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Sterling Environmental Engineering, P.C.

REMEDIAL INVESTIGATION WORK PLAN

HILLS HOLDING CORPORATION
CONSTRUCTION AND DEMOLITION DEBRIS LANDFILL
NYS ROUTE 42, FALLSBURG, NEW YORK

SITE NO. E-3-53-009

Prepared For:

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EXECUTIVE SUMMARY

The Hills Holding Corporation Construction and Demolition (C&D) Debris Landfill (Site No. E-3-53-009) is on County Route 42 in the Town of Fallsburg, Sullivan County, New York. The approximate location is presented on Figure 1. On July 3, 2006, the Town of Fallsburg acquired Temporary Incident of Ownership of the property in order to complete the requirements for the Environmental Restoration Fund (ERF) grant authorized under the New York State refinancing/reform legislation of October 2003.

The Site is situated on a property encompassing 26.4 acres abutting the Neversink River and overlies the Primary Aquifer known as the Fallsburg-Woodbourne Valley Fill Aquifer. The Site itself consists of approximately eight (8) acres of the property previously used as a C&D Debris Landfill during the year 1988.

The 1991 Final Preliminary Site Assessment (PSA) Report recommended the C&D Debris Landfill be capped to limit infiltration and provide surface water drainage controls. At present, the Landfill remains inactive, but has not been satisfactorily remediated. The New York State Department of Environmental Conservation (NYSDEC) has confirmed that this Landfill is not on the registry of Class 1 or Class 2 Inactive Hazardous Waste Sites. Limited additional sampling of groundwater monitoring wells was reportedly conducted by the NYSDEC in 1996.

The Town anticipates conducting a full remedial investigation and remediation of the Hills Holding Corporation property. Alternatives for remediation include on-site encapsulation, removal of the C&D debris for disposal at a permitted facility, and use of the debris as grading material for the closure of the Town's municipal landfill located approximately 2.7 miles from the Hills Holding Corporation site.

The Final PSA Report, attached as Appendix A, was issued to the NYSDEC in November 1991 (NYSDEC Work Assignment #DOO2520-7). The site assessment, performed by Dunn Geoscience Engineering Company, P.C. in association with TAMS Consultants, Inc., includes the following components:

- Data and records search;
- Site reconnaissance;
- Geophysical survey;
- Soil gas survey;
- Initial environmental sampling at six (6) surface water, five (5) sediment, five (5) leachate, and three (3) surface soil locations;
- Test pit excavation and sampling;
- Two (2) ambient air sampling events; and
- Installation of six (6) monitoring wells for hydrogeologic evaluation and groundwater sampling.

Concentrations of organic contaminants were reported in excess of 600,000 ug/kg in 2 of 10 test pits and in excess of 200,000 ug/kg in 10 of 14 soil/waste samples. However, groundwater, surface water, and leachate data suggested that inorganics are the principal contaminants of concern. Inorganic contaminants were reported leaching from the Landfill and impacting surface water and groundwater quality in the vicinity of the Site.

This Remedial Investigation Work Plan proposes the following additional site investigation work:

- Test pitting, borings through the waste mass, surveying and mapping are proposed to define the limits of waste;
- Existing well inspection and new monitoring well installations are proposed to enhance the existing well network;
- Groundwater monitoring well sampling;
- Surface water sampling at nine (9) locations;
- Sediment sampling at eight (8) locations;
- Surficial soil sampling at three (3) locations on the Landfill and six (6) locations on the balance of the property;
- Leachate investigation within the Landfill perimeter to identify and sample leachate seeps or areas characterized by stained vegetation;
- Vector investigation;
- Explosive gas investigation;
- Fish and wildlife impact analysis; and
- Soil vapor assessment.

Table 1 presents the proposed implementation schedule for the Remedial Investigation.

Additionally, a Health and Safety Plan (HASP) and Quality Assurance Project Plan (QAPP) are appended as Appendices B and C, respectively.

1.0 SITE DESCRIPTION AND BACKGROUND

1.1 Site Description

The Hills Holding Corporation Construction and Demolition (C&D) Debris Landfill (Site No. E3-53-009) is on County Route 42 in the Town of Fallsburg, Sullivan County, New York. The approximate location is presented on Figure 1. Until recently, it was privately owned by Hills Holding Corporation. The principal stockholders are reported to be Mr. Thomas Gambino and Mr. Dominic Dercole. On July 3, 2006, the Town of Fallsburg acquired Temporary Incident of Ownership of the site in order to complete the requirements for the Environmental Restoration Fund (ERF) grant authorized under the New York State refinancing/reform legislation of October 2003.

The Site is situated on a property encompassing 26.4 acres abutting the Neversink River and overlies the Primary Aquifer known as the Fallsburg-Woodbourne Valley Fill Aquifer. The Site itself consists of approximately eight (8) acres of the property previously used as a C&D Debris Landfill during the year 1988.

The 1991 Final Preliminary Site Assessment (PSA) Report recommended the C&D Debris Landfill be capped to limit infiltration and provide surface water drainage controls. At present, the Landfill remains inactive, but has not been satisfactorily remediated. The New York State Department of Environmental Conservation (NYSDEC) has confirmed that this Landfill is not on the registry of Class 1 or Class 2 Inactive Hazardous Waste Sites. Limited additional sampling of groundwater monitoring wells was reportedly conducted by the NYSDEC in 1996.

The Town has assumed Lead Agency status on a proposed remediation project and is coordinating review of its proposed action with all involved agencies including the NYSDEC. The Town will serve as the Lead Agency and has made a State Environmental Quality Review Act (SEQRA) determination and a Negative Declaration.

In accordance with the NYSDEC "Draft DER-10 Technical Guidance for Site Investigation and Remediation, December 2002" (DER-10), the Town anticipates conducting a full remedial investigation and remediation of the Hills Holding Corporation property. Alternatives for remediation include on-site encapsulation, removal of the C&D debris for disposal at a permitted facility, and use of the debris as grading material for the closure of the Town's municipal landfill located approximately 2.7 miles from the Hills Holding Corporation site. The municipal landfill is slated for closing pursuant to an Administrative Order on Consent. The municipal landfill closure requires improved gas venting and collection systems and construction of a final cover system.

Additional information regarding the Site and surrounding property can be found in the 1991 Final Preliminary Site Assessment (PSA) Report, attached as Appendix A.

1.2 Site History

The C&D Debris Landfill began operation in the summer of 1988, and ceased in October 1988. In October 1988, the NYSDEC found hazardous wastes were disposed at the site. The hazardous wastes were subsequently removed in 1988 by the NYSDEC. The Landfill was required to terminate operations in October 1988 because the facility had received waste other then exempt C&D debris. Several investigations have been performed at the site, and are described below.

1.3 Previous Investigations

The New York State Department of Health (NYSDOH) initiated monitoring of leachate and an on-site drinking water well in late 1988 continuing through 1989. The Town commenced monitoring the nearby municipal drinking water production wells beginning in November 1989, after leachate was noted during a site reconnaissance. A Preliminary Site Assessment (PSA) was performed by Dunn Geoscience Engineering Company, P.C. in association with TAMS Consultants, Inc. during the period from 1990 through 1991.

The Final PSA Report, attached as Appendix A, was issued to the NYSDEC in November 1991 (NYSDEC Work Assignment #DOO2520-7). The site assessment, performed by Dunn Geoscience Engineering Company, P.C. in association with TAMS Consultants, Inc., includes the following components:

- Data and records search;
- Site reconnaissance;
- Geophysical survey;
- Soil gas survey;
- Initial environmental sampling at six (6) surface water, five (5) sediment, five (5) leachate, and three (3) surface soil locations;
- Test pit excavation and sampling;
- Two (2) ambient air sampling events; and
- Installation of six (6) monitoring wells for hydrogeologic evaluation and groundwater sampling.

Concentrations of organic contaminants were reported in excess of 600,000 ug/kg in 2 of 10 test pits and in excess of 200,000 ug/kg in 10 of 14 soil/waste samples. However, groundwater, surface water, and leachate data suggested that inorganics are the principal contaminants of concern. Inorganic contaminants were reported leaching from the Landfill and impacting surface water and groundwater quality in the vicinity of the Site.

The NYSDEC conducted follow-up sampling of the groundwater monitoring wells in 1996. The results of the NYSDEC sampling are provided as Appendix D.

2.0 STUDY AREA INVESTIGATION

The Department Project Manager will be notified prior to all field activities, and to the extent feasible, all field work will be supervised by the Department Project Manager or on-site representative.

2.1 Test Pitting, Borings through Waste Mass, Surveying and Mapping

In order to better define the limits of waste of the C&D Debris Landfill, test pits are proposed, as shown on Figure 2. The locations shown on the figure are approximate, and the actual locations will be determined in the field by Sterling Environmental Engineering, P.C. (STERLING) and approved by the NYSDEC's on-site representative. As many as 30, but no fewer than 25, test pits are anticipated. The test pits commence in the apparent "clean" area, and continue until the edge of fill is determined. The test pits will be excavated to the bottom of the fill material, or to a maximum depth of ten (10) feet. Test pits will be completed at approximate 100 foot intervals, as field conditions allow, around the perimeter of the Landfill. Every third test pit will be recessed horizontally into the wastemass 10 to 20 feet, as feasible. At least one (1) soil sample will be obtained from each test pit for chemical analysis. Additional samples will be obtained as appropriate for visual characterization and for monitoring with handheld instruments. The number and location of such sampling will be determined in the field subject to the approval of the NYSDEC's representative. The test pits will be backfilled with the excavated material upon completion. The test pit locations will be marked with a wooden stake for subsequent surveying. Each test pit will be logged on a log form and photographed.

Thickness of the waste mass will be determined by conducting borings through the waste at selected locations. As shown on Figure 2, a minimum of eight (8) borings are proposed in the waste mass. Actual locations of borings will be determined in the field subject to approval by the NYSDEC's on-site representative. The borings will be completed to native material using a hollow stem auger. At each location, soil samples will be collected continuously at two (2) foot intervals by split-spoon sampling and screened with a Photo-ionization detector (PID) until native material is encountered. Each soil sample will be logged using the Unified Soil Classification System (USCS). Two (2) of the soil borings will be selected for small diameter (1") piezometer installations to allow monitoring of groundwater elevations within the wastemass. Drilling logs for each boring will be completed by STERLING using the Unified Soil Classification System (USCS), and the depth of surface cover and depth of fill layers noted. At least one (1) analytical sample will be obtained from each boring location. Additional sampling may be obtained as directed by the NYSDEC's representative.

Samples obtained from test pits and soil borings will be analyzed as set forth in Table 2 for:

- Semi-Volatile Organic Compounds (SVOCs);
- PCBs/Pesticides;
- Metals; and
- Petroleum Hydrocarbons.

At least ten (10) samples will be analyzed for full TCL, hazardous waste characteristics and asbestos.

Once the test pitting, soil borings and field sampling activities are complete, a topographic survey will be undertaken in order to prepare an updated map of the site, showing the limits of waste and all sample locations. This topographic survey and the thickness estimates will aid in determining the total amount of fill material that may need to be excavated as part of a final remedy. Revised mapping of the site will be of construction plan quality including all relevant site features pertinent to a remedial action (power lines, building, surface water features, etc.) with a two (2) foot minimum contour interval.

2.2 Existing Well Inspection and Monitoring Well Installation

The six (6) existing groundwater monitoring wells, MW-1 through MW-6, will be inspected by STERLING to determine the existing condition of each well for resuming sampling and monitoring. The existing wells were installed in 1991 as part of the Preliminary Site Assessment (PSA) field investigation. Specific information regarding well location and depth, drilling and well completion logs are contained in Appendix A. Existing wells (MW-3, MW-4 and MW-5) were completed as overburden wells. Two (2) wells (MW-1 and MW-2) were completed as bedrock wells. Well MW-6 was completed as an overburden/bedrock interface well (see Section 2.7 of Appendix A). If the NYSDEC and STERLING concur the existing monitoring wells are viable for sampling, the overburden wells will be redeveloped by a combination of pumping and surge blocking to remove fine sediments that may be blocking the well screen at least one (1) week prior to the sampling event. Bedrock wells will be redeveloped by pumping. If MW-1 through MW-6 are not viable for sampling, then the well in question will be abandoned following 6 NYCRR Part 360-2.11(a)(8)(vi) procedures and a new monitoring well will be installed in the same vicinity and to a similar depth.

Up to six (6) additional off-site overburden groundwater monitoring wells are proposed at locations suggested by the NYSDEC in order to enhance the existing well network. The approximate locations of these are shown on Figure 2. Actual locations will be field determined subject to the approval of the NYSDEC's representative. MW-7 will be installed between existing wells MW-2 and MW-3; MW-8 will be installed south of existing MW-4, towards the municipal water supply well. Two (2) clustered overburden monitoring wells are proposed southeast of the landfill as sentinel wells for the Town of Fallsburg public water supply well PW-4A. One well, MW-9, will be screened at an intermediate level of 50 to 60 feet and MW-10 will be screened at the interval comparable to PW-4A (127 to 164 feet below grade).

Two (2) existing observation wells, OB-8b and OB-8c, owned by the Town of Fallsburg, are located approximately 400 feet to the northwest of the landfill on the east side of the Neversink River. These wells are primarily used for monitoring groundwater levels during pumping of Town public water supply wells PW-6 and PW-7. Water quality data that exists from observation well sampling will be included in the Remedial Investigation Report. The two (2) observation wells are screened in sand and gravel. The well logs for the observation wells and public water supply wells have been provided to the NYSDEC and will be included in the Remedial Investigation Report. With the Town's permission, observation well OB-8c (depth 54 feet, screened 37-54 feet) will be used as a monitoring well for the Remedial Investigation. If OB-8c is not viable for sampling, MW-12 will be installed as an intermediate overburden aquifer well approximately 60 feet deep, subject to physical and legal access. A new monitoring well, MW-11, will be installed on the east side of the Neversink River between the river and the Town public water supply wells PW-6 and PW-7, subject to physical and legal access. MW-11 will screen the deeper section of the overburden aquifer and will be comparable in depth to PW-6, which is screened from 108 to 128 feet below ground surface (bgs).

Monitoring well construction for overburden and bedrock monitoring wells will follow the specifications and proposed monitoring well details provided in Appendix E. Well schematics for typical overburden and bedrock monitoring well construction are shown in Figures 3 and 4. Overburden wells will have screens ranging from 10 to 30 feet in length, depending on material encountered during drilling and the depth of the well.

The anticipated approximate depth for MW-7 and MW-8 is 20-feet deep for each well. Soil samples will be collected continuously at two (2) foot intervals by split-spoon sampling and screened using a PID. Previous to drilling sentinel cluster wells MW-9 and MW-10, STERLING will review the well logs for existing Town wells PW-4A and OB-4A to identify overburden units. The anticipated depths for MW-9 and MW-10 are 60 feet and 165 feet, respectively. STERLING proposes soil sampling and PID screening at five (5) foot intervals during the installation of MW-10. Because MW-9 is a cluster well with MW-10, MW-9 will be drilled with no soil sampling or PID screening. Similarly, the well logs for OB-8c, OB-8b and PW-6 and PW-7 will be reviewed by STERLING prior to the installation of MW-11 (and potentially MW-12). The anticipated depths for MW-11 and MW-12 (if drilled) are 128 feet and 60 feet, respectively. Soil sampling and PID screening for MW-11 will occur at five (5) foot intervals. If MW-12 is drilled, and because it is a cluster well with MW-11, MW-12 will be drilled with no soil sampling or PID screening.

Each soil sample will be logged using the Unified Soil Classification System (USCS). Drilling logs for soil borings and bedrock corings will be completed by STERLING. Bedrock coring will require a potable water supply.

Information regarding the existing Town-owned public water supply wells is provided as Appendix F.

2.3 Groundwater Well Sampling

The existing and proposed additional monitoring wells will be sampled and analyzed for full Target Compound List/Target Analyte List (TCL+30/TAL) compounds as specified in the EPA Contract Laboratory Program Statement of Work for Inorganic and Organic Analysis, plus petroleum hydrocarbons and pH, in accordance with DER-10, as detailed in Table 2.

The newly installed monitoring wells will be developed following installation and will be developed at least one (1) week prior to the sampling event. Well development is conducted to remove sediment that is introduced during drilling and to allow formation water to flow freely into the well environment and is usually conducted by a combination of pumping and surge blocking. Well development logs will be maintained to record the water volume removed, turbidity readings and visual observations.

Groundwater samples will be collected from monitoring wells using low-flow purging and sampling techniques as specified in USEPA Ground Water Issue EPA/540/S-95/504, Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures (USEPA, April 1996). Low-flow purging and sampling techniques are designed to provide samples that are as representative of groundwater quality in the formation being sampled and involves the purging and collection of samples from the screened interval of the monitoring well at a low rate of flow through the sampling device. Flow should be between 0.1 and 0.5 liter per minute, with the goal being to sample at the lowest sustainable rate. During purging, water quality is monitored using in-line real-time field monitoring equipment (flow cell). Parameters monitored include pH, temperature, specific conductance, oxidation reduction potential (ORP), dissolved oxygen (DO), and turbidity. Water level is also monitored continuously during purging and sampling rate is adjusted to minimize drawdown (< 0.1 meter) to the extent possible based on rate of recharge. Readings of real-time parameters and water level are recorded every three to five (3 to 5) minutes during well purging. Wells are purged until parameters stabilize, indicating that flow patterns have been established, bringing water from the sampled formation through the well screen and into the sampling inlet. In order to be considered to have stabilized, parameters must fall within the following guidance ranges for three (3) consecutive readings:

pH	± 0.1
Conductivity	± 3%
ORP	± 10mv
Turbidity	± 10%
Temp (°C)	± 3%
DO	± 10%

Following stabilization of the field parameters, the tubing will be disconnected from the flow cell and the groundwater sample will be collected. For overburden wells, samples will be collected at the mid-point of the well screen if the water level at the time of sampling exceeds the top of the well screen, or the mid-point of the water level at the time of sampling and the bottom of the well screen, if the water level at the time of sampling is within the well screen. For bedrock wells, samples will be collected 5 feet from the bottom of the well. Sampling flow rates will not exceed laboratory guidelines for analytes (i.e., VOCs, PCBs).

Samples will be placed in appropriate bottles prepared by the laboratory for full TCL+30/TAL compounds, plus petroleum hydrocarbons analysis, in accordance with DER-10. Upon collection, samples requiring low temperature preservation will be placed in coolers and kept chilled using ice or ice packs.

All groundwater samples will be filtered in the field for TAL Inorganics (metals) and filtered by the laboratory for Pesticides/PCBs. In addition, all off-site sentinel monitoring wells (MW-9 through MW-12) and one on-site monitoring well (the most likely contaminated monitoring well, to be determined in the field) will also have unfiltered samples collected for metals and PCB/Pesticides analyses.

2.4 Surface Water and Sediment Sampling

The 1991 PSA investigation included six (6) surface water and five (5) sediment sampling locations. These approximate locations will be resampled and additional locations are proposed in the large pond, small pond, and in the Neversink River between previous locations SW/SS-2 and SW/SS-3. The approximate locations of these samples are given in Figure 2, and actual locations will be identified in the field subject to the approval of the NYSDEC's representative. This results in a total of nine (9) surface water and eight (8) sediment samples. The anticipated sampling locations are shown on Figure 2. SW/SS-1 will be collected in the Neversink River to the north (upstream) of the site. SW/SS-2 will be collected in the river adjacent to the landfill. SW/SS-3 will be collected at the public access fishing area approximately 800 feet downstream of the site.

These surface water and sediment samples will be analyzed, as detailed in Table 2, for full TCL+30/TAL compounds as specified in the EPA Contract Laboratory Program Statement of Work for Inorganic and Organic Analysis, plus petroleum hydrocarbons and pH, in accordance with DER-10. Parameters measured in the field for surface water will include temperature, pH, Specific Conductivity, Oxidation-Reduction Potential (ORP) and Dissolved Oxygen. In shallow moving water, downstream surface water samples will be collected first to avoid disturbing stream bottom sediments. For water bodies over three (3) feet deep, a composite sample of the whole water column will be collected. Sediment samples will also be obtained at each surface water sample location and will consist of the upper five (5) centimeters of sediment. Sampling equipment such as an Ekman Grab Sampler or a core sampler will be used to collect the sediment samples located in the deeper surface water locations, if necessary.

2.5 Leachate Investigation

The PSA conducted in 1991 included a leachate investigation at five (5) locations. Similarly, leachate will be collected during the investigation at observed leachate seeps and at the pipe discharging water north of the site. STERLING personnel, in conjunction with the NYSDEC's representative, will conduct an investigation within the Landfill property to identify leachate seeps or areas characterized by stained vegetation. If any flowing leachate seeps are identified, these areas will be sampled following the same protocol for surface water sampling. It is anticipated that up to seven (7) samples will be collected and analyzed for leachate indicator parameters as outlined in Table 2.

2.6 Surficial Soil Sampling

Surficial soil sampling will be conducted at three (3) locations on the landfill and six (6) locations on the balance of the property, as shown on Figure 2. Actual sample locations will be determined in the field with the NYSDEC's representative. The surficial sampling locations on the landfill will be in approximately the same locations as three (3) of the borings proposed in Section 2.1. Soil samples will be collected at a depth of 0 to 2 inches, and analyzed for full TCL/TAL compounds as specified in the EPA Contract Laboratory Program Statement of Work for Inorganic and Organic Analysis, plus petroleum hydrocarbons and pH, in accordance with DER-10. Results of the surficial soil sampling will aid the NYSDOH in determining any health risks posed by the site.

2.7 Vector Investigation

STERLING personnel will conduct an investigation within the Landfill perimeter and immediate areas to identify evidence of vectors. A vector is defined as any animal that carries disease; typical vectors at landfills are flies, crows, seagulls and rodents. The landfill cover system will be surveyed for burrow holes.

2.8 Fish and Wildlife Resource Impact Analysis

In accordance with DER-10, a Fish and Wildlife Resource Impact Analysis (FWRIA) will be conducted at the site. A Resource Characterization will first be conducted in accordance with DER-10, Section 3.10.1, to identify actual or potential impacts to fish and wildlife resources from site contaminants. If actual or potential impacts are identified, an ecological impact assessment will be conducted in accordance with DER-10, Section

3.10.2 to further evaluate and define adverse impacts.

2.9 Explosive Gas Investigation

STERLING will conduct a perimeter explosive gas survey at the site. Additionally, explosive gases will be measured at each soil boring location prior to drilling.

A Q-RAE Multi-Gas Monitor or equivalent explosimeter will be used. This unit monitors combustible gases, oxygen, carbon monoxide, and hydrogen sulfide. The unit is equipped with a pump and a six (6) inch probe. The explosimeter has a range of 0% to 100% of the lower explosive limit (LEL) with a resolution of 1% LEL.

Before conducting the perimeter gas survey, a visual reconnaissance of the landfill will be conducted to look for signs of potential gas migration, such as stressed vegetation. If visual evidence of gas migration is discovered, gas monitoring activities will be modified to include these areas.

The method and procedures for conducting the survey are as follows:

A shallow probe hole will be installed at 100-foot intervals around the landfill using a metal rod and hammer. The probe hole will be approximately 18 inches deep. Upon removal of the metal rod, the probe of the multi-gas monitor will be inserted. The multi-gas monitor probe will be left in the hole for a minimum of 30 seconds to obtain a representative sample of soil gas. If explosive gases are detected above 100% of the LEL, additional probe holes 10 to 15 feet further from the landfill footprint will be installed to determine the extent of gas migration.

Explosive gas readings at each sample location will be recorded and provided in the Remedial Investigation Report.

2.10 Soil Vapor Assessment

Permanent soil vapor probes will be installed north, west and south of the Landfill footprint in apparent undisturbed areas in the general locations shown on Figure 2. The actual locations will be determined in the field with the NYSDEC. A total of six (6) probes will be installed using the methods and protocols recommended by the final NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (October 2006, Final Guidance). Two (2) probes will be installed in each direction north, west and south of the Landfill. Permanent sampling probes will be constructed in accordance with Figure 2.2 of the Final Guidance, and the following:

<u>Installation:</u>

A. Implants will be installed using a soil auger to a depth of approximately 6 to 7 feet below grade.

B. Following drilling, a porous, inert backfill material consisting of washed #1 crushed stone will be used to create a sampling zone 1 to 2 feet in length.

C. The sampling zone and borehole will be fitted with an inert polyethylene tube of laboratory or food grade quality of ¼ inch diameter. The tubing will extend to the ground surface.

D. The probes will be sealed above the sampling zone with a bentonite slurry for a minimum distance of 3 feet to prevent outdoor air infiltration. The remainder of the borehole will be backfilled with clean material.

E. The probe will be placed to minimize infiltration of groundwater, surface water, and outdoor air. The probe location will be clearly marked and the sampling tube will be enclosed in a protective steel casing to prevent accidental damage.

Sample Collection:

To obtain representative samples and to minimize possible discrepancies, soil vapor samples should be collected in the following manner at all locations:

A. At least 24 hours after the installation of permanent probes, 1 to 3 implant volumes (i.e., the volume of the sample probe and tube) will be purged prior to collecting the samples.

B. Flow rates for both purging and collecting should not exceed 0.2 liter per minute to minimize outdoor air infiltration during sampling.

C. Samples will be collected, using conventional sampling methods, in an appropriate container. Samples will be obtained using a Summa canister and will be analyzed by USEPA method TO-15. The Summa canister will be calibrated to obtain a one liter sample over a 24 hour period.

D. An ambient air sample will be obtained at a representative upwind location and will be analyzed using the sample methodology followed for the subsurface sample locations.

E. A tracer gas (e.g., helium, butane, sulfur hexafluoride, etc.) will be used when collecting soil vapor samples to verify that adequate sampling techniques are followed and that infiltration of outdoor air is not occurring.

F. Weather conditions will be noted for the 24 to 48 hours preceeding sampling, and field notes including a site sketch of sampling locations will be recorded specifically noting:

  - Sample identification,
  - Date and time of sample collection,
  - Sampling depth,
  - Identity of samplers,
  - Sampling methods and devices,
  - Purge volumes,
  - Volume of soil vapor extracted,
  - If canisters used, the vacuum before and after samples were collected,
  - Apparent moisture content (dry, moist, saturated, etc.) of the sampling zone, and
  - Chain of custody protocols and records used to track samples from sampling point to analysis.

3.0 HEALTH AND SAFETY PLAN

The ERF requires that a Health and Safety Plan (HASP) be included in the RI Work Plan, and be adhered to by all personnel involved in investigation and/or remediation activities. In accordance with DER-10, the HASP, attached as Appendix B, has been prepared in accordance with industry (29 CFR 1910) and construction (29 CFR 1926) standards of the Occupational Safety and Health Administration (OSHA) and will be available at the site during all field activities. The HASP also includes a section on community health and safety to ensure the public is protected from exposure to site contaminants during investigation or remediation activities, including a Community Air Monitoring Plan (CAMP), as required under DER-10.

Prior to the start of any subsurface work, underground utilities and piping that may pose a potential hazard will be identified and located. The Dig SafeSystem Inc. - NewYork, center or equivalent service will be called and underground utilities will be located and marked. Also, the location of privately owned utility lines will be ascertained.

In the event a pipe or line is struck, work will stop and the emergency action plan (see Section 5.0 of the HASP) will be implemented.

4.0 QUALITY ASURANCE PROJECT PLAN

In accordance with DER-10, a Quality Assurance Project Plan (QAPP) is attached as Appendix C, to address quality assurance procedures for sampling and analysis. Quality Assurance/Quality Control (QA/QC) quantities are outlined in Table 2. All sample analysis shall be by a NYSDOH ELAP Certified Laboratory providing for Category B deliverable data reports.

5.0 SCHEDULE

Table 1 presents the proposed implementation schedule for the Remedial Investigation. The field investigation work is proposed to take place following the NYSDEC acceptance of this Remedial Investigation Work Plan. The alternatives analysis report will then be prepared in early 2007, followed by NYSDEC review. The preparation of the contract documents, advertisement for bids, and site work are proposed to take place following the NYSDEC's issuance of the Record of Decision (ROD).

The anticipated budget is provided as Table 3.

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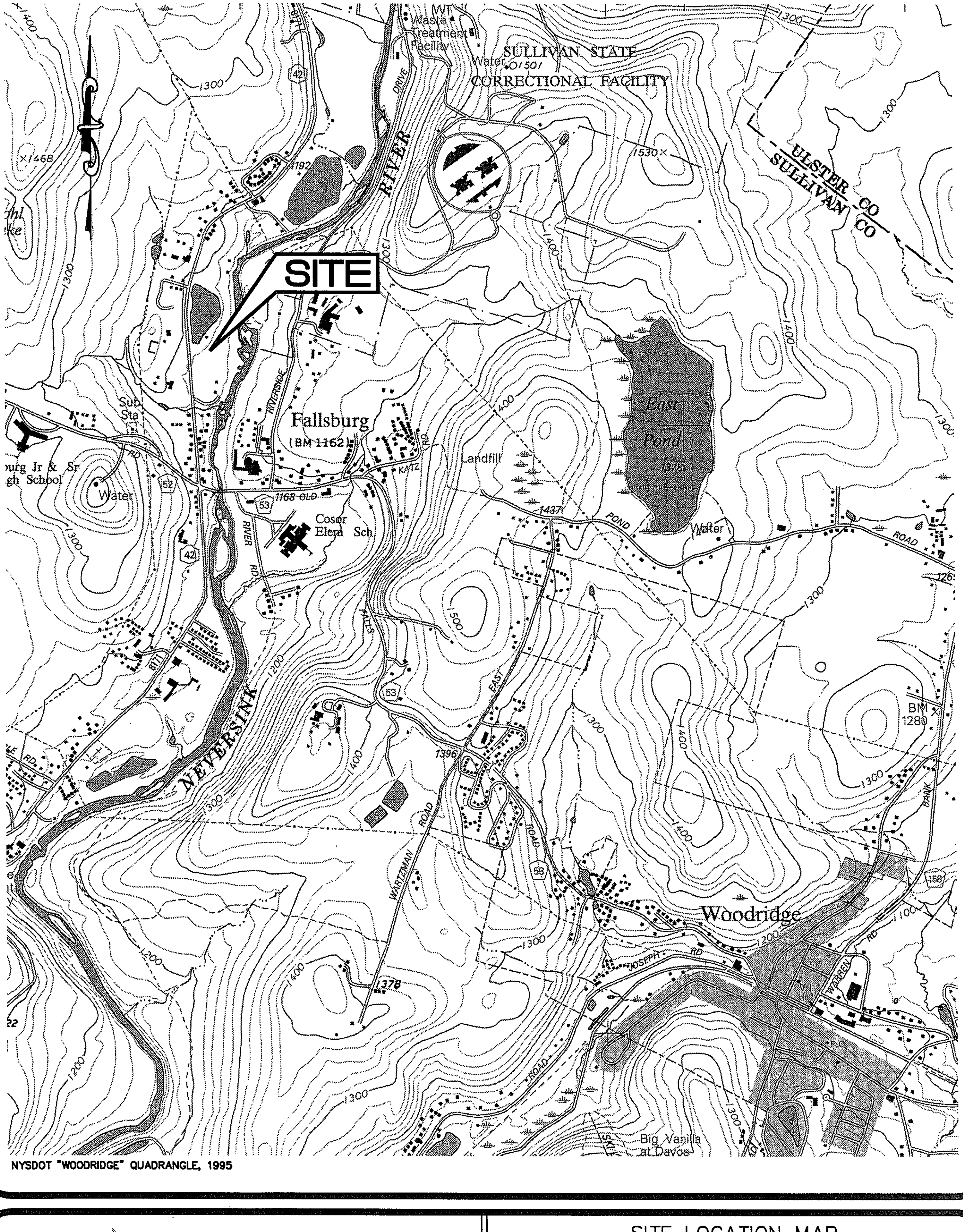
FIGURES



NYSDOT "WOODRIDGE" QUADRANGLE, 1995

STERLING

Sterling Environmental Engineering, P.C.

24 Wade Road ♦ Latham, New York 12110

SITE LOCATION MAP

HILLS HOLDING CORPORATION

CONSTRUCTION AND DEMOLITION DEBRIS LANDFILL

TOWN OF FALLSBURG SULLIVAN CO., N.Y.

PROJ. No.:	23068	DATE:	09/13/04	SCALE:	1" = 2000'	DWG. NO.	23068001	FIGURE	1

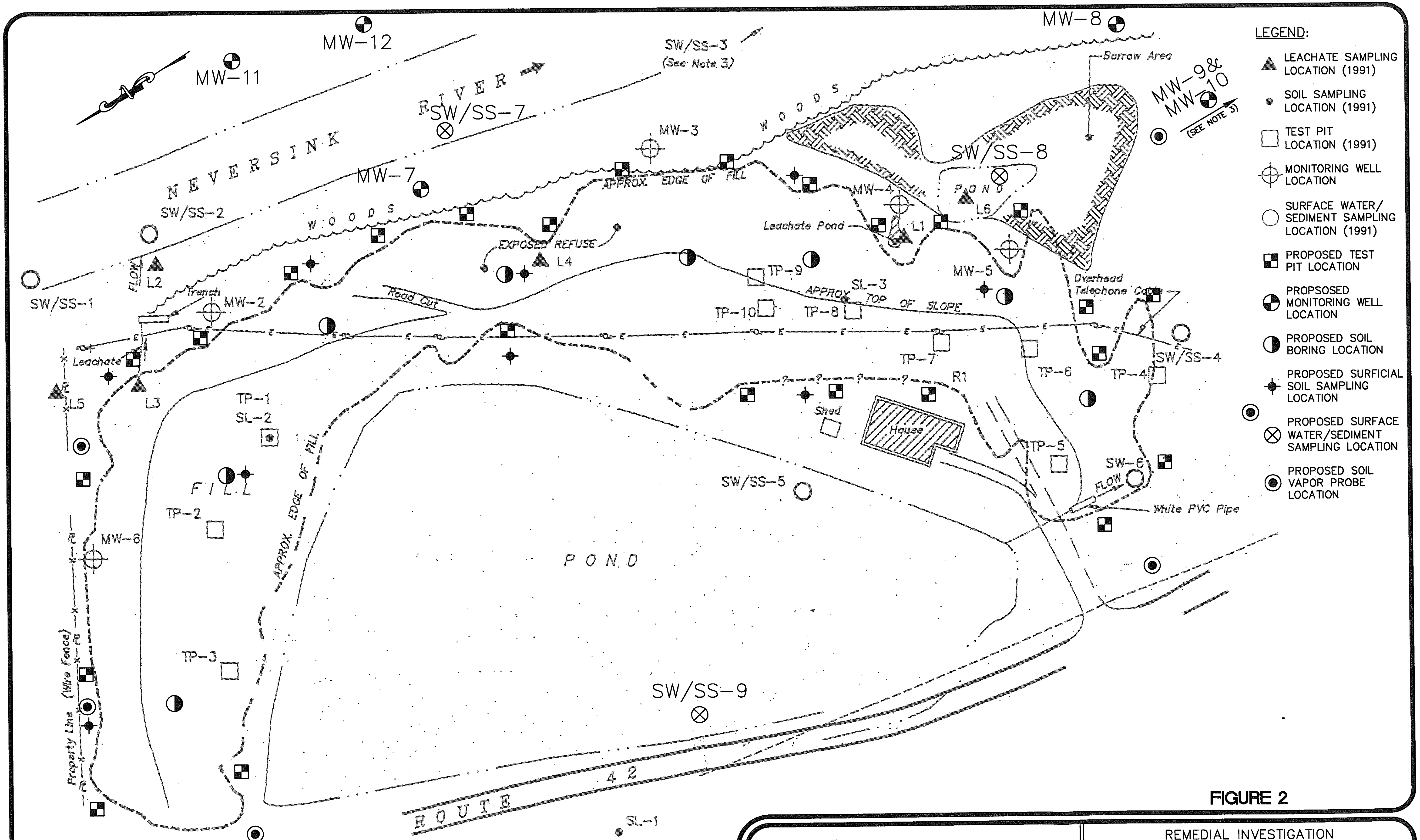


FIGURE 2

NOTES:

1. BASE MAP FROM "SITE SKETCH & SAMPLING LOCATIONS", DATED NOV. 1991, BY TAMS CONSULTANTS, INC., FOR 1991 SITE INVESTIGATION REPORT BY DUNN GEOSCIENCE ENGINEERING CO., P.C.
2. MW-1 IS OFFSITE ON JDT CONSTRUCTION CORP. PROPERTY.
3. SW/SS-3 IS LOCATED AT THE PUBLIC ACCESS FISHING AREA, APPROX. 800 FT DOWNSTREAM. MW-9 AND MW-10 ARE PROPOSED CLUSTER WELLS TO BE LOCATED APPROX. 250' SOUTHEAST FROM THE LANDFILL FOOTPRINT BOUNDARY, MIDWAY BETWEEN THE LANDFILL AND TOWN DRINKING WATER WELL.

STERLING
Sterling Environmental Engineering, P.C.
24 Wade Road • Latham, New York 12110

REMEDIAL INVESTIGATION
SAMPLING LOCATIONS
HILLS HOLDING CORPORATION
CONSTRUCTION & DEMOLITION DEBRIS LANDFILL
E-3-53-009
TOWN OF FALLSBURG SULLIVAN CO., N.Y.

PROJ. No.: 23068	DATE: 10/3/06, rev. 1/11/07	SCALE: 1" = 100'	DWG. NO. 23068004	FIGURE 2

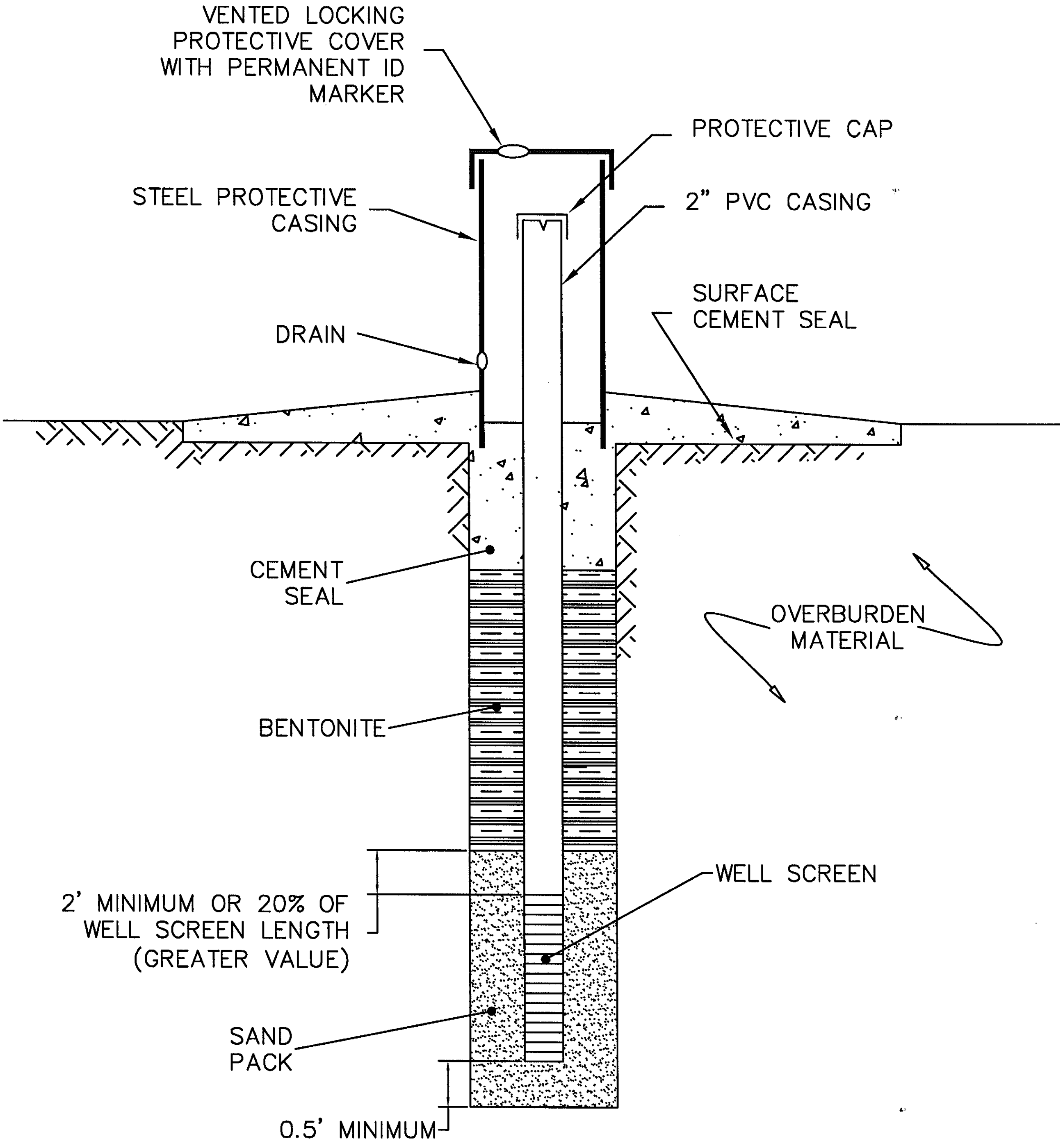


FIGURE 3

STERLING
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24 Wade Road ♦ Latham, New York 12110

STANDARD OVERBURDEN MONITORING WELL INSTALLATION DETAIL
HILLS HOLDING CORPORATION
CONSTRUCTION AND DEMOLITION DEBRIS LANDFILL
TOWN OF FALLSBURG SULLIVAN CO., N.Y.

PROJ. No.:	23068	DATE:	10-2-06	SCALE:	N.T.S	DWG. NO.	23068002	FIGURE	3

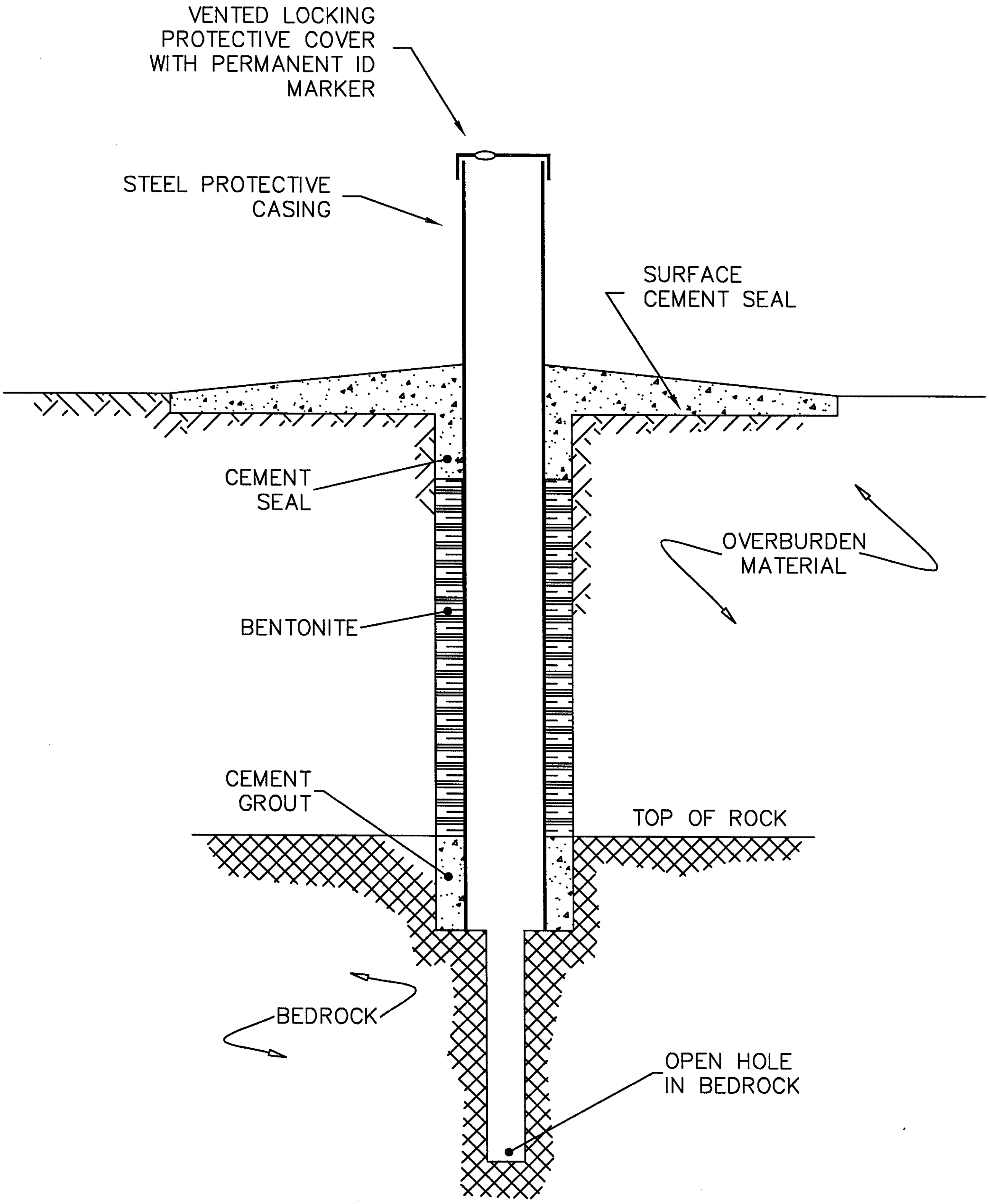

FIGURE 4

STERLING
Sterling Environmental Engineering, P.C.
24 Wade Road ♦ Latham, New York 12110

STANDARD BEDROCK MONITORING WELL INSTALLATION DETAIL
HILLS HOLDING CORPORATION
CONSTRUCTION AND DEMOLITION DEBRIS LANDFILL
TOWN OF FALLSBURG SULLIVAN CO., N.Y.

PROJ. No.: 23068
DATE: 10-2-06
SCALE: N.T.S
DWG. NO. 23068003
FIGURE 4

TABLES

TABLE 1

REMEDIAL INVESTIGATION IMPLEMENTATION SCHEDULE

HILLS HOLDING CORPORATION
CONSTRUCTION AND DEMOLITION DEBRIS LANDFILL
NYS ROUTE 42, FALLSBURG, NEW YORK

SITE NO. E-3-53-009

Item	**Estimated Schedule**
Grant Application	Completed
Negotiate/Approve State Assistance Contract	Complete
Supplemental Site Investigations: • Update Site Mapping • Install Additional Monitoring Wells • Resample Groundwater Wells • Stream/Sediment Sampling • Leachate Investigation • Vector Investigation • Explosive Gas Investigation	January – February 2007
Prepare Alternatives Analysis Report	March 2007
NYSDEC Review of Alternatives Analysis Report	April 2007
NYSDEC Prepares PRAP	June 2007
NYSDEC Prepares Record of Decision (ROD)	September 2007

HILLS HOLDING CORPORATION CONSTRUCTION AND DEMOLITION DEBRIS LANDFILL
NYS RT 42, FALLSBURG, NY
REMEDIAL INVESTIGATION WORK PLAN
TABLE 2
Proposed Sampling Matrix Quantities and Parameter Analysis

Location/Matrix	# of Samples	Analysis	Method
Test Pits/ Soil	Test pits will be excavated and sampled at 25 locations around the perimeter of the landfill. All samples will be analyzed for Total Petroleum Hydrocarbons and TCL/TAL parameters (including SVOCs, PCBs, Pesticides, and Metals), and 5 samples will be chosen to also be analyzed for TCL VOCs + 10, Asbestos and Full TCLP + reactivity, ignitability, corrosivity.		
	25	SVOCs	Full 8270C + TICs
	25	PCB/Pesticides	8082; 8081A
	25	Metals (TAL Inorganics)	6010A; 7471A
	25	Petroleum HydroCarb. (DRO & GRO)	8015M
	5	TCL VOCs + 10	8260B
	5	Full TCLP plus Reac, Ignit. & Corros	1311; 6010/7000; 8260; Full 8270 + TICs; 8081; 8152; 9045; 1010; Section 7.3 Reactivity
	5	Asbestos	EPA 600 / R-93 / 116
Borings / Soil	Samples will be collected from 8 soil borings. All samples will be analyzed for Total Petroleum Hydrocarbons and TCL/TAL parameters (including SVOCs, PCBs, Pesticides, and Metals), and five samples will be chosen to also be analyzed for TCL VOCs +10 Asbestos and Full TCLP + reactivity, ignitability, corrosivity.		
	8	SVOCs	Full 8270C + TICs
	8	PCB/Pesticides	8082; 8081A
	8	Metals (TAL Inorganics)	6010A; 7471A
	8	Petroleum HydroCarb. (DRO & GRO)	8015M
	5	TCL VOCs +10	8260B
	5	Full TCLP plus Reac, Ignit. & Corros	1311; 6010/7000; 8260; Full 8270 + TICs; 8081; 8152; 9045; 1010; Section 7.3 Reactivity
	5	Asbestos	EPA 600 / R-93 / 116
Surface Soils	Surface soils will be sampled at 9 locations. All samples will be analyzed for Total Petroleum Hydrocarbons and Full TCL +30/TAL parameters (including VOCs, SVOCs, PCBs, Pesticides, and Metals)		
	9	Full TCL +30/TAL	Full 8270C + TICs; 8082; 8081A; 6010A; 7471A; 8260B
	9	Petroleum HydroCarb. (DRO & GRO)	8015M
Sediment	Sediments will be sampled at 8 locations. All samples will be analyzed for Total Petroleum Hydrocarbons and Full TCL +30/TAL parameters (including VOCs, SVOCs, PCBs, Pesticides, and Metals)		
	8	Full TCL +30/TAL	Full 8270C + TICs; 8082; 8081A; 6010A; 7471A; 8260B
	8	Petroleum HydroCarb. (DRO & GRO)	8015M

Location/Matrix	# of Samples	Analysis	Method
Groundwater	Groundwater samples will be collected from 12 locations. Samples will be analyzed for FULL TCL+30/TAL parameters and petroleum hydrocarbons. Filtered samples will be collected for TAL inorganics and Pesticides/PCBs analysis. 5 of the 12 locations will also be selected to have unfiltered samples analyzed for TAL inorganics, PCBs, and Pesticides.		
	12	TAL Inorganics (filtered)	6010B; 7040A
	12	TCL VOCs + 10	8260B
	12	SVOCs	Full 8270C + TICs
	12	PCB/Pesticides (filtered)	8082; 8081A
	12	Petroleum HydroCarb. (DRO & GRO)	8015M
	5	TAL Inorganics (un-filtered)	6010B; 7040A
	5	PCB/Pesticides (un-filtered)	8082; 8081A
Surface Water	Surface water will be sampled at 8 locations. All samples will be analyzed for Total Petroleum Hydrocarbons and Full TCL +30/TAL parameters (including VOCs, SVOCs, PCBs, Pesticides, and Metals)		
	9	Full TCL +30/TAL	Full 8270C + TICs; 8082; 8081A; 6010A; 7471A; 8260B
	9	Petroleum HydroCarb. (DRO & GRO)	8015M
Leachate	Leachate will be sampled at up to 7 locations. All samples will be analyzed for the parameters listed below.		
	7	TCL Metals include Na,K, Mo & V	6010A; 7471A
	7	Alkalinity	SM2320
	7	Nitrate & Nitrite	EPA 300.0
	7	Amonia	SM4500NH3B
	7	Chloride	EPA 300.0
	7	Fluoride	EPA 300.0
	7	Sulfate	EPA 300.0
	7	Sulfide	SM4500SD
	7	TDS	SM5540C
	7	BOD5	EPA 405.1
	7	COD	SM55220D
	7	Cyanide	SW846 9012
Soil Vapor	Soil vapor samples will be obtained from up to six (6) probe locations and one (1) ambient air location. The samples will be analyzed for VOCs by USEPA Method TO-15 by a laboratory that is ELAP approved for air contaminants.		
	7	VOCs	EPA TO-15

Location/Matrix	# of Samples	Analysis	Method
QA/QC Samples:			
Surface and Boring Soils / Test Pits (42 total)			
Duplicates	3	Full TCL +30/TAL	Full 8270C + TICs; 8082; 8081A; 6010A; 7471A; 8260B
	3	Petroleum HydroCarb. (DRO & GRO)	8015M
	1	Full TCLP plus Reac, Ignit. & Corros	1311; 6010/7000; 8260; Full 8270 + TICs; 8081; 8152; 9045; 1010; Section 7.3 Reactivity
	1	Asbestos	EPA 600 / R-93 / 116
MS/MSD	3	Full TCL +30/TAL	Full 8270C + TICs; 8082; 8081A; 6010A; 7471A; 8260B
	3	Petroleum HydroCarb. (DRO & GRO)	8015M
	1	Full TCLP plus Reac, Ignit. & Corros	1311; 6010/7000; 8260; Full 8270 + TICs; 8081; 8152; 9045; 1010; Section 7.3 Reactivity
	1	Asbestos	EPA 600 / R-93 / 116
Rinse Blank	3	Full TCL +30/TAL	Full 8270C + TICs; 8082; 8081A; 6010A; 7471A; 8260B
	3	Petroleum HydroCarb. (DRO & GRO)	8015M
Trip Blank	14	TCL VOCs + 10	8260B
Ground and Surface Water (21 total)			
Duplicates	2	Full TCL +30/TAL (unfiltered TAL/PCB/PEST)	Full 8270C + TICs; 8082; 8081A; 6010A; 7471A; 8260B
	2	Petroleum HydroCarb. (DRO & GRO)	8015M
	1	TAL Inorganics (filtered)	6010B; 7040A
	1	PCB/Pesticides (filtered)	8082; 8081A
MS/MSD	2	Full TCL +30/TAL (unfiltered TAL/PCB/PEST)	Full 8270C + TICs; 8082; 8081A; 6010A; 7471A; 8260B
	2	Petroleum HydroCarb. (DRO & GRO)	8015M
	1	TAL Inorganics (filtered)	6010B; 7040A
	1	PCB/Pesticides (filtered)	8082; 8081A
Rinse Blank	2	Full TCL +30/TAL (unfiltered TAL/PCB/PEST)	Full 8270C + TICs; 8082; 8081A; 6010A; 7471A; 8260B
	2	Petroleum HydroCarb. (DRO & GRO)	8015M
	1	TAL Inorganics (filtered)	6010B; 7040A
	1	PCB/Pesticides (filtered)	8082; 8081A
Trip Blank	8	TCL VOCs + 10	8260B
Sediment (8 total)			
Duplicates	1	Full TCL +30/TAL	Full 8270C + TICs; 8082; 8081A; 6010A; 7471A; 8260B
	1	Petroleum HydroCarb. (DRO & GRO)	8015M
MS/MSD	1	Full TCL +30/TAL	Full 8270C + TICs; 8082; 8081A; 6010A; 7471A; 8260B
	1	Petroleum HydroCarb. (DRO & GRO)	8015M
Rinse Blank	1	Full TCL +30/TAL	Full 8270C + TICs; 8082; 8081A; 6010A; 7471A; 8260B
	1	Petroleum HydroCarb. (DRO & GRO)	8015M
Trip Blank	3	TCL VOCs + 10	8260B

Location/Matrix	Quantity	Analysis	Method
Leachate (7 total)			
Duplicates	1	TCL Metals include Na,K, Mo & V	6010A; 7471A
	1	Alkalinity	SM2320
	1	Nitrate & Nitrite	EPA 300.0
	1	Amonia	SM4500NH3B
	1	Chloride	EPA 300.0
	1	Fluoride	EPA 300.0
	1	Sulfate	EPA 300.0
	1	Sulfide	SM4500SD
	1	TDS	SM5540C
	1	BOD5	EPA 405.1
	1	COD	SM55220D
	1	Cyanide	SW846 9012
MS/MSD	1	TCL Metals include Na,K, Mo & V	6010A; 7471A
	1	Alkalinity	SM2320
	1	Nitrate & Nitrite	EPA 300.0
	1	Amonia	SM4500NH3B
	1	Chloride	EPA 300.0
	1	Fluoride	EPA 300.0
	1	Sulfate	EPA 300.0
	1	Sulfide	SM4500SD
	1	TDS	SM5540C
	1	BOD5	EPA 405.1
	1	COD	SM55220D
	1	Cyanide	SW846 9012
Rinse Blank	1	TCL Metals include Na,K, Mo & V	6010A; 7471A
	1	Alkalinity	SM2320
	1	Nitrate & Nitrite	EPA 300.0
	1	Amonia	SM4500NH3B
	1	Chloride	EPA 300.0
	1	Fluoride	EPA 300.0
	1	Sulfate	EPA 300.0
	1	Sulfide	SM4500SD
	1	TDS	SM5540C
	1	BOD5	EPA 405.1
	1	COD	SM55220D
Trip Blank	1	Cyanide	SW846 9012
Trip Blank	3	TCL VOCs +10	8260B

Note: For Trip Blank calculations, assume 4 sample sets per cooler.

Sterling Environmental Engineering, P.C.

Hills Holding Corporation
Route 52, Fallsburg, NY
Remedial Investigation Cost Estimate-Staff & Expenses

TABLE 3

Task	Total
Remedial Investigation Preparation:	
File Review, Work Plan Preparation, NYSDEC negotiation meetings and Work Plan Revisions	$55,000.00
Obtain Field Investigation Proposals, Review, Cost Estimate Tables	$6,865.00
On-Site Tasks (On-site is defined as landfill footprint):	$6,050.00
Test Pit Supervision/Test Pit Sampling with H&S Officer	$7,750.00
8 Soil Borings & Two Piezometers through Waste with H&S Officer	$510.00
Explosive Gas & Vector Surveys	
Off-Site Tasks (Off-site is defined as off the landfill footprint):	
Evaluate Existing MWs Viability for Sampling/ Re-Develop Wells	$1,365.00
Drilling Supervision for up to six (6) New Monitoring Wells with H&S Officer	$14,000.00
Sample Existing & New Monitoring Wells (by low-flow sampling), SW , Sed, Leach., Surf. Soils & Conduct Hydraulic Conductivity Tests on New Wells.	$8,610.00
Install and sample six (6) Soil Vapor Probes with H&S officer	$6,770.00
Remedial Investigation Summary:	
Prepare Remedial Investigation Report	$20,000.00
Complete Fish and Wildlife Resource Impact Analysis (Part 1 only-Literature Search)	$3,260.00
Alternatives Analysis	$35,000.00
PRAP/ROD Support	$5,000.00
Total Estimated Personnel Subtotal:	$170,180.00
Estimated Grant Administration Support (calculated @ 3% of Labor)	$5,105.40
TOTAL LABOR:	$175,285.40
TOTAL EXPENSES (itemized below):	**$196,314.82**
TOTAL REMEDIAL INVESTIGATION:	**$371,600.22**

Expenses (Estimated)		**Total Estimate**
Photocopying, fax, telephone, Postage		$1,725.00
Mileage (210 miles roundtrip per site visit-)		
Evaluate and Re-Develop Wells site visit-one vehicle		$117.13
Drilling, Test Pit Site Visit-2 vehicles x 2trips (weekend)		$468.52
Sampling Site Visit-1 vehicle		$117.13
Tolls (per round trip per vehicle)		$30.36
Hotel (Days Inn, Liberty, NY $90/night)		
Evaluate and Re-Develop 6 Wells site visit (one night-1 room)		$103.50
Drilling Site Visit (5 nights-two rooms)		$1,035.00
Test Pit Site Visit (2 nights-two rooms)		$414.00
Hydraulic Conductivity Testing /Sampling Site Visit (5 nights-two rooms)		$828.00
Meals		
Evaluate and Re-Develop Wells site visit (1.5 per diem day)		$69.00
Test Pit Site Visit (3 per diem days-2 people)		$276.00
Drilling Site Visit (6 per diem days-2 People)		$552.00
Hydraulic Conductivity Testing /Sampling Site Visit 6.0 per diem days-2 people)		$552.00
Supplies-Wooden Stakes, ice, tubing, locks,		$575.00
PID (Drilling 6 days)		$862.50
PID (Test Pits 3 days & Soil Borings 4 days)		$1,006.25
Air Particulate Monitoring Units 2 for 230/day Drilling 6 days		$1,587.00
Air Particulate Monitoring Units 2 for 230/day Test Pits 3 days/ Soil Borings 4 days		$1,851.50
Water Meter (12 days- MW Installation & Sampling)		$690.00
Turbidity Meter (6 days)		$345.00
YSI (6 days)		$621.00
Four-Gas Meter (1 day)		$115.00
Pumps (4 at 35 each for 6 days)		$966.00
Laboratory-Test Pit, soil boring and 3 surface soil samples (on-site)		$31,498.50
Laboratory-Groundwater, SW, SED, 6 surface soils, Leachate, Soil Vapor Samples (off-site)		$29,992.00
Laboratory-QA/QC samples Test Pit, soil boring surface soils		$9,217.25
Laboratory-QA/QC samples-GW,SED, Leachate, Soil Vapor		$9,441.50
Data Validation		$7,542.86
Drilling Services-Monitoring well installation & development & Soil Vapor Probes (off-site)		$46,318.50
Test Pit & Soil Boring Services, 2 Piezometer wells installation (on-site)		$22,701.64
Topographic & Property Boundary Survey		$24,695.68
	Sub-Total	**$196,314.82**

Summary:

	Labor	**Expense**	**Total**
On-Site	$144,540.40	$80,561.25	$225,101.65
Off-Site	$30,745.00	$115,753.57	$146,498.57
Total:	**175,285.40**	**$196,314.82**	

APPENDIX A

FINAL PRELIMINARY SITE ASSESSMENT REPORT

5 3030.1

ENGINEERING INVESTIGATIONS AT CONSTRUCTION & DEMOLITION DEBRIS SITES

FINAL

PRELIMINARY SITE ASSESSMENT

Route 52 - Hills Holding Corp. Site

Town of Fallsburg Sullivan County

RECEIVED
NOV 27 1991
BUREAU OF
HAZARDOUS SITE CONTROL
DIVISION OF HAZARDOUS
WASTE REMEDIATION

Prepared for:

**New York State
Department of
Environmental Conservation**
50 Wolf Road, Albany, New York 12233
Thomas C. Jorling, *Commissioner*

Division of Hazardous Waste Remediation
Michael J. O'Toole, Jr., *Director*

By:
DUNN GEOSCIENCE ENGINEERING COMPANY, P.C.
in association with
TAMS CONSULTANTS, INC.

ENGINEERING INVESTIGATIONS AT CONSTRUCTION & DEMOLITION DEBRIS SITES

FINAL

PRELIMINARY SITE ASSESSMENT

Route 52 Hills Holding Corporation Site
Town of Fallsburg

Sullivan County

NYSDEC Work Assignment #D002520-7

November 1991

Prepared for:

DIVISION OF HAZARDOUS WASTE REMEDIATION
NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION
50 Wolf Road
Albany, New York 12233-7010

Prepared by:

Dunn Geoscience Engineering Company, P.C.
12 Metro Park Road
Albany, NY 12205

In Association with

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300 Broadacres Drive
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LICENSED PROFESSIONAL ENGINEER
TAMS CONSULTANTS INC
NO 118
STATE OF NEW YORK

TAMS Inc

ENGINEERING INVESTIGATIONS AT CONSTRUCTION & DEMOLITION DEBRIS SITES

FINAL

PRELIMINARY SITE ASSESSMENT

Route 52 Hills Holding Corporation Site
Town of Fallsburg

Sullivan County

NYSDEC Work Assignment #D002520-7

November 1991

Prepared for:

DIVISION OF HAZARDOUS WASTE REMEDIATION
NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION
50 Wolf Road
Albany, New York 12233-7010

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Figures (Appendix A)

Tables (Appendix B)

Appendices

EXECUTIVE SUMMARY

Introduction

This report presents the results of a Preliminary Site Assessment of the Route 52 Hills Holding Corporation construction and demolition (C&D) debris landfill site. The site is also listed as the Route 42 C&D Landfill in some documents. This assessment report was prepared for the New York State Department of Environmental Conservation (NYSDEC) by TAMS Consultants, Inc. (TAMS), under contract to DUNN Geoscience Engineering Co., P.C. (DUNN). This report has been prepared under the New York State Superfund Contract Work Assignment No. D002520-7.

Site Description

The project site is a landfill comprising 8 eight acres of a 26.4-acre parcel (Block 1, Lot 45) located on Route 42 in Fallsburg, Sullivan County, New York. A ranch-style house on the property is leased to a tenant. The house is located east of the pond and west of the landfill. Landfill material was placed up to the rear foundation wall of the house. Another residence is located adjacent to the site (Block 1, Lot 44) approximately 200 feet to the north. The northern toe of the landfill slope is approximately 50 feet south of the north property line.

Site History

The landfill began operation in the summer of 1988 as an exempt construction and demolition debris site. The debris was deposited on a hillside between a pond and the Neversink River. From the summer of 1988 until its closure in October 1988 there were numerous complaints of burning and illegal dumping. The New York State Department of Health - Monticello District Office, the New York State Department of Environmental Conservation, and a private laboratory sampled the adjacent residence's well water and leachate from the site. Results of this sampling indicated low levels of contamination from carbon tetrachloride. During TAMS' site reconnaissance in November 1990, leachate was observed flowing into the Neversink River at the northeast corner of the site.

Site Assessment

As part of the characterization of the site, both a geophysical survey and soil gas survey were conducted. The results of these surveys indicated the presence of high concentrations of volatile organic chemicals across the site and also indicated the presence of buried metallic debris. The results of both these surveys were utilized in the determination of test pit and monitoring well locations.

