore hole was backfilled upon completion.

SS-Split Spoon Sample NX-Rock Core U-Undisturbed Sample P-Piston Type Sample

# Northern Technical Services, LLC

(518) 481-5008

## SOIL BORING LOG

CLIENT: Earth Science Engineering, PC
Willsboro, New York

PROJECT: Black Ash Pond
Willsboro, New York

NTS DRILLERS: C. Wheeler T. Martin

Casing ____________

H.S. Auger 3 1/4"

Sampler Hammer
Wt. 140 lbs.
Fall 30 in.

Boring No. B-3 Sheet 1 of 2
Date Start: 7/20/05 Finish 7/20/05
NTS Report No. JN 540-1-4-05
Location of Boring: As Staked
Ground Elevation: ______

Ground Water Observations

| Date | Time | Depth | Casing at |
|---|---|---|---|
| 7/20/05 | | 12.0' | OUT |
| | | | |

| CASING TYPE | DEPTH | SAMPLE NO. | DEPTH OF SAMPLE (Ft.) From | To | SAMPLE TYPE | BLOWS ON SAMPLER PER 6" DROP (2" O.D. SAMPLER) | DEPTH OF CHANGE | CLASSIFICATION OF MATERIAL (f - fine, m - medium, c - coarse; and - 35-50%, some - 20-35%, little - 10-20%, trace - 0-10%) | STANDARD PENETRATION RESISTANCE (N) |
|---|---|---|---|---|---|---|---|---|---|
| | | | 0.0 | 6.0 | Auger | | | Black ASH (moist, non-plastic) | |
| HS AUGER | | 1 | 6.0 | 8.0 | SS | 1 0 1 0 | | Black ASH (moist, non-plastic) | 1 |
| | | 2 | 8.0 | 10.0 | SS | WOH | | Similar Material | 0 |
| | | 3 | 10.0 | 12.0 | SS | 0 0 1 0 | | Similar Material | 1 |
| | | 4 | 12.0 | 14.0 | SS | WOH | | Black ASH, with sludge (saturated, non-plastic) | 0 |
| | | 5 | 14.0 | 16.0 | SS | 7 10 5 2 | 15.0 | Similar Material to 15.0 feet | 15 |
| | | | | | | | | Brown cmf SAND, and mf GRAVEL, trace SILT (wet, non-plastic) | |
| | | 6 | 16.0 | 18.0 | SS | WOH | | Black ASH with sludge (wet, non-plastic) | 0 |
| | | 7 | 18.0 | 20.0 | SS | WOH | 19.0 | Similar Material to 19.0 feet | 0 |
| | | | | | | | | Blackish brown SILT, some cmf SAND (wet, non-plastic) | |

SS-Split Spoon Sample NX-Rock Core U-Undisturbed Sample P-Piston Type Sample

# Northern Technical Services, LLC

(518) 481-5008

## SOIL BORING LOG

CLIENT: Earth Science Engineering, PC
Willsboro, New York

PROJECT: Black Ash Pond
Willsboro, New York

Boring No. B-3 Sheet 2 of 2

Date Start: 7/20/05 Finish 7/20/05

NTS Report No. JN 540-1-4-05

| CASING TYPE | DEPTH | SAMPLE NO. | DEPTH OF SAMPLE (Ft.) From | To | SAMPLE TYPE | BLOWS ON SAMPLER PER 6" DROP (2" O.D. SAMPLER) | DEPTH OF CHANGE | CLASSIFICATION OF MATERIAL (f - fine, m - medium, c - coarse; and - 35-50%, some - 20-35%, little - 10-20%, trace - 0-10%) | STANDARD PENETRATION RESISTANCE (N) |
|---|---|---|---|---|---|---|---|---|---|
| HS AUGER | | | | | | | 20.0 | | |
| | | 8 | 20.0 | 22.0 | SS | 103/5" | | Blackish SAND, some SILT, with Rock Fragment (wet, non-plastic) | 100+ |

NOTES:
1) WOH denotes sampler was advanced by the weight of the hammer.
2) Boring was terminated at 20.5 feet.
3) Bore hole was backfilled upon completion.

SS-Split Spoon Sample NX-Rock Core U-Undisturbed Sample P-Piston Type Sample

# Northern Technical Services, LLC

(518) 481-5008

## SOIL BORING LOG

CLIENT: Earth Science Engineering, PC
Willsboro, New York

PROJECT: Black Ash Pond
Willsboro, New York

Boring No. B-4 Sheet 1 of 1
Date Start: 7/19/05 Finish 7/19/05
NTS Report No. JN 540-1-4-05
Location of Boring: As Staked
Ground Elevation: ______

NTS DRILLERS: C. Wheeler T. Martin

Casing ______
H.S. Auger 3 1/4"

Sampler Hammer
Wt. 140 lbs.
Fall 30 in.

Ground Water Observations

| Date | Time | Depth | Casing at |
|---|---|---|---|
| 7/19/05 | | 7.0' | OUT |
| | | | |

| CASING TYPE | DEPTH | SAMPLE NO. | DEPTH OF SAMPLE (Ft.) From | To | SAMPLE TYPE | BLOWS ON SAMPLER PER 6" DROP (2" O.D. SAMPLER) | DEPTH OF CHANGE | CLASSIFICATION OF MATERIAL (f - fine, m - medium, c - coarse; and - 35-50%, some - 20-35%, little - 10-20%, trace - 0-10%) | STANDARD PENETRATION RESISTANCE (N) |
|---|---|---|---|---|---|---|---|---|---|
| HS AUGER | | | 0.0 | 6.0 | Auger | | | Black ASH | |
| | | | 6.0 | 8.0 | SS | WOH | | No Recovery | |
| | | | | | | | | | 0 |
| | | 1 | 8.0 | 10.0 | SS | WOH | | Black ASH, with sludge, some SAND (saturated, non-plastic) | 0 |
| | | 2 | 10.0 | 12.0 | SS | WOH | | Similar Material to 11.5 (saturated, non-plastic) | |
| | | | | | | WOH | | | 4 |
| | | | | | | 4 | 11.5 | | |
| | | | | | | 4 | | Black cmf SAND, and SILT (sat., non-plastic) | |
| | | 3 | 12.0 | 14.0 | SS | 3 | | Blackish gray cmf SAND, little cmf GRAVEL, little SILT (saturated, non-plastic) | |
| | | | | | | 5 | | | 14 |
| | | | | | | 9 | | | |
| | | | | | | 11 | | | |
| | | 4 | 14.0 | 15.0 | SS | 6 | | Similar Soils, with Rock Fragments (saturated, non-plastic) | |
| | | | | | | 136 | | | 100+ |

NOTES:
1) WOH denotes sampler was advanced by the weight of the hammer.
2) Boring was terminated at 15.0 feet.
3) Bore hole was backfilled upon completion.

SS-Split Spoon Sample NX-Rock Core U-Undisturbed Sample P-Piston Type Sample

# Northern Technical Services, LLC

(518) 481-5008

## SOIL BORING LOG

CLIENT: Earth Science Engineering, PC
Willsboro, New York

PROJECT: Black Ash Pond
Willsboro, New York

Boring No. B-5 Sheet 1 of 1
Date Start: 7/19/05 Finish 7/19/05
NTS Report No. JN 540-1-4-05
Location of Boring: As Staked
Ground Elevation: ______

NTS DRILLERS: C. Wheeler T. Martin

Sampler Hammer
Casing ______ Wt. 140 lbs.
H.S. Auger 3 1/4" Fall 30 in.

Ground Water Observations

| Date | Time | Depth | Casing at |
|---|---|---|---|
| 7/19/05 | | 9.0' | OUT |
| | | | |

| CASING TYPE | DEPTH | SAMPLE NO. | DEPTH OF SAMPLE (Ft.) From | To | SAMPLE TYPE | BLOWS ON SAMPLER PER 6" DROP (2" O.D. SAMPLER) | DEPTH OF CHANGE | CLASSIFICATION OF MATERIAL (f - fine, m - medium, c - coarse; and - 35-50%, some - 20-35%, little - 10-20%, trace - 0-10%) | STANDARD PENETRATION RESISTANCE (N) |
|---|---|---|---|---|---|---|---|---|---|
| HS AUGER | | 1 | 6.0 | 8.0 | SS | WOH | | Black ASH (wet, non-plastic) | 0 |
| | | 2 | 8.0 | 10.0 | SS | WOH | | Black ASH, with white sludge (saturated, non-plastic) | 0 |
| | | 3 | 10.0 | 12.0 | SS | WOH | 12.0 | Similar Material (saturated, non-plastic) | 0 |
| | | 4 | 12.0 | 14.0 | SS | WOH | | Grayish black SILT, trace SAND (saturated, non-plastic) | 0 |
| | | 5 | 14.0 | 16.0 | SS | WOH | | Grayish black cmf SAND, little SILT (saturated, non-plastic) | 0 |

NOTES:
1) WOH denotes sampler was advanced by the weight of the hammer.
2) Boring was terminated at 16.0 feet.
3) Bore hole was backfilled upon completion.

SS-Split Spoon Sample NX-Rock Core U-Undisturbed Sample P-Piston Type Sample

# Northern Technical Services, LLC

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## SOIL BORING LOG

CLIENT: Earth Science Engineering, PC
Willsboro, New York

PROJECT: Black Ash Pond
Willsboro, New York

Boring No. B-6 Sheet 1 of 1
Date Start: 7/20/05 Finish 7/20/05
NTS Report No. JN 540-1-4-05
Location of Boring: As Staked
Ground Elevation: ______

NTS DRILLERS: C. Wheeler T. Martin

Sampler Hammer
Casing ______ Wt. 140 lbs.
H.S. Auger 3 1/4" Fall 30 in.

Ground Water Observations

| Date | Time | Depth | Casing at |
|---|---|---|---|
| 7/20/05 | | 8.0' | OUT |
| | | | |

| CASING TYPE | DEPTH | SAMPLE NO. | DEPTH OF SAMPLE (Ft.) From | To | SAMPLE TYPE | BLOWS ON SAMPLER PER 6" DROP (2" O.D. SAMPLER) | DEPTH OF CHANGE | CLASSIFICATION OF MATERIAL (f - fine, m - medium, c - coarse; and - 35-50%, some - 20-35%, little - 10-20%, trace - 0-10%) | STANDARD PENETRATION RESISTANCE (N) |
|---|---|---|---|---|---|---|---|---|---|
| HS AUGER | | | 0.0 | 6.0 | Auger | | | Black ASH | |
| | | 1 | 6.0 | 8.0 | SS | WOH | | No Recovery | 0 |
| | | 2 | 8.0 | 10.0 | SS | WOH | | Black ASH, Poor Recovery (saturated, non-plastic) | 0 |
| | | 3 | 10.0 | 12.0 | SS | 3, 2, 3, 6 | 11.5 | Black ASH with sludge to 11.5 feet (saturated, non-plastic) | 5 |
| | | 4 | 12.0 | 14.0 | SS | 5, 5, 40, 33 | | Grayish black cmf SAND, some cmf GRAVEL (saturated, non-plastic) | 45 |

NOTES:
1) WOH denotes sampler was advanced by the weight of the hammer.
2) Boring was terminated at 14.0 feet.
3) Bore hole was backfilled upon completion.

SS-Split Spoon Sample NX-Rock Core U-Undisturbed Sample P-Piston Type Sample

# Northern Technical Services, LLC

(518) 481-5008

## SOIL BORING LOG

CLIENT: Earth Science Engineering, PC
Willsboro, New York

PROJECT: Black Ash Pond
Willsboro, New York

NTS DRILLERS: C. Wheeler T. Martin

Casing ____________
H.S. Auger 3 1/4"

Sampler Hammer
Wt. 140 lbs.
Fall 30 in.

Boring No. B-7 Sheet 1 of 1
Date Start: 7/20/05 Finish 7/20/05
NTS Report No. JN 540-1-4-05
Location of Boring: As Staked
Ground Elevation: _______

Ground Water Observations

| Date | Time | Depth | Casing at |
|---|---|---|---|
| | | | |
| | | | |

| CASING TYPE | DEPTH | SAMPLE NO. | DEPTH OF SAMPLE (Ft.) From | To | SAMPLE TYPE | BLOWS ON SAMPLER PER 6" DROP (2" O.D. SAMPLER) | DEPTH OF CHANGE | CLASSIFICATION OF MATERIAL (f - fine, m - medium, c - coarse; and - 35-50%, some - 20-35%, little - 10-20%, trace - 0-10%) | STANDARD PENETRATION RESISTANCE (N) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 0.5 | Wood chips | |
| | | 1 | 0.0 | 2.0 | SS | 3 | | Brown cmf SAND, some cmf GRAVEL, trace | |
| | | | | | | 12 | | SILT (moist, non-plastic) | 28 |
| | | | | | | 16 | | | |
| | | | | | | 6 | | | |
| | | 2 | 2.0 | 4.0 | SS | 9 | | Similar Material with asphalt | |
| | | | | | | 6 | | (moist, non-plastic) | 10 |
| | | | | | | 4 | | | |
| | | | | | | 4 | | | |
| | | 3 | 4.0 | 6.0 | SS | 3 | 4.5 | Brownish CLAY to 4.5 feet | |
| | | | | | | 3 | | Black ASH | 6 |
| | | | | | | 3 | | | |
| | | | | | | 3 | | | |
| H | | 4 | 6.0 | 8.0 | SS | 1 | | Black ASH | |
| S | | | | | | 1 | | (moist, non-plastic) | 2 |
| | | | | | | 1 | | | |
| A | | | | | | 1 | | | |
| U | | 5 | 8.0 | 10.0 | SS | 1 | | Similar Material | |
| G | | | | | | 1 | | (moist, non-plastic) | 2 |
| E | | | | | | 1 | | | |
| R | | | | | | 1 | | | |
| | | 6 | 10.0 | 12.0 | SS | 1 | | Similar Material | |
| | | | | | | 1 | | (wet, non-plastic) | 2 |
| | | | | | | 1 | | | |
| | | | | | | 1 | | | |
| | | 7 | 12.0 | 14.0 | SS | 1 | | Black ASH | |
| | | | | | | 1 | | (saturated, non-plastic) | 2 |
| | | | | | | 1 | | | |
| | | | | | | 1 | 14.5 | | |
| | | 8 | 14.0 | 16.0 | SS | 1 | | Brownish cmf SAND, and cmf GRAVEL, mixed | |
| | | | | | | 14 | | with Black ASH (saturated, non-plastic) | 100+ |
| | | | | | | 100/5" | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | NOTES: | |
| | | | | | | | | 1) Auger refusal encountered at 16.0 feet. | |
| | | | | | | | | 2) Bore hole was backfilled upon completion. | |

SS-Split Spoon Sample NX-Rock Core U-Undisturbed Sample P-Piston Type Sample

# Northern Technical Services, LLC

(518) 481-5008

## SOIL BORING LOG

CLIENT: Earth Science Engineering, PC
Willsboro, New York

PROJECT: Black Ash Pond
Willsboro, New York

NTS DRILLERS: C. Wheeler T. Martin

Casing ____________
H.S. Auger 3 1/4"

Sampler Hammer
Wt. 140 lbs.
Fall 30 in.

Boring No. B-8 Sheet 1 of 1
Date Start: 7/14/05 Finish 7/14/05
NTS Report No. JN 540-1-4-05
Location of Boring: As Staked
Ground Elevation:_______

Ground Water Observations

| Date | Time | Depth | Casing at |
|---|---|---|---|
| 7/14/05 | | 4.0' | OUT |
| | | | |

| CASING TYPE | DEPTH | SAMPLE NO. | DEPTH OF SAMPLE (Ft.) From | To | SAMPLE TYPE | BLOWS ON SAMPLER PER 6" DROP (2" O.D. SAMPLER) | DEPTH OF CHANGE | CLASSIFICATION OF MATERIAL (f - fine, m - medium, c - coarse; and - 35-50%, some - 20-35%, little - 10-20%, trace - 0-10%) | STANDARD PENETRATION RESISTANCE (N) |
|---|---|---|---|---|---|---|---|---|---|
| H S AUGER | | 1 | 0.0 | 2.0 | SS | 1 / 1 / WOH / WOH | | Black ASH (moist, non-plastic) | 1 |
| | | 2 | 2.0 | 4.0 | SS | WOH | | Black ASH (moist, non-plastic) | 0 |
| | | 3 | 4.0 | 6.0 | SS | WOH | | Black ASH, with white sludge (saturated, non-plastic) | 0 |
| | | 4 | 6.0 | 8.0 | SS | WOH | | Similar Material (saturated, non-plastic) | 0 |
| | | 5 | 8.0 | 10.0 | SS | WOH | | Similar Material (saturated, non-plastic) | 0 |
| | | 6 | 10.0 | 12.0 | SS | WOH | | Similar Material (saturated, non-plastic) | 0 |
| | | 7 | 12.0 | 14.0 | SS | WOH | | Similar Material (saturated, non-plastic) | 0 |
| | | 8 | 14.0 | 16.0 | SS | 1 / 1 / 1 / 6 | 15.7 | Black ASH, and white sludge to 15.7 feet. Brownish cmf SAND, little SILT (saturated, non-plastic) | 2 |
| | | 9 | 16.0 | 18.0 | SS | 26 / 50 / 100/1" | | Brown cmf SAND, some cmf GRAVEL, some SILT (saturated, non-plastic) | 100+ |

NOTES:
1) WOH denotes sampler was advanced by the weight of the hammer.
2) Boring was terminated at 18.0 feet.
3) Bore hole was backfilled upon completion.

SS-Split Spoon Sample NX-Rock Core U-Undisturbed Sample P-Piston Type Sample

# Northern Technical Services, LLC

(518) 481-5008

## SOIL BORING LOG

CLIENT: Earth Science Engineering, PC
Willsboro, New York

PROJECT: Black Ash Pond
Willsboro, New York

Boring No. B-9 Sheet 1 of 2
Date Start: 7/14/05 Finish 7/14/05
NTS Report No. JN 540-1-4-05
Location of Boring: As Staked
Ground Elevation:

NTS DRILLERS: C. Wheeler T. Martin

Casing ________
H.S. Auger 3 1/4"

Sampler Hammer
Wt. 140 lbs.
Fall 30 in.

