REPORT

Remedial Investigation Report

Volume II of V

M. Wallace and Son, Inc. Scrapyard
Cobleskill, New York

Niagara Mohawk Power Corporation
Syracuse, New York

July 1995
Revised March 1996

BBL
BLASLAND, BOUCK & LEE, INC.
engineers & scientists

Remedial Investigation Report

Volume II of V

M. Wallace and Son, Inc. Scrapyard
Cobleskill, New York

Niagara Mohawk Power Corporation
Syracuse, New York

July 1995
Revised March 1996

BLASLAND, BOUCK & LEE, INC.
ENGINEERS & SCIENTISTS

6723 Towpath Road
Syracuse, New York 13214
(315) 446-9120

Appendix A

Phase I Remedial Investigation, M. Wallace and Son, Inc. Scrapyard, Work Plan

PHASE I REMEDIAL INVESTIGATION
WORK PLAN
M. WALLACE AND SON, INC. SCRAPYARD
COBLESKILL, NEW YORK

Niagara Mohawk Power Corporation

Syracuse, New York

April 1993

Report

Phase I Remedial Investigation Work Plan

M. Wallace and Son, Inc. Scrapyard
Cobleskill, New York

Niagara Mohawk Power Corporation

April 1993

BLASLAND & BOUCK ENGINEERS, P.C.
BLASLAND, BOUCK & LEE
ENGINEERS & SCIENTISTS

6723 Towpath Road
Syracuse, New York 13214
(315) 446-9120

Table of Contents

FIGURES

1.0 - Introduction

1.1 Preface

This document presents a detailed Work Plan for conducting a Phase I Remedial Investigation (RI) of the M. Wallace and Son, Inc. Scrapyard located in Cobleskill, New York. The Phase I RI Work Plan has been prepared by Blasland & Bouck Engineers, P.C., (Blasland & Bouck) at the request of Niagara Mohawk Power Corporation (NMPC). The Work Plan presents a detailed description of the Phase I RI, which will be implemented to assess the presence and extent of chemical constituents in soils, sediments, surface water, and ground water at the scrapyard site and in surface water and sediments off-site. Relevant background information and the objectives and scope of the Phase I RI Work Plan are summarized below.

1.2 Background Information

This section presents a summary of the existing information used to develop the strategy for the Phase I RI presented in this Work Plan. A description of the location and physical setting of the scrapyard, followed by a historical summary of scrapyard operations and previous investigations is presented below.

1.2.1 Location and Physical Setting

The scrapyard location, topographic and surface water features, and the geologic and hydrogeologic setting are discussed below.

1.2.1.1 Location

The M. Wallace and Son, Inc. Scrapyard is located at the intersection of New York State Route 10 (Elm Street) and West Street in the village of Cobleskill, Schoharie County, New York. The location of the M. Wallace and Son, Inc., Scrapyard is shown on Figure 1.

The Phase I RI will focus on the section of the M. Wallace and Son, Inc. Scrapyard located north of Route 10 (the "site") which encompasses an area of approximately 6.6 acres. The site is bordered by West Street to the west; Route 10 to the south; several apartments and residential housing to the east; and a high school athletic field to the north. The site can be divided into two general areas as follows:

1. The "lower" section of the site consisting of an office/garage building, a storage shed, and a quarry pond formed in an old limestone quarry; and
2. The "upper" section of the site consisting of several scrap metal stockpile areas and an area known as the "electrical equipment gut area" where electrical equipment was reportedly disassembled.

A site map showing the location of features at the site is presented as Figure 2.

1.2.1.2 Topography and Drainage

The site is located in the glaciated Mohawk section of the Appalachian Plateau Physiographic Province. United States Geological Survey (USGS) topographic mapping (the Cobleskill 7.5 Minute Quadrangle) indicates that elevations at the site range between approximately 940 and 980 feet. The site is located near the base of a ridge which extends to an elevation of over 1600 feet and forms the northern boundary of a broad, shallow valley trending towards the northeast.

The quarry pond and the quarry pond outlet channel are the only surface water features present at the site. The quarry pond covers an area of approximately 1.3 acres and ranges in depth between 8 and 20 feet (average depth of approximately 15 feet). The quarry pond does not have a water quality classification in accordance with the standards for surface water quality and purity contained in Title 6, Official Compilation of Codes, Rules and Regulations of the State of New York (6NYCRR) Part 701.

Flow sources into the pond include direct precipitation and surface water runoff from the upper section of the site which drains southward into the pond. The pond formerly overflowed into a small outlet channel which flows into a culvert on the north side of Route 10. The outlet channel re-emerges on the south side of Route 10 and flows for a distance of approximately 75 feet prior to entering a culvert beneath the Delaware and Hudson Railroad track embankment. The outlet channel re-emerges on the south side of the embankment and flows for a short distance prior to entering a below ground culvert which combines with storm water flow from a parking lot on a neighboring property. Storm water flow from the parking lot eventually discharges into Cobleskill Creek.

As part of the 1992 Interim Remedial Measures (IRMs) implemented at the site, a quarry pond water treatment system was constructed to treat pond water prior to discharge into the Village of Cobleskill storm water drainage system located south of the site (see Section 1.2.4 below). The quarry pond water treatment system was initially installed to drain the quarry pond to facilitate debris removal from the pond. The New York State Department of Law (NYSDOL) and New York State Department of Environmental Conservation (NYSDEC) have required NMPC to continue operation of the quarry pond water treatment system until a final remedy for the site has been completed.

1.2.1.3 Geology and Hydrogeology

Surface soils, unconsolidated material, and bedrock in the vicinity of the site are described in the Soil Survey of Schoharie County prepared by the United States Department of Agriculture Soil Conservation Service (USDA-SCS). Based on the soil survey, soils in the area primarily consist of well drained to moderately well drained Schoharie and Hudson series soils and somewhat poorly drained Odessa and Rhinebeck series soils. All the soil series are silt loams which developed in red and gray calcareous glaciolacustrine silt and clays located on gently sloping terrain. The soil survey indicates that a thin veneer of glaciolacustrine silt and clay, which formed during recession of ice sheets which once covered the area, is present beneath the surface soils.

The soil survey also indicates that ground water in the area is primarily encountered within carbonate bedrock. The water within the bedrock occurs within secondary permeability features such as fractures, bedding planes, and joints. Water yields within the bedrock unit vary depending on the number and size of the secondary features found in the bedrock.

The site area is underlain by the Onondaga Limestone of Middle Devonion Age. In the Cobleskill area, the Onondaga Limestone is comprised of Coeymans and Manlius Formations which dip 1 to 2 degrees to the south-southwest. The Coeymans Formation overlies the Manlius Formation and is a medium to massive unevenly-bedded limestone which is moderately fossiliferous. This formation exhibits low angle cross-bedding and bioturbation.

The Manlius Formation is characterized into upper and lower sections. The upper sections of the manlius formation are comprised of a medium to thick unevenly-bedded limestone and carbonate pebble conglomerate. The upper section exhibits cross-bedding, ripple marks, bioturbation, and is sparsely to moderately fossiliferous. The lower sections of the Manlius Formations are characterized by thin-medium laminated evenly-bedded limestones and dolostones, calcareous shales, and minor evaporites. The lower sections are sparsely to moderately fossiliferous.

1.2.2 Site History

The M. Wallace and Son, Inc. Scrapyard site is an active salvage business which recovers and resells mechanical parts and materials from various equipment or other items. Between 1978 and the mid-1980s, PCB transformers were purchased by the site operator and transported to the scrapyard. The transformers were disassembled within the electrical equipment gut area to recover copper components which were then resold. During the scrapping operations, transformer dielectric fluid containing polychlorinated biphenyls (PCBs) may have been released from the transformers to the ground surface.

In June 1983, personnel from the NYSDEC Bureau of Enforcement and Criminal Investigation (BECI) collected samples of soil in the electrical equipment gut area, sediment and water from the quarry pond, and sediment from the quarry pond outlet channel. Results for the samples collected by BECI indicated that PCBs were present in soils, sediment, and surface water at the site. In response to the BECI sampling results, the Schoharie County Department of Health (SCDH) sampled eight household groundwater supply wells near the site for the presence of purgeable hydrocarbons, purgeable aromatics, PCBs, and metals. Results for the SCDH samples indicated that purgeable hydrocarbons, purgeable aromatics, and PCBs were not detected in off-site wells. Due to the presence of PCBs identified at the site by the BECI sampling, the site is currently listed by the NYSDEC as a Class 2 Inactive Hazardous Waste Site (site # 448003). In response to a lawsuit filed by the State of New York Attorney General, NMPC and M. Wallace and Son, Inc., have entered into a Interim Consent Order (case no. 85-CV-219) to address the presence of PCBs and other chemical constituents in environmental media at the site.

1.2.3 Summary of Initial Site Investigation

NMPC retained O'Brien & Gere Engineers, Inc., (O'Brien & Gere) in early 1987 to perform an initial investigation of soils, sediments, surface water, and ground water at the site. O'Brien & Gere submitted a Work Plan for conducting the site investigation to the NYSDEC in October 1987. Following approval of the Work Plan, O'Brien & Gere implemented the initial investigation which was completed during 1989. A final report for the investigation was submitted to the State of New York Attorney General's office and the NYSDEC during June 1990.

Prior to preparing the initial site investigation Work Plan, O'Brien & Gere collected two surface soil samples from the electrical equipment gut area for analysis of Hazardous Substance List (HSL) parameters in order to determine the parameters of concern for the initial site investigation. Compounds detected in the HSL samples included PCBs, volatile organic compounds (i.e., 1,1-dichloroethane and xylenes), semi-volatile organic compounds (i.e., phthalates and polynuclear aromatic hydrocarbons) and metals (arsenic, cadmium, copper, lead, and zinc). Pesticides and cyanide were not detected.

During the initial site investigation, seven soil borings were completed to the top of bedrock (four were installed in the upper area of the site and three south of Route 10). At four of the soil boring locations, monitoring wells were installed. The soil boring and monitoring well locations are shown on Figure 2.

Observations during the installation of the monitoring wells and soil borings indicated that the thickness overburden to the top of bedrock ranges between 3.3 feet in the upper area and 17.5 feet in the lower area. Limited information was obtained regarding the overburden stratigraphy and bedrock lithology during the soil boring and monitoring well installations. Additional information pertaining to the stratigraphy and lithology of the site will be required to adequately evaluate the dynamics of the groundwater system(s) at the site. Based on water levels measured at the three monitoring wells south of Route 10, the potentiometric surface is located between 4.12 and 8.05 feet below the ground surface. Ground water in the monitoring well located in the upper section of the site was also located within bedrock at a depth of 22.62 feet below the ground surface. Based on the water level elevations, ground water flows generally towards the south-southeast.

The initial site investigation included collecting 54 surface soil samples (44 in the electrical equipment gut area) for laboratory analysis for PCBs and oil and grease. One of the 54 surface soil samples collected from the electrical equipment gut area was analyzed for the HSL parameters. In addition, 6 subsurface soil samples were collected from soil borings MW-1, B2, B3, and B4 for laboratory analysis for PCBs, HSL volatile organic compounds, and metals. One of the soil samples collected from B2 was analyzed for the complete list of HSL parameters.

Four sediment samples were collected from the quarry (SED-1, SED-2, SED-3, and SED-4) and two sediment samples were collected from the quarry pond outlet channel (SED-5 and SED-6). SED-3 was analyzed for the complete set of HSL parameters, while the other sediment samples were analyzed for PCBs and metals.

Two surface water samples from the quarry pond (W-1 and W-2) and two water samples from the quarry pond outlet channel (W-3 and W-4) were also collected during the initial investigation. Sample W-1 was analyzed for the complete set of HSL parameters, while the other surface water samples were analyzed for a reduced set of HSL parameters consisting of PCBs, HSL volatile and semi-volatile organic compounds, and metals.

One round of ground-water samples was collected from the existing monitoring wells (MW-1, MW-2, MW-3, and MW-4) during the initial investigation. The sample collected from MW-3, a downgradient well, was analyzed for the complete set of HSL parameters, while the samples collected from MW-1 (upgradient well), MW-2, and MW-4 were analyzed for a reduced set of HSL parameters consisting of PCBs, volatile and semi-volatile organic compounds, and metals.

A summary of the results from the initial investigation is presented below.

Soil Sampling

Analytical results indicated that PCB concentrations ranged between non-detect and 2,100 parts per million (ppm) in the surface soil samples. The highest concentration of both PCBs and oil and grease were found in the vicinity of the electrical equipment gut area, where visibly-stained soils were observed. Volatile and semi-volatile organics, pesticides, and cyanide were not detected in the surface soil sample which was analyzed for the complete set of HSL parameters. The HSL analytical results for the subsurface soil samples collected from B2 indicated that PCB concentrations ranged from 0.25 ppm to 6.6 ppm. Volatile and semi-volatile organic compounds, pesticides, and cyanide were not detected, with the exception of bis(2-ethylhexyl)phthalate, a common field and laboratory contaminant.

Sediment Sampling

PCB concentrations ranged from 0.23 ppm in SED-3 to 28 ppm in SED-5. Methylene chloride and acetone were detected in SED-3, but they were also found in the trip blank at the same concentrations, indicating their detections were likely due to sample contamination. Metals detected in the sediment samples include aluminum, arsenic, barium, calcium, chromium, copper, iron, lead, magnesium, manganese, nickel, silver, sodium, vanadium, and zinc.

Surface Water Sampling

PCB concentrations in the surface water samples ranged from 0.12 parts per billion (ppb) in W3 to 0.72 ppb in W4. No volatile or semi-volatile organic compounds were detected in any of the surface water samples. Metals detected include calcium, magnesium, manganese, sodium, and zinc.

Ground-Water Sampling

The analytical results indicated that PCBs were detected in the ground-water sample collected from MW-1 at a concentration of 0.39 ppb. PCBs were not detected (laboratory detection limit of 0.065 ppb) in ground-water samples collected from MW-2, MW-3, and MW-4. Chloroform was the only other detectable organic compound found in the ground water at MW-1. Bis(2-ethylhexyl)phthalate was the only other organic compound found in the site ground water. Metals detected in the ground water above New York State Class GA standards included iron, lead, and manganese. A second round of ground-water samples was collected in October of 1991 during the implementation of the Interim Remedial Measures at the site as discussed below. The analytical results from this sampling event indicated that PCBs were not detected in ground-water obtained from MW-1, MW-2, MW-3, and MW-4.

Based on the results of the initial site investigation, NMPC prepared an IRMs Work Plan dated March 1991 to address the presence of PCBs in the following site areas:

1. Electrical equipment gut area;
2. Quarry pond sediments; and
3. Quarry pond outlet sediments.

1.2.4 Summary of Interim Remedial Measures

Following approval of the March 1991 IRM Work Plan, NMPC retained Chemical Waste Management, Inc. - Environmental Remedial Action Division (CWM-ENRAC) to implement the IRMs. In August 1991, CWM-ENRAC conducted the following four items:

1. Excavation and disposal of soils in the electrical equipment gut area with PCB concentrations greater than 1.0 part per million (ppm), the cleanup criteria for soils and sediments established for the IRMs. CWM-ENRAC excavated approximately 2,900 cubic yards of soil in the electrical equipment gut area to the limits and depths required by NMPC's on-site observer. Samples collected by CWM-ENRAC following the excavation activities indicate that PCB concentrations in soils remaining in the electrical equipment gut area were above the 1.0 ppm cleanup criteria.

2. Removal and disposal of sediment from the section of the quarry pond outlet channel located south of Route 10 to the northern side of the railroad embankment. Analysis of a composite sediment sample collected following excavation of the sediment indicated that PCBs were present at an average concentration of 4.3 ppm.

3. Underwater reconnaissance of the quarry pond by a CWM-ENRAC diver to determine the extent of sediments which may potentially require removal. Based on sediment depth measurements performed with a calibrated probe, sediments on the bottom of the quarry pond ranged between 1 and 4 feet in depth and the total volume of sediment in the pond was estimated to be approximately 5,000 cubic yards (2,900 cubic yards of heavy mud sediment and 2,100 cubic yards of fine silt sediment). During the survey of the pond, the diver discovered the presence of various debris located at the bottom of the pond including electrical wire spools, transformers, and 55-gallon drums. The condition and contents of the transformers and drums are unknown. CWM-ENRAC also conducted a sediment sampling program which consisted of collecting sediment grab samples from 97 locations within the quarry pond. The sediment sampling program was conducted without program approval from NYSDEC or NYSDOL. Forty-four of the sediment samples were analyzed for PCBs. The analytical results indicated that PCBs were present in the sediments at concentrations ranging between non-detect and 100 ppm.

4. Collection of ground-water samples for PCB analysis from the four existing monitoring wells at the site. PCBs were not detected in any of the samples collected. The detection limits ranged between 0.72 parts per billion (ppb) and 1.4 ppb.

Based on the IRMs conducted during the summer of 1991, NMPC implemented additional IRMs at the site between August 1992 and April 1993. These IRMs included:

1. Installation of a quarry pond water treatment system to drain in the quarry pond to facilitate debris removal;

2. Removing the debris identified at the bottom of the pond during the August 1991 underwater reconnaissance;

3. Erecting a fence to restrict access to the site from West Street and Route 10 (fencing is already present along the north and east boundaries of the site);

4. Removing scrap metal and debris located on the ground surface at the site; and

5. Installation of silt fencing along the western site perimeter.

Based on the results of the verification sampling conducted following removal of soil and sediment at the site during the 1991 IRMs which indicate that PCBs were still present at concentrations greater than 1 ppm, NMPC elected to conduct a comprehensive RI/FS. The objectives of the Phase I RI are discussed below.

1.3 Objectives of the Phase I RI

The overall objective of the RI is to provide data which can be used to assess the current site conditions and determine the scope of future remedial activities which may be implemented at the site. Based on the general objective, the following specific objectives have been established for the Phase I RI:

1. Determine the presence and extent of chemical constituents in environmental media (i.e., soils, sediment, surface water, and ground water) at the site.
2. Determine the presence and extent of chemical constituents (i.e., PCBs and mercury) in sediments and surface water downstream of the quarry pond outlet channel.
3. Determine whether additional IRMs are necessary to address existing conditions (i.e., buried debris) present at the site.
4. Provide data for completion of a baseline risk assessment (RA) which will evaluate potential on-site and off-site risks (if any) posed by chemical constituents identified at the site.
5. Provide data for preparation of a FS to determine appropriate remedial actions for implementation at the site or at off-site locations, if necessary.

The Phase I RI will be conducted using a phased approach. During Phase I, information will be gathered to evaluate the presence and extent of chemical constituents at the site. A Phase II investigation will be conducted, if necessary, to further evaluate the extent of chemical constituents identified at the site during the Phase I investigation and to provide additional data to perform a risk assessment and conduct a FS. The specific work performed as part of the Phase II investigations, if any, will depend on the results of the Phase I investigation. Following completion of the Phase II activities, a baseline RA and FS will be prepared based on the results of the Phase I RI.

1.4 Scope of Work Plan and Associated Plans

The Phase I RI Work Plan is organized into the following sections:

Section	Purpose
Section 1 - Introduction	Provides background information on the site, as well as the objectives and scope of the Phase I RI.
Section 2 - Work Plan Rationale	Establishes the specific data requirements to meet the Phase I RI objectives, describes how the data from the Phase I RI will be used, and the quality of data required.

Section	Purpose
Section 3 - Phase I Remedial Investigation	Describes the Phase I RI activities, including: performance of field investigations, evaluation of field data, identification of potential interim remedial measures, and preparation of a Phase I RI Report.
Section 4 - Phase I Project Schedule	Provides a timetable for completion of the Phase I RI work tasks.

This Work Plan is supported by a Sampling and Analysis Plan (SAP) which includes a Field Sampling Plan (FSP) and a Quality Assurance Project Plan (QAPP). The SAP addresses sample collection, analytical methods, and quality assurance/quality control (QA/QC) procedures to be followed during execution of the Phase I RI Work Plan. This Work Plan is also supported by a Health and Safety Plan (HASP) which contains procedures and plans to be followed during the Phase I RI to protect the health and safety of field personnel.

1.5 Consistency with CERCLA

This Work Plan is consistent with the elements of an RI/FS as set fourth in the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended, 42 U.S.C. 960 et seq., the National Contingency Plan (NCP), and the United States Environmental Protection Agency (USEPA) guidance document entitled "Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA, " dated October 1988.

2.0 - Work Plan Rationale

2.1 Data Requirements and Approaches

This section of the Work Plan presents the basis for the specific investigation activities which will be implemented to address the Phase I RI objectives. The data collection needs and planned approaches to obtaining the data are described below with regard to the Phase I RI objectives.

1. **Determine the presence and extent of chemical constituents in environmental media (i.e., soils, sediment, surface water, and ground water) at the site.**

   This objective will be address by implementing a comprehensive site-wide sampling investigation to define the presence and/or extent of chemical constituents in soils, sediment, surface water, and ground water at the site. Based on the analytical results generated during previous investigations, samples collected during the Phase I RI will be analyzed for PCBs (at every sample location), Target Compound List (TCL) volatile and semi-volatile organic compounds, and Target Analyte List (TAL) inorganics (at selected sampling locations).

2. **Determine the presence and extent of chemical constituents (i.e., PCBs and mercury) in sediments and surface water downstream of the quarry pond outlet channel north of the railroad embankment.**

   This objective will be address by collecting sediment and surface water samples downstream of the quarry pond outlet channel during the Phase I RI. Sediment and surface water samples collected downstream of the quarry pond outlet channel will be analyzed for PCBs and mercury.

3. **Determine whether additional IRMs are necessary to address existing conditions (i.e. buried debris) present at the site.**

   The need for additional IRMs will also be determined if buried debris (i.e., transformers and/or drums) are encountered during Phase I RI field activities. The evaluation will include an assessment of whether additional data is needed to confirm the need for additional IRMs.

4. **Provide data for completion of a baseline RA which will evaluate potential on-site and off-site risks (if any) posed by chemical constituent identified at the site.**

   Following completion of the Phase II RI investigation activities (if any), a baseline RA will be prepared to evaluate potential risks to human health or the environment posed by the concentrations of constituents identified during the Phase I RI. The baseline RA will be prepared based on the sampling results obtained from the samples collected at the site and at specific locations adjacent to the site. The Phase I RI data will be evaluated in conjunction with information on potential receptors, exposure points and exposure routes, and the potential toxicity of constituents identified during the Phase I RI.

5. **Provide data for preparation of a FS to determine appropriate remedial actions (if any) for implementation at the site or at off-site locations.**

   This objective will be addressed by collecting the appropriate data necessary to facilitate and support the identification and evaluation of potential remedial alternatives to address the remedial objectives developed for the site and any off-site locations.

2.2 Data Quality Objectives

As described above, some of the work tasks conducted for the remedial activities will entail the collection and analysis of soil, sediment, surface water, and ground-water samples. The QAPP specifies the data quality required to meet the objectives of the study and the appropriate analytical procedures to achieve the desired data quality.

3.0 - Phase I Remedial Investigation

3.1 General

This section of the Work Plan presents a description of the activities that will be performed during Phase I of the Phase I RI. Phase I of the Phase I RI has been designed to generate the data needed to meet the objectives set forth in Section 1.3. The investigations discussed herein will determine the concentration of PCBs and other chemical constituents in soils, sediments, surface water, and ground water at a number of locations at the site and at specific locations downstream of the quarry pond outlet channel. The specific work tasks associated with Phase I of the Phase I RI are:

- Task 1 - Area Reconnaissance and Mapping;
- Task 2 - Soils Investigation;
- Task 3 - Sediment Investigation;
- Task 4 - Surface Water Investigation;
- Task 5 - Ground Water Investigation;
- Task 6 - Biota Investigation;
- Task 7 - Assessment of Air Emissions;
- Task 8 - Assessment of Potential Interim Remedial Measures; and
- Task 9 - Phase I Remedial Investigation Report.

Field protocols which will be followed during completion of Tasks 2 through 5 are detailed in the Field Sampling Plan (FSP). Analytical procedures which will be followed for the samples collected as part of the Phase I investigation are presented in the QAPP. As detailed in the QAPP, organic and inorganic samples collected for the Phase I investigation will be analyzed using NYSDEC 1991 Analytical Services Protocols (ASP) methods. Sediment, surface water, and ground-water samples collected for the Phase I investigation will also be analyzed for supplemental parameters using the analytical procedures presented in the QAPP. Health and safety protocols which will be followed by field sampling personnel during completion of the Phase I investigation tasks are discussed in the project-specific Health and Safety Plan (HSP). Each of the Phase I work tasks are detailed below.

3.2 Proposed Phase I RI Activities

Task 1 - Area Reconnaissance and Mapping

This task consists of conducting reconnaissance activities to determine ground-water usage within a 2-mile radius of the site. The reconnaissance activities will include contacting the SCHD and other appropriate agencies to obtain available information regarding the construction of residential water supply wells within a 2-mile radius the site. In addition, local well drillers will be contacted to obtain information on the construction of supply wells in the area of the site.

Blasland & Bouck has conducted a topographic survey of the site in October 1992. The topographic survey included locating the property boundary, buildings, roads, utilities, rights-of-ways, quarry pond, existing monitoring wells, as well as spot elevations on a grid pattern and breaks in grade. Elevations of permanent structures were obtained to the nearest 0.01 foot and all spot elevations were surveyed to the nearest 0.01 foot based on the National Geodetic Vertical Data of 1929. In addition, during the field survey activities, bench-marks and baseline stations with physical ties have been established. The topographic base map was prepared at a suitable scale such as 1" = 40', with 2-foot contours. Upon completion of the Phase I activities, the locations of rock cores, soil samples, and test pits will be surveyed in the field and added to the existing topographic map. The topographic map will be used graphically to present the locations of test pits, test borings, monitoring wells, and sampling data collected during the RI. The topographic survey map will include the identification of surface water drainage channels at the site.

Task 2 - Soil Investigation

Based on the information discussed in Section 1.2, together with the objectives of the Phase I RI, a soil investigation will be conducted to define the presence and horizontal extent of chemical constituents in site soils and to characterize surface and subsurface soils. The soil investigation activities will also aid in determining the presence of buried debris and potential source materials. The soil investigation will include the excavation of test pits, completion of test borings, if necessary, field screening, and soil sampling and analysis as described in the subtasks below.

Subtask 2.1 - Field Stake Test Pit and Soil Sampling Locations

This subtask will consist of field staking 35 test pit and soil sampling locations at the site based on a 100-foot by 100-foot sampling grid. The proposed test pit and soil sampling locations are shown on Figure 3. Test pit locations will be adjusted in the field within each sampling grid based on the presence of soil staining on the ground surface. The first step in the soil investigation will consist of the collection of surface soil samples followed by the excavation of test pits to characterize subsurface soil conditions.

Subtask 2.2 - Collection of Surface Soil Samples

This subtask will consist of collecting 35 surface soil samples from the locations shown on Figure 3. The surface soil samples will be collected from a depth of 0 to 6 inches using the protocols specified in the FSP. The surface soils will also be visually characterized and screened using a PID to evaluate the presence and relative concentration of volatile organic compounds. The 35 surface soil samples will be submitted for laboratory analysis for PCBs, TCL semi-volatile organics, and TAL inorganics.

Subtask 2.3 - Install Test Pits

Under this subtask, 35 test pits will be excavated at the site to allow for a visual assessment of the subsurface soils and facilitate the collection of subsurface soil samples to aid in defining the extent of chemical constituents in subsurface soils at the site. The test pits will be excavated using a backhoe, except at those locations where site conditions limit the operation of excavation equipment (i.e., adjacent to the edge of the quarry pond). At these locations, a hand bucket auger will be used to collect soil samples.

During test pit excavations, continuous screening for volatile organic vapors will be conducted with a PID to evaluate the presence and relative concentration of volatile organic compounds in the subsurface. PID screening procedures are set forth in the FSP.

The use of soil test pit excavations has been selected as the preferred method for investigating subsurface conditions in the overburden at the site because test pits allow for characterization of a much larger cross section of soils than comparable soil sampling methods (i.e., soil borings) and increases the probability of encountering any debris which may be buried at a particular location. If buried debris (i.e., transformers or drums) are encountered during excavation of a test pit, the excavation activities will be temporarily discontinued in order to assess the type and condition of the debris and, based on the assessment, determine the need for an IRM.

Soil test pits will be excavated to the depth of bedrock and/or ground water (whichever is encountered first) or to the maximum excavation limits of the backhoe (typically about 14 feet). Test pits will be excavated in accordance with the procedures set forth in the FSP.

At each test pit location, a soil sample will be collected at each 2-foot depth interval for visual characterization and PID screening. One soil sample from each test pit will be collected for laboratory analysis for PCBs and for potential laboratory analysis for TAL inorganics and TCL volatile and semi-volatile organic compounds based on the presence of visual staining, odors, or PID measurements above background levels. If no staining, odors, or PID measurements above background are encountered, then several discrete samples will be collected from the 6-inch to 18-inch depth interval and composited in the field to form one sample for laboratory analysis. At the conclusion of daily test pit activities, soil samples will be selected for analysis for TCL volatile and semi-volatile organic compounds and TAL inorganics based on the results of test pit activities. The selections of subsurface soil samples for TCL/TAL analysis will be based on PID readings, visual observations, and with the objective of achieving a uniform distribution of TCL/TAL data for subsurface soils across the site. A total of 17 subsurface soil samples (from up to one-half of the test pits) will be collected and analyzed for TCL volatile and semi-volatile organic compounds and TAL inorganics.

Following collection of any soil samples, the test pit will be backfilled with the soils excavated from the test pit in accordance with the procedure presented in the FSP. The locations of the surface soil samples and test pits will be surveyed using standard surveying practices and referenced to the National Geodetic Vertical Datum (NGVD) of 1929.

Task 3 - Sediment Investigation

Based on the information presented in Section 1.2, as well as the objectives of the Phase I RI, sediment probing, coring, and sampling was conducted by NMPC in January 1993 in the quarry pond and outlet channel to:

1. Investigate the distribution and depth of sediments; and
2. Determine the presence and extent of chemical constituents in the sediments.

Prior to collecting sediment samples, sediment probing was conducted in the quarry pond and quarry pond outlet channel north of the railroad embankment. The location for each sediment probe in the quarry pond is shown on Figure 3 and is based on a 50-foot by 50-foot sampling grid. Based on the results of the sediment probing, sediment sampling locations were selected as follows:

- Three surface sediment samples (0 to 6 inches in depth) from the quarry pond outlet channel (one immediately south of the quarry pond outlet, one north of the railroad embankment, and one south of the railroad embankment); and
- Eight sediment core samples from the quarry pond. Sediment samples were collected at the 0- to 6-inch depth and at 1-foot intervals from each core location. Six sediment core samples were uniformly distributed across the quarry pond and were located based on the sampling grid. Two sediment core samples were collected in the western area of the quarry pond.

In addition, 26 surface sediment samples were collected from the quarry pond. The location of the sediment samples are shown on Figure 3.

Based on the results of the on-site sediment sampling, NMPC will conduct an off-site sediment sampling program as described below. The validated analytical results from the on-site sediment sampling will be provided in the Phase I RI Report. NMPC will provide, under separate cover, a summary of the unvalidated analytical data from the on-site sediment sampling including copies of the laboratory results to NYSDOL and NYSDEC for review.

As part of the off-site sediment investigation, 9 surface sediment samples will be collected for PCB and total organic carbon (TOC) analysis, and 4 surface sediment samples will be collected for mercury analysis from locations within the Village of Cobleskill storm water drainage system south of the quarry pond outlet channel. The surface sediment sample locations within the Village of Cobleskill storm water drainage system south of the quarry pond outlet channel are shown on Figure 4.

In addition, sediment core samples will be collected from Cobleskill Creek south of the quarry pond outlet channel. Prior to the collection of sediment core samples, sediment probing will be conducted at the proposed sampling locations within Cobleskill Creek. Upon completion of the sediment probing activities, 10 sediment core samples will be collected from Cobleskill Creek at the locations shown on Figure 4. Sediment samples will be collected at each sediment core location at 0- to 6-inch depth and at 1-foot intervals thereafter. Each sediment sample collected from the sediment cores will be analyzed for PCBs and TOC.

NMPC understands that the location of off-site sediment and surface water samples (see Task 4) will be coordinated with a NYSDOL/NYSDEC on-site representative. NMPC also understands that additional sediment sampling may be required to further characterize the extent of PCBs in off-site sediments. Additional off-site sediment sampling will be discussed and agreed upon with NYSDOL/NYSDEC prior to initiation of additional off-site sediment sampling.

Sediment sampling will be conducted in accordance with the procedures presented in the FSP and HSP. Surface sediment samples will be analyzed for PCBs, total organic carbon, and mercury in accordance with the methods presented in the QAPP. Sediment samples collected from the 10 sediment core locations will be analyzed for PCBs and TOC following the methods presented in the QAPP. The QA/QC measures, which will be followed during the analysis of the sediment samples are included in the QAPP.

Task 4 - Surface Water Investigation

Based on the information presented in Section 1.2, together with the objectives of the Phase I RI, surface water sampling will be conducted to determine the presence, concentration, and spatial distribution of chemical constituents in the quarry pond and in the Village of Cobleskill storm water drainage system south of the quarry pond outlet channel. The surface water investigation will consist of water column sampling in the quarry pond and the collection of surface water grab samples from the Village of Cobleskill storm water drainage system south of the quarry pond outlet channel. The surface water investigation is designed to generate hydrologic and water quality data to support the following evaluations:

1. Determine the extent to which the surface water is a migration pathway for constituents associated with the site; and

2. Investigate the spatial distribution of chemical constituents in the quarry pond and chemical constituents (PCBs and mercury) the Village of Cobleskill storm water drainage system south of the quarry pond outlet channel.

The proposed surface water sampling locations in the quarry pond are shown on Figure 3. The proposed surface water sample locations south of the quarry pond outlet channel are shown on Figure 4. Surface water sampling will be conducted in accordance with the procedures presented in the FSP.

During each sampling event, dissolved oxygen, pH, temperature, and conductivity will be measured at each sample location using field instrumentation as described in the FSP.

The surface water samples from the quarry pond will be analyzed for PCBs, TCL volatile organic and semi-volatile organic compounds, TAL inorganics, and total suspended solids (TSS). Filtered and unfiltered surface water samples will be collected at each location for PCB and TAL inorganics analysis in accordance with the methods presented in the QAPP.

The surface water samples collected south of the quarry pond outlet channel will be analyzed for PCBs and mercury. Filtered and unfiltered surface water samples will be collected at each location for PCB and mercury analysis in accordance with the methods presented in the QAPP.

A storm sewer dye-testing was conducted by Blasland & Bouck on January 15, 1993 to confirm the flow route of surface water from the quarry pond outfall (via the Village of Cobleskill storm sewer system) to Cobleskill Creek, located south of the site. The dye-testing consisted of placing yellow/green fluorescent dye-test tablets into the storm sewer at the storm sewer manhole located south of the site where the treated surface water from the quarry pond was being discharged. Several manhole/catch basin locations along the expected route of flow were monitored to detect the presence of the dye. The dye was observed in the manholes/catch basins, as expected, and was eventually observed discharging to the drainage ditch on the SUNY Cobleskill campus which in turn discharges to Cobleskill Creek. The dye-testing program confirmed the route of surface water flow from the quarry pond outlet to Cobleskill Creek, as indicated on Figure 4.

A surface water level monitoring point will be installed in the quarry pond in order to compare surface water levels with ground-water levels observed in the monitoring wells. The monitoring point will be surveyed in the field and referenced to NGVD of 1929.

Task 5 - Ground-Water Investigation

Based on the discussions of previous ground-water investigation activities conducted at the site (Section 1.2), as well as the objectives of the Phase I RI, a ground-water investigation has been designed to generate hydrogeologic and water quality data to support the evaluation of the following:

1. The dynamics of the ground-water system(s) at the site (horizontal and vertical flow direction, hydraulic gradients, and ground-water velocity, as well as discharge areas);
2. The lateral and vertical extent of chemical constituents in the ground-water flow system(s) at the site; and
3. Whether the geologic characteristics of subsurface soil and bedrock (i.e., secondary permeability features such as fractures, bedding planes, and joints) are affecting the migration of chemical constituents at the site.

Data required to support these evaluations will be obtained by implementing the five subtasks presented below.

Subtask 5.1 - Evaluation of Existing Monitoring Wells

This subtask will consist of evaluating the condition of the four existing ground-water monitoring wells at the site (MW-1 through MW-4) prior to utilizing the wells as monitoring locations. Existing data on well specifications will be reviewed to determine the construction details and whether a representative ground-water sample can be collected from the existing wells. A field inspection of the existing wells will also be conducted which will consist of evaluating the following:

- Condition of the protective casing, cap, and lock;
- Condition of the surface seal surrounding the protective casing;
- Presence of depressions or standing water around the casing; and
- Presence of grout between the riser and outer protective casing and the presence of a drain hole in the protective casing.

In addition, the depth of each well will be measured to determine whether siltation of the well or bedrock collapse has occurred. If siltation has occurred, the well(s) will be redeveloped as described in the FSP. If the bedrock formation has collapsed into the well(s), an attempt will be made to remove the rock debris via drilling or hydraulic removal. If the rock debris cannot be removed, the well will be replaced. Any existing wells which appear to have compromised seals, locks, or casings may require replacement following the procedures for new well installation as described in Subtask 5.2.

Subtask 5.2 - Monitoring Well Installation

The ground-water investigation includes the installation of two hydraulically downgradient wells (monitoring wells MW-5 and MW-6), one upgradient monitoring well (monitoring well MW-7), and one monitoring well upgradient from the western-most bedrock-fissure observed in the quarry pond to supplement the existing monitoring well network at the locations shown on Figure 3. The two hydraulically downgradient wells will aid in evaluating ground-water quality in areas not previously investigated, provide information on the ground-water flow system at the site, and provide additional information on the geologic characteristics of the overburden and bedrock at the site. The upgradient well will replace existing monitoring well MW-1 as the upgradient monitoring well because MW-1 is located adjacent to a potential source area and may not yield ground water representative of upgradient ground-water conditions.

As discussed under Subtask 5.3 - Soil Boring/Bedrock Cores below, three bedrock cores will be installed at the following locations:

- One bedrock core upgradient of the northwest quarry pond rock face;
- One bedrock core upgradient of the western-most bedrock-fissure in the quarry pond; and
- One bedrock core upgradient of the northern rock face of the quarry pond.

The locations of these bedrock cores are shown on Figure 3. At a minimum, one ground-water monitoring well will be installed in the bedrock core upgradient from the northwestern bedrock-fissure. The installation of a monitoring well within the bedrock cores will be based on hydrogeologic conditions encountered at the time of coring. Based on preliminary sampling of ground-water discharging from the northwestern rock fissure, NMPC recognizes that a potential source of PCBs exists within the ground water upgradient of this rock fissure location. NMPC also understands that additional bedrock cores and monitoring wells may be required to define the source of PCBs in ground water upgradient from the rock fissure. During the Phase I RI field activities, NMPC will coordinate with NYSDOL/NYSDEC to determine the need for additional rock cores and monitoring wells, if necessary, to define the source of PCBs in ground water at this location.

Prior to monitoring well installation, soil borings will be drilled to the top of the bedrock. Soil samples will be obtained continuously via a split-spoon sampler, while bedrock core samples will be obtained using NX coring equipment. Soil and bedrock core samples will be screened using a PID. Soil samples will be visually classified for color, texture, soil classification, and moisture content. Rock cores will be visually characterized for color, rock types, fractures, and weathering. Procedures for completion of soil borings and bedrock cores; soil and bedrock sampling; and field screening are described in the FSP. One surface soil sample and one subsurface soil sample will be collected during installation of MW-7. The two soil samples will be analyzed for TAL inorganics.

The four monitoring wells will be installed in bedrock following the procedures described in the FSP. The wells will be advanced up to 10 feet into the water-bearing zone of the bedrock. Completion of the wells will be conducted in accordance with the procedures described in the FSP.

Each well will be developed after completion to remove fines from the well. Development will be performed by bailing or pumping water from the well until the turbidity is reduced to 50 Nephelometric Turbidity Units (NTUs) or less. In the event the wells cannot be developed to 50 NTUs, development will proceed until three consecutive measurements of pH, conductivity and temperature agree within 10 percent. Development water and any water produced during coring will be disposed of at an on-site location by allowing the water to infiltrate the subsurface. Soils and cuttings generated during well installation will remain at the location where the well was installed.

The locations and elevations of the ground-water monitoring wells will be surveyed using standard surveying practices and referenced to the NGVD of 1929.

Subtask 5.3 - Soil Borings/Bedrock Cores

This subtask will consist of installing two soil boring/bedrock cores (to a maximum depth of 10 feet in the bedrock) between the existing downgradient wells and installing a minimum of three bedrock cores near the quarry pond, as described above under Subtask 5.2. The purpose of these cores is to better define the geologic characteristics of the overburden and the upper bedrock zone and the cores will be installed in accordance with the procedures presented in the FSP. The locations of the soil borings/bedrock cores are shown on Figure 3. In addition, the rock cores generated during the installation of the existing monitoring wells will be reviewed.

The overburden materials will be continuously sampled using a 2-inch diameter split-spoon sampler, visually classified for color, texture, and moisture content, and screened with a PID. Bedrock samples will be obtained using NX coring equipment, and the retrieved rock cores will be characterized for color, rock type, fractures, and degree of weathering. Upon completion of coring, the temporary casing will be removed, and the core hole and overburden boring will be grouted to the surface. If, during the coring activities, saturated conditions in overburden materials that could potentially act as a ground-water migration pathway are encountered, then a well will be installed and screened to monitor the ground water present in the overburden.

The locations of the five soil borings/bedrock cores will be surveyed in the field and referenced to NGVD of 1929.

Subtask 5.4 - Hydraulic Conductivity Testing

Under this subtask, hydraulic conductivity testing will be performed at each of the eight monitoring well locations. The purpose of the in-situ hydraulic conductivity testing will be to generate data to aid in determining ground-water characteristics (i.e., ground-water velocity). Hydraulic conductivity testing will be conducted in accordance with the procedures presented in the FSP.

Subtask 5.5 - Ground-Water Sampling

This subtask will consist of the collection of ground-water samples from the eight monitoring well locations. The samples will be collected at least two weeks after completion of development of the new wells. Prior to sampling, each well will be purged of three well volumes using dedicated bailers installed in each well. The wells will be allowed to recover to approximately 90 percent of the static levels before sampling. The ground-water samples will be analyzed for PCBs, TCL volatile and semi-volatile organic compounds, and TAL inorganics using the methods outlined in the QAPP. Both filtered and unfiltered samples will be obtained and submitted for PCB and TAL inorganic analysis. Field parameters consisting of pH, conductivity, dissolved oxygen, and temperature will be measured at each well in accordance with the procedures presented in the FSP. Ground-water analyses will be performed according to the methods presented in the QAPP.

Concurrent with the sampling events, ground-water levels will also be obtained at each monitoring well. These levels will be converted into elevations using the survey data and the used to prepare a ground-water contour map for the site. The ground-water sampling will be conducted in accordance with the procedures presented in the FSP.

Task 6 - Biota Investigation

The Phase I biota investigation will consist of work necessary to satisfy the data requirements for performing the ecological risk assessment in accordance with Steps I through IIB of the NYSDEC 1991 Fish and Wildlife Impact (FWIA) guidance. The Phase I biota investigation will involve a site visit by a qualified biologist to evaluate the general ecology of the site. No biota collection or sampling will be performed as part of the Phase I RI, but may be implemented subsequently if the Phase I biota investigation and other Phase I RI activities indicate that such sampling is warranted. Biota sampling may be necessary if, for example, the Phase I data indicates the presence of bioaccumulative contaminants in sediments or surface water at levels which might be a concern with regard to accumulation by aquatic biota.

An Ecological RA will be prepared in accordance the NYSDEC 1991 guidance for conducting Fish and Wildlife Impact Analyses (FWIA) for inactive hazardous waste sites. The components of the Ecological RA section will be:

1. Site description; and
2. Contaminant-specific impact.

The contaminant-specific impact analysis will follow a step-wise approach. Whether the impact analysis proceeds through additional steps will depend upon conclusion reached in each step of the process. The initial analysis will proceed through Step II(B) - criteria-specific pathway analysis. Upon completion of Step IIB, a determination will be made as to whether additional study of potential fish and wildlife impacts is needed. If minimal impact is demonstrated using a pathway analysis, then additional study will not be necessary. If additional study is needed, further analysis will be performed in accordance with the NYSDEC 1991 FWIA guidance.

Described below are steps to be completed as part of the initial ecological RA effort (Steps I through IIB).

Site Description

The existing ecology of the site and adjacent off-site area at the M. Wallace scrapyard site will be evaluated and described in the site description. Investigative activities associated with this portion of the RA will be include a site visit by a qualified biologist to assess the general ecology of the site and adjacent areas, and data retrieval and evaluation using information resources (e.g., USGS topographic map, aerial photographs, literature sources). Components of the site description will include: (1) site map; (2) description of fish and wildlife resources; (3) value of fish and wildlife resources; and (4) identification of applicable fish and wildlife regulatory criteria.

Site Map

A topographic map that identifies areas or resources that could potentially be impacted by site-related contamination will be prepared. Specially designated areas such as regulated wetlands and critical habitats will be identified on this map. The topographic map will address areas within 2 miles of the site perimeter. The map will also show major resources downstream that may potentially be impacted by the site. A vegetative cover-type map addressing the area within one-half mile of the site perimeter will also be prepared. The cover-type map will outline major vegetative communities, including wetlands, aquatic habitats, and any areas of special concern according to agency records.

Description of Fish and Wildlife Resources

The vegetation, fish, and wildlife species which are typical of the site habitat and surrounding area will be identified. Field evidence of current or past use by various fish and wildlife species will be noted.

The use classification of area surface water bodies and wetlands will be identified. The potential for any threatened, endangered, or rare species, or species of concern (i.e., protected species) in the vicinity of the site will be noted. Alterations in fish and wildlife resources that may be related to site contamination will be discussed. Any areas that exhibit visible contamination or evidence of resource stress potentially related to site contamination will be identified.

Value of Fish and Wildlife Resources

A qualitative assessment of the value of the on-site habitat to wildlife will be provided. This assessment will address the area within one-half mile of the site perimeter in terms of general food, cover and breeding requirement for fish and wildlife species. A general assessment of the current and future potential use of fish and wildlife resources by humans will be provided. This latter evaluation will address resources located on-site, within one-half mile of the site perimeter, within 2 miles of the site perimeter and downstream of the site to the extent that site-related contaminants are judged to pose potential adverse impacts. Human use of fish and wildlife resources may, for example, include hunting, fishing, wildlife observation, and scientific studies.

Applicable Fish and Wildlife Regulatory Criteria

Criteria applicable to the remediation of fish and wildlife resource will be identified. Both contaminant-specific and site-specific criteria will be presented. Applicable criteria may consist of water quality standards/guidance values for the protection of aquatic life (6 NYCRR Part 701 and TOGS 1.1.1), sediment criteria developed by the Division of Fish and Wildlife (December 1989), or the Freshwater Wetlands Act and implementing regulations (Article 24 ECL, 6 NYCRR Part 663 and 664), among others.

Contaminant-Specific Pathway

A pathway analysis will be conducted to assess the likelihood that site-related contaminants impact fish and wildlife resources. The pathway analysis will evaluate information on fish and wildlife resources, contaminants of concern, sources of contamination, potential chemical migration pathways, and potential routes of exposure. Site impacts will be considered minimal if no significant resources or potential exposure pathways are determined to be present.

Criteria-Specific Pathway

A criteria-specific analysis (Step IIB) will be conducted. The criteria-specific analysis involves the comparison of site analytical data to relevant regulatory agency numerical criteria for the chemicals of concern associated with specific media or biota. This comparison is done to determine if the concentrations of the chemicals of concern are above relevant numerical criteria which would indicate potential impact on biota.

Task 7 - Assessment of Air Emissions

Requirements for air emissions monitoring will be identified based on an analysis of the air monitoring data which will be collected during the IRMs conducted at the site between August 1992 and April 1993. If the air monitoring data collected during implementation of the IRMs indicate that the Phase I investigation activities could result in off-site migration of air emissions containing chemical constituent present at the site, a site perimeter air monitoring plan will be prepared prior to implementation of the Phase I RI activities. Air monitoring will be conducted for particulates and volatile organic compounds in the worker breathing zone as part of the HSP.

Task 8 - Assessment of Potential Interim Remedial Measures

Following completion of the Phase I work tasks and based on a review of the data obtained during the Phase I RI, an evaluation will be made regarding the potential application of additional IRMs. If the Phase I investigation indicates that additional IRMs would be necessary, potential IRMs will be identified and evaluated based on effectiveness, feasibility, implementability, and cost. If additional IRMs are necessary, a scope of work will be developed and presented with the Phase I RI report. The scope of work will define the following:

1. The specific IRMs to be implemented;
2. A schedule for implementation (including design and construction); and
3. The necessary permits and approvals (if any).

Task 9 - Phase I Remedial Investigation Report

The Phase I RI Report will include the results of the soil, sediment, surface water, and ground-water investigations conducted at the site. The Phase I RI Report will also present an assessment of the potential IRMs. The report will also include an evaluation of data collected and the identification of data gaps which need to be addressed as part of Phase II of the RI to meet the overall RI objectives.

4.0 - Phase I Project Schedule

A tentative schedule for completion of the Phase I RI work tasks as summarized in Section 3.0 of the Work Plan is presented on Figure 5. The schedule assumes that the Phase I RI Work Plan will be submitted for approval to the State Attorney General's Office and the NYSDEC on April 30, 1993.

The schedule is subject to change if approval is not received as anticipated or if unforeseen problems arise during implementation of the Work Plan. A delay in one task may also affect the schedule for subsequent tasks due to the seasonal nature of the ability to complete the surface water and sediment sampling and the inter-connection between the tasks.

TABLE 1

NIAGARA MOHAWK POWER CORPORATION
Phase I RI Work Plan
M. WALLACE AND SON, INC. SCRAPYARD

TARGET COMPOUND LIST (TCL) VOLATILE AND SEMI-VOLATILE ORGANIC PARAMETERS

Volatile Organic Compounds

Chloromethane
Bromomethane
Vinyl Chloride
Chloroethane
Methylene Chloride
Acetone
Carbon Disulfide
1,1-Dichloroethene
1,1-Dichloroethane
1,1-Dichloroethene (total)
Chloroform
1,2-Dichloroethane
2-Butanone
1,1,1-Trichloroethane
Carbon Tetrachloride
Vinyl Acetate
Bromodichloromethane
1,2-Dichloropropane
cis-1,3-Dichloropropene
Trichloroethene
Dibromochloromethane
1,1,2-Trichloroethane
Benzene
trans-1,3-Dichloropropene
Bromoform
4-Methyle-2-pentanone
2-Hexanone
Tetrachloroethene
Toluene
1,1,2,2-Tetrachloroethane
Chlorobenzene
Ethylbenzene
Styrene
Xylenes (total)

Semi-Volatile Organic Compounds

Phenol
bis(2-chloroethyle)ether
2-Chlorophenol
1,3-Dichlorobenzene
1,4-Dichlorobenzene
Benzyl alcohol
1,2-Dichlorobenzene
2-Methylphenol
bis(2-Chloroisopropyl)ether
4-Methylphenol
N-nitroso-di-n-dipropylamine
Hexachloroethane
Nitrobenzene
Isophorone
2-Nitrophenol
2,4-Dimethylphenol
Benzoic Acid
bis(2-Chloroethoxy)methane
2,4-Dichlorophenol
1,2,4-Trichlorobenzene
Naphthalene
4-Chloroaniline
Hexachlorobutadiene
4-Chloro-3-methylphenol
(para-chloro-meta-cresol)
2-Methylnaphthalene
Hexachlorocyclopentadiene
2,4,6-Trichlorophenol
2,4,5-Trichlorophenol
2-Chloronaphthalene
2-Nitroaniline
Dimethylphthalate
Acenaphthylene
2,6-Dinitrotoluene
3-Nitroaniline
Acenaphthene
2,4-Dinitrophenol
4-Nitrophenol
Dibenzofuran
2,4-Dinitrotoluene
Diethylphthalate
4-Chlorophenyl-phenyl ether
Fluorene
4,6-Dinitro-2-methylphenol
N-nitrosodiphenylamine
4-Bromophenyl-phenylether
Hexachlorobenzene
Pentachlorophenol
Phenanthrene
Anthracene
Di-n-butylphthalate
Fluoranthene
Pyrene
Butylbenzylphthalate
3,3'-Dichlorobenzidine
Benzo(a)anthracene
Chrysene
bis(2-ethylhexyl)phthalate
Di-n-octylphthalate
Benzo(b)fluoranthene
Benzo(k)fluoranthene
Benzo(a)pyrene
Indeno(1,2,3-cd)pyrene
Dibenzo(a,h)anthracene
Benzo(g,h,i)perylene

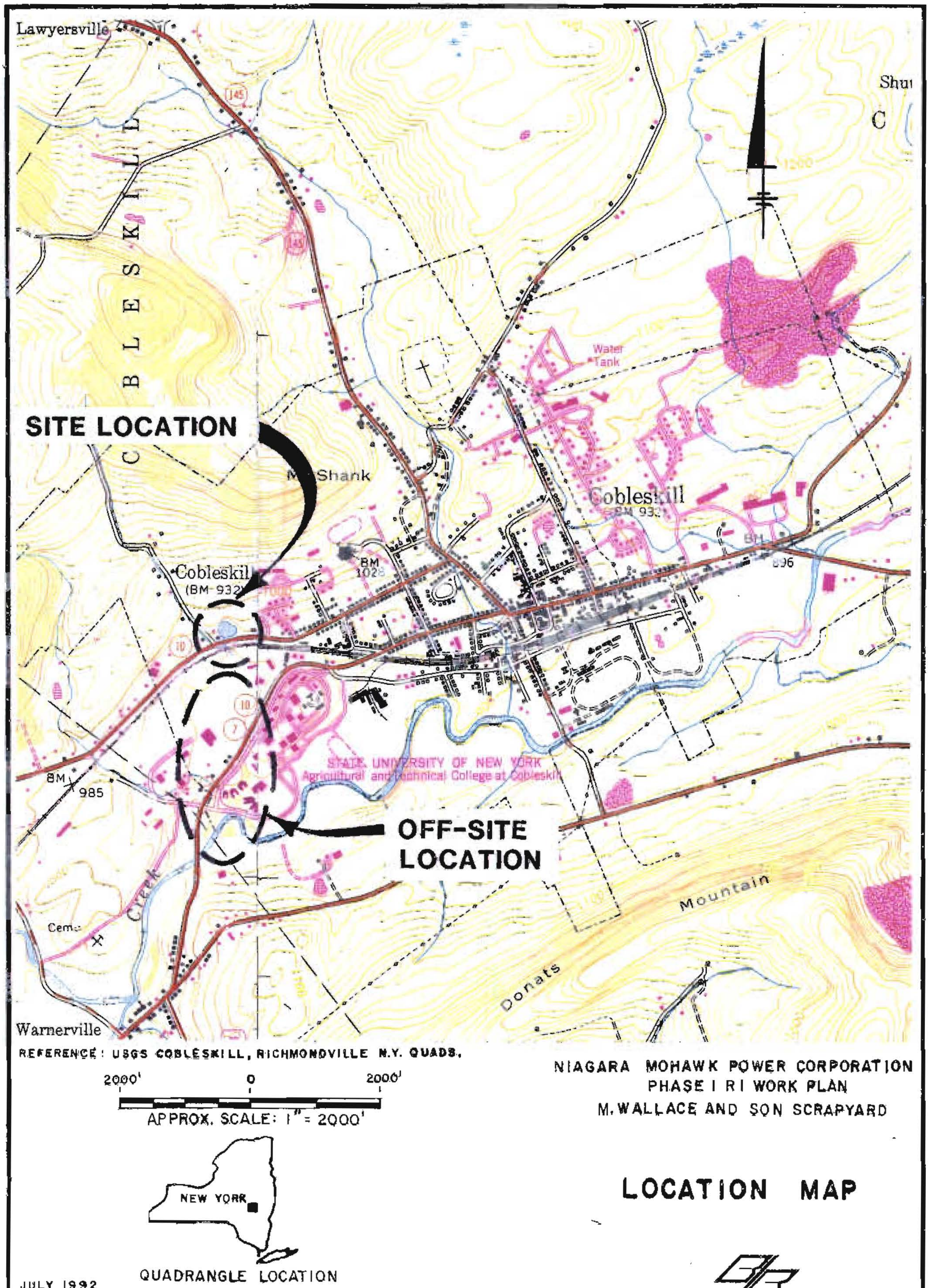
TABLE 2

NIAGARA MOHAWK POWER CORPORATION
Phase I RI Work Plan
M. WALLACE AND SON, INC. SCRAPYARD

TARGET ANALYTE LIST (TAL) INORGANIC PARAMETERS

Aluminum
Antimony
Arsenic
Barium
Beryllium
Cadmium
Calcium
Chromium
Cobalt
Copper
Iron
Lead
Magnesium
Manganese
Mercury
Nickel
Potassium
Selenium
Silver
Sodium
Thallium
Vanadium
Zinc
Cyanide

FIGURE 1

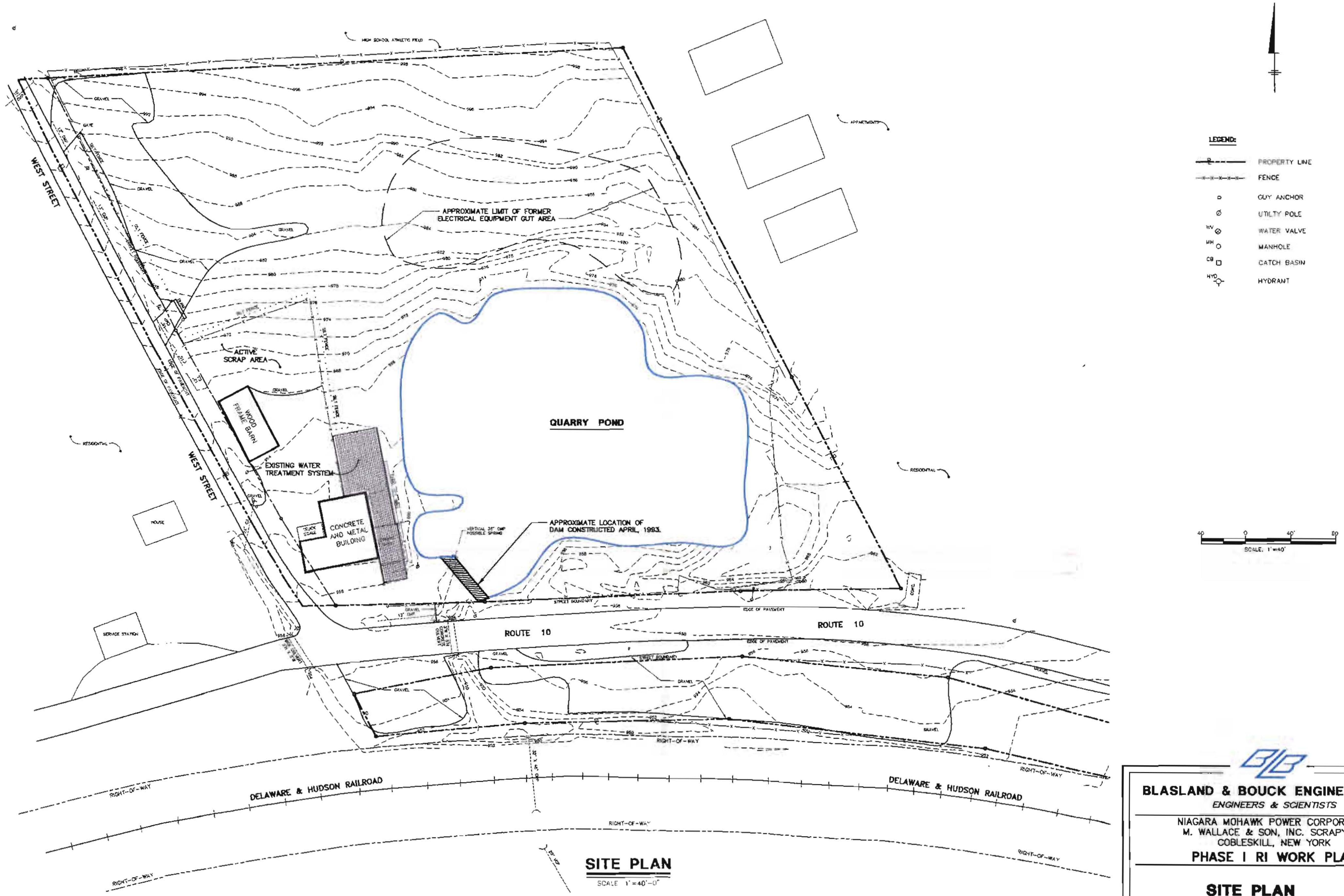


NIAGARA MOHAWK POWER CORPORATION
PHASE I RI WORK PLAN
M. WALLACE AND SON SCRAPYARD

LOCATION MAP

JULY 1992
364.17.45

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & GEOSCIENTISTS



SITE PLAN

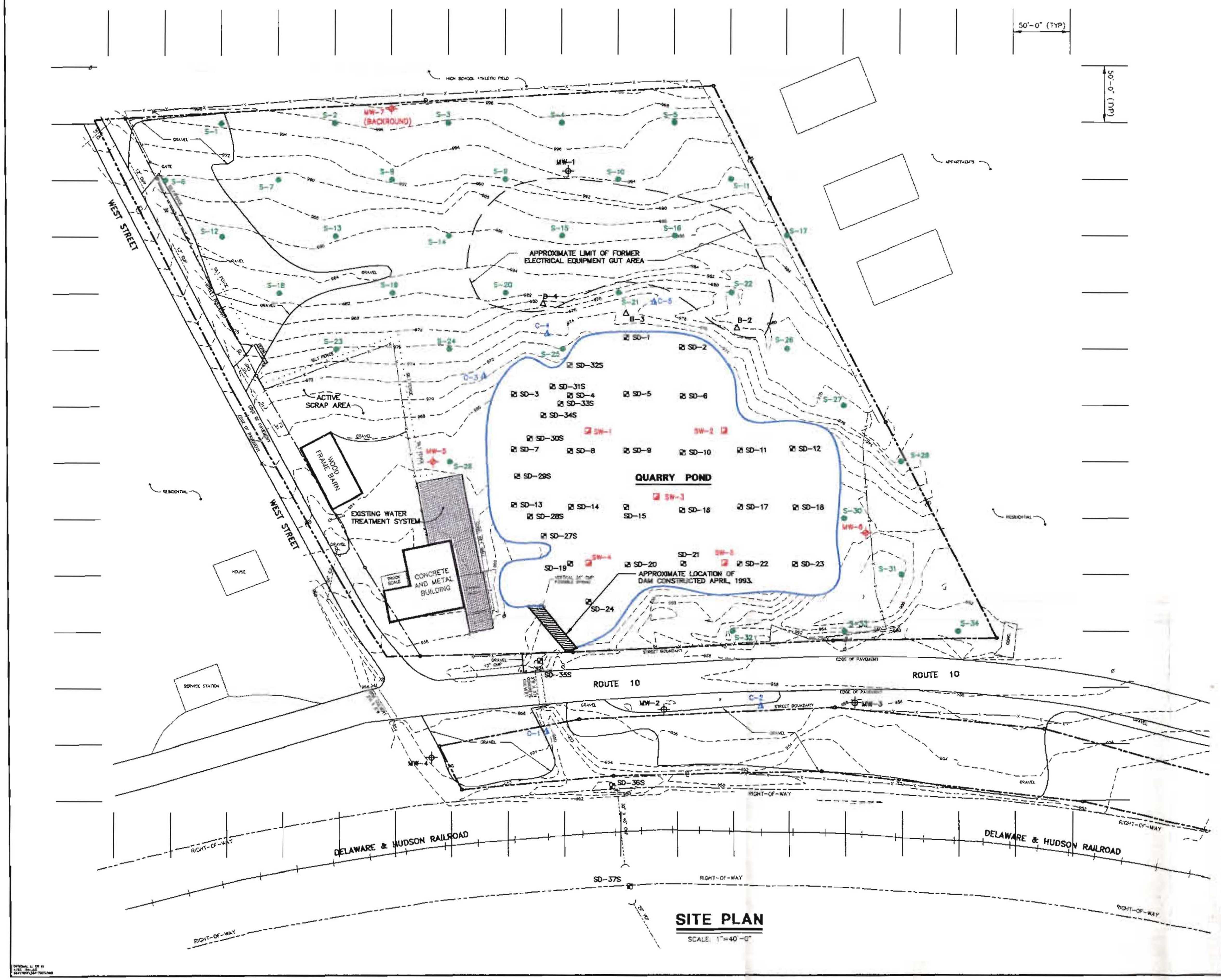
SCALE: 1"=40'-0"

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

NIAGARA MOHAWK POWER CORPORATION
M. WALLACE & SON, INC. SCRAPYARD
COBLESKILL, NEW YORK
PHASE I RI WORK PLAN

SITE PLAN

FIGURE
2



SITE PLAN

SCALE: 1"=40'-0"

LEGEND:

SW-1	PROPOSED SURFACE-WATER SAMPLE LOCATION
S-1 ●	PROPOSED SOIL SAMPLE TEST PIT LOCATION
C-1 ▲	PROPOSED ROCK CORE LOCATION
MW-5	PROPOSED GROUND-WATER MONITORING WELL LOCATION
MW-1	EXISTING GROUND-WATER MONITORING WELL LOCATION
B-2 △	EXISTING SOIL BORING LOCATION
SD-20	EXISTING SEDIMENT SAMPLE LOCATION
	PROPERTY LINE
—x—x—x—x—x—	FENCE
○	GUY ANCHOR
Ø	UTILITY POLE
WV	WATER VALVE
MH ○	MANHOLE
CB ☐	CATCH BASIN
HYD	HYDRANT

GENERAL NOTE:

1. BORING B-1 COMPLETED AT MONITORING LOCATION M-1.

40 0 40' 80'

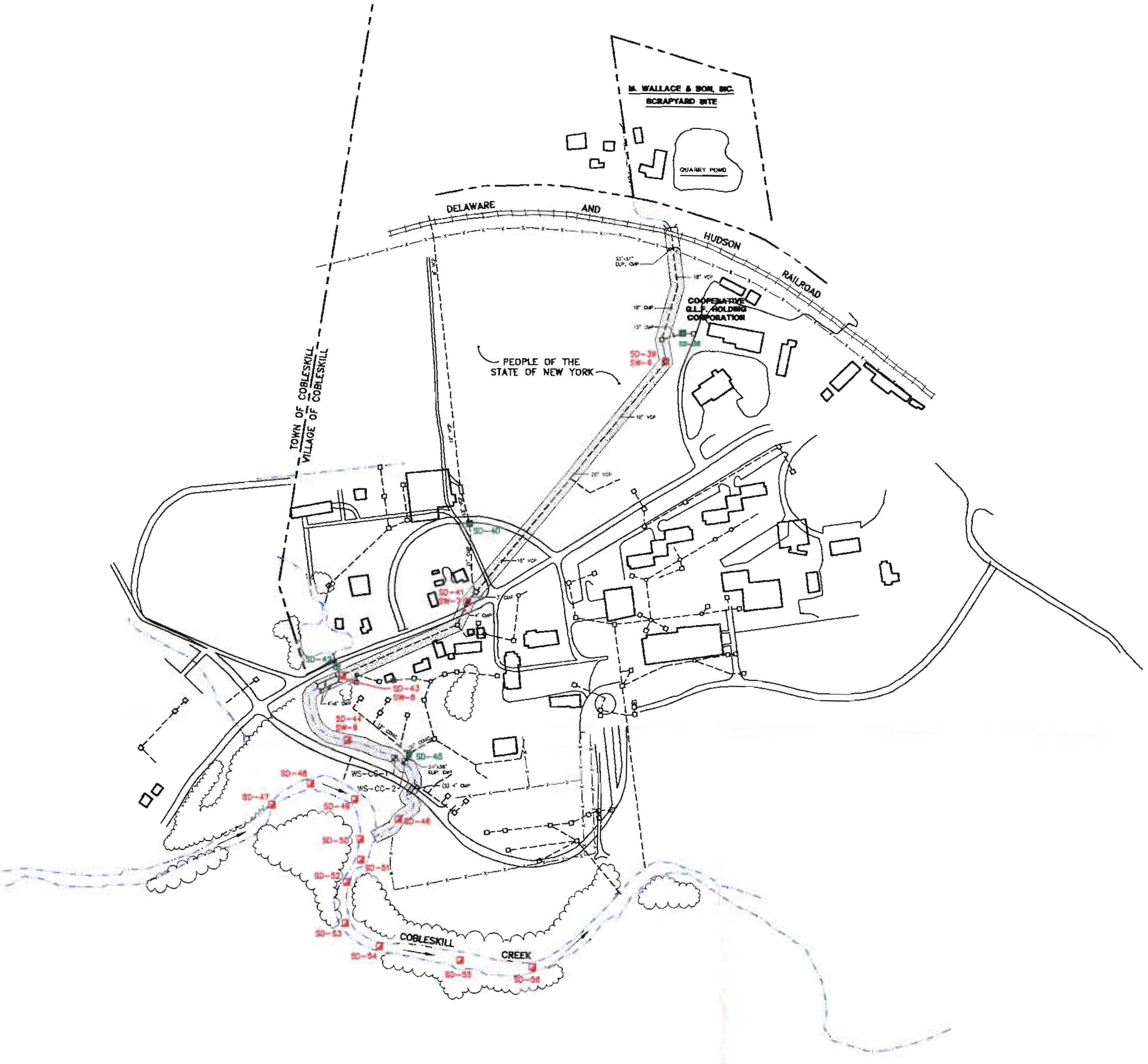
SCALE: 1"=40'

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

NIAGARA MOHAWK POWER CORPORATION
M. WALLACE & SON, INC. SCRAPYARD
COBLESKILL, NEW YORK
PHASE I RI WORK PLAN

PROPOSED ON-SITE SAMPLING LOCATIONS

FIGURE **3**



SITE PLAN

APPROXIMATE SCALE: 1"=200'-0"

LEGEND:

SD-1 SW-1 🟥	PROPOSED SEDIMENT AND SURFACE-WATER SAMPLING LOCATION FOR ANALYSIS OF PCBs AND MERCURY
SD-20 ⊞	PROPOSED SEDIMENT SAMPLING LOCATION FOR ANALYSIS OF PCBs
SD-21 ■	EXISTING SEDIMENT SAMPLING LOCATION ANALYZED FOR PCBs
▨	QUARRY POND SURFACE WATER DRAINAGE ROUTE
—P– – –—	PROPERTY LINE
– – – – – –	STORM SEWER PIPE ROUTE
– · – · –	DRAINAGE DITCH
–x–x–x–x–	FENCE
MH ○	STORM SEWER MANHOLE
CB □	STORM SEWER CATCH BASIN
⊏⊐	BUILDINGS
←——	DIRECTION OF SURFACE WATER FLOW

200' 0 200' 400'

APPROXIMATE SCALE. 1"=200'

GENERAL NOTES:

1. THIS SHEET WAS DEVELOPED FROM THE VILLAGE OF COBLESKILL, NEW YORK, STORM SEWER SYSTEM MAP. THIS SHEET HAS BEEN UPDATED UNDER HC 7525 DATED FEBRUARY 1985.

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

NIAGARA MOHAWK POWER CORPORATION
M. WALLACE & SON, INC. SCRAPYARD
COBLESKILL, NEW YORK
PHASE I RI WORK PLAN

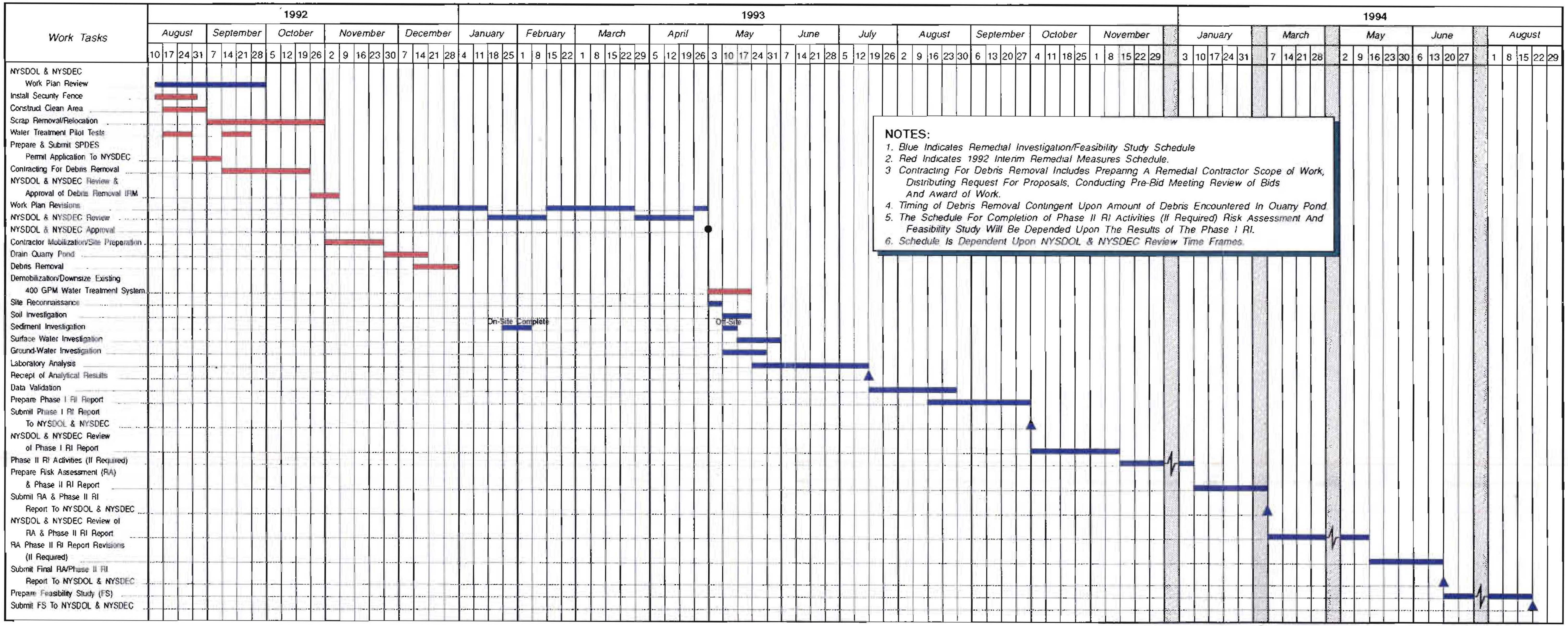
PROPOSED OFF-SITE SAMPLING LOCATIONS

FIGURE
4

NIAGARA MOHAWK POWER CORPORATION
M. WALLACE AND SON, INC. SCRAPYARD

FIGURE 5

OVERALL PROJECT SCHEDULE



NOTES:

1. Blue Indicates Remedial Investigation/Feasibility Study Schedule
2. Red Indicates 1992 Interim Remedial Measures Schedule.
3 Contracting For Debris Removal Includes Preparing A Remedial Contractor Scope of Work, Distributing Request For Proposals, Conducting Pre-Bid Meeting Review of Bids And Award of Work.
4. Timing of Debris Removal Contingent Upon Amount of Debris Encountered In Quarry Pond
5. The Schedule For Completion of Phase II RI Activities (If Required) Risk Assessment And Feasibility Study Will Be Depended Upon The Results of The Phase I RI.
6. Schedule Is Dependent Upon NYSDOL & NYSDEC Review Time Frames.

[illegible] D54-DJH
[illegible]17J01.CDR

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & GEOSCIENTISTS

Appendix B

Phase I Remedial Investigation, M. Wallace and Son, Inc. Scrapyard, Sampling and Analysis Plan, Volume I: Field Sampling Plan

PHASE I REMEDIAL INVESTIGATION
M. WALLACE AND SON, INC. SCRAPYARD

SAMPLING AND ANALYSIS PLAN
VOLUME 1: FIELD SAMPLING PLAN

Niagara Mohawk Power Corporation

Syracuse, New York

April 1993

Report

Phase I Remedial Investigation M. Wallace and Son, Inc. Scrapyard

Sampling and Analysis Plan
Volume I: Field Sampling Plan

Niagara Mohawk Power Corporation
Syracuse, New York

April 1993

BLASLAND & BOUCK ENGINEERS, P.C.
BLASLAND, BOUCK & LEE
ENGINEERS & SCIENTISTS

6723 Towpath Road
Syracuse, New York 13214
(315) 446-9120

Table of Contents

Table of Contents

TABLES

FIGURES

APPENDICES

1.0 - Introduction

1.1 General

This Field Sampling Plan (FSP) is part of the Sampling and Analysis Plan (SAP), which supports the Phase I Remedial Investigation (RI) Work Plan for the M. Wallace and Son, Inc., Scrapyard Site ("the site") in Cobleskill, New York. The site includes soil, sediment, ground water, and surface water potentially affected by past activities at the site. The FSP addresses the field procedures and sample collection methods to be used during implementation of the Phase I RI. Related documents include the Quality Assurance Project Plan (QAPP), which is Volume II of the SAP and the Phase I RI Work Plan for the site.

The QAPP sets forth the analytical measurements and procedures to be used in the Phase I RI, while this FSP (Volume I of the SAP) sets forth the Phase I RI field procedures. These two documents are integrated and cross-referenced where applicable to eliminate redundancy.

This FSP contains detailed field investigation and sampling procedures, including the identification of sampling locations, the sampling designation system, and the sample handling and documentation procedures. This document also contains pertinent information from the Phase I RI Work Plan and the QAPP, as necessary, to assist the field personnel in implementing the Phase I RI field work tasks.

1.2 Objectives of the Phase I RI

The overall objective of the M. Wallace and Son, Inc. Scrapyard Site Phase I RI is to provide data which can be used to assess the current site conditions and determine the scope of future remedial activities which may be implemented at the site. Based on the general objective, the following specific objectives have been established for the Phase I RI:

1. Determine the presence and extent of chemical constituents in environmental media (i.e., soils, sediment, surface water, and ground water) at the site.
2. Determine the presence and extent of chemical constituents (i.e., PCBs and mercury) in sediments and surface water downstream of the quarry pond outlet channel;
3. Determine whether additional Interim Remedial Measures (IRMs) are necessary to address existing conditions (i.e., buried debris) present at the site.
4. Provide data for completion of a baseline risk assessment (RA) which will evaluate potential on-site and off-site risks (if any) posed by chemical constituents identified at the site.
5. Provide data for preparation of a Feasibility Study (FS) to determine appropriate remedial actions for implementation at the site or at off-site locations.

1.3 Overview of Phase I RI Field Investigations

To obtain information necessary to meet the objectives of the Phase I RI, four field sampling investigations will be conducted. These include the following:

- Soils Investigation;
- Sediment Investigation;
- Surface Water Investigation; and
- Ground-Water Investigation.

The rationale for each field sampling investigation is provided in detail in the Phase I RI Work Plan and therefore is not included in this FSP. Environmental medium will be monitored for polychlorinated biphenyls (PCBs), Target Compound List (TCL) volatile and semi-volatile organic compounds, and Target

Analyte List (TAL) inorganics as shown on Table 1. Further detail regarding these investigations is provided in Section 2.

A location map, site map, and a proposed sampling location map have been prepared for the site to support the field investigations. The location map, included as Figure 1, shows the location of the site relative to the village of Cobleskill. The site map, included as Figure 2, shows the quarry pond, electrical gut area, and other site features. The proposed on-site sampling locations are shown on Figure 3, while the proposed off-site sampling locations are shown on Figure 4. The maps were developed using existing planimetric data available from the United State Geologic Survey (USGS), village tax maps, and aerial photographs.

2.1 General

This section presents the details associated with implementing four field sampling investigations (Soil Investigation, Sediment Investigation, Surface Water Investigation, and Ground-Water Investigation) at the site. The following information is provided for each field sampling investigation:

- Proposed sample locations, number, and type;
- Sampling and measurement procedures; and
- A summary of the data to be generated from each sampling effort, including field parameters, and analytical laboratory parameters.

Detailed sampling information is presented in table format to provide a concise synopsis for the field personnel. Detailed sample collection procedures are provided in the appendices. Information regarding the pre-investigation area reconnaissance and mapping activities is provided in the Phase I RI Work Plan.

2.2 Soils Investigation

The Soils Investigation described in the Phase I RI Work Plan consists of the following activities:

- Collection of surface soil samples; and
- Excavation of soil test pits.

Each of these soil investigation activities is discussed in detail below.

2.2.1 Collection of Surface Soil Samples

The soils investigation activities to be conducted during the Phase I RI will consist of the collection of 35 surface soil samples. The surface soil samples will be collected at alternating intersection points along a 100-foot by 100-foot sampling grid established across the site (with the exception of the paved area and active scrap storage area surrounding the site office/garage). The sampling grid was developed to investigate soils at the site and is not intended to facilitate confirmational soil sampling in previously excavated areas. The locations of the surface soil samples are shown on Figure 3.

All surface soil samples (0 to 6 inches) will be collected using a dedicated stainless steel trowel for laboratory analysis for PCBs, TCL semi-volatile organics and TAL inorganics. Procedures to be used when collecting surface soil samples are presented in Appendix A. Each surface soil sample will be segregated into laboratory sample containers and a separate container which will be used for photoionization detector (PID) screening to determine the presence and level of organic vapors and for visual characterization by the on-site engineer. QA/QC surface soil samples will also be collected as described in Section 5.0 and in the QAPP. Table 1 presents the number of surface soil samples to be collected and associated QA/QC soil sampling frequencies.

Samples will be placed into the appropriate sample containers, preserved as described in Section 4.0, and labeled as described in Section 3.0. The samples will be handled, packaged, and shipped following the procedures in Section 4.0 and Appendix L.

2.2.2 Excavation of Soil Test Pits

Soil test pits will be excavated by a subcontractor using a backhoe under the supervision of an on-site geologist at each location where surface soil samples have been collected. The soil test pits will be excavated at 2-foot depth intervals from the surface of the ground to bedrock, the ground-water table, or the limits of the backhoe reach (whichever is encountered first as determined by the supervising on-site engineer) as described in Appendix B. Decontamination of the backhoe between pit locations will be done in accordance with the procedures in Appendix M.

At each 2-foot depth interval, a sample of soil will be collected from the sidewall of the test pit using a hand auger and placed in a glass container for volatile head space screening using a PID and for visual characterization (i.e., staining, soil type, etc.) as discussed in Appendix C. During the test pit excavation activities, the on-site geologist will also examine the test pits for the potential presence of any buried equipment/source materials.

One soil sample from each test pit will be collected for laboratory analysis for PCBs and for potential laboratory analysis for TAL inorganics and TCL volatile and semi-volatile organic compounds based on the presence of visual staining, odors, or PID measurements above background levels. If no staining, odors or PID measurements above background are encountered, then several discrete samples will be collected from the 6-inch to 18-inch depth interval and composited in the field to form one sample for laboratory analysis. At the conclusion of daily test pit activities, soil samples will be selected for analysis for TCL volatile and semi-volatile organic compounds and TAL inorganics based on the results of test pit activities. The selection of subsurface soil samples for TCL/TAL analysis will be based on PID readings, visual observations, and with the objective of achieving a uniform distribution of TCL/TAL data for subsurface soils across the site. A total of 17 subsurface soil samples (from up to one-half of the test pits) will be collected and analyzed for TCL volatile and semi-volatile organic compounds and TAL inorganics.

Upon completion of each test pit, the excavation will be backfilled with the excavated soils. The backhoe bucket will then be decontaminated as described in Appendix M.

Test pits will not be excavated in areas of the site where operation of the excavation equipment would present a safety risk (i.e., close to the edge of the quarry pond).

2.3 Sediment Investigation

The Sediment Investigation described in the Phase I RI Work Plan consists of the following activities:

- Collection of surface sediment samples for the storm water drainage system downstream of the quarry pond outlet channel;
- Sediment probing in Cobleskill Creek; and
- Collection of sediment core samples in Cobleskill Creek.

A description of the field procedures to be followed during the sediment investigation is presented below.

2.3.1 Storm Water Drainage System Surface Sediment Sampling

As described in the Phase I RI Work Plan, 9 surface sediment samples will be collected for PCBs and total organic carbon (TOC) analysis and 4 surface sediment samples will be collected for mercury analysis from locations within the storm water drainage system downstream of the quarry pond outlet channel at the locations shown on Figure 4. These sediment samples will be collected in accordance with the Appendix D protocols.

2.3.2 Cobleskill Creek Sediment Probing

Field probing of the sediments in Cobleskill Creek will be performed at the 10 locations indicated on Figure 3. The field probing will be performed as described in Appendix D and will include the installation of guide ropes across the creek water surface to assist sampling personnel in locating the sediment probing, coring, and sampling locations. The work will be performed by floating in a boat and physically probing with a metal rod to determine sediment depths at each sample location. Sediment locations and depths will be noted in a field book.

2.3.3 Collection of Sediment Core Samples

Based on the results of the sediment depth probing activities described above, 10 sediment sample locations will be chosen for sediment core sampling. Sediment core samples at these locations will be collected using the protocols described in Appendix E. Core samples will be collected until refusal is reached using reasonable human force. At each of the 10 core locations, sediment samples will be collected from the 0- to 6-inch depth interval and at 1-foot depth intervals thereafter. The sediment samples will be submitted for laboratory analysis for PCBs and TOC analysis. The field sampling crew will also visually examine each core to determine the presence and depth of sediment lenses, layering of varying sediment types, percent recovery, sediment water interface, color, texture, and odor. Visual observations of the sediment and the sediment core depths will be recorded in a field notebook. QA/QC samples will also be collected as described in Section 5.0 of the QAPP, and at the frequencies set forth on Table 1.

Sediment samples collected during the sediment investigation will be placed into appropriate containers, preserved as described in Section 4.0, and labeled as described in Section 3.0. Sediment samples will be handled, packaged, and shipped following the procedures in Section 4.0 and Appendix L.

2.4 Surface Water Investigation

The Surface Water Investigation will consist of collecting depth-integrated water samples from the quarry pond and the collection of surface water samples from the storm water drainage system downstream of the quarry pond outlet channel.

Details of the surface water investigation are described below.

2.4.1 Collection of Quarry Pond Surface Water Samples

Surface water samples will be collected from the quarry pond at five locations as shown on Figure 3. Each sampling location will be determined in the field using the guidelines as referenced and will be accessed using a boat. At each of the five locations, surface water samples will be collected using the protocol in Appendix F for laboratory analysis for PCBs, TCL volatile organic and semi-volatile organic compounds, TAL inorganics, and total suspended solids (TSS). Both a filtered and unfiltered surface water sample will be collected at each location for PCBs and TAL inorganic analysis as described in Appendix F. Samples collected for organic analysis and TSS will be unfiltered. QA/QC samples will be collected as described in Section 5.0 of the FSP, the QAPP, and at the frequencies set forth in Table 1.

At each surface water sample location, field measurements consisting of temperature, pH, dissolved oxygen, and conductivity will be taken and documented using the procedures described in Appendix G.

2.4.2 Collection of Storm Water Drainage System Surface Water Samples

Surface water samples will be collected at 4 locations within the Village of Cobleskill storm water drainage system as shown on Figure 4. Procedures for collecting surface water samples from the channel are described in Appendix F.

The 4 surface water samples will be collected for PCBs and mercury analysis. Both filtered and unfiltered samples will be collected for PCBs and mercury analysis. QA/QC samples may also be collected as described in Section 5.0 of this FSP, the QAPP, and as set forth on Table 1.

The surface water samples described in this section will be placed into appropriate sample containers, preserved as described in Section 4.0, and labeled as described in Section 3.0. Surface water samples will be handled, packaged, and shipped following the procedures in Section 4.0 and Appendix L.

2.5 Ground-Water Investigation

The Ground-Water Investigation will consist of the following activities:

- Evaluation of existing monitoring wells;
- Ground-water monitoring well installation;
- Collection of soil/bedrock cores;
- Hydraulic conductivity testing; and
- Ground-water sampling.

Each of these ground-water investigation activities are described below.

2.5.1 Evaluation of Existing Monitoring Wells

Existing site monitoring wells will be evaluated as described in the Phase I RI Work Plan. If the evaluation concludes that new wells are required, then these wells will be installed in accordance with the procedures for overburden or bedrock wells (if applicable) presented in Appendix I.

2.5.2 Ground-Water Monitoring Well Installation

As described in the Work Plan, 4 new wells will be installed at the site. The new wells will be installed in the first water-bearing zone in the subsurface bedrock. Each well will be developed after completion to remove fines from the well. Development will be performed by bailing or pumping water from the well until the turbidity is reduced to 50 Nephelometric Turbidity Units (NTUs) or less. In the event the wells cannot be developed to 50 NTUs, development will proceed either by bailing or slow pumping until three consecutive measurements of pH, conductivity and temperature agree within 10 percent. Well development procedures are presented in detail in Appendix I. Development water and any water produced during coring will be disposed of at an on-site location by allowing the water to infiltrate the subsurface. Soils and cuttings will be disposed of on-site at each new well location.

The well locations and relative elevations will be determined by a licensed surveyor. Locations and elevations will be obtained to the nearest hundredth of a foot using standard surveying practices and referenced to the NGVD of 1929. The casings will be marked to provide a consistent measuring point for ground-water level measurement.

2.5.3 Collection of Soil/Bedrock Cores

Soil/bedrock cores will be installed at 5 locations at the site as described in the Phase I RI Work Plan. General procedures for the core installations are described below.

The overburden will be penetrated using 4¼-inch I.D. hollow-stem augers, and the overburden soils will be continuously sampled using 2-inch diameter split-spoon samplers. The overburden materials will be characterized for color, texture, and moisture content. Once bedrock is reached (determined by split-spoon refusal), a temporary 4-inch outside diameter PVC casing will be set on the rock and sealed with bentonite. The purpose of the temporary casing is to eliminate the movement of potentially impacted overburden soils into the bedrock. The bedrock will then be cored using NX coring equipment, and the retrieved rock cores will be characterized for color, rock type, fractures, and degree of weathering. Upon completion of coring, the core hole will be grouted, the temporary casing will be removed, and the borehole will be grouted to the surface. During the installation of the soil borings, if saturated soils that could potentially act as a ground-water migration pathway are encountered (e.g., sand and gravel strata), then a well will be installed and screened to monitor the ground water present in the overburden. The wells will be installed in accordance with the overburden well installation procedures in Appendix I.

2.5.4 Hydraulic Conductivity Testing

As described in the Phase I RI Work Plan, in-situ hydraulic conductivity testing will be performed at each of the seven monitoring well locations to aid in determining ground-water flow patterns and gradients. The in-situ hydraulic conductivity tests will be performed following the packer test procedures presented in Appendix N.

2.5.5 Ground-Water Sampling

One round of ground-water samples will be collected from the 8 monitoring wells (more if additional wells are installed) at least two weeks after completion of the well development procedures. Disposable bailers will be used to purge and sample the monitoring wells using the procedures presented in Appendix K. During the ground-water sampling activities, ground-water levels will also be measured at each well from a reference point at the top of the inner casing (or outer casing if no inner casing is present) using the procedures in Appendix J. During the sampling activities, field measurements including pH, conductivity, dissolved oxygen, and temperature will be measured and recorded as described in Appendix G.

Ground-water samples will be collected at each monitoring well for laboratory analysis for PCB, TCL volatile and semi-volatile organic compounds, and TAL inorganics. Both filtered and unfiltered ground-water samples will be collected from each well for PCB and TAL inorganic analysis.

Ground-water samples will be placed into appropriate sample containers as described in Section 4.0 and sample containers will be labeled as described in Section 3.0. Ground-water samples will be handled, packaged, and shipped following the procedures in Section 4.0 and Appendix L.

3.0 - Sample Designation System

3.1 Sample Codes

A six-digit sample designation code coupled with the sample date will provide each sample with a unique "name". This alpha numeric system will apply to all ground-water, surface water, and soil and sediment samples collected during implementation of the Phase I RI for the site, which are to be transmitted to the analytical laboratory. The six-digit designation code system includes a two digit letter prefix describing the sample matrix, a three digit number indicating the sample location, and a one digit letter suffix depicting the sample type. The letter prefix indicating the sample matrix will be taken from the following list:

Ground water - "GW"
Surface water - "SW"
Sediment - "SD"
Surface Soil - "SS"
Subsurface Soil - "TP"

The three digit sample location number will be assigned by the field sampling personnel prior to each sampling event. The one digit letter suffix, which designates the sample type, will be taken from the following list:

Discrete sample - "S"
Rinse blank - "R"
Trip blank - "T"
Distilled water - "W"

The suffix "D" will be added to the location number to indicate a duplicate sample. Additional sample volumes collected for matrix spike and matrix spike duplicate analysis will be noted on the chain-of-custody forms but the associated additional sample containers will be labeled as described above.

4.0 - Sample Handling and Documentation

4.1 Sample Containers and Preservation

Appropriate sample containers, preservation methods, and laboratory holding times for ground-water, soil, surface water, and sediment samples are shown in Table 2.

The analytical laboratories will supply appropriate sample containers in sealed cartons, as well as sample labels and preservatives. The field personnel will be responsible for properly labeling containers and preserving samples (as appropriate). Sample labeling procedures are described in Appendix L.

4.2 Packing, Handling, and Shipping Requirements

Sample custody seals and packing materials for filled sample containers will also be provided by the analytical laboratories. The filled, labeled, and sealed containers will be placed in a cooler on ice and carefully packed to eliminate the possibility of container breakage. Trip blanks of analyte-free water will be provided by the laboratory and included in each cooler containing ground-water and surface water samples to be analyzed for volatile organic constituents.

All samples will be packaged by the field personnel and transported as low-concentration environmental samples. The packaged samples will be either shipped via express overnight carrier (Federal Express or Courier) or hand delivered by sampling personnel to the laboratory within 24 to 48 hours of sample collection. General procedures for packing, handling, and shipping environmental samples are included in Appendix L.

4.3 Documentation

Field personnel will provide comprehensive documentation covering all aspects of field sampling, field analysis, and chain-of-custody. This documentation constitutes a record which allows reconstruction of all field events to aid in the data review and interpretation process. All documents, records, and information relating to the performance of the field work will be retained in a project file at the Blasland & Bouck office in Syracuse, New York.

The various forms of documentation which will be maintained throughout the Phase I RI are briefly outlined below.

4.3.1 Daily Production Documentation

Each field crew will maintain a field notebook consisting of a waterproof, bound notebook which will contain a record of all activities performed at the site. The specific measurements from field testing and sampling will be recorded in the field notebook or on separate documentation forms. At the time of sampling, detailed notes of the exact site of sampling will be recorded in the field notebook.

4.3.2 Sampling Information

During surface water, soil, and sediment sampling, detailed notes will be made as to the exact site of sampling, physical observations, sample depths, and weather conditions. These notes will be recorded in the field notebook. Field measurements of temperature, pH, conductivity, and dissolved oxygen for surface water sampling will be recorded in the field notebook.

Ground-water sampling field logs (included in Appendix K) will be filled out during each sampling event and will contain sample location, data on water levels, well depths, physical observations of the water, and field measurements (temperature, pH, dissolved oxygen, and conductivity). Water level readings will be measured to surveyed reference points, i.e., the top of inner casing (TI), where present, or the top of outer casing (TO) and will be documented in the field notebook and on the water level form in Appendix J.

4.3.3 Sample Chain-of-Custody

Persons will have custody of samples when the samples are in their physical possession, in their view after being in their possession, or in their physical possession and secured so they cannot be tampered with. In addition, when samples are secured in a restricted area accessible only to authorized personnel, they will be deemed to be in the custody of such authorized personnel.