Initial environmental sampling was performed at six surface water, five sediment, five leachate, and three surface soil locations. Volatile organics and PCBs were not detected in the surface water samples. Semivolatile organics were only detected in sample SW-5, in which the total of target and non-target semivolatile organics were 64 ug/l. One pesticide (DDT) was detected at 0.069 ug/l in one sample. Inorganic analyte concentrations exceeding class B standards include copper, iron, and zinc in one sample, lead in two samples, and vanadium in five samples. The highest inorganic concentrations were generally found in sample SW-2.

Toluene was detected in the three samples from the Neversink River at a maximum concentration of 130 ug/l in sample SS-2, where the leachate enters the river. However, target and non-target semivolatile organic analytes were detected in the sediment samples. Polynuclear aromatic hydrocarbons (PNAs) were the most frequently detected target analyte class, with as many as five different PNA compounds at a total concentration of 840 ug/kg in SS-4 and 560 ug/kg in SS-3. Other target semivolatiles were detected at concentrations less than 1,000 ug/kg. The most non-target analytes detected in a sediment sample were 20 different unknowns at a total estimated concentration of 79,290 ug/kg; however, it is believed that most if not all of the unknowns in the sediment samples may be naturally occurring. No pesticides or PCBs were detected in the sediment samples. The concentrations of inorganics detected in the sediment samples did not exceed reported US background concentrations.

Organic contaminant concentrations in the leachate samples were relatively low (less than 1000 ug/l total concentration). Inorganic concentrations were elevated in some leachate samples, especially in one which was collected from the leachate pond south of the landfill.

Chloroform, at an estimated concentration of 3 ug/kg, was the only volatile organic compound detected in any of the three surface soil samples. PNAs (up to 21,630 ug/kg) and unknown semivolatiles (up to 2,130 ug/kg) were detected in two of the three samples. No concentrations of inorganics in excess of reported background ranges were detected.

The excavation of ten test pits on the site revealed fill at nine of the location. The contents varied, but fill material generally consisted of wood; silty sand and gravel, which was occasionally oily; and miscellaneous C&D debris such as concrete and brick fragments, steel re-bar, glass, carpets, plastic, wire, and metal. No visible evidence of the disposal of hazardous, industrial, or household waste was noted. No C&D fill or refuse was encountered in the tenth test pit excavated in a wet area south of the known area of fill, and the soils were not oily.

BTEX compounds (benzene, toluene, ethylbenzene, and xylene) were detected in most test pit samples at concentrations up to 326 ug/kg. Relatively low levels (40 ug/kg of less) of other target volatile organics were detected sporadically. Substantial concentrations of PNAs were detected in all fourteen samples at total concentrations as high as 360,000 ug/kg. Other semivolatiles detected include phthalates (at total concentrations up to 87,660 ug/kg), and numerous semivolatile unknowns, at total estimated concentrations up to 632,400 ug/kg. Pesticides or PCBs were detected in some or all of the samples. Compounds detected included DDT and its metabolites (up to 369 ug/kg); chlordane (up to 194 ug/kg), and aroclors 1242, 1254, and 1260 (up to 7,000 ug/kg total PCBs). The only inorganic analytes detected in the test pits at significant concentrations (exceeding reported background surface soil concentrations) were lead, which was reported at up to 1620 mg/kg (TP-2A), and cadmium as high as 125 mg/kg (TP-6A). Samples of the soil/waste material were not determined to be hazardous, as defined by the criteria of the Extraction Procedure Toxicity (EP TOX) or Toxicity Characteristic Leaching Procedure (TCLP) Test results.

Two air sampling events were performed for hydrogen sulfide and volatile organic analyses. Hydrogen sulfide was not detected during either event. Toluene was detected at low levels (at a maximum concentration of 28 ug/m^3) at most sampling locations during each sampling event. Tetrachloroethene was detected in the upwind sample during the first event. The concentrations of volatile organics reported were below New York State ambient guideline concentrations.

Six monitoring wells were installed on site for hydrogeologic evaluation and groundwater sampling. Three monitoring wells were completed as overburden wells, and two monitoring wells were completed as open rock holes. The sixth monitoring well was installed as an overburden/bedrock interface well. Results of hydraulic conductivities averaged 1.8×10^{-3} cm/sec for all wells. Groundwater flow appears to be predominantly to the east toward the Neversink River.

No concentrations of volatile organics greater than 3 ug/l were detected in groundwater samples. No target semivolatile organics were detected, although semivolatile unknowns were detected (at less than 100 ug/l total concentration) in all six samples. No pesticides or PCBs were detected in any of the groundwater samples. Concentrations of inorganics were significantly higher in samples from several of the downgradient wells than in the upgradient well; and class GA standards were exceeded for barium, lead, magnesium, iron manganese, sodium, zinc, and chromium in some of the downgradient samples. The inorganics and dissolved solids groundwater data, when evaluated together with the leachate and surface water data, suggest that inorganic contaminants are leaching from the fill and affecting surface water and groundwater in the vicinity of the site.

Conclusions

Based on site history, data search, and the preliminary site assessment, the disposal of hazardous wastes as defined by 6NYCRR Part 371 has not been documented at the site. However, disposal of hazardous waste at the site was documented by NYSDEC in 1988; this particular waste was subsequently removed from the site.

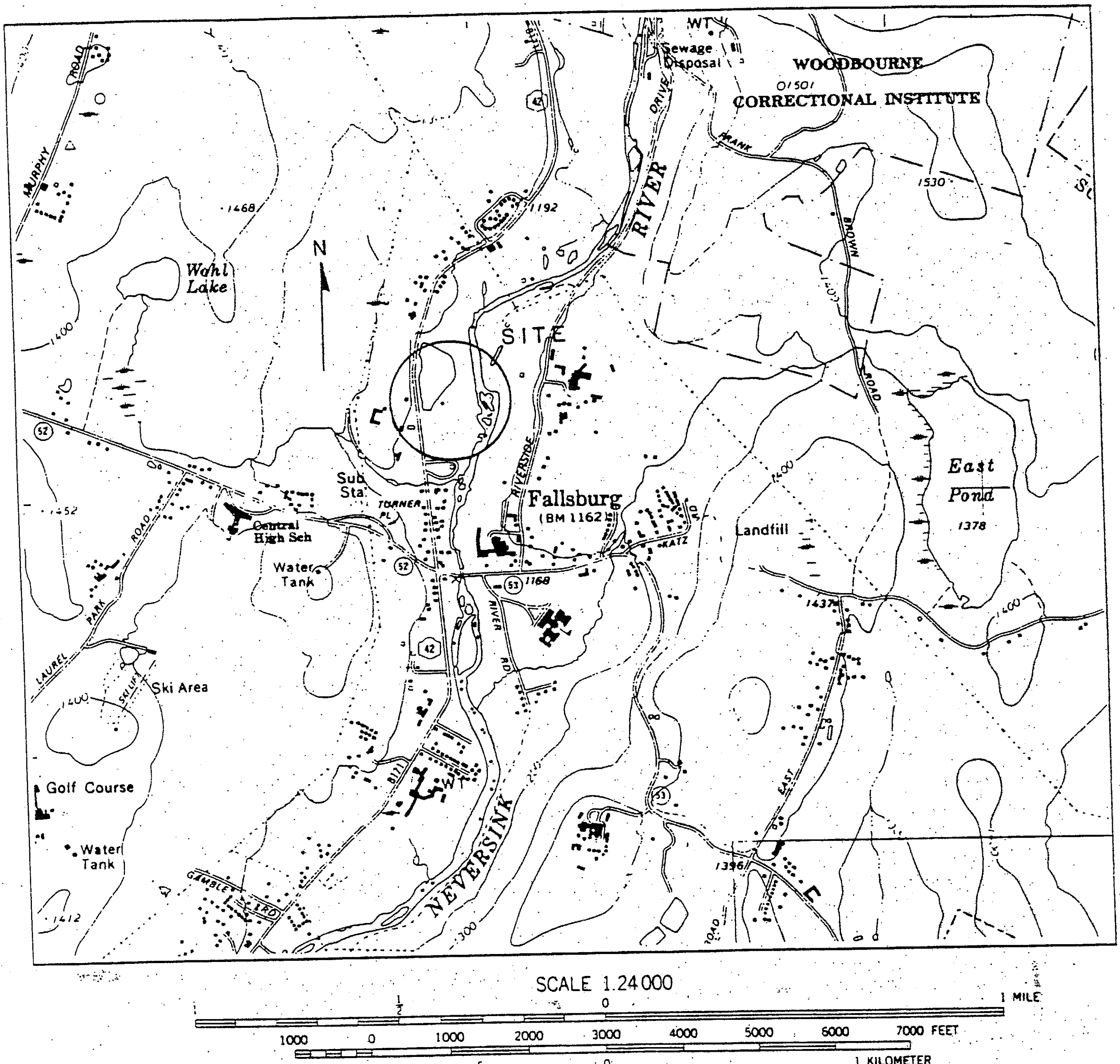
Nine of the ten test pits excavated at the site revealed the presence of C&D debris and other wastes. Typical components of the excavations included soil which appeared oily, wood and lumber products, concrete, brick, steel re-bar, carpet, glass, plastic sheeting, wires, rags, telephone cable, and steel pipes. A loose silty sand cover approximately one foot thick was encountered at each location. No C&D debris or other wastes were found in a test pit excavated in a wet area on the site, outside the known area of waste disposal.

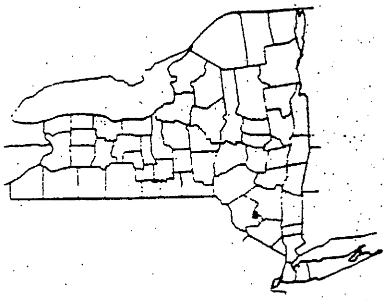
Although concentrations of organic contaminants exceeding 600,000 ug/kg were detected in two samples and exceeded 200,000 ug/kg in ten of the fourteen soil/waste samples, the groundwater, surface water, and leachate data suggest that inorganics are the principal contaminants of concern. Elevated concentrations of inorganics attributable to the landfill were detected in these media, and inorganic contaminant concentrations exceeding applicable standards were reported in surface water and groundwater samples collected from locations in the immediate vicinity of the site. Inorganic contaminant concentrations were slightly higher in a surface water sample collected about 800 feet downstream than in the upstream sample. The dissolved solids data are consistent with the leaching of inorganic contaminants from the landfill into the groundwater in the vicinity of the site. The fill samples analyzed were not hazardous as defined by EP TOX or TCLP test results.

The data suggest that inorganic contaminants are leaching from the landfill and are impacting surface water and groundwater quality in the vicinity of the site.

Recommendations

Properly close the landfill in accordance with NYSDEC Part 360 regulations. The closure should include a cap to limit infiltration and provide surface water drainage control.





QUADRANGLE LOCATION

CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL

Adapted from Woodridge, NYSDOT Quadrangle
Compiled 1966/Photorevised 1974
Published 1976

Site Location:
Latitude - 41°27'40" N
Longitude - 73°38'40" W

New York State Department of Environmental Conservation
ROUTE 52 C & D LANDFILL
Preliminary Site Assessment Site Location Map Figure ES-1
TAMS Consultants, Inc.

1.0 INTRODUCTION

This report presents the results of a Preliminary Site Assessment of the Route 52 Hills Holding Corporation Construction and Demolition (C&D) debris landfill. This assessment report has been prepared for the NYSDEC under the New York State Superfund Standby Contract Work Assignment No. D002520-7 by TAMS Consultants, Inc. under Subcontract to Dunn Geoscience Engineering Company, P.C. (DUNN).

1.1 Site Description

The project site is a landfill comprising eight acres of a 26.4-acre parcel (Block 1, Lot 45) located on Route 42 in Fallsburg, Sullivan County, New York. A ranch-style house on the property is leased to a tenant. The house is located east of a pond and west of the landfill. Landfill material was placed up to the rear foundation wall of the house. Another residence is located adjacent to the site (Block 1, Lot 44), approximately 200 feet to the north. The northern toe of the landfill slope is approximately 50 feet south of the north property line.

1.2 Site Investigation Objectives

The purpose of the environmental site investigation is to determine if hazardous wastes as defined by the New York Code of Rules and Regulations (NYCRR) Part 371 have been disposed at the site, and to determine the impact on human health or the environment. NYSDEC or NYSDOH will determine if the site poses a threat to the environment or public health.

Previous data for this site (prior to this Preliminary Site Assessment) were inadequate for site characterization and classification. Therefore, this Preliminary Site Assessment was performed to obtain sufficient data to evaluate the presence of hazardous waste at the site. This was achieved through an investigative program which included the following components:

- Site reconnaissance and records review
- Geophysical survey
- Soil gas survey
- Surface water, sediment, leachate, and surface soil sampling
- Ambient air sampling
- Test pit excavation and sampling
- Exploratory boring and monitoring well installation

- Groundwater sampling
- Hydraulic conductivity testing

Prior to initiating field work, a data and records search and a site reconnaissance were performed. Information obtained from these efforts enabled the development of appropriate site-specific work plans for execution of subsequent tasks.

Sampling locations were selected to characterize the contamination, if present, and to provide information on the nature of the potential contamination resulting from past activities at the site. The sampling program utilized several techniques in order to determine the extent of contamination. The activities described below correspond to the scope of work outlined by NYSDEC for a Preliminary Site Assessment. The investigation techniques used include:

Geophysical and Soil Gas Survey

The purpose of the geophysical and soil gas surveys was to provide additional site information subsequent to the data and records search and site reconnaissance. The results of these surveys have been incorporated into this report.

Specific objectives of the surveys were:

- The geophysical survey was conducted to delineate the edge of the landfill; identify anomalies within the landfill caused by variations in the nature of the fill materials; and to identify magnetic anomalies within the landfill possibly caused by large concentrations of buried ferrous metal such as drums, tanks, or other containers.
- The soil gas survey was used as a screening technique to identify the presence of contamination by volatile organic compounds (VOCs) in the fill material or groundwater, in order to optimize selection of sampling locations in the subsequent investigation.

The results of both the soil gas survey and the geophysical survey were evaluated in selecting the locations of groundwater monitoring wells and test pits.

Initial Environmental Sampling

1. Surface water and sediment samples were collected from the leachate pond and from upstream and downstream locations of the Neversink River to determine if contaminants present on site are migrating to the Neversink River via surface water routes. Sampling of the river also provided information on impact to the environment.

2. Leachate samples were collected from an interceptor trench on the adjacent residential property north of the site and from overflow of a trench at the northeast corner of the property which is entering the adjacent residential property to the north of the site. Samples were also collected from leachate seeps on the Route 52 Hills Holding Corporation property. The leachate analyses aided in characterizing the contaminants present at the site.

3. Surface soil samples were collected from three locations at the site. One of the surface soil samples was collected from a location believed to be uncontaminated in order to provide information on background soil conditions at the site.

4. Air samples were collected for volatile organic compounds and hydrogen sulfide at one upwind location, one on-site location, the adjacent residential property, and two to three downwind locations near the site. The results will be used to determine if airborne contaminants are impacting nearby receptors. Two air sampling events were conducted.

Subsurface Investigation/Additional Environmental Sampling

1. Test pits were excavated at nine locations within the C&D landfill material and one location outside the landfill area to identify the presence of any material other than C&D fill, investigate metallic anomalies, and to collect samples for waste characterization purposes.

2. Six monitoring wells were installed both on- and off-site to provide information on the nature of groundwater contamination. One well was located upgradient of the site to provide background characteristics. The remaining wells were located between the C&D fill and the property boundaries.

3. Soil samples were collected for physical and chemical analyses from the test pits and the monitoring well borings. The soil samples were used to characterize the geologic and hydrogeologic characteristics of the soils, and to characterize on-site contamination.

4. Groundwater samples were collected from the monitoring wells for chemical characterization. Analytical results were used to evaluate the nature of groundwater contamination within the shallow overburden aquifer.

2.0 SCOPE OF WORK

The scope of work conducted under this NYSDEC work assignment is listed below. This scope was developed to aid in the assessment of the site and ascertain a potential impact of the site to the surrounding environment. The report presents the results of a site reconnaissance and data and records search and assessment; geophysical and soil gas surveys; initial environmental sampling; and subsurface investigation and additional environmental sampling for the Route 52 site.

In order to accomplish objectives of the site assessment, the following items were performed:

- Data and records search and site reconnaissance;
- Geophysical survey;
- Soil gas survey;
- Surface water, sediment, leachate, and surface soil sampling;
- Ambient air sampling;
- Test pit excavation and soil/waste sampling;
- Hydrogeologic investigation including exploratory borings/well installations;
- Groundwater sampling; and
- Hydraulic conductivity testing.

2.1 Site Reconnaissance and Records Search

2.1.1 Site Reconnaissance

TAMS personnel performed a site reconnaissance on November 28, 1990. Present for the site reconnaissance were Laurie Gneiding and Richard Kruzansky (TAMS), and T.S. Manickam, Parimal Mehta, and Mauricio Roma-Hernandez (NYSDEC). A record of the visit was entered into a bound, weatherproof field notebook.

TAMS personnel monitored the site with an HNu Model PI-101 photoionization detector to screen for concentrations of volatile organic compounds above background concentrations, a Radiation Alert Monitor 4 radiation survey meter to screen for areas where radiation levels were above background levels, and an Industrial Scientific Corporation Model HMX 271 LEL-O_2-H_2S meter to screen for explosive atmospheres and the presence of hydrogen sulfide (H_2S). No readings above background were noted, although a septic smell and a hydrogen sulfide odor were reported at one location.

The personnel walked over the entire site and accessible portions of adjoining properties noting topography, geology, hydrology, potential sampling locations, and proximity to potential receptors. A sketch of the site was made noting the approximate area of the site, orientation, adjoining properties, and access restrictions. Color photographs were taken of significant observations and general site location. Refer to Appendix C for representative photographs of the site.

2.1.2 Data and Records Search

TAMS personnel performed a data and records search at various offices in Sullivan County and at NYSDEC Region 3 offices in New Paltz, New York, during the week of November 26, 1990.

TAMS personnel visited the following offices to interview representatives and obtain information regarding the site: New York State Department of Environmental Conservation, Region 3 Offices, New Paltz, New York, to meet with Al Klauss (Environmental Engineer), and T.S. Manickam (Project Manager, visiting from Albany, New York); New York State Department of Health (NYSDOH), Monticello, New York to meet with Gerald Lieber; Town of Fallsburg Town Hall, South Fallsburg, New York to meet with Darryl Kaplan (Town Supervisor), Dave Quick (Town Assessor), Steven Proyect (Code Enforcement Officer), Allen Frishman (Code Enforcement Deputy), and Dave Meckes (Utilities Director); and Silverman Jaffe & Levine, Liberty, New York, to speak with Bruce Silverman, esq., and Ken Klein, esq., attorneys for Town of Fallsburg.

TAMS personnel telephoned the listed offices in advance to schedule appointments for interviews and to request the opportunity to review project files. Certain agencies did not schedule interviews, requesting that TAMS personnel visit the agency and request to see an individual or review the files at that time. The agencies which were visited did not generally allow TAMS personnel access to the file rooms; instead, in most cases, an agency employee brought the requested files to TAMS personnel at a visitors' work station. In some cases, TAMS personnel were allowed to view the files and to make handwritten notes of pertinent items instead of photocopying.

The material obtained in the file search was catalogued for inclusion in the project file. The reference material used in this report is listed and identified in Table 1.

2.2 Geophysical Survey

A geophysical survey was conducted by DUNN on December 12, 13, 14 and 18, 1990. Geophysical traverse lines were laid out in an approximate northeast-southwest orientation. Wooden stakes for horizontal control were installed by TAMS Consultants, Inc. on a square grid with 100-foot centers across the entire landfill surface and its accessible periphery. The locations of intermediate stations were interpolated between the stakes during data collection. Numbering of grid locations included labeling the X axis in the 700-plus range (e.g., 700, 800, etc.) and the Y axis in the 5,000-plus range (e.g., 5000, 5100, etc.). The four-digit grid numbering was necessary to accommodate sampling at 25-foot intervals, for example, station 5,125.

Geophysical measurements were made at 25-foot intervals along traverses 25 feet apart. Terrain conductivity and magnetic measurements were made at generally the same locations. There were a total of 31 traverses ranging from 125 feet to 1200 feet in length. Many traverses consisted of two segments located on either side of the large pond which occupies most of the property. Several stations were omitted due either to steep slopes, the house near station 1100 + 5300, or the small pond near station 1350 + 5200. Despite precautions to avoid making measurements near obvious sources of electromagnetic interference, a large-amplitude EM-31 in-phase anomaly along line 5325 was probably caused by the house or its utility lines.

2.2.1 Terrain Conductivity Survey

The conductivity of soils is a function of lithology, porosity, pore-water chemistry, and degree of water saturation. Measurable conductivity variations can result from groundwater contamination, abandoned trenches and lagoons, bedrock fracture zones, lithologic variations and buried metallic objects.

Terrain conductivity surveying is based on the principle of electromagnetic induction. By creating a primary magnetic field, a transmitter coil induces the flow of very small electrical currents in the earth. These currents generate a secondary magnetic field which is sensed, together with the primary field, by the receiver coil. The ratio of the secondary to primary magnetic fields is linearly proportional to the terrain conductivity.

The quadrature (Q) and in-phase (I) components of the secondary magnetic field were measured at 714 stations with a Geonics EM-31 Terrain Conductivity Meter, and were recorded by an Omnidata Polycorder digital data logger. The Q component, expressed in millimhos/meter (mmhos/m), is a weighted average of the electrical conductivity of assumed horizontal layers within approximately 20 feet of the ground surface. The I component, expressed in parts per thousand of the primary magnetic field, offers greater sensitivity to metallic conductors than the Q component.

The manufacturer's recommended equipment functional checks were performed several times each day on the Geonics instrument to verify that it was operating properly. These procedures involved zeroing the instrument output under certain operating conditions, and adjusting the instrument phasing and sensitivity. The data were downloaded each evening from the data logger to a computer for preliminary analysis. The Q data were continually monitored in the field during the survey so that an adequate number of relatively low-conductivity measurements were made beyond the visibly apparent landfill boundary. Such low conductivities typically indicate areas of clean fill or native soils.

2.2.2 Magnetic Survey

Magnetic surveying involves the measurement of spatial variations of the earth's magnetic field intensity. Because of their large magnetic susceptibility, ferrous metal objects may cause measurable perturbations of the natural geomagnetic field. Detection of such variations, i.e. anomalies, in areas that should otherwise be magnetically uniform provides strong evidence for the presence of buried metal. Magnetic anomalies caused by buried metal objects are commonly dipolar; that is, they consist of positive and negative portions. Simple magnetic models show that the anomaly "trough" is usually located just north of the "peak". The source of simple anomalies often underlies the peak, or the source may be somewhat displaced toward the trough.

The total geomagnetic field intensity, expressed in gammas, was measured at 694 stations with a Geometrics G-856 Proton Precession Magnetometer. Readings were taken at nearby base stations at approximately 90-minute intervals during the survey to enable subsequent correction of the data for the natural variations of the geomagnetic field. The data were downloaded from the magnetometer to a computer each evening for preliminary analysis. The base station measurements indicated a regional geomagnetic field strength of approximately 55,170 gammas; this value was subtracted from all measurements to simplify data analysis.

2.3 Soil Gas Survey

2.3.1 Site Grid and Sampling

The soil gas survey was conducted by DUNN at the Route 52 site during January 4, 7, 8, 9 and 10, 1991. Staked and labeled soil gas sampling locations at the Route 52 site were located on a 100 foot square grid established by TAMS Consultants, Inc. prior to the soil gas survey. In the event that an area was unsuitable for sampling due to the presence of bedrock, debris, or surface water, the sampling point was relocated to the nearest appropriate location. Sampling point coordinates were recorded on a daily sample log sheet.

Sampling locations were prepared by using a sliding hammer to drive a 5/8-inch steel rod to a maximum depth of four feet, removing it and inserting a 1/2-inch diameter hollow aluminum tube into the probe hole to maintain the opening in the shallow vadose zone. Care was taken so that the tube was not plugged or inserted into shallow groundwater. Following placement of the aluminum tube, surface soil and a bentonite slurry seal were packed into the annular space around it at the top of the probe hole to prevent infiltration of surface air during sampling.

Soil gas samples were collected with a 125 milliliter gas sampling bulb. The sampling bulb consists of a wide glass tube with teflon stopcock valves at either end, and a septa in the center of the glass wall to allow for sample withdrawal. The top of the aluminum tube in the probe hole was connected with dedicated 1/2-inch polyethylene tubing to one of the valves of the gas sampling bulb. The other bulb valve was connected with tubing to a laboratory bench vacuum pump. The vacuum pump withdrew soil gas up through the subsurface probe and glass bulb until approximately two liters (six sampling train volumes) was purged. Soil gas was contained in the glass bulb by closing the valve nearest the pump (to prevent backflow), shutting off the pump and removing it from the glassware. The other valve (nearest the aluminum tube) was left open to the soil gas source for approximately two minutes to allow the system to come to equilibrium pressure. Following the equilibrating period, the second valve was closed and the sample was removed for analysis.

The dedicated polyethylene tubing was discarded and replaced for each new sampling location. Samples were labeled corresponding to the sample location and stored in a cool, dark place until the time of analysis. Analyses were performed within one-half hour of collection. A needle was inserted through the septa of the sampling bulb and a sample was withdrawn using a 500-microliter syringe for injection into the gas chromatograph.

2.3.2 Soil Gas Sample Field GC Analysis

A Photovac 10S50 gas chromatograph (GC), mobilized on-site by DUNN, was equipped with a photoionization detector (PID) and an on-board computer which was programmed to analyze samples for 18 target volatile organic compounds (VOCs).

The Photovac GC analyzes gaseous samples and is capable of generating quantitative data specific to each compound. After injection into the instrument, the gaseous sample passes through a chromatographic column prior to the PID. The various VOCs pass through this column at different rates and thus reach the detector at different times after the injection. A strip-chart record of detector response versus time is obtained during each analysis and the presence of VOCs in the sample is manifested by peaks on this strip-chart record.

The portable GC measures two parameters for each peak observed during an analysis. First, the length of time is measured between the initial injection of the sample and the detection of the peak. This time is known as the retention time and each VOC has a characteristic retention time relative to those of other compounds. Retention times allow the identification of VOCs in the sample. Second, the portable GC integrates the detector response to measure the area under the peak. The area is measured in millivolt seconds (mv-s) and is proportional to the concentration of the compound in the sample.

Prior to the start of field activities, the instrument was calibrated to recognize retention times and convert peak areas into concentrations for the 18 target VOCs. Standards were prepared by injecting a measured volume of headspace over a pure compound into a one liter glass bulb that had been thoroughly flushed with organic free (ultra zero grade) air. The concentration of the standard was calculated using the room temperature, the vapor pressure of the compound at that temperature, the noble gas law and other related equations.

A library was programmed into the instrument by sequentially analyzing each standard. A syringe was used to withdraw 250 microliters (ul) of the headspace gas and inject the vapor into the instrument for analysis. A peak was detected for the standard and recognized, but not identified or quantitated, by the instrument; the peak is simply recognized as having a certain retention time and peak area. The analyst enters both the identity and concentration of the standard and repeats this process for each of the remaining target VOCs. At the end of the initial calibration, the portable GC can identify and quantitate the peaks associated with the target VOCs; other peaks which are recognized during the analysis remain unidentified and a retention time and peak area are reported rather than a compound and concentration.

The retention time and detector response are influenced by other conditions such as the internal temperature of the instrument and the rate of gas flow through the column. Although regulated, some variations in these conditions occur and act to shift the retention times and response factors of the target VOCs. Thus, continuing calibration must be routinely performed.

The continuing calibration is performed by injecting a standard, typically toluene, into the portable GC for analysis. Using a keyboard command, the analyst instructs the instrument to recalibrate the library. After the peak is detected, the analyst enters both the identity and the concentration. The retention times and response factors for all of the target VOCs in the library are then linearly adjusted relative to that calibration standard.

At a minimum, a continuing calibration was performed on a daily basis during field work. However, since the field conditions tended to be very cold in the morning hours and warming as the day progressed, the instrument had to be recalibrated throughout the day. The analyst monitored the retention time for shifts (caused by temperature fluctuations) in excess of approximately 5 percent. Retention time shifts of this magnitude or greater would result in the inability of the instrument to identify and quantitate peaks which were detected.

The PID is coupled to a 10.6 electron-volt ultraviolet lamp which is capable of ionizing all of the VOC target analytes during this study. However, the detector's sensitivity for different chemical classes varies and is considerably lower for ketones than for aromatics and aliphatic compounds. Table 2 lists the practical quantitation limits (PQL) (along with the data summary) for the compounds of interest.

Sample analyses were conducted by injecting with a syringe 250 ul aliquots of the sample vapors into the GC; comparisons of sample instrument responses were made to that of calibration standards previously stored into the GC memory. Documenting the analysis, the GC prepared a strip-chart record detailing the concentration of recognized compounds and the raw instrument response of "unknown" compounds detected in the sample. In the event that sample results were above the linear range of the instrument calibration, a smaller aliquot was injected and the sample results were corrected for the dilution factor.

2.3.3 Soil Gas Survey Quality Control/Quality Assurance

Three background, on-site air samples were collected and analyzed during the four days of the sampling effort. Background samples were scheduled to be collected on a daily basis; however, on the first day of field work the instrument became contaminated and work stopped before a background sample was collected and analyzed. No target analytes were detected at or above the PQL in any of the background samples. However, trace levels of petroleum related volatile compounds (i.e., toluene, benzene, ethylbenzene, xylenes and methyl isobutyl ketone) were detected in all three background samples.

Three blind field duplicates were collected during the effort (at 1300 + 5800, 1300 + 5200, and 1100 + 5100). None of the three original samples nor the duplicates exhibited target analytes above the PQL. However, trace levels of petroleum indicator compounds were detected in comparable quantities in all three duplicate pairs.

All samples were initially analyzed within one-half hour of collection. Subsequent analyses (i.e., dilution of off scale peaks) were completed within the same working day of collection (usually within one and one-half hours of collection).

Decontamination of the 5/8-inch steel rod was performed following the preparation of each sampling location. The rod was rinsed with tap or distilled water, washed with detergent, and then rinsed with distilled water. Each aluminum tube was cleaned prior to mobilization and was dedicated to only one sampling location; therefore, field decontamination was not required. The polyethylene tubing which connected the aluminum probe to the glass sampling bulb was dedicated and therefore discarded following each sample collection. In order to minimize potential carry-over contamination, repeated flushing with purified air through the glass sampling bulb and syringes was conducted between samples. Samples exhibiting significantly elevated concentrations of analytes which may have produced carry-over were followed by injection of clean air (i.e., blank gas) through the gas chromatograph system to flush and record the absence of such contaminants.

Field notebooks were used to record pertinent information (e.g., odors, visual observations, weather), field measurements and irregularities or deviations from the prescribed sampling procedure. All entries were initialled for personnel identification. All notebooks were weatherproof and entries were made with black waterproof ink.

2.3.4 Soil Gas Survey EPA Method TO-14 Sampling

In order to provide full target compound list (TCL) VOC screening, five samples were collected on January 14, 1991 and shipped overnight for laboratory analysis by EPA Method TO-14 (USEPA, 1988). These samples were collected using six-liter stainless steel SUMMA canisters evacuated to less than 3 mm Hg provided by the laboratory. Prior to shipping to the site, the canisters were prepared by the laboratory following the procedures detailed in Method TO-14. Each canister was assigned a serial number by the laboratory for sample identification.

At the site the SUMMA canisters were connected with dedicated polyethylene tubing to the subsurface sampling probes used for the initial soil gas screen. A low flow rate into the canister was maintained in order not to exceed the "yield" of the soil pores. This was effected by placing a dedicated flow restricting valve (supplied by the laboratory) in line between the sampling probe and the SUMMA canister. Additionally, a dedicated filter (supplied by the laboratory) was installed between the flow controller and the intake line of the canister. The purpose of the filter was to remove particulates from the air sample to prevent interference with the analysis.

After the sampling train was set up, the control valve was opened, the time was noted, and sampling was allowed to proceed for approximately one half hour. A sampling log was kept which related each SUMMA canister to the flow restrictor used and sampling time. This log was shipped to the laboratory along with the samples.

The SUMMA canisters were shipped overnight to International Technology (IT) Analytical Services (Cincinnati, Ohio) under chain-of-custody following each day of sampling. An aliquot of the canister contents was concentrated in a cryogenically cooled VOC trap. The cryogen was then removed and the temperature of the trap was raised such that the VOCs originally collected in the trap were revolatilized, separated on a GC column, then detected by a mass spectrometer for identification and quantification.

2.4 Surface Water, Sediment, Leachate and Surface Soil Sampling

Surface water, sediment, leachate and surface soil sampling was conducted by TAMS on July 2, 1991 and is described in greater detail below. Figure 3 provides a sample and boring location plan.

2.4.1 Surface Water Sampling

A total of six surface water samples were collected. Of the six samples, one stream sample (SW-1) was collected from the Neversink River north of the site; SW-2 was collected from the Neversink River adjacent to the backfill; SW-3 from a public access fishing area on an adjacent property about 800 feet downstream of the site; two samples (SW-5 and SW-6) were collected from the onsite pond water west of the landfill; two samples (SW-3 and SW-6) were collected from the effluent stream south of the landfill; and one sample (SW-4) was collected from the wet area located southwest of the landfill.

The surface water samples were analyzed for the Target Compound List (TCL) organic and inorganic analytes. Due to insufficient sample volume, SW-4 was submitted for volatile organics analyses only. Field measurements for water temperature, specific conductance, salinity, and pH were obtained at each sampling location from a separate sample aliquot not submitted for chemical analysis. Due to instrument malfunction, dissolved oxygen measurements were not obtained.

Surface water quality control samples submitted from the Route 52 site included one field duplicate (SW-7, duplicate of SW-5). One trip blank was also submitted for volatile organic analysis.

2.4.2 Sediment Sampling

Five sediment samples were collected from the general vicinities of the surface water sampling points described above in Section 2.4.1. No sediment sample corresponding to SW-6 was planned or collected. Final sample locations were based on field observations in order to optimize the detection of chemical releases into surface waters. Due to the nature of the stream bed of the SW-1 location, SS-1 was taken about 40 feet downstream of the associated surface water sample.

The sediment samples were analyzed for TCL organic and inorganic analytes.

2.4.3 Leachate

Six leachate samples were planned for collection during the implementation of the initial environmental sampling on June 20, 1991. L-1 was collected from the ponded leachate at the edge of the fill, about 150 feet southeast of the on-site residence; L-5 was collected at the fenceline with the adjacent residence to the north of the site; and L-6 was collected from a pond in the borrow area, about 100 feet south of L-1. No sample was collected at the planned L-2 location, where leachate had previously been observed emanating from exposed fill on the slope of the landfill. Samples L-3 and L-4 were to be collected from a leachate seep emanating from the northeast corner of the landfill; however, no leachate was visible during the sampling event at L-3. A soil sample, designated as L-3, was taken from the planned L-3 location at edge of the landfill. A sample was collected from the location designated as L-4 in the project plans, where leachate was entering the Neversink River; this sample was designated as L-2 by the field sampling team. All five leachate samples (including L-3) were analyzed for full TCL organic and inorganic analytes.

2.4.4 Surface Soil

Three surface or near-surface soil samples were planned and collected at the Route 52 site. The background soil sample, SL-1, was collected on the west side of Route 42, across from the pond. In addition, two surface soil samples were collected from the fill area. SL-2 was collected at the location where test pit TP-1 was later excavated, and SL-3 from the TP-10 location.

These samples were collected on June 20, 1991, and shipped via overnight delivery to the analytical laboratory (Aquatec, South Burlington, VT) for full TCL organics and inorganics analysis.

2.5 Ambient Air Sampling

Two air sampling events were conducted by TAMS personnel at the Route 52 Hill Holding Co. site. The first event was conducted on July 26, 1991, and the second event was conducted on August 23, 1991. Sample locations were determined prior to sampling by TAMS personnel. During the first sampling event, one upwind (UP1), one downwind (DN1), and two receptor locations (R1 and R2) were sampled. During the second sampling event, an additional downwind sample (DN2) and an onsite sample (ON1) were added. Air sampling locations are shown on Figure 4.

2.5.1 Air Sampling Analyses

Air samples were analyzed for volatile organics by EPA Method TO-14 using gas chromatography/mass spectroscopy, with a detection limit of five micrograms per cubic meter (ug/m^3). Hydrogen sulfide (H_2S) was analyzed by Method 701 (Methods of Air Sampling and Analysis, Third Edition; Intersociety Committee, APCA, ACS, AIChE, ASCE, ASME, AOAC, HRS, ISA), with a detection limit of five parts per billion by volume (ppbv). Impinger solutions for the hydrogen sulfide analysis were provided by the analytical laboratory (C.T. Male, Latham, NY). SUMMA canisters for the volatile organics sampling were provided by the analytical laboratory (Performance Analytical, Canoga Park, CA).

2.5.2 Air Sampling Methodology

Prior to performing the air sampling, weather instrumentation was set up on site. Readings of temperature, relative humidity, barometric pressure, and wind speed and direction were recorded during each event. Table 2 provides a summary of weather conditions during each of the air sampling events. Due to instrument malfunction, wind speed readings were estimated. Three sets of H_2S samples were taken, each for a two-hour duration, in each sampling event. The first set of samples was collected from two a.m. to four a.m.; the second set from five a.m. to seven a.m., and the third set from eight a.m. to ten a.m.

Samples for volatile organics were collected over a six-hour period, from nine a.m. to three p.m.

2.5.2.1 Hydrogen Sulfide Sample Collection

Air samples for hydrogen sulfide analysis were collected over a two-hour period by aspirating a measured volume of air through a midget impinger containing an alkaline suspension of cadmium hydroxide, equipped with a coarse porosity fritted bubbler. The impinger contained an alkaline suspension of cadmium hydroxide. When exposed to hydrogen sulfide, it precipitates out as cadmium sulfide. The concentration of sulfide in the sample is subsequently determined by spectrophotometric measurement of the methylene blue color produced by the reaction of sulfide in an acidic solution of N,N-dimethyl-p-phenylenediamine.

The pump flow rate, approximately 1.5 liters/minute, was calibrated immediately prior to sample collection using a Buck Scientific Calibrator, and was measured again at the conclusion of the two-hour period. The volume of air sampled, calculated using the average flow rate and the actual duration of sampling, was recorded in the field notebook and provided to the laboratory.

As cadmium sulfide is photosensitive, the sample collection devices were wrapped in aluminum foil, and arabinogalactan was pre-added by the laboratory to reduce the photosensitivity of the cadmium sulfide reaction product. The method states that the samples should be analyzed within twenty four hours of collection even with the arabinogalactan. Therefore, samples were picked up at the site by courier and delivered to the laboratory, where they were immediately analyzed. All samples were analyzed within twenty four hours of collection by CTM Analytical Laboratories, Ltd. of Latham, New York.

The cadmium hydroxide and arabinogalactan solution were subject to foaming during collection of the ambient air sample. Although the method calls for adding 5 ml of ethanol to control foaming, in practice this was found to exaggerate the foaming problem. Foaming was controlled by eliminating the ethanol and using Teflon disks slipped over the impinger tube, which the method recommended as an alternate procedure for controlling foaming.

During the collection of hydrogen sulfide samples, a real time hydrogen sulfide analyzer (Jerome Instrument Hydrogen Sulfide Analyzer) was used periodically to measure the ambient air hydrogen sulfide content at each sampling station. This was performed partly as a precaution so that high ambient air sulfide concentrations did not saturate the absorbing solution, which would have resulted in erroneously low sulfide sample results. Real time instrument readings at each location are presented in Table 4.

2.5.2.2 Volatile Organics Sample Collection

The volatile organics samples were collected using SUMMA canisters equipped with laboratory calibrated flow controllers. The flow controllers allowed continuous collection of the sample over a six-hour period at a rate of one liter per hour. The canisters were shipped to the analytical laboratory (Performance Analytical) by overnight delivery service so that the samples could be analyzed within the required seven-day holding time.

Samples were collected by connecting a flow controller to a canister and opening the valve. After six hours, the valve on the flow controller was shut off and the flow controller was disconnected from the canister. The canister was then shipped to the laboratory for analysis. A log sheet was used to record the canister number, the flow controller number, the sample location, the start time and the stop time.

Samples were planned to be collected in the breathing zone (approximately four to five feet above the ground) by connecting tubing to the inlet of the SUMMA canister. However, due to the desorption of siloxane compounds from the tubing which was noted during the air sampling at other sites being investigated concurrently, NYSDOH approved collection of samples at ground surface without the use of tubing.

2.6 Test Pit Excavation

Ten test pits were excavated at the site on June 26 and 27, 1991, as shown in Figure 3. The rationale for the location of the test pits was to determine the presence non-C&D waste or contamination within the landfill material. The locations of the test pits were based on the results of the soil gas and geophysical surveys which identified magnetic and soil gas anomalies. The test pit excavations were observed by two TAMS personnel and a NYSDEC Region 3 representative.

Excavations were performed by the drilling contractor (Parratt-Wolff) using a tire mounted backhoe. The test pits were excavated to a maximum depth of ten feet, or to the bottom of fill material, whichever was less. Groundwater was encountered in one of the ten excavations. Each test pit was at least nine feet long and three feet wide. Upon completion, each test pit was backfilled with the excavated material in approximately the same order as it was removed. The test pit locations were then marked and identified with wooden stakes for later surveying and plotting on base maps.

Excavation of the test pits proceeded in approximately two foot lifts with the excavated material being screened for volatile organic vapors using an HNu Model PI-101 photoionization detector and a Foxboro OVA 128 flame ionization detector; for oxygen, hydrogen sulfide, and combustible atmospheres using an HMX Model 271 tri-gas monitor. Only the OVA typically detected any levels above background during the test pit excavation. The levels ranged from 5 ppm to over 100 ppm in some cases. Test pits 7, 8, and 10 were sampled by personnel in Level C respiratory protection.

A total of 14 soil/waste samples were collected from seven of the ten test pit locations. The samples were collected at two points within each of the seven test pits for Target Compound List (TCL) volatile organics, semivolatile organics, pesticide/PCB compounds, and inorganics, and Extraction Procedure Toxicity (EP TOX) analysis. Three of the 14 samples (TP-1A, TP-2B, and TP-3A) were also analyzed for Toxicity Characteristic Leaching Procedure (TCLP). The sample locations were determined by field personnel based on instrument readings, observed contamination, and consistency of the excavation material. In general, the test pit samples with the "A" suffix (e.g., TP-1A) were collected from the upper part of the excavation, (one to five feet deep); and samples with the "B" suffix were collected from the deeper part of the pit (five to ten feet). The specific depth of each sample is shown with the tabulated data.

The TAMS field geologist logged each test pit on a test pit log form. Each test pit was photographed to provide further documentation of the contents. Selected test pit photographs are included in Appendix C. Test pit logs are included in Appendix D.

2.7 Exploratory Borings/Well Installation

For the purpose of investigating the nature and extent of site generated groundwater contamination, six monitoring wells were installed during the period of July 25 to August 6, 1991. Locations are shown on Figure 3 and a summary of monitoring well installation details is provided in Table 3. Three wells were completed as overburden monitoring wells (MW-3, MW-4, MW-5); two wells were completed as standard bedrock monitoring wells (MW-1, MW-2); and one well (MW-6) was completed as an overburden/bedrock interface well, which was sand packed through 12 feet of overburden and five feet into bedrock. Monitoring well MW-1 was installed in an off-site, upgradient location to monitor background groundwater quality at the site, while the remaining wells were positioned around the landfill at locations likely to intercept groundwater contamination. Parratt-Wolff, Inc. (Syracuse, NY) performed the monitoring well installations.

2.7.1 Overburden Borings/Well Construction

Three overburden wells (MW-3, MW-4, and MW-5) were installed at the site between the landfill and the Neversink River. The borings were installed using a drilling rig mounted on an all-terrain vehicle (ATV) rig using 4-1/4 inch diameter (ID) augers. The borehole and each split-spoon sample were monitored with an HNu PI-101 photoionization detector (PID), an OVA 128 flame ionization detector (FID), and a combustible gas indicator (to monitor for hydrogen sulfide and explosive atmospheres). No readings above background were recorded and no odors were noted.

Overburden soil samples were obtained to the top of bedrock by continuous split spoon sampling. Samples were classified in accordance with the Unified Soil Classification System (American Society for Testing and Materials Standard Method D2487-85).

Based on a review of the soil samples and monitoring observations, the final depth of each overburden monitoring well was determined by the TAMS field geologist. Once the final depth had been obtained, the monitoring well was installed through the hollow stem augers. Boring logs and monitoring well completion logs are presented in Appendix D.

The split spoon samplers were decontaminated after each sample by scraping any remaining solids from the surface, washing and scrubbing the sampler in a non-phosphate detergent and potable water solution, and rinsing with potable water. All downhole equipment and the rear of the drilling rig were steam cleaned between borings and prior to leaving the site.

Monitoring well materials were steam cleaned prior to placement in the borehole. The overburden wells consisted of two-inch diameter (ID) schedule 40 polyvinyl chloride (PVC) riser pipe (variable length) and 10 feet of two-inch ID 0.010 inch slotted PVC screen. Clean silica sand (No. 0 grade) was added as a filter pack. The sand was added to approximately two feet above the screen. A very fine sand choke was placed on top of the sand pack to protect the sand pack from possible bentonite infiltration. A two-foot thick bentonite pellet seal was placed on top of the sand pack and hydrated continuously for one hour. A thick bentonite/cement slurry was then placed on top of the bentonite seal to approximately three feet below grade. The augers were pulled incrementally as backfill materials were placed, being careful to maintain backfill materials inside the augers during removal. A cement collar and four inch ID (five-foot long) protective steel casing were placed to complete the installation. Typical overburden well construction details are shown on Figure 5 and summarized on Table 4.

Monitoring well MW-6 was installed in the same manner, except that the boring was advanced five feet into the top of rock. The bedrock borehole was advanced using a 5-3/8 inch tri-cone roller bit. The borehole was advanced into bedrock in order to obtain a sufficient quantity of water for groundwater sampling. The top of rock was encountered at approximately twelve feet below grade, with the depth to water at approximately 11.5 feet below grade. TAMS consulted with NYSDEC regarding whether to install a bedrock well (casing off the overburden) or abandoning the location and moving further from the toe of the landfill in an attempt to locate a more substantial saturated zone. The decision was made to advance the hole into bedrock at the current location without casing off the overburden. The final monitoring well consisted of 10 feet of 0.010-inch slotted screen from 16.9 feet below grade to 6.9 feet below grade. The sand pack was placed in both the bedrock and overburden annulus to 5.6 feet below grade. The remainder of the well was completed as described above.

2.7.2 Bedrock Well Borings/Construction

Two monitoring wells (MW-1 and MW-2) were installed as open hole bedrock wells. The Work Plan did not anticipate the installation of bedrock monitoring wells; however, the wells were installed in accordance with procedures utilized for two other Region 3 sites being investigated concurrently with Route 52 site.

A 4-inch inside diameter (ID) PVC casing was installed at each bedrock well (MW-1 and MW-2) to seal the overburden from the bedrock. To facilitate placement of the 4-inch PVC casing and collection of overburden soil samples, a large diameter (6-inch ID) steel casing equipped with a cutting shoe was advanced by rotation to the top of the rock. After collection of samples ahead of the casing, the casing was advanced and washed out prior to collection of subsequent samples. Once the casing was properly seated on the top of bedrock, an initial NX-core run was performed to verify the location and condition of the bedrock.

Upon completion of the initial NX-core run, the NX corehole was reamed to approximately six inches in diameter using a standard

5-7/8-inch tri-cone roller bit. The borehole was washed clean of cuttings with potable water prior to placement of the PVC casing.

Approximately five gallons of a thick granular bentonite and water mixture was prepared and tremie grouted into the bedrock socket. A threaded flush joint PVC bottom cap was then placed on the PVC casing, and the casing set into the bedrock socket. Bentonite pellets were then added to the annular space to bring bentonite at least one foot into the overburden. A bentonite/cement grout was then prepared and tremie grouted into the annular space, prior to the removal of the 6-inch steel drilling casing. The depth to the top of the grout was checked periodically as the steel drilling casing was removed, and was topped off as necessary to maintain a level of grout at least six inches above the bottom of the casing. The casing sealant was allowed to cure for 24 hours before bedrock drilling resumed.

The monitoring wells were completed to varying depths depending on location. At the completion of each five-foot NX-core run, the water level was monitored to observe for fluctuations. Occasionally, water was bailed manually with a PVC bailer to verify the current water elevation. Upon completion, a period of 24 hours was allowed to elapse prior to the start of well development (refer to Section 2.7.3). Figure 5 presents a typical monitoring well schematic as completed at the Route 52 site. Monitoring well construction details are summarized on Table 3.

2.7.3 Well Development

The six Route 52 monitoring wells were developed by TAMS personnel between August 1, 1991 and August 8, 1991. The wells were developed by evacuation with a surface centrifugal pump. During development, the purge water was monitored periodically for temperature, pH, turbidity, and specific conductance. Development throughout the screened interval was accomplished by moving the pump intake up and down in the screened interval during pumping. Rapid up-and-down movement of the intake also created a surging effect, as did varying the pumping rate and repeated on/off cycles of pumping.

With the exception of MW-1, all wells were developed to less than 50 NTU. Monitoring well MW-1 did not produce clear water even after purging 110 gallons (about 35 well volumes). Other parameters (pH, specific conductance, temperature) were stable.

Well development data are summarized on Table 5.

2.8 Groundwater Sampling

The six Route 52 monitoring wells were sampled by TAMS personnel on August 9, 1991. Samples were collected using dedicated, laboratory decontaminated stainless steel bailers with Teflon check valves. Samples were analyzed for TCL organics and inorganics. At the request of NYSDEC, analyses for total dissolved solids (TDS) and total suspended solids (TSS) were also performed.

The wells were evacuated by bailing prior to sampling. Four well volumes were evacuated prior to sampling. All six wells were sampled within one hour of evacuation.

Field measurements of temperature, specific conductance, salinity, and pH, were taken prior to evacuation, and after the removal of each well volume to verify stabilization of these indicated parameters prior to sampling. Due to instrument malfunction, turbidity readings were only reported as qualitative observations. Turbidity at the time of sampling at the Route 52 wells was reported as "low", except for MW-3 and MW-5, at which turbidity was reported as "moderate".

Groundwater samples were shipped via overnight delivery service (Federal Express) to the designated analytical laboratory, (Nytest Environmental, Inc., Port Washington, NY). Quality control samples submitted with Route 52 site samples included one field duplicate (sample MW-8, duplicate of MW-2) and a trip blank.

2.9 Hydraulic Conductivity Testing

Hydraulic conductivity tests, or slug tests, were performed at each well on September 23 and 24, 1991. The purpose of the slug tests was to gather information for estimation of the hydraulic conductivity of the near-well bedrock formation. Hydraulic conductivities commonly vary by one or two orders of magnitude within a single geologic unit. Therefore, the estimates presented below are only applicable to the near-well environment.

The procedure for the slug testing was as follows. First, the static depth to water was measured and recorded, along with other pertinent information on well construction (e.g., total depth, length of open hole, depth to bottom of PVC casing). Next, the electronic data logger transducer was placed below the water table, while keeping the transducer at least one foot off the bottom of the well. The static pressure reading was noted from the readout on the electronic data logger (Hermit Model 1000C), and the appropriate test identification information was programmed into the unit. For the Route 52 site, a four-foot long by two-inch diameter (volume = 0.65 cubic feet) stainless steel slug was used for MW-1 and MW-2, and a four-foot long by one and one-half inch diameter stainless steel slug (0.37 cubic feet volume) was used for the other four wells. The slug was lowered by a polyvinyl cord to just above the water table. Static readings were checked to verify stability, and the slug was quickly lowered completely into the water, causing the water level to rise (falling head test).

The electronic data logger collected readings on the recovering water levels on a log cycle as follows:

0-2	sec	readings every 0.2 seconds
2-20	sec	readings every 1.0 second
20-120	sec	readings every 5.0 seconds
120-n	sec	readings every 30.0 seconds

Recovery was also monitored using an electronic water level indicator to verify the readings of the electronic data logger. The water level in the well was allowed to recover to at least 80 percent of the original water level. Prior to beginning the rising head test, data were reviewed for accuracy and completeness. For the rising head test the same procedures were followed except that the stainless steel slug was quickly removed from the water, causing a fall in the water level. Again, water level was allowed to recover to at least 80 percent of static prior to stopping the test.

Prior to each slug test, the stainless steel slug was scrubbed with non-phosphate detergent and laboratory grade deionized (DI) water, followed by a double DI water rinse. The polyvinyl cord was discarded.

The slug test data were reduced and the hydraulic conductivity was calculated using the Hvorslev method. The following formula was used in the analysis:

$$K = r^2 \ln(L/R) / 2 LT_o$$

where

K = hydraulic conductivity (feet/sec)
r = radius of the well casing (feet)
R = radius of the well screen (feet)
L = length of the well screen (feet)
T_o = Time required for the water level to rise or fall 37 percent of the initial change (seconds)

2.10 Analytical and Validation Protocols

Samples were analyzed and resulting data were validated in accordance with the procedures established prior to the initiation of field sampling. These procedures are summarized below.

2.10.1 Laboratory Analysis of Samples

Samples collected for the C&D site investigation were analyzed for the New York State Analytical Services Protocol (ASP) Contract Laboratory Program (CLP) Target Compound List (TCL) analytes. The TCL consists of four parts, referred to as fractions: volatile organics; semivolatile organics; pesticides/PCBs; and inorganics. The specific analytes and the required detection limits are shown on Tables 7A - 7D.

The volatile organic fraction consists of 34 target compounds, analyzed by gas chromatography/mass spectrometry, for which the analytical system is specifically calibrated. These 34 compounds and the contract-required detection level, are shown on Table 7A. In addition to the 34 volatile target compounds, the laboratory is also required to report the presence of any non-target compounds (up to a maximum of 10) meeting certain minimum criteria, and compare the mass spectra of these non-target compounds to a library of over 50,000 spectra stored in the data system of the analytical instruments. The data system software then attempts to match the spectrum of the non-target (unidentified) compound to one or more of those in the library. The analyst also reviews the spectra retrieved by the software, and uses his judgement to determine the extent to which the non-target compound can be identified. In some cases, identification as a specific compound can be made; in others, only as to the class of compound (e.g., aromatic hydrocarbon); and in others, a good match cannot be achieved, and the non-target compound is identified only as "unknown" with an approximate (estimated) concentration, based on one of the method standards and assuming a one-to-one response between the unknown and the standard. The laboratory reports the results of this search on a specific form labeled "Tentatively Identified Compounds", or TICs.

The semivolatile organic fraction of the TCL consists of 65 target compounds, analyzed by gas chromatography/mass spectrometry, for which the analytical system is specifically calibrated. These 65 compounds and the contract-required detection levels are shown on Table 7B. In addition to the 65 semivolatile target compounds, the laboratory is also required to report the presence of any non-target semivolatile compounds (up to a maximum of 20), in the same manner described above for volatile organics.

The pesticide/PCB fraction consists of 20 pesticides and 7 PCBs (polychlorinated biphenyls, also referred to as aroclors). These 27 compounds and the contract-required detection levels are shown on Table 7C. The pesticide/PCB fraction is analyzed by two column gas chromatography; analytes must elute on both the primary and secondary (confirmatory) columns at the retention time established during calibration in order to be considered present in the sample. Non-target analytes or TICs are not reported from analysis of the pesticide/PCB fraction, due to the limitations of the method.

The inorganic fraction of the TCL consists of 23 metals and cyanide. (The USEPA CLP refers to the TCL inorganics as the Target Analyte List, or TAL.) These 24 analytes and the contract-required detection level, are shown on Table 7D. Most of these metals are analyzed by inductively coupled plasma (ICP) spectroscopy. However, in order to achieve the detection limits required by the ASP, four metals (arsenic, lead, selenium, and thallium) are generally analyzed by atomic absorption (AA), and mercury is analyzed by cold vapor spectrospcopy. Non-target analytes or TICs are not reported for the inorganic fraction.

In addition to the TCL analyses, other analyses were also performed on some samples. Groundwater samples were analyzed for total suspended solids (TSS) and total dissolved solids (TDS) (filterable and non-filterable residue), analyzed by USEPA methods 170.1 and 170.2 (USEPA, 1983). Soil/waste samples were analyzed for Extraction Procedure Toxicity (EP Tox) and in some cases Toxicity Characteristic Leaching Procedure (TCLP) constituents, to evaluate hazardous characteristics and leaching potential.

2.10.2 Data Validation

All Route 52 TCL data generated during the PSA were validated by ChemWorld Environmental, Inc. (Bethesda, MD). Data validation and data acceptability was based on the USEPA Region II Contract Laboratory Program (CLP) Organics Data Review and Preliminary Review (SOP No. HW-6, Revision #7, March 1990) in conjunction with the USEPA CLP Statement of Work for Organic Analysis (Document No. OLM01.0) and the CLP portion of the NYSDEC Analytical Services Protocol (ASP), (September 1989) where applicable and relevant.

Data from TSS, TDS, EP Tox, and TCLP analyses were not subject to validation. Air sampling data (hydrogen sulfide and SUMMA canister analyses) were not validated.

Except as noted in the specific sections of text discussing the data (sections 3.6.4 and 3.6.5), the data obtained during the investigation were considered useable for the intended purposes. The data included in the summary tables in Appendix B incorporate the findings of the data validation .

2.10.3 Data Qualifiers

For the sake of simplicity, only three data qualifiers have been used on the tabulated data included in the tables in Appendix B. These three qualifiers are as follows:

U: Analysis was performed but the analyte was not detected. The numerical value represents the contract required detection limit (for organics) or the instrument detection limit (for metals).

J: The reported value is estimated. This may be a result of quantitation outside the calibrated range of the analysis or from minor deviations from the analytical protocol or quality assurance/quality control (QA/QC) requirements.

R: The analysis has been rejected due to serious deviation from the analytical protocol or QA/QC requirements. The data are unusable and provide no information regarding the presence or absence of the analyte in the sample.

III

3.0 SITE ASSESSMENT

3.1 Site History

The site is presently owned by Route 52 Hills Holding Corporation, whose principal stockholders are Thomas Gambino and Dominic Dercole. The company name was changed from Parvis Industries Inc. to the present name in 1986. The property encompasses 26.4 acres, of which approximately eight acres were used as a C&D landfill (Town of Fallsburg, Block 1, Lot 45). The operation began as an exempt C&D site early in the summer of 1988 and operated for approximately four months. The landfill was allowed to operate as an exempt C&D site because operations began prior to the July 1988 legislation ending the exemption (Reference #1). References are identified in Table 1.

In a letter dated February 12, 1987, Lawrence Gallagher (NYSDEC Region 3) notified Thomas Gambino of the requirements of an exempt C&D site. The accompanying letter clearly listed materials which were unacceptable as C&D material, and also stated that the landfill would be shut down if non-C&D material were deposited at the site (Reference #2). The Town of Fallsburg expressed concern over the location of the landfill in close proximity to the Town water supply wells as early as June, 1988 (Reference #3).

The facility was cited for violation of 6 NYCRR Part 360, section 8(a)(6) on July 8, 1988, after a field inspection by Parimal Mehta (NYSDEC) documented that access to the site was not controlled by fencing, gates, signs, or other suitable means (Reference #4).

In August, 1988, the Town of Fallsburg passed a local law requiring a permit for the operation of a landfill within the Town. Mr. Gambino was subsequently cited for operating a C&D landfill without a permit (Reference #5). Mr. Gambino was ordered to cease dumping as a result of the violation. Mr. Gambino did not stop dumping; however, an agreement was reached to allow a Town inspector to observe operations at the facility (Reference #6). The Town retained Camp Dresser & McKee (CDM) to monitor site activities. CDM noted various inconsistencies, including refuse trucks dumping at the site (Reference #7 and #8). A Town of Fallsburg police officer observed several refuse trucks dumping at the site before 7:00 a.m. on August 30, 1988 (Reference #7).

On September 6, 1988, Peter DiCicco (NYSDEC) documented the disposal of four 5-gallon pails of a roofing compound at the site (Reference #9). The constituents of the compound were identified as a hazardous waste (Reference #8 and #10). The pails were removed from the landfill and placed in an overpack drum. On three occasions in late September and early October 1988, unpermitted burning of debris was observed at the site (Reference #11).

The landfill was closed by the NYSDEC in October, 1988 because the facility received waste other than C&D material (Reference #1).

Monitoring by the NYSDOH of leachate and the drinking water well at the adjacent residence began in late 1988 and continued through 1989 (Reference #13). The adjacent residential drinking water well, which is located immediately north of the site, was found to be contaminated with carbon tetrachloride during this sampling (Reference #14). Municipal wells that supply drinking water for the Town of Fallsburg are located approximately 700 feet (two wells) and 1200 feet (one well) northeast of the site, and 500 feet (one well) south of the site (Reference #15). As a result of these concerns, the Town began monitoring the nearby production wells for Priority Pollutant parameters beginning in November, 1989 (Reference #16, #17, and #18). The Town also retained CDM to develop an environmental monitoring plan for the landfill, and to develop a facility plan for the four wells in close proximity to the landfill (Reference #19 and #20). The facility plan was to explore alternative water supply sources and potential treatment technologies for contaminated groundwater.

In February of 1989, authorization was granted by the NYSDEC to Mr. Scheinman of Woodbourne Lawn and Garden to cover the site with topsoil (Reference #21). During the site reconnaissance conducted November 28, 1990, TAMS and NYSDEC observed leachate emanating from the northeast corner of the landfill flowing into the Neversink River. (Refer to Appendix C for photographs of the leachate flow.)

3.2 Site Topography

The Route 52 site is located in the Southern New York Section of the Appalachian Plateau (Reference #22). This section is the largest topographic subdivision in Sullivan County. The Catskill Section of the Appalachian Plateau borders to the north and the Ridge and Valley Province borders to the south and southeast. The boundary to the Ridge and Valley Province is marked by a southeastward facing dissected escarpment. The highest point of the County is in the Catskill Section at an elevation of 3051 feet above sea level; the lowest point is in the Ridge and Valley Province at 380 feet. The maximum elevations of hilltops in the Southern New York Section range from 2000 feet above sea level in the north to 1200 feet in the south. The slopes on hillsides are generally smoother and the divides are broader in the Southern New York Section than in the Catskill Section. Floodplains are common, and range in width from less than 100 feet to more than 2000 feet in the southern reaches of the County. Bedrock in the region generally dips slightly to the northwest. Most of Sullivan County is drained by the Delaware River and its tributaries. The Neversink River, which flows southward past the site, is a major tributary to the Delaware River. Only a small section of the eastern portion of the County eventually drains to the Hudson

River via Orange County. Surface drainage is poor in the area of the site due to the presence of unstratified glacial till, as is evidenced by numerous lakes and swamps. Surface drainage near the site will most likely follow the topography and flow south and east past the site to the Neversink River (Reference #23).

The Route 52 site lies within the west wall of the Neversink River valley. The site slopes downward to the east and south. The elevation of the site is approximately 1200 feet above sea level. The Neversink River borders the site to the east at an elevation of approximately 1160 feet above sea level. Nearby peaks range in elevation from 1468 feet 0.6 miles to the northwest, to 1400 feet approximately 0.4 miles southeast. The nearby terrain generally slopes to the south with significant irregularities due to numerous hills and ridges. The slope immediately west of the site rises at approximately six percent; the slope to the east across the Neversink River rises approximately three percent (Reference #23).

The Route 52 site is a 26.4-acre lot consisting of a five-acre pond, approximately eight acres of C&D landfill, approximately two acres of disturbed land (shallow excavations and berms), and approximately eleven acres of undeveloped property. The site is bounded on the west by State Highway No. 42, on the north by a private residence, on the east by the Neversink River, and on the south by the Town of Fallsburg Water Department property (Reference #24 Refer to Figure 2). A public access fishing area is located immediately south of the site along the Neversink River. A one story ranch-style house is built on the shore of the pond on the property and is currently occupied by a tenant. Based on a review of the Woodridge topographic quadrangle (photorevised 1976), the house pre-dates the landfill activities. The south central portion of the site is its lowest point and contains wet soils at the surface.

3.3 Proximity to Potential Receptors

3.3.1 Wetlands

Wetlands on the site were identified by review of the Woodridge quadrangle NYSDEC Freshwater Wetlands (FW) map, and field reconnaissance (Reference #25). As of this writing, the United States Fish and Wildlife Service (USFWS) has not prepared a National Wetlands Inventory (NWI) map for the Woodridge quadrangle. However, for the purposes of this study, a special note by the USFWS is equally applicable to the use of the NYSDEC FW maps. This note states that "...some small wetlands and those obscured by dense vegetation may not be included..." on the NWI maps due to the margin of error inherent in using aerial photographs, and that the limits of Federal, State, or local jurisdiction are not defined by the NWI maps. The NYSDEC FW maps only depict wetlands 12.4-acres or greater in size and indicate the approximate location of the actual boundaries of wetlands regulated by the Freshwater Wetlands Act. Wetlands which are not on NYSDEC FW maps, but are connected to those which are mapped, are also considered jurisdictional wetlands. However, no such wetlands were discovered during field reconnaissance.