Ground Water Observations

| Date | Time | Depth | Casing at |
|---|---|---|---|
| 7/14/05 | | 8.0' | OUT |
| | | | |

f - fine, m - medium, c - coarse; and - 35-50%, some - 20-35%, little - 10-20%, trace - 0-10%

| CASING TYPE | DEPTH | SAMPLE NO. | DEPTH OF SAMPLE (Ft.) From | To | SAMPLE TYPE | BLOWS ON SAMPLER PER 6" DROP (2" O.D. SAMPLER) | DEPTH OF CHANGE | CLASSIFICATION OF MATERIAL | STANDARD PENETRATION RESISTANCE (N) |
|---|---|---|---|---|---|---|---|---|---|
| HS AUGER | | 1 | 0.0 | 2.0 | SS | 1, 0, 1, 0 | | Black ASH with Organic material | 1 |
| | | 2 | 2.0 | 4.0 | SS | WOH | | Similar Material (moist, non-plastic) | 0 |
| | | 3 | 4.0 | 6.0 | SS | WOH | | Similar Material (moist, non-plastic) | 0 |
| | | 4 | 6.0 | 8.0 | SS | WOH | | Black ASH (moist, non-plastic) | 0 |
| | | 5 | 8.0 | 10.0 | SS | 1, 0, 1, 0 | | Black ASH, with white sludge (saturated, non-plastic) | 1 |
| | | 6 | 10.0 | 12.0 | SS | 1, 0, 1, 0 | | Similar Material (saturated, non-plastic) | 1 |
| | | 7 | 12.0 | 14.0 | SS | WOH | | Similar Material (saturated, non-plastic) | 0 |
| | | 8 | 14.0 | 16.0 | SS | 1, 1, 1, 1 | | Similar Material (saturated, non-plastic) | 2 |
| | | 9 | 16.0 | 18.0 | SS | 1, 0, 6, 6 | 17.0 | Similar Material to 17.0 feet | 6 |
| | | | | | | | | Brown cmf SAND, little SILT (wet, non-plastic) | |

SS-Split Spoon Sample NX-Rock Core U-Undisturbed Sample P-Piston Type Sample

# Northern Technical Services, LLC

(518) 481-5008

## SOIL BORING LOG

CLIENT: Earth Science Engineering, PC
Willsboro, New York

PROJECT: Black Ash Pond
Willsboro, New York

Boring No. B-9 Sheet 2 of 2

Date Start: 7/14/05 Finish 7/14/05

NTS Report No. JN 540-1-4-05

| CASING TYPE | DEPTH | SAMPLE NO. | DEPTH OF SAMPLE (Ft.) From | To | SAMPLE TYPE | BLOWS ON SAMPLER PER 6" DROP (2" O.D. SAMPLER) | DEPTH OF CHANGE | CLASSIFICATION OF MATERIAL (f - fine, m - medium, c - coarse; and - 35-50%, some - 20-35%, little - 10-20%, trace - 0-10%) | STANDARD PENETRATION RESISTANCE (N) |
|---|---|---|---|---|---|---|---|---|---|
| HS AUGER | | 10 | 18.0 | 20.0 | SS | 6 | | Black cmf SAND, some cmf GRAVEL, trace SILT (wet, non-plastic) | |
| | | | | | | 16 | | | 41 |
| | | | | | | 25 | | | |
| | | | | | | 21 | | | |

NOTES:
1) WOH denotes sampler was advanced by the weight of the hammer.
2) Boring was terminated at 20.0 feet.
3) Bore hole was backfilled upon completion.

SS-Split Spoon Sample NX-Rock Core U-Undisturbed Sample P-Piston Type Sample

# Northern Technical Services, LLC

(518) 481-5008

## SOIL BORING LOG

CLIENT: Earth Science Engineering, PC
Willsboro, New York

PROJECT: Black Ash Pond
Willsboro, New York

Boring No. B-10 Sheet 1 of 1
Date Start: 7/20/05 Finish 7/20/05
NTS Report No. JN 540-1-4-05
Location of Boring: As Staked
Ground Elevation: ______

NTS DRILLERS: C. Wheeler T. Martin

Casing ______
H.S. Auger 3 1/4"

Sampler Hammer
Wt. 140 lbs.
Fall 30 in.

Ground Water Observations

| Date | Time | Depth | Casing at |
|---|---|---|---|
| 7/20/05 | | 5.0' | OUT |
| | | | |

| CASING TYPE | DEPTH | SAMPLE NO. | DEPTH OF SAMPLE (Ft.) From | To | SAMPLE TYPE | BLOWS ON SAMPLER PER 6" DROP (2" O.D. SAMPLER) | DEPTH OF CHANGE | CLASSIFICATION OF MATERIAL (f - fine, m - medium, c - coarse; and - 35-50%, some - 20-35%, little - 10-20%, trace - 0-10%) | STANDARD PENETRATION RESISTANCE (N) |
|---|---|---|---|---|---|---|---|---|---|
| HS AUGER | | | 0.0 | 6.0 | Auger | | | Black ASH (moist, non-plastic) | |
| | | 1 | 6.0 | 8.0 | SS | WOH, WOH, 1, 1 | 7.0 | Black ASH to 7.0 feet (saturated, non-plastic); Brownish cmf SAND, some SILT (saturated, non-plastic) | 1 |
| | | 2 | 8.0 | 10.0 | SS | 5, 6, 5, 3 | | Grayish brown cmf SAND, some SILT (saturated, non-plastic) | 11 |
| | | 3 | 10.0 | 12.0 | SS | 3, 4, 3, 3 | | Similar Material (saturated, non-plastic) | 7 |

NOTES:
1) WOH denotes sampler was advanced by the weight of the hammer.
2) Boring was terminated at 12.0 feet.
3) Bore hole was backfilled upon completion.

SS-Split Spoon Sample NX-Rock Core U-Undisturbed Sample P-Piston Type Sample

# Northern Technical Services, LLC

(518) 481-5008

## SOIL BORING LOG

CLIENT: Earth Science Engineering, PC
Willsboro, New York

PROJECT: Black Ash Pond
Willsboro, New York

Boring No. B-11 Sheet 1 of 1
Date Start: 7/26/05 Finish 7/26/05
NTS Report No. JN 540-1-4-05
Location of Boring: As Staked
Ground Elevation:

NTS DRILLERS: C. Wheeler T. Martin

Casing
H.S. Auger 3 1/4"

Sampler Hammer
Wt. 140 lbs.
Fall 30 in.

Ground Water Observations

| Date | Time | Depth | Casing at |
|---|---|---|---|
| | | | |
| | | | |

| CASING TYPE | DEPTH | SAMPLE NO. | DEPTH OF SAMPLE (Ft.) From | To | SAMPLE TYPE | BLOWS ON SAMPLER PER 6" DROP (2" O.D. SAMPLER) | DEPTH OF CHANGE | CLASSIFICATION OF MATERIAL (f - fine, m - medium, c - coarse; and - 35-50%, some - 20-35%, little - 10-20%, trace - 0-10%) | STANDARD PENETRATION RESISTANCE (N) |
|---|---|---|---|---|---|---|---|---|---|
| HS AUGER | | | 0.0 | 8.0 | Auger | | | Black ASH (moist, non-plastic) | |
| | | 1 | 8.0 | 10.0 | SS | WOH | | Black ASH (moist, non-plastic) | 0 |
| | | 2 | 10.0 | 12.0 | SS | WOH | | Black ASH layered with white sludge (saturated, non-plastic) | 0 |
| | | 3 | 12.0 | 14.0 | SS | WOH<br>WOH<br>1<br>1 | | Similar Material (saturated, non-plastic) | 1 |

NOTES:
1) WOH denotes sampler was advanced by the weight of the hammer.
2) Boring was terminated at 14.0 feet.
3) Bore hole was backfilled upon completion.

SS-Split Spoon Sample NX-Rock Core U-Undisturbed Sample P-Piston Type Sample

# Northern Technical Services, LLC

(518) 481-5008

## SOIL BORING LOG

CLIENT: Earth Science Engineering, PC
Willsboro, New York

PROJECT: Black Ash Pond
Willsboro, New York

Boring No. B-12 Sheet 1 of 1
Date Start: 7/26/05 Finish 7/26/05
NTS Report No. JN 540-1-4-05
Location of Boring: As Staked
Ground Elevation: ______

NTS DRILLERS: C. Wheeler T. Martin

Casing ______
H.S. Auger 3 1/4"

Sampler Hammer
Wt. 140 lbs.
Fall 30 in.

Ground Water Observations

| Date | Time | Depth | Casing at |
|---|---|---|---|
| | | | |
| | | | |

| CASING TYPE | DEPTH | SAMPLE NO. | DEPTH OF SAMPLE (Ft.) From | To | SAMPLE TYPE | BLOWS ON SAMPLER PER 6" DROP (2" O.D. SAMPLER) | DEPTH OF CHANGE | CLASSIFICATION OF MATERIAL (f - fine, m - medium, c - coarse; and - 35-50%, some - 20-35%, little - 10-20%, trace - 0-10%) | STANDARD PENETRATION RESISTANCE (N) |
|---|---|---|---|---|---|---|---|---|---|
| HS AUGER | | | 0.0 | 8.0 | Auger | | | Black ASH | |
| | | 1 | 8.0 | 10.0 | SS | WOH | | No Recovery | 0 |
| | | 2 | 10.0 | 12.0 | SS | WOH | | Black ASH, with white sludge (saturated, non-plastic) | 0 |
| | | 3 | 12.0 | 14.0 | SS | WOH | | Similar Material (saturated, non-plastic) | 0 |
| | | 4 | 14.0 | 16.0 | SS | WOH, WOH, 3, 6 | 15.0 | Black ASH, with white sludge to 15.0 feet / Brown cmf SAND, some SILT (saturated, non-plastic) | 3 |
| | | 5 | 16.0 | 18.0 | SS | 1, 5, 7, 5 | | Brown cmf SAND, little SILT (saturated, non-plastic) | 12 |

NOTES:
1) WOH denotes sampler was advanced by the weight of the hammer.
2) Boring was terminated at 18.0 feet.
3) Bore hole was backfilled upon completion.

SS-Split Spoon Sample NX-Rock Core U-Undisturbed Sample P-Piston Type Sample

# Northern Technical Services, LLC

(518) 481-5008

## SOIL BORING LOG

CLIENT: Earth Science Engineering, PC
Willsboro, New York

PROJECT: Black Ash Pond
Willsboro, New York

Boring No. B-13 Sheet 1 of 1
Date Start: 7/26/05 Finish 7/26/05
NTS Report No. JN 540-1-4-05
Location of Boring: As Staked
Ground Elevation: ______

NTS DRILLERS: C. Wheeler T. Martin

Casing ______
H.S. Auger 3 1/4"

Sampler Hammer
Wt. 140 lbs.
Fall 30 in.

Ground Water Observations

| Date | Time | Depth | Casing at |
|---|---|---|---|
| | | | |
| | | | |

| CASING TYPE | DEPTH | SAMPLE NO. | DEPTH OF SAMPLE (Ft.) From | To | SAMPLE TYPE | BLOWS ON SAMPLER PER 6" DROP (2" O.D. SAMPLER) | DEPTH OF CHANGE | CLASSIFICATION OF MATERIAL (f - fine, m - medium, c - coarse; and - 35-50%, some - 20-35%, little - 10-20%, trace - 0-10%) | STANDARD PENETRATION RESISTANCE (N) |
|---|---|---|---|---|---|---|---|---|---|
| HS AUGER | | | 0.0 | 10.0 | Auger | | | Black ASH | |
| | | 1 | 10.0 | 12.0 | SS | WOH | | Black ASH to 11.0 feet | |
| | | | | | | | 11.0 | (saturated, non-plastic) | 0 |
| | | | | | | | | Brown cmf SAND, little SILT | |
| | | | | | | | | (saturated, non-plastic) | |
| | | 2 | 12.0 | 14.0 | SS | WOH | | Similar Material | |
| | | | | | | | | (saturated, non-plastic) | 0 |

NOTES:
1) WOH denotes sampler was advanced by the weight of the hammer.
2) Boring was terminated at 14.0 feet.
3) Bore hole was backfilled upon completion.

SS-Split Spoon Sample NX-Rock Core U-Undisturbed Sample P-Piston Type Sample

# APPENDIX D

# DATA USABILITY REVIEW

## Data Usability Review

As part of the SI, media samples were collected from subsurface test trench excavations, soil borings, groundwater monitoring wells, and Boquet River sediments. As previously mentioned, all samples collected as part of the SI were analyzed for TCL parameters, in accordance with NYSDEC ASP-95 methodologies. As part of this project, the analytical laboratory, Adirondack Environmental Services, Inc. (AES), provided analytical data reports in the form of NYSDEC ASP Category B reportables/deliverables packages.

As part of the services of the analytical laboratory, AES completed a review of the generated analytical data for compliance with QC acceptance limits as specified in the applicable ASP method for each analysis.

The following Quality Control operations and items are considered in the usability and validation of reported results holding times, surrogate recovery, spiked sample recovery, duplicates/spike duplicate precision, tuning criteria, internal standard variation, continuing calibration variation, reference (check) sample recovery, and instrument, method, trip, and field blanks. The appropriate frequency for each operation is also considered. A data quality review summary for the three (3) project specific sample delivery groups (SDGs) is listed below:

**SDG: BG1-S-05-12**

**Volatile Organic Compounds:** Samples in this SDG were analyzed using criteria for EPA OLM04.2. VOC analyses were completed within seven (7) days of sample receipt, as required. Samples received with temperatures ranging between 13 to 20 deg. C. Sample TT-16-S-05-0 was used for matrix spike (MS) and matrix spike duplicate (MSD) analysis. The recovery for all compounds in the MS and MSD were outside the required limits. In accordance with analysis specific protocol, a MS blank was analyzed and all MS blank recoveries were within acceptable limits. Although some samples had surrogate and/or internal standards that were outside required limits, only estimated or trace concentrations of VOCs were detected as part of analysis of the samples included in this SDG. Based on the above listed satisfactory data quality results, the VOC data for SDG: BG1-S-05-12 should be considered usable.

**Semi-Volatile Organic Compounds:** Samples in this SDG were analyzed using criteria for EPA OLM04.2. Semi-VOC extractions and cleanups were completed within five (5) days of sample receipt, as required, and semi-VOC analyses were completed within forty (40) days of sample receipt, as required. Sample TT-16-S-05-

0 was used for MS and MSD analysis. The recovery for several compounds in the MS and MSD were outside the required limits. In accordance with analysis specific protocol, a MS blank was analyzed and all MS blank recoveries (with the exception of 4-nitrophenol) were within acceptable limits. The surrogate recovery for 2-fluorophenol on sample TT-16-S-05-0 was outside specified limits. The surrogate recovery for 2,4,6-tribromophenol on sample WM-4-S-05-24 was outside specified limits. According to the protocol, one base/neutral and one acid surrogate may be outside specified limits with no further action necessary. Based on the above listed satisfactory data quality results, the Semi-VOC data for SDG: BG1-S-05-12 should be considered usable.

**Pesticides/PCBs:** Samples in this SDG were analyzed using criteria for EPA OLM04.2. PCB/pesticide extractions and cleanups were completed within five (5) days of sample receipt, as required, and PCB/pesticide analyses were completed within forty (40) days of sample receipt, as required. All samples were sulfur cleaned prior to analysis as necessary. Sample TT-12-S-05-30 was used for soil MS and MSD analysis. All recoveries were within acceptable limits. Based on the above listed satisfactory data quality results, the PCB and pesticide data for SDG: BG1-S-05-12 should be considered usable.

**Inorganics/Metals:** Samples in this SDG were analyzed for metals and cyanide using criteria for CLP – ILM 4.0. Metals analyses were completed within one hundred eighty (180) days of sample receipt, as required. Hg analyses were completed within 26 days of sample receipt, as required. cyanide analyses were completed within 12 days of sample receipt, as required. The recovery for Ca and Fe in the ICSA and the ICSAB check standards were outside the required limit. The required concentration for these analytes in the check standards is 500,000 ug/L and 200,000 ug/L, respectively. The linear range on the instrument for Ca and Fe is 200,000 ug/L and 100,000 ug/L respectively. At this level, accurate recovery of Ca and Pb in check standards is not possible. The digested spike recoveries for elements including Pb, Hg, Se and Th (for various samples) were outside the required 75-125% limits. A post-digestion spike was performed and the recoveries were within acceptable limits for these metals were within acceptable limits. The results for these metals were flagged with an "N" as specified by the protocol, indicating possible matrix interference. The elements Al, Na, and Zn (for various samples) did not meet the serial dilution criteria of 10%. These metals were flagged with an "E" as required by the protocol, indicating an estimated value resulting from a possible chemical or physical interference. Sample TT-12-S-05-30 was used for MS and duplicate cyanide analysis, with all recoveries within the required limits. Sample TT-16-S-05-0 was used for the MS and duplicate cyanide analysis. The spike recovery for cyanide was slightly outside the required limits (126%). Based on the above listed satisfactory data quality results of metals and cyanide analysis, the metals and cyanide data for SDG - BG1-S-05-12 should be considered usable.

**SDG: B-11-SU-05-168**

**Volatile Organic Compounds:** Samples in this SDG were analyzed using criteria for EPA OLM04.2. VOC analyses were completed within seven (7) days of sample receipt, as required. Samples were received with a temperature of 14 deg. C. Sample MW-4-SU-05-144/216 was used for MS and MSD analysis. The recovery for toluene in the MSD was outside the required limits. In accordance with analysis specific protocol, a MS blank was analyzed and the MS blank recovery was within acceptable limits. Although some samples had surrogate and/or internal standards that were outside required limits, only estimated or trace concentrations of VOCs were detected as part of analysis of the samples included in this SDG. Based on the above listed satisfactory data quality results, the VOC data for SDG: B-11-SU-05-168 should be considered usable.