Chain-of-custody forms will provide the record of responsibility for sample collection, transport, and submittal to the laboratory. Chain-of-custody forms are provided in Appendix L. The forms will be filled out at each sampling site, at a group of sampling sites, or at the end of each day of sampling by one of the field personnel designated to be responsible for sample custody. In the event that the samples are relinquished by the designated sampling person to other sampling or field personnel, the chain-of-custody form will be signed and dated by the appropriate personnel to document the sample transfer. The original chain-of-custody form will accompany the samples to the laboratory and copies will be forwarded to the Blasland & Bouck Quality Assurance Officer.

4.3.4 Field Equipment, Calibration, and Maintenance Logs

To document the calibration and maintenance of field instrumentation, calibration and maintenance logs will be maintained for each piece of field equipment. Calibration procedures and calibration and maintenance logs are provided in Appendix G.

4.4 Management of Investigation-Derived Materials and Wastes

The handling of investigation-derived materials and wastes is discussed below.

4.4.1 Excess Ground Water, Surface Water, Soil, and Sediment

Purged ground water from the monitoring wells will be disposed on the ground adjacent to the well from which it was extracted. Any excess surface water, soil, and/or sediment not submitted for laboratory analysis will be placed back into the media from which they were obtained.

4.4.2 Disposable Equipment and Debris

Disposable equipment and debris such as health and safety equipment, plastic sheeting, sampling equipment, and other equipment and/or sampling debris not reused in the investigation will be collected in plastic bags during the sampling events and then placed into appropriately labeled 55-gallon containers which will be stored adjacent to the office/garage. At the end of the Phase I RI, the contents will be disposed of in accordance with applicable rules and regulations by Niagara Mohawk Power Corporation (NMPC).

4.4.3 Decontamination Rinsate

Decontamination rinsate (e.g., tap and distilled water containing small amount of hexane) will be containerized at each sampling location or group of locations. Upon completion of the field activities, the rinsate will be placed in an appropriately labeled 55-gallon container to be stored adjacent to the office/garage. At the end of field activities, the drum contents will be characterized for disposal by NMPC and disposed of in accordance with applicable rules and regulations.

5.0 - Quality Assurance/Quality Control

This section summarizes the Quality Assurance/Quality Control (QA/QC) requirements for all field investigation activities associated with the Phase I RI at the M. Wallace and Son, Inc. Scrapyard site.

5.1 Field Instrument Calibration and Preventative Maintenance

Field personnel are responsible for assuring that a master calibration/ maintenance log will be maintained following procedures specified in Appendix G for each measuring device. Each log will include at a minimum where applicable:

- Name of device and/or instrument calibrated;
- Device/instrument serial/I.D. number;
- Frequency of calibration;
- Date(s) of calibration(s);
- Results of calibration(s);
- Name of person(s) performing calibration(s);
- Identification of calibration gas (HNU, OVA and Photovac); and
- Buffer solutions (pH meter only).

Equipment to be used each day shall be calibrated prior to the commencement of the days activities or as suggested by the manufacturer.

Health and safety monitoring equipment and water quality testing equipment (pH, conductivity, dissolved oxygen, and temperature meters) will be calibrated and maintained in general accordance to manufacturer manual specifications.

5.2 QA/QC Sample Collection

An estimate of QA/QC field samples to be collected is provided in Table 1. This estimate is based on the QA/QC sample collection frequency as discussed in the QAPP. Guidance on the collection of the QA/QC samples is presented below.

Trip Blanks

On events/days of aqueous volatile sampling, a trip blank is to be collected. A trip blank is an aliquot of deionized, demonstrated analyte-free water which is sealed in 40-millimeter (ml) glass vials with teflon lined septum caps prior to initiation of field work. This blank is applied in sample validation to determine if any cross contamination has occurred between samples during shipment. These sealed bottles will be prepared by the environmental laboratory (Aquatec, Inc.) and included with each shipment of sample bottles for aqueous media to and from the lab site.

Rinse Blanks

Rinse blanks will be prepared by pouring demonstrated analyte free water over decontaminated sampling equipment as a check that the decontamination procedure has been adequately performed and that cross contamination of samples will not occur due to the equipment. One rinse blank will be collected for each type of equipment used each day as decontamination event occurs. Rinse blanks will be performed on sampling equipment, and other equipment such as bowls or pans used to homogenize samples as well as any filtration devices. The same aliquot of rinse water may be used on all equipment coming in contact with a particular matrix for analysis of semi-volatile organics, PCBs and inorganics. A separate rinse blank must be collected for each piece of equipment used for a particular sample matrix to be analyzed for volatile organics. Rinse blanks will be collected at the beginning of the day before the sampling event and must accompany the samples collected that day.

Rinse blanks will be prepared in the field. Laboratory supplied analyte-free water will be poured into or over the sampling equipment and then directly into the laboratory supplied sample bottles. The intent is for the water making up the blank to follow the same path, and therefore, come in contact with the same equipment as the samples.

Potable Water/Distilled Water Samples

One sample each will be collected for PCBs, TCL, volatile and semi-volatile organic compounds, and TAL inorganics analysis from the potable water, used during test pit/drilling activities and the distilled water used to clean equipment. Such samples will be transferred directly into sample jars from the containers used for drilling water and distilled water. These samples will be collected to ensure that contaminants have not been introduced into the samples from drilling water and distilled water.

Duplicate Samples

Duplicate samples will be sent for laboratory analysis to evaluate the reproducibility of the sampling technique used. Five percent (i.e., one for every 20 samples) of each matrix and at each location will be duplicated.

Duplicate samples will be collected using methods to maximize the compatibility of the samples. For example, ground water contained in a bailer retrieved from a monitoring well will be divided between the sample and duplicate sample laboratory containers.

Matrix Spike/Matrix Spike Duplicate

Triple sample volumes from designated sample locations will be collected for each matrix in order to perform matrix spike/matrix spike duplicate analysis. Table 1 sets forth the frequency of collection for matrix spike/matrix spike duplicates.

5.3 QA/QC Field Audits

Quality assurance and quality control during the sampling program will be performed by the Blasland & Bouck Quality Assurance Officer, as discussed in the QAPP. The Quality Assurance Officer will accompany sampling personnel into the field for one or two days to verify that sampling is being correctly implemented according to the FSP. All findings will be documented to the Environmental Media Investigation Task Manager.

5.4 Field Changes and Corrective Action

Any changes in the program to accommodate site-specific needs or unforeseen events will be documented on a Field Change Request Form (FCR) which is signed by the initiator, the Investigation Task Manger. The FCRs for each change shall be numbered sequentially starting with the Number "1."

The Environmental Media Investigation Task Manager is responsible for the control, tracking and implementation of the identified changes. Completed FCRs will be distributed to affected parties.

TABLE 1

ENVIRONMENTAL AND QUALITY CONTROL ANALYSES

Environmental Sample Matrix/ Laboratory Parameters	Est. Environmental Sample Quantity	Field QC Analyses							Laboratory QC Analyses								Est. Overall Total
		Trip Blank		Field Duplicate		Rinse Blank		Est. Matrix Total	MS		MSD		SB		Lab Duplicate		
		Freq	No.	Freq	No.	Freq.	No.		Freq.	No.	Freq.	No.	Freq.	No.	Freq.	No.	
Soil Samples																	
Total PCBs	70^1	--	--	1/20	4	1/20	4	78	1/20	4	1/20	4	1/20	4	--	--	90
TCL Volatile Organics	17	--	--	1/20	1	1/20	1	79	1/20	1	1/20	1	1/20	1	--	--	22
TCL Semi-Volatile Organics	52	--	--	1/20	3	1/20	3	58	1/20	3	1/20	3	1/20	3	--	--	67
TAL Inorganics	54^2	--	--	1/20	3	1/20	3	60	1/20	3	--	--	1/20	3	1/20	3	69
Off-Site Sediment Samples																	
Total PCBs	29^3	--	--	1/20	2	1/20	2	33	1/20	2	1/20	2	--	2	--	--	39
TAL Mercury	4	--	--	1/20	1	1/20	1	6	1/20	--	1/20	1	1/20	1	1/20	1	9
Total Organic Carbon	29^3	--	--	1/20	2	--	--	31	--	--	--	--	--	--	--	--	31
Surface Water Samples																	
Total PCBs - Filtered	9	--	--	1/20	1	1/20	1	11	1/20	1	1/20	1	1/20	1	--	--	14
Total PCBs - Unfiltered	9	--	--	1/20	1	1/20	1	11	1/20	1	1/20	1	1/20	1	--	--	14
TCL Volatile Organics	5	1/day[4]	1	1/20	1	1/20	1	8	1/20	1	1/20	1	1/20	1	--	--	11
TCL Semi-Volatile Organics	5	--	--	1/20	1	1/20	1	7	1/20	1	1/20	1	1/20	1	--	--	10
TAL Inorganics - Filtered	5	--	--	1/20	1	1/20	1	7	1/20	1	--	--	1/20	1	1/20	1	10
TAL Inorganics - Unfiltered	5	--	--	1/20	1	1/20	1	7	1/20	1	--	--	1/20	1	1/20	1	10
TAL Mercury - Filtered	4	--	--	1/20	1	1/20	1	6	1/20	1	--	--	1/20	1	1/20	1	9
TAL Mercury - Unfiltered	4	--	--	1/20	1	1/20	1	6	1/20	1	--	--	1/20	1	1/20	1	9
Total Suspended Solids	5	--	--	1/20	1	--	--	6	--	--	--	--	--	--	--	--	6
Ground-Water Samples																	
Total PCBs - Filtered	8	--	--	1/20	1	--	--	9	1/20	1	1/20	1	1/20	1	--	--	12
Total PCBs - Unfiltered	8	--	--	1/20	1	--	--	9	1/20	1	1/20	1	1/20	1	--	--	12
TCL Volatile Organics	8	1/day[3]	2	1/20	1	--	--	11	1/20	1	1/20	1	1/20	1	--	--	14
TCL Semi-Volatile Organics	8	--	--	1/20	1	--	--	9	1/20	1	1/20	1	1/20	1	--	--	12
TAL Inorganics - Filtered	8	--	--	1/20	1	--	--	9	1/20	1	--	--	1/20	1	1/20	1	12
TAL Inorganics - Unfiltered	8	--	--	1/20	1	--	--	9	1/20	1	--	--	1/20	1	1/20	1	12

TABLE 1

ENVIRONMENTAL AND QUALITY CONTROL ANALYSES

Notes:

1. Includes surface and subsurface soil samples for PCB analysis.
2. Quantity includes two background soil samples from MW-7 installation for TAL inorganic analysis. Additional samples may require additional QC analyses based on additional sample quantity compared to QC sample frequencies shown on table.
3. Quantity assumes that a total of nine samples for analysis for PCBs will be collected from the 10 sediment core samples (20 total samples) from Cobleskill Creek.
4. 1/day = One trip blank per day of volatile organic sampling of aqueous media. One rinse blank per day of sampling with sampling device which requires field cleaning.
5. MS = Matrix spike
6. MSD = Matrix spike duplicate
7. SB = spike blank
8. PCBs = Polychlorinated biphenyls
9. Field Dup = field duplicate
10. Lab Dup = laboratory duplicate
11. TCL = Target Compound List per NYSDEC 1991 ASP.
12. TAL = Target Analyte List per NYSDEC 1991 ASP.
13. One sample of tap water used for ground-water well installations/rock cores will be collected for analysis for total PCBs, TCL volatile organics, TCL semi-volatile organics, and TAL inorganics (not shown on Table 1).
14. Table assumes that samples will be processed in groups of 20 samples for QC analyses. If smaller sample groups are processed, then one MS/MSD (or MS/lab dup) per sample delivery group (up to 20 samples) will be prepared for each sample delivery group.

TABLE 2

SAMPLE CONTAINERS, PRESERVATION, AND HOLDING TIMES

Water Samples*					
Parameter	Reference	Sample Container	Sample Volume	Preservation	Maximum Holding Time from Collection
Volatile Organics	ASP[1], Organics	two 40-ml glass vials with teflon-lined septum cap	80-ml	no head space, 4 drops concentrated HCl, cool 4°C	10 days[2] - VTSR
Semi-Volatile Organics	ASP[1], Organics	four liter amber glass with telfon-lined cap	4 liters	cool 4°C	extract within 5 days, VTSR, analyze within 40 days following the start of extraction
PCBs	SW-846, Method 8080, as referenced in ASP	One 2 liter amber glass with teflon-lined cap	2 liters	cool, 4°C	extract within 5 days, VTSR, analyze within 40 days following the start of extraction
Inorganics*	ASP[1], Inorganics	One 1 liter plastic	1 liter	HNO_3	180 days (26 days for Mercury), VTSR
Cyanide	ASP[1] inorganics	One 1 liter glass	1 liter	NAOH	12 days, VTSR
TSS	Method 160.1, as referenced in ASP	polyethylene or glass	500 ml	cool, 4°C	5 days, VTSR
pH	Method 150.1	plastic or glass	25 ml	None required	Analyze immediately

Notes:

1. ASP = NYSDEC 1991 ASP.
2. 7 days if not properly preserved.
3. * = filtered surface water and ground-water samples to be analyzed for inorganics and PCBs will be field filtered prior to the addition of preservatives, all other water samples will not be filtered.
4. VTSR = Verifiable Time of Sample Receipt.

TABLE 2 (Cont'd)

M. WALLACE AND SON, INC. SCRAPYARD SITE

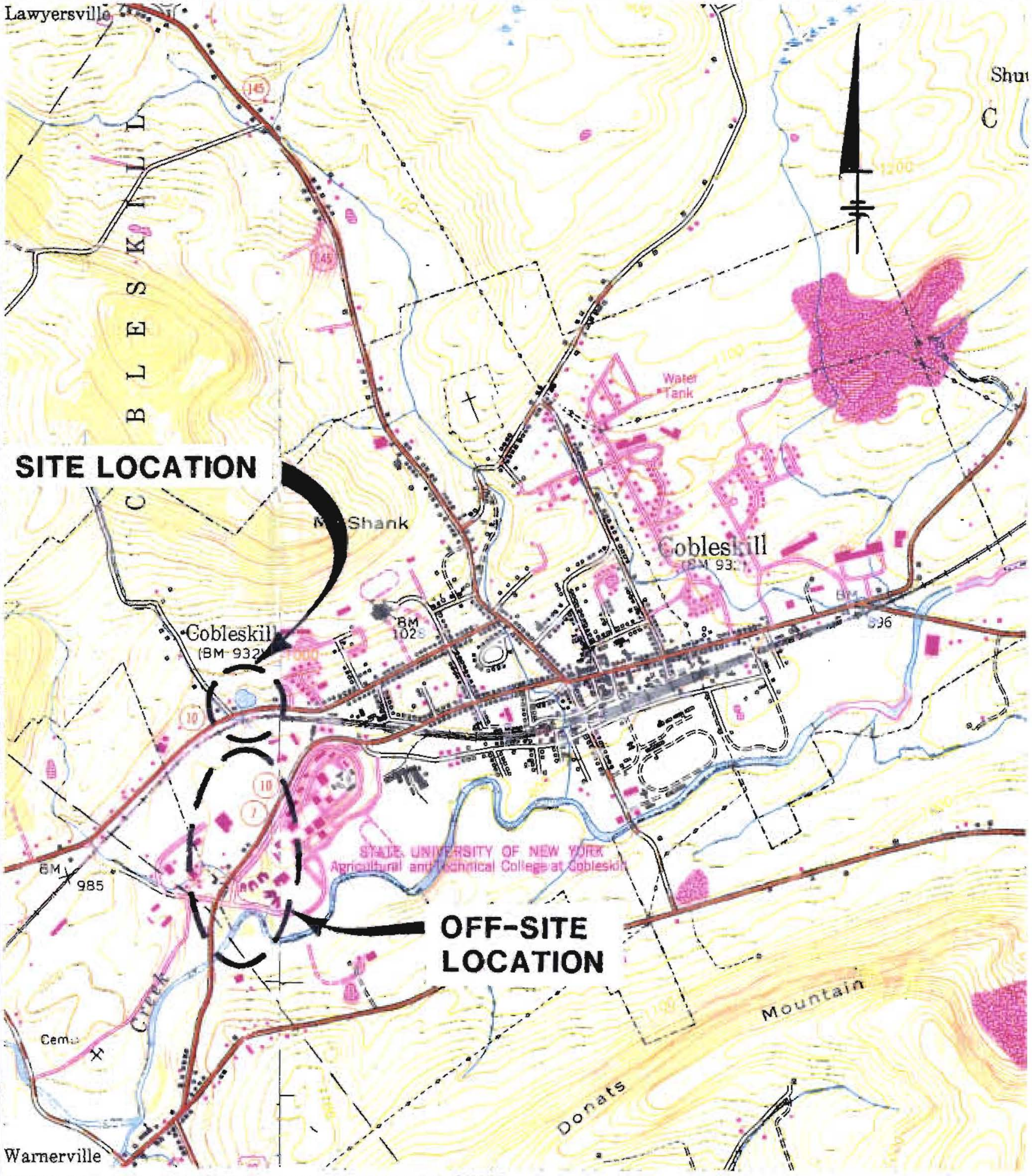
SAMPLE CONTAINERS, PRESERVATION, AND HOLDING TIMES

Soil and Sediment					
Parameter	Reference	Sample Container	Sample Volume	Preservation	Maximum Holding Time from Collection
Volatile Organics	ASP[1], Organics	two 125 ml widemouth glass vial, caps lined with teflon	250 ml	minimize head space, cool 4°C	7 days, VTSR
Semi-Volatile Organics	ASP[1], Organics	one 250 ml widemouth glass, caps lined with teflon	250 ml	cool, 4°C	extract within 5 days, VTSR, analyze within 40 days following start of extraction
PCBs	SW-846 Method 8080, as referenced in ASP	One 250 ml widemouth amber glass, caps lined with teflon	250 ml	cool, 4°C	extract within 5 days, VTSR, analyze within 40 days following start of extraction
Inorganics	ASP[1], Inorganics	One 16 ounce widemouth glass	16 oz.	cool, 4°C	180 days (26 days for Mercury), VTSR
Cyanide	ASP[1] Inorganics	One 16 oz. widemouth glass	16 oz.	cool, 4°C	12 days, VTSR
Particle Size Distribution	ASTM, D-422	One 8 oz glass or plastic	8 oz.	--	--
Total Organic Carbon	Lloyd Kahn	One 8 oz. glass	8 oz.	Cool, 4°C	26 days, VTSR

Notes:

1. ASP = NYSDEC 1991 ASP.
2. VTSR = Verifiable Time of Sample Receipt.

FIGURE 1



SITE LOCATION

OFF-SITE LOCATION

REFERENCE: USGS COBLESKILL, RICHMONDVILLE N.Y. QUADS.

2000' 0 2000'

APPROX. SCALE: 1" = 2000'

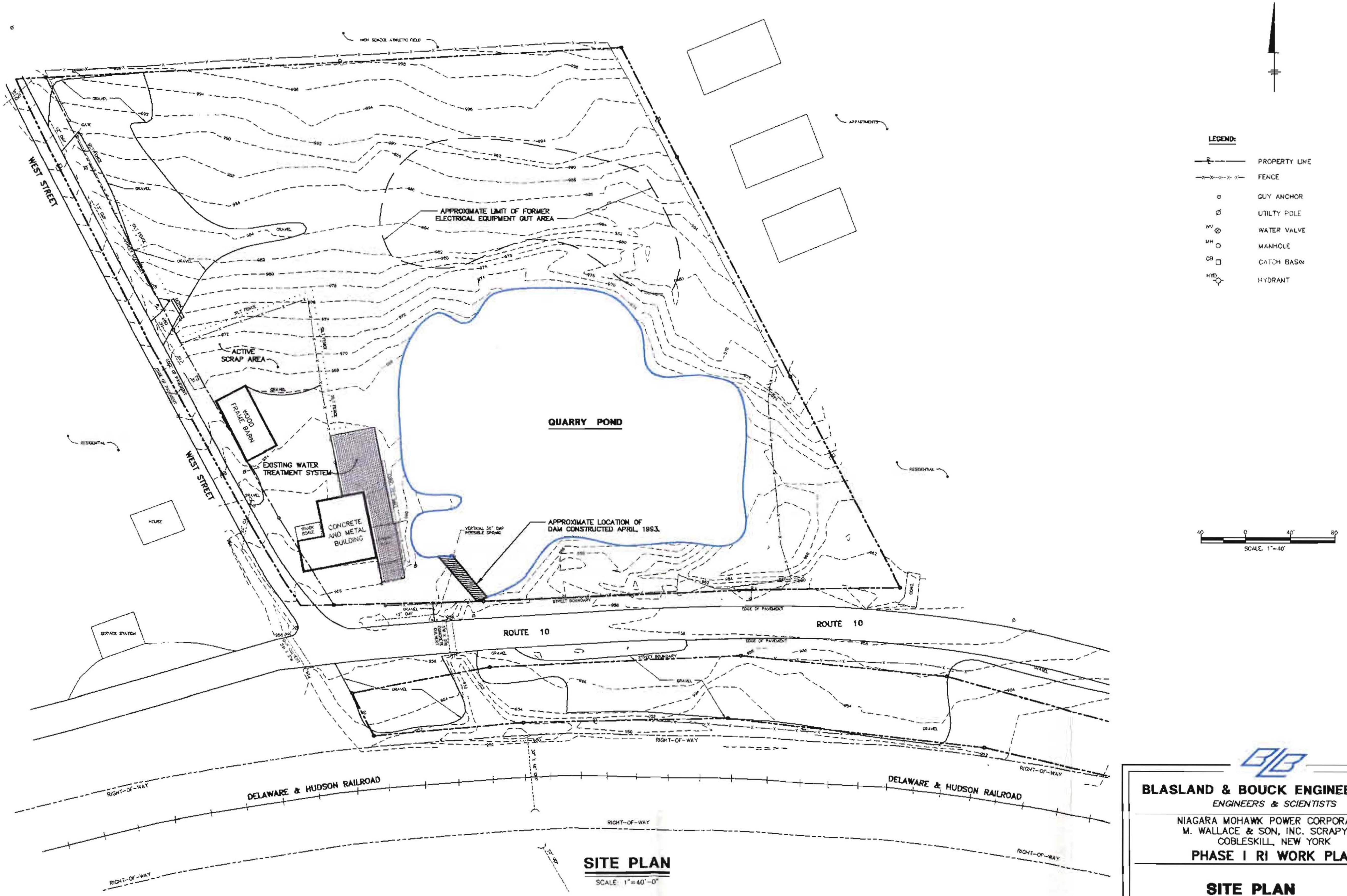
QUADRANGLE LOCATION

NIAGARA MOHAWK POWER CORPORATION
PHASE I RI WORK PLAN
M. WALLACE AND SON SCRAPYARD

LOCATION MAP

JULY 1992
364.17.45

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & GEOSCIENTISTS



SITE PLAN

SCALE: 1"=40'-0"

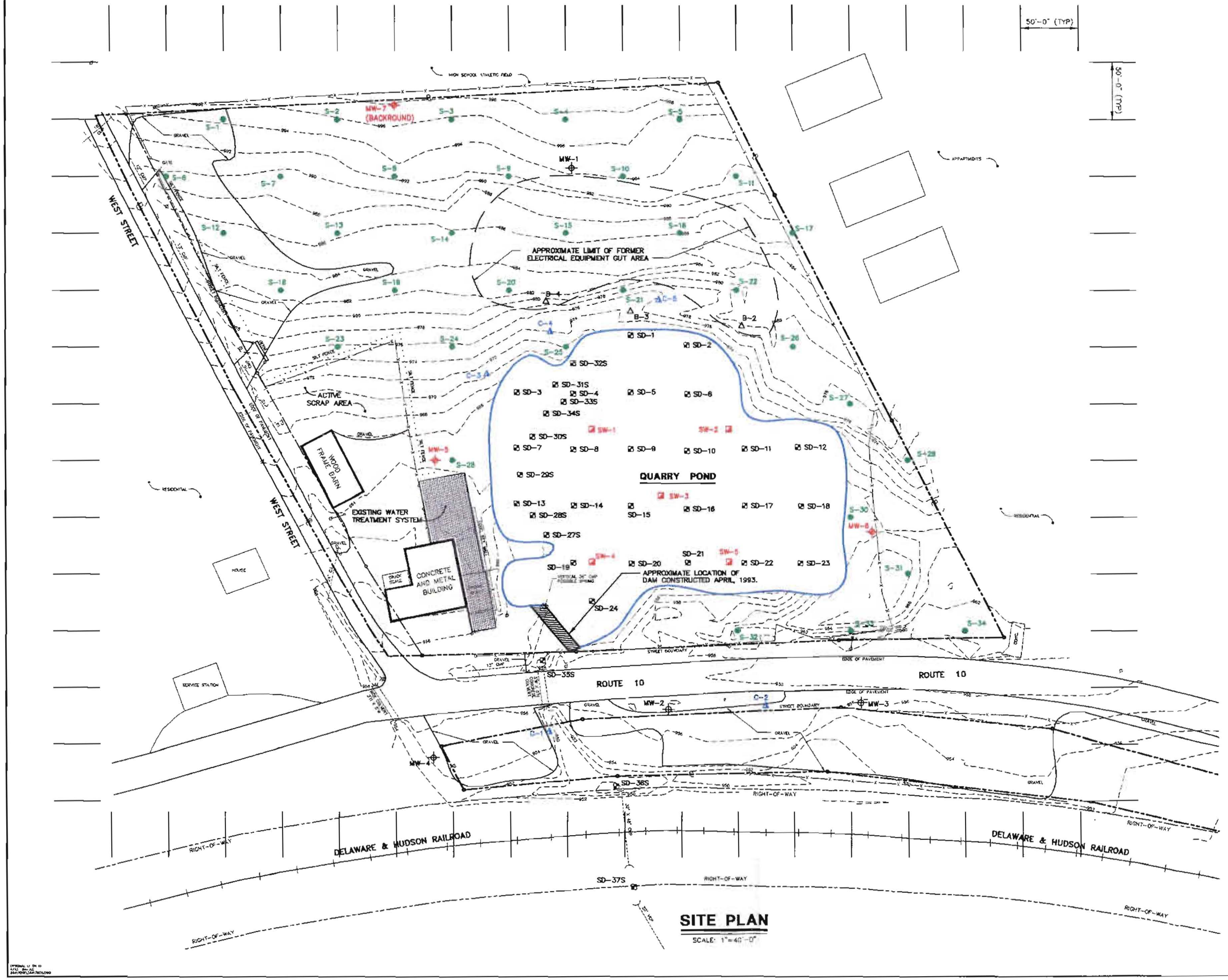
BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

NIAGARA MOHAWK POWER CORPORATION
M. WALLACE & SON, INC. SCRAPYARD
COBLESKILL, NEW YORK

PHASE I RI WORK PLAN

SITE PLAN

FIGURE
2



SITE PLAN

SCALE: 1"=40'-0"

LEGEND:

SW-1 ▨	PROPOSED SURFACE-WATER SAMPLE LOCATION
S-1 ●	PROPOSED SOIL SAMPLE TEST PIT LOCATION
C-1 ▲	PROPOSED ROCK CORE LOCATION
MW-5 ⌖	PROPOSED GROUND-WATER MONITORING WELL LOCATION
MW-1 ⌖	EXISTING GROUND-WATER MONITORING WELL LOCATION
B-2 △	EXISTING SOIL BORING LOCATION
SD-20 ⊠	EXISTING SEDIMENT SAMPLE LOCATION
—P---	PROPERTY LINE
—x—x—x—	FENCE
▫	GUY ANCHOR
⌀	UTILTY POLE
WV ⊗	WATER VALVE
MH ○	MANHOLE
CB □	CATCH BASIN
HYD	HYDRANT

GENERAL NOTE:

1. BORING B-1 COMPLETED AT MONITORING LOCATION M-1.

40' 0 40' 80'

SCALE: 1"=40'

BLASLAND & BOUCK ENGINEERS, P.C.

ENGINEERS & SCIENTISTS

NIAGARA MOHAWK POWER CORPORATION
M. WALLACE & SON, INC. SCRAPYARD
COBLESKILL, NEW YORK

PHASE I RI WORK PLAN

PROPOSED ON-SITE SAMPLING LOCATIONS

FIGURE 3

SITE PLAN

APPROXIMATE SCALE: 1"=200'-0"

LEGEND:

SD-1 SW-1 🟥	PROPOSED SEDIMENT AND SURFACE-WATER SAMPLING LOCATION FOR ANALYSIS OF PCBs AND MERCURY
SD-20 ⊞	PROPOSED SEDIMENT SAMPLING LOCATION FOR ANALYSIS OF PCBs
SD-21 ■	EXISTING SEDIMENT SAMPLING LOCATION ANALYZED FOR PCBs
▨	QUARRY POND SURFACE WATER DRAINAGE ROUTE
—P- - ——	PROPERTY LINE
- - - - - -	STORM SEWER PIPE ROUTE
— — —	DRAINAGE DITCH
—x—x—x—x—	FENCE
MH ○	STORM SEWER MANHOLE
CB □	STORM SEWER CATCH BASIN
⊏⊐	BUILDINGS
←	DIRECTION OF SURFACE WATER FLOW

200' 0 200' 400'

APPROXIMATE SCALE: 1"=200'

GENERAL NOTES:

1. THIS SHEET WAS DEVELOPED FROM THE VILLAGE OF COBLESKILL, NEW YORK, STORM SEWER SYSTEM MAP. THIS SHEET HAS BEEN UPDATED UNDER HC 7525 DATED FEBRUARY 1965.

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

NIAGARA MOHAWK POWER CORPORATION
M. WALLACE & SON, INC. SCRAPYARD
COBLESKILL, NEW YORK
PHASE I RI WORK PLAN

PROPOSED OFF-SITE SAMPLING LOCATIONS

FIGURE 4

APPENDIX A - SURFACE SOIL SAMPLING PROTOCOL

I. Introduction

This appendix presents protocols by which surface soil samples will be collected at the site.

II. Equipment

- Shovel
- Photoionization Detector (PID)
- Camera

III. Materials

- Health and safety equipment (as required by the Health and Safety Plan);
- Cleaning equipment;
- Aluminum or stainless steel tray;
- Dedicated stainless steel scoops;
- Measuring device;
- Appropriate sample containers and forms;
- Coolers with ice;
- Field book;
- Dedicated aluminum mixing containers.

IV. Procedure

The following procedures will be employed to collect surface soil samples:

1. Put on personal protective equipment (as required by the Health and Safety Plan).
2. Identify sample locations from sample location plan and note locations in field notebook.
3. If the sample location is a vegetated area, the vegetation should be removed prior to sample collection.
4. Measure off a one-meter diameter circle around the sample location.
5. Samples will be collected by carefully cutting into the soil to the desired depth with a precleaned stainless steel scoop at 8 equidistant locations within the circle.
6. Combine the discrete surface soil sample aloquits in the mixing container and thoroughly mix soil.
7. Obtain one surface soil sample from the mixing container and place it into an 8 ounce glass jar and screen the headspace with a PID. Record PID reading in field book. Visually characterize the soil for presence of stains and classify according to ASTM soil classification procedures.
8. Obtain one discrete sample and place into the appropriate sample containers for analysis for PCBs, TCL semi-volatile organics and TAL inorganics.
9. Label sample container and cap in accordance with procedures in Appendix L.
10. Place sample containers in a transportation cooler.
11. Discard gloves, stainless-steel scoop, and mixing container in designated location.

12. Handle, pack, and ship the samples with appropriate chain-of-custody procedures in accordance with Section 4 and Appendix L.

13. Record all other appropriate information in the field log book.

V. Disposal Methods

Materials generated during the above activities will be disposed of as described in Section 4.4.

APPENDIX B - PROTOCOL FOR TEST PIT EXCAVATION

I. Introduction

This appendix presents protocols which will be used to excavate test pits at the site. The procedures which will be utilized for the excavation of test pits are discussed below.

II. Equipment

- Backhoe with bucket (supplied by subcontractor)
- Shovel
- Photoionization detector (PID); HNU or similar instrument
- Camera
- Video camera

III. Materials

- 20' x 20' Tarp
- Plastic sheeting
- Stainless steel hand trowel
- Appropriate sample containers
- Distilled water
- Cleaning solvent
- Hard hats
- Safety glasses
- 50' length of safety rope
- Caution tape and stakes
- Disposable gloves (vinyl inner and nitrile outer)
- Test pit log (Attachment 1)
- Plastic bags
- Dedicated aluminum mixing containers

IV. Procedure

1. Identify the test pit location number on the test pit log. Also indicate the temperature, weather, date, and personnel at the site.

2. Set up cleaning station and clean the backhoe and bucket prior to excavating test pits and between each test pit (if necessary, as determined by the on-site engineer). Decontaminate reusable sampling equipment as described in Appendix M - Equipment Decontamination and Cleaning Procedures.

3. Put on a new pair of disposable inner and outer gloves, along with hard hat and safety glasses.

4. Place the 20' x 20' tarp on the surface of the ground adjacent to the test pit location.

5. Install stakes around the tarp and test pit area. String up the caution tape on the stakes 2 feet above the ground.

6. Screen ambient air to obtain background PID readings prior to excavating test pits.

7. Excavate the soil with the backhoe in 2-foot intervals. At each 2-foot interval, examine and classify the soils according to ASTM standard soils classification procedures. At each interval, collect approximately eight ounces of soil and place in a glass jar for PID screening as described in Appendix C. Record observations and PID measurements on the attached test pit log.

8. Soils excavated from the 0- to 4-foot, 8- to 12-foot, and greater than 12-foot depth intervals shall be placed into segregated piles on plastic sheeting.

9. The test pit will be terminated when bedrock, ground water, or the limit of the backhoe is encountered.

10. The on-site engineer will review the PID screening results and visual assessment results for each test pit depth interval to determine if soil samples will be collected for analysis for PCBs and potential analysis for TCL volatiles and semi-volatiles, and TAL inorganics as described in Appendix C. Soil samples will be selected for analysis based on PID screening results above background and the presence of staining or odors.

11. After completion, the test pits will be backfilled with the original contents. Soils excavated from the greater than 12-foot depth interval will be placed back into the pit first (if applicable), followed in succession by soils from the 12- to 8-foot, 8- to 4-foot, and the 4- to 0-foot depth intervals.

12. A labeled stake denoting the test pit number will be placed at the test pit location following filling of the excavation.

13. Each test pit location will be photographed before, during, and after excavation. The number and location of each photograph will be recorded on the test pit log.

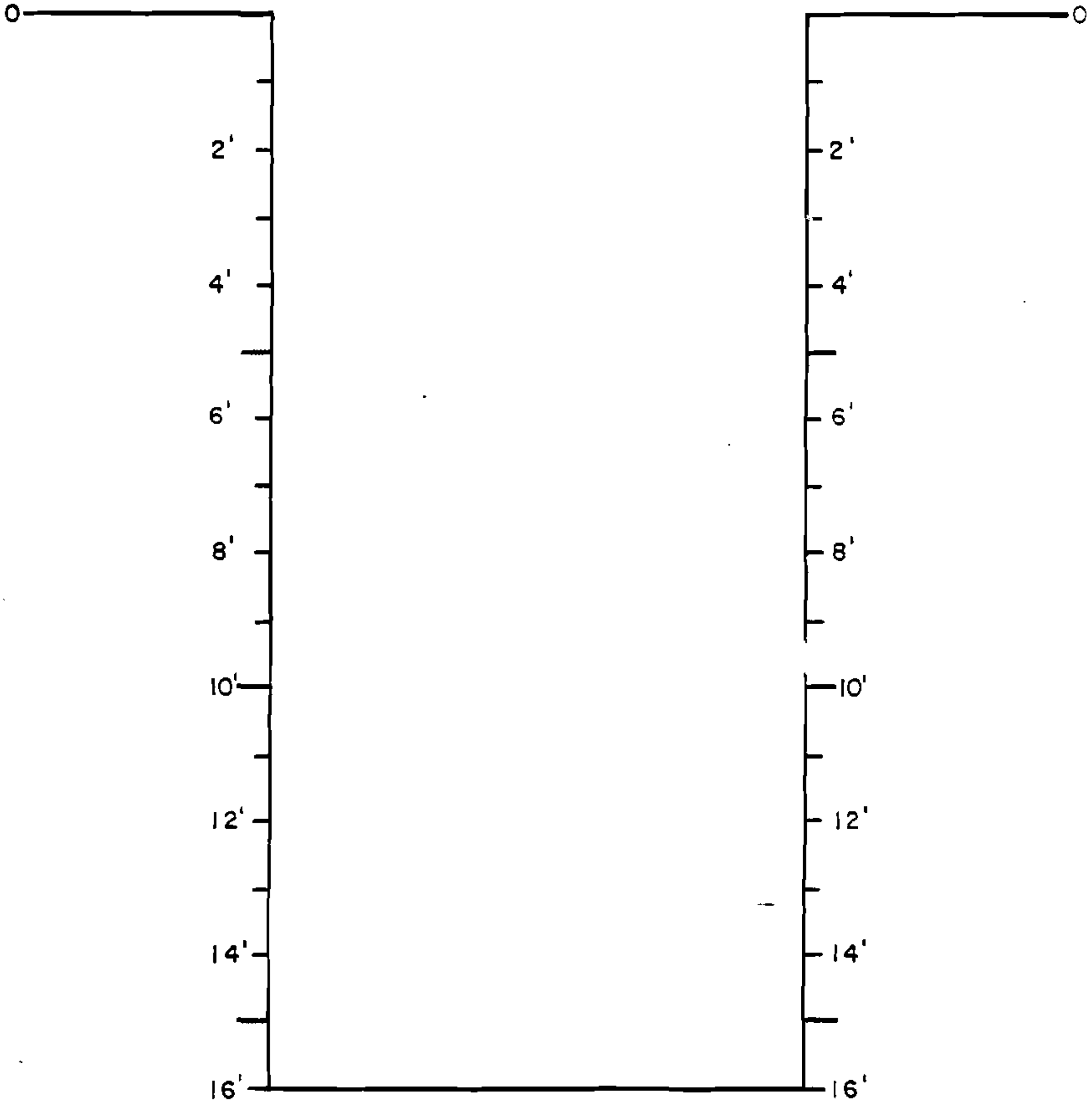
V. Disposal Methods

1. Materials generated during the above activities will be disposed of as described in Section 4.4

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & GEOSCIENTISTS

PROJECT NAME ____________________
PROJECT NUMBER ____________________
LOCATION ____________________
LOGGED BY ____________ DATE ____________

TEST PIT LOG



NOTES: ____________________
____
____
____

50663

APPENDIX C - SOIL SAMPLE COLLECTION PROTOCOL

FOR TEST PITS

I. Introduction

This appendix presents protocols which will be utilized to collect soil samples from the test pits. The procedures used to collect soil samples are presented below.

II. Equipment

- Hand spade
- Hand auger with extension handle

III. Materials

- Laboratory-type soap (Alquinox or Liquinox)
- Cotton coveralls (if applicable)
- Disposable gloves (inner and outer)
- Safety glasses or goggles
- Hard hats
- Plastic sheeting
- Distilled water
- Clean, disposable paper towels ("Handi-wipes")
- Sample labels, sample tags, and sample custody seal labels (Appendix L)
- Chain-of-Custody forms and field notebook (Appendix L)
- Appropriate sampling containers (supplied by laboratory)
- Insulated transport containers with ice or "blue ice"
- Measuring tape - 50 feet
- Wristwatch
- Dedicated aluminum mixing containers

IV. Procedure

1. All equipment which contacts soil samples will be decontaminated prior to, between, and following the collection of soil samples as outlined in Appendix M - Equipment Decontamination and Cleaning Procedures.

2. Identify the test pit number in the field sampling notebook, along with time and conditions at start of excavation of test pit.

3. Collect soil samples from each 2-foot interval for PID screening and record observations within test pit at each 2-foot interval.

4. The on-site engineer will be responsible for characterizing soils encountered and any visual observations of potential source materials in the test pit.

5. The on-site engineer will determine the location for sampling of PCBs and potential analysis for TCL volatile and semi-volatile compounds, and TAL inorganics based on the presence of visually-stained soils, odors, and/or PID readings above background levels. If no staining, odors, or PID measurements above background are encountered, then several discrete samples will be collected from the 6- to 18-inch depth interval and composited in the field to form one composite sample for analysis.

6. Soil samples from the test pits collected for PID screening and laboratory analysis will be collected from the side wall of the pit using a decontaminated hand bucket auger with an extension handle. Care will be taken to ensure that the samples are relatively undisturbed.

7. Soil samples collected for PCB analysis and potential TCL, and TAL analysis will be transferred from the auger into the appropriate sample container presented on Table 2.

8. All samples will be stored in a cooler at approximately 4°C and transferred to the site trailer.

9. At the conclusion of daily test pit activities, the on-site engineer will select subsurface soil samples for analysis for TCL volatile and semi-volatile organics and TAL inorganics based on the results of the test pit activities. The selection of subsurface soil samples for TCL/TAL analysis will be based on PID readings, visual observations, and with the objective of achieving a uniform distribution of TCL/TAL data for subsurface soils across the site.

10. Transfer subsurface soil samples to the laboratory.

11. All sampling activities and sample handling procedures used at the site will follow the protocols outlined in Appendix L - Sample, Packing, Handling, and Shipping Procedures.

V. Disposal Methods

1. Materials generated during the above activities will be disposed of as described in Section 4.4.

APPENDIX D - SURFACE SEDIMENT SAMPLING PROCEDURES

I. Introduction

This appendix describes the procedures to collect surface sediment samples.

II. Procedures for Surface Sediment Sampling

A. Materials

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

- Health and safety equipment (as required by the Health and Safety Plan)
- Cleaning equipment
- Aluminum or stainless-steel tray
- Hand-held dredge (with rope)
- Dedicated stainless-steel scoop
- Survey rod
- Transport container with ice
- Appropriate sample container and forms
- Field book

B. Procedures

1. Identify the proposed sample location in the field notebook along with other appropriate information collected during sediment probing activities.

2. Don personal protective equipment (as required by the Health and Safety Plan).

3. At each sample location, drop opened dredge making sure that the end of the rope is maintained at all times. The use of a dredge will be dependent upon field conditions. Where a dredge is not appropriate, the surface sediment samples will be collected with a stainless-steel scoop.

4. Once the dredge has been allowed to settle into the bottom sediments, a hard pull on the rope will close the sediments inside the dredge (or use a stainless-steel scoop to collect samples).

5. Retrieve the dredge.

6. Open the dredge to allow the sediments to empty onto an aluminum or stainless-steel tray, or empty scoop onto tray.

7. Describe and record sample descriptions.

8. Package sediments in the appropriate containers.

9. Label all sample containers per Section 3.0 and Appendix L.

10. Handle, pack, and ship the samples using the chain-of-custody procedures in accordance with Section 4.0 and Appendix L.

III. Field Cleaning Procedures

Field cleaning procedures will follow those set forth in Appendix N.

IV. Disposal Methods

Materials generated during the sampling activities and disposable equipment will be disposed appropriately as discussed in Section 4.4.

APPENDIX E - SEDIMENT CORE SAMPLING PROTOCOL

I. Introduction

Prior to sediment sampling in Cobleskill Creek, sediment probing will be conducted within Cobleskill Creek at the proposed sediment sample locations. Sediment probing will be accomplished by floating in a boat and physically probing with a metal rod for sediment deposit areas. Sediment depths will be recorded in the field notebook.

Following sediment probing activities, sediment core samples will be collected as described below in Section IV.

II. Probing Procedures

A. Materials

The following materials will be available as required during sediment probing activities:

- Health and safety equipment (as required by the Health and Safety Plan)
- Boat
- Field book
- Surveyor's rod or 6-foot rule
- 200-foot measuring tape
- Metal rod calibrated for sediment depth measurement

B. Procedures

1. Identify and locate sediment sample locations using the measuring tape.

2. Don personal protective equipment (as required by the Health and Safety Plan).

3. Begin physically probing for sediments with a metal rod by floating in a boat. Soft areas which are penetratable with the rod will be considered sediment deposits.

4. Record the following information in the field sampling notebook: approximate location, date, personnel, weather, average sediment depth, average water depth cover, and any other pertinent comments.

III. Materials for Sediment Core Sampling

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

- Health and safety equipment (as required by the Health and Safety Plan)
- Cleaning equipment (Section VI)
- Boat
- Aluminum or stainless-steel tray
- Duct tape
- Lexan^R tubing with end caps
- Brass push rod
- Hacksaw
- Stainless steel core driver
- Vacuum pump
- Piston sampler
- 6-foot rule or survey rod
- Transport container with ice

- Appropriate sample containers and forms
- Field book

IV. Procedures for Sediment Core Sampling

1. Identify the proposed sample location in the field notebook along with other appropriate information collected during the sediment probing activities.

2. Don personal protective equipment (as required by the Health and Safety Plan).

3. At each sample location, lower a section of Lexan^R tube until it just reaches the top of sediment. Measure the depth of water. (Sections of Lexan^R tube may need to be spliced together in deep water locations).

4. Push the Lexan^R tube into the sediment by hand until refusal. Measure the depth of sediment.

5. Drive the tube several more inches using a stainless steel core driver block and measure the distance. This procedure is performed to obtain a "plug" at the bottom of the core and prevent the loose sediment from escaping.

6. Place a vacuum pump on the top end of the Lexan^R tube and create a vacuum to prevent the sediments/plug from escaping.

7. Slowly pull the tube from the sediment, twisting it slightly as it is removed (if necessary).

8. Before the tube is fully removed from the water, place a cap on the bottom end of the tube while it is still submerged.

9. Keeping the tube upright, wipe the bottom end dry and seal the cap with duct tape and label. Measure the length of sediment recovered and evaluate the integrity of the core. If the core is not suitably intact, repeat coring procedure within 5 to 10 feet of the first location attempted.

10. While still keeping the core upright, use a hacksaw to make a horizontal cut in the tube approximately one inch above the sediment.

11. Re-cap the cut end of the tube, seal the cap with duct tape, and mark this end as "top".

12. Wipe the tube dry.

13. Place a completed sample label on the tube.

14. Record the following information on both the tube and on the cap: 1) sample number. 2) sampling date; and 3) sampling time.

15. Place the core sample upright in a container with ice.

16. Repeat the above procedures until the appropriate number of core samples are collected (for the sampling event or the sampling day).

17. Extrude the sediment cores from the Lexan^R tubing onto an aluminum or stainless steel tray. Describe and record sample description including depths at which sediment characteristics change and visual characteristics.

18. Section the cores into depth-proportioned increments. The saw or knife used to section the core should be cleaned (Section V) between each cut. The 0- to 6-inch depth interval and each 1-foot increment thereafter will be placed into the appropriate sample containers for PCBs and TOC analysis.

19. Label all sample containers according to the procedures in Section 3.0 and Appendix L.

20. Handle, pack, and ship the samples using the chain-of-custody procedures in accordance with Section 4.0 and Appendix L.

V. Field Cleaning Procedures

A. Materials

- Health and safety equipment (as required in the Health and Safety Plan)
- Distilled water (laboratory-supplied)
- Non-phosphate soap; (Alconox^R, or equivalent)
- Tap water
- Appropriate cleaning solvent (e.g., hexane)
- Rinse collection plastic containers
- Brushes
- Aluminum foil
- Garbage bags
- Spray bottles for solvent
- Ziploc^R type bags

B. Procedures

1. Follow health and safety procedures specified in the Health and Safety Plan.

2. Cleaning of reusable sampling equipment (e.g., trays, spatulas, scoops and core driver) will follow the decontamination procedures presented below:

   a. Alconox^R and tap water wash.
   b. Tap water rinse.
   c. Solvent spray rinse (e.g., hexane).
   d. Distilled water rinse. and
   e. Allow to air dry and wrap in aluminum foil.

4. Cleaning will be conducted in plastic containers to collect all decontamination rinsate.

VI. Disposal Methods

Materials generated during the sediment sampling activities and disposable equipment will be disposed of as described in Section 4.4.

APPENDIX F - SURFACE WATER SAMPLING PROCEDURES

I. Introduction

Two methods for collecting surface water samples will be used. Water samples will be collected as surface water grab samples for locations in the storm water drainage system downstream of the quarry pond outlet channel and also as depth-integrated samples for locations in the quarry pond.

II. Materials

The following materials will be available, as required, during surface water sampling:

- Health and safety equipment as required by the Health and Safety Plan
- Cleaning equipment
- Boat
- Rope
- 200-foot measuring tape
- Surveyor's rod
- Pyrex Beaker/laboratory cleaned glass container
- Thermometer
- Large glass mixing container
- Teflon stirring rod
- Field book
- Dissolved oxygen meter
- Conductivity/temperature meter
- pH Meter
- Graduated cylinder/beaker/or equivalent glass measuring device
- Appropriate water sample containers (prepared with appropriate preservatives by the laboratory prior to each sampling event)
- Appropriate blanks (trip)
- Appropriate transport containers and appropriate packing, labeling and shipping materials (coolers) with ice
- Appropriate water sampler (i.e., grab sample containers or peristaltic pump)

III. Procedures

A. Depth-Integrated Water Sampling Procedures

Depth-integrated water samples will be collected from a boat utilizing a peristaltic pump.

1. Identify sampling location in field notebook along with other appropriate information.

2. Don health and safety equipment (as required by the Health and Safety Plan).

3. Clean the sampling equipment in accordance with IV below.

4. Install new medical-grade silicone tubing in the pump head, as per the manufacturer's instructions. Allow sufficient tubing on the discharge side to facilitate convenient dispensation of liquid into sample containers and only enough on the suction end for attachment to the intake line. This practice will minimize sample contact with the silicone pump tubing.

5. Select the length of teflon tubing necessary to reach the required sample depth and attach to intake side of pump tubing. Taping the teflon tube to a surveyor's rod will facilitate reaching the required depth.

6. If possible, allow several liters of water to pass through the system before actual sample collection. Discharge this water to the water body.

7. When sampling for volatile organics, an erlenmeyer flask will be installed on the suction side of the pump to collect a distinct sample from approximately mid-depth as shown in Attachment 1 (as volatiles may adhere to the silicone tubing).

8. Samples for PCBs, inorganics, semi-volatile organic compounds, and total suspended solids will be collected by raising and lowering the sampling pump inlet to form a composite from points located between 30 and 70 percent of the water column as referenced from the surface.

9. For PCBs and inorganics, two separate samples will be collected at each surface water sampling location. One of the PCB samples and one of the inorganic samples will be filtered in the field prior to analysis. The other sample will not be filtered.

10. For samples requiring filtration, pump a sufficient volume of the samples into a sample container using a peristaltic pump, dedicated or pre-cleaned tubing, and dedicated 0.45 micron in-line filter (change filter in between sampling locations).

11. Secure the sample container caps tightly.

12. Label all sample containers in accordance with the procedures in Section 3 and Appendix L.

13. After sample containers have been filled, fill a beaker or glass container with the depth-integrated water and measure the water temperature, pH, conductivity, and dissolved oxygen at each sampling location.

14. Handle, pack, and ship the samples using the chain-of-custody procedures in accordance with the procedures in Section 4 and Appendix L.

15. Record required information on the appropriate forms and/or field log book.

B. Surface Water Grab Sample Procedures

1. Don health and safety equipment, as required by the Health and Safety Plan.

2. Collect sample via the use of a laboratory-cleaned glass container. The container may have to be lowered into the drainage structure attached to a rod. Take meter readings for dissolved oxygen, conductivity, temperature, and pH using procedures in Appendix G. These results will be recorded in the field notebook.

3. Collect the water sample by submerging the glass container directly in the drainage structure and allow the bottle to fill. Transfer contents of glass container into appropriate filtering device and/or appropriate sample container. After filling, cap the bottle and place on ice in the cooler.

4. Label all bottles as appropriate, as discussed in Section 3 and Appendix L.

5. Place filled sample containers on ice in a cooler.

6. Follow procedures for preservation of samples and packing, handling, and shipping with associated chain-of-custody procedures of samples as set forth in Section 4 and Appendix L.

IV. Field Cleaning Procedures

A. Materials

- Health and safety equipment (as required in the Health and Safety Plan)
- Distilled water (laboratory-supplied)
- Non-phosphate soap; (Alconox^R, or equivalent)
- Tap water
- Appropriate cleaning solvent (e.g., hexane)
- Rinse collection plastic containers
- Brushes
- Aluminum foil
- Garbage bags
- Spray bottles for solvent
- Ziploc^R type bags

B. Procedures

1. Follow health and safety procedures specified in the Health and Safety Plan.

2. Cleaning of reusable sampling equipment (e.g., glass beakers, glass mixing containers, teflon stirring rods, teflon tubing) will follow the decontamination procedures presented below:

    a. Alconox^R and tap water wash;
    b. Tap water rinse;
    c. Solvent spray rinse (e.g., hexane);
    d. Distilled water rinse; and
    e. Allow to air dry and wrap in aluminum foil.

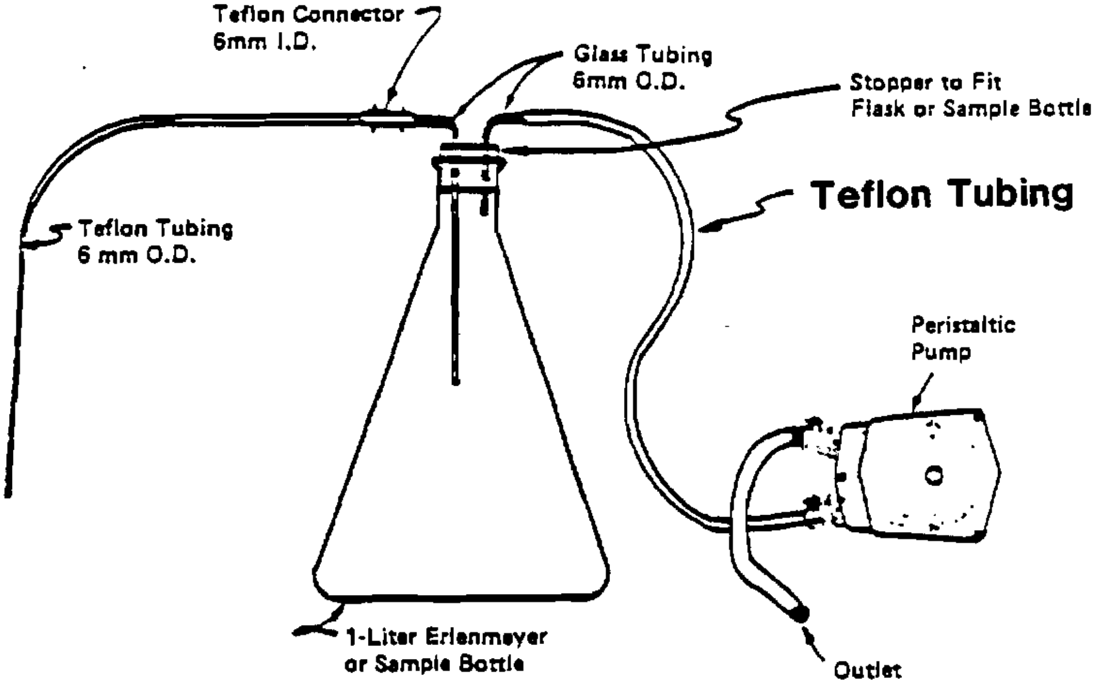
3. Cleaning will be conducted in plastic containers that will be transported to each sampling location (or group of locations). These containers will also be used to collect all decontamination rinsate.

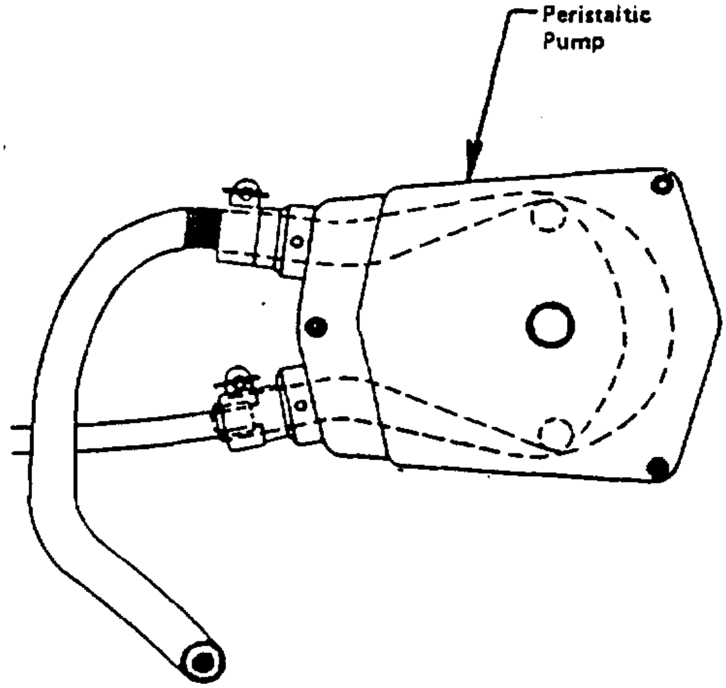
V. Disposal Methods

Materials generated during the above activities will be disposed of as described in Section 4.4.

ATTACHMENT 1
MODIFIED PERISTALTIC PUMP METHOD

FOR COLLECTION OF SURFACE WATER SAMPLES





APPENDIX G - CALIBRATION, OPERATION, AND MAINTENANCE PROCEDURES FOR SOIL, SURFACE WATER AND GROUND-WATER INVESTIGATIONS

APPENDIX G - CALIBRATION, OPERATION, AND MAINTENANCE PROCEDURES FOR SOIL, SURFACE WATER AND GROUND-WATER INVESTIGATIONS

APPENDIX G-1

HNU Photoionization Detector Calibration,
Operation, and Maintenance Procedures

I. Introduction

The HNU meter measures relative concentrations of total organic and inorganic vapors and will be calibrated daily prior to use. The HNU meter is certified by Factory Mutual for use in Class 1, Division 2, Group A, B, C, and D environments. The HNU will be used to monitor breathing zones and work zones as specified in the Health and Safety Plan.

II. Materials

- HNU Photoionization Detector (PID)
- Isobutylene calibration gas tank with pressure regulator
- Plastic tubing to connect the PID probe to the calibration gas tank
- PID calibration log

III. Calibration Procedures

1. Turn the HNU meter dial to the standby position and zero the meter needle with the zero dial.

2. Switch the meter dial to the appropriate concentration range so as to be able to accurately read the calibration gas value.

3. Loosen the dial on the regulator allowing the calibration gas to flow from the tank, through the plastic tubing to the HNU probe.

4. Adjust the HNU calibration dial so that the meter value is equal to the calibration gas concentration.

5. Record the calibration dial value and the other information on the PID Calibration and Maintenance Log (Attachment 1).

IV. Operation Procedure

1. Don health and safety equipment (as required by the Health and Safety Plan).

2. Turn the FUNCTION switch to the BATTERY CHECK position. Check that the indicator is within or beyond the green battery arc. If indicator is below the arc or the red LED is lit, the battery must be charged.

3. Turn the FUNCTION switch to the STANDBY position and rotate the ZERO POTENTIOMETER until the meter reads zero. Wait 15 to 20 seconds to confirm the adjustment. If unstable, readjust.

4. Check to see that the SPAN POTENTIOMETER is set for the appropriate setting for the probe being used (5.0 for 9.5 eV probe, 9.8 for 10.2 eV, and 5.0 for 11.7 eV).

5. Set the FUNCTION switch to the desired ppm range (0-20, 0-200, or 0-2,000). A violet glow from the UV source should be visible at the sample inlet of the probe/sensor unit.

6. Listen for the fan operation to verify fan function (HNU only).

7. Measure and record the background PID reading.

8. Use PID as specified in the Health and Safety Plan.

V. Maintenance Procedures

1. At the end of each day or after 8 hours of monitoring with the HNU, recharge the batteries for 12 hours.

2. Store the instrument in protective case when not in use.

3. Keep records of operation, maintenance, calibration, problems, and repairs.

4. After use, the instrument will be inspected and the inspection recorded in the field notebook.

5. A replacement instrument will be available on-site or ready for overnight shipment, if necessary.

6. The HNU will be sent back to the manufacturer for service, if needed.

7. Record calibration information on PID Calibration and Maintenance Log (Attachment 1).

APPENDIX G - CALIBRATION, OPERATION, AND MAINTENANCE PROCEDURES FOR SOIL, SURFACE WATER AND GROUND-WATER INVESTIGATIONS

APPENDIX G-2

pH Meter Calibration, Operation, and Maintenance Procedures

I. Introduction

The pH meter will be calibrated daily prior to use.

II. Materials

- 10.0, 7.0, 4.0 pH buffer solutions
- Thermometer
- Distilled water
- Disposable plastic beakers
- Calibration and maintenance log

III. Calibration Procedures

The pH meter will be calibrated as follows:

1. Switch on instrument.

2. Connect electrode to meter and remove protective cap.

3. Rinse electrode in distilled water.

4. Measure and record temperature of buffer solutions.

5. Immerse pH electrode in pH buffer 7.00, set the temperature control to that of the buffer 7.00 and allow sufficient time for the electrode to stabilize. Adjust the Standardize Control for the correct readout.

6. Rinse electrode with distilled water.

7. Immerse pH electrode in buffer 4.0, set the temperature control to that of the buffer 4.0 and allow sufficient time for the electrode to stabilize. Adjust the Slope Control for the correct readout.

8a. Rinse the electrode with distilled water. The meter is calibrated and ready for use.

8b. (Optional step) If the pH is expected or could be between 7.0 to 10.0, then immerse the pH electrode in buffer 10.0, set temperature control, and allow sufficient time for the electrode to stabilize. Adjust the slope control for the correct read out.

9. Record calibration information on the Temperature/pH/Conductivity Meter Calibration and Maintenance Log (Attachment 2).

IV. Operation Procedures

1. Calibrate pH meter.
2. Rinse probe in distilled water.
3. Fill a disposable beaker with the water sample.
4. Insert probe into one sample beaker and obtain a reading. The meter will read between 0 and 14, in 0.01 increments.
5. Repeat Step 4.
6. Log results in field notebook and the average will be the actual result.
7. Rinse probe off in distilled water.

V. Maintenance Procedures

1. Replace batteries on a regular basis.
2. Store electrode in protective casing when not in use.
3. Keep records of operation, maintenance, calibration, problems, and repairs.
4. After use, the meter will be inspected and the inspection recorded in the field notebook.
5. A replacement meter will be available on-site or ready for overnight shipment, if necessary.
6. pH meter will be sent back to manufacturer for service, if needed.
7. Record maintenance information on the Temperature/pH/Conductivity Meter Calibration and Maintenance Log (Attachment 2).

APPENDIX G - CALIBRATION, OPERATION, AND MAINTENANCE PROCEDURES FOR SOIL, SURFACE WATER AND GROUND-WATER INVESTIGATIONS

APPENDIX G-3

Temperature/Conductivity Meter Calibration,
Operation, and Maintenance Procedures

I. Introduction

The temperature/conductivity meter (HACH Model 44600 or equivalent) will be calibrated daily prior to use.

II. Materials

- Beaker capable of submerging the entire probe in a calibration liquid standard
- Calibration liquid standard (NaCL, 1,000 mg/L or equivalent)
- Fine screw driver
- Disposable plastic beakers

III. Calibration Procedures

The conductivity meter will be calibrated as follows:

1. Be sure the probe is clean.
2. Soak the probe in distilled water for at least 30 minutes.
3. Remove the probe from the water and shake off distilled water.
4. Immerse the probe to or beyond the vent holes in a disposable beaker containing Sodium Chloride Standard Solution, 1,000 mg/L. Agitate vertically to remove trapped air.
5. Repeat Steps 3 and 4 at least once more.
6. Press the Power key and CND key. Verify that the LO BAT indicator does not appear.
7. Press the 2 milliSiemens per centimeter (mS/cm) range key.
8. Check the reading on the display. It should be 1.990 mS/cm. If adjustment is needed, use a small screwdriver to adjust the CAL control next to the display. Counterclockwise adjustment increases the reading.
9. Record calibration information on Temperature/pH/Conductivity Meter Calibration and Maintenance Log (Attachment 2).

IV. Operation Procedures - Temperature/Conductivity

1. Calibrate the conductivity meter.
2. Rinse probe in distilled water.
3. Fill a disposable beaker with water.
4. Turn meter to read temperature and record the temperature of the water twice.

5. Turn meter on to the 2 mS/cm scale.

6. Insert probe into sample beaker and obtain a reading. The meter will read between 0 and 20 mS/cm, in 0.001 increments.

7. Repeat Step 6.

8. Record results in the field notebook and the average will be the actual result.

9. Rinse probe off in distilled water.

VI. Maintenance Procedures

1. Replace batteries on a regular basis.

2. Store electrode in protective casing when not in use.

3. Keep records of operation, maintenance, calibration, and of any problems and repair.

4. After use, the meter will be inspected and the inspection recorded in the log book.

5. A replacement meter will be available on-site or ready for overnight shipment, if necessary.

6. Conductivity meter will be sent back to manufacturer for service when needed.

APPENDIX G-4

Dissolved Oxygen Meter Calibration, Operation,
and Maintenance Procedures

I. Introduction

Dissolved oxygen (DO) will be measured using a YSI Model 50 Series or equivalent meter which will be calibrated prior to each field event.

II. Calibration Procedure

The dissolved oxygen meter will be calibrated as follows:

1. Prepare the probe with a thin Teflon^{R} membrane stretched over the sensor.
2. Perform a battery check.
3. Set mode switch to operate and the operation switch to zero, and zero the instrument.
4. Take a temperature measurement and determine the calibration value from the provided table for the appropriate atmospheric pressure.
5. Select the desired range and adjust the instrument to an appropriate calibration value (determined in Step 4).
6. Place the probe in a water sample with a known dissolved oxygen level and read mg/L-dissolved oxygen.
7. Record temperature and dissolved oxygen calibration information on the Dissolved Oxygen Meter Calibration and Maintenance Log (Attachment 3).

III. Operation Procedure

1. Calibrate the dissolved oxygen meter.
2. Perform the battery check.
3. Fill a disposable beaker with water.
4. Set mode switch to operate and the operation switch to the desired range.
5. Place probe into water sample.
6. Take a temperature measurement and adjust temperature dial.
7. Switch to dissolved oxygen content measurement and allow reading to stabilize.
8. Record results in the field notebook.
9. Repeat procedure and record second reading. Average results and record.

10. Rinse the probe with distilled water.

IV. Maintenance Procedures

1. Replace batteries on a regular basis.
2. Store electrode in protective casing when not in use.
3. Keep records of operation, maintenance, calibration, and any problems and repair.
4. A replacement dissolved oxygen meter will be ready for overnight shipment, if necessary.
5. Dissolved oxygen meter will be sent back to manufacturer for service when needed.
6. Record maintenance information on the Dissolved Oxygen Meter Calibration and Maintenance Log (Attachment 3).

APPENDIX G-5

Water Level Probe Calibration Procedures

I. Introduction

The water level probe cable will be checked once to a standard to assess if the meter has been correctly calibrated by the manufacturer.

II. Materials

- Water level probe and cable
- 6-foot engineer's rule

III. Procedures

1. Each water level probe will be calibrated prior to using.
2. To calibrate, the lengths between each increment markers on the cable will be measured with a six-foot engineer's rule. The cable will be checked for the first 150 feet.
3. If markers are incorrect, the probe will be sent back to the manufacturer.
4. Record verification on form (Attachment 4).

APPENDIX G - CALIBRATION, OPERATION, AND MAINTENANCE PROCEDURES FOR SOIL, SURFACE WATER AND GROUND-WATER INVESTIGATIONS

APPENDIX G-6

Turbidity Meter Calibration, Operation, and Maintenance Procedures

I. Introduction

The turbidity meter, a Cole-Parmer Model 8391-35 or equivalent, will be calibrated daily prior to use.

II. Materials

- Portable turbidity meter
- 0.5, 5.0, 40 Formazin standard solutions

III. Calibration Procedures

The turbidity meter will be calibrated as follows:

Zero Adjust

1. With the instrument turned off, check the meter needle position. If the needle does not read zero, adjust the mechanical zero screw.
2. Turn on the instrument and allow to warm up for 5 minutes.
3. Insert the black body into the sample well.
4. Turn the set standard control fully clockwise.
5. Place the NTU range switch to the x 0.01 position.
6. Adjust the circuit board mounted potentiometer to read zero on the meter (an access hole is marked on the right hand side of the instrument).

   Note: An insulated, non-magnetized calibration screwdriver is required for both adjustments.

Calibrations of Secondary Standards

1. Make the Formazin standard or obtain a commercially available standard.
2. Set the NTU range switch to x 1 (0-100 NTU full scale).
3. Pour the 40 NTU Formazin or commercial standard into the chosen sample cuvette. Make certain that the sample cuvette is wiped clean of all dirt and finger prints. Insert the cuvette into the sample well and align properly. Cover with the light shield.
4. Use the SET STANDARD knob to adjust the meter needle to read exactly 40 NTU.

5. Remove the sample cuvette and insert the 40 NTU standard. Align the cuvette properly and cover with the light shield. Note the exact reading and record this value on the calibration and maintenance log (Attachment 5). This is the value that should now be used for the 40 NTU sealed standard.

6. Rinse the sample cuvette thoroughly and dry completely inside and out.

7. Fill the sample cuvette with the 5 NTU Formazin or commercial standard. Insert the sample cuvette into the test well. Align the cuvette properly and cover with the light shield.

8. Turn NTU RANGE knob to x 0.1 (0-10 NTU full scale). Use the SET STANDARD knob to adjust the meter needle to read exactly 50 (actually 5 NTU).

9. Remove the sample cuvette and insert the 5 NTU sealed standard. Align the cuvette properly and cover with the light shield. Note the exact reading and record this value on the calibration and maintenance log (Attachment 5). This is the value that should now be used for the 5 NTU sealed standard.

10. Rinse the sample cuvette thoroughly and dry completely inside and out.

11. Fill the sample cuvette with the 0.5 NTU Formazin or commercial standard. Insert the sample cuvette into the test well, align properly and cover with the light shield.

12. Turn NTU RANGE knob to x 0.01 (0-1 NTU full scale). Use the SET STANDARD knob to adjust the meter needle to read exactly 50 (actually 0.5 NTU).

13. Remove the sample cuvette and insert the 0.5 NTU sealed standard. Align the cuvette properly and cover with the light shield. Note the exact reading and record this value on the calibration and maintenance log (Attachment 5). This is the value that should be used for the NTU sealed standard.

14. Record calibration information on the Turbidity Calibration and Maintenance Log (Attachment 5).

IV. Operation Procedures

1. Calibrate turbidity meter.

2. All samples should be measured using the same sample cuvette. Samples are read by inserting the sample cuvette, properly aligned with the key, into the test well. Cover with the light shield and take the reading off of the correct scale on the meter. Make certain to take the range factor (x 1, x 0.1, or x 0.01) into account when calculating the actual NTU value of the sample.

V. Maintenance Procedures

1. Replace batteries on a regular basis.

2. Store instrument in protective carrying case when not in use.

3. Keep records of operation, maintenance, calibration, problems and repairs.

4. After use, the meter will be inspected and the inspection recorded in the field book.

5. A replacement meter will be available on-site or ready for overnight shipment, if necessary.

6. The turbidity meter will be sent back to the manufacturer for service when needed.

7. Record maintenance information on the Turbidity Calibration and Maintenance Log (Attachment 5).

Attachment 1

PHOTOIONIZATION DETECTOR CALIBRATION AND MAINTENANCE LOG

INSTRUMENT MANUFACTURER ____________________

INSTRUMENT MODEL ____________________

IDENTIFICATION NUMBER ____________________

LAMP (Circle One) 9.5eV 10.2eV 11.7eV

DATE/ TIME	INITIALS	BATTERY CHECK	CALIBRATION STANDARD			SPAN POTENTIOMETER SETTING	COMMENTS
			SOURCE	TYPE	CONCENTRATION		

Attachment 2

TEMPERATURE/pH/CONDUCTIVITY METER CALIBRATION AND MAINTENANCE LOG

INSTRUMENT MANUFACTURER ______________________________
INSTRUMENT MODEL ______________________________
IDENTIFICATION NUMBER ______________________________

DATE/TIME	INITIALS	TEMPERATURE	pH STANDARD USED/ EXPIRATION	CONDUCTIVITY STANDARD USED/ EXPIRATION	BATTERY CHECK	COMMENTS

Attachment 3

DISSOLVED OXYGEN METER CALIBRATION AND MAINTENANCE LOG

INSTRUMENT MANUFACTURER ____________________

INSTRUMENT MODEL ____________________

IDENTIFICATION NUMBER ____________________

DATE/ TIME	INITIALS	WATER TEMPERATURE	ACTUAL D.O.	MEASURED D.O.	BATTERY CHECK	MEMBRANE CHECKED/ REPLACED	COMMENTS

ATTACHMENT 4

WATER LEVEL PROBE MAINTENANCE LOG

Instrument Serial Number

			Check					
Date/ Time	Date Batteries Installed	Date Decontaminated	Sound Indicator	Light Indicator	Case	Six Foot Rule	Weight	Initials

ATTACHMENT 5

TURBIDITY CALIBRATION AND MAINTENANCE LOG

Instrument Manufacturer ____________________
Instrument Model ________________________
Identification Number _____________________

		Calibration/Standard		Standard	Reading	(NTU)
Date/Time	Initials	Type	Concentration	40	5	0.5

APPENDIX H - DRILLING PROCEDURES FOR COLLECTING AND SCREENING SOIL AND ROCK SAMPLES

I. Introduction

Soil borings shall be completed with a truck-mounted drill rig using the hollow-stem auger drilling method, and rock corings will be completed using a core barrel.

II. Soil Sampling

Samples of the encountered subsurface material shall be collected continuously to the top of the bedrock. The sampling method employed shall be ASTM D-1586/Split- Barrel Sampling (Standard Method for Penetration Test and Split-Barrel Sampling of Soils, ASTM D 1586-84, published in Annual Book of ASTM Standards, Volume 04.08). Upon retrieval of split-barrel sampler, two representative portions of each soil sample will be placed in two 1-pint containers, labeled, and stored on-site. All split-barrel samples will be screened for organic vapors with a photoionization detector (PID), using the procedures described in III below. In addition, a geologist will be on site during the drilling operations to fully describe each soil sample including: 1) soil type, 2) color, 3) percent recovery; 4) moisture content; 5) texture; 6) grain size and shape; 7) consistency; 8) visible evidence of waste; and 9) miscellaneous observations. The descriptions will be according to the Department of Transportation (DOT), Soil Description Procedure, Official Issuance No. 741-5 STP (February 1975) and will be recorded on a subsurface log form (Attachment 1). Each sample container will be labeled with: 1) site; 2) boring number; 3) interval sample/interval period; 4) date; and 5) initials of sampling personnel. The supervising geologist will be responsible for documenting drilling events using the daily field log provided in Attachment 2.

The Drilling Contractor will be responsible for obtaining accurate and representative samples, informing the supervising geologist of changes in drilling pressure and loss of circulation, and keeping a separate general log of soils encountered including blow counts (i.e., the number of blows from a soil sampling drive weight [140 pounds] required to drive the split-barrel sampler in 6-inch increments).

III. Field Screening Procedures

All soil samples will be field screened upon collection with the PID for a relative measure of the total volatile concentration. In addition, field screening will be conducted on the head space of soil samples with a PID (HNU). A representative portion of the sample will be obtained to fill approximately one half of a 1-pint container. These samples will be screened as follows:

1. The headspace of the sample will be measured directly from the sample container with the PID;
2. The readings will be recorded on the soil boring/rock coring logs (Attachment 1).

The PID meter will be calibrated to isobutylene daily or more frequently if field conditions warrant according to the procedures provided in Appendix G.

IV. Bedrock Coring Procedures

Bedrock cores will be completed using an NX size core barrel in accordance with ASTM D2113, Standard Practice for Diamond Core Drilling for Site Investigation, ASTM D 2113-83, as published in Annual Book of ASTM Standards, Volume 04.08. Shallow (5 to 10 feet) rock cores will be obtained in the bedrock.

Prior to core barrel introduction into the hole, circulation of water will be maintained for a short time to remove any cuttings that may clog the barrel. Drilling rods will be carefully centered to prevent core breakage. Drilling bit pressure and water pressure will be maintained at a level consistent throughout the runs and the runs will be completed without interruption such that penetration rates can be determined.

Core samples will be rinsed with tap water and placed in wood boxes. Obvious man-made breaks will be marked with a pen across the break. Wood blocks will be labeled and placed at the end of each core run to indicate the run number. A wooden spacer will be inserted if no sample is recovered and labeled "L.C." (lost core) with corresponding depth. The core box will be labeled on the outside top and inside lid for: 1) site; 2) date; 3) job number; 4) boring number; 5) run number; and 6) run interval. A diagram of core box labeling is included in Attachment 4.

The supervising geologist will be responsible for recording mechanical and geologic characteristics of the rock core. The mechanical characteristics will include: 1) penetration rates; 2) RQD (rock quality degree); 3) percent recovery; 4) water loss; 5) bit type and size.

A geologic classification will include the following parameters as applicable: 1) lithology; 2) color, 3) grain size and shape; 4) estimated percent porosity; 5) presence of interstitial water; 6) bedding planes or foliation; 7) mineralogy; 8) degree of crystallinity; 9) properties of joints and fractures; 10) nature of voids, vugs, cavities; 11) hardness; 12) degree of weathering; and 13) degree of solution enlargement. A rock core subsurface log is shown in Attachment 3 and a key to the subsurface log is shown in Attachment 5.

A supervising geologist will be responsible for documenting drilling events using the daily field log provided in Attachment 2. A documentation of drilling events will include: 1) start and finish dates of drilling; 2) name and location of project; 3) project number, client and site location; 4) sample number and depths; 5) type and size of samples; 6) depth to water; 7) type of drilling method; 8) size of casing; 9) names of contractor's drillers, inspectors or people on site; and 10) weather conditions.

V. Survey

A field survey control program will be conducted by a qualified survey crew using standard instrument survey techniques to document boring and coring locations to the State Plane Coordinate System of 1927 and the ground elevations to the National Geodetic Vertical Datum of 1929..

VI. Equipment Cleaning

Equipment cleaning will occur prior to use on the site, between each drilling location, and upon completion of the drilling prior to leaving the site. All drilling equipment and associated tools including augers, drill rods, sampling equipment, wrenches, core barrel, core rods and any other equipment or tools that may have come in contact with the soils and bedrock will be cleaned with high-pressure steam cleaning equipment using a tap water source. The drilling equipment will be cleaned for each boring or coring in an area designated by the supervising geologist.

ATTACHMENT 1

SUBSURFACE LOG

DEPTH (FT)	SAMPLES	SAMPLE NO	RECOVERY (FEET)	BLOW COUNTS (PER 6 IN.)	HNU	WELL COLUMN	GEOLOGIC COLUMN	DESCRIPTION

SURFACE ELEVATION ________

DATE STARTED ________

DATE COMPLETED ________

CLASSIFIED BY ________

PROJECT ________

PROJECT NO ________

NO. ________

SHEET ____ OF ____

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & GEOSCIENTISTS

DAILY FIELD REPORT
ATTACHMENT 2

DATE ____________

DAY

S	M	T	W	Th	F	S

PROJECT ____________

JOB NO. ____________

CLIENT ____________

CONTRACTOR ____________

PROJECT MANAGER ____________

WEATHER	Bright Sun	Clear	Overcast	Rain	Snow
TEMP.	To 32	32-50	50-70	70-85	85 up
WIND	Still	Moder	High	Report No.	
HUMIDITY	Dry	Moder	Humid		

AVERAGE FIELD FORCE

NAME			REMARKS

VISITORS

TIME	REPRESENTING	REPRESENTING	REMARKS

EQUIPMENT AT THE SITE

FIELD ACTIVITIES

PAGE 1 OF ____ PAGES

BY ____________ TITLE ____________

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & GEOSCIENTISTS

ATTACHMENT 3

SUBSURFACE LOG

DEPTH (FT)	SAMPLES	SAMPLE/RUN NO.	SOIL DATA			ROCK DATA				WELL COLUMN	GEOLOGIC COLUMN	SOIL/ROCK CLASSIFICATION	ROCK FEATURES
			RECOVERY (FT)	BLOWS / 6 IN.	HNU	FROM/TO	% RECOVERY	% RQD	AVERAGE RATE (MIN./FT.)				

SURFACE ELEVATION __________

DATE STARTED __________

DATE COMPLETED __________

CLASSIFIED BY __________

PROJECT __________

LOCATION __________

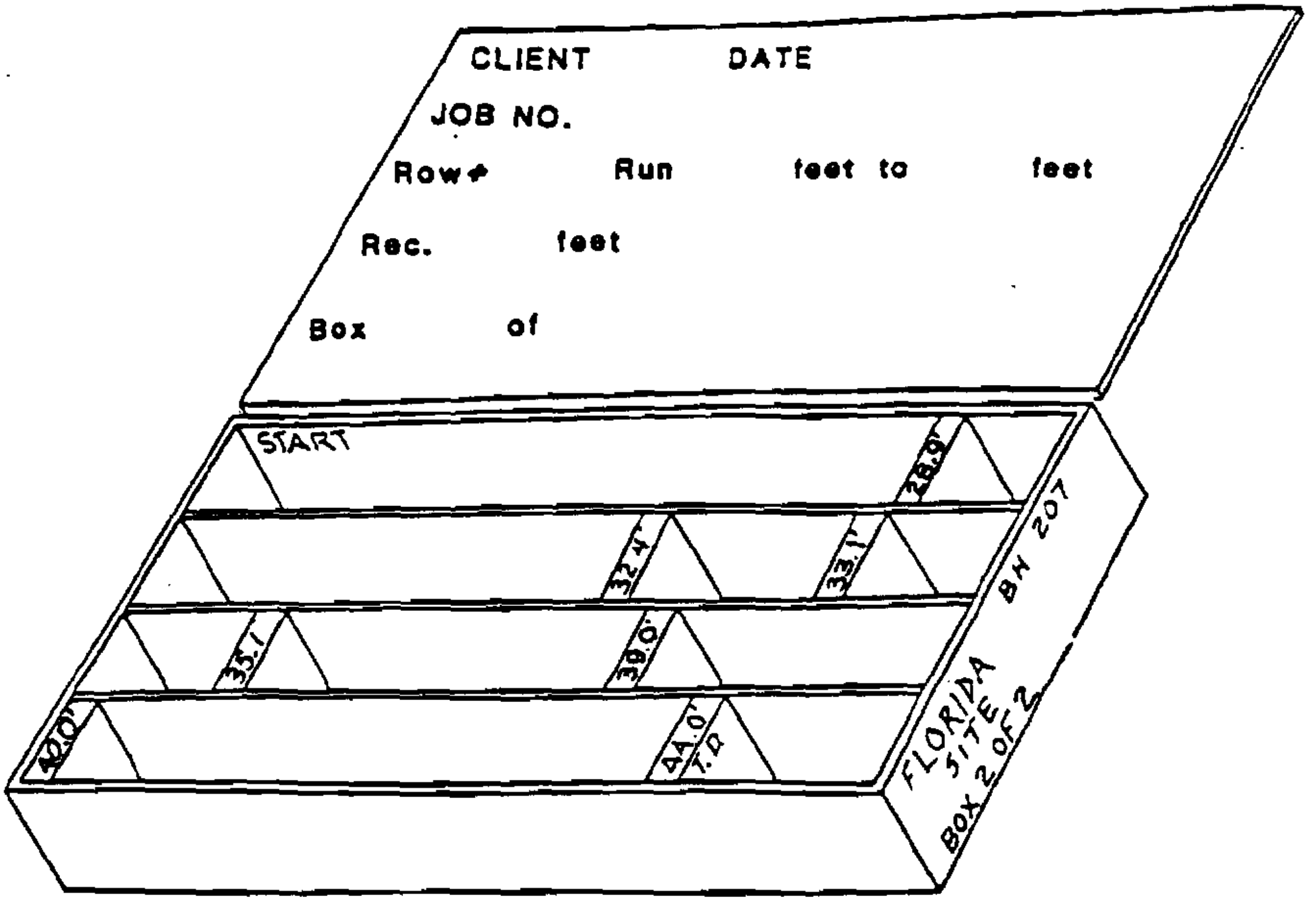
PROJECT NO. __________

SHEET _____ OF _____

BLASLAND & BOUCK ENGINEERS, P.C.

ATTACHMENT 4

SAMPLE CORE BOX LAYOUT



NOT TO SCALE

ATTACHMENT 5

KEY TO SUBSURFACE LOGS

Core Conditions

% Recovery - length of core recovered divided by length of core run.

RQD - Rock Quality Degree, a percent, the sum of the length of pieces four inches long or greater divided by the length of the core run.

Rock Hardness Scale

VERY HARD - surface cannot be scratched by a knife.

HARD - difficult to scratch with a knife.

MODERATELY HARD - surface is easily scratched by a knife. Difficult to scratch with a fingernail.

SOFT - surface is easily scratched by a fingernail.

Morphology

S - straight

C - curved

I - irregular

Surface Condition

1 - slick

2 - smooth

3 - rough

Core Descriptions

N° - angle of fracture surface from horizontal.

hf/ - horizontal fracture

vf/ - vertical fracture

wz - weathered zone

v - vuggy

bp/ - bedding plan

l/ - laminae

s/ - stylolite

/o - oxidized

/w - weathered

/is - iron stained

/s - solution enlargement

/p - solution enlargement with a patina

/m - mud in opening

/rm - red mud in opening

/gm - green mud in opening

/bkzn - broken zone

JxF - joint (fracture) crosses foliation

J||F - joint is parallel to foliation

U - joint in unfoliated rock

MB - mechanical break

APPENDIX I - MONITORING WELL INSTALLATION AND DEVELOPMENT PROCEDURES

I. Procedures - Monitoring Wells in Overburden

Soil borings will be completed using the hollow-stem auger drilling method prior to monitoring well completion. All monitoring wells will be constructed of PVC. Each monitoring well will have flush-joint threaded well screen and riser casing that will extend from the screened interval to 2 feet to 3 feet above existing grade. Monitoring wells will be constructed of 2-inch diameter screen and riser casing. Well screen slot sizes will be 0.010 inches in width. Well screens will be 5 to 10 feet in length. Well screens will be placed in zones visually determined to be the most permeable and/or in zones that correlate to the geologic units monitored and well screen locations at the existing wells.

Monitoring wells will be installed by placing the screen and casing assembly with bottom cap into the auger string once the screen interval has been selected. At that time, a washed silica sand pack will be placed in the annular space opposite the screen to 1 to 2 feet above the top of the screen. Bentonite pellets will then be added to the annulus between the casing and the borehole wall for at least two feet. A cement grout will then be added above the bentonite pellets during the extraction of the augers to ground surface. During placement of sand and bentonite, frequent measurements will be made to check the height of the sand pack and thickness of bentonite by a weighted tape measure.

A vented protective steel casing shall be located over the riser casing extending at least 1.5 feet below grade and 2 feet to 3 feet above grade secured by a neat Portland Cement seal. The cement seal shall extend laterally at least 1 foot in all directions from the protective casing and shall slope gently away to drain water away from the well. A vented slip-on steel cap will be fitted on and around the protective casing and a steel hasp shall be welded on one side of the steel casing so the cap may be secured with a padlock.

A typical monitoring well detail is shown on Figure 1. The supervising geologist shall specify the monitoring well designs to the drilling contractor before installation.

The supervising geologist is responsible for recording the exact construction details as relayed by the drilling contractor and actual measurements. Both the supervising geologist and drilling contractor are responsible for tabulating all materials used such as footage of casing and screen or bags of bentonite, cement, and sand.

II. Procedures - Monitoring Wells in Bedrock

Hollow-stem auger drilling will be used to drill through the overburden to the top of the bedrock and coring procedures will be used to drill in the bedrock as described in Appendix I. Monitoring wells will be set a minimum of 2 feet into the bedrock and grouted in place. These wells will be installed such that the zones monitored are those that are visually determined to be the most permeable and/or correlate to the monitored zones of existing wells. The wells will be advanced up to 10 feet into the first water-bearing zone.

All monitoring wells will be constructed of carbon steel. Single cased bedrock monitoring wells shall be installed with a 4-inch diameter steel casing from approximately 2 feet into bedrock to at least 2 feet above the ground surface. The annulus between the 4-inch casing and the rock hole wall will be tremie grouted with a neat Portland Cement. A locking well cover with a vented steel cap will be installed on the 4-inch casing. A surface seal will be constructed that will extend laterally at least 1 foot in all directions from the protective casing and slope gently outward to drain water away from the well.

A typical single cased bedrock monitoring well detail is shown on Figure 2. The supervising geologist shall specify the monitoring well design to the drilling contractor before installation.

The supervising geologist is responsible for recording the exact well details as relayed by the drilling contractor and measuring the actual details. Both the supervising geologist and drilling contractor are responsible for tabulating all well materials used such as footage of casing and bags of grout or cement.

Once bedrock is reached (determined by split-spoon refusal), a temporary 4-inch diameter casing will be set on the rock and sealed with bentonite. The bedrock will then be cored using NX coring equipment, and the retrieved rock cores will be characterized according to the protocols of Appendix I. The geologic characteristics of the overburden and the upper bedrock zone will be recorded by the on-site geologist on the subsurface log

III. Development

All monitoring wells will be developed or cleared of fine grain materials that may have settled in or around the screen during installation. Development will be accomplished by surging and evacuating water by bailing. The well will be developed until turbidity is reduced to 50 nephelometric turbidity units (NTUs) or less. In the event that the wells cannot be developed to 50 NTUs, development will proceed until three consecutive measurements of pH, conductivity, and temperature agree within 10 percent.

A. Materials for well development include:

- Appropriate Health and Safety Equipment
- Appropriate Cleaning Equipment
- Bottom Loading Bailer
- Polypropylene Rope
- Plastic Sheeting
- Nephelometric Turbidity Meter

B. The procedure for developing a well using the bailer method is outlined below:

1. Clean bailers using the following: soapy (Alconox) water wash, distilled water rinse, solvent rinse (methanol), and distilled water rinse.

2. Determine depth of well through examination of drilling log data and measure at least 10 feet greater of rope than the total depth of the well.

3. Secure one end of the rope to the well casing, secure the other end of the rope to the bailer. Test the knots and make sure the rope will not loosen. Check bailers to be sure all parts are intact and will not be lost in the well.

4. Lower bailer into well until bailer reaches total depth of the well.

5. Surge by raising and lowering the bailer at 2-foot intervals.

6. Lower bailer back into well and repeat raising and lowering at an interval two feet above the previously surged interval.

7. Repeat Step 6 through Step 7 until entire screen has been surged.

8. Discharge any evacuated water during the surging to the ground adjacent to the well.

IV. Survey

A field survey control program will be conducted by a qualified survey crew using standard instrument survey techniques to document the well location to the State Plane Coordinate System of 1927, as well as the ground, inner casing, and outer casing elevations to the National Geodetic Vertical Datum (NGVD) of 1929.

V. Equipment Cleaning

Drilling equipment and well materials (casing and screen) will be cleaned using high-pressure steam cleaning equipment using a tap water source. Drilling equipment will be cleaned prior to use on the site, between each monitoring well location, and at the completion of the drilling prior to leaving the site as discussed in Appendix N.

FIGURE 1

SHEET ____ OF ____

SUBSURFACE FIELD LOG
MONITORING WELL CONSTRUCTION DETAILS

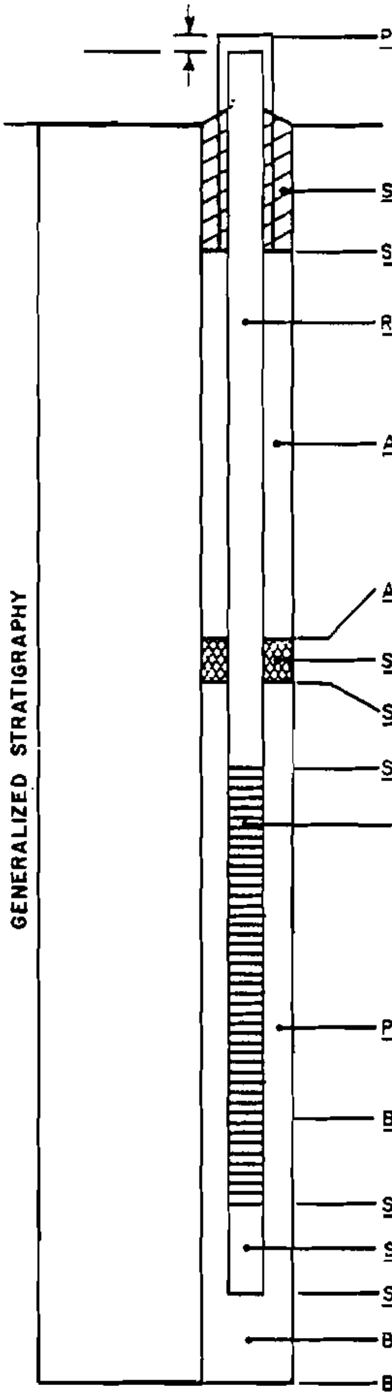
MONITORING WELL ________

PROJECT: ________

PROJECT NO.: ________

BY: ________

DATE: ________



PROTECTIVE CASING-MATERIAL ________

-HEIGHT ________

-DIAMETER ________

SURFACE SEAL-MATERIAL ________

SURFACE SEAL-DEPTH ________

RISER-MATERIAL ________

-DIAMETER ________

ANNULUS-MATERIAL ________

ANNULUS-DEPTH ________

SEAL-MATERIAL ________

SEAL-DEPTH ________

SCREEN-TOP ________

-MATERIAL ________

-SLOT SIZE ________

-LENGTH ________

PACK-MATERIAL ________

BORING-DIAMETER ________

SCREEN-DEPTH ________

SUMP-LENGTH ________

SUMP-DEPTH ________

BACKFILL-MATERIAL ________

BORING-DEPTH ________

WATER LEVEL UPON COMPLETION ________

DRILLER ________

METHOD ________

RIG TYPE ________

SAMPLING METHOD ________

DEVELOPMENT DATE ________

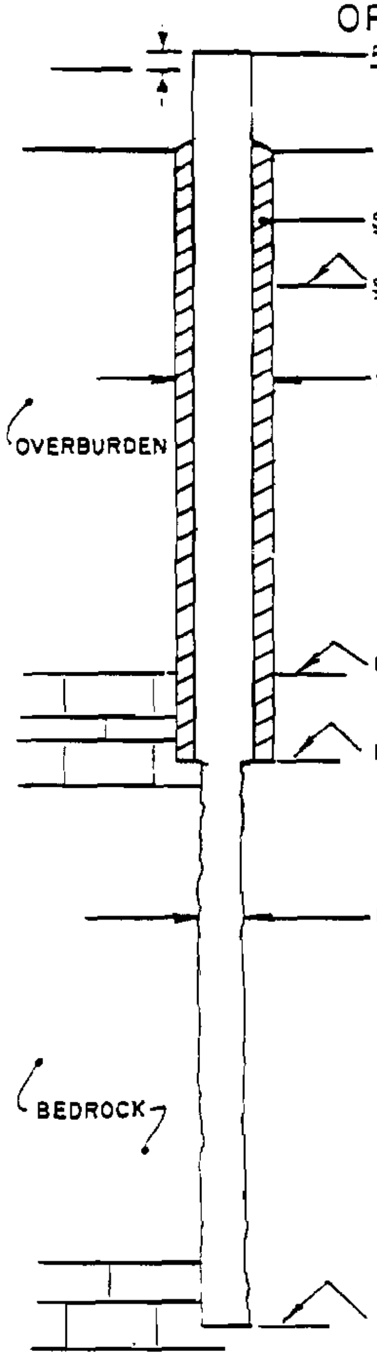
DEVELOPMENT METHOD ________

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & GEOSCIENTISTS

FIGURE 2

SHEET ______ OF ______

SUBSURFACE FIELD LOG
MONITORING WELL CONSTRUCTION DETAILS
OPEN HOLE WELL (SINGLE CASED)



WELL NO ______

PROJECT ______

PROJECT NO ______

BY: ______

DATE ______

PROTECTIVE CASING-MATERIAL ______

-HEIGHT ______

-DIAMETER ______

SURFACE SEAL-MATERIAL ______

SURFACE SEAL-DEPTH ______

SURFACE SEAL-DIAMETER ______

DEPTH TO BEDROCK ______

PROTECTIVE CASING DEPTH ______

BORING DIAMETER ______

BORING DEPTH ______

WATER LEVEL UPON COMPLETION ______

DRILLER ______

METHOD ______

RIG TYPE ______

SAMPLING METHOD ______

DEVELOPMENT DATE ______

DEVELOPMENT METHOD ______

BLASLAND & BOUCK ENGINEERS, P.C.

