REMEDIAL INVESTIGATION REPORT

FOR

HERTEL LANDFILL SITE

PLATTEKILL, NEW YORK

VOLUME 3

EPA WORK ASSIGNMENT NO. 003-2LH7

JULY, 1991

REGION II

ALTERNATIVE REMEDIAL CONTRACTING STRATEGY (ARCS)
FOR
HAZARDOUS WASTE REMEDIAL SERVICES

EPA Contract No. 68-S9-2001

TAMS CONSULTANTS, Inc.

and

TRC ENVIRONMENTAL CONSULTANTS, Inc.

HERTEL LANDFILL SITE

TABLE OF CONTENTS

HERTEL LANDFILL SITE

TABLE OF CONTENTS

(Continued)

HERTEL LANDFILL SITE

TABLE OF CONTENTS

(Continued)

VOLUME 1 (Continued)

VOLUME 2

LIST OF TABLES

TABLE OF CONTENTS

(Continued)

VOLUME 2 (Continued)

TABLE

HERTEL LANDFILL SITE

TABLE OF CONTENTS

(Continued)

VOLUME 2 (Continued)

TABLE

LIST OF FIGURES

FIGURE

HERTEL LANDFILL SITE

TABLE OF CONTENTS

(Continued)

VOLUME 2 (Continued)

APPENDIX A

EXCERPTS FROM THE FIELD OPERATIONS PLAN

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX A

Appendix A includes Section 3.0 of the "Final Field Operations Plan for the Hertel Landfill Site, Plattekill, New York. Section 3.0 includes a detailed discussion of the procedures proposed for the field investigations conducted at the Hertel Landfill site. The Table of contents for Section 3.0 is as follows:

THIS PAGE INTENTIONALLY LEFT BLANK

3. FIELD SAMPLING AND ANALYSIS PLAN (FSAP)

The FSAP provides detailed procedures for each field activity that will be performed during the Hertel Landfill RI/FS. The FSAP includes standard operating procedures (SOPs) for the field investigations (sampling, monitoring, and field instrument calibration), sample handling and, chain-of-custody procedures, decontamination procedures, and QA/QC procedures. All SOP or QA/QC protocols are prepared in accordance with USEPA Region II guidelines and the site-specific Health and Safety Plan (HASP) discussed in Section 4.

3.1 General Site Operations

3.1.1 Sample Identification

All samples will be given a unique number according to the following system:

HL-XXN-000000

Where:
HL - Hertel Landfill
XX - Sample Location
(i.e., TP-test pits,SD-sediment, SW-Surface water,etc.)
N - Sample Number (e.g., TP1, TP2, TP3)
000000 - Sample Date (e.g., 081989)

3.1.2 Sampling Procedures

An essential part of the RI/FS is the collection of environmental samples for chemical analyses. Several media will be sampled including: soil gas, surface soil, subsurface soil, ground water, surface water, sediment, and biota. Strict control over the sampling procedures and the use of accepted protocols allows confidence in the resulting data. Sampling protocols described herein are consistent with guidance provided in "Characterization of Hazardous Waste Sites - A Methods Manual" (EPA-600/4-84-076), and "A Compendium of Superfund Field Operations Methods" (EPA, 1987), where applicable.

3.1.3 Sample Handling, Packaging and Shipping

All samples will be collected in the appropriate sample containers as outlined in Table 3-1. Traffic reports and chain-of-custody forms will be completed according to procedures outlined in the USEPA User's Guide to the Contract Laboratory Program (9240.0-1 12/88).

Prior to packaging any samples for shipment, the sample containers will be checked for proper label identification and compared to sample traffic reports and field logbooks for accuracy. Custody seals will be placed over the jar lids and then taped. The samples will be placed in a cooler (or laboratory shuttle) with a sufficient amount of ice to keep the samples at 4°C until arrival at the laboratory. Vermiculite or other packaging materials will be placed into the cooler to prevent bottle breakage.

All necessary documentation required (e.g., traffic reports and chain-of-custody forms) will accompany the samples during shipments.

These documents will be placed in a sealed plastic bag and taped to the inside lid of the cooler. Two custody seals, one in the front and one over the cooler hinges, will be used so any tampering with the cooler, prior to its arrival at the laboratory, can be detected. The cooler will then be sealed with filament tape.

All samples requiring chemical analyses will be shipped overnight to the appropriate laboratory(ies) in accordance with Contract Laboratory Program (CLP) protocols.

3.1.4 Documentation

Each field team leader will maintain a bound, weatherproof notebook. In situ measurements, such as pH, temperature, and specific conductivity, as well as physical characteristics, such as depth to groundwater or soil type, will be recorded for each sample. All sampling activities will be documented with photographs. Entries will be made into the field logbook noting the time and identification of each sample collected. Each sample will be identified in the photograph with a placard noting the time, date, site name, and sample identification number or other description. Traffic reports and chain-of-custody forms will be filed in the appropriate section in the office central file.

3.1.5 Performance of Field Audits

At any time during the field investigation, the TAMS/TRCC Quality Assurance/Quality Control (QA/QC) officer will perform an audit to verify adherence to the FOP. EPA personnel may also perform a field audit, either jointly with or independent of the TAMS/TRCC audit. The QA/QC procedures are described in the Quality Assurance Program Plan (QAPP) for the ARCS II program. All findings will be documented and distributed to the Site Manager and the Regional Manager (RM).

3.1.6 Field Changes and Corrective Actions

In the event that field conditions necessitate the modification of the proposed FOP, the Field Operations Leader will notify the SM of the necessary changes. The Site Manager will, in turn, notify the EPA.

All modifications to the FOP will be documented and filed.

3.1.7 Control and Disposal of Contaminated Material

A decontamination pad will be constructed near the command post at an upwind location. The pad will consist of a 20 foot by 20 foot, graded, lined pit with a sand and gravel cover to protect the liner material. A sump will be placed at the low end of the pad for the removal of wastewater to storage drums. Off-site movement of steam and water sprays from the decontamination pad will be minimized by erecting tarps.

Development and purge waters will be collected onsite in DOT 17-E closed head 55-gallon drums and staged at the drum storage site.

Soils from subsurface soil sampling and well point installation activities will be containerized in DOT 17-H open head 55-gallon drums which will be staged at the drum storage site. The analytical results of the soil samples will be used to determine the level of hazardous material in each drum. If the analytical results do not adequately determine the level of hazardous material in a specific drum(s), a composite sample from the drum will be collected and sent for analysis. After the results have been received, a determination will be made as to the hazardous nature of the contents of each drum. All hazardous soils will then be shipped to a hazardous waste disposal facility through arrangements made by EPA. Any soils considered to be nonhazardous will be emptied from the drums and left onsite. Drill cuttings generated during the installation of monitoring wells will also be containerized and the contents handled in the same manner as described above.

Containerized soils will be transported to a designated, fenced storage area at the end of each day. Each drum will be marked to indicate the sampling point from which the soils originated. A master list with all drum designations will be kept and updated daily by the Field Operations Leader.

DOT 17-H 55-gallon drums will also be available for soiled, disposable, protective clothing.

3.1.8 Field Instrumentation

The following instrumentation will be used at the Hertel Landfill:

- o HNu photoionization detector (PID)
- o OVA flame ionization detector (FID)
- o pH meter
- o EH meter
- o hydrogen sulfide meter
- o LEL/O_2 meter
- o electronic water-level indicator
- o salinity, conductivity, and temperature (SCT) meter
- o soil-gas sampling apparatus

Each instrument will be calibrated in accordance with the manufacturer's operating procedures manual and EPA procedures (referenced in Section 3.1.2) prior to each day's use. Calibration will be documented on an equipment calibration logsheet (Figure 3-1).

3.2 Field Activities

3.2.1 Geophysical Investigation

Prior to establishing final well/boring, test pit and surface soil sampling locations, a geophysical survey will be conducted in order to locate areas of buried metallic wastes and other subsurface contamination. The survey will also allow more accurate delineation of previously identified disposal areas and identify specific areas of concern for subsurface investigation. If necessary, an adjustment to the boring, monitoring well and test pit locations in the FOP will be made based on information gathered during the geophysical survey.

3.2.1.1 Task Approach - Geophysical Survey

Three geophysical techniques have been selected for use at the Hertel Landfill Site: 1) electromagnetic conductivity, 2) magnetometry, and 3) metal detection. The electromagnetic conductivity (EM) survey will be used to identify areas of fill, buried metal (especially drums and containers), and shallow groundwater contamination (leachate) plumes. A standard proton magnetometry survey will be conducted to indicate the number and locations of larger buried metal objects at the site. The EM and magnetometry surveys will be conducted on a 25-foot grid over the area indicated in Figure 3-2. The metal detector survey will be performed in those areas where either the EM or magnetometry data indicate the presence of buried metal. The metal detector will be used to scan for the edge of the fill material to define the fill extent in those areas. A maximum grid spacing of 5 feet will be used for the metal detection survey in the areas where the EM and magnetometry survey indicate the presence of buried metal to help distinguish between shallow and deeply buried metal objects.

3.2.1.2 Field Procedures - Geophysical Survey

The geophysical surveys will be performed by TAMS and their subcontractor on a 25- or 5-foot grid (as noted above) established in the area shown in Figure 3-2. As indicated, the locations of the corners of this grid will be surveyed in relative to existing or newly installed benchmarks. The gridlines will be laid out in the field using a compass and a surveyor's tape. Grid points will be staked and labelled. East-west trending gridlines will be identified alphabetically every 100 feet; north-south trending gridlines will be identified numerically. Individual grid points would be identified by identifying both the east-west and north-south gridlines of the intersection (i.e., B+25 X 125, E+00 X 650).

The electromagnetic conductivity survey will be conducted using a Geonics EM-31 conductivity meter. This instrument has a fixed inter-coil spacing of 3.7 meters which allows an approximate exploration depth between 8 and 18 feet. Before conducting the survey with the EM-31, the instrument will be calibrated according to the manufacturer's recommended calibration specifications. The EM-31 survey will help determine the relative conductivity of various subsurface conditions including natural hydrogeologic conditions, potential contaminant plumes, trench boundaries, and buried metal objects.

The magnetometer survey will be conducted using a proton procession magnetometer. Typically, this type of instrument is capable of detecting small ferrous metallic interferences (i.e., a single 55-gallon drum) at depths up to 20 feet and larger ferrous metallic interferences (i.e., tanks or piles of drums) at depths up to 60 feet. A base station will be set up in one area where no buried metal is present. Frequent base station readings will be collected to determine the fluctuations in the magnetic field at the site during the course of the survey. The data will be corrected accordingly prior to contouring. The magnetic data will be used to identify areas of buried ferrous metal and to distinguish EM anomalies due to ferrous metal from electrically conductive non-ferrous objects (i.e., concentrations of conductive contaminants). This activity will be subcontracted.

The third geophysical survey will be conducted using a metal detector. The primary use of the metal detector will be to survey the areas where either the EM or magnetometry data indicate a subsurface metallic interference. The metal detector sensitivity will be calibrated in the field using a known mass of metal. The metal detector survey will be conducted on a five-foot grid spacing to provide detailed coverage of buried ferrous and non-ferrous metallic objects. The metal detector will also be used to scan the edge of the fill material to define the lateral extent of the metallic debris in the subsurface. The edge of the fill, as determined by the metal detector survey, will be staked in the field and marked on the site map. The depth detection range of the metal detector is dependent on the surface area of the metal object. For example, a one-quart-sized metal container can be detected within 3 feet and large deposits of metallic materials (buried drums) can be detected at depths of 10 to 20 feet.

After all three survey types are completed, the geophysical survey crews will interpret the results and contour the data on site base maps. This information will be reviewed by TAMS/TRCC and used to establish optimum locations for subsequent fieldwork.

3.2.1.3 QA/QC Requirements

Instrument calibration will be performed in accordance with manufacturer's instructions. Calibration information will be recorded in a field logbook that will be incorporated into the project's permanent file. The geophysical surveys will be conducted in accordance with USEPA procedures referenced in Section 3.1.2.

3.2.2 Soil Gas Survey

The soil gas survey will be performed to determine the locations, extent, and characteristics of waste materials existing in the subsurface.

3.2.2.1 Task Approach - Soil Gas Survey

Increased concentrations of gaseous volatile organic compounds are commonly present within the pore space of contaminated unsaturated soils, above contaminated buried wastes, and above groundwater contaminant plumes containing significant amounts of volatile organic compounds. Soil gas sampling will be conducted following the same grid system used for the geophysical investigation (see Figure 3-2), and should aid in directing the subsequent surface and subsurface investigation activities at the site. Soil gas survey results will be reviewed a long with results of the geophysical survey, and used to revise the locations of the planned borings, monitoring wells, and test pit locations.

3.2.2.2 Field Procedures - Soil Gas Survey

The soil gas survey will be performed by TAMS/TRCC utilizing a 100 foot grid which overlays the grid system developed for the geophysical surveys. Soil gas sampling will be accomplished by inserting a 5/8"-diameter steel probe into the ground using a sledge hammer or slide hammer to an approximate depth of 4.5 feet or refusal. If groundwater is encountered, the tube will be kept above the water table. The steel probe will be removed, and a section of Teflon® tubing will be quickly inserted into the hole. The annular space at the top of the sampling tube will be sealed with an inert plastic putty which will prevent atmospheric air from entering the hole. The Teflon tubing will be attached to a vacuum pump, and a vacuum will be applied to the tubing. A clamp will then be applied to the Teflon tubing and the tubing allowed to equilibrate for approximately ten minutes.

After the equilibration period, the borehole will be evacuated by extracting about one liter (depending on pumpflow) prior to sampling. The soil gas inside the tube will be measured with four different portable instruments: an OVA, an HNu, a combustible gas indicator, and a hydrogen sulfide meter. Contamination of the sample probe will be checked between sampling points with an HNu. Ambient air will be monitored as it is drawn through the probe via the pump. If readings are above background, the probe will be replaced or decontaminated by drawing air through the probe until HNu readings return to background, or the probe will be washed and scrubbed with a low phosphate detergent and deionized water solution followed by a deionized water rinse and a check with the HNu. The data obtained from the OVA and HNu will be reviewed together to estimate the percentage of methane amongst nonmethane hydrocarbons present in the soil gas. Data collected from the combustible gas indicator and the hydrogen sulfide meters will be evaluated to determine the potential for explosive hazards or flammable vapors. Should the data indicate that the concentrations of vapors are elevated to flammable or otherwise dangerous levels, locations for subsurface fieldwork (i.e., test pits and borings) will be re-evaluated and will include the necessary additional safety precautions.

In addition to utilizing the portable monitoring equipment to scan organic vapors, approximately 10 soil gas samples will be collected from approximately ten locations in the paint waste/municipal fill area Number 7 (see Figure 3-3). The samples will be collected directly from the Teflon tubing used to evacuate the sampling holes using a 1.0 ml gas-tight syringe. The sample will then be injected into a portable gas chromatograph (GC) (HNu 311) to tentatively identify the volatile organic compounds present. The strip chart readout will be retained and provided in the sampling report.

3.2.2.3 QA/QC Requirements

Instrument calibration will be performed in accordance with manufacturer's instructions. Calibration information will be recorded in a field logbook that will be incorporated into the project's permanent file. Collection of soil gas samples will be done in accordance with USEPA procedures referenced in Section 3.1.2. Sampling will take 5 days. Therefore, 5 ambient air blanks (one per day), two probe blanks and two environmental duplicate samples will be collected.

3.2.3 Test Pits

The test pit excavation and sampling activities will be conducted at the site to visually investigate the presence and areal extent of the waste disposal areas. Historical aerial photos and the results of the geophysical and soil gas surveys will aid in siting the actual test pit locations. The findings of the test pit investigation, in conjunction with geophysical and soil gas data, will be reviewed by TAMS/TRCC and used to establish final locations for test borings/monitor wells.

3.2.3.1 Task Approach - Test Pits

For waste characterization purposes, a total of 25 test pits will be excavated at the site at known areas of contamination and to determine the vertical extent of contamination. A total of 10 test pits will be excavated to investigate the paint waste/municipal landfill area (Number 7 in Figure 3-3). A soil sample will be collected for chemical analysis from the bottom of four of these test pits at the discretion of the field supervisor. In addition, one test pit will be excavated near the center in each of the waste areas 1 through 6 and 8, as shown in Figure 3-3. One sample for chemical analysis will also be collected from each of these test pits for a total of eleven samples from seventeen test pits.

For exploratory purposes, eight test pits will be excavated outside apparent disposal areas throughout the central and southern portions of the site, as shown in Figure 3-3. The soil types within each test pit will be classified and visual observations of subsurface conditions (e.g., seeps) will be documented with photographs and on test pit logs. From each of these pits disturbed or undisturbed bulk soil samples will be collected. These soil samples will be tested for the following physical properties: grain size distribution (sieve analysis), vertical permeability, hydrometer analysis, moisture content, and Atterberg limits. The exploratory test pits and associated soil samples for physical testing will aid in the characterization of subsurface soils and geology necessary for understanding aspects of site groundwater flow and the potential for contaminant transport.

In addition to the piezometers to be installed in test borings, shallow piezometers may be installed in selected test pits where groundwater is encountered, for the purpose of providing additional water table elevation data.

3.2.3.2 Field Procedures - Test Pits

The 10 test pits planned to be excavated in waste disposal area Number 7 will be completed in a sequence starting from the areas suspected to having the heaviest contamination to areas expected to having little or no contamination. This procedure will permit the identification of the limits of contamination at area 7 in an efficient manner. The test pits completed in the other areas onsite (waste disposal areas 1 to 6 and 8) will be centrally located in order to chemically and visually determine the type of waste materials present in the subsurface. Test pits will be excavated by a backhoe to a maximum depth of approximately 12 feet. Soils will be stockpiled on plastic tarps when excavated and segregated (clean versus contaminated) as much as possible. The soils, waste products, and groundwater encountered in the test pits will be logged and photographed by TAMS/TRCC field personnel and the dimensions of the test pits will be recorded.

While the backhoe is in operation, the inspector and any other bystanders shall stand in front of the pit to avoid being hit by the backhoe arm. Personnel will not enter the test pits at any time.

The soil profile log of each test pit will be recorded in a field notebook and each test pit log shall be preceded by the following general information:

- Date
- Client and TAMS/TRCC Project Number
- Location of Project Site
- Weather Conditions
- Time Excavation Started/Stopped
- Test Pit ID Number and Specific Location
- Person Logging the Test Pit

Vertical measurements in the excavation will be made from the top of the test pit at a spot representative of the original grade and from a location which provides safe access to the pit. A fresh exposure of soil will be used for a soil profile description at the side of the pit (preferably an area in direct sunlight) in an area most representative of the overall soil profile. The description of each horizon will include the following information:

- Depth from original grade to top and bottom of each horizon.
- Textural description of grains (e.g., fine to medium). This will be used mostly when describing natural in-place sands and gravels.
- The predominant grain size (i.e., clay, silt, sand, or gravel).
- The predominant color or color range, including any natural or artificial staining.
- The secondary grain size using the proportions "trace" (0-10 percent), "little" (10-20 percent), "some" (20-35 percent), and "and" (35-50 percent).
- The relative density and consistency of the soil using the descriptions for cohesionless soils (sands and gravels) of "very loose", "loose", "medium", "dense", and "very dense". For cohesive soils (silts and clays) the consistency descriptions of "very soft", "soft", "medium", "stiff", "very stiff", and "hard" will be used.
- The moisture content of the soil using the relative descriptions "dry", "damp", "wet", and "saturated".
- The structure of the soil (e.g., blocky, granular, prismatic).
- Note any mottling and the depth at which it starts and ends.
- Record the depth of groundwater seepage into the pit and, to the extent possible, the rate and characteristics (odor, color).
- Record the total depth of the pit and note if the backhoe had difficulty excavating deeper and the reason for the final depth (e.g., bedrock, slumping).
- Describe any bedrock encountered in the excavation.

Any additional observations that are pertinent to the interpretation of the subsurface conditions will also be recorded (i.e., visible contamination, buried structures, odors).

Samples for chemical analysis will be collected from the backhoe bucket using a field decontaminated stainless steel spoon, or by using a field decontaminated long reach sampling tool if the backhoe operator is unable to obtain a soil sample from a location requested by the supervisor. If the sample is collected from the backhoe bucket, the material will be collected from an area which is not in contact with the bucket. All sampling equipment will be decontaminated in accordance with the procedures outlined in Appendix D.

Samples requiring VOC analyses will be placed immediately into a sample jar to avoid VOC losses due to mixing. Soil collected for all other required analytical parameters will be emptied into a field decontaminated, stainless steel bowl and homogenized with the stainless steel spoon. Samples will then be placed into the remaining sample bottles. The depth, time sampled, physical characteristics and HNu or OVA readings of the sample will be documented in the field notebook. Each sample container used for the test pits will be labelled in the manner outlined in Section 3.1.1. The TAMS/TRCC field supervisor will direct the backhoe operator and have control over the depth of excavation. Excavation will be terminated in any of the following occurs:

- Encountering gross contamination that may endanger the health and safety of the field team.

- A confining layer (lens) is encountered at an elevation lower than contaminated soil.

- A heavy flow of contaminated groundwater or contaminants enters the pit, where a continued excavation would cause heavier flow and subsequent problems in backfilling when the contaminant is displaced and brought to the ground surface.

Leachate will be collected from test pits performed in waste areas 1 through 6 and 8, and from 3 pits performed in area 7, if encountered. The three samples from area 7, will be collected at the discretion of the field supervisor. Leachate samples will be collected using a field decontaminated one quart amber glass jar attached to a long reach pond sampler. The jar will be positioned to intercept leachate as it enters the test pit. The leachate will then be transferred directly the appropriate sample containers. Samples requiring VOC analysis will be collected first followed by TOC, extractable organics (semivolatiles and pesticides/PCB's), total metals (unfiltered), cyanide, nitrogen and compounds, and Cl, SO_4, CO_3, and HCO_3, respectively. The amber glass jar will be a dedicated device cleaned before use in accordance with the procedures outlined in Appendix D.

If containerized waste materials (e.g., drums) are encountered during test pit excavation, their location and depth will be marked above ground and on the site map. Characterization of the drum(s) contents is imperative for waste disposal and any labels or markings that would indicate the contents, hazards, or "lot numbers" will be recorded.

After the test pit has been excavated to its maximum depth, the soil piled on the sides of the pit will be placed back in 1-foot compacted lifts. Dust control measures will be evaluated if dry and windy conditions exist during test pit excavations. In addition, the test pit locations will be marked with stakes and flagged for later surveying and plotting on base maps. The test pit information will be transcribed onto the "Test Pit Log" form (Appendix A).After excavating each test pit, the backhoe bucket will be decontaminated by steam-cleaning before moving on to the next location. Decontamination of the backhoe wheels/tracks, undercarriage, and boom may be warranted between test pits and will be done, based on field conditions, at the discretion of the TAMS/TRCC field supervisor.

3.2.3.3 QA/QC Requirements

Test pits will be excavated and sampled in accordance with USEPA procedures referenced above and in Section 3.1.2.

A total of 16 soil samples will be collected for chemical analysis comprised of 11 environmental samples, one environmental duplicate, one MS/MSD, and two field blanks (one/decontamination event) for QA/QC purposes.

A total of 22 samples will be analyzed for leachate parameters including 10 environmental samples (estimated), one environmental duplicate, one MS/MSD pair, three field blanks (one per decontamination event), and six trip blanks (VOA only).

Eight soil samples will be collected for analysis of physical parameters. Analyses will be performed by a subcontracted laboratory equipped and maintained to handle potentially contaminated soils. Soils will be analyzed for grain size distribution and hydrometer analysis, vertical permeability, Atterberg limits, and moisture content by ASTM methods D421-85 and D422-63 (1972), and D2434-68 (1974), D4318-84, and D2216-80 respectively. No QA/QC requirements are necessary for geotechnical parameters.

3.2.4 Test Borings

3.2.4.1 Task Approach - Test Borings

Twenty-five test borings will be drilled at seventeen locations depicted on Figure 3-4. At each boring location, either a monitoring well or a piezometer will be installed. Boreholes will be drilled through the unconsolidated overburden materials and advanced to the desired depth using a 4-inch inside diameter (ID) hollow-stem auger. Split spoon samples will be collected at five foot intervals or continuously depending upon the location of the well. Standard penetration tests (ASTM D1586-84) will be conducted at every 2-foot sampling interval. The physical characteristics of each soil sample will be visually classified and described based upon the Unified Soil Classification System (ASTM D 2487-85).

3.2.4.2 Field Procedures - Test Borings

TAMS/TRCC field personnel will record the name of the drilling firm and the names of the driller and assistant(s) on a daily or weekly basis in the fieldbook. The date, project location, project number, and weather conditions will also be recorded. An accurate log of drilling activities will be recorded. This log will contain (including a minimum) the following information:

- Time drillers and rig arrive on site
- Weather conditions
- Time drilling begins/finishes

- Any delays in the drilling activities and the cause of such delays
- Time drillers go off site
- Down time (those periods when drilling activities cease due to equipment malfunctions, weather, ordered stoppages)
- Geologic descriptions, sample intervals, sample blow counts, sample recovery
- Drilling conditions, water losses, depths of formation changes, other observations

The different soil and rock sampling techniques used for each boring will be recorded in the field notebook.

The soil sampling will be conducted using a carbon steel split-spoon penetration sampler, driven with a 140-pound hammer with a freefall of 30 inches. This standard method of soil sampling is described in ASTM D 1586-84. The TAMS/TRCC field personnel will record, at a minimum, the weight of the hammer, the length of the split spoon sampler, and the number of hammer blows on the spoon per 6 inches of penetration. Split spoon samples will be collected at either 5-foot intervals or continuously through unconsolidated materials, depending on the boring location. Upon removal of the sampler, the earth materials shall be logged in accordance with the United Soil Classification System described in ASTM D 2487-85.

Upon extraction of the sampler, moisture conditions on the drill rods and sample will be noted. Upon opening the sampler, the percent recovery will be recorded as the length of sample retained over the length of sampler penetration. Changes in lithology, color, moisture conditions, and texture of soil in the spoon will be measured and recorded prior to emptying the spoon.

Soil samples collected from the split spoon samples will be carved from the center of the sample with laboratory cleaned, stainless steel spoons. Samples requiring VOC analyses will be placed immediately into a sample jar to avoid VOC losses due to mixing. Soil collected for all other required analytical parameters will be emptied into a field decontaminated, stainless steel bowl and homogenized with a stainless steel spoon. Samples will then be placed into the remaining sample bottles. An effort will be made to collect a sample which has not contacted the split-spoon sampler wall. The depth, time sampled, physical characteristics, and HNu or OVA readings of the sample will be documented in the field notebook. Each soil sample container used for the test borings will be labelled in the manner outlined in Section 3.1.1.

The test boring/monitoring well information will be transcribed onto the Test Boring Log form shown in Appendix B.

Shelby tube samples will also be collected at selected locations across the site. Shelby tube samples will be collected according to ASTM Method D 1587-83 from the selected test boring locations. All Shelby tubes will be labelled with the following information:

- Project number
- Project name
- Date of Sampling
- Boring number
- Sample number
- Zone of sampling
- Marking the tube TOP and BOTTOM so that the orientation of the soil sample is known.

After this information is marked on the Shelby tube, the ends of the tube will be closed with tight-fitting metal or plastic caps and wrapped with tape. After taping, the ends will be dipped in hot wax, completely covering the tape to ensure sealing.

Rock sampling will be conducted using an NX double-barrel core sampler. The supervising TAMS/TRCC personnel will log and record the geologic and geotechnical information from the rock cores.

The following information will be included in a rock core run log:

- The depth and length of the core run.
- The coring rate, down pressure, torque and rotation speed. This information will be obtained from the driller.
- The color of the core wash water. Any changes, loss of return water, or gain of return water will be noted.
- The recovery of the core run recorded as length of rock recovered over the length of the core run.
- The Rock Quality Designation (RQD) of the run. RQD is reported as the sum of inches of all rock core pieces larger than four inches over the total number of inches in the run.
- The rock type(s) and their location in the core run, rotation color, mineralogy, texture, fossil content, and any other data of geologic significance.
- Any structure in the core, including fractures, clay seams, vugs, bedding, fissility, and any other data of geologic or geotechnical significance.

Rock cores shall be stored in a core box in the exact sequence in which they were removed from the ground. Core runs will be separated by wooden blocks clearly marked with the depth of the run. The top of the core box will be marked with the project name, location, project number, boring number and the depths of the core runs in that box. The front and one end of the core box will be marked with project name, boring number, and depths of the core runs in that box.

3.2.4.3 QA/QC Requirements

Samples will be collected in accordance with USEPA procedures referenced in Section 3.1.2. A total of nine boring samples will be collected comprised of three environmental samples, one MS/MSD sample pair, one environmental duplicate, and three field blanks (one blank/decontamination event).

3.2.5 Surface Soils

Surface soil sampling activities will concentrate on those areas surrounding possible and/or known contamination sources. In general, the surface soil sampling will be conducted to aid in determining the presence, nature, and extent of surface soil contamination at the site. Information obtained from initial site surveys may be used to determine the final surface soil locations at each site.

3.2.5.1 Task Approach - Surface Soils

Surface soil sampling will be completed prior to any other field sampling activity (i.e., drilling, excavating). This procedure will help avoid sampling surface soils that may have been disturbed during the site investigation process.

The samples will be collected for chemical analysis within and around each of the eight areas of obvious waste disposal identified in Figure 3-5. Within each of the eight areas, one sample will be collected at a central location to identify apparent worst-case contamination (eight samples). The specific locations within each area will be based on visual observation and screening of near-ground surface air with an HNu PID. In addition, for waste disposal Areas 1, 2, 4, 5, and 8, one sample will be taken at a location just beyond the apparent perimeter of each of these identified waste areas for determining background conditions and delineating the extent of contamination for each area (five samples). Due to their greater areal extent, two perimeter samples will be collected from waste disposal Areas 3 and 6 and three perimeters samples will be taken from Area 7 for determining background conditions for each of these areas (seven samples). A total of 12 perimeter samples will be collected among the eight areas in this manner. In addition, two background surface soil samples will be taken from apparently clean, upgradient portions of the site and three QA/QC soil samples will be obtained at specific locations to be chosen in the field. This provides for a total of 22 surface soil samples.