**Semi-Volatile Organic Compounds:** Samples in this SDG were analyzed using criteria for EPA OLM04.2. Semi-VOC extractions and cleanups were completed within five (5) days of sample receipt, as required, and semi-VOC analyses were completed within forty (40) days of sample receipt, as required. Sample MW-4-SU-05-144/216 was used for MS and MSD analysis. The recovery for several compounds in the MS and MSD were outside the required limits. In accordance with analysis specific protocol, an MS blank was analyzed and all MS blank recoveries were within acceptable limits. The surrogate recovery for 2-fluorophenol on sample B-11-SU-05-96/168 was outside specified limits. According to the protocol, one base/neutral and one acid surrogate may be outside specified limits with no further action necessary. The surrogate and internal standard recoveries on samples MW-4-SU-05-144/216 MS/MD were outside specified limits. According to the protocol, the MS, MSD, and matrix spike blank are not re-analyzed for surrogates and internal standards outside of specified limits. Based on the above listed satisfactory data quality results, the Semi-VOC data for SDG: B-11-SU-05-168 should be considered usable.

**Pesticides/PCBs:** Samples in this SDG were analyzed using criteria for EPA OLM04.2. PCB/pesticide extractions and cleanups were completed within five (5) days of sample receipt, as required, and PCB/pesticide analyses were completed within forty (40) days of sample receipt, as required. All samples were sulfur cleaned prior to analysis as necessary. Sample MS-4-SU-05-144/216 was used for soil MS and MSD analysis. All recoveries were within acceptable limits. Based on the above listed satisfactory data quality results, the PCB and pesticide data for SDG: B-11-SU-05-168 should be considered usable.

**Inorganics/Metals:** Samples in this SDG were analyzed for metals and cyanide using criteria for CLP – ILM 4.0. Metals analyses were completed within one hundred eighty (180) days of sample receipt, as required. Hg analyses were completed within twenty six (26) days of sample receipt, as required. cyanide analyses were completed within twelve (12) days of sample receipt, as required. The recovery for Ca and Fe in the ICSA and the ICSAB check standards were outside the required limit. The required concentration for these analytes in the check standards is 500,000 ug/L and 200,000 ug/L, respectively. The linear range on the instrument for Ca and Fe is 200,000 ug/L and 100,000 ug/L, respectively. At this level, accurate recovery of Ca and Fe in check standards is not possible. The digested spike recoveries for metals including; Sb, Se, and Tl (for sample MS-4-SU-05-144/216) was outside the required 75-125% limits. A post-digestion spike was performed and the recoveries were within acceptable limits for these metals were within acceptable limits. The results for these metals were flagged with an "N" as specified by the protocol, indicating possible matrix interference. The elements Ca and K (for sample MW-4-SU-05-144/216) did not meet the serial dilution criteria of 10%. These metals were flagged with an "E" as required by the protocol, indicating an estimated value resulting from a possible chemical or physical interference. Sample MW-4-SU-05-144/216 was used for MS and duplicate Cy analysis. The spike recovery for cyanide was outside the required limits. A post-distillation spike was performed and the recovery was 34%. The soil Laboratory Control Sample (LCS) was outside the specified limits. The calibration verification samples were all within required limits. A water LCS also analyzed was within acceptable limits. The samples were prepared on the last day of holding time and could not be re-prepared with a different soil LCS. Despite a few of the above listed minor deficiencies (based on the consistency of solids media metals concentrations) the metals and cyanide data for SDG - BG1-S-05-12 should be considered usable.

**SDG: MW-1**

**Volatile Organic Compounds:** Samples in this SDG were analyzed using criteria for EPA OLM04.2. VOC analyses were completed within seven (7)days of sample receipt, as required. Samples were received with a temperature of 14 deg. C. Sample MW-4 was used for water MS and MSD analysis, with all recoveries within acceptable limits. Similarly, sample SD-2-SU-05-6 was used for soil MS and MSD analysis, with all recoveries within acceptable limits.

The surrogate recovery for bromofluorobenzene on samples MS-4 MS/MSD was outside specified limits. According to the protocol, the MSD and MS blank are not re-analyzed for surrogates outside of specified limits. Based on the above listed satisfactory data quality results, the VOC data for SDG: MW-1 should be considered usable.

**Semi-Volatile Organic Compounds:** Samples in this SDG were analyzed using criteria for EPA OLM04.2. Semi-VOC extractions and cleanups were completed within five (5) days of sample receipt, as required, and semi-VOC analyses were completed within forty (40) days of sample receipt, as required. Sample MW-4 was used for water MS and MSD analysis. The recovery for pentachlorophenol in the MS was outside the required limits. In accordance with analysis specific protocol, an MS blank was analyzed and all MS blank recoveries were within acceptable limits. Sample SD-2-SU-05-6 was used for soil MS and MSD analysis. The recoveries for several compounds were outside the required limits. In accordance with analysis specific protocol, an MS blank was analyzed and the recoveries for 4-chloro-3methylphenol, 4-nitrophenol, and pyrene were higher than the specified limits, however all other recoveries were within acceptable limits. Despite the above listed minor deficiencies, and based on the estimated or trace presence of semi-VOCs detected within the SDG: MW-1 samples, it is justified that the Semi-VOC data for SDG: MW-1 be considered usable.

**Pesticides/PCBs:** Samples in this SDG were analyzed using criteria for EPA OLM04.2. PCB/pesticide extractions and cleanups were completed within five (5) days of sample receipt, as required, and PCB/pesticide analyses were completed within forty (40) days of sample receipt, as required. All samples were sulfur cleaned prior to analysis as necessary. Sample MW-4 was used for water MS and MSD analysis, with all recoveries within acceptable limits. Sample SD-2-SU-05-6 was used for soil MS and MSD analysis, with all recoveries within acceptable limits. Based on the above listed satisfactory data quality results, the PCB and pesticide data for SDG: MW-1 should be considered usable.

**Inorganics/Metals:** Samples in this SDG were analyzed for metals and cyanide using criteria for CLP – ILM 4.0. Metals analyses were completed within one hundred eighty (180) days of sample receipt, as required. Hg analyses were completed within twenty six (26) days of sample receipt, as required. cyanide analyses were completed within twelve (12) days of sample receipt, as required.

**Inorganics/Metals (Water):** The recovery for Ca and Fe in the ICSA and the ICSAB check standards were outside the required limit. The required concentration for these analytes in the check standards is 500,000 ug/L and 200,000 ug/L, respectively. The linear range on the instrument for Ca and Fe is 200,000 ug/L and 100,000 ug/L, respectively. At this level, accurate recovery of Ca and Fe in check standards is not possible. The digested spike recoveries for metals including Al, Ag, and Th (for sample MW-4) was outside the required 75-125% limits. A post-digestion spike was performed and the recoveries were within acceptable limits for these metals were within acceptable limits. The results for these metals were flagged with an "N" as specified by the protocol, indicating possible matrix interference. The elements Ba, Ca, Fe, Mg, Mn, K and Na (for sample MW-4) did not meet the serial dilution criteria of 10%. These metals were flagged with an "E" as required by the protocol, indicating an estimated value resulting from a possible chemical or physical interference. Sample MW-4 was used for MS and duplicate cyanide analysis. The spike recovery for cyanide was within the acceptable limits. Despite a few of the above listed minor deficiencies (based on the consistency of water media metals concentrations exhibited) the metals and cyanide water data for SDG: MW-1 should be considered usable.

**Inorganics/Metals (Soil-Sediment):** The recovery for Ca and Fe in the ICSA and the ICSAB check standards were outside the required limit. The required concentration for these analytes in the check standards is 500,000 ug/L and 200,000 ug/L, respectively. The linear range on the instrument for Ca and Fe is 200,000 ug/L and 100,000 ug/L, respectively. At this level, accurate recovery of Ca and Fe in check standards is not possible. The digested spike recoveries for metals, including Se and Ag (for sample SD-2-SU-05-6) was outside the required 75-125% limits. A post-digestion spike was performed and the recovery for silver was within acceptable limits for these metals were within acceptable limits. The results for these metals were flagged with an "N" as specified by the protocol, indicating possible matrix interference. Na (for sample SD-2-SU-05-6) did not meet the serial dilution criteria of 10%. Accordingly, Na was flagged with an "E" as required by the protocol, indicating an estimated value resulting from a possible chemical or physical interference. Sample SD=2-SU-05-6 was used for the soil-sediment MS and duplicate cyanide analysis. The spike recovery for cyanide was within the acceptable limits. Despite a few of the above listed minor deficiencies (based on the consistency of sediment media metals concentrations exhibited) the metals and cyanide sediment data for SDG: MW-1 should be considered usable.

As referenced by the laboratory in the Sample Delivery Group specific case narratives, every effort has been made to report data that is compliant with the EPA methodology cited for each analysis. In cases where the laboratory was unable to meet all method requirements prior to sample expiry, either due to the nature of the sample or other technical difficulty, results are reported with qualification with the understanding that qualified results may not be suitable for compliance purposes. Overall, as detailed under each of the above listed Sample Delivery Group Case Narrative Data Usability Assessments, all data accumulated as part of this SI should be considered usable, as well as reasonably valid and defensible.

The results of the internal laboratory review and usability assessment, are included as a preface to each of the three media specific sample delivery groups of analytical data, included within Appendix D (Soil Sample Analytical Data), and Appendix E (Groundwater and Sediment Sample Analytical Data).