APPENDIX J - WATER LEVEL MEASUREMENT PROCEDURES

I. Introduction

Water levels will be measured using an electric well probe. Water levels readings will be made twice at each location.

II. Materials

- Photoionization detector (PID).
- Appropriate health and safety equipment as specified in the Health and Safety Plan.
- Water Level Probe.
- Laboratory-type Soap (Alconox or equivalent).
- Distilled water.
- Plastic sheeting.

III. Procedures

A. A detailed procedure for obtaining water levels will be as follows:

1. Identify site and well number on Water Level Records Log (Attachment 1) along with date, time, personnel and weather conditions.

2. Don safety equipment as specified in the Health and Safety Plan.

3. Clean the water level probe and cable with a soapy (Alconox) water rinse followed by a distilled water rinse. Discard rinse water adjacent to each well.

4. Put clean plastic sheeting on the ground next to the well.

5. Establish a background reading with the PID.

6. Unlock and open the well cover while standing up wind from the well. Place the well cap on the plastic sheeting. Monitor the air in the breathing zone above the well casing with the PID. If the meter reads greater than 1 ppm meter units, move up wind from the well and allow the air inside the casing to vent for approximately 5 minutes. Repeat PID reading. If above 1 ppm, follow instructions in the Health and Safety Plan.

7. Locate a measuring reference point on the well casing. If one is not found, initiate a reference point by notching the inner casing (or outer if an inner casing is not present) casing with a hacksaw. All down hole measurements will be taken from one reference point (RP) established at each well on the inner casing (on the outer only if an inner casing is not present). Document the RP established in the Comments column of the Water Level Records log.

8. Measure to the nearest hundredth of a foot and record the height of the inner and outer casing from reference point to ground level.

9. Lower the water level indicator probe until it indicates the top of water. Measure to the nearest hundredth foot and record the depth to water from the reference point.

10. Lower the water level recorder to bottom of well. Measure to the nearest hundredth of a foot and record the depth of the well from the reference point.

11. Remove probe from the well.

12. Repeat Step 9 and record.

13. Clean the instrument with a soapy (Alconox) water rinse followed by a distilled water rinse. Discard rinse water on the ground adjacent to the well.

14. Compare depth of well to previous records.

15. Lock the well when all activities are completed.

ATTACHMENT 1

WATER LEVEL RECORDS

Site ______________________

Date ______________________

Job Title ______________________

Job No. ______________________

Sheet _____ of _____

Well No.	Stickup	Well Depth	Water Depth	Water Elev.	Time	Comments	By

BLASLAND & BOUCK ENGINEERS, P.C.

APPENDIX K - GROUND-WATER SAMPLING PROCEDURES FOR MONITORING WELLS

I. Introduction

This protocol describes the procedures to be used to collect ground-water samples. No wells will be sampled until well development has been performed. During precipitation events, ground-water sampling will be discontinued until precipitation ceases.

II. Materials

The following materials, as required, shall be available during ground-water sampling:

- Photoionization detector (PID) - HNU or equivalent
- Appropriate health and safety equipment as specified in the Health and Safety Plan.
- Plastic sheeting (for each sampling location)
- Disposable teflon bailers
- Polypropylene rope
- Buckets to measure purge water
- Water level well probe
- 6-foot rule with gradation in hundredths of a foot
- Conductivity/temperature meter
- Dissolved oxygen meter
- pH meter
- Appropriate water sample containers
- Appropriate blanks (trip)
- Appropriate transport containers (coolers) with ice and appropriate labeling, packing, and shipping materials
- Ground-water sampling logs
- Chain-of-Custody forms
- Indelible ink pens
- Site map with well locations and ground-water contours maps
- Keys to wells

III. Procedures

A. The procedures to sample monitoring wells will be as follows:

1. Review materials check list (Part II) to ensure the appropriate equipment has been acquired.

2. Identify site and well sampled on sampling log sheets, along with date, arrival time, and weather conditions. Identify the personnel and equipment utilized and other pertinent data requested on the logs (Attachment 1).

3. Label all sample containers using the label in Attachment 2 according to the procedures in Section 3 and Appendix L.

4. Don safety equipment, as required in the Health and Safety Plan.

5. Place plastic sheeting adjacent to well to use as a clean work area.

6. Establish the background reading with the PID and record the reading on the field log (Attachment 1).

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

8. Unlock and open the well cover while standing upwind of the well. Remove well cap and place on the plastic sheeting. Insert PID probe in the breathing zone above the well casing. Proceed if PID reading is below 1 ppm. If PID reading is above 1 ppm, move upwind from well 5 minutes to allow the well headspace volatiles to dissipate. Repeat PID reading. If above 1 ppm, follow instructions in the Health and Safety Plan.

9. Set out on plastic sheeting the dedicated sampling device (stored in the well above the water surface) and meters.

10. Obtain a water level depth and bottom of well depth following the procedures in Appendix K using an electric well probe and record on sampling log sheet. Clean the well probe after each use with a soapy (Alconox) water wash and a distilled water rinse. [Note: water levels may be measured at all wells prior to initiating any sampling activities].

11. Calculate the number of gallons of water in the well using the length of water column (in feet) and the table found in Attachment 3. Record the well volume on the groundwater sampling field log.

12. Remove the required purge volume of water from the well (measure purge water volume in measuring buckets). The required purge volume shall be three well volumes, unless the well runs dry, in which case the water that comes into the well will be sampled (RCRA Ground-Water Monitoring Technical Enforcement Guidance Document, EPA, September 1986). Dispose of purge water on the ground adjacent to the well.

13. After the appropriate purge volume of ground water in the well has been removed or if the well has been bailed dry and allowed to recover, obtain the ground water sample needed for analysis with a bailer and pour the ground water directly from the sampling device in the appropriate container and tightly screw on the caps.

14. For samples requiring filtration, pour ground water from the bailer into a pre-cleaned glass bowl. Using a peristaltic pump, dedicated or pre-cleaned tubing, and dedicated 0.45 micron in-line filter, pump the sample from the bowl into the sample container.

15. Place the custody seal around the cap and the sampler container. Note the time on the sample label. Secure with packing material and store at 4°C on wet ice in an insulated transport container provided by the laboratory as discussed in Appendix L.

16. After all sampling containers have been filled, remove an additional volume of ground water. Check the calibration of the pH meter (Appendix G) and then measure and record on the field log physical appearance, pH, temperature, dissolved oxygen, and conductivity following the procedures provided in Appendix G. Dispose of this ground water on the ground adjacent to the well.

17. Cap and lock well.

18. Record the time sampling procedures were completed on the field logs.

19. Place all disposable sampling materials (plastic sheeting, bailer, and health and safety equipment) in an appropriately marked 55-gallon container at the site. At the end of the Phase I RI, the contents will be disposed of in an appropriate manner. Go to next well and repeat Step 1 through Step 17 until all wells are sampled.

20. Complete the procedures for packaging, shipping, and handling with associated chain-of-custody according to the procedures in Section 4 and Appendix L.

ATTACHMENT 1

GROUND-WATER SAMPLING FIELD LOG

Project ______________________________
Sampling Purpose ____________________
Well No. ____________________________
Key No. _____________________________
HNU Background ______ Well __________

Project No.____________________________
Site Name______________________________
Sampling Personnel ____________________
Date/Time ____ In ____ Out ____________
Weather _______________________________

I. Well Information

Reference Point Marked
on Casing Y N
Well Diameter ____ ID ____ OD
Well depth ________ from RP
Water table depth _____ from RP
Slug test Y N

Length of Inner Casing
____ above grade
Length of Outer Casing
____ above grade
Redevelop Y N

II. Well Water Information

Length of water column ____________________________
Volume of water in well ___________________________
Volume of bailer __________________________________

III. Evacuation Information

Volume of water removed
from well ____________
Did well go dry? Y N

Evacuation method
Bailer ( )
Evacuation rate ______________

IV. Well Sampling

Container	Preservative	Time Sampled	Lab Sample No.	Analysis

V. Ground-Water Characteristics/After Well Evacuation

Temperature ______
Conductivity ______
pH ______

Film ______
Redline? Y N
____ 10; ____ 4; ____ 7
(calibration standard readings)

VI. Miscellaneous Observations/Problems

VII. Sample Destination

Laboratory Via ________ By _________

____
Field Personnel

ATTACHMENT 2

SAMPLE LABEL

BLASLAND & BOUCK
ENGINEERS, P.C.

PROJECT #

SAMPLE I.D.

DATE

SAMPLE TYPE

COLLECTION MODE
☐ Composite
☐ Grab

TIME

ANALYSIS

SAMPLER(S)

PRESERVATIVE

ATTACHMENT 3

Volume In Gallons for Various Well Diameters and Feet of Water In Well

Feet of Water	Casing diameter (inches)							
	1.50	2.00	3.00	4.00	6.00	8.00	10.00	12.00
1	0.09	0.16	0.37	0.65	1.47	2.61	4.08	5.87
2	0.18	0.33	0.73	1.31	2.94	5.22	8.16	11.75
3	0.28	0.49	1.10	1.96	4.41	7.83	12.24	17.62
4	0.37	0.65	1.47	2.61	5.87	10.44	16.32	23.50
5	0.46	0.82	1.84	3.26	7.34	13.06	20.40	29.37
6	0.55	0.98	2.20	3.92	8.81	15.67	24.48	35.25
7	0.64	1.14	2.57	4.57	10.28	18.28	28.56	41.12
8	0.73	1.31	2.94	5.22	11.75	20.89	32.64	47.00
9	0.83	1.47	3.30	5.87	13.22	23.50	36.72	52.87
10	0.92	1.63	3.67	6.53	14.69	26.11	40.80	58.75
11	1.01	1.80	4.04	7.18	16.16	28.72	44.88	64.62
12	1.10	1.96	4.41	7.83	17.62	31.33	48.96	70.50
13	1.19	2.12	4.77	8.49	19.09	33.94	53.04	76.37
14	1.29	2.28	5.14	9.14	20.56	36.55	57.12	82.25
15	1.38	2.45	5.51	9.79	22.03	39.17	61.20	88.12
16	1.47	2.61	5.87	10.44	23.50	41.78	65.28	94.00
17	1.56	2.77	6.24	11.10	24.97	44.39	69.36	99.87
18	1.65	2.94	6.61	11.75	26.44	47.00	73.43	105.75
19	1.74	3.10	6.98	12.40	27.91	49.61	77.51	111.62
20	1.84	3.26	7.34	13.06	29.37	52.22	81.59	117.50
21	1.93	3.43	7.71	13.71	30.84	54.83	85.67	123.37
22	2.02	3.59	8.08	14.36	32.31	57.44	89.75	129.25
23	2.11	3.75	8.44	15.01	33.78	60.05	93.83	135.12
24	2.20	3.92	8.81	15.67	35.25	62.66	97.91	140.99
25	2.29	4.08	9.18	16.32	36.72	65.28	101.99	146.87
26	2.39	4.24	9.55	16.97	38.19	67.89	106.07	152.74
27	2.48	4.41	9.91	17.62	39.65	70.50	110.15	158.62
28	2.57	4.57	10.28	18.28	41.12	73.11	114.23	164.49
29	2.66	4.73	10.65	18.93	42.59	75.72	118.31	170.37
30	2.75	4.90	11.02	19.58	44.06	78.33	122.39	176.24
31	2.85	5.06	11.38	20.24	45.53	80.94	126.47	182.12
32	2.94	5.22	11.75	20.89	47.00	83.55	130.55	187.99
33	3.03	5.39	12.12	21.54	48.47	86.16	134.63	193.87
34	3.12	5.55	12.48	22.19	49.94	88.77	138.71	199.74
35	3.21	5.71	12.85	22.85	51.40	91.39	142.79	205.62
36	3.30	5.87	13.22	23.50	52.87	94.00	146.87	211.49
37	3.40	6.04	13.59	24.15	54.34	96.61	150.95	217.37
38	3.49	6.20	13.95	24.80	55.81	99.22	155.03	223.24
39	3.58	6.36	14.32	25.46	57.28	101.83	159.11	229.12
40	3.67	6.53	14.69	26.11	58.75	104.44	163.19	234.99
41	3.76	6.69	15.05	26.76	60.22	107.05	167.27	240.87
42	3.86	6.85	15.42	27.42	61.69	109.66	171.35	246.74
43	3.95	7.02	15.79	28.07	63.15	112.27	175.43	252.62
44	4.04	7.18	16.16	28.72	64.62	114.88	179.51	258.49
45	4.13	7.34	16.52	29.37	66.09	117.50	183.59	264.37
46	4.22	7.51	16.89	30.03	67.56	120.11	187.67	270.24
47	4.31	7.67	17.26	30.68	69.03	122.72	191.75	276.11
48	4.41	7.83	17.62	31.33	70.50	125.33	195.83	281.99
49	4.50	8.00	17.99	31.99	71.97	127.94	199.91	287.86
50	4.59	8.16	18.36	32.64	73.43	130.55	203.99	293.74

APPENDIX L - SAMPLE PACKING, HANDLING, AND SHIPPING PROCEDURES

I. Handling

1. Fill in sample label (Attachment 1) with:
    a. Sample type (soil, sediment, surface water, ground water);
    b. Project number and site name;
    c. Sample identification code and other sample identification information, if applicable;
    d. Analysis required;
    e. Date;
    f. Time sampled;
    g. Name, affiliation, and contact phone number;
    h. Sample type (composite or grab); and
    i. Preservative added, if applicable.
2. Cover the label with clear packing tape to secure the label onto the container.
3. Check the caps on the sample containers to ensure that they are tightly sealed.
4. Mark the level of the sample in the container using an indelible ink marker or grease pencil.
5. Wrap the sample container cap with clear packing tape to prevent it from becoming loose.
6. Place a signed custody seal label (Attachment 2) over the cap such that the cap cannot be removed without breaking the custody seal.
7. Initiate chain-of-custody by designated sampling personnel responsible for sample custody (Attachment 3) (after sampling or prior to sample packing). Note: If the designated sampling person relinquishes the samples to other sampling or field personnel for packing or other purposes, the samplers will complete the chain-of-custody prior to this transfer. The appropriate personnel will sign and date the chain-of-custody form to document the sample custody transfer.

II. Packing

1. Using duct tape, secure the outside and inside of the drain plug at the bottom of the cooler that is used for sample transport.
2. Place each sample container or package in individual polyethylene bags (Ziploc^R-type) and seal.
3. Place one to two inches of vermiculite at the bottom of the cooler as a cushioning material.

4. Package the sealed sample containers upright in the cooler.

5. Repackage ice (if required) in small Ziploc^R-type plastic bags and place loosely in the cooler. Do not pack ice so tightly that it may prevent addition of sufficient cushioning material.

6. Fill the remaining space in the cooler with vermiculite.

7. Place the completed chain-of-custody forms (Attachment 3) in a large Ziploc^R-type bag and tape the forms to the inside of the cooler lid.

8. Close the lid of the cooler and fasten with duct tape.

9. Wrap strapping tape around both ends of the cooler at least twice.

10. Mark the cooler on the outside with the following information: shipping address, return address, "Fragile" labels (Attachment 4) on the top and on one side, and arrows indicating "This Side Up" (Attachment 4) on two adjacent sides.

11. Place custody seal evidence tape (Attachment 4) over front right and back left of the cooler lid and cover with clear plastic tape.

III. Shipping

1. All samples will be hand delivered or delivered by an express carrier within 48 hours or less from the date of sample collection.

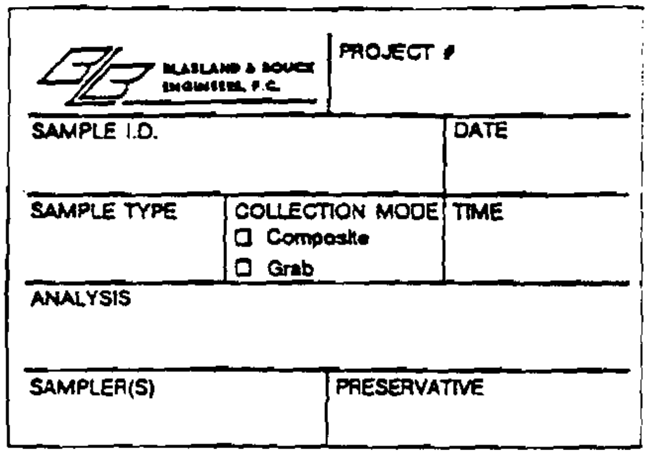
2. The following chain-of-custody procedures will apply to sample shipping:

   a. Relinquish the sample containers to the laboratory via express carrier. The signed and dated forms should be included in the cooler. The express carrier will not be required to sign the chain-of-custody forms. The sampler should retain the express carrier receipt or bill of lading.

   b. When the samples are received by the laboratory, the laboratory personnel shall complete the chain-of-custody forms by recording receipt of samples, measure and record the internal temperature of the shipping container, and then check the sample identification numbers on the containers to the chain-of-custody forms.

ATTACHMENT 1

SAMPLE LABEL



BLASLAND & BOUCK ENGINEERS, P.C.

PROJECT #

SAMPLE I.D.

DATE

SAMPLE TYPE

COLLECTION MODE
☐ Composite
☐ Grab

TIME

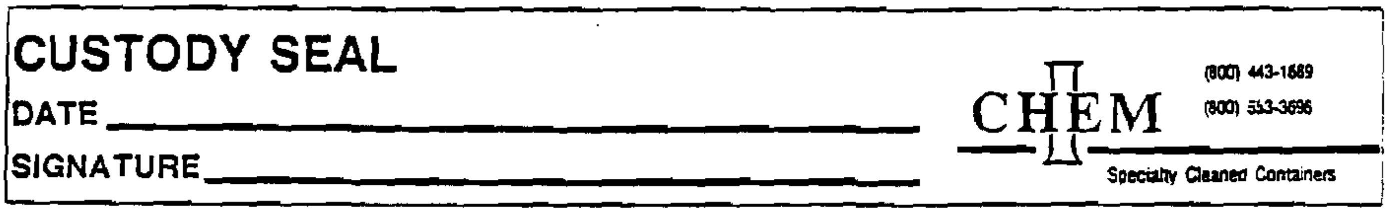
ANALYSIS

SAMPLER(S)

PRESERVATIVE

ATTACHMENT 2

CUSTODY SEAL LABEL



CUSTODY SEAL

DATE ____________________

SIGNATURE ____________________

CHEM

(800) 443-1689

(800) 553-3696

Specialty Cleaned Containers

ATTACHMENT 3

BLASLAND & BOUCK
ENGINEERS, P.C.

CHAIN OF CUSTODY RECORD

PROJ. NO.
PROJECT NAME
SAMPLERS: *(Signature)*

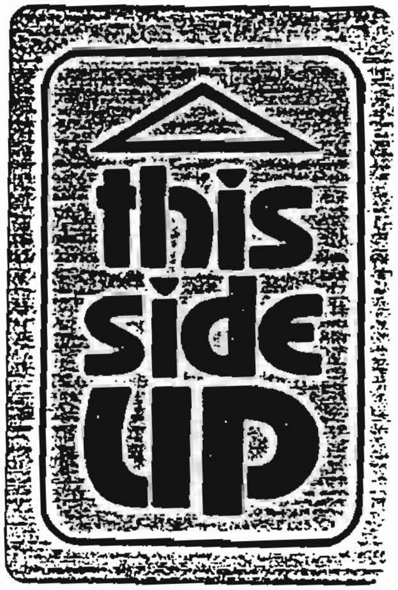
STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS							REMARKS

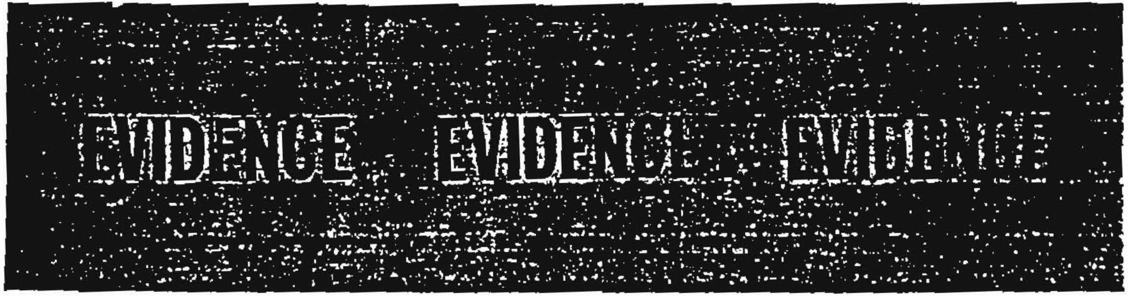
Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
Relinquished by: *(Signature)*	Date / Time	Received for Laboratory by: *(Signature)*	Date / Time	Remarks	

Distribution: Original Accompanies Shipment; Copy to Coordinator [illegible] Files

ATTACHMENT 4

PACKING LABELS





APPENDIX M - EQUIPMENT DECONTAMINATION AND CLEANING PROCEDURES

I. Introduction

This appendix presents procedures which will be used to decontaminate equipment used to collect soil and ground-water samples. In addition, the appendix presents the protocols to be followed in cleaning equipment used to excavate test pits and install monitoring wells. The adequacy of cleaning procedures will be monitored through the collection of QA/QC rinse blank samples which will be submitted for laboratory analysis.

II. Sampling Equipment Decontamination

The equipment to be used for the collection of ground water and soil samples (i.e., bailers, split-spoon samplers, etc.) will be decontaminated prior to each use to mitigate the potential for cross-contamination of the samples. The decontamination procedure to be utilized for samples which do not contain metals will include the following steps:

1. Non-phosphate detergent solution wash.
2. Distilled water rinse.
3. Methanol rinse.
4. Distilled water rinse.
5. Allow to air-dry.

For samples containing metals, the decontamination procedure will include the following steps:

1. Non-phosphate detergent solution wash.
2. Tap water rinse.
3. 10 percent nitric acid rinse.
4. Distilled water rinse.
5. Methanol rinse.
6. Hexane rinse.
7. Distilled water rinse.
8. Allow to air-dry.

III. Drilling and Test Pit Excavation Equipment Cleaning

In addition to the above-discussed decontamination procedures, the drilling rig and all downhole equipment associated with the drilling of soil borings and the installation of monitoring wells will be steam cleaned prior to arrival on site and between each drilling location. The bucket of the backhoe used to excavate test pits will also be steam cleaned prior to arrival on site and between test pit locations (if necessary, as determined by the on-site engineer).

APPENDIX N

PACKER TEST PROCEDURES

I. Introduction

Packer testing is a method used to estimate the hydraulic conductivity of discrete bedrock zones within an open-rock corehole or open-rock well/piezometer. A packer test involves tightly sealing off a selected interval in the rock hole, pumping clean water into the test interval under a specified head for a specified duration, and recording the volume of water pumped into the formation during the test duration. To allow interpretation of the flow characteristics (e.g., laminar or turbulent), the rock fracture response (e.g., dilation, wash-out, or void filling) and the representative conductivity value for the tested rock interval, five test increments are performed at three different head conditions. The hydraulic conductivity is calculated based on the observed test pumping rates, the total applied head values, the geometry of the tested interval, and the pattern of pumping rates achieved during each of the five test increments.

II. Materials

The equipment used for packer testing consists of two assemblies:

1. A packer apparatus consisting of inflatable rubber packer(s) and a length of perforated pipe; and
2. A water system, including a water meter, pressure gauge and valves to adjust and maintain the water pressure and flow (Figure 1).

III. Packer Apparatus Configurations

Either single-packer or double-packer configurations may be used to perform the packer test. A single-packer test configuration is shown in Figure 2. The single-packer test typically is performed after each core run during the drilling of corehole. The packer is seated at the top of the interval of rock core just removed, and the newly exposed section of rock is tested. To remove sediment from the corehole wall, the corehole may be bailed, surged, or swabbed prior to packer testing. The test should not be initiated, however, until the water level in the drill casing returns to the static level.

Single-packer tests may provide more reliable results than double-packer tests because if water leaks past a single, upper packer, the leak may be discerned by the recognition of a rising water level in the corehole or drill casing above the packer or by the appearance of water in the casing at the ground surface. In contrast, if a double-packer configuration is used, leakage past the lower packer may enter a permeable corehole section below the lower packer without being recognized as leakage.

The double-packer configuration (Figure 3) is used if discrete rock intervals are to be tested in a previously-drilled, long open corehole. Two packers are placed into the corehole and inflated with the perforated portion of the pipe between the packers. The spacing between the packers, corresponding to the test interval length, typically is 5 to 10 feet. Specified rock intervals are tested starting from the bottom of the hole and working upwards at intervals selected by the supervising geologist/engineer.

IV. Water System

The water system typically is assembled in the general scheme shown on Figure 1. A bypass valve and line are connected to the main water line before the water meter valve. The purposes of the bypass valve are (1) to dampen the surge of water produced by the action of the pump, thus providing a relatively constant flow rate and water pressure; and (2) to allow a pressure bypass so that relatively low pressures may be applied to the tested rock interval, if appropriate. A surge suppression tank may also be plumbed into the water system before the bypass line to help dampen pump surge affects.

A water meter valve and the water meter follow the bypass valve and line. Flow to the tested rock interval passes through the water meter valve and is recorded by the water meter. The bypass and water meter valves are used simultaneously to maintain the water in the line at the desired pressure. The maximum water pressure for a particular pumping rate is achieved with the meter valve fully opened and the bypass valve fully closed. The bypass valve should be used as much as possible, however, to utilize its surge damping effect.

The remainder of the water system apparatus consists of a check valve, a relief valve and line, a water pressure gauge, and finally a length of riser pipe connecting the perforated pipe and packer assembly to the water supply apparatus. The pressure gauge indicates the water pressure in the apparatus at that location, rather than the pressure applied to the tested rock interval. The total head applied during a test consists of the gauge pressure plus the elevation head (the vertical distance between the pressure gauge and the static water level in the corehole), minus the frictional head loss between the pressure gauge and the perforated pipe where the water exits the apparatus and enters the tested rock interval. The magnitude of frictional head loss depends on the length of riser pipe used and the pumping rate, and is best determined empirically by calibrating the test assembly in the field. Alternately, frictional losses may be estimated based a hydraulics equation such as the Hazen-Williams equation (Meritt, 1983), which relates head loss to pipe geometry and flow rate.

V. Packer Test Apparatus Calibration

The frictional head loss in the riser pipe assembly should be determined in the field by a calibration process to obtain a reliable estimate of the total head applied to the test interval. The calibration is performed by pumping water through the apparatus at a constant pressure and flow rate for a specified duration, typically a few minutes. The gauge pressure, total flow volume, pumping duration, and riser pipe length are recorded, and the procedure is repeated at a different flow rate. The process is repeated at several flow rates that span the representative range of flow rates achievable by the pump.

The calibration is performed with the water system and packer apparatus laid out horizontally along the ground surface. The packer(s) remain deflated during the calibration procedure to avoid rupturing. The perforated section of pipe is supported slightly above the ground surface so that water may drain freely during pumping through the test assembly. The perforated pipe section and the pressure gauge are situated at approximately equal elevation during the calibration to eliminate the elevation head between the pressure gauge and the perforated pipe section. Because the elevation head is zero, the pressure gauge measurements obtained during calibration indicate only the frictional head loss in the pipe assembly.

The calibration process should be repeated and a separate set of gauge pressure versus pumping rate data generated for each total length of riser pipe used during actual packer testing. The calibration procedure may be performed after the appropriate riser-pipe lengths are identified by the performance of packer tests. The data of gauge pressure versus pumping rate are later plotted on an X-Y axis. A best-fit power-law regression curve is calculated for each data set to determine the mathematical relationship between pumping rate and frictional loss. During hydraulic conductivity calculation, frictional head loss for each observed flow rate is estimated from the plot of calibration data corresponding to the length of riser pipe used during the test.

VI. Test Gauge Pressure Calculation

Appropriate test pressures to be used during each of the five test increments are calculated as follows:

1. Calculate the maximum gauge pressure, to be used during test increment #3 as:

   P_3 (psi) = 0.75 x Depth of Test Section Midpoint (feet)

2. Calculate the gauge pressures to be used during the other test increments as:

   $P_1 = P_5 = 0.4 \times P_3$; and
   $P_2 = P_4 = 0.7 \times P_3$.

VII. Packer Test Procedures

Prior to testing a given rock interval, the corehole identification number, the depth of the test interval, the static depth to water in the corehole, the gauge height above ground surface, and the length of riser pipe used in the apparatus are recorded on a packer test data log (Figure 4 or equivalent). After the packer(s) have been seated at the desired interval, the remainder of the test is performed as follows:

1. Open the bypass valve completely with the water meter valve closed.

2. Start the pump or open other water supply.

3. Open the meter valve slowly to allow water to flow and pressure to build. If this valve is completely opened and additional pressure is still needed, it may be obtained by slowly closing off the bypass valve, thus forcing more water through the water meter valve.

4. After the desired pressure for a desired given test increment has been achieved, record the time and volume from the totalizing water meter.

5. To perform a test increment, record the water meter reading at one minute intervals for 5 to 10 minutes of continuous pumping. Check the gauge to ensure the pressure remains constant throughout the test increment, and adjust the flow valves as needed to maintain constant pressure.

6. Adjust the valves in the water system to achieve the calculated appropriate pressure for the next test increment, and repeat steps #4 and #5.

7. If the appropriate test interval gauge pressure can not be achieved due to a highly-permeable tested rock interval, the maximum achievable gauge pressure and the pumping rate data for the five minute test increment should be recorded.

8. The packer test for a given rock interval is complete after all five test increments have been performed.

9. Record the test data on the form presented on Figure 4 or an equivalent packer test data log.

VII. Packer Test Data Reduction

Packer test data are reduced to develop estimates of hydraulic conductivity for each tested interval based on standard data reduction procedures (United States Bureau of Reclamation, 1974; Houlsby, 1976). Data are entered into an automatic packer-test data reduction spreadsheet program developed at Blasland & Bouck. An example of the spreadsheet is shown in Figure 5.

The spreadsheet calculates the hydraulic conductivity from each of the five test increments for each tested rock interval as:

$$K = Cp\ Q/H,$$

where:

K = hydraulic conductivity (feet per year)
Q = flow rate (gallons per minute)
H = total head applied during test (feet)
Cp = packer coefficient

Based on equations published in the Earth Manual (United States Bureau of Reclamation, 1974), the packer coefficient can be calculated from:

$$Cp=[70267\ \ln(L/r)]\ /\ 2\pi L,$$

where:

L = length of the tested rock interval (feet); and
r = radius of tested rock corehole (feet).

In addition to the hydraulic conductivity value, the packer test reduction spreadsheet calculates a Ludgeon value (Houlsby, 1976) for each of the five test increments. The five Ludgeon values are evaluated to interpret the type of flow and rock formation response and the most representative calculated hydraulic conductivity value for the tested rock interval from the following list:

(1) Laminar Flow

Indication:	Lugeon values are approximately equal;
Conductivity:	Average of values from five test increments;

(2) Turbulent Flow

Indication:	Lugeon value from increment #3 is less than those from the lower pressure increments, which are approximately equal in value;
Conductivity:	Value from increment #3;

(3) Dilation of Rock Fractures

Indication:	Lugeon value from increment #3 is greater than those from the lower pressure increments which are approximately equal in value;
Conductivity:	Average value from increments #1 and #5;

(4) Wash-out of Fracture Filling Materials

Indication:	Progressive increase in five Ludgeon values without any return to lower values during increments #4 and #5;
Conductivity:	Value from increment #1;

(5) Void Filling

Indication:	Progressive decrease in five Ludgeon values without any return to values during increments #4 and #5;
Conductivity:	Value from increment #5.

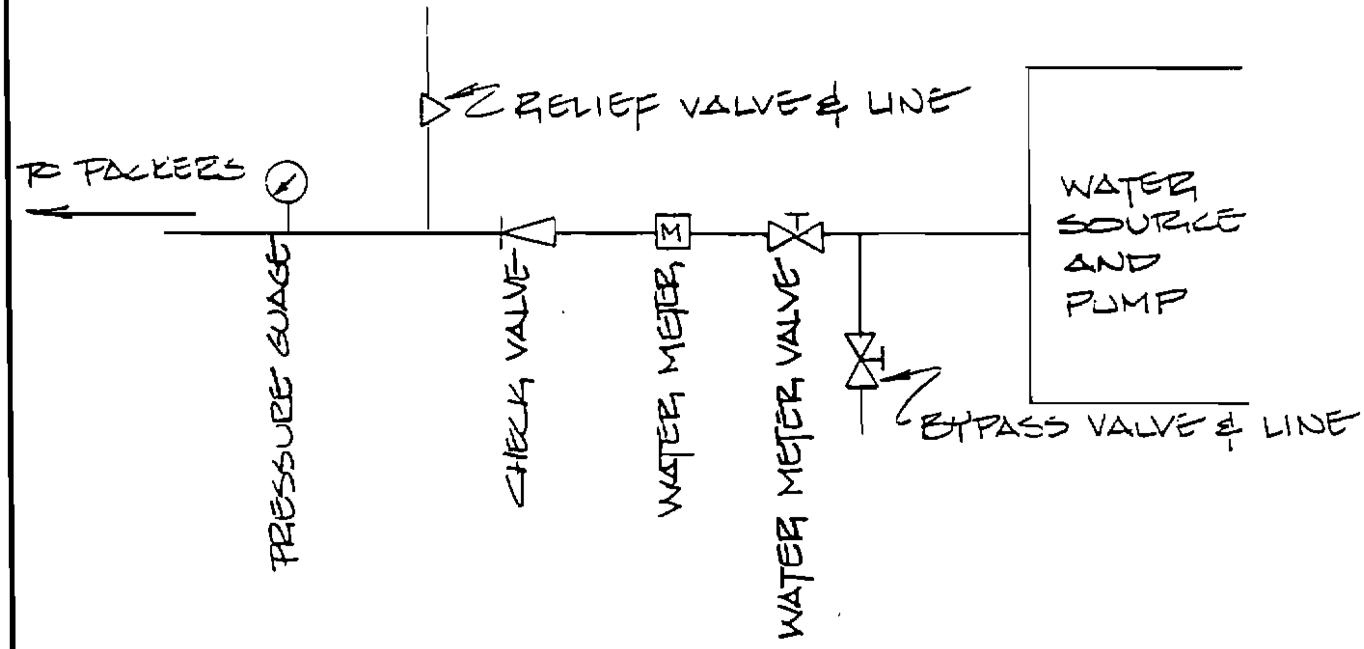
REFERENCES

Houlsby, A.C., 1976, Routine Interpretation of the Ludgeon Water-Test, Q. Jl. Engng. Geol., Vol. 9, pp. 303-313.

Meritt, F.S., 1983, Standard Handbook for Civil Engineers, McGraw-Hill, New York.

United States Bureau of Reclamation, 1974, Earth Manual, 2nd Edition, Department of the Interior, Denver, Colorado, pp. 573-578.

FIGURE 1



GENERAL WATER SYSTEM LAYOUT

BLASLAND & BOUCK
ENGINEERS, P.C.

FIGURE 2

SINGLE PACKER TEST DETAILS

PROJECT NAME ____________________

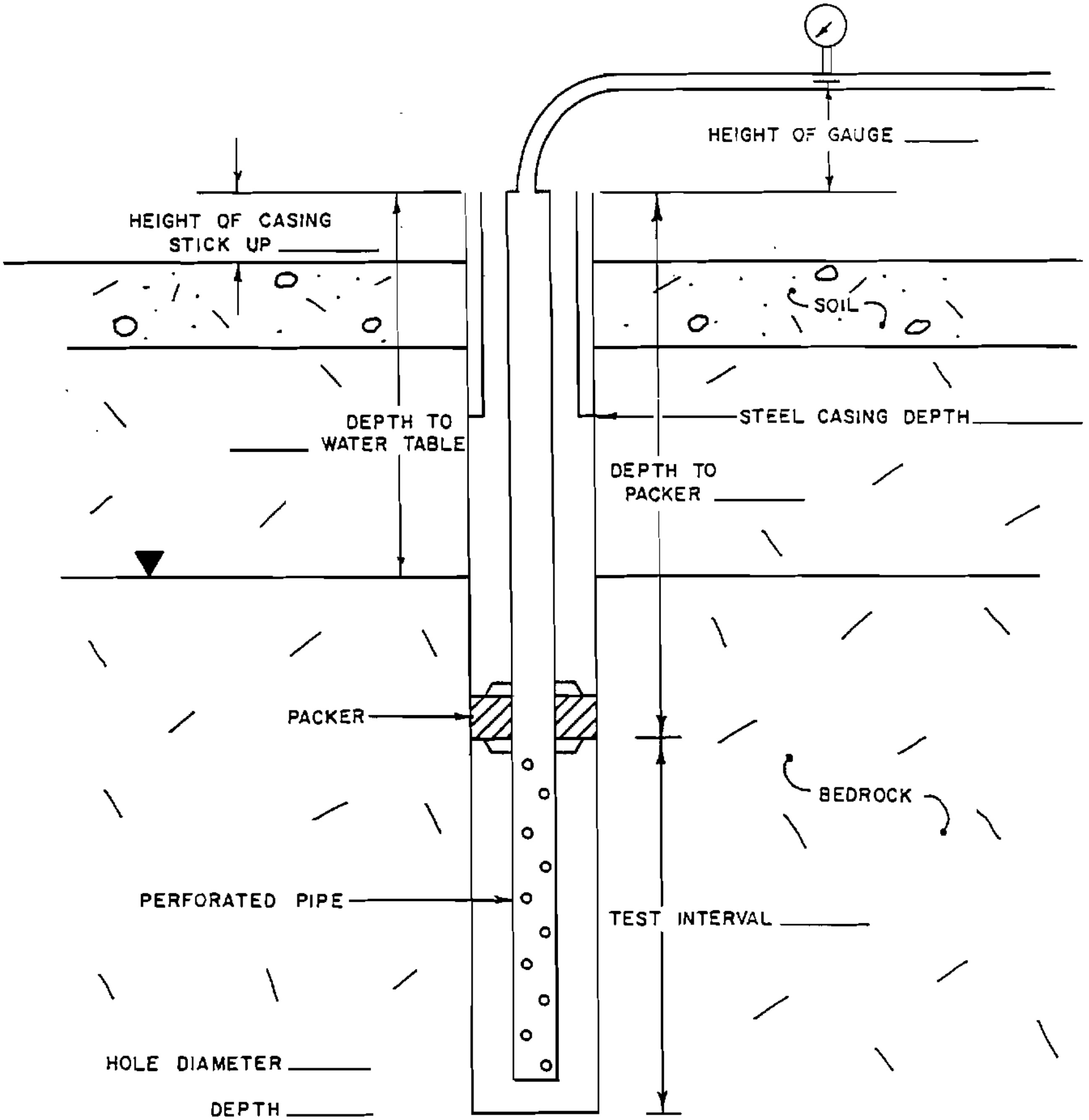
CORING / BORING ____________________

PROJECT NUMBER ____________________

PERSONNEL ____________________

LOCATION ____________________

DATE ____________________



NOTES:

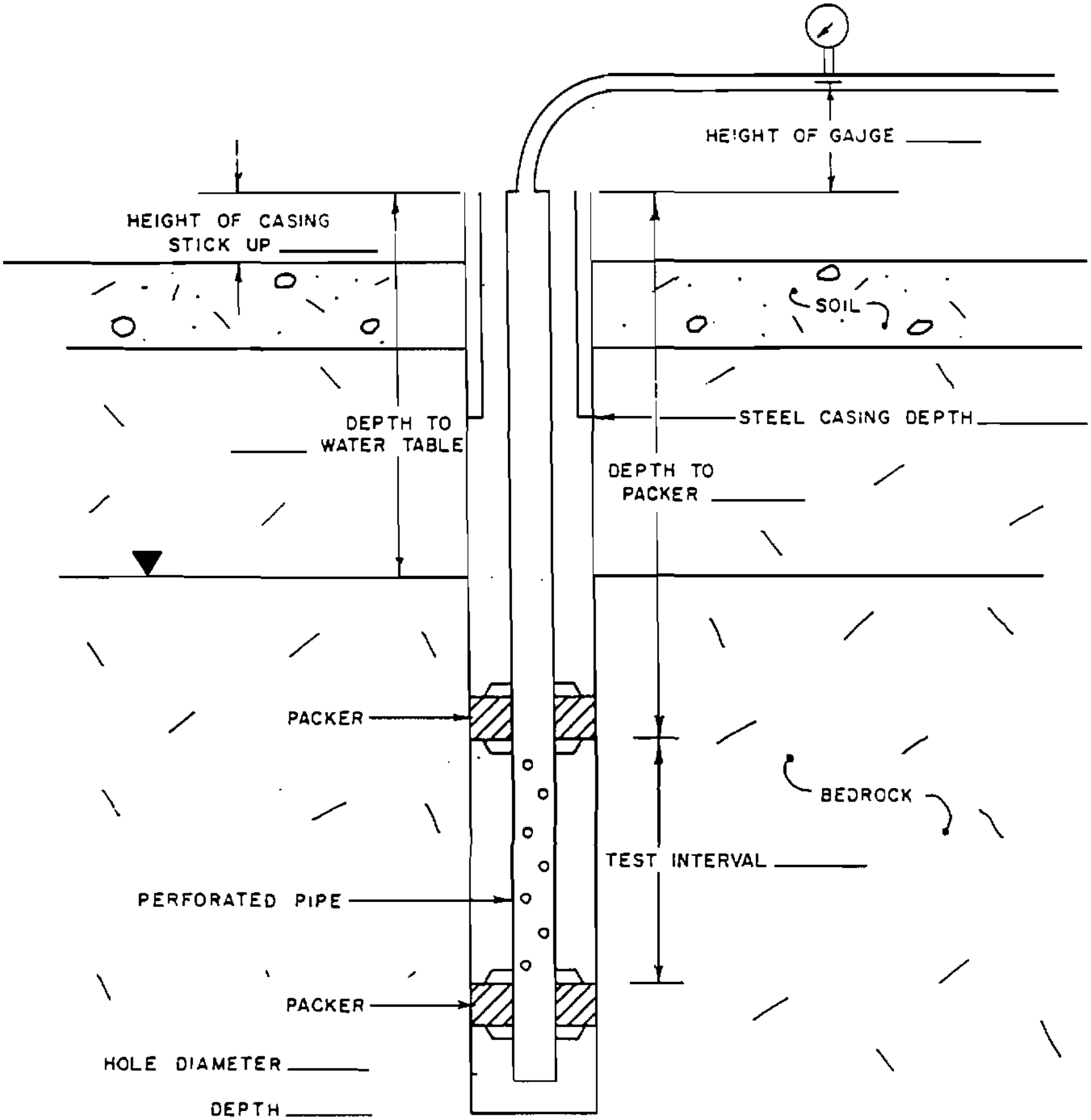
BLASLAND & BOUCK
ENGINEERS, P.C.

DOUBLE PACKER TEST DETAILS

PROJECT NAME ______________________ CORING / BORING ______________________

PROJECT NUMBER ______________________ PERSONNEL ______________________

LOCATION ______________________ DATE ______________________



NOTES:

BLASLAND & BOUCK ENGINEERS, P.C.

FIGURE 4

PACKER TEST LOG

Project Title ____________________ Test Date ____________________
Project No. ____________________ Boring Diameter(2r) ____________________
Location ____________________ Casing Height ____________________
Boring No. ____________________ Gauge Height ____________________
Personnel ____

Test No.	Depth Interval		Depth to Water Table	Height of Gauge(ft)	Gauge Pressure	Meter Reading		Time	
	To(ft)	From(ft)				Start	Finish	Start	Finish

BLASLAND & BOUCK
ENGINEERS, P.C.

FIGURE -5

PACKER TEST DATA REDUCTION

TEST INTERVAL (ft) TOP: 25.0
BOTTOM: 30.0
NOMINAL COREHOLE SIZE: NX
PACKER COEFFICIENT* (1/ft): 8200
STATIC WATER DEPTH (ft): 14.9
GAUGE HEIGHT (ft): 0.4

TEST INCREMENT:	1	2	3	4	5
GAUGE PRESSURE (psi):	9	17	24	17	9
GAUGE PRESSURE (ft):	22	38	55	38	22
TOTAL INTAKE (gal):	3.0	7.2	30.5	21.6	5.0
FLOW RATE, Q (gpm):	0.6	1.4	6.1	4.3	1.0
FRICTIONAL LOSS** (ft):	0.0	0.1	1.7	0.9	0.1
TOTAL APPLIED HEAD (ft):	37	53	68	53	37
K (ft/yr):	135	222	734	675	222
K (cm/sec):	1.3E-04	2.1E-04	7.1E-04	6.5E-04	2.1E-04
LUDGEON VALUE:	6	10	33	31	10

INTERPRETATION: DILATION AND WASHOUT; USE VALUE FROM FIRST INCREMENT

REPRESENTATIVE K
FOR INTERVAL (cm/sec): 1.3E-04

TEST INTERVAL (ft) TOP: 27.1
BOTTOM: 32.1
NOMINAL COREHOLE SIZE: NX
PACKER COEFFICIENT* (1/ft): 8200
STATIC WATER DEPTH (ft): 11.0
GAUGE HEIGHT (ft): 0.4

TEST INCREMENT:	1	2	3	4	5
GAUGE PRESSURE (psi):	11	20	28	20	11
GAUGE PRESSURE (ft):	26	45	64	45	26
TOTAL INTAKE (gal):	9.0	28.9	71.0	37.0	-15.5
FLOW RATE, Q (gpm):	1.8	5.8	14.2	7.4	-3.1
FRICTIONAL LOSS** (ft):	0.2	1.5	8.2	2.4	NA
TOTAL APPLIED HEAD (ft):	37	55	67	54	NA
K (ft/yr):	400	863	1726	1124	NA
K (cm/sec):	4E-04	8E-04	2E-03	1E-03	NA
LUDGEON VALUE:	18	39	78	51	NA

INTERPRETATION: DILATION AND WASHOUT; USE VALUE FROM FIRST INCREMENT

REPRESENTATIVE K
FOR INTERVAL (cm/sec): 4.0E-04

NOTES: * Packer coefficient values from:
United States Department of Interior, Bureau of Reclamation. 1977. Design of Small Dams. Water Resources Technical Publication, U.S. Government Printing Office, Washington, D.C., p. 196.

** Frictional head loss estimated for a 40 ft equivalent length of 1-inch diameter steel pipe at the indicated flow rates, based on the text:
Merritt, F.S. 1983. Standard Handbook for Civil Engineers. McGraw-Hill Book Company, New York.

NA Calculations not applicable due to (negative) flow out of formation into packer testing assembly.

Appendix C

Phase I Remedial Investigation, M. Wallace and Son, Inc. Scrapyard, Sampling and Analysis Plan, Volume II: Quality Assurance Project Plan

PHASE I REMEDIAL INVESTIGATION
M. WALLACE AND SON, INC. SCRAPYARD

SAMPLING AND ANALYSIS PLAN
VOLUME 2: QUALITY ASSURANCE PRJECT PLAN

Niagara Mohawk Power Corporation

Syracuse, New York

April 1993

Report

Phase I Remedial Investigation

Sampling and Analysis Plan
Volume 2: Quality Assurance Project Plan

M. Wallace and Son, Inc. Scrapyard
Cobleskill, New York

April 1993

BLASLAND & BOUCK ENGINEERS, P.C.
BLASLAND, BOUCK & LEE
ENGINEERS & SCIENTISTS

6723 Towpath Road
Syracuse, New York 13214
(315) 446-9120

QUALITY ASSURANCE PROJECT PLAN (QAPP)
REMEDIAL INVESTIGATION

M. WALLACE & SON, INC. SCRAPYARD
COBLESKILL, NEW YORK

Approved: Edward H. Lynch Date: 4/27/93
Project Officer
Blasland & Bouck Engineers, P.C.

Approved: ____________________ Date: ____________
Project Manager
Blasland & Bouck Engineers, P.C.

Approved: ____________________ Date: 4/23/93
Quality Assurance Officer
Blasland & Bouck Engineers, P.C.

Approved: Pauline Malik Date: 4/26/93
Project Manager
Aquatec, Incorporated

Approved: Karen R. Chirgwin Date: 4/26/93
Quality Assurance Officer
Aquatec, Incorporated

Approved: ____________________ Date: ____________
Project Coordinator
New York State Department of Law

Approved: ____________________ Date: ____________
Project Coordinator
New York State Department of
Environmental Conservation

Table of Contents

Table of Contents

Page

5.0 - SAMPLE AND DOCUMENT CUSTODY

6.0 - CALIBRATION PROCEDURES AND FREQUENCY

7.0 - ANALYTICAL PROCEDURES

8.0 - DATA REDUCTION, VALIDATION, AND REPORTING

Table of Contents

1.0 - Project Description

1.1 Introduction

This Quality Assurance Project Plan (QAPP) is part of the Sampling and Analysis Plan (SAP) which supports the Phase I Remedial Investigation (RI) Work Plan for the M. Wallace and Son Scrapyard Site located in Cobleskill, New York. The M. Wallace & Son, Inc. Scrapyard Site Remedial Investigation will include the investigation of ground water, surface water, soils, and sediments. The QAPP presents the analytical methods and procedures to be used during implementation of the Phase I RI. Related documents include the Phase I RI Work Plan and the Field Sampling Plan (FSP) which is Volume I of the SAP.

This QAPP sets forth the analytical methods and procedures to be used in the RI, while the Field Sampling Plan (FSP) component of the SAP sets forth the RI field procedures. The FSP and this QAPP are integrated and cross-referenced where applicable to minimize redundancy.

This QAPP was prepared in a manner consistent with the United States Environmental Protection Agency (USEPA) reference document, Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA - Interim Final (EPA/540/G-89/004).

Information contained in the QAPP has been organized into the following sections:

Section	Content
1	Project Description
2	Project Organization and Responsibilities
3	Quality Assurance Objectives for Measurement Data
4	Sampling Procedures
5	Sample and Document Custody
6	Calibration Procedures and Frequency
7	Analytical Procedures
8	Data Reduction, Validation, and Reporting
9	Field and Laboratory Quality Control Checks
10	Performance and System Audits
11	Preventive Maintenance
12	Data Assessment Procedures
13	Corrective Action
14	Quality Assurance Reports to Management

Details are provided in the subsequent sections. This document also contains pertinent information from the Phase I RI Work Plan and the FSP related to the measurement and evaluation of Phase I RI analytical data.

1.2 RI Objectives

The purpose of the QAPP is to present the quality assurance/quality control (QA/QC) procedures to be implemented during the Phase I RI. The QAPP has been developed to provide data quality which is sufficient to meet the Phase I RI objectives. The overall objective of the M. Wallace and Son Inc. Scrapyard Site Phase I RI is to obtain the information necessary to a) determine the presence and extent of chemical constituents in environmental media present at the site; b) determine the presence and extent of chemical constituents (i.e., PCBs and mercury) in sediments and surface water downstream of the quarry pond outlet channel; c) assess the risks, if any, to human health and the environment; and d) support the development, evaluation, and selection of appropriate remedial/response alternatives.

1.3 RI Data Quality Objectives

1.3.1 General

Data quality objectives (DQOs) are statements, in either qualitative or quantitative terms, regarding the appropriate data quality for an investigation. DQOs are typically determined through an iterative process and are refined as additional information becomes available, and established based on the intended end use of the data to be obtained. General project DQOs for the M. Wallace and Son, Inc. Scrapyard Site Phase I RI are summarized in this section, with detailed information provided throughout the QAPP, FSP, and the Phase I RI Work Plan.

Generally, the data generated during the Phase I RI will be used to determine the distribution of chemical constituents to: 1) determine the presence and extent of chemical constituents in environmental media present at the site; 2) determine whether constituents (i.e., PCBs and mercury) are present in the sediments and surface water south of the quarry pond outlet channel; 3) assess the risks, if any, to human health and the environment; and 4) support the development, evaluation, and selection of appropriate remedial/response alternatives.

To obtain information necessary to meet the Phase I RI objectives stated above, the following four field sampling investigations will be conducted:

1. Soil Investigation;
2. Sediment Investigation;
3. Surface Water Investigation; and
4. Ground-Water Investigation.

Preliminary DQOs were identified during the M. Wallace and Son Inc. Scrapyard Site RI scoping and incorporated into the development of the Work Plan, FSP, and QAPP to ensure that the data generated during field investigations will be of adequate quality and sufficient quantity to form a sound basis for decision making purposes relative to the above objectives. Data quality objectives have been specified for each data collection activity or investigation. The DQOs presented herein address investigation efforts only and do not cover health and safety issues, which are addressed in detail in the Health and Safety Plan (HASP) for this project.

A DQO summary for each of the five investigation efforts is presented below. The summary consists of stated DQOs relative to the following items:

A. Data Uses;
B. Data Types;
C. Data Quality;
D. Data Quantity;
E. Sampling and Analytical Methods; and

F. Data Precision, Accuracy, Representativeness, Completeness, Comparability and Sensitivity (PARCCS Parameters).

The analytical levels discussed in the following sections with regard to data quality are defined as follows:

- Level I - field screening or analysis using portable instruments. Results are often not compound specific and not quantitative but results are available in real time.
- Level II - field analyses using more sophisticated portable analytical instruments. In some cases, the instruments may be set up in a mobile laboratory on site. There is a wide range in the quality of data that can be generated, depending on the use of suitable calibration standards, reference materials, and sample preparation equipment. Results are available in real-time or several hours of sample collection.
- Level III - all analyses performed in an off-site analytical laboratory. Level III analyses may or may not use New York State Department of Environmental Conservation (NYSDEC) 1991 Analytical Services Protocols (ASPs), but do not usually utilize the validation or documentation procedures required of NYSDEC 1991 ASP Level IV analysis. The laboratory may or may not be a NYSDEC 1991 ASP laboratory.
- Level IV - NYSDEC 1991 ASP methods. All analyses are performed in an ASP analytical laboratory following ASP protocols. Level IV is characterized by rigorous QA/QC protocols and documentation.
- Level V - analysis by non-standard methods. All analyses are performed in an off-site analytical laboratory which may or may not be a NYSDEC 1991 ASP laboratory. Method development or method modification may be required for specific constituents or detection limits.

1.3.1.1 Soil Investigation

Data Uses

The soil investigation is designed to generate data to support the following evaluations:

1. Determine the presence and horizontal extent of chemical constituents in soil at the site; and
2. Characterize surface and subsurface soils at the site.

The primary intent of the soil investigation is to characterize the nature and extent of chemical constituents in the site soils. The soil data will also be used to assess the risks to human health and the environment associated with the level of constituents detected in the soils and to evaluate remedial/response alternatives, if necessary.

Data Types

The soil investigations will include the collection and analysis of soil samples for polychlorinated biphenyls (PCBs), Target Compound List (TCL) volatile and semi-volatile organic compounds, and Target Analyte List (TAL) inorganics. Table 1 of this QAPP presents the number of soil samples to be collected for analysis. Table 2 of this QAPP presents the specific chemical parameters for which the soil samples will be analyzed. Visual examination and photoionization device (PID) screening of soil samples from various depth intervals will also be conducted to evaluate subsurface conditions at the site and to select soil samples for laboratory analysis as described in the Phase I RI Work Plan and FSP.

The Phase I RI Work Plan, as well as the FSP, provide for the rationale for the soil chemical parameters selected for analysis.

Data Quality

Analytical Level IV is considered appropriate for NYSDEC 1991 ASP analyses for volatile organic and semi-volatile organic compounds, PCBs, and for inorganics.

Analytical Level I is appropriate for the field screening of soil samples.

Data Quantity

Soil samples will be collected from 35 locations at the site. The soil sample locations are uniformly distributed throughout the site on a grid basis. As described in the Phase I RI Work Plan and FSP, one surface soil sample will be selected from each sampling location for laboratory analysis and additional subsurface soil samples will be selected for analysis based on visual assessment and above background PID readings, as appropriate. The quantity of soil analytical data, including the required field and analytical QA/QC samples is summarized in Table 1. In addition, a background surface soil sample and background subsurface soil samples will be collected during the installation of ground-water monitoring well MW-7 located north of the site. These background soil samples will be analyzed for TAL inorganics.

Sampling and Analytical Methods

The FSP contains a description of the soil sampling procedures to be employed during the RI. The laboratory analytical methods to be utilized are listed in Table 2 of this QAPP.

PARCCS Parameters

Precision and accuracy quality control (QC) limits for chemical constituents which are used during data validation to assess analytical performance, are included on Table 3. Published guidance QC limits are identified except as noted on Table 2.

Data representativeness is addressed by the sample quantities and locations identified in the Phase I RI Work Plan and FSP. Data comparability is intended to be achieved through the use of standard USEPA-/NYSDEC-approved methods. Data completeness will be assessed at the conclusion of the RI.

1.3.1.2 Sediment Investigation

Data Uses

The sediment investigation is designed to generate data to support the following evaluations:

1. Determine the presence and extent of chemical constituents in the on-site quarry pond sediments;

2. Determine the presence of chemical constituents in the quarry pond outlet channel sediments north and south of the railroad embankment;

3. Determine the presence and extent of PCBs and mercury in sediment samples from the Village of Cobleskill storm water drainage system south of the site and the presence of PCBs at select locations in Cobleskill Creek; and

4. Determine the extent to which sediments act as source areas for chemical constituents.

The primary intent of the sediment investigation is to characterize the nature and extent of chemical constituents in sediments. The sediment data will also be used to assess the risks to human health and the environment associated with the level of constituents detected in sediments and to evaluate remedial/response alternatives, if necessary.

Data Types

The sediment investigation will include the collection and analysis of sediment samples for PCBs, TCL volatile and semi-volatile organics, TAL inorganics, total organic carbon (TOC), and particle size distribution (see Table 1 and Table 2 for number of samples and specific constituents). Sediment TOC and particle size distribution data will be obtained for use in evaluating constituent distribution and transport and will be used in evaluating potential remedial/response alternatives (if necessary).

The Phase I RI Work Plan, as well as the FSP, provide further rationale for the sediment physical and chemical parameters selected for analysis.

Data Quality

Analytical Level IV is considered appropriate for NYSDEC 1991 ASP analyses for volatile organic compounds semi-volatile organic compounds, PCBs, and inorganics.

For TOC and particle size distribution, Analytical Level III is considered appropriate because these data will be used to support the chemical constituent data.

Data Quantity

As described in the Work Plan, 26 surface (0- to 6-inch) sediment samples have been collected from the on-site quarry pond. These surface sediment sample locations have been uniformly distributed throughout the quarry pond on a grid basis. Eight full-core samples were also collected as described in the Work Plan. At each full-core location, a visual examination was conducted and sediment samples were selected for analysis at the 0- to 6-inch depth interval and at each 1-foot of sample depth thereafter. In addition, three sediment samples were collected from the quarry pond outlet channel. Three surface sediment samples from the quarry pond outlet channel were collected from 0- to 6-inch depths.

As described in the Work Plan, an off-site sediment sampling program will be conducted. Nine surface sediment samples (0- to 6-inch depth) will be collected from locations within the Village of Cobleskill storm water drainage system south of the quarry pond outlet channel. In addition, 10 sediment core samples will be collected as described in the FSP and Work Plan from Cobleskill Creek. At each full-core location, a visual examination will be conducted and sediment samples will be collected from the 0- to 6-inch depth internal and at 1-foot intervals thereafter. The estimated quantity of sediment analytical data, including the required field and laboratory QA/QC samples that will be collected during the Phase I RI off-site sediment sampling is summarized on Table 1.

Sampling and Analytical Methods

The FSP contains a description of the sediment sampling procedures to be employed during the Phase I RI. The laboratory analytical methods to be utilized are listed in Table 2 of this QAPP.

PARCCS Parameters

Project analytical precision and accuracy QA limits for sediments, identified on Table 3, have been established to incorporate data quality objectives. A discussion of the general approach to evaluate sediment PARCCS parameters is provided in the PARCCS parameter discussion for soil.

1.3.1.3 Surface Water Investigation

Data Uses

The surface water investigation is designed to generate hydrologic and water quality data to support the following evaluations:

1. Determine the extent to which the surface water is a migration pathway for constituents associated with the site; and
2. Investigate the spatial distribution of chemical constituents in the quarry pond; and
3. Determine the presence and extent of PCBs and mercury in surface water in the Village of Cobleskill storm water drainage system south of the site.

The data obtained will be used to characterize the nature and extent of constituents in surface water associated with the site. The surface water data will also be used to assess the risks to human health and the environment associated with the level of constituents detected in the surface water and to evaluate applicable remedial/response alternatives, if necessary.

Data Types

The surface water samples collected in the quarry pond will be analyzed for PCBs, TCL volatile organics and semi-volatile organics and TAL inorganics, while surface water samples collected from the Village of Cobleskill storm water drainage system will be analyzed for PCBs and mercury (see Table 2 of this QAPP for specific constituents). These parameters will aid in characterizing the nature and extent of these target constituents in the site and off-site surface water. The rationale for selection of the specific physical (i.e., total suspended solids) and chemical surface water parameters is discussed in detail in the Phase I RI Work Plan, and the FSP, and in Section 3.0 of this QAPP. Water quality field parameters such as temperature, conductivity, pH, and dissolved oxygen will also be determined during the Phase I RI.

Data Quality

Analytical Level IV is considered appropriate for NYSDEC 1991 ASP analyses for volatile organic compounds, semi-volatile organic compounds, PCBs, and inorganics.

For total suspended solids analysis, Analytical Level III is considered appropriate because these data will be used to support chemical constituent data.

Analytical Level I is appropriate for the surface water quality field parameters.

Data Quantity

As described in the Phase I RI Work Plan and FSP, five surface water samples will be collected from the quarry pond. Four surface water samples will be collected from the Village of Cobleskill storm water drainage system downstream of the quarry pond for PCB and mercury analysis. The quarry pond surface water sample locations have been selected to provide a uniform distribution of surface water data. Surface water samples will be collected in the quarry pond in such a manner as to characterize the water column at each sampling location as described in the Phase I RI Work Plan and FSP. The number of surface water samples, including the required field and analytical QA/QC samples that will be collected during the RI is summarized on Table 1.

Sampling and Analytical Methods

The FSP contains a description of the surface water sampling procedures. The laboratory analytical methods being utilized for the chemical and physical parameters are listed in Table 2 of this QAPP.

PARCCS Parameters

Precision and accuracy quality control (QC) limits for chemical constituents which are used during data validation to assess analytical performance are included on Table 4.

Data representativeness is addressed by the sample quantities and locations identified in the Phase I RI Work Plan and FSP. Data comparability is intended to be achieved through the use of standard USEPA-/NYSDEC-approved methods. Data completeness will be assessed at the conclusion of the Phase I RI.

1.1.3.4 Ground-Water Investigation

Data Uses

The ground-water investigation is designed to generate hydrogeologic and water quality data to support the following evaluations:

1. Determine ground-water quality at the site (including hydraulically upgradient, sidegradient and downgradient water quality);
2. Characterize the ground-water flow system at the site, including flow directions, gradients, and velocities; and
3. Determine the geological characteristics of overburden and bedrock at the site which could affect the migration of constituents from the site.

The data obtained will be used primarily to characterize the nature and extent of the chemical constituents in the ground water. These data will also be used to assess the risks to human health and the environment associated with the level of constituents detected in the ground water and to evaluate applicable remedial/response alternatives, if necessary.

Data Types

As set forth in the Phase I RI Work Plan and above, both hydrogeologic and water quality data are required to meet the objective of the ground-water investigation and subsequently, to use the ground-water data for its intended purposes. Hydrogeologic data will consist of water level information which will be used to calculate other hydrogeologic parameters. Water quality data will consist of field parameters, including: pH, temperature, conductivity and dissolved oxygen, as well as laboratory parameters, including: PCBs, volatile, semi-volatile, and inorganic constituents (see Table 1 for parameters and Table 2 of this QAPP for specific constituents). The rationale for the selection of these parameters is discussed in detail in the Phase I RI Work Plan, the FSP, and Section 3.0, herein.

Hydraulic conductivity testing will also be performed during the ground-water investigation. This will consist of obtaining water level measurements over time after a known volume of water has been added or removed from each ground-water monitoring well.

In addition, five soil/bedrock cores will be installed on-site as described in the Phase I RI Work Plan and FSP. During the soil/bedrock core installations and new ground-water monitoring well installations, overburden soil samples will be obtained for visual characterization for color, texture, moisture, and soil types. Bedrock cores collected during the soil/bedrock core activities will be visually characterized for color, rock type, fractures, and weathering. These assessments will be used to aid in meeting the objectives of the ground-water investigation.

Data Quality

Analytical Level IV is considered appropriate for NYSDEC 1991 ASP analyses for volatile organic compounds, semi-volatile organic compounds, PCBs, and inorganics.

Analytical Level I is appropriate for the surface water quality field parameters.

Data Quantity

The ground-water investigation will involve the collection of ground-water samples from four existing monitoring wells and from four new monitoring wells (to be installed as part of the Phase I RI) on and near the M. Wallace and Son Scrapyard Site for field and laboratory analyses, as well as the measurement of ground-water levels in those wells. The existing and new well locations were selected to provide information on the water quality and movement of ground water through the site bedrock. Two additional wells may be installed based on the results of the soil/bedrock coring investigation south of the site. These additional wells, if installed, will be constructed to screen ground water in the overburden or weathered bedrock depending upon the coring results. The quantity of ground-water analytical data, including QA/QC samples, that will be collected during the Phase I RI is summarized in Table 1.

Data quantity related to the water level measurements, hydraulic conductivity testing, and water quality measurements are described in the FSP.

Sampling and Analytical Methods

The ground-water level measurement procedures, water quality measurement procedures, hydraulic conductivity testing procedures, and ground-water sampling procedures are provided in the FSP. The laboratory analytical methods for ground-water samples are listed in Table 2.

PARCCS Parameters

PARCCS parameters for ground water are the same as those specified for surface water.

2.1 Project Organization

The M. Wallace and Son, Inc. Scrapyard Site Phase I RI will require integration of personnel from the organizations identified below, collectively referred to as the project team. A project organization chart depicting the project team personnel is included as Figure 1. A detailed description of the responsibilities of each member of the project team is presented below.

2.1.1 Overall Project Management

Blasland & Bouck Engineers, P.C., (Blasland & Bouck) on behalf of Niagara Mohawk Power Corporation (NMPC), has overall responsibility for the M. Wallace and Son, Inc. Scrapyard Site Phase I RI. Blasland & Bouck personnel will perform the ground water, surface water, soil, and sediment investigations; the ecological risk assessment; the air emissions assessment; and the potential interim remedial measures assessment. In addition, Blasland & Bouck will be responsible for evaluating resultant investigation data, and preparing the Phase I RI deliverables specified in the Phase I RI Work Plan and FSP. Project direction and oversight will be provided by NMPC personnel. Oversight in the field may also be provided by NMPC. A listing of key project management personnel is provided below.

Project Title	Company/Organization	Name	Phone Number
Project Manager	Niagara Mohawk Power Corporation	Mr. James F. Morgan	(315) 428-3101
Project Officer	Blasland & Bouck	Edward R. Lynch, P.E.	(315) 446-9120
Project Manager	Blasland & Bouck	David J. Ulm	(315) 446-9120
Project Coordinator	New York State Department of Law	Albert M. Bronson, Esq.	(518) 474-8480
Project Coordinator	New York State Department of Environmental Conservation	Daniel R. Lightsey, P.E.	(518) 382-6680

2.1.2 Task Managers

The staff performing the investigative and engineering activities of the Phase I RI will be directed by representatives of Blasland & Bouck. The personnel responsible for each of the Phase I RI tasks are listed below.

Project Title	Company	Name	Phone Number
Environmental Media Investigation Task Manager	Blasland & Bouck	Nancy E. Gensky	(315) 446-9120
Ecological Risk Assessment Task Manager	Blasland & Bouck	Michele A. Anatra-Cordone, Ph.D.	(315) 446-9120
Health and Safety Manager	Blasland & Bouck	Marc B. Evans, C.I.H, C.S.P	(315) 446-9120

2.1.3 Analytical Laboratory and Data Validation Services

Laboratory analytical services for environmental media samples associated with the M. Wallace and Son Scrapyard Phase I RI will be provided by Aquatec, Incorporated (Aquatec).

Analytical data identified in Section 8.2.3 of this QAPP will be transmitted to OBG Laboratories, Inc., personnel for independent data validation. Laboratory and data validation management personnel are listed below.

Title	Company	Name	Phone Number
Laboratory Project Manager	Aquatec	Pauline T. Malik	(802) 655-1203
Independent Data Validator	OBG Laboratories, Inc.	David R. Hill	(315) 437-0200

2.1.4 Quality Assurance Staff

The QA aspects of the Phase I RI will be conducted by Blasland & Bouck, Aquatec, OBG Laboratories, Inc., and representatives of the New York State Department of Environmental Conservation (NYSDEC). To date, the following personnel have been assigned to this project component:

Title	Company/Organization	Name	Phone Number
Quality Assurance Officer	Blasland & Bouck	Laurie Johnston	(315) 446-9120
Quality Assurance Officer	Aquatec	Karen Chirgain	(802) 655-1203
Independent Data Validator	OBG Laboratories, Inc.	David R. Hill	(315) 437-0200
Quality Assurance Officer	NYSDEC	To be assigned by NYSDEC	

Prior to any deviations to the protocols set forth in this QAPP, the NYSDEC QAO will be informed.

2.2 TEAM MEMBER RESPONSIBILITIES

This section of the QAPP discusses the responsibilities and duties of the project team members.

2.2.1 Niagara Mohawk Power Corporation

Project Manager

Responsibilities and duties include:

1. Overall direction of the Phase I RI;
2. Direction of Blasland & Bouck and coordination with regulatory agencies; and
3. Review of Blasland & Bouck work products, including data, memoranda, letters, and reports and all documents transmitted to the New York State Department of Law (NYSDOL) and NYSDEC.

2.2.2 Blasland & Bouck Engineers, P.C.

Project Officer

Responsibilities and duties include:

1. Oversight of the Blasland & Bouck Phase I RI work products; and
2. Provide Blasland & Bouck approval for major project deliverables.

Project Manager

Responsibilities and duties include:

1. Management and coordination of all aspects of the project as defined in the Phase I RI Work Plan with an emphasis on adhering to the objectives of the Phase I RI;
2. Review Phase I RI Report and all documents prepared by Blasland & Bouck; and
3. Assure corrective actions are taken for deficiencies cited during audits of Phase I RI activities.

Task Managers

The M. Wallace and Son, Inc. Scrapyard Site Phase I RI will be managed by Task Managers as set forth in Section 2.1.2. Responsibilities and duties of each Task Manager include:

1. Manage day-to-day relevant Phase I RI activities;
2. Develop, establish, and maintain files on relevant Phase I RI activities;
3. Review data reductions from the relevant Phase I RI activities;
4. Perform final data review of field data reductions and reports on relevant Phase I RI activities;
5. Assure corrective actions are taken for deficiencies cited during audits of relevant Phase I RI activities;
6. Overall QA/QC of the relevant portions of the Phase I RI;
7. Review all relevant field records and logs;
8. Instruct personnel working on relevant Phase I RI activities;
9. Coordinate field and laboratory schedules pertaining to relevant Phase I RI activities;
10. Request sample bottles from laboratory;
11. Review the field instrumentation, maintenance, and calibration to meet quality objectives;
12. Prepare sections of Phase I RI report pertaining to relevant Phase I RI activities; and
13. Maintain field and laboratory files of notebooks and logs, data reductions and calculations, and transmit originals to the Project Manager.

Field Personnel

Responsibilities and duties include:

1. Perform field procedures associated with the ground-water, surface water, sediment, soil, and biota investigations as set forth in the FSP;
2. Perform field analyses and collect QA samples;
3. Calibrate, operate, and maintain field equipment;
4. Reduce field data;
5. Maintain sample custody; and
6. Prepare field records and logs.

Quality Assurance Officer (QAO)

Responsibilities and duties include:

1. Review laboratory data packages;
2. Oversee and interface with the analytical laboratories;
3. Oversee and interface with the independent data validator;

4. Coordinate field QA/QC activities with task managers, including audits of Phase I RI activities, concentrating on field analytical measurements and practices to meet data quality objectives;
5. Review field reports;
6. Review audit reports;
7. Prepare interim QA/QC compliance reports; and
8. Prepare QA/QC report which includes an evaluation of field and laboratory data and data validation reports.

2.2.3 Aquatec, Incorporated

General responsibilities and duties of Aquatec include:

1. Perform sample analyses and associated laboratory QA/QC procedures;
2. Supply sampling containers and shipping cartons;
3. Maintain laboratory custody of sample; and
4. Strictly adhere to all protocols in the QAPP.

Project Manager

Responsibilities and duties include:

1. Serve as primary communication link between Blasland & Bouck and laboratory technical staff;
2. Monitor work loads and ensure availability of resources;
3. Oversee preparation of analytical reports; and
4. Supervise in-house chain-of-custody.

Quality Assurance Officer

Responsibilities and duties include:

1. Supervise the group which reviews and inspects all project-related laboratory activities; and
2. Conduct audits of all laboratory activities.

Sample Custodian

Responsibilities and duties include:

1. Receive all samples; and
2. Maintain custody of the samples and all documentation.

Laboratory Data Reviewer

Responsibilities and duties include:

1. Verify final analytical data prior to transmittal to Blasland & Bouck.

2.2.4 OBG Laboratories, Inc.

Responsibilities and duties include:

1. Provide independent validation of analytical data; and
2. Prepare validation report for incorporation into Phase I RI Report.

2.2.5 Parratt-Wolff, Inc.

General responsibilities and duties include:

1. Performance of Phase I RI ground-water monitoring well installations, test pits, and soil/rock borings in accordance with the Phase I RI protocols in the FSP;
2. Decontamination of drilling equipment; and
3. Well development.

2.2.6 New York State Department of Law (NYSDOL)

Project Coordinator

Responsibilities and duties include:

1. Provide NYSDOL approval of the Phase I RI Work Plan, SAP, supporting documents, and future Phase I RI deliverables;
2. Provide oversight during performance of the Phase I RI.

2.2.7 New York State Department of Environmental Conservation (NYSDEC)

Project Coordinator

Responsibilities and duties include:

1. Provide NYSDEC approval of Phase I RI Work Plan, SAP, supporting documents and future Phase I RI deliverables; and
2. Provide oversight during performance of the Phase I RI.

Quality Assurance Officer

Responsibilities and duties include:

1. Review and approval of the QAPP;
2. Review of the QA/QC portion of the Phase RI Report; and
3. Field and laboratory audit responsibilities, if determined necessary.

3.1 Selection of Measurement Parameters, Laboratory Methods, and Field Testing Methods

3.1.1 Field Parameters and Methods

3.1.1.1 Field Parameters

During the ground-water and surface water investigations, field parameters consisting of pH, conductivity, dissolved oxygen and temperature will be measured to provide general water quality information. Field test methods to measure pH, conductivity, dissolved oxygen and temperature are presented in Appendix G of the FSP.

Soil samples collected as part of the soil investigation will be screened with a PID to determine the presence and approximate levels of volatile organic compounds in the site soil. PID measurement protocols are presented in Appendix G of the FSP.

During the Phase I RI, a site topographic survey will be conducted with the accuracy and precision requirements discussed in the FSP. In addition, site soil samples, sediment samples, and surface water samples will be surveyed to the nearest foot. Top of monitoring site well casing elevations will be obtained to the nearest 0.1 of a foot.

3.1.1.2 Hydrogeologic Measurements

As described in the FSP, ground-water levels will be measured prior to sampling. In-situ hydraulic conductivity measurements will be performed as described in the FSP. Ground-water levels will be measured using the procedures presented in Appendix J of the FSP.

3.1.2 Laboratory Parameters and Methods

As described in the Phase I RI Work Plan and FSP, laboratory analyses of ground water, surface water, soil, and sediment will be performed as set forth in Table 1. The analytical parameters selected for each media are described in the Phase I RI Work Plan and FSP. Table 2 presents the chemical constituents identified by matrix, along with the selected analytical methods and reporting limits. If other constituents are detected during the performance of the selected analytical methods, they will be identified in the laboratory report.

In order to support the risk assessment, aid in determining the potential for off-site chemical constituent migration and to aid in evaluating appropriate remedial/response alternatives, filtered and unfiltered ground water and surface water samples will be collected at each proposed sampling location for PCB analysis and inorganic analysis as described in the Phase I RI Work Plan and FSP.

Supplemental parameters will be analyzed to provide additional information regarding the on-site media as discussed in the Phase I RI Work Plan and FSP at the frequency set forth in Table 1. Table 2 presents these supplemental parameters identified by matrix, with the selected analytical methods and reporting limits, if applicable. These parameters were selected to provide ancillary data to support the chemical constituent data.

For sediments, the supplemental parameters include proportion of organic carbon (also referred to as TOC) and particle size distribution. For surface water samples, total suspended solids analysis will be performed on all collected samples.

3.2 Quality Assurance Objectives

The overall quality assurance objective for this Phase I RI is to develop and implement procedures for sampling, chain-of-custody, laboratory analysis, instrument calibration, data reduction and reporting, internal quality control, audits, preventive maintenance, and corrective action, such that valid data will be generated. These procedures are presented or referenced in the following sections of the QAPP. Specific QC checks are discussed in Section 9.0 of this QAPP.

Quality assurance objectives are generally defined in terms of five parameters:

1. Representativeness;
2. Comparability;
3. Completeness;
4. Precision; and
5. Accuracy.

Each parameter is defined below. Specific objectives for this Phase I RI are set forth in other sections of this QAPP as referenced below.

3.2.1 Representativeness

Representativeness is the degree to which sampling data accurately and precisely represent site conditions, and is dependent on sampling and analytical variability and the variability of the site. The Phase I RI has been designed to assess the presence of the chemical constituents and supplemental parameters at the time of sampling. The Phase I RI Work Plan and FSP presents the rationale for sample quantities and location. The FSP and this QAPP present field sampling methodologies and laboratory analytical methodologies, respectively. The use of the prescribed field and laboratory analytical methods with associated holding times and preservation requirements are intended to provide representative data. Further discussion of QC checks is presented in Section 9.0 of this QAPP.

3.2.2 Comparability

Comparability is the degree of confidence with which one data set can be compared to another. Comparability between phases of the Phase I RI, and to the extent possible, with existing data will be maintained through consistent sampling and analytical methodologies set forth in this QAPP, the FSP through the use of established QA/QC procedures, and through utilization of appropriately trained personnel. The comparability of Phase I RI data with existing data is limited by uncertainties associated with sampling and analytical differences.

3.2.3 Completeness

Completeness is defined as a measure of the amount of valid data obtained from an event and/or investigation compared to the total amount that was obtained. This will be determined upon final assessment of the analytical results, as discussed in Section 12.0 of this QAPP.

3.2.4 Precision

Precision is a measure of the reproducibility of sample results. The goal is to maintain a level of analytical precision consistent with the objectives of the Phase I RI. To maximize precision, sampling and analytical procedures will be followed. All work for this Phase I RI will adhere to established protocols presented in the QAPP and FSP. Checks for analytical precision will include the analysis of matrix spike, matrix spike duplicates, laboratory duplicates and field duplicates. Checks for field measurement precision will include obtaining duplicate field measurements. Further discussion of precision QC checks is provided in Sections 9.0 and 12.0 of this QAPP.

3.2.5 Accuracy

Accuracy is a measure of how close a measured result is to the true value. Both field and analytical accuracy will be monitored through initial and continuing calibration of instruments. In addition, reference standards, matrix spikes, blank spikes, and surrogate standards will be used to assess the accuracy of the analytical data. Further discussion of these QC samples is provided in Sections 9.0 and 12.0 of this QAPP.

4.0 - Sampling Procedures

Ground water, surface water, soil, and sediment samples will be collected as described in the FSP. In addition, the FSP contains the procedures for installing monitoring wells; measuring ground-water levels; performing field measurements; calculating in-situ hydraulic conductivity; and handling, packing, and shipping of Phase I RI samples.

5.0 - Sample and Document Custody

5.1 Field Procedures

The objective of field sample custody is to assure that samples are not tampered with from the time of sample collection through time of transport to the analytical laboratory. Persons will have "custody of samples" when the samples are in their physical possession, in their view after being in their possession, or in their physical possession and secured so they cannot be tampered with. In addition, when samples are secured in a restricted area accessible only to authorized personnel, they will be deemed to be in the custody of such authorized personnel. A discussion of sample custody and directions for the field use of chain-of-custody forms are provided in the FSP. An example field chain-of-custody form is also provided in Appendix L of the FSP.

5.2 Laboratory Procedures

5.2.1 General

Upon sample receipt, laboratory personnel will be responsible for sample custody. The original field chain-of-custody form will accompany all samples requiring laboratory analysis. The laboratory will use chain-of-custody guidelines described in the NYSDEC 1991 ASP. Requirements which specifically pertain to EPA contracts (i.e., EPA Traffic Reports, etc.) are not relevant to this project. Samples will be kept secured in the laboratory until all stages of analysis are complete. All laboratory personnel having samples in their custody will be responsible for documenting and maintaining sample integrity.

5.2.2 Sample Receipt and Storage

Immediately upon sample receipt, the laboratory sample custodian will verify the package seal, open the package, and compare the contents against the field chain-of-custody. At this time, the laboratory sample custodian will also be responsible for logging the samples in, assigning a unique laboratory identification number to each, and labelling the sample bottle with the laboratory identification number. The project name, field sample code, date sampled, date received, analysis required, storage location and date, and action for final disposition will be recorded in the laboratory logbook. If a sample container is broken, the sample is in an inappropriate container, or has not been preserved by appropriate means, Blasland & Bouck will be notified.

5.2.3 Sample Analysis

Analysis of an acceptable sample will be initiated by a work sheet which will contain all pertinent information for analysis. The routing sheet will be forwarded to the analyst, and the sample will be moved into an appropriate storage location to await analysis. The analyst will sign and date the laboratory chain-of-custody form when removing the samples from storage. The document control officer will file all chain-of-custody forms in the project file.

Samples will be organized into sample delivery groups (SDGs) by the laboratory according to both matrix and analysis parameter. A SDG may contain up to 20 field samples (field duplicates, trip blanks, and rinse blanks are considered field samples for the purposes of SDG assignment). All field samples assigned to a single SDG must be received by the laboratory over a maximum of 7 calendar days (less, when 7-day holding times for extraction must be met), and must be processed through the laboratory (preparation, analysis, and reporting) as a group. Every SDG must include a minimum of one MS/MSD (or MS/lab dup) pair.

Each SDG will therefore be self-contained for all of the required quality control samples. All parameters within an SDG will be extracted and analyzed together in the laboratory. At no time will the laboratory be allowed to run any sample (including QC samples) at an earlier or later time than the rest of the SDG. An entire SDG for any single parameter will be analyzed on a single instrument within the laboratory. These rules for analysis will ensure that the quality control samples for an SDG are applicable to the field samples of the same SDG, and that the best possible comparisons may be made.

Information regarding the sample, analytical procedures performed, and the results of the testing will be recorded in a laboratory notebook by the analyst. These notes will be dated, and also identify the analyst, the instrument used, and the instrument conditions.

5.2.4 Laboratory Project Files

During the Phase I RI, Aquatec will establish a file for all pertinent data. The file will include the chain-of-custody forms, raw data, chromatograms (required for all constituents analyzed by chromatography), and sample preparation information. Aquatec will retain project records until the conclusion of the Phase I RI, at which time they will be transferred to Blasland & Bouck or NMPC for continued storage, as necessary.

5.2.5 Laboratory Documentation

5.2.5.1 Aquatec Procedures

Documentation

Workbooks, bench sheets, instrument logbooks, and instrument printouts, are used to trace the history of samples through the analytical process, and document and relate important aspects of the work, including the associated quality controls. All logbooks, bench sheets, instrument logs, and instrument printouts are part of the permanent record of the laboratory. Completed workbooks and instrument logbooks are submitted to Aquatec's internal data review groups for review and storage (Aquatec, Inc., 1992).

As required, each page or entry is to be dated and initialed by the analyst at the time the record is made. Entries in the standards logbooks and runlogs are made in duplicate using carbon sheets. Errors in entry are to be crossed out in indelible ink with a single stroke and corrected without the use of white-out or by obliterating or writing directly over the erroneous entry. All corrections are to be initialed and dated by the individual making the correction. Pages inserted into logbooks are to be stapled to a clean, bound page. The analyst's initials are to be recorded in such a manner that the initials overlap the inserted page and the bound page. A piece of non-removable transparent tape is then to be placed over the initials as a seal. Pages of logbooks that are not completed as part of normal record keeping should be completed by lining out unused portions (Aquatec, Inc., 1992).

Laboratory notebooks are periodically reviewed by the laboratory section leaders for accuracy, completeness, and compliance to this QAPP. All entries and calculations are verified by the laboratory section leader. If all entries on the pages are correct, then the laboratory section leader initials and dates the pages. Corrective action is taken for incorrect entries before the laboratory section leader signs (Aquatec, Inc., 1992).

Computer Tape Storage

Magnetic computer tapes are stored in the computer room, and corresponding tape streamer logbooks are maintained for a minimum of seven years (Aquatec, Inc., 1992).

Sample Storage Following Analysis

Once an analysis is complete, the unused portion of sample and all identifying tags and laboratory records will be maintained by the laboratory. Samples will be retained at Aquatec for a period of three months, after which Blasland & Bouck, NMPC, and New York State personnel will determine the need for continued storage.

5.3 Project File

Phase I RI documentation will be placed in a single project file at the Blasland & Bouck office in Syracuse, New York. This file will consist of the following components:

1. Agreements (filed chronologically);
2. Correspondence (filed chronologically);
3. Memos (filed chronologically); and
4. Notes and Data (filed by topic).

Reports (including QA reports) will be filed with correspondence. Analytical laboratory documentation (when received) and field data will be filed with notes and data. Filed materials may be removed and signed out by personnel on a temporary basis only.

6.1 Field Equipment Calibration Procedures and Frequency

Specific procedures for performing and documenting calibration and maintenance for the equipment measuring conductivity, temperature, dissolved oxygen, pH, surface water velocity, and ground-water level and organic vapors are provided in Appendix G of the FSP. Calibration checks will be performed daily when measuring conductivity, temperature, dissolved oxygen, water velocity, and pH. For ground-water sampling, the pH meter will be calibrated at each sampling location. Field equipment, frequency of calibration, and calibration standards are provided in Table 5.

6.2 Laboratory Equipment Calibration Procedures and Frequency

Instrument calibration will follow the specifications provided by the instrument manufacturer or specific analytical method used. The analytical methods for chemical constituents and supplemental parameters are identified separately below.

6.2.1 Chemical Constituents

ASP-TCL/TAL/PCBs

Initial and continuing instrument equipment calibration will follow, at a minimum, ASP guidelines (NYSDEC 1991 ASP 12/91 with updates)

6.2.2 Supplemental Parameters

Analysis of the supplementary parameters identified below will require use of calibration procedures and frequencies as specified in the respective methods outlined in Table 2:

Surface Water

Total Suspended Solids (TSS)

Sediment Samples

Total Organic Carbon
Particle Size Distribution

7.0 - Analytical Procedures

7.1 *Field Analytical Procedures*

Field analytical procedures will include the measurement of temperature, conductivity, dissolved oxygen, pH, organic vapors, and ground-water levels. Specific field measurement protocols are provided in the Appendices of the FSP. Field measurement quality control limits in terms of precision and accuracy are presented in Table 6.

7.2 *Laboratory Analytical Procedures*

Laboratory analytical requirements presented in the sub-sections below include a general summary of requirements, specifics related to each sample medium to be analyzed, and details of the methods to be used for this project. Current ASP methods will be used with the following exceptions: TOC, particle size distribution, and total suspended solids.

7.2.1 General

The following tables summarize general analytical requirements:

Table	Title
Table 1	Environmental and Quality Control Sample Analyses
Table 2	Parameters, Methods and Reporting Limits
Table 7	Sample Containers, Preservation Methods, and Holding Times Requirements

7.2.2 Phase I RI Sample Matrices

7.2.2.1 Water

Matrices in this category consist of surface water and ground water. For samples requiring filtering, samples will be filtered in the field using a 0.45-micron pore glass fiber filter, or equivalent as described in the FSP. Analytical results for all analyses will be reported in units identified in Table 2.

7.2.2.2 Soil/Sediment

Analyses in this category relates to sediment and soil samples. Results will be reported as dry weight, in units presented in Table 2. Moisture content will be reported separately. QC limits cited in Table 3 are intended for soil analyses and are generally applied to sediment analyses, as well. However, matrix differences between soils and sediments (i.e., higher moisture content of sediments) may affect method performance. Therefore, the QC limits are considered advisory for sediment analyses.

7.2.3 Analytical Requirements

The primary sources for methods used for this investigation are provided in the NYSDEC 1991 ASP documents. All analyses will be performed by Aquatec, Inc.

Tables summarizing QC limits required to evaluate analytical performance are provided as follows:

Table	Title
3	Soil/Sediment Analyses Quality Control Limits
4	Water Analyses Quality Control Limits

As identified in Tables 3 and 4, matrix spike/matrix spike duplicate precision for applicable organic analyses will be evaluated as noted on the tables. Also, assessment of the supplemental parameters will generally be based on duplicate sample results.

7.2.3.1 Chemical Constituents

Organic and inorganic analyses will be performed by ASP methods, and will be reported as complete data validation packages using ASP forms.

7.2.3.2 Supplemental Parameters

Total Suspended Solids

Surface water samples will be analyzed for total suspended solids by USEPA Method 160.2 as described in the USEPA document title Methods for Chemical Analysis of Water and Wastes (USEPA 1983), as referenced in NYSDEC 1991 ASP.

Total Organic Carbon

Sediment samples will be analyzed for TOC according to the Lloyd Kahn Method, USEPA Region II (7/88).

Particle Size Distribution

Sediment samples will be analyzed according to American Society for Testing and Materials (ASTM) Procedure D-422.

After field and laboratory data are obtained, these data will be subject to:

1. Validation;
2. Reduction or manipulation mathematically or otherwise into meaningful and useful forms; and
3. Organization, interpretation, and reporting.

8.1 *Field Data Reduction, Validation, and Reporting*

8.1.1 Field Data Reduction

Information which is collected in the field through visual observation, manual measurement and/or field instrumentation will be recorded in field notebooks, datasheets, and/or forms. Such data will be reviewed by the appropriate Task Manager for adherence to the FSP and consistency. Any concerns identified as a result of this review will be discussed with the field personnel, corrected if possible, and as necessary incorporated into the data evaluation process.

8.1.1.1 Sediment Investigation

Specific data reduction activities which will be performed for the sediment investigation include:

1. Calculation and mapping of sediment deposition areas and depths based on sediment sampling activities.

8.1.1.2 Ground-Water Investigation

Reduction of the field data collected during the ground-water investigation will include:

1. Calculation of water elevations by subtracting the depth-to-water data from the surveyed elevation of the measuring point;
2. Calculation of in-situ hydraulic conductivities;
3. Production of hydrogeologic contour maps by contouring lines of equal water elevations using linear interpolation through known elevation points; and
4. Addition of ground-water elevations to database of hydrogeologic measurements.

8.1.2 Field Data Validation

Field data calculations, transfers, and interpretations will be conducted by the field personnel and reviewed for accuracy by the appropriate Task Manager and the QAO. Task Managers will recalculate at least five percent of all data reductions. All logs and documents will be checked for:

1. General completeness;
2. Readability;
3. Usage of appropriate procedures;
4. Appropriate instrument calibration and maintenance;
5. Reasonableness in comparison to present and past data collected;
6. Correct sample locations; and
7. Correct calculations and interpretations.

8.1.3 Field Data Reporting

Where appropriate, field data forms and calculations will be processed and included in appendices to the Phase I RI Report. The original field logs, documents, and data reductions will be kept in the project file at the Blasland & Bouck office in Syracuse, New York.

8.2 Laboratory Data Reduction, Review, and Reporting

8.2.1 Laboratory Data Reduction

Laboratory analytical data will be directly transferred from the instrument to the computer or the data reporting form (as applicable) by the analyst. Calculation of sample concentrations will be performed using the calculation procedures specified by the analytical method used including, as applicable, regression analysis, response factors, and dilution factors.

8.2.2 Laboratory Data Review

8.2.2.1 Aquatec Review Procedures

Each Aquatec laboratory section provides extensive data review according to the methods used, prior to reporting results to Blasland & Bouck. In general, there are three levels of review as outlined below.

The analyst is responsible for primary review of data generated from sample analysis. If recoveries of all QC samples are within specified QC limits, then the data are presented to data review groups for secondary review. If recoveries of any QC samples exceed specified QC limits, then affected samples are reanalyzed (Aquatec, Inc., 1992).

Secondary review is conducted by data review groups to determine if analytical results are within established QC limits. If recoveries of all QC samples are within specified tolerances, then the data are presented to the Aquatec Project Manager for final review. If recoveries of any QC samples exceed specified tolerances, then affected samples are submitted for reanalysis (Aquatec, Inc., 1992).

The Aquatec Project Manager determines if all analytical results of a sample(s) are consistent. If so, then the data are presented in a final report. If discrepancies or deficiencies exist in the analytical results, then corrective action is taken (Aquatec, Inc., 1992) as discussed in Section 13. Deficiencies discovered as a result of internal data validation, as well as the corrective actions to be used to rectify the situation, will be documented on a Corrective Action Form (Appendix B). This form will be submitted to the Blasland & Bouck Project Manager.

8.2.3 Laboratory Data Reporting

The laboratory is responsible for reporting the data in tabular form. Data will be tabulated by method and sample with reference to the sample by both field and laboratory identifications. The data tables will provide a cross-reference between each sample and the appropriate QC data package. In addition, the laboratory will provide documentation backup (laboratory calculation sheets, chain-of-custody documentation, etc.).

For the laboratory analyses identified below, a full ASP data package and case narrative will also be provided for each sample delivery group.

Matrix	Data Type
Water, Soil, and Sediment	PCBs, TCL Volatile Organics, TCL Semi-Volatile Organics, and TAL Constituents

In addition, sample preparation records including extraction sheets, digestion sheets, percent solids, and logbook pages will also be provided in the data package.

8.3 Independent Data Validation

Data validation entails a review of the QC data and the raw data to verify that the laboratory was operating within required limits, the analytical results are correctly transcribed from the instrument read outs, and which, if any, environmental samples are related to any out-of-control QC samples. The objective of data validation is to identify any questionable or invalid laboratory measurements.

An independent data validator, OBG Laboratories, Inc. has been selected to validate the laboratory data for ASP and non-ASP analyses. OBG Laboratories, Inc., is not directly associated with the Phase I RI work efforts or laboratory analyses, and as such OBG Laboratories, Inc. responsibility will be to objectively review the analytical data. Data validation will consist of data editing, screening, checking, auditing, review, and interpretation to document analytical data quality and determine if the quality is sufficient to meet the data quality objectives. In addition, data validation will include a review of completeness and compliance, including the elements provided in Table 8, as well as the actual validation.

The independent data validator will use the most recent versions of the NYSDEC 1991 ASP documents, available at the time of project initiation and for the entire duration of the project, as guidance, where appropriate.

OBG Laboratories, Inc., will verify reduction of laboratory measurements and laboratory reporting of analytical parameters is in accordance with the procedures specified for each analytical method (i.e., perform laboratory calculations in accordance with the method-specific procedure) and/or as specified in this QAPP. Any deviations from the analytical method will be delineated on chain of custody forms. Any special reporting requirements apart from this QAPP will also be detailed on chain of custody forms. The data quality will be evaluated by application of the Functional Guidelines procedures and criteria modified as necessary to address project-specific and method-specific criteria, control limits, and procedures.