3.2.5.2 Field Procedures- Surface Soils

All the surface soil sampling locations will be staked by TAMS/TRCC personnel following the review of the initial site surveys. The surface soil samples will be collected directly from the ground surface to a depth of six inches using a dedicated stainless-steel spoon. Soil collected for volatile organic compound analysis will be spooned directly into the proper bottles. Subsequently collected soils will be placed in a field decontaminated, stainless steel bowl and homogenized thoroughly. Samples for all other analytical parameters will be collected from the homogenized surface soil sample and labelled in the manner outlined in Section 3.1.1.

3.2.5.3 QA/QC Requirements

Samples will be collected in accordance with USEPA procedures referenced in Section 3.1.2.

A total of 30 surface soil samples will be collected consisting of 22 environmental samples, two environmental duplicates, two MS/MSD samples and two field blanks (one field blank/decontamination event [for each sampling device]).

3.2.6 Piezometers/Monitoring Well Installation

Twenty-five test borings will be drilled at seventeen locations at the Hertel Landfill. At each location a monitoring well or piezometer will be installed. Groundwater samples will be collected to assess the extent and concentrations of contaminants underlying the site. In addition, hydraulic conductivity tests will be conducted in each well to determine characteristics of the groundwater flow system so that the potential for contaminant migration via the groundwater can be evaluated.

3.2.6.1 Task Approach - Piezometers/Monitoring Wells

Twenty-five monitoring wells/piezometers will be drilled at seventeen locations across the site (see Figure 3-4). The seventeen locations will include four piezometers, five shallow monitoring wells, and eight bedrock monitoring wells (each paired with a shallow monitor well).

Of the eight monitoring well pairs, four pairs will be used to check the background groundwater quality entering the site. The four "background" pairs are located as follows: one pair at the north end of the site near the beginning of the access road, one pair located approximately 100 feet northwest of disposal area 4, one pair at the western edge of the site (approximately 500 feet west of disposal area 5), and a fourth pair will be located at the southern part of the site (approximately 300 feet south of disposal area 8). The four remaining monitoring well pairs will be located downgradient of the identified waste disposal areas. These include one pair located between the two wetlands areas and downgradient of the general fill area, and two well pairs located downgradient of waste disposal areas 1 through 7. Background soil samples will be collected from three of the background boring locations for chemical analysis. Analysis parameters are summarized in Section 3.4.

Five unpaired, shallow monitoring wells will also be installed. These will be used to help determine the shallow groundwater quality and groundwater level elevations adjacent to specific waste disposal areas. Data from these monitoring wells will indicate the hydraulic relationships between groundwater and surface water and provide samples for comparison of groundwater and surface water quality. Four of the unpaired shallow monitoring wells will be located downgradient of waste disposal areas 1, 2, 3, and 5; the fifth shallow monitoring well will be located downgradient of the general waste disposal area, approximately 100 feet south of waste disposal area 7 on the west side of the wetlands.

The remaining well installations include four shallow wells that will be used only as piezometers. These are located in selected areas adjacent to surface water bodies (see Figure 3-4) to provide additional water level data. Stream gauges will be placed in the surface water bodies near the monitoring wells to enable measurement of surface water elevations and correlation with groundwater elevations.

3.2.6.2 Field Procedures - Piezometers/Monitoring Wells

The installation of the 25 wells will utilize three different types of drilling. Overburden drilling will be performed by using hollow stem augering for the shallow wells and piezometers and driven casing for the deep bedrock wells. Bedrock will be drilled and sampled by coring.

The final depth of all monitoring wells will be determined by the TAMS/TRCC field geologist. Variables to be considered in establishing the final well depths will include: observed contamination, geologic material (thickness, depth, the presence of confining layers, etc.), depth to water table, and site sampling objectives.

Shallow Monitoring Wells/Piezometers

The boreholes for the wells to be constructed in the unconsolidated overburden materials will be advanced to the desired depth using 4-inch (minimum) inside-diameter (ID) hollow-stem augers. Borings for the five unpaired shallow monitoring wells and the four piezometers will have 2-foot split spoon samples collected at 5-foot intervals from the surface to ten feet below the water table. For shallow borings associated with deep well borings, split spoon soil samples will be collected only at those intervals where sampling was unsuccessful in the deep borings (deep borings will be drilled first and split spoon samples will be collected). Standard penetration tests (ASTM D1586-84) will be conducted at every 2-foot sampling interval. The physical characteristics of each soil sample will be visually classified and described based upon the Unified Soil Classification System (ASTM D 2487-85).

The eight paired and five unpaired shallow monitoring wells will be constructed of 2-inch diameter slotted or wire-wrapped stainless-steel screen and stainless-steel riser. Before the monitoring wells are installed, the well materials (casings and screens) will be steam-cleaned to ensure all oils, greases, and waxes are removed. The four piezometers will be constructed of two-inch diameter, threaded, flush-joint, slotted PVC screen and PVC riser. The casing and screen will be set in the augers so that the water table intersects the screen. The annular space between the screen and the borehole will be filled with sand. The sand will be emplaced in increments, as the augers are removed, to assure that native material does not collapse around the well screen. Frequent measurements of the sand level will be made using a weighted measuring tape. The sand pack will extend to approximately two feet above the top of the screen. Following placement of the sand pack, a two-foot thick (minimum) bentonite pellet seal will be put in place using similar procedures. The remainder of the borehole will be filled with bentonite/cement grout. A granular bentonite/cement slurry mixture will be tremie grouted to within one foot of the ground surface prior to drill casing or auger removal. As the casing is removed, this backfill will be continuously "topped off" to preclude breaches in the seal caused by caving of natural materials. A steel protective casing (minimum 4-inch ID) will be cemented in place at grade. The protective casing will have a locking steel cap five inches in inside diameter and no less than nine inches long. The concrete apron around the protective casing will be sloped to route drainage away from the well. The construction details/specifications for monitoring wells/piezometers are shown on Figure 3-6.

Deep Monitoring Wells

The overburden boreholes for the deep monitoring wells will be advanced to the desired depth using 6-inch ID driven casing fitted with a steel drive shoe. Four of the eight deep monitor well borings will have continuous split spoon samples collected at 2-foot intervals through the unconsolidated materials to the top of bedrock. Split spoon samples will be collected at 5-foot intervals in the remaining four deep borings. The samples will be collected and classified according to the ASTM procedures referenced earlier. Selected samples will be collected for analysis of physical parameters (Atterburg limits, vertical permeability, grain size distribution, moisture content, hydrometer analysis) using a Shelby tube. The 6-inch spun casing will be advanced to the top of bedrock, if bedrock is encountered within 50 feet of grade. If bedrock is not encountered to a depth of 50 feet below ground level, a deep overburden well will be installed following the well construction details shown in Figure 3-6.

Once the drilling casing is seated into bedrock, NX-size rock coring will be used to advance the borehole into bedrock and to collect core samples. After the first 5-foot rock core is completed, a 5- to 6-inch diameter roller bit will be used to ream the bedrock borehole five feet into bedrock and a 4-inch ID steel casing will be grouted in place using a cement/bentonite grout. The annular space between the 4-inch diameter steel casing and the 6-inch diameter borehole will be tremie grouted as the 6-inch diameter drilling casing is withdrawn to assure no cross-contamination between the overburden and bedrock. The grouted steel casing will be allowed to set up overnight then the NX rock core hole will be advanced an additional 10 feet (minimum) into the bedrock.

The eight deep wells will be constructed of 2-inch diameter slotted or wire-wrapped stainless-steel screen (10-foot lengths) and stainless-steel riser. The screen and casing will be set into the borehole to the desired depth. The annular space between the screen and the bedrock corehole will be sand packed to approximately two feet above the top of the screen. A two-to-five-foot bentonite pellet seal will be placed above the sand pack and the remainder of the annular space between the stainless-steel well casing and the 4-inch diameter steel outer casing will be grouted. The well will be secured with a locking steel protective casing cemented in place at grade. The construction details/specifications for the deep bedrock wells are shown on Figure 3-7.

Well Development

Following completion, all monitoring wells and piezometers will be developed by pumping and/or surging to create a good hydraulic connection between the well and the adjacent formation. Shallow monitoring wells will be developed using a centrifugal pump or a low volume peristaltic pump. Deep monitoring wells will be developed using a submersible pump or a submersible bladder pump. Fine-grained material around the well screen will be drawn into the well and removed by agitating the well water with a surge block and/or by pumping water from the well at alternating discharge rates. Accumulated sediments will be removed from the wells by pumping. This method will also be used to redevelop the existing on-site (Wehran) monitor wells. Should the pumping and surging method prove to be ineffective or not feasible due to depth to water, other development methods such as manual bailing will be used.

3.2.7 Groundwater Sampling

Groundwater samples from monitoring wells will be collected and analyzed in order to define the potential contaminants underlying the site. The results will be compared to previous sampling events and used to assess the extent of groundwater contamination.

3.2.7.1 Task Approach-Groundwater Sampling

The twenty-one new monitoring wells and four existing Wehran monitoring wells will be sampled to determine groundwater quality at the site. Two rounds of samples will be collected, separated by a minimum of two months. All parameters tested for in Round 1 will be tested for in Round 2. However, a review of Round 1 data may provide information which will allow the Round 2 parameter list to be amended. Sample analysis parameters are summarized in Section 3-4.

3.2.7.2 Field Procedures-Groundwater Sampling

Hydraulic Conductivity Testing

After the completion and development of the wells, a hydraulic conductivity test will be performed at each monitoring well (not including piezometers) onsite, including wells that were installed by Wehran Engineering. The hydraulic conductivity test data will define the near-well aquifer characteristics for use in evaluating the groundwater conditions at each site. The test method that will be used to determine the hydraulic conductivity is a slug injection/extraction test. The test will be conducted by producing a nearly instantaneous change in water level in the well by introducing or removing a slug of known volume from the well. Slug removal tests will be performed in shallow wells where the water table intersects the well screen. Water level recovery will be recorded using a pressure transducer and data logger. The well hydraulic conductivity testing will not be conducted until the first round of groundwater sampling is complete. The test data will be analyzed using the Hvorslev (Figure 3-8) or similar method.

Monitoring Wells

Prior to the evacuation of groundwater from any well, the depth to water shall be measured to the nearest 0.01 feet. An electronic water level indicator will be used for this purpose and will be decontaminated with deionized water and wiped with a paper towel, prior to each use unless visual observations indicate additional decontamination is necessary. The depth to water will be measured from a permanent reference point established on the top of the inner well casing and will be recorded in the field notebook. If both an inner and outer casing are present, the one used as the measurement reference point will be identified and the vertical distance between the two measured and recorded as well as the stick-up of the outer casing.

Three to five times the volume of the standing water in the well will be evacuated from the well prior to sampling to introduce a fresh sample of formation water for collection. The approximate volume of water evacuated will be logged into the field notebook. Because of the small diameter of the wells, either a bailer or a low-volume peristaltic pump will be used for well purging. HNU readings will be recorded during well evacuation. In instances where the depth to water precludes the use of a pump, wells will be purged with a dedicated, hand-operated, bottom-loading bailer. Intake hose or tubing associated with evacuation pumps will be constructed of polyethylene or Teflon • and dedicated to each well to avoid cross contamination. If bailers are used, the bailer and stainless steel cable will be thoroughly decontaminated prior to use and between uses. If a well is evacuated dry prior to removing three well volumes, the evacuation will be considered complete and the well will be allowed to recharge to at least 75% of its original volume prior to sampling. However, evacuation rates will be kept below five gallons/minute to avoid over-pumping or pumping the well to dryness (ideally, wells should never be pumped to dryness). Any purged well water which is obviously contaminated (odor, sheen) will be contained in 55-gallon drums. Other purge waters will be disposed onsite in the vicinity of the source water. Indicator parameters (i.e., pH, EH, specific conductance and temperature) will be measured periodically during well evacuation to aid in determining water stabilization. When indicator parameters vary by less than 10% between two successive well volumes, the well will be considered adequately evacuated for sampling.

The well will be sampled within three hours of evacuation. All groundwater samples will be collected with dedicated, laboratory-cleaned Teflon bailers. All stainless steel cables and attachment hardware will be cleaned, according to the decontamination procedures in Appendix D.

Vials for volatile organic analysis (40 ml septum vials) will be filled with the initial bailer of groundwater. The sequence of sample collection will be as follows:

In-situ measurements
Volatile organics (VOA)
Total Organic Halogen (TOX)
Total Organic Carbon (TOC)
Extractable Organics (Semivolatiles and Pesticides/PCBs)
Total Metals (unfiltered)
Dissolved Metals (filtered)
Cyanide
Sulfate and Chloride
Turbidity, dissolved solids, suspended solids
Nitrogen and compounds (nitrate, ammonia, etc.)
Other analyses not specified above

A filtered and unfiltered metals sample will be collected from each monitoring well. Subsequently, the remaining sample bottles will be filled, taking care to avoid overflowing bottles already containing preservative (pre-preserved). Groundwater samples will be field filtered using a disposable filtration apparatus. The commercially available apparatus (Nalge Catalog No. 450-0045) consists of a polystyrene upper unit, a 0.45 micron cellulose nitrate filter, and a 500-ml polystyrene receiver with a sidearm. These filters are individually wrapped and sealed by the manufacturer, and will not be field-cleaned. Verification of filter apparatus decontamination will be assessed by collection of filtered field blanks for each matrix. Following filtration into the 500 ml receiver, the sample will be transferred to the polyethylene sample bottle to which preservative (nitric acid) has been added. Samples will not be prefiltered prior to filtration through the 0.45 micron filter. The filter apparatus will be disposed after one use. Each extra sample volume for field duplicates, matrix spikes, and matrix spike duplicates will be filtered through a separate, new, filter apparatus.

At a minimum, the following information will be recorded in the field notebook during sampling:

- sample identification number
- location of sample
- time and date of sample
- personnel performing task
- depth to water table, reference mark, casing(s) stick-up, and vertical distance between inner and outer casing
- amount evacuated from well and device used for evacuation
- visual or sensory description of the sample (color, odor, turbidity, etc.)
- weather conditions during sampling
- other pertinent observations

Each sample container used for the groundwater samples will be labelled in the manner outlined in Section 3.1.1.

Once the above information is completed, all samples will be placed into shipping containers, cooled with bags of ice, and proper forms completed and accompanying the sample shipment. Sample packaging, shipping and labeling procedures are detailed in SOPs 60 and 61, included in Appendix C.

3.2.7.3 QA/QC Requirements

Drilling, sampling of groundwater, and hydraulic conductivity testing will be performed as specified above, and in accordance with USEPA procedures referenced in Section 3.1.2.

Two rounds of sampling will occur each taking two days to complete. A total of 78 samples will be collected from groundwater monitoring wells. Each round of sampling will consist of a total of 39 samples comprising 29 well samples, two field blanks (one for each decontamination event), two trip blanks (VOA only), two environmental duplicate samples, and two MS/MSD sample pairs.

For hydraulic conductivity, 50 percent of the tests will be repeated for QA/QC purposes.

3.2.8 Private Water Supply Wells

Selected private wells that exist near the Hertel Landfill will be sampled and analyzed in order to define the potential contaminants in the homeowner's drinking water. The results will be compared to previous sampling events, where data are available, and used to assess the effects of the landfill on the local groundwater quality.

3.2.8.1 Task Approach- Private Wells

Eleven private water supply well water samples will be collected from the homes shown on Figure 3-9. These locations were determined by the State of New York Department of Health and will be sampled and analyzed during the site field investigation program.

3.2.8.2 Field Procedures- Private Wells

Eleven private water supply wells will be sampled according to the following described procedures. Before TAMS/TRCC field personnel collect the water samples, a letter will be drafted by TAMS/TRCC and revised by the appropriate town officials. Upon approval of the letter content, letters will be forwarded (on city/town letterhead) to each of the homeowners which require analytical testing. The letter will contain information regarding TAMS/TRCC personnel conducting the sampling, general sampling procedures, and a sampling schedule.

On the day of sample collection, TAMS/TRCC field personnel will identify themselves to the homeowner and then proceed to survey the house for the optimum sampling point (usually an outdoor faucet). An inspection of the basement will be performed (provided access is permitted) to locate the well, pump, storage tanks, and any treatment systems that may be present. The sample access point will be chosen as close to the well head as possible, prior to the storage tank or any treatment equipment. Evacuation, where possible, will be performed by connecting a garden hose to an outside faucet and allowing the system to pump for a minimum of fifteen minutes. [By pumping the water through a garden hose and away from the house, the risk of overloading the homeowner's septic system will be minimized.] After the evacuation period, the hose will be disconnected and samples will be collected. During sample collection, the water flow will be reduced to a rate where the water will flow gently down the side of the sample bottle with minimum entry turbulence, thereby minimizing VOC losses due to aeration of the water. Vials for volatile organic analysis (40 ml septum vials) will be filled first. Secondly, sample bottles for TOC, TOX, metals and major ions will be filled. Subsequently, the remaining samples will be filled, taking care to avoid overflowing bottles containing preservatives (pre-preserved). Only unfiltered water sarnples for total metals analyses will be collected from the private supply wells. Metals and major ions will not be filtered for the private water supply well samples. At a minimum, the following information will be recorded in the field notebook during sampling:

- sample identification number
- location of the sample (owner's name and address)
- time and date of sampling
- personnel performing task
- evacuation duration and evacuation method used
- visual or sensory description of the sample (color, odor, turbidity, etc.)

- weather conditions while sampling (if sample collected outside)
- other pertinent observations

Each sample container used for the ground water samples will be labelled in the manner outlined in Section 3.1.1.

Upon completion of the water sampling, TAMS/TRCC personnel will record the exact location (i.e., indoor/outdoor faucet or tap) used during the sample collection. These locations will be designated as the sample access point, should additional sampling be needed in the future. Analysis parameters are summarized in Section 3.4.

3.2.8.3 QA/QC Requirements

A total of 15 samples will be collected from private supply wells including 11 tap samples, one environmental duplicate, one MS/MSD, and one trip blank (VOA only).

3.2.9 Surface Water/Sediment

The surface water and sediment sampling activities will be performed in order to define the potential contaminants that may have entered the stream sediments and surface water through surface runoff and groundwater discharge.

3.2.9.1 Task Approach- Surface Water/Sediment

A total of 24 surface water grab samples will be collected from the sampling stations tentatively identified by area in Figure 3-10. Siting of surface locations will be based upon a comprehensive site inspection and review of aerial photography. Sample location placement will be a field decision and will maximize the detection of chemical releases into surface waters.

Of the 24 samples, three samples will be collected from leachate seeps, four samples will be collected from background locations (e.g.,Area A), two samples will be collected from Area B, four samples will be collected from Area C, and five samples will be collected from Area D. In addition, four samples will be collected from the drainage ditch and two samples will be collected from the creek, one upstream and one downstream of the confluence with the drainage ditch.

Sediment samples will be collected subsequently at each surface water location. As noted, these include seep outflows, adjacent wetlands, the creek and a tributary, and background locations as indicated on Figure 3-10. To the extent possible, samples will be collected from the point of greater sediment accumulation, usually depositional areas of low stream flow velocity. Actual locations will be determined in the field during the initial site survey.

3.2.9.2 Field Procedures - Surface Water/Sediment

Surface water and stream sediment samples will be collected concurrently at each sample location as depicted in Figure 3-10. Both sample types will be collected in relatively slow-moving areas of the stream where contaminated water and sediment may collect, and will proceed from the furthest downstream location to the furthest upstream location. In areas of standing surface water (ponded wetlands), sampling will be conducted first in areas considered to be the least contaminated; areas of suspected greater contamination will be sampled last. At each surface water/sediment location, the surface water sample will be collected prior to the sediment sample. This procedure will minimize the contamination of surface water samples from artificially suspended sediment particles.

For sediment samples, field measurements of sediment oxidation/reduction potential will be made at each location and a total of 24 grab samples from 0 to 6 inches in depth will be collected.

At 6 of the 24 locations, two additional sediment samples will be collected from 6 to 12 inches and 12 to 18 inches in depth. The purpose of the deeper samples is to provide a column to determine if contaminants are migrating downwards. One sampling location in each of the six above mentioned areas will be selected for the additional samples at the discretion of the field supervisor. Therefore, an additional twelve samples will be collected, creating a total of 36 sediment samples.

Surface Water Sampling

In an area where the surface water body is relatively shallow (two feet deep or less), water samples will be collected by submerging the sample container and directing the open mouth of the container upstream. TAMS/TRCC personnel collecting the sample will stand on the downgradient side in order to avoid agitating bottom sediment particles. If areas are accessible to personnel wearing hip waders, TAMS/TRCC personnel will use a three-liter size jar to collect the water sample and then transfer the water into sample containers. Samples collected from small lakes, ponds, or deeper streams not accessible by wading will be collected from a boat using a polyethylene Van Dorn sampler. Vials for volatile organic analysis (40 ml septum vials) will be filled by submerging the containers into the surface water body, regardless of the depth or size of the surface water body. Subsequently, sample bottles for remaining analytes will be filled in the same sequence as groundwater samples (Section 3.2.7.2), taking care to avoid overflowing bottles already containing preservative (pre-preserved). Surface water samples collected for inorganic analyses will be unfiltered only (for total metals analysis). At minimum, the following will be recorded in the field notebook during sampling:

- sample identification number
- location of the sample (sketch of the sample point)

- time and date sample was taken
- personnel performing the task
- method of sample collection (i.e. Van Dorn versus direct submergence)
- visual or sensory description of the sample (color, odor, turbidity, etc.)
- field measurements (temperature, conductivity, pH, and dissolved oxygen)
- weather conditions during sampling
- other pertinent observations

Field measurements will be performed at each sampling location and will be obtained from a separate sample aliquot not used for chemical analysis. Field measurements will consist of water temperature, conductivity, pH, and dissolved oxygen.

Each sample container used for the surface water sampling will be labelled in the manner outlined in Section 3.1.1.

Once the above information is completed, all samples will be placed into shipping container, cooled with ice packs, and proper forms completed to accompany the sample shipment.

Sediment Sampling

Sediment sample locations will be chosen from areas that are representative of sediment depositional areas. These areas may include the inside corner of a stream bed in a meander, or a deep pool where water velocities are reduced and greater particle deposition occurs. Twenty-four samples will be collected within the top six inches of the stream bed. Six samples will be collected from 6 to 12 inches, and six samples will be collected from 12 to 18 inches. Any vegetation debris (leaves, roots, bark) along with any large stones will be removed from the sample so that only the finer-grained material is collected. Sediment samples will be collected by using one of the following: field cleaned, stainless steel spoon (in relatively shallow areas); a field decontaminated petite ponar dredge [in deeper areas (>6 inches)]; or a field decontaminated stainless steel hand auger bucket (8 inches long by 3 1/4 inch diameter) (at selected locations). Samples from the 6 inch to 12 inch and 12 inch to 18 inch depths will be collected using dedicated hand auger buckets. If necessary, a 24 inch long by 6 inch diameter section of carbon steel pipe will be used to case the auger hole for the deeper samples. The carbon steel pipe will be scrubbed with Alconox and tapwater, and steam cleaned prior to use. While collecting the sediment samples, using any of the three mentioned methods, care will be taken to minimize disturbance and sample washing as it is retrieved through the water column above. Finer-grained sediment could be carried out of the sample during collection if the water above is flowing or deep.

Samples requiring VOC analysis will be collected with a stainless steel spatula directly from the sample collection device and transferred into the sample containers to avoid VOC losses due to mixing. Sediment for all other required analytical parameters will be emptied into a field decontaminated stainless steel bowl and homogenized with a stainless steel spoon. At a minimum, the following will be recorded in the field notebook during sampling:

- sample identification number
- location of the sample (sketch of the sample point)
- time and date sample was taken
- personnel performing the task
- method of sample collection (i.e., Van Dorn versus direct submergence)
- visual or sensory description of the sample
- brief sediment description (color, texture, appearance)

3.2.9.3 QA/QC Requirements

Surface water and sediment samples will be collected in accordance with USEPA procedures referenced in Section 3.1.2.

Surface water and sediment samples will be collected simultaneously at 24 locations in six generalized areas: Area A, Area B, Area C, Area D, the Creeks and at the leachate seeps. At one location within each of these areas, two additional sediment samples will be collected at depths of approximately 6" - 12" and 12" - 18". This will give a total of 36 sediment samples.

A total of 34 surface water samples will be collected consisting of 24 environmental samples, two environmental duplicates, two MS/MSD samples, two field blanks, and two trip blanks (VOA only).

A total of 44 sediment samples will be collected comprising 36 environmental samples, two environmental duplicates, two MS/MSD samples, and two field blanks. No trip blanks will be required.

Analytical parameters are summarized in Section 3.4.

3.2.10 Biota

A resource inventory will be conducted at the Hertel Landfill Site which will include quantitative sampling of macroinvertebrates, fish, birds, mammals, amphibians and reptiles. Additionally, a survey of dominant vegetation cover types will be conducted. Wetland boundaries will be determined utilizing the three parameter approach, i.e., an analysis of vegetation, soils and hydrology.

An inventory of macroinvertebrates, fish, mammals and reptiles, the determination of vegetation cover types and the designation of wetland boundaries will be conducted in the Fall of 1989. Birds and amphibian surveys will be conducted in the spring of 1990.

3.2.10.1 Task Approach - Biota Sampling

The biota sampling plan has been designed to define the present community structure associated with the flora and fauna in the vicinity of the site and adjacent wetlands, and to assess the potential impact of the site on the area of concern by comparison to historical records and similar "control" areas.

The biota sampling plan consists of data gathering or surveying designed to determine the present structure of the wetland and stream communities via detailed field observations and a limited sample collection program. On-site wetland areas will be identified based on the coincidence of hydric soil, hydrophytic vegetation, and the presence of water. Qualitative methods will be used to provide an inventory of the common, threatened, and endangered flora and fauna observed in the wetland and stream habitats immediately adjacent to the site, upstream and downstream from the site, and in wetland and stream communities sufficiently removed from the site to serve as control areas. Similar surveys for terrestrial habitats on site, adjacent to and in nearby control areas will also be conducted. Any available background or survey reports for the area will be reviewed to help evaluate historical fluctuations in the community structure and anthropogenic disturbances.

The biological inventories for each area will be compared for obvious differences in the number of different taxa present and the relative abundance of sensitive species in control versus site areas with similar physical characteristics.

3.2.10.2 Field Procedures - Biota Sampling

Macroinvertebrates

Since benthic macroinvertebrates are sensitive to stress, they are often used as monitors of various environmental disturbances. Their limited mobility and relatively long life spans have made them prime candidates for assessing stresses due to toxic discharges. Certain benthic species such as sludge worms, certain midge larvae, leeches and pulmonate snails are known to be very pollution tolerant and tend to thrive in and dominate systems which are severely perturbed. The presence of large numbers of these species and the absence of other ;more sensitive species such as operculate snails and immature stages of certain mayflies, stone flies, and caddis flies is often indicative of a stressed system. In a healthy ecosystem there is generally a high species diversity and a low number of individuals due to natural ecological factors such as predation and competition for food and space. On the other hand, pollution by toxic chemicals may eliminate the entire macroinvertebrate community from an affected area.

The primary objective of this macroinvertebrate survey is to determine whether the macroinvertebrate community on-site and/or downstream from the discharge of the landfill is damaged. To ascertain this, six 50-foot stream reaches will be selected, two within the study area, two downstream, and two upstream. Three stratified, random aquatic macroinvertebrate samples will be taken at each stream reach for statistical analyses. A Surber-type, square-foot sample net with a 280 micron mesh nylon netting will be used. Also, TAMS/TRCC personnel will perform qualitative D-Net "kick sampling" within the 50 foot reach to complement the Surber sampling data. These data will be analyzed separately.

For comparing species diversity and abundance from different sites, similar habitat types and sampling methods must be used. However, different habitat types require different sampling methodologies. A ponar dredge is the prescribed sampling device in ponds, while a surber sampler is the most effective for streams. Therefore, we will not compare pond samples vs. stream samples, but rather will compare the stream samples, to each other (i.e., below and above landfill) and will compare the pond samples to each other. In addition, an overall species list will be compiled. Detailed notes on grain size will be made in the field notes.

In addition to the stream, two ponds adjacent to the site will be sampled. One pond is upstream and the other is downstream from the site. Within each pond, three benthos sample will be collected using a 6-inch Ponar dredge.

For each of the stream samples, the Surber Net will be placed over the substrate, parallel to the water flow, with the net portion downstream. Care will be taken such that there will be no gaps under the edges of the frame that would allow water to wash under the net. When the sampler is in place, all rocks and large stones will be carefully turned over and rubbed lightly with the hands to dislodge organisms clinging to them. Each stone will be examined before it is discarded to determine if there are any organisms, larval or pupal cases, etc., that may be clinging to it. Attached algae, insect cases, etc. will be scraped from the stones into the sampler net. Gravel and sand will be stirred with the hands or a stick to a depth of 5 to 10 cm to dislodge bottom -dwelling organisms to be repeated 2 to 3 times.

The sample will be removed by inverting the net into a sampler container. The net will be examined for small organisms clinging to it. These will be removed and placed into the sample container. a 10% Rose-Bengal formalin solution will be added to the sample as a preservative.

For each of the samples in the pond sites, the Ponar will be set open then lowered slowly to the bottom. The trigger mechanisms will be released upon impact with the substrate. The collected sample will then be transferred to a wash bucket with a 500 micron sieve at the bottom. Samples will be washed with water to remove mud and silts. The remaining sample will be placed in a jar with a 10% Rose-Bengal formalin solution as a preservative.

Each benthic sample will be clearly labelled with the site name, date, and time with waterproof ink. Also a corresponding field data sheet will be completed in detail for each sample and will include such comments as characteristics of the sediment (i.e., grain size, sewage odor, visible fauna, presence of detritus, problem with sample gear, etc.).