# APPENDIX E

# AMBIENT AIR MONITORING

# DATA

# UPWIND DATA

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"Device no.   ", 1
 Tag Number   ", 2
"Start Time   ", 08:08:42
"Start Date   ", 13-Jul-2005
 Log Period   ", 00:15:00
 Number       ", 1
"CalFactor    ", 1.000000
 Unit         ", 0
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"SIZE_CORRECT", "DISABLED"
"TEMPUNITS    ", F
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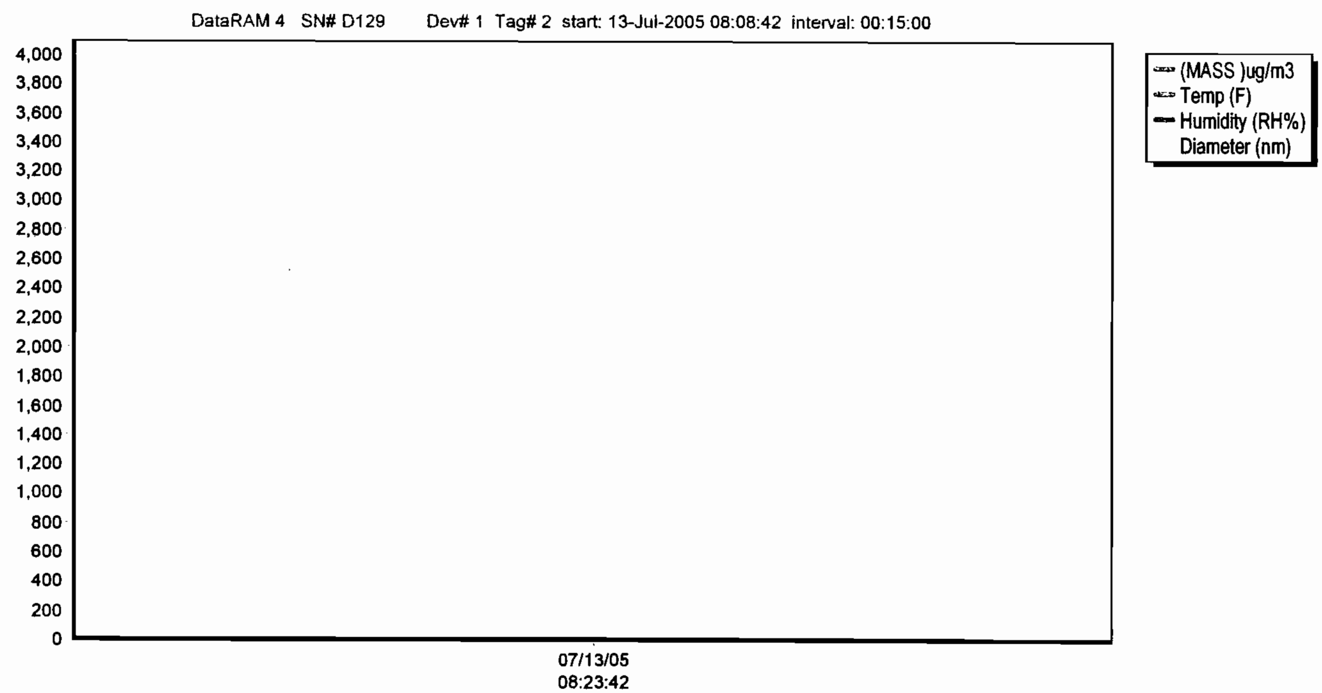
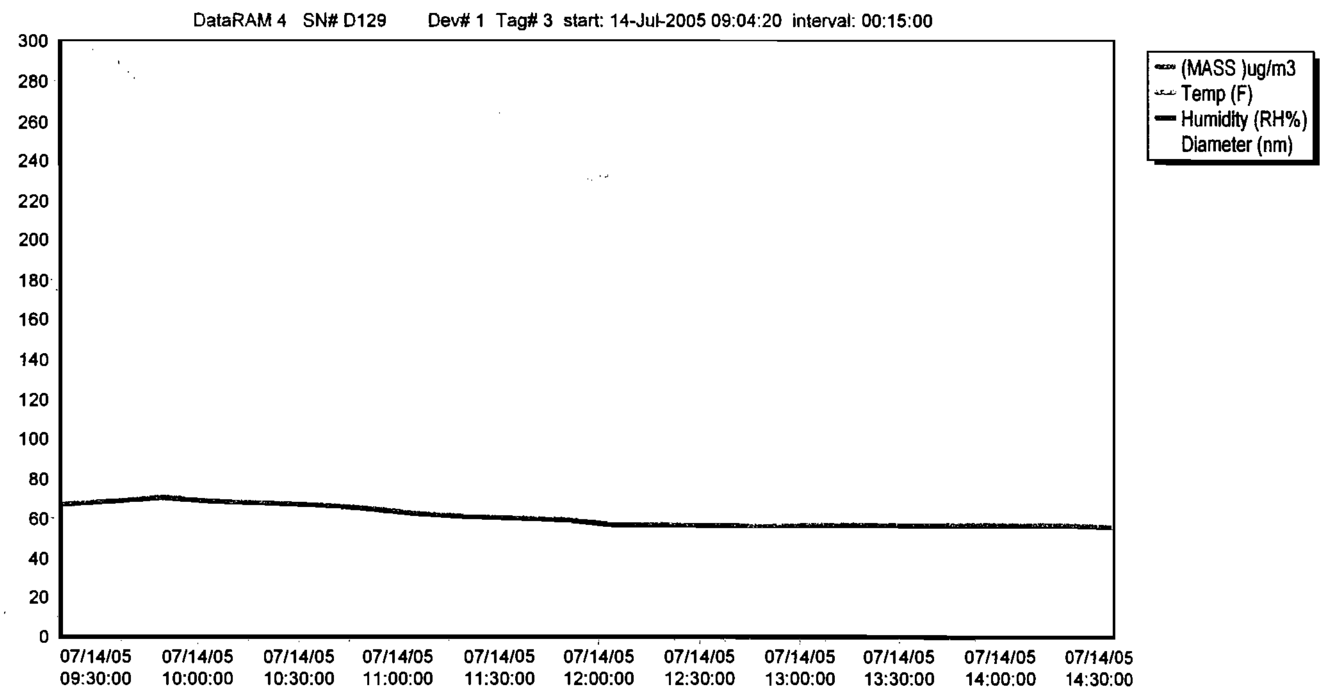
 Max MASS  @ ", 1  ,08:23:42  ,13-Jul-2005
"Avg MASS     ", 13.476810
 Max Diam     ", 4.092425
 Max Diam @  ", 1  ,08:23:42  ,13-Jul-2005
"Avg Diam     ", 4.092425
 ALARM        ", "DISABLED"
 ALARM_LEVEL ", 0.0
"AUTO_ZERO    ", "DISABLED"
"AZ INTERVAL ", 1
 Errors       ", 0001
Record,"(MASS )ug/m3", Temp, RHumidity, Diameter
     1,       13.5,  75.7,    71,    4.0924  ,08:23:42  ,13-Jul-2005
```


DataRAM 4 SN# D129 Dev# 1 Tag# 2 start: 13-Jul-2005 08:08:42 interval: 00:15:00
4,000
3,800
3,600
3,400
3,200
3,000
2,800
2,600
2,400
2,200
2,000
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
07/13/05
08:23:42
(MASS )ug/m3
Temp (F)
Humidity (RH%)
Diameter (nm)

"Model Number ", "DataRAM 4 ", 104
"Serial no. ", "D129 "
"Device no. ", 1
"Tag Number ", 3
"Start Time ", 09:04:20
"Start Date ", 14-Jul-2005
"Log Period ", 00:15:00
"Number ", 22
"CalFactor ", 1.000000
"Unit ", 0
"Unit Name ", "(MASS )ug/m3"
"SIZE_CORRECT", "DISABLED"
"TEMPUNITS ", F
"Max MASS ", 112.183700
"Max MASS @ ", 1 ,09:19:20 ,14-Jul-2005
"Avg MASS ", 77.800330
"Max Diam ", 0.300288
"Max Diam @ ", 1 ,09:19:20 ,14-Jul-2005
"Avg Diam ", 0.246063
"ALARM ", "DISABLED"
"ALARM_LEVEL ", 0.0
"AUTO_ZERO ", "DISABLED"
"AZ INTERVAL ", 1
"Errors ", 0000

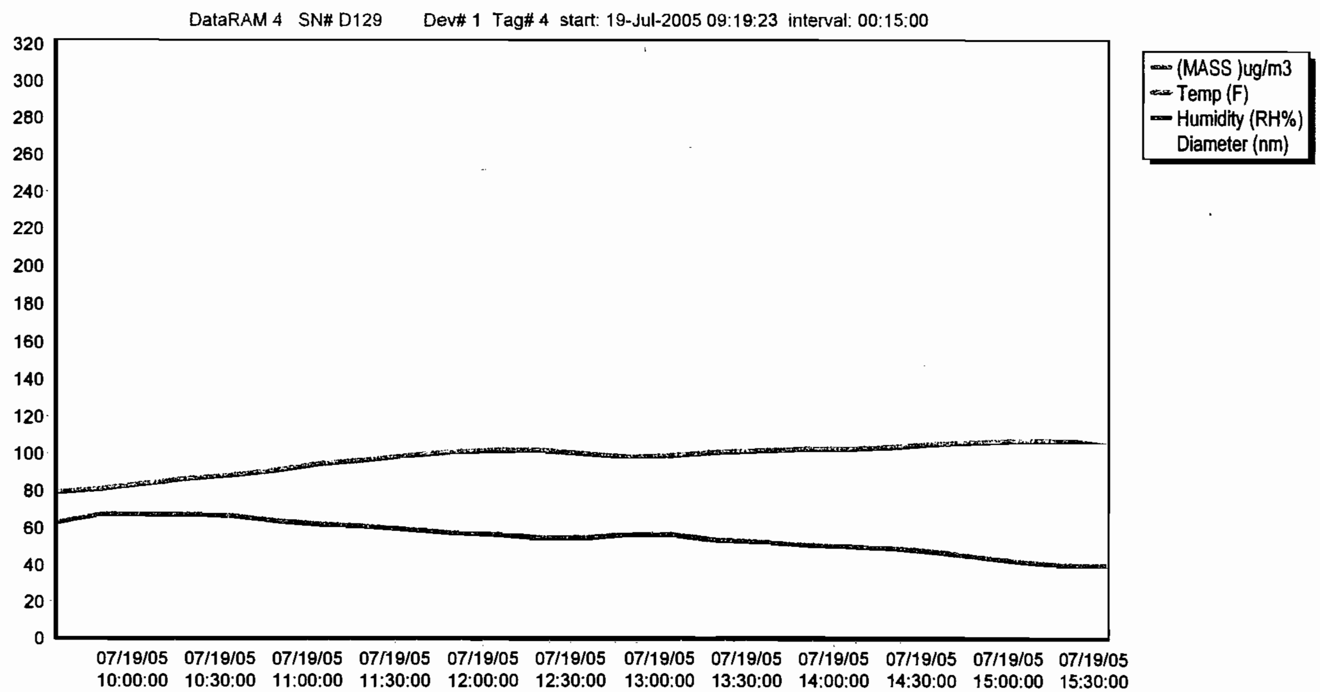
| Record, | "(MASS )ug/m3", | Temp, | RHumidity, | Diameter | | |
|---|---|---|---|---|---|---|
| 1, | 112.2, | 75.1, | 67, | 0.3003 | ,09:19:20 | ,14-Jul-2005 |
| 2, | 98.0, | 76.8, | 69, | 0.2931 | ,09:34:20 | ,14-Jul-2005 |
| 3, | 83.0, | 78.8, | 70, | 0.2694 | ,09:49:20 | ,14-Jul-2005 |
| 4, | 72.0, | 81.5, | 69, | 0.2536 | ,10:04:20 | ,14-Jul-2005 |
| 5, | 69.7, | 84.2, | 68, | 0.2504 | ,10:19:20 | ,14-Jul-2005 |
| 6, | 69.1, | 86.5, | 67, | 0.2505 | ,10:34:20 | ,14-Jul-2005 |
| 7, | 66.8, | 88.7, | 65, | 0.2443 | ,10:49:20 | ,14-Jul-2005 |
| 8, | 66.4, | 91.6, | 63, | 0.2415 | ,11:04:20 | ,14-Jul-2005 |
| 9, | 67.7, | 93.5, | 61, | 0.2328 | ,11:19:20 | ,14-Jul-2005 |
| 10, | 65.3, | 94.4, | 60, | 0.2260 | ,11:34:20 | ,14-Jul-2005 |
| 11, | 66.2, | 96.1, | 59, | 0.2279 | ,11:49:20 | ,14-Jul-2005 |
| 12, | 71.7, | 97.0, | 57, | 0.2333 | ,12:04:20 | ,14-Jul-2005 |
| 13, | 76.5, | 96.8, | 57, | 0.2426 | ,12:19:20 | ,14-Jul-2005 |
| 14, | 76.5, | 96.9, | 57, | 0.2408 | ,12:34:20 | ,14-Jul-2005 |
| 15, | 75.4, | 96.0, | 56, | 0.2370 | ,12:49:20 | ,14-Jul-2005 |
| 16, | 71.3, | 94.7, | 57, | 0.2335 | ,13:04:20 | ,14-Jul-2005 |
| 17, | 75.3, | 93.5, | 57, | 0.2350 | ,13:19:20 | ,14-Jul-2005 |
| 18, | 83.7, | 92.5, | 57, | 0.2432 | ,13:34:20 | ,14-Jul-2005 |
| 19, | 85.7, | 91.9, | 57, | 0.2442 | ,13:49:20 | ,14-Jul-2005 |
| 20, | 87.2, | 92.5, | 57, | 0.2422 | ,14:04:20 | ,14-Jul-2005 |
| 21, | 87.2, | 93.6, | 57, | 0.2393 | ,14:19:20 | ,14-Jul-2005 |
| 22, | 84.8, | 94.9, | 56, | 0.2324 | ,14:34:20 | ,14-Jul-2005 |



DataRAM 4 SN# D129 Dev# 1 Tag# 3 start: 14-Jul-2005 09:04:20 interval: 00:15:00
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
07/14/05 09:30:00
07/14/05 10:00:00
07/14/05 10:30:00
07/14/05 11:00:00
07/14/05 11:30:00
07/14/05 12:00:00
07/14/05 12:30:00
07/14/05 13:00:00
07/14/05 13:30:00
07/14/05 14:00:00
07/14/05 14:30:00
(MASS )ug/m3
Temp (F)
Humidity (RH%)
Diameter (nm)

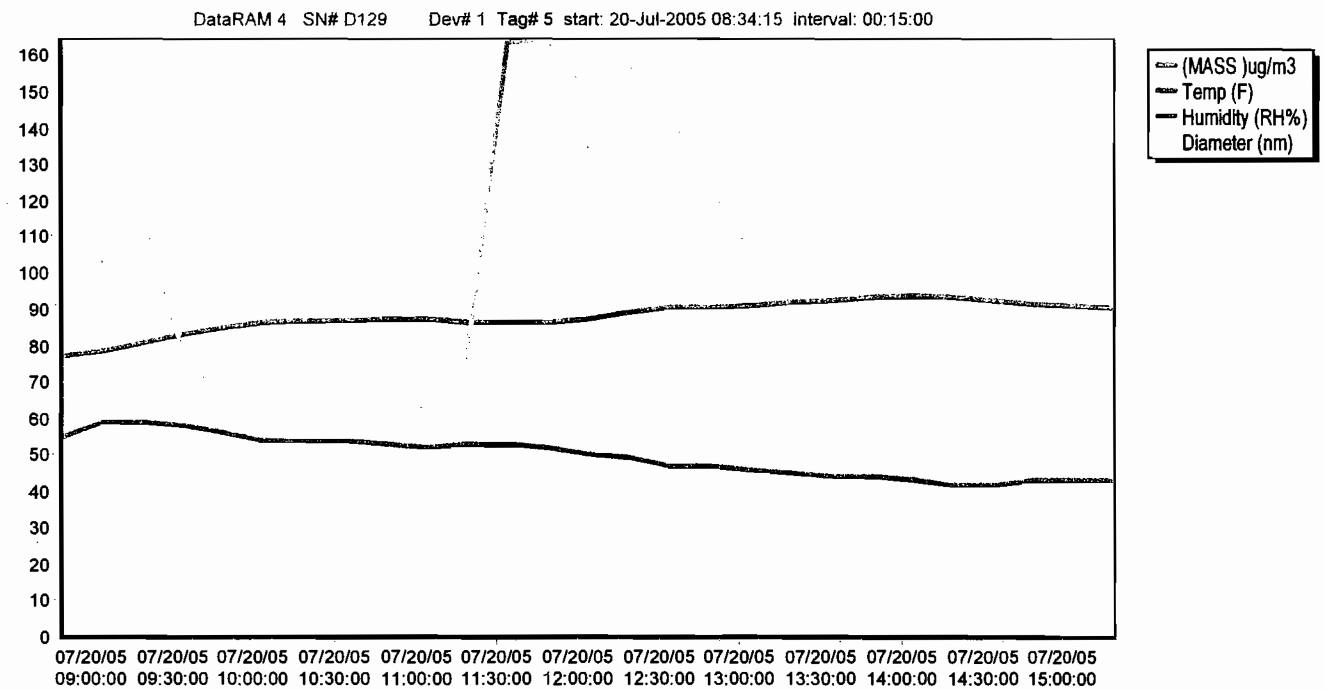
```
"Model Number ", "DataRAM 4 ", 104
"Serial no.   ", "D129      "
"Device no.   ", 1
"Tag Number   ", 4
"Start Time   ", 09:19:23
"Start Date   ", 19-Jul-2005
"Log Period   ", 00:15:00
"Number       ", 25
"CalFactor    ", 1.000000
"Unit         ", 0
"Unit Name    ", "(MASS )ug/m3"
"SIZE_CORRECT", "DISABLED"
"TEMPUNITS    ", F
"Max MASS     ", 84.359160
"Max MASS   @ ", 1   ,09:34:23   ,19-Jul-2005
"Avg MASS     ", 57.257860
"Max Diam     ", 0.322134
"Max Diam @   ", 2   ,09:49:23   ,19-Jul-2005
"Avg Diam     ", 0.231401
"ALARM        ", "DISABLED"
"ALARM_LEVEL ", 0.0
"AUTO_ZERO    ", "DISABLED"
"AZ INTERVAL ", 1
"Errors       ", 0000
"record,"(MASS )ug/m3", Temp, RHumidity, Diameter
```

| record, | "(MASS )ug/m3", | Temp, | RHumidity, | Diameter | | |
|---|---|---|---|---|---|---|
| 1, | 84.4, | 78.8, | 63, | 0.3135 | ,09:34:23 | ,19-Jul-2005 |
| 2, | 74.1, | 80.9, | 67, | 0.3221 | ,09:49:23 | ,19-Jul-2005 |
| 3, | 65.8, | 83.6, | 67, | 0.3126 | ,10:04:23 | ,19-Jul-2005 |
| 4, | 63.6, | 86.3, | 67, | 0.3049 | ,10:19:23 | ,19-Jul-2005 |
| 5, | 61.6, | 88.7, | 66, | 0.2913 | ,10:34:23 | ,19-Jul-2005 |
| 6, | 60.9, | 91.4, | 64, | 0.2735 | ,10:49:23 | ,19-Jul-2005 |
| 7, | 61.4, | 94.2, | 62, | 0.2634 | ,11:04:23 | ,19-Jul-2005 |
| 8, | 61.2, | 96.8, | 61, | 0.2552 | ,11:19:23 | ,19-Jul-2005 |
| 9, | 62.7, | 99.2, | 59, | 0.2511 | ,11:34:23 | ,19-Jul-2005 |
| 10, | 66.5, | 100.7, | 57, | 0.2537 | ,11:49:23 | ,19-Jul-2005 |
| 11, | 68.9, | 101.8, | 56, | 0.2516 | ,12:04:23 | ,19-Jul-2005 |
| 12, | 75.1, | 101.9, | 55, | 0.2637 | ,12:19:23 | ,19-Jul-2005 |
| 13, | 75.7, | 100.0, | 55, | 0.2704 | ,12:34:23 | ,19-Jul-2005 |
| 14, | 79.4, | 98.7, | 56, | 0.2758 | ,12:49:23 | ,19-Jul-2005 |
| 15, | 79.0, | 99.6, | 56, | 0.2669 | ,13:04:23 | ,19-Jul-2005 |
| 16, | 79.5, | 101.4, | 54, | 0.2629 | ,13:19:23 | ,19-Jul-2005 |
| 17, | 59.0, | 102.0, | 53, | 0.2232 | ,13:34:23 | ,19-Jul-2005 |
| 18, | 48.2, | 102.4, | 51, | 0.1937 | ,13:49:23 | ,19-Jul-2005 |
| 19, | 34.6, | 102.8, | 50, | 0.1568 | ,14:04:23 | ,19-Jul-2005 |
| 20, | 33.4, | 103.9, | 49, | 0.1472 | ,14:19:23 | ,19-Jul-2005 |
| 21, | 33.4, | 105.4, | 47, | 0.1495 | ,14:34:23 | ,19-Jul-2005 |
| 22, | 30.8, | 106.7, | 45, | 0.1401 | ,14:49:23 | ,19-Jul-2005 |
| 23, | 26.6, | 107.5, | 42, | 0.1232 | ,15:04:23 | ,19-Jul-2005 |
| 24, | 23.3, | 107.8, | 40, | 0.1112 | ,15:19:23 | ,19-Jul-2005 |
| 25, | 22.3, | 107.3, | 40, | 0.1073 | ,15:34:23 | ,19-Jul-2005 |



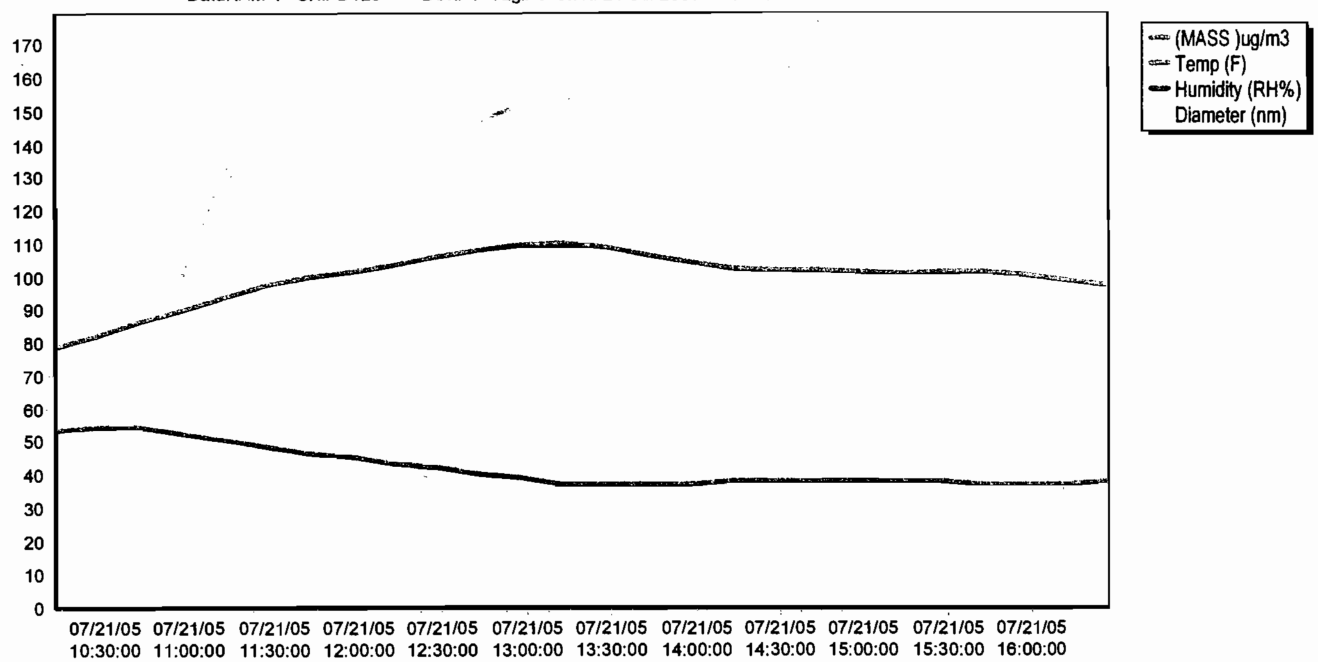
DataRAM 4 SN# D129 Dev# 1 Tag# 4 start: 19-Jul-2005 09:19:23 interval: 00:15:00
320
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
07/19/05 10:00:00
07/19/05 10:30:00
07/19/05 11:00:00
07/19/05 11:30:00
07/19/05 12:00:00
07/19/05 12:30:00
07/19/05 13:00:00
07/19/05 13:30:00
07/19/05 14:00:00
07/19/05 14:30:00
07/19/05 15:00:00
07/19/05 15:30:00
(MASS )ug/m3
Temp (F)
Humidity (RH%)
Diameter (nm)

```
"Model Number ", "DataRAM 4 ", 104
"Serial no.  ", "D129      "
"Device no.  ", 1
"Tag Number  ", 5
"Start Time  ", 08:34:15
"Start Date  ", 20-Jul-2005
"Log Period  ", 00:15:00
"Number      ", 27
"CalFactor   ", 1.000000
"Unit        ", 0
"Unit Name   ", "(MASS )ug/m3"
"SIZE_CORRECT", "DISABLED"
"TEMPUNITS   ", F
"Max MASS    ", 12.433570
"Max MASS  @ ", 8  ,10:34:15  ,20-Jul-2005
"Avg MASS    ", 7.726999
"Max Diam    ", 0.164374
"Max Diam @  ", 13  ,11:49:15  ,20-Jul-2005
"Avg Diam    ", 0.118628
"ALARM       ", "DISABLED"
"ALARM_LEVEL ", 0.0
"AUTO_ZERO   ", "DISABLED"
"AZ INTERVAL ", 1
"Errors      ", 0000
record,"(MASS )ug/m3", Temp, RHumidity, Diameter
     1,          7.1,  76.9,    55,    0.1254  ,08:49:15  ,20-Jul-2005
     2,          6.7,  78.5,    59,    0.1241  ,09:04:15  ,20-Jul-2005
     3,          7.0,  80.7,    59,    0.1172  ,09:19:15  ,20-Jul-2005
     4,         10.0,  83.1,    58,    0.0764  ,09:34:15  ,20-Jul-2005
     5,         12.0,  85.2,    56,    0.0668  ,09:49:15  ,20-Jul-2005
     6,         12.3,  86.3,    54,    0.0636  ,10:04:15  ,20-Jul-2005
     7,         11.5,  86.7,    54,    0.0672  ,10:19:15  ,20-Jul-2005
     8,         12.4,  86.9,    54,    0.0651  ,10:34:15  ,20-Jul-2005
     9,         11.5,  87.5,    53,    0.0643  ,10:49:15  ,20-Jul-2005
    10,         11.9,  87.3,    52,    0.0622  ,11:04:15  ,20-Jul-2005
    11,         11.2,  86.2,    53,    0.0776  ,11:19:15  ,20-Jul-2005
    12,          5.3,  86.2,    53,    0.1636  ,11:34:15  ,20-Jul-2005
    13,          5.3,  86.3,    52,    0.1644  ,11:49:15  ,20-Jul-2005
    14,          6.1,  87.5,    50,    0.1500  ,12:04:15  ,20-Jul-2005
    15,          5.8,  89.3,    49,    0.1565  ,12:19:15  ,20-Jul-2005
    16,          6.3,  90.5,    47,    0.1444  ,12:34:15  ,20-Jul-2005
    17,          6.7,  90.5,    47,    0.1239  ,12:49:15  ,20-Jul-2005
    18,          7.2,  91.1,    46,    0.1070  ,13:04:15  ,20-Jul-2005
    19,          6.5,  91.8,    45,    0.1257  ,13:19:15  ,20-Jul-2005
    20,          6.0,  92.5,    44,    0.1358  ,13:34:15  ,20-Jul-2005
    21,          5.5,  93.4,    44,    0.1504  ,13:49:15  ,20-Jul-2005
    22,          5.2,  93.7,    43,    0.1535  ,14:04:15  ,20-Jul-2005
    23,          5.3,  93.5,    42,    0.1530  ,14:19:15  ,20-Jul-2005
    24,          5.8,  92.5,    42,    0.1454  ,14:34:15  ,20-Jul-2005
    25,          5.5,  91.5,    43,    0.1434  ,14:49:15  ,20-Jul-2005
    26,          6.8,  91.2,    43,    0.1358  ,15:04:15  ,20-Jul-2005
    27,          5.6,  90.5,    43,    0.1404  ,15:19:15  ,20-Jul-2005
```


DataRAM 4 SN# D129 Dev# 1 Tag# 5 start: 20-Jul-2005 08:34:15 interval: 00:15:00
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
07/20/05 09:00:00
07/20/05 09:30:00
07/20/05 10:00:00
07/20/05 10:30:00
07/20/05 11:00:00
07/20/05 11:30:00
07/20/05 12:00:00
07/20/05 12:30:00
07/20/05 13:00:00
07/20/05 13:30:00
07/20/05 14:00:00
07/20/05 14:30:00
07/20/05 15:00:00
(MASS )ug/m3
Temp (F)
Humidity (RH%)
Diameter (nm)