Upon receipt of the laboratory data, the following reduction, validation and reporting scheme will be executed by OBG Laboratories, Inc.:

1. Laboratory data will be screened to ensure that the necessary QC procedures (detection limit verification, initial calibration, continuing calibration, duplicates, spikes, reagent blanks, etc.) have been performed. QC information not included or of insufficient frequency will be identified in the validation report along with a discussion of the implications.

2. QC supporting information will subsequently be screened to identify QC data outside established control limits. If out-of-control data are discovered, documentation of appropriate corrective action will be reviewed. Certain out-of-control data without appropriate corrective action shall result in designation of the affected data as qualified or rejected.

   It should be noted that the existence of qualified results does not automatically invalidate data. The goal to produce the best possible data does not necessarily mean producing data without QC qualifiers. Qualified data can provide useful information.

Resolution of any issues regarding laboratory performance or deliverables will be handled between OBG Laboratories, Inc., and the Blasland & Bouck QAO. Suggestions for reanalysis may be made to the Blasland & Bouck QAO at this point.

Upon completion of the validation of each sample delivery group/parameter, a report addressing the following topics as applicable to each method will be prepared.

1. Assessment of the data package;
2. Description of any protocol deviations;
3. Failures to reconcile reported and/or raw data;
4. Assessment of any compromised data;
5. Laboratory case narrative;
6. Overall appraisal of the analytical data; and
7. Table of site name, sample quantities, data submitted to the laboratory, year of protocol used, matrix, and fractions analyzed.

The data validation reports will be included as an appendix to the Phase I RI Report, if appropriate, and kept in the project file at the Blasland & Bouck office in Syracuse, New York.

9.0 - Field and Laboratory Quality Control Checks

Both field and laboratory quality control checks are proposed for the M. Wallace and Son, Inc. Scrapyard Site Phase I RI. In the event that there are any deviations from these checks, the Blasland & Bouck QAO will be notified. The proposed field and laboratory control checks are discussed below.

9.1 Field Quality Control Checks

9.1.1 Field Measurements

To verify the quality of data using field instrumentation, duplicate measurements will be obtained and reported for all field measurements. A duplicate measurement will involve obtaining measurements a second time at the same sampling location.

9.1.2 Sample Containers

Certified-clean sample containers (I-Chem 300 series or equivalent) will be supplied by Aquatec, Inc. Certificates of analysis will be filed in the project file.

9.1.3 Field Duplicates

Field duplicates will be collected for water and soil/sediment samples to check reproducibility of the sampling methods. Field duplicates will be prepared as discussed in the FSP. In general, soil/sediment. surface water, and ground-water sample field duplicates will be analyzed at a 5 percent frequency (every 20 samples) for both the chemical constituents and the supplemental parameters. Table 1 provides an estimated number of field duplicates to be prepared for each applicable parameter and matrix.

9.1.4 Rinse Blanks

Rinse blanks are used to monitor the cleanliness of the sampling equipment and the effectiveness of the cleaning procedures. Rinse blanks will be prepared and submitted for analysis at a frequency of one per day (when sample equipment cleaning occurs) or once for every 20 samples collected, whichever is more. Rinse blanks will be prepared by filling sample containers with analyte-free water (supplied by the laboratory) which has been routed through a cleaned sampling device. When dedicated sampling devices are used or sample containers are used to collect the samples, rinse blanks will not be necessary. Table 1 provides an estimated number of rinse blanks for environmental media samples to be collected during the Phase I RI.

9.1.5 Trip Blanks

Trip blanks will be used to assess whether site samples have been exposed to non-site-related volatile constituents during sample storage and transport. Trip blanks will be analyzed at a frequency of once per day, per cooler containing surface water and/or ground-water samples to be analyzed for volatile organic constituents. A trip blank will consist of a container filled with analyte-free water (supplied by the laboratory) which remains unopened with field samples throughout the sampling event. Trip blanks will only be analyzed for volatile organic constituents. Table 1 provides an estimated number of trip blanks to be collected for each matrix and parameter during the Phase I RI.

9.1.6 Background Samples

Background samples are used to identify constituents which are non-site-related. Background samples will be obtained as described in the Phase I RI Work Plan for the sampling media listed below:

Media	Background Samples
Ground Water	One upgradient ground-water monitoring well.
Soil	One surface soil sample and one subsurface soil sample from the installation of ground-water monitoring well MW-7 on the north side of the site.

9.1.7 Other Field Quality Control Checks

One sample of the potable water to be used during the test pit/drilling activities will be collected and analyzed for ASP TCL/TAL chemical constituents and for PCBs to ensure contaminants are not present in the water supply. In addition, a sample of distilled water used for equipment cleaning will be collected and analyzed for ASP/TCL/TAL constituents and for PCBs.

9.2 Analytical Laboratory Quality Control Checks

9.2.1 Aquatec Procedures

Internal laboratory quality control checks will be used to monitor data integrity. These checks will include method blanks, matrix spikes (and matrix spike duplicates), spike blanks, internal standards, surrogate samples, calibration standards, and reference standards. Project QC limits for duplicates and matrix spikes are identified in Tables 3 and 4. Laboratory control charts will be used to determine long-term instrument trends.

9.2.1.1 Method Blanks

Sources of contamination in the analytical process, whether specific analytes or interferences, need to be identified, isolated, and corrected. The method blank is useful in identifying possible sources of contamination within the analytical process. For this reason, it is necessary that the method blank is initiated at the beginning of the analytical process and encompasses all aspects of the analytical work. As such, the method blank would assist in accounting for any potential contamination attributable to glassware, reagents, instrumentation, or other sources which could affect sample analysis. One method blank will be analyzed with each analytical series associated with no more than 20 samples (Aquatec, 1992). ASP guidelines for acceptance will be used. Guidelines for non-standard methods are provided in the appropriate protocols.

9.2.1.2 Matrix Spikes/Matrix Spike Duplicates

Matrix spikes and matrix spike duplicates will be used to measure the accuracy of organic analyte recovery from the sample matrices. All matrix spikes and matrix spike duplicates will be site-specific. For organic constituents, matrix spike/matrix spike duplicate pairs will be analyzed at a 5 percent frequency (every 20 samples). For inorganics, a matrix spike will be analyzed at a 5% frequency.

For water, soil, and sediment organic matrix spike data, results will be examined in conjunction with spike blanks (Section 9.2.1.3 of this QAPP) data and surrogate spike (Section 9.2.1.5) data to assess the accuracy of the analytical method. When matrix spike recoveries are outside QC limits, associated spike blank and surrogate recoveries will be evaluated to attempt to verify the reason for the variance(s), and determine the effect on the reported sample results. Table 1 presents an estimated number of matrix spike and matrix spike duplicate analyses for each applicable matrix and parameter.

9.2.1.3 Spike Blanks

For water, soil, and sediment organic analyses, spike blanks will be included to provide an additional assessment of data accuracy. The spike blanks provide an assessment of method performance without interferences which may be present in environmental samples. Spike blanks will be analyzed at a frequency of one blank associated with no more than 20 samples. For spike blank analyses, clean matrix is spiked and recoveries are calculated similar to matrix spike recoveries. The clean matrix will consist of laboratory reagent water and clean, dried sand for water and soil/sediment analyses, respectively. Matrix spike blank data will be assessed in conjunction with matrix spike data, as discussed in Section 9.2.1.2 of this QAPP. Table 1 presents an estimated number of matrix spike blanks for each matrix and parameter.

9.2.1.4 Surrogate Spikes

Surrogates are compounds unlikely to be found in nature that have properties similar to the analytes of interest. This type of control is primarily used for organic samples analyzed by GC/MS and GC methods and is added to the samples prior to purging or extraction. The surrogate spike is utilized to provide broader insight into the proficiency and efficiency of an analytical method on a sample specific basis. This control reflects analytical conditions which may not be attributable to sample matrix (Aquatec 1992).

If surrogate spike recoveries exceed specified QC limits, then the analytical results need to be evaluated thoroughly in conjunction with other control measures. In the absence of other control measures (i.e., internal standard and matrix spikes), the integrity of the data may be verifiable and reanalysis of the sample with additional controls would be necessary (Aquatec 1992).

Surrogate spike compounds will be selected utilizing the guidance provided in the analytical methods summarized in Table 2.

9.2.1.5 Laboratory Duplicates

For inorganics and other supplemental parameters, laboratory duplicates will be analyzed to assess laboratory precision. Laboratory duplicates are defined as a second aliquot of an individual sample which is analyzed as a separate sample. Table 1 provides an estimated number of laboratory duplicates for each applicable matrix and parameter.

9.2.1.6 Calibration Standards

Calibration check standards analyzed within a particular analytical series provide insight regarding the instruments' stability. A calibration check standard will be analyzed at the beginning and end of an analytical series, or periodically throughout a series containing a large number of samples.

In general, calibration check standards will be analyzed after every 10 samples, or more frequently as specified in the applicable analytical method. In analyses where internal standards are used, a calibration check standard will only be analyzed in the beginning of an analytical series. If results of the calibration check standard exceed specified tolerances, then all samples analyzed since the last acceptable calibration check standard will be reanalyzed (Aquatec 1992).

Laboratory instrument calibration standards will be selected utilizing the guidance provided in the analytical methods summarized in Table 2.

9.2.1.7 Internal Standards

Internal standard areas and retention times are monitored for organic analyses performed by GC/MS methods. Method-specified internal standard compounds are spiked into all field samples, calibration standards and QC samples after preparation and prior to analysis. The response of each internal standard is plotted on a control chart. In general, Aquatec applies the following criteria for internal standards; the area of any compound cannot fall below 50 percent of its value in the preceding check standard nor can it rise above 100 percent of its value. If internal standard areas in one or more samples exceeds the specified tolerances, then the instrument will be recalibrated and all affected samples reanalyzed (Aquatec, Inc., 1992).

The use and frequency of internal standard analyses will be determined using the guidance provided within the analytical methods summarized in Table 2.

9.2.1.8 Reference Standards

Reference standards are standards of known concentration, and independent in origin from the calibration standards. Reference standards, are generally available through the EPA, the National Bureau of Standards, or are specified in analytical methods. Reference standards are included in the analytical process, although in some aspects of sample handling and preparation, these standards may not reflect the analytical process. The intent of reference standard analysis is to provide insight into the analytical proficiency within an analytical series. This includes the preparation of calibration standards, the validity of calibration, sample preparation, instrument set-up, and the premises inherent in quantitation. Reference standards are utilized in every analytical series with the exception of GC/MS and certain GC methods for which reference standards do not exist. Reference standards will be analyzed at the frequencies specified within the analytical methods summary in Table 2.

9.3 Sediment Characterization Quality Control Checks

Analyses of sediment particle size and TOC will be performed in duplicate for 5 percent (every 20 samples) of the total samples in each matrix.

10.0 - Performance and Systems Audits

Performance and systems audits will be completed in the field and the laboratory during the Phase I RI as described below.

10.1 Field Audits

The following field performance and systems audits will be completed during this project.

10.1.1 Performance Audits

The appropriate Task Manager will monitor field performance. Field performance audit summaries will contain an evaluation of field measurements and field meter calibrations to verify that measurements are taken according to established protocols. The Blasland & Bouck QAO will review all field reports and communicate concerns to the Blasland & Bouck Project Manager and/or Task Managers, as appropriate. In addition, the Blasland & Bouck QAO will review the rinse and trip blank data to identify potential deficiencies in field sampling and cleaning procedures.

10.1.2 Internal Systems Audits

A field internal systems audit is a qualitative evaluation of all components of field QA/QC. The systems audit compares scheduled QA/QC activities from this document with actual QA/QC activities completed. The appropriate Task Manager and QAO will periodically confirm that work is being performed consistent with this QAPP, the Phase I RI Work Plan, FSP and HASP.

10.1.3 External Audits

New York State representatives may conduct audits of field operations, if determined necessary.

10.2 Laboratory Audits

The following laboratory performance and systems audits will be completed during this project.

10.2.1 Aquatec Procedures

10.2.1.1 Internal Systems Audits

The internal quality control program will consist of two key segments:

1. Documented procedures for daily operation of the laboratory; and
2. Inspection and review of laboratory procedures by the Aquatec QAO.

Examples of laboratory procedures that are required for daily operation include:

1. Instruments and Equipment: All instruments and equipment are operated according to laboratory SOPs (on record at the laboratory) which include details of calibration, operation, and maintenance of these devices. The Aquatec QAO observes the use of instruments and the adherence to the SOPs as part of regular inspection activities (Aquatec, Inc., 1992).

2. Reagents: All reagents are labeled according to laboratory SOPs. This procedure requires labeling of name, concentration, expiration data, storage condition, date of preparation, and name of person who prepared the reagent. The Aquatec QAO also includes reagents in the regular inspection program (Aquatec, Inc., 1992).

The assessment of laboratory analytical data is initiated at the bench level. The analyst directly responsible for the test understands the current operating acceptance limits. The analyst can directly accept or reject the data generated and consult the section leader for any corrective action. Data reported by the analyst is entered into a central data retrieval system. All data is subject to review by the Aquatec Project Manager, who is also responsible for monitoring quality control and analytical procedures (Aquatec, Inc., 1992).

A comprehensive QA/QC program is coordinated by the Aquatec QAO, who is independent of all operating departments and reports directly to management. The Aquatec QAO reviews, approves, and distributes all technical and administrative methods and procedures used in project work. These written methods and SOPs, including an updated file, are part of the official records (Aquatec, Inc., 1992).

The Aquatec QAO conducts semi-annual inspections. The following items are typically inspected:

1. Sample handling;
2. Chemical assay procedures and validation;
3. Reagent preparation and labeling;
4. Analytical controls and standards;
5. Instrument calibration and maintenance;
6. Results of analyses;
7. Data recording and analysis;
8. Data archiving procedures;
9. Preventative maintenance procedures for laboratory instruments; and
10. Training, documentation, and personnel qualifications.

Inspection reports are issued to management for all inspections and kept on file by the Aquatec QAO. Adverse findings must be addressed to the Aquatec Project Manager as well as the Laboratory Director. Adverse findings and steps taken to correct deficiencies will be documented in the Corrective Action Form (Appendix A). Once final, the Aquatec QAO inspection records will be made available to Blasland & Bouck. Data units and final report reviews are also part of the Aquatec QAO inspection program.

10.2.1.2 External Audits

There are three mechanisms by which external laboratory audits may be conducted.

1. The independent data validator (OBG Laboratories, Inc.) will provide an evaluation of laboratory performance for all data packages submitted for review.

2. The State may conduct audits of laboratory operations, if deemed necessary.

3. As a participant in State and federal certification programs, the laboratory sections at Aquatec are audited by representatives of the regulatory agency issuing certification. Audits are usually conducted on an annual basis and focus on laboratory conformance to the specific program protocols for which the laboratory is seeking certification. The auditor reviews sample handling and tracking documentation, analytical methodologies, analytical supportive documentation, and final reports. The audit findings are formally documented and submitted to the laboratory for corrective action, if necessary (Aquatec, Inc., 1992).

11.0 - Preventative Maintenance

Preventive maintenance schedules have been developed for both field and laboratory instruments. A summary of the maintenance activities to be performed is presented below.

11.1 Field Instruments and Equipment

Prior to any field sampling, each piece of field equipment will be inspected to assure it is operational. If the equipment is not operational, it must be serviced prior to use. All meters which require charging or batteries will be fully charged or have fresh batteries. If instrument servicing is required, it is the responsibility of the appropriate Task Manager or designer to follow the maintenance schedule and arrange for prompt service.

Field instrumentation to be used in this study includes meters to measure conductivity, temperature, pH, dissolved oxygen, water level, organic vapors, and water flow. Field equipment also includes sediment samplers, sediment traps, vacuum pumps, and sampling devices for ground water. A logbook will be kept for each field instrument. Each logbook contains records of operation, maintenance, calibration, and any problems and repairs. The Blasland & Bouck Task Managers will review calibration and maintenance logs.

Field equipment returned from a site will be inspected to confirm it is in working order. This inspection will be recorded in the logbook or field notebooks as appropriate. It will also be the obligation of the last user to record any equipment problems in the logbook.

Non-operational field equipment will be either repaired or replaced. Appropriate spare parts will be made available for field meters. A summary of preventive maintenance requirements for field instruments is provided in Table 9. Details regarding field equipment maintenance, operation, and calibration, are provided in the FSP.

11.2 Laboratory Instruments and Equipment

11.2.1 General

Laboratory instrument and equipment documentation procedures are provided in SOPs. Documentation includes details of any observed problems, corrective measure(s), routine maintenance, and instrument repair (which will include information regarding the repair and the individual who performed the repair).

Preventive maintenance of laboratory equipment generally will follow the guidelines recommended by the manufacturer. A malfunctioning instrument will be repaired immediately by in-house staff or through a service call from the manufacturer. Specific procedures used by Aquatec are discussed below.

11.2.2 Aquatec Procedures

11.2.2.1 Instrument Maintenance

Analytical instrumentation are maintained and serviced according to the manufacturer specifications. Each analytical instrument has a specific maintenance logbook. All routine maintenance and repair work is recorded with the date and the initials of the individual performing the maintenance task. Reports from outside service work are incorporated into the instrument logbooks. For GC/MS instrumentation, all performance checks (decafluorotriphenylphosphine and p-bromofluorobenzene) associated with instrument tune for a particular instrument are to be maintained in a separate loose-leaf notebook for that instrument (Aquatec, Inc., 1992).

11.2.2.2 Equipment Monitoring

On a daily basis, the operation of balances, incubators, refrigerators, the high purity water system, furnaces, ovens, and air conditioning, are documented on Aquatec Monitoring Worksheets. Any discrepancies are immediately reported to the appropriate laboratory or technical services personnel for resolution. All analytical balances are checked with Class "S" weights and a thermometer is present in each refrigerator/freezer (Aquatec, Inc., 1992).

The temperatures inside the refrigerator/freezer units are manually recorded on a daily basis through thermometer readings. A computer based system is also connected to the refrigerator/freezer units, which monitors temperature on a continual basis. Acceptable temperature limits have been established and set within computerized program. Each temperature reading is immediately compared to the limits, and for values falling outside of the established limits, a buzzer will sound and corrective action will be initiated immediately. Provisions have been made to contact technical services personnel during off hours to ensure that the refrigeration systems are not out of control for more than 20 minutes (Aquatec, Inc., 1992).

11.2.2.3 Maintenance Control Charts

In addition to routine and preventative maintenance, control charts are maintained for several instruments as an indicator of when maintenance may be necessary. In the GC/MS laboratory, instrument sensitivity is monitored using internal standards. The internal standard solution is injected into every standard, blank, and sample analyzed on the GC/MS. The area of the internal standard compounds are plotted on control charts that can serve as an indicator of the overall condition of the instrument. Instrumentation problems may be diagnosed and remedied by tracking the response patterns on the control charts. The control charts are updated following each analysis (Aquatec, Inc., 1992).

12.0 - Data Assessment Procedures

The analytical data generated during the M. Wallace and Son Scrapyard Phase I RI will be evaluated with respect to precision, accuracy, and completeness and compared to the data quality objectives set forth in Sections 1.0 and 3.0 of this QAPP. The following tables summarize QC limits required to evaluate analytical performance:

Table	Title
3	Soil/Sediment Analyses Quality Control Limits
4	Water Analyses Quality Control Limits

The procedures utilized when assessing data precision, accuracy, and completeness are presented below.

12.1 DATA PRECISION ASSESSMENT PROCEDURES

Field precision is difficult to measure because of temporal variations in field parameters. However, precision will be controlled through the use of experienced field personnel, properly calibrated meters, and duplicate field measurements. Field duplicates will be used to assess precision for the entire measurement system including sampling, handling, shipping, storage, preparation, and analysis.

Laboratory data precision for organic analyses will be monitored through the use of matrix spike/matrix spike duplicate sample analyses. For other parameters, laboratory data precision will be monitored through the use of field duplicates and/or laboratory duplicates as identified in Table 1.

The precision of data will be measured by calculation of the relative percent difference (RPD) by the following equation:

$$RPD = \frac{(A-B)}{(A+B)/2} \times 100$$

Where:

A = Analytical result from one of two duplicate measurements
B = Analytical result from the second measurement.

Precision objectives for duplicate analyses are identified in Tables 3 and 4.

12.2 Data Accuracy Assessment Procedures

The accuracy of field measurements will be controlled by experienced field personnel, properly calibrated field meters, and adherence to established protocols. The accuracy of field meters will be assessed by review of calibration and maintenance logs.

Laboratory accuracy will be assessed via the use of matrix spikes, surrogate spikes and reference standards. Where available and appropriate, QA performance standards will be analyzed periodically to assess laboratory accuracy. Accuracy will be calculated in terms of percent recovery as follows:

$$\% \text{ Recovery} = \frac{A-X}{B} \times 100$$

Where:

A = Value measured in spiked sample or standard
X = Value measured in original sample
B = True value of amount added to sample or true value of standard

This formula is derived under the assumption of constant accuracy between the original and spiked measurements. Accuracy objectives for matrix spike recoveries are identified in Tables 3 and 4.

12.3 Data Completeness Assessment Procedures

Completeness of a field or laboratory data set will be calculated by comparing the number of valid sample results generated to the total number of results generated.

$$\text{Completeness} = \frac{\text{No Valid Results}}{\text{Total number of results generated} \times 100}$$

As a general guideline, overall project completeness is expected to be at least 90 percent. The assessment of completeness will require professional judgement to determine data useability for intended purposes.

13.0 - Corrective Action

Corrective actions are required when field or analytical data are not within the objectives specified in this QAPP, the Work Plan, or the FSP. Corrective actions include procedures to promptly investigate, document, evaluate, and correct data collection and/or analytical procedures. Field and laboratory corrective action procedures for the M. Wallace and Son, Inc. Scrapyard Site Phase I RI are described below.

13.1 Field Procedures

When conducting the Phase I RI field work, if a condition is noted that would have an adverse effect on data quality, corrective action will be taken so as not to repeat this condition. Condition identification, cause, and corrective action implemented will be documented on a Corrective Action Form (Appendix A) and reported to the appropriate Blasland & Bouck Task Manager, QAO, and Project Manager.

Examples of situations which would require corrective actions are provided below:

1. Protocols as defined by the QAPP and FSP have not been followed;
2. Equipment is not in proper working order or properly calibrated;
3. QC requirements have not been met; and
4. Issues resulting from performance or systems audits.

Project personnel will continuously monitor ongoing work performance in the normal course of daily responsibilities.

13.2 Laboratory Procedures

13.2.1 General

In the laboratory, when a condition is noted to have an adverse effect on data quality, corrective action will be taken so as not to repeat this condition. Condition identification, cause, and corrective action to be taken will be documented, and reported to the appropriate project manager and QAO.

Corrective action may be initiated, at a minimum, under the following conditions:

1. Protocols as defined by this QAPP have not been followed;
2. Predetermined data acceptance standards are not obtained;
3. Equipment is not in proper working order or calibrated;
4. Sample and test results are not completely traceable;
5. QC requirements have not been met; and
6. Issues resulting from performance or systems audits.

Laboratory personnel will continuously monitor ongoing work performance in the normal course of daily responsibilities. Additional details of corrective action procedures used by Aquatec are provided below.

13.2.2 Aquatec Procedures

When deficiencies or out-of-control situations exist, the samples analyzed during out-of-control situations will be reanalyzed prior to reporting of results. There are several levels of out-of-control situations that may occur in the laboratory during analysis. (Aquatec, Inc., 1992).

13.2.2.1 Bench Level

Corrective action procedures are often handled at the bench level. If an analyst finds a nonlinear response during calibration of an instrument, then the problem is often corrected by a careful examination of the preparation or extraction procedure, spike and calibration mixes, or instrument sensitivity. If the problem persists, it is brought to the attention of the management level. (Aquatec, Inc., 1992).

13.2.2.2 Laboratory Management Level

If resolution at the bench level was not achieved or a deficiency is detected after the data has left the bench level, then corrective action becomes the responsibility of the Aquatec section leader. Unacceptable matrix or surrogate spike recoveries detected by data review are reported to the Aquatec section leader. A decision to reanalyze the sample or report the results is made depending on the circumstances. Documentation procedures for sample reanalysis are initiated at this point if necessary. (Aquatec, Inc., 1992).

13.2.2.3 Receiving Level

If discrepancies exist in either the documentation of a sample or its container, a corrective action decision must be made after consulting with the appropriate management personnel. All decisions will be fully documented. Some examples of container discrepancies are broken samples, inappropriate containers, or improper preservation. In these cases, corrective action will involve the Aquatec Project Manager contacting the Blasland & Bouck Project Manager or QAO to resolve the problems. (Aquatec, Inc., 1992).

13.2.2.4 Statistical Events

An out-of-control situation is defined as data exceeding control limits, unacceptable trends detected in charts, or unusual changes in the instrument detection limits. When these situations arise, it is brought to the attention of the Aquatec Project Manager and the Laboratory Director who will initiate corrective action. (Aquatec, Inc., 1992).

14.0 - Quality Assurance Reports to Management

14.1 Internal Reporting

The independent data validator (OBG Laboratories, Inc.) will submit validation report(s) to the Blasland & Bouck QAO, consistent with the requirements presented in Section 8.3. The Blasland & Bouck QAO will review analytical concerns identified by the independent data validator with the laboratory. For data qualified by the data validator, data useability will be assessed by data users relative to project decision-making requirements. Supporting data (i.e., historic data, related field or laboratory data) will be reviewed to assist determining data quality, as appropriate. The Blasland & Bouck QAO will incorporate results of data validation reports and assessments of data useability into a summary report that will be submitted to the Blasland & Bouck Project Manager and appropriate Task Managers. This report will be filed in the project file at Blasland & Bouck's office and will include the following:

1. Assessment of data accuracy, precision, and completeness for both field and laboratory data;
2. Results of the performance and systems audits;
3. Significant QA/QC problems, solutions, corrections, and potential consequences; and
4. Analytical data validation report.

14.2 Phase I RI Reporting

The Phase I RI Report prepared by Blasland & Bouck will contain a separate QA/QC section(s) summarizing the quality of data collected and/or used as appropriate to the project data quality objectives which are discussed in Section 1.3 of this QAPP. Additional details of data quality objectives are provided in the Work Plan and FSP. The Blasland & Bouck QAO will prepare the QA/QC summaries using reports and memoranda documenting the data assessment and validation.

In addition, records will be maintained to provide evidence of the QA activities. A QA records index will be initiated at the beginning of the project, and all information received from outside sources or developed during the project will be retained by Blasland & Bouck. Upon termination of an individual task or work assignment, working files will be forwarded to the project files.

Copies of all completed data validation reports and data usability reports will be submitted to NYSDEC as they become available during the RI.

References

ASTM (1992). Annual Book of ASTM Standards, Volume 04.08, Soil and Rock, Building Stones, Geotextiles. Philadelphia, Pennsylvania: American Society for Testing and Materials

Aquatec, Inc. (1992). Aquatec Quality Assurance Program Plan. Colchester, Vermont.

NYSDEC (1991). New York State Department of Environmental Conservation 1991 Analytical Services Protocols (ASP).

TABLE 1

ENVIRONMENTAL AND QUALITY CONTROL ANALYSES

Environmental Sample Matrix/ Laboratory Parameters	Est. Environmental Sample Quantity	Field QC Analyses							Laboratory QC Analyses								Est. Overall Total
		Trip Blank		Field Duplicate		Rinse Blank		Est. Matrix Total	MS		MSD		SB		Lab Duplicate		
		Freq	No.	Freq	No.	Freq.	No.		Freq.	No.	Freq.	No.	Freq.	No.	Freq	No.	
Soil Samples																	
Total PCBs	70[1]	--	--	1/20	4	1/20	4	78	1/20	4	1/20	4	1/20	4	--	--	90
TCL Volatile Organics	17	--	--	1/20	1	1/20	1	79	1/20	1	1/20	1	1/20	1	--	--	22
TCL Semi-Volatile Organics	52	--	--	1/20	3	1/20	3	58	1/20	3	1/20	3	1/20	3	--	--	67
TAL Inorganics	54[2]	--	--	1/20	3	1/20	3	60	1/20	3	--	--	1/20	3	1/20	3	69
Off-Site Sediment Samples																	
Total PCBs	29[3]	--	--	1/20	2	1/20	2	33	1/20	2	1/20	2	--	2	--	--	39
TAL Mercury	4	--	--	1/20	1	1/20	1	6	1/20	--	1/20	1	1/20	1	1/20	1	9
Total Organic Carbon	29[3]	--	--	1/20	2	--	--	31	--	--	--	--	--	--	--	--	31
Surface Water Samples																	
Total PCBs - Filtered	9	--	--	1/20	1	1/20	1	11	1/20	1	1/20	1	1/20	1	--	--	14
Total PCBs - Unfiltered	9	--	--	1/20	1	1/20	1	11	1/20	1	1/20	1	1/20	1	--	--	14
TCL Volatile Organics	5	1/day[4]	1	1/20	1	1/20	1	8	1/20	1	1/20	1	1/20	1	--	--	11
TCL Semi-Volatile Organics	5	--	--	1/20	1	1/20	1	7	1/20	1	1/20	1	1/20	1	--	--	10
TAL Inorganics - Filtered	5	--	--	1/20	1	1/20	1	7	1/20	1	--	--	1/20	1	1/20	1	10
TAL Inorganics - Unfiltered	5	--	--	1/20	1	1/20	1	7	1/20	1	--	--	1/20	1	1/20	1	10
TAL Mercury - Filtered	4	--	--	1/20	1	1/20	1	6	1/20	1	--	--	1/20	1	1/20	1	9
TAL Mercury - Unfiltered	4	--	--	1/20	1	1/20	1	6	1/20	1	--	--	1/20	1	1/20	1	9
Total Suspended Solids	5	--	--	1/20	1	--	--	6	--	--	--	--	--	--	--	--	6
Ground-Water Samples																	
Total PCBs - Filtered	8	--	--	1/20	1	--	--	9	1/20	1	1/20	1	1/20	1	--	--	12
Total PCBs - Unfiltered	8	--	--	1/20	1	--	--	9	1/20	1	1/20	1	1/20	1	--	--	12
TCL Volatile Organics	8	1/day[3]	2	1/20	1	--	--	11	1/20	1	1/20	1	1/20	1	--	--	14
TCL Semi-Volatile Organics	8	--	--	1/20	1	--	--	9	1/20	1	1/20	1	1/20	1	--	--	12
TAL Inorganics - Filtered	8	--	--	1/20	1	--	--	9	1/20	1	--	--	1/20	1	1/20	1	12
TAL Inorganics - Unfiltered	8	--	--	1/20	1	--	--	9	1/20	1	--	--	1/20	1	1/20	1	12

TABLE 1

ENVIRONMENTAL AND QUALITY CONTROL ANALYSES

Notes:

1. Includes surface and subsurface soil samples for PCB analysis.

2. Quantity includes two background soil samples from MW-7 installation for TAL inorganic analysis. Additional samples may require additional QC analyses based on additional sample quantity compared to QC sample frequencies shown on table.

3. Quantity assumes that a total of nine samples for analysis for PCBs will be collected from the 10 sediment core samples (20 total samples) from Cobleskill Creek.

4. 1/day = One trip blank per day of volatile organic sampling of aqueous media. One rinse blank per day of sampling with sampling device which requires field cleaning.

5. MS = Matrix spike

6. MSD = Matrix spike duplicate

7. SB = spike blank

8. PCBs = Polychlorinated biphenyls

9. Field Dup = field duplicate

10. Lab Dup = laboratory duplicate

11. TCL = Target Compound List per NYSDEC 1991 ASP.

12. TAL = Target Analyte List per NYSDEC 1991 ASP.

13. One sample of tap water used for ground-water well installations/rock cores will be collected for analysis for total PCBs, TCL volatile organics, TCL semi-volatile organics, and TAL inorganics (not shown on Table 1).

14. Table assumes that samples will be processed in groups of 20 samples for QC analyses. If smaller sample groups are processed, then one MS/MSD (or MS/lab dup) per sample delivery group (up to 20 samples) will be prepared for each sample delivery group.

TABLE 2

PARAMETERS, METHODS, AND REPORTING LIMITS

Water, Soil, and Sediment Samples
Chemical Constituents
Target Compound List (TCL) ASP Methods

Constituent	Reporting Limits[1] (ppb)		
	Water	Low Soil	Medium Soil
Volatile Organics			
Chloromethane	10	10	1,200
Bromomethane	10	10	1,200
Vinyl Chloride	10	10	1,200
Chloroethane	10	10	1,200
Methylene Chloride	10	10	1,200
Acetone	10	10	1,200
Carbon Disulfide	10	10	1,200
1,1-Dichloroethene	10	10	1,200
1,1-Dichloroethane	10	10	1,200
1,2-Dichloroethene (total)	10	10	1,200
Chloroform	10	10	1,200
1,2-Dichloroethane	10	10	1,200
2-Butanone	10	10	1,200
1,1,1-Trichloroethane	10	10	1,200
Carbon Tetrachloride	10	10	1,200
Bromodichloromethane	10	10	1,200
1,2-Dichloropropane	10	10	1,200
cis-1,3-Dichloropropene	10	10	1,200
Trichloroethene	10	10	1,200
Dibromochloromethane	10	10	1,200
1,1,2-Trichloroethane	10	10	1,200
Benzene	10	10	1,200
trans-1,3-Dichloropropene	10	10	1,200
Bromoform	10	10	1,200
4-Methyl-2-pentanone	10	10	1,200
2-Hexanone	10	10	1,200
Tetrachloroethene	10	10	1,200

TABLE 2

PARAMETERS, METHODS, AND REPORTING LIMITS

Water, Soil, and Sediment Samples
Chemical Constituents
Target Compound List (TCL) ASP Methods

Constituent	Reporting Limits[1] (ppb)		
	Water	Low Soil	Medium Soil
Toluene	10	10	1,200
1,1,2,2-Tetrachloroethane	10	10	1,200
Chlorobenzene	10	10	1,200
Ethylbenzene	10	10	1,200
Styrene	10	10	1,200
Total Xylenes	10	10	1,200
Semi-Volatile Organics			
Phenol	10	330	10,000
bis(2-chloroethyl) ether	10	330	10,000
2-Chlorophenol	10	330	10,000
1,3-Dichlorobenzene	10	330	10,000
1,4-Dichlorobenzene	10	330	10,000
1,2-Dichlorobenzene	10	330	10,000
2-Methylphenol	10	330	10,000
2,2'-oxybis (1-chloropropane)	10	330	10,000
4-Methylphenol	10	330	10,000
N-Nitroso-di-n-propylamine	10	330	10,000
Hexachloroethane	10	330	10,000
Nitrobenzene	10	330	10,000
Isophorone	10	330	10,000
2-Nitrophenol	10	330	10,000
2,4-Dimethylphenol	10	330	10,000
bis(2-chloroethoxy)methane	10	330	10,000
2,4-Dichlorophenol	10	330	10,000
1,2,4-Trichlorobenzene	10	330	10,000
Naphthalene	10	330	10,000
4-Chloroaniline	10	330	10,000
Hexachlorobutadiene	10	330	10,000

TABLE 2

PARAMETERS, METHODS, AND REPORTING LIMITS

Water, Soil, and Sediment Samples
Chemical Constituents
Target Compound List (TCL) ASP Methods

Constituent	Reporting Limits[1] (ppb)		
	Water	Low Soil	Medium Soil
4-Chloro-3-methylphenol	10	330	10,000
2-Methylnapthalene	10	330	10,000
Hexachlorocyclopentadiene	10	330	10,000
2,4,6-Trichlorophenol	10	330	10,000
2,4,5-Trichlorophenol	25	800	25,000
2-Chloronaphthalene	10	330	10,000
2-Nitroaniline	25	800	25,000
Dimethylphthalate	10	330	10,000
Acenaphthylene	10	330	10,000
2,6-Dinitrotoluene	10	330	10,000
3-Nitroaniline	25	800	25,000
Acenaphthene	10	330	10,000
2,4-Dinitrophenol	25	800	25,000
4-Nitrophenol	25	800	25,000
Dibenzofuran	10	330	10,000
2,4-Dinitrotoluene	10	330	10,000
Diethylphthalate	10	330	10,000
4-Chlorophenyl phenyl ether	10	330	10,000
Fluorene	10	330	10,000
4-Nitroaniline	25	800	25,000
4,6-Dinitro-2-methylphenol	25	800	25,000
N-nitrosodiphenylamine	10	330	10,000
4-Bromophenyl phenyl ether	10	330	10,000
Hexachlorobenzene	10	330	10,000
Pentachlorophenol	25	800	25,000
Phenanthrene	10	330	10,000
Anthracene	10	330	10,000
Carbazole	10	330	10,000

TABLE 2

PARAMETERS, METHODS, AND REPORTING LIMITS

Water, Soil, and Sediment Samples
Chemical Constituents
Target Compound List (TCL) ASP Methods

Constituent	Reporting Limits[1] (ppb)		
	Water	Low Soil	Medium Soil
Di-n-butyl phthalate	10	330	10,000
Fluoranthene	10	330	10,000
Pyrene	10	330	10,000
Butyl benzyl phthalate	10	330	10,000
3,3'-Dichlorobenzidine	10	330	10,000
Benz(a)anthracene	10	330	10,000
Chrysene	10	330	10,000
bis(2-Ethylhexyl)phthalate	10	330	10,000
Di-n-octyl phthalate	10	330	10,000
Benzo(b)fluoranthene	10	330	10,000
Benzo(k)fluoranthene	10	330	10,000
Benzo(a)pyrene	10	330	10,000
Indeno(1,2,3-cd)pyrene	10	330	10,000
Dibenzo(a,h)anthracene	10	330	10,000
Benzo(g,h,i)perylene	10	330	10,000

TABLE 2

PARAMETERS, METHODS, AND REPORTING LIMITS

Water, Soil, and Sediment Samples
Chemical Constituents
Target Analyte List (TAL) ASP Analytical Procedures

Analyte	Reporting Limit^a	
	Water (ppb)	Soil (ppb)
Aluminum	200	200
Antimony	60	60
Arsenic	10	10
Barium	200	200
Beryllium	5	5
Cadmium	5	5
Calcium	5,000	5,000
Chromium	10	10
Cobalt	50	50
Copper	25	25
Iron	100	100
Lead	5	5
Magnesium	5,000	5,000
Manganese	15	15
Mercury	0.2	0.2
Nickel	40	40
Potassium	5,000	5,000
Selenium	5	5
Silver	10	10
Sodium	5,000	5,000
Thallium	10	10
Vanadium	50	50
Zinc	20	20
Cyanide	10	10

TABLE 2

PARAMETERS, METHODS, AND REPORTING LIMITS

Water, Soil, and Sediment Samples
Chemical Constituents
PCB Analysis Using SW-846 Method 8080 as Referenced in ASP

Constituent	Reporting Limit[3]	
	Water (ppb)	Soil (ppm)
Aroclor 1016	0.05	0.050
Aroclor 1221	0.05	0.050
Aroclor 1232	0.05	0.050
Aroclor 1242	0.05	0.050
Aroclor 1248	0.05	0.050
Aroclor 1254	0.05	0.050
Aroclor 1260	0.05	0.050
Total PCBs[4]	0.35	0.350

TABLE 2

PARAMETERS, METHODS, AND REPORTING LIMITS

Analyses	Method	Reporting Limit
Sediment Supplemental Parameters		
Total Organic Carbon Particle Size Distribution	Lloyd Kahn Method ASTM-D-422	100 ppm --
Surface Water Supplemental Parameters		
Total Suspended Solids	USEPA Method 160.2 (referenced in ASP)	4 ppm[5]

Notes:

[1] Reporting limits presented are NYSDEC 1991 ASP contract required quantitation limits (CQRLs). Quantitation limits for soil and sediment are based on wet weight. The quantitation limits calculated by the laboratory for soil and sediment calculated on dry weight basis will be higher. Specific quantitation limits are highly matrix dependent. The quantitation limits shown are provided for guidance and may not always be achievable.

[2] Reporting limits presented are based on NYSDEC 1991 ASP CRQLs for inorganics and are subject to restrictions specified in NYSDEC 1991 ASP. Higher detection limits may be used if conditions warrant in accordance with NYSDEC 1991 ASP. CRQLs shown for inorganics are provided for guidance and may not always be achievable.

[3] Reporting limits shown are based on NYSDEC 1991 ASP CRQLs and are for guidance purposes. The quantitation limits calculated by the laboratory for soil and sediments, calculated on dry weight basis, will be higher.

[4] Reporting limits shown for total PCBs are the summation of the reporting limits for each aroclor listed.

[5] Reporting limits are method detection limits based on USEPA for supplemental parameters. Methods contained in Methods for Chemical Analysis of Water and Wastes, USEPA-6001/4-79-020, except as noted.

[6] PCBs = polychlorinated biphenyls.

[7] ppb = parts per billion.

[8] ppm = parts per million.

[9] -- = not applicable.

TABLE 3

SOIL/SEDIMENT ANALYSES QUALITY CONTROL LIMITS

Constituent	Method	Accuracy, % Recovery	Precision, RPD
Volatile Organics^{1,2}			
1,1-Dichloroethane	ASP/TCL	59-172	22
Trichloroethane	ASP/TCL	62-137	24
Benzene	ASP/TCL	66-142	21
Toluene	ASP/TCL	59-139	21
Chlorobenzene	ASP/TCL	60-133	21
Semi-Volatile Organics^{1,2}			
2-Chlorophenol	ASP/TCL	25-102	50
1,4-Dichlorobenzene	ASP/TCL	28-104	27
N-nitroso-di-n-propylamine	ASP/TCL	41-126	38
1,2,4-Trichlorobenzene	ASP/TCL	38-107	23
4-chloro-3-methylphenol	ASP/TCL	26-103	33
Acenapthene	ASP/TCL	31-137	19
4-nitrophenol	ASP/TCL	11-114	50
2,4-dinitrotoluene	ASP/TCL	28-89	47
Pentachlorophenol	ASP/TCL	17-109	47
Pyrene	ASP/TCL	35-142	36
Phenol	ASP/TCL	26-90	35
PCBs^{1,2,3}			
Aroclor 1242	Method 8080	39-159	--
Arclor 1254	Method 8080	29-131	--
Inorganics^{3,4}			
All TAL Inorganics	ASP/TAL	75-120	30

Notes:

[1] Available QC limits are presented from NYSDEC 1991 ASP for organic analyses. These limits may be used for guidance on QC limits for other ASP/TCL volatiles or semi-volatiles.

[2] QC limits shown on table are only advisory, however, frequent failures to meet the QC limits warrant investigation of the laboratory.

[3] QC limits are presented for aroclors 1242 and 1254 from NYSDEC 1991 ASP.

[4] QC limits obtained from NYSDEC 1991 ASP for Inorganics Analyses.

[5] QC limits for supplemental soil/sediment parameters consist of 25% relative percent difference in duplicate samples.

[6] RPD = relative percent difference.

[7] MS = matrix spike

[8] MSD = matrix spike duplicate

[9] SB = spike blank

Lab dup = laboratory duplicate

TABLE 4

WATER ANALYSES QUALITY CONTROL LIMITS

Constituent	Method	Accuracy, % Recovery	Precision, RPD
Volatile Organics[1]			
1,1-Dichloroethane	ASP/TCL^{1,2}	61-145	14
Trichloroethane	ASP/TCL^{1,2}	71-120	14
Benzene	ASP/TCL^{1,2}	76-127	11
Toluene	ASP/TCL^{1,2}	76-125	13
Chlorobenzene	ASP/TCL^{1,2}	75-130	13
Semi-Volatile Organics[2]			
2-Chlorophenol	ASP/TCL	27-123	40
1,4-Dichlorobenzene	ASP/TCL	36-97	28
N-nitroso-di-n-propylamine	ASP/TCL	41-116	38
1,2,4-Trichlorobenzene	ASP/TCL	39-98	28
4-chloro-3-methylphenol	ASP/TCL	23-97	42
Acenapthene	ASP/TCL	46-118	31
4-nitrophenol	ASP/TCL	10-80	50
2,4-dinitrotoluene	ASP/TCL	24-96	38
Pentachlorophenol	ASP/TCL	9-103	50
Pyrene	ASP/TCL	26-127	31
Phenol	ASP/TCL	12-110	42
PCBs[2]			
Aroclor 1242	Method 8080	39-150	--
Aroclor 1254	Method 8080	39-150	--
Inorganics[3]			
All TAL Inorganics	ASP/TAL	75-120	20

Notes:

[1] Available QC limits are presented from NYSDEC 1991 ASP for organic analysis. These limits may be used for guidance on QC limits for other ASP/TCL volatiles or semi-volatiles.

[2] QC limits presented for aroclors 1242 and 1254 are from NYSDEC 1991 ASP for organic analysis.

[3] QC limits obtained from NYSDEC 1991 ASP for inorganics analysis 3/90.

[4] QC limits shown on table are only advisory, however, frequent failures to meet the QC limits warrant investigation of the laboratory.

[5] QC limits for supplemental surface water parameters (i.e., TSS) consist of 25% relative percent difference in duplicate samples.

[6] RPD = relative percent difference.

[7] MS = matrix spike

[8] MSD = matrix spike duplicate

[9] SB = spike blank

[10] Lab dup = laboratory duplicate

TABLE 5

FIELD CALIBRATION FREQUENCY

Equipment	Calibration Check	Calibration Standard	Calibration Standard Holding Time
pH Meter	Prior to use - daily[1]	pH 4.0 pH 7.0 pH 10.0	One Month
Conductivity Meter	Prior to use - daily	1,000 mg/l Sodium Chloride	One Month
Water Level Meter	Prior to implementing field work	100-foot engineer's tape	N/A
Dissolved Oxygen Meter	Per sampling event	Air	N/A
Turbidity	Prior to use - daily	Formazin 0.5 NTU, 5.0 NTU, 40.0 NTU	N/A

Notes:

[1] The pH meter will also be calibrated at each well prior to ground-water sampling.

[2] N/A = not applicable.

[3] NTU = nephelometric turbidity units.

TABLE 6

FIELD MEASUREMENTS QUALITY CONTROL

Field Parameter	Matrix	Precision[1]	Accuracy
Water Temperature	Ground Water Surface Water	± 1°C	± 1°C instrument capability
pH	Ground Water Surface Water	± 1°C pH S.U.	± 1°C pH S.U. (instrument capability)
Conductivity	Ground Water Surface Water	± 1°C mS/cm	± 5% standard
Dissolved Oxygen	Ground Water Surface Water	± 0.02 mg/l	± 5%
Turbidity	Ground Water	± 1.0 NTU	± 2% standard
Water Level	Ground Water	± 0.1 foot	± 0.01 foot

Notes:

[1] Precision units presented in applicable significant figures.

[2] N/A = not applicable.

TABLE 7

SAMPLE CONTAINERS, PRESERVATION, AND HOLDING TIMES

Water Samples*					
Parameter	Reference	Sample Container	Sample Volume	Preservation	Maximum Holding Time from Collection
Volatile Organics	ASP[1], Organics	two 40-ml glass vials with teflon-lined septum cap	80-ml	no head space, 4 drops concentrated HCl, cool 4°C	10 days[2] - VTSR
Semi-Volatile Organics	ASP[1], Organics	four liter amber glass with teflon-lined cap	4 liters	cool 4°C	extract within 5 days, VTSR, analyze within 40 days following the start of extraction
PCBs	SW-846, Method 8080, as referenced in ASP	One 2 liter amber glass with teflon-lined cap	2 liters	cool, 4°C	extract within 5 days, VTSR, analyze within 40 days following the start of extraction
Inorganics*	ASP[1], Inorganics	One 1 liter plastic	1 liter	HNO_3	180 days (26 days for Mercury), VTSR
Cyanide	ASP[1] inorganics	One 1 liter glass	1 liter	NAOH	12 days, VTSR
TSS	Method 160.1, as referenced in ASP	polyethylene or glass	500 ml	cool, 4°C	5 days, VTSR
pH	Method 150.1	plastic or glass	25 ml	None required	Analyze immediately

Notes:

1. ASP = NYSDEC 1991 ASP.
2. 7 days if not properly preserved.
3. * = filtered surface water and ground-water samples to be analyzed for inorganics and PCBs will be field filtered prior to the addition of preservatives, all other water samples will not be filtered.
4. VTSR = Verifiable Time of Sample Receipt.

TABLE 7 (Cont'd)

M. WALLACE AND SON, INC. SCRAPYARD SITE

SAMPLE CONTAINERS, PRESERVATION, AND HOLDING TIMES

Soil and Sediment					
Parameter	Reference	Sample Container	Sample Volume	Preservation	Maximum Holding Time from Collection
Volatile Organics	ASP[1], Organics	two 125 ml widemouth glass vial, caps lined with teflon	250 ml	minimize head space, cool 4°C	7 days, VTSR
Semi-Volatile Organics	ASP[1], Organics	one 250 ml widemouth glass, caps lined with teflon	250 ml	cool, 4°C	extract within 5 days, VTSR, analyze within 40 days following start of extraction
PCBs	SW-846 Method 8080, as referenced in ASP	One 250 ml widemouth amber glass, caps lined with teflon	250 ml	cool, 4°C	extract within 5 days, VTSR, analyze within 40 days following start of extraction
Inorganics	ASP[1], Inorganics	One 16 ounce widemouth glass	16 oz.	cool, 4°C	180 days (26 days for Mercury), VTSR
Cyanide	ASP[1] Inorganics	One 16 oz. widemouth glass	16 oz.	cool, 4°C	12 days, VTSR
Particle Size Distribution	ASTM, D-422	One 8 oz glass or plastic	8 oz.	--	--
Total Organic Carbon	Lloyd Kahn	One 8 oz. glass	8 oz.	Cool, 4°C	26 days, VTSR

Notes:

1. ASP = NYSDEC 1991 ASP.
2. VTSR = Verifiable Time of Sample Receipt.

TABLE 8

DATA VALIDATION CHECKLIST - LABORATORY ANALYTICAL DATA

REVIEW FOR COMPLETENESS

1. All chain-of-custody forms included.
2. Case narratives including sample preparation and analysis summary forms*
3. QA/QC summaries of analytical data including supporting documentation.
4. All relevant calibration data including supporting documentation.
5. Instrument and method performance data.
6. Documentation showing laboratory's ability to attain specified method detection limits.
7. Data report forms of examples for calculations of concentrations.
8. Raw data used in identification and quantification of the analysis required.

REVIEW OF COMPLIANCE

1. Data package completed as described above.
2. QAPP requirements for data production and reporting have been met.
3. QA/QC criteria production and reporting have been met.
4. Instrument type and calibration procedures have been met.
5. Initial and continuing calibration have been met.
6. Data reporting forms are completed.
7. Problems and corrective actions documented.

Note:

* These forms appear as an Addendum to the NYSDEC ASP forms package and will be required for all data submissions regardless of the protocol requested.

TABLE 9

PREVENTIVE MAINTENANCE SUMMARY

Maintenance	Frequency
Turbidity Meter	
-Store in protective casing	D
-Inspect equipment after use	D
-Clean sample cells	D
-Clean lens	M or X
-Check and recharge batteries	D
-Keep log book on instrument	D
-Have replacement meter available	D
-Return to manufacturer for service	X
-Calibration	D
Conductivity, pH, Dissolved Oxygen Meters	
-Store in protective casing	D
-Inspect equipment after use	D
-Clean probe	D
-Keep log book in instrument	D
-Have replacement meter available	D
-Replace probes	X
-Return to manufacturer for service	X
-Calibration	D
Thermometer	
-Store in protective casing	D
-Inspect equipment after use	D
-Have a replacement thermometer available	D
Water Level Meter	
-Store in protective covering	D
-Inspected equipment after use	D
-Check indicators/batteries	D
-Keep log book on instrument	D
-Have a replacement meter available	X
Photoionization Detector	
-Store in protective casing	D
-Inspect equipment after use	D
-Check and recharge batteries	D
-Clean UV lamp and ion chamber	M or X
-Keep log book on instrument	D
-Have replacement meter available	D
-Return to manufacturer for service	X
-Calibration	D

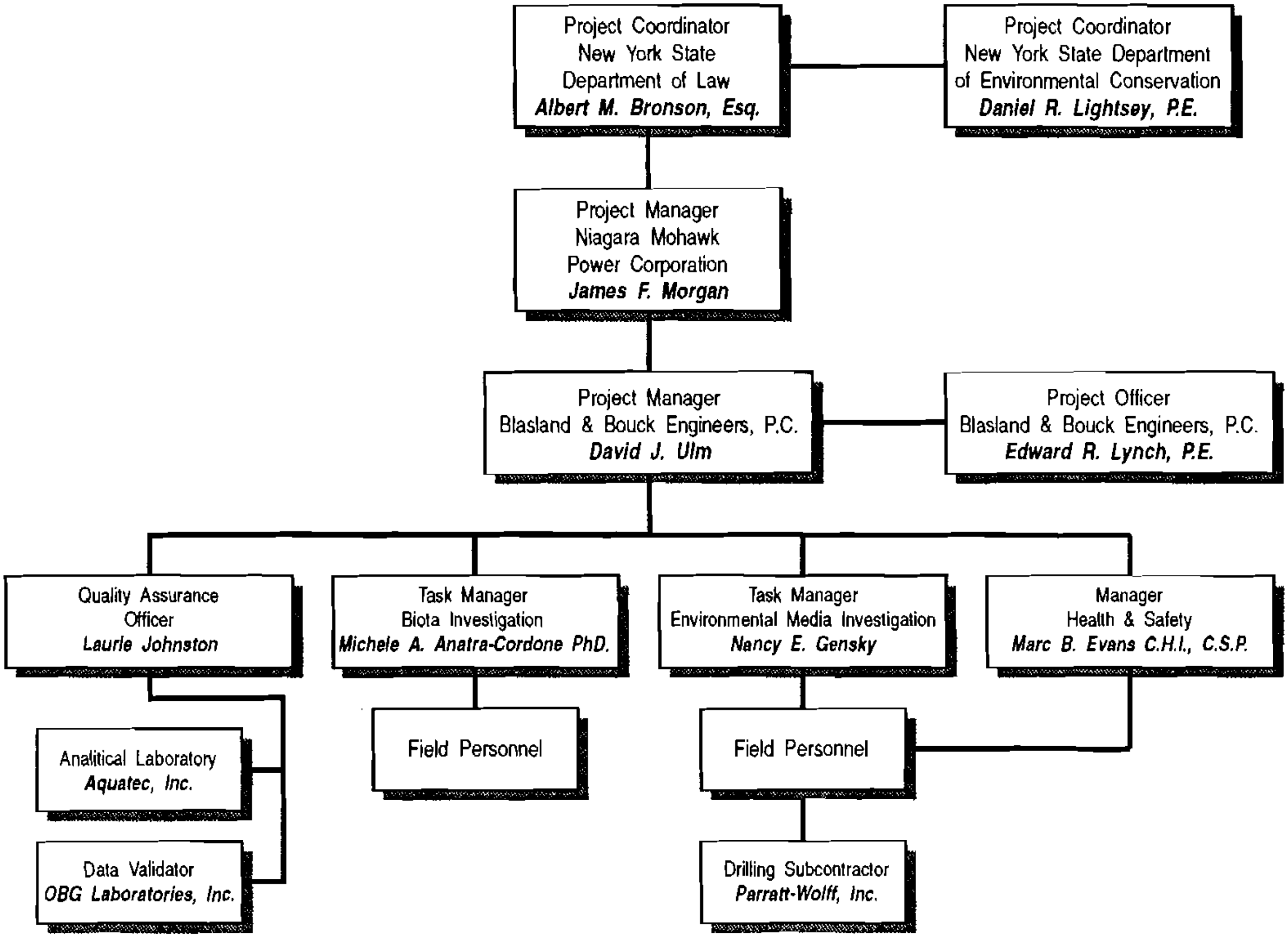
Notes:

D = Daily
M = Monthly
X = Operator's discretion

URE 1

NIAGARA MOHAWK POWER CORPORATION
PHASE I REMEDIAL INVESTIGATION
M. WALLACE & SON SCRAPYARD

PROJECT MANAGEMENT CHART



04/93 D54-DJH
3641743R/36417f01.cdr

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

APPENDIX A

CORRECTIVE ACTION FORM

FIGURE 3

CORRECTIVE ACTION FORM

Car No. ______________________ Date: ______________________

To: ______________________ cc: Task Manager

You are hereby requested to take corrective actions indicated below and as otherwise determined by you (A) to resolved the noted condition, and (B) to prevent it from reoccurring. Your written response is to be returned to the Quality Assurance Manager (QAM).

Condition

Reference Documents

Recommended Corrective Actions

Originator	Date	QAM Approval Date	P.M. Approval Date

Response

Corrective Action

A. Resolution

B. Pretention

C. Affected Documents

Signature ______________________ Date: ______________________

Followup

Corrective Action Verified:

By: ______________________ Date: ______________________

Appendix D

Phase I Remedial Investigation, M. Wallace and Son, Inc. Scrapyard, Health and Safety Plan

PHASE I REMEDIAL INVESTIGATION
M. WALLACE AND SON, INC. SCRAPYARD

HEALTH AND SAFETY PLAN

Niagara Mohawk Power Corporation

Syracuse, New York

April 1993

Report

Phase I Remedial Investigation

Health and Safety Plan

M. Wallace and Son, Inc. Scrapyard
Cobleskill, New York

Niagara Mohawk Power Corporation

April 1993

BLASLAND & BOUCK ENGINEERS, P.C.
BLASLAND, BOUCK & LEE
ENGINEERS & SCIENTISTS

6723 Towpath Road
Syracuse, New York 13214
(315) 446-9120

M. WALLACE AND SON SCRAPYARD

HEALTH AND SAFETY PLAN
APPROVAL SIGN-OFF SHEET

Approved: ______________________ Date: ______________________
Project Manager

Approved: ______________________ Date: ______________________
Health and Safety Supervisor

Approved: ______________________ Date: ______________________
Manager, Health and Safety

Approved: Edward M. Lynch Date: 4/27/1993
Officer

Table of Contents

Table of Contents

Table of Contents

TABLES

FIGURES

ATTACHMENTS

Disclaimer

This Health and Safety Plan specifically applies to work performed by employees of Blasland & Bouck Engineers, P.C., and sets forth the minimum safety requirements pursuant to OSHA regulations. It should be acknowledged that the employees of other consulting and/or contracted companies will work in accordance with their own independent Health and Safety Plans; provided that the minimum requirements of this plan are fulfilled.

1.0 - Introduction

1.1 General

This Health and Safety Plan (HASP) has been prepared to identify the health and safety procedures, methods, and requirements for activities performed during the Phase I Remedial Investigation (RI) at the M. Wallace and Son, Inc., Scrapyard site (the Scrapyard Site) in Cobleskill, New York (Figure 1). This plan applies to the activities to be performed by employees of Blasland & Bouck Engineers, P.C., (Blasland & Bouck) during implementation of Phase I RI activities as outlined in the Phase I RI Work Plan. This HASP sets forth the minimum safety requirements pursuant to OSHA regulations. It should be acknowledged that the employees of other consulting and/or contracted companies will work in accordance with their own independent Health and Safety Plans, provided that the minimum requirements of this HASP are fulfilled.

This HASP addresses those health and safety issues related to the presence of specific physical and/or chemical hazards potentially present during the performance of Phase I RI activities. An Emergency Response/Contingency Plan (Section 9) has been prepared to outline the procedures to be followed in the event of an emergency or unusual situation. During development of this HASP, consideration was given to current health and safety standards as defined by the Occupational Safety and Health Administration and/or National Institute for Occupational Safety and Health (OSHA/NIOSH), health effects data and standards known for contaminants, and also by consulting procedures designed to account for the exposure potential to unknown substances. Specifically, the following reference sources have been consulted:

- OSHA 29 CFR 1910 and 1926
- OSHA/NIOSH/EPA/Coast Guard "Occupational Health and Safety guidelines for Activities at Hazardous Waste Sites"
- NIOSH Pocket Guide to Chemical Hazards
- American Conference of Governmental Industrial Hygienist (ACGIH), Threshold Limit Values (TLV)

This document will be periodically reviewed to ensure that it is current and technically correct. Any changes in site conditions and/or the scope of work will require a review and modification of this HASP. Such changes will be completed in the form of an addendum.

1.2 Project Background

A detailed description of the Scrapyard Site is presented in the Phase I RI Work Plan. The overall objectives of this RI are to address issues resulting from past activities at the Scrapyard Site and to assess the impact on ground water, surface water, and soil/sediments. The site contains PCBs and potentially other parameters such as metals, volatiles, and semi-volatiles compounds whose levels and extent have not been characterized.

1.3 Definitions

The following definitions will apply to this HASP:

a. Site - The area where the work is to be performed.

b. Project - All work performed on the Scrapyard Site under the scope of work presented in the RI/FS Work Plan.

c. Subcontractor - Includes on-site subcontractor personnel hired by Blasland & Bouck.

d. On-Site Personnel - All Niagara Mohawk Power Corporation (NMPC) representatives, State of New York representatives, Blasland & Bouck, and subcontractor personnel involved with the project.

e. Visitor - All other personnel, except the on-site personnel. Visitors will need to receive approval to enter the Work Zone.

f. Health and Safety Supervisor (HSS) - is a Blasland & Bouck employee so designated, and will be primarily responsible for the implementation and enforcement of the HASP. The HSS will be familiar with applicable state and federal occupational safety and health regulations and have formal training in occupational safety and health (OSHA Supervisory Training).

g. Work Zone - Any portion of the project where hazardous substances are, or may reasonably be suspected, to be present in the air, water or soil/sediment.

h. Decontamination Zone - Area between the Work Zone and Support Zone that provides a transition between contaminated and clean areas. Decontamination stations are located in this Zone.

i. Support Zone - The rest of the site. Support equipment is located in this Zone.

j. Monitoring - The use of field instrumentation to provide information regarding the levels of contaminants. Monitoring will be conducted to evaluate employee exposures to chemical and physical hazards.

k. HASP - Health and Safety Plan approved for this Project.

l. Buddy System - A system of grouping workers in hazardous areas developed to ensure that workers are able to provide assistance when needed, observe partner for signs of chemical or heat exposure, and contact HSS or others if emergency assistance is needed.

2.0 - Identification of Key Health & Safety Personnel

2.1 Key Personnel

Implementation of this HASP will be accomplished through an integrated team effort. The names of key personnel involved with this project are provided below:

KEY PERSONNEL

New York State Department of Law

Albert M. Bronson, Esq. Assistant Attorney General	State of New York Department of Law Albany, NY 12224	518-474-8480
Dean Sommer, Esq. Assistant Attorney General	State of New York Department of Law Albany, NY 12224	518-474-8010
Alan Belensz Environmental Scientist	State of New York Department of Law Albany, NY 12224	518-474-8480

New York State Department of Environmental Conservation

Steven Hammond Director, Bureau of Central Remedial Action	Hazardous Waste Remediation 50 Wolf Road Albany, NY 12233	518-457-5637
Daniel R. Lightsey, P.E. Environmental Engineer	Hazardous Waste Remediation 2176 Guilderland Avenue Schenectady, NY 12306	518-382-6680

Niagara Mohawk Power Corporation

James F. Morgan Associate Senior Environmental Analyst	300 Erie Boulevard West Syracuse, NY 13202	315-428-3101

Blasland & Bouck Engineers, P.C.

Edward R. Lynch, P.E. Project Supervisor	P.O. Box 66 6723 Towpath Road Syracuse, NY 13214	315-446-9120
David J. Ulm Project Manager	P.O. Box 66 6723 Towpath Road Syracuse, NY 13214	315-446-9120

Blasland & Bouck Engineers, P.C.

Robert W. Rhoades Health & Safety Supervisor	P.O. Box 66 6723 Towpath Road Syracuse, NY 13214	315-446-9120
Marc B. Evans, CIH/CSP Manager, Health & Safety	P.O. Box 66 6723 Towpath Road Syracuse, NY 13214	315-446-9120

2.2 Assignment of HASP Responsibilities

2.2.1 Blasland & Bouck Engineers, P.C.-Roles and Responsibilities

Blasland & Bouck will perform all work outlined in the Phase I RI Work Plan in a manner consistent with generally accepted professional principles and practices. Blasland & Bouck will provide for the health and safety of all Blasland & Bouck personnel on-site during any job function covered by this HASP. It is the responsibility of Blasland & Bouck to:

- Name a HSS who has the health and safety responsibility for tasks listed in this HASP;
- Assure medical examinations and training requirements for all Blasland & Bouck personnel are current and comply with 29 CFR 1919.120 and 134;
- Be responsible for the pre-job indoctrination of all Blasland & Bouck personnel with regard to this HASP and other safety requirements, including but not limited to: (a) potential hazards; (b) personal hygiene principles; (c) personal protective equipment (PPE); (d) respiratory protection equipment usage; and (e) emergency procedures dealing with fire and medical situations;
- Be responsible for the implementation of the HASP, special safety considerations, and the emergency response/contingency plan;
- Ensure that all Blasland & Bouck on-site personnel are properly protected and equipped;
- Comply with OSHA health and safety regulations; and
- Maintain a daily field report of Blasland & Bouck on-site personnel and visitors who enter the site during field activities (Attachment A).

2.2.2 HSS Roles and Responsibilities

The Blasland & Bouck designated HSS for this project is Robert W. Rhoades. It is the responsibility of the HSS and/or designated alternate to:

- Maintain a daily logbook for recording all significant health and safety activities and incidents;
- Have authority to suspend work due to health and/or safety related concerns;
- Provide on-site technical assistance;
- Conduct routine air monitoring (if required), including equipment maintenance and calibration;
- Assure that a basic first aid kit is on-site during the completion of the project;

- Conduct periodic health and safety audits;
- Ensure that appropriate personnel have received the necessary training, including safety equipment and personal protective equipment;
- Provide regular pre-task health and safety briefings;
- Ensure that appropriate personnel have received the necessary physical examinations;
- Review the adequacy of the HASP;
- Draft necessary amendments to the HASP for review;
- Assure that all site, oversight, project and authorized personnel are made aware of the provisions of the HASP and have been informed of the nature of any physical and/or chemical hazards associated with the site activities; and
- Maintain control of required documents for recordkeeping purposes.

3.0 - Task/Operation Health and Safety Risk Analysis

3.1 *Scope*

The purpose of this section is to identify the physical, chemical, and biological hazards associated with the job tasks/operations being performed during this project. A brief description of the project activities are contained in Section 1.2 - Project Background. The following subsections discuss each task and/or operation in terms of the associated potential hazards. Also identified are the protective measures to be implemented during completion of the specific activity.

3.2 TASK-BY-TASK ANALYSIS

Activities conducted under this HASP are discussed by task. The tasks covered are as follows:

Task No.	Task Description
1	Test Pit Excavation and Soil Sampling
2	Surface Water and Sediment Sampling
3	Monitoring Well Installation
4	Ground-Water Sampling

Physical hazards and associated protection mechanisms for each task are listed in Table 1. Section 3.6 (Physical Hazards) of this HASP also provides supplemental information regarding general physical hazards which require additional consideration during site activities. As mentioned in Section 1.2, the Scrapyard Site contains PCBs and potentially other parameters such as metals, volatiles, and semi-volatile compounds. Biological hazards that may be encountered, identification of those tasks associated with potential for contact with biological hazards, and a description of suggested preventive measures are listed in Table 2. All tasks will be performed in the level of protection outlined in each of the following task-specific subsections. Section 4 (Personal Protective Equipment (PPE) and Equipment Reassessment Program) provides information describing the protective equipment ensembles.

The potential routes of exposure for the constituents include inhalation, skin absorption, ingestion, and skin/eye contact. The potential for exposure through any of these routes will depend on the specific activity conducted by the worker. Because of general operating procedures (Section 7.5) (i.e., no eating or smoking), ingestion is not considered a likely exposure route. The other potential routes of exposure for the activities to be conducted during the RI are discussed in the following task-specific subsections.

3.3 Task 1 - Test Pit Excavation and Soil Sampling

3.3.1 Description of Activity

This task will involve collecting soil samples at 35 locations identified using a sampling grid across the entire site. At as many of the sampling locations as possible, a backhoe will be utilized to excavate test pits to facilitate collection of soil samples. In locations where excavation of test pits is not feasible due to safety concerns (i.e., adjacent to the edge of the quarry pond), soil samples will be collected using a hand-augured soil boring.

3.3.2 Hazard Assessment

Potential chemical hazards associated with digging test pits include skin or eye contact with soil containing chemical constituents and inhalation of organic vapors. Potential physical hazards include injury from equipment or operator error or soil failure near the edge of the quarry wall. Other physical hazards include falling into the test pits, and tripping over obstacles.

3.3.3 Health and Safety Mitigation Actions

Due to the unknown nature of debris which may be encountered during excavation of the soil test pits, workers will be required to wear Level C protection with a possible downgrade to Level D. The worker breathing zone will be monitored for organic vapors during sampling using a photoionization detector (PID). The worker breathing zone will also be monitored for particulate levels using a real time aerosol monitor (Mini-RAM). If total volatile organic levels and particulate levels are less than the criteria specified in Section 4, field personnel may downgrade to Level D protection.

Field personnel will be required to wear hard-hats and steel-toed boots during the sampling activities to reduce the risk of physical injury. No field personnel will be allowed to enter test pits over 4 feet deep. Workers will utilize caution when working adjacent to the test pits and the area around the test pit will be kept free of equipment and obstacles to avoid tripping. The on-site geologist shall terminate excavation of the test pit if sandy soils are encountered which make the test pit sidewalls unstable.

3.4 Task 2 - Surface Water and Sediment Sampling

3.4.1 Description of Activity

This task will involve the sampling of surface waters and sediments from the quarry pond, the drainage system south of the site, and Cobleskill Creek. The sampling of surface water and sediments is performed by wading or boating to a specific location and collecting water samples or sediment samples. Surface water samples will be collected utilizing various sampling techniques (i.e., peristaltic pump, grab sampler, or DH-76 depth integrating sampler) dependent on location. Sediment samples will be obtained utilizing Lexan^R tubing or stainless steel scoops.

3.4.2 Hazard Assessment

Chemical hazards associated with the above sampling task include potential contact with surface waters and sediments containing chemical constituents and inhalation of organic vapors. Potential physical hazards associated with this task include back strain and muscle fatigue due to lifting; slip, trip, and fall hazards from working around vegetated areas; and drowning due to slipping, tripping or falling while working near streambanks and over water (in a boat).

3.4.3 Health and Safety Mitigation

Workers will be required to wear Level D protection. The worker breathing zone will be monitored with a PID. Due to water and wet sediment, dust will not be a problem. If the monitoring results exceed the criteria listed in Section 4, workers will be required to upgrade to Level C protection. Nitrile (chemical-resistant) gloves will be used during sampling activities to minimize the potential for dermal contact with surface water, soils, and sediments potentially containing chemical constituents. Hip or chest waders will be used when entering the stream. When entering a surface water body, buoyancy devices will be utilized. Additionally, all personnel working over water (from a boat) will wear USCG-approved flotation devices. If a boat is used, there will be at least two people in the boat. A buddy system will be utilized during all water sampling work. Any work near, over, or in water must comply with OSHA 29 CFR 1926.106.

3.5 Task 3 - Soil Borings/Bedrock Cores and Ground-Water Monitoring Well Installation

3.5.1 Description of Activity

Soil borings in the overburden will be performed using split-spoon sampling devices. Bedrock cores will be performed using NX coring equipment. Monitoring wells will be installed using a hollow-stem auger drilling method to bore through overburden above bedrock, a steel casing will then be installed in the boring and grouted to the top of the bedrock. The monitoring wells will then be completed to a depth of 10 feet into the first water-bearing zone using NX coring equipment.

3.5.2 Hazard Assessment

Potential chemical hazards associated with soil borings/bedrock cores and monitoring well installations include contact of soil containing chemical constituents with skin or eyes. Potential physical hazards include injury from equipment or operator error and tripping over obstacles.

3.5.3 Health and Safety Mitigation Actions

Workers will be required to wear Level D protection. The worker breathing zone will be monitored with a PID and Mini-RAM during the sampling activities and if monitoring levels exceed the criteria specified in Section 4.0, workers will be required to upgrade to Level C. Nitrile (chemical-resistant) gloves will be used to minimize the potential for dermal contact with chemical constituents during sampling. Steel-toed boots and a hard hat will be used to reduce the risk of physical injury. The work area will be kept dry and clean to avoid tripping.

3.6 Task 4 - Ground-Water Sampling

3.6.1 Description of Activity

The ground-water sampling program will involve uncapping, purging (pumping water out of the well), and sampling monitoring wells. A mechanical pump may be utilized to purge the wells and can be hand-gas-, or electric operated. Water samples taken from the wells are then placed in containers and shipped to a laboratory for analysis.

3.6.2 Hazard Assessment

Potential chemical hazards associated with ground-water sampling include inhalation of volatile organic vapors emanating from the well head after initial opening, and contact of groundwater containing chemical constituents with skin or eyes. Potential physical hazards include electric shock from improper grounding of electrical equipment, slipping on wet surfaces, and tripping over obstructions.

3.6.3 Health and Safety Mitigation Actions

Workers will be required to wear Level D protection. Because there is a potential for the inhalation of organic vapors venting from the well cap upon opening, breathing zone monitoring will be conducted using a PID. The level of personal protection may be adjusted (upgraded to Level C, or downgraded back to Level D) during ground-water sample collection in accordance with the reassessment program described in Section 4. Splash goggles and rubber gloves will be used to minimize the potential for dermal contact with ground water containing chemical constituents during sampling. The work area will be kept dry and clean (to the extent possible) to avoid slipping and unnecessary exposure to ground water potentially containing chemical constituents.

Whenever possible, pumps will be used to purge wells, thereby avoiding the potential for muscle strain and heat stress. Electrical equipment will have the following safeguards: ground fault interrupters or properly grounded circuitry, and protection of extension cords from damage. Workers must ensure that all power cords, etc., for sampling devices are in good working condition to minimize the hazard of electrocution. All personnel will operate in a manner to reduce exposure to these hazards.

3.7 Physical Hazards

Physical hazards and associated protective mechanisms are listed in Table 1. The purpose of this section is to provide information regarding health and safety approaches to general physical hazards associated with site-activities.

3.7.1 Heat Stress

One of the most frequently encountered problems during field investigations is heat stress. Heat stress manifests itself in two forms: heat stroke and heat exhaustion. Depending on ambient conditions, the worker, and the work being performed, heat stress can adversely affect a worker in as little as 15 minutes. This is especially important as ambient temperatures exceed approximately 70°F at high humidities. For this reason, all workers will be observed for heat stress using the following indicators: worker appearance and responses. The field staff will take care to monitor ambient conditions, the type of protective equipment, and personnel fitness. Work loads will be adjusted to account for potentially unsafe conditions.

Early symptoms of heat stress can include rashes, cramps, discomfort, irritability and drowsiness. These symptoms can cause impaired functional ability which may threaten the safety of operations. Advanced symptoms of heat exhaustion include pale, clammy skin, profuse perspiration, and extreme tiredness or weakness.

Heat stroke is a much more dangerous form of heat stress. Symptoms of heat stroke include high body temperatures and red or flushed, hot, dry skin. Other symptoms may include dizziness, nausea, headache, rapid pulse, and unconsciousness. First aid for all forms of heat stress includes cooling the body by removing PPE, moving to a safe zone, and allowing the worker to rest in a cooler environment.

3.7.2 Cold Stress

Persons working outdoors in temperatures at, or below, freezing may be frostbitten. Frostbite may be categorized into three types:

- Frostbite or incipient frostbite characterized by sudden blanching or whitening of the skin.
- Superficial frostbite - skin has a waxy or white appearance, is firm to the touch, but tissue beneath is resilient.
- Deep frostbite - tissues are cold and hard, indicating an extremely serious injury.

Sign and symptoms of frostbite include:

- The skin changes to white or grayish-yellow in appearance.
- Pain is sometimes felt early but subsides later (often there is no pain.)
- Blisters may appear later.
- The affected part feels intensely cold and numb.

- The person frequently is not aware of frostbite until someone tells him or he observes the pale, glossy skin.

As time passes, the affected worker may become confused, stagger, experience eyesight impairment, lose consciousness, and/or stop breathing.

First aid for frostbite includes protecting the frozen area from further injury, bringing the victim indoors, warming the affected areas quickly with warm water, and maintaining respiration according to first aid procedures. Medical help should be called immediately.

Frostbite may be prevented by the use of insulated gloves, socks and other protective clothing capable of keeping moisture away from the skin. All clothing should be chosen so that it is compatible with the PPE required for certain activities.

3.8 Potential Constituents of Concern

As previously mentioned in Section 1.2, organic constituents present in the ground water, surface water, and sediments at the Scrapyard Site are PCBs and potentially metals, volatiles, and semi-volatile compounds. The reports, documents, and data that were reviewed to determine the constituents of concern for the environmental media are referenced in the RI/FS Work Plan. Based on the constituents detected in the different environmental media, the levels of PPE associated with each work task were selected by Blasland & Bouck and are discussed in Section 4.0.

4.1 Personal Protective Equipment Selection Criteria

Personal protective equipment (PPE) ensembles chosen for each individual task were specified in Section 3.0 - Task/Operation Health and Safety Risk Analysis. Equipment selection was based upon the mechanics of the task and the nature of the hazards which were anticipated. The following criteria were used in the selection of equipment ensembles:

- Chemical hazards known or suspected to be present;
- Routes of entry through which the chemicals could enter the body, e.g., inhalation, ingestion, skin contact; and
- Potential for contaminant/worker contact while performing the specific task or activity.

With the exception of the soil investigation, we anticipate that the work activities will be performed using Level D protection; however, Level C protection will be available in the event an upgrade is required. Soil sampling activities will initially be conducted using Level C protection and may be downgraded if conditions permit.

4.2 Selected PPE Ensembles

The following components of Level D PPE will be available and used as appropriate in accordance with the specifications presented in Section 4.2.1:

1. Cotton overalls;
2. Steel-toed boots;
3. Rubber overboots (when necessary);
4. Gloves (Nitrile and/or rubber); and
5. Safety glasses or face shields.

Level C protection will be utilized during test pit excavation and may be necessary for other work task (i.e., ground-water sampling). Level C protection will consist of the following:

1. Polylaminated Tyvek disposable coveralls;
2. Rubber overboots;
3. Outer nitrile protective gloves; and
4. Full-face respirator with combination organic vapor, acid gases, and particulates cartridges (NIOSH/MSHA approved).

4.2.1 Levels of Protection

In general, the following levels of protection will be used for specific work activities. Adjustments to these levels may be required given the site conditions encountered:

a. Test Pit Excavation and Soil Sampling

This work will be conducted in Level C protective gear including:

- Polylaminated Tyvek disposable coveralls;
- Rubber overboots;
- Outer nitrile gloves; and
- Full-face respirator with combination organic vapor, acid gases, and particulate cartridges (NIOSH/MSHA approved).

Additional protective gear to be worn during this task includes:

- Steel-toed boots;
- Rubber gloves; and
- Hard hat.

Based on air monitoring results, PPE may be downgraded to Level D protective gear consisting of the following:

- Cotton overalls;
- Steel-toed boots;
- Rubber overboots (when necessary);
- Gloves (nitrile and/or rubber); and
- Safety glasses or face shields.

Additional protective gear to be worn during the PPE downgrade includes:

- Hard hat.

b. Monitoring Well Installation

This work will be conducted in modified Level D protective gear including:

- Cotton overalls;
- Steel-toed boots;
- Rubber overboots (when necessary);
- Gloves (nitrile and/or rubber); and
- Safety glasses or face shields.

Additional protective gear to be worn during this task includes:

- Hard hat.

Air monitoring will be conducted during this work. If Level C is required based on air monitoring results, the equipment will consist of (in addition to Level D equipment):

- Polylaminated Tyvek coveralls;
- Rubber overboots;
- Outer nitrile protective gloves; and
- Full-face, purifying respirator with combination organic vapor, acid gases, and particulate cartridges (NIOSH/MSHA approved).

c. Ground-Water Sampling

This work will be conducted in Level D protective gear including:

- Cotton overalls;
- Steel-toed boots;
- Rubber overboots (when necessary);
- Gloves (nitrile and/or rubber); and
- Safety glasses or face shields.

Additional protective gear to be worn during this task includes:

- Hard hat.

Air monitoring will be conducted during this work. If Level C is required based on air monitoring results, this equipment will consist of (in addition to Level D equipment):

- Polylaminated Tyvek coveralls;
- Rubber overboots;
- Outer nitrile protective gloves; and
- Full-face, purifying respirator with combination organic vapor, acid gases, and particulate cartridges (NIOSH/MSHA approved).

d. Surface Water and Sediment Sampling

This work will be conducted in Level D protective gear including:

- Cotton overalls;
- Steel-toed boots;
- Rubber overboots (when necessary);
- Gloves (nitrile and/or rubber); and
- Safety glasses or face shields.

Additional protective gear to be worn during this task includes:

- Outer JVC nylon jacket;
- Hip-waders (for selected sampling locations); and
- Buoyancy devices/life preservers (on the quarry pond).

Air monitoring will be conducted during completion of the sampling, if upgrading to Level C is required, the equipment utilized will consist of (in addition to the Level D equipment):

- Polylaminated Tyvek coveralls;
- Rubber overboots;
- Outer nitrile protective gloves; and
- Full-face purifying respirator with combination organic vapor, acid gases, and particulate cartridges (NIOSH/MSHA approved).

4.3 PPE Reassessment Program

Air monitoring will be conducted during test pit excavation, surface water and sediment sampling, monitoring well installation, and ground-water sampling. Such monitoring will be conducted within the work zone utilizing a HNU Systems Model P1-101 photoionization detector (PID) with a 10.2 eV lamp, or equivalent. During test pits excavation and ground-water monitoring well installation, air particulate levels will be monitored with a Mini-RAM. This monitoring will consist of a general scan utilizing the PID meter or equivalent. The air monitoring equipment utilized will be calibrated, as per the manufacturer's instructions, to the most appropriate standard. The calibrations and checks will be recorded in the appropriate calibration record log book. This will be performed by field staff at the beginning of each day and more frequently, as the conditions warrant.

Prior to sampling any ground-water wells, background readings will be obtained in the Support Zone. Following the establishment of background conditions, monitoring will be conducted in the Work Zone. Data will be utilized for upgrading to Level C, if necessary, by comparing data to pre-established action levels. The frequency of air monitoring with monitoring devices will depend on the potential hazards associated with each location and work activity.

The action levels for the PID air monitoring device are provided below.

Upgrade from Level D to Level C:

- Total Organic Vapor (TOV) - greater or equal to 1 and less than 50 PID units with compensation made for background readings sustained for a period of at least 5-minutes. This action level is based on the exposure limit for benzene.
- Particulate Level - Mini-RAM reading of greater than 2.0 milligrams per cubic meter (mg/m^3).

Downgrade from Level C to Level D:

- Total Organic Vapor (TOV) - less than 1 PID unit, sustained for a period of at least 5 minutes, with subsequent approval to downgrade provided by HSS.
- Particulate level - RAM reading of less than 2.0 mg/m^3.

Immediate Evacuation of Area:

- Total Organic Vapor (TOV) - greater or equal to 50 PID units.

4.4 Daily Field Reports

A daily field report documenting the findings of all direct-reading measurements will be maintained by the HSS and/or the designated alternate. The daily field report will document the task, time, meter reading, and level of protection being worn by workers involved with the activity. Actions taken in response to releases or recordings above pre-established action levels will also be recorded in the daily field report. The daily field report will also document personnel conducting work activities, visitors, and activities completed (Attachment A).

5.0 - Personnel Training Requirements

5.1 *Training Requirements*

All Blasland & Bouck personnel, and visitors, will be trained commensurate with their job responsibilities. Such training will be provided prior to being allowed to engage in site activities which could expose personnel to health and safety hazards. The HSS or designated alternate has the responsibility to assure that this training is provided as appropriate for site conditions, and is updated, as needed. Every worker is required to read and understand the HASP prior to commencement of the work activity. Workers are also required to sign a training acknowledgment form signifying their understanding of the activity to be carried out and the hazards involved and that they will abide by all the safety rules (Attachment B).

5.1.1 Site Orientation

The following is a listing of general site information/training provided to all personnel during an initial site orientation:

- Names of all site health and safety personnel and alternates;
- Work rules and safe work practices;
- Use of personal protective equipment;
- Site chemical and physical hazards;
- Safe use of engineering controls and site equipment;
- Medical surveillance requirements;
- Symptoms associated with exposure to site hazards;
- Site control measures;
- Decontamination procedures;
- Provisions of the emergency response plan;
- Standard operating procedures, e.g., confined space entry, spill containment, etc.

This listing of health and safety topics essentially incorporates a thorough review of this HASP.

5.1.2 Preassigned Training

Blasland & Bouck personnel and visitors entering the Work and/or Decontamination Zones will have pre-assignment training in accordance with the provisions outlined in 29 CFR 1910.120(e) Training, prior to engaging in their work activities.

The HSS or designated alternate is responsible for ensuring that personnel assigned to this site are trained in accordance with the above 29 CFR 1910.120(e) Training. The HSS will ensure that all training certificates are current by checking company issued wallet training cards and/or actual training certificates.

5.1.3 First Aid/Cardiopulmonary Resuscitation (CPR)

The HSS and designated alternate must possess current certification in first aid and CPR. At least one of these individuals must be present during each work-shift while Blasland & Bouck personnel are on-site. Documentation of current certification must be filed with this HASP.

5.2 *Periodic Health and Safety Meetings*

The HSS or designated alternate will conduct periodic health and safety meetings. These meetings will be a review of existing protocols as well as a means to update personnel on new site requirements or conditions. The meetings will also provide an opportunity for site personnel to express any health and safety concerns. Topics for discussion would include, but not be limited to, the following:

- Review of available analytical or relevant process data which may relate to a potential for worker exposure during task execution;
- Review of the type and frequency of environmental and personal monitoring (if any) to be performed;
- Task-specific levels of protection and anticipated potential for upgrading;
- Review of emergency procedures; and
- Review of existing and/or new health and safety issues.

5.3 Documentation/Recordkeeping

Attachment B contains a Training Acknowledgement Form. This form will be utilized to document compliance with the training requirements specified in this section. All on-site Blasland & Bouck personnel and subcontractors are required to sign this training acknowledgement form.

6.0 - Medical Surveillance

6.1 General Medical Program

Medical surveillance for this project will reflect the provisions established under Title 29 CFR 1910.120(f), OSHA's medical surveillance requirements for hazardous waste operations.[1]

Verification of the individuals current health status and medical restrictions must be provided to the HSS prior to the individual's first day at the site. Such verification must be in the form of company issued wallet cards or other equivalent documentation.

6.2 Respirator Certification

Prior to authorizing the use of any air-purifying or air-supplied respirator, OSHA under 29 CFR 1910.134, 29 CFR 1926.58, and Blasland & Bouck policy, requires that a determination be made regarding the prospective wearer's physical ability to safely use such equipment. Consequently, individuals scheduled to work in areas that may require the use of a respirator must provide the HSS with current documentation (not older than 24 months) regarding the individual's physical abilities to wear a respirator. The inability to provide current or complete documentation will be sufficient grounds to preclude any individual from areas or tasks requiring such protection. Any worker performing sampling activities who may be required to wear a respirator, is required to have been trained in the proper use of the respirator and have 40 hours of OSHA training, as well as have passed a respirator fit test. A copy of the Respirator Inspection/Maintenance Log is provided as Attachment C.

6.3 Exposure/Injury Medical Emergency

As a follow-up to an injury or illness or as a result of possible excessive exposure to either a chemical or physical hazard, all employees are entitled to and encouraged to seek appropriate medical attention. The HSS or designated alternate must be appraised of the need for seeking such medical attention and assist in determining the immediacy of the situation.

During and immediately following the emergency medical situation, the HSS or designated alternate have the following responsibilities:

- Ensure that the examining medical facility is fully appraised of the site condition and/or hazard which caused the medical emergency;
- Conduct an investigation of the site condition which caused the medical situation prior to reassigning the task;
- Complete the report of Accident Form (Attachment D);
- Ensure the injured/ill worker receives written medical clearance prior to return to the site;
- Provide a copy of the medical clearance and accident investigation form for the employee's medical records; and
- Provide a copy of the accident investigation form to the Manager, Health and Safety, Syracuse, New York.

---

[1] Medical clearance is not required for individuals who will visit the Support Zone.

Injuries/illnesses and/or possible excessive exposure to either a chemical or physical hazard requiring emergency medical treatment and hospitalization must be reported within 24-hours to Manager, Health and Safety, Syracuse, New York. Fatalities must be reported immediately.

7.0 - Site Control Measures

7.1 Site Control

Site control will minimize potential contamination of workers and observers, protect the public from potential on-site hazards, and prevent vandalism of equipment and materials. Site control measures also enhance response in emergency situations.

Most, if not all, work under this program will be done under Level D conditions. If an upgrade is necessary, the site of field operations will be divided into three distinct areas. The actual extent of the areas are considered task and location specific and will be determined on a task-specific basis. When utilized, the work areas at each location will be divided into the three following zones: Work Zone, Decontamination Zone, and Support Zone. Work activities that will require the establishment of Work Zones are test pit excavation and soil sampling, monitoring well installation, and ground-water sampling. Zones will not be set up for the surface water and sediment sampling.

7.1.1 Work Zone

The Work Zone is the area in which test pit excavation and soil sampling, surface water and sediment sampling, monitoring well installation, and ground-water sampling will occur. Workers entering this Zone are required to be protected as previously defined in Section 4.2. During work activities, only OSHA-trained workers will be allowed into this Zone. Within this Zone, the levels of protection may be changed by the HSS or designated alternate based on the degree of hazard present.

7.1.2 Decontamination Zone

The Decontamination Zone is the area that is the area that is set up adjacent to the Work Zone where equipment and personnel are decontaminated. One centralized Decontamination Zone will be set up to service all the sampling locations to facilitate decontaminating equipment that is reused throughout the sampling procedure (e.g., spatulas, scoops, beakers) and worker cleanup. The location of the Decontamination Zone will depend on the prevailing wind direction and physical site features.

7.1.3 Support Zone

A Support Zone may be set up outside the Decontamination Zone. The Support Zone will be used to store equipment and first aid supplies. Administrative and other support functions will occur within the Support Zone, including communications and documentation. Protective clothing worn in the Work Zone may not be worn in a Support Zone except in emergencies.

7.2 Site Security

It is the responsibility of the HSS or designated alternate to control access to the active work Zones and assure proper security. Any evidence of unauthorized entry should be noted in the daily field report.

The monitoring wells will all be equipped with locking protective casings.

7.3 The Buddy System

Most activities in contaminated or otherwise hazardous areas should be conducted with a buddy who is able to:

- Provide partner with assistance;
- Observe partner for signs of chemical or heat exposure;
- Periodically check the integrity of partner's protective clothing; and
- Notify the HSS or others if emergency help is needed.

7.4 Site Communications

Communications will be conducted through verbal communications. When out of audible range, verbal communications will be assisted (if necessary) using portable telephones or a two-way FM radio. Non-verbal communications will be conducted utilizing standard hand signals and air horn signals, as outlined in Attachment E.

Communications between workers in the various Zones shall consist of either the standard hand signals, voice, or radios. The portable telephone will be used to contact appropriate agencies in the event of an emergency.

7.5 Safe Work Practices

Operating procedures consist of general safety rules for all workers. All workers will be conscientious of others working around them and check that they are safe, and working in a safe manner.

General safety rules which will be enforced at the Scrapyard Site including the following:

1. Smoking will be prohibited in any area within the fenced portion of the Scrapyard Site, in any Work Zone and Decontamination Zone, and during any sampling activities;
2. Eating and chewing gum will be prohibited in any area within the fenced portion of the Scrapyard Site, in any Work Zone and Decontamination Zone, and during sampling activities;
3. Field work will only be conducted during daylight hours unless adequate light is provided;
4. Anyone authorized to enter the fenced portion of the Scrapyard Site or any Work Zone or Decontamination Zone, who does not participate in routine activities, will be entered on the daily field report (Attachment A) and will be required to follow all procedures in this HASP.
5. Workers must thoroughly wash their hands prior to leaving the Work Zone and Decontamination Zone, or after any other sampling activities, before eating, drinking, or any other activities; and
6. No excessive facial hair will be allowed on workers that may be required to wear respiratory equipment.

7.6 Visitors

Visitors will be permitted in the immediate area of active operations only with approval from the HSS. Approval for entry into Work Zones and Decontamination Zones will require physical examination and compliance with training requirements (OSHA 29 CFR 1910.120). All site visitors must be briefed on appropriate sections of the Emergency Response/Contingency Plan (Section 9) and the Task/Operation Health and Safety Risk Analysis (Section 3). Visitors will be documented on the daily log of all site activities prepared by the HSS or designated alternate for Blasland & Bouck. Visitor vehicles are restricted to Support Zones.

7.7 Nearest Medical Assistance

First Aid supplies will be located near the area of work activity and/or in the appropriate field vehicle. Additional medical assistance can be summoned from the Cobleskill Ambulance/Fire Department by dialing "0" or (518) 234-2222 or (518) 295-8114.

The nearest medical assistance is Community Hospital, located at 41 Grand View Drive, Cobleskill, New York (518-234-2511). Figure 2 details the emergency route with directions to the hospital from the site. Additional information regarding medical assistance, evacuation routes, emergency procedures, etc., are contained in Section 9.

7.8 Safety Equipment

In addition to the PPE necessary to conduct work activities, the following inventory of safety equipment will be available:

1. Industrial first aid kit;
2. Scissors for emergency equipment removal;
3. Emergency eye wash;
4. Rope for securing objects and use as a lifeline;
5. Electrolyte replacement drink - stored in clean area and used to prevent heat stress; and
6. Fire extinguisher for Class A, B, and C fires.

8.1 Decontamination Plan

The various tasks and specific levels of protection required for each task are put forth in Section 3 of this HASP. Consistent with the levels of protection required, Figure 3 provides a step-by-step representation of the personnel decontamination process for Levels C and D.

All reusable personnel gear which has been used will be cleaned with a detergent and water. Personnel gear may include overboots, hard hats, respirators, and air monitors. Personnel with equipment working within the Scrapyard Site or any work area shall proceed directly to the Decontamination Zone upon completion of work.

Prior to removal of protective gear, personnel will remove soil from boots and gloves using designated wash basins. If other protective gear or clothing is thoroughly soiled, the HSS or designated alternate may decide to dispose of this equipment, rather than try to clean it.

8.2 Level(s) of Protection Required for Decontamination Personnel

The level(s) of protection required for personnel assisting with decontamination will be equivalent to the level of protection to the workers in the Work Zone.

8.3 Equipment Decontamination

Sampling equipment will be decontaminated in accordance with procedures defined in the Field Sampling Plan (FSP) for this site. Decontamination of equipment will be completed either in the Work Zone or in the Decontamination Zone.

Cleaning of small reusable equipment will be performed by hand washing. All sampling equipment will be cleaned prior to use and between samples using the procedure identified in the FSP. All reusable PPE will be cleaned adjacent to the office/garage on the Scrapyard Site.

The disposal requirements for wastes generated during the decontamination procedures are presented in the FSP.

8.4 Emergency Decontamination Procedures

In the event of an emergency, the first priority is for all workers to move to a safe location before removing PPE. All workers will quickly and calmly remove disposable equipment and place all reusable equipment at a secured location within the Decontamination Zone for later cleaning. In the event of an injury, the person closest to the injured person will perform the appropriate emergency first aid procedures, and then will remove the injured person's PPE in the Decontamination Zone prior to transporting to an appropriate safe location.

9.0 - Emergency Response/Contingency Plan

9.1 General

The following Emergency Response/Contingency Plan includes instruction and procedures for emergency vehicular access, evacuation procedures for personnel, methods of containing fires, and procedures for medical emergencies. All emergency conditions require concise and timely actions that are conducted in a manner that minimizes the health and safety risks.