The NYSDEC FW map depicts two wetlands within one mile of the site. One wetland is located approximately 5000 feet east of the site (identification WO-3), and the other wetland is located approximately 3500 feet west (identification WO-1). Surface water runoff from the site is not likely to reach either of these wetlands due to topographic restrictions (Refer to Figure 1).

3.3.2 Surface Water

A pond approximately five acres in size exists along the western side of the landfill. Its surface is approximately one foot below the landfill grade. The Neversink River flows approximately 100 feet from the eastern side of the landfill, where its elevation is approximately 40 feet below that of the pond. The River is classified as a Class B waterway by the NYSDEC (Reference #26). Class B waterways are defined as those "waters with best usage as primary contact recreation, and any other use except as a source of water supply for drinking, culinary, or food processing purposes" (Reference #27). An area of approximately 10 feet by 20 feet of shallow standing water lies between the Neversink and the landfill's southeast corner. Wetland vegetation (sedge) was found in this area.

3.3.3 Critical Habitats

The Neversink River is used throughout most of its length by bald eagles (Haliaeetus leucocephalus), which are a federally protected endangered species. Typically, the eagles will hunt fish from the river (Reference #28).

3.3.4 Population

The site is located in a rural section of Sullivan County. The population within a one mile radius is estimated to be 1,240 (calculated by multiplying the number of houses seen on a topographic map by a factor of 3.8). The population within a three mile radius is estimated to be less than 10,000. There is a ranch-style house adjacent to the southeast corner of the pond on site. The house is currently occupied by a tenant. There is another occupied residence located approximately 200 feet north of the site. Two schools are located 0.5 mile from the site (Reference #24).

3.3.5 Agricultural Land

Very little land surrounding the site is classified as agricultural. The land is mostly wooded or residential. According to the County Soil Survey, the southern tip of this property is considered prime farm land, although it is not used as such (Reference #29).

3.3.6 Commercial Land

The nearest commercial land is located 0.25 mile south of the site (Reference #24).

3.4 Results of the Geophysical Survey

3.4.1 Definition of the Landfill Boundary

Based on published data (Telford et al, 1976) and DUNN's experience in glaciated terrain in New York State, conductivities of moist, natural sandy soils are often less than five mmhos/m. Clay-rich soils may have Q values as high as 50-100 mmhos/m. Undisturbed native soils such as those around a landfill are typified by relatively uniform and low Q values, and I values of a few parts per thousand (ppt). In contrast, heterogeneous materials in landfills generally have relatively higher and more variable Q and I values than the surrounding native soils. Conductivities measured on landfills commonly exceed 100 mmhos/m, and at those levels, the instrument output understates the true conductivity of the fill material.

Geophysical measurements are displayed on contour maps (Figures 6, 7, and 8). The contour intervals were selected to display the main features of the data while avoiding excessive detail.

The Route 52 site displays contrasting electrical properties typical of landfills. Q and I measurements recorded on the landfill show large variations, with many readings above 120 mmhos/m and 10 ppt, respectively (Figures 6 and 7). In contrast, background Q values are generally less than 10 mmhos/m, suggesting that the native soils are silty sands. I values in the 0 to -1 ppt range further characterize the undisturbed soils in most areas around the landfill.

The terrain conductivity data suggests the approximate landfill boundary as shown on Figure 6. The area of the landfill thus defined is approximately seven acres. The boundary marks the transition between an area within which Q and I values are large and variable, and an outlying area where such values are more uniform and relatively low. The boundary shown on Figure 6 appears to be in general agreement with visual assessments of the location of the landfill edge. The interpreted landfill boundary is shown as a dashed line at several locations along the edge of the pond where background values could not be measured.

3.4.2 Anomalies Associated with Buried Metal Sources

The terrain conductivity and magnetic data provide information on the probable distribution of buried metal in the landfill. Both the magnetometer and the EM-31 detect ferrous metal, while the latter instrument is also sensitive to other conductive materials, including copper, aluminum and non-magnetic stainless steel. The magnetic anomaly map (Figure 8) is a contoured display of the positive and negative deviations from the background value.

The magnetic anomaly map (Figure 8) provides evidence of buried ferrous metal within the landfill. Magnetic values measured at the site, and referenced to a background level of 55,170 gammas, range from a low of -9649 gammas at (1150 + 5025) to a high of 2447 gammas at (950 + 6000). This 12,096-gamma variation is equivalent to 22 percent of the total geomagnetic field intensity.

The distribution of in-phase and magnetic anomalies on Figures 7 and 8 indicates that concentrations of buried metal occur mainly in the northern and southern portions of the landfill, with relatively smaller amounts in the central area. The areas outlined on Figure 8 are characterized by anomalous magnetic and I values, and are interpreted to contain significant quantities of buried metal. Test pits were excavated in or near nine of the magnetic anomalies. The results of these test pit excavations are discussed in Section 3.6.5.1.

An additional eleven EM-31 I anomalies (Figure 7) that may be associated with buried metal were also identified. Because there are no discrete magnetic anomalies at these locations, each I anomaly may indicate the presence of non-ferrous metal, or a relatively small accumulation of ferrous metal.

Additional areas of buried metal may exist within the landfill, but the geophysical data suggest that the major concentrations are associated with the anomalies discussed above.

3.4.3 Summary Of Geophysical Results

Analysis of terrain conductivity data suggests that the landfill encompasses approximately seven acres and is bounded by the line shown on Figure 6. Conductivity values measured outside of the landfill are typical of native silty sand soils.

Substantial quantities of buried ferrous metal probably underlie the eight areas of the site shown on Figure 8. Subsequent excavation of test pits to confirm the presence or metal at these locations is discussed in Section 3.6.5.1. Several I anomalies identified at specific locations across the site probably indicate the presence of either non-ferrous metal, or relatively small accumulations of ferrous metal.

3.5 Hydrogeology

Prior to commencement of field activities, TAMS personnel reviewed the available information regarding the regional geologic and hydrogeologic setting. Publications of the Soil Conservation Service, United States Geological Survey, New York State Department of Environmental Conservation, and the Town of Fallsburg Water Department were compiled and reviewed to assist in evaluating existing data and planning investigation activities.

3.5.1 Regional Hydrogeologic Setting

The discussion on geology and hydrogeology is based largely on a report by Soren (Reference #22). Sullivan County is underlain by consolidated sedimentary rocks ranging in age from Middle Ordovician to Late Devonian. The bedrock is mantled by unconsolidated stratified and unstratified deposits of Quaternary age (glacial drift). Bedrock in the County generally dips to the northwest. The bedrock becomes progressively younger from east to west. The majority of the County is underlain by rocks of upper Devonian age described as interbedded gray marine shale, siltstone, and sandstone overlain by interbedded non-marine (continental) red and gray-green shale, siltstone, and conglomerate. Sandstone is the predominant rock in both the marine and continental sequences.

3.5.1.1 Unconsolidated Deposits

As noted above, the majority of the County is mantled by unconsolidated Quaternary deposits of Pleistocene age (Wisconsin Glaciation). This mantle of glacial drift consists of stratified and unstratified deposits. The unstratified drift consists of both lodgement and ablation till. The stratified deposits consist of gravel, sand, silt and clay. Some areas of drift are overlain by Recent deposits, which consist chiefly of floodplain alluvium.

Based on a review of 164 well logs by Soren, 1961, the average depth of unstratified deposits in the county is 26 feet. The thickness of the till ranges from a few feet in several areas to nearly 450 feet near the Village of Beaver Kill. The thickness of stratified deposits has been reported to be greater than 100 feet in the Neversink River Valley.

3.5.1.2 Bedrock

Bedrock in the County has undergone at least three periods of deformation. First, the beds of the Hudson River Formation were folded and faulted during the Taconic orogeny (Late Ordovician); second, the region was elevated and tilted as a result of the Acadian disturbance (Late Devonian); and third, the region was folded and faulted as a result of the Appalachian Revolution (Late Permian). The most intense folding and faulting occurred in the southeast portion of the County. Both faults and fractures have been created, which will greatly control the occurrence and movement of groundwater. Joints are commonly perpendicular to bedding planes. Bedding varies from shaley in the shales to flaggy in the upper Devonian sandstones.

The upper Devonian series outcrops from the upper slopes of the escarpment at the east side of the County (the Port Jervis Trough) westward across the County. The upper contact of the marine rocks with the continental rocks is believed to be at the base of the first red stratum above the base of the escarpment and west of the Port Jervis Trough. It is at this horizon that the predominant rock color changes from the grays typical of the marine series to the gray-greens and reds of the continental series. The contact elevation near Wurtsboro (13 miles southeast of the site) is roughly 1100 feet above sea level. The marine unit is approximately 1000 feet thick at that location, while the total thickness of the upper Devonian rocks is probably greater than 5000 feet.

3.5.1.3 Groundwater

Groundwater occurs in the Quaternary deposits and in the Upper Devonian rock. Both of these deposits are sources of drinking water for the County.

For the Upper Devonian rock, the marine sequence is not the primary source of water. The rock may be too deeply buried west of its outcrop to be of practical use as an aquifer. The continental beds constitute the most important and extensive bedrock aquifer in the County. The continental deposits may yield up to 120 gallons per minute (gpm) when properly screened. The water is generally soft; however, high iron content is not uncommon. The occurrence and movement of groundwater within the upper Devonian deposits is greatly controlled by the fractures, folds, faults, and jointing patterns of the rocks discussed earlier. Groundwater which occurs in the stratified glacial drift near perennial streams and permanent lakes may be hydraulically connected to these deposits. It is believed that induced infiltration occurs near the wells tapping sand and gravel deposits in the Neversink River Valley. Saturated stratified deposits can yield up to a few hundred gallons per minute.

There are twelve public wells within a three-mile radius of the site (Reference #15). The wells supply water to approximately

12,000 people year round, with as much as a fivefold increase in the summer months (Reference #30). In addition, four wells are located at the Woodbourne Correctional Institute, north (upgradient) of the site. In 1982, the population of the Correctional Institute was 1200 (Reference #31). Six of the twelve public wells are municipal wells operated by the Town of Fallsburg and located within a one-mile radius of the site (Reference #15). These wells are screened in the stratified drift deposits within the Neversink River Valley. Five of the six wells are north of the site and one well is approximately 500 feet south of the site.

3.5.2 Site Hydrogeology

As determined by the field investigation, two unconsolidated units and the C&D fill material overlie weathered bedrock. These units include an alluvial unit and glacial till. Each of these units and the bedrock encountered are described in detail in Appendix D (Test Pit Logs and Monitoring Well Boring and Construction Logs).

3.5.2.1 Unconsolidated Deposits

The lowermost unconsolidated unit identified on-site during the drilling program was a glacial till. This unit was encountered in all borings except MW-1 in varying thicknesses above bedrock. The material is described by the USCS as brown medium to fine silty sand, some gravel. The material was very dense, with N- values between 25 and 100. The N-value is a measure of the standard penetration resistance of a soil, and is described as the number of blows required to drive a two-inch nominal diameter split spoon sampler through 12 inches of soil with a 140 pound hammer falling 30 inches. Soils with N-values between 10 and 30 are described as medium dense, between 30 and 50 as dense, and from 50 to 100 as very dense. Based on grain size analyses (with hydrometer) performed on two overburden soil samples, the grain size distribution is 35 percent gravel, 40 percent sand, 20 percent silt and five percent clay. The glacial till unit was overlain by recent alluvial soils at locations MW-3 through MW-5.

The alluvial soils appear to have been deposited by over bank flood events along the Neversink River, and by downslope erosional deposits from the west of the well locations. This material is described by the USCS as a loose brown fine silty sand. This material varied in thickness from 3.0 feet at MW-4, to 10.0 feet at MW-3, which was installed through a natural levee.

The soils that underlie the site are classified as very rocky Arnot-Lordstown complex, with zero to 15 percent slopes. The soils are considered capability class VIs soils, which have severe limitations that make them generally unsuitable for cultivation. They are limited due to shallowness or stoniness.

This soil is composed of approximately 40 percent Arnot soil, 40 percent Lordstown soil and 20 percent other soils and rock outcrops. The Arnot soil is shallow and excessively to moderately well drained. The Lordstown soil is moderately deep and well drained. The bedrock is sandstone. The seasonally high water table is perched above bedrock for short periods in spring but is usually at a depth of 6 feet or more. Permeability is moderate (0.6 to 2.0 in/hr) with moderate to rapid surface runoff. These soils formed in glacial till on uplands (Reference #29).

Hydraulic conductivity tests were performed on the three standard overburden wells (MW-3 through MW-5) and on the overburden/bedrock interface well (MW-6). The average hydraulic conductivity for these four overburden wells was determined to be 2.9×10^{-4} cm/sec (see Table 8). The four wells are screened primarily in the glacial till material.

3.5.2.2 Bedrock

Bedrock was encountered at shallow depths in monitoring wells at the north end of the site, and west of Route 42. The highly weathered and fractured bedrock surface was encountered at depths ranging from six inches at MW-1 to twelve feet at MW-6. Descriptions of bedrock are based on observations of NX size cores obtained from each of the boreholes. Based on the bedrock core samples, the site is underlain by a grey weathered and fractured coarse-grained sandstone of the lower Walton Formation. The lower Walton Formation consists of non-marine Upper Devonian shales, sandstones, and conglomerates. Very thin shale lenses were noted from 13.5 feet to 14.6 feet at MW-1. Rock Quality Designation (RQD) values ranged from zero to 35 percent at MW-1; from 12 to 36 percent at MW-2; and was 53 percent for the one five foot run performed at MW-6. Rock quality based on these values is poor to very poor, indicating a highly fractured or highly weathered bedrock at the monitoring well locations (Hunt, 1984). Analysis of the bedrock cores indicated numerous fractures parallel and perpendicular to bedding planes in weathered to highly weathered states.

Upon review of water elevation readings and the nature of the overburden and shallow bedrock, it is believed that the two units are in hydraulic communication.

Hydraulic conductivity tests conducted on the two bedrock wells produced hydraulic conductivity values of 9.0×10^{-3} cm/sec and 7.5×10^{-4} cm/sec for monitoring wells MW-1 and MW-2, respectively. The average value of 4.9×10^{-3} cm/sec represents the secondary permeability along joints and fractures. These values are also consistent with the average value obtained for the overburden wells (2.9×10^{-4} cm/sec). Hydraulic conductivity results are summarized on Table 7.

3.5.2.3 Groundwater Movement

Based on water level readings obtained August 8, 1991, the groundwater movement within the overburden and shallow bedrock systems is influenced by the on-site pond and the Neversink River. The groundwater appears to be flowing radially from the pond to the east toward the Neversink River. As a result, groundwater flow at the north end of the site is to the northeast toward the neighboring property, and flow at the south end of the site is southeast toward the neighboring property. Figure 9 shows the estimated direction of flow and groundwater elevation contours for the August 8, 1991 measurements. It should be noted that the elevation of the on-site pond was estimated based on survey information obtained for test pit locations.

Due to the very weathered and fractured nature of the shallow bedrock, the water elevations in the overburden and bedrock wells likely represent a single water table environment. Therefore, it is very likely that the overburden and bedrock are in direct communication. Additionally, the hydraulic conductivities of all the wells are similar. For this reason, an average overall hydraulic conductivity of 1.8×10^{-3} cm/sec is reported for the site.

The location of the site on stratified and unstratified glacial drift indicates that this site can potentially recharge the local aquifer system with leachate generated by the landfill. Thus, a hydraulic connection with the aquifer does potentially exist.

Additionally, the Route 52 site is located at the toe of a slope which meets the Neversink River. The predominantly eastern flow of groundwater toward the nearby river leaves the drift deposits vulnerable to impact from the site. Leachate was observed in excavations on the property to the north of the site, as well as entering the Neversink River at the northeast corner of the site.

3.6 Assessment of Site Contamination

3.6.1 Previous Enforcement/Response Actions

Surveillance of the site by the Town began in August of 1988. Observations of materials delivered to the site prompted a NYSDEC investigation. In September of 1988 a NYSDEC site inspection revealed the presence of three small drums containing adhesive cement. NYSDEC inspectors confirmed the presence of hazardous waste in these containers (Reference #8 and #9). In October 1988, the NYSDEC closed the site to further dumping (Reference #1). In May 1989 Thomas Gambino and Dominic Dercole (owners of the site) were arrested and charged with one misdemeanor and three felony counts of discharging pollutants into State waters without permits (Reference #32). Both Gambino and Dercole pleaded innocent to the charges.

3.6.2 Previous Sampling

The New York State Department of Health (NYSDOH) collected a water sample from the adjacent residential well in December, 1988. The sample was analyzed for halogenated volatile organics, purgeables aromatic , ketones, and organochlorine pesticides and PCBs. The results indicated the presence of 1,1-dichloroethane (1 ug/l) and carbon tetrachloride (6 ug/l). The level of carbon tetrachloride found exceeded the New York State standard of 5 ug/l for public water supplies (Reference #14, #33, and #34).

The NYSDOH repeated the sampling and analysis of the adjacent residential well in January, 1989. All results were within New York State drinking water standards for this event (Reference #35 and #36).

In January and February, 1989, sampling and testing were conducted for the Route 52 Hills Holding Corporation by EnviroTest Laboratories, Inc. Samples were collected from leachate flowing into the Neversink River and from the on-site water well. Analyses indicated that trace amounts of commercial solvents, petroleum by-products, and insecticides were present in the leachate (Reference #37). Results from analyses of the well water were within New York State drinking water standards (Reference #38). CDM reviewed the results of the analyses at the Town's request and found them to be inappropriate for comparison to New York State drinking water standards because the method of analysis did not provide the appropriate detection limits (Reference #39).

In April 1989 the NYSDOH again collected samples from the adjacent residential well and from seeps in that property. Again, the results from the well water analyses were within New York State drinking water standards. The seep samples were found to contain volatile halogenated organic compounds and purgeable aromatic compounds. The total concentrations of volatile halogenated organics and purgeable aromatic compounds were 9 ug/l and 19 ug/l, respectively (Reference #40).

In May, 1989 the NYSDOH tested ponded leachate from the northeast corner of the landfill and leachate entering the Neversink River. The samples, which were collected by NYSDEC Region 3, were analyzed for pH, chemical oxygen demand, settleable solids, sulfate, chloride, and nitrate (Reference #41). Sulfate concentrations (845 mg/l and 931 mg/l) exceeded the New York State Ambient Water Quality Standard of 250 mg/l (Reference #42).

The NYSDEC sampled sediment and leachate from the C&D site in September, 1989. The samples were analyzed for organics, metals, and other inorganic parameters. The leachate sample data indicated the presence of toluene (17 ug/l) and 2,4-dimethylphenol (20 ug/l). The sediment sample did not contain any organic compounds above method detection limits (Reference #43).

The NYSDOH tested the adjacent residential well water again in October, 1989. Carbon tetrachloride (26 ug/l) was the only organic contaminant detected at a concentration exceeding the drinking water standard (5 ug/l). Tests for inorganic constituents indicated that iron (547 ug/l) exceeded the New York State secondary drinking water standard of 300 ug/l (Reference #44 and #45).

During the site reconnaissance performed November 28, 1990, NYSDEC and TAMS personnel noted a strong odor of hydrogen sulfide. Air monitoring with the portable instruments did not register levels of contaminants above background levels. TAMS personnel observed vapor releases which may have been methane or steam venting from the landfill.

3.6.3 Results of the Soil Gas Survey

3.6.3.1 Field Gas Chromatography (GC) Results

The results of field GC analysis of soil gas samples are listed in Table 8. Examination of the raw data reveals that many of the samples exhibit the same pattern of peaks (or "fingerprint"), which resembles that of a light fraction petroleum hydrocarbon mixture (e.g., gasoline, petroleum distillate thinners/strippers, or No. 2 heating fuel). This is exemplified by the presence of many peaks in the early portion of the chromatogram and the presence of petroleum indicator compounds (i.e., benzene, toluene, ethylbenzene, and xylenes). In most samples where this "fingerprint" was exhibited, chlorinated compounds (not normally related to petroleum mixtures) were also identified and quantitated by the GC. Since compound recognition by GC analyses is based solely on the retention time of the peaks, this may have occurred in part because non-target compounds related to the petroleum mixture probably have retention times which fall within the ±5 percent window of recognition for target chlorinated compounds. The results of the laboratory analysis (by GC/MS) of the SUMMA canisters (discussed in Section 3.6.3.3) support the theory that some or all of these compounds have been misidentified. Two of the five canister samples were collected in the area of highest VOC impact (see Figure 10) as identified by the field GC data. However, no chlorinated VOCs were identified in these SUMMA samples, whereas the field analyses identified trichloroethene, cis-1,2-dichloroethene, and 1,2-dichloroethane.

3.6.3.2 Soil Gas Survey Contour Maps

Figures 10 and 11 depict isoconcentration contouring of total VOCs and o-xylene, respectively (as exhibited by field analysis of soil gas samples). Figure 10 shows two areas of impact to the vadose zone that exist at the site. The first incorporates the entire northern end of the landfill; however, the highest total concentration detected in this area is only 295 ppbv. The second area is located near the tenant's house. Two samples collected in the vicinity of the house exhibited total concentrations over 1000 ppbv. However, the largest part of the total VOC concentrations detected is dichloroethane. This may represent misidentification of a non-target compound, as discussed in Section 3.6.3.1. Because 1,2-dichloroethane was not detected in SUMMA canister samples collected in this vicinity, it is suspected that the gas chromatograph peak more likely represents a petroleum-based compound. Due to differences in detector response, the concentration of a petroleum hydrocarbon compound would be approximately one-tenth of the reported concentration of the misidentified 1,2-dichloroethane. Therefore, the magnitude of the total volatile isoconcentration contours east of the house would be reduced. The detection of toluene during field GC analysis (75 ppbv at 1200+5400) and EPA Method TO-14 analyses (120 ppbv at 1400+5400 and 130 ppbv at 1200+5500) indicate that petroleum hydrocarbons are present in this vicinity.

O-xylene isoconcentration contouring was chosen for Figure 11 because it was the most consistently detected single compound across the site. Figure 11 illustrates the extent of the impacted area on the north end of the site as discussed above.

3.6.3.3 Soil Gas Survey EPA Method TO-14 Results

Table 9 presents a summary of the results of analysis of the SUMMA canisters. Sampling procedural and temporal differences make it difficult to compare the results of these analyses to the field GC data. However, the SUMMA canister results are consistent with the field GC data in that the main source of impact to the vadose zone appears to be from light weight petroleum-based compounds.

Two compounds, carbon disulfide and methylene chloride, were detected in the SUMMA canister samples at concentrations near the PQL. These compounds are used as sample preparation solvents at the laboratory and most likely appear in the sample results due to instrument or sample contamination. The laboratory method blank analyzed along with DUNN samples exhibited low levels of carbon disulfide which supports the probability of laboratory contamination of the samples. Methylene chloride was not detected in the laboratory method blank; however, this compound is considered a common laboratory contaminant.

3.6.3.4 Soil Gas Survey SUMMA Canister/Field GC Data Comparison

The TO-14 SUMMA canister data and field GC data are not in good agreement with regard to the specific contaminants detected; however, data from both the field GC and corresponding SUMMA canister indicate only low levels of volatile organic contamination (less than 300 ppbv).

In those instances where field results of the soil gas survey are not comparable with the laboratory results of the SUMMA canister TO-14 analyses, the latter are considered more accurate. Soil gas survey data were generated by gas chromatography (GC), which is a non-confirmatory test that recognizes the presence of compounds by the time that they elute (i.e., leave the analytical/instrument column that separates them and arrive at the detector), and not by their intrinsic chemical character. This recognition and assignment of an identification to a specific elution time is arbitrary, based on the standard used at the time of analysis. GC does not differentiate compounds based on their specific structure, it differentiates compounds based on elution time only.

SUMMA canister data were generated by mass spectrometry (MS) which is a confirmatory test that recognizes the presence of a compound, and identifies it by its chemical structure. There are several situations in which GC recognition can differ from MS identification:

- The compound recognized by the GC is not what the GC was programmed to identify; i.e., a different compound elutes at the same time as the compound of interest.

- The sensitivities of the detection systems of the two different analytical mechanisms to different compounds or their concentrations may result in observation of a particular compound under one analysis, and not the other. This would occur predominantly under conditions of trace to low concentrations, or when the compounds of interest are incompatible with the analytical procedure.

- Unlike the GC, which does not recognize the specific structure of a compound, the MS can be computer programmed to identify a non-target compound whose structure is known, and whose analysis is compatible with the MS instrument and analytical protocol. Current computer software programs used nationally under EPA protocols maintain a library of approximately 50,000 compounds. When a non-targeted, non-calibrated/standardized compound is detected by the MS, it compares its particular chemical structure characteristics against those of the library compounds and selects the closest match as a "tentatively identified compound" (TIC). If the computer cannot make a match, it will label the compound as "unknown". Unfortunately, the elution times of TICs have nothing in common with elution times of the GC analyses, since the mechanisms which determine compound separation and transport through the analytical system are different.

GC and MS data can only be compared when a compound's characteristics under both analytical systems are known. Its presence (or absence) in one system can then be compared to its presence (or absence) in the other system. As used during this investigation, the soil gas survey served as a preliminary screening device using several compounds that are frequently detected in areas of industrial pollution.

Substances such as petroleum products, (e.g., gasoline, diesel fuel, paint thinners, kerosene) may be comprised of hundreds of individual compounds, some of which will likely elute at the same time as the target compounds chosen for the soil gas survey, although they may have nothing in common chemically. It is not surprising that soil gas and SUMMA canister analyses may produce data which are not comparable.

3.6.4 Initial Environmental Sampling

Surface water, sediment, leachate, and surface soil samples were collected and analyzed, and two air sampling events were conducted; the results are discussed below.

3.6.4.1 Surface Water Sample Results

Six surface water samples were collected at the Route 52 site as described in Section 2.4.1. The analytical data are summarized below and presented in Table 10.

3.6.4.1.1 Volatile Organics Data

No detection of target or non-target volatile organics in any of the surface water samples was reported.

3.6.4.1.2 Semivolatile Organics Data

No target or non-target semivolatile organics were detected in any of the Route 52 surface water samples except SW-5. The only target semivolatile organics detected were naphthalene (10 ug/l) and bis(2-ethylhexyl)phthalate (2 ug/l). Three non-target analytes (tentatively identified compounds, or TICs) were detected in SW-5, at a total estimated concentration of 52 ug/l; these TICs were tentatively identified as C_4 alkyl benzene compounds. No target or non-target semivolatile analytes were detected in SW-7, the field duplicate of SW-5.

3.6.4.1.3 Pesticides/PCBs Data

4,4'-DDT was detected in SW-3 at a concentration of 0.069 ug/l. No other pesticides or PCBs were detected in the Route 52 surface water samples. Due to insufficient sample volume, SW-4 was not analyzed for pesticides/PCBs.

3.6.4.1.4 Inorganics Data

Inorganics data are presented in Table 10 and summarized below relative to New York State surface water standards (6 NYCRR 703.5) NYSDEC, (1991) and guidance values (NYSDEC, 1990), based on the classification of the Neversink River as a Class B waterway. For some inorganics (e.g., calcium, potassium), there are no criteria for any water classification. For others, only groundwater (class GA) or drinking water criteria exist. Due to insufficient sample volume, SW-4 was not analyzed for inorganics.

The criteria for cadmium, chromium, copper, lead, and nickel are calculated based on the hardness of the water body. No hardness measurements were taken; therefore, the hardness was calculated. For the purposes of this discussion, the Neversink River and the on-site pond were considered as separate water bodies. Data from samples SW-1 (upstream) and SW-3 (far enough downstream to be beyond direct influence of the site) were used for the Neversink River calculation; sample SW-2 was not included since the data indicated a probable site influence, resulting in elevated concentrations of calcium and magnesium. For the on-site pond, data from all three analyses (including the field duplicate, SW-7) were used. For the Neversink River, using the average concentrations of calcium (3.9 ppm) and magnesium (0.8 ppm), assuming that each was present entirely as its carbonate ($CaCO_3$), and then calculating the sum of the two carbonates (9.8 ppm $CaCO_3$ and 2.8 ppm $MgCO_3$), the calculated estimate of 12.6 ppm total hardness was determined. Similarly, for the on-site pond, a value of 38.6 ppm total hardness was calculated (based on average calcium concentrations of 13.7 ppm and 1.27 ppm magnesium). The criterion for barium in class B waters varies depending on whether or not the hardness exceeds 75 ppm; the less than 75 ppm criterion was used.

There are no class B standards or guidance values for aluminum, antimony, barium, calcium, magnesium, manganese, and selenium. Where appropriate, reference is made to criteria for other water classifications in the discussion of these data.

Antimony, cadmium, cobalt, mercury, selenium, thallium, and cyanide were not detected in any of the Route 52 surface water samples.

Aluminum was detected in four of the five samples, ranging from not detected in SW-6 to 11,000 ug/l in SW-2. There are no applicable surface water criteria for aluminum.

Arsenic was detected in two samples at a maximum concentration of 8.9 ug/l in the sample from SW-2. No sample concentrations exceeding the Class B standard of 190 ug/l were detected.

Barium was detected in all five samples at concentrations ranging from 35.1 ug/l to 358 ug/l. There is no class B criterion for barium; none of the samples exceeds the class A standard of 1,000 ug/l.

Beryllium was detected in all samples at concentrations from 1.4 ug/l to 2.4 ug/l, all of which are less than the surface water standard for class B of 11 ug/l for hardness less than 75 ppm.

Calcium was detected in all five samples at concentrations ranging from 3,650 ug/l in SW-1 to 14,000 ug/l in SW-2. There are no applicable surface water criteria for calcium.

Chromium was detected only in sample SW-2 at a concentration of 12.6 ug/l, which is lower than the calculated standard of 37.9 ug/l.

Copper was detected only in SW-2, at a concentration of 29.9 ug/l, which exceeds the calculated standard for surface water class B through C (2.0 ug/l), although it is lower than the class GA standard of 200 ug/l.

Iron concentrations ranged from 61.6 to 24,000 ug/l. Only the SW-2 sample concentration (24,000 ug/l) exceeds the 300 ug/l standard.

Lead concentrations range from not detected to 69.8 ug/l in SW-2. Concentrations in samples SW-1 (1.2 ug/l) and SW-2 exceed the calculated standard of 0.23 ug/l; however, the SW-1 concentration is less than the drinking water standard (50 ug/l).

Magnesium concentrations ranged from 728 ug/l to 6,500 ug/l in SW-2. There are no surface water criteria for magnesium. The class GA guidance value is 35,000 ug/l.

Manganese was detected in all five samples at concentrations ranging from 37.6 ug/l to 3,420 ug/l in SW-2. There are no surface water standards for manganese; the class GA standard is 300 ug/l. Only the SW-2 concentration was greater than 300 ug/l.

Mercury was not detected in any sample. The guidance value for all surface water classes is 0.2 ug/l.

Nickel was detected only in the SW-2 sample, at a concentration of 17.8 ug/l, which is less than the calculated class B standard of 19.8 ug/l.

Potassium was detected in all five samples at concentrations ranging from 576 ug/l in SW-6 to 2,260 ug/l in SW-2. There are no applicable surface water criteria for potassium.

Silver was detected in three samples at concentrations ranging from 6.8 to 8.7 ug/l. The standard for surface water class B is 0.1 ug/l ionic silver. However, the analytical data are for total silver; therefore, comparison to this standard is not appropriate. All concentrations are less than the class GA total silver standard of 50 ug/l.

Sodium was detected in all five samples at concentrations ranging from 2,990 ug/l in SW-1 to 39,200 ug/l in SW-6. There are no applicable surface water criteria for sodium.

Vanadium was detected in four of the six samples at concentrations ranging from 15.3 ug/l to 25.8 ug/l. All reported detections exceeded the class B standard of 14 ug/l. Vanadium was not detected in SW-1. ✓

Zinc was detected in four of the five samples, at concentrations ranging from 6.6 ug/l to 156 ug/l in SW-2. Only the SW-2 concentration exceeds the class B standard of 30 ug/l. ✓

3.6.4.2 Sediment Sample Results

Five sediment samples were collected as described in Section 2.4.2. The analytical data are presented below and shown on Table 11.

3.6.4.2.1 Volatile Organics Data

Toluene was detected in the three samples from the Neversink River at concentrations ranging from 2 ug/l in SS-1 to 130 ug/l in SS-2, and chloroform was detected at 2 ug/l in SS-3. No other detections of target or non-target volatile organics were reported.

3.6.4.2.2 Semivolatile Organics Data

Target and non-target semivolatile organics were detected in varying concentrations in three of the four sediment samples analyzed for semivolatiles. Semivolatile data were not reported for SS-5. No target analytes were detected in SS-1; however, five different non-target analytes (tentatively identified compounds, or TICs) at a total estimated concentration of 4,070 ug/kg were reported in SS-1. Target polynuclear aromatic hydrocarbons (PNAs) detected in SS-3 included three different PNAs and related compounds at concentrations totalling 560 ug/kg, 4-methylphenol at 990 ug/kg, and 570 ug/kg bis(2-ethylhexyl)phthalate, as well as 20 TICs totalling 57,080 ug/kg. The only target semivolatiles detected in SS-4 were PNAs (four PNA compounds, with a total estimated concentration of 840 ug/kg), along with 15 TICs at a total estimated concentration of 17,650 ug/kg. Only one target semivolatile compound was detected in SS-2 (benzoic acid at 250 ug/kg), and 20 TICs were also detected with a total estimated concentration of 79,290 ug/kg. Based on both the field description of the samples and the classes of compounds tentatively identified in these samples, it is likely that many if not all the TICs reported are naturally occurring. The concentration of organic contaminants detected in SS-1 may be lower than other samples due to the gravelly nature of the material submitted for analysis which provides less affinity for the adsorption of these compounds than sediments with higher organic content.

3.6.4.2.3 Pesticides/PCBs Data

No pesticides or PCBs were detected in any of the Route 52 sediment samples. SS-5 was not analyzed for pesticides/PCBs.

3.6.4.2.4 Inorganics Data

Antimony was detected at a maximum concentration of 22.5 mg/kg, beryllium at a maximum concentration of 1.0 mg/kg, cadmium at a maximum of 2.1 mg/kg, and lead at a maximum concentration of 87.0 mg/kg. No other significant concentrations of inorganics were detected in Route 52 sediment samples. Mercury, silver, selenium, and thallium were not detected in any sample.

3.6.4.3 Leachate Sample Results

Leachate samples were collected on June 20, 1991 as described in Section 2.4.3, and were analyzed by Aquatec Labs. The data from the four leachate samples presented on Table 12 and the soil sample L-3 presented on Table 13 are discussed below.

3.6.4.3.1 Volatile Organics Data

Chloromethane was detected at 1 ug/l in L-5; no other target or non-target volatile organic compounds were detected in any of the Route 52 leachate samples.

3.6.4.3.2 Semivolatile Organics Data

No target or non-target semivolatile organic compounds (SVOCs) were detected in L-6. No target SVOCs were detected in L-1; however, 16 TICs at a total estimated concentration of 280 ug/kg were reported. Two PNAs at a total estimated concentration of 5 ug/l were detected in L-5, along with bis(2-ethylhexyl)phthalate at 2 ug/l, and five TICs at concentrations totalling 93 ug/l. Three target SVOCs were also detected in L-3, also consisting of two PNAs at concentrations totalling 440 ug/kg and bis(2-ethylhexyl)phthalate at a concentration of 150 ug/kg, along with two TICs at a total estimated concentration of 400 ug/kg. Two phthalates totalling 13 ug/l were the only target SVOCs detected in L-2; however, data for the acid-extractable fraction, which includes phenol and related compounds, were rejected by data validation. Seventeen TICs, most of which were identified as alkanes, were detected in L-2 at a total estimated concentration of 318 ug/l.

3.6.4.3.3 Pesticides/PCBs Data

No pesticides or PCBs were detected in any of the Route 52 leachate samples.

3.6.4.3.4 Inorganics Data

The highest concentrations of inorganics were detected in L-1, including antimony (75.8 ug/l), arsenic (150 ug/l), beryllium (23.1 ug/l), cadmium (31.3 ug/l), cyanide (71.1 ug/l), and lead (498 ug/l). Less toxic inorganics were also present at elevated concentrations including iron at 973,000 ug/l.

Inorganic analyte concentrations were significantly lower in the other leachate samples, although arsenic (8.5 ug/l to 19.3 ug/l), and beryllium (1.5 to 3.4 ug/l) were detected in the other three aqueous samples, along with iron at 3,230 ug/l to 57,000 ug/l (L-6). Silver was also detected in L-5 at 6.7 ug/l, and the highest concentrations of vanadium (excluding L-1) and lead were reported in L-6, at 62.3 ug/l and 73.8 ug/l, respectively. Arsenic was reported at a concentration of 6.1 mg/kg in L-3, and beryllium at 0.8 mg/kg in L-3.

3.6.4.4 Surface Soil Analytical Results

Three surface soil samples were collected at the Route 52 site, as described in Section 2.4.4. Sample SL-1 is the assumed background sample. Surface soil data are presented on Table 13.

3.6.4.4.1 Volatile Organics Data

Chloroform was detected at an estimated concentration of 1 ug/kg in SL-3. No other target or non-target volatile organics attributable to site contamination were reported.

3.6.4.4.2 Semivolatile Organics Data

No target or non-target semivolatile analytes were detected in SL-2. Seventeen target analytes were reported in SL-3, which include 14 PNAs at concentrations totalling 21,630 ug/kg, two phthalates at concentrations totalling 5,000 ug/kg, and dibenzofuran at a concentration of 69 ug/kg. Soil samples from rural areas in the eastern United States have been reported to have total PNA concentrations from 4,000 to 13,000 ug/kg (ATSDR, 1990a). One target semivolatile (bis(2-ethylhexylphthalate) at a concentration of 200 ug/kg and four TICs at a total estimated concentration of 2,130 ug/kg were detected in SL-1.

3.6.4.4.3 Pesticides/PCBs Data

No pesticides or PCBs were detected in SL-1 or SL-2. Two chlordane isomers (estimated concentration 49 ug/kg) and 4,4′-DDT and 4,4′-DDD (estimated total concentration 67 ug/kg) were detected in SL-3.

3.6.4.4.4 Inorganics Data

Surface soil data discussed below are compared to background concentrations found in the literature. Where available, the high end of the background range for samples from New York has been used. In other cases, the background levels for the eastern United States were the best available, and for a few metals, other values were used. The various values obtained from the literature are shown on Table 14; the references are identified at the end of the table. The specific values used for evaluation of site surface soil data are listed in the last column of the inorganics data summary in Table 13; the reference indicates the source of the specific value used, as identified in the references listed at the end of Table 14.

Lead was detected at a maximum concentration of 273 mg/kg which exceeds the high end of the New York State background concentration range (36 mg/kg); and mercury was reported at 0.42 mg/kg in the only sample in which it was detected (SL-3), exceeding the 0.066 mg/kg background concentration. Zinc was detected on the SL-3 sample at a concentration of 313 mg/kg, exceeding the 64 mg/kg average background concentration, and copper was detected in the sample from SL-3 at 20.2 mg/kg exceeding the background concentration of 15 mg/kg. However, these concentrations are less than the reported are less than the reported background concentrations from other parts of the US (see Table 14); therefore, the detected concentrations of lead and mercury are not considered significant. Antimony, selenium, silver, and thallium were not detected in any of the three surface soil samples.

No other concentrations of inorganics which exceeded expected background concentrations were detected in any of the three surface soil samples.

3.6.4.5 Ambient Air Sampling Results

Two air sampling events were conducted at the Route 52 site, as discussed in Section 2.5. The results are shown on Table 15 and are discussed below.

3.6.4.5.1 Hydrogen Sulfide Data

Hydrogen sulfide was not detected in any sample during either of the events. Real time field measurements (Table 2) are generally consistent with the laboratory data. Real time field measurements indicated that hydrogen sulfide was not detected, or was detected only at low concentrations (less than 10 ppb). The real time readings are based on instantaneous measurement of hydrogen sulfide in the air at a particular point in time. Unless a value were sustained for an extended time period, it would not be detected by the laboratory procedure, which measures the concentration of hydrogen sulfide absorbed by the reaction fluid over a two-hour period.

The New York State Department of Health has documented, through experience with similar sites, that hydrogen sulfide production/odors at C&D-type landfills is most prevalent when weather conditions produce cool nights and warm days, and after several days of rain. The hydrogen sulfide is believed to be formed from the decomposition of gypsum (calcium sulfate dihydrate) wallboard unanaerobic conditions. This might account for the larger number of sulfide odor complaints after several days of rain. Samples were collected at the Route 52 site when weather conditions were adequate, but not highly conducive to the generation of hydrogen sulfide.

3.6.4.5.2 Volatile Organics Data

Target volatile organics detected in the upwind, on-site, or downwind (receptor) samples during the first event included toluene which was detected in all four samples at concentrations of 11 ug/m^3 (3.0 ppb) to 28 ug/m^3 (7.5 ppb); benzene, detected at the on-site residence at 7.8 ug/m^3 (25 ppb), and trichlorotrifluoroethane, detected at the receptor location north of the site at 8 ug/m^3 (1.0 ppb). These concentrations are substantially below the ACGIH TLVs and NYSDEC ambient guideline concentrations (AGCs) (NYSDEC, 1989) for these substances.

In the second event, low concentrations of toluene were reported in three of the six samples, ranging from 7.6 ug/m^3 (2.0 ppb) in the upwind sample to 13 ug/m^3 (3.3 ppb) in the on-site receptor sample. These concentrations are also less than the New York AGCs.

The library search for unidentified peaks performed on the samples revealed the presence of siloxanes. These constituents were subsequently traced to a silicone-based tubing that was expected to be highly resistant to chemical attack. However, during the high temperature conditions present at the site during sample collection, the siloxane compounds were desorbed from the tubing. These siloxanes are not considered site-related. This observation is supported by similar results from sites that were sampled during the same time period using the silicone based tubing.

The apparatus was changed from that planned to reduce the high siloxane concentrations reported at other sites where a five foot section of tubing was used.

3.6.5 Subsurface Investigation

In the following text, the results of the subsurface investigation are presented and discussed. The specific components include observation and sampling of test pits (3.6.5.1), and groundwater sampling (3.6.5.2). Geotechnical analysis of samples from soil borings is included in Section 3.5; no samples from borings were submitted for chemical analysis.

3.6.5.1 Test Pit Observations and Data

Nine of the ten pits excavated at the Route 52 site were in three general zones within the known C&D landfill area. Three test pits were excavated in each zone in order to investigate geophysical or soil gas anomalies.

The nine test pit excavations within the C&D material revealed a consistent, thin (approximately one foot), loosely compacted layer of silty sand and gravel cover material. The underlying fill at test pits TP-1 through TP-3 was composed of approximately 30 to 60 percent wood; 35 to 45 percent black oily silty sand and gravel; and about 5 to 25 percent plastic sheets, concrete and brick fragments, steel re-bar, carpet, and glass. The fill at test pits TP-5 through TP-7 was composed of approximately 85 to 95 percent grey to brown sand and gravel, some silt, cobbles and boulders; and 5 to 15 percent wood, plastic, wires, rags, carpet, metal, concrete and brick, and telephone cable. The material between four and six feet at TP-5 and TP-7 exhibited an oily appearance. The fill at test pits TP-8 through TP-10 was composed of approximately 30 to 75 percent brown or dark grey silty sand, silty, occasionally oily in appearance, with occasional cobbles or small boulders; 15 to 65 percent wood; and 5 to 40 percent brick and concrete fragments, plastic sheets, carpet, and steel pipes. TP-10 was abandoned at 9.5 feet on a large piece of heavy steel. No odors were reported.

The presence of metal was observed in eight of the nine test pits which were excavated at or near magnetic anomalies, confirming the results of the magnetometer survey (except at TP-1, in which no metal was observed).

One test pit (TP-4) was excavated south of the C&D landfill adjacent to the small wetland area. The excavation revealed brown silty sand, trace fine gravel, from grade to four feet. The excavation was abandoned at four feet as groundwater was encountered. No C&D material was observed in the excavation. This test pit was excavated about 30 feet from a magnetic anomaly (grid location 5025+1150; see Figure 8); however, no evidence of metal was observed in this test pit.

The results of the chemical analyses of test pit soil/waste samples are presented on Table 16 and summarized below. In general, soil/waste samples with the suffix "A" were collected from the upper half of the test pit, while samples with the suffix "B" were collected from the lower (deeper) part of the pit. The specific depths of the samples are shown on Table 16.

3.6.5.1.1 Test Pits - Volatile Organics Data

BTEX compounds (benzene, toluene, ethylbenzene, and xylene) were detected in twelve of the fourteen test pit samples at concentrations ranging from 25 ug/kg (TP-8A) to 326 ug/kg (TP-10A). BTEX compounds were not detected in either TP-6 sample. The presence of BTEX compounds is often associated with gasoline or petroleum product contamination. Other volatile organics detected in Route 52 test pit samples included carbon disulfide (detected in 10 of 14 samples at concentrations ranging from 6 ug/kg to 28 ug/kg); 1,1,1-trichloroethane, in nine of 14 samples at concentrations ranging from 2 ug/kg to 40 ug/kg in TP-7B; and chloroform in three of 14 samples at concentrations ranging from 2 ug/kg to 7 ug/kg. Methyl ethyl ketone (2-butanone), methyl isobutyl ketone, and acetone were also reported in several samples, but were negated in most cases due to contamination in associated laboratory method blanks.

Unknown or tentatively identified compounds were detected in 13 of the 14 samples. One to ten TICs were reported in these samples, at total estimated concentrations ranging from 7 ug/kg to 1023 ug/kg.

The volatile organics data from the test pit samples partially confirm the soil gas survey results (see Section 3.6.3). The presence of BTEX compounds reported in the soil gas survey was confirmed; however, the presence of the chlorinated VOCs detected in the soil gas survey field GC data was not. The test pit data do tend to confirm the soil gas survey SUMMA canister data. The presence of low concentrations of carbon disulfide reported in the soil gas survey SUMMA canister data, which had been attributed to laboratory contamination, was confirmed by its detection in 10 of 14 test pit samples. The presence of carbon disulfide may result from the reaction of petroleum products with sulfur-containing wallboard (gypsum) in the fill.

3.6.5.1.2 Semivolatile Organics Data

The major class of target semivolatile organic analytes detected in the Route 52 soil/waste samples is polynuclear aromatic hydrocarbons, which were detected in all 14 samples. Between three and seventeen different PNA or PNA-related compounds were detected in each sample, at total concentrations ranging from 11,400 ug/kg (TP-10A) to over 360,000 ug/kg (TP-6B). One to four phthalates (excluding those negated due to their presence in laboratory blanks) were detected in 11 of the 14 samples, at concentrations ranging from 660 ug/kg (TP-6B) to 87,660 ug/kg (TP-8B). Phthalates were not detected in TP-6A or TP-7. Dibenzofuran (detected in 12 samples at a maximum concentration of about 3,600 ug/kg), various phenols (up to three different phenol compounds, detected in seven samples at a maximum total concentration of about 11,800 ug/kg), and di- and trichlorobenzenes (detected in three samples at an estimated maximum total concentration of 1,140 ug/kg) comprised the remainder of the target semivolatile organics identified.

Numerous semivolatile TICs were also detected in the Route 52 soil/waste samples. At least six TICs, ranging up to 20 different TICs (the maximum reported by the laboratory under the NYSDEC ASP CLP protocol), were detected in the 14 samples, at total estimated concentrations ranging from 15,120 ug/kg (TP-6A) to 632,400 ug/kg (TP-3A). These TICs were predominantly identified as high molecular weight alkanes (C_{10} to C_{32}), although a few non-target PNAs, phenols, terpenes, benzene derivatives, and other compounds were also tentatively identified.

3.6.5.1.3 Pesticides/PCBs Data

The pesticides and PCBs detected in the Route 52 soil/waste samples are 4,4′-DDT and its metabolites (4,4-DDD and 4,4′-DDE); two chlordane isomers (alpha and gamma-chlordane); aroclors 1242, 1254, and 1260; dieldrin; and heptachlor. Aroclors 1242, 1254, and 1260 were detected in all 14 samples, at total PCB concentrations ranging from 210 ug/kg to 7,000 ug/kg. DDT or its metabolites were detected in all 14 samples, at total concentrations up to 369 ug/kg. The two chlordane isomers were detected in thirteen samples, at a maximum total concentration of 194 ug/kg in TP-2A; dieldrin in five of 14 samples at a maximum concentration of 51 ug/kg; and heptachlor in one sample at 63 ug/kg.

3.6.5.1.4 Inorganics Data

Compared to surface soil background concentrations (Table 14), moderately high lead concentrations were reported, ranging from 184 mg/kg to 1960 mg/kg in TP-2B. Mercury was detected in all 14 samples at concentrations ranging from 0.18 mg/kg to 1.7 mg/kg in TP-10A. Cadmium was detected at a maximum concentration of 125 mg/kg in TP-6A and 67.1 mg/kg in TP-1B; other detections were less than 3 mg/kg. Cyanide was detected in all 13 valid analyses (cyanide data for TP-8A were rejected) at concentrations ranging from 1.3 mg/kg to 15.5 mg/kg in TP-7A. No other significant concentrations of inorganics were reported.

3.6.5.1.5 EP TOX/TCLP Data

All fourteen soil/waste samples from the test pits were subject to Extraction Procedure Toxicity (EP TOX) analysis, and three samples for Toxicity Characteristic Leaching Procedure Analysis. No EP TOX or TCLP analytes were detected in any of the samples.

3.6.5.2 Groundwater Sample Analytical Results

Groundwater sample analytical data are presented on Table 17 and are summarized below.

3.6.5.2.1 Volatile Organics Data

Only relatively low concentrations of volatile organics were detected in the Route 52 monitoring well groundwater samples (MW-1 through 6; the sample designated MW-8 is a field duplicate of MW-2). Methylene chloride was detected at a concentration of 3 ug/l in MW-8, the field duplicate of MW-2 (methylene chloride was not detected in the MW-2 sample), and acetone was detected at a concentration of 1 ug/l in MW-1. Both these compounds are common laboratory contaminants and their reported detection at low concentrations may not be attributable to environmental contamination.

3.6.5.2.2 Semivolatile Organics Data

No target semivolatile analytes were detected in Route 52 groundwater samples, other than phthalates attributable to laboratory contamination. However, from one to six non-target analytes (TICs) were detected in all of the wells. Three semivolatile TICs totalling about 58 ug/l were detected in the upgradient well MW-1; total TICs, ranging from about 32 ug/l in MW-2 to 91 ug/l in MW-5, were detected in the downgradient wells. None of the PNAs detected in the test pit samples were detected in groundwater samples, which is consistent with the literature which indicates that it is not likely that PNAs will occur to any significant extent in groundwater at hazardous waste sites or other sites (ATSDR, 1990).

3.6.5.2.3 Pesticides/PCBs Data

No pesticides or PCBs were detected in any of the Route 52 groundwater samples.

3.6.5.2.4 Inorganics Data

Antimony, cadmium, mercury, selenium, silver, and thallium were not detected in any of the Route 52 groundwater samples. Cyanide data were rejected by data validation and are not discussed. Groundwater samples were not field filtered; the data discussed below represent total (as opposed to dissolved) metals concentrations.

There are no class GA or drinking water standards for the following inorganic analytes: aluminium (detected in all six samples at concentrations ranging from 736 to 51,200 ug/l); calcium (8,180 to 123,000 ug/l); cobalt (detected in two samples at 65.9 and 75.9 ug/l); nickel (detected in three of six samples at concentrations ranging from 86.7 to 157 ug/l); potassium (detected in all six samples ranging from 1,980 to 17,700 ug/l); and vanadium (detected in the samples from MW-3 at 39.7 ug/l and MW-5 at 35.9 ug/l).

Arsenic was detected in three of the downgradient monitoring wells at a maximum concentration of 10.1 ug/l in the MW-3 sample. All reported detections are less than the class GA groundwater standard of 25 ug/l.

Barium was detected in all six samples ranging from 186 ug/l to 1,290 ug/l. The concentration in one sample, MW-5 (1,290 ug/l), exceeds the class GA standard of 1000 ug/l.

Beryllium was detected in samples from two wells (MW-3 and MW-5) at a maximum concentration of 4.6 ug/l. The reported concentrations exceed the class GA groundwater guidance value of 3 ug/l.

Chromium was detected in four downgradient samples at concentrations ranging from 15.5 ug/l (MW-2) to 151 ug/l (MW-5). The reported concentrations in MW-5 and MW-3 (91.8 ug/l) exceed the 50 ug/l class GA chromium groundwater standard.

Copper was detected in all six samples at concentrations ranging from 55.5 ug/l to 169 ug/l. All detections are lower than the class GA standard of 200 ug/l.

Iron was detected in all six samples at concentrations ranging from 2,080 ug/l to 90,500 ug/l in the sample from MW-5. The class GA standard of 300 ug/l was exceeded in all six wells.

Lead was detected in four of the six samples at concentrations as high as 90.0 ug/l in MW-5. The concentrations in MW-4 (32.1 ug/l), MW-3 (81.7 ug/l), and MW-5 exceed the class GA standard of 25 ug/l.

Magnesium was detected in all six samples at concentrations ranging from 2,820 ug/l to 55,200 ug/l in MW-5. The class GA guidance value of 35,000 ug/l is exceeded in the sample from MW-3 (47,800 ug/l) and MW-5.

Manganese was detected in all six samples at concentrations ranging from 352 ug/l (MW-1) to 36,300 ug/l (MW-5). The class GA standard of 300 ug/l is exceeded in all six samples.

Sodium was detected in all six samples at concentrations ranging from 7,700 ug/l to 71,800 ug/l. The class GA standard of 20,000 ug/l is exceeded in four of the six samples (all except MW-1 and MW-4).

Zinc was detected in all six samples at concentrations ranging from of 13.2 ug/l to 364 ug/l. The reported concentrations in MW-3 (320 ug/l) and MW-5 (364 ug/l) exceed the class GA standard of 300 ug/l.

Total dissolved solids (TDS) and total suspended solids (TSS) analyses were also performed on the Route 52 site groundwater samples. The lowest TDS concentration 40 ppm was reported in upgradient well MW-1. TDS concentrations in the five downgradient wells ranged from 277 ppm in MW-6 to 812 ppm in MW-3. The class GA groundwater standard of 500 ppm was exceeded in MW-3, MW-2 (604 ppm), and MW-5 (746 ppm). These dissolved solids concentrations are consistent with the total metals concentrations, and suggest that when evaluated along with the surface water (Neversink River) and leachate data, there is evidence that inorganic contaminants are leaching from the fill and into the groundwater from the fill and into the groundwater and surface water in the vicinity of the site.

Total suspended solids concentrations were low in MW-1, MW-2, and MW-6, ranging from 61 ppm to 174 ppm. TSS concentrations in MW-3 (1580 ppm), MW-4 (1,190 ppm), and MW-5 (1,130 ppm) were higher, indicating that some of the inorganics detected in these groundwater samples may be due to particulates or suspended matter. However, review of the overall site data, including other matrices (leachate and surface water), suggest that a substantial fraction of the inorganics detected in the groundwater samples is attributable to the landfill.

IV

4.0 CONCLUSIONS/RECOMMENDATIONS

4.1 Site History

- Operations began at the site in the summer of 1988 as an exempt construction and demolition debris site and was closed in October 1988.

- Disposal of non-C&D material and unpermitted burning were noted at the site during the summer and fall of 1988. Disposal of hazardous waste at the site was documented by NYSDEC in September, 1988. These wastes have been removed.

- In February 1989, NYSDEC authorized Woodbourne Lawn and Garden to cover the site with topsoil.

- Leachate was noted during the site reconnaissance in November 1989.

4.2 Field Sample Analytical Results and Observations

Surface Water

- Little or no organic contamination was reported in any of the surface water samples. Copper, zinc, vanadium, lead, and iron concentrations exceed the class B surface water standards in sample SW-2, taken from the Neversink River immediately adjacent to the site. Concentrations of other inorganics for which there are no standards or for which standards were not exceeded were noticeably higher in SW-2 than in any of the other on-site or off-site surface water samples.

Sediment

- Volatile organic compounds were not detected in significant concentrations (maximum concentration of 130 ug/kg in SS-2). Semivolatile target organics, consisting of phenols, PNAs and phthalates, were detected at a maximum concentration of 222 ug/kg in SS-3. Unidentified semivolatile compounds or TICs were detected at higher estimated concentrations; however, most or all of these TICs may be naturally occurring compounds. PCBs were not detected. Pesticides were detected only at the sample from SL-3 (67 ug/kg DDT metabolites and 49 ug/kg total chlordane). Inorganic contaminant concentrations were not considered significant in the sediment samples.

Leachate

Organic contaminant concentrations in the leachate samples are relatively low (less than 1000 ug/l total concentration). Inorganic contaminant concentrations were elevated in some leachate samples, especially L-1, which was collected from the leachate pond south of the landfill.

Surface Soil

- Surface soil contaminants similar to those detected in the test pit soil/waste samples were detected in one of the two on-site surface soil samples. Based on comparison with reported regional or national background concentrations, inorganic concentrations are not considered significant.

Air

- Hydrogen sulfide was not detected during the sampling events of July 26 or August 23, 1991.
- Trichlorotrifluoroethane was detected at the adjacent residence at a level of 8 ug/m^3 in July.
- Benzene was detected at the on-site residence at a level of 7.8 ug/m^3 in July.
- Toluene was detected in all four samples in July ranging from levels of 11 ug/m^3 at the adjacent residence to 28 ug/m^3 at the on-site residence. Toluene was detected in two samples in August, 7.6 ug/m^3 in the upwind sample and 13 ug/m^3 at the on-site residence.
- None of the contaminant levels exceeded the NYSDEC ambient air quality criteria (6 NYCRR Part 257), ACGIH Threshold Limit Values (TLVs), or NYSDEC ambient guideline concentrations (ACGs).

Fill

Ten test pits were excavated at the Route 52 site. The nine test pit excavations within the C&D landfill revealed a consistent, thin (approximately one foot), silty sand and gravel cover material. The underlying fill varied by location. Typical contents included: 1) approximately 30 to 60 percent wood; 35 to 45 percent black oily silty sand and gravel; and about 5 to 25 percent plastic sheets, concrete and brick fragments, steel re-bar, carpet, and glass; 2) approximately 85 to 95 percent grey to brown sand and gravel, some silt, cobbles and boulders; and 5 to 15 percent wood, plastic, wires, rags, carpet, metal, concrete and brick, and telephone cable; or 3) approximately 30 to 75 percent brown or dark grey silty sand, occasionally oily in appearance, with occasional cobbles or small boulders; 15 to 65 percent wood; and 5 to 40 percent brick and concrete fragments, plastic sheets, carpet, and steel pipes. One test pit (TP-4) was performed south of the C&D landfill adjacent to the small wetland area. The excavation revealed brown silty sand, trace fine gravel, from grade to four feet where groundwater was encountered. No C&D material was observed in the TP-4 excavation.

The predominant contaminants detected in the soil/waste samples were polynuclear aromatic hydrocarbons, which were detected at total concentrations as high as 360,000 ug/kg. Unidentified or tentatively identified compounds were also reported in all fourteen soil/waste samples, at total estimated concentrations as high as 632,000 ug/kg. Lesser concentrations of BTEX compounds (benzene, toluene, ethylbenzene, and xylenes), pesticides, and PCBs were also detected. No analytes were detected in the soil/waste samples subjected to EP TOX and TCLP analysis.

Groundwater

- Few organic contaminants were detected (maximum total concentration in any sample less than 100 ug/l), and those detected appeared to be randomly distributed; i.e., significantly greater concentrations were not detected in samples from the downgradient wells as opposed to the upgradient well.

- Concentrations of inorganics were significantly higher in samples from downgradient wells MW-3, MW-4, and MW-5 than in the samples from upgradient well MW-1. The detected concentration of barium exceeds the class GA groundwater standard in MW-5; magnesium exceeded the class GA guidance value in samples from MW-3 and MW-5; and chromium, zinc, and lead exceeded the GA standard in MW-3 and MW-5. The class GA standards for iron and manganese are exceeded in samples from all six wells; however, the level of exceedance was much greater in samples from MW-3, MW-4, and MW-5 than in samples from MW-1, MW-2, and MW-6. Sodium exceeded the class GA standard in MW-2, MW-3, and MW-6. The concentration of beryllium in MW-3 and MW-5 exceeds the class GA guidance value.

4.3 Transport Routes

Groundwater

- Based on available data, the groundwater flow in the overburden appears to be affected by the on-site pond which causes a local radial flow pattern eastward toward the Neversink River. The shallow groundwater in the bedrock is believed to be hydraulically connected to the overburden.

Surface Water/Sediment

- Surface water run-off and associated sediments from all but the northern third of the landfill area are bounded by natural levees or man made berms on the site. Surface water and sediments from the northern third of the site enter the Neversink River via intermittent streams or the drainage ditch on the adjacent residential property. A small quantity of run-off enters the on-site pond; there is no overland drainage channel from the pond.

Air

- The predominant wind direction has not been established.

4.4 Receptors

Surface Water/Sediment

- The primary receptors for surface water and sediment associated with the site are the Neversink River and the on-site pond. Local residents report that people occasionally fish at the on-site pond. The Neversink River is a Class B (primary recreational use) waterway.

Groundwater

- The primary receptors for groundwater are discharge areas and possibly the municipal well field for the Town of Fallsburg. The nearest groundwater discharge area is the Neversink River. Municipal wells for the Town of Fallsburg draw groundwater from the deep overburden approximately one-half mile south of the site.

Air

- Potential receptors include the on-site residence and the adjacent residence north of the site.

4.5 Summary

Fill material at the Route 52 site varies within the site, but was generally found to consist of wood; silty sand and gravel, which was occasionally oily; and miscellaneous C&D and other debris such as concrete and brick fragments, steel re-bar, glass, carpets, plastic, wire, and metal. Samples of the fill were not hazardous as defined by EP TOX and TCLP analytical results.

Although elevated concentrations of organic contaminants were detected in many of the soil/waste samples, the groundwater, surface water, and leachate data suggest that inorganics are the principal contaminants of concern. Literature indicates that significant migration of the major organic contaminants, polynuclear aromatic hydrocarbons, into groundwater or surface water is not likely. Elevated concentrations of inorganics attributable to the landfill were detected in these media (surface water, groundwater, and leachate), and inorganic contaminant concentrations exceeding applicable standards were reported in surface water and groundwater samples collected from locations in the immediate vicinity of the site. Inorganic contaminant concentrations were slightly higher in a surface water sample collected about 800 feet downstream of the site than in the upstream sample.

Based on site history, data search, and the preliminary site assessment field investigation, the disposal of hazardous waste as defined by 6NYCRR Part 371 has not been documented at this site. However, disposal of hazardous waste at the site was documented by NYSDEC in 1988. This particular hazardous waste was subsequently removed from the site.

4.6 Recommendations

Properly close the landfill in accordance with NYCRR Part 360 regulations. The closure should include a cap to limit infiltration and provide surface water drainage control.