```
"Serial no.  ", "D129      "
"Device no.  ", 1
"Tag Number  ", 6
"Start Time  ", 09:57:42
"Start Date  ", 21-Jul-2005
"Log Period  ", 00:15:00
"Number      ", 26
"CalFactor   ", 1.000000
"Unit        ", 0
"Unit Name   ", "(MASS )ug/m3"
"SIZE_CORRECT", "DISABLED"
"TEMPUNITS   ", F
"Max MASS    ", 12.590880
"Max MASS  @ ", 19  ,14:42:42  ,21-Jul-2005
"Avg MASS    ", 6.491178
"Max Diam    ", 0.179292
"Max Diam @  ", 19  ,14:42:42  ,21-Jul-2005
"Avg Diam    ", 0.140492
"ALARM       ", "DISABLED"
"ALARM_LEVEL ", 0.0
"AUTO_ZERO   ", "DISABLED"
"AZ INTERVAL ", 1
"Errors      ", 0100
record,"(MASS )ug/m3", Temp, RHumidity, Diameter
     1,          7.8,  78.5,    53,    0.0933  ,10:12:42  ,21-Jul-2005
     2,          7.8,  82.2,    54,    0.0874  ,10:27:42  ,21-Jul-2005
     3,          7.2,  86.3,    54,    0.0932  ,10:42:42  ,21-Jul-2005
     4,          7.1,  89.7,    52,    0.1002  ,10:57:42  ,21-Jul-2005
     5,          6.0,  93.5,    50,    0.1348  ,11:12:42  ,21-Jul-2005
     6,          6.7,  97.4,    48,    0.1101  ,11:27:42  ,21-Jul-2005
     7,          7.3, 100.0,    46,    0.1077  ,11:42:42  ,21-Jul-2005
     8,          6.9, 101.5,    45,    0.1144  ,11:57:42  ,21-Jul-2005
     9,          6.7, 103.5,    43,    0.1251  ,12:12:42  ,21-Jul-2005
    10,          6.0, 105.9,    42,    0.1410  ,12:27:42  ,21-Jul-2005
    11,          6.1, 108.0,    40,    0.1470  ,12:42:42  ,21-Jul-2005
    12,          6.0, 109.3,    39,    0.1516  ,12:57:42  ,21-Jul-2005
    13,          6.1, 110.1,    37,    0.1527  ,13:12:42  ,21-Jul-2005
    14,          5.7, 109.1,    37,    0.1577  ,13:27:42  ,21-Jul-2005
    15,          5.7, 106.6,    37,    0.1600  ,13:42:42  ,21-Jul-2005
    16,          5.6, 104.3,    37,    0.1562  ,13:57:42  ,21-Jul-2005
    17,          5.7, 102.4,    38,    0.1533  ,14:12:42  ,21-Jul-2005
    18,          5.8, 101.7,    38,    0.1530  ,14:27:42  ,21-Jul-2005
    19,         12.6, 101.7,    38,    0.1793  ,14:42:42  ,21-Jul-2005
    20,          8.1, 101.3,    38,    0.1570  ,14:57:42  ,21-Jul-2005
    21,          5.5, 100.9,    38,    0.1577  ,15:12:42  ,21-Jul-2005
    22,          5.3, 101.1,    38,    0.1683  ,15:27:42  ,21-Jul-2005
    23,          5.2, 101.4,    37,    0.1690  ,15:42:42  ,21-Jul-2005
    24,          5.3, 100.3,    37,    0.1644  ,15:57:42  ,21-Jul-2005
    25,          5.6,  98.6,    37,    0.1606  ,16:12:42  ,21-Jul-2005
    26,          5.4,  97.0,    38,    0.1577  ,16:27:42  ,21-Jul-2005
```

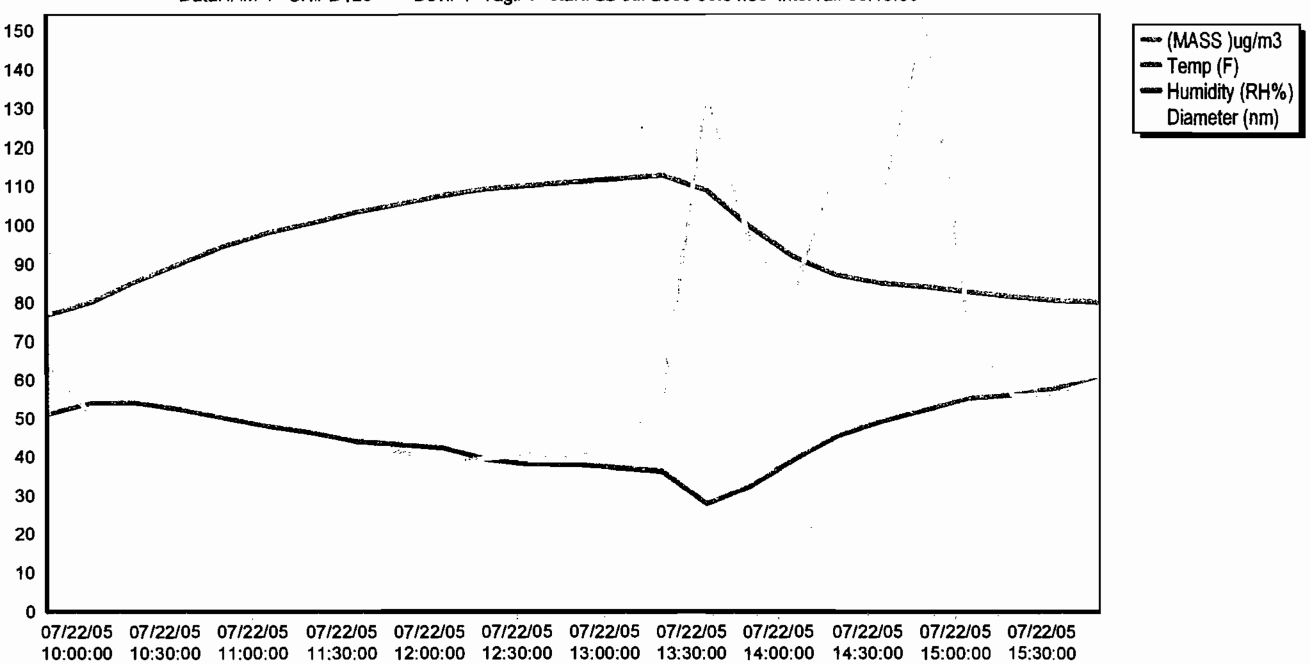
DataRAM 4 SN# D129 Dev# 1 Tag# 6 start: 21-Jul-2005 09:57:42 interval: 00:15:00



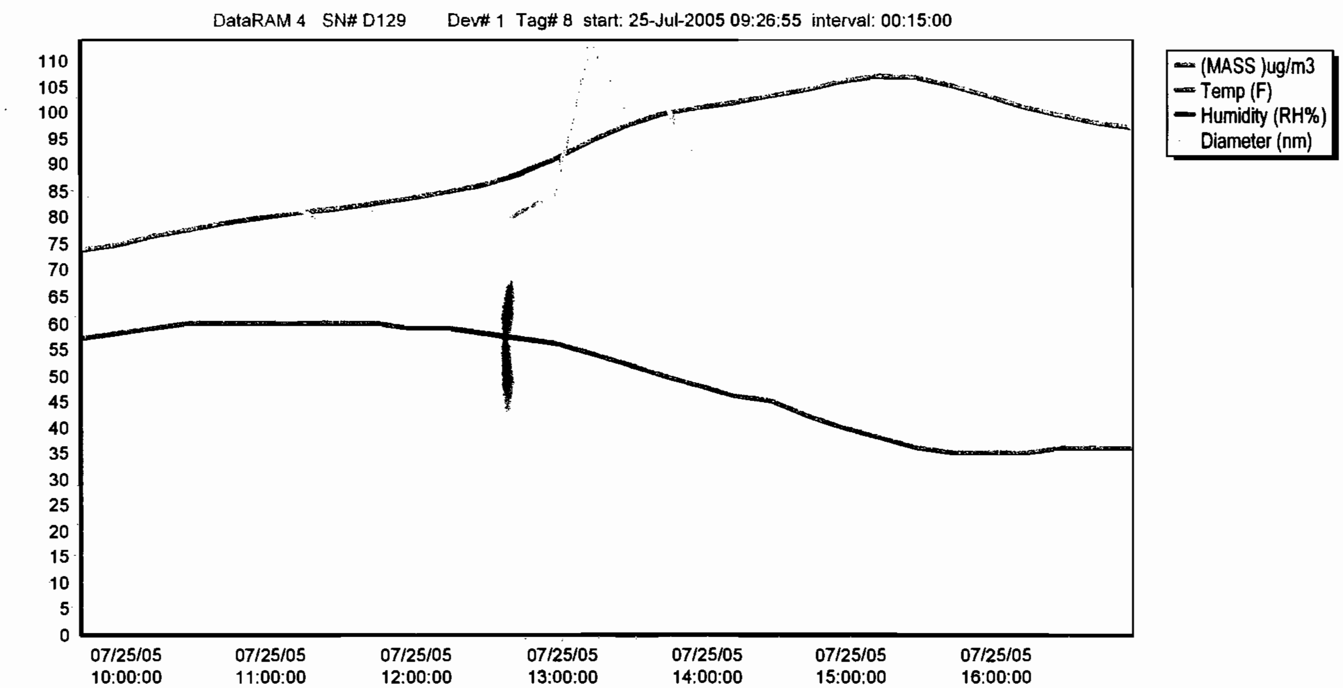
```
"Model Number", "DataRAM 4 ", 104
"Serial no.  ", "D129      "
 Device no.  ", 1
 Tag Number  ", 7
"Start Time  ", 09:34:56
 Start Date  ", 22-Jul-2005
 Log Period  ", 00:15:00
"Number      ", 25
"CalFactor   ", 1.000000
 Unit        ", 0
 Unit Name   ", "(MASS )ug/m3"
"SIZE_CORRECT", "DISABLED"
 TEMPUNITS   ", F
 Max MASS    ", 23.823960
"Max MASS  @ ", 1  ,09:49:56  ,22-Jul-2005
"Avg MASS    ", 14.425700
 Max Diam    ", 0.153881
"Max Diam @  ", 21  ,14:49:56  ,22-Jul-2005
"Avg Diam    ", 0.062965
 ALARM       ", "DISABLED"
 ALARM_LEVEL ", 0.0
"AUTO_ZERO   ", "DISABLED"
 AZ INTERVAL ", 1
 Errors      ", 0000
```

| record, | "(MASS )ug/m3", | Temp, | RHumidity, | Diameter | | |
|---|---|---|---|---|---|---|
| 1, | 23.8, | 76.6, | 51, | 0.0646 | ,09:49:56 | ,22-Jul-2005 |
| 2, | 19.5, | 80.2, | 54, | 0.0504 | ,10:04:56 | ,22-Jul-2005 |
| 3, | 16.7, | 85.1, | 54, | 0.0437 | ,10:19:56 | ,22-Jul-2005 |
| 4, | 15.1, | 89.9, | 52, | 0.0363 | ,10:34:56 | ,22-Jul-2005 |
| 5, | 15.6, | 94.3, | 50, | 0.0377 | ,10:49:56 | ,22-Jul-2005 |
| 6, | 16.5, | 97.8, | 48, | 0.0365 | ,11:04:56 | ,22-Jul-2005 |
| 7, | 16.1, | 100.5, | 46, | 0.0336 | ,11:19:56 | ,22-Jul-2005 |
| 8, | 16.1, | 103.0, | 44, | 0.0358 | ,11:34:56 | ,22-Jul-2005 |
| 9, | 16.5, | 105.2, | 43, | 0.0413 | ,11:49:56 | ,22-Jul-2005 |
| 10, | 16.3, | 107.3, | 42, | 0.0379 | ,12:04:56 | ,22-Jul-2005 |
| 11, | 16.9, | 109.3, | 39, | 0.0397 | ,12:19:56 | ,22-Jul-2005 |
| 12, | 17.8, | 110.2, | 38, | 0.0403 | ,12:34:56 | ,22-Jul-2005 |
| 13, | 18.3, | 110.8, | 38, | 0.0402 | ,12:49:56 | ,22-Jul-2005 |
| 14, | 20.3, | 111.8, | 37, | 0.0438 | ,13:04:56 | ,22-Jul-2005 |
| 15, | 20.6, | 112.6, | 36, | 0.0557 | ,13:19:56 | ,22-Jul-2005 |
| 16, | 18.1, | 108.6, | 28, | 0.1348 | ,13:34:56 | ,22-Jul-2005 |
| 17, | 13.9, | 99.4, | 32, | 0.0959 | ,13:49:56 | ,22-Jul-2005 |
| 18, | 9.5, | 91.7, | 39, | 0.0822 | ,14:04:56 | ,22-Jul-2005 |
| 19, | 6.6, | 86.9, | 45, | 0.1168 | ,14:19:56 | ,22-Jul-2005 |
| 20, | 7.0, | 84.8, | 49, | 0.1075 | ,14:34:56 | ,22-Jul-2005 |
| 21, | 5.4, | 83.8, | 52, | 0.1539 | ,14:49:56 | ,22-Jul-2005 |
| 22, | 7.9, | 82.4, | 55, | 0.0735 | ,15:04:56 | ,22-Jul-2005 |
| 23, | 9.0, | 81.2, | 56, | 0.0558 | ,15:19:56 | ,22-Jul-2005 |
| 24, | 8.9, | 80.5, | 58, | 0.0567 | ,15:34:56 | ,22-Jul-2005 |
| 25, | 8.2, | 80.2, | 60, | 0.0596 | ,15:49:56 | ,22-Jul-2005 |

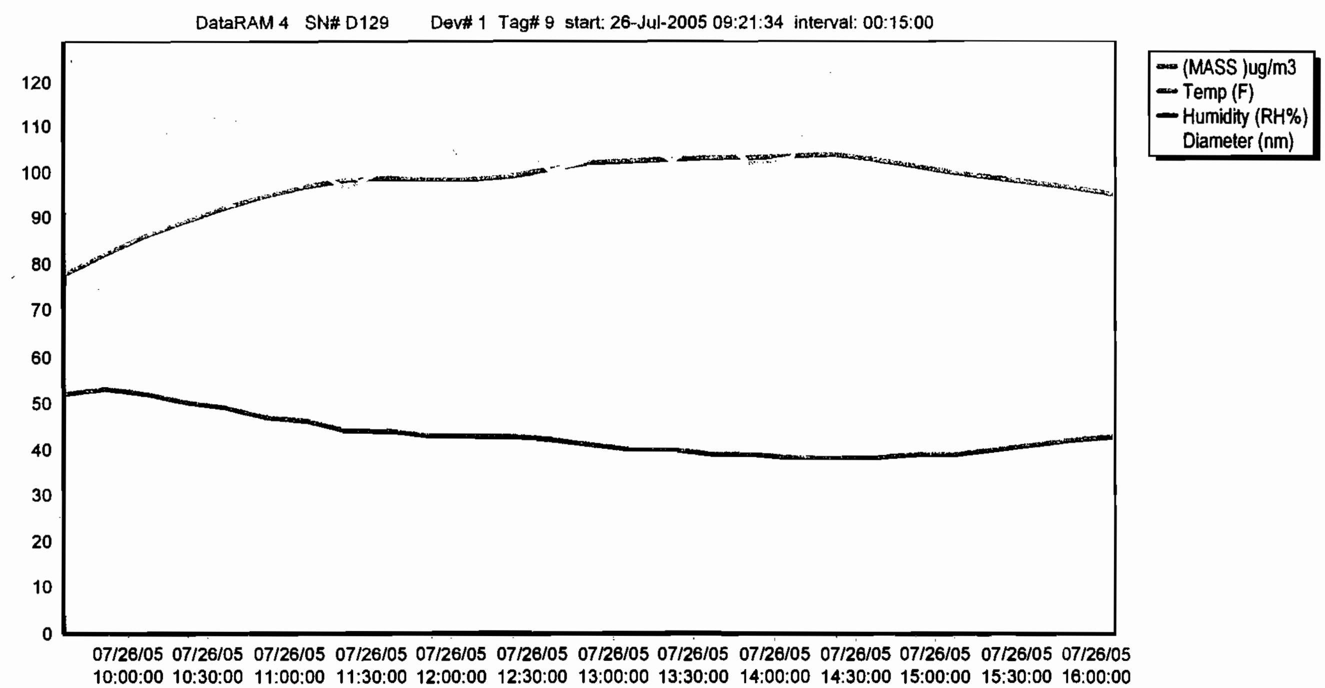
DataRAM 4 SN# D129 Dev# 1 Tag# 7 start: 22-Jul-2005 09:34:56 interval: 00:15:00



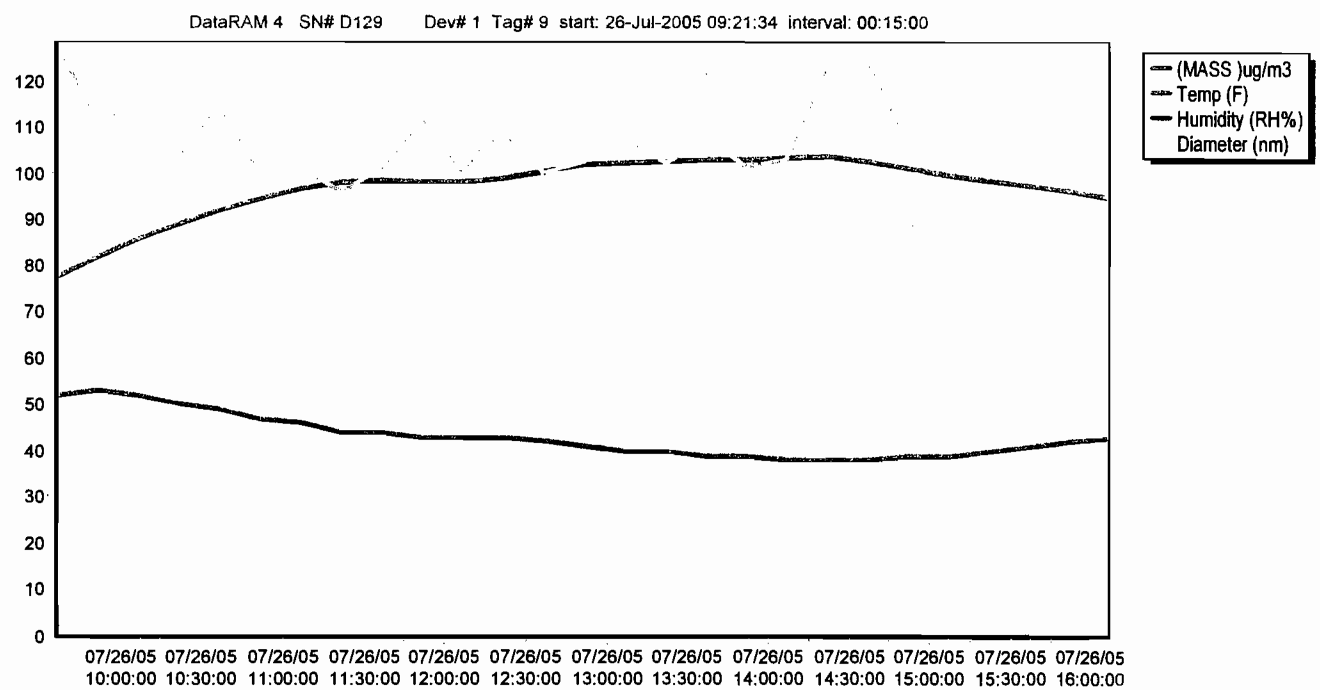
```
"Model Number", "DataRAM 4 ", 104
"Serial no.  ", "D129      "
 Device no.  ", 1
 Tag Number  ", 8
"Start Time  ", 09:26:55
 Start Date  ", 25-Jul-2005
 Log Period  ", 00:15:00
"Number      ", 30
"CalFactor   ", 1.000000
 Unit        ", 0
 Unit Name   ", "(MASS )ug/m3"
"SIZE_CORRECT", "DISABLED"
 TEMPUNITS   ", F
 Max MASS    ", 36.863800
"Max MASS  @ ", 15  ,13:11:55  ,25-Jul-2005
 Avg MASS    ", 23.912700
 Max Diam    ", 0.113909
"Max Diam @  ", 15  ,13:11:55  ,25-Jul-2005
"Avg Diam    ", 0.086134
 ALARM       ", "DISABLED"
 ALARM_LEVEL ", 0.0
"AUTO_ZERO   ", "DISABLED"
 AZ INTERVAL ", 1
 Errors      ", 0000
record,"(MASS )ug/m3", Temp, RHumidity, Diameter
     1,         29.5,  73.6,    57,    0.0841   ,09:41:55   ,25-Jul-2005
     2,         28.2,  74.8,    58,    0.0835   ,09:56:55   ,25-Jul-2005
     3,         26.8,  76.2,    59,    0.0833   ,10:11:55   ,25-Jul-2005
     4,         26.5,  77.6,    60,    0.0820   ,10:26:55   ,25-Jul-2005
     5,         26.6,  78.7,    60,    0.0805   ,10:41:55   ,25-Jul-2005
     6,         26.9,  79.7,    60,    0.0806   ,10:56:55   ,25-Jul-2005
     7,         27.8,  80.6,    60,    0.0813   ,11:11:55   ,25-Jul-2005
     8,         27.8,  81.5,    60,    0.0775   ,11:26:55   ,25-Jul-2005
     9,         28.9,  82.4,    60,    0.0809   ,11:41:55   ,25-Jul-2005
    10,         28.3,  83.3,    59,    0.0778   ,11:56:55   ,25-Jul-2005
    11,         28.6,  84.5,    59,    0.0776   ,12:11:55   ,25-Jul-2005
    12,         28.0,  86.0,    58,    0.0761   ,12:26:55   ,25-Jul-2005
    13,         29.0,  87.8,    57,    0.0803   ,12:41:55   ,25-Jul-2005
    14,         29.6,  90.7,    56,    0.0841   ,12:56:55   ,25-Jul-2005
    15,         36.9,  94.2,    54,    0.1139   ,13:11:55   ,25-Jul-2005
    16,         34.6,  97.1,    52,    0.1007   ,13:26:55   ,25-Jul-2005
    17,         33.5,  99.3,    50,    0.1020   ,13:41:55   ,25-Jul-2005
    18,         29.1, 100.8,    48,    0.0900   ,13:56:55   ,25-Jul-2005
    19,         27.5, 101.7,    46,    0.0828   ,14:11:55   ,25-Jul-2005
    20,         22.9, 102.9,    45,    0.0811   ,14:26:55   ,25-Jul-2005
    21,         17.1, 104.4,    42,    0.0784   ,14:41:55   ,25-Jul-2005
    22,         16.2, 105.8,    40,    0.0798   ,14:56:55   ,25-Jul-2005
    23,         15.4, 106.9,    38,    0.0842   ,15:11:55   ,25-Jul-2005
    24,         15.2, 106.6,    36,    0.0916   ,15:26:55   ,25-Jul-2005
    25,         14.9, 104.9,    35,    0.0955   ,15:41:55   ,25-Jul-2005
    26,         13.5, 102.8,    35,    0.0918   ,15:56:55   ,25-Jul-2005
    27,         12.6, 100.8,    35,    0.0919   ,16:11:55   ,25-Jul-2005
    28,         12.0,  99.2,    36,    0.0911   ,16:26:55   ,25-Jul-2005
    29,         11.7,  97.9,    36,    0.0928   ,16:41:55   ,25-Jul-2005
    30,         12.0,  96.7,    36,    0.0869   ,16:56:55   ,25-Jul-2005
```


DataRAM 4 SN# D129 Dev# 1 Tag# 8 start: 25-Jul-2005 09:26:55 interval: 00:15:00
110
105
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
07/25/05 10:00:00
07/25/05 11:00:00
07/25/05 12:00:00
07/25/05 13:00:00
07/25/05 14:00:00
07/25/05 15:00:00
07/25/05 16:00:00
(MASS )ug/m3
Temp (F)
Humidity (RH%)
Diameter (nm)