When the benthic samples are analyzed in the laboratory, the sample will be washed through a 0.55mm screen to remove the formalin and any remaining fine sediments. It will then be placed in a white pan under a magnifying lamp to identify and sort organisms to their respective taxonomic groups (i.e., polychaetes, amphipods, etc.) and placed in separate dishes by taxon. Each of these dishes will be sorted under a stereoscope with adjustable magnification lenses (a compound microscope will be available) and the organisms will be identified at least to family and genus level and counted. Voucher specimens of all taxa will be stored in small labelled vials and preserved in 70 percent alcohol solution. If the contaminants of concern are detected in sediment samples, then benthic samples will be sorted and identified in the laboratory under an exhaust hood.

Subsequent to laboratory analysis of the samples;

- A species list will be compiled according to habitat type;
- Species diversity and relative abundance (species richness) per habitat will be calculated;
- Representative specimens shall be turned over to EPA upon completion if requested.

Fish

Fish will be collected from 50-foot stream segments. A total of six segments will be identified-two at the landfill, two upstream, and two downstream. Seining will be conducted in the fall when streamflows are low to determine the relative abundance of species present. If deemed necessary and appropriate in the field, blocks nets may be used to segregate different sections of the stream to prevent movement of fish between sampling areas. If seining proves ineffective, an electroshocking method will be employed.

Seining will also be conducted in the ponds adjacent to the site. A 25 foot seine with a 3/16-inch mesh size will be utilized during this study. Two technicians will feed out the net making sure that the weighted line makes contact with the bottom of the channel. The seine will be pulled upstream for 50 feet, then pulled toward the bank, drawing the seine into a semi-circle, leading with the weighted edge of the seine.

Fish will be identified to species in the field, measured and released, except those kept for a reference collection. Calculations of species relative abundance will be determined. Observations of the general condition and any obvious abnormalities will be noted. Endangered species will be returned immediately. Specimens will be preserved in a 4 percent formaldehyde solution.

Representative specimens shall be turned over to EPA upon completion if requested.

These fish will not be used in the bioaccumulation study. This discussion of methodology concern only the fish survey.

Other Fauna

While conducting the fauna surveys, careful attention will be paid to the existence of any threatened or endangered species.

Two ecological inventory transects per vegetative cover type will be established on the site to conduct a strip census of birds and large and medium-sized mammals through direct (sighting and calls) and indirect (tracks, burrows, dens, tree rubs, and scat) observations. To a limited extent, the same procedure will be followed to determine amphibian and reptile populations. There are few proven or accepted techniques for collecting amphibians and reptiles other than simply searching suitable habitats including stream banks, ponds, underneath logs and rocks, in leaf litter and on sun-exposed rocks and outcroppings. Searches will be conducted in all types of weather but certain groups will be sought most intensively when conditions are optimal for them (i.e., hot, sunny days for turtles, snakes and lizards; rainy or otherwise damp conditions for salamanders; and warm nights for frogs and toads). All species observed will be identified in the field using appropriate field guides, such as Behler and King (1979). All mammals observed will be identified in the field using Burt and Grossenheider (1976).

Resident and transient birds on the project site and within the control area will be identified. Sight and sound observations, along with other available evidence including feathers, eggs and nests will be identified by species using standard field guides such as Robbins, Bruun, and Zim (1966). Beginning 150 feet inside the property boundary at the northeast terminus of Ecological Transect 1 and the northwest terminus of Ecological Transect 2, ten-minute bird counts will be conducted by a TAMS ecologist.

At the completion of the sample period, the ecologist will move 500 feet down the transect and conduct another ten-minute bird count. Minor adjustments in count location will be made to insure that all habitats are sampled. Observations of waterfowl will be conducted in the appropriate habitat. The control areas will be sampled in a similar fashion. All observations will be made in the early morning (one hour before to one hour after dawn) or early evening (one hour to one and a half hours before dusk) for three sample periods along each on-site and control transect.

Qualitative bird observations will also be conducted in the fall to assess fall migration patterns. Detailed bird surveys will be conducted in the spring using two 3-day sampling periods.

Paired, baited live and snap traps will be established along each transect for three nights to inventory small mammals. Small mammals species will be inventoried using HAVAHART live traps ranging in size from 5"x5"x18" to 11"x13"x36" and SHERMAN box traps measuring 3"x3.5"x9". Trapping sessions will begin in the morning or evening hours and last from one to three days in any one location. The traps will be checked each morning. The standard method of quantifying trapping sessions is through use of the measure "trap nights" (Giles, 1971). In other words, one trap left out for a single night is equal to one trap night, thirty traps left out for three nights is equal to ninety trap nights and so on. Traps will be set along each transect spaced approximately 500 feet apart depending on terrain. A variety of baits will be used for all traps. Traps will be checked first thing in the morning in order to identify and release any mammal contained within as soon as possible.

A night census of amphibians in appropriate habitats during spring using "jack lighting" will be conducted. A daytime amphibian/reptile census will be conducted using a random quadrant and grid location system. An amphibian and reptile census will be performed on a warm, rainy night using drift fences with pitfalls. They will be set in the appropriate habitat for three nights during the spring/early summer. Two sampling periods will be utilized. Seining will be conducted for tadpoles in the spring, in the two pond sites, utilizing the same methodology as discussed in the Section 3.2.10.2 - Fish.

After species have been collected, an animal species list will be compiled with estimates of diversity and relative abundance per cover type. A second list will be compiled identifying endangered and threatened species, and species of concern.

Vegetation

Careful attention will be paid to the presence of endangered or threatened flora. The vegetation investigation has a two-fold purpose. One, to provide a vegetation survey of the site; and two, as part of the wetland delineation.

An initial vegetation survey will be conducted at the site and the control area based on recent aerial photography. A brief site reconnaissance will be conducted by a TAMS ecologist to determine general vegetation cover types. The site will be broken into cover types by dominant vegetation. Subsequently, each cover type will be sampled using a nested-plot sampling program to identify species in the tree, sapling/shrub, and herbaceous layers. From the results of the sampling, a plant species list will be developed for each cover type on the site and the control area.

Wetland Delineation

On-site wetlands will be identified based on New York State Department Environmental Conservation (NYSDEC) wetlands maps and the NYSDEC Freshwater Wetlands Mapping Technical Methods Statement. The wetlands on the site will also be identified using the Federal Manual for Identifying and Delineating Jurisdictional Wetlands (1989) for submittal to the U.S. Army Corps of Engineers as appropriate.

The 1989 Federal Manual for Identifying and Delineating Jurisdictional Wetlands presents technical guidelines to identify wetlands and distinguish them from aquatic habitats and non-wetlands. In order to apply the guidelines, the manual provides a set of scientific methods and supporting information. A positive indication of wetlands must be present for three environmental parameters: vegetation, soils and hydrology. This is the so-called "three-parameter" approach. Wetlands must possess hydrophytic vegetation, hydric soil, and wetland hydrology. For this project, the essentials of the federal method were taken from the Field Guide for Delineating Wetlands: Unified Federal Method, (1989).

Pertinent background information available for the site will be obtained and reviewed, as recommended in the guide for routine on-site determination. Data will include USGS topographic quadrangles, a recently flown aerial photo, U.S. Fish and Wildlife Service National Inventory Maps, and soil survey information.

Appropriate habitat of endangered and threatened species of concern will be investigated. This information will focus the field investigations to locate these species if they exist on-site.

Vegetation will be characterized along the wetland/non-wetland boundary by following the methodology prescribed in the Federal Wetlands Delineation Manual.

At each sampling point, the overstory trees will be identified within a 30-foot radius of the selected observation point. Each tree at or over 3.0 inches Diameter Breast Height (DBH) will be identified, species will be recorded and the DBH measured with a diameter tape. Second, all tree saplings and shrubs (under 3.0 inches DBH but over 3.2 feet high) within a 10-foot radius will be sampled, placed in specific height classes and height mid-point recorded. Herbs will be sampled within a 1.64 foot radius plot. The percent cover will be estimated and recorded. All woody and non-woody material under 3.2 feet in height will be included in the sampling of herbs. Next, woody vines greater than 3.2 feet in height are counted within a 10-foot radius plot of the observation point.

Each vegetation layer will be separately evaluated to determine the dominant species. Criteria for determining dominance in each layer include: basal areas for trees; height classes for saplings and shrubs; percent cover for herbs and the number of stems for vines in each respective sampling plot. The wetland indicator status of the dominant plant species in each layer will be determined according to the 1988 Wetland Plant List Northeast Region.

From the information obtained at the observation points, the hydrophytic vegetation boundary will be established at a point where wetland species no longer have a competitive advantage over upland species.

Soils

By use of a soil sampling auger and spade the area will be investigated at intervals along the natural soil wetness gradient to initially establish a point and subsequently, a line between hydric soil conditions and drier upland areas where the soil is not saturated for significant periods during the growing season. Along this boundary, soils will be examined for indications of hydric conditions. This shall include 1) presence of an aquic moisture regime and 2) soil colors (low chroma matrix, mottling).

Hydrology

Once the areal extent of hydric soil is determined, the area will be investigated for obvious signs of wetland hydrology. Obvious signs included surface ponding, indications of free water within 18 inches of the surface in auger holes made during soil investigations, and matted, water-stained, surface leaf litter.

A wetland determination will be made in the field at the designated observation points. The area at the observation point is determined to be a wetland, if hydrophytic vegetation, hydric soils, and wetland hydrology are all present. An assessment will also be made to ascertain whether normal environmental conditions are present and will also be present in the growing season of most years.

The approximate location of each observation point will be indicated on a topographic map of the site. Each observation point will be marked in the field with a stake or a survey ribbon attached to vegetation and coded for future identification.

3.2.10.3 Bioassay/Bioaccumulation Studies

Bioassay Studies

Aquatic toxicity tests will be conducted to assess the toxicity of site-related surface water entering Pancake Hollow Creek compared to water from appropriate control areas.

Chronic static renewal tests with the cladoceran (Ceriodaphnia sp.) (7-day life cycle) and the Fathead minnow (Pimephales promelas) (7-day larval) will be run with surface water samples from the site and control sites. The testing protocol will follow the methods presented in the New York State "Manual for Toxicity Testing of Industrial and Municipal Effluents" (edited by P.A. Jones, 1985). Bioassay testing with Ceriodaphnia sp. may be deleted if control water (i.e., upstream source) is not conducive to cladoceran culture.

The toxicity test results will be compared to the New York State Ambient Water Quality Standards and Guidance values as defined in NYSDEC's Technical Operations Guidance Series, Part 1.1.1.

Bioaccumulation Studies

The findings of the groundwater, surface water, sediment and biota sampling will be reviewed relative to each other to assess the present status of the terrestrial wetlands and stream habitats in the area of concern. If the sediment and water analyses show no environmentally significant differences from control areas, and the biological inventories show no significant differences between control and landfill areas, contamination studies of the flora and fauna may not be required. However, if the analytical results for groundwater, surface water, and sediment indicate the presence of site-related compounds or levels of concern, or if significant population differences are observed near the site compared with control areas, investigations utilizing appropriate species will be recommended to continue through at least two subsequent seasons (spring and summer). The Cost Proposal, however, does not contain these costs.

Biota outlined in section 3.2.10 to be collected during the spring investigation would be subject to chemical analysis. From the wetland areas, muscle and adipose tissue would be analyzed from the snapping turtle muscle and muscle tissue from bull frog. Fish composites shall also be analyzed. When possible, sampling personnel will select older specimens for analysis.

Analysis would consist of testing from amongst those chemicals outlined in Table 3-1 known to accumulate in biota tissue and organs.

The objectives and methodology of the bioaccumulation study will be more clearly defined based on the data gleaned from the groundwater, surface water, and biota sampling. It would not be appropriate at this time to design a detailed bioaccumulation plan without at first establishing the presence of site-related compounds or levels of concern and without gathering baseline data on the existing flora and fauna of the site.

3.3 Field Instrument Calibration Procedures

Field instruments and equipment used to gather, generate, or measure environmental data will be calibrated in accordance with procedures in Appendix C so that accuracy and reproducibility of results are maximized, subject to the inherent limitations of the instrument.

Calibration of field instruments will be performed at intervals specified by the SOP or by the manufacturer, or more frequently, as conditions dictate. Calibrations may also be performed at the start and completion of each test run; however, such calibrations will be re-initiated as a result of delay due to meals, work shift change, or instrument damage. Records of calibration, repair or replacement will be maintained by the designated field personnel. Calibration standards used as reference standards will be traceable to the National Bureau of Standards (NBS) when possible. Calibration procedures for field instruments are included in Appendix C of this plan.

3.4 Sample and Analysis Summary

Sample amounts and analysis parameters are listed in Table 3-2. Brossman short forms for each sampling event are listed in Tables 3-3 to 3-11.

Table 3-1

Chemicals of Concern for Biota Samples Collected during the Hertel Landfill Investigation

Arsenic
Cadmium
Chromium
Selenium
Lead
Mercury
Phenols (total)
DDT (and metabolites)
Endrin
Other pesticides? (related to apple orchards)
Phthalates
PCBs
Dioxins (TCDD)
Dibenzofurans

TABLE 3-2

SUMMARY OF SAMPLES AND ANALYTICAL PARAMETERS REQUIRED FOR THE HERTEL LANDFILL SITE

Source:	Monitor Wells	Monitor Wells	Private Wells	Surface Soil	Test Pits	Test Pits	Test Pits	Test Borings	Test Borings	Streams, Wetlands	Streams, Wetlands
Matrix:	Ground Water	Ground Water	Ground Water	Soil	Soil	Soil	Leachate	Soil	Soil	Surface Water	Sediment
Number of Events:	1	1	1	1	1	1	1	1	1	1	1
Duration of Events:	2 Days	2 Days	2 Days	2 Days	8 Days	8 Days	8 Days	3 Days	6 Days	2 Days	2 Days
Total Samples Per Event:											
Matrix:	28	28	11	22	11	8	10(e)	3	6	24	36
Field Blanks	2	2	–	2	2	–	3	3	-	2	2
Trip Blanks:	2	2	1	–	--	–	6	–	-	2	–
Duplicates:	2	2	1	2	1	–	1	1	1	2	2
MS/MSD:	2/2	2/2	1/1	2/2	1/1	–	1/1	1/1	-	2/2	2/2
Sampling Procedures:	Evacuation and Sampling Using Bailer	Evacuation and Sampling Using Bailer	Evacuation and Sampling From Tap	Grab Sample w/Stainless Steel Spoon	Grab Sample w/Stainless Steel Spoon From Bucket or Long-Reach Tool	Undisturbed (Shelby Tube), or disturbed (split spoon)	Grab Sample using Extended Reach Tool	Split Spoon	Undisturbed (Shelby Tube)	(Concurrent w/Ground Water Sampling) Direct Collection	(Concurrent w/Surface Water Sampling) Stainless Steel Spoons, Corers
Purpose:	Determine Ground Water Quality On Site	Determine Ground Water Quality On Site	Determine Ground Water Quality At User Locations	Determine Areal Extent of Surface Contamination	Determine Vertical Extent of Soil Contamination	Quantify Physical Parameters of Shallow Soils	Determine "Worst Case" Ground Water Quality	Background Soil Quality	Physical Parameters of Deeper Soils	Identify if Contaminants Are Leaving Site Via Surface Water Bodies	Identify if Contaminants Are Leaving Site Via Surface Water Bodies
Parameters:	VOC BNAs Pest/PCBs TAL Metals Cyanide TOC Cl SO_4 HCO_3 CO_3 Inorganic N Organic N Ammonia N	VOC BNAs Pest/PCBs TAL Metals Cyanide TOC Cl SO_4 HCO_3 CO_3 Inorganic N Organic N Ammonia N	VOC BNAs Pest/PCBs TAL Metals Cyanide TOC Cl SO_4 HCO_3 CO_3 Inorganic N Organic N Ammonia N	VOC BNAs Pest/PCBs TAL Metals Cyanide TOC	VOC BNAs Pest/PCBs TAL Metals Cyanide TOC	Hydrometer Analysis, Moisture Content, Grain Size, Atterburg Limits, Vertical Permeability	VOC BNAs Pest/PCBs TAL Metals Cyanide TOC Organic N Inorganic N Ammonia N Cl SO_4 CO_3 HCO_3	VOC BNAs Pest/PCBs TAL Metals Cyanide	Hydrometer Analysis, Moisture Content, Grain Size, Atterburg Limits, Vertical Permeability	VOC BNAs Pest/PCBs TAL Metals Filtered Metals Cyanide TOX TOC TDS BOD COD Organic N Inorganic N Ammonia N Phosphorus Cl SO_4 CO_3 HCO_3	VOC BNAs Pest/PCBs TAL Metals Cyanide Organic N Inorganic N Phosphorus TOC
Field Measurements:	pH EH Temperature Conductivity	pH EH Temperature Conductivity	pH EH Temperature Conductivity	None	None	None	pH EH Temperature Conductivity	None	None	None pH EH Temperature Conductivity Dissolved Oxygen	None

General Note: Indicator parameters for aqueous samples will be conducted in the field and will not be sent to an analytical laboratory. These parameters include pH, temperature, conductivity, EH, and dissolved oxygen.

FOOTNOTES:

(e) = estimate
VOC = volatile organic compounds
BNA = base/neutral and acid extractables (semivolatiles)
TOX = total organic halogens
TOC = total organic carbon
TDS = total dissolved solids
BOD = biological oxygen demand
COD = chemical oxygen demand

TABLE 3-3

PARAMETER TABLE
[SECTION E OF BROSSMAN SHORT FORM]
SURFACE SOIL SAMPLES

Parameter	Number of Samples	Sample Matrix(1)	Analytical Method Reference	Sample Preservation	Holding Time(5)	Container(4)
Volatiles	22	S	CLP(7)	4°C	10 days	2-40 ml VOA
Semivolatiles	22	S	CLP(7)	4°C	(3)	8 oz G(B)
Pesticides/PCBs	22	S	CLP(7)	4°C	(3)	8 oz G
TAL Metals	22	S	CLP(8)	4°C	6 months	8 oz G(A)
Cyanide	22	S	CLP(8)	4°C	14 days	(A)
TOC	22	S	(6)	4°C	14 days	(B)

(1) S = Soil
(2) Test Methods for Evaluating Solid Waste - SW-846, Third Edition, November 1986
(3) Extraction 10 days from sample receipt; analysis within 40 days of extraction.
(4) A single container will be used for all analytes with an identical letter subscript:
AG = Amber Glass
G = Glass
P = Plastic
VOA = Glass volatile organic bottle with teflon septum
(5) Holding times for CLP methods are calculated from Verified Time of Sample Receipt (VTSR); holding times for other methods calculated from time of sample collection.
(6) Kahn, L. USEPA Region II, July 1988.
(7) USEPA Contract Laboratory Program Statement of Work for Organics Analysis, Multi-Media, Multi-Concentration, 2/88.
(8) USEPA Contract Laboratory Program Statement of Work for Inorganics Analysis, Multi-Media, Multi-Concentration, SOW No. 787.

Sampling Event Duration 2 Days.

TABLE 3-4

PARAMETER TABLE
[SECTION E CF BROSSMAN SHORT FORM]
TEST PIT SOIL SAMPLES

Parameter	Number of Samples	Sample Matrix[2]	Analytical Method Reference	Sample Preservation	Holding Time[6]	Container[5]
Volatiles	11	S	CLP[7]	4°C	10 days	2-40 ml VOA
Semivolatiles	11	S	CLP[7]	4°C	(4)	8 oz G[B]
Pesticides/PCBs	11	S	CLP[7]	4°C	(4)	8 oz G
TAL Metals	11	S	CLP[8]	4°C	6 months	8 oz G[A]
Cyanide	11	S	CLP[8]	4°C	14 days	[A]
TOC[1]	11	S	(3)	4°C	14 days	[B]

(1) TOC = Total Organic Carbon
(2) S = Soil
(3) Kahn, L., USEPA Region II, July 1988
(4) Extraction 10 days from sample receipt; analysis within 40 days of extraction.
(5) A single container will be used for all analytes with an identical letter subscript:
AG = Amber Glass
G = Glass
P = Plastic
VOA = Amber glass volatile organic bottle
(6) Holding times for CLP methods are calculated from Verified Time of Sample Receipt (VTSR); holding times for other methods calculated from time of sample collection.
(7) USEPA Contract Laboratory Program Statement of Work for Organics Analysis, Multi-Media, Multi-Concentration, 2/88.
(8) USEPA Contract Laboratory Program Statement of Work for Inorganics Analysis, Multi-Media, Multi-Concentration, SOW No. 787.

Sampling Event Duration: 8 Days

TABLE 3-5

PARAMETER TABLE
[SECTION E OF BROSSMAN SHORT FORM]
TEST BORING SOIL SAMPLES

Parameter	Number of Samples	Sample Matrix[1]	Analytical Method Reference	Sample Preservation	Holding Time[5]	Container[3]
Volatiles	3	S	CLP[6]	4°C	10 days	2-40 ml VOA
Semivolatiles	3	S	CLP[6]	4°C	(3)	8 oz G
Pesticides/PCBs	3	S	CLP[6]	4°C	(3)	8 oz G
TAL Metals	3	S	CLP[7]	4°C	6 months	8 oz G[A]
Cyanide	3	S	CLP[7]	4°C	14 days	[A]

(1) S = Soil
(2) Test Methods for Evaluating Solid Waste - SW-846, Third Edition, November 1986
(3) Extraction 10 days from sample receipt; analysis within 40 days of extraction.
(4) A single container will be used for all analytes with an identical letter subscript:
AG = Amber Glass
G = Glass
VOA = Glass volatile organic bottle with teflon septum
(5) Holding times for CLP methods are calculated from Verified Time of Sample Receipt (VTSR); holding times for other methods calculated from time of sample collection.
(6) USEPA Contract Laboratory Program statement of Work for Organics Analysis, Multi-Media, Multi-Concentration, 2/88.
(7) USEPA Contract Laboratory Program Statement of Work for Inorganics Analysis, Multi-Media, Multi-Concentration, SOW No. 787.

Sampling Event Duration: 3 Days

TABLE 3-6
Page 1 of 2

PARAMETER TABLE
[SECTION E OF BROSSMAN SHORT FORM]
SURFACE WATER/SEDIMENT SAMPLES

Parameter	Number of Samples	Sample Matrix[1]	Analytical Method Reference	Sample Preservation	Holding Time[5]	Container[4]
Volatile	24	W	CLP[9]	4°C,HCl, pH<2	10 days	2-40 ml VOA
	36	SD	CLP[9]	4°C	10 days	2-40 ml VOA
Semivolatile	24	W	CLP[9]	4°C	(6)	80 oz AG
	36	SD	CLP[9]	4°C	(7)	8 oz G
Pesticides/PCBs	24	W	CLP[9]	4°C	(6)	80 oz AG
	36	SD	CLP[9]	4°C	(7)	8 oz G
TAL Metals	24	W	CLP[10]	4°C, HNO_3, pH <2	6 months	1 liter P
	36	SD	CLP[10]	4°C	6 months	8 oz G[A]
Cyanide	24	W	CLP[10]	4°C, NaOH, pH >12	14 days	1 liter P
	36	SD	CLP[10]	4°C	14 days	(A)
TOC	24	W	415.1[2]	4°C, H_2SO_4, pH <2	28 days	1 liter AG
	36	SD	(11)	4°C	14 days	8 oz G[F]
Kjeldahl N (Organic N)	24	W	351.2[2]	4°C, H_2SO_4, pH <2	28 days	1 liter P[E]
Nitrate/Nitrite (Inorganic N)	24	W	353.3[2]	4°C, H_2SO_4, pH <2	28 days	(E)
Ammonia N	24	W	350.1[2]	4°C, H_2SO_4, pH <2	28 days	(E)

(Continued)

PARAMETER TABLE
[SECTION E OF BROSSMAN SHORT FORM]
SURFACE WATER/SEDIMENT SAMPLES
(Continued)

Parameter	Number of Samples	Sample Matrix[1]	Analytical Method Reference	Sample Preservation	Holding Time	Container[4]
Phosphorus (total)	24	W	365.4[2]	4°C, H_2SO_4, pH <2	28 days	(A)
	36	SD	365.4[2]	4°C	28 days	8 oz[E]
Filtered Metals	24	W	CLP[10]	4°C, HNO_3, pH <2	6 months	1 liter P
Major Ions:						
Cl	24	W	325.1,.2,.3[2]	4°C	6 months	500 ml P[D]
SO_4^{2-}	24	W	375.1,.2,.3[2]	4°C	6 months	(D)
CO_3^{2-}	24	W	403[8]	4°C	28 days	(D)
HCO_3	24	W	403[8]	4°C	28 days	(D)
TOX	24	W	9020[3]	4°C	14 days	1 liter AG
TDS	24	W	160.2[2]	4°C	7 days	(D)
BOD	24	W	405.1[2]	4°C	48 hours	1 liter P
COD	24	W	410.1[2]	4°C, H_2SO_4, pH <2	28 days	(C)

(1) SD = Sediment; W = Water
(2) Methods for Chemical Analysis of Water and Wastes - EPA 600/4-79-020, Revised March 1983.
(3) Test Methods for Evaluating Solid Wastes - SW-846, Third Edition, November 1986.
(4) A single container will be used for all analytes with an identical letter subscript:
AG = Amber Glass
G = Glass
P = Plastic
(5) Holding times for CLP methods are calculated from Verified Time of Sample Receipt (VTSR); holding times for other methods calculated from time of sample collection.
(6) Extraction 5 days from receipt; Analysis within 40 days after extraction
(7) Extraction 10 days from sample receipt; analysis within 40 days of extraction.
(8) Standard Methods for the Examination of Water and Wastewater, 15th Edition.
(9) USEPA Contract Laboratory Program Statement of Work for Organics Analysis, Multi-Media, Multi-Concentration, 2/88.
(10) USEPA Contract Laboratory Program Statement of Work for Inorganics Analysis, Multi-Media, Multi-Concentration, SOW No. 787.
(11) L. Kahn, USEPA Region II, July 1988.

Sampling Event Duration: 2 Days

TABLE 3-7

PARAMETER TABLE
[SECTION E OF BROSSMAN SHORT FORM]
GROUNDWATER SAMPLES (ROUND 1)

Parameter	Number of Samples	Sample Matrix[1]	Analytical Method Reference	Sample Preservation	Holding Time[4]	Container[3]
Volatiles	25	GW	CLP[7]	4°C,HCl,pH<2	10 days	2-40 ml VOA
Semivolatiles	25	GW	CLP[7]	4°C	[2]	80 oz AG
Pesticides/PCBs	25	GW	CLP[7]	4°C	[2]	80 oz AG
TAL Metals (Total)	25	GW	CLP[8]	4°C,HNO_3, pH<2	6 months	1 liter P
Filtered TAL Metals	25	GW	CLP[8]	4°C,HNO_3,pH<2	6 months	1 liter P
Cyanide	25	GW	CLP[8]	4°C,NaOH,pH>12	14 days	1 liter P
Major Ions:						
Cl	25	GW	325.1,.2,.3[6]	4°C	6 months	500 ml P[A]
SO_4	25	GW	375.1,.2,.3[6]	4°C	6 months	[A]
CO_3	25	GW	403[5]	4°C	6 months	[A]
HCO_3	25	GW	403[5]	4°C	6 months	[A]
TOC	25	GW	415.1[6]	4°C,H_2SO_4,pH<2	28 days	2-40 ml VOA
Kjeldahl N (Organic Nitrogen)	25	GW	351.2[6]	4°C,H_2SO_4,pH<2	28 days	1 liter P[E]
Nitrate/Nitrite (Inorganic N)	25	GW	353.2[6]	4°C,H_2SO_4,pH<2	28 days	(E)
Ammonia N	25	GW	350.1[6]	4°C,H_2SO_4,pH<2	28 days	(E)

(1) GW = Groundwater
(2) Extraction 5 days from receipt; analysis within 40 days after extraction.
(3) A single container will be used for all analytes with an identical letter subscript:
AG = Amber Glass
G = Glass
P = Plastic
(4) Holding times for CLP methods are calculated from Verified Time of Sample Receipt (VTSR); holding times for other methods calculated from time of sample collection.
(5) Standard Methods for the Examination of Water and Wastewater, 15th Edition.
(6) Methods for Chemical Analysis of Water and Wastes -- EPA 600/4-79-020, Revised March 1983.
(7) USEPA Contract Laboratory Program Statement of Work for Organics Analysis, Multi-Media, Multi-Concentration, 2/88.
(8) USEPA Contract Laboratory Program Statement of Work for Inorganics Analysis, Multi-Media, Multi-Concentration, SOW No. 787.

Sampling Event Duration: 2 Days

TABLE 3-8

PARAMETER TABLE
[SECTION E OF BROSSMAN SHORT FORM]
GROUNDWATER SAMPLES (ROUND 2)

Parameter	Number of Samples	Sample Matrix[1]	Analytical Method Reference	Sample Preservation	Holding Time[4]	Container[3]
Volatiles	25	GW	CLP[7]	4°C,HCl,pH<2	10 days	2-40 ml VOA
Semivolatiles	25	GW	CLP[7]	4°C	[2]	80 oz AG
Pesticides/PCBs	25	GW	CLP[7]	4°C	[2]	80 oz AG
TAL Metals (Total)	25	GW	CLP[8]	4°C,HNO_3, pH<2	6 months	1 liter P
Cyanide	25	GW	CLP[8]	4°C,NaOH,pH>12	14 days	1 liter P
Major Ions:						
Cl	25	GW	325.1,.2,.3[6]	4°C	6 months	500 ml P[A]
SO_4	25	GW	375.1,.2,.3[6]	4°C	6 months	[A]
CO_2	25	GW	403[5]	4°C	28 days	[A]
HCO_3	25	GW	403[5]	4°C	28 days	[A]
TOC	25	GW	415.1[6]	4°C,H_2SO_4,pH<2	28 days	2-40 ml VOA
Kjeldahl N (Organic Nitrogen)	25	GW	351.2[6]	4°C,H_2SO_4,pH<2	28 days	1 liter P[E]
Nitrate/Nitrite (Inorganic N)	25	GW	353.2[6]	4°C,H_2SO_4,pH<2	28 days	(E)
Ammonia N	25	GW	350.1[6]	4°C,H_2SO_4,pH<2	28 days	(E)

(1) GW = Groundwater
(2) Extraction 5 days from receipt; analysis within 40 days after extraction.
(3) A single container will be used for all analytes with an identical letter subscript:
AG = Amber Glass
G = Glass
P = Plastic
(4) Holding times for CLP methods are calculated from Verified Time of Sample Receipt (VTSR); holding times for other methods calculated from time of sample collection.
(5) Standard Methods for the Examination of Water and Wastewater, 15th Edition.
(6) Methods for Chemical Analysis of Water and Wastes. EPA 600/4-79-020, Revised March 1983.
(7) USEPA Contract Laboratory Program Statement of Work for Organics Analysis, Multi-Media, Multi-Concentration, 2/88.
(8) USEPA Contract Laboratory Program Statement of Work for Inorganics Analysis, Multi-Media, Multi-Concentration, SOW No. 787.