V

5.0 BIBLIOGRAPHY

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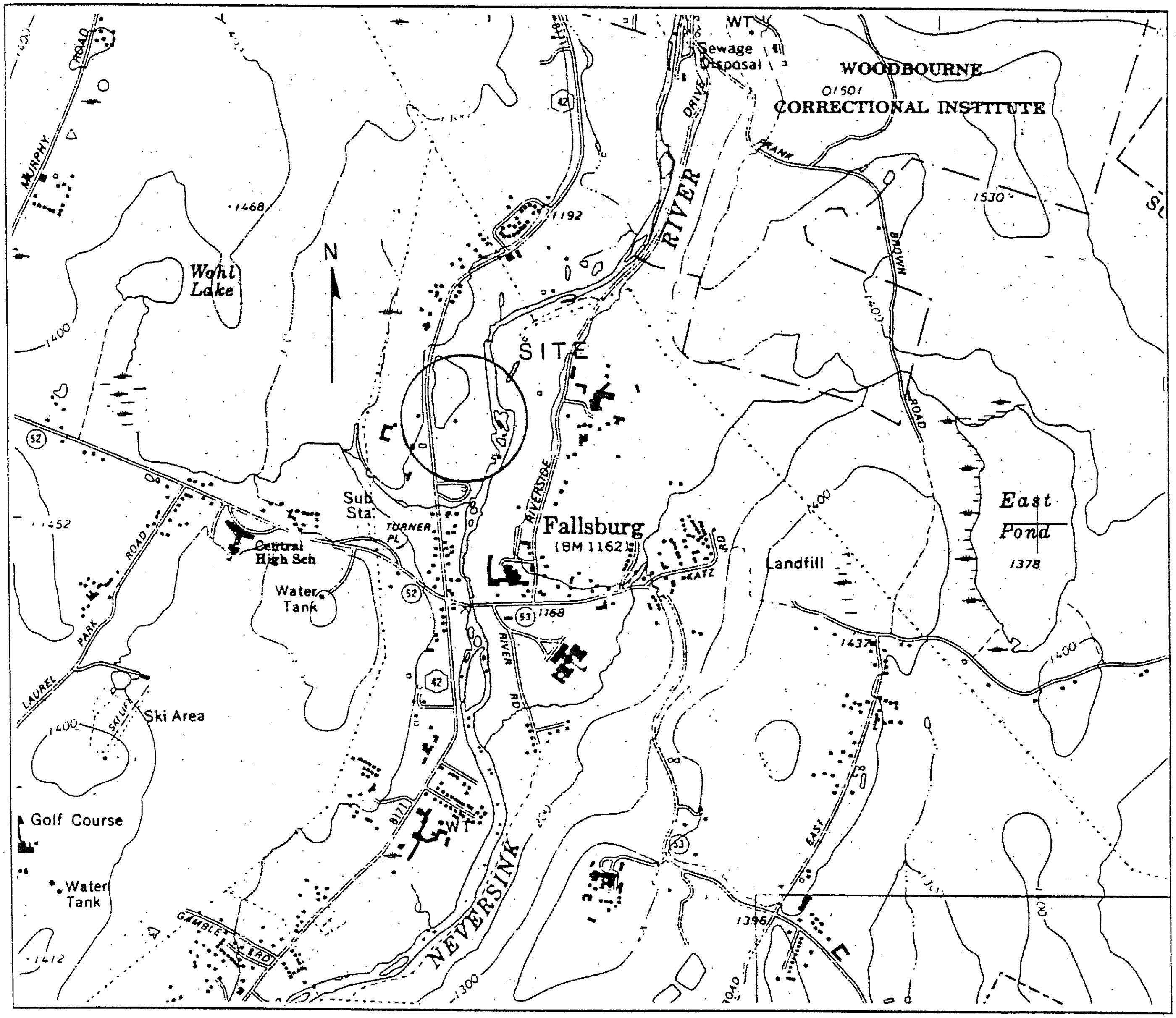
A

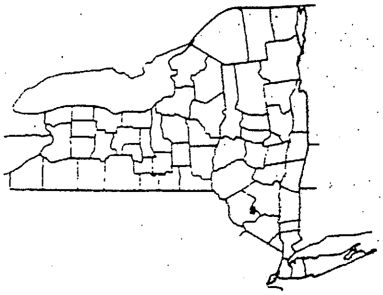


SCALE 1:24000

1 ½ 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 .5 0 1 KILOMETER



QUADRANGLE LOCATION

CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL

Adapted from Woodridge, NYSDOT Quadrangle
Compiled 1966/Photorevised 1974
Published 1976

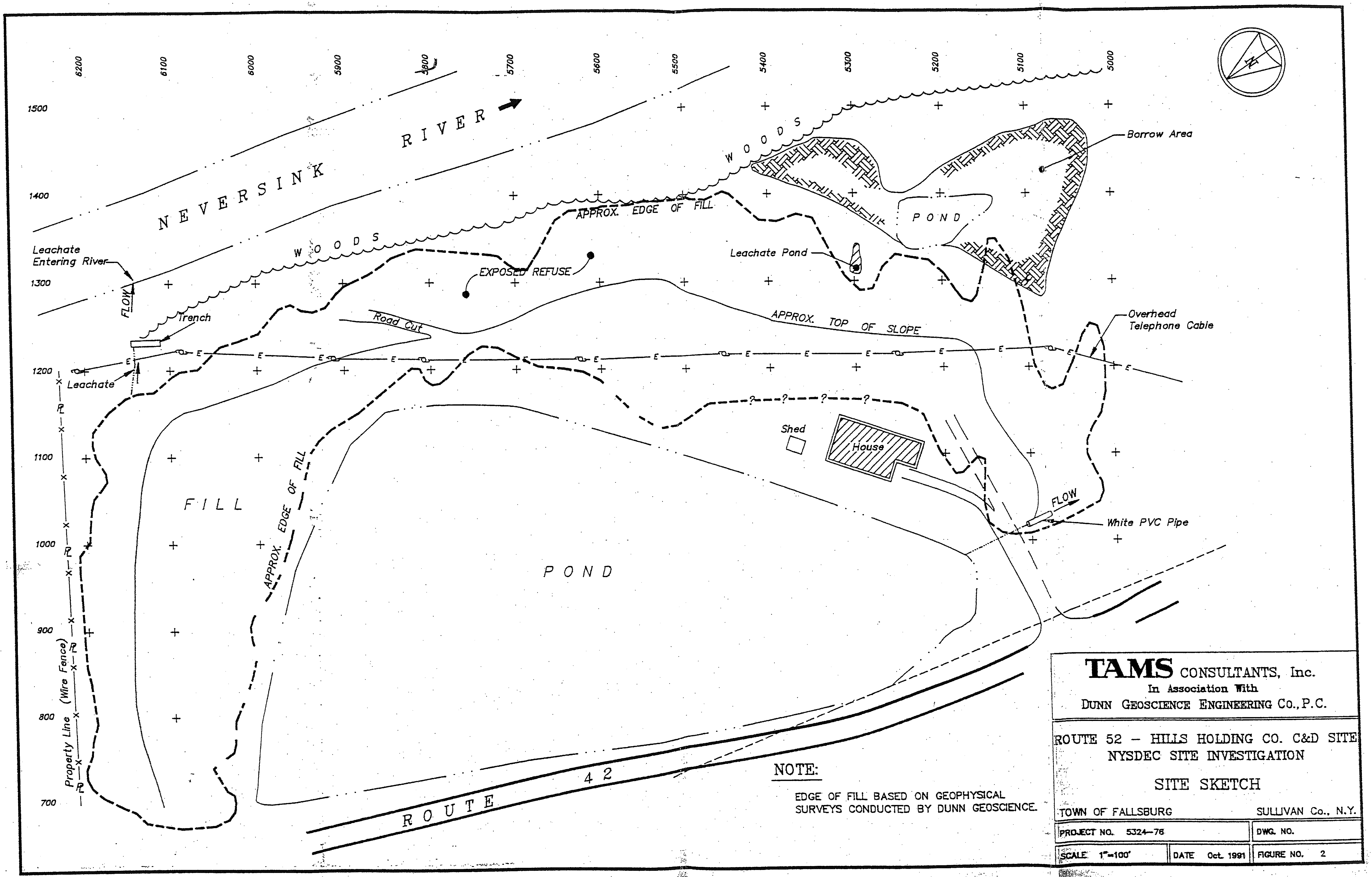
Site Location:
Latitude - 41°27'40" N
Longitude - 73°38'40" W

New York State Department of Environmental Conservation

ROUTE 52 C & D LANDFILL

Preliminary Site Assessment
Site Location Map
Figure 1

TAMS Consultants, Inc.



NOTE:

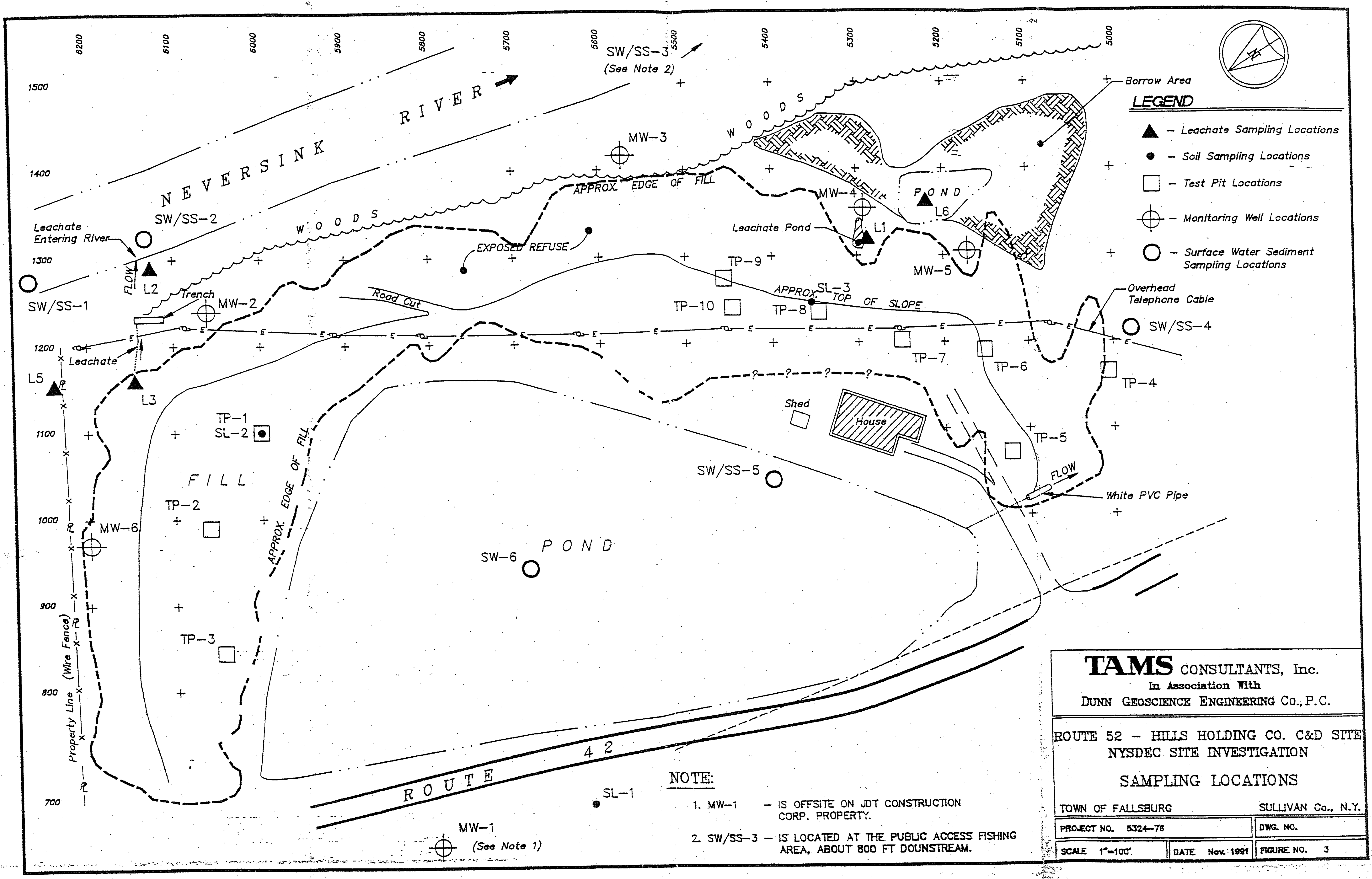
EDGE OF FILL BASED ON GEOPHYSICAL SURVEYS CONDUCTED BY DUNN GEOSCIENCE.

TAMS CONSULTANTS, Inc.
In Association With
DUNN GEOSCIENCE ENGINEERING Co., P.C.

ROUTE 52 – HILLS HOLDING CO. C&D SITE
NYSDEC SITE INVESTIGATION

SITE SKETCH

TOWN OF FALLSBURG	SULLIVAN Co., N.Y.
PROJECT NO. 5324-76	DWG. NO.
SCALE 1"=100' DATE Oct. 1991	FIGURE NO. 2



LEGEND

- ▲ – Leachate Sampling Locations
- ● – Soil Sampling Locations
- ☐ – Test Pit Locations
- ⊕ – Monitoring Well Locations
- ○ – Surface Water Sediment Sampling Locations

NOTE:

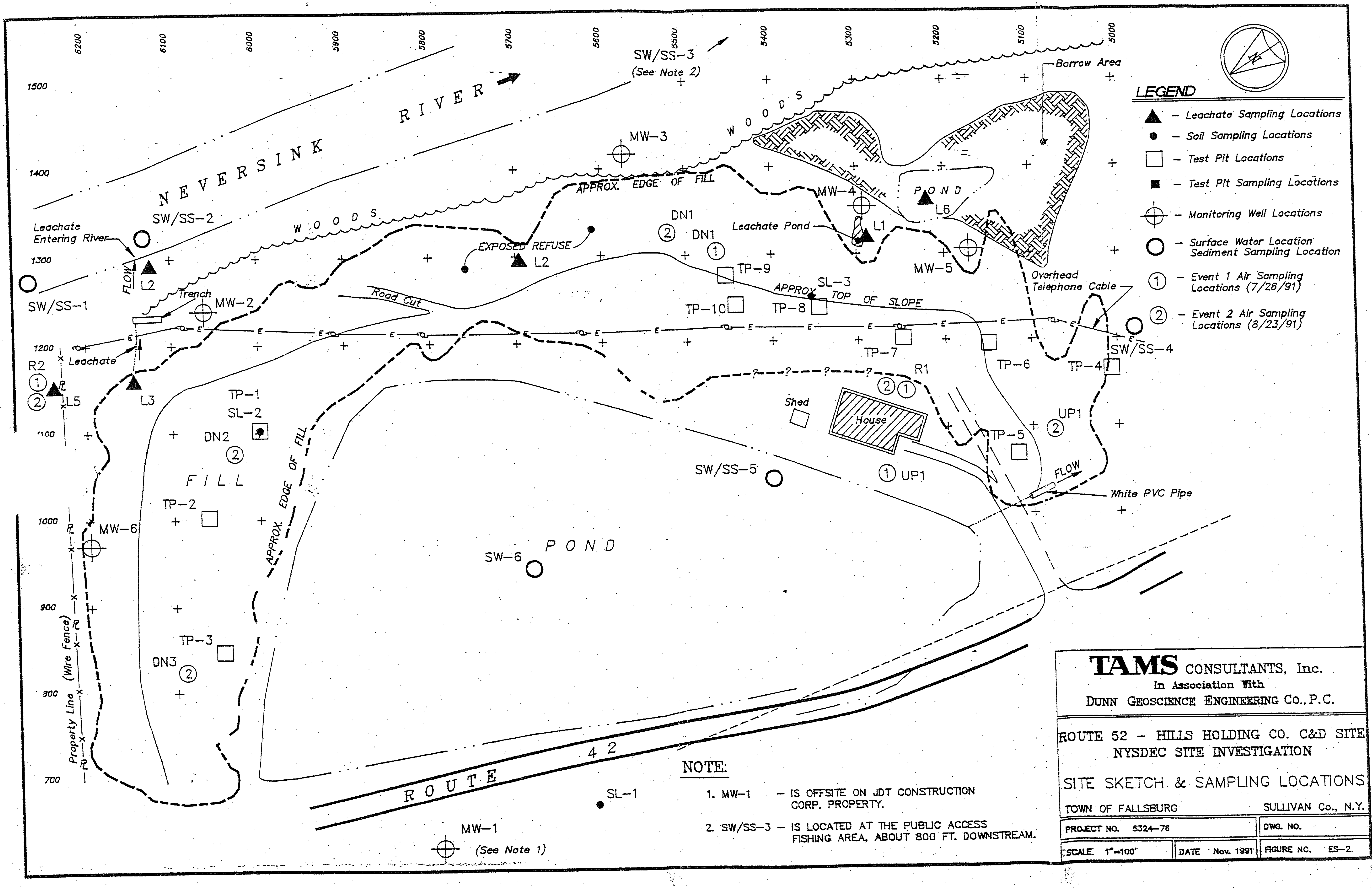
1. MW-1 – IS OFFSITE ON JDT CONSTRUCTION CORP. PROPERTY.
2. SW/SS-3 – IS LOCATED AT THE PUBLIC ACCESS FISHING AREA, ABOUT 800 FT DOUNSTREAM.

TAMS CONSULTANTS, Inc.
In Association With
DUNN GEOSCIENCE ENGINEERING Co., P.C.

ROUTE 52 – HILLS HOLDING CO. C&D SITE
NYSDEC SITE INVESTIGATION

SAMPLING LOCATIONS

TOWN OF FALLSBURG	SULLIVAN Co., N.Y.
PROJECT NO. 5324-76	DWG. NO.
SCALE 1"=100'	DATE Nov. 1991
FIGURE NO. 3	



NOTE:

1. MW-1 – IS OFFSITE ON JDT CONSTRUCTION CORP. PROPERTY.
2. SW/SS-3 – IS LOCATED AT THE PUBLIC ACCESS FISHING AREA, ABOUT 800 FT. DOWNSTREAM.

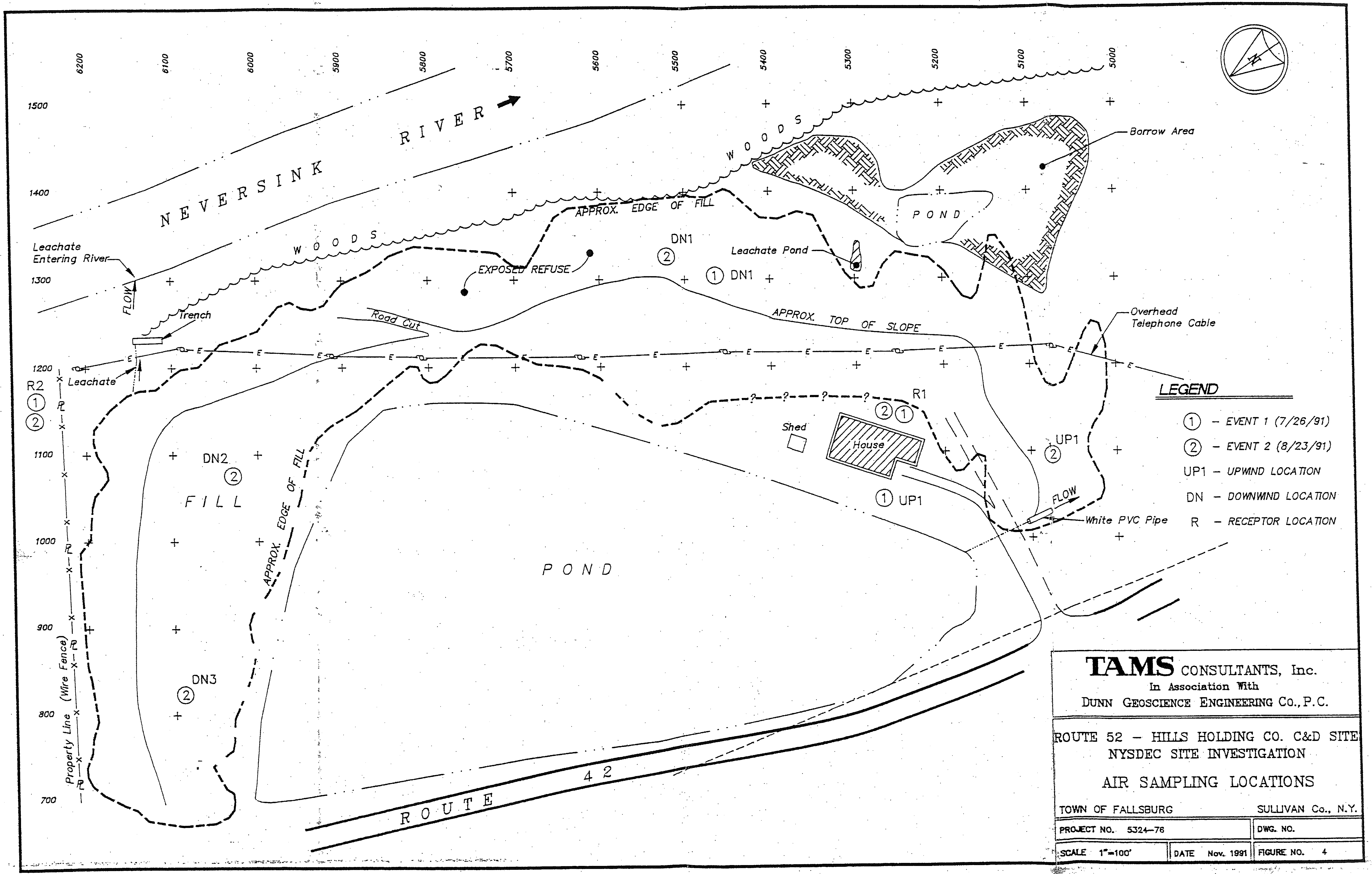
TAMS CONSULTANTS, Inc.
In Association With
DUNN GEOSCIENCE ENGINEERING Co., P.C.

ROUTE 52 – HILLS HOLDING CO. C&D SITE
NYSDEC SITE INVESTIGATION

SITE SKETCH & SAMPLING LOCATIONS

TOWN OF FALLSBURG SULLIVAN Co., N.Y.

PROJECT NO. 5324-78
DWG. NO.
SCALE 1"=100'
DATE Nov. 1991
FIGURE NO. ES-2



TAMS CONSULTANTS, Inc.
In Association With
DUNN GEOSCIENCE ENGINEERING Co., P.C.

ROUTE 52 – HILLS HOLDING CO. C&D SITE
NYSDEC SITE INVESTIGATION

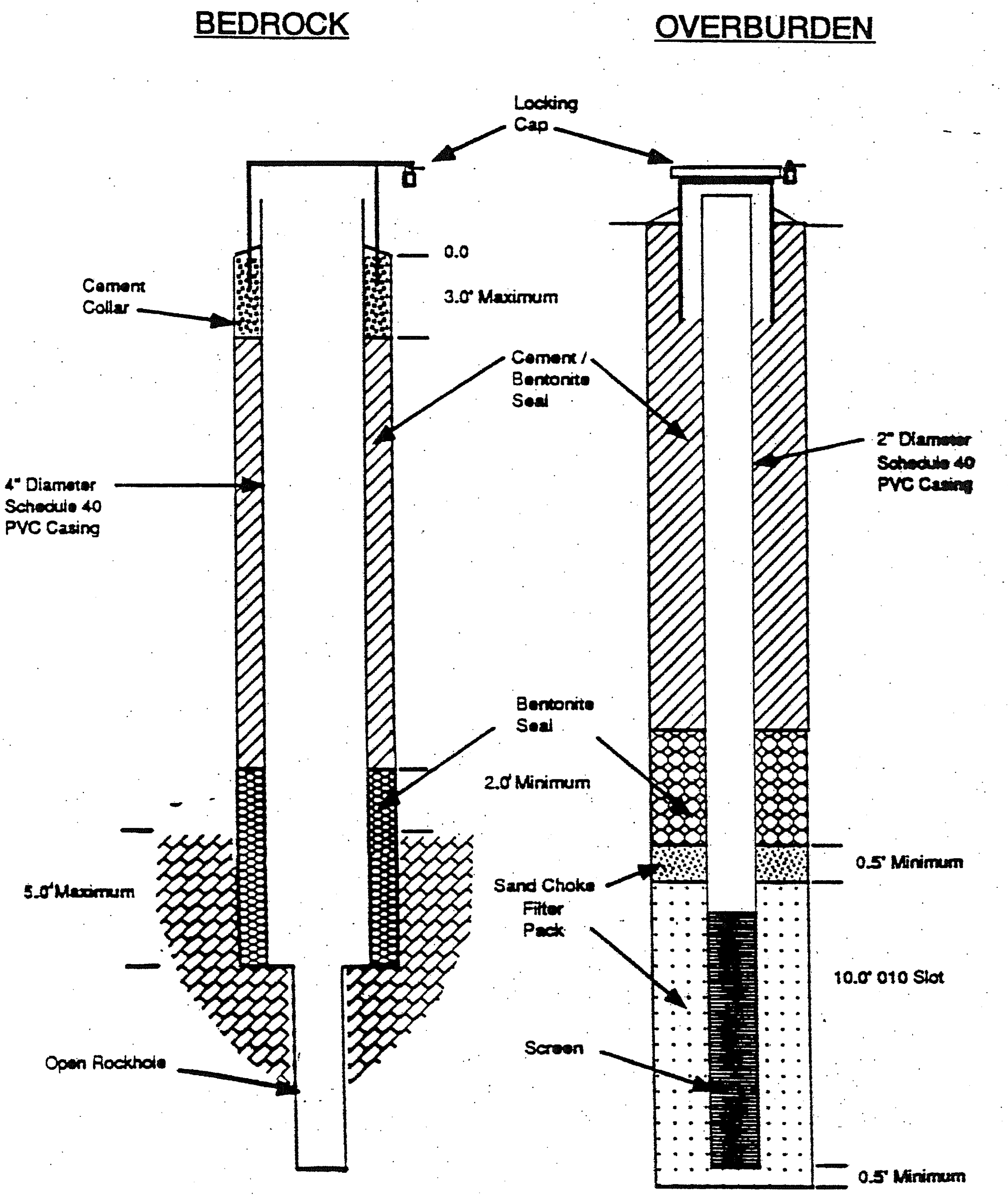
AIR SAMPLING LOCATIONS

TOWN OF FALLSBURG SULLIVAN Co., N.Y.

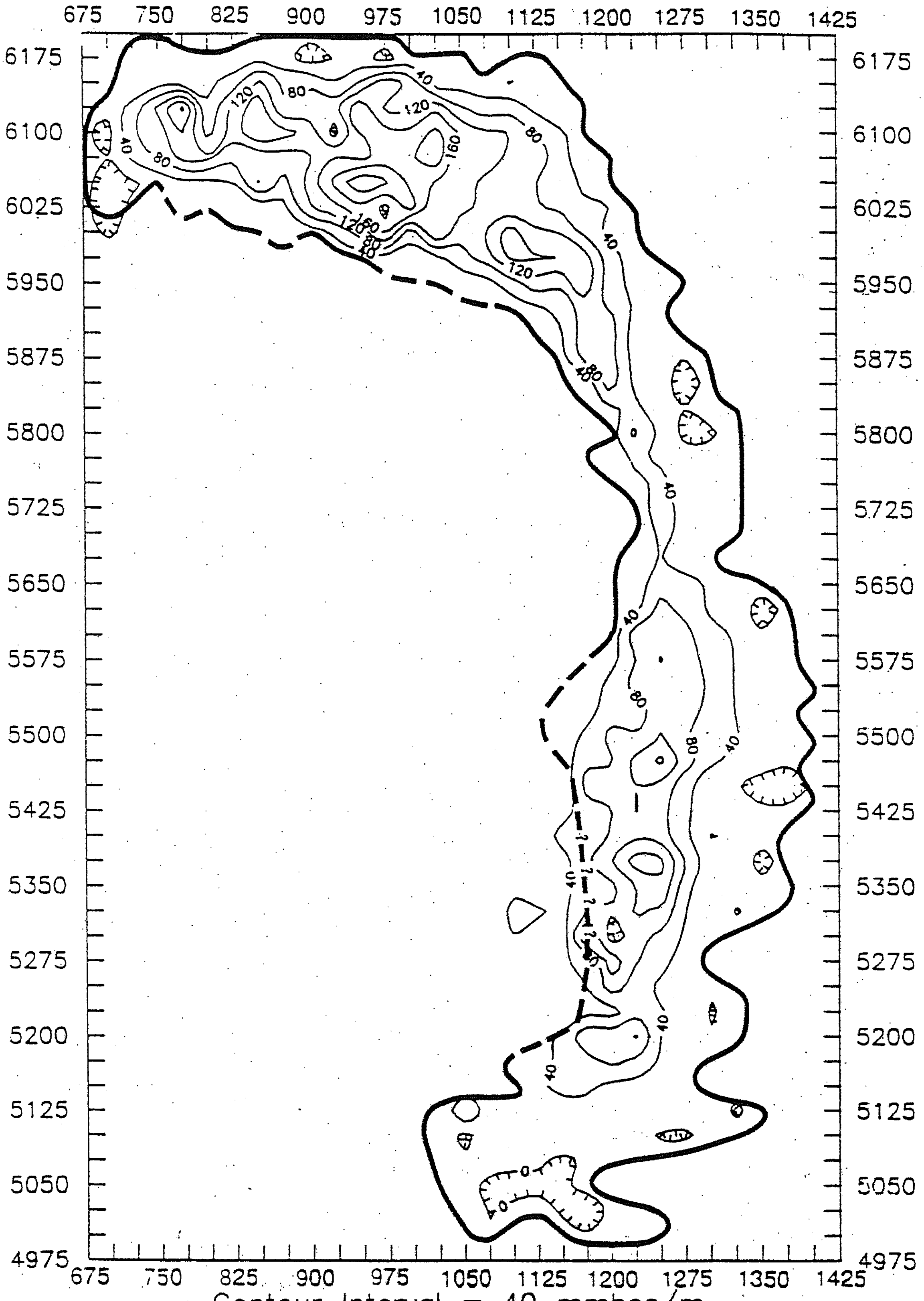
PROJECT NO. 5324-76	DWG. NO.

SCALE 1"=100'	DATE Nov. 1991	FIGURE NO. 4

FIGURE 5
MONITORING WELL CONSTRUCTION SCHEMATIC
NYSDEC C & D SITE
ROUTE 52

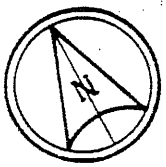


NOT TO SCALE



Contour Interval = 40 mmhos/m

SCALE 1 inch = 100 feet



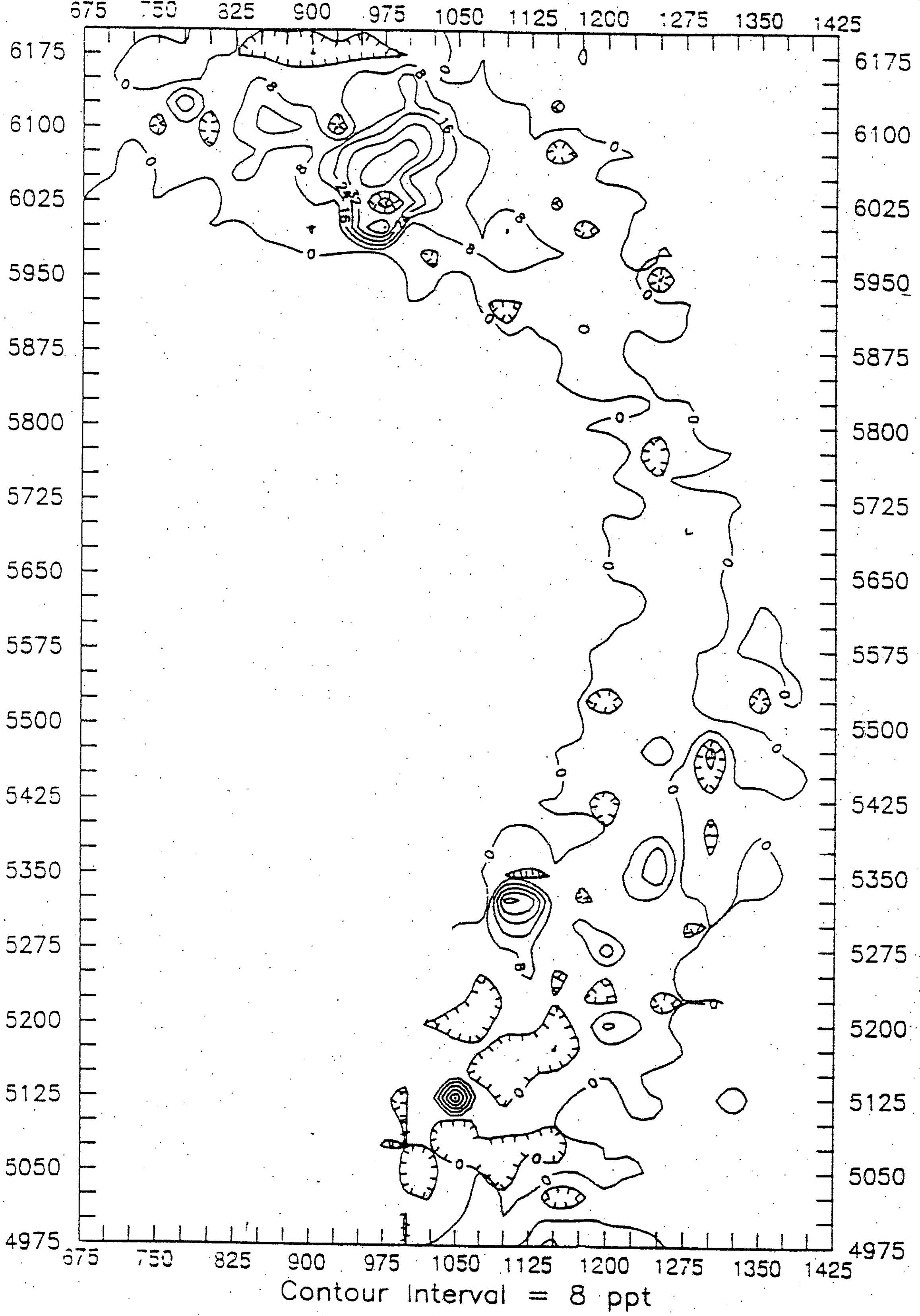
NOTE:
Adapted from Dunn Geoscience –
Terrain Conductivity Survey

New York State Department of
Environmental Conservation

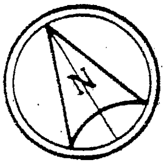
ROUTE 52 C & D LANDFILL

Preliminary Site Assessment
Terrain Conductivity Survey
Figure 6

TAMS Consultants, Inc.



Contour Interval = 8 ppt



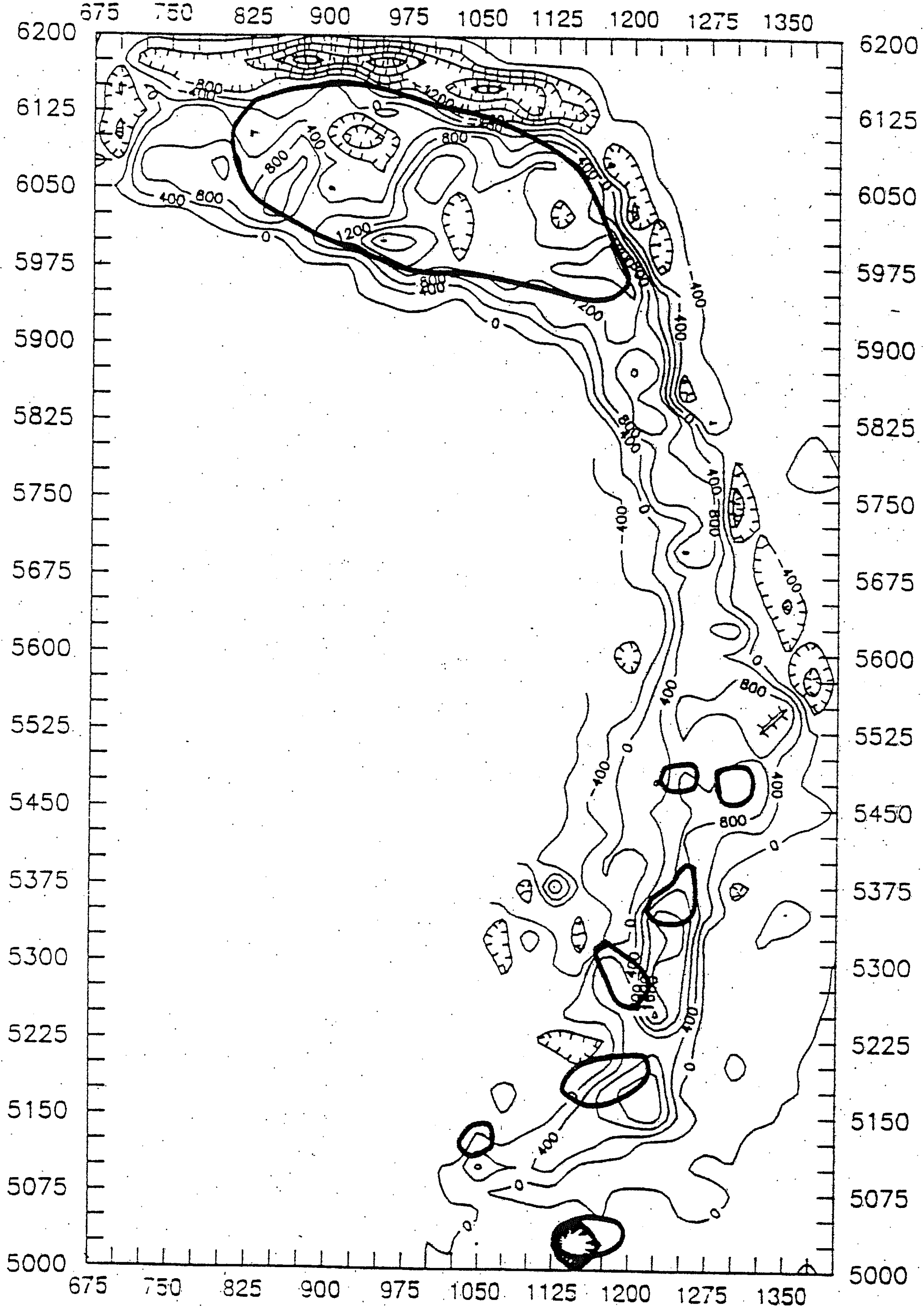
NOTE:
Adapted from Dunn Geoscience –
TC Survey – In-Phase Component

New York State Department of
Environmental Conservation

ROUTE 52 C & D LANDFILL

Preliminary Site Assessment
TC Survey – In-Phase Component
Figure 7

TAMS Consultants, Inc.



Contour Interval = 400 gammas

SCALE 1 inch = 100 feet

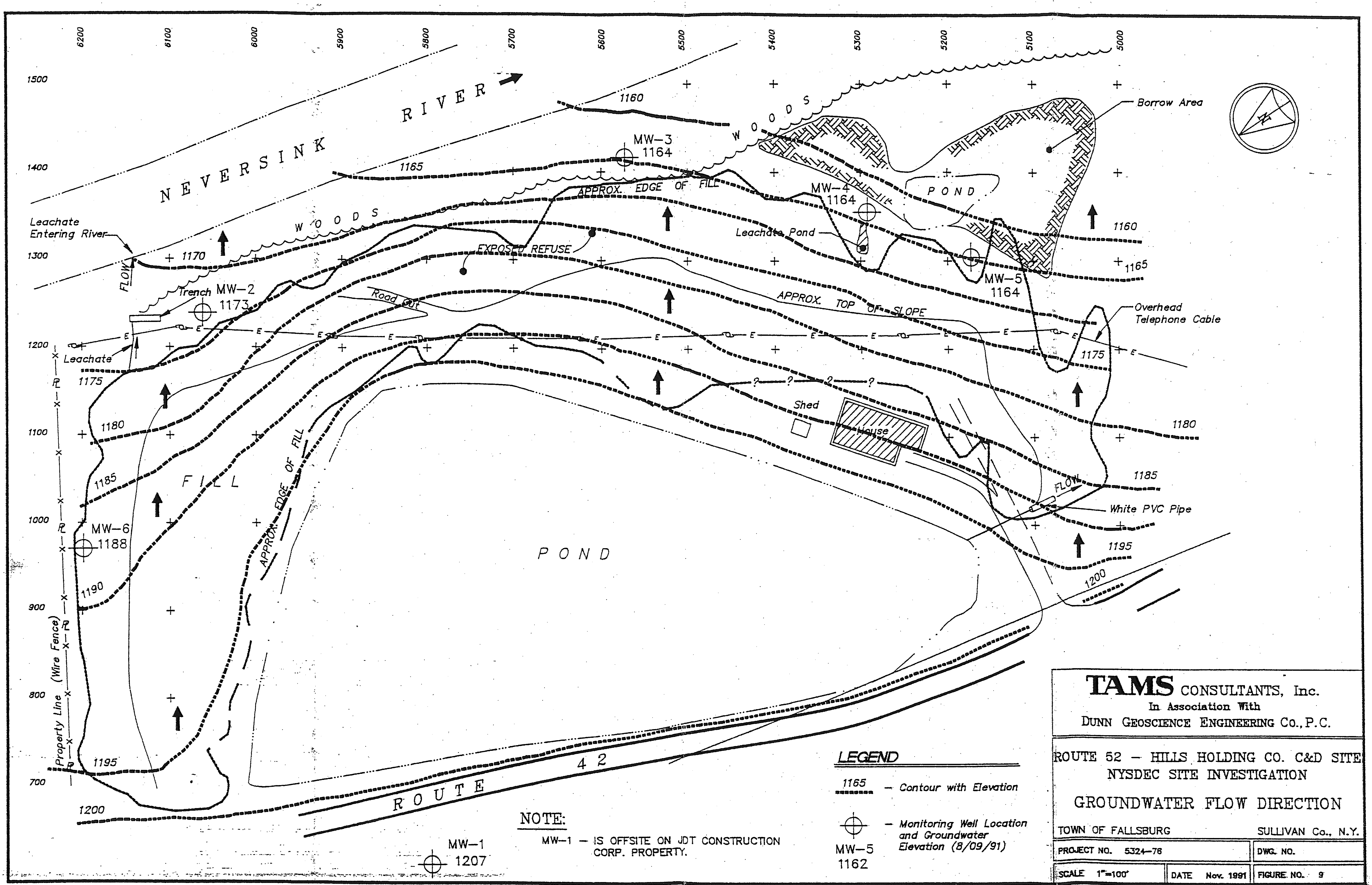
NOTE:
Adapted from Dunn Geoscience –
Magnetic Anomaly Map

New York State Department of
Environmental Conservation

ROUTE 52 C & D LANDFILL

Preliminary Site Assessment
Magnetic Anomaly Map
Figure 8

TAMS Consultants, Inc.



NOTE:

MW-1 – IS OFFSITE ON JDT CONSTRUCTION CORP. PROPERTY.

TAMS CONSULTANTS, Inc.
In Association With
DUNN GEOSCIENCE ENGINEERING Co., P.C.

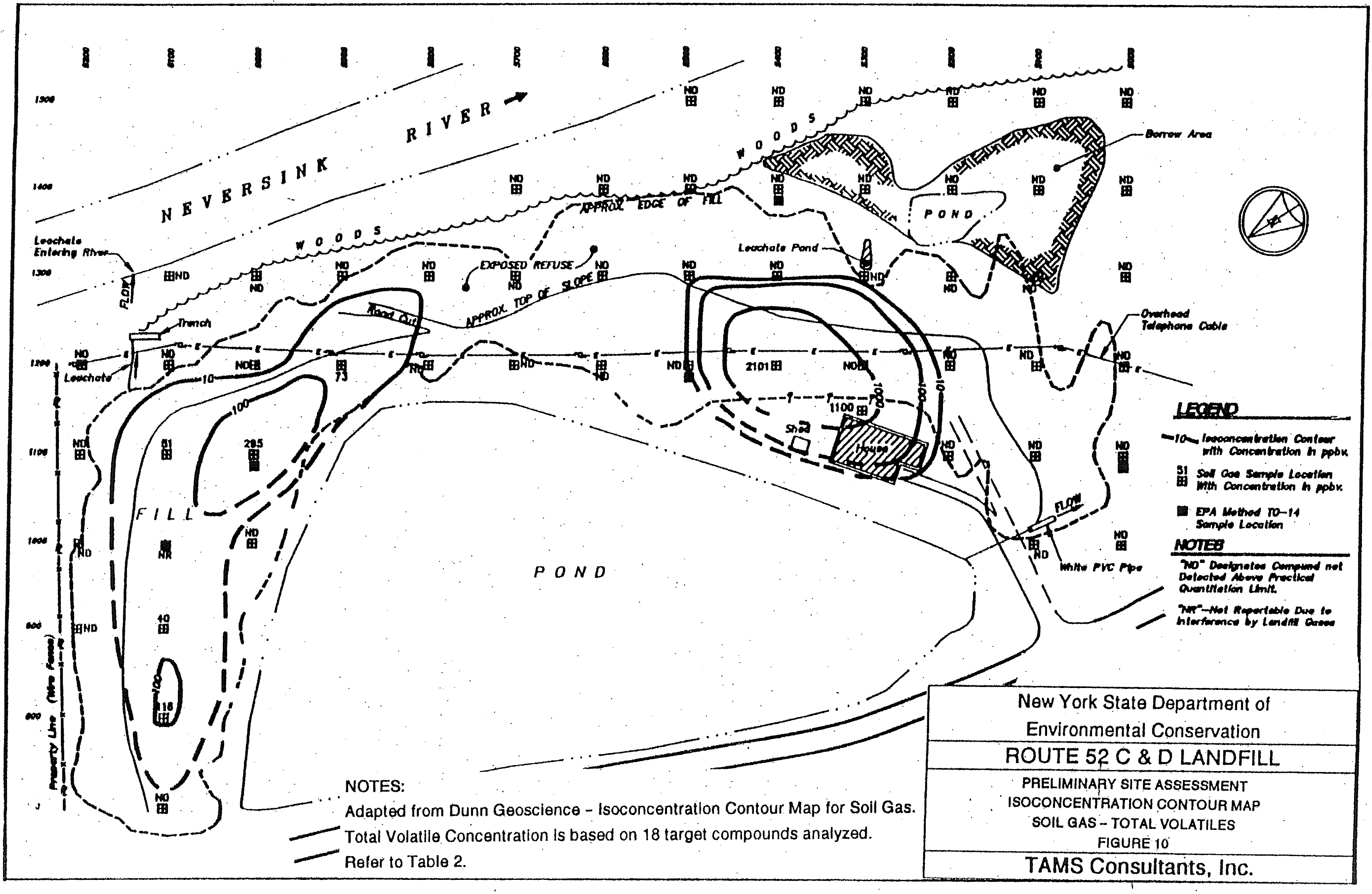
ROUTE 52 – HILLS HOLDING CO. C&D SITE
NYSDEC SITE INVESTIGATION

GROUNDWATER FLOW DIRECTION

TOWN OF FALLSBURG SULLIVAN Co., N.Y.

PROJECT NO. 5324-76 DWG. NO.

SCALE 1"=100' DATE Nov. 1991 FIGURE NO. 9



NOTES:

Adapted from Dunn Geoscience - Isoconcentration Contour Map for Soil Gas.

Total Volatile Concentration is based on 18 target compounds analyzed.

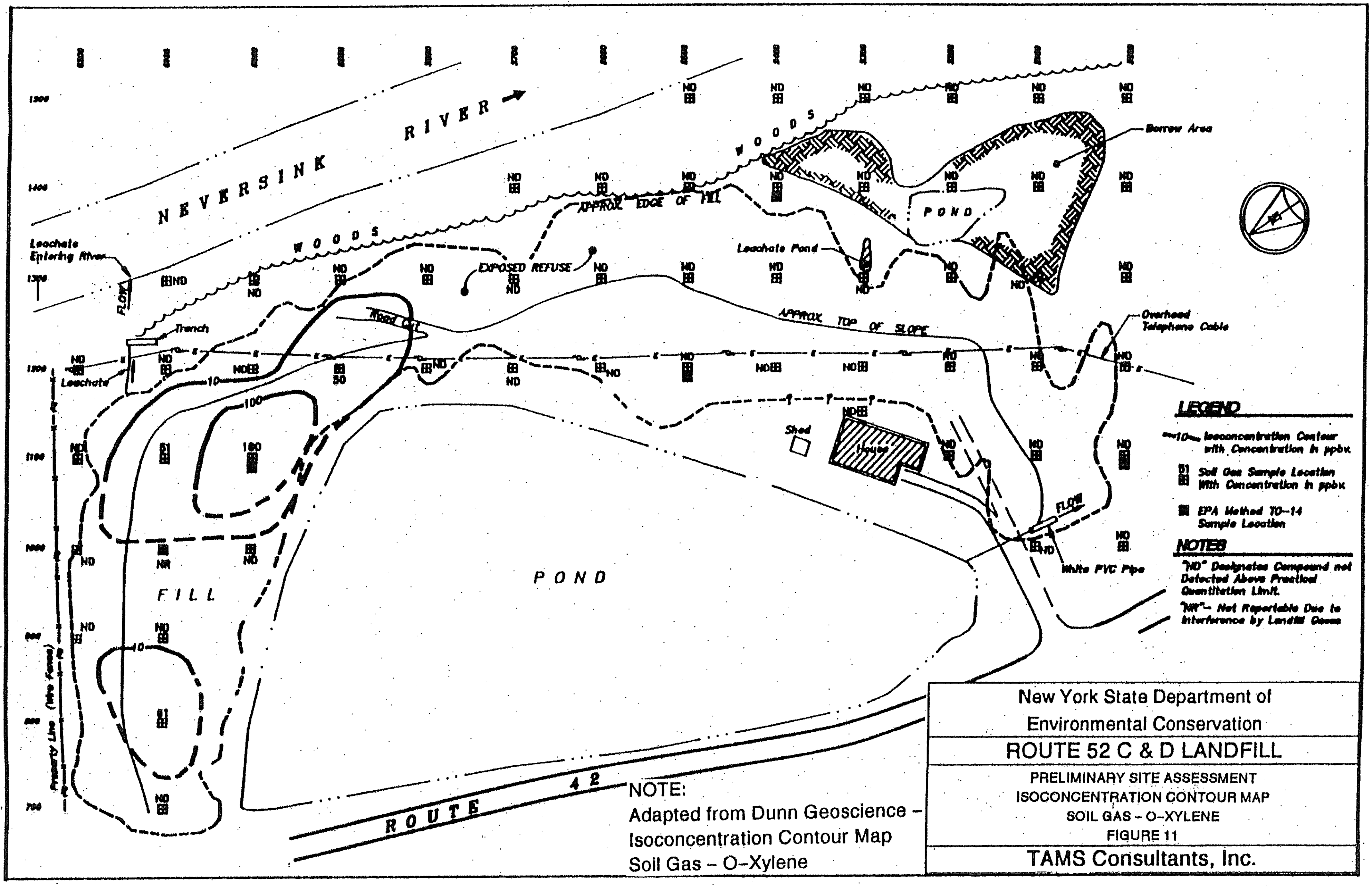
Refer to Table 2.

New York State Department of
Environmental Conservation

ROUTE 52 C & D LANDFILL

PRELIMINARY SITE ASSESSMENT
ISOCONCENTRATION CONTOUR MAP
SOIL GAS - TOTAL VOLATILES
FIGURE 10

TAMS Consultants, Inc.



NOTE:
Adapted from Dunn Geoscience –
Isoconcentration Contour Map
Soil Gas – O-Xylene

New York State Department of
Environmental Conservation

ROUTE 52 C & D LANDFILL

PRELIMINARY SITE ASSESSMENT
ISOCONCENTRATION CONTOUR MAP
SOIL GAS – O-XYLENE
FIGURE 11

TAMS Consultants, Inc.

B

TABLE 1
ROUTE 52 HILLS HOLDING CORPORATION SITE
LIST OF REFERENCES
(Page 1 of 5)

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2 New York State Department of Environmental Conservation, Region 3, Letter from Lawrence C. Gallagher to Thomas Gambino; Subject: Requirements of an Exempt C&D Fill, February 12, 1987.

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5 Town of Fallsburg, Letter from Steven Proyect, Code Enforcement Officer, to Thomas Gambino; Subject: Violation of Local Law No. 9, August 18, 1988.

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TABLE 1
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(Page 2 of 5)

11 New York State Department of Health, Office of Public Health, Monticello, New York, Letter from Gerald Lieber, NYSDOH, to Paul Keller, NYSDEC, Region 3, Subject: A Complaint about the Gambino C & D Landfill, October 6, 1988.

12 Town of Fallsburg, Memorandum from Steven Proyect, Code Enforcement Officer, to Darryl Kaplan, Town Supervisor, Town of Fallsburg, Subject: C & D Landfill Update, February 2, 1989.

13 TAMS Consultants, Inc., Site Interview Form, Florence Rollino and Dave Scheuing interviewing Gerald Lieber, NYSDOH, Monticello, New York, November 26, 1990.

14 New York State Department of Health, Letter from Kim Mann, Senior Sanitarian, to Donald Hallenbeck; Subject: Discussion of water samples collected December 15, 1988, January 23, 1989.

15 Town of Fallsburg, Municipal Wells located within one mile of C&D site, Will Illing. Department of Public Works, Town of Fallsburg; Received January 2, 1991.

16 Town of Fallsburg, Letter from David D. Meckes, Director of Public Works, to Gerald Lieber, NYSDOH; Subject: Town of Fallsburg Production Wells #4, #5, #6, #7; April 16, 1990.

17 New York State Department of Environmental Conservation, Region 3, letter from Richard A., Gardineer, PE, to Gerald Lieber, PE, New York State Department of Health; Subject: Town of Fallsburg Water Supply Wells, April 4, 1990.

18 Town of Fallsburg, Letter from David D. Meckes, Utilities Director, Town of Fallsburg, to Darryl Kaplan, Town Supervisor, Town of Fallsburg; Subject: Impact of Route 42 C&D Landfill on Hallenback and Municipal Wells, February 14, 1988.

19 Camp Dresser & McKee, Letter from Kevin McEvoy, to Richard Kerbel, Town Manager, Town of Fallsburg; Subject: Transmittal of Detailed Monitoring Plan for Route 42 C&D Landfill, September 13, 1988.

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TABLE 1
ROUTE 52 HILLS HOLDING CORPORATION SITE
LIST OF REFERENCES
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21 New York State Deptartment of Environmental Conservation, Letter from Parimal Mehta, NYSDEC, Region 3, to Robert Scheinman, Woodbourne Lawn & Garden, Subject: Soil Covering at C & D Landfill, February 3, 1989.

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(Page 4 of 5)

32	The Times Herald Record, "Dump Owners Face Charges on Seepage", Andrew Fraser, May 16, 1989.
33	New York State Department of Health, Wadsworth Center for Laboratories and Research, Analytical Data, Subject: Results of Hallenbeck Water Well Sampling, Samples collected December 15, 1988, received January 19, 1989.
34	New York State Department of Health, Office of Public Health, Letter from Manfred German, Assistant Sanitary Engineer to Donald Hallenbeck, Subject: Discussion of water samples collected December 15, 1988, January 10, 1989.
35	New York State Department of Health, Wadsworth Center for Laboratories and Research, Analytical Data, Subject: Results of landfill residence tap water collected January 31, 1989; February 8, 1989.
36	New York State Department of Health, Wadsworth Center for Laboratories and Research, Analytical Data; Subject: Results of Hallenbeck well water sample collected, January 31, 1989; March 8, 1989.
37	Town of Fallsburg, Letter from David Meckes, Utilities Director, to Darryl Kaplan, Town Supervisor, Subject: Test results from Neversink River, samples collected February 2, 1989; February 14, 1989.
38	EnviroTest Laboratories, Inc., Ronald A. Bayer, President, to Route 52 Hills Holding Corp., Analytical Data; Subject: Landfill residence tap water sample collectd February 2, 1989; February 21, 1989.
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40	New York State Department of Health, Letter from Kim Mann, Senior Sanitarian, NYSDOH, to Donald Hallenbeck, Subject: Results and discussion of well water samples collected April 27, 1989; September 6, 1989.
41	New York State Department of Health, Wadsworth Center for Laboratories and Research, Analytical Data; Subject: Results of leachate samples collected May 15, 1989; June 2, 1989.

TABLE 1
ROUTE 52 HILLS HOLDING CORPORATION SITE
LIST OF REFERENCES
(Page 5 of 5)

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44 New York State Department of Health, Wadsworth Center for Laboratories and Research, Analytical Data; Subject: Results of Hallenbeck well water collected October 25, 1989; Decmeber 21, 1989.

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TABLE 2
ROUTE 52 HILLS HOLDING CORPORATION SITE
SOIL GAS SURVEY VOLATILE ORGANICS PQLs AND DATA SUMMARY
(PAGE 1 OF 6)

SAMPLING LOCATIONS - GRID COORDINATES

PARAMETER	PQL	0700-6100	0800-6100	0900-6000	0900-6100	0900-6200	1000-5000	1000-5100	1000-6000	1000-6100*	1000-6200	1100-5000-
vinyl chloride	50	ND	ND	ND	ND	ND	ND	ND	ND	***	ND	ND
1,1-dichloroethene	20	ND	ND	ND	ND	ND	ND	ND	ND	***	ND	ND
trans-1,2-dichloroethene	20	ND	ND	ND	ND	ND	ND	ND	ND	***	ND	ND
cis-1,2-dichloroethene	20	ND	31	ND	20	ND	ND	ND	ND	***	ND	ND
trichloroethene	20	ND	ND	ND	ND	ND	ND	ND	ND	***	ND	ND
tetrachloroethene	50	ND	ND	ND	ND	ND	ND	ND	ND	***	ND	ND
chloromethane	2000	ND	ND	ND	ND	ND	ND	ND	ND	***	ND	ND
1,2-dichloroethane	1000	ND	ND	ND	ND	ND	ND	ND	ND	***	ND	ND
1,1,1-trichloroethane	1000	ND	ND	ND	ND	ND	ND	ND	ND	***	ND	ND
chlorobenzene	50	ND	ND	ND	ND	ND	ND	ND	ND	***	ND	ND
acetone	150	ND	ND	ND	ND	ND	ND	ND	ND	***	ND	ND
2-butanone (MEK)	100	ND	ND	ND	ND	ND	ND	ND	ND	***	ND	ND
4-methyl-2-pentanone (MIBK)	100	ND	ND	ND	ND	ND	ND	ND	ND	***	ND	ND
benzene	20	ND	24	ND	20	ND	ND	ND	ND	***	ND	ND
toluene	50	ND	ND	ND	ND	ND	ND	ND	ND	***	ND	ND
ethylbenzene	50	ND	ND	ND	ND	ND	ND	ND	ND	***	ND	ND
m- & p-xylene	50	ND	ND	ND	ND	ND	ND	ND	ND	***	ND	ND
o-xylene	50	ND	61	ND	ND	ND	ND	ND	ND	***	ND	ND
TOTAL VOLATILES		ND	116	ND	40	ND	ND	ND	ND	***	ND	ND

All results expressed in ppbv (parts per billion by volume).
PQL = Pratical Quantitation Limit.
ND = Not detected at or above the PQL.
* Sample results cannot be reported due to masking by light mass landfill gases (e.g. H2S)

TABLE 2
ROUTE 52 HILLS HOLDING CORPORATION SITE
SOIL GAS SURVEY VOLATILE ORGANICS PQLs AND DATA SUMMARY
(PAGE 2 OF 6)

		SAMPLING LOCATIONS - GRID COORDINATES										
PARAMETER	PQL	1100- 5100	1100- 5100 dup.	1100- 5200	1100- 6000	1100- 6100	1100- 6200	1150- 5300	1200- 5100	1200- 5200	1200- 5400	1200- 5500
vinyl chloride	50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-dichloroethene	20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-dichloroethene	20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-dichloroethene	20	ND	ND	ND	50	ND	ND	ND	ND	ND	ND	ND
trichloroethene	20	ND	ND	ND	ND	ND	ND	ND	ND	ND	26	ND
tetrachloroethene	50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
chloromethane	2000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-dichloroethane	1000	ND	ND	ND	ND	ND	ND	1100	ND	ND	2000	ND
1,1,1-trichloroethane	1000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
chlorobenzene	50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
acetone	150	ND	ND	ND	ND	ND	ND	ND	ND	150	ND	ND
2-butanone (MEK)	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4-methyl-2-pentanone (MIBK)	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
benzene	20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
toluene	50	ND	ND	ND	ND	ND	ND	ND	ND	ND	75	ND
ethylbenzene	50	ND	ND	ND	65	ND	ND	ND	ND	ND	ND	ND
m- & p-xylene	50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
o-xylene	50	ND	ND	ND	180	51	ND	ND	ND	ND	ND	ND
TOTAL VOLATILES		ND	ND	ND	295	51	ND	1100	ND	150	2101	ND

All results expressed in ppbv (parts per billion by volume).
PQL = Pratical Quantitation Limit.
ND = Not detected at or above the PQL.

TABLE 2
ROUTE 52 HILLS HOLDING CORPORATION SITE
SOIL GAS SURVEY VOLATILE ORGANICS PQLs AND DATA SUMMARY
(PAGE 3 OF 6)

SAMPLING LOCATIONS - GRID COORDINATES

PARAMETER	PQL	1200-5600	1200-5700	1200-5800	1200-5900	1200-6000	1200-6100	1200-6200	1300-5000	1300-5100	1300-5200	1300-5200 dup.
vinyl chloride	50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-dichloroethene	20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-dichloroethene	20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-dichloroethene	20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trichloroethene	20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
tetrachloroethene	50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
chloromethane	2000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-dichloroethane	1000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-trichloroethane	1000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
chlorobenzene	50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
acetone	150	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-butanone (MEK)	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4-methyl-2-pentanone (MIBK)	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
benzene	20	ND	ND	ND	23	ND	ND	ND	ND	ND	ND	ND
toluene	50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
ethylbenzene	50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
m- & p-xylene	50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
o-xylene	50	ND	ND	ND	50	ND	ND	ND	ND	ND	ND	ND
TOTAL VOLATILES		ND	ND	ND	73	ND	ND	ND	ND	ND	ND	ND

All results expressed in ppbv (parts per billion by volume).
PQL = Pratical Quantitation Limit.
ND = Not detected at or above the PQL.

TABLE 2
ROUTE 52 HILLS HOLDING CORPORATION SITE
SOIL GAS SURVEY VOLATILE ORGANICS PQLs AND DATA SUMMARY
(PAGE 4 OF 6)

SAMPLING LOCATIONS - GRID COORDINATES

PARAMETER	PQL	1300-5300	1300-5400	1300-5500	1300-5600	1300-5600 dup.	1300-5700	1300-5800	1300-5900	1300-6000	1400-5000	1400-5100
vinyl chloride	50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-dichloroethene	20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-dichloroethene	20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-dichloroethene	20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trichloroethene	20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
tetrachloroethene	50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
chloromethane	2000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-dichloroethane	1000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-trichloroethane	1000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
chlorobenzene	50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
acetone	150	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-butanone (MEK)	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4-methyl-2-pentanone (MIBK)	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
benzene	20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
toluene	50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
ethylbenzene	50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
m- & p-xylene	50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
o-xylene	50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TOTAL VOLATILES		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

All results expressed in ppbv (parts per billion by volume).
PQL = Pratical Quantitation Limit.
ND = Not detected at or above the PQL.

TABLE 2
ROUTE 52 HILLS HOLDING CORPORATION SITE
SOIL GAS SURVEY VOLATILE ORGANICS PQLs AND DATA SUMMARY
(PAGE 5 OF 6)

SAMPLING LOCATIONS - GRID COORDINATES

PARAMETER	PQL	1400-5200	1400-5300	1400-5400	1400-5500	1400-5600	1400-5700	1500-5000	1500-5100	1500-5200	1500-5300	1500-5400
vinyl chloride	50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-dichloroethene	20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-dichloroethene	20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-dichloroethene	20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trichloroethene	20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
tetrachloroethene	50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
chloromethane	2000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-dichloroethane	1000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-trichloroethane	1000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
chlorobenzene	50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
acetone	150	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-butanone (MEK)	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4-methyl-2-pentanone (MIBK)	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
benzene	20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
toluene	50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
ethylbenzene	50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
m- & p-xylene	50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
o-xylene	50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TOTAL VOLATILES		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

All results expressed in ppbv (parts per billion by volume).
PQL = Pratical Quantitation Limit.
ND = Not detected at or above the PQL.

TABLE 2
ROUTE 52 HILLS HOLDING CORPORATION SITE
SOIL GAS SURVEY VOLATILE ORGANICS PQLs AND DATA SUMMARY
(PAGE 6 OF 6)

SAMPLING LOCATIONS - GRID COORDINATES

PARAMETER	PQL	1500-5500										
vinyl chloride	50	ND										
1,1-dichloroethene	20	ND										
trans-1,2-dichloroethene	20	ND										
cis-1,2-dichloroethene	20	ND										
trichloroethene	20	ND										
tetrachloroethene	50	ND										
chloromethane	2000	ND										
1,2-dichloroethane	1000	ND										
1,1,1-trichloroethane	1000	ND										
chlorobenzene	50	ND										
acetone	150	ND										
2-butanone (MEK)	100	ND										
4-methyl-2-pentanone (MIBK)	100	ND										
benzene	20	ND										
toluene	50	50										
ethylbenzene	50	ND										
m- & p-xylene	50	ND										
o-xylene	50	ND										
TOTAL VOLATILES		50										

All results expressed in ppbv (parts per billion by volume).
PQL = Pratical Quantitation Limit.
ND = Not detected at or above the PQL.

TABLE 3
ROUTE 52 HILLS HOLDING CORPARATION SITE
WEATHER CONDITIONS DURING AIR SAMPLING EVENTS

EVENT 1 – JULY 26, 1991

TIME	BAROMETRIC PRESSURE (CM Hg)	AIR TEMP (F)	RELATIVE % HUMIDITY	WIND SPEED (MPH)	WIND DIRECT. FROM	COMMENTS
0015	72.95	71	90	<1	W	
0254	72.95	70	91	<1	W	
0432	72.95	66	96	<1	W	FOGGY
0606	72.98	65	100	CALM	---	
0919	73.03	71	91	5	E	

EVENT 2 – AUGUST 23, 1991

TIME	BAROMETRIC PRESSURE (IN Hg)	AIR TEMP (F)	RELATIVE % HUMIDITY	WIND SPEED (MPH)	WIND DIRECT. FROM	COMMENTS
0030	28.74	62	84	CALM	W	

TABLE 4
ROUTE 52 HILLS HOLDING CORPORATION SITE
REAL TIME HYDROGEN SULFIDE DATA (AMBIENT AIR)

EVENT 1 – JULY 26, 1991

UPWIND		RECEPTORS				DOWNWIND	
R52UP1 TIME	READING (ppb)	R52R1 TIME	READING (ppb)	R52R2 TIME	READING (ppb)	R52DN1 TIME	READING (ppb)
0206	1	0204	1	0158	2	0211	2
0241	0	0240	0	0233	2	0245	0
0330	0	0330	0	0320	0	0331	0
0455	9	0453	0	0403	0	0417	0
0538	0	0530	2	0502	0	0445	0
0626	0	0624	0	0550	0	0542	0
0830	0	0829	0	0636	0	0620	0
				0703	0	0712	0
				0836	0	0825	0

EVENT 2 – AUGUST 23, 1991

UPWIND		RECEPTORS				DOWNWIND				ONSITE	
R52UP1 TIME	READING (ppb)	R52R1 TIME	READING (ppb)	R52R2 TIME	READING (ppb)	R52DN1 TIME	READING (ppb)	R52DN2 TIME	READING (ppb)	R52ON1 TIME	READING (ppb)
0206	2	0203	4	0228	2	0159	1	0218	3	0213	3
0237	3	0238	3	0255	3	0240	7	0244	2	0243	0
0303	0	0305	0	0327	0	0306	0	0311	0	0310	0
0331	0	0333	0	0357	0	0334	0	0338	0	0337	0
0401	0	0406	0	0434	0	0410	0	0419	0	0418	0
0506	0	0508	1	0502	0	0510	0	0514	0	0513	0
0534	0	0535	0	0529	0	0537	0	0541	0	0540	0
0603	0	0605	0	0600	2	0607	0	0610	0	0609	0
0637	0	0639	0	0634	1	0641	0	0645	0	0644	0
0711	0	0716	0	0705	0	0719	0			0725	0
0806	0	0808	0	0802	0	0809	0				

Note: R52UP1 represents site name Route 52 (R52) and sample location (UP1). For sample locations refer to Figure 4.