```
"Model Number", "DataRAM 4 ", 104
"Serial no.  ", "D129      "
"Device no.  ", 1
"Tag Number  ", 9
"Start Time  ", 09:21:34
"Start Date  ", 26-Jul-2005
"Log Period  ", 00:15:00
"Number      ", 27
"CalFactor   ", 1.000000
"Unit        ", 0
"Unit Name   ", "(MASS )ug/m3"
"SIZE_CORRECT", "DISABLED"
"TEMPUNITS   ", F
"Max MASS    ", 20.835520
"Max MASS  @ ", 1  ,09:36:34  ,26-Jul-2005
"Avg MASS    ", 14.008620
"Max Diam    ", 0.128681
"Max Diam @  ", 1  ,09:36:34  ,26-Jul-2005
"Avg Diam    ", 0.107960
"ALARM       ", "DISABLED"
"ALARM_LEVEL ", 0.0
"AUTO_ZERO   ", "DISABLED"
"AZ INTERVAL ", 1
"Errors      ", 0000
record,"(MASS )ug/m3", Temp, RHumidity, Diameter
     1,        20.8,  77.5,    52,    0.1287  ,09:36:34  ,26-Jul-2005
     2,        16.8,  81.9,    53,    0.1121  ,09:51:34  ,26-Jul-2005
     3,        17.1,  85.7,    52,    0.1147  ,10:06:34  ,26-Jul-2005
     4,        15.9,  89.1,    50,    0.1041  ,10:21:34  ,26-Jul-2005
     5,        17.7,  92.1,    49,    0.1157  ,10:36:34  ,26-Jul-2005
     6,        14.6,  94.7,    47,    0.1003  ,10:51:34  ,26-Jul-2005
     7,        14.7,  96.8,    46,    0.1013  ,11:06:34  ,26-Jul-2005
     8,        14.6,  98.3,    44,    0.0961  ,11:21:34  ,26-Jul-2005
     9,        15.2,  98.5,    44,    0.1013  ,11:36:34  ,26-Jul-2005
    10,        16.5,  98.0,    43,    0.1122  ,11:51:34  ,26-Jul-2005
    11,        15.4,  98.0,    43,    0.1006  ,12:06:34  ,26-Jul-2005
    12,        15.3,  98.9,    43,    0.1095  ,12:21:34  ,26-Jul-2005
    13,        13.6, 100.5,    42,    0.0998  ,12:36:34  ,26-Jul-2005
    14,        13.1, 101.9,    41,    0.1026  ,12:51:34  ,26-Jul-2005
    15,        13.2, 102.1,    40,    0.1080  ,13:06:34  ,26-Jul-2005
    16,        12.5, 102.4,    40,    0.1023  ,13:21:34  ,26-Jul-2005
    17,        12.0, 102.9,    39,    0.1079  ,13:36:34  ,26-Jul-2005
    18,        11.4, 102.9,    39,    0.1016  ,13:51:34  ,26-Jul-2005
    19,        11.0, 103.4,    38,    0.1029  ,14:06:34  ,26-Jul-2005
    20,        12.2, 103.6,    38,    0.1236  ,14:21:34  ,26-Jul-2005
    21,        13.0, 102.7,    38,    0.1252  ,14:36:34  ,26-Jul-2005
    22,        11.4, 101.1,    39,    0.1074  ,14:51:34  ,26-Jul-2005
    23,        12.2,  99.5,    39,    0.1110  ,15:06:34  ,26-Jul-2005
    24,        11.5,  98.5,    40,    0.0992  ,15:21:34  ,26-Jul-2005
    25,        11.8,  97.5,    41,    0.1079  ,15:36:34  ,26-Jul-2005
    26,        12.6,  96.3,    42,    0.1135  ,15:51:34  ,26-Jul-2005
    27,        12.3,  95.0,    43,    0.1055  ,16:06:34  ,26-Jul-2005
```


DataRAM 4 SN# D129 Dev# 1 Tag# 9 start: 26-Jul-2005 09:21:34 interval: 00:15:00
120
110
100
90
80
70
60
50
40
30
20
10
0
07/26/05 10:00:00
07/26/05 10:30:00
07/26/05 11:00:00
07/26/05 11:30:00
07/26/05 12:00:00
07/26/05 12:30:00
07/26/05 13:00:00
07/26/05 13:30:00
07/26/05 14:00:00
07/26/05 14:30:00
07/26/05 15:00:00
07/26/05 15:30:00
07/26/05 16:00:00
(MASS )ug/m3
Temp (F)
Humidity (RH%)
Diameter (nm)