Sampling Event Duration: 2 Days

TABLE 3-9

PARAMETER TABLE
[SECTION E OF BROSSMAN SHORT FORM]
LEACHATE SAMPLES

Parameter	Number of Samples	Sample Matrix[1]	Analytical Method Reference	Sample Preservation	Holding Time[4]	Container[3]
Volatiles	10(e)	W	CLP[7]	4°C, HC1,pH<2	10 days	2-40 ml VOA
Semivolatiles	10(e)	W	CLP[7]	4°C	[2]	80 oz AG
Pesticides/PCBs	10(e)	W	CLP[7]	4°C	[2]	80 oz AG
TAL Metals	10(e)	W	CLP[8]	4°C,HNO_3,pH<2	6 months	1 liter P
Cyanide	10(e)	W	CLP[8]	4°C,NaOH, pH>12	14 days	1 liter P
Major Ions						
Cl	10(e)	W	325.1,.2,.3[6]	4°C	6 months	500 ml P[A]
SO_4^{2-}	10(e)	W	375.1,.2,.3[6]	4°C	6 months	[A]
CO_3^{2-}	10(e)	W	403[5]	4°C	6 months	[A]
HCO^3	10(e)	W	403[5]	4°C	6 months	[A]
Kjeldahl N (Organic N)	10(e)	W	351.2[6]	4°C,H_2SO_4,pH<2	28 days	1 liter P [B]
Nitrate/Nitrite (Inorganic N)	10(e)	W	353.2[6]	4°C,H_2SO_4,pH<2	28 days	[B]
Ammonia N	10(e)	W	350.1[6]	4°C,H_2SO_4,pH<2	28 days	[B]

(e) = estimated number; actual number dependent on field observations.
(1) W = Leachate water sample
(2) Extraction 5 days from receipt; Analysis within 40 days after extraction.
(3) A single container will be used for all analytes with an identical letter subscript:
AG = Amber Glass
G = Glass
P = Plastic
(4) Holding times for CLP methods are calculated from Verified Time of Sample Receipt (VTSR); holding times for other methods calculated from time of sample collection.
(5) Standard Methods for the Examination of Water and Wastewater, 15th Edition.
(6) Methods for Chemical Analysis of Water and Wastes -- EPA 600/4-79-020, Revised March 1983.
(7) USEPA Contract Laboratory Program Statement of Work for Organics Analysis, Multi-Media, Multi-Concentration, 2/88.
(8) USEPA Contract Laboratory Program Statement of Work for Inorganics Analysis, Multi-Media, Multi-Concentration, SOW No. 787.

Sampling Event Duration: 8 Days

TABLE 3-10

PARAMETER TABLE
[SECTION E OF BROSSMAN SHORT FORM]
WASTE SAMPLES

Parameter	Number of Samples	Sample Matrix(1)	Analytical Method Reference	Sample Preservation	Holding Time(5)	Container(4)
Volatiles	5(e)	S	CLP(6)	4°C	10 days	2-40 ml VOA
Semivolatiles	5(e)	S	CLP(6)	4°C	(2)	8 oz G
Pesticides/PCBs	5(e)	S	CLP(6)	4°C	(2)	8 oz G
TAL Metals	5(e)	S	CLP(7)	4°C	6 months	8 oz G(A)
Cyanide	5(e)	S	CLP(7)	4°C	14 days	(A)
RCRA Characteristics:						
Ignitability	5(e)	S	1010(3)	4°C	--	32 oz G(B)
Corrosivity	5(e)	S	9045(3)	4°C	--	(B)
Reactivity	5(e)	S	9010/9030(3)	4°C	--	(B)
EP Toxicity	5(e)	S	1310(3)	4°C	--	(B)

(e) = estimated number; actual number is dependent on field observations
(1) S = Solid waste sample (soil)
(2) Extraction 10 days from sample receipt; analysis within 40 days of extraction.
(3) Test Methods for Evaluating Solid Waste - SW-846, Third Edition, November 1986.
(4) A single container will be used for all analytes with an identical letter subscript:
AG = Amber Glass
G = Glass
P = Plastic
(5) Holding times for CLP methods are calculated from Verified Time of Sample Receipt (VTSR); holding times for other methods calculated from time of sample collection.
(6) USEPA Contract Laboratory Program Statement of Work for Organics Analysis, Multi-Media, Multi-Concentration, 2/88.
(7) USEPA Contract Laboratory Program Statement of Work for Inorganics Analysis, Multi-Media, Multi-Concentration, SOW No. 787.

Sampling Event Duration: 5 Days

TABLE 3-11

PARAMETER TABLE
[SECTION E OF BROSSMAN SHORT FORM]
POTABLE WATER (PRIVATE WELLS)

Parameter	Number of Samples	Sample Matrix(1)	Analytical Method Reference	Sample Preservation	Holding Time(4)	Container(3)
Volatiles	11	PW	CLP(7)	4°C,HCl,pH<2	10 days	2-40 ml VOA
Semivolatiles	11	PW	CLP(7)	4°C	(2)	80 oz AG
Pesticides/PCBs	11	PW	CLP(7)	4°C	(2)	80 oz AG
TAL Metals	11	PW	CLP(8)	4°C,HNO_3,pH<2	6 months	1 liter P
Cyanide	11	PW	CLP(8)	4°C,NaOH,pH>12	14 days	1 liter P
TOC	11	PW	415.1(6)	4°C,H_2SO_4,pH<2	28 days	2-40 ml VOA
Major Ions:						
Cl	11	PW	325.1,.2,.3(5)	4°C	6 months	500 ml P(A)
SO_4	11	PW	375.1,.2,.3(5)	4°C	6 months	(A)
CO_3	11	PW	403(5)	4°C	6 months	(A)
HCO_3	11	PW	403(5)	4°C	6 months	(A)

(1) PW = Potable Water
(2) Extraction 5 days from sample receipt; analysis within 40 days of extraction.
(3) A single container will be used for all analytes with an identical letter subscript:
AG = Amber Glass
G = Glass
P = Plastic
(4) Holding times for CLP methods are calculated from Verified Time of Sample Receipt (VTSR); holding times for other methods calculated from time of sample collection.
(5) Standard Methods for the Examination of Water and Wastewater, 15th Edition.
(6) Methods for Chemical Analysis of Water and Wastes -- SW-846, Third Edition, November 1986.
(7) USEPA Contract Laboratory Program Statement of Work for Organics Analysis, Multi-Media, Multi-Concentration, 2/88.
(8) USEPA Contract Laboratory Program Statement of Work for Inorganics Analysis, Multi-Media, Multi-Concentration, SOW No. 787.

Sampling Event Duration: 2 Days

Figure 3-1
EQUIPMENT CALIBRATION LOGSHEET
NAME:

OVA-128	Instr. ID #	Gas cyl. #	Calib. gas conc.	Initial instr. read'g*	Adjustm't req'd?	Filters cleaned?	Filled w/H2?	Burn chamber cleaned?	Comments
DATE: ______									
DATE: ______									
DATE: ______									
DATE: ______									
DATE: ______									
DATE: ______									
DATE: ______									
DATE: ______									
DATE: ______									

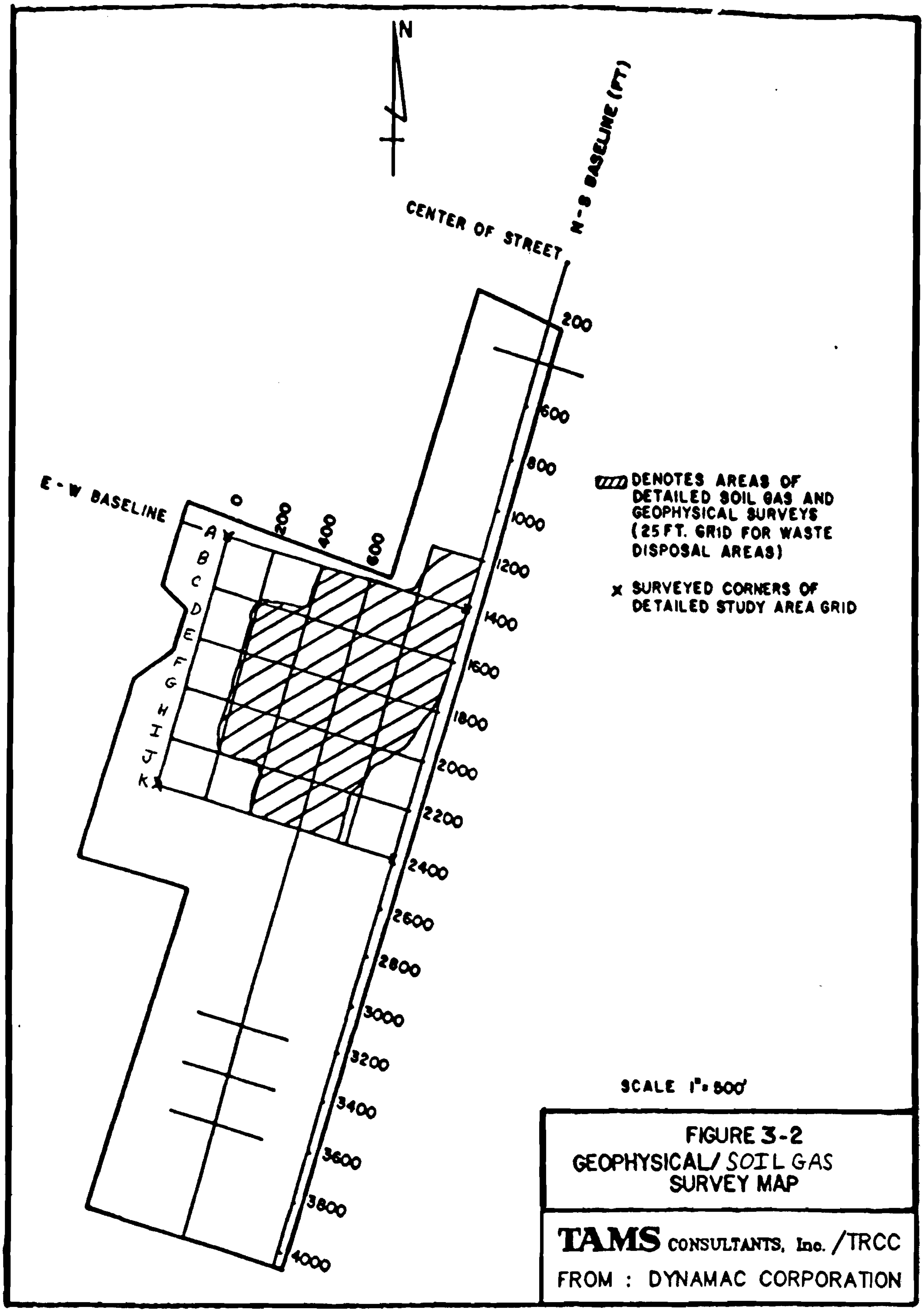


FIGURE 3-2
GEOPHYSICAL/ SOIL GAS
SURVEY MAP

TAMS CONSULTANTS, Inc. /TRCC
FROM : DYNAMAC CORPORATION

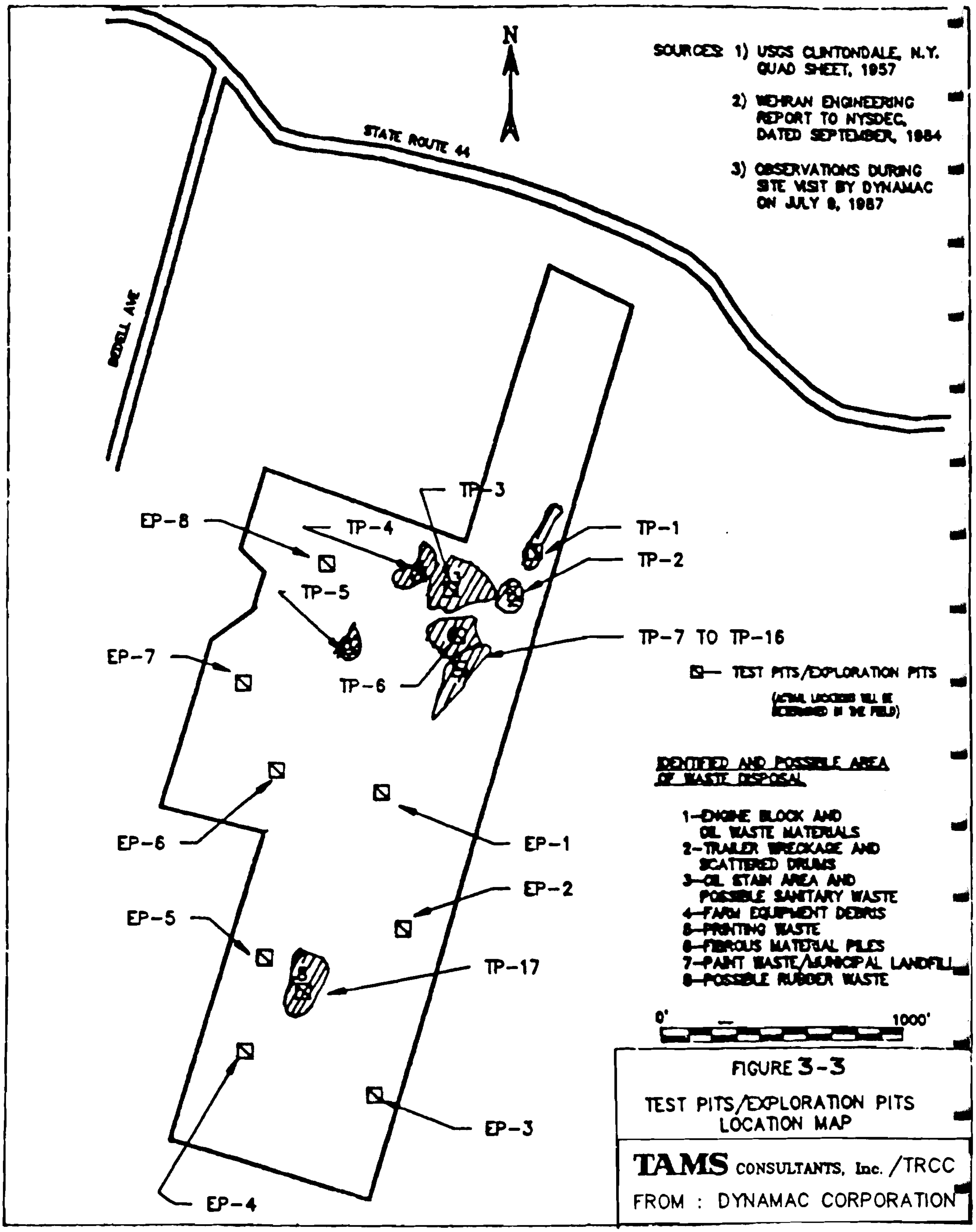


FIGURE 3-3

TEST PITS/EXPLORATION PITS LOCATION MAP

TAMS CONSULTANTS, Inc. /TRCC

FROM : DYNAMAC CORPORATION

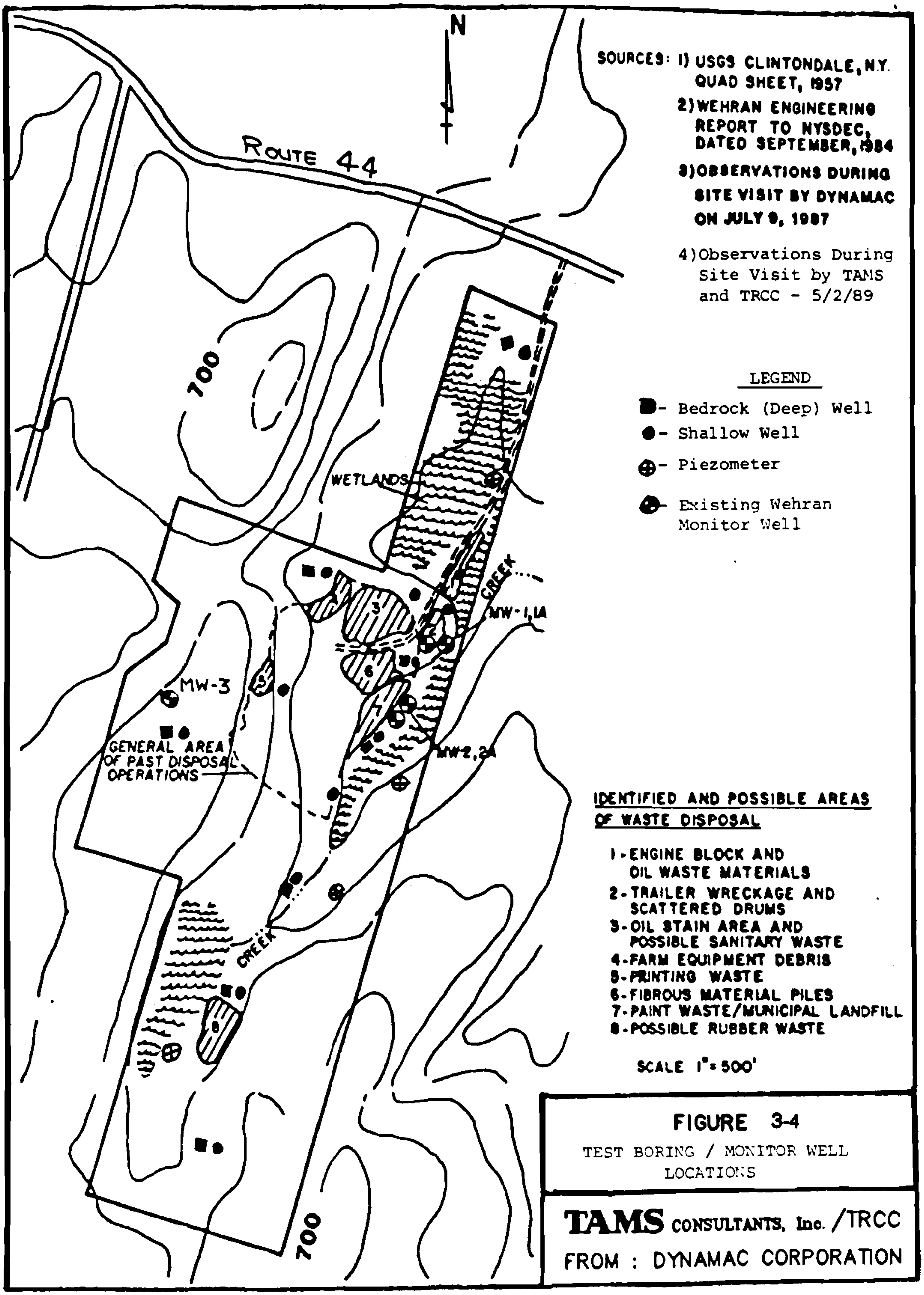


FIGURE 3-4

TEST BORING / MONITOR WELL LOCATIONS

TAMS CONSULTANTS, Inc. /TRCC

FROM : DYNAMAC CORPORATION

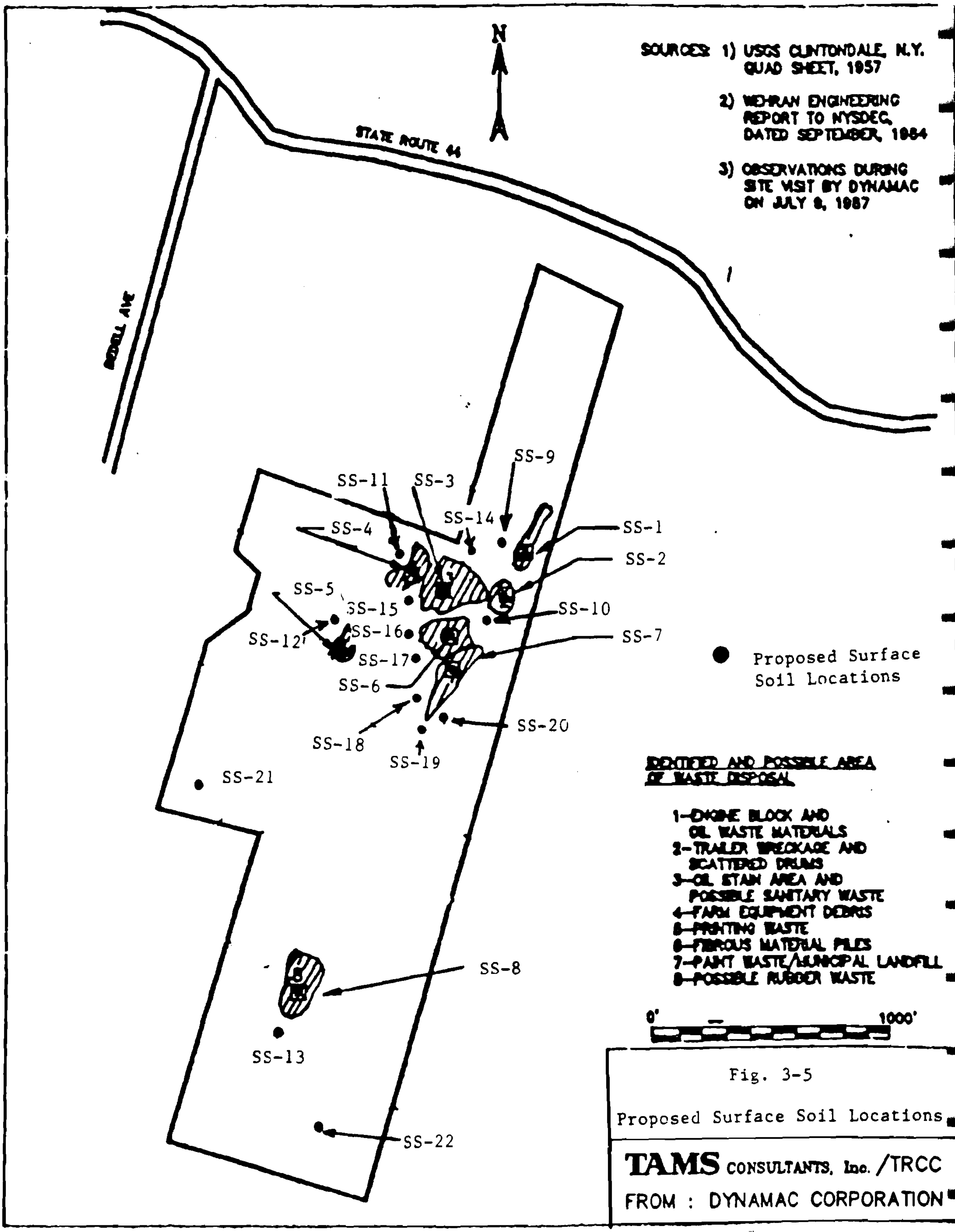
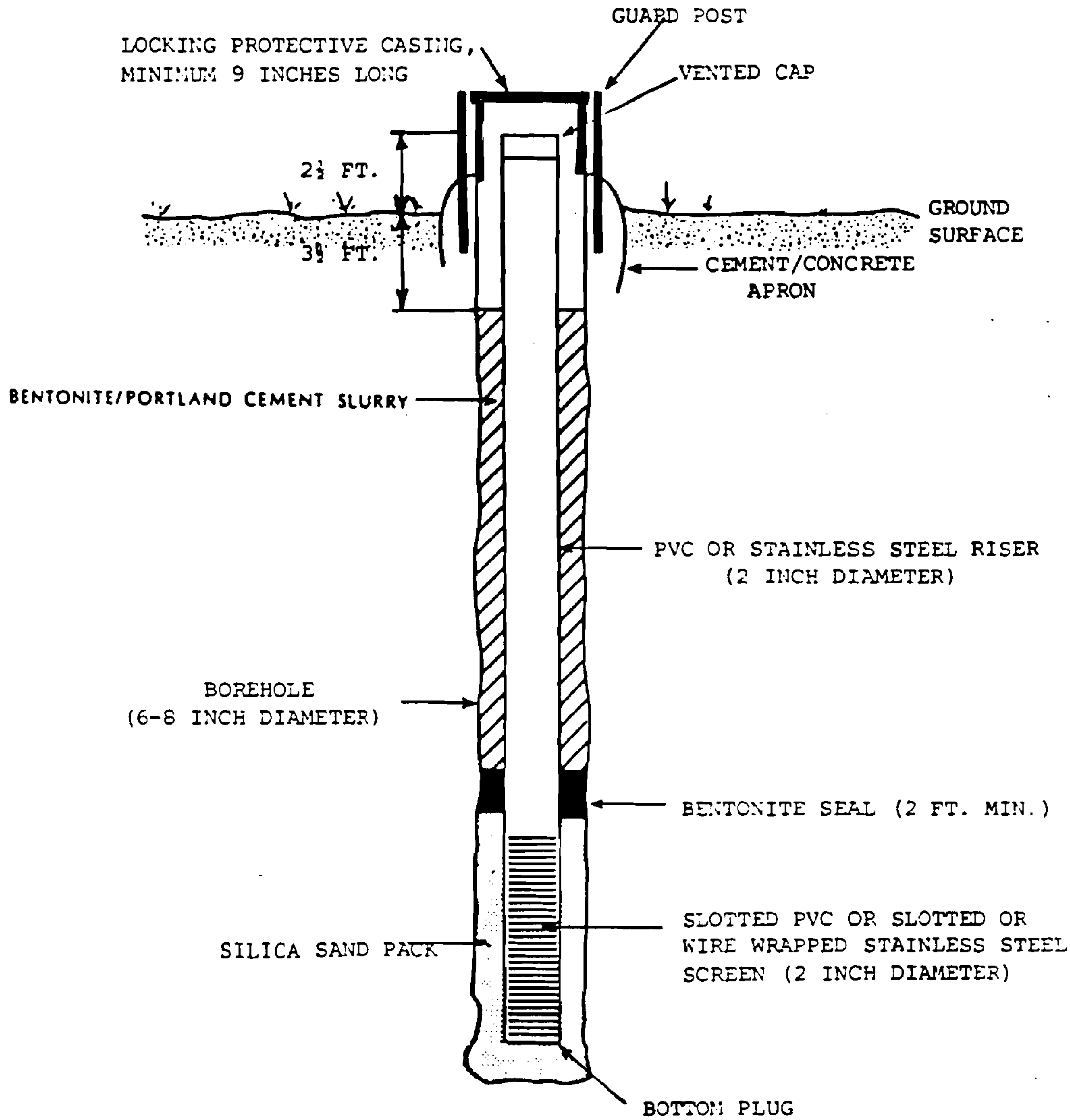


Fig. 3-5

Proposed Surface Soil Locations

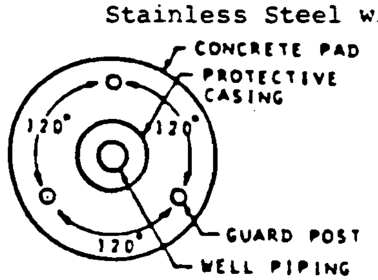
TAMS CONSULTANTS, Inc. /TRCC

FROM : DYNAMAC CORPORATION



NOTES: PVC will be used for piezometers.
Stainless Steel will be used for shallow wells.