TABLE 5
ROUTE 52 HILLS HOLDING CORPORATION SITE
MONITORING WELL CONSTRUCTION SUMMARY

	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6
Date of Installation	08/05-06/91	07/29-30/91; 08/05/91	07/30/91	07/26/91	07/26/91	07/29/91; 08/01-02/9
Drilling Method:						
Overburden	6″ ID casing	6″ ID casing	4-1/4″ HSA	4-1/4″ HSA	4-1/4″ HSA	6″ ID casing
Bedrock	Nx core	Nx core	N/A	N/A	N/A	Nx core
Diameter of Borehole:						
Overburden	6.5″	6.5″	8.0″	8.0″	8.0″	8.0″
Bedrock	3.0″	3.0″	N/A	N/A	N/A	3.0″
Depth to Rock	1.5'	5.0'	N/A	N/A	N/A	12.0'
Total Depth	17.1'	18.0'	18.0'	20.0'	20.0'	17.9'
Well Diameter/Material	3″ open-hole	3″ open-hole	2″ PVC	2″ PVC	2″ PVC	2″ PVC
Ground Elevation	1212.80	1180.80	1174.70	1167.70	1171.78	1197.80
Top of PVC (TOC) Elevation	1215.08	1182.63	1176.58	1169.52	1173.77	1199.59
Depth to Water (TOC, 8/9/91)	10.95	11.70	12.17	5.17	9.39	11.58
Water Elevation	1204.13	1170.93	1164.41	1164.35	1164.38	1188.01
Protective Casing	6″ steel	6″ steel	4″ steel	4″ steel	4″ steel	4″ steel
Intervals of (in feet from grade):						
Schedule 40 riser pipe	N/A	N/A	1.9 - 8.0	+2 - 9	+2 - 9	+2 - 7.9
0.01″ slotted screen	N/A	N/A	8.0 - 18.0	9 - 19	9 - 19	7.9 - 17.9
No. 0 (Morie) sand pack	N/A	N/A	6.0 - 18.0	7.5 - 20	7.5 - 20	5.6 - 17.9
No. 00 (Morie) sand choke	N/A	N/A	none	6.5 - 7.5	6.5 - 7.5	none
Open hole	8.2 - 17.1	10.0 - 18.0	N/A	N/A	N/A	N/A
4″ PVC casing	+2 - 7.4	+2.2 - 10.0	N/A	N/A	N/A	N/A
Bentonite seal	6.2 - 8.2	7.0 - 10.0	4.0 - 6.0	4.5 - 6.5	4.4 - 6.5	3.2 - 5.6
Cement grout	0 - 6.2	0.0 - 7.0	N/A	0 - 4.5	0 - 4.4	0 - 3.2
Bentonite/cement grout	N/A	N/A	N/A	none	none	none
Cement collar	yes	yes	yes	yes	yes	yes

TABLE 6
ROUTE 52 HILLS HOLDING CORPORATION SITE
MONITORING WELL DEVELOPMENT SUMMARY

	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6
Date Completed	08/06/91	08/05/91	07/30/91	07/26/91	07/26/91	08/02/91
Date Developed	08/08/91	08/08/91	08/02/91	08/01/91	08/01/91	08/08/91
Total Depth (1)	17.1	18.1	18.0	19.0	19.0	17.9
Depth to Water (2)	8.54	9.78	12.15	5.07	9.28	11.50
Depth to Rock (1)	1.5	5.0	N/A	N/A	N/A	12.0
Well Diameter	3″	3″	2″	2″	2″	2″
Well Volume (gals.)	3.9	3.7	1.2	2.5	1.8	1.3
Total Gallons Purged	110	32	38	38	34	24
Total Volumes Purged	28.4	8.5	31.0	15.1	18.4	18.3
Total Development Time (mi	87	188	183	245	267	79
Final:						
pH	5.3	6.3	6.8	6.4	6.6	5.9
Temperature (Celsius)	18	25	23	32	35	20
Conductivity (umhos/cm	53	750	1000	600	1150	350
Turbidity (NTU)	>200	21	41	46	25	3

Notes: 1. Depth provided in feet below grade.

2. Depth referenced to top of PVC casing.

TABLE 7A

TARGET COMPOUND LIST (TCL) AND CONTRACT REQUIRED QUANTITATION LIMITS (CRQL)* VOLATILE ORGANICS

			QUANTITATION LIMITS**	
	VOLATILES	CAS NUMBER	LOW WATER ug/L	LOW SOIL/ SEDIMENT(a) ug/Kg
1.	Chloromethane	74-87-3	10	10
2.	Bromomethane	74-83-9	10	10
3.	Vinyl Chloride	75-01-4	10	10
4.	Chloroethane	75-00-3	10	10
5.	Methylene Chloride	75-09-2	5	5
6.	Acetone	67-64-1	10	10
7.	Carbon Disulfide	75-15-0	5	5
8.	1,1-Dichloroethene	75-35-4	5	5
9.	1,1-Dichloroethane	75-35-3	5	5
10.	1,2-Dichloroethene (Total)	540-59-0	5	5
11.	Chloroform	67-66-3	5	5
12.	1,2-Dichloroethane	107-06-2	5	5
13.	2-Butanone	78-93-3	10	10
14.	1,1,1-Trichloroethane	71-55-6	5	5
15.	Carbon Tetrachloride	56-23-5	5	5
16.	Vinyl Acetate	108-05-4	10	10
17.	Bromodichloromethane	75-27-4	5	5
18.	1,1,2,2-Tetrachloroethane	79-34-5	5	5
19.	1,2-Dichloropropane	78-87-5	5	5
20.	cis-1,3-Dichloropropene	10061-01-5	5	5
21.	Trichloroethene	79-01-6	5	5
22.	Dibromochloromethane	124-48-1	5	5
23.	1,1,2-Trichloroethane	79-00-5	5	5
24.	Benzene	71-43-2	5	5
25.	trans-1,3-Dichloropropene	10061-02-6	5	5
26.	Bromoform	75-25-2	5	5
27.	2-Hexanone	591-78-6	10	10
28.	4-Methyl-2-pentanone	108-10-1	10	10
29.	Tetrachloroethene	127-18-4	5	5
30.	Toluene	108-88-3	5	5
31.	Chlorobenzene	108-90-7	5	5
32.	Ethyl Benzene	100-41-4	5	5
33.	Styrene	100-42-5	5	5
34.	Xylenes (Total)	133-02-7	5	5

(a) Medium concentration soil/sediment Contract Required Quantitation Limits (CRQLs) for Volatile TCL Compounds are 125 times the individual low concentration soil/sediment CRQL.

* Specific quantitation limits are highly matrix dependent. The quantitation limits listed herein are provided for guidance and may not always be achievable.

** Quantitation limits listed for soil/sediment are based on wet weight. The quantitation limits calculated by the laboratory for soil/sediment, calculated on dry weight basis as required by the contract, will be higher.

TABLE 7B

TARGET COMPOUND LIST (TCL) AND CONTRACT REQUIRED QUANTITATION LIMITS (CRQL)* SEMIVOLATILE ORGANICS (Page 1 of 2)

			QUANTITATION LIMITS**	
	SEMIVOLATILES	CAS NUMBER	LOW WATER ug/L	LOW SOIL/ SEDIMENT(b) ug/Kg
35.	Phenol	108-95-2	10	330
36.	bis(2-Chloroethyl) ether	111-44-4	10	330
37.	2-Chlorophenol	95-57-8	10	330
38.	1,3-Dichlorobenzene	95-57-8	10	330
39.	1,4-Dichlorobenzene	106-46-7	10	330
40.	Benzyl Alcohol	100-51-6	10	330
41.	1,2-Dichlorobenzene	95-50-1	10	330
42.	2-Methylphenol	95-48-7	10	330
43.	bis(2-Chloroisopropyl)ether	39638-32-9	10	330
44.	4-Methylphenol	106-44-5	10	330
45.	N-Nitroso-Di-n-propylamine	621-64-7	10	330
46.	Hexachloroethane	67-72-1	10	330
47.	Nitrobenzene	98-95-3	10	330
48.	Isophorone	78-59-1	10	330
49.	2-Nitrophenol	88-75-5	10	330
50.	2,4-Dimethylphenol	105-67-9	10	330
51.	Benzoic Acid	65-85-0	50	1600
52.	bis(2-Chloroethoxy)methane	111-91-1	10	330
53.	2,4-Dichlorophenol	120-83-2	10	330
54.	1,2,4-Trichlorobenzenee	120-82-1	10	330
55.	Naphthalene	91-20-3	10	330
56.	4-Chloroaniline	106-47-8	10	330
57.	Hexachlorobutadienene	87-68-3	10	330
58.	4-Chloro-3-methylphenol (para-chloro-meta-cresol)	59-50-7	10	330
59.	2-Methylnaphthalene	91-57-6	10	330
60.	Hexachlorocyclopentadiene	77-47-4	10	330
61.	2,4,6-Trichlorophenol	88-06-2	10	330
62.	2,4,5-Trichlorophenol	95-95-4	50	1600
63.	2-Chloronaphthalene	91-58-7	10	330
64.	2-Nitroaniline	88-74-4	50	1600
65.	Dimethyl Phthalate	131-11-3	10	330
66.	Acenaphthylene	208-96-8	10	330
67.	2,6-Dinitrotoluene	606-20-2	10	330
68.	3-Nitroaniline	99-09-2	50	1600
69.	Acenaphthene	83-32-9	10	330
70.	2,4-Dinitrophenol	51-28-5	50	1600
71.	4-Nitrophenol	100-02-7	50	1600
72.	Dibenzofuran	132-64-9	10	330
73.	2,4-Dinitrotoluene	121-14-2	10	330
74.	Diethylphthalate	84-66-2	10	330

TABLE 7B

TARGET COMPOUND LIST (TCL) AND
CONTRACT REQUIRED QUANTITATION LIMITS (CRQL)*
SEMIVOLATILE ORGANICS (Page 2 of 2)

			QUANTITATION LIMITS	
	SEMI-VOLATILES	CAS NUMBER	LOW WATER ug/L	LOW SOIL/ SEDIMENT(b) ug/Kg
75.	4-Chlorophenyl Phenyl ether	7005-72-3	10	330
76.	Fluorene	86-73-7	10	330
77.	4-Nitroaniline	100-01-6	50	1600
78.	4,6-Dinitro-2-methylphenol	534-52-1	50	1600
79.	N-nitrosodiphenylamine	86-30-6	10	330
80.	4-Bromophenyl Phenyl ether	101-55-3	10	330
81.	Hexachlorobenzenene	118-74-1	10	330
82.	Pentachlorophenol	87-86-5	50	1600
83.	Phenanthrene	85-01-8	10	330
84.	Anthracene	120-12-7	10	330
85.	Di-n-butylphthalate	84-74-2	10	330
86.	Fluoranthene	206-44-0	10	330
87.	Pyrene	129-00-0	10	330
88.	Butyl Benzyl Phthalate	85-68-7	10	330
89.	3,3'-Dichlorobenzidine	91-94-1	20	660
90.	Benzo(a)anthracene	56-55-3	10	330
91.	Chrysene	218-01-9	10	330
92.	bis(2-ethylhexy)phthalate	117-81-7	10	330
93.	Di-n-octyl Phthalate	117-84-0	10	330
94.	Benzo(b)fluoranthene	205-99-2	10	330
95.	Benzo(k)fluoranthene	207-08-9	10	330
96.	Benzo(a)pyrene	50-32-8	10	330
97.	Indeno(1,2,3-cd)pyrene	193-39-5	10	330
98.	Dibenz(a,h)anthracene	53-70-3	10	330
99.	Benzo(g,h,i)perylene	191-24-2	10	330

(b) Medium concentration soil/sediment Contract Required Quantitation Limits (CRQLs) for semivolatile TCL Compounds are 60 times the individual low concentration soil/sediment CRQL.

* Specific quantitation limits are highly matrix dependent. The quantitation limits listed herein are provided for guidance and may not always be achievable.

** Quantitation limits listed for soil/sediment are based on wet weight. The quantitation limits calculated by the laboratory for soil/sediment, calculated on dry weight basis as required by the contract, will be higher.

TABLE 7C

TARGET COMPOUND LIST (TCL) AND CONTRACT REQUIRED QUANTITATION LIMITS (CRQL) * PESTICIDES/PCBs

			QUANTITATION LIMITS **	
	PESTICIDES/PCBs	CAS NUMBER	LOW WATER ug/L	LOW SOIL/ SEDIMENT (c) ug/Kg
100.	alpha-BHC	319-84-6	0.05	8.0
101.	beta-BHC	319-85-7	0.05	8.0
102.	delta-BHC	319-86-8	0.05	8.0
103.	gamma-BHC (Lindane)	58-89-9	0.05	8.0
104.	Heptachlor	76-44-8	0.05	8.0
105.	Aldrin	309-00-2	0.05	8.0
106.	Heptachlor Epoxide	1024-57-3	0.05	8.0
107.	Endosulfan I	959-98-8	0.05	8.0
108.	Dieldrin	60-57-1	0.10	16.0
109.	4,4'-DDE	72-55-9	0.10	16.0
110.	Endrin	72-20-8	0.10	16.0
111.	Endosulfan II	33213-65-9	0.10	16.0
112.	4,4'-DDD	72-54-8	0.10	16.0
113.	Endosulfan Sulfate	1031-07-8	0.10	16.0
114.	4,4'-DDT	50-29-3	0.10	16.0
115.	Endrin Ketone	53494-70-5	0.10	16.0
116.	Methoxychlor	72-43-5	0.5	80.0
117.	alpha-chlordane	5103-71-9	0.5	80.0
118.	gamma-chlordane	5103-74-2	0.5	80.0
119.	Toxaphene	8001-35-2	1.0	160.0
120.	Aroclor-1016	12674-11-2	0.5	80.0
121.	Aroclor-1221	11104-28-2	0.5	80.0
122.	Aroclor-1232	11141-16-5	0.5	80.0
123.	Aroclor-1242	53469-21-9	0.5	80.0
124.	Aroclor-1248	12672-29-6	0.5	80.0
125.	Aroclor-1254	11097-69-1	1.0	160.0
126.	Aroclor-1260	11096-82-5	1.0	160.0

(c) Medium concentration soil/sediment Contract Required Quantitation Limits (CRQLs) for Pesticides/PCBs are 15 times the individual Low Soil/Sediment CRQL.

* Specific quantitation limits are highly matrix dependent. The quantitation limits listed herein are provided for guidance and may not always be achievable.

** Quantitation limits listed for soil/sediment are based on wet weight. The quantitation limits calculated by the laboratory for soil/sediment, calculated on dry weight basis as required by the contract, will be higher.

TABLE 7D

TARGET COMPOUND LIST (TCL) AND CONTRACT REQUIRED QUANTITATION LIMITS (CRQL) * INORGANIC ANALYTES

	ANALYTE	QUANTITATION LIMITS ** LOW WATER ug/L
1.	Aluminum	200
2.	Antimony	60
3.	Arsenic	10
4.	Barium	200
5.	Beryllium	5
6.	Cadmium	5
7.	Calcium	5000
8.	Chromium	10
9.	Cobalt	50
10.	Copper	25
11.	Iron	100
12.	Lead	5
13.	Magnesium	5000
14.	Manganese	15
15.	Mercury	0.2
16.	Nickel	40
17.	Potassium	5000
18.	Selenium	5
19.	Silver	10
20.	Sodium	5000
21.	Thallium	10
22.	Vanadium	50
23.	Zinc	20
24.	Cyanide	10

Notes:

* The CRQLs listed above are minimum requirments; the laboratory is required to report data using its actual instrument detection limit (IDL), which will be less than or equal to the CRQLs shown above.

** These CRQLs are those obtained in pure water using NYSDEC ASP CLP procedures. Actual quantitation limits for samples may vary, depending on the sample matrix.

TABLE 8
ROUTE 52 HILLS HOLDING CORPORATION SITE
CALCULATED HYDRAULIC CONDUCTIVITIES

Monitoring Well	Hydraulic Conductivity Falling Head (cm/sec)	Rising Head (cm/sec)	Average (cm/sec)	ln K (Average)
MW–1	9.0E–03	9.0E–03	9.0E–03	–4.71
MW–2	8.0E–04	7.0E–04	7.5E–04	–7.20
MW–3	3.0E–04	1.0E–03	6.5E–04	–7.34
MW–4	7.0E–05	6.0E–05	6.5E–05	–9.64
MW–5	2.0E–04	1.0E–04	1.5E–04	–8.80
MW–6	1.0E–04	5.0E–04	3.0E–04	–8.11

Arithmetic Mean for:	1.8E–03	cm/sec
Geometric Mean:	4.8E–04	cm/sec

TABLE 9
ROUTE 52 HILLS HOLDING CORPORATION SITE
SOIL GAS SURVEY SUMMA CANISTER TO-14 DATA SUMMARY

SAMPLING LOCATIONS - GRID COORDINATES

COMPOUND	H1000+6100		H1100+5000		H1100+6000		H1200+5500		H1400+5400	
	DETECTION LIMIT	RESULT (ppb)	DETECTION LIMIT	RESULT (ppb)	DETECTION LIMIT	RESULT (ppb)	DETECTION LIMIT	RESULT (ppb)	DETECTION LIMIT	RESULT (ppb)
carbon disulfide	78	110	80	ND	78	96	74	82	74	83
methylene chloride	78	ND	80	ND	78	ND	74	ND	74	74
toluene	78	114	80	110	78	110	74	130	74	120
TOTAL		224		110		206		212		277

All results are expressed in ppb (volume basis).
ND = Not detected above the reported detection limit.
Analysis performed by I.T.Analytical Services.
Only reported parameters are summarized above; complete analytical data presented in Appendix D.
Method blank = 0.24ppb Carbon Disulfide/detection limit = 0.2

TABLE 10
ROUTE 52 HILLS HOLDING CORPORATION SITE
SURFACE WATER ANALYTICAL DATA SUMMARY

SAMPLE ID	SW-1	SW-2	SW-3	SW-4	SW-5	SW-7	SW-6	
SAMPLE LOCATION	NEVERSINK R. UPSTREAM	NEVERSINK R. ADJ. TO SITE	NEVERSINK R. DOWNSTREAM	ON-SITE	ON-SITE	SW-5DUP ON-SITE	ON-SITE	
SAMPLE DATE	Jun-20-91	Jun-20-91	Jun-20-91	Jun-20-91	Jun-20-91	Jun-20-91	Jun-20-91	
VOLATILES (UG/L)								
NO TARGET COMPOUNDS WERE DETECTED.								
SEMIVOLATILES (UG/L)								
NAPHTHALENE	10 U	10 U	10 U	NA	10	11 U	10 U	
BIS(2-ETHYLHEXYL)PHTHALATE	10 U	10 U	10 U	NA	2 J	11 U	10 U	
PESTICIDES/PCBS (UG/L)								
4,4'-DDT	0.10 U	0.10 U	0.069 J	NA	0.099 U	0.10 U	0.10 U	
INORGANIC (UG/L)								CLASS B SURFACE WATER STANDARDS
ALUMINUM	51.1	11000	56.2	NA	51.5	89.3	45.9 U	NONE
ANTIMONY	46.1 U	46.1 U	46.1 U	NA	46.1 U	46.1 U	46.1 U	100 I
ARSENIC	4.9	8.9	1.8 U	NA	1.8 U	1.8 U	1.8 U	190
BARIUM	54.5	358	65.8	NA	35.2	38.2	35.1	NONE
BERYLLIUM	1.8	2.4	1.5	NA	1.6	1.7	1.4	11
CADMIUM	3.9 U	3.9 U	3.9 U	NA	3.9 U	3.9 U	3.9 U	
CALCIUM	3650	14000	4220	NA	13500	13800	13700	NONE
CHROMIUM	7.3 U	12.6 J	7.3 U	NA	7.3 U	7.3 U	7.3 U	37.9 F
COBALT	17.2 U	17.2 U	17.2 U	NA	17.2 U	17.2 U	17.2 U	5
COPPER	9.7 U	29.9	9.7 U	NA	9.7 U	9.7 U	9.7 U	2.0 F
IRON	61.6	24000	92.6	NA	270	496	252	300
LEAD	1.2 J	69.8 J	0.80 U	NA	0.80 U	2.1 J	0.80 U	0.23 F
MAGNESIUM	728	6500	842	NA	1280	1280	1240	NONE
MANGANESE	37.6	3420	46.8	NA	107	175	107	NONE
MERCURY	0.12 U	0.20 U	0.12 U	NA	0.12 U	0.12 U	0.12 U	NONE
NICKEL	10.2 U	17.8	10.2 U	NA	10.2 U	10.2 U	10.2 U	19.8 F
POTASSIUM	758	2260	681	NA	641	712	576	NONE
SELENIUM	1.2 U	12.0 U	1.2 U	NA	1.2 U	1.2 U	1.2 U	1.0
SILVER	6.2 U	8.7 J	6.8 J	NA	6.2 U	6.2 U	7.8 J	0.1 I
SODIUM	2990	10400	3080	NA	38500	38200	39200	NONE
THALLIUM	2.1 U	2.1 U	2.1 U	NA	2.1 U	2.1 U	2.1 U	8
VANADIUM	13.2 U	25.8	16.1	NA	18.1	16.2	15.3	14
ZINC	6.6	156	9.1	NA	4.7 U	6.9	7.6	30
CYANIDE	10.0 U	10.0 U	10.0 U	NA	10.0 U	10.0 U	10.0 U	5.2

F = CALCULATED VALUE BASED ON FORMULA (6NYCRR 703.5) USING AN ESTIMATED HARDNESS VALUE OF 38.6 PPM.

I = IONIC FORM; NOT APPLICABLE TO TOTAL METALS ANALYSIS PERFORMED FOR THIS PSA.

NA = NOT ANALYZED

NOTES:
- DATA QUALIFIERS ARE DEFINED IN SECTION 2.10.3.
- ORGANIC ANALYTES NOT LISTED WERE NOT DETECTED.
- SEE TABLE 7 FOR LIST OF TARGET COMPOUND LIST ANALYTES.
- VALUES EXCEEDING THE NY STANDARD ARE SHADED.
- SAMPLE LOCATIONS ARE SHOWN ON FIGURE 3.
- SAMPLE SW-4 WAS ANALYZED FOR VOLATILES ONLY, BECAUSE OF INSUFFICIENT SAMPLE VOLUME.
- EVALUATION OF SAMPLE SW-5 IS BASED ON ORIGINAL SAMPLE (SW-5). SW-5DUP DATA USED FOR QC PURPOSES ONLY.

TABLE 11
ROUTE 52 HILLS HOLDING CORPORATION SITE
SEDIMENT ANALYTICAL DATA SUMMARY

SAMPLE ID	SS-1	SS-2	SS-3	SS-4	SS-5
SAMPLE LOCATION	NEVERSINK R. UPSTREAM	NEVERSINK R. ADJ. TO SITE	NEVERSINK R. DOWNSTREAM	ON-SITE	ON-SITE
SAMPLE DATE	Jul-2-91	Jul-2-91	Jul-2-91	Jul-2-91	Jul-2-91
VOLATILES (UG/KG)					
CHLOROFORM	10 U	11 U	2 J	16 U	7 U
TOLUENE	2 J	130 J	15	16 U	7 U
SEMIVOLATILES (UG/KG)					
4-METHYLPHENOL	1100 U	1200 U	990 J	1500 U	
BENZOIC ACID	5400 U	250 J	8800 U	7200 U	
PHENANTHRENE	1100 U	1200 U	170 J	1500 U	
FLUORANTHENE	1100 U	1200 U	220 J	270 J	
PYRENE	1100 U	1200 U	170 J	190 J	
BENZO(A)ANTHRACENE	1100 U	1200 U	1800 U	150 J	
CHRYSENE	1100 U	1200 U	1800 U	230 J	
BIS(2-ETHYLHEXYL)PHTHALATE	1100 U	1200 U	570 J	1500 U	
PESTICIDES/PCBS (UG/KG)					
NO TARGET COMPOUNDS WERE DETECTED.					
INORGANIC (MG/KG)					
ALUMINUM	6550	5520	6130 J	11900 J	5420
ANTIMONY	13.3 U	13.5 U	22.7 U	22.5 J	5.9 U
ARSENIC	1.7	2.1	1.7 J	2.0 J	1.3
BARIUM	115	126	117 J	344 J	52.9
BERYLLIUM	0.56	0.45	1.0 J	0.96 J	0.33
CADMIUM	1.3	1.1 U	2.1 J	1.60 U	0.50 U
CALCIUM	884	1130	2890 J	4450 J	348
CHROMIUM	7.2	4.9	5.9 J	12.8 J	5.3
COBALT	6.7	7.1	8.7 J	7.2 U	3.5
COPPER	20.8	13.1	18 J	25.2 J	5.7 J
IRON	9070	9480	10000 J	11600 J	8090
LEAD	28.4	30.9	48.9 J	87.0 J	18.8
MAGNESIUM	2050	1640	2290 J	2440 J	1460
MANGANESE	476	609	550 J	884 J	199
MERCURY	0.09 U	0.08 U	0.13 U	0.13 U	0.06 U
NICKEL	9.9	9.3	10.0 J	10.8 J	6.7
POTASSIUM	850 J	694 J	773 J	1230 J	440 J
SELENIUM	0.41 U	0.46 U	0.91 U	0.71 U	0.35 U
SILVER	1.8 U	1.8 U	3.1 U	2.6 U	0.80 U
SODIUM	95.7 U	97.2 U	163 U	150 J	48.8 J
THALLIUM	0.45 U	0.51 U	1.0 U	0.78 U	0.39 U
VANADIUM	10.2	8.7	15.2 J	23.5 J	10.1
ZINC	70.4 J	73.7 J	79.2 J	132 J	31.4 J
CYANIDE	1.0 U	1.1 U	1.6 U	1.3 U	0.75 U

NOTES:
- DATA QUALIFIERS ARE DEFINED IN SECTION 2.10.3.
- ORGANIC ANALYTES NOT LISTED WERE NOT DETECTED.
- SEE TABLE 7 FOR LIST OF TARGET COMPOUND LIST ANALYTES.
- SAMPLE LOCATIONS ARE SHOWN ON FIGURE 3.
- NO SEMIVOLATILES OR PESTICIDES/PCBS DATA AVAILABLE FOR SS-5 DUE TO BREAKAGE OF SAMPLE BOTTLE.

TABLE 12
ROUTE 52 HILLS HOLDING CORPORATION SITE
LEACHATE ANALYTICAL DATA SUMMARY

SAMPLE ID	L-1	L-2	L-5	L-6
SAMPLE LOCATION	EDGE OF FILL	ON-SITE NE	FENCELINE N	BORROW AREA
SAMPLE DATE	Jul-2-91	Jul-2-91	Jul-2-91	Jul-2-91
<u>VOLATILES (UG/L)</u>				
CHLOROMETHANE	10 U	10 U	1 J	10 U
<u>SEMIVOLATILES (UG/L)</u>				
ACENAPHTHENE	10 U	11 U	3 J	10 U
FLUORENE	10 U	11 U	2 J	10 U
BUTYLBENZYLPHTHALATE	10 U	5 J	10 U	10 U
BIS(2-ETHYLHEXYL)PHTHALATE	10 U	8 J	2 J	10 U
<u>PESTICIDES/PCBS (UG/L)</u>				
NO TARGET COMPOUNDS WERE DETECTED.				
<u>INORGANIC (UG/L)</u>				
ALUMINUM	579000	512	226	42600
ANTIMONY	75.8 J	46.1 U	46.1 U	46.1 U
ARSENIC	150	19.3	8.5	17.3
BARIUM	6380	501	588	359
BERYLLIUM	23.1 J	1.5	1.7	3.4
CADMIUM	31.3 J	3.9 U	3.9 U	3.9 U
CALCIUM	1190000	152000	150000	50100
CHROMIUM	599 J	12.9 J	26.6 J	36.6 J
COBALT	206	17.2 U	17.2 U	27.9
COPPER	520 J	9.7 U	9.7 U	52.8
IRON	973000	19500	3230	57000
LEAD	498	2.8 J	2.0 J	73.8 J
MAGNESIUM	187000	61000	51700	16900
MANGANESE	133000	27700	8470	2700
MERCURY	0.12 U	0.12 U	0.12 U	0.12 U
NICKEL	407	11.8	10.2 U	38.2
POTASSIUM	73900	17100	18200	7510
SELENIUM	12.0	1.2 U	1.2 U	12.0 U
SILVER	14.4 J	6.2 U	6.7 J	6.2 U
SODIUM	101000	98300	105000	9480
THALLIUM	21.0 U	21.0 U	21.0 U	2.1 U
VANADIUM	901	16.7	15.6	62.3
ZINC	2970 J	10.7	56.2	628
CYANIDE	71.1	18.7	10.0 U	10.0 U

NOTES:
- DATA QUALIFIERS ARE DEFINED IN SECTION 2.10.3.
- ORGANIC ANALYTES NOT LISTED WERE NOT DETECTED.
- SEE TABLE 7 FOR LIST OF TARGET COMPOUND LIST ANALYTES.
- SAMPLE LOCATIONS ARE SHOWN ON FIGURE 3.
- ANALYTICAL DATA FOR SAMPLE L-3 IS LISTED IN TABLE 13.
- SAMPLE L-4 WAS NOT COLLECTED.

TABLE 13
ROUTE 52 HILLS HOLDING CORPORATION SITE
SURFACE SOIL ANALYTICAL DATA SUMMARY

SAMPLE ID	SL-1		SL-2		SL-3		L-3			
SAMPLE LOCATION	BACKGROUND		FILL AREA		FILL AREA		EDGE OF FILL			
SAMPLE DATE	Jul-2-91		Jul-2-91		Jul-2-91		Jul-2-91			
VOLATILES (UG/KG)										
CHLOROFORM	11	U	11	U	1	J	15	U		
SEMIVOLATILES (UG/KG)										
ACENAPHTHYLENE	720	U	730	U	130	J	1000	U		
ACENAPHTHENE	720	U	730	U	130	J	1000	U		
DIBENZOFURAN	720	U	730	U	69	J	1000	U		
FLUORENE	720	U	730	U	150	J	1000	U		
PHENANTHRENE	720	U	730	U	1800		1000	U		
ANTHRACENE	720	U	730	U	420	J	1000	U		
FLUORANTHENE	720	U	730	U	3500		200	J		
PYRENE	720	U	730	U	2800		240	J		
BUTYLBENZYLPHTHALATE	720	U	730	U	3000		1000	U		
BENZO(A)ANTHRACENE	720	U	730	U	1900		1000	U		
CHRYSENE	720	U	730	U	2100		1000	U		
BIS(2-ETHYLHEXYL)PHTHALATE	200	J	730	U	2000		150	J		
BENZO(B)FLOURANTHENE	720	U	730	U	2400		1000	U		
BENZO(K)FLOURANTHENE	720	U	730	U	1900		1000	U		
BENZO(A)PYRENE	720	U	730	U	2200		1000	U		
INDENO(1,2,3-C,D)PYRENE	720	U	730	U	1100	J	1000	U		
BENZO(G,H,I)PERYLENE	720	U	730	U	1100	J	1000	U		
PESTICIDES/PCBS (UG/KG)										
4,4'-DDD	35	U	35	U	36		49	U		
4,4'-DDT	35	U	35	U	31	J	49	U		
ALPHA-CHLORDANE	170	U	180	U	21	J	250	U		
GAMMA-CHLORDANE	170	U	180	U	28	J	250	U		
INORGANIC (MG/KG)									MAXIMUM BACKGROUND VALUE**	REFERENCE NO.
ALUMINUM	6240		4130		4950		15300		25000	8,43
ANTIMONY	6.8	U	7.1	U	8.3	U	8.6	U	10	55
ARSENIC	2.3		1.8		2.9		6.1		12	52
BARIUM	36.3		22.3		285		114		600	43,44
BERYLLIUM	0.16		0.11	U	0.14		0.80		1.75	43,44
CADMIUM	0.65		0.65		1.2		1.4		1.80	26
CALCIUM	445		2780		18600		1930		35000	43
CHROMIUM	5.7		4.2		9.1		13.8		40	8
COBALT	4.2		4.0		5.2		11.7		60	8
COPPER	7.9		3.5		20.2		17.8		15	8,43
IRON	10100		7520		9340		22000		25000	8,15
LEAD	13.9		7.2		273		36.4		36	26
MAGNESIUM	1830		1710		3670		3970		6000	8
MANGANESE	239		210		230		1030		5000	8,43
MERCURY	0.05	U	0.06	U	0.42	J	0.07	U	0.066	43
NICKEL	7.1		6.0		8.3		17.4		25	8
POTASSIUM	731	J	573	J	726	J	1400	J	43000	43
SELENIUM	0.24	U	0.22	U	0.36	U	0.29	U	0.125	43
SILVER	0.91	U	0.95	U	1.1	U	1.2	U	5	55
SODIUM	58.4	J	50.8	U	99.0	J	172	J	8000	43
THALLIUM	0.26	U	0.24	U	0.40	U	0.32	U	5	55
VANADIUM	9.1		6.2		13.4		18.6		60	NC
ZINC	34.6	J	26.1	J	313	J	121	J	64	47
CYANIDE	0.66	U	0.65	U	0.74		2.5		12	55

NOTES:
- DATA QUALIFIERS ARE DEFINED IN SECTION 2.10.3.
- ORGANIC ANALYTES NOT LISTED WERE NOT DETECTED.
- SEE TABLE 7 FOR LIST OF TARGET COMPOUND LIST ANALYTES.
- **SEE TABLE 14 FOR LIST OF BACKGROUND VALUES REFERENCES.
- SAMPLE LOCATIONS ARE SHOWN ON FIGURE 3.

TABLE 14
ROUTE 52 HILLS HOLDING CORPORATION SITE
SURFACE SOIL BACKGROUND ELEMENTAL CONCENTRATIONS

Parameters	N.Y.S	Albany	U.S.	Other	Citation
ALUMINUM	----	1,000 - 25,000	----	7,000 - 100,000a	8/43, 43
ARSENIC	3 - 12	0.1 - 6.5	<0.1 - 45	<0.1- 73	51, 1/5/29/36/50/52/53, 43,43
BARIUM	15 - 600	250 - 350	10 - 3,000	10 - 1,500	43/44, 43, 50, 24
BERYLLIUM	0 - 1.75	0 - 0.9	----	< 1 - 7a	43/44, 43/44, 43
CADMIUM	1.8	----	0.05 - 2.4	0.0001 - 1.0	26, NC 26/35/36/41/47
CALCIUM	130 - 35,000	150 - 6,500	----	100 - 280,000	43, 43/44, 44
CHROMIUM	1.5 - 40	1.5 - 25	2 - 270	0.1 - 1,000e/a	8, 8/43, 43, 3/43
COBALT	2.5 - 6	2.5 - 6	0.1 - 2.4	<0.3 - 70a	8/43, 5/36, 50, 43
COPPER	----	<1 -15	1 - 57	<1 - 700a	8/43, 47/39, 43
IRON	----	17,500 - 2,500	----	100 - 100,000a	8/43, 43
LEAD	30	1 - 12.5	4 - 61	<10 - 300a	26, 8/43, 29, 43
MAGNESIUM	----	1,700 - 6,000	----	50 -50,000a	43/8, 43
MANGANESE	5 - 5,000	400 - 600	----	<2 - 7,000a	8/43, 8/43, 43
MERCURY	----	0.042 - 0.066	----	0.01 - 3.4a	43, 43
NICKEL	0.5 - 25	6 - 12.5	0.5 - 23	<5 - 700a	8, 8/43, 1, 43
POTASSIUM	47.5 - 43,000	12,500 - 17,500	10,000 - 20,000	50 - 37,000a	21/43, 42/43, 20, 43
SELENIUM	----	<0.1 - 0.125	----	0.1- 5.1c	43, 24/43
SODIUM	----	6,000 - 8,000	----	150 - 50,000b	43, 8/43
VANADIUM	----	25 - 60	2 - 270	1- 300	NC, 50, 8/43
ZINC	----	----	----	<5 - 2,900	43

Key : NC- no citation available; a- Eastern US; b-New Jersey; c-Massachusetts; d-Pennsylvania e-Vermont; f- New Hampshire

Note: Where ranges are given, citation references are listed sequentially by group. Groups are separated by commas. In ranges where multiple references are cited, the citations are separated by slashes.

TABLE 14

ROUTE 52 HILLS HOLDING CORP SITE
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TABLE 15
ROUTE 52 HILLS HOLDING CORPORATION SITE
AMBIENT AIR SAMPLING VOLATILE ORGANICS DATA SUMMARY

	JULY 26, 1991				AUGUST 23, 1991					
	UPWIND	RECEPTORS		DOWNWIND	UPWIND	RECEPTORS		DOWNWIND		ONSITE
COMPOUND (ug/m3)	R52UP1V	R52R1V	R52R2V	R52DN1V	R52UP1V	R52R1V	R52R2V	R52DN1V	R52DN2V	R52ON1V
CHLOROMETHANE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
VINYL CHLORIDE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
CHLOROETHANE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BROMOMETHANE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TRICHLOROFLUOROMETHANE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-DICHLOROETHENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
METHYLENE CHLORIDE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
CARBON DISULFIDE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TRICHLOROTRIFLUOROETHANE	ND	ND	8.0	ND	ND	ND	ND	ND	ND	ND
trans-1,2-DICHLOROETHENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-DICHLOROETHANE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
CHLOROFORM	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-DICHLOROETHANE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1,-TRICHLOROETHANE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BENZENE	ND	7.8	ND	ND	ND	ND	ND	ND	ND	ND
CARBON TETRACHLORIDE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-DICHLOROPROPANE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BROMODICHLOROMETHANE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TRICHLOROETHENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,3-DICHLOROPROPENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,3-DICHLOROPROPENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-TRICHLOROETHANE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TOLUENE	13	28	11	14	7.6	13	ND	ND	ND	8.4
DIBROMOCHLOROMETHANE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TETRACHLOROETHENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
CHLOROBENZENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
ETHYLBENZENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BROMOFORM	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
STYRENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TOTAL XYLENES	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2,2-TETRACHLOROETHANE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,3-DICHLOROBENZENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,4-DICHLOROBENZENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-DICHLOROBENZENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TICS										
SILOXANES	--	70	80	--	--	--	100	--	2000	--
TRIMETHYLSILANOL	--	--	--	--	--	--	200	--	400	--
2-BUTANONE	--	--	--	--	--	90	--	--	--	--
4-METHYL-2-PENTANONE	--	--	--	--	--	60	--	--	--	--

Note: R52UP1 represents the site name Route 52 (R52) and the sample location (UP1).
For sample location, refer to Figure No. 4.

TABLE 16, page 1 of 4
ROUTE 52 HILLS HOLDING CORPORATION SITE
TEST PIT ANALYTICAL DATA SUMMARY

SAMPLE ID	TP-1A	TP-1B	TP-2A	TP-2B	TP-3A	TP-3B	TP-6A	TP-6B	TP-7A	TP-7B	TP-8A	TP-8B	TP-10A	TP-10B
SAMPLE LOCATION	TEST PIT 1	TEST PIT 1	TEST PIT 2	TEST PIT 2	TEST PIT 3	TEST PIT 3	TEST PIT 6	TEST PIT 6	TEST PIT 7	TEST PIT 7	TEST PIT 8	TEST PIT 8	TEST PIT 10	TEST PIT 10
SAMPLE DATE	Jun-26-91	Jun-26-91	Jun-26-91	Jun-26-91	Jun-26-91	Jun-26-91	Jun-27-91	Jun-27-91	Jun-27-91	Jun-27-91	Jun-27-91	Jun-27-91	Jun-26-91	Jun-26-91
SAMPLE DEPTH	4'	9'	5'	10'	2.8'	10'	6'	10'	4'	8'	4'	8'	2'	4'
VOLATILES (UG/KG)														
ACETONE	49 U	100 U	97 U	210	140 U	150 U	25 U	97 U	600 J	280	200 U	71 U	150 U	310 J
CARBON DISULFIDE	18	8	12	28	12	17	7 U	7 U	14 U	10	7	7 U	19	6 J
CHLOROFORM	7 U	7 J	4 J	2 J	8 U	6 U	7 U	7 U	14 U	7 U	6 U	7 U	7 U	7 U
2-BUTANONE	14 U	21 U	14 U	25 U	21 U	23 U	14 U	24 U	67 U	56 U	44 U	16 U	22 U	88 J
1,1,1-TRICHLOROETHANE	3 J	7 U	4 J	4 J	4 J	2 J	16	7 U	12 J	40	6 U	7 U	4 J	4 J
BENZENE	7 U	7 U	7 U	6 U	8 U	6 U	7 U	7 U	3 J	10	6 U	7 U	1 J	7 U
4-METHYL-2-PENTANONE	14 U	14 U	4 J	4 J	15 U	12 U	14 U	13 U	10 U	10 U	10 U	15 U	13 U	9 J
TETRACHLOROETHENE	7 U	7 U	2 J	6 U	8 U	6 U	7 U	7 U	14 U	7 U	6 U	7 U	1 J	7 U
TOLUENE	3 J	3 J	24	13	13 U	9 U	7 U	7 U	19 U	26 U	5 U	5 U	26	150 J
ETHYLBENZENE	21	10	44	36	19	17	7 U	7 U	36	51	7	10	69	14 J
TOTAL XYLENES	23	16	200	190	76	57	7 U	7 U	100	170	19	15	230	27 J
SEMIVOLATILES (UG/KG)														
PHENOL	8900 U	11000 U	1700 U	390 J	190 J	1700 U	910 U	6900 U	1500 U	800 U	830 U	1500 J	30000 U	1300
2-CHLOROPHENOL	8900 U	11000 U	1700 U	850 U	1200 U	1700 U	910 U	6900 U	1500 U	800 U	830 U	1000 J	30000 U	950 U
1,4-DICHLOROBENZENE	8900 U	11000 U	1700 U	140 J	1200 U	1700 U	910 U	6900 U	1500 U	800 U	830 U	640 J	30000 U	950 U
4-METHYLPHENOL	8900 U	11000 U	650 J	990	470 J	420 J	910 U	6900 U	410 J	110 J	830 U	9300	30000 U	7600
1,2,4-TRICHLOROBENZENE	8900 U	11000 U	1700 U	850 U	1200 U	1700 U	910 U	6900 U	1500 U	800 U	830 U	500 J	30000 U	160 J
NAPHTHALENE	1300 J	11000 U	3100	4800	1500	2100	330 U	5800 J	1400 J	730 J	330 J	930 J	30000 U	1500
2-METHYLNAPHTHALENE	8900 U	11000 U	1500 J	1300	820 J	1000 J	140 J	2600 J	640 J	310 J	190 J	530 J	30000 U	620 J
ACENAPHTHYLENE	8900 U	11000 U	400 J	350 J	200 J	260 J	320 J	790 J	410 J	180 J	470 J	3600 U	30000 U	330 J
ACENAPHTHENE	1700 J	11000 U	2700	1400	920 J	2500	330 U	3700 J	1200 J	330 U	330 U	1400 J	30000 U	420 J
DIBENZOFURAN	1000 J	11000 U	2100	1000	690 J	1400 J	120 J	3600 J	1000 J	270 J	280 J	600 J	30000 U	540 J
FLOURENE	2000 J	11000 U	3200	1500	1200 J	2100	240 J	5900 J	1600	370 J	440 J	1000 J	30000 U	930 J
PHENANTHRENE	12000	5500 J	20000 J	9800 J	7900	13000	2400	68000	12000	2500	3300	6700	3200 J	4900 J
ANTHRACENE	3200 J	1400 J	4500	2300	1700	3400	610 J	13000	2400	520 J	870	1700 J	30000 U	920 J
DI-N-BUTYLPHTHALATE	8900 U	11000 U	480 J	2500	1300	510 J	910 U	660 J	240 U	210 U	840	860 J	30000 U	270 J
FLUORANTHENE	14000	8000 J	22000	11000	8800	16000	3600	64000	14000	3300	7200	8700	4300 J	5300
PYRENE	13000	7500 J	17000	9100	8000	12000	4300	66000	11000	2900	6600	7400	3900 J	4700
BUTYLBENZYLPHTHALATE	14000	32000	1900	12000	5000	1700 U	330 U	1200 U	1300 U	2500 U	13000	55000	29000 J	2300
BENZO(A)ANTHRACENE	5900 J	3600 J	8900	4500	3600	6000	2300	27000	5000	1300	3700	3600 J	30000 U	2200
CHRYSENE	6600 J	4200 J	8800	4700	3800	6300	2600	26000	5400	1500	3800	4100	30000 U	2600
BIS(2-ETHYLHEXYL)PHTHALATE	85000	86000	14000	13000	16000	27000	2000 U	6100 U	4500 U	2000 U	4700 U	28000	200000	7500
DI-N-OCTYL PHTHALATE	1100 J	1400 J	830 J	340 J	800 U	1800	910 U	6900 U	1500 U	800 U	830 U	3800	30000 U	950 U
BENZO(B)FLUORANTHENE	4600 J	3100 J	5900	3300	3200	4800	2300	16000	3600	980	2400	3100 J	30000 U	1900
BENZO(K)FLUORANTHENE	5400 J	3700 J	6200	2800	2900	3700	1900	16000	3500	910 U	2700	2800 J	30000 U	1300
BENZO(A)PYRENE	5800 J	4000 J	7500	4000	3500	6300	3000	21000	5300	1200	3400	3900	30000 U	2100
INDENO(123-CD)PYRENE	3400 J	2300 J	4900	3200	2400	3700	2800	10000	3300	890 U	2300	2300 J	30000 U	1900
DIBENZO(A,H)ANTHRACENE	8900 U	11000 U	2300	1500	890 J	1800	1400	4300 J	1300 J	370 U	960	940 J	30000 U	950 U
BENZO(G,H,I)PERYLENE	4100 J	2500 J	5600	3600	2700	3800	3300	11000	3200	900	2300	2300 J	30000 U	2200

NOTES: - DATA QUALIFIERS ARE DEFINED IN SECTION 2.10.3.
- ORGANIC ANALYTES NOT LISTED WERE NOT DETECTED.
- SEE TABLE 7 FOR LIST OF TARGET COMPOUND LIST ANALYTES.
- SAMPLE LOCATIONS ARE SHOWN ON FIGURE 3.

TABLE 16, page 2 of 4
ROUTE 52 HILLS HOLDING CORPORATION SITE
TEST PIT ANALYTICAL DATA SUMMARY

SAMPLE ID	TP-1A	TP-1B	TP-2A	TP-2B	TP-3A	TP-3B	TP-6A	TP-6B	TP-7A	TP-7B	TP-8A	TP-8B	TP-10A	TP-10B
SAMPLE LOCATION	TEST PIT 1	TEST PIT 1	TEST PIT 2	TEST PIT 2	TEST PIT 3	TEST PIT 3	TEST PIT 6	TEST PIT 6	TEST PIT 7	TEST PIT 7	TEST PIT 8	TEST PIT 8	TEST PIT 10	TEST PIT 10
SAMPLE DATE	Jun-26-91	Jun-26-91	Jun-26-91	Jun-26-91	Jun-26-91	Jun-26-91	Jun-27-91	Jun-27-91	Jun-27-91	Jun-27-91	Jun-27-91	Jun-27-91	Jun-26-91	Jun-26-91
SAMPLE DEPTH	4'	9'	5'	10'	2.8'	10'	6'	10'	4'	8'	4'	8'	2'	4'
PESTICIDES/PCBS (UG/KG)														
HEPTACHLOR	110 U	54 U	63 U	41 U	22 U	40 U	22 U	42 U	18 U	20 U	20 U	22 U	63 J	23 U
DIELDRIN	210 U	110 U	130 U	82 U	37 J	80 U	29 J	50 J	20 J	39 U	40 U	51	220 U	46 U
4,4'-DDE	210 U	81 J	50 J	74 J	64	80 U	56	84 U	53	39 U	40 U	69	220 U	58
4,4'-DDD	190 J	280	160	230	160	75 J	120	140	96	34 J	34 J	99	300	91
4,4'-DDT	210 U	110 U	130 U	65 J	51	80 U	44 U	84 U	37	39 U	40 U	44 U	220 U	46 U
ALPHA-CHLORDANE	95 J	66 J	96 J	57 J	38 J	48 J	26 J	58 J	25 J	21 J	22 J	39 J	1100 U	59 J
GAMMA-CHLORDANE	41 J	49 J	98 J	49 J	34 J	50 J	25 J	41 J	27 J	23 J	26 J	40 J	1100 U	58 J
AROCLOR-1242	3400	1000	900	540	880	630	590	2100	810	470	210	1400	1000 J	280
AROCLOR-1254	3600	1500	360 J	960	440 U	800 U	440 U	840 U	370 U	390 U	400 U	440 U	1000 J	280 J
AROCLOR-1260	2100 U	1100 U	1300 U	820 U	440 U	450 J	290 J	510 J	370 U	390 U	400 U	440 U	220 U	460 U
INORGANIC (MG/KG)														
ALUMINUM	6090	6890	6890	3320	6520 J	7400 J	6210 J	4990 J	6550 J	6520 J	8890 J	8500 J	5580	6930
ANTIMONY	14.4 J	12.0 U	11.7 J	11.6 U	12.0 U	R	9.5 U	11.7 U	10.3 U	9.6 U	10.8 U	10.6 U	12.6 U	12.6 U
ARSENIC	7.0 J	18.2 J	5.4 J	5.6 J	5.5 J	10.1 J	6.2 J	4.9 J	4.6 J	4.5 J	6.0 J	5.5 J	4.5 J	3.9 J
BARIUM	579	399	436	706	1620	303	880	274	447	198	163	555	1190	503
BERYLLIUM	0.80	0.59	0.51	0.58	0.47	0.51	0.32	0.38	0.39	0.32	0.70	0.56	0.75	0.79
CADMIUM	0.99 U	67.1	0.96 U	1.3	2.2	1.8	125	2.2	0.87 U	1.1	1.2	2.5	1.1	1.1 U
CALCIUM	82300	96600	51900	77400	108000	52000	58900	50700	43700	39500	44000	91400	111000	52700
CHROMIUM	323 J	27.7 J	16.2	3.0	22.1	24.3	25.1	14.2	15.8	14.2	17.5	33.7	20.5 J	19.5
COBALT	4.4 U	8.0 J	4.2 U	4.3 U	4.7	4.0	3.6 U	4.4 U	4.2	5.0	4.8	12.2	4.7 U	4.8 U
COPPER	73.0 J	346 J	63.0	41.5	40.6 J	80.8 J	72.8 J	7270	15.8 J	24.6 J	24.4 J	348	44.4 J	56.1
IRON	22300	95900	15700	17100	18900	15700	9560	20500	10400	10600	20600	21000	2870	19100
LEAD	545 J	368 J	478 J	1960 J	685.0	255	779	286	270	184	352	776	430 J	414 J
MAGNESIUM	12100	9960	5020	7450	6540	6450	6260	16600	6260	7170	4990	7940	8880	6040
MANGANESE	308 J	514 J	390 J	279 J	R	R	R	R	R	R	R	R	370 J	432 J
MERCURY	0.87 J	1.0 J	0.55 J	0.56 J	1.5	0.58	0.82	0.57	0.39	0.18	0.86	1.4	1.7 J	0.52 J
NICKEL	28.0	35.9	15.2	15.4	14.5	13.1	12.1	10.4	12.3	11.2	15.5	29.5	21.6	17.6
POTASSIUM	1090	1150	977	1480	1280	1380	1010	740	1080	996	1280	1270	1210	2080
SELENIUM	R	R	R	R	R	R	R	R	R	R	R	R	R	R
SILVER	1.6 U	1.6 U	1.5 U	1.6 U	1.6 U	1.6 J	1.3 U	1.6 U	1.4 U	1.3 U	1.5 U	2.1 J	1.7 U	1.7 U
SODIUM	306	507	530	629	371	565	429	348	479	419	360	529	504	782
THALLIUM	0.68 U	0.78 U	0.64 U	0.64 U	0.63 U	0.56 U	0.47 U	0.51 U	0.47 U	0.48 U	0.55 U	0.55 U	0.67 U	0.74 U
VANADIUM	22.3	13.5	23.4	22.4	19.2	25.0	22.2	15.0	15.0	20.3	17.5	29.5	12.3	23.9
ZINC	1160 J	4350 J	2030 J	1000 J	1110	477 J	37600	322 J	399 J	332 J	243 J	1470	1150 J	1000 J
CYANIDE	1.3	1.8	1.8 J	2.0 J	2.0 J	1.5 J	1.5 J	1.3 J	15.5 J	1.4 J	R	1.4 J	1.8 J	2.2 J

NOTES: - DATA QUALIFIERS ARE DEFINED IN SECTION 2.10.3.
- ORGANIC ANALYTES NOT LISTED WERE NOT DETECTED.
- SAMPLE LOCATIONS ARE SHOWN ON FIGURE 3.
- SEE TABLE 7 FOR LIST OF TARGET COMPOUND LIST ANALYTES.

TABLE 16, page 3 of 4
ROUTE 52 HILLS HOLDING CORPORATION SITE
TEST PIT ANALYTICAL DATA SUMMARY

SAMPLE LOCATION	TEST PIT 1		TEST PIT 2		TEST PIT 3		TEST PIT 6		TEST PIT 7		TEST PIT 8		TEST PIT 10		DETECTION	REGULATORY
SAMPLE ID	TP-1A	TP-1B	TP-2A	TP-2B	TP-3A	TP-3B	TP-6A	TP-6B	TP-7A	TP-7B	TP-8A	TP-8B	TP-10A	TP-10B	LIMIT	LIMIT
SAMPLE DATE	6/26/91	6/26/91	6/26/91	6/26/91	6/26/91	6/26/91	6/27/91	6/27/91	6/27/91	6/27/91	6/27/91	6/27/91	6/26/91	6/26/91		
DEPTH	4'	9'	5'	10'	2.8'	10'	6'	10'	4'	8'	4'	8'	2'	4'	(MG/L)	(MG/L)
EXTRACTION PROCEDURE TOXICITY (EP TOX) TEST RESULTS (MG/L)																
Arsenic	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.50	5.0
Barium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	10.0	100.0
Cadmium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.10	1.0
Chromium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.50	5.0
Lead	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.50	5.0
Mercury	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.02	0.2
Selenium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.10	1.0
Silver	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.50	5.0

TABLE 16, page 4 of 4
ROUTE 52 HILLS HOLDING CORPORATION SITE
TEST PIT ANALYTICAL DATA SUMMARY

SAMPLE LOCATION	TEST PIT 1		TEST PIT 2		TEST PIT 3		TEST PIT 6		TEST PIT 7		TEST PIT 8		TEST PIT 10		DETECTION LIMIT (MG/L)	REGULATORY LIMIT (MG/L)
SAMPLE ID	TP-1A	TP-1B	TP-2A	TP-2B	TP-3A	TP-3B	TP-6A	TP-6B	TP-7A	TP-7B	TP-8A	TP-8B	TP-10A	TP-10B		
SAMPLE DATE	6/26/91	6/26/91	6/26/91	6/26/91	6/26/91	6/26/91	6/27/91	6/27/91	6/27/91	6/27/91	6/27/91	6/27/91	6/26/91	6/26/91		
DEPTH	4'	9'	5'	10'	2.8'	10'	6'	10'	4'	8'	4'	8'	2'	4'		
TOXICITY CHARACTERISTIC LEACHING PROCEDURE (TCLP) TEST RESULTS (MG/L)																
Arsenic	ND	NA	NA	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.50	5.0
Barium	ND	NA	NA	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	10.0	100.0
Benzene	ND	NA	NA	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.05	0.5
Cadmium	ND	NA	NA	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.10	1.0
Carbon Tetrachloride	ND	NA	NA	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.05	0.5
Chlordane	ND	NA	NA	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.003	0.03
Chlorobenzene	ND	NA	NA	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	10.0	100.0
Chloroform	ND	NA	NA	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.60	6.0
Chromium	ND	NA	NA	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.50	5.0
o-Cresol	ND	NA	NA	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	20.0	200.0
m & p Cresol	ND	NA	NA	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	20.0	200.0
2,4-d	ND	NA	NA	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.0	10.0
1,4-Dichlorobenzene	ND	NA	NA	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.75	7.5
1,2-Dichloroethane	ND	NA	NA	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.05	0.5
1,1-Dichloroethene	ND	NA	NA	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.07	0.7
2,4-Dinitrotoluene	ND	NA	NA	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.013	0.13
Endrin	ND	NA	NA	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.002	0.02
Heptachlor and its epoxide	ND	NA	NA	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0008	0.008
Hexachlorobenzene	ND	NA	NA	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.013	0.13
Hexachloro-1,3-butadiene	ND	NA	NA	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.05	0.5
Hexachloroethane	ND	NA	NA	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.30	3.0
Lead	ND	NA	NA	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.50	5.0
Lindane	ND	NA	NA	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.04	0.4
Mercury	ND	NA	NA	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.02	0.2
Methoxychlor	ND	NA	NA	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.0	10.0
Methyl Ethyl Ketone	ND	NA	NA	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	20.0	200.0
Nitrobenzene	ND	NA	NA	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.20	2.0
Pentachlorophenol	ND	NA	NA	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	10.0	100.0
Pyridine	ND	NA	NA	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.50	5.0
Selenium	ND	NA	NA	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.10	1.0
Silver	ND	NA	NA	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.50	5.0
Tetrachloroethene	ND	NA	NA	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.07	0.7
Toxaphene	ND	NA	NA	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.05	0.5
Trichloroethene	ND	NA	NA	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.05	0.5
2,4,5-Trichlorophenol	ND	NA	NA	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	40.0	400.0
2,4,6-Trichlorophenol	ND	NA	NA	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.2	2.0
2,4,5-TP (Silvex)	ND	NA	NA	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.10	1.0
Vinyl Chloride	ND	NA	NA	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.02	0.2

NA = NOT ANALYZED
ND = NOT DETECTED
NOTE: SAMPLE LOCATIONS ARE SHOWN ON FIGURE 3.

TABLE 17
ROUTE 52 HILLS HOLDING CORPORATION SITE
GROUNDWATER ANALYTICAL DATA SUMMARY

SAMPLE ID SAMPLE LOCATION SAMPLE DATE	MW-1 UPGRADIENT Aug-9-91	MW-2 Aug-9-91	MW-8 MW-2DUP Aug-9-91	MW-3 Aug-9-91	MW-4 Aug-9-91	MW-5 Aug-9-91	MW-6 Aug-9-91	NY STATE GROUNDWATER STANDARDS
VOLATILES (UG/L)								
METHYLENE CHLORIDE	5 U	5 U	3 J	5 U	5 U	5 U	5 U	5
ACETONE	1 J	10 U	10 U	10 U	10 U	10 U	10 U	NONE
SEMIVOLATILES (UG/L)								
NO TARGET COMPOUNDS WERE DETECTED.								
PESTICIDES/PCBS (UG/L)								
NO TARGET COMPOUNDS WERE DETECTED.								
INORGANIC (UG/L)								
ALUMINUM	6150 J	1040 J	985 J	47400 J	16700 J	51200 J	736 J	NONE
ANTIMONY	50.0 U	50.0 U	50.0 U	50.0 U	50.0 U	50.0 U	50.0 U	3 (G)**
ARSENIC	5.0 U	5.0 U	5.0 U	10.1	5.0	7.9	5.0 U	25
BARIUM	230	186	194	769	627	1290	549	1000
BERYLLIUM	3.0 U	3.0 U	3.0 U	4.0	3.0 U	4.6	3.0 U	3 (G)
CADMIUM	4.7 U	4.7 U	4.7 U	4.7 U	4.7 U	4.7 U	4.7 U	10
CALCIUM	8180	62400	64000	123000	90200	122000	51800	NONE
CHROMIUM	9.9 U	15.5 J	12.7 J	91.8 J	31.8 J	151 J	9.9 U	50
COBALT	25.0 U	25.0 U	25.0 U	65.9	25.0 U	75.9	25.0 U	NONE
COPPER	74.4	63.6	8.9 U	160	90.6	169	55.5	200
IRON	6900	2080	2110	85400	29500	90500	2520	300
LEAD	8.5	3.0 U	3.0 U	81.7	32.1	90.0	3.0 U	25
MAGNESIUM	2820	18400	18300	47800	17300	55200	11300	35000 (G)
MANGANESE	352	13000	13000	16900	6110	36300	4750	300
MERCURY	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	2
NICKEL	32.6 U	32.6 U	32.6 U	123 J	86.7 J	157 J	32.6 U	NONE
POTASSIUM	1980	4500	4330	17700	6470	12000	3760	NONE
SELENIUM	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	10
SILVER	7.4 U	7.4 U	7.4 U	7.4 U	7.4 U	7.4 U	7.4 U	50
SODIUM	7700	71100	73200	57400	18000	71800	34900	20000
THALLIUM	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	4 (G)
VANADIUM	21.7 U	21.7 U	21.7 U	39.7	21.7 U	35.9	21.7 U	NONE
ZINC	45.5	18.8	20.8	320	124	364	13.2	300
CYANIDE	R	R	R	R	R	R	R	100
WET CHEMISTRY(MG/L)								
TOTAL DISSOLVED SOLIDS	40	604	576	812	340	746	277	500
TOTAL SUSPENDED SOLIDS	174	70	38	1580	1190	1130	61	NONE

NOTES:
- DATA QUALIFIERS ARE DEFINED IN SECTION 2.10.3.
- ORGANIC ANALYTES NOT LISTED WERE NOT DETECTED.
- SEE TABLE 7 FOR LIST OF TARGET COMPOUND LIST ANALYTES.
- VALUES EXCEEDING THE NY STANDARD ARE SHADED.
- SAMPLE LOCATIONS ARE SHOWN ON FIGURE 3.
- **(G) = GUIDANCE VALUE

C

Photo 1 - Ponded leachate at northeast corner of site.

Photo 2 - Leachate flowing into Neversink River near northeast corner of site.

Photo 3 – View west towards landfill. Note house in background on edge of fill.

Photo 4 – View looking north at eastern side of landfill are with exposed tree stumps and other debris at toe of slope.

Photo 5: Test Pit 3 C & D material consists of plastic sheets, metal, concrete, brick, and "re-bar".

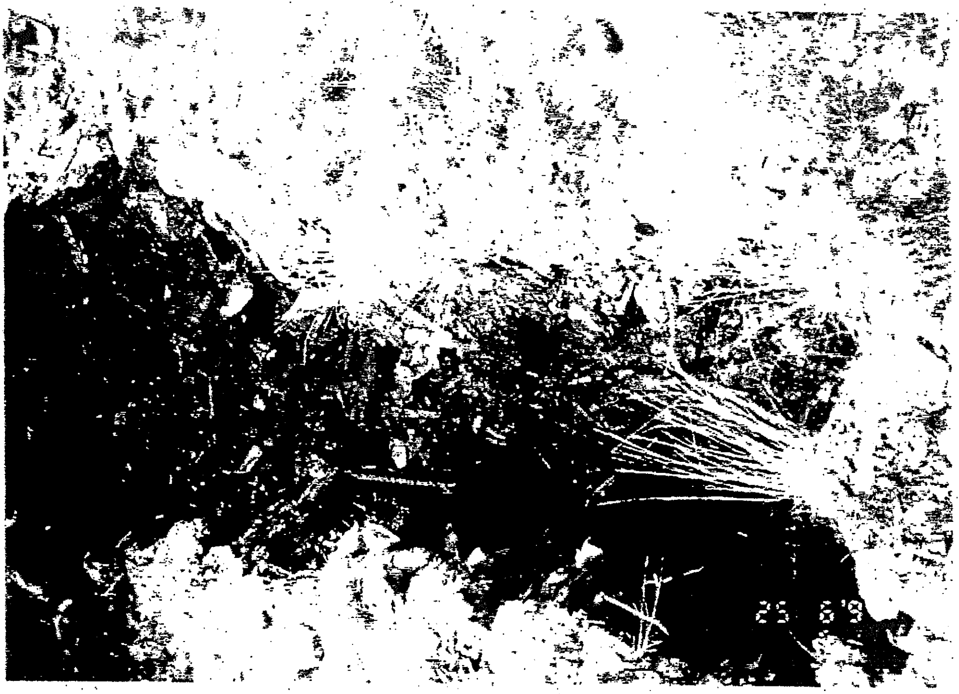


Photo 6: Looking into Test Pit 3. Note the black oily sand.