```
"Model Number", "DataRAM 4 ", 104
"Serial no.  ", "D129        "
 Device no.  ", 1
 Tag Number  ", 9
"Start Time  ", 09:21:34
 Start Date  ", 26-Jul-2005
 Log Period  ", 00:15:00
"Number      ", 27
"CalFactor   ", 1.000000
 Unit        ", 0
 Unit Name   ", "(MASS )ug/m3"
"SIZE_CORRECT", "DISABLED"
 TEMPUNITS   ", F
 Max MASS    ", 20.835520
"Max MASS  @ ", 1  ,09:36:34  ,26-Jul-2005
 Avg MASS    ", 14.008620
 Max Diam    ", 0.128681
"Max Diam @  ", 1  ,09:36:34  ,26-Jul-2005
"Avg Diam    ", 0.107960
 ALARM       ", "DISABLED"
 ALARM_LEVEL ", 0.0
"AUTO_ZERO   ", "DISABLED"
 AZ INTERVAL ", 1
 Errors      ", 0000
record,"(MASS )ug/m3", Temp, RHumidity, Diameter
    1,        20.8,  77.5,    52,    0.1287   ,09:36:34   ,26-Jul-2005
    2,        16.8,  81.9,    53,    0.1121   ,09:51:34   ,26-Jul-2005
    3,        17.1,  85.7,    52,    0.1147   ,10:06:34   ,26-Jul-2005
    4,        15.9,  89.1,    50,    0.1041   ,10:21:34   ,26-Jul-2005
    5,        17.7,  92.1,    49,    0.1157   ,10:36:34   ,26-Jul-2005
    6,        14.6,  94.7,    47,    0.1003   ,10:51:34   ,26-Jul-2005
    7,        14.7,  96.8,    46,    0.1013   ,11:06:34   ,26-Jul-2005
    8,        14.6,  98.3,    44,    0.0961   ,11:21:34   ,26-Jul-2005
    9,        15.2,  98.5,    44,    0.1013   ,11:36:34   ,26-Jul-2005
   10,        16.5,  98.0,    43,    0.1122   ,11:51:34   ,26-Jul-2005
   11,        15.4,  98.0,    43,    0.1006   ,12:06:34   ,26-Jul-2005
   12,        15.3,  98.9,    43,    0.1095   ,12:21:34   ,26-Jul-2005
   13,        13.6, 100.5,    42,    0.0998   ,12:36:34   ,26-Jul-2005
   14,        13.1, 101.9,    41,    0.1026   ,12:51:34   ,26-Jul-2005
   15,        13.2, 102.1,    40,    0.1080   ,13:06:34   ,26-Jul-2005
   16,        12.5, 102.4,    40,    0.1023   ,13:21:34   ,26-Jul-2005
   17,        12.0, 102.9,    39,    0.1079   ,13:36:34   ,26-Jul-2005
   18,        11.4, 102.9,    39,    0.1016   ,13:51:34   ,26-Jul-2005
   19,        11.0, 103.4,    38,    0.1029   ,14:06:34   ,26-Jul-2005
   20,        12.2, 103.6,    38,    0.1236   ,14:21:34   ,26-Jul-2005
   21,        13.0, 102.7,    38,    0.1252   ,14:36:34   ,26-Jul-2005
   22,        11.4, 101.1,    39,    0.1074   ,14:51:34   ,26-Jul-2005
   23,        12.2,  99.5,    39,    0.1110   ,15:06:34   ,26-Jul-2005
   24,        11.5,  98.5,    40,    0.0992   ,15:21:34   ,26-Jul-2005
   25,        11.8,  97.5,    41,    0.1079   ,15:36:34   ,26-Jul-2005
   26,        12.6,  96.3,    42,    0.1135   ,15:51:34   ,26-Jul-2005
   27,        12.3,  95.0,    43,    0.1055   ,16:06:34   ,26-Jul-2005
```


DataRAM 4 SN# D129 Dev# 1 Tag# 9 start: 26-Jul-2005 09:21:34 interval: 00:15:00
120
110
100
90
80
70
60
50
40
30
20
10
0
07/26/05 10:00:00
07/26/05 10:30:00
07/26/05 11:00:00
07/26/05 11:30:00
07/26/05 12:00:00
07/26/05 12:30:00
07/26/05 13:00:00
07/26/05 13:30:00
07/26/05 14:00:00
07/26/05 14:30:00
07/26/05 15:00:00
07/26/05 15:30:00
07/26/05 16:00:00
(MASS )ug/m3
Temp (F)
Humidity (RH%)
Diameter (nm)

"Model Number ", "DataRAM 4 ", 104
"Serial no. ", "D129 "
"Device no. ", 1
"Tag Number ", 1
"Start Time ", 08:58:13
"Start Date ", 11-May-2005
"Log Period ", 00:01:00
"Number ", 435
"CalFactor ", 1.000000
"Unit ", 0
"Unit Name ", "(MASS )ug/m3"
"SIZE_CORRECT", "DISABLED"
"TEMPUNITS ", F
"Max MASS ", 104.642600
"Max MASS @ ", 326 ,14:24:13 ,11-May-2005
"Avg MASS ", 57.181700
"Max Diam ", 1.092875
"Max Diam @ ", 148 ,11:26:13 ,11-May-2005
"Avg Diam ", 0.331137
"ALARM ", "DISABLED"
"ALARM_LEVEL ", 0.0
"AUTO_ZERO ", "DISABLED"
"AZ INTERVAL ", 1
"Errors ", 0001

| record, | "(MASS )ug/m3", | Temp, | RHumidity, | Diameter | | |
|---|---|---|---|---|---|---|
| 1, | 59.0, | 71.5, | 55, | 0.4366 | ,08:59:13 | ,11-May-2005 |
| 2, | 61.0, | 71.7, | 54, | 0.5354 | ,09:00:13 | ,11-May-2005 |
| 3, | 68.3, | 71.9, | 54, | 0.3758 | ,09:01:13 | ,11-May-2005 |
| 4, | 71.8, | 72.1, | 54, | 0.2909 | ,09:02:13 | ,11-May-2005 |
| 5, | 69.5, | 72.4, | 54, | 0.3212 | ,09:03:13 | ,11-May-2005 |
| 6, | 75.8, | 72.6, | 53, | 0.2631 | ,09:04:13 | ,11-May-2005 |
| 7, | 77.8, | 72.8, | 53, | 0.2077 | ,09:05:13 | ,11-May-2005 |
| 8, | 67.0, | 72.9, | 53, | 0.2864 | ,09:06:13 | ,11-May-2005 |
| 9, | 69.2, | 73.1, | 53, | 0.3373 | ,09:07:13 | ,11-May-2005 |
| 10, | 67.9, | 73.3, | 53, | 0.3283 | ,09:08:13 | ,11-May-2005 |
| 11, | 65.1, | 73.4, | 53, | 0.3702 | ,09:09:13 | ,11-May-2005 |
| 12, | 65.6, | 73.5, | 53, | 0.3548 | ,09:10:13 | ,11-May-2005 |
| 13, | 67.9, | 73.6, | 52, | 0.3337 | ,09:11:13 | ,11-May-2005 |
| 14, | 65.4, | 73.7, | 52, | 0.3631 | ,09:12:13 | ,11-May-2005 |
| 15, | 65.3, | 73.7, | 52, | 0.3643 | ,09:13:13 | ,11-May-2005 |
| 16, | 66.9, | 73.8, | 52, | 0.3295 | ,09:14:13 | ,11-May-2005 |
| 17, | 64.2, | 73.9, | 52, | 0.3385 | ,09:15:13 | ,11-May-2005 |
| 18, | 62.8, | 74.0, | 52, | 0.3697 | ,09:16:13 | ,11-May-2005 |
| 19, | 63.1, | 74.1, | 52, | 0.3847 | ,09:17:13 | ,11-May-2005 |
| 20, | 70.6, | 74.1, | 52, | 0.3248 | ,09:18:13 | ,11-May-2005 |
| 21, | 68.8, | 74.2, | 52, | 0.2988 | ,09:19:13 | ,11-May-2005 |
| 22, | 70.8, | 74.3, | 51, | 0.3063 | ,09:20:13 | ,11-May-2005 |
| 23, | 68.1, | 74.3, | 51, | 0.3318 | ,09:21:13 | ,11-May-2005 |
| 24, | 68.1, | 74.4, | 51, | 0.3379 | ,09:22:13 | ,11-May-2005 |
| 25, | 71.5, | 74.4, | 51, | 0.3086 | ,09:23:13 | ,11-May-2005 |
| 26, | 74.1, | 74.5, | 51, | 0.2867 | ,09:24:13 | ,11-May-2005 |
| 27, | 69.6, | 74.5, | 51, | 0.3010 | ,09:25:13 | ,11-May-2005 |
| 28, | 63.5, | 74.6, | 51, | 0.3491 | ,09:26:13 | ,11-May-2005 |
| 29, | 63.0, | 74.6, | 51, | 0.3362 | ,09:27:13 | ,11-May-2005 |
| 30, | 65.7, | 74.7, | 51, | 0.3274 | ,09:28:13 | ,11-May-2005 |
| 31, | 60.5, | 74.7, | 51, | 0.3861 | ,09:29:13 | ,11-May-2005 |
| 32, | 61.2, | 74.8, | 51, | 0.3884 | ,09:30:13 | ,11-May-2005 |
| 33, | 62.7, | 74.8, | 51, | 0.3806 | ,09:31:13 | ,11-May-2005 |
| 34, | 61.7, | 74.9, | 51, | 0.3784 | ,09:32:13 | ,11-May-2005 |
| 35, | 57.8, | 75.0, | 50, | 0.3888 | ,09:33:13 | ,11-May-2005 |
| 36, | 60.9, | 75.1, | 51, | 0.3628 | ,09:34:13 | ,11-May-2005 |
| 37, | 59.9, | 75.1, | 50, | 0.3690 | ,09:35:13 | ,11-May-2005 |
| 38, | 57.8, | 75.2, | 50, | 0.4005 | ,09:36:13 | ,11-May-2005 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 39, | 55.8, | 75.3, | 50, | 0.4149 | ,09:37:13 | ,11-May-2005 |
| 40, | 54.2, | 75.4, | 50, | 0.3978 | ,09:38:13 | ,11-May-2005 |
| 41, | 58.1, | 75.4, | 50, | 0.3641 | ,09:39:13 | ,11-May-2005 |
| 42, | 61.9, | 75.5, | 50, | 0.3353 | ,09:40:13 | ,11-May-2005 |
| 43, | 56.9, | 75.6, | 50, | 0.3365 | ,09:41:13 | ,11-May-2005 |
| 44, | 58.8, | 75.8, | 50, | 0.3501 | ,09:42:13 | ,11-May-2005 |
| 45, | 64.1, | 75.9, | 50, | 0.3165 | ,09:43:13 | ,11-May-2005 |
| 46, | 65.0, | 76.0, | 50, | 0.2787 | ,09:44:13 | ,11-May-2005 |
| 47, | 64.5, | 76.1, | 50, | 0.2739 | ,09:45:13 | ,11-May-2005 |
| 48, | 64.8, | 76.2, | 50, | 0.2664 | ,09:46:13 | ,11-May-2005 |
| 49, | 63.5, | 76.3, | 50, | 0.2777 | ,09:47:13 | ,11-May-2005 |
| 50, | 63.6, | 76.3, | 50, | 0.2651 | ,09:48:13 | ,11-May-2005 |
| 51, | 61.6, | 76.5, | 50, | 0.2875 | ,09:49:13 | ,11-May-2005 |
| 52, | 62.1, | 76.6, | 50, | 0.2823 | ,09:50:13 | ,11-May-2005 |
| 53, | 63.0, | 76.7, | 49, | 0.2940 | ,09:51:13 | ,11-May-2005 |
| 54, | 62.0, | 76.8, | 49, | 0.3039 | ,09:52:13 | ,11-May-2005 |
| 55, | 64.0, | 76.9, | 49, | 0.3004 | ,09:53:13 | ,11-May-2005 |
| 56, | 57.1, | 77.0, | 49, | 0.3256 | ,09:54:13 | ,11-May-2005 |
| 57, | 57.1, | 77.1, | 49, | 0.3471 | ,09:55:13 | ,11-May-2005 |
| 58, | 58.7, | 77.2, | 49, | 0.3460 | ,09:56:13 | ,11-May-2005 |
| 59, | 58.0, | 77.3, | 49, | 0.3320 | ,09:57:13 | ,11-May-2005 |
| 60, | 60.1, | 77.4, | 49, | 0.3113 | ,09:58:13 | ,11-May-2005 |
| 61, | 59.7, | 77.5, | 49, | 0.3223 | ,09:59:13 | ,11-May-2005 |
| 62, | 59.1, | 77.6, | 49, | 0.3000 | ,10:00:13 | ,11-May-2005 |
| 63, | 55.2, | 77.7, | 49, | 0.3425 | ,10:01:13 | ,11-May-2005 |
| 64, | 56.9, | 77.8, | 48, | 0.3405 | ,10:02:13 | ,11-May-2005 |
| 65, | 57.5, | 77.9, | 48, | 0.3309 | ,10:03:13 | ,11-May-2005 |
| 66, | 57.2, | 77.9, | 48, | 0.3275 | ,10:04:13 | ,11-May-2005 |
| 67, | 60.6, | 78.0, | 48, | 0.3087 | ,10:05:13 | ,11-May-2005 |
| 68, | 59.2, | 78.0, | 48, | 0.3224 | ,10:06:13 | ,11-May-2005 |
| 69, | 65.3, | 78.1, | 48, | 0.3151 | ,10:07:13 | ,11-May-2005 |
| 70, | 61.7, | 78.1, | 48, | 0.3045 | ,10:08:13 | ,11-May-2005 |
| 71, | 65.0, | 78.1, | 48, | 0.2779 | ,10:09:13 | ,11-May-2005 |
| 72, | 65.3, | 78.1, | 48, | 0.2690 | ,10:10:13 | ,11-May-2005 |
| 73, | 68.2, | 78.1, | 48, | 0.2362 | ,10:11:13 | ,11-May-2005 |
| 74, | 64.8, | 78.1, | 48, | 0.2372 | ,10:12:13 | ,11-May-2005 |
| 75, | 63.4, | 78.1, | 48, | 0.2498 | ,10:13:13 | ,11-May-2005 |
| 76, | 64.9, | 78.1, | 47, | 0.2657 | ,10:14:13 | ,11-May-2005 |
| 77, | 63.4, | 78.1, | 48, | 0.2709 | ,10:15:13 | ,11-May-2005 |
| 78, | 66.9, | 78.0, | 47, | 0.2649 | ,10:16:13 | ,11-May-2005 |
| 79, | 66.0, | 78.0, | 47, | 0.2637 | ,10:17:13 | ,11-May-2005 |
| 80, | 64.7, | 78.0, | 47, | 0.2610 | ,10:18:13 | ,11-May-2005 |
| 81, | 62.7, | 78.0, | 47, | 0.2696 | ,10:19:13 | ,11-May-2005 |
| 82, | 63.0, | 77.9, | 47, | 0.2862 | ,10:20:13 | ,11-May-2005 |
| 83, | 62.3, | 77.9, | 47, | 0.3036 | ,10:21:13 | ,11-May-2005 |
| 84, | 62.9, | 77.9, | 47, | 0.2919 | ,10:22:13 | ,11-May-2005 |
| 85, | 60.2, | 77.9, | 47, | 0.2888 | ,10:23:13 | ,11-May-2005 |
| 86, | 58.0, | 77.9, | 47, | 0.3082 | ,10:24:13 | ,11-May-2005 |
| 87, | 51.3, | 77.9, | 47, | 0.4555 | ,10:25:13 | ,11-May-2005 |
| 88, | 49.2, | 77.9, | 47, | 0.4868 | ,10:26:13 | ,11-May-2005 |
| 89, | 49.6, | 77.9, | 47, | 0.4658 | ,10:27:13 | ,11-May-2005 |
| 90, | 50.4, | 77.9, | 47, | 0.4467 | ,10:28:13 | ,11-May-2005 |
| 91, | 52.2, | 77.9, | 47, | 0.5234 | ,10:29:13 | ,11-May-2005 |
| 92, | 51.3, | 77.9, | 47, | 0.4185 | ,10:30:13 | ,11-May-2005 |
| 93, | 50.6, | 77.9, | 47, | 0.3845 | ,10:31:13 | ,11-May-2005 |
| 94, | 55.9, | 77.9, | 47, | 0.3604 | ,10:32:13 | ,11-May-2005 |
| 95, | 57.9, | 77.9, | 47, | 0.3238 | ,10:33:13 | ,11-May-2005 |
| 96, | 58.3, | 77.9, | 47, | 0.3574 | ,10:34:13 | ,11-May-2005 |
| 97, | 52.7, | 77.9, | 47, | 0.3518 | ,10:35:13 | ,11-May-2005 |
| 98, | 53.7, | 77.9, | 47, | 0.3301 | ,10:36:13 | ,11-May-2005 |
| 99, | 52.6, | 77.9, | 47, | 0.3264 | ,10:37:13 | ,11-May-2005 |
| 100, | 48.1, | 78.0, | 47, | 0.4037 | ,10:38:13 | ,11-May-2005 |
| 101, | 46.1, | 78.0, | 47, | 0.3923 | ,10:39:13 | ,11-May-2005 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 102, | 46.0, | 78.0, | 47, | 0.4717 | ,10:40:13 | ,11-May-2005 |
| 103, | 43.3, | 78.0, | 47, | 0.5693 | ,10:41:13 | ,11-May-2005 |
| 104, | 49.1, | 78.0, | 47, | 0.5105 | ,10:42:13 | ,11-May-2005 |
| 105, | 51.2, | 78.0, | 47, | 0.4200 | ,10:43:13 | ,11-May-2005 |
| 106, | 50.4, | 78.0, | 47, | 0.3713 | ,10:44:13 | ,11-May-2005 |
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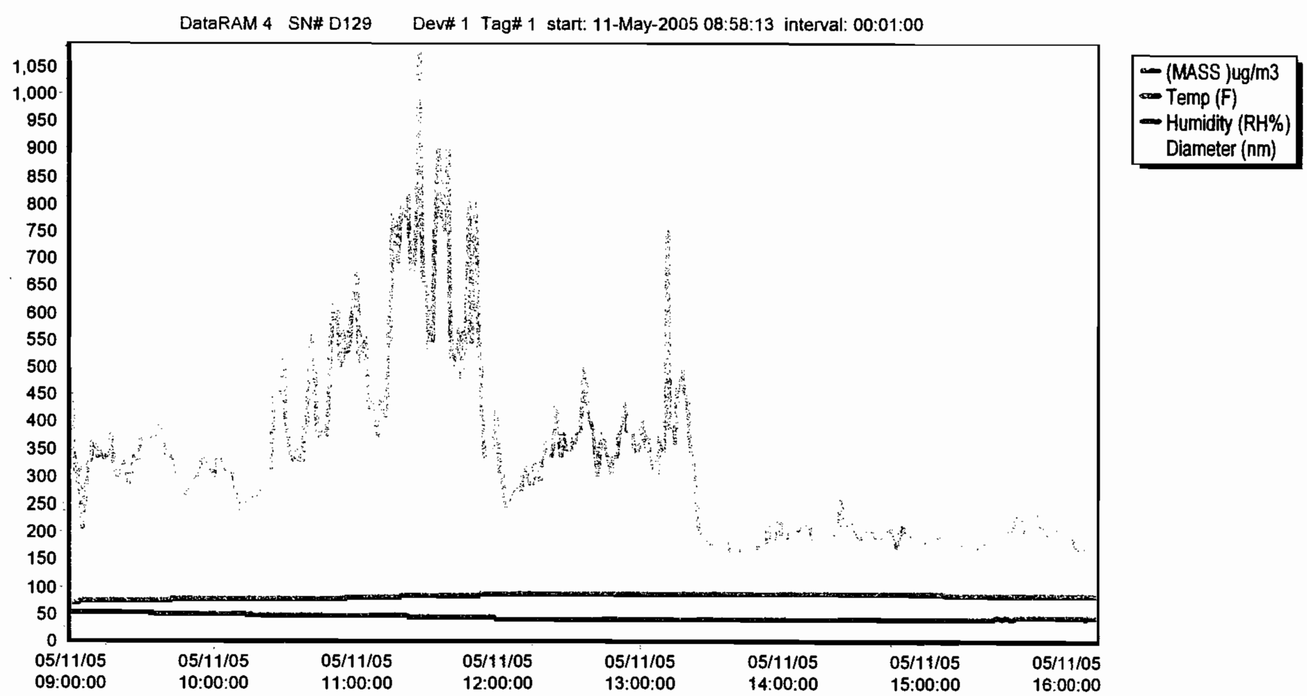

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1,050
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05/11/05 14:00:00
05/11/05 15:00:00
05/11/05 16:00:00
(MASS )ug/m3
Temp (F)
Humidity (RH%)
Diameter (nm)

# APPENDIX F

# FISH AND WILDLIFE RELATED CONCERNS

**New York State Department of Environmental Conservation**
**Division of Fish, Wildlife & Marine Resources**
**Bureau of Habitat, 5th Floor**
625 Broadway, Albany, New York 12233-4756
**Phone:** (518) 402-8970 • **FAX:** (518) 402-8925
**e-mail:** txsinnot@gw.dec.state.ny.us

Denise M. Sheehan
Commissioner

# MEMORANDUM

April 27, 2006

TO: Lance Durfey

FROM: Tim Sinnott

SUBJECT: Toxicity of Antimony in Sediment

Like most metals, the toxicity of antimony is dependent on its chemical form. As metals are insoluble, they must be formulated as a soluble salt to conduct a toxicity test, and the toxicity of the salt used in the test may not bear any resemblance to the toxicity of the contaminant found in a sediment sample.

The EPA found the acute toxicity of antimony in water to range from 9 mg/L for *Daphnia magna* exposed to antimony potassium tartrate to 21.9 mg/L for fathead minnows exposed to antimony trichloride (EPA, 1980). The chronic toxicity of antimony in water was reported as ranging from 1.6 mg/L for fathead minnows during an early life stage (ELS) test to 5.4 mg/L for *Daphnia magna* during a full life cycle test. Both tests were conducted with antimony trichloride (EPA, 1980). The only other chronic test described in EPA (1980) was a fathead minnow ELS test conducted with antimony trioxide. In this test, no effects were noted at the highest concentration tested of 7.5 mg/L.

You stated in your e-mail that the site in question was an abandoned paper mill. That might have some bearing on the formulation of the antimony found at the site. Antimony potassium tartrate is used a mordant[1] in the textile and leather industry. It also has some pesticide applications, primarily for control of snails[2]. It is very soluble in water (83,000 mg/L @ 20 °C) (HSDB, 2006). Antimony trichloride, the antimony compound most frequently appearing in toxicity studies reported in EPA (1980), is similarly quite soluble, with one gram dissolving in 10.1 ml of water at 25°C. However, it readily hydrolyzes in water, forming

[1] a chemical that fixes a dye in or on a substance by combining with the dye to form an insoluble compound

antimony trioxide ($Sb_2O_3$). It is used as a reagent and catalyst in the synthesis of organic compounds and as a mordant.

The most common end-use of antimony compounds is antimony trioxide for fire retardation for plastics, textiles, rubber, adhesives, pigments, and *paper* (NSC, 2006; EPA, 1980). CRC (1968) describes the solubility of antimony trioxide in water as "very slightly soluble". The solubility of antimony trioxide in water is also described as 1.5 mg/100 ml of water at 30°C (Wikipedia, 2006). Wikipedia (2006) also describes one of the uses of antimony trioxide as a pigment.

The information described above suggests that the antimony present in the Boquet River sediments near Wilsboro is probably antimony trioxide. That is most likely to be the compound used for or involved with paper production (for pigmentation and flame retardation). Also, it is insoluble (or at worst, only very slightly soluble) whereas the other two products examined are highly soluble, and would not have been likely to have persisted in sediments.

Antimony trioxide is considerably less toxic than other antimony compounds in water. The EPA ECOTOX database contains 141 toxicity records for antimony; 24 for antimony trioxide, 33 for plain antimony[3], 7 for antimony chloride, and 77 for antimony trichloride (ECOTOX, 2006). The most sensitive study reported for antimony trichloride was a rainbow trout 28 day $LC_{50}$ of 0.66 mg/L. For antimony trioxide, the compound most likely present in Boquet River sediments, the most sensitive study reported was a 24 hour immobilization $EC_{50}$ of 108 mg/L for tubifex worms.

The ECOTOX database does contain one record that describes a 30 day antimony trioxide test with fathead minnow larvae. The test concentration was 7 ug/L, and the effect measurement was general growth, but the brief summary in the ECOTOX database was unclear as to whether or not such an effect was observed, and no endpoint (i.e., no effects level, lowest effects level, $EC_{50}$, etc.) ws reported. I am trying to get a copy of the journal article (LeBlanc & Dean, 1984). If an effect was noted, it would be inconsistent with the results of a 28 day ELS study with fathead minnows reported in EPA (1980), in which no adverse impacts were observed at the highest concentration tested of 7.5 ug/L.

The Lowest Effects Level (LEL) and Severe Effects Levels (SEL) for antimony in sediment as described in NYSDEC (1999) are taken from Long and Morgan, 1991. Long and Morgan, 1991 used a variety of empirical (field) data to associate toxic effects with contaminant concentrations in sediment. They do not report (for antimony or any other metal) the chemical formulation of the contaminant. Their data are not always consistent. For example, they report

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[3] Pure, elemental antimony is insoluble in water (CRC, 1968). The tests had to have been done with some soluble antimony salt, but enough information was not provided to identify which salt was used. Twenty five of the thirty three records came from one study using a radioactive antimony isotope (Amiard, 1973) and list results in units of microcuries/L. These are irrelevant to assessing risks from non-radioactive antimony

the 1986 Puget Sound Apparent Effects threshold, or AET[4] based on a bioassay with the marine amphipod *Rhepoxynius abronius* as being 5.3 mg/kg (ppm), and the 1988 Puget Sound AET for a *R. abronius* bioassay as being 200 ppm. Similarly, the 1986 Puget Sound sediment AET based on benthic community composition as being 3.2 ppm, and the 1988 Puget Sound sediment AET for benthic community composition as being150 ppm. The LELs and SELs are useful because they are based on data that suggests effects *can* occur at those levels, but by no means do they demonstrate that adverse effects *always* happen at those levels.