9.2 Emergency Response/Contingency Plan

All workers shall be familiar with the Emergency Response/Contingency Plan described in this section. The following procedures shall be implemented in the event of an emergency:

1. First aid or other appropriate initial action will be administered by those closest to the accident/event. This assistance will be coordinated by the HSS or designated alternative and conducted in a manner to minimize health and safety risks to those rendering assistance to other workers;

2. Workers shall report all accidents and unusual events to:

    a. HSS; and
    b. Project Manger

3. The HSS or designated alternate is responsible for conducting the emergency response in an efficient, rapid, and safe manner. The HSS or designated alternate will decide if outside assistance and/or medical treatment is required and shall be responsible for alerting local authorities and arranging for their assistance.

9.3 Incident Reporting Procedures

The HSS will provide to the Project Manager a Report of Accident (Attachment D) which includes the following:

1. A description of the emergency (including date, time, and duration);

2. Date, time, and name of all persons/agencies notified and their response; and

3. A description of corrective actions implemented or other resolution of the incident.

9.4 Responsibilities

The HSS or designated alternate shall have the responsibility for directing response activities in the event of an emergency, specifically:

1. Assess the situation;
2. Determine required response measures;
3. Notify appropriate response teams; and
4. Determine and direct workers during the emergency.

The HSS or designated alternate shall coordinate any response activities with those of public agencies and is responsible for implementing the emergency response procedures for all workers.

All workers are responsible for conducting themselves in a mature, calm manner in the event of an accident/unusual event.

9.5 Public Response Agencies

A list of public response agencies, who may be contacted in an emergency, depending on the nature of the situation, is included in Table 3. This table presents the local emergency numbers including the local hospital (Community Hospital), Scoharie County Health Department, ambulance service, fire and police departments, and utility numbers. In addition, nationwide hotline numbers provided by the United States Environmental Protection Agency (USEPA) for emergency assistance are included. These phone lists should be retained by all workers.

The route to the closest hospital is provided in this HASP on Figure 2. Direction to the hospital are listed below. The HSS will provide direction and/or maps to the hospital to all on-site personnel prior to commencement of on-site activities.

9.5.1 Emergency Route from the Scrapyard Site to Community Hospital

- Route 10 East (Elm Street) into the village of Cobleskill.
- Right turn onto Route 145 (North Grand Street).
- Left turn onto East Main Street.
- Left turn onto Legion Drive.
- Right turn onto Grandview Drive.
- Community Hospital is located at 41 Grandview Drive.

9.5.2 Emergency Route from Off-Site Sampling Area to Community Hospital

- East on Route 7 (East Main Street).
- Left turn onto Legion Drive.
- Right turn onto Grandview Drive.
- Community Hospital is located at 41 Grandview Drive.

9.6 Accidents and Non-Routine Events

Several types of emergencies are outlined in the following subsections. These are not intended to cover all potential situations, and the corresponding response procedures should be followed using common sense. Every accident is a unique event that must be dealt with by trained personnel working in a calm, controlled manner. In the event of an accident/unusual event, the prime consideration is to provide the appropriate initial response to assist those in the accident while minimizing risks to other workers.

9.6.1 On-Site Personal Injury

If a worker is physically injured, appropriate first aid procedures shall be followed. Depending on the severity of the injury, emergency medical response may be sought. If the worker can be moved, he/she will be taken to the edge of the work area where protective clothing (if any) will be removed, emergency first aid administered, and transportation to a local emergency medical facility provided.

If the injury to the worker is exposure to chemicals, the following first aid procedures are generally initiated as soon as possible:

a. Eye Exposure - If solid or liquid gets into the eyes, wash eyes immediately using water and lifting the lower and upper lids occasionally. Obtain medical attention immediately.

b. Skin Exposure - If solid or liquid gets on the skin, wash skin immediately at the emergency wash station using water. Obtain medical attention immediately.

c. Inhalation - If a person inhales large amounts of organic vapor, move him/her to fresh air at once. If breathing has stopped, appropriately trained personnel should perform cardiopulmonary resuscitation. Keep the affected person warm and at rest. Obtain medical attention immediately.

d. Ingestion - If solid or liquid is swallowed, medical attention shall be obtained immediately.

The HSS or designated alternate shall inform the Blasland & Bouck Project Manager or Project Supervisor of the injury/accident, and provide a written report detailing the accident, its causes, and consequences within one day of the accident. A copy of the Report of Accident Form is provided as Attachment D.

9.6.2 Temperature-Related Problems

Excessive heat or cold may affect workers' health and the ability to function. These are discussed in Section 3.7, including first aid procedures.

9.6.3 Fires

Workers will be knowledgeable in fire-suppression techniques. They shall be instructed in proper use of the fire extinguisher(s) supplied. Fire extinguishers should be used only for small fires in the early stages of development. When the fire cannot be controlled through extinguisher use, the area should be evacuated immediately. The local fire department should be called to fight the fire.

9.6.4 Precipitation

In general, field and sampling activities can be conducted during rain or snowfall, or light fog. If rain (or snow) becomes heavy it may be necessary to cease all activities. All on-site activities will be halted in the event of a thunder and lightning storm.

9.6.5 Water-Related Incidents

During sampling at the rivers, lakes, etc., personnel will be outfitted with flotation (USCG approved) devices. In addition, a floating safety line will be available in the boat. General boat safety procedures will be followed and must comply with OSHA 29 CFR 1926.106. In the event of an incident, the general response considerations set forth in Sections 9.2 and 9.5 will be followed.

9.6.6 Emergency Evacuation Procedures

The HSS or designated alternate will initiate emergency evacuation procedures, should an incident be determined to be sufficiently serious to require evacuation of an area. Air monitoring action levels which would require evacuation are discussed in Section 4.3. In addition, fire or other uncontrolled situations would require evacuation. In the event of an evacuation:

a. The HSS or designated alternate will contact all workers by voice or the 2-way radio. All workers are to stop work immediately and report to a designated area.

b. A worker count will be conducted.

c. The area in question will be evacuated through the Decontamination Zone, if feasible (provided that Zone is not affected). All workers will reassemble at a safe distance.

d. The HSS or designated alternate will contact other response agencies, as warranted.

e. Engines and motorized equipment will be shut off before the site is evacuated.

TABLE 1

PHYSICAL HAZARDS

Physical Hazard	Tasks	Protection Mechanism
Noise	NA	Hearing protection when elevated noise levels exist
Heavy Manual Lifting	1, 2, 3, 4	Lift with legs; get assistance
Housekeeping	1, 2, 3, 4	Store equipment properly Remove rubbish/scrap material from work area
Compressed Gases (calib. gas)	3	Store properly
Working over Water	4	USCG approved life jackets or vests available Ring Buoy with 90 ft. of line available
Vehicle Traffic	1, 2, 3, 4	Warning signs; away from work area
Heavy Equipment	1, 2	Trained/licensed operators; warning signs Backup alarms
Using Ladders	NA	Examine for defects prior to use
Materials Handling	1, 2	Material stacked/stored to prevent collapsing Machinery properly braced
Hazardous Material Storage	1, 3, 4	Segregate flammable/combustible liquid from ignition sources Store in approved containers Solvent waste, oily rags and liquids kept in fire resistant containers
Fire Prevention	1, 2, 3, 4	Training in fire extinguisher use and classes
Electrical	3	Approved grounding and bonding procedures Electrical lines/cords/cables guarded and maintained Damaged equipment tagged/removed from service
Hand/Power Tool	1, 2, 3, 4	Guards and safety devices in place
Tools	1, 2, 3, 4	Defective tools tagged/removed from service Tools maintained and inspected; intrinsically safe Proper eye protection used

N/A - Not applicable to job tasks conducted during these RI field activities.

TABLE 2

BIOLOGICAL HAZARDS

Hazard	Task Nos. (s)*	Location/Source (K/S)**	Route of Exposure (I,G,C,D)***	Immunization Required	Prevention
Poisonous Plants	1, 2, 3, 4	Fields, Brush-covered and wooded areas	I, C, G	No	Avoid contact with plants Wear long sleeves and pants
Insects	1, 2, 3, 4	All areas	D	No	Insect repellant Wear long sleeves and pants
Deer Tick (potential vector of Lyme's Disease)	1, 2, 3, 4	Fields, Brush-covered and wooded areas	D	No	Insect repellant Wear long sleeves and pants Avoid contact with plants Check yourself for bites and rashes

* List all Task Numbers which would involve potential exposure to this/these hazard(s).

** K - Known, S - Suspect

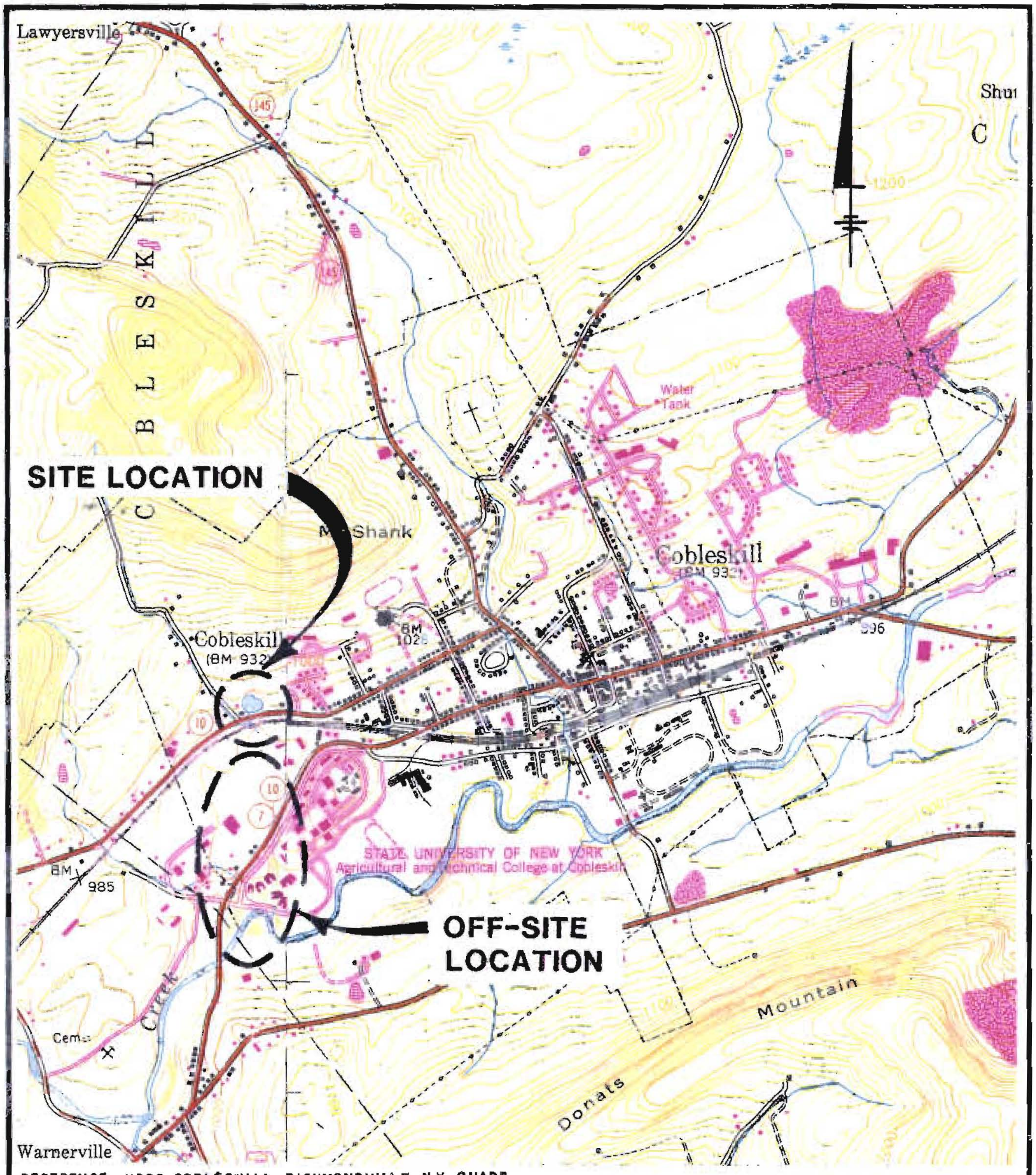
*** I - Inhalation, G - Ingestion, C - Contact, D - Direct Penetration (Bite, Inject., Open Wound or Sore).

TABLE 3
EMERGENCY RESPONSE CONTACT LIST

Agency	Contact/Function	Phone Number
Cobleskill Fire Department	Report Fire	O - Operator or (518) 234-2222
	If No Answer	(518) 295-8114
Cobleskill Ambulance	Ambulance	O - Operator or (518) 234-2222
Community Hospital - Scoharie County 41 Grand View Drive Cobleskill, NY	Hospital	(518) 234-2511
Contingency Plan Contact List		
Scoharie County Health Dept. (Middleburg, NY)	Environmental Hazards	(518) 295-8365
Cobleskill Police Department	Report Incidents	(518) 234-2923
Scoharie County Sheriffs Dept.	Report Incidents	(518) 295-8114
State Police	Report Incidents	(518) 234-3131 (518) 783-3211
National Emergency Contact List		
USEPA Emergency Response Team, Region 2		(212) 340-6656
Chemtrec - Chemical Emergencies (Washington, D.C.)		(800) 424-9300
National Foam Center - Emergency Response (Pennsylvania)		(215) 363-1400
Utility Telephone Contact List		
Niagara Mohawk Power Corporation Glens Falls Work Station		(800) 637-2770
Cobleskill Town Supervisor		(518) 234-2990
New York Telephone Company		(607) 272-1834
	Emergency	(800) 722-2300
Underground Utility (UFPO) 3650 James Street Syracuse, New York		(800) 962-7962
New York State Department of Environmental Conservation Contact List		
Oil Spill or Hazardous Material Spill		(800) 457-7362

Note: See Page 3 of this HASP for telephone numbers of key Niagara Mohawk and Blasland & Bouck personnel associated with this project.

FIGURE 1



REFERENCE: USGS COBLESKILL, RICHMONDVILLE N.Y. QUADS.

APPROX. SCALE: 1" = 2000'

QUADRANGLE LOCATION

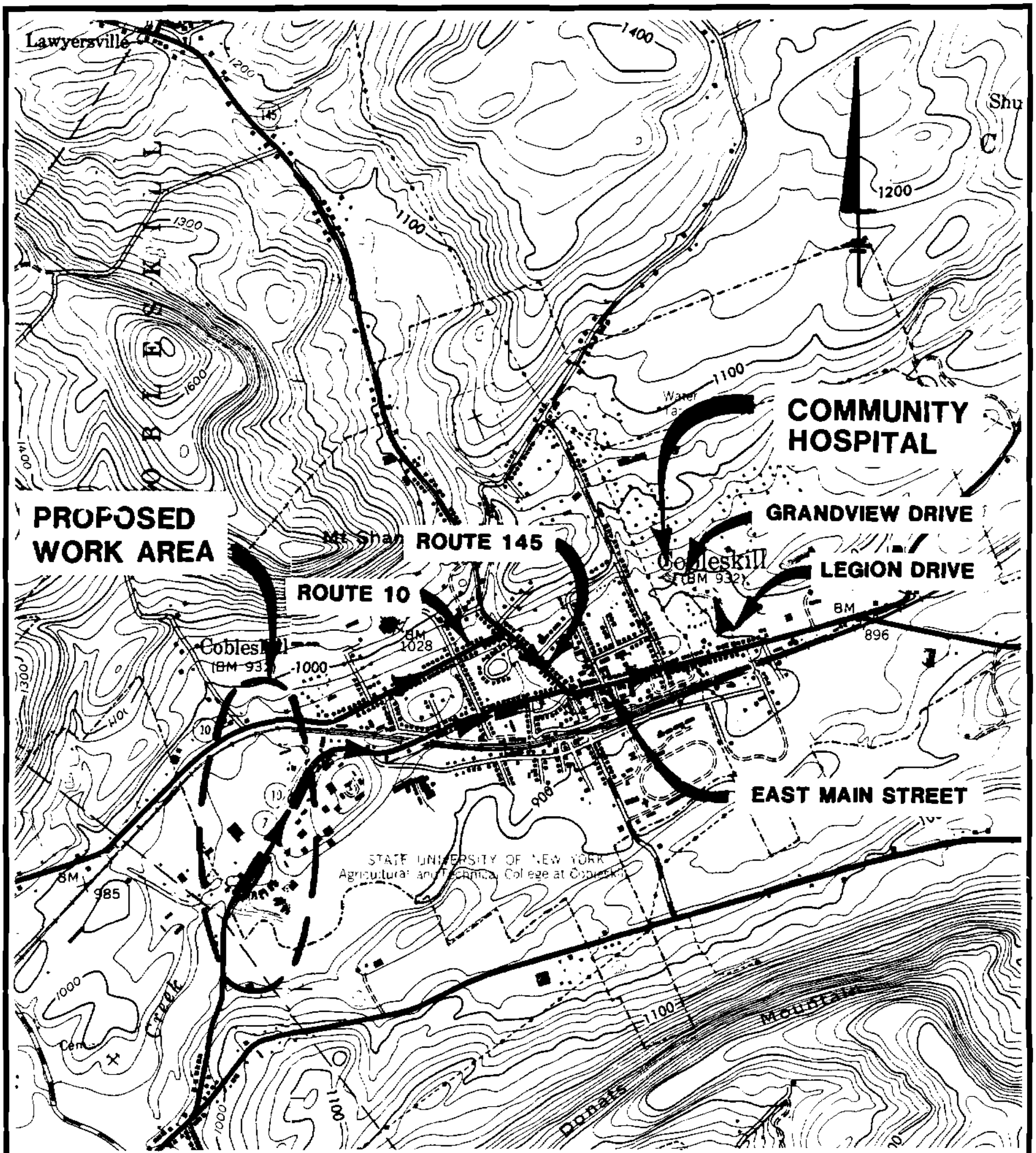
NIAGARA MOHAWK POWER CORPORATION
PHASE I RI WORK PLAN
M. WALLACE AND SON SCRAPYARD

LOCATION MAP

JULY 1992
364.17.45

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & GEOSCIENTISTS

FIGURE 2



REFERENCE: USGS COBLESKILL, NEW YORK 1960 QUAD.

2000' 0 2000'

APPROX. SCALE: 1" = 2000'

QUADRANGLE LOCATION

NIAGARA MOHAWK POWER CORPORATION
M. WALLACE AND SON SCRAPYARD

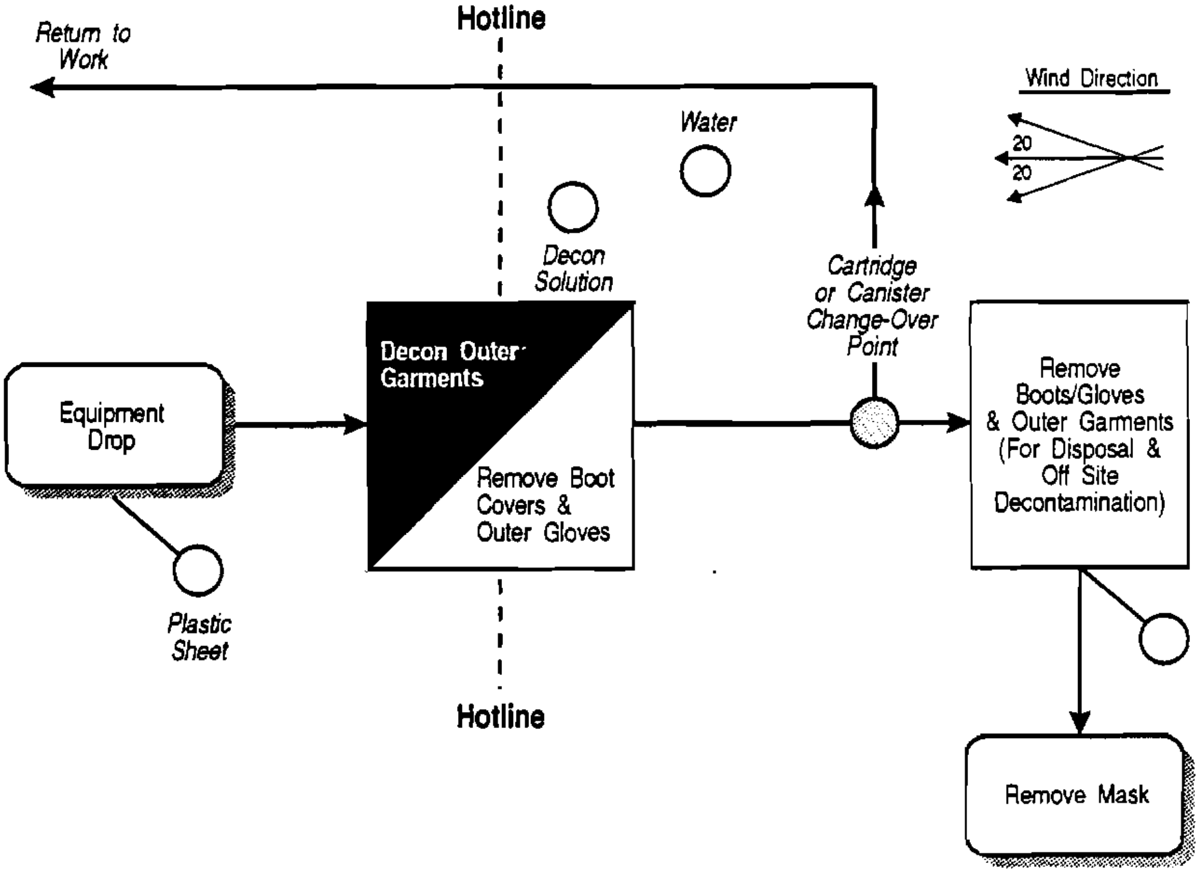
HEALTH & SAFETY PLAN

EMERGENCY ROUTE

JULY 1992
364.17.45

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & GEOSCIENTISTS

MINIMUM DECONTAMINATION LAYOUT
LEVEL C & LEVEL D PROTECTION



07/92 DJH
3641743R/36417n01.cd

FIGURE 4

LEVEL C AND LEVEL D CONTAMINATION

Step 1	Segregated equipment drop
Step 2	Boot and glove wash
Step 3	Boot and glove wash
Step 4	Tape removal - boot and glove
Step 5	Boot removal
Step 6	Outer glove removal
HOT LINE	
Step 7	Face piece removal
Step 8	Inner glove removal
Step 9	Field wash (hands, neck, and face)

ATTACHMENT A
DAILY FIELD REPORTS

DAILY FIELD REPORT

DATE ____________________

DAY	S	M	T	W	TH	F	S

PROJECT ____________________

JOB NO. ____________________

CLIENT ____________________

CONTRACTOR ____________________

PROJECT MANAGER ____________________

WEATHER	Bright Sun	Clear	Overcast	Rain	Snow
TEMP.	To 32	32 50	50 70	70 85	85 up
WIND	Still	Moder.	High	Report No.	
HUMIDITY	Dry	Moder.	Humid		

AVERAGE FIELD FORCE

NAME			REMARKS

VISITORS

TIME	REPRESENTING	REPRESENTING	REMARKS

EQUIPMENT AT THE SITE

FIELD ACTIVITIES

PAGE 1 OF ____ PAGES

BY ____________________ TITLE ____________________

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & GEOSCIENTISTS

ATTACHMENT B
TRAINING ACKNOWLEDGEMENT FORM

TRAINING ACKNOWLEDGEMENT FORM

Name: ______________________________

Address: ______________________________

Social Security No: ______________________________

Employer: ______________________________

Site Involvement: ______________________________

____

I have completed and understand the training program(s) for work to be performed at this project site. I have received training on the following subjects during my initial site orientation:

________ A. Names of Site Health and Safety Personnel and Alternates.

________ B. Work Rules and Safe Work Practices.

________ C. Personal Protective Equipment.

________ D. Site Chemical and Physical Hazards.

________ E. Safe Use of Engineering Controls and Site Equipment.

________ F. Medical Surveillance Requirements.

________ G. Symptoms which may indicate overexposure to site hazards.

________ H. Site Control Measures

________ I. Decontamination Procedures

________ J. Emergency Response Plan

________ K. Standard Operating Procedures

Other (List): ______________________________

____

____

Additionally, I certify that I have completed the necessary training required by 29CFR 1910.120 (e) Training as indicated below:

Level of Training:

24-hour _____ 40-hour _____ 8-hour Supervisory _____

Equivalent* _____

Certificate(s) Attached _____ Yes _____ No

Date(s) Completed: ______________________________

Annual Refresher (8-hour) Date:________________________

Certificate Attached: _____ Yes _____ No

Site Training Completed:_____ 3-day ________ 1-day

Date:_________

Employee Signature:______________________________ Date:_________

HSS Signature: ______________________________ Date:_________

* See attached Supplemental Training Acknowledgment

SUPPLEMENTAL TRAINING ACKNOWLEDGEMENT

This form is to be completed as a supplement to the Training Acknowledgment Form and retained along with the training form on-site with the HASP. See section 5.6 - Equivalent Training

Name: ______________________________

Social Security No: ____________________

Provide details which demonstrate your academic and/or work experience as it pertains to activities on hazardous waste sites (be specific):

Signature: ____________________________________

Date: ____________________________________

ATTACHMENT C
RESPIRATORY INSPECTION/MAINTENANCE LOG

RESPIRATOR INSPECTION/ MAINTENANCE LOG

FIT TEST

RESPIRATOR OWNER	INSPECTION DATE	POS./NEG. PRESSURE TEST	FIT TEST (PASS/FAIL)	DECONTAMINATION DATE	HSO INITIALS

BLASLAND & BOUCK
ENGINEERS, P.C.

ATTACHMENT D
HEALTH AND SAFETY REPORT OF ACCIDENT

HEALTH & SAFETY
REPORT OF ACCIDENT

Date ____________________

DAY

S	M	T	W	TH	F	S

WEATHER	Brite Sun	Clear	Overcast	Rain	Snow
TEMP.	To 32	32 50	50 70	70 85	85 up
WIND	Still	Moderate	High	No	

Project ______________________________

Unit ______________________________

Proj. No. ______________ Contract No. ______________

Contractor: ______________________________

Sub-Contractor: ______________________________

Date of Accident: ______________ Time: __________ AM/PM Location: ______________

Description of Accident: ______________________________

Primary Cause: ______________________________

Contractor's Personnel or Equipment

Name of Injured Employee: ______________________________ Age: __________

Occupation: ______________________________ Sex: __________

Nature of Injury: ______________________________

Degree of Injury: __________ First Aid ☐ Doctor Visit ☐ Hospital ☐ Fatality ☐

Type of Equipment: ______________________________

Extent of Damage: ______________________________

Other Persons or Property

Name of Injured Party: ______________________________ Age: __________

Address: ______________ City: ______________ State: __________

Nature of Injuries: ______________________________

Name of Property Owner: ______________ Address: ______________

Nature and Extent of Damages: ______________________________

Was Use or Lack of Safety Equipment a Factor in This Accident: ______________________________

If so, Explain: ______________________________

What Safety Regulations Were Violated: ______________________________

What Corrective Action Has Been Taken by the Contractor: ______________________________

DISTRIBUTION:
1. Project Manager
2. Legal Staff
3. Engineer/Architect
4. Project File

Report by: ______________________________

Title: ______________________________

Wiley-Fisk Form 8-13

ATTACHMENT E
STANDARD HAND SIGNALS, AIR HORN SIGNALS

STANDARD HAND SIGNALS

Hand gripping throat.	Can't breathe.
Grip partner's wrist or both hands around waist.	Leave area immediately.
Hands on top of head. Thumbs up.	OK, I'm all right, I understand.
Thumbs down.	No, negative.

If immediate notification of evacuation of the workers is necessary, the HSS will use the air horn to alert the workers.

AIR HORN SIGNALS

Long blast. (Two second blast followed by two second break)	Leave site immediately.

ATTACHMENT F

MATERIAL SAFETY DATA SHEETS

Material Safety Data Sheet

From Genium's Reference Collection

Genium Publishing Corporation
1145 Catalyn Street
Schenectady, NY 12303-1836 USA
(518) 377-8855

No. 7

NITRIC ACID
(Revision C)
Issued: October 1980
Revised: August 1988

SECTION 1. MATERIAL IDENTIFICATION 26

NFPA

Material Name: NITRIC ACID

Description (Origin/Uses): Used to dissolve noble metals, for etching and cleaning metals, to make organic nitrates and nitrocompounds, to destroy residues of organic matter, and in explosives.

Other Designations: Red Fuming Nitric Acid; HNO_3; CAS No. 7697-37-2

Manufacturer: Contact your supplier or distributor. Consult the latest edition of the *Chemicalweek Buyers' Guide* (Genium ref. 73) for a list of suppliers.

HMIS
H 3
F 0
R 1
PPG*
*See sect. 8

R 1
I 4
S 4
K 0

SECTION 2. INGREDIENTS AND HAZARDS	%	EXPOSURE LIMITS
Nitric Acid, CAS No. 7697-37-2 *Contact your supplier to determine the percent by weight of nitric acid in the purchased product. Water is the other component of the product. **See NIOSH, *RTECS* (QU5775000, QU5900000), for additional data with references to reproductive effects.	*	**OSHA PEL** 8-Hr TWA: 2 ppm, 5 mg/m^3 **ACGIH TLVs, 1987-88** TLV-TWA: 2 ppm, 5 mg/m^3 TLV-STEL: 4 ppm, 10 mg/m^3 **Toxicity Data**** Mouse, Inhalation, LC_{50}: 67 ppm/4 Hrs

SECTION 3. PHYSICAL DATA

Boiling Point: Ca 251°F (122°C)*
Specific Gravity (H_2O = 1): 1.4*
pH: Very Acidic

Water Solubility (%): Complete
Molecular Weight: 63 Grams/Mole
Melting Point: Ca -30°F (-34°C)*

Appearance and Odor: A water white to slightly yellow liquid that darkens to a brownish color on aging and exposure to light; characteristic nitrogen dioxide (NO_2) odor.

*These properties are for the approximately 68%-by-weight nitric acid that is commercially available.

SECTION 4. FIRE AND EXPLOSION DATA

Flash Point and Method	Autoignition Temperature	Flammability Limits in Air	LOWER	UPPER
*	*	% by Volume	*	*

Extinguishing Media: *Nitric acid does not burn. Use extinguishing agents that will put out the surrounding fire. Use a water spray to dilute nitric acid during fires and to absorb liberated oxides of nitrogen.

Unusual Fire or Explosion Hazards: Although nitric acid does not burn, it is a strong oxidizing agent that can react with combustible materials to cause fires. Also, it can react with metals to liberate extremely flammable hydrogen gas. If this happens, direct fire-fighting procedures at this evolved hydrogen gas.

Special Fire-fighting Procedures: Wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in the pressure-demand or positive-pressure mode. Choose protective equipment carefully (see sect. 5, Conditions to Avoid).

SECTION 5. REACTIVITY DATA

Nitric acid is stable in closed containers at room temperature under normal storage and handling conditions. It cannot undergo hazardous polymerization.

Chemical Incompatibilities: Nitric acid reacts explosively with metallic powders, carbides, hydrogen sulfide, and turpentine. Contact with organic materials such as wood, paper, sawdust, or alcohol, etc., may cause fires. Combustible materials can attain an increased flammability after being exposed to nitric acid even if they do not immediately catch fire.

Conditions to Avoid: Avoid any contact with incompatible chemicals. Because it is so reactive, always establish another material's compatibility with nitric acid before mixing the two materials. This applies to the selection of safety and handling equipment, because nitric acid can attack some forms of coatings, plastics, and rubber.

Hazardous Products of Decomposition: Various nitrogen oxides, including nitric oxide (NO), nitrogen dioxide (NO_2), nitrous oxide (N_2O), as well as nitric acid mist or vapor, can be produced by the decomposition reactions that can affect the nitric acid during fires.

SECTION 6. HEALTH HAZARD INFORMATION

Nitric acid is not listed as a carcinogen by the NTP, IARC, or OSHA.
Summary of Risks: This material is corrosive to any body tissue it contacts. Dental erosion is also reported.
Medical Conditions Aggravated by Long-Term Exposure: None reported. **Target Organs:** Skin, eyes, mucous membranes of the respiratory tract, teeth. **Primary Entry:** Inhalation, skin contact. **Acute Effects:** Irritation and/or corrosive burns of skin, eyes, and upper respiratory tract (URT), delayed pulmonary edema, pneumonitis, bronchitis, and dental erosion. **Chronic Effects:** None reported.

FIRST AID: **Eyes.** Immediately flush eyes, including under the eyelids, gently but thoroughly with plenty of running water for at least 15 minutes. Treat for eye burns. **Skin.** Immediately wash the affected area with soap and water. Watch for chemical skin burns and treat them accordingly. **Inhalation.** Remove the exposed person to fresh air; restore and/or support his or her breathing as needed. If the exposure is severe, hospitilization with careful monitoring by trained medical personnel to detect the delayed onset of severe pulmonary edema (lungs filled with fluid) is recommended for at least 72 hours. **Ingestion.** Call a poison control center. Never give anything by mouth to someone who is unconscious or convulsing. Do not induce vomiting. If the exposed person is responsive, give him or her one or two glasses of milk or water to drink as quickly as possible after exposure.
GET MEDICAL HELP (IN PLANT, PARAMEDIC, COMMUNITY) FOR ALL EXPOSURES. **Seek prompt medical assistance for further treatment, observation, and support after first aid.** NOTE TO PHYSICIAN: **Wash affected skin areas with a 5% solution of sodium bicarbonate ($NaHCO_3$). If ingested, the risk versus the benefit of the passage of a naso-gastric tube is debatable. Activated charcoal is of *no* value. Do *not* give the exposed person bicarbonate to neutralize the material.**

SECTION 7. SPILL, LEAK, AND DISPOSAL PROCEDURES

Spill/Leak: Notify safety personnel, provide ventilation, and eliminate all sources of ignition immediately in case contact with metals should produce highly flammable hydrogen gas. Cleanup personnel need protection against contact with and inhalation of nitric acid (see sect. 8). Contain large spills and collect waste. Use water sprays to direct nitric acid away from incompatible chemicals (see sect. 5). Neutralize the spilled nitric acid with soda ash or sodium bicarbonate. Use an absorbent such as sand, earth, or vermiculite on the resulting slurry and place the neutralized nitric acid material into containers suitable for eventual disposal, reclamation, or destruction.
Waste Disposal: Consider reclamation, recycling, or destruction rather than disposal in a landfill. Contact your supplier or a licensed contractor for detailed recommendations. Follow Federal, state, and local regulations.
OSHA Designations
Air Contaminant (29 CFR 1910.1000 Subpart Z)
EPA Designations (40 CFR 302.4)
CERCLA Hazardous Substance, Reportable Quantity: 1000 lbs (454 kg), per Clean Water Act (CWA), Section 311 (b) (4)

SECTION 8. SPECIAL PROTECTION INFORMATION

Goggles: Always wear protective eyeglasses or chemical safety goggles. Where splashing of nitric acid solution is possible, wear a full face shield as a supplementary protective measure. Follow OSHA eye- and face-protection regulations (29 CFR 1910.133).
Respirator: Consult the *NIOSH Pocket Guide to Chemical Hazards* (Genium ref. 88) for general recommendations on proper respiratory procedures. Follow OSHA respirator regulations (29 CFR 1910.134). For emergency or nonroutine use (leaks or cleaning reactor vessels and storage tanks), wear an SCBA with a full facepiece operated in the pressure-demand or positive-pressure mode. **Warning:** Air-purifying respirators will *not* protect workers in oxygen-deficient atmospheres. **Other:** Wear impervious gloves, boots, aprons, gauntlets, etc., to prevent skin contact with nitric acid. Choose protective equipment carefully (see sect. 5, Conditions to Avoid).
Ventilation: Install and operate both general and local exhaust-ventilation systems powerful enough to maintain airborne concentrations of nitric acid below the OSHA PEL standard cited in section 2. Construct exhaust ducts and systems with material such as fiberglass, which resists attack by nitric acid. **Safety Stations:** Make emergency eyewash stations, washing facilities, and safety/quickdrench showers available in work areas. **Contaminated Equipment:** Contact lenses pose a special hazard; soft lenses may absorb irritants and all lenses concentrate them. Do *not* wear contact lenses in any work area. Remove contaminated clothing and launder it before wearing it again; clean nitric acid from shoes and equipment. **Comments:** Practice good personal hygiene; always wash thoroughly after using this material. Keep it off of your clothing and equipment. Avoid transferring it from your hands to your mouth while eating, drinking, or smoking. Do *not* eat, drink, or smoke in any work area. Provide preplacement and annual medical exams with emphasis on skin irritation to workers who are regularly exposed to nitric acid. Workers must receive training before handling this material in the workplace; even experienced workers should undergo refresher training periodically.

SECTION 9. SPECIAL PRECAUTIONS AND COMMENTS

Storage/Segregation: Store nitric acid in a cool, dry, well-ventilated area away from incompatible chemicals (see sect. 5). Consider outside, isolated, or detached storage. Protect containers from direct sunlight.
Special Handling/Storage: Build all storage facilities of nonflammable materials that are resistant to chemical attack by nitric acid. Protect containers from physical damage. Preplan for routine use and emergency response.
Engineering Controls: Proper ventilation is essential in bulk storage areas; consider installing an automatic monitoring system to detect hazardous levels of nitrogen oxides that can develop from this material.
Comments: Separate nitric acid from hydrazine, diethylenetriamine, fluorides, and all other corrosives except sulfuric acid and sulfur trioxide when shipping or transferring it.
Transportation Data (49 CFR 172.101-2)
DOT Shipping Name: (I) Nitric Acid, Fuming or (II) Nitric Acid, Over 40% or (III) Nitric Acid, 40% or Less
DOT Label: (I) Oxidizer and Poison or (II) Oxidizer and Corrosive or (III) Corrosive
DOT Hazard Class: (I) and (II) Oxidizer or (III) Corrosive Material
DOT ID Nos. (I) UN2032; (II) UN2031; (III) NA1760
IMO Class: 8 (All Types of Nitric Acid)
IMO Label: (I) Corrosive, Oxidizer, Poison; or (II) and (III) Corrosive
References: 1, 2, 26, 38, 84-94, 100, 112, 113, 114.

Prepared by PJ Igoe, BS

Industrial Hygiene Review: DJ Wilson, CIH

Medical Review: MJ Hardies, MD

Genium Publishing Corporation
1145 Catalyn Street
Schenectady, NY 12303-1836 USA
(518) 377-8854

Material Safety Data Sheets Collection:

Sheet No. 397
n-Hexane

Issued: 8/83 Revision: C, 8/89

Section 1. Material Identification

n-Hexane Description: *n*-Hexane is the chief constituent of petroleum ether or liqroin. Used to determine the refractive index of minerals; and as a mercury replacement in thermometers (usually with blue or red dye).
Other Designations: Normal-hexane; C_6H_{14}; CAS No. 0110-54-3.
Manufacturer: Contact your supplier or distributor. Consult the latest *Chemicalweek Buyers' Guide* (Genium ref. 73) for a suppliers list.
Comments: See *MSDS Colletion*, No. 397A, for isohexanes.

R	1
I	3
S	2
K	4

NFPA

HMIS

H	1
F	3
R	0
PPG*	

* Sec. 8

Section 2. Ingredients and Occupational Exposure Limits

n-Hexane, ca 100%*

OSHA PEL	ACGIH TLV, 1988-89	Toxicity Data†
8-hr TWA: 50 ppm, 180 mg/m³	TLV-TWA: 50 ppm, 180 mg/m³	Human, inhalation, TC_{Lo}: 5000 ppm/10 min Rat, oral, LD_{50}: 28,710 mg/kg

* *n*-Hexane is this product's major component; however, possible contaminants are other isomers of hexane, C_5 to C_7 saturated hydrocarbons, C_5 to C_7 olefinic hydrocarbons, and aromatic hydrocarbons.
† See NIOSH, *RTECS* (MN9275000), for additional data with references to reproductive, irritative, and neurological effects.

Section 3. Physical Data

Boiling Point: 156.11 °F (68.95 °C)
Melting Point: ca -139 °F (-95 °C)
Vapor Pressure: 124 torr at 68 °F (20 °C)
Vapor Density (Air = 1): 3.0
Molecular Weight: 86 g/mol
Specific Gravity (H_2O = 1): 0.66 at 68 °F (20 °C)
Water Solubility: Insoluble

Appearance and Odor: A clear, colorless, mobile, volatile, flammable liquid: a mild hydrocarbon odor.

Section 4. Fire and Explosion Data

Flash Point: -22 °F (-30 °C) CC	Autoignition Temperature: 473 °F (223 °C)	LEL: 1.2% v/v	UEL: 8% v/v

Extinguishing Media: Use carbon dioxide (CO_2), foams, or dry chemical to put out *n*-hexane fires. Never direct solid streams of water into burning pools of liquid since this can scatter and spread the fire. Use water sprays to cool fire-exposed containers, prevent dangerous pressure rise and/or rupture, disperse vapors, and flush unignited spills away from sensitive exposures.
Unusual Fire or Explosion Hazards: *n*-Hexane is a very flammable, volatile liquid which burns like gasoline. It represents a dangerous fire and explosion hazard. Since it evaporates quickly, the resulting denser-than-air vapors can flow along surfaces, collect in low-lying or enclosed areas like sumps and utility rooms, reach distant sources of ignition, and flash back to the original liquid.
Special Fire-fighting Procedures: Wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in the pressure-demand or positive-pressure mode.

Section 5. Reactivity Data

Stability/Polymerization: *n*-Hexane is stable at room temperature during routine operations. Hazardous polymerization cannot occur.
Chemical Incompatibilities: *n*-Hexane can react violently with strong oxidizing agents.
Conditions to Avoid: Never expose this liquid to any ignition source (heat, sparks, open flames, or uninsulated heating elements).
Hazardous Products of Decomposition: Thermal oxidative degradation of *n*-hexane can produce carbon dioxide and toxic carbon monoxide (CO).

Section 6. Health Hazard Data

Carcinogenicity: Neither the NTP, IARC, nor OSHA lists *n*-hexane as a carcinogen.

Summary of Risks: The metabolic products of *in vivo* partial oxidation of *n*-hexane include 2, 5-hexanedione. This metabolite is the most hightly neurotoxic compound formed from *n*-hexane. Occupational exposures to *n*-hexane are associated with chronic neurotoxic damage to the central nervous system (CNS) and the peripheral nervous system (PNS). The effects are not permanent; Genium reference 100 notes that recovery from neuropathy is usually complete within a year after the exposure. Methyl *n*-butyl ketone (MBK) (*MSDS Collection*, No. 425) produces the neurotoxic metabolite 2, 5-hexadione in even greater quantities than the *n*-hexane. Prevent simultaneous exposures to *n*-hexane and MBK. Genium reference 89 notes: "...concurrent exposure to methyl ethyl ketone, and possibly other chemicals or drugs which boost liver oxidative mechanisms, reduces the time for neuropathy to appear as a result of exposure to both *n*-hexane and MBK." **Medical Conditions Aggravated by Long-Term Exposure:** CNS and PNS disorders, vision defects, and memory diminution. **Target Organs:** Skin, eyes, CNS, PNS. **Primary Entry:** Inhalation, skin contact. **Acute Effects:** Irritation of eyes, nose, and upper respiratory tract (URT); dermal erythema (abnormally red skin from capillary congestion), edema (abnormal acccmulation of clear, watery fluid in body tissue), and vesiculation (blistering). Acute inhalation causes headache, dizziness, nausea, narcosis, and coma. High concentrations may act as asphyxiants. **Chronic Effects:** Anorexia, nausea, weight loss, malaise; muscular weakness, pain, and spasms in extremities; neurotoxic effects like sensorimotor polyneuropathy, generalized polyneuropathy, and other degenerative changes in the peripheral nervous system (PNS).

FIRST AID

Eyes: Flush immediately, including under the eyelids, gently but thoroughly with flooding amounts of running water for at least 15 min.

Skin: After rinsing affected area with flooding amounts of water, wash it with soap and water. **Inhalation:** Remove exposed person to fresh air and support breathing as needed. Have a qualified medical personnel adminsister oxygen as required. **Ingestion:** Never induce vomiting! Severe aspiration hazard exists. If vomiting occurs spontaneously, lower victim's head to the knee level. Never give anything by mouth to an unconscious or convulsing person. Administer several ounces of edible oil to drink.

After first aid, get appropriate in-plant, paramedic, or community medical attention and support.

Section 7. Spill, Leak, and Disposal Procedures

Spill/Leak: *Design and practice a* n-*hexane spill control and countermeasure plan (SCCP).* When a spill occurs, notify safety personnel, evacuate unnecessary personnel, eliminate heat and ignition sources, provide maximum explosion-proof ventilation, and implement the SCCP. Cleanup personnel should wear fireproof personal protective equipment (Sec. 8).

Disposal: Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations.

OSHA Designations

Listed as an Air Contaminant (29 CFR 1910.1000, Subpart Z)

EPA Designations

Assigned the RCRA Hazardous Waste No. D001 (40 CFR 261.21, Ignitability)
Assigned as a CERCLA Hazardous Substance (40 CFR 302.4), Reportable Quantity (RQ): 100 lb (45.4 kg)
SARA Extremely Hazardous Substance (40 CFR 355): Not listed
SARA Toxic Chemical (40 CFR 372.65): Not listed

Section 8. Special Protection Data

Goggles: Wear protective eyeglasses or chemical safety goggles, per OSHA eye- and face-protection regulations (29 CFR 1910.133). Where splashing is possible, wear a full face shield. **Respirator:** Wear a NIOSH-approved respirator if necessary. Follow OSHA respirator regulations (29 CFR 1910.134). For emergency or nonroutine operations (spills or cleaning reactor vessels and storage tanks), wear an SCBA.

Warning: Air-purifying respirators do *not* protect workers in oxygen-deficient atmospheres. **Other:** Wear impervious gloves, boots, aprons, and gauntlets to prevent skin contact. **Ventilation:** Provide general and local explosion-proof ventilation systems to maintain airborne concentrations below the OSHA PEL standard (Sec. 2). Local exhaust ventilation is preferred since it prevents contaminant dispersion into the work area by eliminating it at its source (Genium ref. 103). **Safety Stations:** Make available in the work area emergency eyewash stations, safety/quick-drench showers, washing facilities, and properly serviced fire extinguishers. **Contaminated Equipment:** Never wear contact lenses in the work area: soft lenses may absorb, and all lenses concentrate, irritants. Launder contaminated clothing before wearing. Remove this material from your shoes and equipment. **Other:** Preplacement and periodic medical exams focusing on the skin nd the central nervous system are advised.

Comments: Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially before eating, drinking, smoking, using the toilet, or applying cosmetics. Handle this flammable, volatile material with appropriate caution.

Section 9. Special Precautions and Comments

Storage Requirements: Store *n*-hexane in closed containers in a cool, dry, well-ventilated, fireproof area away from heat and ignition sources and incompatible chemicals. Protect these containers from physical damage; shield them from direct sunlight.

Engineering Controls: To prevent static sparks, electrically ground and bond all containers, tank cars, and pipes used in shipping, receiving, or transferring operations in production and storage areas. All electrical services, including lights, must be sparkproof.

Transportation Data (49 CFR 172.101-2)

DOT Shipping Name: Hexane
DOT Hazard Class: Flammable liquid
DOT ID No.: UN1208
DOT Label: Flammable liquid
DOT Packaging Requirements: 49 CFR 173.119
DOT Packaging Exceptions: 49 CFR 173.118

IMO Shipping Name: Hexane *(and its isomers)*
IMO Hazard Class: 3.1
IMO Label: Flammable liquid
IMDG Packaging Group: II

***MSDS Collection* References:** 1, 6, 7, 84-94, 100, 116, 117, 119, 120, 122

Prepared by: PJ Igoe, BS; **Industrial Hygiene Review:** DJ Wilson, CIH; **Medical Review:** W Silverman, MD

Appendix E

Test Pit Logs

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & GEOSCIENTISTS

PROJECT NAME
PROJECT NUMBER 364.17
LOCATION Cobleskill, NY
LOGGED BY TWB DATE 5/25/93

TEST PIT LOG

S-1

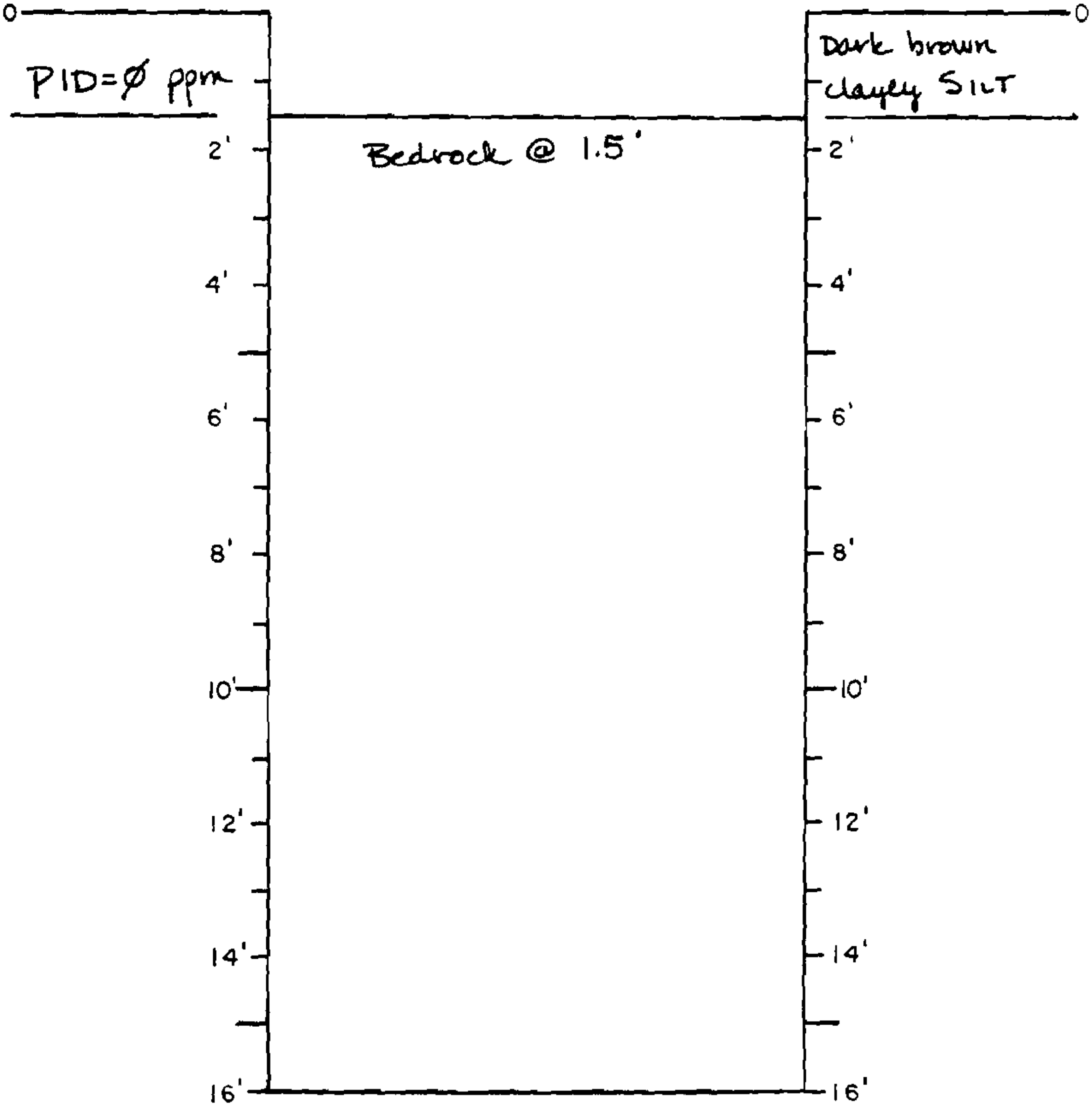
0		0
PID = 0 ppm		Clayey silt w/ cobbles & gravel
2'		2'
PID = 0 ppm		SAA
4'	Bedrock @ 4.0'	4'
6'		6'
8'		8'
10'		10'
12'		12'
14'		14'
16'		16'

NOTES: Sampling conducted @ 6-18" per protocol due to lack of odors, staining, or PID readings
Sample Time : 1540
Photos : 23, 24, 25

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & GEOSCIENTISTS

PROJECT NAME M. Wallace & Son (NMPC)
PROJECT NUMBER 364.17
LOCATION Cobleskill, NY
LOGGED BY TWB DATE 5/24/93

TEST PIT LOG
S-2



PID=0 ppm

Bedrock @ 1.5'

Dark brown clayey SILT

NOTES: Sampling conducted @ 6-18" per protocol due to lack of odors, staining or PID readings.
Sample Time: 12:40
Photos: 8, 9, 10

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & GEOSCIENTISTS

PROJECT NAME M. Wallace & Son (NMPC)
PROJECT NUMBER 364.17
LOCATION Cobleskill, NY
LOGGED BY TWB DATE 5/24/93

TEST PIT LOG
S-3

0 — 0
PID = 0 ppm — Dark brown clayey SILT w/ GRAVEL
2' — 2'
PID = 1 ppm — SAA
4' — 4'
Bedrock @ 4.0'
6' — 6'
8' — 8'
10' — 10'
12' — 12'
14' — 14'
16' — 16'

NOTES: Sampling conducted @ 2-4' due to elevated PID reading; no odors or visible staining present.
Sample Time: 13:05
Photos: 11, 12, 13

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & GEOSCIENTISTS

PROJECT NAME M. Wallace & Son (NMPC)
PROJECT NUMBER 364.17
LOCATION Cobleskill, NY
LOGGED BY TWB DATE 5/24/93

TEST PIT LOG

S-4

0		0
PID = 0.5 ppm		Brown/black SILT w/ GRAVEL
2'		2'
PID = 0 ppm		SAA
4'		4'
	Bedrock @ 4.0'	
6'		6'
8'		8'
10'		10'
12'		12'
14'		14'
16'		16'

NOTES: Sampling conducted @ 0-2' per protocol. No odors, black staining - possibly burn and
Sample Time: 1400
Photos: 14, 15, 16

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & GEOSCIENTISTS

PROJECT NAME M. Wallace & Son (NMPC)
PROJECT NUMBER 364.17
LOCATION Cobleskill, NY
LOGGED BY TWB DATE 5/24/93

TEST PIT LOG
S-5

0
PID= 0ppm
2'

Bedrock @ 2.5'

4'
6'
8'
10'
12'
14'
16'

0
Brown clayey SILT w/ GRAVEL and COBBLES
2'
4'
6'
8'
10'
12'
14'
16'

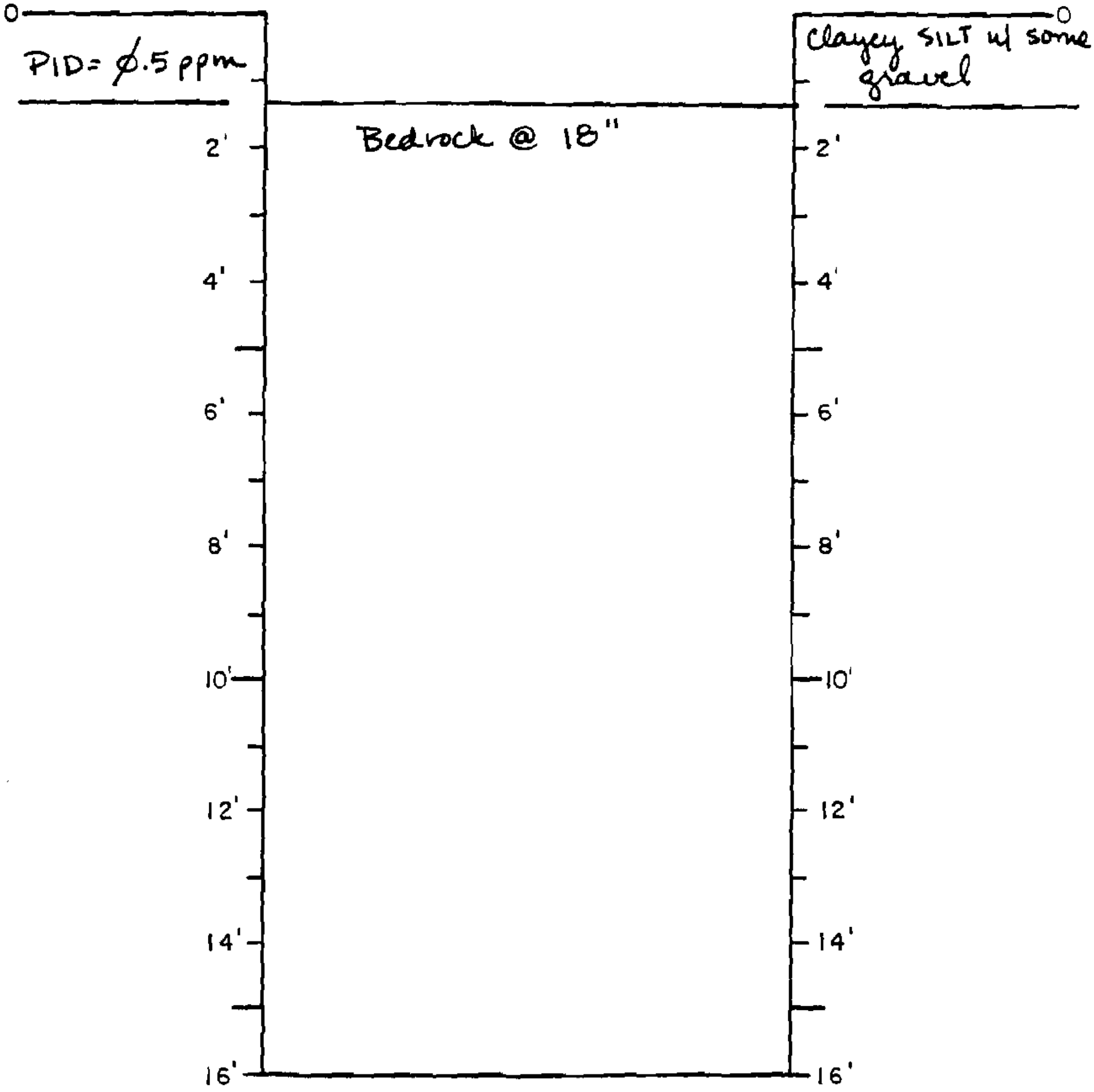
NOTES: Sampling conducted @ 6-18" per protocol due to no odors, visible staining, or elevated PID readings.
Sample Time: 1330
Photos: 17, 18, 19

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & GEOSCIENTISTS

PROJECT NAME M. Wallace & Son (NMPC)
PROJECT NUMBER 364.17
LOCATION Cobleskill, NY
LOGGED BY TWB DATE 5/25/93

TEST PIT LOG

S-6



PID= 0.5 ppm

Clayey SILT w/ some gravel

Bedrock @ 18"

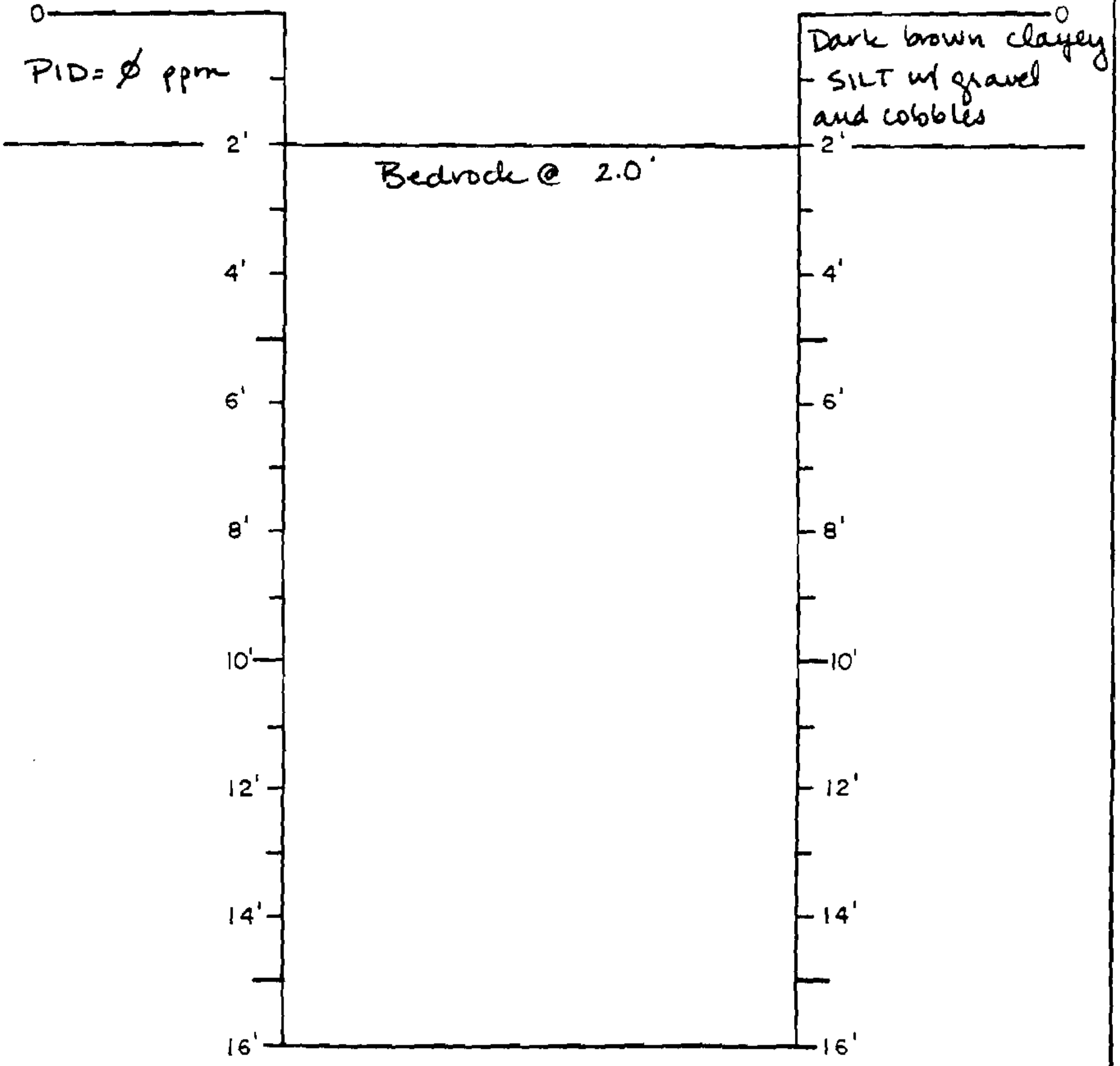
NOTES: Sampling conducted @ 0 - 18" per protocol due to small PID reading; no odors or visible staining
Sample Time: 1335
Photos: 14, 15, 16

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & GEOSCIENTISTS

PROJECT NAME M.Wallace & Son (UNPC)
PROJECT NUMBER 364.17
LOCATION Cobleskill, NY
LOGGED BY TWB DATE 5/24/93

TEST PIT LOG

S-7



PID= 0 ppm

Dark brown clayey SILT w/ gravel and cobbles

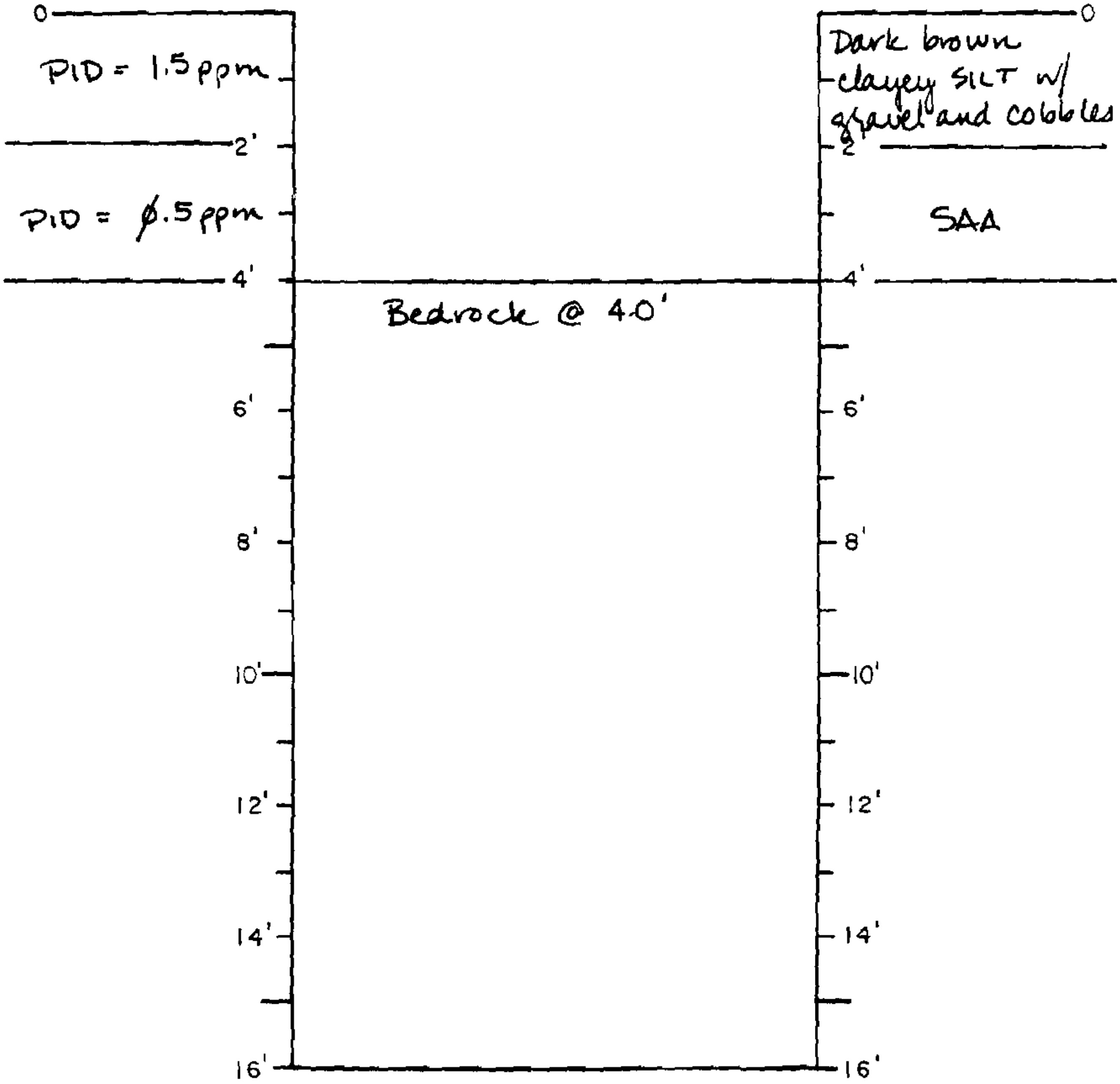
Bedrock @ 2.0'

NOTES: Sampling conducted per protocol @ 6-18" due to no elevated ~~Ht~~ PID readings, staining, or odors
Sample Time: 1215
Photos: 5,6,7

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & GEOSCIENTISTS

PROJECT NAME M. Wallace & Son (NMPC)
PROJECT NUMBER 364.17
LOCATION Cobleskill, NY
LOGGED BY TWB DATE 5/24/93

TEST PIT LOG
S-8



PID = 1.5 ppm

PID = 0.5 ppm

Dark brown clayey SILT w/ gravel and cobbles

SAA

Bedrock @ 4.0'

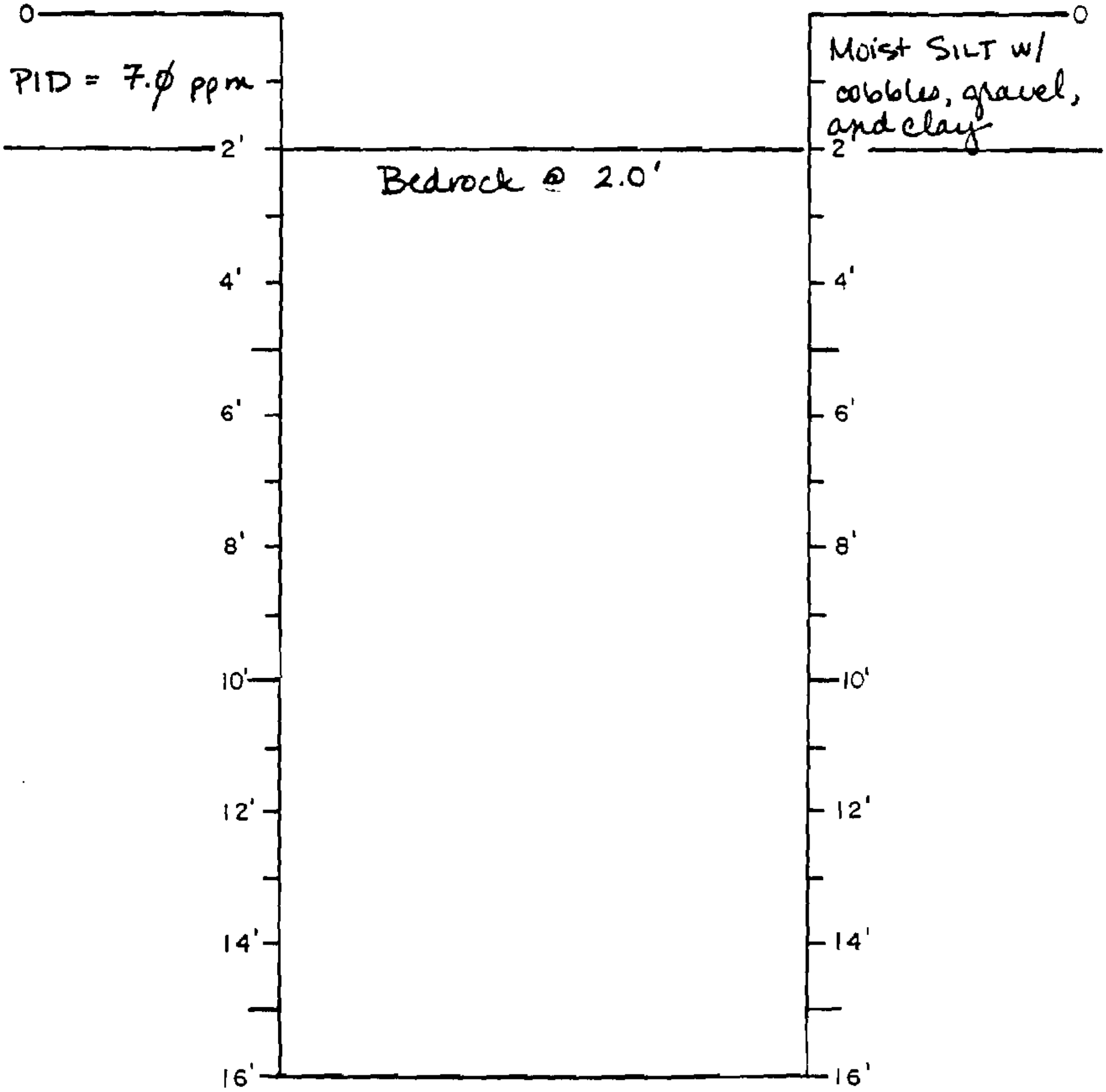
NOTES: Buried debris - buried metal and glass down to bedrock; Sampling conducted 0-2' due to elevated PID reading. Sample Time: 1145
Photos: 1, 2, 3, 4

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & GEOSCIENTISTS

PROJECT NAME M. Wallace & Son (NMPC)
PROJECT NUMBER 364.17
LOCATION Cobleskill, NY
LOGGED BY TWB DATE 5/21/93

TEST PIT LOG

S-9



PID = 7.0 ppm

Moist SILT w/ cobbles, gravel, and clay

Bedrock @ 2.0'

NOTES: Sampling conducted @ 0-2' due to elevated PID reading. No stains or odors present.
Sampling time: 1040
Photos: 7, 8, 9

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & GEOSCIENTISTS

PROJECT NAME M. Wallace & Son (NMPC)
PROJECT NUMBER 364.17
LOCATION Cobleskill, NY
LOGGED BY TWB DATE 5/21/93

TEST PIT LOG
S-10

0	PID = 5.5 ppm		Moist clayey SILT w/ gravel and cobbles	0
2'	PID = 1ppm		SAA	2'
4'		Bedrock @ 3.5'		4'
6'				6'
8'				8'
10'				10'
12'				12'
14'				14'
16'				16'

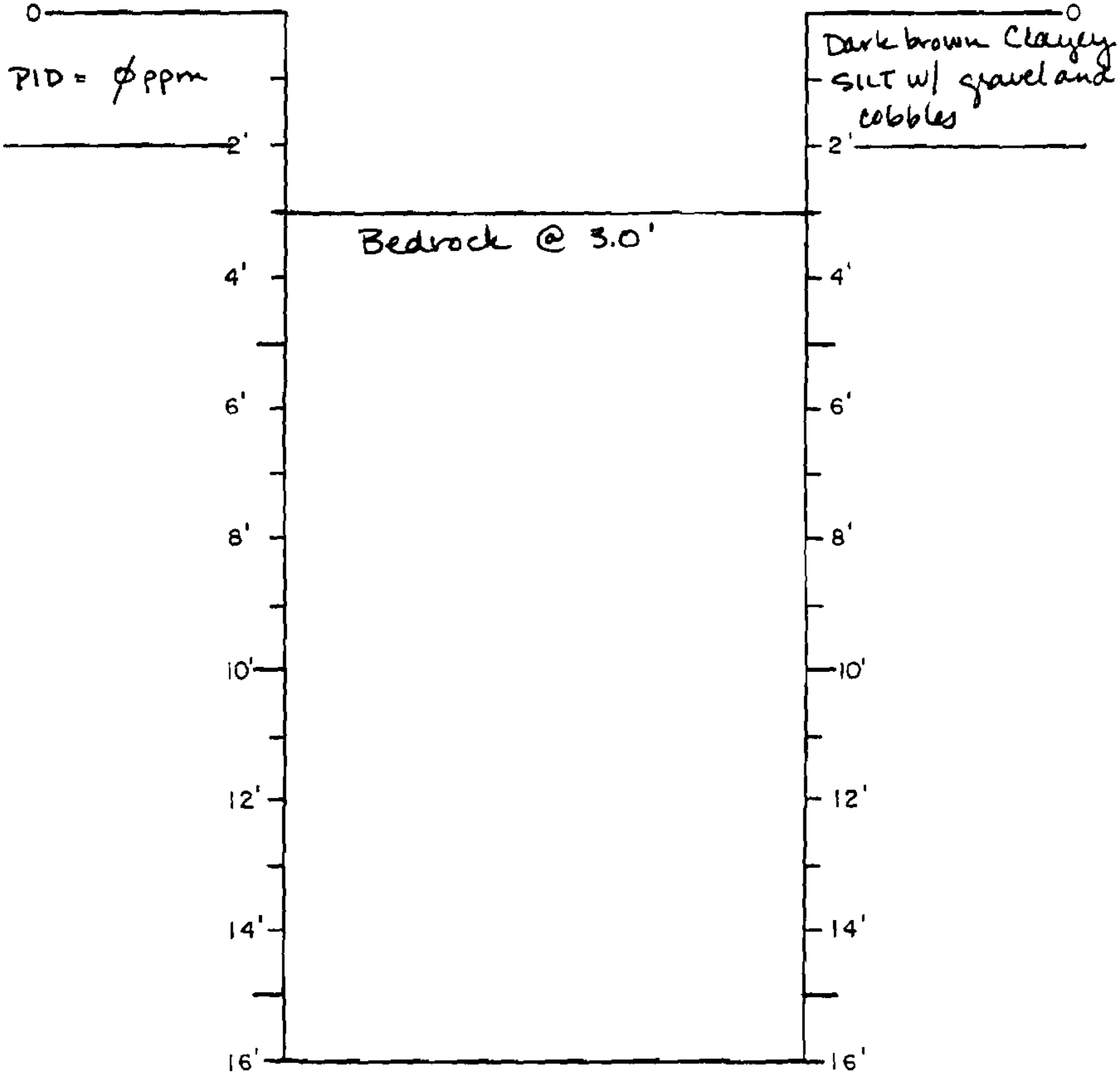
NOTES: Sampling conducted @ 0-2' due to elevated PID reading.
No odors, visible staining, or buried debris present.
Sample time: 1115
Photos: 10, 11, 12

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & GEOSCIENTISTS

PROJECT NAME M. Wallace & Son (NMPC)
PROJECT NUMBER 364.17
LOCATION Cobleskill, NY
LOGGED BY TWB DATE 5/21/93

TEST PIT LOG

S-11



PID = 0 ppm

Dark brown Clayey SILT w/ gravel and cobbles

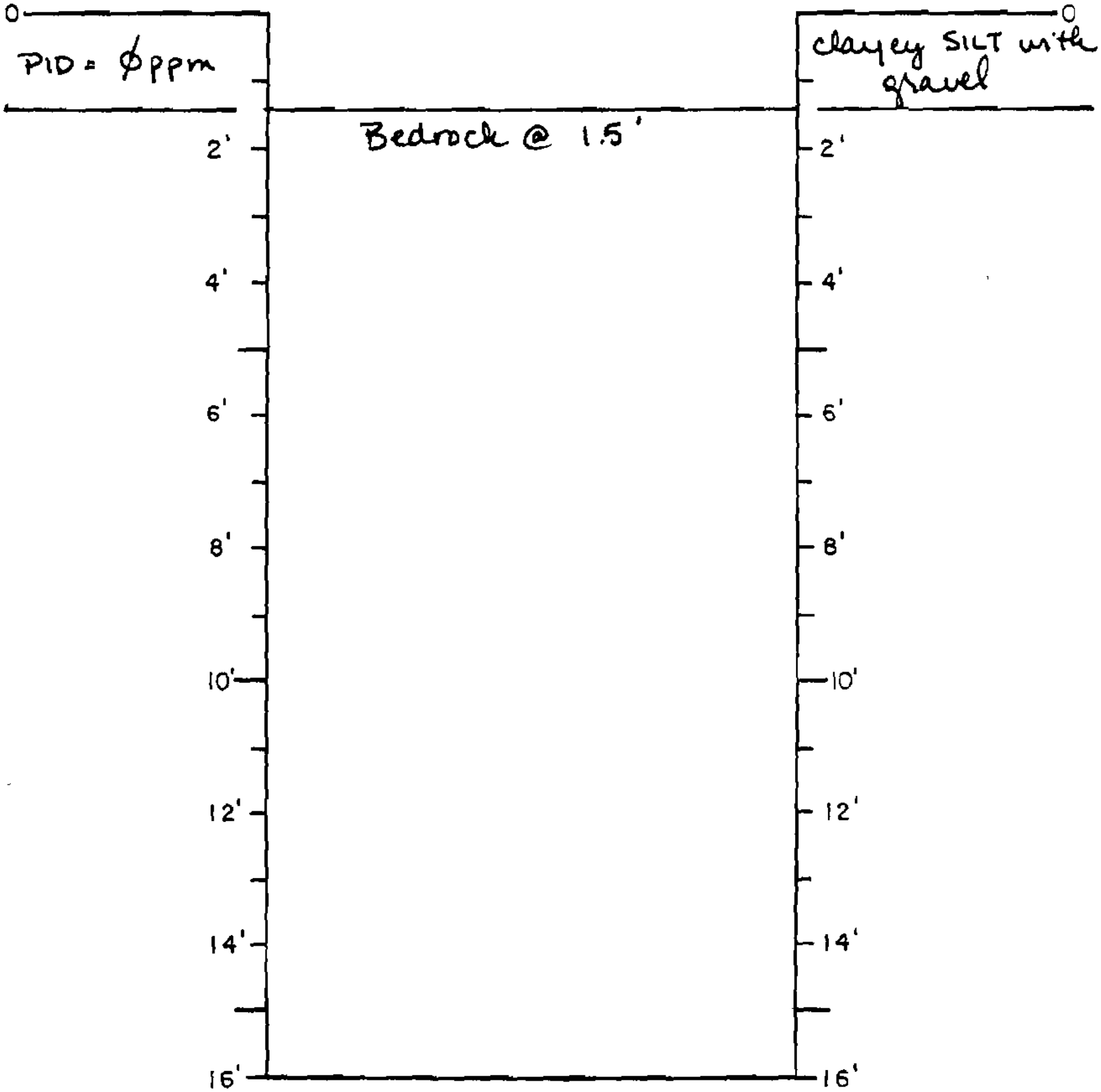
Bedrock @ 3.0'

NOTES: Buried transformer lid found. Sampling conducted at 6-18" per protocol due to no odors, visible staining, or elevated PID readings.
Photos: 13, 14, 15
Sample Time: 1145

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & GEOSCIENTISTS

PROJECT NAME M. Wallace & Son (NMPC)
PROJECT NUMBER 364.17
LOCATION Cobleskill, NY
LOGGED BY TWB DATE 5/25/93

TEST PIT LOG
S-12



PID = Øppm

clayey SILT with gravel

Bedrock @ 1.5'

NOTES: Sampling conducted @ 6-18" per protocol due to lack of PID reading, odors, or visible staining.
Sample Time: 1410
Photos: 17, 18, 19

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & GEOSCIENTISTS

PROJECT NAME M. Wallace & Son (NMPC)
PROJECT NUMBER 364.17
LOCATION Cobleskill, NY
LOGGED BY TWB DATE 5/25/93

TEST PIT LOG

S-13

0 – 2'	PID = 2 ppm	Brown clayey SILT with cobbles and gravel
2' – 4'	PID = 0 ppm	SAA
4' – 5.0'	PID = 0 ppm	SAA

Bedrock @ 5.0'

0, 2', 4', 6', 8', 10', 12', 14', 16'

NOTES: Sampling conducted @ 0-2' per protocol due to slight PID measurement. no odors or visible staining present.
Sample Time: 0755
Photos: 31, 32, 33

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & GEOSCIENTISTS

PROJECT NAME M. Wallace & Son (NMPC)
PROJECT NUMBER 364.17
LOCATION Cobleskill, NY
LOGGED BY TWB DATE 5/21/93

TEST PIT LOG
S-14

0		
	PID = 110.0 ppm	Moist brown SILT with gravel and cobbles
2'		
	PID = 47 ppm	SAA
4'		
	PID = 30 ppm	SAA with large rocks
6'		
	PID = 23 ppm	SAA
8'		Fine grain SAND on top of bedrock
	Bedrock @ 8.5'	
10'		
12'		
14'		
16'		

NOTES: Sampling conducted at 0-2' due to elevated PID reading; odor present below 1 foot; no visible staining.
Sample Time: 1010
Photos: 4,5,6

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & GEOSCIENTISTS

PROJECT NAME M. Wallace & Son (NMPC)
PROJECT NUMBER 364.17
LOCATION Cobleskill, NY
LOGGED BY TWB DATE 5/21/93

TEST PIT LOG
S-15

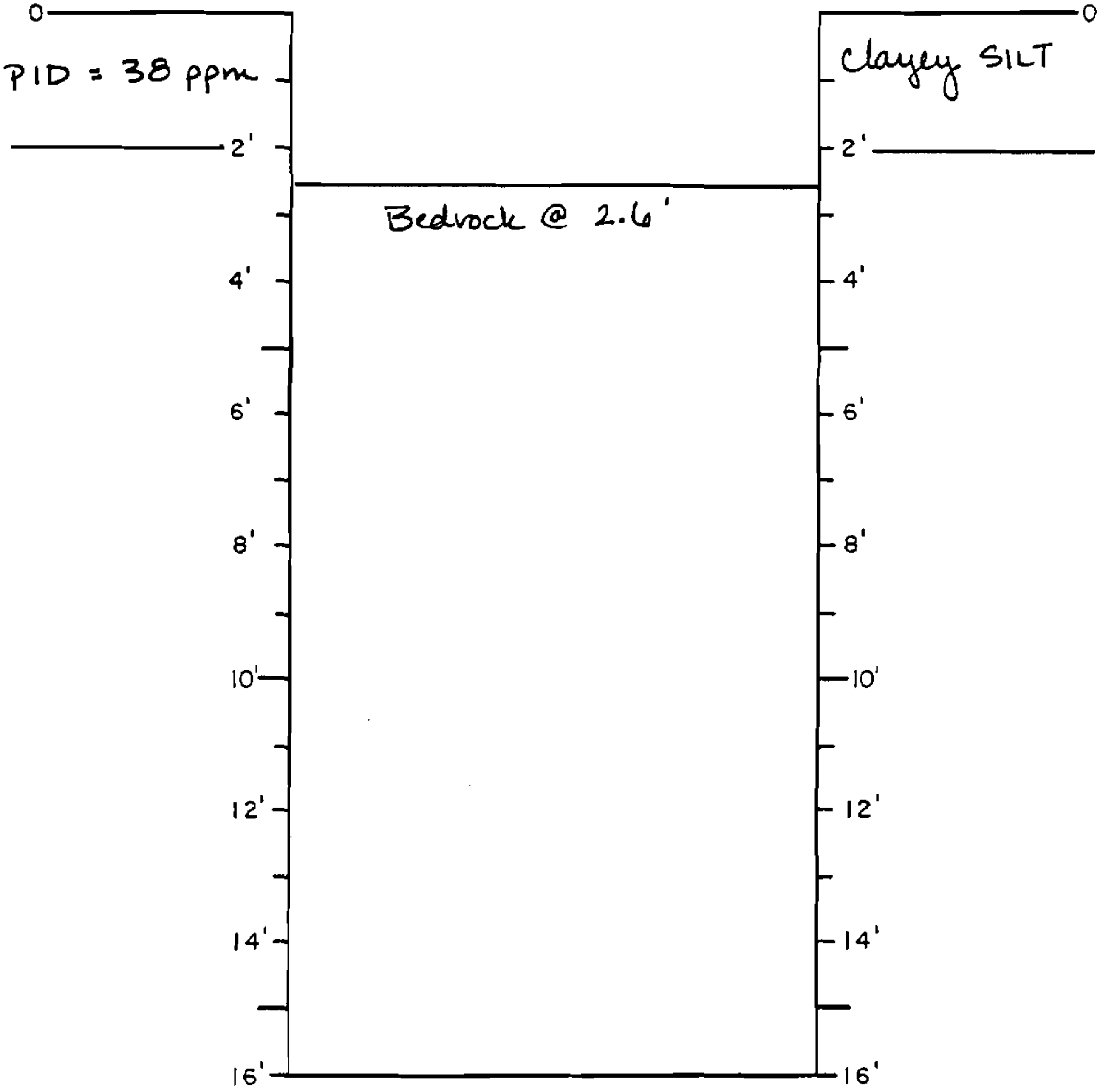
	0		0	
PID = 153 ppm				moist clayey SILT with boulders and cobbles
	2'		2'	
PID = 63 ppm				SAA
	4'		4'	
		Bedrock @ 5.0'		
	6'		6'	
	8'		8'	
	10'		10'	
	12'		12'	
	14'		14'	
	16'		16'	

NOTES: Sampling conducted @ 0-2' due to elevated PID reading. No odors, visible staining, or buried debris.
Sample Time: 0930
Photos: 1, 2, 3

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & GEOSCIENTISTS

PROJECT NAME M.Wallace & Son (NMPC)
PROJECT NUMBER 364.17
LOCATION Cobleskill, NY
LOGGED BY TWB DATE 5/20/93

TEST PIT LOG
S-16



PID = 38 ppm

Clayey SILT

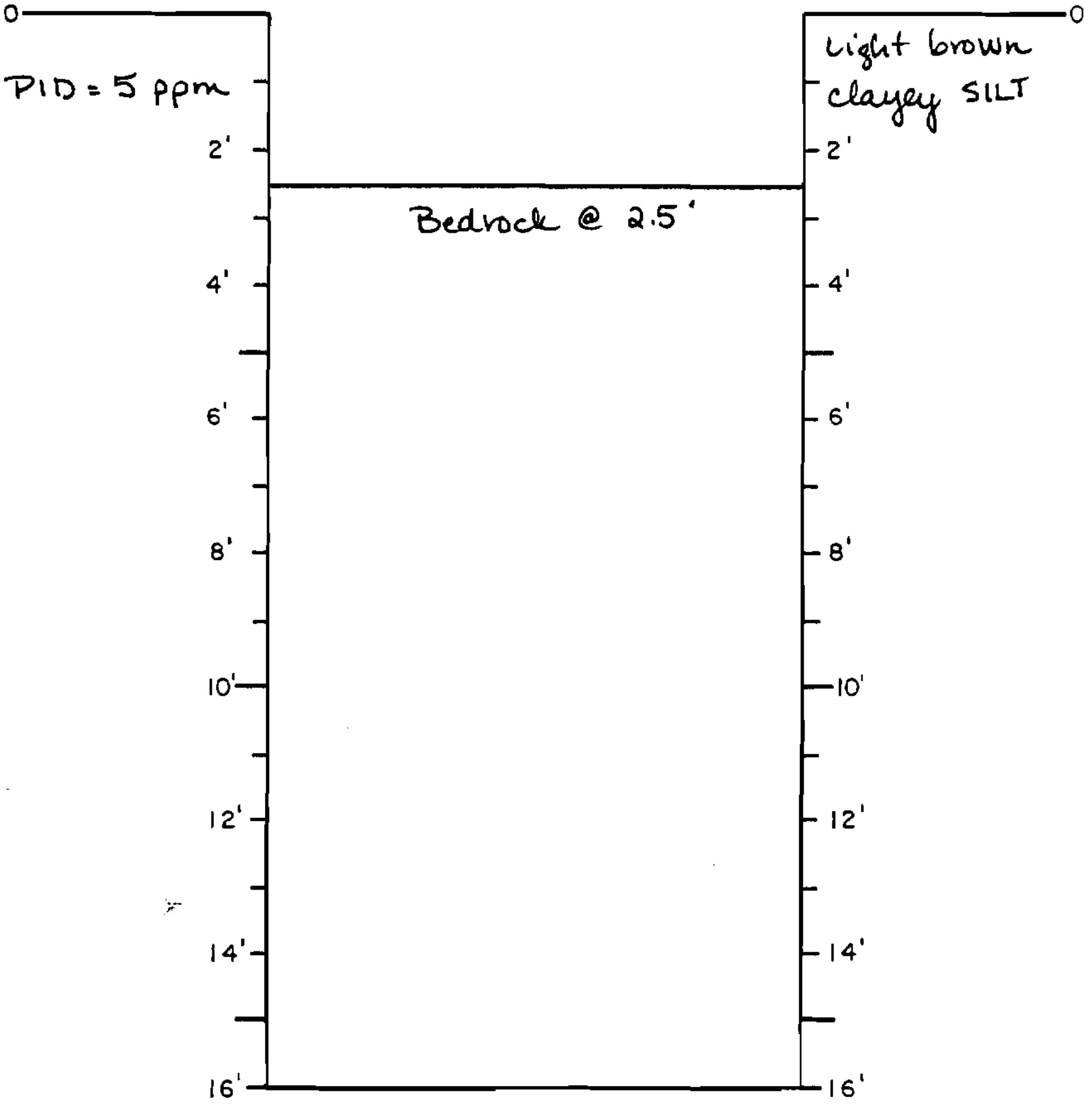
Bedrock @ 2.6'

NOTES: Sampling conducted @ 6-18" per protocol due to lack of PID reading; odors, or visible staining.
Sample Time: 1745

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & GEOSCIENTISTS

PROJECT NAME M Wallace & Son (NMPC)
PROJECT NUMBER 364.17
LOCATION Cobleskill, NY
LOGGED BY TWB DATE 5/20/93

TEST PIT LOG
3-17



NOTES: Sampling conducted @ 6-18" per protocol; no odors or staining visible
Sample Time: 1810

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & GEOSCIENTISTS

PROJECT NAME M. Wallace & Son (NMPC)
PROJECT NUMBER 364.17
LOCATION Cobleskill, NY
LOGGED BY TWB DATE 5/25/93

TEST PIT LOG
3-18

	0	
PID = 0 ppm		Clayey SILT with gravel and cobbles
	2'	
PID = 0 ppm		SAA
	4'	
	Bedrock @ 4.5'	
	6'	
	8'	
	10'	
	12'	
	14'	
	16'	

NOTES: Sampling conducted @ 6-18" per protocol due to lack of PID readings, odors, or visible staining.
Sample Time: 1510
Photos: 20, 21, 22

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & GEOSCIENTISTS

PROJECT NAME M. Wallace & Son (NMPC)
PROJECT NUMBER 364.17
LOCATION Cobleskill, NY
LOGGED BY TWB DATE 5/25/93

TEST PIT LOG

S-19

	0		0	
PID = 2ppm				Clayey SILT with cobbles and gravel
	2'		2'	
PID = 6ppm				SAA
	4'		4'	
PID = 4ppm				SAA
	6'		6'	
		Bedrock @ 7.0'		
	8'		8'	
	10'		10'	
	12'		12'	
	14'		14'	
	16'		16'	

NOTES: Transformer found @ 6" below surface. odors present no visible staining. Sampling conducted @' 2-4' per protocol due to elevated PID reading.
Sample Time: 0830
Photo's: 34, 35, 36, 37, 1

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & GEOSCIENTISTS

PROJECT NAME M. Wallace & Son (NMPC)
PROJECT NUMBER 364.17
LOCATION Cobleskill, NY
LOGGED BY TWB DATE 5/20/93

TEST PIT LOG
S-20

	0	
PID = 0 ppm		Sandy SILT, gravel and cobbles
	2'	
PID = 0 ppm		Grey clayey, sandy SILT
	4'	
PID = 0 ppm		Brown Sandy SILT with grey clay
	6'	
	8'	
	10'	
	12'	
	14'	
	16'	

NOTES: Sampling conducted @ 6-18" per protocol due to lack of odors, staining or PID readings
Sample Time: 1230
Photos: 12, 13, 14

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & GEOSCIENTISTS

PROJECT NAME M. Wallace & Son (NMPC)
PROJECT NUMBER 364.17
LOCATION Cobleskill, NY
LOGGED BY TWB DATE 5/20/93