Photo 7: No C & D material encountered in Test Pit 4. Note groundwater seeping into test pit at a depth of 4 feet.

Photo 8: Looking into Test Pit 5. Note the black oily sand.

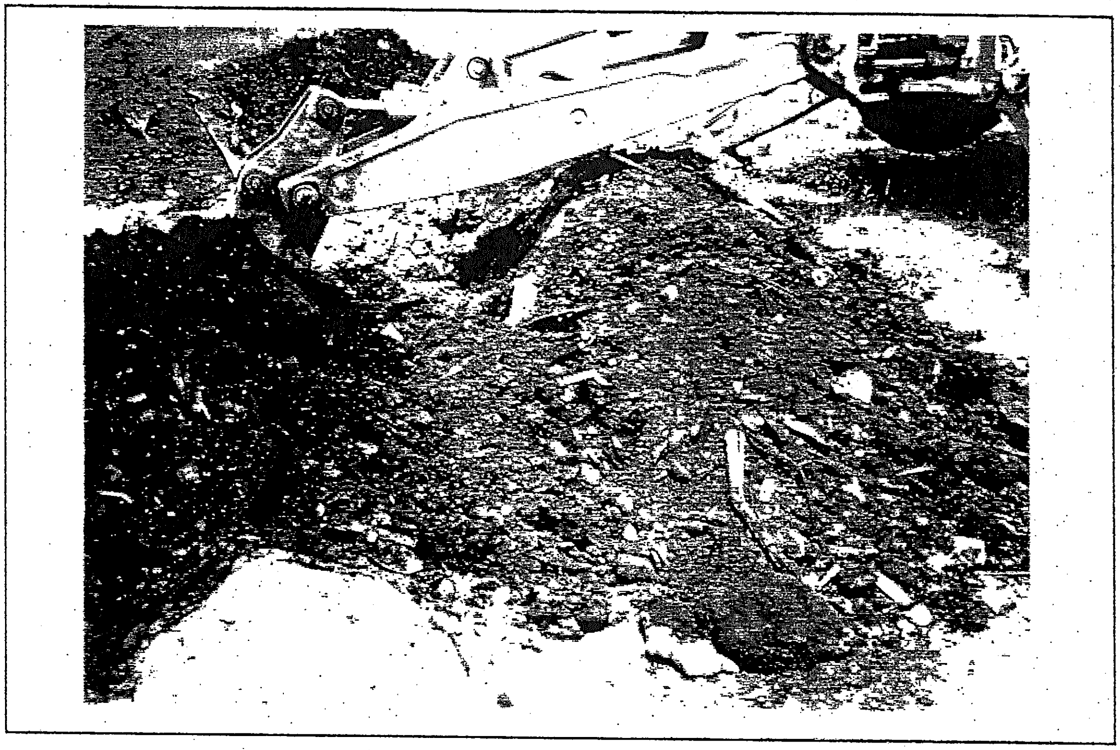


Photo 9: Test Pit 5 C & D material consisting of wood, plastic, and metal pieces.

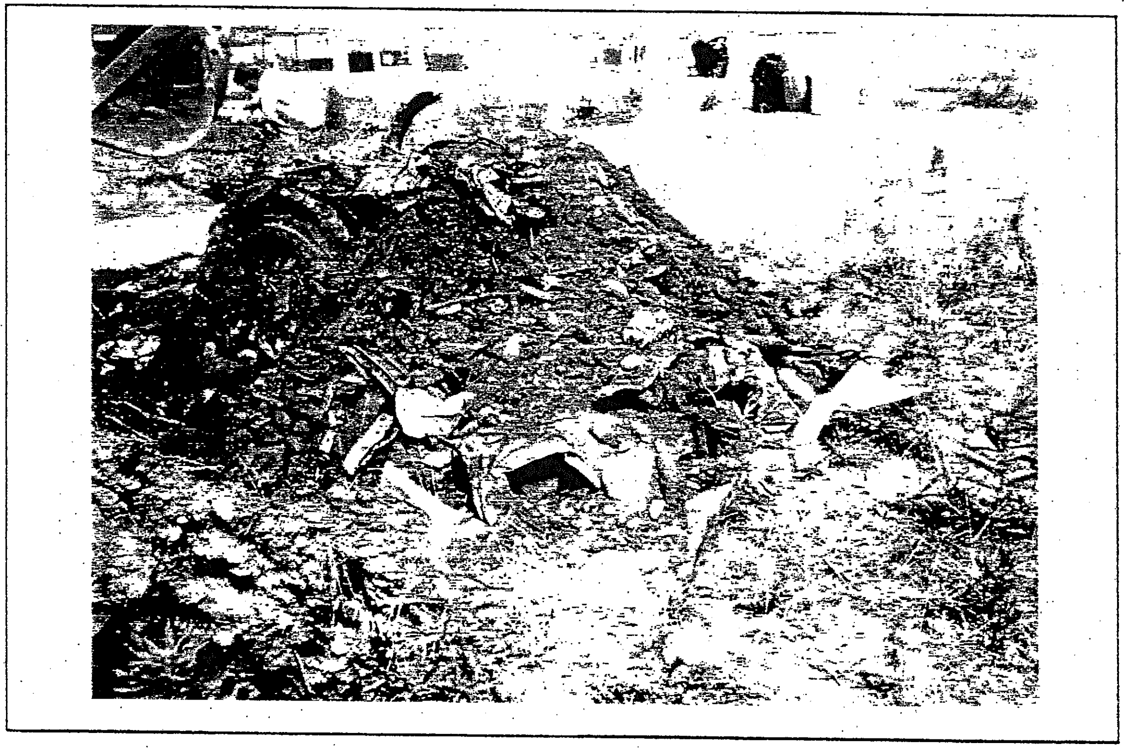


Photo 10: Test Pit 6 C & D material consisting of wood, plastic, metal pieces and a rubber tire.

Photo 11: Looking into Test Pit 6 at 4 feet.

Photo 12: Rugs and tires excavated from Test Pit 6.

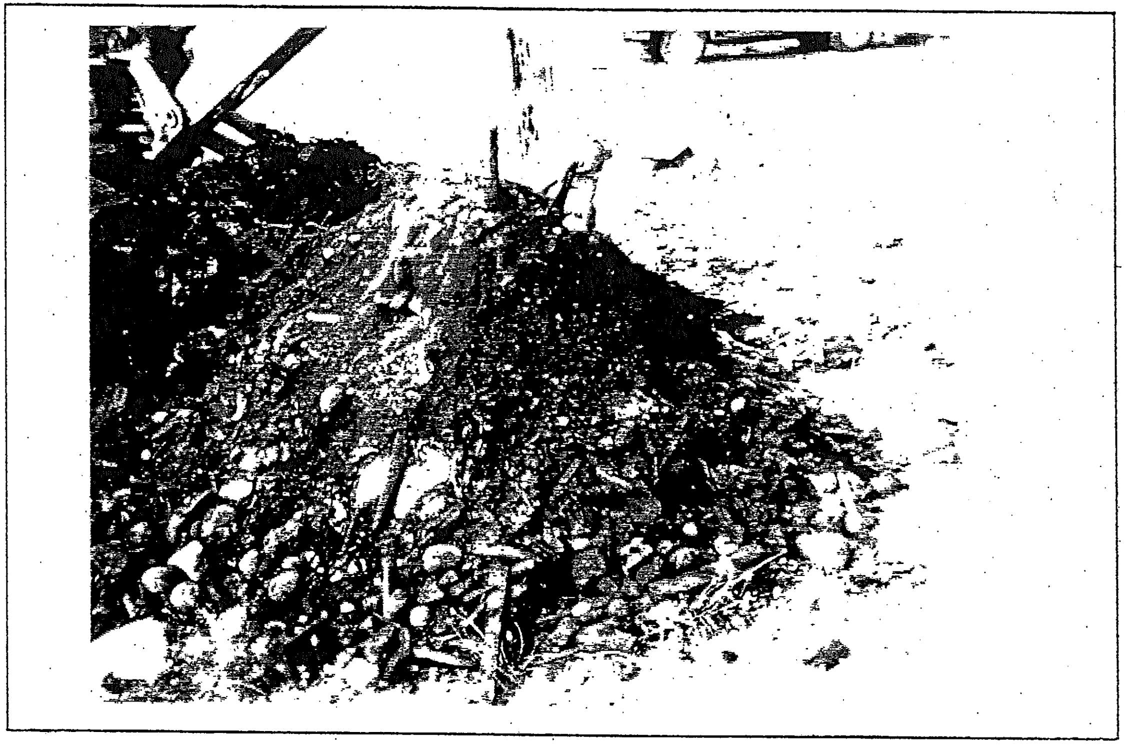


Photo 13: Test Pit 7 C & D material consisting of wood, plastic, and some metal.

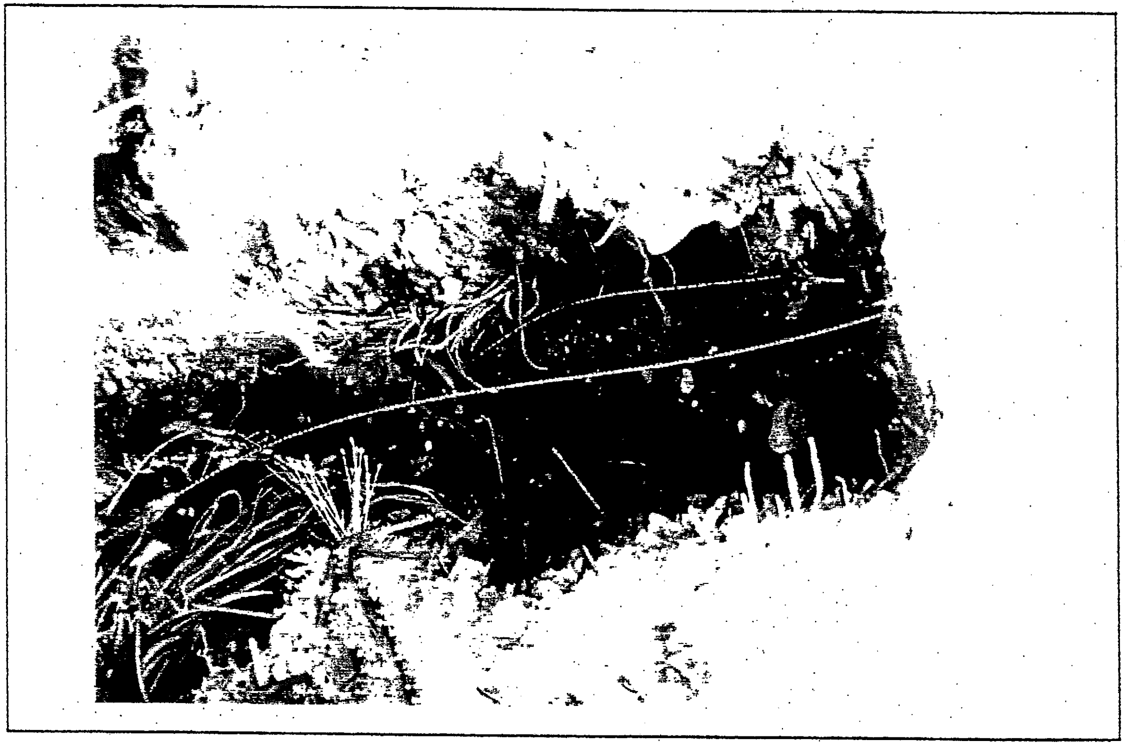


Photo 14: Telephone cable found in Test Pit 7.

Photo 15: Test Pit 8 C & D material consisting of wood, steel pipes, and black oily sand.

Photo 16: Looking into Test Pit 8. Note the wood is burnt and the soil is black and oily.

Photo 17: Test Pit 9 C & D material consisting of brick, concrete, and wood.

Photo 18: Looking into Test Pit 9. Note the plastic sheet, wires, and steel pipe.

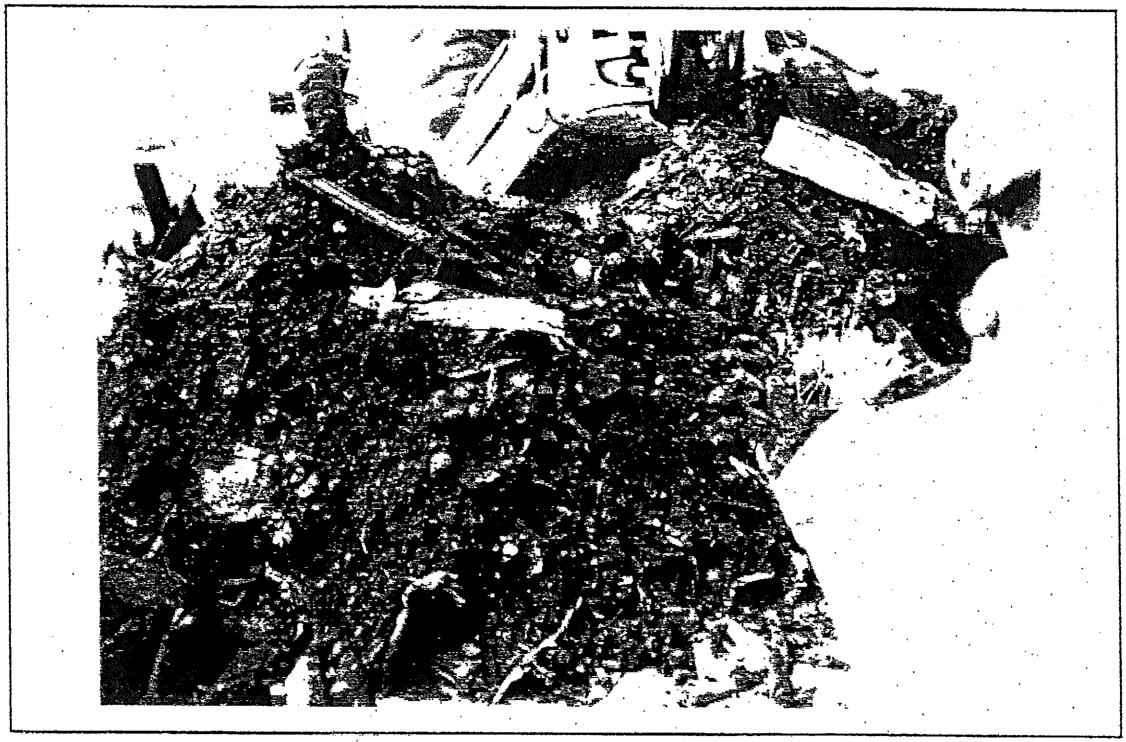


Photo 19: Test Pit 10 C & D material consisting of plastic, metal, and oily sand.

Photo 20: Looking into Test Pit 10. Note the plastic sheet, and steel pieces.

D

TAMS CONSULTANTS, INC.

TEST PIT LOG

DATE STARTED 6/26/91 TIME 07:12 JOB NO. 5324

DATE FINISHED 6/26/91 TIME 08:30 TEST PIT NO. TP-1

CLIENT NYS DEC SITE Rt. 52

SURFACE ELEVATION

EXCAVATOR Mark Eaves

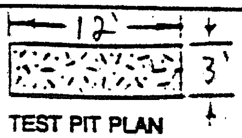
LOCATION

EQUIPMENT Backhoe

INSPECTOR G. Murray

DEPTH	DENS.	MOIST.	DESCRIPTION OF SOIL	REMARKS
1'			Brown Soil Silt, some Clay and Sand.	
2'			50% wood 20% Bricks and Rocks 30% Black Silty Sand	
3'			50% wood 30% Bricks, Rocks 20% Black silty sand	
4'				
5'			50% wood 30% Plastic, Rocks, Bricks, Rug 20% Black Silty Sand.	
6'				
7'			50% Black silty corse sand 25% wood 25% Plastic, Rocks, Rug	appears oily
8'				
9'			70% Soil 15% wood 15% Rug, Plastic	
10'				
			Bottom of test pit at 10' Depth	

NOTES:



TEST PIT PLAN

NORTH

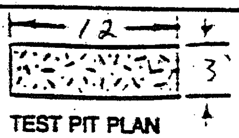
TAMS CONSULTANTS, INC.

TEST PIT LOG

DATE STARTED 6/26/91 TIME 09:20 JOB NO. 5324
DATE FINISHED 6/26/91 TIME 11:05 TEST PIT NO. TP-2
CLIENT NYS DEC SITE RT. 52
SURFACE ELEVATION EXCAVATOR Mark Eaves
LOCATION EQUIPMENT Back hoe
INSPECTOR George Murray

DEPTH	DENS.	MOIST.	DESCRIPTION OF SOIL	REMARKS
			Brown Silt Some sand and Clay.	
0.8'			50% silty corse sand - appeared oily 30% wood 20% Plastic, Papper, Rocks	
2.5'			50% Black Corse Sand - appeared oily 30% wood 20% Plastic, Bricks, Rocks	
5'			65% Corse Sand - 20% wood 15% Plastic, clothing, metal Pipe, Rug	
6'			60% Corse Sand - appeared oily 30% wood 10% Plastic + metal at 7½' a 3' metal Drum was Found HNu was background.	
7'				
8'			40% Corse Sand - appearal oily 40% wood 20% Plastic, Metal, Bricks at 8.7' a large "bundle" of Clear Plastic Sheeting	
9'				
10'				

NOTES:



TEST PIT PLAN

NORTH

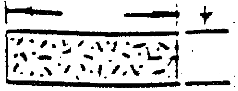
TAMS CONSULTANTS, INC.

TEST PIT LOG

DATE STARTED 6-26-91 TIME 12:20 JOB NO. 5324
DATE FINISHED 6-26-91 TIME 14:30 TEST PIT NO. TP-3
CLIENT ______ SITE Route 52, HHC
SURFACE ELEVATION ______ EXCAVATOR Mark Eaves
LOCATION ______ EQUIPMENT Backhoe
______ INSPECTOR M. Akbar/G. Murray

DEPTH	DENS.	MOIST.	DESCRIPTION OF SOIL	REMARKS
1			Brown silty SAND, some gravel and Cobbles (dry)	
2			Wood 50% Dark gray to black oily silty SAND and GRAVEL 45% plastic sheets, metal, concrete fragments, brick, rebars, etc (5%)	
3				
4				
5				
6				
7			Wood (60%) Dark gray to black oily silty SAND with Concrete and brick fragments (35%) plastic, metal, wire, glass, rug, etc. (5%)	
8				
9				
10				
			Bottom of test pit at 10' depth.	

NOTES:



TEST PIT PLAN

NORTH

TAMS CONSULTANTS, INC.

TEST PIT LOG

DATE STARTED 6-27-91 TIME 12:10 JOB NO. 5324

DATE FINISHED 6-27-91 TIME 12:35 TEST PIT NO. TP-4

CLIENT NYSDEC SITE Route 52 HHC

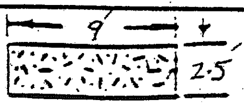
SURFACE ELEVATION EXCAVATOR Mark Eaves

LOCATION EQUIPMENT Backhoe

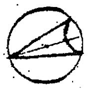
INSPECTOR M-AKBAR / G. Murray

DEPTH	DENS.	MOIST.	DESCRIPTION OF SOIL	REMARKS
1'			Brown silty fine SAND, trace roots. (dry)	
2'			Brown medium to fine SAND, trace fine gravel and silt (dry)	Ground wate Water table encountered at 4' depth
3'			Brown medium to fine SAND, trace fine gravel (moist)	
4'				
			Bottom of test pit at 4' depth	

NOTES:



TEST PIT PLAN



NORTH

TAMS CONSULTANTS, INC.

TEST PIT LOG

DATE STARTED 6-27-91 TIME 13:00 JOB NO. 5324

DATE FINISHED 6-27-91 TIME 14:30 TEST PIT NO. TP-5

CLIENT NYSDEC SITE Route 52 HHC

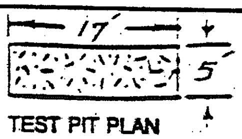
SURFACE ELEVATION EXCAVATOR Mark Eaves

LOCATION EQUIPMENT Backhoe

INSPECTOR M. AKBAR / G. Murray

DEPTH	DENS.	MOIST.	DESCRIPTION OF SOIL	REMARKS
1'			Brown sandy SILT, some coarse to fine gravel. (dry)	
2' 3' 4'			Brown and gray medium to fine SAND and GRAVEL, some silt, some cobbles and boulders (90%) Wood, plastic and metal pieces (10%)	
5' 6'			Dark gray and black oily silty SAND and GRAVEL, some cobbles and boulders (90%) Wood, rag, plastic, carpet, wire (10%)	
7' 8' 9' 10'			Gray and brown silty SAND and GRAVEL, some Cobbles and boulders (90%) Wood, plastic, wires, rag, carpet and metal pieces (10%)	
			Bottom of test pit at 10' depth.	

NOTES:



TEST PIT PLAN

NORTH

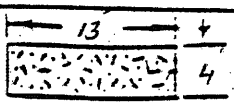
TAMS CONSULTANTS, INC.

TEST PIT LOG

DATE STARTED 6-27-91 TIME 10:30 JOB NO. 5324
DATE FINISHED 6-27-91 TIME 12:00 TEST PIT NO. TP-6
CLIENT NYSDEC SITE Route 52 HHC
SURFACE ELEVATION EXCAVATOR Mark Eaves
LOCATION EQUIPMENT Backhoe
INSPECTOR M. Akbar / G. Murray

DEPTH	DENS.	MOIST.	DESCRIPTION OF SOIL	REMARKS
1			Brown sandy SILT, some coarse to fine gravel with a few boulders (dry)	
2				
3			Gray brown silty SAND, some gravel and boulders (80%)	
4			Wood, plastic, rubber and metal pieces (20%)	
5			Gray brown silty SAND and coarse to fine gravel, a few boulders (80%)	
6			wood (15%)	
7			plastic, rubber, brick, iron pipes, wire, a tire, paper, rug, metallic pieces, etc. (5%)	
8				
9				
10			Wood 80% with with occasional plastic, rug, metal pieces, etc. Dark dark to black oily silty SAND (20%)	
			Bottom of Test pit at 10' depth	

NOTES:



TEST PIT PLAN

NORTH

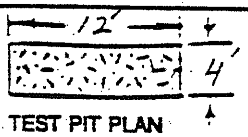
TAMS CONSULTANTS, INC.

TEST PIT LOG

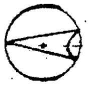
DATE STARTED 6-27-91 TIME 08:45 JOB NO. 5324
DATE FINISHED 6-27-91 TIME 10:20 TEST PIT NO. TP-7
CLIENT NYSDEC SITE Route 52 HHC
SURFACE ELEVATION ______ EXCAVATOR Mark Eaves
LOCATION ______ EQUIPMENT Backhoe
______ INSPECTOR M. Akbar / G. Murray

DEPTH	DENS.	MOIST.	DESCRIPTION OF SOIL	REMARKS
1			Brown Sandy SILT, some gravel and Cobbles. (dry)	
2			Brown and dark gray silty SAND and GRAVEL. (95%) Wood with occasional plastic (5%)	
3 4			Brown and dark gray silt SAND, some gravel and cobbles (80%) Wood 15% Miscell. including telephone cable, plastic, metal (5%)	
5 6			Brown and dark gray oily silty SAND and coarse to fine SAND (80%) Wood 15% plastic, metal, rugs, a tire, brick and concrete (5%)	
7 8 9 10			Dark gray silty SAND and coarse to fine GRAVEL, some cobbles (70%) Wood (20%) Concrete, brick, rugs, plastic, wire, etc. (10%)	
			Bottom of test pit at 10' depth	

NOTES:



TEST PIT PLAN



NORTH

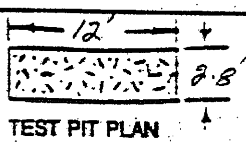
TAMS CONSULTANTS, INC.

TEST PIT LOG

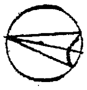
DATE STARTED 6-27-91 TIME 0610 JOB NO. 5324
DATE FINISHED 6-27-91 TIME 0840 TEST PIT NO. TP-8
CLIENT NYSDEC SITE Route 52 HHC
SURFACE ELEVATION EXCAVATOR Mark Eaves
LOCATION EQUIPMENT Backhoe
INSPECTOR M. Akbar / G. Murray

DEPTH	DENS.	MOIST.	DESCRIPTION OF SOIL	REMARKS
1			Brown Sandy SILT, trace roots (dry)	
2			Brown Silty SAND (70%) Wood, trace plastic, metal fragments 30%	
3 4			Dark gray to black oily SAND, some fine gravel 60% Wood, metal and plastic sheets, brick and concrete fragments 40%	
5 6			Dark gray to black silty SAND, some coarse to fine gravel (60%) Wood 30% Brick and concrete fragments, occasional plastic 10%	
7 8			Wood (60%) Dark gray oily sand SILT (30%) Concrete and brick (5%) carpets, rubber, plastic, steel plates, pipes, etc. (5%)	
9 10			Wood (60%) Dark gray to black silty SAND (30%) Brick and concrete fragments, trace plastic, glass, metal, rug, etc. (10%)	
			Bottom of test pit at 10' depth	

NOTES:



TEST PIT PLAN



NORTH

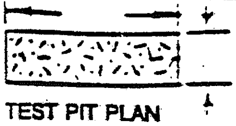
TAMS CONSULTANTS, INC.

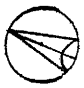
TEST PIT LOG

DATE STARTED 6-26-91 TIME 17:15 JOB NO. 5324
DATE FINISHED 6-26-91 TIME 18:00 TEST PIT NO. TP-9
CLIENT ______ SITE Route 52 HHC
SURFACE ELEVATION ______ EXCAVATOR Mark Eaves
LOCATION ______ EQUIPMENT Backhoe
______ INSPECTOR M. Akbar/G. Murray

DEPTH	DENS.	MOIST.	DESCRIPTION OF SOIL	REMARKS
1			Brown Sandy SILT, Some gravel, trace roots (dry)	
2			Brown silty medium to fine SAND (60%) Brick and Concrete fragments (20%) Wood 15% steel pipes, plastic sheets, wires, etc. (5%)	
3				
4				
5				
6				
7			Brown silty SAND (60%) Wood 30% Brick and Concrete fragments, occasional plastic and metal pieces (10%)	
8				
9				
10				
			Bottom of test pit at 10' depth.	

NOTES:


TEST PIT PLAN


NORTH

TAMS CONSULTANTS, INC.

TEST PIT LOG

DATE STARTED 6-26-91 TIME 14:50 JOB NO. 5324

DATE FINISHED 6-26-91 TIME 16:45 TEST PIT NO. TP-10

CLIENT

SITE Route 52, HHC

SURFACE ELEVATION

EXCAVATOR Mark Eaves

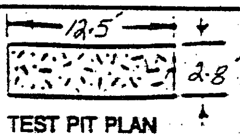
LOCATION

EQUIPMENT Backhoe

INSPECTOR M. Akbar / G. Murray

DEPTH	DENS.	MOIST.	DESCRIPTION OF SOIL	REMARKS
1			Brown Sandy SILT, some gravel (dry)	
2			Dark gray to black oily SAND and SILT, Some concrete fragments and brick (65%) Wood 30%	
3			Dark gray to black SAND and SILT 45% Wood (45%)	
4			Miscell. material including plastic, metal, rag, carpets, wires, etc.	
5			Wood (70%) Sand and SILT (30%)	
6			Brick and concrete fragments, occasional plastic and metal pieces (5%)	
7				
8				
9			Wood 75% SAND and SILT, Some concrete fragments, occasional steel pipe, rug, plastic, paper, wire, heavy steel at bottom, could not be removed.	
9.5			Bottom of test pit at 9.5' depth	

NOTES:



TEST PIT PLAN

NORTH

TAMS CONSULTANTS, Inc.

BORING/WELL LOG

Boring No. MW-1

PROJECT NYSDEC C+D SITES
CONTRACTOR PARRATT WOLFF
PAGE 1 OF 2
PROJECT NO. 5324-74
LOCATION RTE 52 SITE, FALLSBURG NY
DATE 8/5 + 8/6/91
SURFACE ELEVATION
DATUM
DRILLER BARNEY WATERS
TAMS REP. DAVID SCHEUK

WATER LEVELS

DATE	TIME	DEPTH	CASING
8/6/91	18:55	8.43	PVC

DRILLING AND SAMPLING

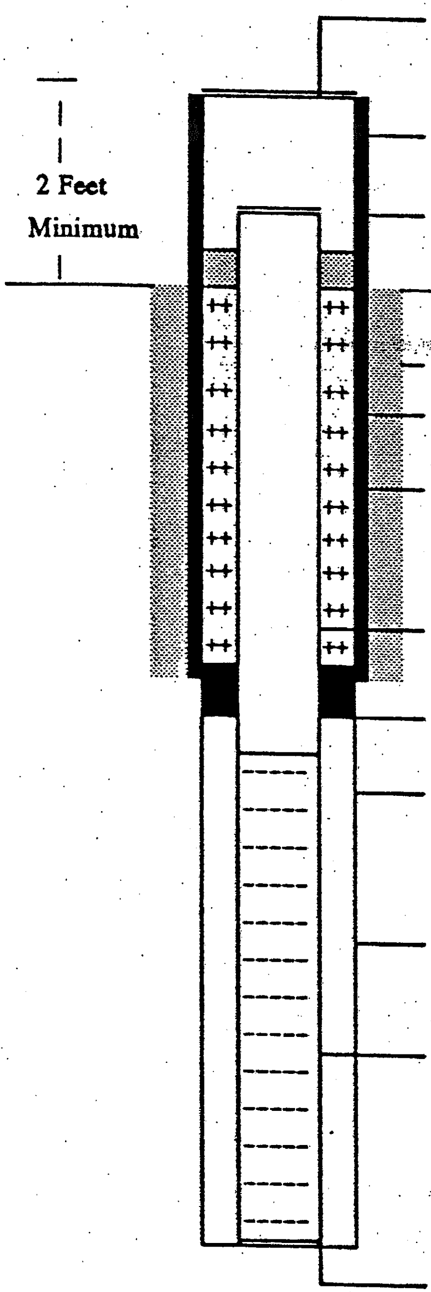
	CASING	SAMPLER	CORE	TUBE
TYPE	FLUSH JOINT STEEL		NX	n/a
I.D.	6"		2 7/8"	
WT/Fall	Spun		n/a	

	Depth (ft)	Casing Blows	Sample Number	Blows per/6"	Recovery (Inches)	SAMPLE DESCRIPTION, REMARKS, AND STRATUM CHANGES
3:30 3/5/91	-- 0					0 → 6" - Brown clayey silt, some fine sand, some fine gravel, some organics
	-- 1		S1	3,48 100/4"	16"	6" → 16" - Reddish-brown and grey laminated weathered sandstone
	-- 2					6" casing spun to 3', and bedrock surface reamed to bottom of casing at 3.3
	-- 3					
	-- 4			4:10		highly weathered and fractured dark grey, med → css grained sandstone, some lge qtz. clasts. RUN = 5.0' (3.3' → 8.3') RQD = 0%
	-- 5		CORE	1:22	3.75'	
	-- 6		RUN #1	2:26		
5/91	-- 7			2:20		
:30	-- 8 8.3'			2:17		
6/91	-- 9			missed timing		highly weathered and fractured, grey, med grained sandstone, some large qtz clasts RUN = 4.5' (8.3' → 12.8') RQD = [illegible]%
:50	--10		CORE	4:00	4.25'	
	--11		RUN #2	2:32		
	--12 12.8'			2:50 1:22 for 0.5'		
	--13			2:59		12.8 → 13.5' - highly fractured and weathered med grained gray sandstone, some css qtz clasts 13.5 → 14.3' - highly fractured reddish brown shale 14.3 → 14.6' - highly fractured grey shale 14.6 → 16.0' - highly fractured reddish brown sandstone 16.0 → 17.8 - fractured, grey, med. grained sandstone, some large qtz clast RUN = 5.0' - (12.8' → 17.8') RQD = 35%
	--14		CORE	8:30		
	--15		RUN #3	5:16	4.25'	
	--16			4:57		
6/91	--17			5:32		
:15	--18					

TAMS CONSULTANTS, Inc. **WELL LOG** Well No. MW-1

Project NYSDEC C&D SITES	Location FALLSBURG NY RTE 52 SITE	Page 2 of 2
Project No. 5324-74	Contractor PARRATT WOLFF	Water Levels
Surface Elevation	Driller Barney WATERS	
Top of Riser Elevation +2.0'	Well Permit Number TAMS Rep. DAVID SCHEUING	
Datum	Date of Completion 8/6/91	

Date	Time	Depth
8/6/91	18:55	8.43'
		-



Lockable Cover with Padlock

6 inch ID Protective Casing

Protective Cap, Type: STEEL

Ground Surface

Concrete Seal, from 0.0 feet to -6.2 feet

4 inch ID Steel Casing, from ______ to ______ feet.

Bentonite Slurry, from ______ feet to ______ feet

4 inch ID Riser Pipe from +2.0 feet to -7.4 feet

Bentonite Pellet Seal, from -6.2 feet to -8.2 feet

Sand Pack, from ______ feet to ______ feet

Sand Size, Number ______

______ inches, Borehole Diameter

2 7/8 inch ~~ID~~ OPEN BEDROCK Well ~~Screen~~, from -8.2 feet to -17.1 feet

Type: ______ Slot size: ______ Sch: ______

Bottom Cap at ______ feet, Type: ______

Note: All measurements based on ground surface at 0 feet, (+) above grade, (-) below grade.

(NOT TO SCALE)

TAMS CONSULTANTS, Inc.

BORING/WELL LOG

Boring No. MW-2

PROJECT Route 52 C & D site	CONTRACTOR Parratt Wolff, Inc	PAGE 1 OF
PROJECT NO. 5324	LOCATION	DATE 7/29-30
SURFACE ELEVATION	DATUM | DRILLER Rick NAVAPTA	TAMS REP. M. AKBAR

WATER LEVELS

DATE	TIME	DEPTH	CASING

DRILLING AND SAMPLING

	CASING	SAMPLER	CORE	TUBE
TYPE	HSA	SPLIT SPOON	NX	
I.D.	4 1/4"	1 3/8"	2 1/8"	
WT/Fall		140 Lb/30"		

Depth (ft)	Casing Blows	Sample Number	Blows per/6"	Recovery (Inches)	SAMPLE DESCRIPTION, REMARKS, AND STRATUM CHANGES
-- 0					
-- 1		S-1	3-4 5-8	6"	Brown fine sandy SILT, trace roots (dry)
-- 2					
-- 3		S-2	8-9 15-27	13"	Brown silty fine SAND, some gravel (dry)
-- 4					
-- 5		S-3	16-65 50/2"	14"	Brown silty fine SAND and coarse to fine GRAVEL (dry)
-- 6					SANDSTONE, gray, hard, well cemented, medium grained, fresh, Fractured, horizontal joints at 2"-6" spacing.
-- 7					
-- 8		R-1		58"	
-- 9					Depth = 5.2'-10', Run = 58", Rec = 58", RQD = 0%
--10					
--11					
--12					
--13					
--14					
--15					
--16					
--17					
--18					

TAMS CONSULTANTS, Inc.

BORING/WELL LOG

Boring No. MW-2

PROJECT NYSDEC C+D SITES	CONTRACTOR PARRATT WOLFF	PAGE 1 OF 2
PROJECT NO. 5324-74	LOCATION RTE 52 SITE, FALLS BURG NY	DATE 8/5/91
SURFACE ELEVATION	DATUM | DRILLER BARNEY WATERS	DAVID SCHELLING TAMS REP.

WATER LEVELS

DATE	TIME	DEPTH	CASING
8/5/91	14:20	9.66'	PVC
8/6/91	16:40	9.71'	PVC
8/7/91	15:15	9.66'	PVC

DRILLING AND SAMPLING

	CASING	SAMPLER	CORE	TUBE
TYPE			NX	n/a
I.D.			2 7/8"	
WT/Fall			n/a	

	Depth (ft)	Casing Blows	Sample Number	Blows per/6"	Recovery (Inches)	SAMPLE DESCRIPTION, REMARKS, AND STRATUM CHANGES
	0					
	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
:25 5/91	10		CORE RUN #	10:16	2.98'	fractured, grey, med grained sandstone, some css qtz clasts. RUN = 3.0' (10.0' → 13.0') RQD = 12%
	11			3:25		
	12			3:50		
	13		CORE RUN #	MISSED TIMING	4.88'	fractured, grey, med. grained sandstone some css qtz clasts RUN = 5.0' (13.0' → 18.0') RQD = 36%
	14			8:00		
	15			7:08		
	16			5:41		
	17			5:08		
30 5/91	18					

TAMS CONSULTANTS, Inc.

WELL LOG

Well No. MW-2

Project NYSDEC C+D SITES

Location FALLSBURG NY RTE 52 SITE

Page 2 of 2

Project No. 5324-74

Contractor PARRATT WOLFF

Surface Elevation

Driller BARNEY WATERS

Well Permit Number

Top of Riser Elevation +2.0'

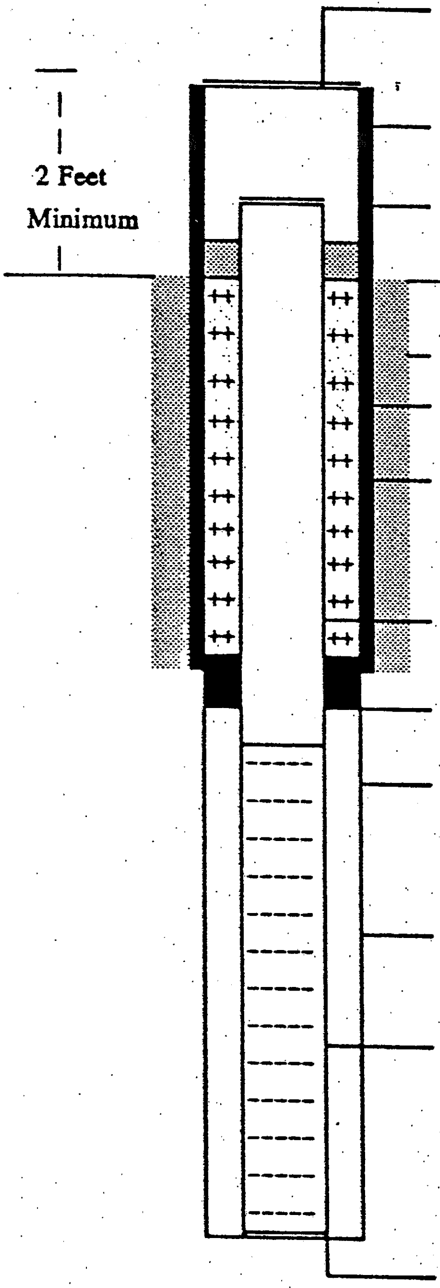
TAMS Rep. DAVID SCHEUING

Datum

Date of Completion 8/5/91

Water Levels

Date	Time	Depth
8/5/91	14:20	9.66'
8/6/91	16:40	9.71'
8/7/91	15:15	9.66'



Lockable Cover with Padlock

_______ inch ID Protective Casing

Protective Cap, Type:____________

Ground Surface

Concrete Seal, from____________ feet to____________ feet

4 inch ID Steel Casing, from ______ to ______ feet.

Bentonite Slurry, from____________ feet to__________ feet

_______ inch ID Riser Pipe from____________ feet to __________ feet

Bentonite Pellet Seal, from____________ feet to____________ feet

Sand Pack, from ____________ feet to____________ feet

Sand Size, Number ____________

_________ inches, Borehole Diameter

2⅛ inch ~~ID~~ OPEN BEDROCK Well ~~Screen~~, from -10.0 feet to -18.0 feet

Type: ______________ Slot size:______________ Sch:_______

Bottom Cap at ____________ feet, Type:______________

Note: All measurements based on ground surface at 0 feet, (+) above grade, (-) below grade.

(NOT TO SCALE)

TAMS CONSULTANTS, Inc.

BORING/WELL LOG

Boring No. MW-3

PROJECT Route 52 C & D site
CONTRACTOR Parratt Wolff, Inc.
PAGE 1 OF
PROJECT NO. 5324
LOCATION
DATE 7/30
SURFACE ELEVATION
DATUM
DRILLER Rick NAVAPTA
TAMS REP. M. Akbar

WATER LEVELS

DATE	TIME	DEPTH	CASING

DRILLING AND SAMPLING

	CASING	SAMPLER	CORE	TUBE
TYPE	HSA	SPLIT SPOON		
I.D.	4 1/4"	1 3/8"		
WT/Fall		140 lb/30"		

Depth (ft)	Casing Blows	Sample Number	Blows per/6"	Recovery (Inches)	SAMPLE DESCRIPTION, REMARKS, AND STRATUM CHANGES
-- 0		S-1	1-1 1-1	6"	Brown fine silty SAND (dry)
-- 1					
-- 2		S-2	1-2 3-3	15"	Brown silty fine SAND (dry)
-- 3					
-- 4		S-3	3-2 2-3	16"	Brown silty fine SAND (dry)
-- 5					
-- 6		S-4	2-2 2-2	16"	Brown silty fine SAND (moist)
-- 7					
-- 8		S-5	1-1 9-16	15"	Brown medium to fine SAND, some gravel (wet)
-- 9					
--10		S-6	13-14 13-19	14"	Brown medium to fine SAND and coarse to fine GRAVEL, trace silt (wet)
--11					
--12		S-7	49-56	12"	Brown coarse to fine SAND and coarse to fine GRAVEL (wet)
--13					
--14		S-8	23-23 29-36	15"	Brown medium to fine silty SAND, some coarse to fine gravel (wet to moist)
--15					
--16		S-9	25-25 26-28	16"	Brown and gray silty medium to fine SAND and coarse to fine GRAVEL (wet to moist)
--17					
--18		S-10	50/3"	NO REC	

TAMS CONSULTANTS, Inc.

BORING/WELL LOG

Boring No. MW-4

PROJECT Route 52 C&D site	CONTRACTOR Parratt Wolff, Inc.	PAGE 1 OF 3
PROJECT NO. 5324	LOCATION	DATE 7/26/91
SURFACE ELEVATION	DATUM | DRILLER Rick NAVAPTA	TAMS REP. M. AKBAR

WATER LEVELS

DATE	TIME	DEPTH	CASING

DRILLING AND SAMPLING

	CASING	SAMPLER	CORE	TUBE
TYPE	HSA	SPLIT SPOON		
I.D.	4 1/4"	1 3/8"		
WT/Fall				

Depth (ft)	Casing Blows	Sample Number	Blows per/6"	Recovery (Inches)	SAMPLE DESCRIPTION, REMARKS, AND STRATUM CHANGES
0					
1		S-1	1-1 2-3	13"	Brown silty fine SAND (dry)
2					
3		S-2	1-2 6-19	11"	Brown silty fine SAND, some gravel, trace wood (dry)
4					
5		S-3	16-19 22-18	14"	Brown medium to fine SAND & fine gravel, some silt (moist to wet)
6					
7		S-4	17-24 25-60	17"	Brown silty fine SAND, some gravel (moist to wet,
8					
9		S-5	15-16 16-16	7"	Gray silty fine SAND, some gravel (moist to wet)
10					
11		S-6	10-14 21-24	14"	Brown silty fine SAND, trace gravel (wet)
12					
13		S-7	28-31 31-31	18"	Brown silty SAND and fine GRAVEL (wet)
14					
15		S-8	12-24 57	13"	Brown silty SAND & fine GRAVEL (wet)
16					
17		S-9	24-36 65	15"	Brown sand SILT, trace to some gravel (moist)
18					

TAMS CONSULTANTS, INC.

BORING/WELL LOG

Boring No. MW-4

PROJECT Route 52 C & D site

PROJECT NO. 5324

PAGE 2 OF 3

Depth (ft)	Casing Blows	Sample Number	Blows per/6"	Recovery (Inches)	SAMPLE DESCRIPTION, REMARKS AND STRATUM CHANGES
--18		S-10	50/5"	5"	Brown sandy SILT, some coarse to fine gravel, trace clay (wet)
--19					
--20					
--					Bottom of Boring at 20' depth
--					
--					
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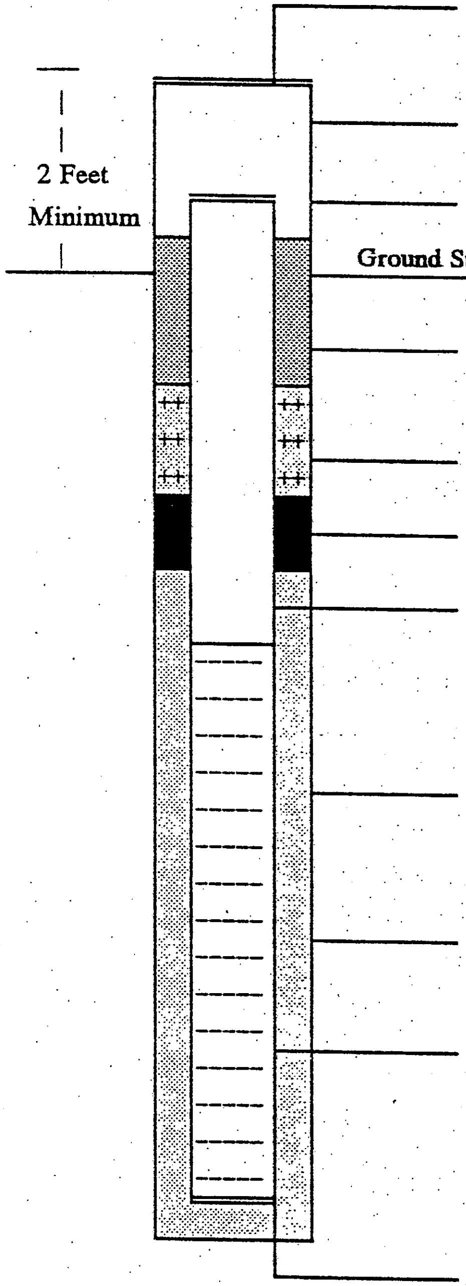
TAMS CONSULTANTS, Inc. WELL LOG Well No. MW-4

Project Route 52, C&D site	Location	Page 3 of 3		
Project No. 5324	Contractor Parratt Wolf, Inc	Water Levels		
Surface Elevation	Driller Rick NAVAPTA	Date	Time	Depth
Top of Riser Elevation	Well Permit Number	7/29/91	0745AM	3.8'
	TAMS Rep. M. AKBAR			
Datum	Date of Completion 7/26/91			



Lockable Cover with Padlock

4 inch ID Protective Casing

Protective Cap, Type: Locking Cap

Concrete Seal, from 0 feet to -4.5 feet

Bentonite Slurry, from ______ feet to ______ feet

Bentonite Pellet Seal, from -4.5 feet to -6.5 feet

2 inch ID Riser Pipe from +1.8 feet to -9 feet

Sand Pack, from -6.5 feet to -20 feet
Sand Size, Number 0 and 00

7 inches, Borehole Diameter

2 inch ID Well Screen, from -9 feet to -19 feet
Type: PVC Slot size: 10 Sch: 40

Bottom Cap at -19 feet, Type: PVC

Note: All measurements based on ground surface at 0 feet, (+) above grade, (-) below grade.

(NOT TO SCALE)

TAMS CONSULTANTS, Inc.

BORING/WELL LOG

Boring No. MW-5

PROJECT Route 52 C&D site	CONTRACTOR Parratt Wolff, Inc	PAGE 1 OF 3
PROJECT NO. 5324	LOCATION	DATE 7/25-26/91
SURFACE ELEVATION	DATUM | DRILLER Rick NAVAPTA	TAMS REP. M. AKBAR

WATER LEVELS

DATE	TIME	DEPTH	CASING

DRILLING AND SAMPLING

	CASING	SAMPLER	CORE	TUBE
TYPE	HSA	SPLIT SPOON		
I.D.	4¼"	1⅜"		
WT/Fall				

Depth (ft)	Casing Blows	Sample Number	Blows per/6"	Recovery (Inches)	SAMPLE DESCRIPTION, REMARKS, AND STRATUM CHANGES
-- 0					
-- 1		S-1	8-11 10-10	12"	Brown silty fine SAND, trace fine gravel (dry)
-- 2					
-- 3		S-2	8-7 9-7	12"	Brown silty fine SAND, trace fine gravel (damp)
-- 4					
-- 5		S-3	4-6 8-12	15"	Brown silty fine SAND (moist)
-- 6					
-- 7		S-4	4-4 3-9	15"	Brown silty fine SAND (6'-7', moist) Gray-brown fine SAND, trace silt (7'-8', wet)
-- 8					
-- 9		S-5	14-25 33-34	15"	Brown silty medium to fine SAND, Some coarse to fine gravel (moist to wet)
--10		S-6	65/6"	6"	Brown silty medium to fine SAND, trace fine gravel (wet)
--11					
--12					
--13		S-7	11-18 22-29	17"	Brown medium to fine silty SAND, Some fine gravel (moist to wet)
--14					
--15		S-8	14-23 18-18	14"	Brown silty medium to fine SAND, Some gravel (wet)
--16					
--17		S-9	27-41 50/4"	13"	Red brown silty medium to fine SAND, Some fine gravel (moist to wet)
--18					

TAMS CONSULTANTS, INC. BORING/WELL LOG Boring No. MW-5

PROJECT Route 52 C&D Site

PROJECT NO. 5324 PAGE 2 OF 3

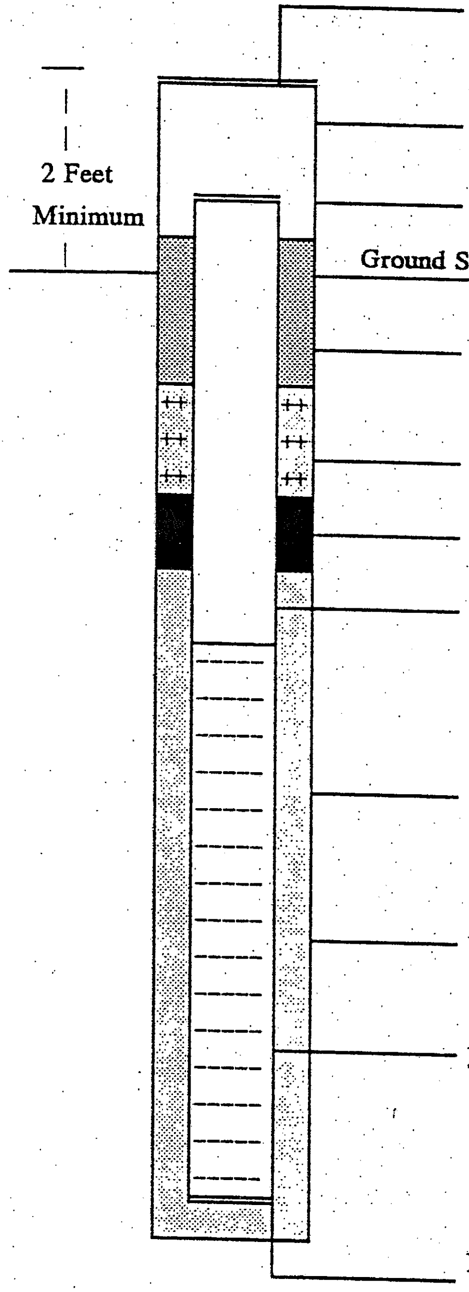
Depth (ft)	Casing Blows	Sample Number	Blows per/6"	Recovery (Inches)	SAMPLE DESCRIPTION, REMARKS AND STRATUM CHANGES
18					
19		S-10	28-36 41-49	14"	Brown silty medium to fine SAND, Some Coarse to fine gravel (moist to wet)
20					
					Bottom of Boring at 20' depth

TAMS CONSULTANTS, Inc. WELL LOG **Well No.** MW-5

Project Route 52 C&D site	Location	Page 3 of 3
Project No. 5324	Contractor Parratt Wolff, Inc	
Surface Elevation	Driller RICK NAVAPTA	
Top of Riser Elevation	Well Permit Number M-Akbar TAMS Rep.	
Datum	Date of Completion 7/26/91	

Water Levels

Date	Time	Depth
7/29/91	2:55PM	7.3'



Lockable Cover with Padlock

4 inch ID Protective Casing

Protective Cap, Type: locking cap

Concrete Seal, from 0 feet to -4.4 feet

Bentonite Slurry, from ______ feet to ______ feet

Bentonite Pellet Seal, from -4.4 feet to -6.5 feet

2 inch ID Riser Pipe from +2 feet to -9 feet

Sand Pack, from -6.5 feet to -20 feet
Sand Size, Number 0 and 00

______ inches, Borehole Diameter

2 inch ID Well Screen, from -9 feet to -19 feet
Type: PVC Slot size: 10 Sch: 40

Bottom Cap at -19 feet, Type: PVC

Note: All measurements based on ground surface at 0 feet, (+) above grade, (−) below grade.

(NOT TO SCALE)

TAMS CONSULTANTS, Inc.

BORING/WELL LOG

Boring No. MW-6

PROJECT Route 52 C&D	CONTRACTOR Parratt Wolff, Inc	PAGE 1 OF
PROJECT NO. 5324	LOCATION	DATE 7/29
SURFACE ELEVATION	DATUM | DRILLER Rick NAVAPTA	TAMS REP. M. AKBAR

WATER LEVELS

DATE	TIME	DEPTH	CASING

DRILLING AND SAMPLING

	CASING	SAMPLER	CORE	TUBE
TYPE	HSA	SPLIT SPOON		
I.D.	4 1/4"	1 3/8"		
WT/Fall		140lb/30"		

Depth (ft)	Casing Blows	Sample Number	Blows per/6"	Recovery (Inches)	SAMPLE DESCRIPTION, REMARKS, AND STRATUM CHANGES
-- 0					
-- 1		S-1	2-3 3-3	12"	Brown Sandy SILT, trace gravel and roots (dry)
-- 2					
-- 3		S-2	3-4 5-6	16"	Brown silty fine SAND (dry)
-- 4					
-- 5		S-3	4-3 10-20	17"	Brown silty fine SAND (4'-5') Brown medium to fine SAND, Some silt, trace gravel (5'-6')
-- 6					
-- 7		S-4	25-22 27-25	18"	Brown medium to fine SAND, Some silt, trace gravel (dry)
-- 8					
-- 9		S-5	9-13 29-27	16"	Gray brown medium to fine SAND, Some Coarse to fine gravel, trace silt (moist)
--10					
--11		S-6		18"	Brown silty medium to fine SAND, Some Coarse to fine gravel (moist to dry)
--12		S-7	50/2"	No Rec	
--13					
--14					
--15					
--16					
--17					
--18					

TAMS CONSULTANTS, Inc.

BORING/WELL LOG

Boring No. MW-6

PROJECT NYSDEC C+D SITES	CONTRACTOR PARRATT-WOLFF	PAGE 1 OF 2
PROJECT NO. 5324-74	LOCATION FALLSBURG N.Y. RTE 52 SITE	DATE 8/1 → 8/2/91
SURFACE ELEVATION	DATUM | DRILLER BARNEY WATERS	TAMS REP. DAVID SCHEU

WATER LEVELS			
DATE	TIME	DEPTH	CASING
8/5/91	9:30	11.55'	PVC
8/6/91	16:30	11.56'	PVC
8/8/91	11:00	11.53'	PVC

DRILLING AND SAMPLING	CASING	SAMPLER	CORE	TUBE
TYPE	flush joint steel		NX	n/a
I.D.	6"		2 1/2	
WT/Fall	Spun		n/a	

Depth (ft)	Casing Blows	Sample Number	Blows per/6"	Recovery (Inches)	SAMPLE DESCRIPTION, REMARKS, AND STRATUM CHANGES
0					
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					12.0' → 12.9' - REAMED OUT with roller bit
7:30 8/2/91 12.9					
13		CORE RUN #1	MISSED TIMING	4.60'	fractured, fine → med. sandstone, faintly stratified, some css gt3 clasts
14			MISSED TIMING		RUN = 4.7' (12.9' → 17.6')
15			8:00		ROD = 53%
16			10:24		
17 17.6			7:06 for 0.7'		
:00 2/91 18 17.9					← REAMED HOLE FROM 17.6' → 17.9'

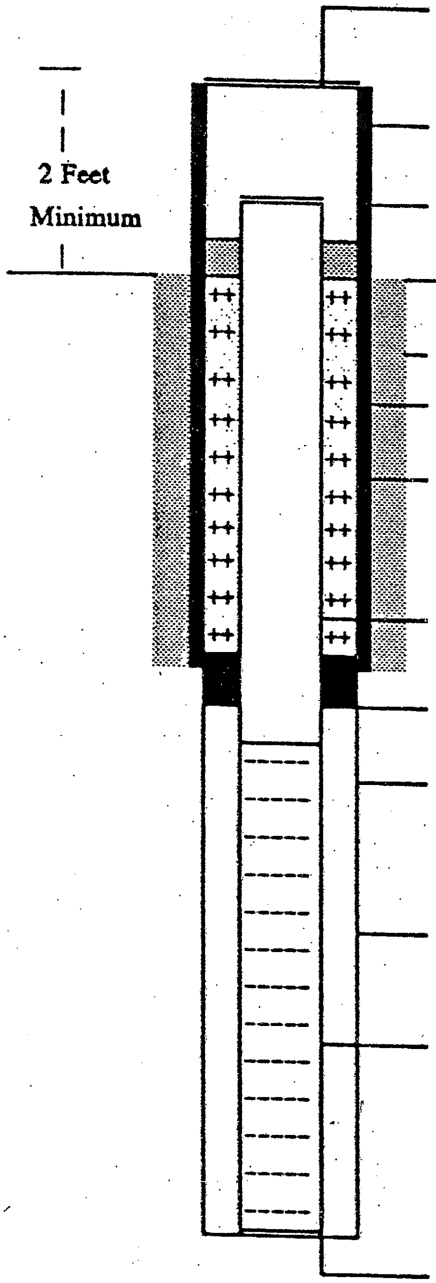
TAMS CONSULTANTS, Inc.

WELL LOG

Well No. MW-6

Project NYSDEC C+D SITES	Location FALLSBURG N.Y. RTE 52 SITE	Page 2 of 2
Project No. 5324-74	Contractor PARRATT WOLFF	Water Levels
Surface Elevation	Driller BARNEY WATTERS	
Top of Riser Elevation + 2'	Well Permit Number TAMS Rep. DAVID SCHEUING	
Datum	Date of Completion	

Date	Time	Depth



Lockable Cover with Padlock

4 inch ID Protective Casing

Protective Cap, Type: STEEL

Ground Surface

Concrete Seal, from 0.0 feet to -3.2 feet

4 inch ID Steel Casing, from ______ to ______ feet.

Bentonite Slurry, from ______ feet to ______ feet

2 inch ID Riser Pipe from +2.0 feet to -7.9 feet

Bentonite Pellet Seal, from -3.2 feet to -5.6 feet

Sand Pack, from -5.6 feet to -17.9 feet

Sand Size, Number ______

5¼ inches, Borehole Diameter

2 inch ID Well Screen, from -7.9 feet to -17.9 feet

Type: PVC Slot size: ______ Sch: ______

Bottom Cap at -17.9 feet, Type: PVC

Note: All measurements based on ground surface at 0 feet, (+) above grade, (–) below grade.

(NOT TO SCALE)

APPENDIX B

HEALTH AND SAFETY PLAN
(HASP)

STERLING
Sterling Environmental Engineering, P.C.

HEALTH AND SAFETY PLAN
(HASP)

HILLS HOLDING CORPORATION
CONSTRUCTION AND DEMOLITION DEBRIS LANDFILL
NYS ROUTE 42, FALLSBURG, NEW YORK

SITE NO. E-3-53-009

Prepared For:

Town of Fallsburg
Town Hall
19 Railroad Plaza
P.O. Box 830
South Fallsburg, New York 12779

Prepared by:

Sterling Environmental Engineering, P.C.
24 Wade Road
Latham, New York 12110

November 16, 2006
Revised January 22, 2007

HEALTH AND SAFETY PLAN
(HASP)

HILLS HOLDING CORPORATION
CONSTRUCTION AND DEMOLITION DEBRIS LANDFILL
NYS ROUTE 42, FALLSBURG, NEW YORK

SITE NO. E-3-53-009

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1.0 GENERAL INFORMATION

This Health and Safety Plan (HASP) is for use during the sampling and field activities to be conducted as part of the Remedial Investigation (RI) being undertaken by the Town of Fallsburg at the Hills Holding Corporation Construction and Demolition (C&D) Debris Landfill (New York State Department of Environmental Conservation (NYSDEC) Site No. E-3-53-009.

This HASP is applicable to all sampling and intrusive activities, proposed for the site investigation. The HASP identifies hazardous substances and conditions known or suspected to be present on the site and specific measures to be taken to ensure that hazardous substances or conditions do not adversely impact the health and safety of personnel conducting field activities. This HASP is intended to identify potential hazards and appropriate precautions for work at sites that are considered potential hazardous waste sites as defined by OSHA 29 CFR 1910.120 (Hazardous Waste Operations and Emergency Response). Anticipated hazards addressed by this HASP are well defined and generally are under reliable control.

All field personnel working on this project must familiarize themselves with this HASP, acknowledge understanding of this plan, and abide by its requirements.

In general, contractors are responsible for complying with all regulations and policies applicable to the work they are performing. Sterling Environmental Engineering, P.C. (STERLING) personnel are authorized to stop work by any contractor/subcontractor failing to adhere to required health and safety procedures.

2.0 SCOPE OF WORK

The site investigation set forth in the Remedial Investigation Work Plan involves the following:

- Test pitting, borings through the waste mass, surveying and mapping are proposed to define the limits of waste;
- Existing well inspection and new monitoring well installations are proposed to enhance the existing well network;
- Groundwater monitoring well sampling;
- Surface water sampling at nine (9) locations;
- Sediment sampling at eight (8) locations;
- Surficial soil sampling at three (3) locations on the Landfill and six (6) locations on the balance of the property;
- Leachate investigation within the Landfill perimeter to identify and sample leachate seeps or areas characterized by stained vegetation;
- Vector investigation;
- Explosive gas investigation;

- Fish and wildlife impact analysis; and
- Soil vapor assessment.

Figure 2 of the RI Work Plan shows the locations of the sampling locations.

The scope of work for this sampling effort is set forth in the RI Work Plan.

3.0 DESIGNATION OF RESPONSIBILITIES

The responsibility for implementing this HASP is shared by the Project Manager, the Corporate Health and Safety Officer (CHSO), and the Site Health and Safety Officer (SHSO). The individuals serving in these roles are identified in Table 3-1.

The Project Manager will recommend policy on all matters and will provide the necessary resources to conduct the project safely.

The CHSO has overall Corporate responsibility for developing safety procedures and training programs, and is the final decision point for determination of health and safety policies and protocols for all projects.

The SHSO, with guidance from the CHSO, is responsible for establishing operating standards and coordinating all safety and technical activities occurring at the site. Specifically, the SHSO is responsible for:

- Ensuring the availability, use, and proper maintenance of specified personal protective, decontamination, and other health or safety equipment.
- Maintaining a high level of safety awareness among other team members and communicating pertinent matters to them promptly.
- Ensuring that all field activities are performed in a manner consistent with STERLING's policy, the New York State Department of Environmental Conservation (NYSDEC) project policy for this project, and this HASP.
- Monitoring for dangerous conditions during field activities.
- Ensuring proper decontamination of personnel and equipment.
- Coordinating with emergency response personnel and medical support facilities.
- Initiating immediate corrective actions in the event of an emergency or unsafe condition.
- Notifying the Project Manager and CHSO promptly of any emergency, unsafe condition, problem encountered, or exception to the requirements of this HASP.
- Recommending improved health and safety measures to the CHSO.

The SHSO has the authority to:

- Suspend field activities or otherwise limit exposures if the health or safety of any person appears to be endangered. This authority includes suspension of work due to adverse weather conditions, fire or other emergency.
- Direct STERLING or contractor personnel to alter work practices that are deemed not properly protective of human health or the environment.
- Suspend an individual from field activities for infraction of the requirements in this HASP.

The SHSO or designated representative must be present for all intrusive investigative activities (both on and off the site boundary. However, the presence of the SHSO shall in no way relieve any person or company of its obligations to comply with the requirements of this Plan and all applicable Federal, State and local laws and regulations.

Everyone involved in this project must be familiar with and conform to the safety protocols prescribed in this HASP, and communicate any relevant experience or observations to the SHSO to ensure that these valuable inputs improve overall safety. Individual field team members are the key elements in ensuring health and safety compliance at the project site. Every individual field team member is considered responsible for implementing and following this HASP.

TABLE 3-1
KEY PERSONNEL

Title of Officer	Name	Telephone #
Project Manager	Mark P. Millspaugh, P.E.	Office: 518/456-4900 Cell: 518/573-4796
Corporate Health and Safety Officer (CHSO)	Rodney L. Aldrich, P.E.	Office: 518/456-4900 Cell: 518/441-8872
Site Health and Safety Officer(s) (SHSO)	Peter J. Kelleher, P.E.	Office: 518/456-4900 Cell: 518/369-9041

4.0 SITE SPECIFIC HEALTH AND SAFETY CONCERNS

4.1 Site History and Setting

The history and setting of the site is detailed in the RI Work Plan. Everyone subject to this HASP should be familiar with the history and setting of the site.

4.2 Site Concerns

All work on this project will be in areas that have been previously characterized for health and safety risks or where potential exposures are defined and well controlled.