To summarize, a review of available data suggests that the formulation of antimony present in the Boquet River sediments is probably antimony trioxide. That compound is the one most likely to be used in the production of paper, and a potential residual in sediments around an abandoned paper mill. The two other antimony compounds for which toxicity data are available (antimony trichloride and antimony potassium tartrate) are both highly soluble and not likely to persist in sediments, and antimony trichloride hydrolyzes in water to form antimony trioxide, which is very slightly soluble and much more likely to persist in sediments. Toxicity data for antimony trioxide shows that it is much less toxic than the other compounds, with $LC_{50}$s ranging from around 100 mg/L (in water) for tubifex worms to between 420 - 550 mg/L for *Daphnia magna*. Sediment toxicity data for antimony is not available by the specific antimony formulation, and what sediment toxicity data are available are somewhat ambivalent. Effects from antimony have been noted at fairly low levels (2- 3 mg/kg sediment) whereas the same tests repeated two years later show the toxicity related to antimony to be nearly two orders of magnitude lower (150 - 200 mg/kg sediment). Antimony does not bioaccumulate (EPA, 1980).

This summary suggests to me that the antimony in sediments at the Boquet River is *probably* not likely to be harmful to benthic aquatic life. Obviously, the greatest potential risks are at site SD-5-SU-05-18", where the antimony concentration is the highest. It is encouraging that the other samples taken at the 18" strata are contaminated to a much lower extent.

I don't know if it is possible to determine through chemical analysis if the antimony present is all in the form of antimony trioxide. If it is, then I would think the risks are relatively low. If it is not, then additional testing, such as a standard 28 day *Hyalella azteca* sediment bioassay should be conducted with samples from the sites SD-5-SU-05-18" and SD-4-SU-05-6".

Another factor is, what does the town propose to do at the site? Eighteen inches is a reasonably deep sediment layer. If surface sediments are not contaminated, or the contaminant is antimony trioxide, then it could probably be left alone. If the sediments will be dredged, then the sediments that will be exposed should be tested. Another factor to consider is, how large is the contaminated area represented by sample SD-5-SU-05-18? If the contaminated area is small, and the surface sediments reflect a generally healthy benthic community assemblage, that is, consistent with that found in adjacent, uncontaminated sites, then it might be best to leave it

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[4] AET = Apparent Effects Threshold. This is the highest concentration of a contaminant in sediment wherein no adverse effects were observed, but effects were observed at every higher concentration.

alone. If the benthic community in the contaminated areas appear impaired, then the toxicity testing should be conducted.

I hope this information is useful. Please contact me if you want to discuss it further.

- ORIGINAL SIGNED -
Biologist 2 (Ecology)
Ecotoxicology and Standards Unit Leader

Literature cited:

Amiard, J.C., 1973. Accumulation of Antimony-125 by some groups of marine organisms. Rep. No. CEA-R-4530, Atomic Energy Commission, Cherbourg, France: 14 p. (FRE) (U.S. NTIS CEA-R-4530); Nucl. Sci. Abst. 29(4):7717 (1974) (ECOTOX Reference 6533).

CRC, 1968. Handbook of Chemistry and Physics, 49th edition. The Chemical Rubber Company, 1968.

EPA, 1980. Ambient Water Quality Criteria for Antimony. U.S. Environmental Protection Agency, EPA 440/5-80-020 October 1980.

ECOTOX, 2006. Data search results for "antimony". U.S. Environmental Protection Agency, ECOTOX Database, accessed April 27, 2006. (http://mountain.epa.gov/ecotox/)

HSDB, 2006. Hazardous Substance Database entries for antimony trioxide (CAS 1309-64-4), antimony potassium tartrate (CAS 28300-74-5) and antimony trichloride (CAS 10025-91-9), National Institutes of Health, National Library of Medicine, Specialized Information Services, TOXNET, accessed April 27, 2006. (http://toxnet.nlm.nih.gov/)

LeBlanc, G.A., and J.W. Dean, 1984. Antimony and thallium toxicity to embryos and larvae of fathead minnows (*Pimephales promelas*), Bull. Environ. Contam. Toxicol. 32(5):565-569 (ECOTOX reference 10427).

Long, E.R., and L.G. Morgan, 1991. The potential for biological effects of sediment-sorbed contaminants tested in the national status and trends program. NOAA Technical Memorandum NOS OMA 52. National Oceanic and Atmospheric Administration, Seattle, Washington, 2nd printing August 1991.

NSC, 2006. Antimony Chemical Backgrounder. National Safety Council Fact Sheet http://www.nsc.org/ehc/chemical/antimony.htm, downloaded April 27, 2006

NYSDEC, 1999. Technical Guidance for Screening Contaminated Sediments. New York State Department of Environmental Conservation, Division of Fish, Wildlife & Marine Resources, January 1999.

Wikipedia, 2006. Entry for antimony trioxide. Wikipedia, The Free Encyclopedia, accessed April 27, 2006. http://en.wikipedia.org/wiki/Main_Page

GREATER ADIRONDACK RESOURCE CONSERVATION & DEVELOPMENT COUNCIL, INC.
60 PACK FOREST ROAD
CHESTERTOWN, NEW YORK 12817

Tel. (518) 623-3090 Fax (518) 623-3140
Email: adirfor@global2000.net
www.timesunion.com/communities/garcd

April 5, 2006

Mr. Douglas Ferris
Earth Science Engineering
P.O. Box 226
Willsboro, NY 12996

Received
ESE, P.C.
Date 4/10/06

Re: BOQUET RIVER BLACK ASH PROJECT

Dear Mr. Ferris:

The Greater Adirondack Resource Conservation and Development (RC&D) Council is extremely supportive of efforts by the Town of Willsboro to remedy problems associated with black ash deposits along the Boquet River. Heavy metals are being increasingly released into the environment as the steep, un-vegetated riverbanks erode away. The negative effects of the black ash contaminants and the sediment deposited in the riverbed are being felt by the trout population, by visiting anglers, and by the local economy dependent upon tourism.

The RC&D Council is comprised of representatives from soil and water conservation districts, boards of supervisors, and planning boards in seven Adirondack counties (including Essex). As a unified group we have visited the project site, have agreed on its importance to our region, and now request that technical and financial support from the Brownfields program be provided to solve the black ash problem. Until these environmental issues are resolved, work cannot begin to construct a wetland for tertiary treatment of the community's wastewater.

We look forward to the day when Willsboro's residents and visitors can enjoy an aesthetically pleasing recreational area, can fish along safe riverbanks, and can reap the benefits of increased phosphorus removal from its waste stream.

Please contact us at (518) 623-3090 if we can provide any additional information.

Thank you!

Sincerely,

John A. Rieger
President

cc: Town of Willsboro
Essex County Planning Department
Essex County Soil & Water Conservation District

TROUT UNLIMITED

NEW YORK STATE COUNCIL OF TROUT UNLIMITED

7 Helen Street
Plattsburgh NY 12901
21 March 2006

Douglas Ferris
Earth Science Engineering
3721 Main Street
Willsboro NY 12996

Received
ESE, ...
Date 3/22/06

Subject: Boquet River Black Ash Removal

Dear Mr. Ferris:

The New York State Council of Trout Unlimited strongly endorses the brownfields grant application for funds to remove the environmentally dangerous black ash deposits along the Boquet River at Willsboro, New York. These deposits are know to be high in heavy metals, such as zinc; are eroding into the Boquet River; and pose a contamination hazard to both inhabitants and to the Boquet River ecosystem.

The Boquet River is a noted fishery, and is one of the few remaining streams in New York State to support a spawning population of Atlantic salmon. It is also a noted trout stream, and is a destination stream for anglers from all over the state in search of brown, rainbow and brook trout, as well as the fall and spring Atlantic salmon runs. As such, its good health has a significant economic impact on Essex County and the North Country. Removal of the black ash deposits will further insure the continued attractiveness and safety of this remarkable ecosystem.

Please contact me if the New York State Council of Trout Unlimited can be of further service in this endeavor.

Sincerely,

William H. Wellman
Region Five Vice President, New York State Council of Trout Unlimited

CC: (All Email)
Essex County WQCC
NYSCTU
GARC&D

WILDLIFE CONSERVATION SOCIETY

**WCS**
ADIRONDACK COMMUNITIES &
CONSERVATION PROGRAM

January 30, 2006

Douglas R. Ferris, P.E.
Earth Science Engineering
24 South Main St.
PO Box 226
Willsboro, NY 12996

Received
ESE, P.C.
Date 1/31/06

Dear Mr. Ferris:

I understand that you are working to obtain funds for wetland construction and bank stabilization projects in the Boquet River at the site of the former pulp mill in Willsboro, NY and that this work would help to eliminate erosion and leakage of ash and sludge into the river.

The Adirondack Communities and Conservation Program, a field program of the Wildlife Conservation Society, is interested in the Boquet and especially in this section of the river because of its importance as habitat for wood turtles (*Glyptemys insculpta*) and other species. Wood turtles were selected a focal species by WCS as part of our conservation planning efforts in the Adirondacks and are important indicators of high quality river and stream habitat. This species utilizes a wide variety of habitats, both aquatic and terrestrial, including rivers, streams, swamps, bogs, wet meadows, woods, upland fields, and farmland. The wood turtle is thought to be in decline throughout its range and is affected by a variety of human activities including collections for biological supply houses and the pet trade, recreation, road kill, dredging, damming, stream channelization, and general habitat loss and degradation. Habitat degradation may be as critical as habitat loss for this species. It is rarely found in polluted areas and may be considered a pollution-intolerant species whether it be caused by siltation, over-enrichment from organic sources, or industrial.

Your project has the potential to substantially increase habitat quality for turtles and other species in the Boquet. We have conducted pilot studies of wood turtle abundance and distribution in sections of the Boquet and located at least one individual in close proximity to the sewage treatment plant. We have also been notified of additional individuals as well as other turtle species in that area by other researchers and local fisherman. Turtle populations are declining in general throughout North America. Turtles, because they have large eggs that can incorporate high levels of environmental pollutants, are particularly susceptible to certain types of polluting chemicals. Turtles serve important functional roles in ecosystems as predators on a variety of plant and animal species, as seed dispersers, and as prey for other species in the form of eggs and young turtles. They are important indicators of water quality and their decline in the Boquet and other river systems would undoubtedly have effects on ecosystem function.

The ACCP is fully supportive of your project and appreciative that efforts will be made which have the potential to greatly enhance habitat quality for wood turtles and other species in the Boquet. If we can be of assistance to your project in any way, please do not hesitate to contact me.

Sincerely,

Michale Glennon, Ph.D.

**New York State Department of Environmental Conservation**
**Division of Fish, Wildlife and Marine Resources, Region 5**
Route 86 – P.O. Box 296, Ray Brook, New York 12977
**Phone:** (518) 897-1333 • **FAX:** (518) 897-1347
**Website:** www.dec.state.ny.us

Denise Sheehan
Commissioner

December 28, 2005

Douglas R. Ferris, P.E.
Earth Science Engineering
24 South Main Street
P.O. Box 226
Willsboro, NY 12996

Received
ESE, P.C.
Date 1/3/06

Dear Mr. Ferris:

Thank you for the tour of the ash beds and sludge lagoons on either side of the Boquet River at the site of the former pulp mill located in Willsboro, NY. Our site visit of December 21, 2005 confirmed there is significant erosion of ash and sludge into the Boquet River. You indicated to me during our discussions that Willsboro is seeking funding for construction of wetlands that would be part of a tertiary treatment of sewage from the Town's existing sewage treatment plant, and that in addition, the Town would also seek funding to allow the ash beds and sludge lagoons to be stabilized so that erosion of these materials into the Boquet River would be eliminated. The Region 5 Bureau of Fisheries is fully supportive of the Town's efforts to stabilize the Boquet River bank to minimize or eliminate the erosion of the sludge and ash into the Boquet. Our interest in bank stabilization is multifold.

The Boquet River is an integral site critical to our efforts in establishing native landlocked Atlantic salmon to the Lake Champlain basin. The Boquet supports an important spring and fall landlocked salmon fishery, and the most popular area for trout and salmon anglers is within the river section bounded by the old pulp mill site. The Boquet is also the site of a DEC-owned and operated fish ladder built specifically to allow passage of landlocked Atlantic salmon above the dam in Willsboro.

Bank stabilization is important for the following reasons:

Fish Spawning Habitat : Excessive siltation reduces and can even eliminate trout and salmon spawning habitat. Female trout and salmon reproduce by building a "redd" or nest in clean gravel. Deposition of fine sediments from the ash beds appears to be reducing suitable spawning habitat. Some redd building by landlocked Atlantic salmon returning to the Boquet River has been documented. However, we wish to encourage additional natural reproduction in the Boquet, and the most effective way to do this on the Boquet is to reduce siltation.

Egg Incubation and Early Development of Fish: Excessive siltation during spawning season can result in loss of developing eggs and sac fry. This includes the very critical early development stage (approximately 90 days) when fish eggs are incubating in the stream bed and when young fish are not fully developed. During this early development period fish eggs and fry are very sensitive to abrasion or suffocation caused by suspended sediment (bed load and wash load). Excessive abrasion will result in decreased egg and fry survival.

Physical Abrasion to Gill Breathing Aquatic Life: Excessive abrasion to the gills of fish, some aquatic insects, and amphibians will decrease their vitality and can contribute to mortality during periods of stress, such as the early spring recovery period (from winter stress), spawning periods, and late summer low dissolved oxygen periods.

Interruption of Aquatic Food Chains: Excessive sedimentation can interrupt food chains in a stream. Macroinvertebrates, such as the larvae of craneflies, mayflies, stoneflies, caddisflies, and beetles require clean, oxygen-rich water to develop in the interstitial spaces of the gravel and stone of the stream bed. Sedimentation harms these aquatic insects by covering their habitat and reducing their ability to forage. Suspended sediment will also damage their external gills through abrasion. These aquatic insects are a primary food source for many species of fish and are essential for fish growth and survival.

Fish Habitat: Bank stabilization may allow for the establishment of trees and other woody plants along the Boquet River shoreline in the impacted river section. Establishment of riparian woody vegetation will help to shade the river, thereby reducing critical summertime water temperatures and increasing dissolved oxygen levels.

Interference with Recreational Activities: The existing river banks within the confines of the stretch bordered by the lagoons and ash beds are extremely steep. The Boquet River is an extremely popular fishing location for wading anglers. The existing banks are sufficiently steep enough that angler access over the river bank is limited. Bank stabilization may allow for the bank slope to be reduced, and/or for incorporation of angler access paths and steps to the water.

Transport of Chemical Contaminants: Erosion of the materials from the ash beds and sludge lagoons will increase the transport of chemical contaminants into the Boquet River. While the heavy metal contaminants identified in the former pulp mill wastes do not rise to the level that would be considered hazardous waste, testing has revealed that the wastes are a metal-contaminated industrial waste. At their original riparian location within the ash beds, the metals were effectively "tied-up" and bound to the stabilized ash piles. However, through time, erosional forces have resulted in a long stretch of river bank comprised primarily of black ash to become exposed. The resulting erosion is allowing the ash and accompanying metals to be carried off-site into the Boquet River. Thus erosion allows these contaminants to become available for incorporation into the river's food chain and, ultimately, to anglers, through biomagnification. Stabilization of the river bank and ash would restrict and possibly eliminate this potential contaminant source.

In summary, the Region 5 Fisheries Office is fully supportive of any and all efforts by the Town of Willsboro to stabilize the Boquet River bank to reduce or eliminate the erosion of the former pulp mill wastes into the Boquet River. If there is any other way in which we can assist the Town in obtaining funding for this objective, please do hesitate to contact me.

Sincerely,

Lance Durfey
Senior Aquatic Biologist

cc: W. Schoch
File 9000-5-4

# APPENDIX G

# SITE PHOTOGRAPHS

Western end of Black Ash Pond

Eastern end of Black Ash Pond

Western end of Black Ash Pond

Saturated eastern end of Black Ash Pond

Sludge buried beneath ash adjecent to Boquet River

Sludge buried beneath ash adjacent to Boquet River

Sludge beneath ash

Test Pit excavation at east end of Black Ash Pond

Pulp Mill Site "c. 1950"

Pulp Mill Site May 29, 2003