NOT TO SCALE

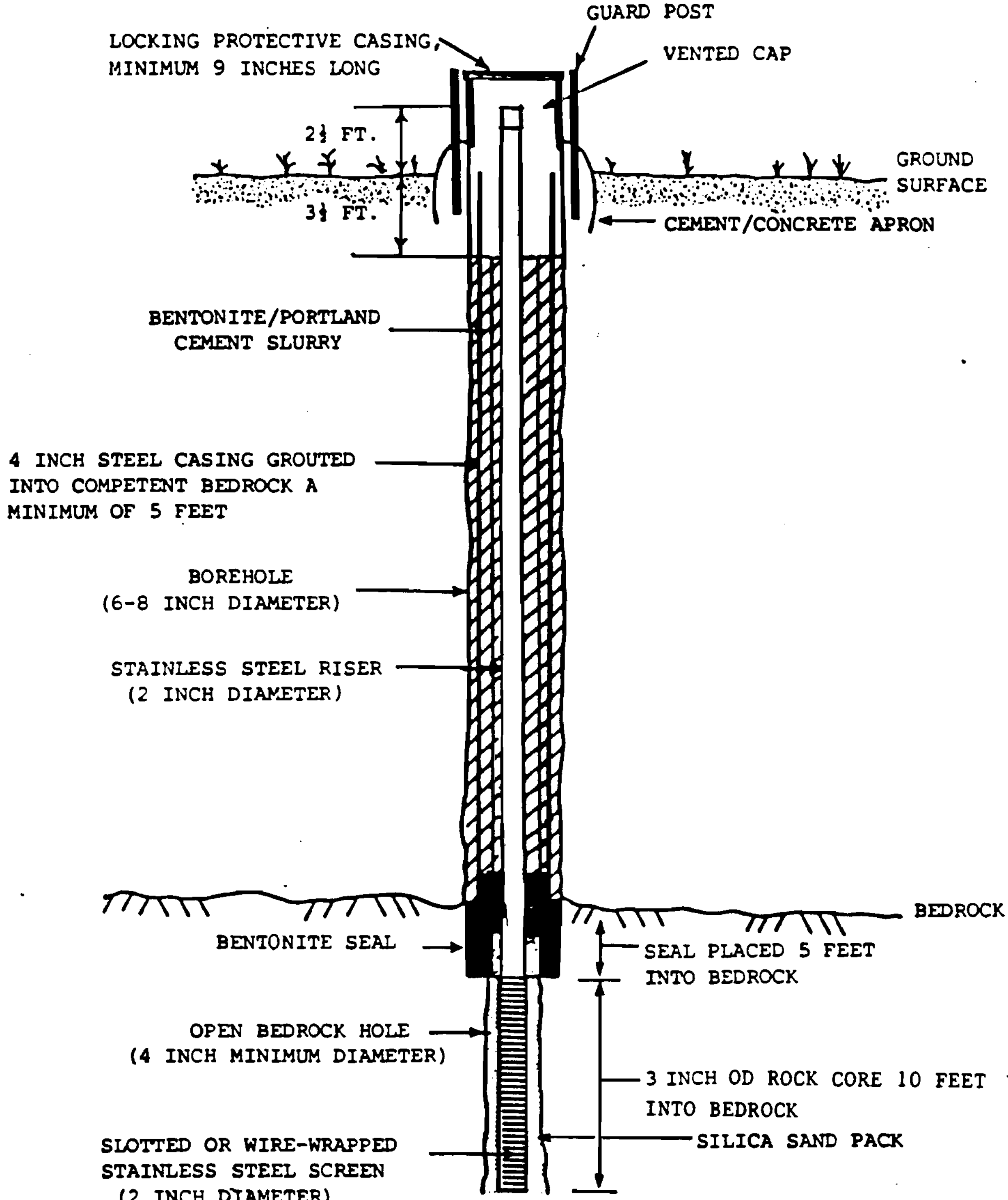


GUARD POST PLAN

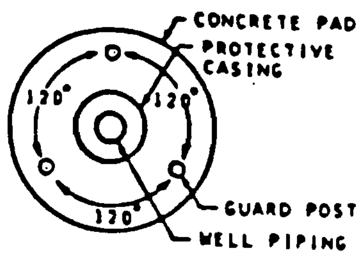
TRC Environmental Consultants
800 Connecticut Boulevard
East Hartford, Connecticut 06108
(203) 289-8631

FIGURE 3-6

OVERBURDEN MONITORING WELL CONSTRUCTION DIAGRAM



NOT TO SCALE



GUARD POST PLAN

TRC
Environmental Consultants
800 Connecticut Boulevard
East Hartford, Connecticut 06108
(203) 289-8631

FIGURE 3-7

BEDROCK MONITORING WELL CONSTRUCTION DIAGRAM

SUBJECT: Determination of Permeability of Soil in-Situ

DATE OF TEST: 11/10/89 WELL NO.: 2

REF.: J. Cherry & R. Freeze, GROUNDWATER, Prentice-Hall, 1979.

TYPE OF TEST: SLUG TEST

METHOD:

$$K = \frac{r \ln (L/R)}{2LT_o}$$

K = permeability (cm/sec)

r = radius of standpipe (cm)

L = length of screen beneath static water level (cm)

R = radius of sand pack (cm)

T_0 = basic time lag (sec)

T_0 = elapsed time at (H-h)/(H-Ho) = 0.37 from best fit line obtained from test data. (sec)

H = reference datum (cm)

Ho = water level at equilibrum (cm)

h = water level at time t (cm)

t = elapsed time (sec)

WELL DATA:

r = 2.54 cm.

L = 304.5 cm.

R = 13.0 cm.

To = 5 sec.

CALCULATION:

$$K = \frac{(2.54)^2 \ln (304.5/13.0)}{2(304.5)(5)}$$

$= 5 \times 10^{-2}$ cm/sec

TEST DATA:

t	(H-h)/(H-Ho)
0	1
5	0.37

TEST DATA POINTS AND BEST-FIT LINE:

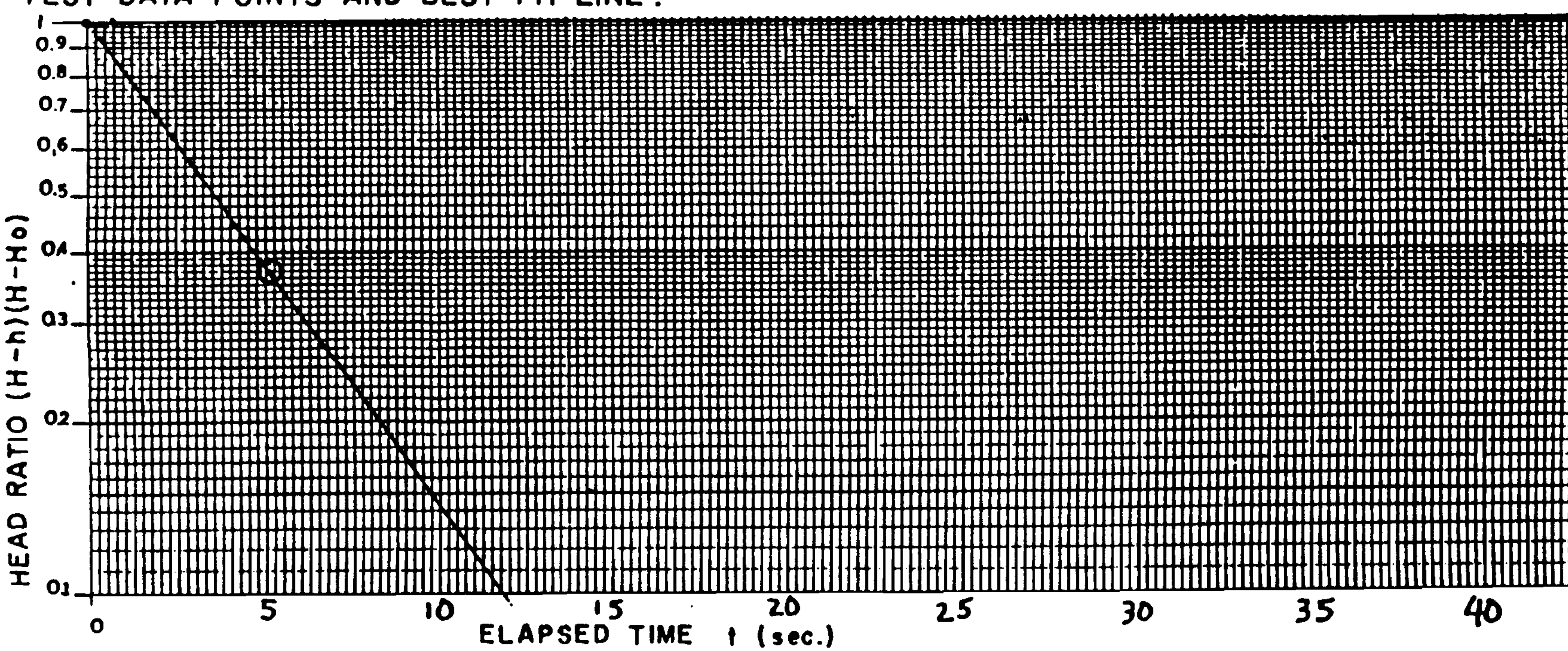


FIGURE 3-8
TYPICAL HYDRAULIC CONDUCTIVITY TEST PROCEDURES

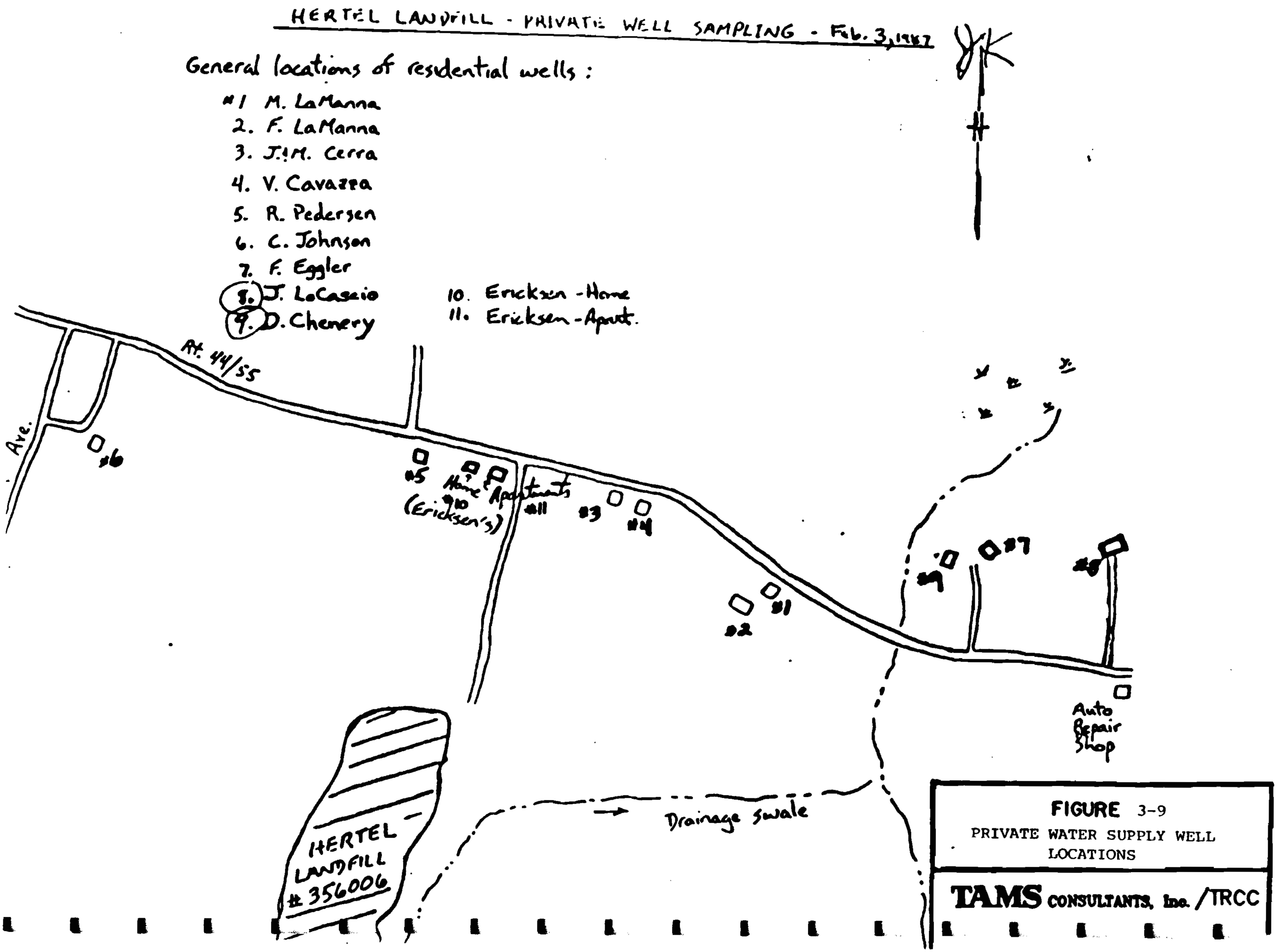


FIGURE 3-9
PRIVATE WATER SUPPLY WELL LOCATIONS

TAMS CONSULTANTS, Inc. /TRCC

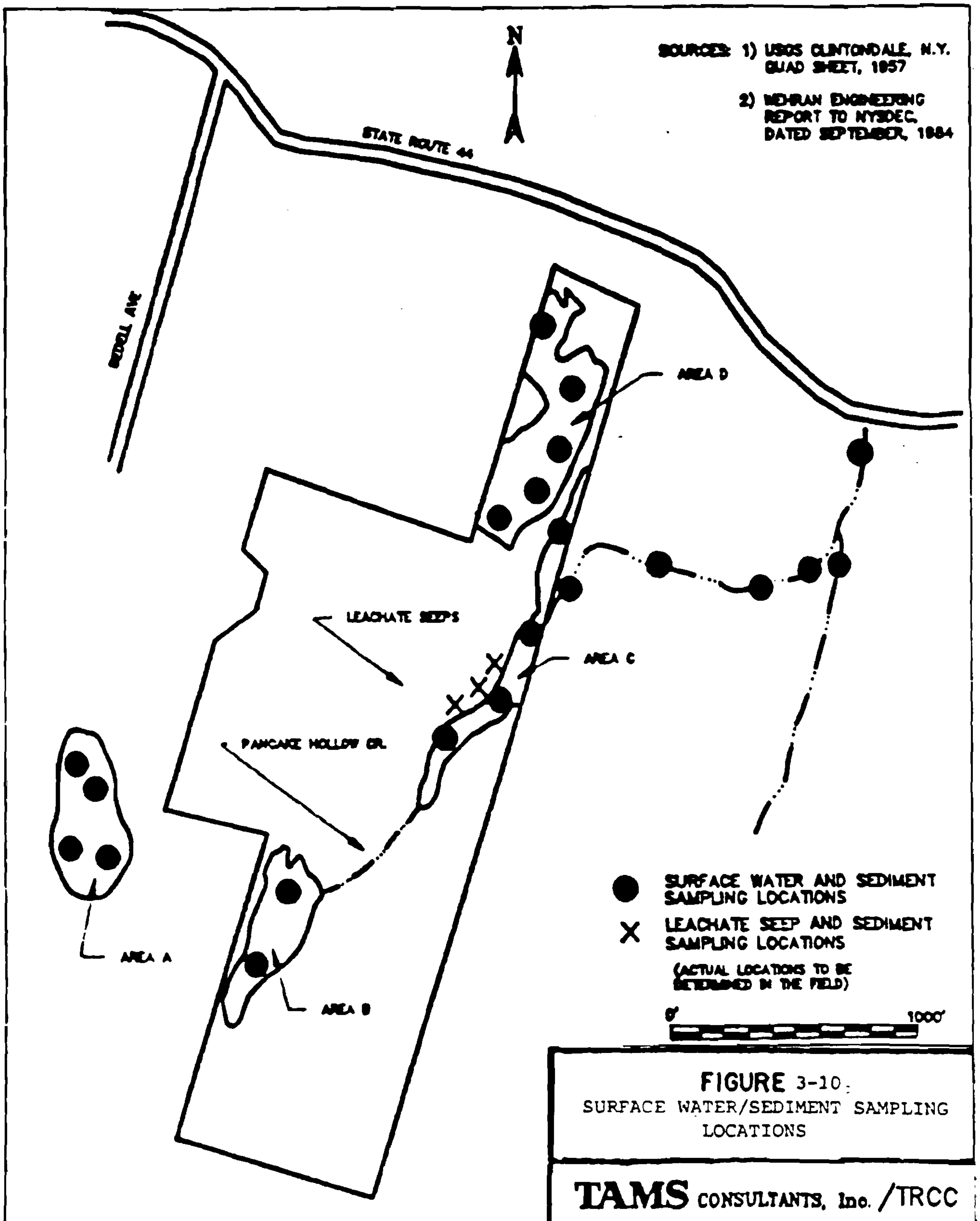


FIGURE 3-10
SURFACE WATER/SEDIMENT SAMPLING LOCATIONS

TAMS CONSULTANTS, Inc. /TRCC
FROM : DYNAMAC CORPORATION

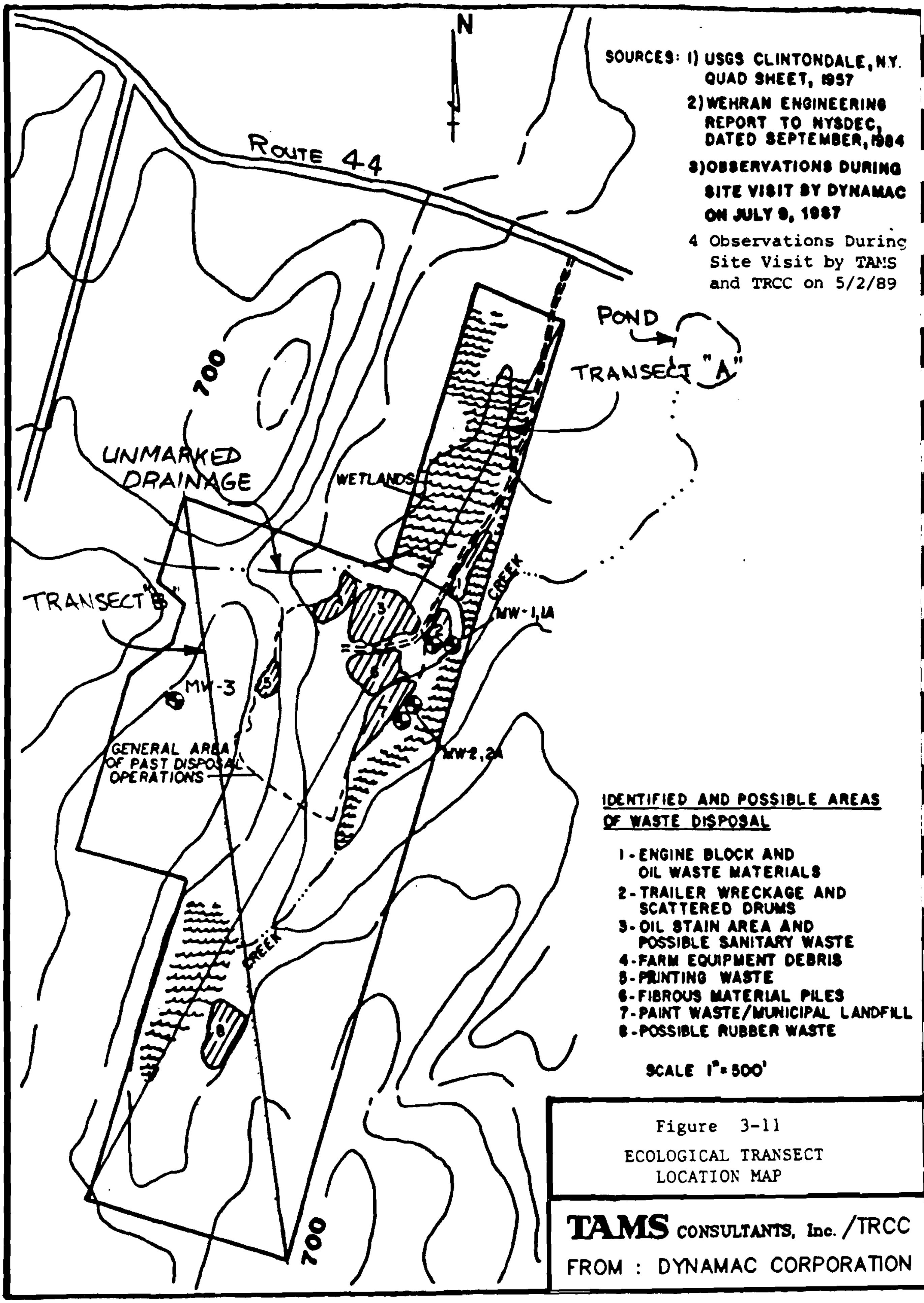


Figure 3-11
ECOLOGICAL TRANSECT LOCATION MAP

APPENDIX B

GEOPHYSICAL SURVEY DATA

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX B

Appendix B includes the data gathered in the geophysical investigations at the Hertel Landfill site. Appendix B.1 presents the raw data gathered in the EM-31 investigations. Appendix B.2 presents the report on the magnetometer survey conducted by Hager-Richter. Only the main body of the Hager-Richter report is presented herein.

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX B1

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX B

HERTEL LANDFILL REMEDIAL INVESTIGATION
U.S. ENVIRONMENTAL PROTECTION AGENCY - REGION II
ALTERNATIVE REMEDIAL CONTRACTING STRATEGY

GEOPHYSICAL SURVEY RESULTS

STATION #	DATE	EM-31 READING (mmhos/cm)	COMMENTS
1200 +00			
00	10/26/89	11	
25 R	10/26/89	-	AREA WET, DID NOT SAMPLE AT THIS LOCATION
25 L	10/26/89	8	
50 L	10/26/89	Neg	
75 L	10/26/89	3	
100 L	10/26/89	6	
1200 +25			
00	10/26/89	5	
25 R	10/26/89	Neg	
25 L	10/26/89	5	
50 L	10/26/89	Neg	
75 L	10/26/89	8	
100 L	10/26/89	8	
1200 +50			
00	10/26/89	Neg	
25 R	10/26/89	13	
25 L	10/26/89	Neg	
50 L	10/26/89	Neg	
75 L	10/26/89	7	
100 L	10/26/89	3	
1200 +75			
00	10/26/89	Neg	
25 L	10/26/89	Neg	
50 L	10/26/89	4	
25 R	10/26/89	Neg	
50 R	10/26/89	Neg	
75 L	10/26/89	6	
100 L	10/26/89	6	
1300 +00			
00	10/26/89	Neg	
25 R	10/26/89	12	
50 R	10/26/89	2	
75 R	10/26/89	Neg	
25 L	10/26/89	2	
50 L	10/26/89	8	
75 L	10/26/89	7	
100 L	10/26/89	6	
1300 +25			
00	10/26/89	Neg	
25 R	10/26/89	Neg	
50 R	10/26/89	4	
25 L	10/26/89	8	
50 L	10/26/89	Neg	
75 L	10/26/89	Neg	
1300 +50			
00	10/26/89	Neg	
25 R	10/26/89	15	
50 R	10/26/89	8	
75 R	10/26/89	Neg	
25 L	10/26/89	Neg	
50 L	10/26/89	Neg	
75 L	10/26/89	15	

APPENDIX B

HERTEL LANDFILL REMEDIAL INVESTIGATION
U.S. ENVIRONMENTAL PROTECTION AGENCY - REGION II
ALTERNATIVE REMEDIAL CONTRACTING STRATEGY

GEOPHYSICAL SURVEY RESULTS

STATION #	DATE	EM-31 READING (mmhos/cm)	COMMENTS
1300 +75			
00	10/26/89	Neg	
25 R	10/26/89	Neg	
50 R	10/26/89	56	
75 R	10/26/89	Neg	
100 R	10/26/89	14	
125 R	10/26/89	13	
150 R	10/26/89	12	
25 L	10/26/89	Neg	
50 L	10/26/89	Neg	
75 L	10/26/89	15	
100 L	10/26/89	8	
1400 +00			
00	10/26/89	Neg	
25 R	10/26/89	Neg	
50 R	10/26/89	300	
75 R	10/26/89	Neg	
100 R	10/26/89	82	
125 R	10/26/89	Neg	
150 R	10/26/89	Neg	
175 R	10/26/89	Neg	
200 R	10/26/89	Neg	
225 R	10/26/89	Neg	
250 R	10/26/89	Neg	
275 R	10/26/89	Neg	
300 R	10/26/89	Neg	
325 R	10/26/89	5.2	
350 R	10/26/89	4.0	
375 R	10/26/89	3.5	
25 L	10/26/89	Neg	
50 L	10/26/89	Neg	
1400 +25			
00	10/26/89	3.8	
25 R	10/26/89	Neg	
50 R	10/26/89	Neg	
75 R	10/26/89	Neg	
100 R	10/26/89	Neg	
125 R	10/26/89	Neg	
150 R	10/26/89	Neg	
175 R	10/26/89	Neg	
200 R	10/26/89	Neg	
225 R	10/26/89	Neg	
250 R	10/26/89	Neg	
275 R	10/26/89	Neg	
300 R	10/26/89	Neg	
325 R	10/26/89	Neg	
350 R	10/26/89	4.4	
375 R	10/26/89	3.5	
400 R	10/26/89	3.2	
25 L	10/26/89	3.3	
50 L	10/26/89	Neg	

APPENDIX B

HERTEL LANDFILL REMEDIAL INVESTIGATION
U.S. ENVIRONMENTAL PROTECTION AGENCY - REGION II
ALTERNATIVE REMEDIAL CONTRACTING STRATEGY

GEOPHYSICAL SURVEY RESULTS

STATION #	DATE	EM-31 READING (mmhos/cm)	COMMENTS
1400 +50			
00	10/26/89	Neg	
25 R	10/26/89	Neg	
50 R	10/26/89	Neg	
75 R	10/26/89	Neg	
100 R	10/26/89	Neg	
125 R	10/26/89	Neg	
150 R	10/26/89	Neg	
175 R	10/26/89	Neg	
200 R	10/26/89	Neg	
225 R	10/26/89	Neg	
250 R	10/26/89	Neg	
275 R	10/26/89	Neg	
300 R	10/26/89	Neg	
325 R	10/26/89	Neg	
350 R	10/26/89	4.5	
375 R	10/26/89	3.8	
25 L	10/26/89	Neg	
50 L	10/26/89	10.0	
75 L	10/26/89	10.5	
100 L	10/26/89	12.0	
125 L	10/26/89	10.0	
1400 +75			
00	10/26/89		INSIDE FENCE. DID NOT SAMPLE AT THIS LOCATION
25 R	10/26/89	27.0	
50 R	10/26/89	10.0	
75 R	10/26/89	9.0	
100 R	10/26/89	12.0	
125 R	10/26/89	Neg	
150 R	10/26/89	Neg	
175 R	10/26/89	Neg	
200 R	10/26/89	Neg	
225 R	10/26/89	Neg	
250 R	10/26/89	Neg	
275 R	10/26/89	Neg	
300 R	10/26/89	Neg	
325 R	10/26/89	Neg	
350 R	10/26/89	Neg	
375 R	10/26/89	Neg	
25 L	10/26/89		POINT UNDERNEATH SITE TRAILER. NO SAMPLE
50 L	10/26/89	Neg	
75 L	10/26/89	11.5	
1500 +00			
00	10/26/89		
25 R	10/26/89	52.0	
50 R	10/26/89	8.5	
75 R	10/26/89	3.5	
100 R	10/26/89	Neg	
125 R	10/26/89	Neg	
150 R	10/26/89	14.0	
175 R	10/26/89	2.5	
200 R	10/26/89	7.0	
225 R	10/26/89	9.0	SAMPLE TAKEN AT 220'. METAL DEBRIS AT 225'
250 R	10/26/89	Neg	
275 R	10/26/89	Neg	
300 R	10/26/89	16.0	

HERTEL LANDFILL REMEDIAL INVESTIGATION
U.S. ENVIRONMENTAL PROTECTION AGENCY - REGION II
ALTERNATIVE REMEDIAL CONTRACTING STRATEGY

GEOPHYSICAL SURVEY RESULTS

STATION #	DATE	EM-31 READING (mmhos/cm)	COMMENTS
1500 +00			
300 R	10/26/89	16.0	
325 R	10/26/89	Neg	
350 R	10/26/89	Neg	
375 R	10/26/89	Neg	
400 R	10/26/89	6.0	
425 R	10/26/89	4.0	
25 L	10/26/89	-	GRID LOCATION INACCESSABLE
50 L	10/26/89	-	GRID LOCATION INACCESSABLE
75 L	10/26/89	-	GRID LOCATION INACCESSABLE
1500 +25	10/26/89		
25 R	10/26/89	17.0	
50 R	10/26/89	7.0	
75 R	10/26/89	Neg	
100 R	10/26/89	14.0	
125 R	10/26/89	Neg	
150 R	10/26/89	Neg	
175 R	10/26/89	Neg	
200 R	10/26/89	17.0	
225 R	10/26/89	Neg	
250 R	10/26/89	27.0	
275 R	10/26/89	10.0	
300 R	10/26/89	28.0	
325 R	10/26/89	27.0	
350 R	10/26/89	5.0	
375 R	10/26/89	Neg	
400 R	10/26/89	Neg	
25 L	10/26/89	-	
50 L	10/26/89	-	
1500 +50			
00	10/26/89	8.5	
25 R	10/26/89	5.0	
50 R	10/26/89	Neg	
75 R	10/26/89	Neg	
100 R	10/26/89	Neg	
125 R	10/26/89	Neg	
150 R	10/26/89	29.0	
175 R	10/26/89	1.0	
200 R	10/26/89	25.0	
225 R	10/26/89	39.0	
250 R	10/26/89	Neg	
275 R	10/26/89	1.0	
300 R	10/26/89	15.0	
325 R	10/26/89	15.0	
350 R	10/26/89	21.0	
375 R	10/26/89	29.0	
400 R	10/26/89	Neg	
425 R	10/26/89	Neg	
450 R	10/26/89	Neg	
25 L	10/26/89	Neg	
50 L	10/26/89	Neg	

APPENDIX B

HERTEL LANDFILL REMEDIAL INVESTIGATION
U.S. ENVIRONMENTAL PROTECTION AGENCY - REGION II
ALTERNATIVE REMEDIAL CONTRACTING STRATEGY

GEOPHYSICAL SURVEY RESULTS

STATION #	DATE	EM-31 READING (mmhos/cm)	COMMENTS
1500 +75			
00	10/26/89	0.5	
25 R	10/26/89	14.5	
50 R	10/26/89	Neg	
75 R	10/26/89	Neg	
100 R	10/26/89	Neg	
125 R	10/26/89	Neg	
150 R	10/26/89	Neg	
175 R	10/26/89	27.0	
200 R	10/26/89	17.0	
225 R	10/26/89	Neg	
250 R	10/26/89	20.0	
275 R	10/26/89	19.5	
300 R	10/26/89	25.0	
325 R	10/26/89	Neg	
350 R	10/26/89	Neg	
375 R	10/26/89	14.0	
400 R	10/26/89	Neg	
425 R	10/26/89	Neg	
450 R	10/26/89	Neg	
475 R	10/26/89	Neg	
500 R	10/26/89	0.5	
25 L	10/26/89	Neg	
50 L	10/26/89	Neg	
75 L	10/26/89	Neg	
1600 +00			
00	10/26/89	Neg	
25 R	10/26/89	4.5	
50 R	10/26/89	Neg	
75 R	10/26/89	Neg	
100 R	10/26/89	Neg	
125 R	10/26/89	Neg	
150 R	10/26/89	Neg	
175 R	10/26/89	Neg	
200 R	10/26/89	26.0	
225 R	10/26/89	29.0	
250 R	10/26/89	27.0	
275 R	10/26/89	4.0	
300 R	10/26/89	17.0	
325 R	10/26/89	16.0	
350 R	10/26/89	23.0	
375 R	10/26/89	Neg	
400 R	10/26/89	4.5	
425 R	10/26/89	Neg	
450 R	10/26/89	Neg	
475 R	10/26/89	Neg	
500 R	10/26/89	Neg	
25 L	10/26/89	Neg	
50 L	10/26/89	0.5	
75 L	10/26/89	4.5	