The primary health hazards to personnel at this site derive from the potential for exposure to contaminated soil, groundwater, leachate or surface water during surface sampling, excavating soil and drilling.

Other health hazards stem from the use of equipment and from working near excavations such as holes, pits or trenches.

As access to the site will be strictly controlled and access by the public will be prevented, the principal potential health threat to the public is from particulates or vapors that have the potential to leave the site. To ensure this potential pathway is not a threat to public health, a Community Air Monitoring Plan (CAMP) is included as a required element of this HASP.

To protect on-site personnel and public, the SHSO will conduct mandatory air monitoring with a 10.6ev photoionization detector (PID) and with colorimetric indicator tubes, which will indicate levels of volatile organic compounds (VOCs). If vapors are released from the ground opening to the atmosphere, the concentration is expected to dissipate rapidly. If soils are encountered where the VOC level in the immediate vicinity of the soils exceeds the action level above which Level C protection must be worn, while the operator of an involved excavator is not exposed above the action level, those in the area of exposure may wear appropriate protective equipment in order to gain samples at the edge of the zone of contamination, but further excavation in that area will be ceased.

If dust levels are excessive due to drilling activities or other activities that generate visible dust, exposure to excessive levels of nuisance particulates and crystalline silica, a major component of various soil types and an identified carcinogen, will be minimized by applying a water spray to the immediate work area so that dust in the work area is suppressed and no visible dust leaves the work area as required by the CAMP in Section 7.0. In addition, as the work areas during investigation are very small, a PM-10 monitor at the downwind edge of the work area may be representative of the worker exposure and will fulfill the downwind monitoring requirement of the CAMP. In any event, worker exposure to particulates must be monitored during intrusive activities and the action level shall be no greater than 100 micrograms per cubic meter (ug/m^3). If alternate actions or increased dust suppression activities cannot reduce the worker exposure to less than 100 ug/m^3, then the workers must be required to don full face respirators with NIOSH approved P100 cartridges or combination cartridges.

The minimum standard protective equipment for this project is specified in Tables 4-3 and 4-4 (see Section 4.5).

To protect the public from potential air releases, a Community Air Monitoring Plan (CAMP) is included in and required by this HASP in Section 7.0.

4.3 Chemicals Potentially Present

Table 4-1 below lists the hazardous substances that are known or suspected to be present at the site, and Table 4-2 lists the published airborne exposure limits for those substances.

Unknown or unexpected materials of a hazardous nature may be encountered during site activities. No work will be conducted if field measurements or observations indicate that there is potential uncontrolled exposure to undefined hazards, or that exposures may exceed protection afforded by the requirements in this HASP.

Table 4-1

Hazardous Substances Known or Suspected to be Present

Substance	Known to be Present or Suspected	Media Present	Expected Concentration Range	Quality and Quantity of Available Data
Benzene	Known	Subsoil	10 ug/kg	12 of 14 samples
Toluene	Known	Subsoil	150 ug/kg	12 of 14 samples
Xylene	Known	Subsoil	230 ug/kg	12 of 14 samples
Carbon Disulfide	Known	Subsoil	28 ug/kg	10 of 14 samples
1,1,1-Trichloroethane	Known	Subsoil	40 ug/kg	9 of 14 samples
Chloroform	Known	Subsoil	7 ug/kg	3 of 14 samples
Phenanthrene	Known	Subsoil	68,000 ug/kg	14 of 14 samples
Butylbenzylphthalate	Known	Subsoil	55,000 ug/kg	9 of 14 samples
Dibenzofuran	Known	Subsoil	3,600 ug/kg	12 of 14 samples
4-Methylphenol	Known	Subsoil	9,300 ug/kg	8 of 14 samples
1,4-Dichlorobenzene	Known	Subsoil	640 ug/kg	2 of 14 samples
4,4'-DDD (Dichlorodiphenyldichloroethane)	Known	Subsoil	300 ug/kg	14 of 14 samples
PCBs – Aroclor - 1242	Known	Subsoil	3,400 ug/kg	14 of 14 samples
Chromium	Known	Subsoil	323 mg/kg	14 of 14 samples
Lead	Known	Subsoil	1,960 mg/kg	14 of 14 samples
Mercury	Known	Subsoil	1.7 mg/kg	14 of 14 samples

ppb – parts per billion
ug/kg - micrograms per kilogram
1,000 ppb = 1 part per million (ppm) = 1 mg/kg (milligram per kilogram)

Table 4-2

Published Airborne Exposure Limits or Odor Thresholds in Parts Per Million (PPM) in Air for Substances Known or Suspected to be Present

Substance	OSHA PEL/STEL/ C	NIOSH REL/STEL	ACGIH TLV/STEL	IDLH	Cancer Causing	Range of Odor Thresholds
Benzene	1/5/25	0.1 / 1	0.5 / 2.5	500	Y	1.5
Toluene	200/150/300	100/150	50 / --	500	N	2.9
Xylene	100/ -	100/150	100/150	900	N	1.1
Carbon Disulfide	20/100/30	1 / 10	10 / --	500	N	0.016
1,1,1-Trichloroethane	350/450/800	350 / -	350 / 450	700	N	100
Chloroform	50/ - / -	CA / 2	10 / --	500	N	85
Phenanthrene	0.027/ -- / --	-- / --	-- / --	--	N	--
Butylbenzylphthalate	-- / -- / --	-- / --	-- / --	--	N	--
Dibenzofuran	-- / -- / --	-- / --	-- / --	--	N	0.15
4-Methylphenol	5/ -- / --	2.3/ -- / --	-- /--	250	Y	--
1,4-Dichlorobenzene	75/ -- / --	CA / --	10 / --	150	Y	0.18
4,4'-DDD (Dichlorodiphenyldichloroethane)	-- / -- / --	-- / --	-- / --	--	N	--
PCBs – Aroclor - 1242	0.46/ -- / --	0.000046	0.046 / 0.092	0.46	Y	
Chromium	0.500/ -- / --	-- / --	-- / --	250		--
Lead	0.050/ -- / --	-- / --	-- / --	700CA	Y	--
Mercury	0.012/ -- / --	-- / --	-- / --	1.2	N	--

"CA" carcinogenic.

Definitions of PEL, REL, STEL, TLV, C and IDLH are discussed below:

PEL	The Occupational Safety and Health Administration's (OSHA) Permissible Exposure Limit for airborne contaminants as a time-weighted average for an 8-hour work shift, as listed in 29 CFR 1910.1000.
REL	The National Institute for Occupational Safety and Health's (NIOSH) Recommended Exposure Level for a work shift.
STEL	A Short Term Exposure Limit as a 15-minute time-weighted average. (No more than four exposures per shift).

TLV	The American Conference of Governmental Industrial Hygienists' (ACGIH) Threshold Limit Value for airborne concentrations to which it is believed that nearly all workers may be repeatedly exposed day after day without adverse effects.
C	Ceiling Concentration – The concentration that should not be exceeded during any part of the working exposure.
IDLH	The Immediately Dangerous to Life and Health maximum concentration from which one could escape within 30 minutes without experiencing any escape–impairing or irreversible health effects. (Note: Level C air-purifying respirators do not adequately protect an individual exposed to these concentrations.) These IDLH values were established by NIOSH and have not been peer reviewed. Caution is recommended with their application.

4.4 Excavator and Drill Rig Operations

Excavation will be performed with a track-mounted excavator or backhoe. To conduct soil borings, a hollow-stem auger drilling rig will be used. Working with or near this equipment poses potential hazards, including being struck by or against equipment, or pinched/caught by equipment, potentially resulting in serious physical bodily harm.

In particular, the following precautions will be used to help prevent injuries and accidents:

- Excavator and drill rig brakes, hydraulic lines, light signals, fire extinguishers, fluid levels, steering, tires, horn, and other safety devices will be inspected prior to the initial mobilization and checked routinely throughout the project.

- Excavator and drill rig cabs will be kept free of all nonessential items and all loose items will be secured.

- Excavators and drill rigs will be provided with necessary safety equipment, including seat belts.

- Drill rig cables and auger flight connections will be checked for signs of, or actual, wear. Frayed or broken cables or defective connections will be replaced immediately.

- Parking brakes will be set before shutting off any heavy equipment or vehicle.

All employees will be briefed on the potential hazards prior to the start of the job.

4.5 Personal Protective Equipment

Table 4-3 indicates the general levels of personal protective equipment (PPE) that may be used on-site. Site and task specific levels of PPE assigned according to the chemicals of concern are listed in Table 4-4.

Table 4-3
General Protection Levels

Protective Equipment	Protection Levels	
	C	D
1. Air-purifying respirator	X	
2. Chemical-resistant disposable overalls		
3. Chemical-resistant outer gloves	X	
4. Disposable gloves	X	X
5. Overboots (chemically resistant)	X	
6. Leather safety shoes or boots	X	X
7. Safety glasses, goggles, or face shield	X	X
8. Hard Hat	X	X
9. Coveralls	X	X

Table 4-4 lists the tasks and chemicals of concern on the site, along with the specific protection level and PPE materials of construction for each.

Table 4-4
Task Specific Personal Protective Equipment (PPE)

Task	Chemicals of Concern	PPE Level	Respirator Type	Gloves	Coveralls/PFDs
Excavation Soil Sampling	VOCs, SVOCs, PCBs, Metals	D (low levels expected or cease at thresholds)	None	Chemical resistant/surgical	Disposable Tyvek recommended
On-Site Soil Borings	VOCs, SVOCs, PCBs, Metals	D (low levels expected or cease at thresholds)	None	Chemical resistant/surgical	Disposable Tyvek recommended
On-Site Groundwater Sampling	VOCs, SVOCs, PCBs, Metals	D (low levels expected or cease at thresholds)	None	Chemical resistant/surgical	Disposable Tyvek recommended
Off-Site Soil Borings	VOCs, SVOCs, PCBs, Metals	D (low levels expected or cease at thresholds)	None	Surgical	Work Clothes

Table 4-4
Task Specific Personal Protective Equipment (PPE)

Task	Chemicals of Concern	PPE Level	Respirator Type	Gloves	Coveralls/PFDs
Off-Site Groundwater Sampling	VOCs, SVOCs, PCBs, Metals	D (low levels expected or cease at thresholds)	None	Surgical	Work Clothes
Soil Gas	VOCs, SVOCs, PCBs, Metals	D (low levels expected or cease at thresholds)	None	None	Work Clothes
Surface Water	VOCs, SVOCs, PCBs, Metals	D (low levels expected or cease at thresholds)	None	Chemical resistant/surgical	Work Clothes with Coast Guard approved Personal Flotation Device
Sediment	VOCs, SVOCs, PCBs, Metals	D (low levels expected or cease at thresholds)	None	Chemical resistant/surgical	Work Clothes with Coast Guard approved Personal Flotation Device

No work is anticipated requiring Level B or A PPE and very limited work in Level C. If air monitoring results require PPE upgrades from Level D, then only appropriate medically qualified, trained personnel experienced in the use and limitations of air purifying or supplied air respirators will be used. Only air purifying respirators with High-Efficiency Particulate Air (HEPA) filters, capable of removing particles of 0.3 microns or larger from air at 99.97% or greater efficiency, should be used when exposure to dust is a potential risk.

Unless the SHSO directs otherwise, when respirators are used for organic vapors or particulates the cartridges should be changed after eight (8) hours of use, or at the end of each shift, or when any indication of breakthrough or excessive resistance to breathing is detected. OSHA regulations require a Respiratory Protection Program for companies that require employees to enter areas where respirators are required and such Respiratory Protection Programs must address the requirements for replacement of cartridges. STERLING and its contractors will have the required Respiratory Protection Program and STERLING will maintain its written program and records at its office as required by OSHA regulations.

4.6 Emergency

A first aid kit, portable eyewash and vehicle will be kept in close proximity to the sampling effort. If the SHSO determines that a potential for fire exists, a fire extinguisher rated 20A-B-C (or higher) will be kept at the site. Employees will be trained in use of emergency supplies.

4.7 Suspected Safety Hazards

Suspected safety hazards include those inherent with the operation of heavy equipment such as drilling rigs or excavators, and proximity to excavations. Inspections to ensure appropriate guards are in place and the use of lockout and tagout procedures during maintenance of this equipment will control these inherent hazards. Personal protective equipment including hard hats, safety shoes and eye protection will be worn to augment other safety precautions.

Except where electrical distribution and transmission lines have been de-energized and visibly grounded at point of work or where insulating barriers, not a part of or an attachment to the equipment or machinery, have been erected to prevent physical contact with the lines, drilling rigs and excavators must not operate closer than 30 feet to any overhead lines, measured directly between any part of the equipment and the lines themselves, except if site sampling requirements require, and only if a special written work plan has been developed by STERLING's contractor or other equipment operator that includes special measures designed to mitigate the risks and reviewed and approved by written signature by the SHSO. Except where electrical distribution and transmission lines have been de-energized and visibly grounded at point of work or where insulating barriers, not a part of or an attachment to the equipment or machinery, have been erected to prevent physical contact with the lines, equipment or machines shall be operated proximate to power lines only in accordance with 29 CFR 1926.550(a)(15) even under the special written work plan noted above.

Care must be taken to ensure loose clothing does not get tangled in any moving equipment while borings are being advanced and while the monitoring wells and piezometers are being installed.

There may be slip or trip hazards associated with rough, slippery or elevated work surfaces at the site.

There is also the possibility of organic vapors being encountered during the drilling operations due to the presence of petroleum contaminated soils. The SHSO will use continuous monitoring instruments that measure total volatile hydrocarbons while each task is being conducted to determine ambient levels of contaminants.

All excavations will be maintained to prevent access by unauthorized persons and will be filled by the end of the work day. Absolutely no one will be permitted in excavations, except the operator of equipment where the operator is always located above the level of the surrounding earth. If equipment breaks down within the excavation, the equipment will have to be towed out of the excavation by other equipment. All subsurface samples will be obtained by operation of the excavating equipment to bring the sample to an area away from the open excavation.

4.8 Adverse Weather

Drilling or excavating is dangerous during electrical storms. All field activity must terminate during thunderstorms. Extreme heat and cold, ice and heavy rain can produce unsafe conditions for drilling work. Such conditions, when present, will be evaluated on a case-by-case basis to determine if work shall terminate.

4.9 Fire and Explosion

Gasoline or diesel powered equipment presents the possibility of encountering fire and explosion hazards. Contractors will be required to store diesel fuel and gasoline in metal cans with self-closing lids and flash arrestors.

4.10 Requirement to Conduct Utility Mark Out

Prior to the start of any subsurface work, underground utilities and piping that may pose a potential hazard will be identified and located. The Dig SafeSystem Inc. - NewYork, center or equivalent service will be called and underground utilities will be located and marked. Also, the location of privately owned utility lines will be ascertained.

In the event a pipe or line is struck, work will stop and the emergency action plan (see Section 5.0) will be implemented.

4.11 Confined Space Entry

Confined space entry is prohibited under this project and no confined space entry is anticipated.

"Confined Space," means a space that:

1) is large enough and so configured that an employee can bodily enter and perform assigned work;
2) has limited or restricted means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry); and
3) is not designed for continuous employee occupancy.

4.12 Site Sampling Work Zones

One of the basic elements of an effective site sampling program is the delineation of work zones at each sampling site. The purpose of establishing work zones is to:

- Reduce the accidental spread of hazardous substances by workers or equipment from the contaminated areas to the clean areas;
- Confine work activities to the appropriate areas, thereby minimizing the likelihood of accidental exposures;
- Facilitate the location and evacuation of personnel in case of an emergency; and
- Prevent unauthorized personnel from entering controlled areas.

Although a site may be divided into as many zones as necessary to ensure minimal employee exposure to hazardous substances, this plan uses the three most frequently identified zones in similar projects. These zones are the Exclusion Zone (sometimes referred to by others as the "hot zone"), the Decontamination Zone, and the Support Zone (sometimes referred to by others as the "clean zone"). Movement of personnel and equipment between these zones should be minimized and restricted to specific access control points to minimize the spreading of contamination.

- **Exclusion Zone**

  During investigative work, the Exclusion Zone is the immediate test pit or borehole or other area where contamination is either known or expected to occur and where the greatest potential for exposure exists. The greatest potential for exposure exists where borings and drilling activities are planned. The Exclusion Zone for the site will be around each test pit or well as it is being conducted. The following protective measures will be taken in the Exclusion Zone.

  Unprotected onlookers will be restricted from the sampling site such that they are 25 feet upwind or 50 feet downwind of excavation or drilling activities.

Those conducting activities and sampling in the Exclusion Zone will wear the applicable Personal Protective Equipment (PPE). The actions to be taken and PPE to be worn in the Exclusion Zone if VOCs are determined with the PID to be above background are described in Section 4.2 and Table 7-1.

- **Decontamination Zone**

  During investigative work, a Decontamination Zone will be established at the perimeter of the Exclusion Zone, and will include the personnel, equipment and supplies that are needed to decontaminate equipment and personnel. The size will be selected by the SHSO to be sufficient to conduct the necessary decontamination activities. Personnel and equipment in the Exclusion Zone must pass through this zone before leaving or entering the Support Zone. The necessary decontamination must be completed in this zone and the requirements are described in Section 6.0 below. This zone should always be established and maintained upwind of the Exclusion Zone.

- **Support Zone**

  During investigative work, the balance of on-site and off-site areas removed from test pits and boreholes will be considered the Support Zone. Break areas, operational direction and support facilities will be located in this area. Eating, smoking and drinking will be allowed only in areas safely removed from the work location within the Exclusion Zone.

4.13 Natural Hazards

Work that takes place in the natural environment may be affected by plants and animals which are known to be hazardous to humans. Spiders, bees, wasps, hornets, ticks, poison oak and poison ivy are only some of the hazards that may be encountered. Individuals who may potentially be exposed to these hazards should be made aware of their existence and instructed in their identification. Emergencies resulting from contact with a natural hazard should be handled through the normal medical emergency channels. Individuals who are sensitive to these types of "natural" hazards should indicate their susceptibility to the SHSO.

4.14 Noise Hazards

Work on-site may involve the use of heavy equipment such as a drill rig or excavator. The unprotected exposure of site workers to this noise during field activities can result in noise induced hearing loss. The SHSO will monitor the noise exposure and will determine whether noise protection is warranted for each of the team members. The SHSO will ensure that either ear muffs or disposable foam earplugs are made available to all personnel and are used by the personnel in the immediate vicinity of the field operation as required.

4.15 Slip, Trip and Fall Hazards

The sampling sites could contain a number of slip, trip and fall hazards for site workers, such as:

- Holes, pits, or ditches
- Excavation faces
- Slippery surfaces

- Steep grades
- Uneven grades
- Snow and ice
- Sharp objects

All personnel are instructed to keep back, and must keep back, three (3) feet from the top edge of excavation faces.

Drill auger sections will be stored on the transport vehicle as long as possible to avoid creating a trip hazard. Drill auger sections and other tools will be stored together in neat arrangements convenient to the drill but sufficiently distant from the immediate area around the drill to minimize trip hazards.

Site personnel will be instructed to look for potential safety hazards and immediately inform the SHSO regarding any new hazards. If the hazard cannot be immediately removed, actions must be taken to warn site workers about the hazard.

4.16 Modifications to this Plan

Requirements and guidelines in this HASP are subject to modification by the Project Manager, the Corporate Health and Safety Officer (CHSO), or the Site Health and Safety Officer (SHSO) in response to additional information that may come to be known regarding the potential for exposure to hazards.

5.0 EMERGENCY ACTION PLAN

On-site personnel will use the following standard emergency procedures. The SHSO will be notified of any on-site emergency and be responsible for ensuring that the appropriate procedures are followed and the CHSO and Project Manager are notified. A first aid kit, eye wash unit, which can provide a minimum flow rate of 0.4 GPM for 15 minutes, and a fire extinguisher will be readily available to field personnel. Questions regarding procedures and practices described in this Plan should be directed to the CHSO.

5.1 Notification

Any symptoms of adverse health, regardless of the suspected cause, are to be reported to the SHSO immediately and to the CHSO promptly.

Upon the occurrence of an emergency, including an unplanned chemical release, fire or explosion, personnel will be alerted and the area evacuated immediately. Re-entry to the site will be limited to that necessary to assist injured personnel, fire fighting or spill control, and only after appropriate protective equipment is donned.

The following alarm system will be utilized to alert personnel to evacuate the restricted area:

_______ Audible Alarm; Airhorn (optional)

__X__ Direct Verbal Communication (10 employees or less)

_______ Radio Communication or Equivalent (Remote Sites)

__X__ Other: Portable or Fixed Telephone Available On-Site

The following standard hand signals will also be used as necessary:

Hand gripping throat	Can't breathe/Out of Air
Grip co-worker's wrist	Leave area immediately No Debate!
Hands on top of head	Need assistance
Thumbs up	Yes/Okay
Thumbs down	No/Problem

Upon activation of the alarm, employees will proceed to the designated assembly area. The designated assembly area will be determined on a daily basis by the SHSO and updated as necessary depending upon work conditions, weather, air monitoring, etc. The location of the designated assembly area will be clearly marked and communicated to employees daily or upon relocation of the area. Employees gathered in the designated assembly area will remain there until their presence has been noted. A comparison of employees against the daily restricted area access roster will be made as necessary to ensure all employees have been properly evacuated and accounted for.

Employees are not expected to remain in the restricted area upon activation of the evacuation alarm.

5.2 Personal Injury

If anyone within a work area is injured and cannot leave the restricted area without assistance, emergency medical services will be notified and appropriate first aid will be initiated by local emergency medical services.

5.3 Fire/Explosion

Upon the occurrence of a fire beyond the incipient stage (where site personnel could respond to extinguish), or an explosion anywhere on the site, the fire department will be alerted and all personnel moved to a safe distance from the involved area.

5.4 Other Equipment Failure

If any other equipment at the work site fails to operate properly, the Project Manager and/or SHSO will determine the effect of this failure on continuing operations. If the failure affects the safety of personnel (e.g., failure of monitoring equipment) or prevents completion of the planned tasks, all personnel will leave the work area until appropriate corrective actions have been taken.

5.5 Emergency Services

<u>Emergency Services</u>	<u>Telephone Number</u>
Owner: Town of Fallsburg	845-434-8810
Fire Department	911 or 845-434-9898
Police Department	911 or 845-434-4422
Ambulance	911
Catskill Regional Medical Center	845-794-3300
Poison Control Center	800/282-3171
Chemical Emergency Advice (CHEMTREC)	800/424-9300

A map showing the preferred route to the nearest emergency health care facility is presented in Appendix A; and written directions are also attached behind the map.

5.6 Record Keeping

The SHSO will maintain records of reports concerning occupational injuries and illnesses in accordance with 29 CFR 1904.

6.0 DECONTAMINATION AND DISPOSAL

6.1 Prevention of Contamination

The SHSO will make all site personnel aware of the potential for contamination. The following procedures will be established to minimize contact with waste:

- Workers will not walk through areas obvious of contamination;
- Workers will not directly touch potentially hazardous substances;
- Workers will wear gloves when working if work may involve touching soil or waste;
- Workers will wear disposable outer garments where appropriate; and
- Excavated soils will be placed on plastic sheeting and returned to the borehole or excavation.

6.2 Decontamination Methods

Significant subsurface contamination at this site is not anticipated, however, all personnel, clothing, and equipment leaving designated contaminated areas of the site must be decontaminated, as presented in Appendix B, Equipment Cleaning and Decontamination Procedures. Decontamination of equipment will be the responsibility of the contractor.

7.0 COMMUNITY AIR MONITORING PLAN (CAMP)

Appendix 1A of the DER-10, which is entitled, "New York State Department of Health (NYSDOH) Generic Community Air Monitoring Plan" (Generic CAMP) was reviewed and determined sufficient for the subject site given the known characteristics of this site. Therefore, this Generic CAMP is accepted as the CAMP for the site investigation and is attached in Appendix C of this HASP.

Similarly, Appendix 1B of the DER-10, entitled, "Fugitive Dust and Particulate Monitoring", was reviewed, determined to be sufficient as part of this CAMP, and is attached as Appendix D of this HASP.

In accordance with these two appendices, the CAMP institutes regular and mandatory air monitoring with a 10.6 ev photoionization detector (PID) and with a particulate monitor. Such air monitoring must occur at the upwind and downwind perimeter of the work area or exclusion zone on a continuous or periodic basis depending on the type of activity being conducted as specified in Appendix C. Briefly, continuous monitoring is required for ground intrusive activities, such as test pitting, soil boring, or well installation and periodic monitoring will be required during non-intrusive on-site activities such as the collection of soil and sediment samples.

The PID will be calibrated at least once daily using isobutylene gas (100 ppm) which is an appropriate surrogate.

The actions dictated in Appendix C will be taken if the PID readings at the downwind edge of the work area or exclusion zone exceed 5 ppm above the upwind background concentration, or persist in the 5 to 25 ppm range above the upwind background concentration.

If a PID reading at the perimeter of the work area is 25 ppm above the upwind background concentration, activities must be shutdown. As this HASP is for an investigative effort, generally the activity will be permanently abandoned at the subject location and an attempt will be made at an alternate location. If for some reason, the activity must occur at this location, the CHSO and the NYSDEC will be contacted to provide advice and approval of alternate work procedures.

The particulate monitor will be real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10), will integrate over 15 minutes, will have its audible alarm set to the appropriate action level, and meet all the specifications given in Appendix D. At the initiation of activities, the necessary dust suppression activities will be started and the action level will be 150 micrograms per cubic meter (ug/m^3) above background. If 100 ug/m^3 is exceeded or if airborne dust is observed leaving the work area, the additional dust suppression will be initiated. If the action level (150 ug/m^3) is exceeded the CHSO and the DER of the NYSDEC will be notified and the notification will describe the control measures to be implemented to prevent further exceedances.

8.0 AMBIENT AIR MONITORING

The SHSO will be responsible for the identification and qualification of any airborne contaminants. As constituents at the site may include volatile organic compounds (VOCs), a portable direct reading instrument such as a PID will be used to screen work areas to determine if elevated levels of the VOCs are generated. Benzene is a carcinogen which has an existing OSHA permissible exposure limit of 10 ppm. Should PID readings in the workers' breathing zone indicate VOC levels of 10 ppm or greater than background measured with the PID, then the SHSO shall use Drager Colorimetric indicator tubes for benzene and a hand pump to determine the actual benzene concentration. Personnel should not proceed with the work if readings are 10 parts per million (ppm) or greater above background measured with the PID and above one (1) ppm for benzene (the OSHA PEL) measured with a colorimetric indicator tube, unless the field personnel are utilizing Level C protection. Work will be stopped if the PID reading is 100 ppm or greater above background with the PID at the work zone or five (5) ppm or above at the downwind edge of the exclusion zone. The actions at the various air monitoring levels are summarized in Table 7-1 below.

Particulates generated from drilling and excavating activities could contain crystalline silica particles and such particles have been identified by NIOSH as carcinogenic. No monitoring for crystalline silica is planned since the dust generation at drilling or excavating activities will be suppressed by spraying with water as necessary.

A combustible gas meter will also be used to determine whether explosive vapors are being generated during drilling and excavation operations. Readings on a combustible gas monitor must be below 10% of the lower flammable limits for the drilling or excavations to continue. Elevated combustible gas, PID and benzene readings above the action levels (see Table 7-1) will require modification of the drilling operations and/or upgrade in personal protective equipment (PPE). Should an upgrade in PPE include respiratory protection, only workers medically qualified to wear respirators and trained in proper use and limitation of the respirator can proceed with the project.

Table 7-1, Air Monitoring Action Levels, contains actions to be taken for field measurements.

Table 7-1
Air Monitoring Action Levels

Instrument	Action Level	Action
PID (10.6.ev)	Continuous less than 10 ppm over background in work zone.	Remain in level D PPE.
PID	Continuous reading of 10 to below 100 ppm above background in work zone.	Either: 1) Level D PPE, screen with Drager detection tube for benzene. PID readings must be taken at any excavator operator location, or 2) If benzene detected > 1 ppm upgrade to Level C and wear an organic vapor (OV) cartridge/air purifying respirator (APR). Investigate source.
PID	Continuous reading of 100 ppm or greater above background in work zone.	Stop Work. Reevaluate work conditions and procedures. Contact CHSO for authorization prior to continuing for authorization.
PID	Continuous reading of less than 5 ppm above background at the downwind perimeter of the exclusion zone.	Work continues.
PID	Continuous reading of 5 ppm or above but less than 25 ppm at the downwind perimeter of the exclusion zone.	Work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.
PID	Continuous reading of 25 ppm or above at the downwind perimeter of the exclusion zone.	Stop Work. Reevaluate work conditions and procedures. Contact CHSO and the NYSDEC for authorization prior to continuing.
Drager Tubes: Benzene	10 to below 100 ppm above background in work zone.	Upgrade PPE to Level C with OV/APR.
Drager Tubes: Benzene	>10 ppm above background in work zone.	Stop Work. Reevaluate work conditions and procedures. Contact CHSO prior to continuing for authorization.
Combustible Gas Indicator	Continuous reading of 0% to 1% lower explosive limit (LEL).	Remain in Level D PPE. If no benzene present, assume source is methane. Continuously monitoring LEL.
Combustible Gas Indicator	Continuous reading of 1% to 10% LEL	Level D unless benzene is present. Investigate source and ventilate, if possible. SHSO may require upgrade to Level C PPE. Contact CHSO prior to continuing for authorization.

Table 7-1
Air Monitoring Action Levels

Instrument	Action Level	Action
Particulate Monitor and Direct Observation	PM-10 particulate level is 100 micrograms per cubic meter (ug/m3) or greater than background for the 15-minute period at the downwind edge of the exclusion zone or visible dust is leaving the work area.	Suppress by spraying the dusty area with water and work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 ug/m3 above the upwind level and provided that no visible dust is migrating from the work area.
Particulate Monitor and Direct Observation	After implementation of dust suppression techniques, downwind PM-10 particulate levels at the downwind edge of the exclusion zone are greater than 150 ug/m^3 above the upwind level.	Work must be stopped and a re-evaluation of activities initiated and notify the CHSO and the NYSDEC. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 ug/m^3 of the upwind level and in preventing visible dust migration.

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APPENDIX A

DIRECTIONS TO HOSPITAL

52
Liberty
55
Grossinger Country Club
52
42
Ferndale
Sullivan County Community College
52
Swan Lake
Swan Lake
Swan Lake Golf And Country Club
17
Hurleyville
Tarry Brae Golf Course
Fallsburg
42
55
Town of Thompson Park
Harris
Sullivan County International Airport
South Fallsburg
Kutshers Country Club
Anawana Lake
Pleasure Lake
55
17
Kiamesha Lake
Bethel
White Lake
White Lake
Mongaup Valley
17B
55
17B
42
17B
Thompson
Concord Resort And Golf Club
Smallwood
Monticello
17
Black Lake
55
Glen Wild
17
Rock Hill
Toronto Reservoir
Burnt
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Directions to Catskill Regional Medical Center
68 Harris Bushville Road
Monticello, New York 12701

1. Head **south** from Rt-42 (Main Street)	
2. Bear **right** into the RT-17 W entry ramp	5.0 miles
3. Take exit **102** to **Harris/Bushville**	0.3 mile
4. Turn right at **CR-174**	341 feet
5. Turn **right** at **Harris Bushville Road**	0.3 mile
6. Arrive at 68 Harris Bushville Road Monticello, New York 12701	

APPENDIX B

EQUIPMENT CLEANING AND DECONTAMINATION PROCEDURES

APPENDIX B

STANDARD OPERATING PROCEDURES

EQUIPMENT CLEANING AND DECONTAMINATION PROCEDURES

Summary

Equipment, tools, materials, etc. used in the investigation and collection of samples at field investigation sites must be properly prepared and cleaned/decontaminated during and after each sampling event. The degree of cleaning/decontamination will be dependent upon site conditions and the nature and type of contamination, if present, the intent and goal(s) of the investigation, and data quality objectives, as well as other site-specific requirements.

Procedure

1. Heavy Equipment Decontamination

All equipment, tools and materials associated with sampling events must be cleaned or decontaminated prior to usage. Items such as drill rigs, auger flights, trackhoes, and backhoes all present potential sources of contamination to environmental samples. Therefore, all heavy equipment utilized at a site must undergo the following decontamination procedures:

- the equipment will first be high pressure, hot washed or steam-cleaned with potable water; and,
- the equipment will be rinsed thoroughly with potable water.

Contain, collect and dispose of all decontamination fluids in accordance with site/project-specific requirements. The bucket of trackhoes and backhoes may be cleaned over the excavation allowing high pressure decontamination washwater to return to the excavation.

2. Cleaning of Field Sampling Equipment

All equipment and tools used to collect samples for chemical analyses, including spatulas, spoons, scoops, trowels, split-spoons, augers, etc. will be decontaminated using the following procedures:

- non-phosphate detergent wash;
- potable water or distilled/deionized water rinse; and
- air or oven-dry.

If the equipment is to be stored for future use, allow to dry and then wrap in aluminum foil (shiny-side out) or seal in plastic bags.

Collect or dispose of all decontamination fluids in accordance with site/project-specific requirements.

3. Personal Clothing Decontamination

All footwear worn in and around the contamination area will be washed down using soap and water to remove soil or oily residue remnants. If disposable gloves, boots or suits (such as Tyvek® suits) are worn, such are to be removed and disposed in a designated 55-gallon drum on site for future disposal. Any other clothing that comes in contact with the potentially contaminated material should not be worn more than 24-hours and should be washed prior to wearing again.

APPENDIX C

DER 10: APPENDIX 1A, NYSDOH GENERIC CAMP

APPENDIX 1A

New York State Department of Health
Generic Community Air Monitoring Plan

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

The generic CAMP presented below will be sufficient to cover many, if not most, sites. Specific requirements should be reviewed for each situation in consultation with NYSDOH to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical- specific monitoring with appropriately-sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements should be determined in consultation with NYSDOH.

Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

Community Air Monitoring Plan

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for volatile organic compounds (VOCs) and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Most sites will involve VOC and particulate monitoring; sites known to be contaminated with heavy metals alone may only require particulate monitoring. If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate NYSDEC/NYSDOH staff.

Continuous monitoring will be required for all ground intrusive activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. "Periodic" monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

- If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

- If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

- If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.

All 15-minute readings must be recorded and be available for State (DEC and DOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

- If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.

- If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^3 of the upwind level and in preventing visible dust migration.

All readings must be recorded and be available for State (DEC and DOH) personnel to review.

APPENDIX D

DER 10: APPENDIX 1B, FUGITIVE DUST AND PARTICULATE MONITORING

Appendix 1B
Fugitive Dust and Particulate Monitoring

A program for suppressing fugitive dust and particulate matter monitoring at hazardous waste sites is a responsibility on the remedial party performing the work, these procedures must be incorporated into appropriate intrusive work plans. The following fugitive dust suppression and particulate monitoring program should be employed at sites during construction and other intrusive activities which warrant its use:

1. Reasonable fugitive dust suppression techniques must be employed during all site activities which may generate fugitive dust.

2. Particulate monitoring must be employed during the handling of waste or contaminated soil or when activities on site may generate fugitive dust from exposed waste or contaminated soil. Remedial activities may also include the excavation, grading, or placement of clean fill, these control measures should not be considered necessary for these activities.

3. Particulate monitoring must be performed using real-time particulate monitors and shall monitor particulate matter less than ten microns (PM10) with the following minimum performance standards:

(a) Object to be measured: dust, mists, aerosols size range: <0.1 to 10 microns;
(b) Sensitivity: 0.001 mg/m3;
(c) Range: 0.001 to 10 mg/m3;
(d) Overall Accuracy: ±10% as compared to gravimetric analysis of stearic acid or reference dust;
(e) Operating Conditions: Temperature: 0 to 40oC;
(f) Humidity: 10 to 99% Relative Humidity;
(g) Power: Battery operated with a minimum capacity of eight hours continuous operation Automatic alarms are suggested; and
(h) Particulate levels will be monitored immediately downwind at the working site and integrated over a period not to exceed 15 minutes. Consequently, instrumentation shall require necessary averaging hardware to accomplish this task.

4. In order to ensure the validity of the fugitive dust measurements performed, there must be appropriate Quality Assurance/Quality Control (QA/QC). It is the responsibility of the remedial party to adequately supplement QA/QC Plans to include the following critical features: periodic instrument calibration, operator training, daily instrument performance (span) checks, and a record keeping plan.

5. The action level will be established at 150 ug/m3 over the integrated period not to exceed 15 minutes. While conservative, this short-term interval will provide areal-time assessment of on-site air quality to assure both health and safety. If particulate levels are detected in excess of 150 ug/m3, the upwind background level must be measured immediately using the same portable monitor. If the working site particulate measurement is greater than 100 ug/m3 above the background level, additional dust suppression techniques must be implemented to reduce the generation of fugitive dust and corrective action taken to protect site personnel and reduce the potential for contaminant migration. Corrective measures may include increasing the level of personal protection for on-site personnel and implementing additional dust suppression techniques (see Paragraph 7). Should the action level of 150 ug/m3 be exceeded, the DER must be notified as provided in the site design or remedial work plan; the notification shall include a description of the control measures implemented to prevent further exceedences.

6. It must be recognized that the generation of dust from waste or contaminated soil that migrates off-site, has the potential for transporting contaminants off-site. There maybe situations when dust is being generated and leaving the site and the monitoring equipment does not measure PM10 at or above the action level. Since this situation has the potential to migrate contaminants off-site, it is unacceptable. While it is not practical to quantify total suspended particulates on a real-time basis, it is appropriate to rely on visual observation. If dust is observed leaving the working site, additional dust suppression techniques must be employed. Activities that have a high dusting potential--such as solidification and treatment involving materials like kiln dust and lime--will require the

need for special measures to be considered.

7. The following techniques have been shown to be effective for the controlling of the generation and migration of dust during construction activities:

(a) Applying water on haul roads;
(b) Wetting equipment and excavation faces;
(c) Spraying water on buckets during excavation and dumping;
(d) Hauling materials in properly tarped or watertight containers;
(e) Restricting vehicle speeds to 10 mph;
(f) Covering excavated areas and material after excavation activity ceases; and
(g) Reducing the excavation size and/or number of excavations.

Experience has shown that utilizing the above-mentioned dust suppression techniques, within reason as not to create excess water which would result in unacceptable wet conditions, the chance of exceeding the 150 ug/m3 action level athazardous waste site remediation is remote. Using atomizing sprays will prevent overly wet conditions, conserve water, and provide an effective means of suppressing the fugitive dust.

8. If the dust suppression techniques being utilized at the site do not lower particulates to an acceptable level (that is, below 150 ug/m3 and no visible dust), work must be suspended until appropriate corrective measures are approved to remedy the situation. Also, the evaluation of weather conditions will be necessary for proper fugitive dust control--when extreme wind conditions make dust control ineffective, as a last resort remedial actions may need to be suspended. There may be situations that require fugitive dust suppression and particulate monitoring requirements with action levels more stringent than those provided above. Under some circumstances, the contaminant concentration and/or toxicity may require appropriate toxic monitoring to protect site personnel and the public. Additional integrated sampling and chemical analysis of the dust may also be in order. This must be evaluated when a health and safety plan is developed and when appropriate suppression and monitoring requirements are established for protection of health and the environment.

APPENDIX C

QUALITY ASSURANCE PROJECT PLAN (QAPP)

STERLING
Sterling Environmental Engineering, P.C.

QUALITY ASSURANCE PROJECT PLAN
(QAPP)

HILLS HOLDING CORPORATION
CONSTRUCTION AND DEMOLITION DEBRIS LANDFILL
NYS ROUTE 42, FALLSBURG, NEW YORK

SITE NO. E-3-53-009

Prepared For:

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November 16, 2006
Revised January 22, 2007

QUALITY ASSURANCE PROJECT PLAN
(QAPP)

HILLS HOLDING CORPORATION
CONSTRUCTION AND DEMOLITION DEBRIS LANDFILL
NYS ROUTE 42, FALLSBURG, NEW YORK

SITE NO. E-3-53-009

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1.0 INTRODUCTION

This document is a Quality Assurance Project Plan (QAPP) to accompany the Hills Holding Corporation Remedial Investigation Work Plan, dated November 16, 2006 and revised January 22, 2007. This document has been prepared in accordance with the New York State Department of Environmental Conservation (NYSDEC) "Draft DER-10 Technical Guidance for Site Investigation and Remediation, December 2002" (DER-10) to address quality assurance procedures during the remedial investigation of the Hills Holding site (Site No. E3-53-009).

2.0 PROJECT SCOPE AND GOALS

The Hills Holding Corporation Construction and Demolition (C&D) Debris Landfill is on County Route 42 in the Town of Fallsburg, Sullivan County, New York. The Site is situated on a property encompassing 26.4 acres abutting the Neversink River and overlies the Primary Aquifer known as the Fallsburg-Woodbourne Valley Fill Aquifer. The Site itself consists of approximately eight (8) acres of the property previously used as a C&D Debris Landfill during the year 1988.

The 1991 Final Preliminary Site Assessment (PSA) Report recommended the C&D Debris Landfill be capped to limit infiltration and provide surface water drainage controls. At present, the Landfill remains inactive, but has not been satisfactorily remediated. The NYSDEC has confirmed that this Landfill is not on the registry of Class 1 or Class 2 Inactive Hazardous Waste Sites. Limited additional sampling of groundwater monitoring wells was reportedly conducted by the NYSDEC in 1996.

In accordance with DER-10, the Town anticipates conducting a full remedial investigation and remediation of the Hills Holding Corporation property. Alternatives for remediation include on-site encapsulation, removal of the C&D debris for disposal at a permitted facility, and use of the debris as grading material for the closure of the Town's municipal landfill located approximately 2.7 miles from the Hills Holding Corporation site. The municipal landfill is slated for closing pursuant to an Administrative Order on Consent. The municipal landfill closure requires improved gas venting and collection systems and construction of a final cover system.

- Test pitting, borings through the waste mass, surveying and mapping are proposed to define the limits of waste;
- Existing well inspection and new monitoring well installations are proposed to enhance the existing well network;
- Groundwater monitoring well sampling;
- Surface water sampling at nine (9) locations;
- Sediment sampling at eight (8) locations;
- Surficial soil sampling at three (3) locations on the Landfill and six (6) locations on the balance of the property;
- Leachate investigation within the Landfill perimeter to identify and sample leachate seeps or areas characterized by stained vegetation;

- Vector investigation;
- Explosive gas investigation;
- Fish and wildlife impact analysis; and
- Soil vapor assessment.

3.0 PROJECT ORGANIZATION

The project will be supervised and primarily conducted by Sterling Environmental Engineering, P.C. (STERLING). Mark P. Millspaugh, P.E. will serve as Project Manager. Rodney L. Aldrich, P.E. will serve as the Quality Assurance Officer. Peter J. Kelleher, P.E. will serve as Field Analyst and Supervisor of Field Investigations.

Qualified drillers and excavation contractors will be utilized to install monitoring wells and conduct test pit excavations under supervision by STERLING. Samples will be sent to an ELAP environmental analysis laboratory qualified for the applicable deliverables category.

4.0 SAMPLING AND EQUIPMENT DECONTAMINATION PROCEDURES

4.1 Prevention of Contamination

The following procedures will be established to minimize contact with waste and contamination of sampling equipment and containers:

1) Workers will not walk through areas obvious of contamination;
2) Workers will not directly contact potentially hazardous substances;
3) Workers will wear gloves when working if work may involve contact with soil or waste;
4) Workers will wear disposable outer garments where appropriate; and
5) Excavated soils will be placed on plastic sheeting and returned to the borehole or excavation.

4.2 Decontamination Methods

Significant subsurface contamination at this site is not anticipated, however, all personnel, clothing, and equipment leaving designated contaminated areas of the site must be decontaminated, as presented in Appendix B, Equipment Cleaning and Decontamination Procedures, of the HASP.

5.0 SAMPLE LOCATION MAP

A site map showing all sample locations is provided in the Remedial Investigation Work Plan as Figure 2.

6.0 ANALYTICAL METHODS AND QUALITY ASSURANCE SUMMARY

In accordance with DER-10, one (1) QA/QC sample for every 20 samples per medium will be duplicated. Further, one in twenty (1 in 20) samples per medium will be submitted for MS/MSD analysis. One rinse blank will be taken from sampling equipment per 20 analytical samples for any given piece of equipment. Trip blanks will be included in all coolers. For the purposes of this project, QA/QC samples will be combined for surface soil and subsurface soil as well as groundwater and surface water. Separate QA/QC samples will be submitted separately for sediment and leachate media. QA/QC samples will be analyzed for each specific analytical method and media. Specific analytical methods are described in Table 7-3, Proposed Sampling Matrix Quantities and Parameter Analysis.

For soil vapor samples, Method TO-15 provides specific method performance criteria which provides inherent quality control for internal standards, system verifications, method blanks and compound identification. In addition, a tracer gas will be used when collecting soil samples to identify if infiltration of outdoor air is occurring. Also, the laboratory performing the Method TO-15 analyses must be ELAP approved for air contaminants.

Table 6-1 summarizes the analytical methods and quality assurance measures that will be obtained for each sample. Table 6-2 provides performance evaluation criteria for interpreting results of QA/QC samples.

7.0 SAMPLING METHODS, SAMPLE STORAGE, HOLDING TIMES, AND ANALYTICAL METHODS

The major aspects of the sampling methods are specified in the Remedial Investigation Work Plan, Sections 2.3 through 2.6.

The specifics of sampling are contained in a series of STERLING's Standard Operating Procedures (SOPs) as follows:

SOP #2a	Groundwater Sampling
SOP #2b	Soil Sampling
SOP #3	Sampling Equipment Decontamination
SOP #4	Sample Preservation, Containers, Handling and Storage
SOP #6	Field Screening with a Photoionization Detector

The specific methods for sample preservation are described generally in Table 7-1 and are enumerated specifically in SOP #4 (see Appendix A).

The specific holding times are described generally in Table 7-2 and again are enumerated specifically in SOP #4 (see Appendix A).

TABLES

TABLE 6-1
Quality Assurance Measures

Matrix Type	Surface Soil / Boring / Test Pit	Sediment	Groundwater / Surface Water	Leachate
# of samples	42	8	21	7
Field/Trip Blanks per Matrix	1 per cooler	1 per cooler	1 per cooler	1 per cooler
MS/MS Duplicate	3/3	1/1	3/3 (1/1 filtered)	1/1
Duplicate	4 (One Asbestos)	1	3 (one filtered)	1
Equipment / Rinse Blank	3*	1	3 (one filtered)	1*
Container Vol. and Type	4 oz. widemouth glass 4 oz. widemouth glass 4 oz. widemouth glass 4 oz. widemouth glass 2 oz. widemouth glass 1- 2 oz widemouth glass, 1 8 oz widemouth glass 4 oz. widemouth glass	4 oz. widemouth glass 4 oz. widemouth glass 4 oz. widemouth glass 2 oz. widemouth glass 4 oz. widemouth glass	250 ml HDPE 2 - 40 ml glass vial teflon septa 2- 1 L glass amber 2- 1 L glass amber 2- 1 L glass amber 250 ml HDPE 2- 1 L glass amber	250 ml HDPE 500 ml HDPE* 500 ml HDPE* 250 ml HDPE 500 ml HDPE* 500 ml HDPE*

* Only necessary if reusable sampling equipment requiring decontamination between samples is utilized.

TABLE 6-2 Performance Evaluation Criteria	
Trip and Rinse Blanks	No target analytes above CRQL except no common laboratory contaminant above five (5) times the CRQL
Matrix Spike	Percent Recovery will meet ASP minimums
Matrix Duplicate	Relative Percent Difference will meet ASP minimums
Field Duplicates and Splits	Relative Percent Difference less than 50%

TABLE 7-1
Sample Preservation Methods

Sample	Soils	Water
Ammonia	**	H_2SO_4 pH < 2 cool to 4°C
Chloride / Fluoride	**	Cool to 4°C
TDS	**	Cool to 4°C
BOD5	**	1L Amber Glass, Cool to 4°C
COD	**	H_2SO_4 pH < 2 Cool to 4°C
Cyanide	**	NaOH to pH > 12, Cool to 4°C
Asbestos	none	none
Carbonate / Bicarbonate (Alkalinity)	**	Cool to 4°C
Nitrate / Nitrite	**	Cool to 4°C
Sulfate	**	Cool to 4°C
Sulfide	**	NaOH to pH > 12, Zn Acetate, Cool to 4°C
VOCs	Sodium Sulfate to pH < 2 or Methanol Cool to 4°C	HCL to pH < 2 & Cool 4°C
SV	Cool to 4°C	Cool to 4°C
Pest	Cool to 4°C	Cool to 4°C
PCBs	Cool to 4°C	Cool to 4°C
Metals	Cool to 4°C	Nitric acid pH < 2 & Cool 4°C
Cyanide	NaOH pH >12 and dark glass, Cool to 4°C	Cool to 4°C
TPA	Cool to 4°C	Sulfuric pH < 2, Cool to 4°C

** No soil samples will be analyzed for these parameters.

TABLE 7-2
Analytical Methods and Sample Holding Times

Sample	Soil	Water
Ammonia	**	28 days
Chloride / Fluoride	**	28 days
TDS	**	7 days
BOD5	**	48 hours
COD	**	28 days
Cyanide	**	14 days
Asbestos	Unlimited	Unlimited
Carbonate / Bicarbonate (Alkalinity)	**	14 days
Nitrate / Nitrite	**	48 hours
Sulfate	**	28 days
Sulfide	**	28 days
VOCs	14 days	14 days
Semi-VOCs	10 days to extraction 40 days to analyze	5 days to extraction 40 days to analyze
Pest	14 days to extraction 40 days to analyze	7 days to extraction 40 days to analyze
PCBs	14 days to extraction 40 days to analyze	7 days to extraction 40 days to analyze
Metals	180 days except 26 days for Hg	180 days except 28 days for Hg
Cyanide	12 days	12 days
TPH	14 days	14 days

** No soil samples will be analyzed for these parameters.

HILLS HOLDING CORPORATION CONSTRUCTION AND DEMOLITION DEBRIS LANDFILL
NYS RT 42, FALLSBURG, NY
QUALITY ASSURANCE PROJECT PLAN (QAPP)
TABLE 7-3
Proposed Sampling Matrix Quantities and Parameter Analysis

Location/Matrix	# of Samples	Analysis	Method
Test Pits/ Soil	Test pits will be excavated and sampled at 25 locations around the perimeter of the landfill. All samples will be analyzed for Total Petroleum Hydrocarbons and TCL/TAL parameters (including SVOCs, PCBs, Pesticides, and Metals), and 5 samples will be chosen to also be analyzed for TCL VOCs + 10, Asbestos and Full TCLP + reactivity, ignitability, corrosivity.		
	25	SVOCs	Full 8270C + TICs
	25	PCB/Pesticides	8082; 8081A
	25	Metals (TAL Inorganics)	6010A; 7471A
	25	Petroleum HydroCarb. (DRO & GRO)	8015M
	5	TCL VOCs + 10	8260B
	5	Full TCLP plus Reac, Ignit. & Corros	1311; 6010/7000; 8260; Full 8270 + TICs; 8081; 8152; 9045; 1010; Section 7.3 Reactivity
	5	Asbestos	EPA 600 / R-93 / 116
Borings / Soil	Samples will be collected from 8 soil borings. All samples will be analyzed for Total Petroleum Hydrocarbons and TCL/TAL parameters (including SVOCs, PCBs, Pesticides, and Metals), and five samples will be chosen to also be analyzed for TCL VOCs +10 Asbestos and Full TCLP + reactivity, ignitability, corrosivity.		
	8	SVOCs	Full 8270C + TICs
	8	PCB/Pesticides	8082; 8081A
	8	Metals (TAL Inorganics)	6010A; 7471A
	8	Petroleum HydroCarb. (DRO & GRO)	8015M
	5	TCL VOCs +10	8260B
	5	Full TCLP plus Reac, Ignit. & Corros	1311; 6010/7000; 8260; Full 8270 + TICs; 8081; 8152; 9045; 1010; Section 7.3 Reactivity
	5	Asbestos	EPA 600 / R-93 / 116
Surface Soils	Surface soils will be sampled at 9 locations. All samples will be analyzed for Total Petroleum Hydrocarbons and Full TCL +30/TAL parameters (including VOCs, SVOCs, PCBs, Pesticides, and Metals)		
	9	Full TCL +30/TAL	Full 8270C + TICs; 8082; 8081A; 6010A; 7471A; 8260B
	9	Petroleum HydroCarb. (DRO & GRO)	8015M
Sediment	Sediments will be sampled at 8 locations. All samples will be analyzed for Total Petroleum Hydrocarbons and Full TCL +30/TAL parameters (including VOCs, SVOCs, PCBs, Pesticides, and Metals)		
	8	Full TCL +30/TAL	Full 8270C + TICs; 8082; 8081A; 6010A; 7471A; 8260B
	8	Petroleum HydroCarb. (DRO & GRO)	8015M

Location/Matrix	# of Samples	Analysis	Method
Groundwater	Groundwater samples will be collected from 12 locations. Samples will be analyzed for FULL TCL+30/TAL parameters and petroleum hydrocarbons. Filtered samples will be collected for TAL inorganics and Pesticides/PCBs analysis. 5 of the 12 locations will also be selected to have unfiltered samples analyzed for TAL inorganics, PCBs, and Pesticides.		
	12	TAL Inorganics (filtered)	6010B; 7040A
	12	TCL VOCs + 10	8260B
	12	SVOCs	Full 8270C + TICs
	12	PCB/Pesticides (filtered)	8082; 8081A
	12	Petroleum HydroCarb. (DRO & GRO)	8015M
	5	TAL Inorganics (un-filtered)	6010B; 7040A
	5	PCB/Pesticides (un-filtered)	8082; 8081A
Surface Water	Surface water will be sampled at 8 locations. All samples will be analyzed for Total Petroleum Hydrocarbons and Full TCL +30/TAL parameters (including VOCs, SVOCs, PCBs, Pesticides, and Metals)		
	9	Full TCL +30/TAL	Full 8270C + TICs; 8082; 8081A; 6010A; 7471A; 8260B
	9	Petroleum HydroCarb. (DRO & GRO)	8015M
Leachate	Leachate will be sampled at up to 7 locations. All samples will be analyzed for the parameters listed below.		
	7	TCL Metals include Na,K, Mo & V	6010A; 7471A
	7	Alkalinity	SM2320
	7	Nitrate & Nitrite	EPA 300.0
	7	Amonia	SM4500NH3B
	7	Chloride	EPA 300.0
	7	Fluoride	EPA 300.0
	7	Sulfate	EPA 300.0
	7	Sulfide	SM4500SD
	7	TDS	SM5540C
	7	BOD5	EPA 405.1
	7	COD	SM55220D
	7	Cyanide	SW846 9012
Soil Vapor	Soil vapor samples will be obtained from up to six (6) probe locations and one (1) ambient air location. The samples will be analyzed for VOCs by USEPA Method TO-15 by a laboratory that is ELAP approved for air contaminants.		
	7	VOCs	EPA TO-15

Location/Matrix	# of Samples	Analysis	Method
QA/QC Samples:			
Surface and Boring Soils / Test Pits (42 total)			
Duplicates	3	Full TCL +30/TAL (unfiltered TAL/PCB/PEST)	Full 8270C + TICs; 8082; 8081A; 6010A; 7471A; 8260B
	3	Petroleum HydroCarb. (DRO & GRO)	8015M
	1	Full TCLP plus Reac, Ignit. & Corros	1311; 6010/7000; 8260; Full 8270 + TICs; 8081; 8152; 9045; 1010; Section 7.3 Reactivity
	1	Asbestos	EPA 600 / R-93 / 116
MS/MSD	3	Full TCL +30/TAL (unfiltered TAL/PCB/PEST)	Full 8270C + TICs; 8082; 8081A; 6010A; 7471A; 8260B
	3	Petroleum HydroCarb. (DRO & GRO)	8015M
	1	Full TCLP plus Reac, Ignit. & Corros	1311; 6010/7000; 8260; Full 8270 + TICs; 8081; 8152; 9045; 1010; Section 7.3 Reactivity
	1	Asbestos	EPA 600 / R-93 / 116
Rinse Blank	3	Full TCL +30/TAL (unfiltered TAL/PCB/PEST)	Full 8270C + TICs; 8082; 8081A; 6010A; 7471A; 8260B
	3	Petroleum HydroCarb. (DRO & GRO)	8015M
Trip Blank	14	TCL VOCs + 10	8260B
Ground and Surface Water (21 total)			
Duplicates	2	Full TCL +30/TAL (unfiltered TAL/PCB/PEST)	Full 8270C + TICs; 8082; 8081A; 6010A; 7471A; 8260B
	2	Petroleum HydroCarb. (DRO & GRO)	8015M
	1	TAL Inorganics (filtered)	6010B; 7040A
	1	PCB/Pesticides (filtered)	8082; 8081A
MS/MSD	2	Full TCL +30/TAL (unfiltered TAL/PCB/PEST)	Full 8270C + TICs; 8082; 8081A; 6010A; 7471A; 8260B
	2	Petroleum HydroCarb. (DRO & GRO)	8015M
	1	TAL Inorganics (filtered)	6010B; 7040A
	1	PCB/Pesticides (filtered)	8082; 8081A
Rinse Blank	2	Full TCL +30/TAL (unfiltered TAL/PCB/PEST)	Full 8270C + TICs; 8082; 8081A; 6010A; 7471A; 8260B
	2	Petroleum HydroCarb. (DRO & GRO)	8015M
	1	TAL Inorganics (filtered)	6010B; 7040A
	1	PCB/Pesticides (filtered)	8082; 8081A
Trip Blank	8	TCL VOCs + 10	8260B
Sediment (8 total)			
Duplicates	1	Full TCL +30/TAL	Full 8270C + TICs; 8082; 8081A; 6010A; 7471A; 8260B
	1	Petroleum HydroCarb. (DRO & GRO)	8015M
MS/MSD	1	Full TCL +30/TAL	Full 8270C + TICs; 8082; 8081A; 6010A; 7471A; 8260B
	1	Petroleum HydroCarb. (DRO & GRO)	8015M
Rinse Blank	1	Full TCL +30/TAL	Full 8270C + TICs; 8082; 8081A; 6010A; 7471A; 8260B
	1	Petroleum HydroCarb. (DRO & GRO)	8015M
Trip Blank	3	TCL VOCs + 10	8260B

Location/Matrix	Quantity	Analysis	Method
Leachate (7 total)			
Duplicates	1	TCL Metals include Na,K, Mo & V	6010A; 7471A
	1	Alkalinity	SM2320
	1	Nitrate & Nitrite	EPA 300.0
	1	Amonia	SM4500NH3B
	1	Chloride	EPA 300.0
	1	Fluoride	EPA 300.0
	1	Sulfate	EPA 300.0
	1	Sulfide	SM4500SD
	1	TDS	SM5540C
	1	BOD5	EPA 405.1
	1	COD	SM55220D
	1	Cyanide	SW846 9012
MS/MSD	1	TCL Metals include Na,K, Mo & V	6010A; 7471A
	1	Alkalinity	SM2320
	1	Nitrate & Nitrite	EPA 300.0
	1	Amonia	SM4500NH3B
	1	Chloride	EPA 300.0
	1	Fluoride	EPA 300.0
	1	Sulfate	EPA 300.0
	1	Sulfide	SM4500SD
	1	TDS	SM5540C
	1	BOD5	EPA 405.1
	1	COD	SM55220D
	1	Cyanide	SW846 9012
Rinse Blank	1	TCL Metals include Na,K, Mo & V	6010A; 7471A
	1	Alkalinity	SM2320
	1	Nitrate & Nitrite	EPA 300.0
	1	Amonia	SM4500NH3B
	1	Chloride	EPA 300.0
	1	Fluoride	EPA 300.0
	1	Sulfate	EPA 300.0
	1	Sulfide	SM4500SD
	1	TDS	SM5540C
	1	BOD5	EPA 405.1
	1	COD	SM55220D
Trip Blank	1	Cyanide	SW846 9012
Trip Blank	3	TCL VOCs +10	8260B

Note: For Trip Blank calculations, assume 4 sample sets per cooler.

APPENDIX A

STANDARD OPERATING PROCEDURES

STERLING ENVIRONMENTAL ENGINEERING, P.C.
STANDARD OPERATING PROCEDURES

GROUNDWATER SAMPLING
SOP #2a

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GROUNDWATER SAMPLING
SOP #2a

1.0 SCOPE AND APPLICATION

The purpose of this standard operating procedure (SOP) is to describe the procedures for the collection of representative groundwater samples from monitoring wells.

These procedures that may be varied or changed as required, dependent upon site conditions, equipment limitations or limitations imposed by the procedure. In all instances, the actual procedures used should be documented and described in the site investigation report.

2.0 METHOD SUMMARY

Groundwater samples may be collected using a variety of methods and equipment depending on the existing water conditions in each monitoring well. Groundwater that displays turbid conditions, even after redevelopment, may be purged and sampled by low-flow pumping.

3.0 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

Chemical preservation of groundwater samples will be necessary for some of the analytical parameters. Samples will also be cooled and protected from sunlight to minimize any potential reaction. The amount of sample to be collected and proper sample container type are discussed in SOP #4, *Sample Preservation, Containers, Handling and Storage.*

4.0 POTENTIAL PROBLEMS

There are two primary potential problems associated with groundwater sampling - cross contamination of samples and improper sample collection. Cross contamination problems can be eliminated or minimized through the use of dedicated sampling equipment. If this is not possible or practical, then decontamination of sampling equipment is necessary. Improper sample collection techniques include using contaminated equipment, and agitating fine sediment in the aquifer formation and increasing the turbidity of the groundwater sample.

5.0 EQUIPMENT

Groundwater sampling equipment includes the following:

- Maps/plot plan
- Safety equipment and personal protective clothing, as specified in the site-specific- Health and Safety Plan
- Camera and Film
- Field log book/field data sheets
- Water level measuring device
- Submersible pumps

- Foot Valves
- Tubing
- Low Flow Cell
- Flow measurement supplies
- Multi-sensor meter (measures pH, temperature, specific conductance and dissolved oxygen)
- Turbidity meter
- Appropriate size sample containers and labels
- Ziploc plastic- bags
- Chain of Custody records and custody seals
- Cooler(s)
- Ice
- Decontamination supplies/equipment

6.0 REAGENTS

Reagents used for the preservation of groundwater samples will be supplied by the selected laboratory. Decontamination solutions are specified in SOP #3, *Sampling Equipment Decontamination*, and the site specific work plan.

7.0 PROCEDURES

7.1 Preparation

1. Determine the extent of the sampling effort, the sampling methods to be employed, and the types and amounts of equipment and supplies required.
2. Obtain necessary sampling and monitoring equipment.
3. Decontaminate or pre-clean equipment, and ensure that it is in working order.
4. Prepare schedules and coordinate with staff, client, and regulatory agencies, if appropriate.
5. Perform a general site survey prior to site entry in accordance with the site specific Health and Safety Plan.

7.2 Sample Collection

7.2.1 Foot-Valve Purging and Sampling Procedures

This procedure will be utilized for wells where turbidity measurements in the groundwater are not elevated.

1. Dedicated tubing and a foot-valve will be stored in the well casing of each monitoring well. The foot-valve end of the tubing will be stored at the top of the well casing between sampling events to avoid silting and will be inverted for the sampling event.

2. An electronic water level indicator will be used to measure the water level from below the top of the monitoring casing at a marked location on the casing. The volume of water in the well will be

calculated from the height of the water column and well diameter and converting the volume from cubic feet to gallons (one (1) cubic foot = 7.48 gallons). Multiplying this number by three (3) will determine the total purge volume. The water level probe will be rinsed with distilled water between wells.

3. Well sampling will be performed within 24 hours after purging and as soon as possible after the well has recovered sufficiently to sample. If a well does not contain or yield sufficient volume for all required laboratory analytical testing (including quality control), a decision will be made to prioritize analyses. After well purging is completed and the well has sufficiently recharged, samples will be collected into the appropriate sample bottles.

4. All groundwater samples will be field analyzed for pH, temperature, specific conductivity and ORP (oxidation-reduction potential) as soon as possible after sample collection. Samples will be placed in appropriate bottles prepared by the laboratory for full TCL+30/TAL compounds, plus petroleum hydrocarbons, in accordance with DER-10. Upon collection, samples will be placed in coolers and kept chilled using ice or ice packs.

5. Record sample location, volume of purged groundwater, time of sample collection and field parameter measurements in field log book.

6. Complete Chain of Custody and include in sample shipment.

7.2.2 Low-Flow Purging and Sampling Procedures

The steps listed below will be followed when elevated turbidity readings for groundwater are reported.

1. Measure the depth to groundwater from a marked point on the top of the well casing and record.

2. Purge the well at a rate of between 0.1-0.5 L/min until field parameters (specific conductivity, DO, pH, turbidity, temperature and ORP) have stabilized. Utilize low-flow sampling protocol, as specified in the USEPA Low-Flow Groundwater Sampling Procedure, EPA/540/5-95/504 (1996).

3. Fill each 40 ml VOA vial first with groundwater, taking care not to let it overflow and lose preservative. Place cap with Teflon septum on each vial as filled. Turn the VOA vial upside down and check for air bubbles. Tap the bottom of the VOA vials to dislodge any bubbles that may have formed around the caps or the sides. If bubbles are present, remove cap and fill VOA vial with additional sample water to completely vial. Reconfirm that there are no bubbles in the vial.