TEST PIT LOG

S-21

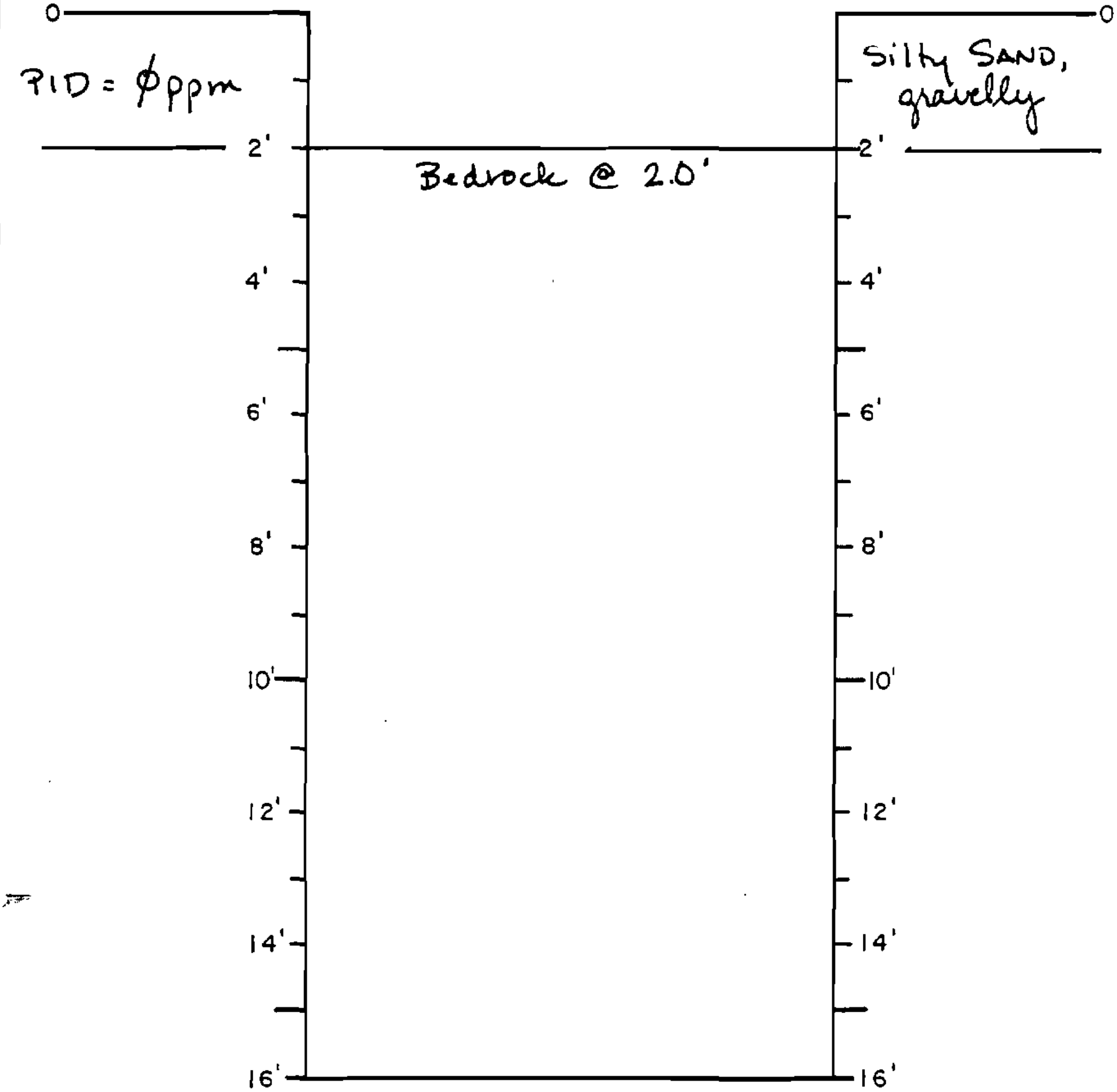
0	0
PID= 0ppm	silty CLAY
2'	2'
PID = 0 ppm	grey CLAY
4'	4'
PID= 0ppm	grey clayey gravelly SILT
6'	6'
8'	8'
10'	10'
12'	12'
14'	14'
16'	16'

NOTES: Debris on surface. Sampling conducted @ 6-18" per protocol due to lack of PID reading, odor, or visible staining. Duplicate PCB sample collected.
Sample Time: 1535
Photo: 15

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & GEOSCIENTISTS

PROJECT NAME N. Wallace & Son (NMPC)
PROJECT NUMBER 364.17
LOCATION Cobleskill, NY
LOGGED BY TWB DATE 5/20/93

TEST PIT LOG
S-22



PID = 0ppm

Silty SAND, gravelly

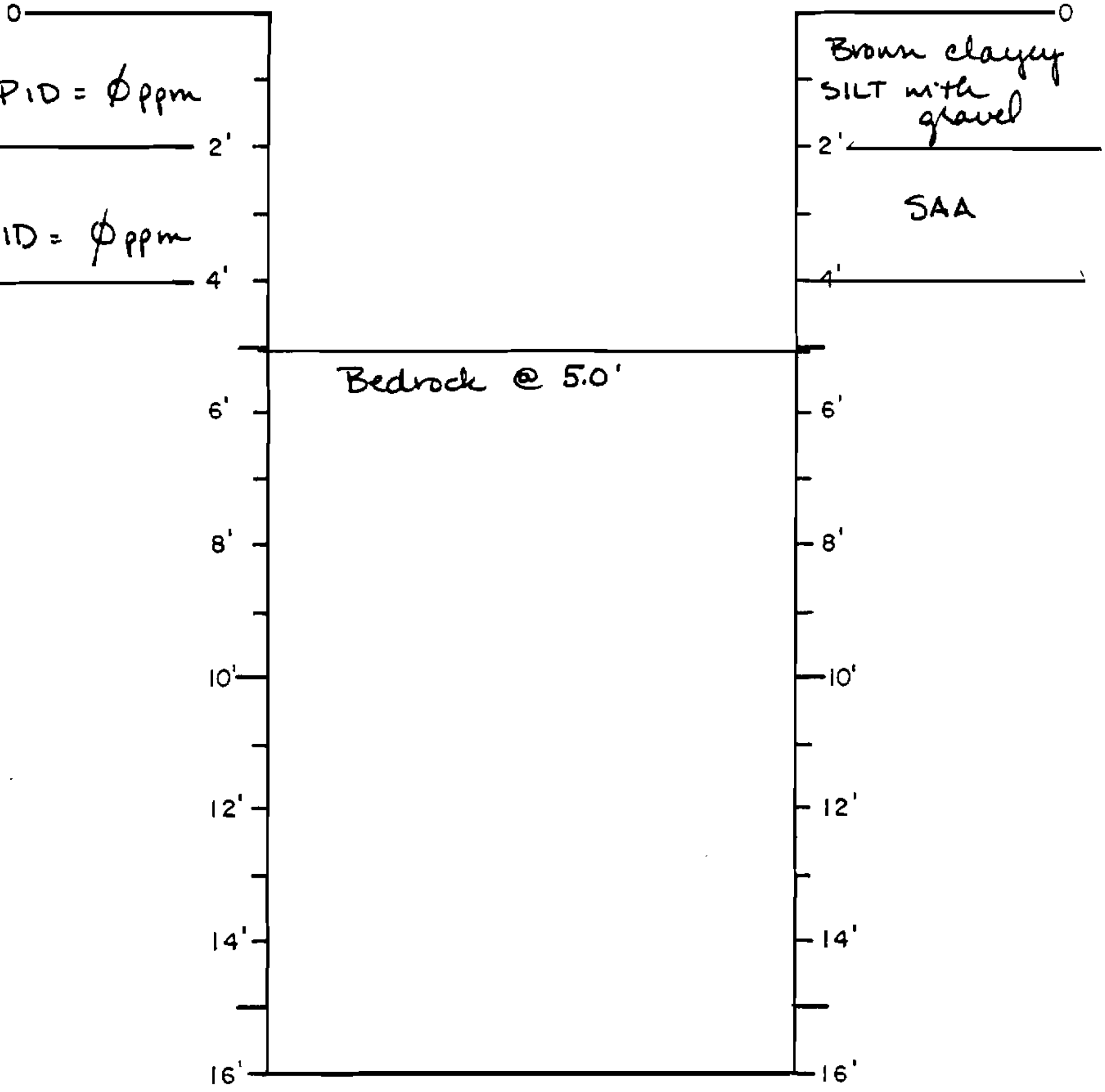
Bedrock @ 2.0'

NOTES: S-22 located on steep bank, debris ~~and~~ on surface. Sampling conducted @ 6-18" per protocol. no elevated PID readings, no odors or visible staining. No debris found below surface.
Sample Time: 1200
Photos: 9, 10, 11

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & GEOSCIENTISTS

PROJECT NAME M.Wallace & Son (NMPC)
PROJECT NUMBER 364.17
LOCATION Cobleskill, NY
LOGGED BY TWB DATE 5/25/93

TEST PIT LOG
S-23



0–2': PID = 0 ppm — Brown clayey SILT with gravel

2'–4': PID = 0 ppm — SAA

Bedrock @ 5.0'

NOTES: Sampling conducted @ 6-18" per protocol due to lack of PID readings, odors, or visible staining
Sample Time: 0910
Photos: 2, 3, 4

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & GEOSCIENTISTS

PROJECT NAME M. Wallace & Son (NMPC)
PROJECT NUMBER 364.17
LOCATION Cobleskill, NY
LOGGED BY TWB DATE 5/20/93

TEST PIT LOG
S-24

	0		0
PID = 0 ppm			SILT & GRAVEL
	2'		2'
PID = 0 ppm			SILT & GRAVEL & COBBLES
	4'		4'
PID = 0 ppm			SAA
	6'	Bedrock @ 6.0'	6'
	8'		8'
	10'		10'
	12'		12'
	14'		14'
	16'		16'

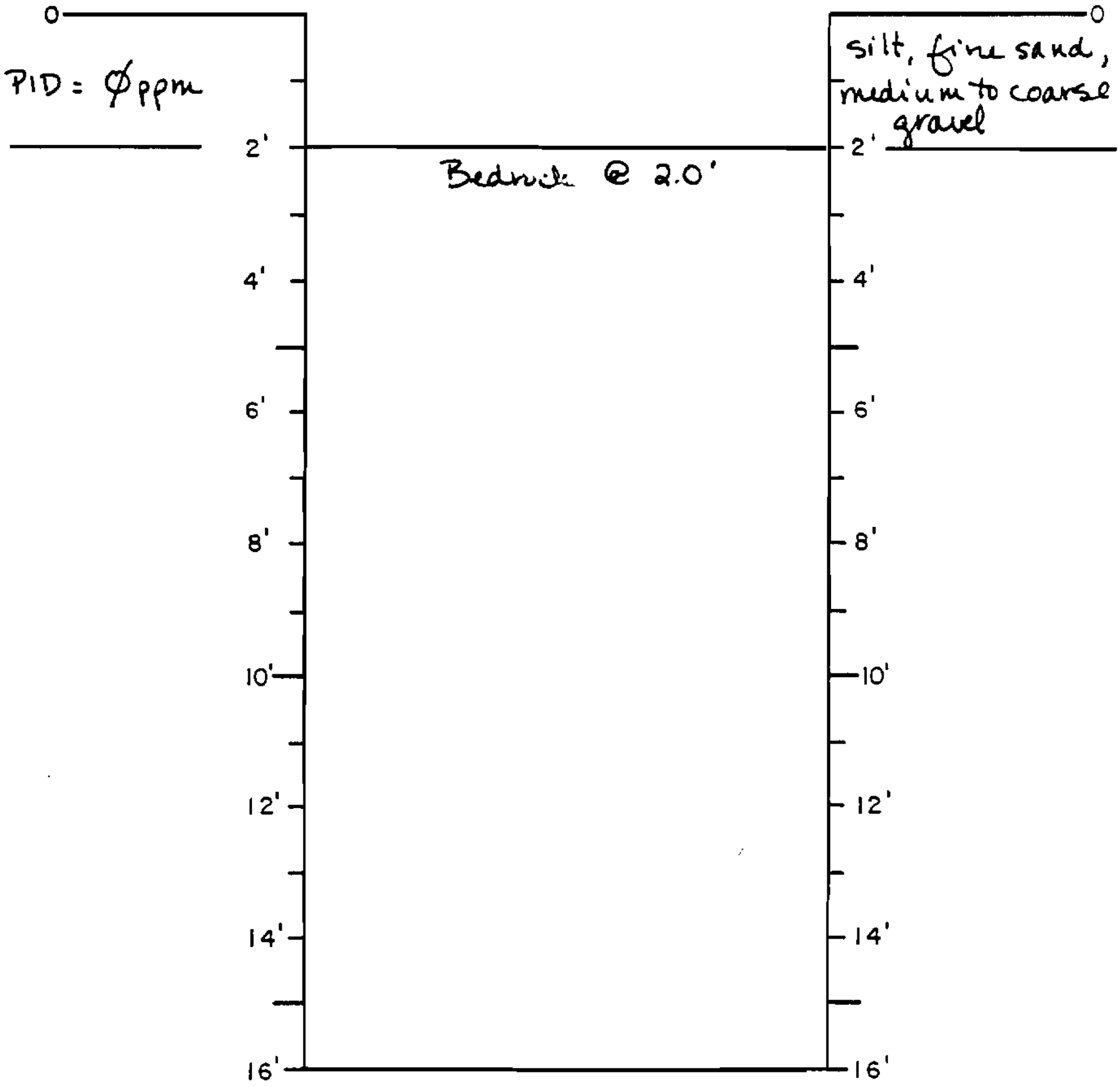
NOTES: Sampling conducted @ 6-18" per protocol; no elevated PID readings, odor, or visible staining.
Sample Time: 1105
Photos: 1, 2, 3, 4, 5

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & GEOSCIENTISTS

PROJECT NAME M. Wallace & Son (NMPC)
PROJECT NUMBER 364.17
LOCATION Cobleskill, NY
LOGGED BY TWB DATE 5/20/93

TEST PIT LOG

S-25



NOTES: Sampling conducted @ 6-18" per protocol; no elevated PID readings, odor, or visible staining
Sample Time: 1145
Photos: 6, 7, 8

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & GEOSCIENTISTS

PROJECT NAME M. Wallace & Son (NMPC)
PROJECT NUMBER 364.17
LOCATION Cobleskill, NY
LOGGED BY TWB DATE 5/25/93

TEST PIT LOG

S-26

	0	0	
PID = 0 ppm			Moist brown clayey SILT with gravel and cobbles
	2'	2'	
PID = 0 ppm			SAA with boulders
	4'	4'	
PID = 0 ppm			SAA
	6'	6'	
	Bedrock @ 7.0'		
	8'	8'	
	10'	10'	
	12'	12'	
	14'	14'	
	16'	16'	

NOTES: Sampling conducted @ 6-18" per protocol due to lack of PID readings, odors or visual staining!
Sample Time: 1045
Photos: 11, 12, 13

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & GEOSCIENTISTS

PROJECT NAME M. Wallace & Son (NMPC)
PROJECT NUMBER 364.17
LOCATION Cobleskill, NY
LOGGED BY TWB DATE 5/25/93

TEST PIT LOG
3-27

0		0
PID = 0 ppm		clayey silt with gravel, cobbles, and boulders
2'		2
PID = 0 ppm		SAA
	Bedrock @ 3.0'	
4'		4'
6'		6'
8'		8'
10'		10'
12'		12'
14'		14'
16'		16'

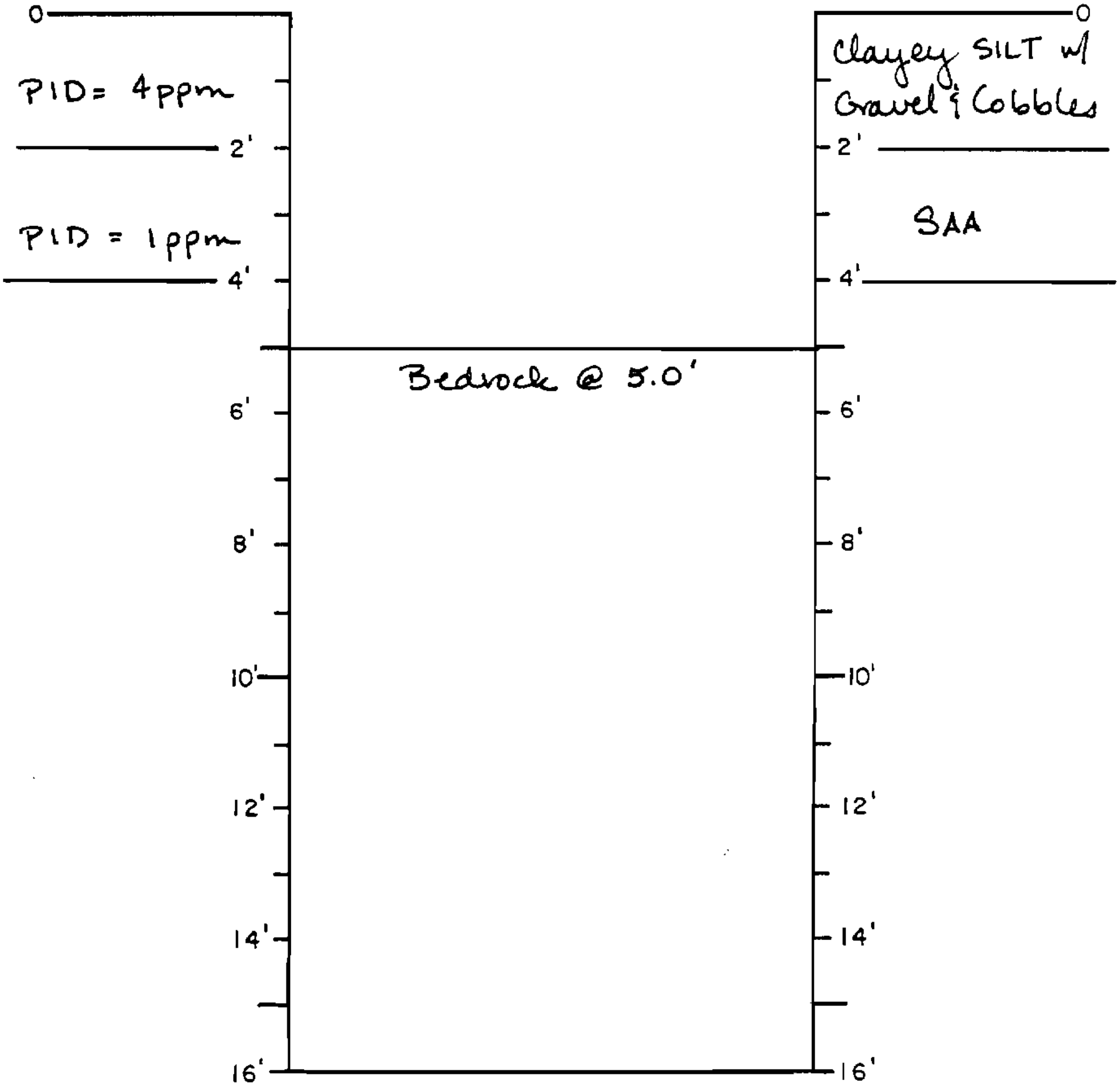
NOTES: Sampling conducted @ 6-18" per protocol due to lack of PID readings, odor, or visible staining.
Sample Time: 1020
Photos: 8, 9, 10

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & GEOSCIENTISTS

PROJECT NAME M. Wallace & Son (NMPC)
PROJECT NUMBER 364.17
LOCATION Cobleskill
LOGGED BY TWB DATE 5/25/93

TEST PIT LOG

S-28



0–2'	PID= 4ppm	Clayey SILT w/ Gravel & Cobbles
2'–4'	PID = 1ppm	SAA

Bedrock @ 5.0'

NOTES: Sampling conducted @ 0-2' per protocol due to slight elevation in PID reading. Field duplicate collected at this location
Sample Time: 0945
Photos: 5,6,7

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & GEOSCIENTISTS

PROJECT NAME M. Wallace & Son (NMPC)
PROJECT NUMBER 364.17
LOCATION Cobleskill, NY
LOGGED BY TWB DATE 5/24/93

TEST PIT LOG

S-29

0			0
PID = 0 ppm		Brown clayey SILT with gravel	
2'			2'
PID = 0 ppm		SAA	
	Bedrock @ 3.0'		
4'			4'
6'			6'
8'			8'
10'			10'
12'			12'
14'			14'
16'			16'

NOTES: Sampling conducted @ 6-18" per protocol due to lack of elevated PID readings, odors, or visible staining.
Sample Time: 1700
Photos: 23, 24, 25

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & GEOSCIENTISTS

PROJECT NAME M. Wallace & Son (NMPC)
PROJECT NUMBER 364.17
LOCATION Cobleskill, NY
LOGGED BY TWB DATE 5/24/93

TEST PIT LOG
S-30

PID = 0 ppm	0 – 2'	Brown clayey SILT with gravel and cobbles
PID = 0 ppm	2' – 4'	SAA
PID = 0 ppm	4' – 6'	SAA
PID = 0 ppm	6' – 8'	SAA
	8' – 10'	
	10' – 12'	
	12' – 14'	
	14' – 16'	

NOTES: Sampling conducted @ 6-18" per protocol due to lack of elevated PID readings, odor, or visible staining.
Sample Time: 1800
Photos: 29, 30, 31

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & GEOSCIENTISTS

PROJECT NAME M. Wallace & Son (NMPC)
PROJECT NUMBER 364.17
LOCATION Cobleskill, NY
LOGGED BY TWB DATE 5/24/93

TEST PIT LOG
S-31

PID = 8.5 ppm (No odor, maybe organic)	0–2'	Brown clayey SILT with some gravel and sand
PID = 0 ppm	2'–4'	SAA
PID = 0 ppm	4'–6'	SAA
PID = 0 ppm	6'–8'	SAA
	8'–10'	
	10'–12'	
	12'–14'	
	14'–16'	

Maximum reach of back hoe @ 8.0' - bedrock not encountered.

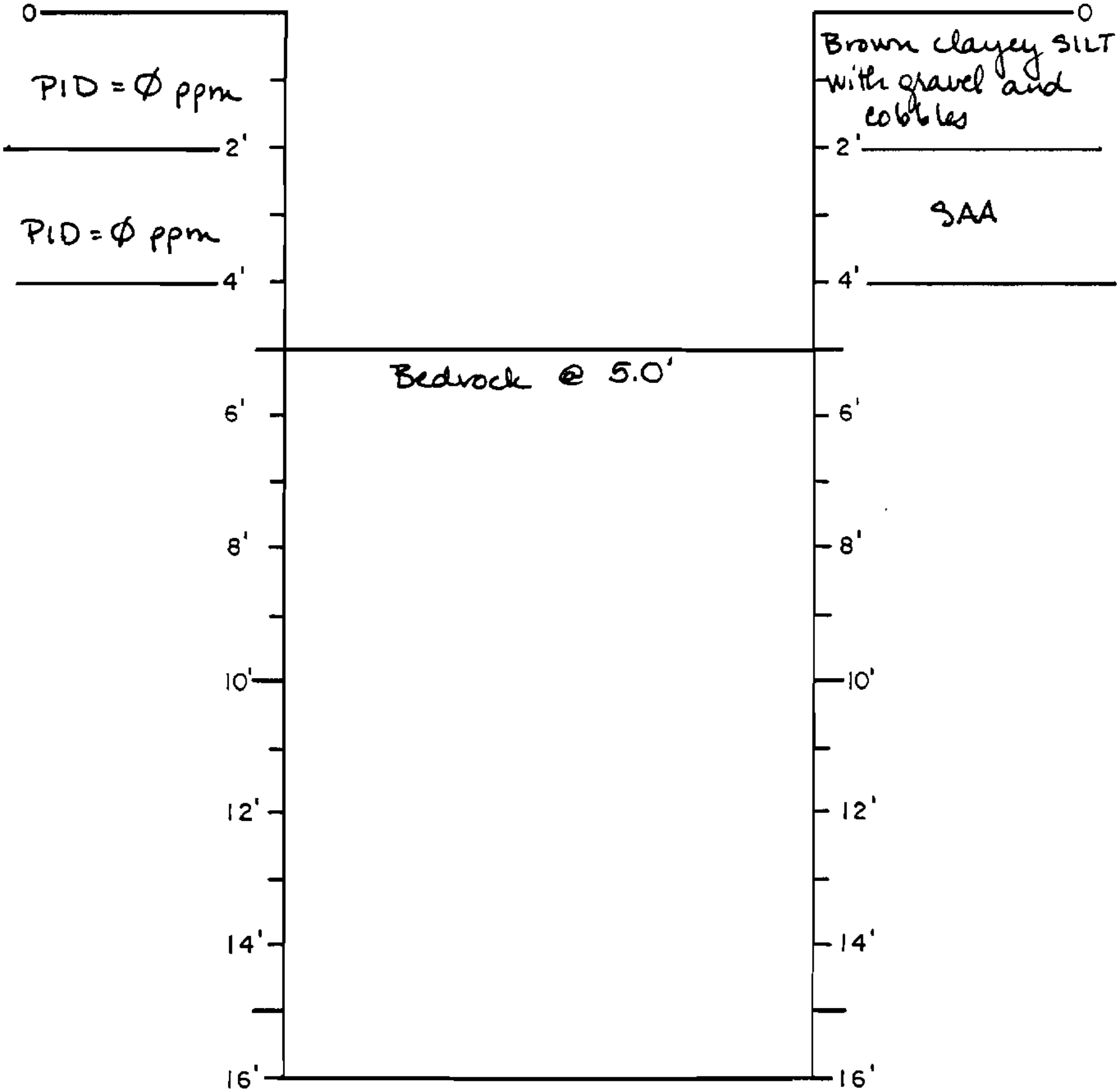
NOTES: Sampling conducted @ 0-2' per protocol due to elevated PID reading. no odors or visible staining present.
Sample Time: 1630
Photos: 20, 21, 22

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & GEOSCIENTISTS

PROJECT NAME M. Wallace & Son (NMPC)
PROJECT NUMBER 364.17
LOCATION Cobleskill, NY
LOGGED BY TWB DATE 5/24/93

TEST PIT LOG

S-34



0–2': PID = Ø ppm — Brown clayey SILT with gravel and cobbles

2'–4': PID = Ø ppm — SAA

Bedrock @ 5.0'

NOTES: Sampling collected @ 6-18" per protocol due to lack of elevated PID readings, odors, or visible staining.
Sample Time: 1730
Photos: 26, 27, 28

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & GEOSCIENTISTS

PROJECT NAME M. Wallace's Son (NMPC)
PROJECT NUMBER 364.17
LOCATION Cobleskill, NY
LOGGED BY HEH DATE 8/16/93

TEST PIT LOG
S-52

Depth	PID	Depth	Description
0–2'	PID = 0.2 ppm	0–2'	Grayish brown silty SanD, gravelly, damp
2'–3'	PID = 0.3 ppm	2'–3'	SAA, wet

Bedrock @ 3.0'

0
2'
4'
6'
8'
10'
12'
14'
16'

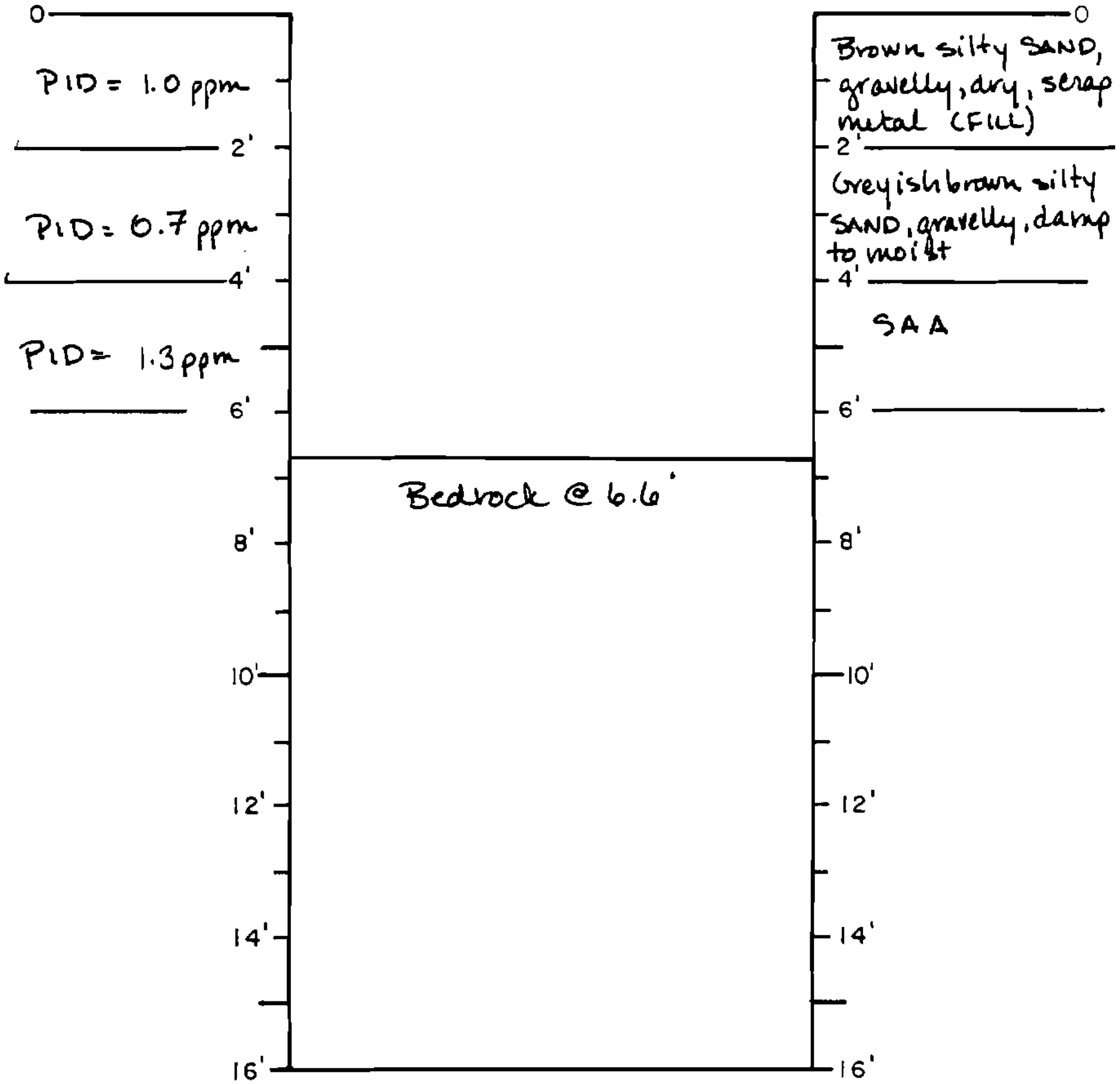
NOTES: Sampling conducted @ 2'-3' as per protocol.
Sample Time: 1445

50663

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & GEOSCIENTISTS

PROJECT NAME M.Wallace & Son (NMPc)
PROJECT NUMBER 364.17
LOCATION Cobleskill, NY
LOGGED BY HEH DATE 8/16/93

TEST PIT LOG
S-53



0

PID = 1.0 ppm

Brown silty SAND, gravelly, dry, scrap metal (FILL)

2'

PID = 0.7 ppm

Greyish brown silty SAND, gravelly, damp to moist

4'

PID = 1.3 ppm

SAA

6'

Bedrock @ 6.6'

NOTES: Sampling conducted @ 4'-6' per protocol
Sample Time: 1600

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & GEOSCIENTISTS

PROJECT NAME M. Wallace & Son (NMPC)
PROJECT NUMBER 364.17
LOCATION Cobleskill, NY
LOGGED BY HEH DATE 8/16/93

TEST PIT LOG
S-54

0		0
PID= 0.1ppm		Light brown SAND, gravelly
2'		2'
PID= 1.6 ppm		SAA
4'		4'
PID = 0.5 ppm		SAA
	Bedrock @ 5.0'	
6'		6'
8'		8'
10'		10'
12'		12'
14'		14'
16'		16'

NOTES: Sampling conducted @ 2-4' as per the protocol.
Duplicate sample also collected
Sample Time: 1715

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & GEOSCIENTISTS

PROJECT NAME M. Wallace & Son (NMPC)
PROJECT NUMBER 364.17
LOCATION Cobleskill, NY
LOGGED BY HEH DATE 8/16/93

TEST PIT LOG
S-55

0	PID = 4.1 ppm		Dark grayish brown sandy SILT, gravelly, clayey, damp to moist, scrap metal
2'	PID = 4.3 ppm		SAA
4'	PID = 1.8 ppm		SAA, large cobbles
6'	PID = 1.5 ppm		SAA
		Bedrock @ 7.3'	
8'			
10'			
12'			
14'			
16'			

NOTES: Sampling conducted @ 2'-4' as per protocol.
Sample Time: 1830

Appendix F

Monitoring Well Inspection Checklist Forms

WELL INSPECTION CHECKLIST

WELL NO. mw-1 DATE 5-17-93

SITE M. WALLACE & SON, INC. SCRAPYARD PERSONNEL HEH

Exterior	Yes	No	Remarks
1. CEMENT SEAL			
Intact		✓	
Cracked	✓		
Missing			
2. PONDING OF WATER AROUND CEMENT SEAL		✓	
3. PROTECTIVE STEEL PIPE AND LOCK (IF USED)			
Pipe - Intact	✓		4-INCH CASING
Lock - Intact	✓		
4. WELL CASING (Stick-up) STRAIGHT	✓		
5. DESIGNATED LEVELING POINT CLEARLY MARKED	✓		
6. WELL CAP VENTED PROPERLY			
7. WELL IS PROTECTED	✓		WELL IS SURROUNDED BY STAKES & CAUTION TAPE.
8. WELL IS CLEARLY MARKED	✓		WELL IS MARKED mw#1 N HEH.

Interior

1. BOTTOM OF WELL FROM TOP OF WELL CASING 37.32
2. STICK-UP 2.02
3. BOTTOM OF WELL BELOW GRADE 35.3
4. REMARKS ON INTEGRITY
5. DEPTH TO WATER FROM TOP OF WELL CASING 22.95
6. HNU READING 0.0 PPM
7. PRODUCT LAYER (circle) Y [✓ N]

WELL INSPECTION CHECKLIST

WELL NO. MW-2

DATE 5-17-93

SITE M. WALLACE & SON, INC. SCRAPYARD

PERSONNEL HEH

Exterior	Yes	No	Remarks
1. CEMENT SEAL			
Intact	✓		
Cracked	✓		SEAL IS CRACKED AND THERE IS A GAP BETWEEN CASING & SEAL.
Missing			
2. PONDING OF WATER AROUND CEMENT SEAL		✓	
3. PROTECTIVE STEEL PIPE AND LOCK (IF USED)			
Pipe - Intact	✓		4-INCH CASING
Lock - Intact	✓		
4. WELL CASING (Stick-up) STRAIGHT	✓		
5. DESIGNATED LEVELING POINT CLEARLY MARKED		✓	WELL COLLAR IS CRACKED & COMES OFF EASILY. HEH REPLACED WITH A NEW ONE ON 5-21-93
6. WELL CAP VENTED PROPERLY			
7. WELL IS PROTECTED			
8. WELL IS CLEARLY MARKED	✓		LABELED AS MW-E2.

Interior

1. BOTTOM OF WELL FROM TOP OF WELL CASING 26.54 FT.

2. STICK-UP 1.76 FT

3. BOTTOM OF WELL BELOW GRADE 24.78 FT.

4. REMARKS ON INTEGRITY

5. DEPTH TO WATER FROM TOP OF WELL CASING 9.67 FT

6. HNU READING 0.0 PPM

7. PRODUCT LAYER (circle) Y [✓ N]

WELL INSPECTION CHECKLIST

WELL NO. MW-3

DATE 5-17-93

SITE M. WALLACE & SON, INC. SCRAPYARD

PERSONNEL HEH

Exterior	Yes	No	Remarks
1. CEMENT SEAL			
Intact	✓		
Cracked			
Missing			
2. PONDING OF WATER AROUND CEMENT SEAL		✓	
3. PROTECTIVE STEEL PIPE AND LOCK (IF USED)			
Pipe - Intact	✓		4-INCH CASING
Lock - Intact	✓		
4. WELL CASING (Stick-up) STRAIGHT	✓		
5. DESIGNATED LEVELING POINT CLEARLY MARKED	✓		
6. WELL CAP VENTED PROPERLY			
7. WELL IS PROTECTED	✓		WELL IS SURROUNDED BY STAKE & CAUTION TAPE.
8. WELL IS CLEARLY MARKED	✓		LABELLED AS MW-E3.

Interior

1. BOTTOM OF WELL FROM TOP OF WELL CASING 35.74 FT.
2. STICK-UP 1.6 FT.
3. BOTTOM OF WELL BELOW GRADE 34.14 FT.
4. REMARKS ON INTEGRITY
5. DEPTH TO WATER FROM TOP OF WELL CASING 9.04 FT
6. HNU READING 0.0 PPM
7. PRODUCT LAYER (circle) Y [✓ N]

WELL INSPECTION CHECKLIST

WELL NO. MW-4　　DATE 5-17-93

SITE M. WALLACE & SON, INC. SCRAPYARD.　　PERSONNEL HEH

Exterior	Yes	No	Remarks
1. CEMENT SEAL			
Intact		✓	THERE IS A GAP BETWEEN
Cracked	✓		CASING AND SEAL.
Missing			
2. PONDING OF WATER AROUND CEMENT SEAL		✓	
3. PROTECTIVE STEEL PIPE AND LOCK (IF USED)			
Pipe - Intact	✓		4-INCH CASING
Lock - Intact	✓		
4. WELL CASING (Stick-up) STRAIGHT	✓		
5. DESIGNATED LEVELING POINT CLEARLY MARKED	✓		
6. WELL CAP VENTED PROPERLY			
7. WELL IS PROTECTED			
8. WELL IS CLEARLY MARKED	✓		MWE#1 HEH.

Interior

1. BOTTOM OF WELL FROM TOP OF WELL CASING　35.3 FT.
2. STICK-UP　1.75 FT.
3. BOTTOM OF WELL BELOW GRADE　33.55 FT.
4. REMARKS ON INTEGRITY
5. DEPTH TO WATER FROM TOP OF WELL CASING　7.21 FT
6. HNU READING　6.0 PPM
7. PRODUCT LAYER (circle)　Y [✓ N]

Appendix G

Monitoring Well/Corehole Subsurface Logs and Monitoring Well Construction Details

KEY TO SUBSURFACE LOGS

CORE CONDITIONS

% Recovery – Length of core recovered divided by length of core run.

RQD – Rock Quality Degree, a percent, the sum of the length of pieces four inches long or greater divided by the length of the core run.

ROCK HARDNESS SCALE

VERY HARD – surface cannot be scratched by a knife.

HARD – difficult to scratch with a knife.

MODERATELY HARD – surface is easily scratched by a knife. Difficult to scratch with a fingernail.

GEOLOGIC FEATURES

 – Ripple marks

 – stringers

 – vugs

CORE DESCRIPTIONS

N – angle of fracture surface from horizontal.

Hf/ – horizontal fracture

vf/ – vertical fracture

wz – weathered zone

v – vuggy

bp – bedding plan

l/ – laminae

s/ – stylolite

/o – oxidized

/w – weathered

/is – iron stained

/m – mud in opening

/rm – red mud in opening

/gm – green mud in opening

/bz – broken zone

JOINTING LEGEND

DESCRIPTION

J 30 // F

J – Joint

MB – Mechanical Break

S – Stratification

U – Unfoliated or Unstratified

// – Parallel

X – Crossing

F – Foliation

SURFACE	CONDITIONS
C – Curved	Slick – 1
I – Irregular	Smooth – 2
S – Straight	Rough – 3

Notes: Gradational contacts are dashed.

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. MW-1 **Well No. MW-1**

Project: M. Wallace & Son, Inc.

Location: Cobleskill, NY

Date Start/Finish: 9/12/89-9/12/89
Drilling Company: Parratt-Wolff, Inc.
ler's Name: Mark Beck
g Type:
Spoon Size:
Hammer Weight: 140'
Height of Fall: 30-inches
Drilling Method:
Bit Size: Auger Size:

Northing: 993.43
Easting: 50413.07
Well Casing Elev.: 996.15 ft.
Corehole Depth: 35.9 ft.
Borehole Depth: 35.9 ft.
Ground Surface Elev.: ft.

Location Sketch:

Scale:

Depth (Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft.) Average rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm)	Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
0													See boring log for boring B-1. Overburden 0 - 3.3 ft.			
1																
2													CASING INSTALLED TO 5.9 ft.			
3																
4																
7	1				5'/5'								Light to medium gray LIMESTONE, contains fossilized rugose coral, brachiopods and biherns, also contains chert nodules.			
8																
9																
10													Same as above.			
11	2				5'/5'											
12																
13																
14													Same as above.			
15	3				5'/5'											
16																
17																
18													Same as above.			
19	4				5'/5'											
20																
21																
22													Same as above.			
23	5				5'/5'											
24																

Geologist Initials: P. M. Haff
O'Brien & Gere Engineers, Inc.
Geologist Signature:

Project No.: 364.17

Remarks:

Monitoring well installed by Parratt-Wolff under the supervision of O'Brien & Gere Engineers, Inc.

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. **MW-1** Well No. **MW-1**

Project: M. Wallace & Son, Inc.

Location: Cobleskill, NY

D (ft)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft) Average Rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm)	Field/Headspace	Drilling Water Level	Geology Col.	Stratigraphic Description	Mat. Test	Well Column	Well Materials
25																
26													Same as above.			
27	6				5'/5'											
28																
29																
30																
31																
32																
33																
34																
35																
36													Bottom of boring 35.9 ft.			
37																
38																
39																
40																
41																
42																
43																
44																
45																
46																
47																
48																
49																

Geologist Initials: P. M. Haff
O'Brien & Gere Engineers, Inc.
Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels		
Date	**Time**	**Elevation**

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. MW-2 Well No. MW-2

Project: M. Wallace & Son, Inc.

Location: Cobleskill, NY

Date Start/Finish: 9/13/89–9/18/89
Drilling Company: Parratt-Wolff, Inc.
ller's Name: Mark Beck
g Type:
Spoon Size:
Hammer Weight: 140'
Height of Fall: 30-inches
Drilling Method:
Bit Size: Auger Size :

Northing: 9616.44
Easting: 60496.36
Well Casing Elev.: 858.57 ft.
Corehole Depth: 25.5 ft.
Borehole Depth: 25.5 ft.
Ground Surface Elev.: 856.7 ft.

Location Sketch:

Scale:

Depth (Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft.)	Average rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm)	Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
0														Overburden 0 – 15.5 ft.			
1														SET CASING TO 17.5 ft.			
2																	
3																	
4																	
7																	
8																	
9																	
10																	
11																	
12																	
13																	
14																	
15																	
16																	
17														Light to medium gray fossiliferous LIMESTONE, contains chert nodules.			
18	1																
19																	
20																	
21														Same as above.			
22	2																
23																	
24																	

Geologist Initials: P. M. Haff
O'Brien & Gere Engineers, Inc.
Geologist Signature:

Project No.: 364.17

Remarks:

Monitoring well installed by Parratt-Wolff under the supervision of O'Brien & Gere Engineers, Inc.

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. MW-2 Well No. MW-2

Project: M. Wallace & Son, Inc.

Location: Cobleskill, NY

Depth (Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft.)	Average Rate (min/ft.)	Recovery (%)	RQD (%)	Fracture Depth	HNU/OVA (ppm)	Field Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
25														Bottom of boring 25.5 ft.			
26																	
27																	
28																	
29																	
30																	
31																	
32																	
33																	
34																	
35																	
36																	
37																	
38																	
39																	
40																	
41																	
42																	
43																	
44																	
45																	
46																	
47																	
48																	
49																	

Geologist Initials: P. M. Haff
O'Brien & Gere Engineers, Inc.
Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels		
Date	**Time**	**Elevation**

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. MW-3 Well No. MW-3

Project: M. Wallace & Son, Inc.
Location: Cobleskill, NY

Date Start/Finish: 9/12/89-9/12/89
Drilling Company: Parratt-Wolff, Inc.
ller's Name: Mark Beck
g Type:
Spoon Size:
Hammer Weight: 140'
Height of Fall: 30 inches
Drilling Method:
Bit Size: Auger Size :

Northing: 9622.44
Easting: 50956.4
Well Casing Elev.: 958.32 ft.
Corehole Depth: 34.5 ft.
Borehole Depth: 34.5 ft.
Ground Surface Elev.: 955.1 ft.

Location Sketch:

Scale:

Depth (Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft.) Average rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm)	Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
0													Overburden 0 - 13.5 ft.			
1													SET CASING TO 15.5 ft.			
2																
3																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15													Light to medium gray fossiliferous LIMESTONE, contains chert nodules.			
16	1				4'/4'											
17																
18																
19																

Geologist Initials: P. M. Haff
O'Brien & Gere Engineers, Inc.
Geologist Signature:

Project No.: 364.17

Remarks:

Monitoring well installed by Parratt-Wolff under the supervision of O'Brien & Gere Engineers, Inc.

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. **MW-3** Well No. **MW-3**

Project: M. Wallace & Son, Inc.

Location: Cobleskill, NY

Depth (Ft)	Sample/Run Number	Sample/Int./Type	Blows/6 in.	N	Recovery (Ft)	Average Rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm) Field/Headspace	During Water Level	Geologic Col.	Stratigraphic Description	Hyd. Test	Well Column	Well Materials
20													Same as above.			
21	2				5'/5'											
22																
23																
24													Same as above.			
25	3				5'/5'											
26																
27																
28													Same as above.			
	4				5'/5'											
30																
31																
32																
33																
34													Bottom of boring 34.5 ft.			
35																
36																
37																
38																
39																

Geologist Initials: P. M. Haff
O'Brien & Gere Engineers, Inc.
Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. **MW-4** Well No. **MW-4**

Project: M. Wallace & Son, Inc.

Location: Cobleskill, NY

Date Start/Finish: 9/14/89–9/18/89
Drilling Company: Parratt-Wolff, Inc.
ller's Name: Mark Beck
g Type:
Spoon Size:
Hammer Weight: 140'
Height of Fall: 30 inches
Drilling Method:
Bit Size: Auger Size :

Northing: 347429
Easting: 502[illegible]44
Well Casing Elev.: ft.
Corehole Depth: 34.5 ft.
Borehole Depth: 34.5 ft.
Ground Surface Elev.: [illegible]58.81 ft.

Location Sketch:

Scale:

Depth (FT)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (FT) Average rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm) Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
0												Overburden 0 – 17.5 ft.			
1												CASING SET TO 19.5 ft.			
2															
3															
4															
7															
8															
9															
10															
11															
12															
13															
14															
15															
16															
17															
18															
19												Light to medium gray fossilferous LIMESTONE, contains chert nodules.			
20	1				5'/ 4.3'										
21															
22															
23															
24												Same as above.			

Geologist Initials: P. M. Haff
O'Brien & Gere Engineers, Inc.
Geologist Signature:

Project No.: 364.17

Remarks:

Monitoring well installed by Parratt-Wolff under the supervision of O'Brien & Gere Engineers, Inc.

Water Levels

Date	Time	Elevation

Depth (Ft)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft) Average Rate (min/ft)	Recovery (%)	RQD (%)	Fracture Depth	HNU/OVA (ppm)	Field/Headspace Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
25	2				5'/5'										
26															
27															
28															
29												Same as above.			
30	3				5'/5'										
31															
32															
33															
34												Bottom of boring 34.5 ft.			
35															
36															
37															
38															
39															
40															
41															
42															
43															
44															
45															
46															
47															
48															
49															

Geologist Initials: P. M. Haff
O'Brien & Gere Engineers, Inc.
Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. **MW-5** Well No. **MW-5**

Project: M. Wallace & Son, Inc.

Location: Cobleskill, NY

Date Start/Finish: 5/18/93 – 5/19/93
Drilling Company: Parratt-Wolff, Inc.
Driller's Name: Glen Lansing
Rig Type: ATV
Spoon Size: 2-inch
Hammer Weight: 140
Height of Fall: 30-inches
Drilling Method: Auger/Coring
Bit Size: HX Core **Auger Size:**

Northing: 9773.43
Easting: 50254.75
Well Casing Elev.: 971.2 ft.
Corehole Depth: 35.0 ft.
Borehole Depth: 35.0 ft.
Ground Surface Elev.: 969.5 ft.

Location Sketch:

Scale:

Depth (Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft.) Average Rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm)	Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
0	1		17 13 10 5	23	0.9				0.0 0.0				Very dark grayish brown Sandy SILT, dry, nonplastic.			4-inch diameter steel casing set to 8.0 ft. stickup to 1.7 ft. above ground surface.
1																
2	2		4 4 6 5	8	1.1				0.0 0.0				SAA, Gravelly, Clayey, dry to moist.			
3																
4	3		6 50/3		0.9				0.0 0.0				SAA, gray rock fragment at tip of split spoon.			
5													Bedrock at 4.8 ft. Drilled socket to 8.0 ft., installed casing and began coring at 8.0 ft.			
6																
7																
8	1				8 7	87.5	62.5		0.0 0.0				Laminated to medium bedded, fine to medium grained, light to medium gray fossiliferous LIMESTONE. (Moderately to highly weathered core, horizontal fractures, iron staining, chert nodules, moderately hard.)			
9																
10	2				6 6 6 5 5	100	80						Moderately to highly weathered core, horizontal fractures, silt in openings, iron staining, horizontal and vertical microcrystalline stringers.			Corehole diameter 2.965-inches.
11																
12																
13																
14																

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

SAA – Same as Above.

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. MW-5 Well No. MW-5

Project: M. Wallace & Son, Inc.

Location: Cobleskill, NY

Depth (Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in	N	Recovery (Ft.) Average Rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm)	Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Mec. Test	Well Column	Well Materials
15	3				6 5 5 5	100	91.6		0.0				Moderately to highly weathered core, horizontal and vertical fractures, silt in openings, iron staining, chert nodules.			
16																
17																
18																
19																
20	4				7 6 6 6 6	100	97.5		0.0				Highly weathered core, individual rock fragments, crumbly, horizontal fractures, silt in openings, chert nodules.			
21																
22																
23																
24								WZ								

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

Boring No. **MW-5** Well No. **MW-5**

Project: M. Wallace & Son, Inc.

Location: Cobleskill, NY

in (Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft.) Average Rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm)	Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
25	5				6 7 6 5 5	98	84	wz /hf/m	24.8				Highly weathered core, horizontal fractures, silt in openings, chert nodules. Loss of drilling water at 25.7 ft.			
26																
27																
28																
29																
30	6				7 6 6 7 7	100	95		0.0				Moderately weathered core, horizontal fractures, silt in openings, slight iron staining.			
31								hf/m								
32								wz/hf/m/is								
33													One solid core piece 33.0' – 35.0'.			
34																

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. **MW-5** Well No. **MW-5**

Project: M. Wallace & Son, Inc.

Location: Cobleskill, NY

Depth (ft)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (ft) Average Rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm)	Field/Headspace	Drilling Water Level	Geology Log	Stratigraphic Description	Misc. Test	Well Column	Well Materials
35													Bottom of corehole at 35.0 ft.			Open bedrock corehole.
36																
37																
38																
39																
40																
41																
42																
43																
44																

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. MW-8 Well No. MW-8
Project: M. Wallace & Son, Inc.
Location: Cobleskill, NY

Date Start/Finish: 5/18/93 – 5/25/93
Drilling Company: Parratt-Wolff, Inc.
Driller's Name: Glen Lansing
Rig Type: ATV
Spoon Size: 2-inch
Hammer Weight: 140
Height of Fall: 30-inches
Drilling Method: Auger/Coring
Bit Size: NX Core Auger Size :

Northing: 9714.34
Easting: 5166.25
Well Casing Elev.: 967.47 ft.
Corehole Depth: 50.0 ft.
Borehole Depth: 50.0 ft.
Ground Surface Elev.: 966.2 ft.

Location Sketch:

Scale:

Depth (Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft.) Average rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm) Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
0 1	1		2 1 2 3	3	0.5				0.0 0.0			Very dark grayish brown Sandy SILT, damp, nonplastic, organic material.			4-inch diameter steel casing set to 32.8 ft. stickup to 1.27 ft. above ground surface.
2 3	2		4 3 3 5	6	1.6				0.0 0.0			SAA, Clayey, Gravelly			
 5	3		2 4 3 2	7	1.5				0.0 0.0			Very dark grayish brown SILT, Clayey, Sandy, Gravelly, damp, nonplastic.			
6 7	4		4 4 4 5	8	1.6				0.0 0.0						
8 9	5		5 4 4 4	8	2.0				0.0 0.1			Dark brown grayish Clayey SILT, Gravelly, damp, nonplastic.			
10 11	6		3 3 11 4	14	1.5				0.0 0.0						
12 13	7		4 3 5 7	8	0.9				0.0 0.0						
14 15	8		1 2 3 4	5	1.9				0.0 0.0			SAA, grades to a very dark grayish brown at tip of spoon.			
16	9		2 3 3	6	1.6				0.0 0.0			Very dark grayish brown Silty CLAY, Sandy, damp to moist,			

Geologist Initials: HEH
Geologist Signature:
Project No.: 364.17

Remarks:

SAA – Same as Above.

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. **MW-8** Well No. **MW-8**

Project: M. Wallace & Son, Inc.

Location: Cobleskill, NY

Depth (Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft.) Average Rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm) Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Details	Well Materials
17			4									plastic.			
18	10		3 5 7 6	12	2.0				0.0 0.0			SAA, orange mottling			
19															
20	11		1 2 3 4	5	1.6				0.0 0.1			grades to a dark gray CLAY, Silty, Sandy, damp, plastic, no mottling.			
21															
22	12		4 5 5 5	10	1.8				0.0 0.0			SAA, Gravelly			
23															
24	13		6 6 6 8	12	1.8				0.0 0.0			yellow mottling			
25															
26	14		4 4 5 5	9	1.9				0.0 0.0			Very dark grayish brown Clayey SILT, Sandy, Gravelly, moist, organic material (roots), nonplastic.			

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. MW-8 Well No. MW-8

Project: M. Wallace & Son, Inc.

Location: Cobleskill, NY

Depth (ft)	Sample/Run Number	Sample/Int/Type	Blows/6 in	N	Recovery (ft) Average Rate (min/ft)	Recovery (%)	RQD (%)	Fracture Depth	HNU/OVA (ppm) Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
27															
28	15		4 3 3 5	6	2.0				0.0 0.0						
29															
30	16		4 50/1		0.2				0.0 0.0			Dark gray GRAVEL, Silty, Clayey, wet.			
												Bedrock at 30.6 ft. Drilled socket to 32.6 ft., installed casing and began coring at 32.6 ft.			
31															
32															
32.6	1				4 5	100	39.6		0.0			Laminated to medium bedded, fine to medium grained, light to medium gray fossiliferous LIMESTONE. (Moderately hard, slightly to highly weathered core, horizontal and vertical fractures, discoloration, iron staining, individual rock fragments, crumbly.)			
33															
34															Corehole diameter 2.965-inches.
35	2				3 3 4 3 4	100	94.1		0.4			Slightly to moderately weathered core, horizontal fractures.			
36															

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels		
Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. **MW-8** Well No. **MW-8**

Project: M. Wallace & Son, Inc.
Location: Cobleskill, NY

(Ft)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft) Average Rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm)	Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
37																
38																
39																
								is								
40	3				3 3 3 3 3	100	916		14				Highly weathered core, many horizontal microcrystalline stringers filled with a dark gray mineral, horizontal fractures, iron staining, discoloration, silt in openings.			
41																
42																
43																
44																
								hf/is								
45	4				2 3 3 3 3	100	716	w/hf					Highly weathered core, horizontal fractures, iron staining, discoloration.			
46																

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. MW-6 **Well No. MW-6**

Project: M. Wallace & Son, Inc.
Location: Cobleskill, NY

Depth (ft)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft)	Average Rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm)	Field/Headspace	Drilling Water Level	Geology Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
47														Loss of drilling water at 47.8 ft.			
48																	
49									wz/hf/m								
50														Bottom of corehole at 50.0 ft.			Open bedrock corehole.
51																	
52																	
53																	
54																	
55																	
56																	

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels		
Date	**Time**	**Elevation**

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. MW-7 **Well No. MW-7**

Project: M. Wallace & Son, Inc.
Location: Cobleskill, NY

Date Start/Finish: 5/17/83 – 5/19/83
Drilling Company: Parratt-Wolff, Inc.
Driller's Name: Glen Landing
Rig Type: ATV
Spoon Size: 2-inch
Hammer Weight: 140
Height of Fall: 30-inches
Drilling Method: Auger/Coring
Bit Size: NX Core **Auger Size:**

Northing: [illegible]
Easting: 60323.22
Well Casing Elev.: 999.17 ft.
Corehole Depth: 45.5 ft.
Borehole Depth: 45.5 ft.
Ground Surface Elev.: 997.6 ft.

Location Sketch:

Scale:

Depth (Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft.) Average rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm)	Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
																4-inch diameter steel casing set to 6.5 ft. stickup to 1.57 ft. above ground surface.
0	1		3 4 7 4	11	1.0				2.7 44.0				Very dark brown Sandy SILT, Clayey, damp, nonplastic.			
2	2		7 4 6 50/1	10	1.4				1.4 13.0				Dark brown SILT, Clayey, damp to moist, nonplastic.			
4													Bedrock at 4.0 ft. Drilled socket to 6.5 ft., installed casing and began coring at 6.5 ft.			
6.5	1				5 5 5 4	100	33		0.0				Laminated to medium bedded, fine to medium grained, light to medium gray fossiliferous LIMESTONE. (Moderately hard, slightly to highly weathered core, horizontal and vertical fractures, silt in openings, dark and light gray chert nodules, horizontal and vertical microcrystalline stringers filled with dark and light gray mineral, megafossils.)			
10.5	2				7 8 8 6 7	100	33		0.0				Moderately weathered core, chert nodules, horizonal and vertical fractures.			Corehole diameter 2.965-inches.

Geologist Initials: HEH
Geologist Signature:
Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. MW-7 **Well No. MW-7**

Project: M. Wallace & Son, Inc.

Location: Cobleskill, N.Y.

Depth (Ft)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft) Average Rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm)	Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
15.5	3				7 9 8 7 7	100	46.6	wz	0.0				Highly weathered core, horizonal fractures, silt in openings, vertical fractures, megafossils, chert nodules.			
20.5	4				6 7 8 8 7	100	91.6		0.0				Slightly to moderately weathered core, horizonal and vertical fractures, slight iron staining, horizontal microcrystalline stringers.			

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. MW-7 Well No. MW-7

Project: M. Wallace & Son, Inc.

Location: Cobleskill, NY

Depth (Ft)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft) Avg. Rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm)	Field/Headspace Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
25															
25.5	5				8 7 7 9 5	100	96.6	7f	0.0			Slightly weathered core, horizontal fractures, slight iron staining, horizontal microcrystalline stringers.			
26															
27															
28															
29															
30															
30.5	6				7 7 7 8 7	100	96.6		0.0			Slightly weathered core, horizontal fractures, silt in openings, megafossils, horizontal microcrystalline stringers filled with white material.			
31															
32															
33															
34															

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

Boring No. **MW-7** Well No. **MW-7**

Project: M. Wallace & Son, Inc.

Location: Cobleskill, NY

Depth (Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft)	Average Rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm)	Field/Headspace	Drilling/Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
35																	
35.5	7					7 5 6 7 8	100	99.1		0.0				Slightly weathered core, few horizonal and vertical fractures, slight iron staining, horizontal and vertical microcrystalline stringers.			
36																	
37																	
38																	
39																	
40																	
40.5	8					6	100	90.8		0.0				Slightly weathered core, few horizonal fractures.			
41																	
42																	
43																	
44																	

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. MW-7 **Well No. MW-7**

Project: M. Wallace & Son, Inc.

Location: Cobleskill, NY

h (ft)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft)	Average Rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm)	Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
45																	
														Bottom of corehole at 45.5 ft.			Open bedrock corehole.
46																	
47																	
48																	
49																	
50																	
51																	
52																	
53																	
54																	

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. C-3 Well No. MW-8

Project: M. Wallace & Son, Inc.

Location: Cobleskill, NY

Date Start/Finish: 5/26/93 - 5/27/93
Drilling Company: Parratt-Wolff, Inc.
riller's Name: Glen Lansing
g Type: ATV
Spoon Size: 2-inch
Hammer Weight: 140
Height of Fall: 30-inches
Drilling Method: Auger/Coring
Bit Size: NX Core **Auger Size:**

Northing: 9342.31
Easting: 50347.31
Well Casing Elev.: 972.27 ft.
Corehole Depth: 45.1 ft.
Borehole Depth: 45.1 ft.
Ground Surface Elev.: 971.6 ft.

Location Sketch:

Scale:

Depth (Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft.) Average rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm)	Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
0													Very dark grayish brown Silty SAND, Gravelly, damp, nonplastic.			4-inch diameter steel casing set to 1.5 ft. stickup to 0.67 ft. above ground surface.
1													Bedrock at 0.5 ft. Drilled socket to 1.5 ft., installed casing to 1.5 ft. and began coring at 1.5 ft.			
1.5	1				5 5 5 5	100	51.1		0.0				Laminated to medium bedded, fine to medium grained, light to medium gray fossiliferous LIMESTONE. (Moderately hard, slightly to highly weathered, silt within fractures, iron staining.)			
								hf hf hf								
3								hf								
4																
5 5.1	2				5 4 5 5 5	100	63.3	vf/m/is	0.0				Highly weathered core.			Corehole diameter 2.965-inches.
6								wz/hf/is					Individual rock fragments in opening, discoloration.			
7								hf wz/hf/wf/is								
8																
9								ht/m					Horizontal fracture, clay and gravel with organic material in opening			

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. C-3 Well No. MW-8

Project: M. Wallace & Son, Inc.

Location: Cobleskill, N.Y.

Depth (Ft.)	Sample/Run Number	Sample/Int/Type	Blows/Run	N	Recovery (Ft.) Average Rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm)	Lost Fluid/Loss	Drilling Water Level	Geology Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
10													Highly weathered core.			
10.1	3				5 5.5 5 4 4	98	83.0	wz/hf	2.5							
11								vf/fr								
12								hf					Rock weathering along bedding planes breaking into thin sections.			
13								vf								
14																
15																
15.1	4				4 4 5 4 4	100	87.5		0.0				Moderately weathered core.			
16								hf/m								
17								Vf/is Hf								
18													Horizontal microcrystalline stringers.			
19								vf/is					Vertical microcrystalline stringers.			

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. C-3 **Well No. MW-8**

Project: M. Wallace & Son, Inc.
Location: Cobleskill, NY

Depth (Ft)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft) Average Rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm) Field/Headspace	Drilling Water Level	Geologic Log	Stratigraphic Description	Misc. Test	Well Column	Well Materials
20 20.1	5				3 5 5 4 5	100	76.6	hf	0.0			Highly weathered core.			
21								wz /hf hf				Horizontal fracture with individual rock fragments in opening.			
22								hf							
23								hf /Hf /vf/is							
24								hf wz /hf				Weathered zone with individual rock fragments.			
25 25.1	6				5 5 6 5 5	100	83.3	hf	0.0			Highly weathered core, horizontal microcrystalline stringers.			
26															
27								hf hf/vf							
28												Gravel and sandy silt in openings, discoloration.			
29								wz /hf/vf/is							

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels		
Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. C-3 Well No. MW-8

Project: M. Wallace & Son, Inc.

Location: Cobleskill, NY

Depth (ft)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (ft) Average rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm)	Field/Headspace Drilling Water Level	Geologic Col	Stratigraphic Description	Misc. Test	Well Column	Well Materials
30															
30.1	7				5 5	100	28.9	wz /hf/is/m	0.0			Highly weathered core, core barrel blocked due to vertical fracture.			
												Vertical microcrystalline stringers.			
31															
32															
32.4	8				5 5	100	44.6	wz /hf/is/m	0.0						
33															
34								wz /hf/vf/m							
35															
35.1	9				5 5 6 6 7	100	87.5	hf/is/m	0.0			Moderately weathered core.			
36															
37															
38								is							
39												Loss of drilling water at 39.7 – 39.8 ft.			

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. C-3 Well No. MW-8

Project: M. Wallace & Son, Inc.
Location: Cobleskill, N

Depth (Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft)/Average Rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm) Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
40 40.1	10				6 6 5 7 7	100	99.2	Hf	1.0 25.0			Slightly weathered, little iron staining, no discoloration or silt in openings, few horizontal fractures, or sheen on rock core.			
41								Hf							
42								Hf							
								Hf							
43								Hf							
44								Hf							
45												Bottom of corehole at 45.1 ft.			Open bedrock corehole.
46															
47												Note: Oil sheen on core barrel when pulled out of corehole.			
48															
49															

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

Boring No. MW-9 Well No. MW-9

Project: M. Wallace & Son, Inc.

Location: Cobleskill, NY

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

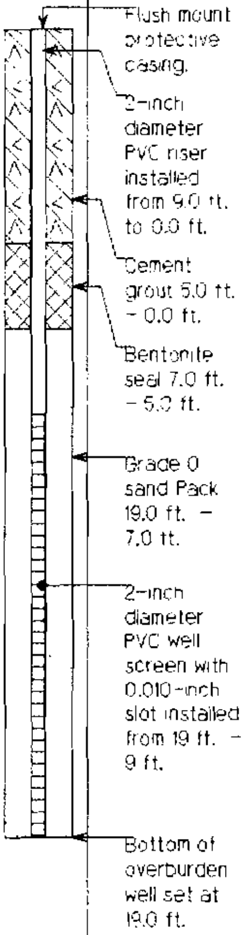
Date Start/Finish: 5/25/93 - 5/25/93
Drilling Company: Parratt-Wolff, Inc.
iller's Name: Glen Lansing
g Type: ATV
Spoon Size: 2-inch
Hammer Weight: 140
Height of Fall: 30-inches
Drilling Method: Auger/Coring
Bit Size: NX Core **Auger Size:**

Northing: 945309
Easting: 50333.92
Well Casing Elev.: 954.3 ft.
Corehole Depth: 19.0 ft.
Borehole Depth: 19.0 ft.
Ground Surface Elev.: 954.3 ft.

Location Sketch:

Scale:

Depth (Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft.) Average rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm)	Field/Headspace	Drilling Water Level	Geology Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
0													See subsurface log for corehole C-1 for stratigraphic description.			
1																
2																
3																
4																
7																
8																
9																
10																
11																
12																
13																
14																
15																
16																
17																
18																
19													Bottom of boring at 19.0 ft.			
20																
21																
22																
23																
24																



Geologist Initials: HEH
Geologist Signature:
Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. **MW-10** Well No. **MW-10**

Project: M. Wallace & Son, Inc.

Location: Cobleskill, NY

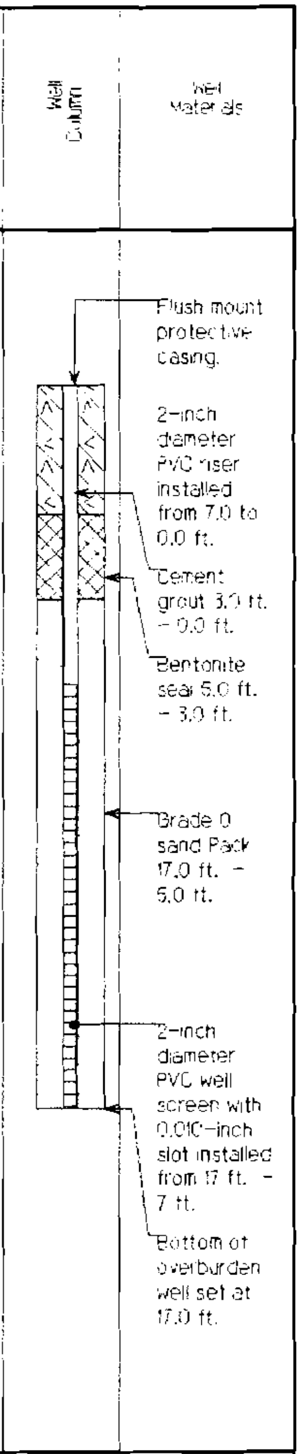
Date Start/Finish: 5/25/93 – 5/25/93
Drilling Company: Parratt-Wolff, Inc.
Driller's Name: Glen Lansing
Rig Type: ATV
Spoon Size: 2-inch
Hammer Weight: 140
Height of Fall: 30-inches
Drilling Method: Auger/Coring
Bit Size: NX Core **Auger Size:**

Northing: 9459.09
Easting: 50339.63
Well Casing Elev.: 956.61 ft.
Corehole Depth: 17.0 ft.
Borehole Depth: 17.0 ft.
Ground Surface Elev.: 956.61 ft.

Location Sketch:

Scale:

Depth (Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft.) Average Rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm)	Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Mod. Test
0													See subsurface log for corehole C-2 for stratigraphic description.	
1														
2														
3														
4														
7														
8														
9														
10														
11														
12														
13														
14														
15														
16														
17													Bottom of boring at 17.0 ft.	
18														
19														
20														
21														
22														
23														
24														



Geologist Initials: HEH
Geologist Signature:
Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. MW-11 Well No. MW-11

Project: M. Wallace & Son, Inc.
Location: Cobleskill, NY

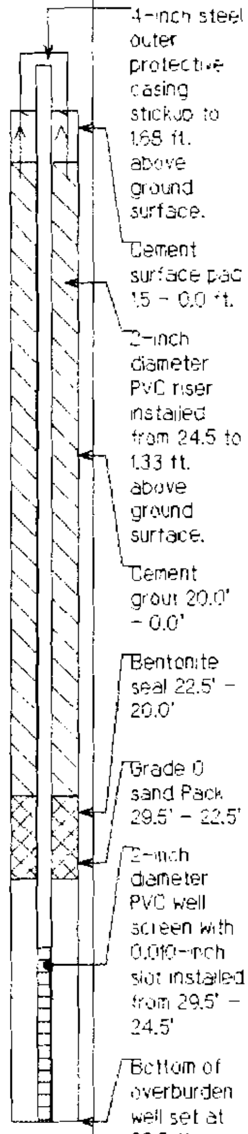
Date Start/Finish: 5/28/93 – 5/28/93
Drilling Company: Parratt-Wolff, Inc.
Driller's Name: Glen Lansing
Rig Type: ATV
Spoon Size: 2-inch
Hammer Weight: 140
Height of Fall: 30-inches
Drilling Method: Auger/Coring
Bit Size: NX Core Auger Size:

Northing: 3638.09
Easting: 5096.83
Well Casing Elev.: 366.63 ft.
Corehole Depth: 29.5 ft.
Borehole Depth: 29.5 ft.
Ground Surface Elev.: 365.0 ft.

Location Sketch:

Scale:

Depth (Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in	N	Recovery (Ft.) Average rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm)	Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
0 – 30													See subsurface log for monitoring well MW-6 for stratigraphic description. Bottom of boring at 29.5 ft.			



4-inch steel outer protective casing stickup to 1.65 ft. above ground surface.

Cement surface pad 1.5 – 0.0 ft.

2-inch diameter PVC riser installed from 24.5 to 1.33 ft. above ground surface.

Cement grout 20.0' – 0.0'

Bentonite seal 22.5' – 20.0'

Grade 0 sand Pack 29.5' – 22.5'

2-inch diameter PVC well screen with 0.010-inch slot installed from 29.5' – 24.5'

Bottom of overburden well set at 29.5 ft.

Geologist Initials: HEH
Geologist Signature:
Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. C-1 **Well No.**

Project: M. Wallace & Son, Inc.
Location: Cobleskill, NY

Date Start/Finish: 5/24/93 – 5/25/93
Drilling Company: Parratt-Wolff, Inc.
Driller's Name: Glen Lansing
Rig Type: ATV
Spoon Size: 2-inch
Hammer Weight: 140
Height of Fall: 30-inches
Drilling Method: Auger/Coring
Bit Size: NX CORE **Auger Size:**

Northing: 3479.74
Easting: 5036.124
Well Casing Elev.: ft.
Corehole Depth: 28.1 ft.
Borehole Depth: 29.1 ft.
Ground Surface Elev.: 954.3 ft.

Location Sketch:

Scale:

Depth (Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft) Average rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm)	Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
0 1	1		7 6 5 4	11	0.8				0.2 67.8				Fill- Black Silty SAND, gravelly, dry.			
2	2		4 2 2 3	4	0.8				0.0 86.6				Very dark grayish brown Sandy SILT, Clayey, gravelly, damp, nonplastic.			
4 5	3		2 5 5 6	10	2.0				0.1 52.1				Very dark grayish brown Clayey SILT, Sandy, damp to moist, nonplastic.			
6 7	4		5 6 7 5	13	0.7				0.0 45.5				SAA, gravelly, wet at tip of spoon.			
8 9	5		2 11 46 18	57	0.5				0.0 69.5				SAA, dark gray subangular rock fragments at tip of spoon, wet.			
10 11	6		3 5 7 12	12	1.5				0.0 86.0				Dark brown Silty CLAY, Gravelly, wet, plastic, orange mottling.			
12 13	7		38 14 15 18	29	0.5				0.0 113				SAA, dark gray subangular rock fragments at tip of spoon.			
14	8		2 3 8	11	0.6				0.0 12.9				Dark gray Silty SAND, Gravelly, wet, gravel is rounded to			

Geologist Initials: HEH
Geologist Signature:
Project No.: 364.17

Remarks:

SAA – Same as above.
The corehole and overburden were grouted to the surface.

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. C-1 Well No.

Project: M. Wallace & Son, Inc.

Location: Cobleskill, NY

Depth (ft)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft) Avg. Penetration Rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm)	Field/Lab Results	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
15			4										subangular.			
16	9		4 50/3		0.4				0.0 58.5				SAA, dark gray subangular to angular rock fragments at tip of split spoon.			
17													Bedrock at 16.8 ft. Drilled socket to 18.0 ft., installed temporary PVC casing and began coring at 18.0 ft.			
18	1				5 5 3 4 7	64.1	46.6	wz vf/is	2.0				Laminated to medium bedded, fine to medium grained, light to medium gray fossiliferous LIMESTONE. (Moderately hard, moderately to highly weathered, horizontal and vertical fractures, discoloration, iron staining, clay and silt within fractures.)			
19								wz/hf/is wz/is/hf/m								
20													Highly weathered, discoloration, iron staining, gray silt and clay and crumbled rock fragments within fracture.			
21																
22																
23	2				6 7 7 5	100	82		0.0							
24								wz hf								

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels		
Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. C-1 Well No.

Project: M. Wallace & Son, Inc.

Location: Cobleskill, NY

Depth (ft)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (ft)	Average Rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm)	Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
25																	
26									wz Fr/s								
27																	
27.3	3				6		100	0		0.0				Horizontal microcystalline stringers.			
28														Bottom of corehole at 28.1 ft.			
29																	
30																	
31																	
32																	
33																	
34																	

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels		
Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. C-2 Well No.

Project: M. Wallace & Son, Inc.

Location: Cobleskill, NY

Date Start/Finish: 5/21/93 - 5/21/93
Drilling Company: Parratt-Wolff, Inc.
Driller's Name: Glen Lansing
Rig Type: ATV
Spoon Size: 2-inch
Hammer Weight: 140
Height of Fall: 30-inches
Drilling Method: Auger/Coring
Bit Size: Nx Core **Auger Size:**

Northing: 9520.52
Easting: 5056150
Well Casing Elev.: ft.
Corehole Depth: 28.5 ft.
Borehole Depth: 29.5 ft.
Ground Surface Elev.: 957.4 ft.

Location Sketch:

Scale:

Depth (Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft.) Average rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm) Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
0 1	1		5 6 5 6	11	1.7				3.4 2.4			Very dark brown Sandy SILT, Gravelly, Clayey, dry, nonplastic.			
2 3	2		3 3 3 3	6	0.6				5.3 0.0						
4 5	3		2 4 10 9	14	1.3				12.0 1.6			SAA, damp, yellow/orange mottling			
6 7	4		5 5 3 3	8	1.2				14.0 5.0			Very dark brown Clayey SILT, Sandy, Gravelly, moist, nonplastic.			
8 9	5		8 5 8 9	13	1.5				2.7 7.0						
10 11	6		8 12 13 18	25	1.5				3.5 2.0			Dark brown Gravelly SILT, Sandy, Clayey, angular rock fragments, moist, nonplastic.			
12 13	7		21 18 30 34	48	1.1				3.5 6.7			Dark brown Silty SAND, Gravelly, damp, gravel is angular.			
14 15	8		13 19 85/3		1.0				1.0 3.3			Gray angular GRAVEL, Sandy, Silty, wet to saturated.			

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

SAA - Same as above.
The corehole and overburden were grouted to the surface.

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. C-2 Well No.

Project: M. Wallace & Son, Inc.
Location: Cobleskill, N.Y.

Depth (Ft)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft)	Average Rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm)	Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Mat'l Test	Well Column	Well Materials
15														Bedrock at 15.2 ft. Drilled socket to 16.5 ft. and drilling rods dropped approximantly 1 foot. Drilled to 18.5 ft. Installed temporary PVC casing to 18.5 ft.			
16																	
17																	
18																	
18.5	1					9	100	66.6	w/nf/m	2.6				Laminated to medium bedded, fine to medium grained, light to medium gray fossiliferous LIMESTONE, moderately hard, dark gray chert nodules, megafossils.			
19																	
.5	2					8 9 7 8	100	85.4	w/ht/m	14.3				Horizontal microcrystalline stringers along bedding planes, some filled with dark gray mineral.			
20																	
21																	
22																	
23																	
23.5	3					7 7 6 7 6	100	95		0.0				Light gray chert nodules.			
24																	

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. C-2 Well No.

Project: M. Wallace & Son, Inc.

Location: Cobleskill, NY

Depth (Ft)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft.)	Av. Core Rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm)	Field/Lab Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
25																	
26																	
27																	
28									wz hf/is					Horizontal fracture, discoloration, iron staining, many horizonal microcystalline stringers some filled with dark gray mineral. Megafossil. Bottom of boring at 28.5 ft.			
29																	
30																	
31																	
32																	
33																	
34																	

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. C-4 Well No. C-4

Project: M. Wallace & Son, Inc.

Location: Cobleskill, NY

Date Start/Finish: 5/28/93 - 6/1/93
Drilling Company: Parratt-Wolff, Inc.
ller's Name: Glen Lansing
g Type: ATV
Spoon Size:
Hammer Weight:
Height of Fall: -inches
Drilling Method: Auger/Coring
Bit Size: NX Core **Auger Size:**

Northing: 364122
Easting: 50403.36
Well Casing Elev.: 972.43 ft.
Corehole Depth: 45.1 ft.
Borehole Depth: 45.1 ft.
Ground Surface Elev.: 971.4 ft.

Location Sketch:

Scale:

Depth (Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft.) Average rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm)	Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
0													Bedrock at ground surface, drilled socket to 2.0 ft., installed casing to 2.0 ft. and began coring at 2.0 ft.			4-inch diameter steel casing set to 2.0 ft. stickup to 1.03 ft. above ground surface.
1																
	1				8 8 8	90	87.7	hf	3.4				Laminated to medium bedded, fine to medium grained, light to medium gray fossiliferous LIMESTONE, moderately hard, horizontal microcrystalline stringers, moderately to highly weathered, megafossils.			
3								wz hf/m/is								corehole diameter 2.965-inches.
4								wz /hf/vf/is/m								
5	2				5 4 5 6 6	100	74.2	hf/is hf/vf/m	0.0				Highly weathered core.			
6								hf hf/m								
7								hf					Horizontal microcrystalline stringers.			
8								hf					Horizontal microcrystalline stringers.			
9								wz/hf/vf/m hf/is vf/is/m								

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. C-4 Well No. C-4

Project: M. Wallace & Son, Inc.
Location: Cobleskill, NY

Depth (Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft.) Average Rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm) Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
10															
10.0	3				5,5,3,5,8	100	99.2		2.0			Moderately weathered core.			
								hf/is							
11															
								hf/m							
12								hf/m							
								hf/m							
13															
								hf/m							
14															
15	4				5 4 4 5 4	100	85		2.1						
								hf/m/is hf/m/is							
16															
								hf hf							
17								hf							
								hf/m				From 17.5 to 18.8 ft., vertical microcrystalline stringers, iron staining in openings.			
18															
								hf							
19															
								hf/m/is							

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

Boring No. C-4 Well No. C-4

Project: M. Wallace & Son, Inc.
Location: Cobleskill, NY

Depth (ft)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (ft)/Average Rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm)	Field/Lab Test	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
20																
20.0	5				6 6 7 6 6	100	88.3		0.0							
								hf/vf hf								
21								hf					Slight discoloration.			
								hf/vf hf								
22																
								hf/vf hf								
23																
								hf/vf/is hf					Slight discoloration.			
24													From 24 to 24.5 ft., pyrite cryatals, spiral fossil-edge of shell.			
								hf					Many horizontal microcrystalline stringers. Slight discoloration at bottom of corerun.			
25	6				7 7 7 8 8	100	82.5	hf	0.1							
26																
								hf								
27								ht/m hf								
28								hf hf					Horizontal microcrystalline stringers.			
29								hf								

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. C-4 Well No. C-4

Project: M. Wallace & Son, Inc.
Location: Cobleskill, NY

Depth (Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft.) Average Rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm)	Field/Headspace	During Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
30 30.0	7				6 6 6 6 5	100	98.3		1.1				Slightly weathered core.			
31																
32								hf/vf hf								
33								hf/m hf/m hf/m								
34								hf					Horizontal microcrystalline stringers.			
35	8				6 7 7 6 2	98	95.8		0.8							
36								vf/hf/vs								
37								hf hf/m					From 37 to 40 ft., many horizontal microcrystalline stringers.			
38								hf/m hf/m								
39								hf/m hf/m								

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. C-4 Well No. C-4

Project: [illegible] & Son, Inc.

Location: Cobleskill, NY

Depth (Ft)	Sample/Run Number	Sample/Int/Type	Blows/6in.	N	Recovery (Ft) / Average Rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm)	Field Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
40																
40.5	9				[illegible]	100	95.8		2.5				dark gray chert nodules.			
								hf								
41								hf/m					Megafossils.			
42								hf/m								
43																
44																
45								hf/m					Bottom of corehole at 45.1 feet.			Open bedrock corehole.
46																
47																
48																
49																

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. C-5 **Well No.** C-5
Project: M. Wallace & Son, Inc.
Location: Cobleskill, NY

Date Start/Finish: 5/26/93 – 5/26/93
Drilling Company: Parratt-Wolff, Inc.
Driller's Name: Glen Lansing
Rig Type: ATV
Spoon Size:
Hammer Weight:
Height of Fall: -inches
Drilling Method: Auger/Coring
Bit Size: NX Core **Auger Size:**

Northing: 9972.79
Easting: 50490.94
Well Casing Elev.: 976.55 ft.
Corehole Depth: 39.5 ft.
Borehole Depth: 39.5 ft.
Ground Surface Elev.: 975.6 ft.

Location Sketch:

Scale:

Depth (Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft.) Average rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm) Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
0												Bedrock at ground surface, Drilled socket to 1.5 ft., installed casing to 1.5 ft., and began coring at 1.5 ft.			4-inch diameter steel casing set to 1.5 ft. stickup to 0.95 ft. above ground surface.
1															
1.5	1				5 4 5	100	51.4	hf/is/m	1.0			Laminated to medium bedded, fine to medium grained, light to medium gray fossiliferous LIMESTONE. (Moderately hard, slightly to highly weathered core, dark gray chert nodules, megafossils.)			
3															
4															
4.5	2				4 4 5 5 5	100	82.5		1.3			Highly weathered core, horizontal and vertical microcrystalline stringers, iron staining, silt in openings.			
5															Corehole diameter 2.965-inches.
6															
7								wz /hf/is/m							
8															
9												Slightly weathered core, horizontal fractures, silt within fractures, megafossils.			
9.5	3				5 5	100	80		3.7						

Geologist Initials: HEH
Geologist Signature:
Project No.: 364.17

Remarks:

Water Levels		
Date	**Time**	**Elevation**

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. C-5 Well No. C-5

Project: M. Wallace & Son, Inc.

Location: Cobleskill, NY

Depth (Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft.) Average rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm) Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
10					5 5 4										
11															
12															
13															
14															
14.5	4				5 5 5 4 5	100	98.3		4.0						
15															
								hf				Megafossil, dark gray chert nodules.			
16															
17															
18															
								wz /hf/m							
19															
19.5	5				5 5 4 4	96	87		0.7						

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. C-5 Well No. C-5

Project: M. Wallace & Son, Inc.
Location: Cobleskill, NY

(Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft.) Average rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm) Field/Headspace	During Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
20					4										
21															
22															
23															
24															
.5	6				4 5 5 5 5	100	95		0.0						
25															
								hf/m							
26								vf							
								hf/m							
27								wz				Highly weathered zone, rock fragments.			
28															
29															
29.5	7				5 5 5	100	90	wz/m	3.0			Highly weathered core.			

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. C-5 Well No. C-5

Project: M. Wallace & Son, Inc.

Location: Cobleskill, NY

(Ft)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft) Average rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm) Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc Test	Well Column	Well Materials
30					5 5			wz /hf/m /vf							
31															
32															
33															
34															
4.5	8				5 4 4 4 4	100	94		3.0			Horizontal microcrystalline stringers.			
35								hf vf hf							
36								hf							
37															
38								hf hf							
39												Bottom of corehole at 39.5 feet.			Open bedrock corehole.

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. C-8 Well No. C-8

Project: M. Wallace & Son, Inc.
Location: Cobleskill, NY

Date Start/Finish: 6/3/83 - 6/4/83
Drilling Company: Parratt-Wolff, Inc.
ller's Name: Glen Lansing
g Type: ATV
Spoon Size: 2-inch
Hammer Weight: 140
Height of Fall: 30-inches
Drilling Method: Auger/Coring
Bit Size: NX Core Auger Size :

Northing: 3352.90
Easting: 50303.53
Well Casing Elev.: 979.22 ft.
Corehole Depth: 50.5 ft.
Borehole Depth: 50.5 ft.
Ground Surface Elev.: 977.7 ft

Location Sketch:

Scale:

Depth (Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft) Average rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm) Field/Headspace	Drilling Water Level	Geologic Col	Stratigraphic Description	Misc. Test	Well Column	Well Materials
															4-inch diameter steel casing set to 7.5 ft. stickup to 1.52 ft. above ground surface.
0	1		16 11 9 6	20	0.6				70.1 20.3			Dark grayish brown Sandy SILT, Gravelly, damp, nonplastic.			
1															
	2		5 5 6 8	11	1.5				9.0 2.1			Dark grayish brown SILT, Sandy, Clayey, moist, nonplastic.			
3															
4	3		7 3 3 27	6	1.2				0.0 1.7			SAA, Gravelly, wet.			
5															
6	4		50/1		0.6				0.0 3.0			Gray Silty SAND, Gravelly, damp. Bedrock at 6.1 ft., Drilled socket to 7.5 ft., installed casing to 7.5 ft., and began coring at 7.5 ft.			
7															
7.5	1				6 7 7	90	45.8	hf/m/is	0.0			Laminated to medium bedded, fine to medium grained, light to medium gray fossiliferous LIMESTONE. (Moderately hard, slightly to highly weathered, horizontal and vertical fractures, iron staining, discoloration, horizontal and vertical microcrystalline stringers, silt in openings, calcite vein, dark gray chert nodules, rhombs,			
8															Corehole diameter 2.965-inches.
9								vf							

Geologist Initials: HEH
Geologist Signature:
Project No.: 364.17

Remarks:

SAA - Same as above.

Water Levels		
Date	**Time**	**Elevation**

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. C-8 Well No. C-8
Project: M. Wallace & Son, Inc.
Location: Cobleskill, NY

(Ft)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft) Average rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm) Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
10												megafossils.)			
10.5	2				6 7 6 6 6	100	71.7		20.0			Highly weathered core, rhombs, dark gray chert nodules.			
11								hf/m hf/m hf/m				Vertical microcrystalline stringers, discolored.			
								hf							
12								hf hf				Megafossil.			
								wz/m hf							
13								hf hf							
14								hf							
15															
15.5	3				6 6 8 7 7	100	76.7	wz	0.0			Highly weathered core, dark gray chert nodules, horizontal and vertical microcrystalline stringers.			
16								hf/m/is							
17								wz /hf/is/m							
								hf/is hf/is hf/is							
18												Vertical microcrystalline stringers.			
								hf/is hf/is							
19															
								hf wz/is/m							

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. C-8 Well No. C-8

Project: M. Wallace & Son, Inc.

Location: Cobleskill, NY

(Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft.) Average Rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm)	Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
20								hf								
								hf/m					Horizontal microcrystalline stringers.			
20.5	4				8 6 5 6 8	100	96.8		0.0				Highly weathered core, calcite vein, dark and light gray chert nodules.			
21								hf/is								
													Horizontal and vertical microcrystalling stringers with iron staining.			
22								hf					Vertical fracture, calcite vein with brown silt and clay in opening.			
								hf/fs/m								
								hf/is/m								
23																
								hf/is/m								
								hf/is/m								
24													From 24.15 to 25.5 ft., horizontal and vertical microcrystalline stringers with iron staining.			
								hf/is								
25																
25.5	5				6 6 8	100	71.7		1.1				Highly weathered core, core barrel blocked, horizontal microcrystalline stringers.			
26								hf								
								hf/m/is								
27								hf					Megafossil.			
								hf/m								
28																
28.0	6				9 7 9	100	75.0		0.4				Moderately weathered core, horizontal fractures.			
29																

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels		
Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. C-8 Well No. C-8

Project: M. Wallace & Son, Inc.
Location: Cobleskill, NY

(Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft.) Average rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm) Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
30															
30.5	7				9 8 8 8 8	100	86.7		0.0			Moderately weathered core.			
31								hf hf							
								vf/is							
32								hf/is							
								hf							
33															
								hf wz/is							
34															
								hf							
35															
35.5	8				7 7 8 8 8	90	94.4		0.0			Slightly weathered core, dark gray chert nodules, horizontal microcrystalline stringers.			
36															
37															
38															
39															

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

Boring No. C-8 Well No. C-8

Project: M. Wallace & Son, Inc.

Location: Cobleskill, NY

(Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft.) Average Rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm)	Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
40																
40.5	9					100	93.3		0.0				Slightly weathered core, rhombs, horizontal microcrystalline stringers.			
41																
42																
43																
								hf								
								hf/m								
								hf								
44																
								hf								
45																
45.5	10				? ? ? ? ?	100	79.2	hf/m	0.0				Highly weathered core, horizontal microcrystalline stringers.			
46																
								hf/m								
								hf/m								
								hf/m								
47																
								hf/m								
								hf/m								
48																
													Horizontal microccrystalline stringers.			
								hf/m								
								hf/m								
49																
								hf/m								

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. C-8 Well No. C-8
Project: M. Wallace & Son, Inc.
Location: Cobleskill, NY

Depth (Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft.) Average Rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm)	Field/Headspace	Drilling Water Level	Geologic Unit	Stratigraphic Description	Misc. Test	Well Column	Well Materials
50													Bottom of corehole at 50.5 feet.			Open bedrock corehole.
51																
52																
53																
54																
55																
56																
57																
58																
59																

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. C-7 Well No. C-7

Project: M. Wallace & Son, Inc.

Location: Cobleskill, NY

Date Start/Finish: 7/12/93 - 7/23/93
Drilling Company: Parratt Wolff, Inc.
ller's Name: Bill Rice
g Type: CME-75
Spoon Size:
Hammer Weight:
Height of Fall: -inches
Drilling Method: Auger/Coring
Bit Size: NX Core **Auger Size:**

Northing: 993.96
Easting: 50307.35
Well Casing Elev.: 987.26 ft.
Corehole Depth: 50.5 ft.
Borehole Depth: 50.5 ft.
Ground Surface Elev.: 985.9 ft.

Location Sketch:

Scale:

Depth (Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft.) Average rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm)	Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
																4-inch diameter steel casing set to 9.5 ft. stickup to 1.36 ft. above ground surface.
0													Dark grayish brown SILT, Sandy, Clayey, moist, nonplastic.			
1																
3																
4																
5																
6																
7																
													Bedrock at 7.5 ft., Drilled socket to 9.5 ft., installed casing to 9.5 ft., and began coring.			
8																

Geologist Initials: HEH
Geologist Signature:
Project No.: 364.17

Remarks: No split spoon sampling, drilled over previous test pit.

Water Levels

Date	Time	Elevation

Boring No. C-7 Well No. C-7

Project: M. Wallace & Son, Inc.

Location: Cobleskill, NY

(Ft)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft) Average rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm)	Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
9																
9.5	1				5½	90	0		0.0				Laminated to medium bedded, fine to medium grained, light to medium gray fossiliferous LIMESTONE. (Moderately hard, slightly to highly weathered, horizontal and vertical fractures, iron staining, silt in openings, horizontal and vertical microcrystalline stringers, rhombs, discoloration, dark gray chert nodules, pyrite crystals, megafossils.)			
10								Hf Hf Hf Hf Hf								Corehole diameter 2.965-inches.
10.5	2				4 4 6 4 3	100	50.5									
11																
								Hf Hf Hf					Discoloration within horizontal fractures, rhombs.			
12								Hf/m/is					Horizontal microcrystalline stringers.			
								Hf Hf/m/is								
13																
								Hf/m/is Hf/m/is Hf					Discoloration.			
14								Hf Hf/m/is Hf/m/is Hf/m/is Hf/m					Rock fragments.			
15								Hf								
								Hf/m Hf/m					Rock fragments.			
15.5	3				4 4 5 5 5	100	65	Hf/m	0.0				Rock fragments, hoizontal microcrystalline stringers. Dark gray nodules.			
16								Hf/m								
17								Hf/m								
								Hf/vf/is/m								
18																
								Hf/m/is					Discoloration.			
								Hf/m					Discoloration.			

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. C-7 Well No. C-7
Project: M. Wallace & Son, Inc.
Location: Cobleskill, NY

(Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft.) Average rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm)	Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
19								Hf/m					Discoloration.			
								Hf								
								Hf/m/is					Rock fragments.			
								Hf/m/is								
20								Hf/m					Rock fragments.			
								Vf								
20.5	4				6 4 5 8 8	100	30		0.0				Highly weathered core, discoloration, dark gray chert nodules.			
								Hf/m								
								Hf/m								
21													Slight iron staining.			
								Hf/is					Horizontal microcrystalline stringers.			
								Hf								
								Hf								
								Hf					Slight iron staining.			
								Vf								
22								Hf/m/is								
								Hf/m								
								Hf					Vertical microcrystalline stringers.			
								Hf/is								
								Hf/is					Vertical microcrystalline stringers.			
								Hf								
23								Hf					Rock fragments.			
24								Hf								
								Vf								
25								Hf								
								Hf								
								Hf								
								Hf								
25.5	5				5 6 ? ? ?	100	63.3		0.0				Highly weathered core.			
								Hf/m					Slight iron staining.			
								Hf/m								
26								Hf/m					Slight iron staining.			
													Slight iron staining.			
													Rock fragments.			
								Wz/Hf								
								Hf								
27								Hf					Horizontal microcrystalline stringers.			
								Hf								
28								Hf								
								Vf								
								Hf								
								Hf								

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. C-7 Well No. C-7
Project: M. Wallace & Son, Inc.
Location: Cobleskill, NY

(Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft.) Average rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm)	Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
29																
								Hf								
								Hf/m								
													Rock fragments.			
30								Hf					Rock fragments.			
								Hf								
30.5	6					100	67.5		0.0				Dark gray chert nodules, very little silt in openings, very slight discoloration.			
31								Hf/m					Vertical microcrystalline stringers, pyrite.			
								Hf								
32								Hf								
													Megafossil.			
								Hf/is								
								Hf								
33								Hf								
								Hf/m					Horizontal microcrystalline stringers.			
								Hf								
								Hf/m					Vertical microcrystalline stringers. Pitted.			
34								Hf								
								Hf								
								Vf								
								Hf								
35								Hf								
								Hf								
35.5	7					100	93.3						Megafossils.			
													Dark gray chert nodules, rhombs.			
36																
								Hf								
								Vf								
								Hf								
37																
								Wz/Hf/m					Slight discoloration.			
								Hf					Rock fragments, slight iron staining.			
								Vf								
38								Hf								
													Horizontal microcrystalline stringers.			
								Hf								
								Hf/m								

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

Boring No. C-7 Well No. C-7

Project: M. Wallace & Son, Inc.

Location: Cobleskill, NY

(Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft.) Average rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	PID/OVA (ppm)	Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
39																
40																
40.5	8					100	94.2	is					Slightly weathered core.			
								Hf/is								
								Hf/is								
41																
								Hf								
42																
								Hf/m								
43								Hf								
								Hf								
44																
45								Hf								
45.5	9					100	99.2		0.0							
46																
								Hf					Horizontal microcrystalline stringers, rock fragments.			
47																
								Hf					Horizontal microcrystalline stringers.			
48																

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

Boring No. C-7 Well No. C-7
Project: M. Wallace & Son, Inc.
Location: Cobleskill, NY

(Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft.) Average rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm) Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
49															
50								Hf				Bottom of corehole at 50.5 feet.			Open bedrock corehole.
51															
52															
53															
54															
55															
56															
57															
58															

Geologist Initials: HEH
Geologist Signature:
Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. C-8 Well No. C-8

Project: M. Wallace & Son, Inc.

Location: Cobleskill, NY

Date Start/Finish: 7/12/83 - 7/23/83
Drilling Company: Parratt Wolff, Inc.
ler's Name: Bill Rice
Type: CME-75
Spoon Size:
Hammer Weight:
Height of Fall: -inches
Drilling Method: Auger/Coring
Bit Size: NX Core **Auger Size:**

Northing: 8897.74
Easting: 50383.81
Well Casing Elev.: 985.52 ft.
Corehole Depth: 55.5 ft.
Borehole Depth: 55.5 ft.
Ground Surface Elev.: 983.0 ft.