APPENDIX 8

HERTEL LANDFILL REMEDIAL INVESTIGATION
U.S. ENVIRONMENTAL PROTECTION AGENCY - REGION II
ALTERNATIVE REMEDIAL CONTRACTING STRATEGY

GEOPHYSICAL SURVEY RESULTS

STATION #	DATE	EM-31 READING (mmhos/cm)	COMMENTS
1600 +25			
00	10/26/89	Neg	
25 R	10/26/89	2.0	
50 R	10/26/89	2.0	
75 R	10/26/89	4.5	
100 R	10/26/89	Neg	
125 R	10/26/89	Neg	
150 R	10/26/89	Neg	
175 R	10/26/89	Neg	
200 R	10/26/89	0.5	
225 R	10/26/89	15.0	
250 R	10/26/89	17.0	
275 R	10/26/89	15.0	
300 R	10/26/89	8.0	
325 R	10/26/89	11.0	
350 R	10/26/89	Neg	
375 R	10/26/89	Neg	
400 R	10/26/89	Neg	
425 R	10/26/89	7.5	
450 R	10/26/89	1.5	
475 R	10/26/89	2.0	
25 L	10/26/89	Neg	
50 L	10/26/89	4.0	
75 L	10/26/89	Neg	
1600 +50			
00	10/26/89	7.5	
25 R	10/26/89	17.5	
50 R	10/26/89	20.0	
75 R	10/26/89	32.0	
100 R	10/26/89	23.5	
125 R	10/26/89	16.5	
150 R	10/26/89	14.5	
175 R	10/26/89	30.0	
200 R	10/26/89	20.5	
225 R	10/26/89	32.0	
250 R	10/26/89	49.0	
275 R	10/26/89	62.0	
300 R	10/26/89	60.0	
325 R	10/26/89	33.0	
350 R	10/26/89	Neg	
375 R	10/26/89	34.0	
400 R	10/26/89	13.5	
425 R	10/26/89	10.5	
450 R	10/26/89	Neg	
475 R	10/26/89	7.0	
500 R	10/26/89	9.5	
525 R	10/26/89	1.0	
550 R	10/26/89	3.5	
25 L	10/26/89	2.0	
50 L	10/26/89	Neg	

HERTEL LANDFILL REMEDIAL INVESTIGATION
U.S. ENVIRONMENTAL PROTECTION AGENCY - REGION II
ALTERNATIVE REMEDIAL CONTRACTING STRATEGY

GEOPHYSICAL SURVEY RESULTS

STATION	DATE	EM-31 READING (mmhos/cm)	COMMENTS
1600 +75			
00	10/26/89	25.5	
25 R	10/26/89	41.0	
50 R	10/26/89	48.0	
75 R	10/26/89	32.0	
100 R	10/26/89	55.0	
125 R	10/26/89	40.0	
150 R	10/26/89	Neg	
175 R	10/26/89	43.0	
200 R	10/26/89	60.0	
225 R	10/26/89	65.0	
250 R	10/26/89	57.0	
275 R	10/26/89	74.0	
300 R	10/26/89	74.0	
325 R	10/26/89	53.0	
350 R	10/26/89	19.0	
375 R	10/26/89	43.0	
400 R	10/26/89	44.0	
425 R	10/26/89	Neg	
450 R	10/26/89	44.0	
475 R	10/26/89	14.5	
500 R	10/26/89	Neg	
525 R	10/26/89	3.5	
550 R	10/26/89	8.5	
25 L	10/26/89	24.0	
50 L	10/26/89	15.5	
1700 +00			
00	10/26/89	14.0	
25 R	10/26/89	50.0	
50 R	10/26/89	45.0	
75 R	10/26/89	68.0	
100 R	10/26/89	45.0	
125 R	10/26/89	45.0	
150 R	10/26/89	41.0	
175 R	10/26/89	64.0	
200 R	10/26/89	105.0	
225 R	10/26/89	58.0	
250 R	10/26/89	78.0	
275 R	10/26/89	54.0	
300 R	10/26/89	72.0	
325 R	10/26/89	63.0	
350 R	10/26/89	42.0	
375 R	10/26/89	34.0	
400 R	10/26/89	57.0	
425 R	10/26/89	65.0	
450 R	10/26/89	32.0	
475 R	10/26/89	18.0	
500 R	10/26/89	14.0	
525 R	10/26/89	27.0	
550 R	10/26/89	33.0	
25 L	10/26/89	17.5	
50 L	10/26/89	44.0	

APPENDIX B

HERTEL LANDFILL REMEDIAL INVESTIGATION
U.S. ENVIRONMENTAL PROTECTION AGENCY - REGION II
ALTERNATIVE REMEDIAL CONTRACTING STRATEGY

GEOPHYSICAL SURVEY RESULTS

STATION	DATE	EM-31 READING (mmhos/cm)	COMMENTS
1700 +25			
00	10/26/89	26.0	
25 R	10/26/89	22.0	
50 R	10/26/89	40.0	
75 R	10/26/89	65.0	
100 R	10/26/89	58.0	
125 R	10/26/89	55.0	
150 R	10/26/89	69.0	
175 R	10/26/89	40.0	
200 R	10/26/89	80.0	
225 R	10/26/89	62.0	
250 R	10/26/89	85.0	
275 R	10/26/89	75.0	
300 R	10/26/89	75.0	
325 R	10/26/89	83.0	
350 R	10/26/89	53.0	
375 R	10/26/89	29.5	
400 R	10/26/89	49.0	
425 R	10/26/89	55.0	
450 R	10/26/89	62.0	
475 R	10/26/89	28.0	
500 R	10/26/89	Neg	
525 R	10/26/89	54.0	
550 R	10/26/89	16.0	
575 R	10/26/89	Neg	
25 L	10/26/89	Neg	
50 L	10/26/89	17.0	
1700 +50			
00	10/26/89	Neg	
25 R	10/26/89	18.0	
50 R	10/26/89	57.0	
75 R	10/26/89	64.0	
100 R	10/26/89	69.0	
125 R	10/26/89	92.0	
150 R	10/26/89	110.0	
175 R	10/26/89	20.0	
200 R	10/26/89	40.0	
225 R	10/26/89	66.0	
250 R	10/26/89	64.0	
275 R	10/26/89	44.0	
300 R	10/26/89	30.0	
325 R	10/26/89	64.0	
350 R	10/26/89	43.0	
375 R	10/26/89	78.0	
400 R	10/26/89	70.0	
425 R	10/26/89	74.0	
450 R	10/26/89	40.0	
475 R	10/26/89	25.0	
500 R	10/26/89	Neg	
525 R	10/26/89	47.0	
550 R	10/26/89	Neg	
575 R	10/26/89	Neg	
600 R	10/26/89	3.5	
25 L	10/26/89	20.0	
50 L	10/26/89	25.0	
75 L	10/26/89	Neg	

APPENDIX B

HERTEL LANDFILL REMEDIAL INVESTIGATION
U.S. ENVIRONMENTAL PROTECTION AGENCY - REGION II
ALTERNATIVE REMEDIAL CONTRACTING STRATEGY

GEOPHYSICAL SURVEY RESULTS

STATION	DATE	EM-31 READING (mmhos/cm)	COMMENTS
1700 +75			
00	10/26/89	15.0	
25 R	10/26/89	27.0	
50 R	10/26/89	50.0	
75 R	10/26/89	55.0	
100 R	10/26/89	40.0	
125 R	10/26/89	34.0	
150 R	10/26/89	69.0	
175 R	10/26/89	32.0	
200 R	10/26/89	14.0	
225 R	10/26/89	44.0	
250 R	10/26/89	28.0	
275 R	10/26/89	22.0	
300 R	10/26/89	17.0	
325 R	10/26/89	35.0	
350 R	10/26/89	25.0	
375 R	10/26/89	50.0	
400 R	10/26/89	85.0	
425 R	10/26/89	64.0	
450 R	10/26/89	51.0	
475 R	10/26/89	32.0	
500 R	10/26/89	34.0	
525 R	10/26/89	34.0	
550 R	10/26/89	5.5	
575 R	10/26/89	Neg	
600 R	10/26/89	3.5	
25 L	10/26/89	19.0	
50 L	10/26/89	9.0	
75 L	10/26/89	Neg	
1800 +00			
00	10/26/89	26.0	
25 R	10/26/89	20.0	
50 R	10/26/89	44.0	
75 R	10/26/89	48.0	
100 R	10/26/89	57.0	
125 R	10/26/89	57.0	
150 R	10/26/89	22.0	
175 R	10/26/89	28.0	
200 R	10/26/89	34.0	
225 R	10/26/89	46.0	
250 R	10/26/89	15.0	
275 R	10/26/89	26.0	
300 R	10/26/89	34.0	
325 R	10/26/89	66.0	
350 R	10/26/89	50.0	
375 R	10/26/89	72.0	
400 R	10/26/89	81.0	
425 R	10/26/89	77.0	
450 R	10/26/89	Neg	
475 R	10/26/89	36.0	
500 R	10/26/89	42.0	
525 R	10/26/89	Neg	
550 R	10/26/89	9.0	

APPENDIX B

HERTEL LANDFILL REMEDIAL INVESTIGATION
U.S. ENVIRONMENTAL PROTECTION AGENCY - REGION II
ALTERNATIVE REMEDIAL CONTRACTING STRATEGY

GEOPHYSICAL SURVEY RESULTS

STATION	DATE	EM-31 READING (mmhos/cm)	COMMENTS
1800 +00			
575 R	10/26/89	Neg	
600 R	10/26/89	6.0	
625 R	10/26/89	4.5	
650 R	10/26/89	3.0	
25 L	10/26/89	15.0	
50 L	10/26/89	41.0	
65 L	10/26/89	12.0	
1800 +25			
00	10/26/89	22.0	
25 R	10/26/89	24.0	
50 R	10/26/89	56.0	
75 R	10/26/89	57.0	
100 R	10/26/89	63.0	
125 R	10/26/89	47.0	
150 R	10/26/89	53.0	
175 R	10/26/89	65.0	
200 R	10/26/89	55.0	
225 R	10/26/89	50.0	
250 R	10/26/89	46.0	
275 R	10/26/89	41.0	
300 R	10/26/89	40.0	
325 R	10/26/89	41.0	
350 R	10/26/89	38.0	
375 R	10/26/89	22.0	
400 R	10/26/89	32.0	
425 R	10/26/89	24.0	
450 R	10/26/89	40.0	
475 R	10/26/89	38.0	
500 R	10/26/89	30.0	
525 R	10/26/89	5.0	
550 R	10/26/89	Neg	
575 R	10/26/89	Neg	
600 R	10/26/89	Neg	
625 R	10/26/89	4.0	
650 R	10/26/89	Neg	
25 L	10/26/89	24.0	
50 L	10/26/89	5.0	
1800 +50			
00	10/26/89	17.0	
25 R	10/26/89	28.0	
50 R	10/26/89	37.0	
75 R	10/26/89	45.0	
100 R	10/26/89	46.0	
125 R	10/26/89	54.0	
150 R	10/26/89	33.0	
175 R	10/26/89	54.0	
200 R	10/26/89	55.0	
225 R	10/26/89	54.0	
250 R	10/26/89	66.0	
275 R	10/26/89	53.0	
300 R	10/26/89	44.0	
325 R	10/26/89	54.0	
350 R	10/26/89	52.0	
375 R	10/26/89	46.0	
400 R	10/26/89	28.0	
425 R	10/26/89	4.5	

HERTEL LANDFILL REMEDIAL INVESTIGATION
U.S. ENVIRONMENTAL PROTECTION AGENCY - REGION II
ALTERNATIVE REMEDIAL CONTRACTING STRATEGY

GEOPHYSICAL SURVEY RESULTS

STATION	DATE	EM-31 READING (mmhos/cm)	COMMENTS
1800 +50			
450 R	10/26/89	40.0	
475 R	10/26/89	19.5	
500 R	10/26/89	0.0	
525 R	10/26/89	Neg	
550 R	10/26/89	14.5	
575 R	10/26/89	6.5	
600 R	10/26/89	5.5	
625 R	10/26/89	11.5	
650 R	10/26/89	4.5	
25 L	10/26/89	33.0	
50 L	10/26/89	10.0	
65 L	10/26/89	15.0	
1800 +75			
00	10/26/89	41.0	
25 R	10/26/89	39.0	
50 R	10/26/89	Neg	
75 R	10/26/89	20.0	
100 R	10/26/89	41.0	
125 R	10/26/89	60.0	
150 R	10/26/89	62.0	
175 R	10/26/89	61.0	
200 R	10/26/89	55.0	
225 R	10/26/89	28.0	
250 R	10/26/89	32.0	
275 R	10/26/89	60.0	
300 R	10/26/89	75.0	
325 R	10/26/89	14.0	
350 R	10/26/89	18.0	
375 R	10/26/89	20.0	
400 R	10/26/89	20.0	
425 R	10/26/89	14.0	
450 R	10/26/89	42.0	
475 R	10/26/89	Neg	
500 R	10/26/89	Neg	
525 R	10/26/89	Neg	
550 R	10/26/89	7.0	
575 R	10/26/89	8.0	
600 R	10/26/89	12.0	
625 R	10/26/89	7.0	
650 R	10/26/89	Neg	
25 L	10/26/89	30.0	
50 L	10/26/89	46.0	
70 L	10/26/89	3.5	
1900 +00			
00	10/26/89	32.0	
25 R	10/26/89	20.0	
50 R	10/26/89	48.0	
75 R	10/26/89	23.0	
100 R	10/26/89	50.0	
125 R	10/26/89	45.0	
150 R	10/26/89	68.0	

GEOPHYSICAL SURVEY RESULTS

STATION	DATE	EM-31 READING (mmhos/cm)	COMMENTS
1900 +00			
175 R	10/26/89	63.0	
200 R	10/26/89	26.0	
225 R	10/26/89	45.0	
250 R	10/26/89	63.0	
275 R	10/26/89	53.0	
300 R	10/26/89	23.0	
325 R	10/26/89	40.0	
350 R	10/26/89	26.0	
375 R	10/26/89	52.0	
400 R	10/26/89	36.0	
425 R	10/26/89	51.0	
450 R	10/26/89	32.0	
475 R	10/26/89	3.0	
500 R	10/26/89	11.0	
525 R	10/26/89	Neg	
550 R	10/26/89	8.0	
575 R	10/26/89	Neg	
600 R	10/26/89	13.0	
625 R	10/26/89	9.0	
650 R	10/26/89	7.0	
675 R	10/26/89	5.0	
25 L	10/26/89	Neg	
50 L	10/26/89	Neg	
75 L	10/26/89	Neg	
1900 +25			
00	10/26/89	Neg	
25 R	10/26/89	40.0	
50 R	10/26/89	78.0	
75 R	10/26/89	130.0	
100 R	10/26/89	63.0	
125 R	10/26/89	62.0	
150 R	10/26/89	21.0	
175 R	10/26/89	Neg	
200 R	10/26/89	48.0	
225 R	10/26/89	60.0	
250 R	10/26/89	64.0	
275 R	10/26/89	60.0	
300 R	10/26/89	58.0	
325 R	10/26/89	38.0	
350 R	10/26/89	28.0	
375 R	10/26/89	16.0	
400 R	10/26/89	44.0	
425 R	10/26/89	21.0	
450 R	10/26/89	26.0	
475 R	10/26/89	32.0	
500 R	10/26/89	22.0	
525 R	10/26/89	Neg	
550 R	10/26/89	Neg	Large metal object at this location
575 R	10/26/89	Neg	
600 R	10/26/89	Neg	
625 R	10/26/89	Neg	
650 R	10/26/89	2.5	Some metal debris at this location
25 L	10/26/89	22.0	
50 L	10/26/89	Neg	

APPENDIX B

HERTEL LANDFILL REMEDIAL INVESTIGATION
U.S. ENVIRONMENTAL PROTECTION AGENCY - REGION II
ALTERNATIVE REMEDIAL CONTRACTING STRATEGY

GEOPHYSICAL SURVEY RESULTS

STATION	DATE	EM-31 READING (mmhos/cm)	COMMENTS
1900 +50			Paint cans and debris
00	10/26/89	-	
25 R	10/26/89	36.0	
50 R	10/26/89	35.0	
25 L	10/26/89	14.0	
50 L	10/26/89	Neg	
1900 +75			
00	10/26/89	3.0	
25 R	10/26/89	12.0	
50 R	10/26/89	48.0	
75 R	10/26/89	120.0	
25 L	10/26/89	Neg	
50 L	10/26/89	Neg	Much refuse at this location
75 L	10/26/89	Neg	
2000 +00			
00	10/26/89	28.0	
25 R	10/26/89	54.0	
50 R	10/26/89	54.0	
75 R	10/26/89	86.0	
100 R	10/26/89	48.0	
125 R	10/26/89	46.0	
25 L	10/26/89	26.0	
50 L	10/26/89	5.0	
2000 +25			
00	10/26/89	32.0	
25 R	10/26/89	54.0	
50 R	10/26/89	68.0	
75 R	10/26/89	81.0	
100 R	10/26/89	28.0	
125 R	10/26/89	40.0	
150 R	10/26/89	5.0	
25 L	10/26/89	Neg	Drums located at the end of grid line
35 L	10/26/89	17.0	
2000 +50			
00	10/26/89	35.0	
25 R	10/26/89	50.0	
50 R	10/26/89	64.0	
75 R	10/26/89	26.0	
100 R	10/26/89	31.0	
125 R	10/26/89	54.0	
150 R	10/26/89	42.0	
175 R	10/26/89	50.0	
200 R	10/26/89	59.0	
25 L	10/26/89	13.0	
50 L	10/26/89	Neg	Paint cans and debris at this location
2000 +75			
00	10/26/89	33.0	
25 R	10/26/89	35.0	
50 R	10/26/89	40.0	
75 R	10/26/89	57.0	
100 R	10/26/89	52.0	
125 R	10/26/89	37.0	
150 R	10/26/89	60.0	Metal debris at this location

APPENDIX B

HERTEL LANDFILL REMEDIAL INVESTIGATION
U.S. ENVIRONMENTAL PROTECTION AGENCY - REGION II
ALTERNATIVE REMEDIAL CONTRACTING STRATEGY

GEOPHYSICAL SURVEY RESULTS

STATION	DATE	EM-31 READING (mmhos/cm)	COMMENTS
2000 +75			
175 R	10/26/89	11.0	
200 R	10/26/89	59.0	
225 R	10/26/89	30.0	
250 R	10/26/89	64.0	
25 L	10/26/89	Neg	
50 L	10/26/89	Neg	
2100 +00			
00	10/26/89	Neg	
25 R	10/26/89	30.0	
50 R	10/26/89	80.0	
75 R	10/26/89	10.0	
100 R	10/26/89	24.0	
125 R	10/26/89	42.0	
150 R	10/26/89	40.0	
175 R	10/26/89	44.0	
200 R	10/26/89	30.0	
225 R	10/26/89	51.0	
250 R	10/26/89	29.0	
275 R	10/26/89	56.0	
300 R	10/26/89	35.0	
25 L	10/26/89	Neg	
50 L	10/26/89	Neg	
2100 +25			
00	10/26/89	20.0	
25 R	10/26/89	19.0	
50 R	10/26/89	30.0	
75 R	10/26/89	7.0	
100 R	10/26/89	36.0	
125 R	10/26/89	17.0	
150 R	10/26/89	45.0	
175 R	10/26/89	61.0	
200 R	10/26/89	21.0	
225 R	10/26/89	25.0	
250 R	10/26/89	25.0	
275 R	10/26/89	80.0	
300 R	10/26/89	68.0	
325 R	10/26/89	34.0	
25 L	10/26/89	Neg	
50 L	10/26/89	6.0	
2100 +50			
00	10/26/89	Neg	
25 R	10/26/89	Neg	
50 R	10/26/89	Neg	
75 R	10/26/89	Neg	Metal debris at this location
100 R	10/26/89	2.0	
125 R	10/26/89	45.0	
150 R	10/26/89	21.0	
175 R	10/26/89	44.0	
200 R	10/26/89	52.0	
225 R	10/26/89	50.0	
250 R	10/26/89	38.0	
275 R	10/26/89	105.0	Crushed drums and other metallic debris
300 R	10/26/89	32.0	
325 R	10/26/89	20.0	
350 R	10/26/89	Neg	
25 L	10/26/89	2.0	
50 L	10/26/89	20.0	

APPENDIX B

HERTEL LANDFILL REMEDIAL INVESTIGATION
U.S. ENVIRONMENTAL PROTECTION AGENCY - REGION II
ALTERNATIVE REMEDIAL CONTRACTING STRATEGY

GEOPHYSICAL SURVEY RESULTS

STATION	DATE	EM-31 READING (mmhos/cm)	COMMENTS
2100 +75			
00	10/26/89	17.0	
25 R	10/26/89	11.0	
50 R	10/26/89	32.0	
75 R	10/26/89	Neg	
100 R	10/26/89	36.0	
125 R	10/26/89	38.0	
150 R	10/26/89	59.0	
175 R	10/26/89	44.0	
200 R	10/26/89	56.0	
225 R	10/26/89	60.0	
250 R	10/26/89	86.0	
275 R	10/26/89	105.0	
300 R	10/26/89	44.0	
325 R	10/26/89	54.0	
350 R	10/26/89	32.0	
375 R	10/26/89	57.0	
400 R	10/26/89	14.0	
25 L	10/26/89	17.0	
50 L	10/26/89	1.0	
2200 +00			
00	10/26/89	Neg	
25 R	10/26/89	27.0	
50 R	10/26/89	40.0	
75 R	10/26/89	46.0	
100 R	10/26/89	4.5	
125 R	10/26/89	40.0	
150 R	10/26/89	50.0	
175 R	10/26/89	60.0	
200 R	10/26/89	18.0	
225 R	10/26/89	64.0	
250 R	10/26/89	74.0	Leachate seep at this location
275 R	10/26/89	Neg	Drums and other metallic debris
300 R	10/26/89	48.0	
325 R	10/26/89	76.0	
350 R	10/26/89	54.0	
375 R	10/26/89	46.0	
400 R	10/26/89	12.0	
425 R	10/26/89	13.5	
25 L	10/26/89	12.0	
50 L	10/26/89	Neg	Drums and other metallic debris to end of grid
2200 +25			
00	10/26/89	17.0	
25 R	10/26/89	27.0	
50 R	10/26/89	23.0	
75 R	10/26/89	18.0	
100 R	10/26/89	3.0	
125 R	10/26/89	42.0	
150 R	10/26/89	53.0	
175 R	10/26/89	76.0	
200 R	10/26/89	38.0	

APPENDIX B

HERTEL LANDFILL REMEDIAL INVESTIGATION
U.S. ENVIRONMENTAL PROTECTION AGENCY - REGION II
ALTERNATIVE REMEDIAL CONTRACTING STRATEGY

GEOPHYSICAL SURVEY RESULTS

STATION	DATE	EM-31 READING (mmhos/cm)	COMMENTS
2200 +25			
225 R	10/26/89	52.0	
250 R	10/26/89	31.0	
275 R	10/26/89	56.0	
300 R	10/26/89	49.0	
325 R	10/26/89	72.0	
350 R	10/26/89	38.0	
375 R	10/26/89	20.0	
400 R	10/26/89	9.5	
425 R	10/26/89	9.0	
450 R	10/26/89	Neg	Metallic debris at this location
25 L	10/26/89	10.0	
50 L	10/26/89	32.0	Much metal debris at this location
75 L	10/26/89	Neg	
100 L	10/26/89	-	Grid location is inaccessible
2200 +50			
00	10/26/89	Neg	
25 R	10/26/89	Neg	
50 R	10/26/89	6.0	
75 R	10/26/89	Neg	
100 R	10/26/89	Neg	
125 R	10/26/89	28.0	
150 R	10/26/89	53.0	
175 R	10/26/89	15.0	
200 R	10/26/89	36.0	
225 R	10/26/89	39.0	
250 R	10/26/89	30.0	
275 R	10/26/89	44.0	
300 R	10/26/89	49.0	
325 R	10/26/89	57.0	
350 R	10/26/89	18.0	
375 R	10/26/89	5.0	
400 R	10/26/89	17.0	
425 R	10/26/89	Neg	
450 R	10/26/89	Neg	
475 R	10/26/89	Neg	
500 R	10/26/89	6.0	
525 R	10/26/89	Neg	
25 L	10/26/89	13.0	
50 L	10/26/89	2.0	
75 L	10/26/89	Neg	
90 L	10/26/89	Neg	Much metal debris at this locatior
2200 +75			
00	10/26/89	Neg	
25 R	10/26/89	Neg	
50 R	10/26/89	13.0	
75 R	10/26/89	Neg	
100 R	10/26/89	20.0	
125 R	10/26/89	23.0	
150 R	10/26/89	13.0	Lrge sheet of metal at this location
175 R	10/26/89	25.0	Metal debris at this location
200 R	10/26/89	Neg	
225 R	10/26/89	30.0	
250 R	10/26/89	51.0	

APPENDIX B

HERTEL LANDFILL REMEDIAL INVESTIGATION
U.S. ENVIRONMENTAL PROTECTION AGENCY - REGION II
ALTERNATIVE REMEDIAL CONTRACTING STRATEGY

GEOPHYSICAL SURVEY RESULTS

STATION	DATE	EM-31 READING (mmhos/cm)	COMMENTS
2200 +75			
275 R	10/26/89	38.0	
300 R	10/26/89	40.0	
325 R	10/26/89	39.0	
350 R	10/26/89	19.0	
375 R	10/26/89	16.0	
400 R	10/26/89	5.0	
425 R	10/26/89	12.0	
450 R	10/26/89	Neg	
475 R	10/26/89	Neg	
500 R	10/26/89	Neg	
525 R	10/26/89	Neg	Metal debris and paint cans at this location
25 L	10/26/89	Neg	
50 L	10/26/89	Neg	
75 L	10/26/89	Neg	
100 L	10/26/89	Neg	
2300 +00			
00	10/26/89	Neg	
25 R	10/26/89	Neg	
50 R	10/26/89	Neg	
75 R	10/26/89	15.0	
100 R	10/26/89	6.0	
125 R	10/26/89	7.0	
150 R	10/26/89	22.0	
175 R	10/26/89	32.0	
200 R	10/26/89	30.0	
225 R	10/26/89	24.0	
250 R	10/26/89	54.0	
275 R	10/26/89	36.0	
300 R	10/26/89	44.0	
325 R	10/26/89	15.0	
350 R	10/26/89	27.0	
375 R	10/26/89	27.0	
400 R	10/26/89	7.5	
425 R	10/26/89	Neg	
450 R	10/26/89	1.5	
475 R	10/26/89	3.5	
500 R	10/26/89	3.5	
25 L	10/26/89	Neg	
50 L	10/26/89	Neg	
75 L	10/26/89	Neg	
100 L	10/26/89	Neg	Metal debris at this location
125 L	10/26/89	Neg	Metal debris at this location
150 L	10/26/89	Neg	Metal debris at this location
2300 +25			
00	10/26/89	Neg	
25 R	10/26/89	Neg	
50 R	10/26/89	Neg	
75 R	10/26/89	25.0	
100 R	10/26/89	32.0	
125 R	10/26/89	Neg	
150 R	10/26/89	20.0	

APPENDIX B

HERTEL LANDFILL REMEDIAL INVESTIGATION
U.S. ENVIRONMENTAL PROTECTION AGENCY - REGION II
ALTERNATIVE REMEDIAL CONTRACTING STRATEGY

GEOPHYSICAL SURVEY RESULTS

STATION	DATE	EM-31 READING (mmhos/cm)	COMMENTS
2300 +25			
175 R	10/26/89	12.0	
200 R	10/26/89	21.0	
225 R	10/26/89	48.0	
250 R	10/26/89	56.0	
275 R	10/26/89	50.0	
300 R	10/26/89	15.0	
325 R	10/26/89	2.5	
350 R	10/26/89	29.0	
375 R	10/26/89	Neg	
25 L	10/26/89	Neg	
50 L	10/26/89	Neg	
75 L	10/26/89	Neg	
100 L	10/26/89	Neg	
125 L	10/26/89	5.0	
2300 +50			
00	10/26/89	Neg	
25 R	10/26/89	0.5	
50 R	10/26/89	Neg	
75 R	10/26/89	Neg	
100 R	10/26/89	0.0	
125 R	10/26/89	16.0	
150 R	10/26/89	25.0	Metal debris located at 160 R
175 R	10/26/89	Neg	
200 R	10/26/89	8.0	
225 R	10/26/89	49.0	
250 R	10/26/89	30.0	
275 R	10/26/89	40.0	
300 R	10/26/89	30.0	
325 R	10/26/89	34.0	
350 R	10/26/89	20.0	
375 R	10/26/89	27.0	Grid points 375 R and 400 R are located approxi
400 R	10/26/89	5.0	5' to the south of the main grid line.
25 L	10/26/89	Neg	
50 L	10/26/89	Neg	
75 L	10/26/89	Neg	
100 L	10/26/89	Neg	
125 L	10/26/89	Neg	
2300 +75			
00	10/26/89	5.0	
25 R	10/26/89	Neg	
50 R	10/26/89	4.0	
75 R	10/26/89	Neg	
100 R	10/26/89	Neg	Metallic debris at this location
125 R	10/26/89	Neg	
150 R	10/26/89	11.0	
175 R	10/26/89	20.0	
200 R	10/26/89	34.0	
225 R	10/26/89	53.0	
250 R	10/26/89	67.0	
275 R	10/26/89	40.0	
300 R	10/26/89	22.0	
325 R	10/26/89	32.0	
350 R	10/26/89	15.0	

APPENDIX 8

HERTEL LANDFILL REMEDIAL INVESTIGATION
U.S. ENVIRONMENTAL PROTECTION AGENCY - REGION II
ALTERNATIVE REMEDIAL CONTRACTING STRATEGY