4. Fill sample containers for other analytes, and seal sample containers.

5. Place labeled sample container(s) into a sample cooler with ice.

6. Record sample location, field parameter measurements and time of sample collection in field book.

7. Complete chain of custody and include in sample shipment.

8.0 CALCULATIONS

When sampling groundwater by pumping with a foot-valve and tubing, the amount of water to be purged must be calculated. This procedure is described in Section 7.2.1(2).

9.0 QUALITY ASSURANCE/QUALITY CONTROL

1. All data must be documented on field data sheets or within site logbooks.
2. All instrumentation must be operated in accordance with operating instructions as supplied by the manufacturer, unless otherwise specified in the work plan. Equipment checkout and calibration activities must occur prior to sampling/operation, and they must be documented.

10.0 HEALTH AND SAFETY

When working with potentially hazardous materials, follow U.S. EPA, OSHA and corporate health and safety procedures, in addition to the procedures specified in the site specific Health & Safety Plan.

11.0 REFERENCES

- United States Environmental Protection Agency (USEPA) Environmental Response Team, SOP#2012
- USEPA Low-Flow Groundwater Sampling Procedure, EPA/540/5-95/504, (1996)

Projects/Standard Forms/SOPs/Groundwater SOP2.doc

STERLING ENVIRONMENTAL ENGINEERING, P.C.
STANDARD OPERATING PROCEDURES

SOIL SAMPLING
SOP #2b

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SOIL SAMPLING
SOP #2b

1.0 SCOPE AND APPLICATION

The purpose of this standard operating procedure (SOP) is to describe the procedures for the collection of representative soil samples. Sampling depths are assumed to be those that can be reached without the use of a drill rig, direct-push, or other mechanized equipment (except for a back-hoe) or with the use of such equipment. Analysis of soil samples may determine whether concentrations of specific pollutants exceed established action levels, or if the concentrations of pollutants present a risk to public health, welfare, or the environment. These are standard (i.e., typically applicable) operating procedures which may be varied or changed as required, dependent upon site conditions, equipment limitations or limitations imposed by the procedure. In all instances, the actual procedures used should be documented and described in an appropriate site report. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

2.0 METHOD SUMMARY

Soil samples may be collected using a variety of methods and equipment depending on the depth of the desired sample, the type of sample required (disturbed vs. undisturbed), and the soil type. Near-surface soils may be easily sampled using a spade, trowel, and scoop. Sampling at greater depths may be performed using a hand auger, continuous flight auger, a trier, a split-spoon, or, if required, a backhoe.

3.0 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

Chemical preservation of solids is not generally recommended. Samples should, however, be cooled and protected from sunlight to minimize any potential reaction. The amount of sample to be collected and proper sample container type are discussed in SOP #4, *Sample Preservation, Containers, Handling and Storage.*

4.0 POTENTIAL PROBLEMS

There are two primary potential problems associated with soil sampling - cross contamination of samples and improper sample collection. Cross contamination problems can be eliminated or minimized through the use of dedicated sampling equipment. If this is not possible or practical, then decontamination of sampling equipment is necessary. Improper sample collection can involve using contaminated equipment, disturbance of the matrix resulting in compaction of the sample, or inadequate homogenization of the samples where required, resulting in variable, non-representative results.

5.0 EQUIPMENT

Soil sampling equipment includes the following:

- Maps/plot plan
- Safety equipment, as specified in the site-specific Health and Safety Plan
- Survey equipment or global positioning system (GPS) to locate sampling points

- Tape measure
- Survey stakes or flags
- Camera and film
- Stainless steel, plastic, or other appropriate homogenization bucket, bowl or pan
- Appropriate size sample containers
- Ziploc plastic- bags
- Logbook
- Labels
- Chain of Custody records and custody seals
- Field data sheets and sample labels
- Cooler(s)
- Ice
- Vermiculite
- Decontamination supplies/equipment
- Canvas or plastic- sheet
- Spade or shovel
- Spatula
- Scoop
- Plastic- or stainless steel spoons
- Trowel(s)
- Continuous flight (screw) auger
- Bucket auger
- Post hole auger
- Extension rods
- T-handle
- Sampling trier
- Thin wall tube sampler
- Split spoons
- Vehimeyer soil sampler outfit
- Tubes
- Points
- Drive head
- Drop hammer
- Puller jack and grip
- Backhoe

6.0 REAGENTS

Reagents are not used for the preservation of soil samples. Decontamination solutions are specified in SOP #3, *Sampling Equipment Decontamination*, and the site specific work plan.

7.0 PROCEDURES

7.1 Preparation

1. Determine the extent of the sampling effort, the sampling methods to be employed, and the types and amounts of equipment and supplies required.
2. Obtain necessary sampling and monitoring equipment.
3. Decontaminate or pre-clean equipment, and ensure that it is in working order.
4. Prepare schedules and coordinate with staff, client, and regulatory agencies, if appropriate.
5. Perform a general site survey prior to site entry in accordance with the site specific Health and Safety Plan.
6. Use stakes, flagging, or buoys to identify and mark all sampling locations. Specific site factors, including extent and nature of contaminant, should be considered when selecting sample location. If required, the proposed locations may be adjusted based on site access, property boundaries, and surface obstructions. All staked locations should be utility-cleared by the property owner or the On-Scene-Coordinator (OSC) prior to soil sampling; and utility clearance should always be confirmed before beginning work.

7.2 Sample Collection

7.2.1 Surface Soil Samples

Collection of samples from near-surface soil can be accomplished with tools such as spades, shovels, trowels, and scoops. Surface material is removed to the required depth and a stainless steel or plastic scoop is then used to collect the sample. This method can be used in most soil types but is limited to sampling at or near the ground surface. Accurate, representative samples can be collected with this procedure depending on the care and precision demonstrated by the sample team member. A flat, pointed mason trowel to cut a block of the desired soil is helpful when undisturbed profiles are required. Tools plated with chrome or other materials should not be used. Plating is particularly common with garden implements such as potting trowels.

The following procedure is used to collect surface soil samples:

1. Carefully remove the top layer of soil or debris to the desired sample depth with a pre-cleaned spade.
2. Using a pre-cleaned, stainless steel scoop, plastic spoon, or trowel, remove and discard a thin layer of soil from the area which came in contact with the spade.
3. If volatile organic analysis is to be performed, transfer the sample directly into an appropriate, labeled sample container with a stainless steel lab spoon, or equivalent and secure the cap tightly. Place the remainder of the sample into a stainless steel, plastic, or other appropriate homogenization container, and mix thoroughly to obtain a homogenous sample representative of the entire sampling interval. Then, either place the sample into appropriate, labeled containers and secure the caps tightly; or, if composite samples are to be collected, place a sample from another sampling interval or location into the homogenization container and mix thoroughly. When compositing is complete, place the sample into appropriate, labeled containers and secure the caps tightly.

7.2.2 Sampling at Depth with Augers and Thin Wall Tube Samplers

This system consists of an auger, or a thin-wall tube sampler, a series of extensions, and a "T" handle. The auger is used to bore a hole to a desired sampling depth, and is then withdrawn. The sample may be collected directly from the auger. If a core sample is to be collected, the auger tip is then replaced with a thin wall tube sampler. The system is then lowered down the borehole, and driven into the soil to the completion depth. The system is withdrawn and the core is collected from the thin wall tube sampler. Several types of augers are available; these include: bucket type, continuous flight (screw), and post-hole augers. Bucket type augers are better for direct sample recovery because they provide a large volume of sample in a short time. When continuous flight augers are used, the sample can be collected directly from the flights. The continuous flight augers are satisfactory when a composite of the complete soil column is desired. Post-hole augers have limited utility for sample collection as they are designed to cut through fibrous, rooted, swampy soil and cannot be used below a depth of approximately three feet.

The following procedure is used for collecting soil samples with the auger:

1. Attach the auger bit to a drill rod extension, and attach the "T" handle to the drill rod.
2. Clear the area to be sampled of any surface debris (e.g., twigs, rocks, litter). It may be advisable to remove the first three to six inches of surface soil for an area approximately six inches in radius around the drilling location.
3. Begin augering, periodically removing and depositing accumulated soils onto a plastic sheet spread near the hole. This prevents accidental brushing of loose material back down the borehole when removing the auger or adding drill rods. It also facilitates refilling the hole, and avoids possible contamination of the surrounding area.
4. After reaching the desired depth, slowly and carefully remove the auger from the hole. When sampling directly from the auger, collect the sample after the auger is removed from the hole and proceed to Step 10.
5. Remove auger tip from the extension rods and replace with a pre-cleaned thin wall tube sampler. Install the proper cutting tip.
6. Carefully lower the tube sampler down the borehole. Gradually force the tube sampler into the soil. Do not scrape the borehole sides. Avoid hammering the rods as the vibrations may cause the boring walls to collapse.
7. Remove the tube sampler, and unscrew the drill rods.
8. Remove the cutting tip and the core from the device.
9. Discard the top of the core (approximately 1 inch), as this possibly represents material collected before penetration of the layer of concern. Place the remaining core into the appropriate labeled sample container. Sample homogenization is not required.
10. If volatile organic analysis is to be performed, transfer the sample into an appropriate, labeled sample container with a stainless steel lab spoon, or equivalent and secure the cap tightly. Place

the remainder of the sample into a stainless steel, plastic, or other appropriate homogenization container, and mix thoroughly to obtain a homogenous sample representative of the entire sampling interval. Then, either place the sample into appropriate, labeled containers and secure the caps tightly; or, if composite samples are to be collected, place a sample from another sampling interval into the homogenization container and mix thoroughly. When compositing is complete, place the sample into appropriate, labeled containers and secure the caps tightly.

11. If another sample is to be collected in the same hole, but at a greater depth, reattach the auger bit to the drill and assembly, and follow steps 3 through 11, making sure to decontaminate the auger and tube sampler between samples.

12. Abandon the hole according to applicable state regulations. Generally, shallow holes can simply be backfilled with the removed soil material.

7.2.3 Sampling at Depth with a Trier

The system consists of a trier, and a "T" handle. The auger is driven into the soil to be sampled and used to extract a core sample from the appropriate depth.

The following procedure is used to collect soil samples with a sampling trier:

1. Insert the trier into the material to be sampled at a 0° to 45° angle from horizontal. This orientation minimizes the spillage of sample.

2. Rotate the trier once or twice to cut a core of material.

3. Slowly withdraw the trier, making sure that the slot is facing upward.

4. If volatile organic analyses are required, transfer the sample into an appropriate, labeled sample container with a stainless steel lab spoon, or equivalent and secure the cap tightly. Place the remainder of the sample into a stainless steel, plastic, or other appropriate homogenization container, and mix thoroughly to obtain a homogenous sample representative of the entire sampling interval. Then, either place the sample into appropriate, labeled containers and secure the caps tightly; or, if composite samples are to be collected, place a sample from another sampling interval into the homogenization container and mix thoroughly. When compositing is complete, place the sample into appropriate, labeled containers and secure the caps tightly.

7.2.4 Sampling at Depth with a Split Spoon (Barrel) Sampler

Split spoon sampling is generally used to collect undisturbed soil cores of 18 or 24 inches in length. A series of consecutive cores may be extracted with a split spoon sampler to give a complete soil column profile, or an auger may be used to drill down to the desired depth for sampling. The split spoon is then driven to its sampling depth through the bottom of the augured hole and the core extracted. When split spoon sampling is performed to gain geologic information, all work should be performed in accordance with ASTM D1586-98, “Standard Test Method for Penetration Test and Split-Barrel Sampling of Soils”.

The following procedures are used for collecting soil samples with a split spoon:

1. Assemble the sampler by aligning both sides of barrel and then screwing the drive shoe on the bottom and the head piece on top.

2. Place the sampler in a perpendicular position on the sample material.

3. Using a well ring, drive the tube. Do not drive past the bottom of the head piece or compression of the sample will result.

4. Record in the site logbook or on field data sheets the length of the tube used to penetrate the material being sampled, and the number of blows required to obtain this depth.

5. Withdraw the sampler, and open by unscrewing the bit and head and splitting the barrel. The amount of recovery and soil type should be recorded on the boring log. If a split sample is desired, a cleaned, stainless steel knife should be used to divide the tube contents in half, longitudinally. This sampler is typically available in 2 and 3 1/2 inch diameters. A larger barrel may be necessary to obtain the required sample volume.

6. Without disturbing the core, transfer it to appropriate labeled sample container(s) and seal tightly.

7.2.5 Test Pit/Trench Excavation

A backhoe can be used to remove sections of soil, when detailed examination of soil characteristics are required. This is probably the most expensive sampling method because of the relatively high cost of backhoe operation.

The following procedures are used for collecting soil samples from test pits or trenches:

1. Prior to any excavation with a backhoe, it is important to ensure that all sampling locations are clear of overhead and buried utilities.

2. Review the site specific Health & Safety plan and ensure that all safety precautions including appropriate monitoring equipment are installed as required.

3. Using the backhoe, excavate a trench approximately three feet wide and approximately one foot deep below the cleared sampling location. Place excavated soils on plastic sheets. Trenches greater than five feet deep must be sloped or protected by a shoring system, as required by OSHA regulations.

4. A shovel is used to remove a one to two inch layer of soil from the vertical face of the pit where sampling is to be done.

5. Samples are taken using a trowel, scoop, or coring device at the desired intervals. Be sure to scrape the vertical face at the point of sampling to remove any soil that may have fallen from above, and to expose fresh soil for sampling. In many instances, samples can be collected directly from the backhoe bucket.

6. If volatile organic analyses are required, transfer the sample into an appropriate, labeled sample container with a stainless steel lab spoon, or equivalent and secure the cap tightly. Place the remainder of the sample into a stainless steel, plastic, or other appropriate homogenization container, and mix thoroughly to obtain a homogenous sample representative of the entire sampling interval. Then, either place the sample into appropriate, labeled containers and secure the caps tightly; or, if composite samples are to be collected, place a sample from another sampling interval into the homogenization container and mix thoroughly. When compositing is complete, place the sample into appropriate, labeled containers and secure the caps tightly.

7. Abandon the pit or excavation according to applicable state regulations. Generally, shallow excavations can simply be backfilled with the removed soil material.

8.0 QUALITY ASSURANCE/QUALITY CONTROL

There are no specific quality assurance (QA) activities which apply to the implementation of these procedures. However, the following QA procedures apply:

1. All data must be documented on field data sheets or within site logbooks.

2. All instrumentation must be operated in accordance with operating instructions as supplied by the manufacturer, unless otherwise specified in the work plan. Equipment checkout and calibration activities must occur prior to sampling/operation, and they must be documented.

9.0 HEALTH AND SAFETY

When working with potentially hazardous materials, follow U.S. EPA, OHSA and corporate health and safety procedures, in addition to the procedures specified in the site specific Health & Safety Plan.

10.0 REFERENCES

United States Environmental Protection Agency Environmental Response Team, SOP#2012

STANDARD OPERATING PROCEDURES

EQUIPMENT CLEANING AND DECONTAMINATION PROCEDURES
SOP #3

Summary

Equipment, tools, materials, etc. used in the investigation and collection of samples at field investigation sites must be properly prepared and cleaned/decontaminated during and after each sampling event. The degree of cleaning/decontamination will be dependent upon site conditions and the nature and type of contamination, if present, the intent and goal(s) of the investigation, and data quality objectives, as well as other site-specific requirements.

Procedure

1. Heavy Equipment Decontamination

All equipment, tools and materials associated with sampling events must be cleaned or decontaminated prior to usage. Items such as drill rigs, auger flights, trackhoes, and backhoes all present potential sources of contamination to environmental samples. Therefore, all heavy equipment utilized at a site must undergo the following decontamination procedures:

- the equipment will first be high pressure, hot washed or steam-cleaned with potable water; and,
- the equipment will be rinsed thoroughly with potable water.

Contain, collect and dispose of all decontamination fluids in accordance with site/project-specific requirements. The bucket of trackhoes and backhoes may be cleaned over the excavation allowing high pressure decontamination washwater to return to the excavation.

2. Cleaning of Field Sampling Equipment

All equipment and tools used to collect samples for chemical analyses, including spatulas, spoons, scoops, trowels, split-spoons, augers, etc. will be decontaminated using the following procedures:

- non-phosphate detergent wash;
- potable water or distilled/deionized water rinse; and
- air or oven-dry.

If the equipment is to be stored for future use, allow to dry and then wrap in aluminum foil (shiny-side out) or seal in plastic bags.

Collect or dispose of all decontamination fluids in accordance with site/project-specific requirements.

3. Personal Clothing Decontamination

All footwear worn in and around the contamination area will be washed down using soap and water to remove soil or oily residue remnants. If disposable gloves, boots or suits (such as Tyvek® suits) are worn, such are to be removed and disposed in a designated 55-gallon drum on site for future disposal. Any other clothing that comes in contact with the potentially contaminated material should not be worn more than 24-hours and should be washed prior to wearing again.

Projects/Standard Forms/SOPs/Equipment Cleaning & Decontamination Procedures

STERLING ENVIRONMENTAL ENGINEERING, P.C.
STANDARD OPERATING PROCEDURES

SAMPLE PRESERVATION, CONTAINERS, HANDLING & STORAGE
SOP #4

1.0 SCOPE AND APPLICATION

The purpose of this Standard Operating Procedure (SOP) is to describe the acceptable methodologies for the placement of samples in containers during collection and subsequent handling of water and soil samples to the point of delivery to the approved laboratory.

These are standard (i.e., typically applicable) operating procedures, which may be varied or changed as required, dependent upon site conditions. In all instances, the actual procedures used must be documented and described in an appropriate site report.

2.0 METHOD SUMMARY

During soil testing, soil samples will be collected from a variety of soil types and moisture contents, and will require storing according to different methods. Depending on site specific conditions, the container, sample collection method, preservative and the allowable storage time will vary. Similarly, water samples may be obtained from surface water, groundwater or leachate. Samples may be collected for PCBs, Pesticides, Herbicides, Metals, Mercury, Volatile Organic Compounds (VOCs), and for Semi-volatile Organic Compounds (SVOCs). As such, all soil samples will be cooled to a temperature less than 4°C. Samples will be physically stored in coolers in such a way as to minimize the potential for cross-contamination, such as by water from melting ice. Samples will be delivered or shipped to a certified laboratory and all transfers will be documented on a Chain-of-Custody form.

3.0 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

Only polyethylene or glass containers with Teflon or Teflon-lined plastic caps will be used under the current scope. Clean latex or nitrile gloves will be used by the person collecting each sample. The sample jars containing the VOC samples will have a Teflon-covered lid that will ensure the sample is maintained void of air and air-tight. The sample containers containing the SVOC or cyanide samples must be amber-colored to prevent sunlight from affecting the quality of the sample.

To avoid losing the ability to obtain data in case of jar breakage, double the sample volume will be collected for each analysis.

The samples will be placed as soon as they are collected in a cooler that is brought to and maintained at less than 4°C. Preservatives appropriate to matrix and intended analysis will be specified in the QAPP or Work Plan. Also, the holding times appropriate to the matrix and the analysis will be adhered to as specified in the QAPP or Work Plan. The samples will be placed in groups where appropriate to minimize the potential for cross contamination. Once the approved laboratory is in possession of the samples, the approved laboratory will be responsible to ensure the proper storage and maintenance of the samples.

4.0 INTERFERENCES AND POTENTIAL PROBLEMS

Cross contamination will be minimized by the use of dedicated or decontaminated equipment for sample collection and by always using containerized ice. The use of ice cubes is allowed, as long as they are containerized within a sealed bag or plastic bottle in such a way that the resulting melt-water does not contact the samples.

Another potential problem might arise from samples not being analyzed within their respective holding time. To avoid this problem, samples will be transferred to the laboratory as soon as the sampling group is completed. This SOP does not specify provisions for storing samples past 24 hours, as within 24 hours the samples will be in the possession of the approved laboratory and the approved laboratory will follow its procedures for storage and management of samples.

5.0 EQUIPMENT

Equipment that will be present includes the following:

- Amber glass sample jars with Teflon-lined plastic caps (4 oz, 8 oz, 250 ml or 500 ml)
- Nitrile or latex sampling gloves
- Ice chest or cooler
- Ice containers, or ice and watertight, sealable bags
- Chain-of-Custody
- Scoop or spoon to collect the sample.
- Alcanox® or other approved soap to decontaminate the scoops
- Deionized water
- Clean brush
- Clean decon wash bucket

6.0 HEALTH AND SAFETY

When working with potentially hazardous materials, follow the United States Environmental Protection Agency (USEPA), Occupational Safety and Health Agency (OSHA) and corporate health and safety procedures, in addition to the procedures specified in the site specific Health & Safety Plan.

STERLING ENVIRONMENTAL ENGINEERING, P.C.
STANDARD OPERATING PROCEDURES

FIELD SCREEING WITH A PHOTOIONIZATION DETECTOR
SOP #6

1.0 SCOPE AND APPLICATION

The purpose of this Standard Operating Procedure (SOP) is to describe the procedure for using a photoionization detector (PID). The PID is a portable, nonspecific, vapor/gas detector employing the principle of photoionization to detect a variety of chemical compounds, both organic and inorganic, in air. This procedure is applicable to the HNU PI-101, HNU ISPI-101, and HW-101 used for air monitoring. These are standard (i.e., typically applicable) operating procedures which may be varied or changed as required, dependent on site conditions, equipment limitations or limitations imposed by the procedure. In all instances, the ultimate procedures employed should be documented and associated with the final report. Mention of trade names or commercial products does not constitute U.S. Environmental Protection Agency (U.S. EPA) endorsement or recommendation for use.

2.0 METHOD SUMMARY

The PID is a useful general survey instrument at hazardous waste sites. A PID is capable of detecting and measuring real-time concentrations of many organic and inorganic vapors in air. A PID is similar to a flame ionization detector (FID) in application; however, the PID has somewhat broader capabilities in that it can detect certain inorganic vapors. Conversely, the PID is unable to respond to certain low molecular weight hydrocarbons, such as methane and ethane, that are readily detected by FID instruments.

The PID employs the principle of photoionization. The analyzer will respond to most vapors that have an ionization potential less than or equal to that supplied by the ionization source, which is an ultraviolet (UV) lamp. Photoionization occurs when an atom or molecule absorbs a photon of sufficient energy to release an electron and form a positive ion. This will occur when the ionization potential of the molecule in electron volts (eV) is less than the energy of the photon.

The sensor is housed in a probe and consists of a sealed ultraviolet light source that emits photons with an energy level high enough to ionize many trace organics, but not enough to ionize the major components of air (e.g., nitrogen, oxygen, carbon dioxide). The ionization chamber exposed to the light source contains a pair of electrodes, one a bias electrode, and the second the collector electrode. When a positive potential is applied to the bias electrode, an electro-magnetic field is created in the chamber. Ions formed by the adsorption of photons are driven to the collector electrode. The current produced is then measured and the corresponding concentration displayed on a meter, directly, in units above background.

Several probes are available for the PID, each having a different eV lamp and a different ionization potential. The selection of the appropriate probe is essential in obtaining useful field results. Though it can be calibrated to a particular compound, the instrument cannot distinguish between detectable compounds in a mixture of gases and, therefore, indicates an integrated response to the mixture. Three probes, each containing a different UV light source, are available for use with the HNU. Energies are 9.5, 10.2, and 11.7 eV. All three detect many aromatic and large molecular hydrocarbons. The 10.2 eV and 11.7 eV probes, in addition, detect some smaller organic molecules and some halogenated hydrocarbons. The 10.2 eV probe is the most useful for environmental response work, as it is more durable than the 11.7 eV probe and detects more compounds than the 9.5 eV probe.

Gases with ionization potentials near to or less than that of the lamp will be ionized. These gases will thus be detected and measured by the analyzer. Gases with ionization potentials higher than that of the lamp will not be detected. Ionization potentials for various atoms, molecules, and compounds are given in Table 1 (Appendix A to this SOP). The ionization potential of the major components of air, oxygen, nitrogen, and carbon dioxide, range from about 12.0 eV to about 15.6 eV and are not ionized by any of the three lamps.

Table 2 (Appendix A of this SOP) illustrates ionization sensitivities for a large number of individual species when exposed to photons from a 10.2 eV lamp. Applications of each probe are included in Table 3 (Appendix A of this SOP).

While the primary use of the HNU is as a quantitative instrument, it can also be used to detect contaminants, or at least to narrow the range of possibilities. Noting instrument response to a contaminant source with different probes can eliminate some contaminants from consideration. For instance, a compound's ionization potential may be such that the 9.5 eV probe produces no response, but the 10.2 eV and 11.7 eV probes do elicit a response.

3.0 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

This section is not applicable to this SOP.

4.0 INTERFERENCES AND POTENTIAL PROBLEMS

4.1 PID Instrument Limitations

1. The PID is a nonspecific total vapor detector. It cannot be used to identify unknown substances; it can only roughly quantify them.

2. The PID must be calibrated to a specific compound.

3. The PID does not respond to certain low molecular weight hydrocarbons, such as methane and ethane. In addition, the HNU does not detect a compound if the probe has a lower energy than the compound's ionization potential.

4. Certain toxic gases and vapors, such as carbon tetrachloride and hydrogen cyanide, have high ionization potentials and cannot be detected with a PID.

5. Certain models of PID instruments are not intrinsically safe. The HNU PI-101 and HW-101 are not designed for use in potentially flammable or combustible atmospheres. Therefore, these models should be used in conjunction with a Combustible Gas Indicator. The ISPI-101 is intrinsically safe, however.

6. Electrical power lines or power transformers may cause interference with the instrument and thus cause measurement errors. Static certain voltage sources such as power lines, radio transmissions, or transformers may also interfere with measurements.

7. High winds and high humidity will affect measurement readings. The HNU may become unusable under foggy or humid conditions. An indication of this is the needle dropping below zero, or a slow constant climb on the read-out dial.

8. The lamp window must be periodically cleaned to ensure ionization of the new compounds by the probe (i.e., new air contaminants).

9. The HNU measures concentrations from about 1-2000 ppm, although the response is not linear over this entire range. For example, if calibrated to benzene, the response is linear from about 0-600 units above background. This means the HNU reads a true concentration of benzene only between 0 and 600. Greater concentrations are detected at a lower level than the true value.

10. This instrument is not to be exposed to precipitation (rain). The units are not designed for this service.

11. Do not use this instrument for head space analysis where liquids can inadvertently be drawn into the probe.

4.2 Regulatory Limitations

Transport of calibration gas cylinders by passenger and cargo aircraft must comply with International Air Transport Association (IATA) Dangerous Goods Regulations or the U.S. Code of Federal Regulations, 49 CFR Parts 100-177. A typical calibration gas included with a PID is isobutylene. It is classified as a non-flammable gas, UN #1556 and the proper shipping name is Compressed Gas. It must be shipped by cargo aircraft only.

5.0 EQUIPMENT/APPARATUS

The following equipment is required for PID operation:

- PID (HNU)
- Operating manual
- Probes: 9.5 eV, 10.2 eV, or 11.7 eV
- Battery charger for PID
- Spare batteries
- Jeweler's screwdriver for adjustments
- Tygon tubing
- NBS traceable calibration gas
- "T" valve for calibration
- Field Data Sheets/Site Logbook
- Intake assembly extension
- Strap for carrying PID
- Teflon tubing for downhole measurements
- Plastic bags for protecting the PID from moisture and dirt

Note: Battery charge status - This instrument may be kept on continuous charge without battery damage.

6.0 REAGENTS

- Isobutylene standards for calibration
- Benzene reference standard
- Methanol for cleaning ionization chamber (GC grade)
- Mild soap solution for cleaning unit surfaces
- Specific gas standards when calibrating to a specific compound
- Light source cleaning compound Cat. No. PA101534-A1 (For use only with 9.5 and 10.2 lamps)

The HNU is calibrated in accordance with the operations manual using isobutylene as the calibration standard. The operations manual may also be referred to for alternate calibration to a specific compound.

7.0 PROCEDURES

7.1 Preparation

Check out and ensure the proper operation of the PID, as appropriate, using the equipment checklist provided in Sections 5.0 and 6.0 and the steps listed below.

7.2 Start-Up Procedures

1. Allow the temperature of the unit to equilibrate to its surrounding. This should take about five minutes.

2. Attach the probe to the read-out unit. Match the alignment key, then twist the connector clockwise until a distinct locking is felt. Make sure the microswitch (red button) is depressed by the locking ring.

3. Turn the FUNCTION switch to the battery check position. Check to ensure that the indicator reads within or beyond the green battery arc on the scale plate. If the indicator is below the green arc, or if the red LED comes on, the battery must be charged prior to using.

4. To zero the instrument, turn the FUNCTION switch to the STANDBY position and rotate the ZERO POTENTIOMETER until the meter reads zero. Wait 15-20 seconds to ensure that the zero adjustment is stable; if not, then readjust.

5. Check to see that the SPAN POTENTIOMETER is set at the appropriate setting for the probe being used (i.e., 9.8 for the 10.2 eV probe, 5.0 for the 11.7 eV probe, 1 for the 9.5 eV probe. Note: The setting may vary based on the intensity of the light source).

6. Set the FUNCTION switch to the desired range (i.e., 0-20, 0-200, 0-2000).

7. Listen for the fan operation to verify fan function.

8. Look for ultraviolet light source in the probe to verify function. Do not look at light source from closer than six inches with unprotected eyes, observe only briefly.

9. Check instrument with an organic point source, such as a magic marker, prior to survey to verify instrument function.

10. Routinely during the day, verify the useful battery life by turning the function switch to BATT and schedule the instrument's use accordingly.

7.3 Field Operation

7.3.1 Field Calibration

1. Follow the start-up procedure in Section 7.2.

2. Set the FUNCTION switch to the range setting which includes the concentration of the calibration gas.

3. Attach a regulator to a disposable cylinder of calibration gas. Connect the regulator to the probe of the HNU with a piece of clean tygon tubing. Open the valve on the regulator.

4. After 15 seconds, the meter reading should equal the response value as indicated on the calibration gas cylinder used. If the reading is within ±15% of the response value, then the instrument can be field calibrated to the response value using the external SPAN ADJUSTMENT control. The SPAN ADJUSTMENT control should be adjusted to a lower setting until the correct reading has been obtained. The lower the number on the SPAN ADJUSTMENT control, the greater the instrument sensitivity. If the SPAN ADJUSTMENT control has to be adjusted below a setting of 4.00, the unit should be red-tagged and returned for repairs.

5. If the meter reading is greater than ±15% of the response value of the calibration gas used, then the instrument should be red-tagged and returned for re-calibration.

6. Record the following information in the site logbook: the instrument ID number (U.S. EPA decal or serial number if the instrument is a rental), the initial and final span settings, calibration gas used, and the name of the person who field calibrated the instrument. Calibrate properly, the instrument should not be used. Under no circumstances is work requiring air monitoring with a PID to be done without a proper functioning the date and time, concentration and type of

7. If the PID does not start up, check out, or calibrate properly, the instrument should not be used. Under no circumstances is work requiring air monitoring with a PID to be done without a proper functioning PID.

8. In some field applications, with the exception of the probe's inlet and exhaust, the PID should be wrapped in clear plastic to prevent it from becoming contaminated and to prevent water from getting inside in the event of precipitation.

7.3.2 Operation

1. All readings are to be recorded in the site logbook. Readings should be recorded, following background readings, as "units above background," not ppm.

2. As with any field instrument, accurate results depend on the operator being completely familiar with the operator's manual. The instructions in the operating manual should be followed explicitly in order to obtain accurate results.

3. Position the probe assembly close to the area to be monitored because the low sampling rate allows for only very localized readings. Under no circumstances should the probe tip assembly be immersed in fluid.

4. While taking care to prevent the PID from being exposed to excessive moisture, dirt, or contamination, monitor the work activity as specified in the site Health and Safety Plan. The PID survey should be conducted at a slow to moderate rate of speed and the intake assembly (the probe) slowly swept from side to side. There is a three to five second delay in read-out depending upon the instruments sensitivity to the contaminant.

5. If the PID fails to calibrate properly, the instrument should not be used. Under no circumstances is work requiring air monitoring with a PID to be done without a proper functioning. If the PID does not start up, check out, or instrument calibrate, then the associated work must not be conducted.

6. In some field applications, with the exception of the probe's inlet and exhaust, the PID should be wrapped in clear plastic to prevent it from becoming contaminated and to prevent water from getting inside in the event of precipitation.

8.0 CALCULATIONS

The HNU is a direct reading instrument. Readings are interpreted as units above background rather than ppm.

9.0 QUALITY ASSURANCE/QUALITY CONTROL

There are no specific quality assurance activities which apply to the implementation of these procedures. However, the following general QA procedures apply:

1. All data must be documented on field data sheets or within site logbooks.
2. All instrumentation must be operated in.6 accordance with operating instructions as supplied by the manufacturer, unless otherwise specified in the work plan.
3. Equipment checkout and calibration activities must occur prior to sampling/operation, and they must be documented.

10.0 HEALTH AND SAFETY

When working with potentially hazardous materials, follow U.S. EPA, OSHA, or corporate health and safety practices. The HNU is certified by OSHA standards for use in Class 1, Division 2, Groups A, B, C, and D locations.

11.0 REFERENCES

United States Environmental Protection Agency Environmental Response Team, SOP#2114

Projects/Standard Forms/SOPs/PID SOP6.doc

APPENDIX A

Tables

TABLE 1. Ionization Potentials

SOME ATOMS AND SIMPLE MOLECULES

Molecule	IP(Ev)	Molecule	IP (eV)
H	13.595	I_2	9.28
C	11.264	HF	15.77
N	14.54	HCl	12.74
O	13.614	HBr	11.62
Si	8.149	HI	10.38
S	10.357	SO_2	12.34
F	17.42	CO_2	13.79
Cl	13.01	COS	11.18
Br	11.84	CS_2	10.08
I	10.48	N_2O	12.90
H_2	15.426	NO_2	9.78
N_2	15.580	O_3	12.80
O_2	12.075	H_2O	12.59
CO	14.01	H_2S	10.46
CN	15.13	H_2Se	9.88
NO	9.25	H_2Te	9.14
CH	11.1	HCN	13.91
OH	13.18	C_2N_2	13.8
F_2	15.7	NH_3	10.15
Cl_2	11.48	CH_3	9.840
Br_2	10.55	CH_4	12.98

PARAFFINS AND CYCLOPARAFFINS

Molecule	IP (eV)
Methane	12.98
Ethane	11.65
Propane	11.07
n-Butane	10.63
I-Butane	10.57
n-Pentane	10.35
ii-Pentane	10.32
2,2-Dimethylpropane	10.35
n-Hexane	10.18
2-Methylpentane	10.12
3-Methylpentane	10.08
2,2-Dimethylbutane	10.06
2,3-Dimethylbutane	10.02
n-Heptane	10.08
2,2,4-Trimethylpentane	9.86
Cyclopropane	10.06
Cyclopentane	10.53
Cyclohexane	9.88
Methylcyclohexane	9.85

APPENDIX A (Cont'd)

Tables

TABLE 1. Ionization Potentials (Continued)

ALKYL HALIDES

Molecule	IP (eV)
HCl	12.74
Cl_2	11.48
CH_4	12.98
Methyl chloride	11.28
Dichloromethane	11.35
Trichloromethane	11.42
Tetrachloromethane	11.47
Ethyl chloride	10.98
1,2-Dichloroethane	11.12
1,3-Dichloropropane	10.85
1-chlorobutane	10.67
2-chlorobutane	10.65
1-chloro-2-methylpropane	10.66
2-chloro-2-methylpropane	10.61
HBr	11.62
Br_2	10.55
Methyl bromide	10.53
Dibromomethane	10.49
Tribomomethane	10.51
CH_2BrCl	10.77
$CHBr_2Cl$	10.59
Ethyl bromide	10.29
1,1-dibromoethane	10.19
1-bromo-2-chloroethane	10.63
1-bromopropane	10.18
2-bromopropane	10.075
1,3-dibromopropane	10.07
1-bromobutane	10.13
2-bromobutane	9.98
1-chloropropane	10.82
2-chloropropane	10.78
1,2-dichloropropane	10.87
1-bromo-2-methylpropane	10.09
2-bromo-2-methylpropane	9.89
1-bromopentane	10.10
HI	10.38
I_2	9.28
Methyl iodide	9.54
Diiodomethane	9.34
Ethyl iodide	9.33
1-iodopropane	9.26
2-iodopropane	9.17
1-iodobutane	9.21
2-iodobutane	9.09
1-iodo-2-methylpropane	9.18
2-iodo-2-methylpropane	9.02
1-iodopentane	9.19
F_2	15.7
HF	15.77
$CFCl_3$ (Freon 11)	11.77
CF_2Cl_2 (Freon 12)	12.31
CF_3Cl (Freon 13)	12.91
$CHClF_2$ (Freon 22)	12.45
CF_2Br_2	11.67
CH_3CF_2Cl (Genetron 101)	11.98
$CFCl_2CF_2Cl$	11.99
CF_3CCl_3 (Freon 113)	11.78
$CFHBrCH_2Br$	10.75
CF_2BrCH_2Br	10.83
CF_3CH_2I	10.00
n-C_3F_7I	10.36
n-$C_3F_7CH_2Cl$	11.84
n-$C_3F_7CH_2I$	9.96
CF_2Br_2	11.07

APPENDIX A (Cont'd)

Tables

TABLE 1. Ionization Potentials (Continued)

ALIPHATIC ALCOHOL, ETHER, THIOL, AND SULFIDES

Molecule	IP (eV)
Water	12.59
Methyl alcohol	10.85
Ethyl alcohol	10.48
n-propyl alcohol	10.20
i-propyl alcohol	10.16
n-butyl alcohol	10.04
Dimethyl ether	10.00
Diemthyl ether	9.53
n-propyl ether	9.27
i-propyl ether	9.20
Hydrogen Sulfide	10.46
Methanethiol	9.440
Ethanethiol	9.285
1-propanethiol	9.195
1-butanethiol	9.14
Dimethyl sulfide	8.685
Ethyl methyl sulfide	8.55
Diethyl sulfide	8.430
di-n-propyl sulfide	8.30

ALIPHATIC ALDEHYDES AND KETONES

Molecule	IP (eV)
Carbon Dioxide	13.79
Formaldehyde	10.87
Acetaldehyde	10.21
Propionaldehyde	9.98
n-butyraldehyde	9.86
Isobutyraldehyde	9.74
n-valeraldehyde	9.82
Isovaleraldehyde	9.71
Acrolein	10.10
Crotonaldehyde	9.73
Benzaldehyde	9.53
Acetone	9.69
Methyl ethyl ketone	9.53
Methyl n-propyl ketone	9.39
Methyl i-propyl ketone	9.32
Diethyl ketone	9.32
Methyl n-butyl ketone	9.34
Methyl i-butyl ketone	9.30
3,3-dimethyl butanone	9.17
2-heptanone	9.33
Cyclopentanone	9.26
Cyclohexanone	9.14
2,3-butanedione	9.23
2,4-pentanedione	8.87

APPENDIX A (Cont'd)

Tables

TABLE 1. Ionization Potentials (Continued)

ALIPHATIC ACIDS AND ESTERS

Molecule	IP (eV)
Carbon Dioxide	13.79
Formic acid	11.05
Acetic acid	10.37
Propionic acid	10.24
n-butyric acid	10.16
Isobutyric acid	10.02
n-valeric acid	10.12
Methyl formate	10.815
Ethyl formate	10.61
n-propyl formate	10.54
n-butyl formate	10.50
Isobutyl formate	10.46
Methyl acetate	10.27
Ethyl acetate	10.11
n-propyl acetate	10.04
Isopropyl acetate	9.99
n-butyl acetate	10.01
Isobutyl acetate	9.97
Sec-butyl acetate	9.91
Methyl propionate	10.15
Ethyl propionate	10.00
Methyl n-butyrate	10.07
Methyl isobutyrate	9.98

ALIPHATIC AMINES AND AMIDES

Molecule	IP (eV)
Ammonia	10.15
Methyl amine	8.97
Ethyl amine	8.86
n-propyl amine	8.78
i-propyl amine	8.72
n-butyl amine	8.71
i-butyl amine	8.70
s-butyl amine	8.70
t-butyl amine	8.64
Dimethyl amine	8.24
Diethyl amine	8.01
Di-n-propyl amine	7.84
Di-i-propyl amine	7.73
Di-n-butyl amine	7.69
Trimethyl amine	7.82
Triethyl amine	7.50
Tri-n-propyl amine	7.23
Formamide	10.25
Acetamide	9.77
N-methyl acetamide	8.90
N,N-dimethyl formamide	9.12
N,N-dimethyl acetamide	8.81
N,N-diethyl formamide	8.89
N,N-diethyl acetamide	8.60

APPENDIX A (Cont'd)

Tables

TABLE 1. Ionization Potentials (Continued)

OTHER ALIPHATIC MOLECULES WITH N ATOM

Molecule	IP (eV)
Nitromethane	11.08
Nitroethane	10.88
1-nitropropane	10.81
2-nitropropane	10.71
HCN	13.91
Acetontrile	12.22
Propiontrile	11.84
n-butyronitrile	11.67
Acrylonitrile	10.91
3-butene-nitrile	10.39
Ethyl nitrate	11.22
Methyl thiocyanate	10.065
Ethyl thiocyanate	9.89
Methyl isothiocyanate	9.25
Ethyl isothiocyanate	9.14

OLEFINS, CYCLO-OLEFINS, ACETYLENES

Molecule	IP (eV)
Ethylene	10.515
Propylene	9.73
1-butene	9.58
2-methylpropene	9.23
Trans-2-butene	9.13
Cis-2-butene	9.13
1-pentene	9.50
2-methyl-1-butene	9.12
3-methyl-1-butene	9.51
3-methyl-2-butene	8.67
1-hexene	9.46
1,3-butadiene	9.07
Isoprene	8.845
Cyclopentene	9.01
Cyclohexene	8.945
4-methylcyclohexene	8.91
4-cinylcylohexene	8.93
Cyclo-octatetraene	7.99
Acetylene	11.41
Propyne	10.36
1-butyne	10.18

APPENDIX A (Cont'd)

Tables

TABLE 1. Ionization Potentials (Continued)

SOME DERIVATIVES OF OLEFINS

Molecule	IP (eV)
Vinyl chloride	9.995
Cis-dichloroethylene	9.65
Trans-dichloroethylene	9.66
Trichloroethylene	9.45
Tetrachloroethylene	9.32
Vinyl bromide	9.80
1,2-dibromoethylene	9.45
tribromoethylene	9.27
3-chloropropene	10.04
2,3-dichloropropene	9.82
1-bromopropene	9.30
3-bromopropene	9.7
$CF_3CCl{=}CClCF_3$	10.36
n-$C_5F_{11}CF{=}CF_2$	10.48
Acrolein	10.10
Crotonaldehyde	9.73
Mesityl oxide	9.08
Vinyl methyl ether	8.93
Allyl alcohol	9.67
Vinyl acetate	9.19

HETEROCYCLIC MOLECULES

Molecule	IP (eV)
Furan	8.89
2-methyl furan	8.39
2-furaldehyde	9.21
Tetrahydrofuran	9.54
Dihydropyran	8.34
Tetrahydropyran	9.26
Thiophene	8.860
2-chlorothiophene	8.68
2-bromothiophene	8.63
Pyrrole	8.20
Pyridine	9.32
2-picoline	9.02
3-picoline	9.04
4-picoline	9.04.
2,3-lutidine	8.85
2,4-lutidine	8.85
2,6-lutidine	8.85
Tribromoethylene	9.27

APPENDIX A (Cont'd)

Tables

TABLE 1. Ionization Potentials (Continued)

AROMATIC COMPOUNDS

Molecule	IP (eV)	Molecule	IP (eV)
Benzene	9.245	Phenyl isothiocyanate	8.520
Toluene	8.82	Benzonitrile	9.705
Ethyl benzene	3.76	Nitrobenzene	9.92
n-propyl benzene	8.72	Aniline	7.70
i-propyl benzene	8.69	Fluoro-benzene	9.195
n-butyl benzene	8.69	Chloro-benzene	9.07
s-butyl benzene	8.68	Bromo-benzene	8.98
t-butyl benzene	8.68	Iodo-benzene	8.73
o-xylene	8.56	o-dichlorobenzene	9.07
m-xylene	8.56	m-dichlorobenzene	9.12
p-xylene	8.445	p-dichlorobenzene	8.94
Mesitylene	8.40	1-chloro-2-fluorobenzene	9.155
Durene	8.025	1-chloro-3-fluorobenzene	9.21
Styrene	8.47	1-bromo-4-fluorobenzene	8.99
o-methyl styrene	8.35	o-fluorotoluene	8.915
Ethynylbenzene	8.815	m-fluorotoluene	8.915
Napthalene	8.12	p-fluorotoluene	8.785
1-methylnapthalene	7.69	o-chlorotoluene	8.83
2-methylnapthalene	7.955	m-chlorotoluene	8.83
Biphenyl	8.27	p-chlorotoluene	8.70
Phenol	8.50	o-bromotoluene	8.79
Anisole	8.22	m-bromotoluene	8.81
Phenetole	8.13	p-bromotoluene	8.67
Benzaldehyde	9.53	o-iodotoluene	8.62
Acetophenone	9.27	m-iodotoluene	8.61
Benzenethiol	8.33	p-iodotoluene	8.50
Phenyl isocyanate	8.77	Benzotrifluoride	9.68
		o-fluorophenol	8.66

APPENDIX A (Cont'd)

Tables

TABLE 1. Ionization Potentials (Continued)

MISCELLANEOUS MOLECULES

Molecule	IP (eV)
Ethylene oxide	10.565
Propylene oxide	10.22
p-dioxane	9.13
Dimethoxymethane	10.00
Diethyoxymethane	9.70
1,1-dimethoxyethane	9.65
Propiolactone	9.70
Methyl disulfide	8.46
Ethyl disulfide	8.27
Diethyl sulfite	9.68
Thiolacetic acid	10.00
Acetyl chloride	11.02
Acetyl bromide	10.55
cyclo-$C_6H_{11}CF_3$	10.46
$(n\text{-}C_3F_7)(CH_3)C{=}O$	10.58
Trichlorovinylsilane	10.79
$(C_2F_5)_3N$	11.7
Isoprene	9.08
Phosgene	11.77

APPENDIX A (Cont'd)

Tables

TABLE 2. Relative Photoionization Sensitivities for Gases

Chemical	Relative Sensitivity	Examples
Aromatic	10	Benzene, Toluene, Styrene
Aliphatic Acid	10	Diethylamine
Chlorinated Unsaturated	5-9	Vinyl Chloride, Vinylidene Chloride, Trichloroethylene
Carbonyl	7-9	MEK, MiBK, Acetone, Cyclohexanone
Unsaturated	3-5	Acrolein, Propylene, Cyclohexanone, Allyl Alcohol
Sulfide	3-5	Hydrogen Sulfide, Methyl Mercaptan
Paraffin (C5-C7)	1-3	Pentane, Hexane, Heptane
Ammonia	0.3	
Paraffin (C1-C4)	0	Methane, Ethane

NOTE: Relative sensitivity = meter reading when measuring 10 ppm of the listed gas with instrument with 10.2 eV probe calibrated for 10 ppm of benzene, span pot setting = 9.8 for direct reading of benzene.

APPENDIX A (Cont'd)

Tables

TABLE 3. Typical Applications of Interchangeable Probes

	Ionization Potentials	Relative Sensitivity	
p-Xylene	8.44	0.10	0.104
p-Chlorotoluene	8.70	0.09	0.112
Toluene	8.82	0.09	0.112
o-Chlorotoluene	8.83	0.075	0.112
Ethyl Acetate	9.19	0.075	0.112
Benzene	9.24	0.10	0.10
Methyl Mercaptan	9.24	0.10	0.072
Pyridine	9.32	0.075	0.122
Allyl Alcohol	9.67	0.10	0.111
Crotonaldehyde	9.88	0.075	0.104
Amyl Alcohol	9.80	0.09	0.116
Cyclohexane	9.88	0.075	0.104
Vinyl Chloride	9.95	0.085	0.112
Butanol	10.94	0.09	0.176
Ammonia	10.15	0.06	0.160
Acetic Acid	10.37	0.04	0.560
Ethylene	10.52	0.0	0.320
Ethylene Oxide	10.56	0.0	0.298

$$\text{Relative sensitivity} = \frac{\text{Response with 9.5 or 11.7 eV probe}}{\text{Response with 10.2 eV probe}}$$

APPENDIX D

1996 GROUNDWATER SAMPLING RESULTS

Route 52 Hills Holding Corporation Landfill
Summary of Laboratory Results
Volatile Organic Compounds

			Upstream	03	01						04
Sample Location	New York	New York	Neversink	Nversink	Jennings	Jennings	MW-2	MW-5	Hallenbeck	N Leachate	N Leachate
Depth of Screened Interval	Ground Water	Water Quality	River	River (near)	Pond	Well	10 - 18	9 - 19	Pipe	Seep	Seep
Unit Sampled	Quality Standards	Standards		seep			Bedrock	S&G			
Sampling Date	(GA)	B (T) Stream	9/26/96	11/4/98	11/4/98	9/6/96	9/26/96	9/26/96	9/26/96	9/26/96	11/4/98
Detected Volatile Organic Compounds in ppb											
Acetone	50		ND	4B	4B	ND	ND	ND	ND	ND	6B
Carbon Disulfide			ND	21	ND	ND	ND	ND	ND	ND	ND
2-Hexanone	50		ND	1B	ND	ND	ND	ND	ND	ND	ND
Methylene chloride	5		ND	5B	11B	ND	ND	ND	ND	ND	11B
Methyl Etyl Ketone	50		ND	3B	2B	ND	ND	ND	ND	ND	ND
Detected Metals											
Arsenic	0.025	0.15	0.0025	ND	ND	ND	0.0021	0.0045	0.0022	0.0762	0.0634
Barium	2		0.053	0.0517	0.0334	0.91	0.191	0.311	0.208	0.975	0.586
Beryllium	0.003	0.011*	ND	0.00046B	0.00036B	ND	ND	ND	ND	ND	0.0007B
Calcium			3.68	6.42	6.6	42.8	155	132	70.6	185	104
Chromium	0.05	0.011	ND	0.00071	0.00068	ND	0.0032	0.0149	ND	0.0072	0.0028B
Cobalt	0.05	0.005	ND	ND	ND	ND	0.006	0.0138	ND	0.0051	0.00016
Copper	0.2	0.004	0.0056	0.0017B	0.0021B	0.375	0.0119	0.0289	0.0054	0.0139	0.007
Iron	0.3	0.3	0.132	0.554	0.0872	1.49	3.37	12.3	3.44	140	70.1
Lead	0.025	0.0007	ND	ND	ND	0.016	0.0019	0.0086	ND	0.02	0.0041
Magnesium	35		0.89	1.57	0.761	3.9	37.8	33.9	15.4	52.4	27.1
Manganese	0.3		0.0421	0.292	0.0206	7.62	7.65	12	1.25	11.9	11
Mercury	0.002		ND	ND	ND	ND	ND	ND	ND	ND	ND
Potassium			0.679	1.02	0.81	1.7	13.6	10.4	9.68	21.8	10.8
Sodium	20		4.31	4.68	32.4	26.8	61.3	38	66.3	63.9	41.4
Strontium						0.174					
Vanadium		0.014	ND	ND	ND	ND	ND	ND	ND	ND	0.0061
Zinc	0.3	0.028	0.0199	ND	ND	0.018	0.0536	0.0729	0.0172	0.0543	0.0068
Boron	1	10	0.0241	0.0315B	0.0234B		1.28	0.76	0.421	1.55	0.844

Route 52 Hills Holding Corporation Landfill
Summary of Laboratory Results
Leachate Indicators

Monitoring Well Number Screen Interval Formation Screened Date Sampled	New York Ground Water Quality Standards (GA)	New York Water Quality Standards B (T) Stream	Upstream Neversink River 9/26/96	03 Nversink River (near) seep 11/4/98	01 Jennings Pond 11/4/98	MW-2 10 - 18 Bedrock 9/26/96	MW-5 9 - 19 S&G 9/26/96	Hallenbeck Pipe 9/26/96	N Leachate Seep 9/26/96	04 N Leachate Seep 11/4/98
Turbidity	-		ND			3.5	6.5	6.2	5	
Alkalinity	-		5	54.6	11.9	296	318	238	548	366
TKN	-		0.5	0.266	0.653	2.4	2.6	1.7	6	4
Ammonia	2	0.16 - 2.2	0.04	ND	ND	1.7	0.89	0.62	4.9	3.04
Nitrate	10		0.6	0.202	0.026	ND	ND	0.7	0.2	0.059
Total Dissolved Solids	500	500	34	100	130	920	718	432	982	460
Chloride	250		4	12.8	52.3	60	40	88	77	60.4
Sulfate	250		ND	13.3	7.67	195	171	33.4	150	63.6
Total Hardness	-		28	27.7	23.8	560	460	220	780	485
Calcium	-		3.68	6.42	6.6	155	132	70.6	185	104
Iron	0.300	0.3	0.132	0.554	0.0872	3.37	12.3	3.44	140	70.1
Magnesium	35		0.89	1.57	0.761	37.8	33.9	15.4	52.4	27.1
Manganese	0.300		0.0421	0.292	0.0206	7.65	12	1.25	11.9	11
Sodium	20		4.31	4.68	32.4	61.3	38	66.3	63.9	41.4
Potassium	-		0.679	1.02	0.81	13.6	10.4	9.68	21.8	10.8
Bromide	-		ND	ND	ND	2.2	3.4	2.5	2.6	ND
Chemical Oxygen Demand	-		ND	24	11	61	63	ND	136	58
Total Organic Carbon	-		5.4	1.75	5.69	50.9	49.4	25	72.3	20.1
Total Phenols	0.001	0.005	0.066	ND	ND	0.0094	0.0162	ND	0.0033	ND
Sodium Meq			0.19	0.20	1.41	2.67	1.65	2.88	2.78	1.80
Potassium Meq			0.02	0.03	0.02	0.35	0.27	0.25	0.56	0.28
Sodium and Potassium Meq			0.20	0.23	1.43	3.01	1.92	3.13	3.34	2.08
Calcium Meq			0.18	0.32	0.33	7.73	6.59	3.52	9.23	5.19
Magnesium Meq			0.07	0.13	0.06	3.11	2.79	1.27	4.31	2.23
Iron Meq			0.00	0.02	0.00	0.12	0.44	0.12	5.01	2.51
Alkalinity (hco3) meq			0.08	0.89	0.20	4.85	5.21	3.90	8.98	6.00
Chloride Meq			0.11	0.36	1.48	1.69	1.13	2.48	2.17	1.70
Sulfate Meq			0.00	0.28	0.16	4.06	3.56	0.70	3.12	1.32
Total in Meq/l			0.66	2.23	3.66	24.58	21.64	15.12	36.17	21.03
%Sodium+Potassium			30.98	10.29	39.12	12.26	8.87	20.71	9.23	9.87
%Calcium			27.77	14.35	9.01	31.46	30.44	23.29	25.52	24.67
%magnesium			11.08	5.79	1.71	12.65	12.90	8.38	11.92	10.60
%Iron			0.71	0.89	0.09	0.49	2.04	0.81	13.86	11.93
%Na+K of Anions			43.91	32.85	78.35	21.56	16.35	38.92	15.24	17.30
%Ca of Anions			39.37	45.83	18.04	55.32	56.12	43.79	42.16	43.22
%Mg of Anions			15.70	18.48	3.43	22.25	23.77	15.75	19.70	18.58
%Fe of Anions			1.01	2.84	0.17	0.86	3.75	1.53	22.90	20.91
%Alkalinity			12.39	40.10	5.34	19.73	24.09	25.79	24.83	28.52
%Chloride			17.06	16.18	40.36	6.88	5.21	16.41	6.00	8.10
%Sulfate			0.00	12.41	4.37	16.51	16.45	4.60	8.63	6.30
%Alkalinity of Cations			42.07	58.38	10.66	45.75	52.64	55.11	62.91	66.46
%Chlorides of Cations			57.93	23.55	80.62	15.96	11.40	35.07	15.21	18.87
%Sulfate of Cations			0.00	18.06	8.73	38.29	35.96	9.82	21.87	14.67

Total Meq Cations	0.47	0.70	1.83	13.98	11.74	8.05	21.89	12.01
Total Meq Anions	0.19	1.53	1.83	10.60	9.90	7.08	14.28	9.03
% Total Cations	70.54	31.32	49.93	56.87	54.24	53.19	60.53	57.08
% Total Anions	29.46	68.68	50.07	43.13	45.76	46.81	39.47	42.92

APPENDIX E

MONITORING WELL CONSTRUCTION DETAILS

Hills Holding Corporation
C&D Debris Landfill

Monitoring Well Construction Details

1. Figure 1, "Site Location Map", depicts the location of the Hills Holding Corporation C&D Debris Landfill.

2. Figure 2, "Sampling Locations", presents the location of the proposed monitoring wells. A track-mounted or other suitable type drill rig is recommended for access to the drilling locations.

3. The installation of the monitoring wells will be completed using 4.25" Inside Diameter (ID) hollow stem augers to advance the soil boring to such a depth as to encounter groundwater and allow for the installation of a minimum 10-foot and maximum 30-foot long screen section and necessary riser pipe. Auger cuttings shall be placed within the limit of waste following completion of drilling.

4. As the boring is advanced, continuous soil sampling will be performed and boring logs will be prepared to describe and note relevant characteristics of the soils encountered at the boring location. For wells over 20 feet deep, soil sampling and PID screening will be conducted at five (5) foot intervals.

5. For overburden monitoring wells, once sufficient depth has been reached to install the well screen, a 2-inch ID Schedule 40 continuous slot wire wrapped, flush joint screen and PVC casing will be used to construct the monitoring well. The screen will be a minimum of 10 feet and maximum of 30 feet in length with #10 slot size. Screen placement will be determined in the field based upon the observed depth to groundwater.

6. For overburden wells, a minimum of 6 inches of sand will be placed at the bottom of the borehole prior to the installation of the screen. Sand pack will be installed around the screen and continued to approximately 2 feet or 20% of the screen length, whichever is greater, above the top of the screen. A seal of bentonite pellets will then be placed to a minimum thickness of 24 inches above the top of the sand pack. The remainder of the well will then be sealed with a cement/bentonite grout to a depth of approximately 24 inches below grade. The installation of the well will be completed with the placement of a locking steel vented protective casing that will be placed above grade a minimum of 3 feet. The protective steel casing will be secured around the monitoring well with a cement/bentonite grout mix. A schematic detail of a typical overburden monitoring well is presented in Figure 3.

7. For bedrock wells, drilling will consist of rock coring with a potable water source using a standard size NX or larger diameter core bit. Figure 4 shows a schematic of a typical bedrock well.

8. All equipment shall be steam cleaned prior to any drilling at the site and between holes. It will not be necessary to contain decon water. A potable water source will be provided by the Town of Fallsburg.

9. In-situ hydraulic conductivity tests will be required for all new wells once installation is complete.

APPENDIX F

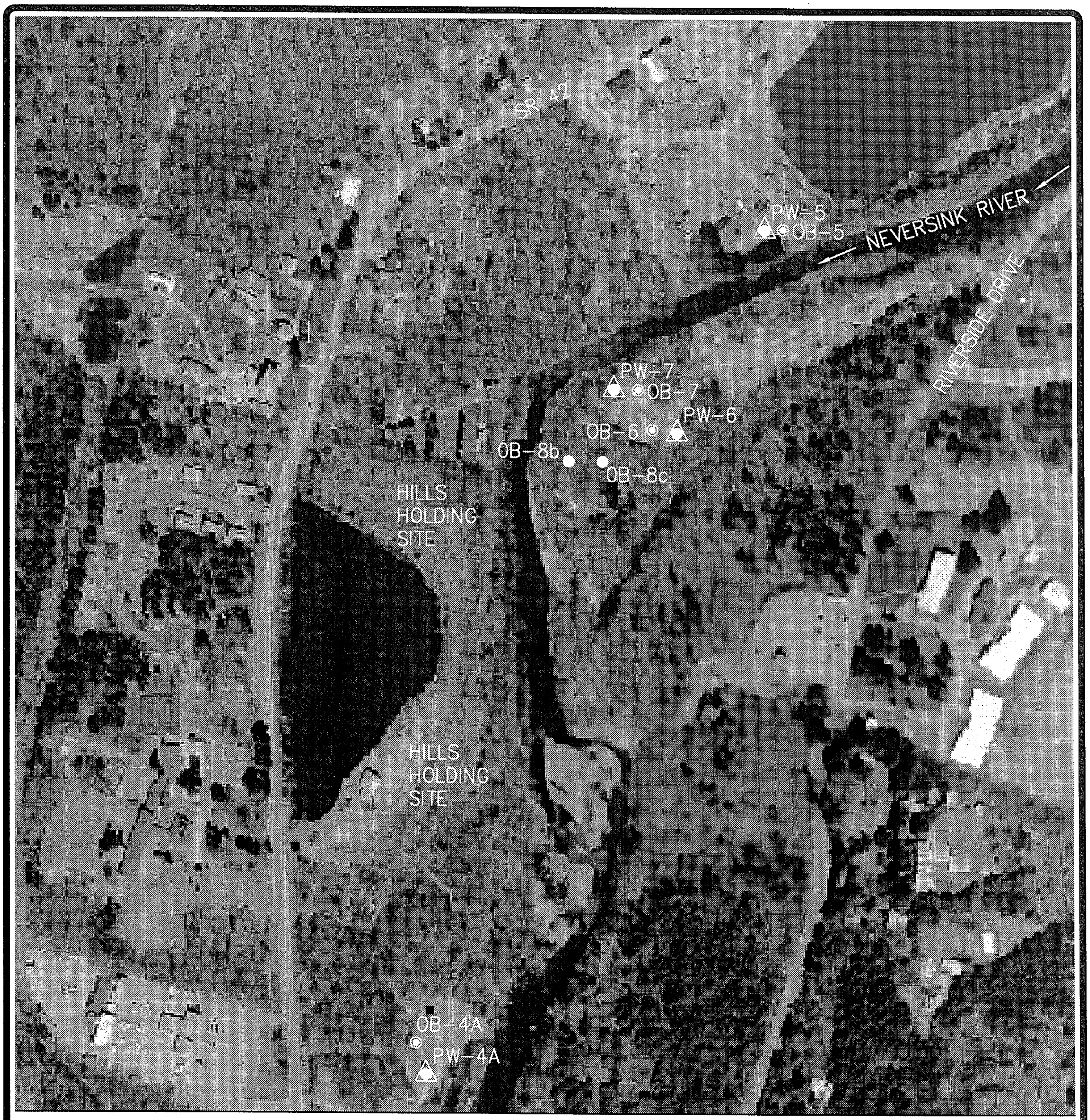
PUBLIC WATER SUPPLY INFORMATION

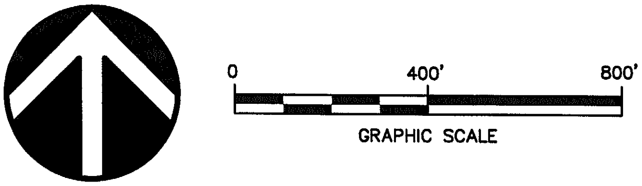
Table 1
Fallsburg Well Field - Well Information Summary
Town of Fallsburg, Sullivan County, New York
SCE Project No. 06098.00

	Total Depth (ft bgs)	Screened Interval (ft bgs)	Diameter (in)	Type	Well Use
Production Wells					
Fallsburg 4a	164	127-137 & 155-164	10	overburden	seasonal public supply well
Fallsburg 5	147	127-147	10	overburden	seasonal public supply well
Fallsburg 6	128	108-128	8	overburden	seasonal public supply well
Fallsburg 7	60	45-60	10	overburden	seasonal public supply well
Observation Wells					
OB-4a	167	127-167	2	overburden	water level monitoring
OB-5	144	132-144	2	overburden	water level monitoring
OB-6	136	106-136	2	overburden	water level monitoring
OB-7	64	44-64	2	overburden	water level monitoring
OB-8b	60	40-60	2	overburden	water level monitoring
OB-8c	54	37-54	2	overburden	water level monitoring

Notes:

Observation wells OB-4a, OB-5, OB-6 and OB-7 are located within 50 feet of corresponding production wells.
Observation wells OB-8b and OB-8c were installed during well field expansion investigation activities.
Depth and screened interval presented in feet below ground surface.
Fallsburg 4a Production Well has a split screen (divided screened interval).





LEGEND:

▲ - PRODUCTION WELL

● - OBSERVATION WELL

SOURCE: (APRIL 2003) http://www.nysgis.state.ny.us/

NOTE: THIS FIGURE REPRESENTS APPROX. LOCATIONS AND SHOULD NOT BE USED FOR ENGINEERING OR SURVEYING PURPOSES.

SHUMAKER
Consulting Engineering & Land Surveying, P.C.
181 Genesee St., Utica, New York Office
Telephone (315) 724-0100/ Fax (315) 724-3715

FALLSBURG WELL FIELD

TOWN OF FALLSBURG SULLIVAN COUNTY, NY

WELL LOCATION MAP

Drawn By: AJM
Checked By: GVL
Project Mgr: GVL
Date: 12/5/06
Project No: 06098

DRAWING NO. 1