Location Sketch:

Scale:

Depth (Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft.) Average rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm)	Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
0 1 2 4 5													Dark grayish brown SILT, Sandy, Clayey, moist, nonplastic.			4-inch diameter steel casing set to 5.5 ft. stickup to 2.52 ft. above ground surface.
6 7													Bedrock at 5.5 ft., Drilled socket to 8.0 ft., installed casing to 8.0 ft., and began coring at 8.0 ft.			
8 8.0 9 10	1				3 5 2	100		Vf m/is Hf Hf Hf Hf Hf Hf Hf	0.0				Laminated to medium bedded, fine to medium grained, light to medium gray fossiliferous LIMESTONE. (Moderately hard, slightly to highly weathered, horizontal and vertical fractures, iron staining, silt in openings, horizontal and vertical microcrystalline stringers, dark gray chert nodules, discoloration, rhombs, megafossils.)			Corehole diameter 2.965-inches.
10.5 11 12	2				4 5 4 5 6	100	54.2	is/Hf/m v Vf Wz Hf	0.0				Highly weathered core from 10.5 to 12.0 feet.			
13 14								Hf Hf/m Hf/m Hf/m Hf/m Hf/m Hf/m					Horizontal microcrystalline stringers from 12.3 to 13.6 feet.			

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks: No split spoon sampling, drilled over previous test pit.

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. C-8 Well No. C-8

Project: M. Wallace & Son, Inc.
Location: Cobleskill, NY

(Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft.) Average rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm) Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
15								Hf/m							
15.5	3				6 5 4 5 4	100	89.2	m/is	0.0			Vertical microcrystalline stringers to 15.5 feet.			
16												Megafossil.			
												Slighty weathered core, horizontal microcrystalline stringers, throughout core, vertical microcrystalline stringers with iron-staining from 15.5 to 16.3 feet.			
								Hf Hf Hf							
17															
								Hf							
18								Hf							
								Hf				Vertical microcrystalline stringers with iron staining from 18.4 to 20.4 feet.			
19								Hf							
								Hf/m				Pitted.			
20															
20.5	4				6 6 4 6 7	100	95.8	Hf	0.0						
21															
								Hf							
22								Hf/is							
23															
								Hf/m				Dark gray chert nodules from 23.6 to 25.25 feet.			
24															

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. C-8 Well No. C-8

Project: M. Wallace & Son, Inc.
Location: Cobleskill, NY

(Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft.) Average rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm)	Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
25																
								Hf/is					Vertical microcrystalline stringers from 25.25 to 25.5 feet.			
25.5	5				5 7 8 9 5	98	96.7		0.0							
26																
								Hf								
													Discoloration.			
								Hf/wz					Vertical microcrystalline stringers from 26.6 to 27.4 feet, and 28.6 to 29.9 feet, iron stained.			
27																
28																
								Hf								
29																
30																
30.5	6				7 7 6 6 8	100	85.8	Hf/is	0.0				Horizontal microcrystalline stringers from 30.5 to 31.6 feet.			
31													Rhombs. Light to dark gray chert nodules.			
								Hf/is Hf/is					Vertical microcrystalline stringers with slight iron staining from 31.5 to 31.7 feet.			
32																
								Hf/is Hf Hf								
33																
34																
								Hf/is Hf Hf								

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. C-8 Well No. C-8
Project: M. Wallace & Son, Inc.
Location: Cobleskill, NY

(Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft.) Average rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm)	Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
-35																
35.5	7				5 7 5 5 4	100	96.8		0.0							
-36																
-37																
-38								Wz					Horizontal microcrystalline stringers from 37.9 to 39.3 feet. Rock fragments and discoloration.			
-39								Hf								
-40																
40.5	8				5 5 4 5 4	100	95.8		0.0							
-41																
-42								Hf					Horizontal microcrystalline stringers.			
-43																
-44								Hf								
								Hf					Horizontal microcrystalline stringers from 44.8 to 45.5 feet.			

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. C-8 Well No. C-8

Project: M. Wallace & Son, Inc.

Location: Cobleskill, NY

h (Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft.) Average rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm) Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
45															
45.5	9				5 5 5 3 5	100	100		0.0						
46															
47															
								Hf/is							
48															
								Hf				Horizontal microcrystalline stringers to 48.8 feet.			
49															
								Hf/m							
50															
								Hf							
50.5	10				4 5 4 3 4	100	100		0.0			Light to very dark gray chert nodules.			
51															
52															
								Hf Hf							
53															
54															

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. C-8 Well No. C-8
Project: M. Wallace & Son, Inc.
Location: Cobleskill, NY

(Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft.) Average rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm)	Field/Headspace	During Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
55													Bottom of corehole at 55.5 feet.			Open bedrock corehole.
56																
57																
58																
59																
60																
61																
62																
63																
64																

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. C-8 Well No. C-8

Project: M. Wallace & Son, Inc.
Location: Cobleskill, NY

Date Start/Finish: 7/16/93 – 7/22/93
Drilling Company: Parratt Wolff, Inc.
iller's Name: Bill Rice
g Type: CME-75
Spoon Size:
Hammer Weight:
Height of Fall: –inches
Drilling Method: Auger/Coring
Bit Size: NX Core **Auger Size:**

Northing: 9875.56
Easting: 50596.53
Well Casing Elev.: 982.27 ft.
Corehole Depth: 49.7 ft.
Borehole Depth: 49.7 ft.
Ground Surface Elev.: 979.9 ft.

Location Sketch:

Scale:

Depth (Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft.) Average rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm)	Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
0													Dark grayish brown SILT, Sandy, Clayey, moist, nonplastic.			4-inch diameter steel casing set to 4.7 ft. stickup to 2.37 ft. above ground surface.
1																
3													Bedrock at 3.3 ft., Drilled socket to 4.7 ft., installed casing to 4.7 ft., and began coring.			
4																
4.7	1				6 4 4 5 7	100	59.2	Hf/is	1.4				Laminated to medium bedded, fine to medium grained, light to medium gray fossiliferous LIMESTONE. (Moderately hard, slightly to highly weathered, horizontal and vertical microcrystalline stringers, iron staining, discoloration, silt and mud in openings, pitted, pyrite, crystals, light to dark gray chert nodules, megafossils, horizontal and vertical fractures.)			Corehole diameter 2.965-inches.
5								Hf/is Hf/m								
6								Hf/m Wz/m Hf/m								
7								Hf/m Hf/m Hf/m Hf/m Hf/m								
8								Hf/m Hf/m Hf/m Hf/m								

Geologist Initials: HEH
Geologist Signature:
Project No.: 364.17

Remarks:

No split spoon sampels, drilled over previous test pit.

Water Levels

Date	Time	Elevation

Boring No. C-9 Well No. C-9

Project: M. Wallace & Son, Inc.

Location: Cobleskill, NY

(Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft.) Average rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm) Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
9								Hf/m Vf Hf/m							
9.7	2				6 5 5 4 7	100	89.2	Hf	0.0			Dark gray chert nodules.			
10								Hf/m Hf				Vertical microcrystalline stringers with slight iron staining.			
11								Hf							
								Hf/m Hf Hf				Horizontal microcrystalline stringers from 11.4 to 11.9 feet.			
12								Hf Hf Hf/is/m/wz							
13								Hf				Rock piece is pitted with pyrite crystals within.			
14								Hf/m							
14.7	3				5 7 6 8 8							Dark gray chert nodules.			
15								Hf/m Hf				Pitted.			
16								Hf/is				Pitted, vertical microcrystalline stringers.			
								Hf/is							
17								Hf							
								Hf/is Hf				Pitted, pyrite crystals.			
18								Hf/m Hf/is Hf/is Hf/m Hf/m							

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. C-9 Well No. C-8

Project: M. Wallace & Son, Inc.

Location: Cobleskill, NY

(Ft)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft). Average rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm) Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
19															
19.7	4				7 6 4 7 5	100	69.2	Hf/is Hf/is Hf/is	0.0			Highly weathered, dark gray chert nodules.			
20												Discoloration.			
								Hf/m							
								Hf Hf/m				Horizontal microcrystalline stringers.			
21								Hf/m Hf/m/is Hf/is				Pitted.			
								Hf/is Hf/is				Vertical microcrystalline stringers.			
22															
								Hf/is Hf/m				Vertical microcrystalline stringers with slight iron staining.			
23															
								Hf/m/is/Wz				Rock fragments.			
								Hf/is							
24								Hf/is				Vertical microcrystalline stringers with slight iron staining.			
								Hf/is							
24.7	5				6 4 5 7 7	100	89.2		0.0			Dark gray chert nodules.			
25															
								Hf/is/m				Rock breaking off at horizontal microcrystalline stringers.			
								Hf/is/m Wz/Hf/is/m				Loss of drilling water.			
26												Discoloration.			
27															
								Hf/m							
28															
								Hf/m							

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

Boring No. C-8 Well No. C-8

Project: M. Wallace & Son, Inc.

Location: Cobleskill, N.Y.

D (Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft.) Average rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm)	Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
29													Vertical calcite vein, iron staining.			
								Hf/is					Horizontal microcrystalline stringers.			
29.7	6				5 6 5 5 5	100	77.5	Hf/is Hf Hf Wz Hf	0.0				Pitted, megafossil.			
30																
31								Hf								
32								Hf/Wz/is Hf					Rock breaking off along bedding planes, megafossil.			
33								Hf								
								Hf Hf/is					Megafossil. Horizontal microcrystalline stringers.			
34								Hf Hf								
34.7	7				6 8 7 4 5	100	92.5		0.0				Light gray chert nodules.			
35								Hf					Pyrite crystals.			
36																
37								Hf Hf Vf Hf								
38								Hf/m					Rock fragments, pitted, slight iron staining.			

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. C-9 Well No. C-9

Project: M. Wallace & Son, Inc.
Location: Cobleskill, NY

(Ft)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft) Average rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm)	Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
39																
								Hf/m					Rock fragments.			
39.7	8				6 6 5 6 5	100	78.3		0.0				Rhombs.			
40								Hf/m								
41																
								Hf								
								Hf								
42																
								Hf								
													Pitted.			
43								Hf					Pitted, horizontal microcrystalline stringers, megafossil.			
								Hf								
								Hf					Horizontal microcrystalline stringers.			
								Hf								
44								Hf/m								
								Hf					Horizontal microcrystalline stringers.			
								Hf								
													Pitted.			
44.7	9					100	100		0.0							
45								Hf/m					Slight iron staining, vertical microcrystalline stringers.			
46																
								Hf					Megafossil, rock fragments, horizontal microcrystalline stringers.			
47								Hf								
								Hf								
								Hf					Pitted.			
48																

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. C-9 Well No. C-9

Project: M. Wallace & Son, Inc.
Location: Cobleskill, NY

(Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft.) Average rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm)	Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
49								Hf					Bottom of corehole at 49.7 feet.			Open bedrock corehole.
50																
51																
52																
53																
54																
55																
56																
57																
58																

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. C-10 Well No. C-10

Project: M. Wallace & Son, Inc.

Location: Cobleskill, NY

Date Start/Finish: 7/26/93 - 7/29/93
Drilling Company: Parratt Wolff, Inc.
ler's Name: Bill Rice
g Type: Mobil B-57
Spoon Size: 2-inch
Hammer Weight: 140
Height of Fall: -inches
Drilling Method: Auger/Coring
Bit Size: NX Core **Auger Size:**

Northing: 9745.83
Easting: 50236.36
Well Casing Elev.: 967.64 ft.
Corehole Depth: 40.5 ft.
Borehole Depth: 40.5 ft.
Ground Surface Elev.: 964.9 ft.

Location Sketch:

Scale:

Depth (Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft.) Average rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm) Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
															4-inch diameter steel casing set to 5.5 ft. stickup to 2.74 ft. above ground surface.
0	1		16 8 15 21	23	1.5				1.1 0.6			Dark brown Sandy SILT, Gravelly, damp, orange mottling.			
2	2		28 20 18 22	38	1.7				2.5 0.6			SAA			
3															
4	3		22 30 50/0.2	80	0.8				0.0 0.5			SAA, moist.			

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks: SAA - Same as above.

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. C-10 Well No. C-10
Project: M. Wallace & Son, Inc.
Location: Cobleskill, NY

D (Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft.) Average rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm) Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
5												Bedrock at 5.2 ft., Drilled socket to 5.8 ft., installed casing to 5.8 ft., and began coring at 6.0 ft.			
6	1				4 5	100	70		0.0			Laminated to medium bedded, fine to medium grained, light to medium gray fossiliferous LIMESTONE. (Moderately hard, slightly to moderately weathered, horizontal and vertical fractures, iron staining, slight discoloration, silt in openings, megafossils, pitted, dark gray chert nodules, horizontal microcrystalline stringers, rhombs.)			
								Hf/m fossil							
7								Hf/m Hf Hf/is Wz Vf/is							
8								Hf/is Hf							
8.5	2					90	41.7	Hf Hf Hf Hf/m	0.0			Megafossil. Slight discoloration.			
9								Hf/m Hf/m				Pitted, slight discoloration. Pitted, slight discoloration.			
10								Hf Hf							Corehole diameter 2.965-inches.
10.5	3				5 7 ? ? 6½	>100	69.2		0.0			Dark gray chert nodules.			
11								Hf Hf/is Vf/is Hf				Rock fragments.			
12								Hf Hf/m				Horizontal micrystalline stringers. Pitted.			
13								Hf/m Hf							
14															

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

Boring No. C-10 Well No. C-10

Project: M. Wallace & Son, Inc.
Location: Cobleskill, NY

(Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft.) Average rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm)	Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
15																
								Vf/Hf								
								Vf/m								
15.5	4				3½ 2 3 3 6	100	73.3	Hf	0.0				Abundant silt in openings, dark gray chert nodules, rhombs.			
16								Hf/m								
17								Hf/m					Horizontal microcrystalline stringers.			
								Hf/m								
18								Hf/m					Rock fragments.			
								Vf/m								
								Hf/m								
19																
								Hf Vf Hf								
20																
								Hf								
20.5	5				3½ 4½ 4 3½ 5½	100	88.3	Hf/m					Abundant silt in openings.			
21								Hf								
								Hf/m								
								Hf/m					Thin rock wedges, pitted, megafossil.			
22																
								Hf/m					Pitted, megafossil.			
23								Hf								
								Hf/is								
								Hf/is					Rock fragments and thin rock wedges, iron stained.			
24																
								Hf								
								Hf								

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. C-10 Well No. C-10

Project: M. Wallace & Son, Inc

Location: Cobleskill, NY

(Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft.) Average rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm)	Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
-25								Hf/is/m					Pitted.			
25.5	6				3 2 3 2½ 4	100	95						Dark gray chert nodules.			
-26								Hf					Horizontal microcrystalline stringers.			
								Hf								
-27								Hf/m								
								Hf								
-28																
								Hf Hf								
-29																
								Ht								
-30								Hf/m					Pitted.			
30.5	7				4 2 2 3½ 3½	100	82.5	Hf	0.0							
								Hf/m					Horizontal microcrystalline stringers, megafossil, pitted.			
-31																
-32								Hf								
								Hf								
-33																
								Hf/is/m Vf/is								
-34								Hf/m/is								

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. C-10 Well No. C-10

Project: M. Wallace & Son, Inc.

Location: Cobleskill, NY

Depth (Ft)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft) Average rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm)	Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
35								Hf								
35.5	8				4 3 3 3½ 5	100	93.3		0.0				Horizontal microcrystalline stringers, dolomite crystals.			
36																
								Hf/m								
								Hf/m					Pitted.			
								Hf/m					Pitted.			
37																
								Hf/m								
38																
39																
40																
													Bottom of corehole at 40.5 feet.			Open bedrock corehole.
41																
42																
43																
44																

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. C-11 Well No. C-11

Project: M. Wallace & Son, Inc.
Location: Cobleskill, NY

Date Start/Finish: 7/27/93 - 7/28/93
Drilling Company: Parratt Wolff, Inc.
Driller's Name: Bill Rice
Rig Type: Mobil B-57
Spoon Size: 2-inch
Hammer Weight: 140
Height of Fall: 30-inches
Drilling Method: Auger/Coring
Bit Size: NX Core **Auger Size:**

Northing: 9673.24
Easting: 50244.87
Well Casing Elev.: 961.52 ft.
Corehole Depth: 40.0 ft.
Borehole Depth: 40.0 ft.
Ground Surface Elev.: 961.8 ft.

Location Sketch:

Scale:

Depth (Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft.) Average rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm)	Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
																Flushmount protective casing. 4-inch diameter steel casing set to 10.0 ft.
0	1		18 21 8 8	29	1.6				0.3 9.0				Brown Gravelly SAND. Dark brown sandy SILT, Gravelly, damp, mottling.			
1																
	2		13 21 10 13	31	0.9				2.1 2.0							
3																
4	3		6 5 8 8	13	2.0				0.1 1.6				SAA, clayey			
5																
6	4		10 13 26 28	39	1.6				0.3 1.3				SAA, moist			
7																
8	5		14 50/.1	>50	0.5				0.1 2.1				Dark brown SILT and SAND, clayey, gravelly, moist to wet. Bedrock at 8.6 ft., Drilled socket			

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks: Corehole is flushmount.
SAA - Same As Above

Water Levels

Date	Time	Elevation

Boring No. C-11 Well No. C-11
Project: M. Wallace & Son, Inc.
Location: Cobleskill, NY

(Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft.) Average rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm)	Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
9													to 10.0 ft., installed casing to 10.0 ft., and began coring at 10.0 ft.			
10	1				5 5 3½ 4½ 5½	100	84.2	Hf Hf	0.0				Laminated to medium bedded, fine to medium grained, light to medium gray fossiliferous LIMESTONE. (Moderately hard, slightly to moderately weathered, horizontal and vertical fractures, 2ilt in openings, iron staining, horizontal and vertical microcrystalline stringers, rhombs, dark gray chert nodules, little discoloration, pitted, megafossils.)			
11								Hf Hf								Corehole diameter 2.965-inches.
12								Hf/m Hf/m Vf/is/Wz Hf								
13								Hf/m Hf/m					Vertical microcrystalline stringers.			
14								Hf Hf Hf/m Hf/m Vf					Horizontal microcrystalline stringers.			
15	2				5 6 5 6 5	100	83.3		0.0							
16								Hf Hf/m					Megafossil.			
17								Hf								
18								Hf Hf/m Hf Hf Hf/m					Rock fragments.			

Geologist Initials: HEH
Geologist Signature:
Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. C-11 Well No. C-11

Project: M. Wallace & Son, Inc.

Location: Cobleskill, NY

(Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft.) Average rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm) Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
19								Hf/m				Megafossil.			
20	3				5 4 5 4 5	100	88.3		0.0						
21								Hf/m/is				Megafossil, rock wedge and rock fragments.			
								Hf							
22								Hf				Horizontal microcrystalline stringers.			
								Hf/m							
								Hf				Horizontal microcrystalline stringers.			
23															
								Hf							
24															
								Hf							
25	4				3 4½ 5 4 4	100	71.7					Horizontal microcrystalline stringers.			
26								Hf							
								Hf/m							
27								Hf							
								Hf/m				Horizontal microcrystalline stringers.			
								Hf							
28															
								Hf Hf/m				Thin rock wedges.			
								Hf/m							

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

(Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft.) Average rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm)	Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
29								Hf Vf Hf								
30	5				4 4½ 4 4 5	100	82.5		0.3				Rhombs, megafossil.			
								Hf/m					Vertical microcrystalline stringers.			
31								Hf/m Hf/m Hf/m								
32																
33																
								Hf					Pitted, horizontal microcrystalline stringers.			
34								Hf/m					Pitted, horizontal microcrystalline stringers.			
								Hf/m					Horizontal microcrystalline stringers.			
35	6				3 3 3 2½ 3	100	99.2									
								Hf					Horizontal microcrystalline stringers, chert nodules.			
36								Hf					Chert nodules.			
								Hf					Chert nodules.			
37								Hf/m								
38																
								Hf					Rock fragments.			

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. C-11 Well No. C-11

Project: M. Wallace & Son, Inc.

Location: Cobleskill, NY

Depth (Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft.) Average rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm)	Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
39								Hf/m								
40													Bottom of corehole at 40.0 feet.			Open bedrock corehole.
41																
42																
43																
44																
45																
46																
47																
48																
9																

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. C-12 Well No. C-12

Project: M. Wallace & Son, Inc.
Location: Cobleskill, NY

Date Start/Finish: 7/27/93 - 7/29/93
Drilling Company: Parratt Wolff, Inc.
ller's Name: Bill Rice
g Type: Mobil B-57
Spoon Size: 2-inch
Hammer Weight: 140
Height of Fall: 30-inches
Drilling Method: Auger/Coring
Bit Size: NX Core Auger Size :

Northing: 9572.77
Easting: 50304.17
Well Casing Elev.: 957.30 ft.
Corehole Depth: 34.9 ft.
Borehole Depth: 34.9 ft.
Ground Surface Elev.: 957.6 ft.

Location Sketch:

Scale:

Depth (Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft.) Average rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm)	Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
																Flushmount protective casing. 4-inch diameter steel casing set to 7.8 feet.
0	1		38 33 16 11	49	0.7				44.4				Brown gravelly SAND, Silty, odorous.			
1																
2	2		12 11 10 8	21	0.6				2,500				Dark grayish brown Sandy SILT, Gravelly, damp, odorous.			
3																
4	3		6 9 9 15	18	0.8				1,044				Dark grayish brown Silty SAND, Gravelly, wet, odorous.			
5																

Geologist Initials: HEH
Geologist Signature:
Project No.: 364.17

Remarks:

Corehole is flushmount.
SAA - Same As Above

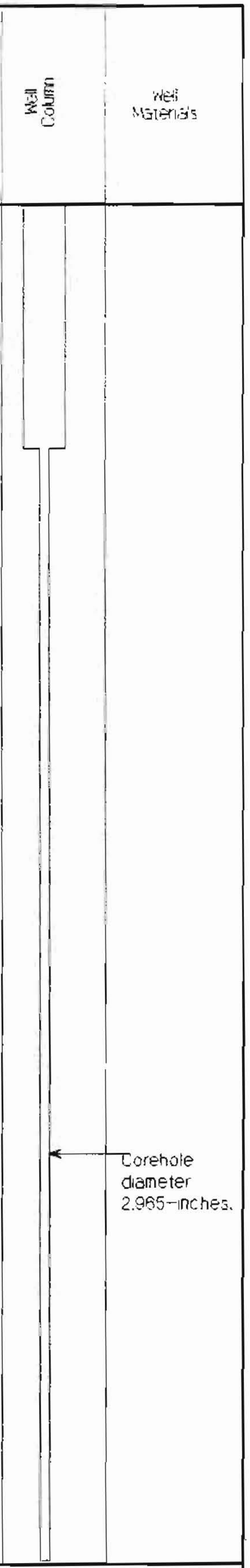
Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. C-12 Well No. C-12
Project: M. Wallace & Son, Inc.
Location: Cobleskill, NY

(Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft.) Average rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm)	Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test
6	4		9 25/0	>25	0.8				44.4				SAA	
													Bedrock at 6.5 ft., Drilled socket to 7.8 ft., installed casing to 7.8 ft., and began coring at 7.9 ft.	
7														
8	1				7½ 6½	95	77.1		0.0				Laminated to medium bedded, fine to medium grained, light to medium dark gray fossiliferous LIMESTONE. (Moderately hard, slightly to moderately weathered, horizontal and vertical fractures, abundant silt in openings, iron staining, horizontal and vertical microcrystalline stringers, slight discoloration, dark gray chert nodules, pryite crystals, pitted, rhombs, stylolites.)	
								Hf Hf						
9								Hf/is/m/wz						
10 9.9	2				6 3 4 6 2	>100	76.7		0.0				Dark gray chert nodules.	
								is						
								Hf/m Hf/m						
11								Hf/m					Horizontal microcrystalline stringers.	
								Hf/m Hf/m/is/Wz					Horizontal microcrystalline stringers.	
12								Hf Hf					Vertical microcrystalline stringers.	
								Hf Vf Hf/m						
13								Hf/m					Slight discoloration.	
14								Hf/m Vf Hf/m						
15 14.9	3				3½ 4 4 4½ 4	100	91.7	Hf Vf Hf						
								Hf/is Hf/m/is					Pyrite crystals.	



Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. C-12 Well No. C-12
Project: M. Wallace & Son, Inc.
Location: Cobleskill, NY

(Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft.) Average rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm) Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
16								Hf/m/is				Pitted.			
17															
18								Hf Wz/m/is Hf							
19								Hf/m Hf/m				Horizontal microcrystalline stringers.			
20 19.9	4				4	100	97.5		0.0						
					3 4 4 3½			Hf				Horizontal microcrystalline stringers.			
21								Hf							
22								Hf							
23															
								Hf							
24															
								Hf/m				Pitted.			
25 24.9	5				3 2 2 3½ 3½	100	100					Rhombs, stylolites.			
								Hf				Megafossil, quartz crystals.			
								Hf							

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. C-12 Well No. C-12

Project: M. Wallace & Son, Inc.
Location: Cobleskill, NY

(Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft.) Average rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm)	Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
26																
27																
								Hf								
28								Hf								
								Vf/is					Rock fragments.			
								Hf/m								
29																
30 29.9	6					100	82.5		0.0				Rhombs.			
31								Hf/m								
													Horizontal microcrystalline stringers, pitted, rock wedges and fragments.			
32								Hf/m Hf/m Hf/m					Horizontal microcrystalline stringers to 32.6 feet.			
33																
34													Pitted, horizontal microcrystalline stringers to 34.8 feet.			
35													Bottom of corehole at 34.9 feet.			Open bedrock corehole.

Geologist Initials: HEH
Geologist Signature:
Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. C-13 Well No. C-13

Project: M. Wallace & Son, Inc.

Location: Cobleskill, NY

Date Start/Finish: 8/2/93 -
Drilling Company: Parratt Wolff, Inc.
ller's Name: Bill Rice
g Type: Mobil B-57
Spoon Size: 2-inch
Hammer Weight: 140
Height of Fall: 30-inches
Drilling Method: Auger/Coring
Bit Size: NX Core **Auger Size:**

Northing: 9707.56
Easting: 50277.00
Well Casing Elev.: 963.0 ft.
Corehole Depth: 39.8 ft.
Borehole Depth: 39.8 ft.
Ground Surface Elev.: 963.5 ft.

Location Sketch:

Scale:

Depth (Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft.) Average rate (mn/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm) Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
															Flushmount proctive casing. 4-inch diameter steel casing set to 7.3 ft.
0	1		19 19 10 10	29	1.6				4.0 9.5			Dark grayish brown SILT and SAND, Gravelly, Clayey, damp.			
1															
2	2		12 14 13 39	27	1.4				4.1 6.8			SAA, moist to wet.			
3															
4												Augered past cobble to 5 feet.			
5	3		6 5 26 25/0	31	1.0				13.2 2.9			Dark grayish brown SILT and GRAVEL, Sandy, Clayey, wet.			

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Corehole is flushmount.
SAA - Same as Above.

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. C-13 Well No. C-13

Project: M. Wallace & Son, Inc.
Location: Cobleskill, NY

h (Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft.) Average rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm) Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
6															
												Bedrock at 6.5 ft., Drilled socket to 7.3 ft., installed casing to 7.3 ft., and began coring at 7.3 ft.			
7															
7.3	1				4½ 9½ 5	100	63.3	Vf Hf Vf Hf Hf Hf Hf	0.0			Laminated to medium bedded, fine to medium grained, light to medium dark gray fossiliferous LIMESTONE. (Moderately hard, slightly to moderately weathered, horizontal and vertical fractures, silt in openings, iron staining, discoloration, pitted, horizontal and vertical microcrystalline stringer dark gray chert nodules, rhombs, megafossils, stylolites.)			
8															
9															
								Hf				Rock fragments.			
9.8	2				3½ 4 6 5 5	100	97.5	Vf Hf	0.0			Rhombs, dark gray chert nodules.			
10															Corehole diameter 2.965-inches.
								Hf				Pitted.			
11															
								Hf Hf/m							
12															
								Hf/m				Vertical microcrystalline stringers, slight discoloration.			
13								Hf/m				Pitted, vertical microcrystalline stringers.			
14								Hf/m							
								Hf/m				Horizontal microcrystalline stringers.			
14.9	3				5½ 5½ 6 8 8	100	75.0		0.0			Dark gray chert nodules, horizontal microcrystalline stringers.			
15								Hf Vf Hf/m							
								Hf/m				Slight iron staining.			

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. C-13 Well No. C-13

Project: M. Wallace & Son, Inc.

Location: Cobleskill, NY

(Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft.) Average rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm)	Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
16																
								Hf								
								Hf					Rock fragments.			
								Hf/m					Megafossil.			
17																
								Hf/m					Rock fragments.			
18																
								Hf/m Vf								
								Hf/m								
19																
								Hf/m Hf/m								
								Hf/m					Rock fragments.			
19.8	4				6 7 6 5 6	100	100		0.0				Horizontal microcrystalline stringers.			
20																
								Hf								
21																
								Hf/m/is					Rock wedges and fragments.			
22																
								Hf/is					Rock wedge.			
23																
								Hf								
24																
								Hf								
24.8	5				5 8½ 6½ 6 5	100	92.5		0.0							
25								Hf/m Vf								
								Hf								

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. C-13 Well No. C-13
Project: M. Wallace & Son, Inc
Location: Cobleskill, NY

D[illegible] (Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft.) Avg. Core Rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm) Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
26								Hf/m							
27															
								Hf/m				Pitted.			
28															
								Hf				Horizontal microcrystalline stringers.			
29															
29.8	6					100	86.7	Hf	0.0						
30															
31															
								Hf/is/m							
32															
33															
								Hf				Megafossil.			
34								Hf/m				Pitted, horizontal microcrystalline stringers, some filled, some hollowed out.			
								Hf/is							
34.8	7				4 4 5½ 4½ 5	100	100	Hf				Horizontal microcrystalline stringers, dark gray chert nodules.			
35															
								Hf							

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels		
Date	**Time**	**Elevation**

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. C-13 Well No. C-13

Project: M. Wallace & Son, Inc.
Location: Cobleskill, NY

(Ft)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft) Average rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm)	Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
-36								Hf Hf					Pitted.			
-37																
-38								Hf								
-39								Hf Vf								
													Bottom of corehole at 39.8 feet.			Open bedrock corehole.
-40																
-41																
-42																
-43																
-44																
-45																

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. C-14 Well No. C-14

Project: M. Walace & Son, Inc.

Location: Cobleskill, NY

Date Start/Finish: 8/2/93 – 8/4/93
Drilling Company: Parratt Wolff, Inc.
ler's Name: Bill Rice
g Type: Mobil B-57
Spoon Size: 2-inch
Hammer Weight: 140
Height of Fall: 30-inches
Drilling Method: Auger/Coring
Bit Size: NX Core **Auger Size** .

Northing: 98115
Easting: 50230.35
Well Casing Elev.: 973.29 ft.
Corehole Depth: 58.9 ft.
Borehole Depth: 58.9 ft.
Ground Surface Elev.: 971.6 ft.

Location Sketch:

Scale:

Depth (Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft.) Average rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm) Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
															4-inch diameter steel casing set to 5.1 ft. stickup to 1.69 ft. above ground surface.
0	1		8 34 14 14	48	1.1				0.0 0.5			Dark grayish brown SILT and SAND, Gravelly, Clayey, damp.			
2	2		13 12 142 50/.4	>50	1.0				0.2 0.5			SAA, grades to gray Gravelly SAND, dry.			
3															
4												Bedrock at 3.9 ft., Drilled socket to 5.0 ft., installed casing to 5.0 ft., and began coring at 5.1 ft.			

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. C-14 Well No. C-14
Project: M. Wallace & Son, Inc.
Location: Cobleskill, NY

Depth (Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft) Average rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm)	Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
5 5.1	1				16½ 11 5½ 8 9	100	69.2	Hf/m/is Hf/m/is Hf/m/is	0.0				Laminated to medium bedded, fine to medium grained, light to medium dark gray fossilferous LIMESTONE. (Moderately hard, slightly to highly weathered, horizontal and vertical fractures, iron staining, discoloration, silt in openings, megafossils, calcite veins, horizontal and vertical microcrystalline stringers, pitted, dark gray chert nodules, rhombs.)			
6								Hf/is Hf/is Hf/m/is								
7								Hf/m/is Hf/m/is Hf					Calcite veins. Megafossil. Discoloration.			
8								Hf/is Hf/is/m Vf Hf/is					Loss of drilling water at 8.0 feet.			
9								Hf/is					Discoloration.			
10 10.1	2				6 10 6½ 6 7	96	85.0						Pit with crystals forming in it. Vertical microcrystalline stringers with iron staining, dark gray chert nodules.			Corehole diameter 2.965-inches.
11								Hf/Wz/is Hf/is Hf					Discoloration. Discoloration.			
12								Hf/is								
13								Hf/is/m Hf/is								
14								Hf/is					Pitted.			

Geologist Initials: HEH
Geologist Signature:
Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. C-14 Well No. C-14

Project: M. Wallace & Son, Inc.

Location: Cobleskill, NY

(Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft.) Average rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm)	Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
15																
15.1	3				7 7	100	88.9	Hf Hf								
16																
16.6	4				3 3½ 3	100	98.9	Hf					Dark gray chert nodules, rhombs, horizontal microcrystalline stringers.			
17																
								Hf								
								Wz/Hf/m					Discoloration.			
18																
								Hf					Rock fragments.			
19																
								Hf/is								
20																
20.6	5				5 4 5 4 5	88	83.6	Hf/is					Rock fragments, vertical microcrystalline stringers.			
21																
								Hf								
22																
								Wz/Hf					Discoloration.			
23																
								Hf Hf								
24																

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. C-14 Well No. C-14

Project: M. Wallace & Son, Inc.

Location: Cobleskill, NY

D (Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft.) Average rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm) Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
25															
25.6	6				7½ 5½ 4 3½ 1	>100	81.7		0.1			Dark gray chert nodules.			
								Hf/m							
26															
								Hf/m							
27								Hf Hf/m							
28															
								Hf/Wz/m							
29								Hf							
								Vf/is							
								Hf							
29.9 30	7					100	100	Vf				Light gray chert nodules.			
								Hf/m				Rock fragments.			
31								Hf/m				Rock fragments.			
32								Hf							
33								Hf Hf/m Hf				Rock fragments, slight iron staining.			
34															
								Hf							
4.9	8				5	100	69.2	Hf	1.2			Rock fragments, iron staining.			

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

Boring No. C-14 Well No. C-14

Project: M. Wallace & Son, Inc.
Location: Cobleskill, NY

(Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft.) Average rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm)	Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
35					4 4 5 4								Moderately to highly weathered core.			
								Hf/Wz/is Hf/Vf					Discoloration.			
36																
37								Hf								
38																
								Hf/is Hf/is/m Hf/is/m					Rock fragments, very iron-stained.			
39																
39.9	9				3 4 3½ 3 3	100	80.8	Hf/m					Horizontal microcrystalline stringers from 40 to 42.2 feet.			
40													Pitted.			
								Hf/m Hf/m Hf/m								
41													pitted.			
								Hf/m					Slight iron staining.			
42								Hf								
43								Bt Vf								
								Hf/m								
44																
4.9	10				3	22	21.7		0.0							

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. C-14 Well No. C-14

Project: M. Wallace & Son, Inc
Location: Cobleskill, NY

Depth (Ft.)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft.) Average rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm)	Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
45					◁◁◁◁								At an approximate depth of 46.4 feet, the core barrel went down very quickly. Recovered only 1.1 feet of medium dark gray LIMESTONE and 0.4 feet of brown Silty CLAY. Rounded coarse Gravel was embedded in the bottom of the Silty CLAY.			
46																
47																
48																
49																
49.9	11				◁◁◁◁◁	20	0.0		0.1				Again the core barrel went down very quickly. Recovered only 1.0 foot of weathered bedrock which was in nine small pieces with brown Sandy Silt within the horizontal fractures. Above the bedrock was approximately 0.8 feet of fine to coarse, rounded to angular GRAVEL, with little Sandy Silt.			
50																
51																
52																
53																
54																
4.9	12				3½	125	68.3		0.0							

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

Boring No. C-14 Well No. C-14

Project: M. Wallace & Son, Inc.

Location: Cobleskill, NY

(Ft)	Sample/Run Number	Sample/Int/Type	Blows/6 in.	N	Recovery (Ft) Average rate (min/ft)	Recovery (%)	RQD (%)	Fracture Sketch	HNU/OVA (ppm)	Field/Headspace	Drilling Water Level	Geologic Col.	Stratigraphic Description	Misc. Test	Well Column	Well Materials
55					2½ 2½ 3								The top of the recovered material is weathered LIMESTONE bedrock and rounded to angular, fine to medium GRAVEL. (53.65 to 54.9 feet.)			
56																
57																
58																
59													Bottom of corehole at 58.9 feet. The subsurface material filled in the corehole to approximately 48.0 feet below ground surface.			Open bedrock corehole.
60																
61																
62																
63																
64																

Geologist Initials: HEH

Geologist Signature:

Project No.: 364.17

Remarks:

Water Levels

Date	Time	Elevation

Appendix H

Packer Pressure Test Results

Project: Phase I Remedial Investigation
Client: Niagara-Mohawk
Site: M. Wallace & Son, Inc.
Project #: 364.17

PACKER TEST DATA REDUCTION

COREHOLE NUMBER:		MW-1
DATE:		6/2/93
TEST INTERVAL (ft)	TOP:	22.6
	BOTTOM:	35.4
COREHOLE DIAMETER (in):		3.0
PACKER COEFFICIENT* (1/ft):		4000
PIPE ASSEMBLY LENGTH (ft):		28
PIPE DIAMETER (in):		1
STATIC WATER DEPTH (ft):		22.5
GAUGE HEIGHT (ft):		3.7

TEST INCREMENT:	1	2	3	4	5
INCREMENT DURATION (min):	5	5	5	5	5
GAUGE PRESSURE (psi):	8.7	15.2	21.7	15.2	8.7
GAUGE PRESSURE (ft):	20.1	35.1	50.1	35.1	20.1
TOTAL INTAKE (gal):	0.1	0.2	0.3	0.0	-0.2
AVG. FLOW RATE, Q (gpm):	0.02	0.04	0.06	0.00	-0.04
FRICTIONAL LOSS** (ft):	0.0	0.0	0.0	0.0	NA
TOTAL APPLIED HEAD (ft):	46	61	76	61	NA
K (ft/yr):	2	3	3	0	NA
K (cm/sec):	1.7E-06	2.5E-06	3.0E-06	<1.3E-06	NA
LUDGEON VALUE:	0	0	0	0	NA

INTERPRETATION: Essentially laminar flow during first three increments; use the average of the first three K estimates.

REPRESENTATIVE K FOR INTERVAL (cm/sec): 2.4E-06

NOTES: * Packer coefficient values calculated based on equation in: United States Department of Interior, Bureau of Reclamation. 1977. Design of Small Dams. Water Resources Technical Publication, U.S. Government Printing Office, Washington, D.C., p. 196.

** Frictional head loss estimated for pipe assembly length and diameter for the observed packer test flow rates, based on the Hazen-Williams formula for pipe friction loss: Merritt, F.S. 1983. Standard Handbook for Civil Engineers, Third Ed., McGraw-Hill Book Company, New York, p. 21-14.

NA - Calculations not applicable due to (negative) flow out of formation into packer testing assembly.

Project:	Phase I Remedial Investigation
Client:	Niagara-Mohawk
Site:	M. Wallace & Son, Inc.
Project #:	364.17

PACKER TEST DATA REDUCTION

COREHOLE NUMBER:		MW-2
DATE:		6/3/93
TEST INTERVAL (ft)	TOP:	15.5
	BOTTOM:	24.7
COREHOLE DIAMETER (in):		3.0
PACKER COEFFICIENT* (1/ft):		5200
PIPE ASSEMBLY LENGTH (ft):		18
PIPE DIAMETER (in):		1
STATIC WATER DEPTH (ft):		9.5
GAUGE HEIGHT (ft):		2.0

TEST INCREMENT:	1	2	3	4	5
INCREMENT DURATION (min):	5	5	5	5	5
GAUGE PRESSURE (psi):	6.0	10.6	15.1	10.6	6.0
GAUGE PRESSURE (ft):	13.9	24.5	34.9	24.5	13.9
TOTAL INTAKE (gal):	13.8	17.1	34.2	13.8	3.9
AVG. FLOW RATE, Q (gpm):	2.76	3.42	6.84	2.76	0.78
FRICTIONAL LOSS** (ft):	0.2	0.3	0.9	0.2	0.0
TOTAL APPLIED HEAD (ft):	25	36	45	36	25
K (ft/yr):	570	498	783	401	160
K (cm/sec):	5.5E-04	4.8E-04	7.6E-04	3.9E-04	1.5E-04
LUDGEON VALUE:	22	19	30	16	6

INTERPRETATION: Dilation of rock fractures; use average value from the first and the last increments.

REPRESENTATIVE K
FOR INTERVAL (cm/sec): 3.5E-04

NOTES: * Packer coefficient values calculated based on equation in: United States Department of Interior, Bureau of Reclamation. 1977. Design of Small Dams. Water Resources Technical Publication, U.S. Government Printing Office, Washington, D.C., p. 196.

** Frictional head loss estimated for pipe assembly length and diameter for the observed packer test flow rates, based on the Hazen-Williams formula for pipe friction loss: Merritt, F.S. 1983. Standard Handbook for Civil Engineers, Third Ed., McGraw-Hill Book Company, New York, p. 21-14.

Project: Phase I Remedial Investigation
Client: Niagara-Mohawk
Site: M. Wallace & Son, Inc.
Project #: 364.17

PACKER TEST DATA REDUCTION

COREHOLE NUMBER:		MW-3
DATE:		6/3/93
TEST INTERVAL (ft)	TOP:	17.5
	BOTTOM:	34.1
COREHOLE DIAMETER (in):		3.0
PACKER COEFFICIENT* (1/ft):		3300
PIPE ASSEMBLY LENGTH (ft):		23
PIPE DIAMETER (in):		1
STATIC WATER DEPTH (ft):		8.3
GAUGE HEIGHT (ft):		2.0

TEST INCREMENT:	1	2	3	4	5
INCREMENT DURATION (min):	5	5	5	5	5
GAUGE PRESSURE (psi):	7.8	13.6	19.4	13.6	7.8
GAUGE PRESSURE (ft):	18.0	31.4	44.8	31.4	18.0
TOTAL INTAKE (gal):	0.1	0.0	0.0	0.0	0.0
AVG. FLOW RATE, Q (gpm):	0.02	0.02	0.02	0.02	0.02
FRICTIONAL LOSS** (ft):	0.0	0.0	0.0	0.0	0.0
TOTAL APPLIED HEAD (ft):	28	42	55	42	28
K (ft/yr):	2	<2	<1	<2	<2
K (cm/sec):	2.3E-06	<1.5E-06	<1.2E-06	<1.5E-06	<2.3E-06
LUDGEON VALUE:	0	0	0	0	0

INTERPRETATION: Void filling; use K value from the last test increment.

REPRESENTATIVE K FOR INTERVAL (cm/sec): <2.3E-06

NOTES: * Packer coefficient values calculated based on equation in: United States Department of Interior, Bureau of Reclamation. 1977. Design of Small Dams. Water Resources Technical Publication, U.S. Government Printing Office, Washington, D.C., p. 196.

** Frictional head loss estimated for pipe assembly length and diameter for the observed packer test flow rates, based on the Hazen-Williams formula for pipe friction loss: Merritt, F.S. 1983. Standard Handbook for Civil Engineers, Third Ed., McGraw-Hill Book Company, New York, p. 21-14.

Project: Phase I Remedial Investigation
Client: Niagara-Mohawk
Site: M. Wallace & Son, Inc.
Project #: 364.17

PACKER TEST DATA REDUCTION

COREHOLE NUMBER: MW-4
DATE: 6/3/93
TEST INTERVAL (ft) TOP: 19.6
BOTTOM: 33.6
COREHOLE DIAMETER (in): 3.0
PACKER COEFFICIENT* (1/ft): 3800
PIPE ASSEMBLY LENGTH (ft): 23
PIPE DIAMETER (in): 1
STATIC WATER DEPTH (ft): 5.8
GAUGE HEIGHT (ft): 1.8

TEST INCREMENT:	1	2	3	4	5
INCREMENT DURATION (min):	5	5	5	5	5
GAUGE PRESSURE (psi):	8.0	13.9	19.9	13.9	8.0
GAUGE PRESSURE (ft):	18.5	32.1	46.0	32.1	18.5
TOTAL INTAKE (gal):	0.1	0.0	0.0	0.0	0.0
AVG. FLOW RATE, Q (gpm):	0.02	0.02	0.02	0.02	0.02
FRICTIONAL LOSS** (ft):	0.0	0.0	0.0	0.0	0.0
TOTAL APPLIED HEAD (ft):	26	40	54	40	26
K (ft/yr):	3	<2	<1	<2	<3
K (cm/sec):	2.8E-06	<1.9E-06	<1.4E-06	<1.9E-06	<2.8E-06
LUDGEON VALUE:	0	0	0	0	0

INTERPRETATION: Void filling; use K value from the last test increment.

REPRESENTATIVE K FOR INTERVAL (cm/sec): <2.8E-06

NOTES: * Packer coefficient values calculated based on equation in: United States Department of Interior, Bureau of Reclamation. 1977. Design of Small Dams. Water Resources Technical Publication, U.S. Government Printing Office, Washington, D.C., p. 196.

** Frictional head loss estimated for pipe assembly length and diameter for the observed packer test flow rates, based on the Hazen-Williams formula for pipe friction loss: Merritt, F.S. 1983. Standard Handbook for Civil Engineers, Third Ed., McGraw-Hill Book Company, New York, p. 21-14.

Project: Phase I Remedial Investigation
Client: Niagara-Mohawk
Site: M. Wallace & Son, Inc.
Project #: 364.17

PACKER TEST DATA REDUCTION

COREHOLE NUMBER:		MW-5
DATE:		6/2/93
TEST INTERVAL (ft)	TOP:	20.0
	BOTTOM:	25.0
COREHOLE DIAMETER (in):		3.0
PACKER COEFFICIENT* (1/ft):		8300
PIPE ASSEMBLY LENGTH (ft):		29.5
PIPE DIAMETER (in):		1
STATIC WATER DEPTH (ft):		20.2
GAUGE HEIGHT (ft):		3.7

TEST INCREMENT:	1	2	3	4	5
INCREMENT DURATION (min):	5	5	5	5	5
GAUGE PRESSURE (psi):	6.8	11.8	16.9	11.8	6.8
GAUGE PRESSURE (ft):	15.7	27.3	39.0	27.3	15.7
TOTAL INTAKE (gal):	0.0	0.8	1.1	0.0	0.0
AVG. FLOW RATE, Q (gpm):	0.02	0.16	0.06	0.02	0.02
FRICTIONAL LOSS** (ft):	0.0	0.0	0.0	0.0	0.0
TOTAL APPLIED HEAD (ft):	40	51	63	51	40
K (ft/yr):	<4	26	8	<3	<4
K (cm/sec):	<4.1E-06	2.5E-05	7.6E-06	<3.1E-06	<4.1E-06
LUDGEON VALUE:	0	1	0	0	0

INTERPRETATION: Possible dilation and/or void filling.
Use an average K value from the first and the fifth increments.

REPRESENTATIVE K FOR INTERVAL (cm/sec): <4.1E-06

NOTES: * Packer coefficient values calculated based on equation in: United States Department of Interior, Bureau of Reclamation. 1977. Design of Small Dams. Water Resources Technical Publication, U.S. Government Printing Office, Washington, D.C., p. 196.

** Frictional head loss estimated for pipe assembly length and diameter for the observed packer test flow rates, based on the Hazen-Williams formula for pipe friction loss: Merritt, F.S. 1983. Standard Handbook for Civil Engineers, Third Ed., McGraw-Hill Book Company, New York, p. 21-14.

Project: Phase I Remedial Investigation
Client: Niagara-Mohawk
Site: M. Wallace & Son, Inc.
Project #: 364.17

PACKER TEST DATA REDUCTION

COREHOLE NUMBER:		MW-5
DATE:		6/2/93
TEST INTERVAL (ft)	TOP:	30.0
	BOTTOM:	35.0
COREHOLE DIAMETER (in):		3.0
PACKER COEFFICIENT* (1/ft):		8300
PIPE ASSEMBLY LENGTH (ft):		33
PIPE DIAMETER (in):		1
STATIC WATER DEPTH (ft):		20.2
GAUGE HEIGHT (ft):		3.7

TEST INCREMENT:	1	2	3	4	5
INCREMENT DURATION (min):	5	5	5	5	5
GAUGE PRESSURE (psi):	9.7	17.0	24.4	17.0	9.7
GAUGE PRESSURE (ft):	22.4	39.3	56.4	39.3	22.4
TOTAL INTAKE (gal):	4.0	0.4	0.3	0.1	0.0
AVG. FLOW RATE, Q (gpm):	0.80	0.08	0.06	0.02	0.02
FRICTIONAL LOSS** (ft):	0.0	0.0	0.0	0.0	0.0
TOTAL APPLIED HEAD (ft):	46	63	80	63	46
K (ft/yr):	143	11	6	3	<4
K (cm/sec):	1.4E-04	1.0E-05	6.0E-06	2.5E-06	<3.5E-06
LUDGEON VALUE:	6	0	0	0	0

INTERPRETATION: Void filling; use K value from the last test increment.

REPRESENTATIVE K FOR INTERVAL (cm/sec): <3.5E-06

NOTES: * Packer coefficient values calculated based on equation in: United States Department of Interior, Bureau of Reclamation. 1977. Design of Small Dams. Water Resources Technical Publication, U.S. Government Printing Office, Washington, D.C., p. 196.

** Frictional head loss estimated for pipe assembly length and diameter for the observed packer test flow rates, based on the Hazen-Williams formula for pipe friction loss: Merritt, F.S. 1983. Standard Handbook for Civil Engineers, Third Ed., McGraw-Hill Book Company, New York, p. 21-14.

Project: Phase I Remedial Investigation
Client: Niagara-Mohawk
Site: M. Wallace & Son, Inc.
Project #: 364.17

PACKER TEST DATA REDUCTION

CORE HOLE NUMBER: MW-6
DATE: 6/2/93
TEST INTERVAL (ft) TOP: 31.0
BOTTOM: 50.0
COREHOLE DIAMETER (in): 3.0
PACKER COEFFICIENT* (1/ft): 3000
PIPE ASSEMBLY LENGTH (ft): 33
PIPE DIAMETER (in): 1
STATIC WATER DEPTH (ft): 26.2
GAUGE HEIGHT (ft): 3.7

TEST INCREMENT:	1	2	3	4	5
INCREMENT DURATION (min):	5				
GAUGE PRESSURE (psi):	2.0				
GAUGE PRESSURE (ft):	4.6				
TOTAL INTAKE (gal):	35.4				
AVG. FLOW RATE, Q (gpm):	7.08				
FRICTIONAL LOSS** (ft):	1.9				
TOTAL APPLIED HEAD (ft):	33				
K (ft/yr):	651				
K (cm/sec):	6.3E-04				

LUDGEON VALUE: 21

INTERPRETATION: Tested interval too permeable to acheive target pressure of 12.1 psi on first test increment. Increments two through five not performed. Use K value from first increment.

REPRESENTATIVE K FOR INTERVAL (cm/sec): 6.3E-04

NOTES: * Packer coefficient values calculated based on equation in: United States Department of Interior, Bureau of Reclamation. 1977. Design of Small Dams. Water Resources Technical Publication, U.S. Government Printing Office, Washington, D.C., p. 196.

** Frictional head loss estimated for pipe assembly length and diameter for the observed packer test flow rates, based on the Hazen-Williams formula for pipe friction loss: Merritt, F.S. 1983. Standard Handbook for Civil Engineers, Third Ed., McGraw-Hill Book Company, New York, p. 21-14.

Project:	Phase I Remedial Investigation
Client:	Niagara-Mohawk
Site:	M. Wallace & Son, Inc.
Project #:	364.17

PACKER TEST DATA REDUCTION

COREHOLE NUMBER:		MW-6
DATE:		6/2/93
TEST INTERVAL (ft)	TOP:	45.0
	BOTTOM:	50.0
COREHOLE DIAMETER (in):		3.0
PACKER COEFFICIENT* (1/ft):		8300
PIPE ASSEMBLY LENGTH (ft):		48
PIPE DIAMETER (in):		1
STATIC WATER DEPTH (ft):		26.2
GAUGE HEIGHT (ft):		3.7

TEST INCREMENT:	1	2	3	4	5
INCREMENT DURATION (min):	5	5	5	5	5
GAUGE PRESSURE (psi):	14.2	24.9	35.6	24.9	14.2
GAUGE PRESSURE (ft):	32.8	57.5	82.2	57.5	32.8
TOTAL INTAKE (gal):	0.1	0.0	0.0	0.0	0.0
AVG. FLOW RATE, Q (gpm):	0.02	0.02	0.02	0.02	0.02
FRICTIONAL LOSS** (ft):	0.0	0.0	0.0	0.0	0.0
TOTAL APPLIED HEAD (ft):	63	87	112	87	63
K (ft/yr):	3	<2	<1	<2	<3
K (cm/sec):	2.6E-06	<1.8E-06	<1.4E-06	<1.8E-06	<2.6E-06
LUDGEON VALUE:	0	0	0	0	0

INTERPRETATION: Void filling; use K value from the last increment.

REPRESENTATIVE K FOR INTERVAL (cm/sec): <2.6E-06

NOTES: * Packer coefficient values calculated based on equation in: United States Department of Interior, Bureau of Reclamation. 1977. Design of Small Dams. Water Resources Technical Publication, U.S. Government Printing Office, Washington, D.C., p. 196.

** Frictional head loss estimated for pipe assembly length and diameter for the observed packer test flow rates, based on the Hazen-Williams formula for pipe friction loss: Merritt, F.S. 1983. Standard Handbook for Civil Engineers, Third Ed., McGraw-Hill Book Company, New York, p. 21-14.

Project: Phase I Remedial Investigation
Client: Niagara-Mohawk
Site: M. Wallace & Son, Inc.
Project #: 364.17

PACKER TEST DATA REDUCTION

COREHOLE NUMBER: MW-5
DATE: 6/2/93
TEST INTERVAL (ft) TOP: 25.0
BOTTOM: 30.0
COREHOLE DIAMETER (in): 3.0
PACKER COEFFICIENT* (1/ft): 8300
PIPE ASSEMBLY LENGTH (ft): 34.5
PIPE DIAMETER (in): 1
STATIC WATER DEPTH (ft): 20.2
GAUGE HEIGHT (ft): 3.7

TEST INCREMENT:	1	2	3	4	5
INCREMENT DURATION (min):	5				
GAUGE PRESSURE (psi):	0.0				
GAUGE PRESSURE (ft):	0.0				
TOTAL INTAKE (gal):	38.3				
AVG. FLOW RATE, Q (gpm):	7.66				
FRICTIONAL LOSS** (ft):	2.2				
TOTAL APPLIED HEAD (ft):	22				
K (ft/yr):	2936				
K (cm/sec):	2.8E-03				
LUDGEON VALUE:	132				

INTERPRETATION: Formation too permeable to pressurize.
The test was stopped after the first increment.
Use the K estimate from the first increment.

REPRESENTATIVE K FOR INTERVAL (cm/sec): 2.8E-03

NOTES: * Packer coefficient values calculated based on equation in: United States Department of Interior, Bureau of Reclamation. 1977. Design of Small Dams. Water Resources Technical Publication, U.S. Government Printing Office, Washington, D.C., p. 196.

** Frictional head loss estimated for pipe assembly length and diameter for the observed packer test flow rates, based on the Hazen-Williams formula for pipe friction loss: Merritt, F.S. 1983. Standard Handbook for Civil Engineers, Third Ed., McGraw-Hill Book Company, New York, p. 21-14.

Project: Phase I Remedial Investigation
Client: Niagara-Mohawk
Site: M. Wallace & Son, Inc.
Project #: 364.17

PACKER TEST DATA REDUCTION

COREHOLE NUMBER: MW-6
DATE: 6/2/93
TEST INTERVAL (ft) TOP: 40.0
BOTTOM: 50.0
COREHOLE DIAMETER (in): 3.0
PACKER COEFFICIENT* (1/ft): 4900
PIPE ASSEMBLY LENGTH (ft): 43
PIPE DIAMETER (in): 1
STATIC WATER DEPTH (ft): 26.2
GAUGE HEIGHT (ft): 3.7

TEST INCREMENT:	1	2	3	4	5
INCREMENT DURATION (min):	5	5	5	5	5
GAUGE PRESSURE (psi):	13.5	23.7	33.8	23.7	13.5
GAUGE PRESSURE (ft):	31.2	54.7	78.1	54.7	31.2
TOTAL INTAKE (gal):	0.1	0.0	0.1	0.0	-0.2
AVG. FLOW RATE, Q (gpm):	0.02	0.02	0.02	0.02	0.02
FRICTIONAL LOSS** (ft):	0.0	0.0	0.0	0.0	0.0
TOTAL APPLIED HEAD (ft):	61	85	108	85	61
K (ft/yr):	2	<1	1	<1	NA
K (cm/sec):	1.6E-06	<1.1E-06	8.8E-07	<1.1E-06	NA
LUDGEON VALUE:	0	0	0	0	0

INTERPRETATION: Essentially laminar flow but near lower limit of flow-measuring capability. Use average of four K estimates.

REPRESENTATIVE K FOR INTERVAL (cm/sec): Approximately 1.0E-06

NOTES: * Packer coefficient values calculated based on equation in: United States Department of Interior, Bureau of Reclamation. 1977. Design of Small Dams. Water Resources Technical Publication, U.S. Government Printing Office, Washington, D.C., p. 196.

** Frictional head loss estimated for pipe assembly length and diameter for the observed packer test flow rates, based on the Hazen-Williams formula for pipe friction loss: Merritt, F.S. 1983. Standard Handbook for Civil Engineers, Third Ed., McGraw-Hill Book Company, New York, p. 21-14.

NA - Calculations not applicable due to (negative) flow out of formation into packer testing assembly.

Project: Phase I Remedial Investigation
Client: Niagara-Mohawk
Site: M. Wallace & Son, Inc.
Project #: 364.17

PACKER TEST DATA REDUCTION

COREHOLE NUMBER:		MW-6
DATE:		6/2/93
TEST INTERVAL (ft)	TOP:	35.0
	BOTTOM:	50.0
COREHOLE DIAMETER (in):		3.0
PACKER COEFFICIENT* (1/ft):		3600
PIPE ASSEMBLY LENGTH (ft):		38
PIPE DIAMETER (in):		1
STATIC WATER DEPTH (ft):		26.2
GAUGE HEIGHT (ft):		3.7

TEST INCREMENT:	1	2	3	4	5
INCREMENT DURATION (min):	5	5	5	5	5
GAUGE PRESSURE (psi):	12.8	22.3	31.9	22.3	12.8
GAUGE PRESSURE (ft):	29.6	51.5	73.7	51.5	29.6
TOTAL INTAKE (gal):	0.1	0.0	4.9	0.0	0.0
AVG. FLOW RATE, Q (gpm):	0.02	0.02	0.98	0.02	0.02
FRICTIONAL LOSS** (ft):	0.0	0.0	0.1	0.0	0.0
TOTAL APPLIED HEAD (ft):	59	81	104	81	59
K (ft/yr):	1	<1	34	<1	<1
K (cm/sec):	1.2E-06	<8.5E-07	3.3E-05	<8.5E-07	<1.2E-06
LUDGEON VALUE:	0	0	1	0	0

INTERPRETATION: Dilation of rock fractures; use average value from the first and last increments.

REPRESENTATIVE K FOR INTERVAL (cm/sec): <1.2E-06

NOTES: * Packer coefficient values calculated based on equation in: United States Department of Interior, Bureau of Reclamation. 1977. Design of Small Dams. Water Resources Technical Publication, U.S. Government Printing Office, Washington, D.C., p. 196.

** Frictional head loss estimated for pipe assembly length and diameter for the observed packer test flow rates, based on the Hazen-Williams formula for pipe friction loss: Merritt, F.S. 1983. Standard Handbook for Civil Engineers, Third Ed., McGraw-Hill Book Company, New York, p. 21-14.

Project: Phase I Remedial Investigation
Client: Niagara-Mohawk
Site: M. Wallace & Son, Inc.
Project #: 364.17

PACKER TEST DATA REDUCTION

COREHOLE NUMBER: MW-7
DATE: 6/2/93
TEST INTERVAL (ft) TOP: 7.0
BOTTOM: 45.5
COREHOLE DIAMETER (in): 3.0
PACKER COEFFICIENT* (1/ft): 1700
PIPE ASSEMBLY LENGTH (ft): 13
PIPE DIAMETER (In): 1
STATIC WATER DEPTH (ft): 7.0
GAUGE HEIGHT (ft): 0.0

TEST INCREMENT:	1	2	3	4	5
INCREMENT DURATION (min):	5	5	5	5	5
GAUGE PRESSURE (psi):	7.9	13.7	19.7	13.7	7.9
GAUGE PRESSURE (ft):	18.2	31.6	45.5	31.6	18.2
TOTAL INTAKE (gal):	0.6	2.4	2.8	2.0	0.9
AVG. FLOW RATE, Q (gpm):	0.12	0.48	0.56	0.40	0.18
FRICTIONAL LOSS** (ft):	0.0	0.0	0.0	0.0	0.0
TOTAL APPLIED HEAD (ft):	25	39	53	39	25
K (ft/yr):	8	21	18	18	12
K (cm/sec):	7.8E-06	2.0E-05	1.8E-05	1.7E-05	1.2E-05
LUDGEON VALUE:	0	1	1	1	0

INTERPRETATION: Essentially laminar flow – use average of five K estimates

REPRESENTATIVE K FOR INTERVAL (cm/sec): 1.5E-05

NOTES: * Packer coefficient values calculated based on equation in: United States Department of Interior, Bureau of Reclamation. 1977. Design of Small Dams. Water Resources Technical Publication, U.S. Government Printing Office, Washington, D.C., p. 196.

** Frictional head loss estimated for pipe assembly length and diameter for the observed packer test flow rates, based on the Hazen-Williams formula for pipe friction loss: Merritt, F.S. 1983. Standard Handbook for Civil Engineers, Third Ed., McGraw-Hill Book Company, New York, p. 21-14.

Project: Phase I Remedial Investigation
Client: Niagara-Mohawk
Site: M. Wallace & Son, Inc.
Project #: 364.17

PACKER TEST DATA REDUCTION

COREHOLE NUMBER:		C-4
DATE:		6/3/93
TEST INTERVAL (ft)	TOP:	26.8
	BOTTOM:	45.0
COREHOLE DIAMETER (in):		3.0
PACKER COEFFICIENT* (1/ft):		3100
PIPE ASSEMBLY LENGTH (ft):		33
PIPE DIAMETER (in):		1
STATIC WATER DEPTH (ft):		26.8
GAUGE HEIGHT (ft):		3.5

TEST INCREMENT:	1	2	3	4	5
INCREMENT DURATION (min):	5	5			
GAUGE PRESSURE (psi):	10.8	18.8			
GAUGE PRESSURE (ft):	24.9	43.4			
TOTAL INTAKE (gal):	0.0	1.1			
AVG. FLOW RATE, Q (gpm):	0.02	0.22			
FRICTIONAL LOSS** (ft):	0.0	0.0			
TOTAL APPLIED HEAD (ft):	55	74			
K (ft/yr):	<1	9			
K (cm/sec):	<1.1E-06	8.9E-06			
LUDGEON VALUE:	0	0			

INTERPRETATION: Test interrupted due to possible presence of oil in vicinity of corehole.

REPRESENTATIVE K FOR INTERVAL (cm/sec): Inconclusive

NOTES: * Packer coefficient values calculated based on equation in: United States Department of Interior, Bureau of Reclamation. 1977. Design of Small Dams. Water Resources Technical Publication, U.S. Government Printing Office, Washington, D.C., p. 196.

** Frictional head loss estimated for pipe assembly length and diameter for the observed packer test flow rates, based on the Hazen-Williams formula for pipe friction loss: Merritt, F.S. 1983. Standard Handbook for Civil Engineers, Third Ed., McGraw-Hill Book Company, New York, p. 21-14.

Project: Phase I Remedial Investigation
Client: Niagara-Mohawk
Site: M. Wallace & Son, Inc.
Project #: 364.17

PACKER TEST DATA REDUCTION

COREHOLE NUMBER: C-5
DATE: 6/3/93
TEST INTERVAL (ft) TOP: 29.6
BOTTOM: 39.5
COREHOLE DIAMETER (in): 3.0
PACKER COEFFICIENT* (1/ft): 4900
PIPE ASSEMBLY LENGTH (ft): 33
PIPE DIAMETER (in): 1
STATIC WATER DEPTH (ft): 29.6
GAUGE HEIGHT (ft): 3.5

TEST INCREMENT:	1	2	3	4	5
INCREMENT DURATION (min):	5	5	5	5	5
GAUGE PRESSURE (psi):	10.4	18.1	25.9	18.1	10.4
GAUGE PRESSURE (ft):	24.0	41.8	59.8	41.8	24.0
TOTAL INTAKE (gal):	0.0	0.0	0.0	0.0	0.0
AVG. FLOW RATE, Q (gpm):	0.02	0.02	0.02	0.02	0.02
FRICTIONAL LOSS** (ft):	0.0	0.0	0.0	0.0	0.0
TOTAL APPLIED HEAD (ft):	57	75	93	75	57
K (ft/yr):	<2	<1	<1	<1	<2
K (cm/sec):	<1.7E-06	<1.3E-06	<1.0E-06	<1.3E-06	<1.7E-06
LUDGEON VALUE:	0	0	0	0	0

INTERPRETATION: No flow observed - use average of five K estimates.

REPRESENTATIVE K FOR INTERVAL (cm/sec): <1.4E-06

NOTES: * Packer coefficient values calculated based on equation in: United States Department of Interior, Bureau of Reclamation. 1977. Design of Small Dams. Water Resources Technical Publication, U.S. Government Printing Office, Washington, D.C., p. 196.

** Frictional head loss estimated for pipe assembly length and diameter for the observed packer test flow rates, based on the Hazen-Williams formula for pipe friction loss: Merritt, F.S. 1983. Standard Handbook for Civil Engineers, Third Ed., McGraw-Hill Book Company, New York, p. 21-14.

Project: Phase I Remedial Investigation
Client: Niagara-Mohawk
Site: M. Wallace & Son, Inc.
Project #: 364.17

PACKER TEST DATA REDUCTION

COREHOLE NUMBER: C-6
DATE: 6/7/93
TEST INTERVAL (ft) TOP: 10.4
BOTTOM: 50.5
COREHOLE DIAMETER (in): 3.0
PACKER COEFFICIENT* (1/ft): 1600
PIPE ASSEMBLY LENGTH (ft): 13
PIPE DIAMETER (in): 1
STATIC WATER DEPTH (ft): 10.4
GAUGE HEIGHT (ft): 2.7

TEST INCREMENT:	1	2	3	4	5
INCREMENT DURATION (min):	5	5	5	5	5
GAUGE PRESSURE (psi):	9.1	16.0	22.8	16.0	9.1
GAUGE PRESSURE (ft):	21.0	37.0	52.7	37.0	21.0
TOTAL INTAKE (gal):	0.0	0.0	0.0	0.0	0.0
AVG. FLOW RATE, Q (gpm):	0.02	0.02	0.02	0.02	0.02
FRICTIONAL LOSS** (ft):	0.0	0.0	0.0	0.0	0.0
TOTAL APPLIED HEAD (ft):	34	50	66	50	34
K (ft/yr):	<1	<1	0	<1	<1
K (cm/sec):	<9.1E-07	<6.2E-07	<4.7E-07	<6.2E-07	<9.1E-07
LUDGEON VALUE:	0	0	0	0	0

INTERPRETATION: No flow observed; use average value of five K estimates.

REPRESENTATIVE K FOR INTERVAL (cm/sec): <7.0E-07

NOTES: * Packer coefficient values calculated based on equation in: United States Department of Interior, Bureau of Reclamation. 1977. Design of Small Dams. Water Resources Technical Publication, U.S. Government Printing Office, Washington, D.C., p. 196.

** Frictional head loss estimated for pipe assembly length and diameter for the observed packer test flow rates, based on the Hazen-Williams formula for pipe friction loss: Merritt, F.S. 1983. Standard Handbook for Civil Engineers, Third Ed., McGraw-Hill Book Company, New York, p. 21-14.

Project: Phase I Remedial Investigation
Client: Niagara-Mohawk
Site: M. Wallace & Son, Inc.
Project #: 364.17

PACKER TEST DATA REDUCTION

COREHOLE NUMBER:		C-7
DATE:		7/23/93
TEST INTERVAL (ft)	TOP:	11.5
	BOTTOM:	50.5
COREHOLE DIAMETER (in):		3.0
PACKER COEFFICIENT* (1/ft):		1600
PIPE ASSEMBLY LENGTH (ft):		17
PIPE DIAMETER (in):		1
STATIC WATER DEPTH (ft):		27.7
GAUGE HEIGHT (ft):		0.0

TEST INCREMENT:	1	2	3	4	5
INCREMENT DURATION (min):	5	5	5	5	5
GAUGE PRESSURE (psi):	9.3	16.3	23.3	16.3	9.3
GAUGE PRESSURE (ft):	21.5	37.7	53.8	37.7	21.5
TOTAL INTAKE (gal):	0.2	0.8	5.9	4.7	1.4
AVG. FLOW RATE, Q (gpm):	0.04	0.15	1.18	0.94	0.28
FRICTIONAL LOSS** (ft):	0.0	0.0	0.0	0.0	0.0
TOTAL APPLIED HEAD (ft):	49	65	81	65	49
K (ft/yr):	1	4	23	23	9
K (cm/sec):	1.3E-06	3.5E-06	2.2E-05	2.2E-05	8.8E-06
LUDGEON VALUE:	0	0	1	1	0

INTERPRETATION: Dilation of rock fractures; use an average value from the first and last increments.

REPRESENTATIVE K FOR INTERVAL (cm/sec): 5.0E-06

NOTES: * Packer coefficient values calculated based on equation in: United States Department of Interior, Bureau of Reclamation. 1977. Design of Small Dams. Water Resources Technical Publication, U.S. Government Printing Office, Washington, D.C., p. 196.

** Frictional head loss estimated for pipe assembly length and diameter for the observed packer test flow rates, based on the Hazen-Williams formula for pipe friction loss: Merritt, F.S. 1983. Standard Handbook for Civil Engineers, Third Ed., McGraw-Hill Book Company, New York, p. 21-14.

Project:	Phase I Remedial Investigation
Client:	Niagara-Mohawk
Site:	M. Wallace & Son, Inc.
Project #:	364.17

PACKER TEST DATA REDUCTION

COREHOLE NUMBER:		C-8
DATE:		7/21/93
TEST INTERVAL (ft)	TOP:	8.0
	BOTTOM:	55.5
COREHOLE DIAMETER (In):		3.0
PACKER COEFFICIENT* (1/ft):		1400
PIPE ASSEMBLY LENGTH (ft):		12
PIPE DIAMETER (in):		1
STATIC WATER DEPTH (ft):		8.2
GAUGE HEIGHT (ft):		2.0

TEST INCREMENT:	1	2	3	4	5
INCREMENT DURATION (min):	5				
GAUGE PRESSURE (psi):	9.5				
GAUGE PRESSURE (ft):	21.9				
TOTAL INTAKE (gal):	61.3				
AVG. FLOW RATE, Q (gpm):	12.26				
FRICTIONAL LOSS** (ft):	1.9				
TOTAL APPLIED HEAD (ft):	30				
K (ft/yr):	567				
K (cm/sec):	5.5E-04				
LUDGEON VALUE:	16				

INTERPRETATION: Initially the packer was set to 8.0 feet below land surface (BLS). The test was started and the total intake for 5 minutes was 61.3 gallons. Water was coming up through the ground surrounding the casing. The packer assembly was then moved below the vertical fracture encountered from 8 to 12 feet BLS.

REPRESENTATIVE K FOR INTERVAL (cm/sec): 5.5E-04

NOTES: * Packer coefficient values calculated based on equation In: United States Department of Interior, Bureau of Reclamation. 1977. Design of Small Dams. Water Resources Technical Publication, U.S. Government Printing Office, Washington, D.C., p. 196.

** Frictional head loss estimated for pipe assembly length and diameter for the observed packer test flow rates, based on the Hazen-Williams formula for pipe friction loss: Merritt, F.S. 1983. Standard Handbook for Civil Engineers, Third Ed., McGraw-Hill Book Company, New York, p. 21-14.

Project: Phase I Remedial Investigation
Client: Niagara-Mohawk
Site: M. Wallace & Son, Inc.
Project #: 364.17

PACKER TEST DATA REDUCTION

COREHOLE NUMBER:		C-8
DATE:		7/21/93
TEST INTERVAL (ft)	TOP:	15.0
	BOTTOM:	55.5
COREHOLE DIAMETER (in):		3.0
PACKER COEFFICIENT* (1/ft):		1600
PIPE ASSEMBLY LENGTH (ft):		17
PIPE DIAMETER (in):		1
STATIC WATER DEPTH (ft):		8.2
GAUGE HEIGHT (ft):		2.0

TEST INCREMENT:	1	2	3	4	5
INCREMENT DURATION (min):	5	5	5	5	5
GAUGE PRESSURE (psi):	10.6	18.5	26.4	18.5	10.6
GAUGE PRESSURE (ft):	24.5	42.7	61.0	42.7	24.5
TOTAL INTAKE (gal):	0.0	0.0	0.0	0.0	-0.5
AVG. FLOW RATE, Q (gpm):	0.02	0.02	0.02	0.02	0.02
FRICTIONAL LOSS** (ft):	0.0	0.0	0.0	0.0	0.0
TOTAL APPLIED HEAD (ft):	35	53	71	53	35
K (ft/yr):	<1	<1	0	<1	NA
K (cm/sec):	<8.9E-07	<5.8E-07	<4.3E-07	<5.8E-07	NA
LUDGEON VALUE:	0	0	0	0	NA

INTERPRETATION: Essentially laminar flow - use average K value from increments one through four.

REPRESENTATIVE K
FOR INTERVAL (cm/sec): <6.2E-07

NOTES: * Packer coefficient values calculated based on equation in: United States Department of Interior, Bureau of Reclamation. 1977. Design of Small Dams. Water Resources Technical Publication, U.S. Government Printing Office, Washington, D.C., p. 196.

** Frictional head loss estimated for pipe assembly length and diameter for the observed packer test flow rates, based on the Hazen-Williams formula for pipe friction loss: Merritt, F.S. 1983. Standard Handbook for Civil Engineers, Third Ed., McGraw-Hill Book Company, New York, p. 21-14.

NA - Calculations not applicable due to (negative) flow out of formation into packer testing assembly.

Project: Phase I Remedial Investigation
Client: Niagara-Mohawk
Site: M. Wallace & Son, Inc.
Project #: 364.17

PACKER TEST DATA REDUCTION

COREHOLE NUMBER:		C-9
DATE:		7/22/93
TEST INTERVAL (ft)	TOP:	7.0
	BOTTOM:	49.7
COREHOLE DIAMETER (in):		3.0
PACKER COEFFICIENT* (1/ft):		1500
PIPE ASSEMBLY LENGTH (ft):		12
PIPE DIAMETER (in):		1
STATIC WATER DEPTH (ft):		5.0
GAUGE HEIGHT (ft):		0.5

TEST INCREMENT:	1	2	3	4	5
INCREMENT DURATION (min):	5	5	5	5	5
GAUGE PRESSURE (psi):	11.4	19.9	28.4	19.9	11.4
GAUGE PRESSURE (ft):	26.3	46.0	65.6	46.0	26.3
TOTAL INTAKE (gal):	1.5	18.8	47.4	37.9	18.5
AVG. FLOW RATE, Q (gpm):	0.30	3.76	9.48	7.58	3.70
FRICTIONAL LOSS** (ft):	0.0	0.2	1.2	0.8	0.2
TOTAL APPLIED HEAD (ft):	32	51	70	51	32
K (ft/yr):	14	110	203	224	175
K (cm/sec):	1.4E-05	1.1E-04	2.0E-04	2.2E-04	1.7E-04
LUDGEON VALUE:	0	3	6	7	5

INTERPRETATION: Essentially laminar flow for increments two through five. Use average of last four K estimates.

REPRESENTATIVE K FOR INTERVAL (cm/sec): 1.7E-04

NOTES: * Packer coefficient values calculated based on equation in: United States Department of Interior, Bureau of Reclamation. 1977. Design of Small Dams. Water Resources Technical Publication, U.S. Government Printing Office, Washington, D.C., p. 196.

** Frictional head loss estimated for pipe assembly length and diameter for the observed packer test flow rates, based on the Hazen-Williams formula for pipe friction loss: Merritt, F.S. 1983. Standard Handbook for Civil Engineers, Third Ed., McGraw-Hill Book Company, New York, p. 21-14.

Project:	Phase I Remedial Investigation
Client:	Niagara-Mohawk
Site:	M. Wallace & Son, Inc.
Project #:	364.17

PACKER TEST DATA REDUCTION

COREHOLE NUMBER:		C-10
DATE:		7/28/93
TEST INTERVAL (ft)	TOP:	8.0
	BOTTOM:	40.5
COREHOLE DIAMETER (in):		3.0
PACKER COEFFICIENT* (1/ft):		1900
PIPE ASSEMBLY LENGTH (ft):		12
PIPE DIAMETER (in):		1
STATIC WATER DEPTH (ft):		14.9
GAUGE HEIGHT (ft):		3.0

TEST INCREMENT:	1	2	3	4	5
INCREMENT DURATION (min):	5	5	5	5	5
GAUGE PRESSURE (psi):	7.3	13.0	18.2	13.0	7.3
GAUGE PRESSURE (ft):	16.9	30.0	42.0	30.0	16.9
TOTAL INTAKE (gal):	5.0	5.8	8.9	4.1	2.8
AVG. FLOW RATE, Q (gpm):	1.00	1.16	1.78	0.82	0.56
FRICTIONAL LOSS** (ft):	0.0	0.0	0.1	0.0	0.0
TOTAL APPLIED HEAD (ft):	35	48	60	48	35
K (ft/yr):	55	46	56	33	31
K (cm/sec):	5.3E-05	4.4E-05	5.5E-05	3.1E-05	3.0E-05
LUDGEON VALUE:	2	1	2	1	1

INTERPRETATION: Essentially laminar flow – use average of five K estimates

REPRESENTATIVE K FOR INTERVAL (cm/sec): 4.3E-05

NOTES: * Packer coefficient values calculated based on equation in: United States Department of Interior, Bureau of Reclamation. 1977. Design of Small Dams. Water Resources Technical Publication, U.S. Government Printing Office, Washington, D.C., p. 196.

** Frictional head loss estimated for pipe assembly length and diameter for the observed packer test flow rates, based on the Hazen-Williams formula for pipe friction loss: Merritt, F.S. 1983. Standard Handbook for Civil Engineers, Third Ed., McGraw-Hill Book Company, New York, p. 21-14.

Project: Phase I Remedial Investigation
Client: Niagara-Mohawk
Site: M. Wallace & Son, Inc.
Project #: 364.17

PACKER TEST DATA REDUCTION

COREHOLE NUMBER:		C-11
DATE:		7/29/93
TEST INTERVAL (ft)	TOP:	12.0
	BOTTOM:	40.0
COREHOLE DIAMETER (in):		3.0
PACKER COEFFICIENT* (1/ft):		2200
PIPE ASSEMBLY LENGTH (ft):		18.7
PIPE DIAMETER (in):		1
STATIC WATER DEPTH (ft):		7.6
GAUGE HEIGHT (ft):		3.0

TEST INCREMENT:	1	2	3	4	5
INCREMENT DURATION (min):	5	5	5	5	5
GAUGE PRESSURE (psi):	8.0	13.6	19.5	13.6	8.0
GAUGE PRESSURE (ft):	18.5	31.4	45.0	31.4	18.5
TOTAL INTAKE (gal):	0.0	2.2	3.0	0.9	0.5
AVG. FLOW RATE, Q (gpm):	0.02	0.44	0.59	0.17	0.09
FRICTIONAL LOSS** (ft):	0.0	0.0	0.0	0.0	0.0
TOTAL APPLIED HEAD (ft):	29	42	56	42	29
K (ft/yr):	<2	23	23	9	7
K (cm/sec):	<1.5E-06	2.2E-05	2.3E-05	8.6E-06	6.6E-06
LUDGEON VALUE:	0	1	1	0	0

INTERPRETATION: Dilation of rock fractures; use K value from the last increment.

REPRESENTATIVE K FOR INTERVAL (cm/sec): Approximately 6.6E-06

NOTES: * Packer coefficient values calculated based on equation in: United States Department of Interior, Bureau of Reclamation. 1977. Design of Small Dams. Water Resources Technical Publication, U.S. Government Printing Office, Washington, D.C., p. 196.

** Frictional head loss estimated for pipe assembly length and diameter for the observed packer test flow rates, based on the Hazen-Williams formula for pipe friction loss: Merritt, F.S. 1983. Standard Handbook for Civil Engineers, Third Ed., McGraw-Hill Book Company, New York, p. 21-14.

Project:	Phase I Remedial Investigation
Client:	Niagara-Mohawk
Site:	M. Wallace & Son, Inc.
Project #:	364.17

PACKER TEST DATA REDUCTION

COREHOLE NUMBER:	C-12
DATE:	7/29/93
TEST INTERVAL (ft) TOP:	10.0
BOTTOM:	34.9
COREHOLE DIAMETER (in):	3.0
PACKER COEFFICIENT* (1/ft):	2400
PIPE ASSEMBLY LENGTH (ft):	17
PIPE DIAMETER (in):	1
STATIC WATER DEPTH (ft):	9.3
GAUGE HEIGHT (ft):	3.0

TEST INCREMENT:	1	2	3	4	5
INCREMENT DURATION (min):	5	5	5	5	5
GAUGE PRESSURE (psi):	6.7	11.7	16.7	11.7	6.7
GAUGE PRESSURE (ft):	15.5	27.0	38.6	27.0	15.5
TOTAL INTAKE (gal):	4.1	8.2	13.5	11.9	8.6
AVG. FLOW RATE, Q (gpm):	0.82	1.64	2.70	2.38	1.72
FRICTIONAL LOSS** (ft):	0.0	0.1	0.2	0.1	0.1
TOTAL APPLIED HEAD (ft):	28	39	51	39	28
K (ft/yr):	71	100	128	146	149
K (cm/sec):	6.9E-05	9.7E-05	1.2E-04	1.4E-04	1.4E-04
LUDGEON VALUE:	2	3	4	5	5

INTERPRETATION: Essentially laminar flow; use average of five K estimates.

REPRESENTATIVE K FOR INTERVAL (cm/sec): 1.1E-04

NOTES: * Packer coefficient values calculated based on equation in: United States Department of Interior, Bureau of Reclamation. 1977. Design of Small Dams. Water Resources Technical Publication, U.S. Government Printing Office, Washington, D.C., p. 196.

** Frictional head loss estimated for pipe assembly length and diameter for the observed packer test flow rates, based on the Hazen-Williams formula for pipe friction loss: Merritt, F.S. 1983. Standard Handbook for Civil Engineers, Third Ed., McGraw-Hill Book Company, New York, p. 21-14.

Project:	Phase I Remedial Investigation
Client:	Niagara-Mohawk
Site:	M. Wallace & Son, Inc.
Project #:	364.17

PACKER TEST DATA REDUCTION

COREHOLE NUMBER:		C-13
DATE:		8/3/93
TEST INTERVAL (ft)	TOP:	9.3
	BOTTOM:	39.8
COREHOLE DIAMETER (in):		3.0
PACKER COEFFICIENT* (1/ft):		2000
PIPE ASSEMBLY LENGTH (ft):		12
PIPE DIAMETER (in):		1
STATIC WATER DEPTH (ft):		21.0
GAUGE HEIGHT (ft):		3.0

TEST INCREMENT:	1	2	3	4	5
INCREMENT DURATION (min):	5	5	5	5	5
GAUGE PRESSURE (psi):	7.4	13.0	24.6	13.0	7.4
GAUGE PRESSURE (ft):	17.1	30.0	56.8	30.0	17.1
TOTAL INTAKE (gal):	1.6	0.9	5.6	2.1	1.7
AVG. FLOW RATE, Q (gpm):	0.31	0.17	1.12	0.42	0.33
FRICTIONAL LOSS** (ft):	0.0	0.0	0.0	0.0	0.0
TOTAL APPLIED HEAD (ft):	41	54	81	54	41
K (ft/yr):	15	6	28	16	16
K (cm/sec):	1.5E-05	6.1E-06	2.7E-05	1.5E-05	1.6E-05
LUDGEON VALUE:	0	0	1	0	0

INTERPRETATION: Essentially laminar flow during increments one, three, four, and five. Use average K value from these four increments.

REPRESENTATIVE K FOR INTERVAL (cm/sec): 1.8E-05

NOTES: * Packer coefficient values calculated based on equation in: United States Department of Interior, Bureau of Reclamation. 1977. Design of Small Dams. Water Resources Technical Publication, U.S. Government Printing Office, Washington, D.C., p. 196.

** Frictional head loss estimated for pipe assembly length and diameter for the observed packer test flow rates, based on the Hazen-Williams formula for pipe friction loss: Merritt, F.S. 1983. Standard Handbook for Civil Engineers, Third Ed., McGraw-Hill Book Company, New York, p. 21-14.

Project: Phase I Remedial Investigation
Client: Niagara–Mohawk
Site: M. Wallace & Son, Inc.
Project #: 364.17

PACKER TEST DATA REDUCTION

COREHOLE NUMBER: C–14
DATE: 8/4/93
TEST INTERVAL (ft) TOP: 10.0
BOTTOM: 15.0
COREHOLE DIAMETER (in): 3.0
PACKER COEFFICIENT* (1/ft): 8300
PIPE ASSEMBLY LENGTH (ft): 24
PIPE DIAMETER (in): 1
STATIC WATER DEPTH (ft): 9.2
GAUGE HEIGHT (ft): 3.0

TEST INCREMENT:	1	2	3	4	5
INCREMENT DURATION (min):	5	5	5	5	5
GAUGE PRESSURE (psi):	3.8	6.6	9.4	6.6	3.8
GAUGE PRESSURE (ft):	8.8	15.2	21.7	15.2	8.8
TOTAL INTAKE (gal):	61.5	74.4	94.0	81.2	72.5
AVG. FLOW RATE, Q (gpm):	12.30	14.88	18.80	16.24	14.50
FRICTIONAL LOSS** (ft):	3.7	5.3	8.2	6.3	5.1
TOTAL APPLIED HEAD (ft):	17	22	26	21	16
K (ft/yr):	5922	5583	6070	6362	7567
K (cm/sec):	5.7E–03	5.4E–03	5.9E–03	6.1E–03	7.3E–03
LUDGEON VALUE:	266	251	273	286	340

INTERPRETATION: Essentially laminar flow; use average of five K estimates.

REPRESENTATIVE K FOR INTERVAL (cm/sec): 6.1E–03

NOTES: * Packer coefficient values calculated based on equation in: United States Department of Interior, Bureau of Reclamation. 1977. Design of Small Dams. Water Resources Technical Publication, U.S. Government Printing Office, Washington, D.C., p. 196.

** Frictional head loss estimated for pipe assembly length and diameter for the observed packer test flow rates, based on the Hazen–Williams formula for pipe friction loss: Merritt, F.S. 1983. Standard Handbook for Civil Engineers, Third Ed., McGraw–Hill Book Company, New York, p. 21–14.

Project:	Phase I Remedial Investigation
Client:	Niagara-Mohawk
Site:	M. Wallace & Son, Inc.
Project #:	364.17

PACKER TEST DATA REDUCTION

COREHOLE NUMBER:		C-14
DATE:		8/4/93
TEST INTERVAL (ft)	TOP:	15.0
	BOTTOM:	20.0
COREHOLE DIAMETER (in):		3.0
PACKER COEFFICIENT* (1/ft):		8300
PIPE ASSEMBLY LENGTH (ft):		29
PIPE DIAMETER (in):		1
STATIC WATER DEPTH (ft):		9.2
GAUGE HEIGHT (ft):		3.0

TEST INCREMENT:	1	2	3	4	5
INCREMENT DURATION (min):	5	5	5	5	5
GAUGE PRESSURE (psi):	5.2	9.2	13.1	9.2	5.2
GAUGE PRESSURE (ft):	12.0	21.3	30.3	21.3	12.0
TOTAL INTAKE (gal):	0.0	0.0	0.0	0.0	0.0
AVG. FLOW RATE, Q (gpm):	0.02	0.02	0.02	0.02	0.02
FRICTIONAL LOSS** (ft):	0.0	0.0	0.0	0.0	0.0
TOTAL APPLIED HEAD (ft):	24	33	42	33	24
K (ft/yr):	<7	<5	<4	<5	<7
K (cm/sec):	<6.6E-06	<4.8E-06	<3.8E-06	<4.8E-06	<6.6E-06
LUDGEON VALUE:	0	0	0	0	0

INTERPRETATION: No flow observed; use average of five K estimates.

REPRESENTATIVE K FOR INTERVAL (cm/sec): <5.3E-06

NOTES: * Packer coefficient values calculated based on equation in: United States Department of Interior, Bureau of Reclamation. 1977. Design of Small Dams. Water Resources Technical Publication, U.S. Government Printing Office, Washington, D.C., p. 196.

** Frictional head loss estimated for pipe assembly length and diameter for the observed packer test flow rates, based on the Hazen-Williams formula for pipe friction loss: Merritt, F.S. 1983. Standard Handbook for Civil Engineers, Third Ed., McGraw-Hill Book Company, New York, p. 21-14.

Project: Phase I Remedial Investigation
Client: Niagara-Mohawk
Site: M. Wallace & Son, Inc.
Project #: 364.17

PACKER TEST DATA REDUCTION

COREHOLE NUMBER:		C-14
DATE:		8/4/93
TEST INTERVAL (ft)	TOP:	20.0
	BOTTOM:	25.0
COREHOLE DIAMETER (in):		3.0
PACKER COEFFICIENT* (1/ft):		8300
PIPE ASSEMBLY LENGTH (ft):		34
PIPE DIAMETER (in):		1
STATIC WATER DEPTH (ft):		9.2
GAUGE HEIGHT (ft):		3.0

TEST INCREMENT:	1	2	3	4	5
INCREMENT DURATION (min):	5	5	5	5	5
GAUGE PRESSURE (psi):	6.8	11.8	16.9	11.8	6.8
GAUGE PRESSURE (ft):	15.7	27.3	39.0	27.3	15.7
TOTAL INTAKE (gal):	0.0	10.7	1.0	0.4	0.0
AVG. FLOW RATE, Q (gpm):	0.02	2.13	0.20	0.08	0.02
FRICTIONAL LOSS** (ft):	0.0	0.2	0.0	0.0	0.0
TOTAL APPLIED HEAD (ft):	28	39	51	39	28
K (ft/yr):	<6	450	32	17	<6
K (cm/sec):	<5.7E-06	4.4E-04	3.1E-05	1.6E-05	<5.7E-06
LUDGEON VALUE:	0	20	1	1	0

INTERPRETATION: Dilation of rock fractures; use an average value from the first and the last increments.

REPRESENTATIVE K FOR INTERVAL (cm/sec): <5.7E-06

NOTES: * Packer coefficient values calculated based on equation in: United States Department of Interior, Bureau of Reclamation. 1977. Design of Small Dams. Water Resources Technical Publication, U.S. Government Printing Office, Washington, D.C., p. 196.

** Frictional head loss estimated for pipe assembly length and diameter for the observed packer test flow rates, based on the Hazen-Williams formula for pipe friction loss: Merritt, F.S. 1983. Standard Handbook for Civil Engineers, Third Ed., McGraw-Hill Book Company, New York, p. 21-14.

Project: Phase I Remedial Investigation
Client: Niagara–Mohawk
Site: M. Wallace & Son, Inc.
Project #: 364.17

PACKER TEST DATA REDUCTION

COREHOLE NUMBER: C–14
DATE: 8/4/93
TEST INTERVAL (ft) TOP: 25.0
BOTTOM: 30.0
COREHOLE DIAMETER (in): 3.0
PACKER COEFFICIENT* (1/ft): 8300
PIPE ASSEMBLY LENGTH (ft): 39
PIPE DIAMETER (in): 1
STATIC WATER DEPTH (ft): 9.2
GAUGE HEIGHT (ft): 3.0

TEST INCREMENT:	1	2	3	4	5
INCREMENT DURATION (min):	5	5	5	5	5
GAUGE PRESSURE (psi):	8.2	14.4	20.6	14.4	8.2
GAUGE PRESSURE (ft):	18.9	33.3	47.6	33.3	18.9
TOTAL INTAKE (gal):	1.6	2.4	2.9	2.3	1.5
AVG. FLOW RATE, Q (gpm):	0.32	0.48	0.58	0.46	0.30
FRICTIONAL LOSS** (ft):	0.0	0.0	0.0	0.0	0.0
TOTAL APPLIED HEAD (ft):	31	45	60	45	31
K (ft/yr):	85	88	81	84	80
K (cm/sec):	8.2E–05	8.5E–05	7.8E–05	8.1E–05	7.7E–05
LUDGEON VALUE:	4	4	4	4	4

INTERPRETATION: Essentially laminar flow – use average of five K estimates

REPRESENTATIVE K FOR INTERVAL (cm/sec): 8.1E–05

NOTES: * Packer coefficient values calculated based on equation in: United States Department of Interior, Bureau of Reclamation. 1977. Design of Small Dams. Water Resources Technical Publication, U.S. Government Printing Office, Washington, D.C., p. 196.

** Frictional head loss estimated for pipe assembly length and diameter for the observed packer test flow rates, based on the Hazen–Williams formula for pipe friction loss: Merritt, F.S. 1983. Standard Handbook for Civil Engineers, Third Ed., McGraw–Hill Book Company, New York, p. 21–14.

Project:	Phase I Remedial Investigation
Client:	Niagara-Mohawk
Site:	M. Wallace & Son, Inc.
Project #:	364.17

PACKER TEST DATA REDUCTION

COREHOLE NUMBER:		C-14
DATE:		8/4/93
TEST INTERVAL (ft)	TOP:	30.0
	BOTTOM:	35.0
COREHOLE DIAMETER (in):		3.0
PACKER COEFFICIENT* (1/ft):		8300
PIPE ASSEMBLY LENGTH (ft):		44
PIPE DIAMETER (in):		1
STATIC WATER DEPTH (ft):		9.2
GAUGE HEIGHT (ft):		3.0

TEST INCREMENT:	1	2	3	4	5
INCREMENT DURATION (min):	5	5	5	5	5
GAUGE PRESSURE (psi):	9.8	17.1	24.4	17.1	9.8
GAUGE PRESSURE (ft):	22.6	39.5	56.4	39.5	22.6
TOTAL INTAKE (gal):	1.0	1.7	2.6	2.0	1.2
AVG. FLOW RATE, Q (gpm):	0.20	0.34	0.52	0.40	0.24
FRICTIONAL LOSS** (ft):	0.0	0.0	0.0	0.0	0.0
TOTAL APPLIED HEAD (ft):	35	52	69	52	35
K (ft/yr):	48	55	63	64	57
K (cm/sec):	4.6E-05	5.3E-05	6.1E-05	6.2E-05	5.5E-05
LUDGEON VALUE:	2	2	3	3	3

INTERPRETATION: Essentially laminar flow – use average of five K estimates

REPRESENTATIVE K FOR INTERVAL (cm/sec): 5.5E-05

NOTES: * Packer coefficient values calculated based on equation in: United States Department of Interior, Bureau of Reclamation. 1977. Design of Small Dams. Water Resources Technical Publication, U.S. Government Printing Office, Washington, D.C., p. 196.