GEOPHYSICAL SURVEY RESULTS

STATION	DATE	EM-31 READING (mmhos/cm)	COMMENTS
2300 +75			
375 R	10/26/89	26.0	
400 R	10/26/89	0.5	
420 R	10/26/89	Neg	Paint can debris and lrge boulders
25 L	10/26/89	Neg	
50 L	10/26/89	Neg	
75 L	10/26/89	Neg	
100 L	10/26/89	Neg	
125 L	10/26/89	3.0	
2400 +00			
00	10/26/89	3.5	Leachate seep between locations 24 +00 and 24 +
25 R	10/26/89	5.0	
50 R	10/26/89	6.0	
75 R	10/26/89	Neg	
100 R	10/26/89	Neg	Drum located at this location
125 R	10/26/89	Neg	Metallic debris at this location
150 R	10/26/89	15.0	Sample point 8' North of grid point
175 R	10/26/89	44.0	
200 R	10/26/89	34.0	
225 R	10/26/89	40.0	
250 R	10/26/89	22.0	
275 R	10/26/89	30.0	
300 R	10/26/89	Neg	
325 R	10/26/89	44.0	Small leachate seep at this location
350 R	10/26/89	28.0	
375 R	10/26/89	Neg	
400 R	10/26/89	13.0	
420 R	10/26/89	Neg	
25 L	10/26/89	Neg	
50 L	10/26/89	Neg	Metallic debris at this location
75 L	10/26/89	Neg	Metallic debris at this location
100 L	10/26/89	Neg	Metallic debris at this location
125 L	10/26/89	4.0	Metallic debris at this location
150 L	10/26/89	4.0	Metallic debris at this location
2400 +25			
00	10/26/89	3.5	
25 R	10/26/89	5.0	
50 R	10/26/89	5.0	
75 R	10/26/89	4.5	
100 R	10/26/89	Neg	
125 R	10/26/89	56.0	Metallic debris at this location
150 R	10/26/89	12.0	
175 R	10/26/89	23.0	
200 R	10/26/89	15.0	
225 R	10/26/89	60.0	
250 R	10/26/89	35.0	
275 R	10/26/89	56.0	
300 R	10/26/89	30.0	
325 R	10/26/89	4.0	
350 R	10/26/89	5.5	
375 R	10/26/89	16.0	
400 R	10/26/89	8.5	

APPENDIX B

HERTEL LANDFILL REMEDIAL INVESTIGATION
U.S. ENVIRONMENTAL PROTECTION AGENCY - REGION II
ALTERNATIVE REMEDIAL CONTRACTING STRATEGY

GEOPHYSICAL SURVEY RESULTS

STATION	DATE	EM-31 READING (mmhos/cm)	COMMENTS
2400 +25			
425 R	10/26/89	Neg	
450 R	10/26/89	3.0	Paint can at this location
25 L	10/26/89	3.5	
50 L	10/26/89	3.0	Metallic debris at this location
75 L	10/26/89	Neg	Metallic debris and drums at this location
100 L	10/26/89	0.0	Metallic debris at this location
125 L	10/26/89	3.5	Metallic debris at this location
150 L	10/26/89	4.0	Wet at this location
2400 +50			
00	10/26/89	3.0	
25 R	10/26/89	3.0	
50 R	10/26/89	4.5	
75 R	10/26/89	4.5	
100 R	10/26/89	7.5	leachate seep 10' to the south of the grid poin
125 R	10/26/89	1.0	Metallic debris at this location extending to 1
150 R	10/26/89	15.0	
175 R	10/26/89	34.0	
200 R	10/26/89	40.0	Metal shovel at this location
225 R	10/26/89	4.5	
250 R	10/26/89	13.0	
275 R	10/26/89	19.0	
300 R	10/26/89	21.0	
325 R	10/26/89	18.0	
350 R	10/26/89	20.0	
375 R	10/26/89	4.0	
400 R	10/26/89	Neg	
425 R	10/26/89	7.0	
450 R	10/26/89	4.0	
25 L	10/26/89	3.0	
50 L	10/26/89	3.0	
75 L	10/26/89	3.9	
100 L	10/26/89	3.0	
125 L	10/26/89	3.0	
150 L	10/26/89	3.5	
175 L	10/26/89	4.0	
200 L	10/26/89	4.0	
225 L	10/26/89	5.0	
2400 +75			
00	10/26/89	2.8	
25 R	10/26/89	3.0	
50 R	10/26/89	2.8	
75 R	10/26/89	3.5	
100 R	10/26/89	4.0	
125 R	10/26/89	10.0	Metallic debris at this location
150 R	10/26/89	5.0	Metallic debris at this location
175 R	10/26/89	21.0	
200 R	10/26/89	25.0	
225 R	10/26/89	18.0	
250 R	10/26/89	3.5	
275 R	10/26/89	Neg	
300 R	10/26/89	28.0	
325 R	10/26/89	26.0	
350 R	10/26/89	11.0	
375 R	10/26/89	13.0	

APPENDIX B

HERTEL LANDFILL REMEDIAL INVESTIGATION
U.S. ENVIRONMENTAL PROTECTION AGENCY - REGION II
ALTERNATIVE REMEDIAL CONTRACTING STRATEGY

GEOPHYSICAL SURVEY RESULTS

STATION	DATE	DATE	EM-31 READING (mmhos/cm)	COMMENTS
2400 +75				
450 R		10/26/89	4.0	
25 L		10/26/89	3.0	
50 L		10/26/89	3.0	
75 L		10/26/89	3.9	
100 L		10/26/89	3.0	
125 L		10/26/89	3.0	
150 L		10/26/89	3.5	
175 L		10/26/89	4.0	
200 L		10/26/89	4.0	
225 L		10/26/89	5.0	
2500 +00				
300 R		10/26/89	24.0	
325 R		10/26/89	27.0	
350 R		10/26/89	10.0	
375 R		10/26/89	Neg	
400 R		10/26/89	Neg	
420 R		10/26/89	8.0	
440 R		10/26/89	6.0	
2500 +25				
300 R		10/26/89	Neg	
325 R		10/26/89	5.0	
350 R		10/26/89	14.0	
375 R		10/26/89	14.0	
400 R		10/26/89	Neg	
425 R		10/26/89	18.0	?; uproad-425 R - 7.0
445 R		10/26/89	4.5	
466 R		10/26/89	4.0	
2500 +50				
300 R		10/26/89	6.0	
325 R		10/26/89	20.0	
350 R		10/26/89	19.0	
375 R		10/26/89	Neg	
400 R		10/26/89	17.0	
2500 +75				
325 R		10/26/89	15.0	
350 R		10/26/89	16.5	
375 R		10/26/89	8.0	
2600 +00				
325 R		10/26/89	17.0	
350 R		10/26/89	3.0	
375 R		10/26/89	0.5	
2600 +25				
325 R		10/26/89	11.0	
350 R		10/26/89	8.5	

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX B2

THIS PAGE INTENTIONALLY LEFT BLANK

HAGER-RICHTER
GEOSCIENCE, INC.

MAGNETIC SURVEY
HERTEL LANDFILL SITE
PLATTEKILL, NEW YORK

Prepared for:

TAMS Consultants, Inc.
300 Broadacres Drive
Bloomfield, New Jersey 07003

Prepared by:

Hager-Richter Geoscience, Inc.
8 Industrial Way - D10
Salem, New Hampshire 03079

File 89D39
November, 1989

HAGER-RICHTER
GEOSCIENCE, INC.

Magnetic Survey
Hertel Landfill Site
Plattekill, New York
November, 1989   File 89D39

0. EXECUTIVE SUMMARY

Hager-Richter Geoscience, Inc. conducted a magnetic survey at the Hertel Landfill Site, Plattekill, New York in November, 1989. The survey was conducted for TAMS Consultants, Inc. of Bloomfield, New Jersey, as part of a RI/FS undertaken on behalf of the United States Environmental Protection Agency. The Site covers approximately 80 acres and is roughly rectangular in shape. Wetlands border the site to the north, south and east.

The magnetic survey was conducted on a 25-foot grid in an area of the Site designated by TAMS. A total of 897 stations was occupied. The purpose of the magnetic survey was to determine the locations of buried metallic wastes, which might include drums. Both total magnetic field and vertical magnetic gradient were measured in the survey. Comparison of magnetic anomalies in both data sets permits one to discriminate surface metal objects from more deeply buried objects.

The magnetic data for the Hertel Landfill Site indicate the widespread presence of buried metal objects. In the northern part of the Site, most of the magnetic anomalies correlate with anomalies in the vertical gradient data, indicating that most of the objects causing the magnetic disturbances are located at or near the ground surface. In the southern part of the Site, most of the magnetic anomalies do not correlate with anomalies in the vertical gradient data, indicating that most of the objects causing the magnetic disturbance are buried.

Magnetic Survey
Hertel Landfill Site
Plattekill, New York
November, 1989 File 89D39

TABLE OF CONTENTS

LIST OF FIGURES and PLATES

LIST OF APPENDICES

HAGER-RICHTER
GEOSCIENCE, INC.

Magnetic Survey
Hertel Landfill Site
Plattekill, New York
November, 1989 File 89D39

1. INTRODUCTION

Hager-Richter Geoscience, Inc. conducted a magnetic survey at the Hertel Landfill Site, Plattekill, New York in November, 1989 for TAMS Consultants, Inc. of Bloomfield, New Jersey. The geophysical survey was part of a larger RI/FS project undertaken by TAMS for the United States Environmental Protection Agency. The general location of the Site is shown in Figure 1.

The Hertel Landfill Site is located in a semi-rural area in the town of Plattekill, Ulster County, New York, just east of the village of Clintondale. The property consists of about 80 acres and is bounded by wetlands to the north, south and east. The area of the magnetic survey is located roughly in the center of the Site and is littered with abundant visible surface metal.

The purpose of the geophysical survey was to determine the locations of concentrations of buried metallic objects, some of which could be drums.

Hager-Richter personnel were on Site on November 2, 1989. George Fields and Jeffrey Reid conducted the magnetic survey. The field operations were coordinated with Mr. Joseph Meaney of TAMS Consultants. Mr. William Penn of TRC Environmental Consultants and Mr. George Murray of TAMS Consultants, the technical representatives for the Hertel Landfill Site, were present during the magnetic survey. They designated the limits of the survey area and observed the field work in part. All field work was conducted under Level D personnel protection. Data analysis and interpretation were completed at the Hager-Richter offices. Original data and field notes reside in the Hager-Richter files and will be retained for a minimum of five years.

TAMS Consultants, Inc. established a surveyed baseline along the road into the Site. The baseline consists of two straight line segments that pivot at about 19+50. That part of the Site was staked on a 25-foot grid with respect to the baseline prior to our field effort. Plate 1 (in pocket) shows the staked area of the Site. Locations on the Site referred to in this document are based on the conventions established by the TAMS survey.

The word "gradient" is used with various meanings in this report. The magnetic gradient that is measured in the field and shown in contour form is the "vertical gradient of the total magnetic field." In the discussion of the total field magnetic anomalies, the term means "horizontal gradient of the total magnetic field." Further, in the discussion of the magnetic gradient map, the term may mean "horizontal gradient of the vertical gradient of the total magnetic field." In most places, the meaning will be clear and we shall use "gradient" without the additional qualifiers.

2. EQUIPMENT AND PROCEDURES

The magnetic survey was conducted using an EG&G Model G856 Proton Precession Portable Magnetometer with a gradiometer option. The G856 is a microprocessor controlled instrument with a resolution of 0.1 gamma, an accuracy of 1 gamma, and a memory capable of storing the data for over 2000 stations. With the gradiometer option, two sensors are mounted on a staff at 4 feet 5 3/4" and 9 feet 3/4" above ground level. Upon command, the magnetometer records data from both sensors sequentially within 3 seconds. Computer software subsequently separates the data for analysis.

Magnetic data were collected at 987 stations at the Site. A recording base station located northeast of the grid in a "clean" area measured the magnetic field at one-minute intervals. These data are necessary to correct for the temporal variation of the earth's magnetic field and to check for sudden fluctuations due to magnetic "storms" that may affect the quality of the field data. All magnetic field data, including gradiometer data, were corrected for diurnal variation prior to plotting and contouring. All data were corrected to the first base value taken during the survey. A graph of the total magnetic field at the base station as a function of time is included as Appendix 1.

Total magnetic field data were contoured using the top sensor magnetic values. Gradiometer data were processed by subtracting the top sensor value from the bottom sensor value and dividing by the distance between the sensors. Total magnetic field profiles for each west-east line of survey are included as Appendix 2.

3. RESULTS

3.1 General

The magnetic data for the Hertel Landfill Site were separated into two sets, for the northern and southern areas respectively, at the change in baseline direction and grid orientation at about 19+50. Figures 2A and 2B are maps showing the magnetic station locations. A total of 987 magnetic stations was occupied on a 25-foot grid in the staked portions of the Site. The maps are at the same scale (1 inch = 100 feet) as the Site map provided by TAMS Consultants.

Figures 3A and 3B are contour maps of the total magnetic field and the vertical magnetic gradient, respectively, for the northern area. Figures 4A and 4B are contour maps of the total magnetic field and the vertical magnetic gradient, respectively, for the southern area. The total magnetic field data are presented as total intensity relative to 55,000 gammas, an arbitrary value near the "normal" total magnetic field for the area. The contour interval of the total magnetic field maps is 200 gammas; this interval was selected because of the large range in the magnetic field measured across the Site. The magnetic gradient maps are plotted with a contour interval of 100 gammas/foot.

The magnetic technique is limited to detecting ferrous metal objects. Neither the particular type of metallic object causing a magnetic disturbance nor its contents can be determined from the magnetic data alone. Magnetic data are strongly affected by surface features such as power lines, chain link fences, and automobiles.

In interpreting total magnetic field data, several factors should be considered. The width, gradient, and amplitude of a magnetic disturbance are useful in estimating the mass and depth of the metal object(s). Total magnetic field disturbances, or anomalies, with steep horizontal gradients are caused by objects at or near the surface.

Anomalies in the vertical magnetic gradient data are produced by objects at or near the surface. Magnetic bodies of small vertical extent (i.e., flat) located on or near the surface produce large vertical magnetic gradients for those stations located near them. The contour plot commonly displays a diagnostic pattern of lows surrounding a high, or highs around a low, provided stations are sufficiently closely spaced. On the other hand, magnetic bodies of "large" vertical extent above the ground, such as buildings, trailers, and steel fencing, are likely to produce small vertical gradients because those objects may be equally close to both magnetic sensors. Since such bodies can be observed, their magnetic effects cause no interpretation problem. For example, in the vicinity of the Site trailer and fenced decontamination area near (15+00, 0), both sensors recorded similar magnetic anomalies of about 4000 gammas, but a vertical magnetic gradient of zero.

By comparing the contour maps of the total magnetic field and the vertical magnetic gradient, then, one can distinguish the anomalies due to objects that are at or near the surface from anomalies that are produced by more deeply buried objects.

3.2 Northern Area

The total magnetic field for the northern portion of the Site is quite complex (Figure 3A). Magnetic anomalies of several hundred gammas occur over the entire area, indicating the widespread presence of metal objects at the Site, as one would expect at a landfill. Most of the disturbances, however, correlate with anomalies evident in the vertical gradient map (Figure 3B), indicating that the objects causing those magnetic disturbances are located either at or near the ground surface.

We interpret those magnetic disturbances that do not correlate with either observed surface objects or anomalies in the vertical magnetic gradient data to be caused by the presence of buried metallic objects. For example, the magnetic anomaly between (17+00, 525R) and (18+00, 525R) has broad lateral extent, and an amplitude of about 800 gammas; we infer that the anomaly is caused by one or more buried metallic bodies. Similar broad total field anomalies that do not correlate with vertical gradient anomalies occur at approximately (17+50, 300R) to (17+50, 425R) and (18+25, 450R) to (18+25, 550R).

Figure 5A summarizes the magnetic anomalies detected in the northern part of the Hertel Landfill Site. The anomalies in the total magnetic field that appear to be caused by metal objects located at or near the surface are indicated by a different pattern than the anomalies caused by buried objects.

3.3 Southern Area

Figure 4A shows the total magnetic field for the southern part of the Hertel Landfill Site. As in the northern area of the Site, magnetic anomalies of several hundred gammas occur over the entire area, indicating the widespread presence of metal objects. In sharp contrast to the northern area, however, most of the anomalies in the total magnetic field in the southern area do not correlate with anomalies present in the vertical gradient map (Figure 4B). The lack of correlation indicates that the objects causing those anomalies are buried. For example, an oblong area extending from about (21+00, 250R) to (23+00, 450R) contains total magnetic field anomalies with amplitudes of about 800 gammas, but there is no similar expression of the feature in vertical magnetic gradient map. Similar total magnetic field anomalies occur at about (22+25, 225R) to (23+75, 325R), (23+75, 350R) to (25+00, 300R), and (24+00, 250R) to (24+75, 150R).

Figure 5B summarizes the magnetic anomalies detected in the southern part of the Hertel Landfill Site. Those anomalies in the total magnetic field data that appear to be caused by metal objects located at or near the surface are indicated by a different pattern than the anomalies caused by buried objects.

4. CONCLUSIONS

On the basis of the magnetic survey conducted at the Hertel Landfill Site on November 2, 1989, we conclude that:

1. Buried metallic objects, some of which could be drums, are widely present in the landfill area.

2. In the northern part of the landfill, most of the metal objects that cause the magnetic anomalies are located at or near the surface. Areas of buried metal in the northern part of the landfill are outlined in Figure 5A.

3. The southern part of the landfill contains much more buried metal than the northern part of the survey area. The areas of buried metal in the southern part of the Site are outlined in Figure 5B.

HAGER-RICHTER
GEOSCIENCE, INC.

Magnetic Survey
Hertel Landfill Site
Plattekill, New York
November, 1989 File 89D39

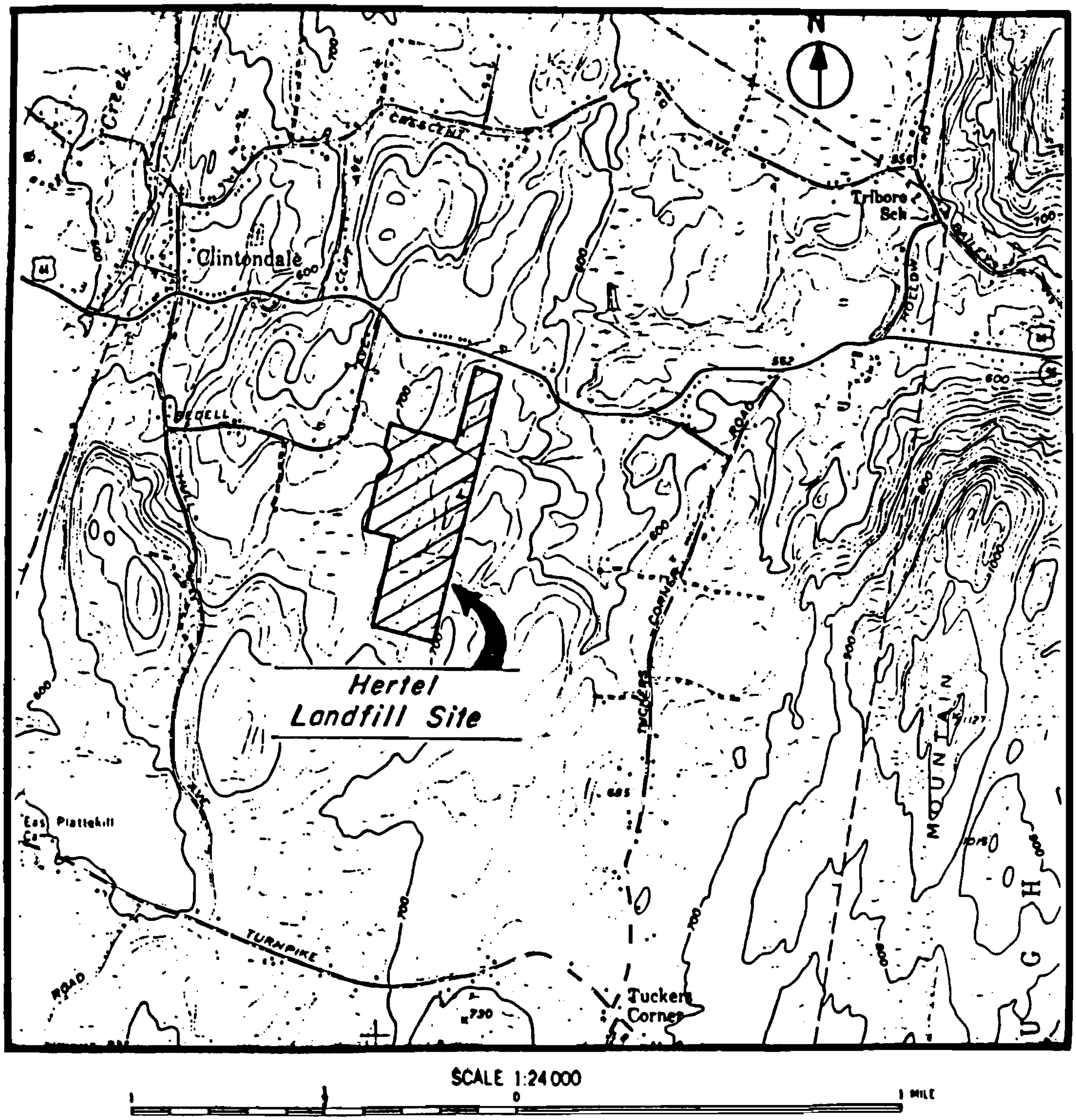


Figure 1. General location of the Hertel Landfill Site. Map courtesy of TAMS Consultants, Inc.