** Frictional head loss estimated for pipe assembly length and diameter for the observed packer test flow rates, based on the Hazen-Williams formula for pipe friction loss: Merritt, F.S. 1983. Standard Handbook for Civil Engineers, Third Ed., McGraw-Hill Book Company, New York, p. 21-14.

Project: Phase I Remedial Investigation
Client: Niagara-Mohawk
Site: M. Wallace & Son, Inc.
Project #: 364.17

PACKER TEST DATA REDUCTION

COREHOLE NUMBER:		C-14
DATE:		8/4/93
TEST INTERVAL (ft)	TOP:	35.0
	BOTTOM:	40.0
COREHOLE DIAMETER (in):		3.0
PACKER COEFFICIENT* (1/ft):		8300
PIPE ASSEMBLY LENGTH (ft):		49
PIPE DIAMETER (in):		1
STATIC WATER DEPTH (ft):		9.2
GAUGE HEIGHT (ft):		3.0

TEST INCREMENT:	1	2	3	4	5
INCREMENT DURATION (min):	5	5	5	5	5
GAUGE PRESSURE (psi):	11.2	19.7	28.1	19.7	11.2
GAUGE PRESSURE (ft):	25.9	45.5	64.9	45.5	25.9
TOTAL INTAKE (gal):	42.8	68.0	93.0	78.0	58.8
AVG. FLOW RATE, Q (gpm):	8.56	13.60	18.60	15.60	11.76
FRICTIONAL LOSS** (ft):	3.9	9.2	16.5	11.9	7.0
TOTAL APPLIED HEAD (ft):	34	48	61	46	31
K (ft/yr):	2079	2327	2545	2825	3145
K (cm/sec):	2.0E-03	2.2E-03	2.5E-03	2.7E-03	3.0E-03
LUDGEON VALUE:	93	104	114	127	141

INTERPRETATION: Essentially laminar flow; use average of five K estimates.

REPRESENTATIVE K FOR INTERVAL (cm/sec): 2.5E-03

NOTES: * Packer coefficient values calculated based on equation in: United States Department of Interior, Bureau of Reclamation. 1977. Design of Small Dams. Water Resources Technical Publication, U.S. Government Printing Office, Washington, D.C., p. 196.

** Frictional head loss estimated for pipe assembly length and diameter for the observed packer test flow rates, based on the Hazen-Williams formula for pipe friction loss: Merritt, F.S. 1983. Standard Handbook for Civil Engineers, Third Ed., McGraw-Hill Book Company, New York, p. 21-14.

Project: Phase I Remedial Investigation
Client: Niagara-Mohawk
Site: M. Wallace & Son, Inc.
Project #: 364.17

PACKER TEST DATA REDUCTION

COREHOLE NUMBER:		C-14
DATE:		8/4/93
TEST INTERVAL (ft)	TOP:	39.0
	BOTTOM:	44.0
COREHOLE DIAMETER (in):		3.0
PACKER COEFFICIENT* (1/ft):		8300
PIPE ASSEMBLY LENGTH (ft):		54
PIPE DIAMETER (in):		1
STATIC WATER DEPTH (ft):		9.2
GAUGE HEIGHT (ft):		3.0

TEST INCREMENT:	1	2	3	4	5
INCREMENT DURATION (min):	5	5	5	5	5
GAUGE PRESSURE (psi):	12.4	21.7	31.0	21.7	12.4
GAUGE PRESSURE (ft):	28.6	50.1	71.6	50.1	28.6
TOTAL INTAKE (gal):	0.0	0.8	3.9	1.9	0.1
AVG. FLOW RATE, Q (gpm):	0.02	0.15	0.77	0.38	0.02
FRICTIONAL LOSS** (ft):	0.0	0.0	0.1	0.0	0.0
TOTAL APPLIED HEAD (ft):	41	62	84	62	41
K (ft/yr):	<4	20	76	51	4
K (cm/sec):	<3.9E-06	1.9E-05	7.4E-05	4.9E-05	3.9E-06
LUDGEON VALUE:	0	1	3	2	0

INTERPRETATION: Dilation of rock fractures; use average value from the first and last increments.

REPRESENTATIVE K FOR INTERVAL (cm/sec): <3.9E-06

NOTES: * Packer coefficient values calculated based on equation in: United States Department of Interior, Bureau of Reclamation. 1977. Design of Small Dams. Water Resources Technical Publication, U.S. Government Printing Office, Washington, D.C., p. 196.

** Frictional head loss estimated for pipe assembly length and diameter for the observed packer test flow rates, based on the Hazen-Williams formula for pipe friction loss: Merritt, F.S. 1983. Standard Handbook for Civil Engineers, Third Ed., McGraw-Hill Book Company, New York, p. 21-14.

Appendix I

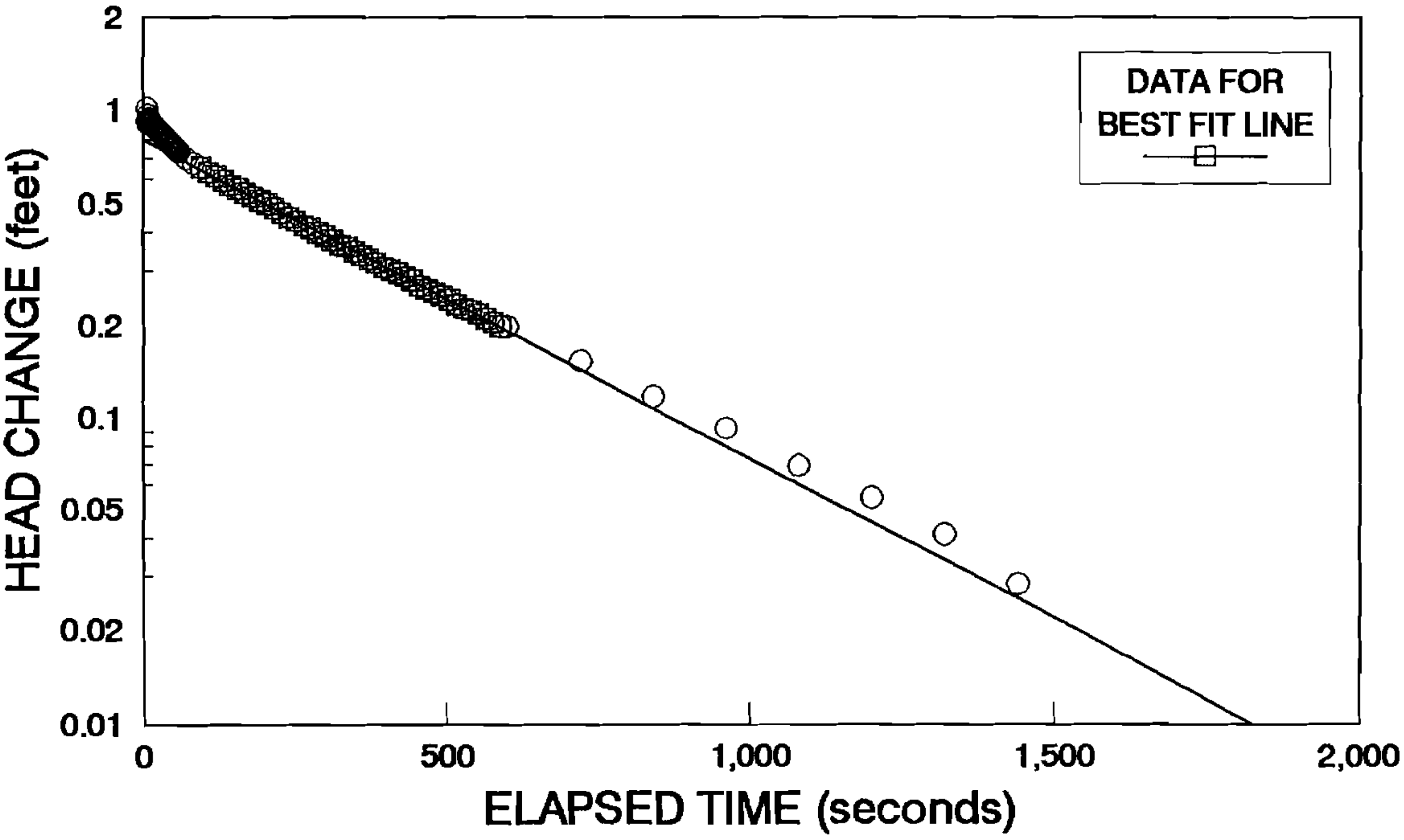
Hydraulic Conductivity Test Results

SLUGCOMP.WK1 S.J. Rossello, March 1988
Modified 6/10/92
Project: M. WALLACE & SON, INC.
Project No.: 36417
Well No.: MW-9
Test Date: 7/1/93
Formation Tested: OVERBURDEN
Rising (R) or Falling (F) Head Test: F

Test Data			Worksheet				
				Bouwer-Rice Computation	Hvorslev Time Lag	Hvorslev Variable Head	Graph Intercepts
		(cm)					
Stickup	0.00 ft	0.00		2.54 Rc		1.53E-04	a: 0.8063719
Static Water Level	3.36 ft	102.41	102.41 SW	120.00 L/Rw			b: -0.002407
Depth to bottom of screen	19.00 ft	579.12	476.71 H	1.00 H/D	413.07 To		x: 1823.83
(ft from ground level)			274.32 Ts	4.60 A	200.00 AH		y: 0.010
Boring Diameter	6.00 In	15.24	2.54 Rw	0.75 B	4.39 HR		
Casing Diameter	2.00 In	5.08	2.54 Rc	4.60 C	5.99 BH		
Screen Diameter	2.00 In	5.08	5.08 DS	ERR Ln[(D-H)/Rw]'	1.5E-04 K in cm/sec		
Screen Length	10.00 ft	304.80	304.60 L	ERR Ln[(D-H)/Rw]			
Depth to Boundary	19.00 ft	579.12	476.71 D	ERR equation (8)			
Delta H at time 0 (Y0)	0.61 ft	24.58	24.58 H0 (Y0)	4.02 equation (9)			
Delta H at Time t (Yt)	0.010 ft	0.30	0.30 Ht (Yt)	4.02 Ln(Re/Rw)			
Time	1824 sec		1823.83 t	1.0E-04 equation (5)			
Ratio Kh/Kv	10		10.00 M				
Porosity of Filter Pack			0.00 P				

	cm/sec	gpd/ft2	ft/day
K (Bouwer-Rice)	1.0E-04	2.2	0.3
K (Hvorslev Time Lag)	1.5E-04	3.3	0.4
K (Hvorslev Variable Head)	1.5E-04	3.2	0.4

M. WALLACE & SON, INC.
HYDRAULIC CONDUCTIVITY TESTING AT MW-9
FALLING HEAD TEST

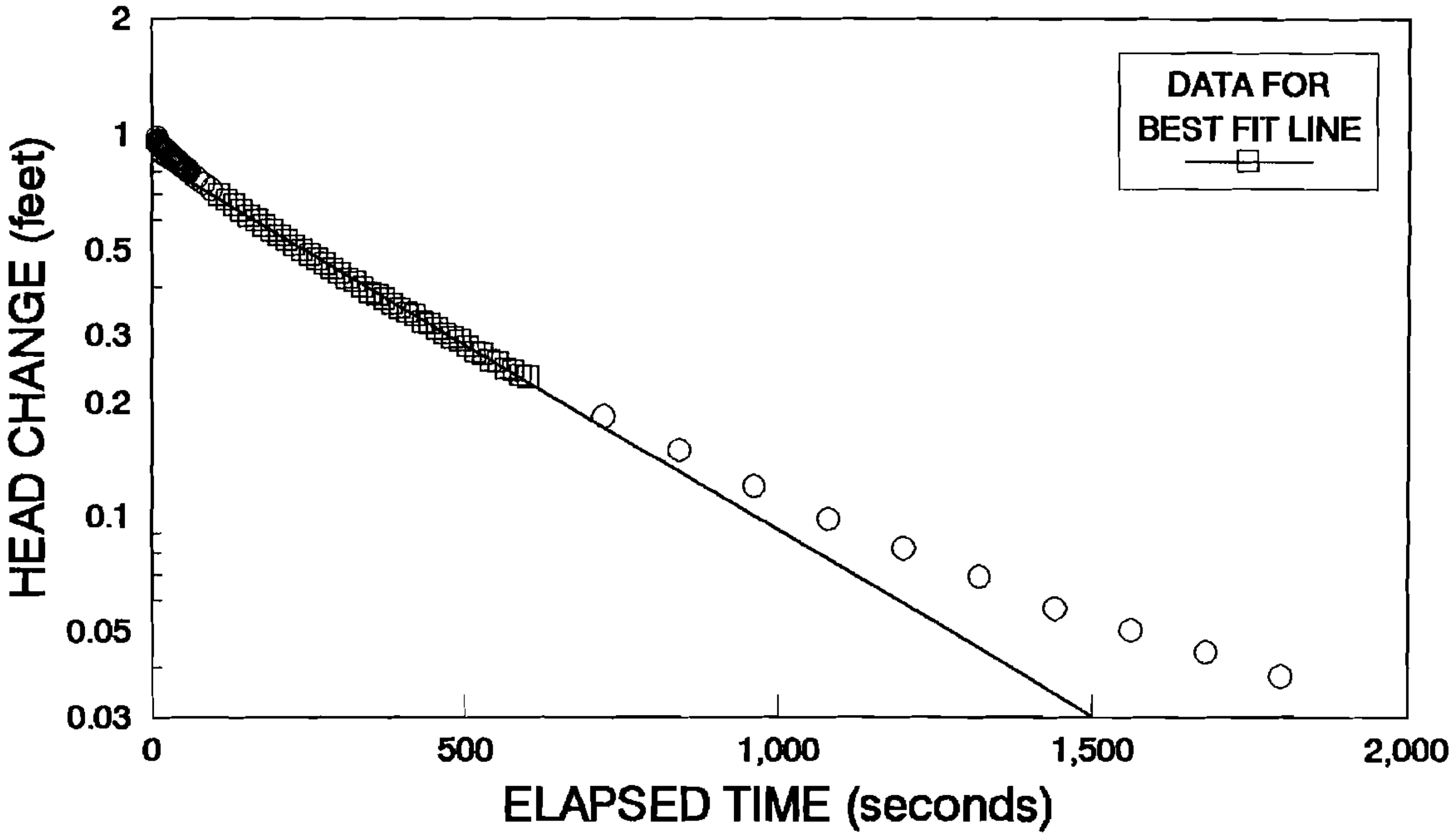


SLUGCOMP.WK1 S.J. Rossello, March 1988
Modified 6/10/92
Project: M. WALLACE & SON, INC.
Project No.: 36417
Well No.: MW−9
Test Date: 7/1/93
Formation Tested: OVERBURDEN
Rising (R) or Falling (F) Head Test: R

Test Data			Worsheet				
				Bouwer−Rice Computation	Hvorslev Time Lag	Hvorslev Variable Head	Graph Intercepts
		(cm)					
Stickup	0.00 ft	0.00		2.54 Rc		1.42E−04 K	a: 0.8623772
Static Water Level	3.36 ft	102.41	102.41 SW	120.00 L/Rw			b: 0.002238
Depth to bottom of screen	19.00 ft	579.12	476.71 H	1.00 H/D	444.26 To		x: 1500.66818
(ft from ground level)			274.32 Te	4.60 A	200.00 AH		y: 0.030
Boring Diameter	6.00 in	15.24	2.54 Rw	0.75 B	3.38 HR		
Casing Diameter	2.00 in	5.08	2.54 Rc	4.60 C	5.99 BH		
Screen Diameter	2.00 in	5.08	5.08 DS	ERR Ln[(D−H)/Rw]'	1.4E−04 K in cm/sec		
Screen Length	10.00 ft	304.80	304.80 L	ERR Ln[(D−H)/Rw]			
Depth to Boundary	19.00 ft	579.12	476.71 D	ERR equation (8)			
Delta H at time 0 (Y0)	0.86 ft	26.29	26.29 H0 (Y0)	4.02 equation (9)			
Delta H at Time t (Yt)	0.030 ft	0.91	0.91 Ht (Yt)	4.02 Ln(Re/Rw)			
Time	1501 sec		1500.67 t	9.5E−05 equation (5)			
Ratio Kh/Kv	10		10.00 M				
Porosity of Filter Pack			0.00 P				

	cm/sec	gpd/ft2	ft/day
K (Bouwer−Rice)	9.5E−05	2.0	0.3
K (Hvorslev Time Lag)	1.4E−04	3.0	0.4
K (Hvorslev Variable Head)	1.4E−04	3.0	0.4

M. WALLACE & SON, INC.
HYDRAULIC CONDUCTIVITY TESTING AT MW-9
RISING HEAD TEST

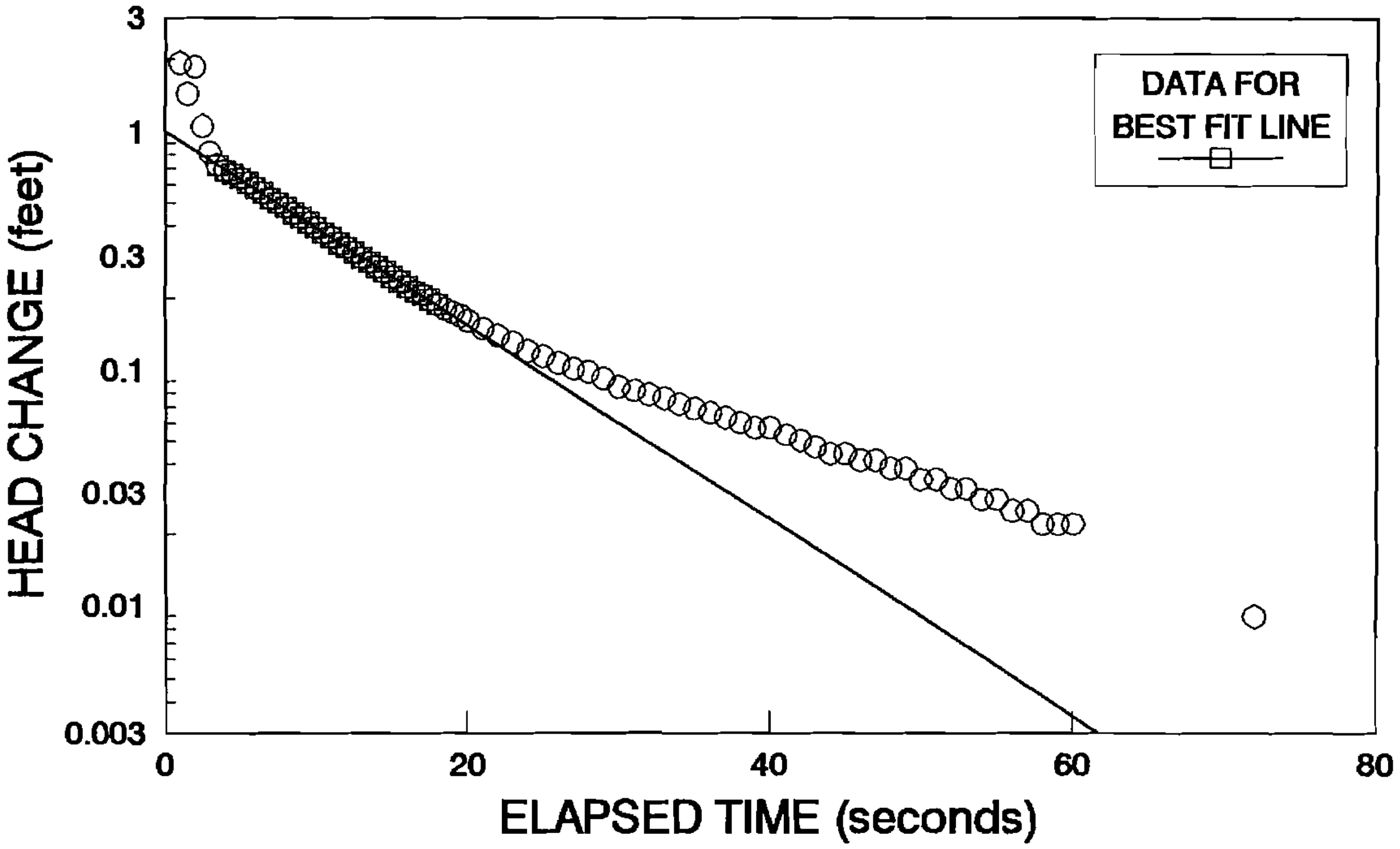


SLUGCOMP.WK1 S.J. Rossello, March 1988
Modified 6/10/92
Project: M. WALLACE & SON, INC.
Project No.: 36417
Well No.: MW-10
Test Date: 7/1/93
Formation Tested: OVERBURDEN
Rising (R) or Falling (F) Head Test: R1

Test Data			Worksheet				
				Bouwer–Rice Computation	Hvorslev Time Lag	Hvorslev Variable Head	Graph Intercepts
		(cm)					
Stickup	−0.29 ft	−8.84		2.54 Rc		NA K	a: 1.0116019
Static Water Level	9.21 ft	280.72	289.56 SW	90.00 L/Rw			b: −0.094353
Depth to bottom of screen	17.00 ft	518.16	228.60 H	1.00 H/D	NA To		x: 61.6904402
(ft from ground level)			213.36 Ta	3.96 A	150.00 AH		y: 0.003
Boring Diameter	6.00 in	15.24	2.54 Rw	0.65 B	5.82 HR		
Casing Diameter	2.00 in	5.08	2.54 Rc	3.70 C	5.70 BH		
Screen Diameter	2.00 in	5.08	5.08 DS	ERR Ln[(D−H)/Rw]'	NA K in cm/sec		
Screen Length	10.00 ft	304.80	228.60 L	ERR Ln[(D−H)/Rw]			
Depth to Boundery	17.00 ft	518.16	228.60 D	ERR equation (8)			
Delta H at time 0 (Y0)	1.01 ft	30.83	30.83 H0 (Y0)	3.50 equation (9)			
Delta H at Time t (Yt)	0.003 ft	0.09	0.09 Ht (Yt)	3.50 Ln(Re/Rw)			
Time	62 sec		61.69 t	4.7E−03 equation (5)			
Ratio Kh/Kv	10		10.00 M				
Porosity of Filter Pack			0.00 P				

	cm/sec	gpd/ft2	ft/day
K (Bouwer−Rice)	4.7E−03	98.9	13.2
K (Hvorslev Time Lag)	NA	NA	NA
K (Hvorslev Variable Head)	NA	NA	NA

M. WALLACE & SON, INC.
HYDRAULIC CONDUCTIVITY TESTING AT MW-10
RISING HEAD TEST - TEST 1

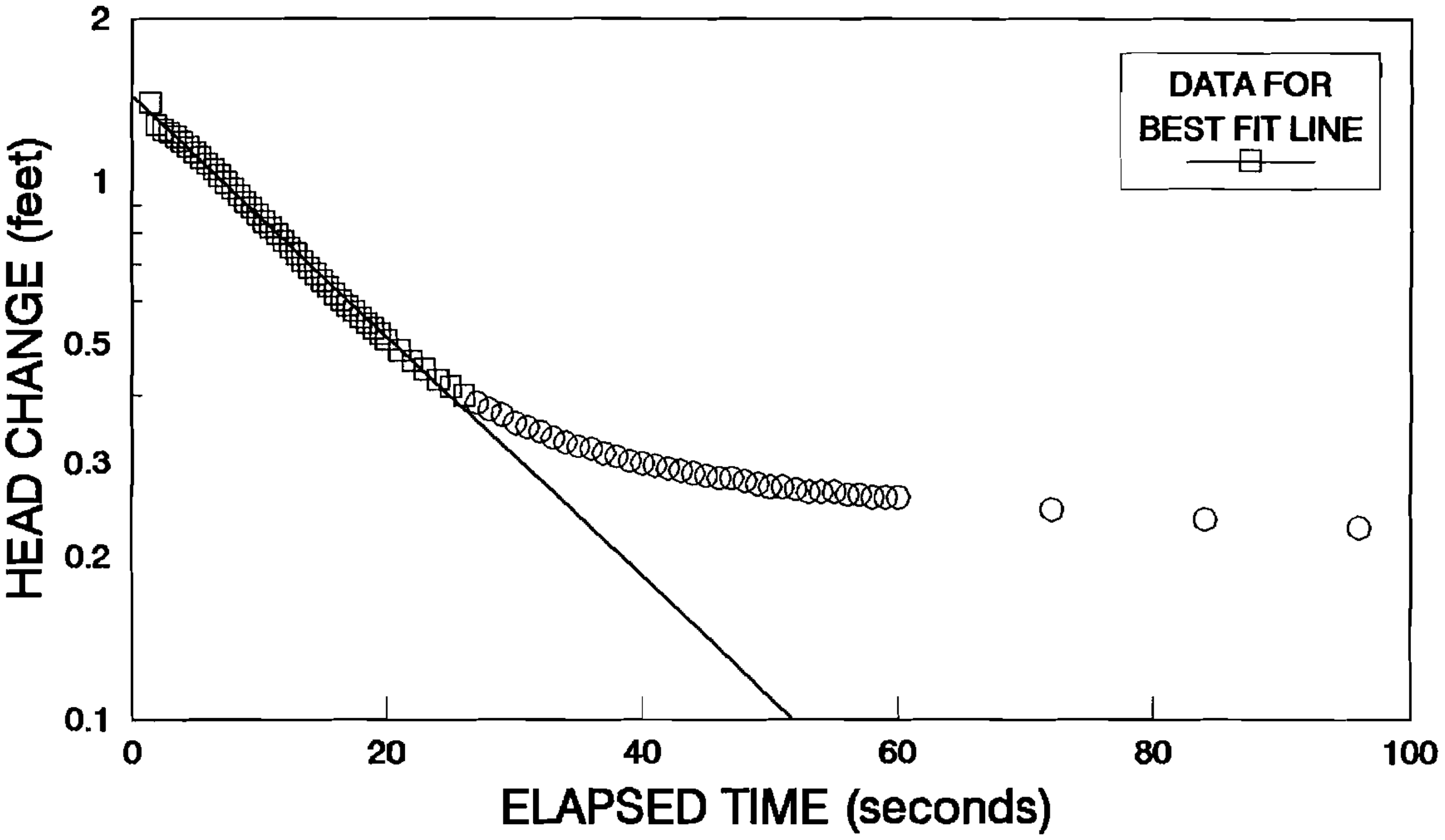


SLUGCOMP.WK1 S.J. Rossello, March 1988
Modified 6/10/92
Project: M. WALLACE & SON, INC.
Project No.: 36417
Well No.: MW−10
Test Date: 7/1/93
Formation Tested: OVERBURDEN
Rising (R) or Falling (F) Head Test: R2

Test Data			Worksheet	Bouwer−Rice Computation	Hvorslev Time Lag	Hvorslev Variable Head	
		(cm)					
Stickup	−0.29 ft	−6.84		2.54 Rc		NA K	
Static Water Level	9.21 ft	280.72	289.56 SW	90.00 L/Rw			
Depth to bottom of screen	17.00 ft	518.16	228.60 H	1.00 H/D	NA To		Graph Intercept
(ft from ground level)			213.36 Ts	3.96 A	150.00 AH		a: 1.442122
Boring Diameter	6.00 in	15.24	2.54 Rw	0.65 B	2.67 HR		b: −0.051603
Casing Diameter	2.00 in	5.08	2.54 Rc	3.70 C	5.70 BH		x: 51.7159997
Screen Diameter	2.00 in	5.08	5.08 DS	ERR Ln[(D−H)/Rw]'	NA K in cm/sec		y: 0.100
Screen Length	10.00 ft	304.80	228.60 L	ERR Ln[(D−H)/Rw]			
Depth to Boundary	17.00 ft	518.16	228.60 D	ERR equation (8)			
Delta H at time 0 (Y0)	1.44 ft	43.96	43.96 H0 (Y0)	3.50 equation (9)			
Delta H at Time t (Yt)	0.100 ft	3.05	3.05 Ht (Yt)	3.50 Ln(Re/Rw)			
Time	52 sec		51.72 t	2.5E−03 equation (5)			
Ratio Kh/Kv	10		10.00 M				
Porosity of Filter Pack			0.00 P				

	cm/sec	gpd/ft2	ft/day
K (Bouwer−Rice)	2.5E−03	54.1	7.2
K (Hvorslev Time Lag)	NA	NA	NA
K (Hvorslev Variable Head)	NA	NA	NA

M. WALLACE & SON, INC.
HYDRAULIC CONDUCTIVITY TESTING AT MW-10
RISING HEAD TEST - TEST 2

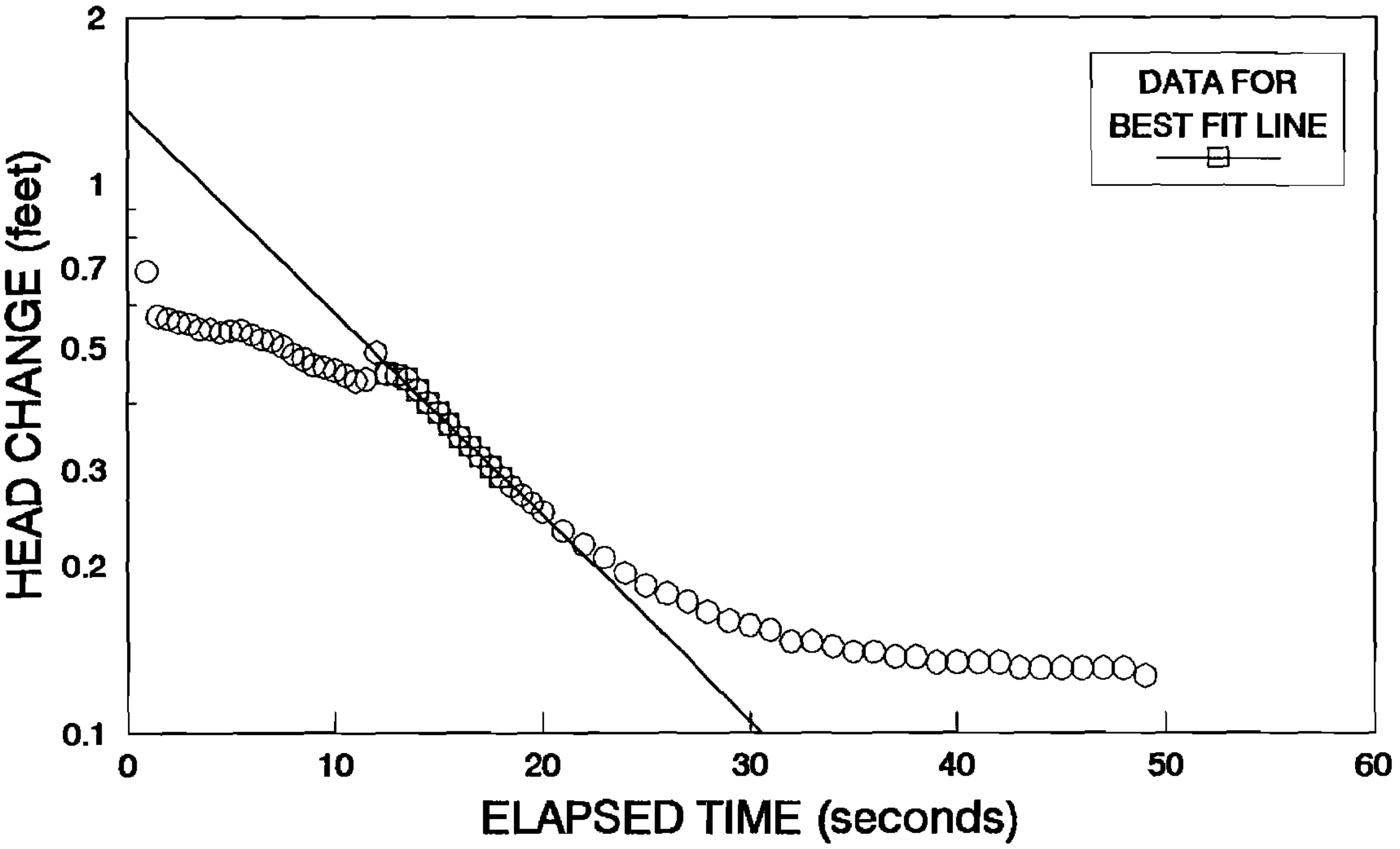


SLUGCOMP.WK1 S.J. Rossello, March 1988
Modified 6/10/92
Project: M. WALLACE & SON, INC.
Project No.: 36417
Well No.: MW−11
Test Date: 7/1/93
Formation Tested: OVERBURDEN
Rising (R) or Falling (F) Head Test: R

Test Data			Worksheet				
				Bouwer−Rice Computation	Hvorslev Time Lag	Hvorslev Variable Head	Graph Intercepts
		(cm)					
Stickup	1.33 ft	40.54		2.54 Rc		NA K	
Static Water Level	26.00 ft	853.44	812.90 SW	33.96 L/Rw			
Depth to bottom of screen	29.50 ft	899.16	86.26 H	1.00 H/D	NA To		
(ft from ground level)			746.76 Ts	2.50 A	56.60 AH		a: 1.3649085
Boring Diameter	6.00 in	15.24	2.54 Rw	0.36 B	2.61 HR		b: −0.085545
Casing Diameter	2.00 in	5.06	2.54 Rc	2.10 C	4.73 BH		x: 30.5531882
Screen Diameter	2.00 in	5.08	5.06 DS	ERR Ln[(D−H)/Rw]'	NA K in cm/sec		y: 0.100
Screen Length	5.00 ft	152.40	66.26 L	ERR Ln[(D−H)/Rw]			
Depth to Boundary	29.50 ft	899.16	86.26 D	ERR equation (8)			
Delta H at time 0 (Y0)	1.36 ft	41.60	41.60 H0 (Y0)	2.67 equation (9)			
Delta H at Time t (Yt)	0.100 ft	3.05	3.05 Ht (Yt)	2.67 Ln(Re/Rw)			
Time	31 sec		30.55 t	8.6E−03 equation (5)			
Ratio Kh/Kv	10		10.00 M				
Porosity of Filter Pack			0.00 P				

	cm/sec	gpd/ft2	ft/day
K (Bouwer−Rice)	8.6E−03	161.6	24.3
K (Hvorslev Time Lag)	NA	NA	NA
K (Hvorslev Variable Head)	NA	NA	NA

M. WALLACE & SON, INC.
HYDRAULIC CONDUCTIVITY TESTING AT MW-11
RISING HEAD TEST



Appendix J

Ground-Water Field Sampling Logs

ATTACHMENT 1

GROUND-WATER SAMPLING FIELD LOG

Project NIAGRA MOHAWK
Sampling Purpose ______
Well No. MW-9
Key No. 2537
HNU Background ______ Well ______

Project No. 3641775
Site Name M. WALLACE & SON, INC.
Sampling Personnel HEH/STH
Date/Time ____ In ____ Out 6-29-93 →
Weather Sunny / Hot.

I. Well Information FLUSH MOUNT WELL

Reference Point Marked on Casing Y N
Well Diameter ____ ID ____ OD 2-INCH
Well depth 18.45' from RP
Water table depth 3.14' from RP = T/C
Slug test Y N

Length of Inner Casing ____ above grade
Length of Outer Casing ____ above grade
Redevelop Y N

II. Well Water Information

Length of water column 15.3'
Volume of water in well 2.45 G x3 = 7.35 G
Volume of bailer ______

III. Evacuation Information

Volume of water removed from well 7.5 G
Did well go dry? Y [✓ N]

Evacuation method
Bailer (✓)
Evacuation rate ______

IV. Well Sampling

Container	Preservative	Time Sampled 6-29-93	Lab Sample No.	Analysis
2, 40-ML VIALS	HCl	17:45	GWMW9S	TCL VOLATILE
1, 2-L AMBER	—	17:45	GWMW9S	TCL SVOC

V. Ground-Water Characteristics/After Well Evacuation

Temperature 60.5° C
Conductivity 1,303 umhos
pH 6.76
Dissolved Oxygen 5.2 mg/L

Film NONE
Redline? Y N
____ 10; ____ 4; ____ 7
(calibration standard readings)

VI. Miscellaneous Observations/Problems

WATER - LIGHT BROWN & MODERATELY TURBID

VII. Sample Destination

Laboratory Via FED EX By ______

Hillary E. Hollister
Field Personnel

ALSO:

1, 1-L PLASTIC	NAOH	17:45	GWMW9S	CYANIDE
1, 1-L "	HNO_3	17:45	GWMW9S	FILTERED METALS
1, 1-L "	HNO_3	17:45	GWMW9S	UNFILTERED METALS

1, 2-L AMBER	—	17:45	GWMW9S	LAB WILL FILTER F[illegible]
1, 2-L AMBER	—	17:45	GWMW9S	UNFILTERED PCBs

ATTACHMENT 1

GROUND-WATER SAMPLING FIELD LOG

Project NIAGRA MOHAWK
Sampling Purpose ______
Well No. MW-10
Key No. 2537
HNU Background ______ Well ______

Project No. 3641775
Site Name M. WALLACE & SON, INC.
Sampling Personnel HEH / STH
Date/Time ____ In ____ Out 6-29-93 →
Weather Sunny, Hot.

I. Well Information WELL IS FLUSH MOUNT.

Reference Point Marked on Casing Y N
Well Diameter ____ ID ____ OD 2-INCH
Well depth 16.1' from RP
Water table depth 8.78' from RP = T/C
Slug test Y N

Length of Inner Casing ____ above grade
Length of Outer Casing ____ above grade
Redevelop Y N

II. Well Water Information

Length of water column 7.32'
Volume of water in well 1.14 G X3 = 3.42G
Volume of bailer ______

III. Evacuation Information

Volume of water removed from well 4 G
Did well go dry? Y [✓ N]

Evacuation method
Bailer (✓)
Evacuation rate ______

IV. Well Sampling

Container	Preservative	Time Sampled	Lab Sample No.	Analysis
		6-29-93		
2, 40-ML VIAL	HCl	18:50	GWMW10S	TCL VOC
1, 2-L AMBER	—	"	"	TCL SVOC

V. Ground-Water Characteristics/After Well Evacuation

Temperature 60.1°C
Conductivity 2,020 umhos
pH 6.85
Dissolved Oxygen 3 mg/L

Film NONE
Redline? Y N
____ 10; ____ 4; ____ 7
(calibration standard readings)

VI. Miscellaneous Observations/Problems

MODERATELY TURBID - LT BROWN COLOR

VII. Sample Destination

Laboratory Via FED EX By ______

Hillary E [illegible]
Field Personnel

4/28/93
193146R

1, 1-L PLASTIC	NACH	18:50	GWMW105	CYANIDE
1, 1-L PLASTIC	HNO_3	↓	↓	FILTERED META
1, 1-L PLASTIC	HNO_3			UNFILTERED MET
1, 2-L AMBER	—			LAB WILL FILTER PC
1, 2-L AMBER	—			UNFILTERED PC

ATTACHMENT 1

GROUND-WATER SAMPLING FIELD LOG

Project NIAGRA MOHAWK
Sampling Purpose ______
Well No. MW-11
Key No. 2537
HNU Background ______ Well ______

Project No. 3641775
Site Name M. WALLACE & SON, INC.
Sampling Personnel HEH / STH
Date/Time ____ In ____ Out 6-29-93 →
Weather Sunny / Hot.

I. Well Information

Reference Point Marked on Casing Y N — WELL IS SCREENED IN OVERBURDEN
Well Diameter ____ ID 2-INCH OD
Well depth 30.68' from RP= T/C
Water table depth 27.88' from RP= T/C
Slug test Y N

ELEVATION
Length of Inner Casing 1.33' above grade — 966.53
Length of Outer Casing 1.68' above grade — 966.88'
Redevelop Y N — 965.2 GROUND

II. Well Water Information

Length of water column 2.8'
Volume of water in well 0.49 G × 3 = 1.47 G
Volume of bailer ______

III. Evacuation Information

Volume of water removed from well 4 G
Did well go dry? Y [✓ N]

Evacuation method
Bailer (✓)
Evacuation rate ______

IV. Well Sampling

Container	Preservative	Time Sampled	Lab Sample No.	Analysis
2, 40-ML VIALS	HCL	6-29-93 19:40	GWMW11S	TCL VOC
1, 2-L AMBER	—			TCL SVOC →

V. Ground-Water Characteristics/After Well Evacuation

Temperature 58.3°C
Conductivity 1,200 umhos
pH 6.68
Dissolved Oxygen 1.9 mg/L

Film NONE.
Redline? Y N
____ 10; ____ 4; ____ 7
(calibration standard readings)

VI. Miscellaneous Observations/Problems

WATER HIGHLY TURBID & BROWN.

VII. Sample Destination

Laboratory Via FED EX By ______

Hillary E Hollister
Field Personnel

1, 1-L PLASTIC	NAOH	19:46	GWMW115	CYANIDE
1, 1-L PLASTIC	HNO_3	↓	↓	FILTERED METALS
1, 1-L PLASTIC	HNO_3	↓	↓	UNFILTERED METALS
1, 2-L AMBER	—	↓	↓	LAB WILL FILTER PCBs
1, 2-L AMBER	—	↓	↓	UNFILTERED PCBs

ATTACHMENT 1

GROUND-WATER SAMPLING FIELD LOG

Project NIAGRA MOHAWK
Sampling Purpose ______
Well No. MW-6
Key No. 2537
HNU Background ______ Well ______

Project No. 3641775
Site Name M. WALLACE & SON, INC.
Sampling Personnel HEH / STH.
Date/Time ____ In ____ Out 6-29-93 → 6-30-9
Weather Sunny / Hot.

I. Well Information

Reference Point Marked on Casing Y N
Well Diameter ____ ID ____ OD 4-IN CASING
Well depth 51' from RP 3-IN CORE
Water table depth 28.78 from RP =TOC
Slug test Y N

Length of Inner Casing ____ above grade
Length of Outer Casing 1.27 above grade
Redevelop Y N

ELEVATION
967.47
966.2 GROUN

II. Well Water Information

Length of water column 22.2'
Volume of water in well 8.08 G x 3 = 24.2 G
Volume of bailer ______

III. Evacuation Information

Volume of water removed from well 25 G
Did well go dry? Y [✓ N]

Evacuation method
Bailer (✓)
Evacuation rate ______

IV. Well Sampling

Container	Preservative	Time Sampled	Lab Sample No.	Analysis
8, 40-mL VIALS	HCL	6-30-93 10:30	GWMW6S	TCL VOC
4, 2-L AMBER	—		GWMW6S1	TCL SVOC.
				PLUS MS/MSD.

V. Ground-Water Characteristics/After Well Evacuation

Temperature 56°C
Conductivity 822
pH 6.43

DISSOLVED OXYGEN 3.4 mg/L

Film NONE
Redline? Y N
____ 10; ____ 4; ____ 7
(calibration standard readings)

VI. Miscellaneous Observations/Problems

TOP OF WATER COLUMN - CLEAR
AFTER TWO BAILS, WATER TURNED TURBID AND BROWN.
TOOK DUPLICATE SAMPLE HERE LABELLED AS GWMW6S1
ALSO SAMPLE DESIGNATED FOR MS/MSD.

VII. Sample Destination

Laboratory Via FED EX By ______

Hillary E Hollister
(Field Personnel)

4/28/93
193146R

+, 1-L PLASTIC NAOH
+, 1-L PLASTIC HNO_3
1, 1-L PLASTIC HNO_3
~~, 1-L PLASTIC~~
, 2-L AMBER —
, 2-L AMBER —

10:30 ↓

GWMW6S
GWMW6SD

CYANIDE
FILTERED META
UNFILTERED META

LAB WILL FILTER PCB
~~LAB W~~
UNFILTERED PCBs

ATTACHMENT 1

GROUND-WATER SAMPLING FIELD LOG

Project NIAGRA MOHAWK
Sampling Purpose ______
Well No. MW-3
Key No. NIAGRA MOHAWK KEY
HNU Background ______ Well ______

Project No. 3641775
Site Name M. WALLACE & SON, INC.
Sampling Personnel HEH / STH
Date/Time ____ In ____ Out 6-29-93 ->6-30-93
Weather Sunny / Hot.

I. Well Information

Reference Point Marked on Casing Y N
Well Diameter ____ ID ____ OD 4-IN CASING 3-IN CORE
Well depth 35.7' from RP
Water table depth 10.5' from RP=TOC
Slug test Y N

ELEVATION: 954.92
Length of Inner Casing ____ above grade
955.2 GROUN
Length of Outer Casing 1.72 above grade
Redevelop Y N

II. Well Water Information

Length of water column 25.2'
Volume of water in well 9.18G x 3 = 27.5G
Volume of bailer ______

III. Evacuation Information

Volume of water removed from well 16 GALLONS
Did well go dry? [✓ Y] N

Evacuation method
Bailer (✓)
Evacuation rate ______

IV. Well Sampling

Container	Preservative	Time Sampled	Lab Sample No.	Analysis
		6-30-93		
2, 40-ML VIAL	HCL	13:00	GWMW3S	TCL VOC
1, 2-L AMBER	—			TCL SVOC →

V. Ground-Water Characteristics/After Well Evacuation

Temperature 61.3°C
Conductivity 1,525 umhos
pH 6.7
Dissolved Oxygen 3.55 mg/L

Film NONE
Redline? Y N
____ 10; ____ 4; ____ 7
(calibration standard readings)

VI. Miscellaneous Observations/Problems

TOP OF WATER COLUMN CLEAR THEN AFTER TWO BAILS WATER TURNED ORANGE/BROWN AND VERY TURBID.

VII. Sample Destination

Laboratory Via FED EX By ______

Hillary E Hollister
Field Personnel

-, 1-L PLASTIC	NAOH	CYANIDE
1, 1-L PLASTIC	HNO_3	FILTERED METALS
1, 1-L PLASTIC	HNO_3	UNFILTERED METALS
1, 2-L AMBER	—	LAB WILL FILTER PCBs
1, 2-L AMBER	—	UNFILTERED PCBs

ATTACHMENT 1

GROUND-WATER SAMPLING FIELD LOG

Project NIAGRA MOHAWK
Sampling Purpose ______
Well No. MW-2
Key No. NIAGRA MOHAWK KEY
HNU Background ______ Well ______

Project No. 3641775
Site Name N. WALLACE & SON, INC.
Sampling Personnel HEH / STH
Date/Time ____ In ____ Out 6-29-93 → 6-30-93
Weather Sunny / Hot.

I. Well Information

Reference Point Marked on Casing Y N
Well Diameter ____ ID ____ OD 4-IN CASING 3-IN CORE
Well depth 26.6' from RP
Water table depth 11.16' from RP = TOC
Slug test Y N

Length of Inner Casing ____ above grade
Length of Outer Casing 1.67 above grade
Redevelop Y N

ELEVATION:
958.57
956.9 GROUN

II. Well Water Information

Length of water column 15.4'
Volume of water in well 5.51 G x 3 = 16.5 G
Volume of bailer ______

III. Evacuation Information

Volume of water removed from well 17 G
Did well go dry? Y [✓ N]

Evacuation method
Bailer (✓)
Evacuation rate ______

IV. Well Sampling

Container	Preservative	Time Sampled	Lab Sample No.	Analysis
		6-30-93		
2, 40-mL VIAL	HCL	13:30	GWMW2S	TCL VOC
1, 2-L AMBER	—			TCL SVOC

V. Ground-Water Characteristics/After Well Evacuation

Temperature 60.4°C
Conductivity 2,380 umhos
pH 6.73
Dissolved Oxygen 3.6 mg/L

Film NONE
Redline? Y N
____ 10; ____ 4; ____ 7
(calibration standard readings)

VI. Miscellaneous Observations/Problems

WATER HIGHLY TURBID

VII. Sample Destination

Laboratory Via FED EX By ______

Hillary E Hollister
Field Personnel

4/28/93
193146R

1, 1-L PLASTIC	NaOH	CYANIDE
1, 1-L PLASTIC	HNO_3	FILTERED METALS
1, 1-L PLASTIC	HNO_3	UNFILTERED METALS
1, 2-L AMBER	—	LAB WILL FILTER PCBs
1, 2-L AMBER	—	UNFILTERED PCBs

ATTACHMENT 1

GROUND-WATER SAMPLING FIELD LOG

Project NIAGRA MOHAWK
Sampling Purpose ______
Well No. MW-4
Key No. NIAGRA MOHAWK KEY
HNU Background ______ Well ______

Project No. 3641775
Site Name M. WALLACE & SON., INC.
Sampling Personnel HEH / STH
Date/Time ____ In ____ Out 6-29-93 → 6-30-93
Weather Sunny / HOT.

I. Well Information

ELEVATION:
956.81
955.1 GROUND

Reference Point Marked
on Casing Y N
Well Diameter ____ ID ____ OD 4-IN CASING 3-IN CORE
Well depth 35.3' from RP
Water table depth 4.4' from RP=TOC
Slug test Y N

Length of Inner Casing
____ above grade
Length of Outer Casing
1.71 above grade
Redevelop Y N

II. Well Water Information

Length of water column 30.9'
Volume of water in well 11.38 G *3= 34.1G
Volume of bailer ______

III. Evacuation Information

Volume of water removed
from well 16 G
Did well go dry? [✓ Y] N

Evacuation method
Bailer (✓)
Evacuation rate ______

IV. Well Sampling

Container	Preservative	Time Sampled	Lab Sample No.	Analysis
		6-30-93		
2, 40-ML VIAL	HCL	14:00	GWMW4S	TCL VOC
1, 2-L AMBER	—			TCL SVOC →

V. Ground-Water Characteristics/After Well Evacuation

Temperature 60.5°C
Conductivity 956 umhos
pH 6.5
Dissolved Oxygen 3.7 mg/L

Film NONE
Redline? Y N
____ 10; ____ 4; ____ 7
(calibration standard readings)

VI. Miscellaneous Observations/Problems

WATER - BROWN, SILTY, HIGHLY TURBID

VII. Sample Destination

Laboratory Via FED EX By ______

Hillary E
Field Personnel

4/28/93
193146R

1, 1-L PLASTIC	NaOH	CYANIDE
"	HNO_3	FILTERED METALS
"	HNO_3	UNFILTERED METALS
1, 2-L AMBER	—	LAB WILL FILTER PCBs
"	—	UNFILTERED PCBs

ATTACHMENT 1

GROUND-WATER SAMPLING FIELD LOG

Project NIAGRA MOHAWK
Sampling Purpose ______
Well No. MW-7
Key No. 2537
HNU Background ______ Well ______

Project No. 3641775
Site Name M. WALLACE & SON, INC.
Sampling Personnel HEH/STH
Date/Time ___ In ___ Out 6-29-93 → 7-1-9
Weather SUNNY / HOT.

I. Well Information

Reference Point Marked on Casing Y N
Well Diameter ___ ID ___ OD 4-IN CASING 3-IN CORE
Well depth 46.51' from RP
Water table depth 8.3' from RP = TOC
Slug test Y N

ELEVATION:

Length of Inner Casing ___ above grade 999.17
Length of Outer Casing 1.57 above grade 997.6 GROUN
Redevelop Y N

II. Well Water Information

Length of water column 38.21'
Volume of water in well 14.3 G x 3 = 42.9 G
Volume of bailer ______

III. Evacuation Information

Volume of water removed from well 19 G
Did well go dry? [✓ Y] N

Evacuation method
Bailer (✓)
Evacuation rate ______

IV. Well Sampling

Container	Preservative	7-1-93 Time Sampled	Lab Sample No.	Analysis
2, 40-ML VIALS	HCL	13:15	GWMW7S	TCL VOC
1, 2-L AMBER	—			TCL SVOC

V. Ground-Water Characteristics/After Well Evacuation

Temperature 61.3°C
Conductivity 612 umhos
pH 7.05
Dissolved Oxygen 3.0 mg/L

Film NONE
Redline? Y N
___ 10; ___ 4; ___ 7
(calibration standard readings)

VI. Miscellaneous Observations/Problems

TOP OF WATER COLUMN - CLEAR

VII. Sample Destination

Laboratory Via FED EX By ______

Hillary E Hollister
Field Personnel

1, 1-L PLASTIC	NaOH	CYANIDE
"	HNO_3	FILTERED METALS
"	HNO_3	UNFILTERED METALS
1, 2-L AMBER	—	LAB WILL FILTER PCBs
"	—	UNFILTERED PCBs

ATTACHMENT 1

GROUND-WATER SAMPLING FIELD LOG

Project NIAGRA MOHAWK
Sampling Purpose ______
Well No. MW-1
Key No. NIAGRA MOHAWK KEY
HNU Background ______ Well ______

Project No. 3041775
Site Name M. WALLACE & SON. INC.
Sampling Personnel HEH / STH
Date/Time ____ In ____ Out 6-29-93 → 7-1-93
Weather Sunny Hot.

I. Well Information

Reference Point Marked on Casing [✓ Y] N
Well Diameter ____ ID ____ OD 4-IN CASING
Well depth 37.3' from RP 3-IN CORE
Water table depth 26' from RP = TOC
Slug test Y N

Length of Inner Casing ____ above grade
Length of Outer Casing 2.05 above grade
Redevelop Y N

ELEVATION:
996.15
994.1 GROUND

II. Well Water Information

Length of water column 11.3'
Volume of water in well 4.04 G X3 = 12.1 G
Volume of bailer ______

III. Evacuation Information

Volume of water removed from well 4.5 G
Did well go dry? [✓ Y] N

Evacuation method
Bailer (✓)
Evacuation rate ______

IV. Well Sampling — ONLY ENOUGH VOLUME TO COLLECT THE FOLLOWING:

Container	Preservative	Time Sampled	Lab Sample No.	Analysis
		7-1-93		
2, 40-ML VIALS	HCL	13:45	GWMW01S	TCL VOC
1, 2-L AMBER	—	"	"	FILTERED PCB

V. Ground-Water Characteristics/After Well Evacuation

Temperature ______
Conductivity ______
pH ______

NOT ENOUGH SAMPLE VOLUME

Film NONE
Redline? Y N
____ 10; ____ 4; ____ 7
(calibration standard readings)

VI. Miscellaneous Observations/Problems

TOP OF H2O COLUMN CLEAR.

VII. Sample Destination

Laboratory Via FED EX By ______

Hillary E Hollister
Field Personnel

Appendix K

Air Emission Results

REMEDIAL SERVICES EAST

INDUSTRIAL HYGIENE SAMPLE ANALYSIS REQUEST FORM

DATE: 11/7/93

TO: Steven N. Delp, Director
Spotts, Stevens & McCoy, Inc.

FROM: Greg Campbell

SUBJECT: ANALYSIS OF AIR MONITORING SAMPLES

Project Name: Niagara Mohawk Location: West ST. Cobleskill N.Y

Please analyze the enclosed air monitoring samples:

Analysis: See Attached

Samples Collected By: G. Campbell

Please send billing information and analysis to:
CWM office Trailers
West ST. Cobleskill N.Y 12043
Fax # 518-234-7341

Also, please send copies of analytical results to:

Therese Perrette
Health and Safety Manager
Remedial Services East
100 Nassau Park Blvd.
Princeton, NJ 08540

SAMPLE SUMMARY:

Sample Number	Air Volume (liter)	Media Type
001	1.22	Florisil/Cassette
002	FB	Florisil/Cassette

RSEAIR4(10/92)

CHEMICAL WASTE MANAGEMENT
REMEDIAL SERVICES GROUP
INDUSTRIAL HYGIENE
PERSONAL AIR MONITORING
CHAIN OF CUSTODY RECORD
HAZARDOUS MATERIALS

Location of Sampling: ________ Producer ________ Hauler ________
Disposal Site ________ Other Project 67317

Company's Name Chemical Waste Management Telephone 1-518-234-7320

Address West ST. Office Trailers, Cobleskill NY 12043
Number Street City State Zip

Collector's Name G. Campbell Telephone (518) 234-7320

Date Sampled 1/7/93 Time Sampled ________ Minutes

Collector Samples No	No of Containers Containers	Sample Description/Source
001	2	Florisil / Cassette
002	2 Field Blank	Florisil / Cassette

Samples (s) Submitted to:

1. Spotts, Steve & McCoy, 345 N. Wyomissing Blvd.
Reading, PA 19610 (215)376-6581
Name of Organization

2. ________
Name of Organization

*Chain of Possession:

Signature	Title	Inclusive Dates
1.	SSO	1/7/93
2.		
3.		
4.		
5.		

"Certification of Representative Sample" attached: ____ Yes ____ No
If No, Explain:

*Note: Apparent gaps/breaks in the "inclusive dates" section of the "Chain of Possession" Section are covered by site sample shipping/receiving logs.

Print name and address of person to whom the results should be sent on the reverse side of this sheet.

Remedial Services Group Form C (3/1/91)

CHEMICAL WASTE MANAGEMENT
REMEDIAL SERVICES EAST
INDUSTRIAL HYGIENE
AIR MONITORING SAMPLE RECORD

ype of Sample: Personal/Area

Site Code: 67317

ocation: Niagara Mohawk

Date: 1/7/93

mployee/Area: Ivan Smith

Sample Number: 001

SN: 180-40-5280

Area: HFV/Quarry Pond

ob Title: Operator

peration Monitored: debris removal

ersonal Protective Equipment

Eye Protection: Full Face Resperator

Respirator: MSA

Gloves/Boots: Latex, Cotton, Nytrile/ Poly, Overboots

Clothing: Poly Tyvek (2)

Other: Tape

ump Number: 502359

Start Calibration: 50.61

Sample Start Time: 1230

End Calibration: 47.12

Sample End Time: 1650

ampling Badge Number:

Sample Duration: 260 min

Manufacturer: SKC

Sample Volume: 1.22 Ltrs

emarks: i.e. possible interferences; weather conditions, temperature, ressure, level of exertion, etc:

Wet, Muddy work area

amples collected by: G. Campbell

alysis Requested: PCBs

ampling/Analytical Method: NIOSH - 5503

aboratory: SPOTTS, STEVENS & MCCOY

ample Results:

ollection Media: Florosil/Cassette

AIP1 (10/92)

page 1 of 2 14JAN93_1502_13_W0747

SSM /Laboratories

ANALYTICAL REPORT

Client: Chemical Waste Management, Inc.

Report to: Greg Campbell
Chemical Waste Management, Inc.
West Street Office Trailers
Cobleskill NY 12043

Project: 118467
Received: 08-JAN-93
Reported: 14-JAN-93

PURCHASE ORDER: 842482

Copy to: T. Perrette, Chemical Waste Management, Inc. ENRAC

Project Description: Niagara Mohawk
West St Cobleskill NY

Sampled: 07-JAN-93 By: G. Campbell

	RESULT	UNITS	CONCENTRATION	UNITS	METHOD
001 Air Volume: 1.22 L SSM Sample: 1071487					
POLYCHLORINATEDBIPHENYLS (PCBS)					5503
PCB 1016	< 0.03	ug/sample	< 25	ug/m3	
PCB 1221	< 0.03	ug/sample	< 25	ug/m3	
PCB 1232	< 0.03	ug/sample	< 25	ug/m3	
PCB 1242	< 0.03	ug/sample	< 25	ug/m3	
PCB 1248	< 0.03	ug/sample	< 25	ug/m3	
PCB 1254	< 0.06	ug/sample	< 50	ug/m3	
PCB 1260	< 0.06	ug/sample	< 50	ug/m3	
002 Air Volume: Field Blank SSM Sample: 1071488					
POLYCHLORINATEDBIPHENYLS (PCBS)					5503
PCB 1016	< 0.03	ug/sample			
PCB 1221	< 0.03	ug/sample			
PCB 1232	< 0.03	ug/sample			
PCB 1242	< 0.03	ug/sample			
PCB 1248	< 0.03	ug/sample			
PCB 1254	< 0.06	ug/sample			

Client: Chemical Waste Management, Inc.
Project: 118467

002
SSM Sample: 1071488 - continued

	RESULT	UNITS	CONCENTRATION	UNITS	METHOD
PCB 1260	< 0.06	ug/sample			

< Indicates less than the limit of quantitation.

Final concentrations were calculated from air volumes supplied by client.

Respectfully submitted,

Steven N. Delp

Steven N. Delp, CIH,
Director, Industrial Hygiene Services

Employee name *Ivan Smith* Employee SSN *130 40 [illegible]*

Location *Niagara Mohawk*
Cobleskill NY

Date: *1/20/93*

Dear *Ivan*:

Providing a working environment which will protect your safety and health is a high priority with Rust Remedial Services.

One of the ways to assure your protection is to sample the air in your workplace. On *1/7/93*, you wore a sampling device which measured the amount *PCB* in the air. The filter was sent to a laboratory, analyzed and the results were compared to the levels established by the American Conference of Governmental Industrial Hygienists (ACGIH). These levels are called Threshold Limit Values or TLV's and represent conditions and concentrations of atmospheric contaminants to which someone may be repeatedly exposed, day after day, without adverse effect.

The results of the sample that you wore were *<400*% of the TLV's. Although these levels were less than the TLV's, you should continue to use your protective equipment in those areas where required and continue to wash before eating, smoking or drinking and shower before you go home.

If you have any questions about the samples or other questions about workplace safety and health, please contact me at phone# *Onsite*.

Sincerely,

(Dust, metals, asbestos, PCB's)
c:\ \forms\below.tlv

REMEDIAL SERVICES EAST

INDUSTRIAL HYGIENE SAMPLE ANALYSIS REQUEST FORM

DATE: 1/26/93

TO: Steven N. Delp, Director
Spotts, Stevens & McCoy, Inc.

FROM:

SUBJECT: ANALYSIS OF AIR MONITORING SAMPLES

Project Name: Niagara Mohawk Location: West ST. Cobleskill NY.

Please analyze the enclosed air monitoring samples:

Analysis: See Attached

Samples Collected By: G. Campbell

Please send billing information and analysis to:

CWM Office Trailers
W. ST. Cobleskill NY 12043
Fax # 518-234-7341

Also, please send copies of analytical results to:

Therese Perrette
Health and Safety Manager
Remedial Services East
100 Nassau Park Blvd.
Princeton, NJ 08540

SAMPLE SUMMARY:

Sample Number	Air Volume (liter)	Media Type
# 003	1.93	Florisil/Cassette
# 004	1.89	Florisil/Cassette
# 005	FB	Florisil/Cassette

RSEAIR4(10/92)

CHEMICAL WASTE MANAGEMENT
REMEDIAL SERVICES GROUP
INDUSTRIAL HYGIENE
PERSONAL AIR MONITORING
CHAIN OF CUSTODY RECORD
HAZARDOUS MATERIALS

Location of Sampling: ________ Producer ________ Hauler ________
Disposal Site ________ other ________

Company's Name Chemical Waste Management Telephone 1-518-234-7320

Address West St. Office Trailers, Cobleskill, NY 12043
Number Street City State Zip

Collector's Name G. Campbell Telephone ( ) 518-234-7320

Date Sampled 1/26/93 Time Sampled 360 Minutes

Collector Samples No	No of Containers Containers	Sample Description/Source
003	2	Florisil/Cassette
004	2	Florisil/Cassette
005	2 FB	Florisil/Cassette

Samples (s) Submitted to:

1. Spotts, Steve & McCoy, 345 N. Wyomissing Blvd.
Reading, PA 19610 (215)376-6581
Name of Organization

2. ________
Name of Organization

*Chain of Possession:

	Signature	Title	Inclusive Dates
1.		550	1/26/93
2.			
3.			
4.			
5.			

"Certification of Representative Sample" attached: ____ Yes ____ No
If No, Explain:

*Note: Apparent gaps/breaks in the "inclusive dates" section of the "Chain of Possession" section are covered by site sample shipping/receiving logs.

rint name and address of person to whom the results should be sent
n the reverse side of this sheet.

Remedial Services Group Form C (3/1/91)

CHEMICAL WASTE MANAGEMENT
REMEDIAL SERVICES EAST
INDUSTRIAL HYGIENE
AIR MONITORING SAMPLE RECORD

Type of Sample: Personal/Area

Site Code: 492317

Location: Perimeter, upwind

Date: 1/26/93

Employee/Area: Fence

Sample Number: 003

SSN: —

Area: —

Job Title: —

Operation Monitored: Site activity

Personal Protective Equipment

Eye Protection: —

Respirator: —

Gloves/Boots: —

Clothing: —

Other: —

Pump Number: 502459

Start Calibration: 53.85

Sample Start Time: 1045

End Calibration: 56.60

Sample End Time: 1645

Sampling Badge Number: —

Sample Duration: 360 min

Manufacturer: SKC

Sample Volume: 1.93 Ltrs.

Remarks: i.e. possible interferences, weather conditions, temperature, pressure, level of exertion, etc:

Lt. winds, Cold to mild,

Samples collected by: G. Campbell

Analysis Requested: PCBs

Sampling/Analytical Method: NIOSH - 5503

Laboratory: SPOTTS, STEVENS & MCCOY

Sample Results:

Collection Media: Florosil/Cassette

SE.AIR3 (10/92)

CHEMICAL WASTE MANAGEMENT
REMEDIAL SERVICES EAST
INDUSTRIAL HYGIENE
AIR MONITORING SAMPLE RECORD

Type of Sample: Personal/Area

Site Code: 492317

Location: Perimeter, downwind

Date: 1/26/93

Employee/Area: Fence

Sample Number: 004

SSN: —

Area: —

Job Title: —

Operation Monitored: Site Activity

Personal Protective Equipment

Eye Protection: —

Respirator: —

Gloves/Boots: —

Clothing: —

Other: —

Pump Number: 502359

Start Calibration: 52.50

Sample Start Time: 1045

End Calibration: 52.97

Sample End Time: 1645

Sampling Badge Number: —

Sample Duration: 360 min

Manufacturer: SKC

Sample Volume: 1.89 Ltrs.

Remarks: i.e. possible interferences, weather conditions, temperature, pressure, level of exertion, etc.:

Lt. winds, Cold to mild

Samples collected by: G. Campbell

Analysis Requested: PCBs

Sampling/Analytical Method: NIOSH - 5503

Laboratory: SPOTTS, STEVENS & MCCOY

Sample Results:

Collection Media: Florosil/Cassette

RSE.AIR3 (10/92)

④

119127

REMEDIAL SERVICES EAST

INDUSTRIAL HYGIENE SAMPLE ANALYSIS REQUEST FORM

DATE: 1/26/93

TO: Steven N. Delp, Director
Spotts, Stevens & McCoy, Inc.

FROM:

SUBJECT: **ANALYSIS OF AIR MONITORING SAMPLES**

Project Name: Niagara Mohawk Location: West ST. Cobleskill NY.

Please analyze the enclosed air monitoring samples:

Analysis: See Attached

Samples Collected By: G. Campbell

Please send billing information and analysis to:

CWM office Trailers
W. ST. Cobleskill NY 12043
Fax # 518-234-7341

Also, please send copies of analytical results to:

Therese Perrette
Health and Safety Manager
Remedial Services East
100 Nassau Park Blvd.
Princeton, NJ 08540

SAMPLE SUMMARY:

Sample Number	Air Volume (liter)	Media Type
# 003	1.93	Florisil/Cassette
# 004	1.89	Florisil/Cassette
# 005	FB	Florisil/Cassette

RSEAIR4(10/92)

①

CHEMICAL WASTE MANAGEMENT
REMEDIAL SERVICES GROUP
INDUSTRIAL HYGIENE
PERSONAL AIR MONITORING
CHAIN OF CUSTODY RECORD
HAZARDOUS MATERIALS

Location of Sampling: ________ Producer __________ Hauler ______
Disposal Site ________ Other ____________________

Company's Name Chemical Waste Management Telephone 1-518-234-7320

Address West St. Office Trailers, Cobleskill, NY 12043
Number Street City State Zip

Collector's Name G. Campbell Telephone ( ) 518-234-7320

Date Sampled 1/26/93 Time Sampled 360 Minutes

Collector Samples No	No of Containers Containers	Sample Description/Source
003	2	Florisil/Cassette
004	2	Florisil/Cassette
005	2 FB	Florisil/Cassette

Samples (s) Submitted to:

1. Spotts, Steve & McCoy, 345 N. Wyomissing Blvd.
Reading, PA 19610 (215)376-6581
Name of Organization

2. ____________________
Name of Organization

*Chain of Possession:

	Signature	Title	Inclusive Dates
1.		SSO	1/26/93
2.	Tammy Cooley	Sample Admin.	2/4/93 1100
3.			
4.			
5.			

"Certification of Representative Sample" attached: ____ Yes ____ No
If No, Explain:

____

*Note: Apparent gaps/breaks in the "inclusive dates" section of the "Chain of Possession" Section are covered by site sample shipping/receiving logs.

Print name and address of person to whom the results should be sent on the reverse side of this sheet.

CHEMICAL WASTE MANAGEMENT
REMEDIAL SERVICES EAST
INDUSTRIAL HYGIENE
AIR MONITORING SAMPLE RECORD

Type of Sample: Personal/Area

Site Code: 492317

Location: Perimeter, upwind

Date: 1/26/93

Employee/Area: Fence

Sample Number: 003

SSN: —

Area: —

Job Title: —

Operation Monitored: Site activity

Personal Protective Equipment

Eye Protection: —

Respirator: —

Gloves/Boots: —

Clothing: —

Other: —

Pump Number: 502459

Start Calibration: 53.85

Sample Start Time: 1045

End Calibration: 56.60

Sample End Time: 1645

Sampling Badge Number: —

Sample Duration: 360 min

Manufacturer: SKC

Sample Volume: 1.93 Ltrs.

Remarks: i.e. possible interferences, weather conditions, temperature, pressure, level of exertion, etc:

LT winds, Cold to mild,

Samples collected by: G. Campbell

Analysis Requested: PCBs

Sampling/Analytical Method: NIOSH - 5503

Laboratory: SPOTTS, STEVENS & MCCOY

Sample Results:

Collection Media: Florosil/Cassette

PSE.AIR3 (10/92)

CHEMICAL WASTE MANAGEMENT
REMEDIAL SERVICES EAST
INDUSTRIAL HYGIENE
AIR MONITORING SAMPLE RECORD

pe of Sample: Personal/Area

Site Code: 492317

Location: Perimeter, downwind

Date: 1/26/93

Employee/Area: Fence

Sample Number: 004

SSN: —

Area: —

Job Title: —

Operation Monitored: Site Activity

Personal Protective Equipment

Eye Protection: —

Respirator: —

Gloves/Boots: —

Clothing: —

Other: —

Pump Number: 502359

Start Calibration: 52.50

Sample Start Time: 1045

End Calibration: 52.97

Sample End Time: 1645

Sampling Badge Number: —

Sample Duration: 360 min

Manufacturer: SKC

Sample Volume: 1.89 Ltrs.

Remarks: i.e. possible interferences, weather conditions, temperature, pressure, level of exertion, etc:

Lt. winds, Cold to mild.

Samples collected by: G. Campbell

Analysis Requested: PCBs

Sampling/Analytical Method: NIOSH - 5503

Laboratory: SPOTTS, STEVENS & MCCOY

ple Results:

Collection Media: Florosil/Cassette

RSE.AIR3 (10/92)

SSM /Laboratories

ANALYTICAL REPORT

Client:	Chemical Waste Management, Inc.	Project:	119127
		Received:	04-FEB-93
Report to:	Greg Campbell Chemical Waste Management, Inc. West Street Office Trailers Cobleskill NY 12043	Reported:	09-FEB-93
		PURCHASE ORDER:	842462

Copy to: T. Perrette, Chemical Waste Management, Inc. ENRAC

Project Description: Niagara Mohawk

Sampled: 26-JAN-93 By: G. Campbell

	RESULT	UNITS	CONCENTRATION	UNITS	METHOD
#003 Air Volume: 1.93 L SSM Sample: 1073635					
POLYCHLORINATEDBIPHENYLS (PCBS)					5503
PCB 1016	< 0.03	ug/sample	< 16	ug/m3	
PCB 1221	< 0.03	ug/sample	< 16	ug/m3	
PCB 1232	< 0.03	ug/sample	< 16	ug/m3	
PCB 1242	< 0.03	ug/sample	< 16	ug/m3	
PCB 1248	< 0.03	ug/sample	< 16	ug/m3	
PCB 1254	< 0.06	ug/sample	< 32	ug/m3	
PCB 1260	< 0.06	ug/sample	< 32	ug/m3	
#004 Air Volume: 1.89 L SSM Sample: 1073636					
POLYCHLORINATEDBIPHENYLS (PCBS)					5503
PCB 1016	< 0.03	ug/sample	< 16	ug/m3	
PCB 1221	< 0.03	ug/sample	< 16	ug/m3	
PCB 1232	< 0.03	ug/sample	< 16	ug/m3	
PCB 1242	< 0.03	ug/sample	< 16	ug/m3	
PCB 1248	< 0.03	ug/sample	< 16	ug/m3	
PCB 1254	< 0.06	ug/sample	< 32	ug/m3	
PCB 1260	< 0.06	ug/sample	< 32	ug/m3	

Client: Chemical Waste Management, Inc.
Project: 119127

	RESULT	UNITS	CONCENTRATION	UNITS	METHOD
#005					
Air Volume: Field Blank					
SSM Sample: 1073637					
POLYCHLORINATEDBIPHENYLS (PCBS)					5503
PCB 1016	< 0.03	ug/sample			
PCB 1221	< 0.03	ug/sample			
PCB 1232	< 0.03	ug/sample			
PCB 1242	< 0.03	ug/sample			
PCB 1248	< 0.03	ug/sample			
PCB 1254	< 0.06	ug/sample			
PCB 1260	< 0.06	ug/sample			

< indicates less than the limit of quantitation.

Final concentrations were calculated from air volumes supplied by client.

Respectfully submitted,

Steven N. Delp, CIH,
Director, Industrial Hygiene Services

REMEDIAL SERVICES EAST

INDUSTRIAL HYGIENE SAMPLE ANALYSIS REQUEST FORM

DATE: 1/27/93

TO: Steven N. Delp, Director
Spotts, Stevens & McCoy, Inc.

FROM: G. Campbell

SUBJECT: ANALYSIS OF AIR MONITORING SAMPLES

Project Name: Niagara Mohawk Location: W. ST. Office Trs. Cobleskill N.Y

Please analyze the enclosed air monitoring samples:

Analysis: See Attached

Samples Collected By: G. Campbell

Please send billing information and analysis to:

CWM Office Trailers
W. ST. Cobleskill NY 12043
Fax #: 518-234-7341

Also, please send copies of analytical results to:

Theresa Perretta
Health and Safety Manager
Remedial Services East
100 Nassau Park Blvd.
Princeton, NJ 08540

SAMPLE SUMMARY:

Sample Number	Air Volume (liter)	Media Type
006	1.94	Florisil/Cassette
007	1.95	Florisil/Cassette
008	FB	Florisil/Cassette

RSEAIR4(10/92)

CHEMICAL WASTE MANAGEMENT
REMEDIAL SERVICES GROUP
INDUSTRIAL HYGIENE
PERSONAL AIR MONITORING
CHAIN OF CUSTODY RECORD
HAZARDOUS MATERIALS

Location of Sampling: ________ Producer ________ Hauler ______
Disposal Site ________ Other ____________________

Company's Name Chemical Waste Management Telephone 518-234-7808

Address W. ST. Office Trailers, Cobleskill NY 12043
Number Street City State Zip

Collector's Name G. Campbell Telephone ( ) 518-234-7808

Date Sampled 1/27/93 Time Sampled 380 Minutes

Collector Samples No	No of Containers Containers	Sample Description/Source
006	2	Florisil/Cassette
007	2	Florisil/Cassette
008	2	Field Blank

Samples (s) Submitted to:

1. Spotts, Steve & McCoy, 345 N. Wyomissing Blvd.
Reading, PA 19610 (215)376-6581
Name of Organization
2. ____________________
Name of Organization

*Chain of Possession:

1.	550	1/27/93
Signature	Title	Inclusive Dates
2.		
Signature	Title	Inclusive Dates
3.		
Signature	Title	Inclusive Dates
4.		
Signature	Title	Inclusive Dates
5.		
Signature	Title	Inclusive Dates

"Certification of Representative Sample" attached: ____ Yes ____ No
If No, Explain:

*Note: Apparent gaps/breaks in the "inclusive dates" section of the "Chain of Possession" Section are caused by site sample [illegible] logs.

Print name and address of person to whom the results should be sent on the reverse side of this sheet.

Remedial Services Group Form C (3/1/91)

CHEMICAL WASTE MANAGEMENT
REMEDIAL SERVICES EAST
INDUSTRIAL HYGIENE
AIR MONITORING SAMPLE RECORD

ype of Sample: Personal/Area

Site Code: 4923/7

Location: Perimeter upwind

Date: 1/27/93

Employee/Area: — Fence

Sample Number: 006

SSN: —

Area: —

Job Title: —

Operation Monitored: Debris Loading / Site Activity

Personal Protective Equipment

Eye Protection: —

Respirator: —

Gloves/Boots: —

Clothing: —

Other: —

Pump Number: 502459

Start Calibration: 51.19

Sample Start Time: 0940

End Calibration: 63.11

Sample End Time: 1600

Sampling Badge Number: —

Sample Duration: 380 min.

Manufacturer: SKC

Sample Volume: 1.94 Ltrs.

Remarks: i.e. possible interferences, weather conditions, temperature, pressure, level of exertion, etc:

Cold, Lt. Snow

Samples collected by: G. Campbell

Analysis Requested: PCBs

Sampling/Analytical Method: NIOSH - 5503

Laboratory: SPOTTS, STEVENS & McCOY

mple Results:

Collection Media: Florosil/Cassette

RSE.AIR3 (10/92)

CHEMICAL WASTE MANAGEMENT
REMEDIAL SERVICES EAST
INDUSTRIAL HYGIENE
AIR MONITORING SAMPLE RECORD

Type of Sample! Personal/Area

Site Code! 492317

Location! Perimeter downwind

Date! 1/27/93

Employee/Area! Fence

Sample Number! 007

SSN! —

Area! —

Job Title! —

Operation Monitored! Debris Loading / S[illegible] activity

Personal Protective Equipment

Eye Protection! —

Respirator! —

Gloves/Boots! —

Clothing! —

Other! —

Pump Number! 502359

Start Calibration! 5155

Sample Start Time! 0940

End Calibration! 5313

Sample End Time! 1600

Sampling Badge Number! —

Sample Duration! 380 min

Manufacturer! SKC

Sample Volume! 1.95

Remarks! i.e. possible interferences, weather conditions, temperature, pressure, level of exertion, etc!

Samples collected by!

Analysis Requested! PCBs

Sampling/Analytical Method! NIOSH 5503

Laboratory! SPOTTS, STEVENS & MCCOY

Sample Results!

Collection Media! Florosil/Cassette

RSE.AIR3 (10/92)

119129

REMEDIAL SERVICES EAST

INDUSTRIAL HYGIENE SAMPLE ANALYSIS REQUEST FORM

DATE: 1/27/93

TO: Steven N. Delp, Director
Spotts, Stevens & McCoy, Inc.

FROM: G. Campbell

SUBJECT: ANALYSIS OF AIR MONITORING SAMPLES

Project Name: Niagara Mohawk Location: W. ST. Office Tlrs. Cobleskill NY

Please analyze the enclosed air monitoring samples:

Analysis: See Attached

Samples Collected By: G. Campbell

Please send billing information and analysis to:
CWM Office Trailers
W. ST. Cobleskill NY 12043
Fax # 518-234-7341

Also, please send copies of analytical results to:

Therese Perrette
Health and Safety Manager
Remedial Services East
100 Nassau Park Blvd.
Princeton, NJ 08540

SAMPLE SUMMARY:

Sample Number	Air Volume (liter)	Media Type
006	1.94	Florisil/Cassette
007	1.95	Florisil/Cassette
008	FB	Florisil/Cassette

RSEAIR4(10/92)

CHEMICAL WASTE MANAGEMENT
REMEDIAL SERVICES GROUP
INDUSTRIAL HYGIENE
PERSONAL AIR MONITORING
CHAIN OF CUSTODY RECORD
HAZARDOUS MATERIALS

Location of Sampling: ________ Producer ________ Hauler ______
Disposal Site ________ Other ________________________

Company's Name Chemical Waste Management Telephone 518-234-7808

Address W. ST. Office Trailers, Cobleskill NY 12043
Number Street City State Zip

Collector's Name G. Campbell Telephone ( ) 518-234-7808

Date Sampled 1/27/93 Time Sampled 380 Minutes

Collector Samples No	No of Containers Containers	Sample Description/Source
006	2	Florisil/Cassette
007	2	Florisil/Cassette
009	2	Field Blank

Samples (s) Submitted to:

1. Spotts, Steve & McCoy, 345 N. Wyomissing Blvd.
Reading, PA 19610 (215)376-6581
Name of Organization

2. ________________________
Name of Organization

*Chain of Possession:

	Signature	Title	Inclusive Dates
1.		550	1/27/93
2.	Tammy Oakley	Sample Admin	2/4/93 1100
3.			
4.			
5.			

"Certification of Representative Sample" attached: ____ Yes ____ No
If No, Explain:

*Note: Apparent gaps/breaks in the "inclusive dates" section of the "Chain of Possession" Section are covered by site sample shipping/receiving logs.

Print name and address of person to whom the results should be sent on the reverse side of this sheet.

CHEMICAL WASTE MANAGEMENT
REMEDIAL SERVICES EAST
INDUSTRIAL HYGIENE
AIR MONITORING SAMPLE RECORD

ype of Sample: Personal/Area

Site Code: 492317

Location: Perimeter upwind

Date: 1/27/93

Employee/Area: — Fence

Sample Number: 006

SSN: —

Area: —

Job Title: —

Operation Monitored: Debris Loading / Site Activity /

Personal Protective Equipment

Eye Protection: —

Respirator: —

Gloves/Boots: —

Clothing: —

Other: —

Pump Number: 502459

Start Calibration: 51.19

Sample Start Time: 0940

End Calibration: 63.11

Sample End Time: 1600

Sampling Badge Number: —

Sample Duration: 380min

Manufacturer: SKC

Sample Volume: 1.94 Ltrs.

Remarks: i.e. possible interferences; weather conditions, temperature, pressure, level of exertion, etc:

Cold, Lt. Snow

Samples collected by: G. Campbell

Analysis Requested: PCBs

Sampling/Analytical Method: NIOSH - 5503

Laboratory: SPOTTS, STEVENS & MCCOY

Sample Results:

Collection Media: Florosil/Cassette

RSE.AIR3 (10/92)

CHEMICAL WASTE MANAGEMENT
REMEDIAL SERVICES EAST
INDUSTRIAL HYGIENE
AIR MONITORING SAMPLE RECORD

pe of Sample: Personal/Area

Site Code: 492317

Location: Perimeter downwind.

Date: 1/27/93

Employee/Area: Fence

Sample Number: 007

SSN: —

Area: —

Job Title: —

Operation Monitored: Debris Loading / Site activity

Personal Protective Equipment

Eye Protection: —

Respirator: —

Gloves/Boots: —

Clothing: —

Other: —

Pump Number: 502359

Start Calibration: 51.55

Sample Start Time: 0940

End Calibration: 53.13

Sample End Time: 1600

Sampling Badge Number: —

Sample Duration: 380 min

Manufacturer: SKC

Sample Volume: 1.95

Remarks: i.e. possible interferences, weather conditions, temperature, pressure, level of exertion, etc:

Samples collected by:

Analysis Requested: PCBs

Sampling/Analytical Method: NIOSH - 5503

Laboratory: SPOTTS, STEVENS & MCCOY

mple Results:

Collection Media: Florosil/Cassette

RSE.AIR3 (10/92)

SSM /Laboratories

ANALYTICAL REPORT

Client: Chemical Waste Management, Inc.

Report to: Greg Campbell
Chemical Waste Management, Inc.
West Street Office Trailers
Cobleskill NY 12043

Project: 119129
Received: 04-FEB-93
Reported: 09-FEB-93

PURCHASE ORDER: 842462

Copy to: T. Perrette, Chemical Waste Management, Inc. ENRAC

Project Description: Niagara Mohawk

Sampled: 27-JAN-93 By: G. Campbell

	RESULT	UNITS	CONCENTRATION	UNITS	METHOD
#006 Air Volume: 1.94 L SSM Sample: 1073646					
POLYCHLORINATEDBIPHENYLS (PCBS)					5503
PCB 1016	< 0.03	ug/sample	< 15	ug/m3	
PCB 1221	< 0.03	ug/sample	< 15	ug/m3	
PCB 1232	< 0.03	ug/sample	< 15	ug/m3	
PCB 1242	< 0.03	ug/sample	< 15	ug/m3	
PCB 1248	< 0.03	ug/sample	< 15	ug/m3	
PCB 1254	< 0.06	ug/sample	< 30	ug/m3	
PCB 1260	< 0.06	ug/sample	< 30	ug/m3	
#007 Air Volume: 1.95 L SSM Sample: 1073647					
POLYCHLORINATEDBIPHENYLS (PCBS)					5503
PCB 1016	< 0.03	ug/sample	< 15	ug/m3	
PCB 1221	< 0.03	ug/sample	< 15	ug/m3	
PCB 1232	< 0.03	ug/sample	< 15	ug/m3	
PCB 1242	< 0.03	ug/sample	< 15	ug/m3	
PCB 1248	< 0.03	ug/sample	< 15	ug/m3	
PCB 1254	< 0.06	ug/sample	< 30	ug/m3	
PCB 1260	< 0.06	ug/sample	< 30	ug/m3	

Client: Chemical Waste Management, Inc.
Project: 119129

	RESULT	UNITS	CONCENTRATION	UNITS	METHOD
#008					
Air Volume: Field Blank					
SSM Sample: 1073648					
POLYCHLORINATEDBIPHENYLS (PCBS)					5503
PCB 1016	< 0.03	ug/sample			
PCB 1221	< 0.03	ug/sample			
PCB 1232	< 0.03	ug/sample			
PCB 1242	< 0.03	ug/sample			
PCB 1248	< 0.03	ug/sample			
PCB 1254	< 0.06	ug/sample			
PCB 1260	< 0.06	ug/sample			

< indicates less than the limit of quantitation.

Final concentrations were calculated from air volumes supplied by client.

Respectfully submitted,

Steven N. Delp, CIH,
Director, Industrial Hygiene Services

REMEDIAL SERVICES EAST

INDUSTRIAL HYGIENE SAMPLE ANALYSIS REQUEST FORM

DATE: 1/28/93

TO: Steven N. Delp, Director
Spotts, Stevens & McCoy, Inc.

FROM:

SUBJECT: **ANALYSIS OF AIR MONITORING SAMPLES**

Project Name: Niagara Mohawk Location: W.S.T. Cobleskill N.Y

Please analyze the enclosed air monitoring samples:

Analysis: See Attached

Samples Collected By: G. Campbell

Please send billing information and analysis to:

Also, please send copies of analytical results to:

Therese Perrette
Health and Safety Manager
Remedial Services East
100 Nassau Park Blvd.
Princeton, NJ 08540

SAMPLE SUMMARY:

Sample Number	**Air Volume (liter)**	**Media Type**
009	2.01	Florisil Cassette
010	2.09	Florisil/Cassette
011	FB	Florisil/Cassette

RSEAIR4(10/92)

CHEMICAL WASTE MANAGEMENT
REMEDIAL SERVICES GROUP
INDUSTRIAL HYGIENE
PERSONAL AIR MONITORING
CHAIN OF CUSTODY RECORD
HAZARDOUS MATERIALS

Location of Sampling: ______ Producer ______ Hauler ______
Disposal Site ______ Other ______

Company's Name Chemical Waste Management Telephone 518-234-7809

Address ______
Number Street City State Zip

Collector's Name G. Campbell Telephone ( ) 518-234-7808

Date Sampled 1/28/93 Time Sampled 390 Minutes

Collector Samples No	No of Containers Containers	Sample Description/Source
#009	2	Florisil/Cassette
#011	2 FB	Field Blank

Samples (s) Submitted to:

1. Spotts, Steve & McCoy, 345 N. Wyomissing Blvd.
Reading, PA 19610 (215)376-6581
Name of Organization

2. ______
Name of Organization

*Chain of Possession:

	Signature	Title	Inclusive Dates
1.		550	1/28/93
2.	Tammy Cooley	Sample Admin	2/4/93 1100
3.			
4.			
5.			

"Certification of Representative Sample" attached: ___ Yes ___ No
If No, Explain:

*Note: Apparent gaps/breaks in the "inclusive dates" section of the "Chain of Possession" Section are covered by site sample shipping/receiving logs.

Print name and address of person to whom the results should be sent on the reverse side of this sheet.

Remedial Services Group Form C (3/1/91)

CHEMICAL WASTE MANAGEMENT
REMEDIAL SERVICES GROUP
INDUSTRIAL HYGIENE
PERSONAL AIR MONITORING
CHAIN OF CUSTODY RECORD
HAZARDOUS MATERIALS

Location of Sampling: ________ Producer ________ Hauler ________
Disposal Site ________ Other ________

Company's Name Chemical Waste Management Telephone 518-234-7808

Address W.S.T. Office Trailers, Cobleskill NY 12043
Number Street City State Zip

Collector's Name G Campbell Telephone ( ) 515-234-7808

Date Sampled 1/28/93 Time Sampled 395 Minutes

Collector Samples No	No of Containers Containers	Sample Description/Source
# 010	2	Florisil /Cossette

Samples (s) Submitted to:

1. Spotts, Steve & McCoy, 345 N. Wyomissing Blvd.
Reading, PA 19610 (215)376-6581
Name of Organization
2. ________
Name of Organization

*Chain of Possession:

	Signature	Title	Inclusive Dates
1.		SSO	1/28/93
2.	Tammy Crosley	Sample Admin.	2/4/93 1100
3.			
4.			
5.			

"Certification of Representative Sample" attached: ____ Yes ____ No
If No, Explain:

*Note: Apparent gaps/breaks in the "inclusive dates" section of the "Chain of Possession" Section are covered by site sample shipping/receiving logs.

Print name and address of person to whom the results should be sent on the reverse side of this sheet.

Remedial Services Group Form C (3/1/91)

CHEMICAL WASTE MANAGEMENT
REMEDIAL SERVICES EAST
INDUSTRIAL HYGIENE
AIR MONITORING SAMPLE RECORD

Type of Sample: Personal/Area

Site Code: 492317

Location: Perimeter/downwind-WTP

Date: 1/28/93

Employee/Area: —

Sample Number: 009

SSN: —

Area: —

Job Title: —

Operation Monitored: Site Activity/WTP

Personal Protective Equipment

Eye Protection: —

Respirator: —

Gloves/Boots: —

Clothing: —

Other: —

mp Number: 502459

Start Calibration: 51.60

Sample Start Time: 0920

End Calibration: 53.43

Sample End Time: 1550

Sampling Badge Number: —

Sample Duration: 390min

Manufacturer: SKC

Sample Volume: 2.01 Ltrs

Remarks: i.e. possible interferences, weather conditions, temperature, pressure, level of exertion, etc:

Cold, Ptly, Cldy, Lt. winds

Samples collected by: G. Campbell

Analysis Requested: PCBs

Sampling/Analytical Method: NIOSH - 5503

boratory: SPOTTS, STEVENS & MCCOY

Sample Results:

ollection Media: Florosil/Cassette

RSE.AIR3 (10/92)

CHEMICAL WASTE MANAGEMENT
REMEDIAL SERVICES EAST
INDUSTRIAL HYGIENE
AIR MONITORING SAMPLE RECORD

of Sample: Personal/Area

Site Code: 492317

ation: Perimeter/Upwind, WTP

Date: 1/28/93

ployee/Area: —

Sample Number: #010

N: —

Area: —

ob Title: —

Operation Monitored: Site activity/WTP

Personal Protective Equipment

Eye Protection: —

Respirator: —

Gloves/Boots: —

Clothing: —

Other: —

Pump Number: 502359

Start Calibration: 52.93

Sample Start Time: 0920

End Calibration: 53.64

Sample End Time: 1555

Sampling Badge Number: —

Sample Duration: 395

Manufacturer: SKC

Sample Volume: 2.09 Ltrs

Remarks: i.e. possible interferences, weather conditions, temperature, pressure, level of exertion, etc:

Cold, Ptly Cldy, Lt. winds

Samples collected by: G. Campbell

Analysis Requested: PCBs

Sampling/Analytical Method: NIOSH - 5503

Laboratory: SPOTTS, STEVENS & MCCOY

mple Results:

Collection Media: Florosil/Cassette

RSE.AIR3 (10/92)

SSM /Laboratories

ANALYTICAL REPORT

Client: Chemical Waste Management, Inc.

Report to: Greg Campbell
Chemical Waste Management, Inc.
West Street Office Trailers
Cobleskill NY 12043

Project: 119130
Received: 04-FEB-93
Reported: 09-FEB-93

PURCHASE ORDER: 842462

Copy to: T. Perrette, Chemical Waste Management, Inc. ENRAC

Project Description: Niagara Mohawk

Sampled: 28-JAN-93 By: G. Campbell

	RESULT	UNITS	CONCENTRATION	UNITS	METHOD
#009					
Air Volume: 2.01 L					
SSM Sample: 1073653					
POLYCHLORINATEDBIPHENYLS (PCBS)					5503
PCB 1016	< 0.03	ug/sample	< 15	ug/m3	
PCB 1221	< 0.03	ug/sample	< 15	ug/m3	
PCB 1232	< 0.03	ug/sample	< 15	ug/m3	
PCB 1242	< 0.03	ug/sample	< 15	ug/m3	
PCB 1248	< 0.03	ug/sample	< 15	ug/m3	
PCB 1254	< 0.06	ug/sample	< 30	ug/m3	
PCB 1260	< 0.06	ug/sample	< 30	ug/m3	
#010					
Air Volume: 2.09 L					
SSM Sample: 1073654					
POLYCHLORINATEDBIPHENYLS (PCBS)					5503
PCB 1016	< 0.03	ug/sample	< 14	ug/m3	
PCB 1221	< 0.03	ug/sample	< 14	ug/m3	
PCB 1232	< 0.03	ug/sample	< 14	ug/m3	
PCB 1242	< 0.03	ug/sample	< 14	ug/m3	
PCB 1248	< 0.03	ug/sample	< 14	ug/m3	
PCB 1254	< 0.06	ug/sample	< 28	ug/m3	
PCB 1260	< 0.06	ug/sample	< 28	ug/m3	

Client: Chemical Waste Management, Inc.
Project: 119130

	RESULT	UNITS	CONCENTRATION	UNITS	METHOD
#011					
Air Volume: Field Blank					
SSM Sample: 1073655					
POLYCHLORINATEDBIPHENYLS (PCBS)					5503
PCB 1016	< 0.03	ug/sample			
PCB 1221	< 0.03	ug/sample			
PCB 1232	< 0.03	ug/sample			
PCB 1242	< 0.03	ug/sample			
PCB 1248	< 0.03	ug/sample			
PCB 1254	< 0.06	ug/sample			
PCB 1260	< 0.06	ug/sample			

< indicates less then the limit of quantitation.

Final concentrations were calculated from air volumes supplied by client.

Respectfully submitted,

Steven N Delp

Steven N. Delp, CIH,
Director, Industrial Hygiene Services

Employee name Ivan Smith

Employee SSN 190-40-1240

Location Niagara Mohawk
Cobleskill NY

Date: 1/20/93

Dear Ivan:

Providing a working environment which will protect your safety and health is a high priority with Rust Remedial Services.

One of the ways to assure your protection is to sample the air in your workplace. On 1/7/93, you wore a sampling device which measured the amount PCB in the air. The filter was sent to a laboratory, analyzed and the results were compared to the levels established by the American Conference of Governmental Industrial Hygienists (ACGIH). These levels are called Threshold Limit Values or TLV's and represent conditions and concentrations of atmospheric contaminants to which someone may be repeatedly exposed, day after day, without adverse effect.

The results of the sample that you wore were ≈400 [illegible]% of the TLV's. Although these levels were less than the TLV's, you should continue to use your protective equipment in those areas where required and continue to wash before eating, smoking or drinking and shower before you go home.

If you have any questions about the samples or other questions about workplace safety and health, please contact me at phone# Jobsite

Sincerely,

(Dust, metals, asbestos, PCB's)
c:\ \forms\below.oth