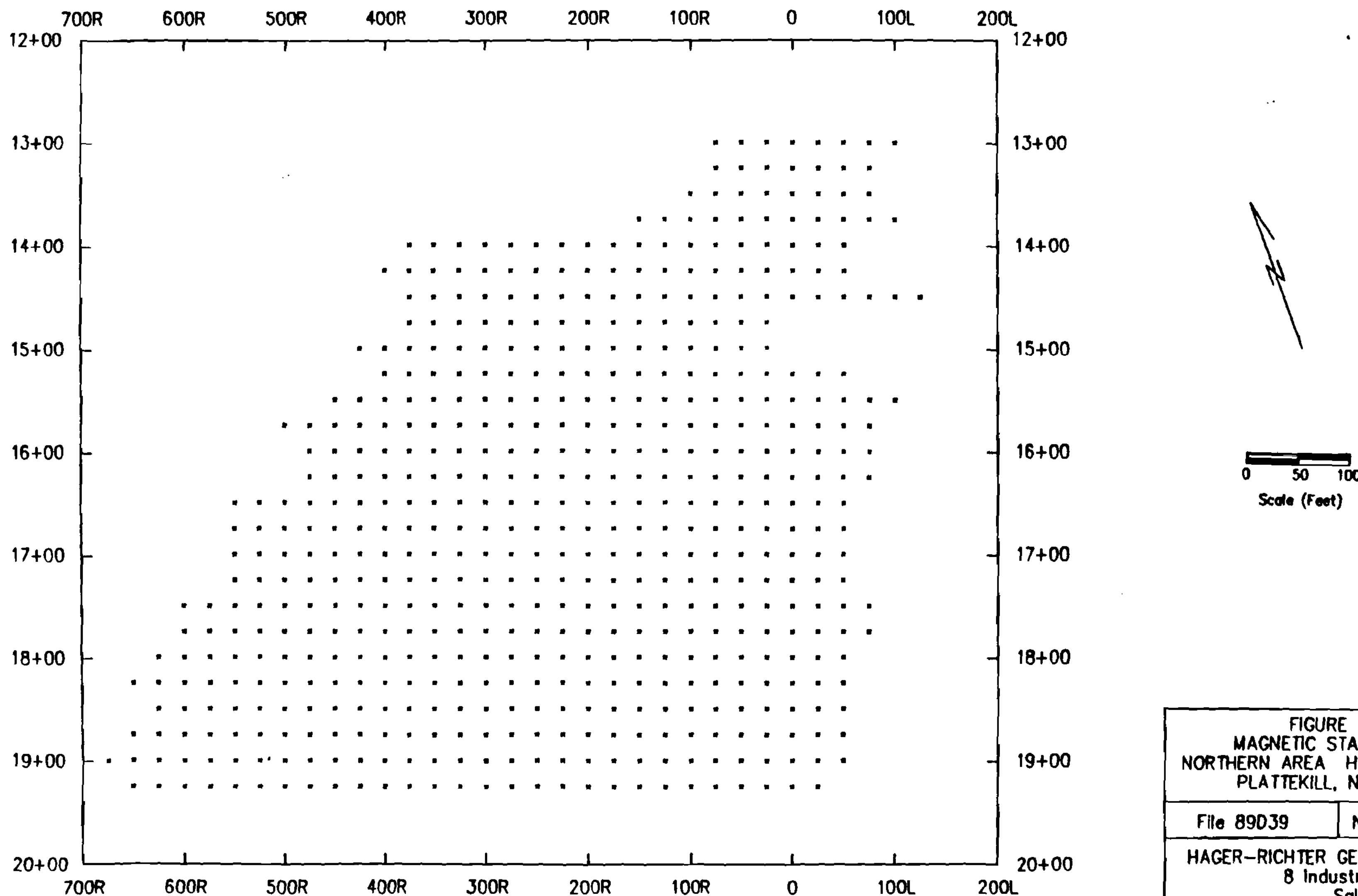


FIGURE 2A.
MAGNETIC STATION MAP
NORTHERN AREA HERTEL LANDFILL
PLATTEKILL, NEW YORK

File 89D39	November, 1989

HAGER-RICHTER GEOSCIENCE, INC.
8 Industrial Way – D10
Salem, NH 03079

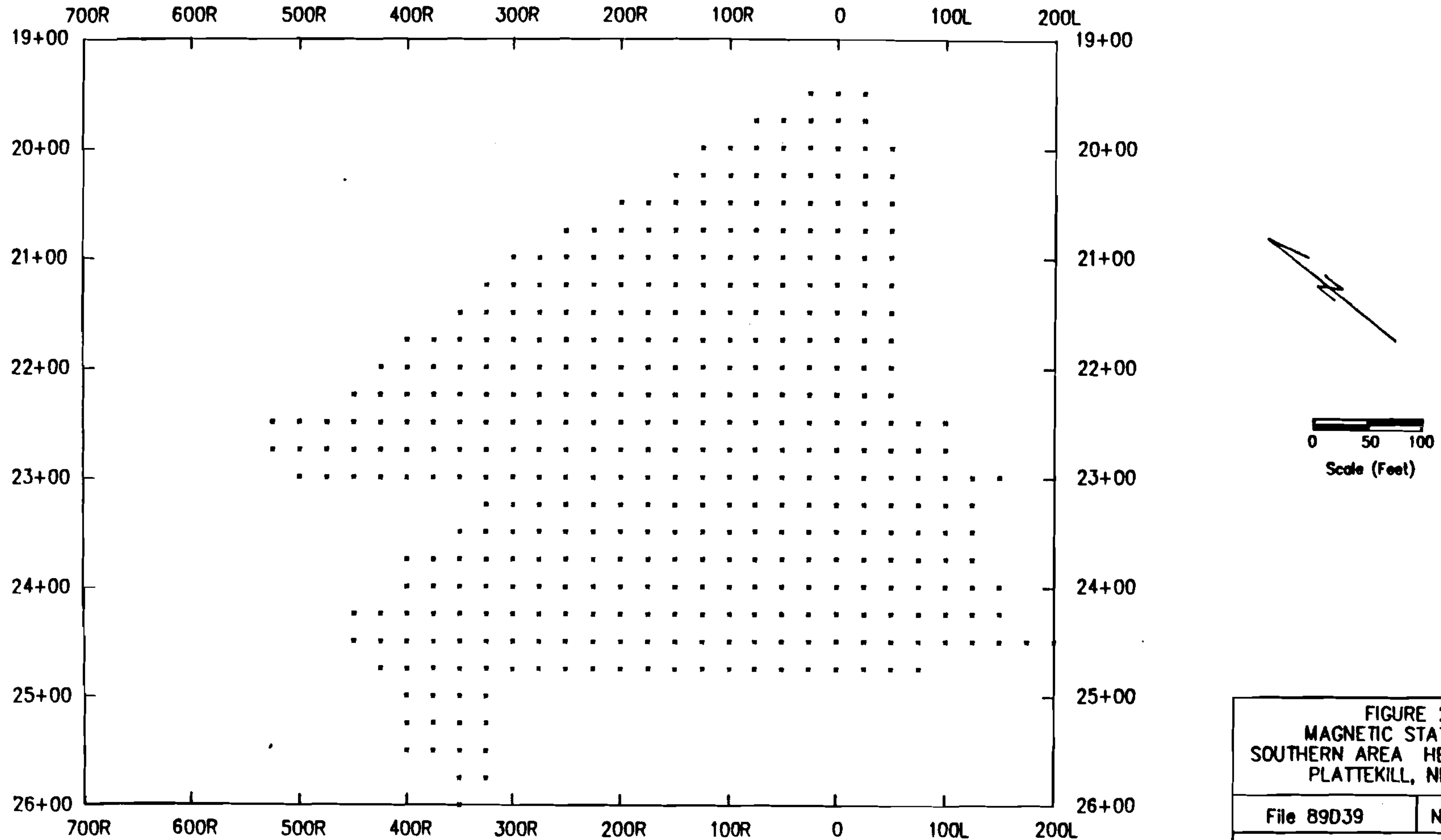


FIGURE 2B.
MAGNETIC STATION MAP
SOUTHERN AREA HERTEL LANDFILL
PLATTEKILL, NEW YORK

File 89D39	November, 1989

HAGER-RICHTER GEOSCIENCE, INC.
8 Industrial Way – D10
Salem, NH 03079

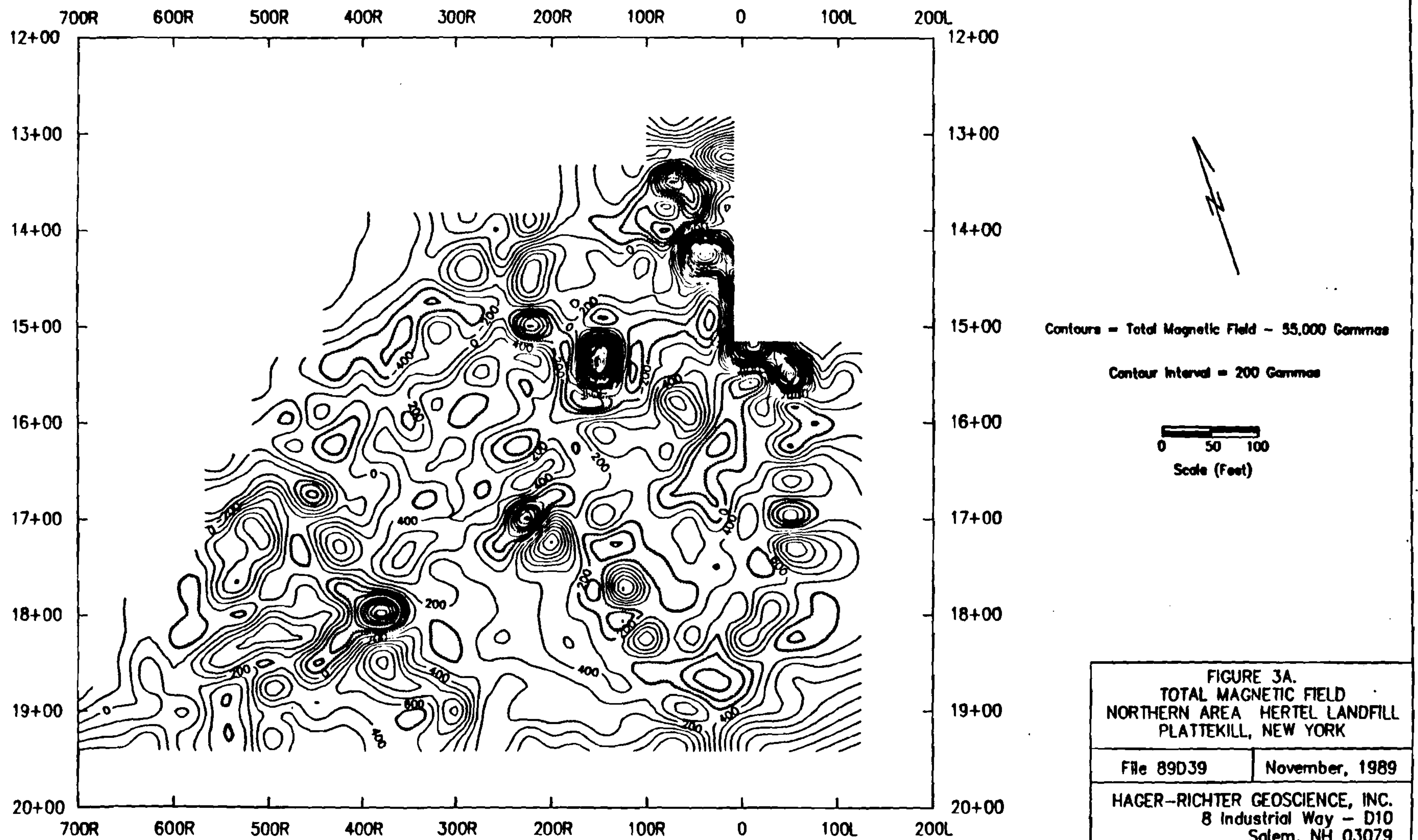


FIGURE 3A.
TOTAL MAGNETIC FIELD
NORTHERN AREA HERTEL LANDFILL
PLATTEKILL, NEW YORK

File 89D39	November, 1989

HAGER–RICHTER GEOSCIENCE, INC.
8 Industrial Way – D10
Salem, NH 03079

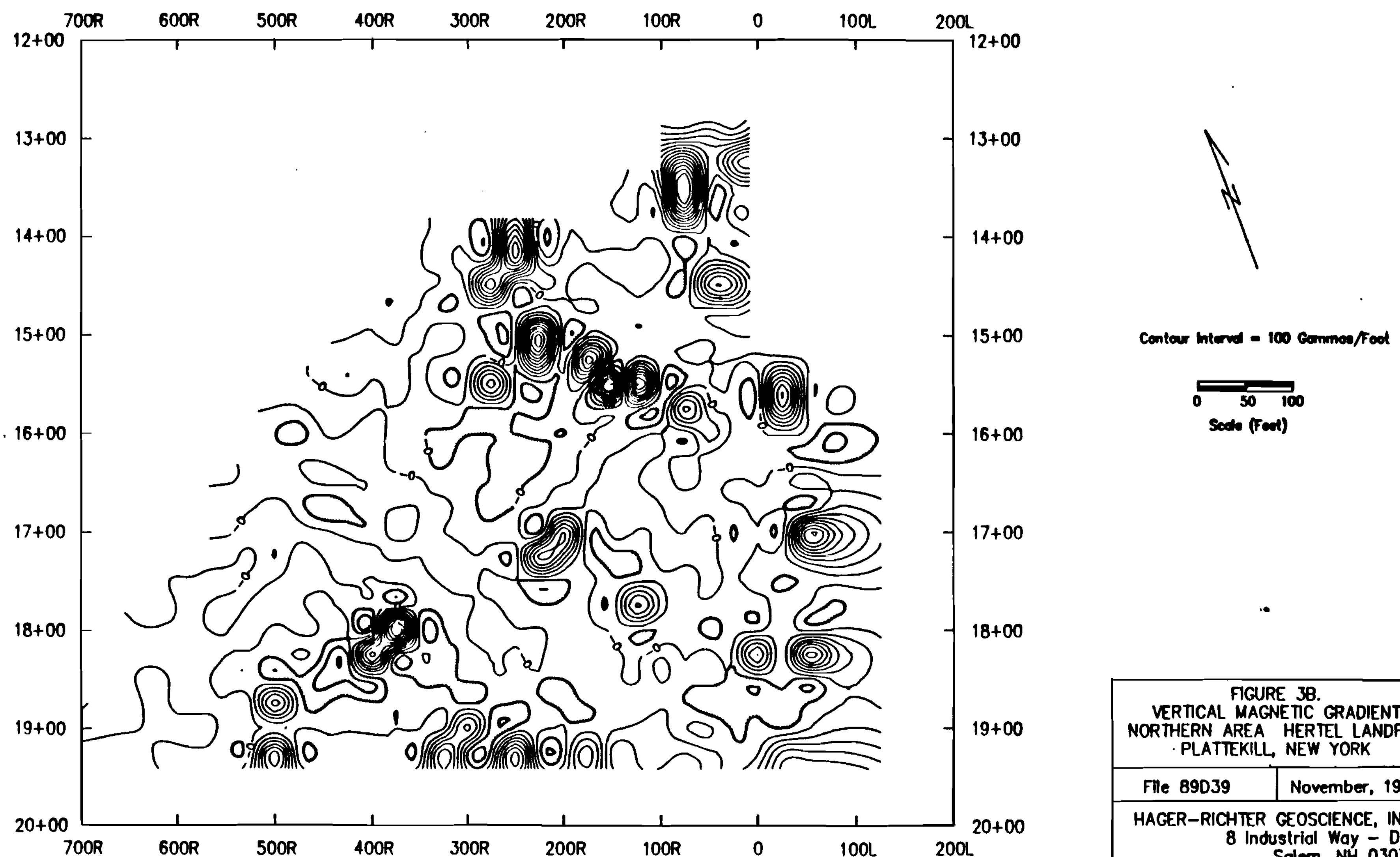


FIGURE 3B.
VERTICAL MAGNETIC GRADIENT
NORTHERN AREA HERTEL LANDFILL
PLATTEKILL, NEW YORK

File 89D39	November, 1989

HAGER-RICHTER GEOSCIENCE, INC.
8 Industrial Way – D10
Salem, NH 03079

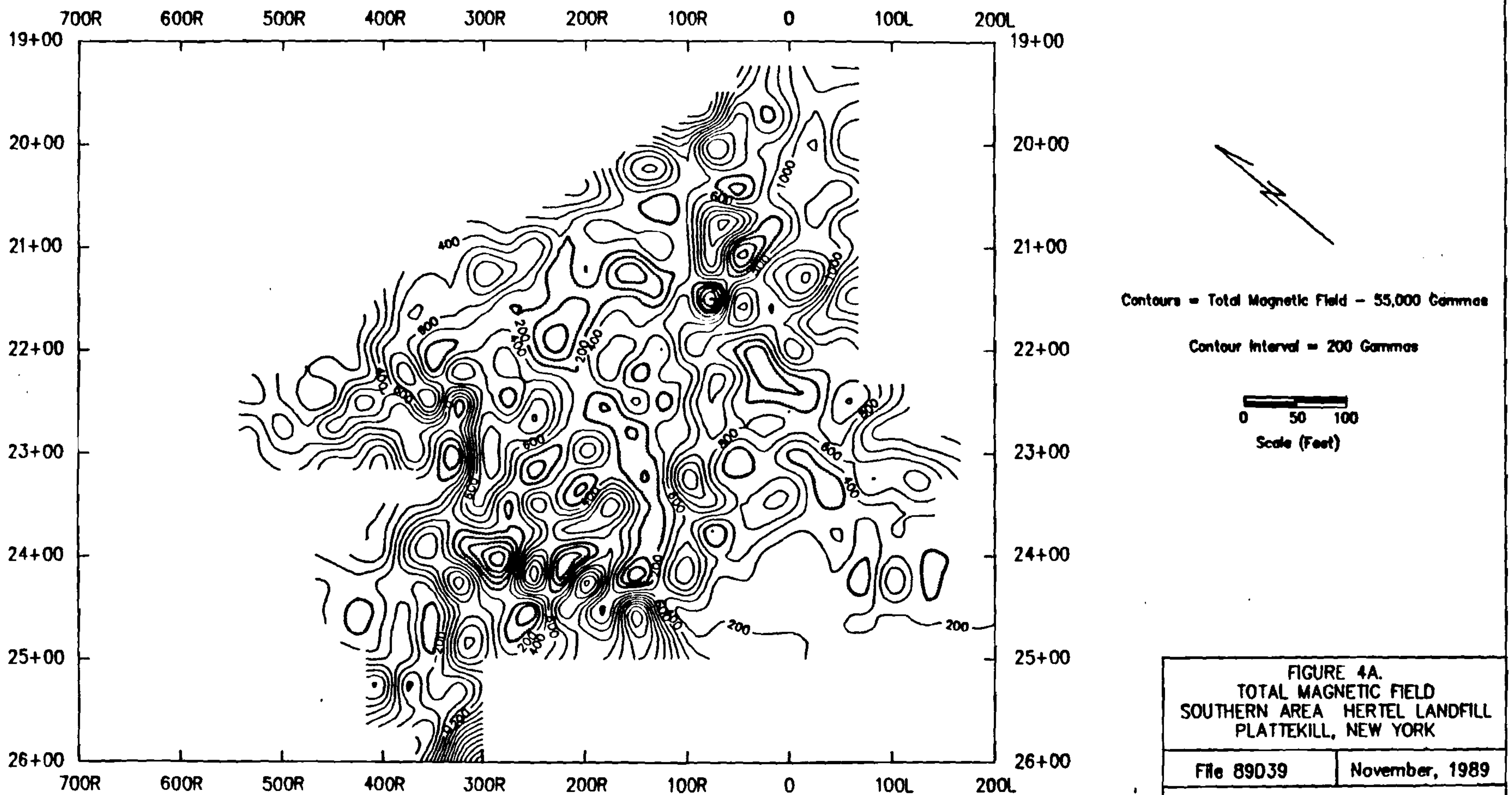


FIGURE 4A.
TOTAL MAGNETIC FIELD
SOUTHERN AREA HERTEL LANDFILL
PLATTEKILL, NEW YORK

File 89D39 | November, 1989

HAGER-RICHTER GEOSCIENCE, INC.
8 Industrial Way – D10
Salem, NH 03079

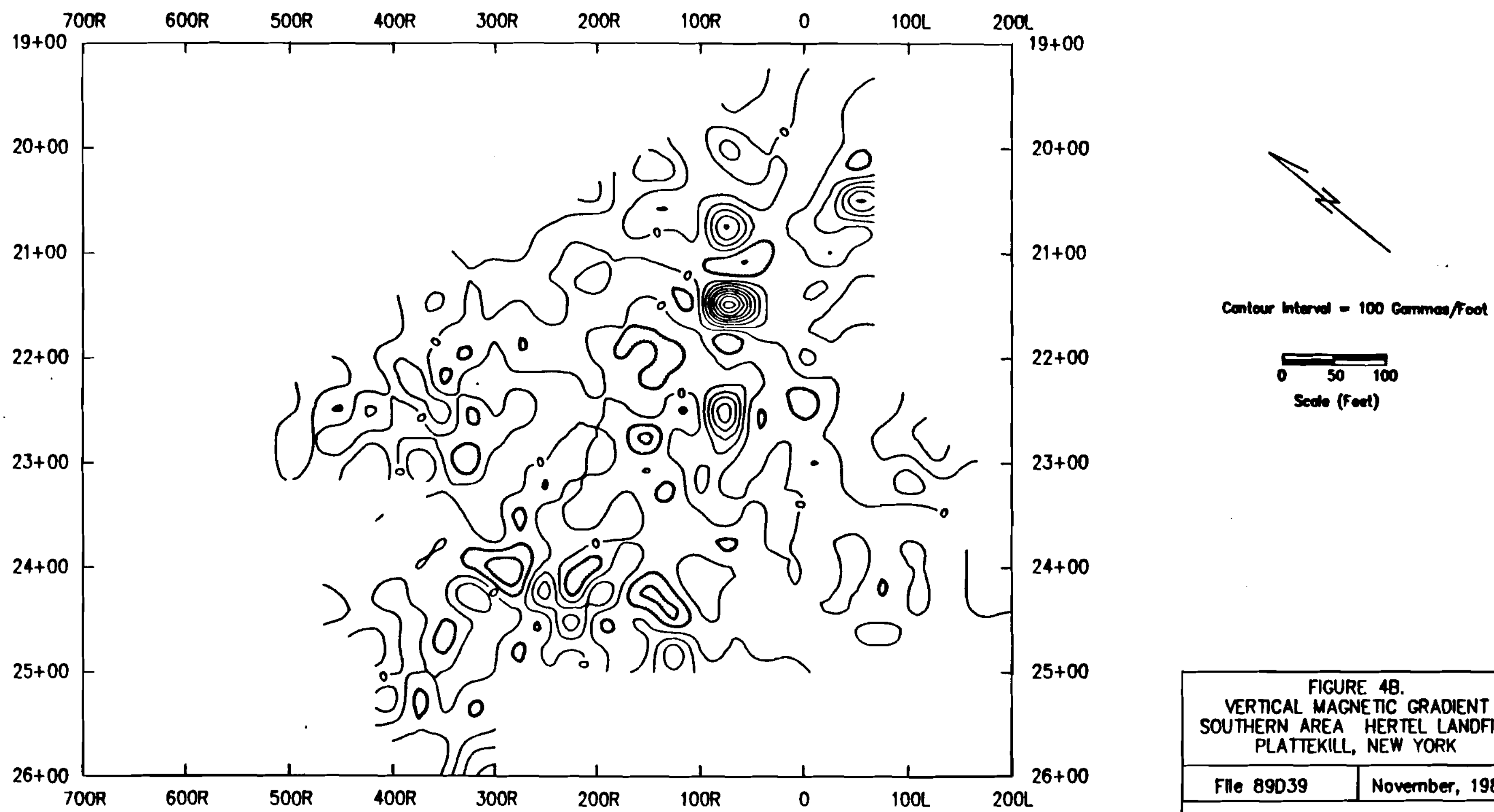


FIGURE 4B.
VERTICAL MAGNETIC GRADIENT
SOUTHERN AREA HERTEL LANDFILL
PLATTEKILL, NEW YORK

File 89D39	November, 1989

HAGER-RICHTER GEOSCIENCE, INC.
8 Industrial Way - D10
Salem, NH 03079

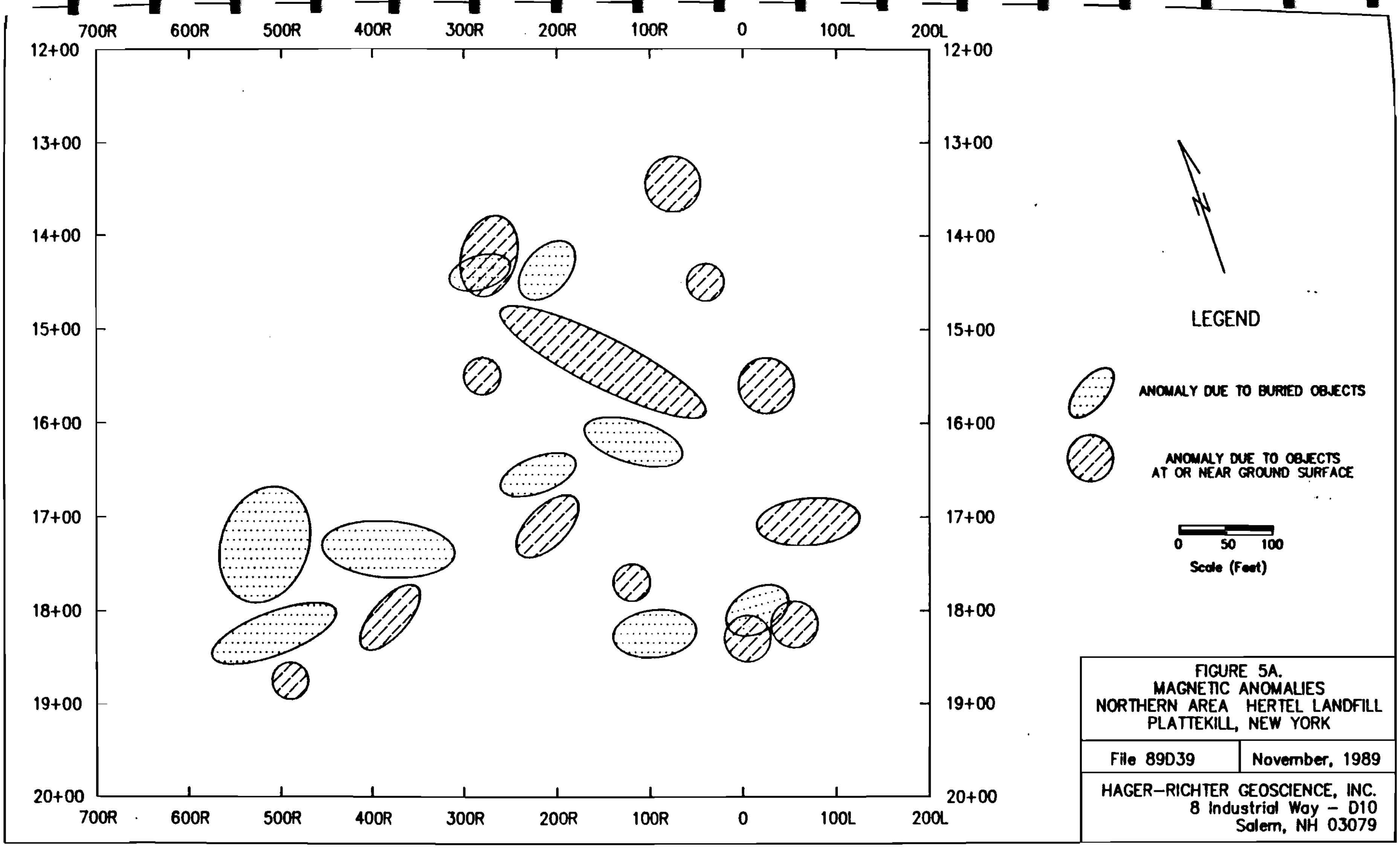


FIGURE 5A.
MAGNETIC ANOMALIES
NORTHERN AREA HERTEL LANDFILL
PLATTEKILL, NEW YORK

File 89D39	November, 1989

HAGER-RICHTER GEOSCIENCE, INC.
8 Industrial Way – D10
Salem, NH 03079

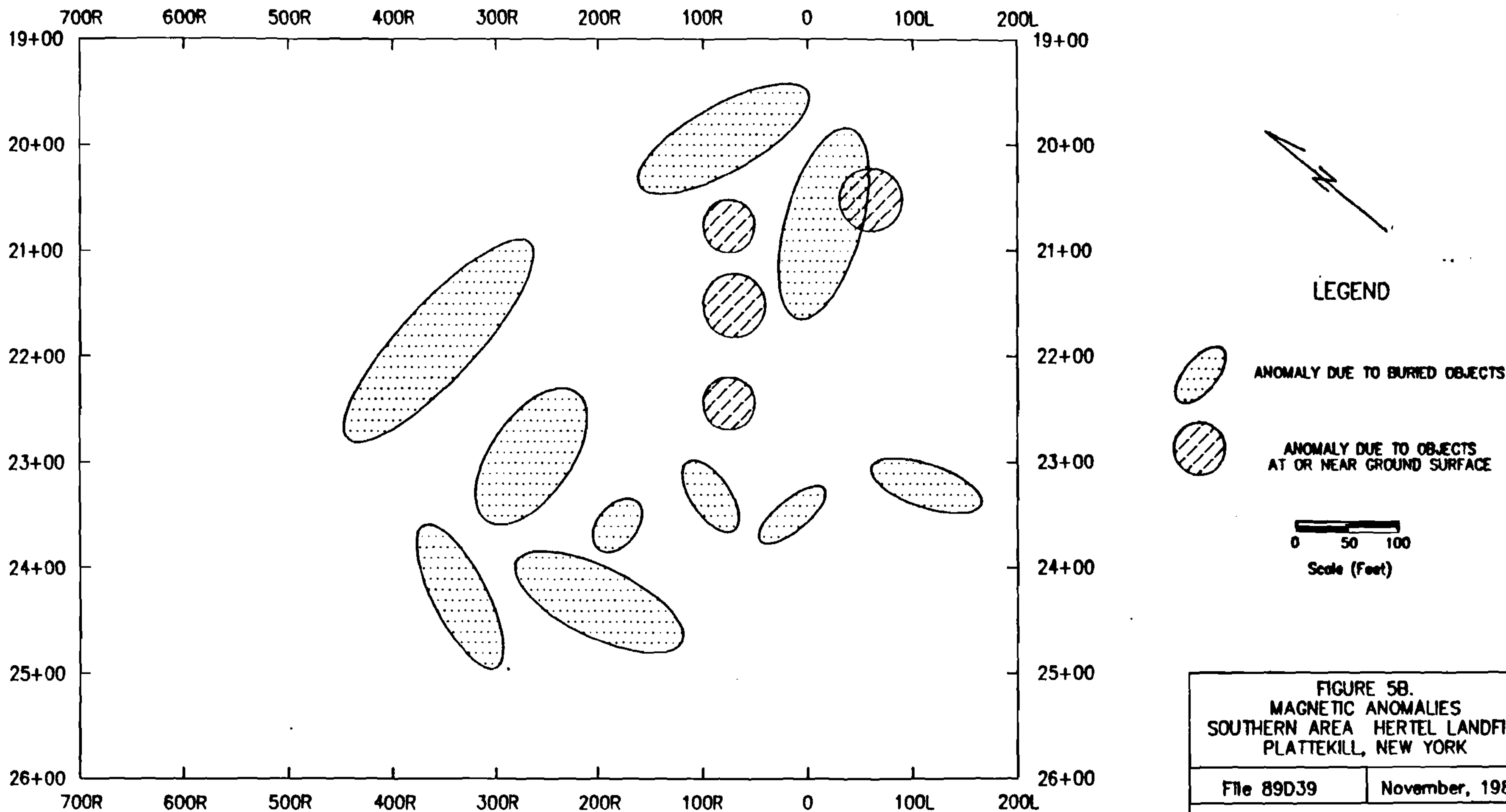


FIGURE 5B.
MAGNETIC ANOMALIES
SOUTHERN AREA HERTEL LANDFILL
PLATTEKILL, NEW YORK

File 89D39	November, 1989

HAGER-RICHTER GEOSCIENCE, INC.
8 Industrial Way - D10
Salem, NH 03079

APPENDIX C

SOIL GAS SURVEY RESULTS

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX C

Appendix C presents the raw data gathered during the soil gas surveys. Appendix C.1 presents the instrument readings from the generalized soil gas survey. Appendix C.2 presents the results (gas chromatographs, measurements, etc.) from the gas chromatograph soil gas survey.

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX C
HERTEL LANDFILL REMEDIAL INVESTIGATION

SOIL GAS SURVEY RESULTS

					INSTRUMENT READINGS						
STATION #	DATE	SAMPLE TIME	PURGE TIME	EQUILIBRIUM PERIOD (min)	HNU (ppm) BKGRD	HNU (ppm) READING	OVA (ppm) BKGRD	OVA (ppm) READING	% LEL	H2S (ppm)	COMMENTS
1200 +25											
50 R		-	-	-	-	-	-	-	-	-	WATER AT SURFACE, DID NOT SAMPLE THIS LOCATION
100 R		-	-	-	-	-	-	-	-	-	WATER AT SURFACE, DID NOT SAMPLE THIS LOCATION
150 R		-	-	-	-	-	-	-	-	-	WATER AT SURFACE, DID NOT SAMPLE THIS LOCATION
1200 +75											
50 R		-	-	-	-	-	-	-	-	-	WATER AT SURFACE, DID NOT SAMPLE THIS LOCATION
100 R		-	-	-	-	-	-	-	-	-	WATER AT SURFACE, DID NOT SAMPLE THIS LOCATION
150 R		-	-	-	-	-	-	-	-	-	WATER AT SURFACE, DID NOT SAMPLE THIS LOCATION
1300 +25											
50 R		-	-	-	-	-	-	-	-	-	WATER AT SURFACE, DID NOT SAMPLE THIS LOCATION
100 R		-	-	-	-	-	-	-	-	-	WATER AT SURFACE, DID NOT SAMPLE THIS LOCATION
150 R		-	-	-	-	-	-	-	-	-	WATER AT SURFACE, DID NOT SAMPLE THIS LOCATION
1300 +75											
50 R	11/03/89	10:30-10:	10:18-10:20	10	7.8	9.7	0.0	1.5	<00.4	0.0	ROCK ENCOUNTERED AT 18"
100 R		-	-	-	-	-	-	-	-	-	WATER AT SURFACE, DID NOT SAMPLE THIS LOCATION
150 R		-	-	-	-	-	-	-	-	-	WATER AT SURFACE, DID NOT SAMPLE THIS LOCATION
1400 +25											
50 R	11/03/89	10:00-10:04	09:48-09:50	12	10.2	10.6	0.0	8.2	<00.3	0.0	
100 R	11/03/89	09:54-09:57	09:42-09:44	10	10.4	17.2	0.0	7.3	<00.3	0.0	
150 R	11/03/89	09:34-09:38	09:22-09:24	10	10.2	12.4	0.2	1.6	<00.3	0.0	
200 R	11/03/89	09:24-09:27	09:10-09:12	12	9.7	11.5	0.0	100.0	<00.3	0.0	
250 R	11/03/89	09:21-09:24	09:06-09:08	13	9.7	10.6	0.0	0.0	<00.3	0.0	
300 R	11/03/89	09:12-09:21	09:00-09:02	10	10.0	12.8	0.0	150.0	<00.2	0.0	
350 R	11/03/89	09:07-09:11	08:52-08:54	13	9.6	12.2	0.0	0.0	<00.3	0.0	
400 R	11/03/89	08:57- :	08:45-08:47	10	7.6	12.4	0.0	0.0	<00.3	0.0	
50 L	11/23/89	12:20-12:26	12:06-12:08	12	0.2	0.3	0.0	0.0	00.1	0.0	
1400 +75											
50 R	11/23/89	15:00-15:04	14:48-14:50	10	0.2	1.6	0.6	1.3	00.2	0.0	
100 R	11/23/89	15:06-15:10	14:54-14:56	10	0.0	0.8	2.0	0.0	00.2	0.0	
150 R	11/23/89	15:18-15:21	15:06-15:08	10	0.2	1.8	0.6	1.8	00.3	0.0	
200 R	11/23/89	15:22-15:25	15:08-15:10	12	0.2	1.6	0.8	72.0	00.3	0.0	
250 R	11/02/89	16:18-16:20	16:06-16:08	10	0.0	7.0	0.8	FO	>98.8	0.0	
300 R	11/02/89	16:21-16:24	16:09-16:11	10	0.0	8.1	0.6	FO	>98.7	0.0	
350 R	11/02/89	16:29-16:	16:17-16:19	10	0.0	9.8	0.3	FO	>98.8	0.0	ROCKS AT 350 R, SAMPLE TAKEN AT 358 R
50 L	11/23/89	12:14-12:20	12:02-12:04	10	0.2	0.2	0.2	0.0	00.2	0.0	

APPENDIX C
BERTEL LANDFILL REMEDIAL INVESTIGATION

SOIL GAS SURVEY RESULTS

INSTRUMENT READINGS

STATION #	DATE	SAMPLE TIME	PURGE TIME	EQUILIBRIUM PERIOD (min)	HNU (ppm) BKGRD	HNU (ppm) READING	OVA (ppm) BKGRD	OVA (ppm) READING	% LEL	H2S (ppm)	COMMENTS
1500 +25											
00	10/30/89	10:55- *: *	10:43-10:45	10	1.0	2.0	6.0	FO	7.0	0.0	* DID NOT RECORD THE DURATION OF
50 R	10/30/89	11:22- *: *	10:55-10:57	25	0.0	0.0	7.8	FO	>98.0	0.0	SAMPLE TIME AT THESE LOCATIONS.
100 R	10/30/89	11:45- *: *	11:33-11:35	10	0.6	5.8	1.8	FO	>98.0	0.0	WATER AT 12"
150 R	10/30/89	11:53- *: *	11:34-11:36	17	0.4	4.8	1.4	FO	>98.0	1.0	
200 R	10/30/89	11:57- *: *	11:36-11:38	19	0.8	0.4	1.5	FO	>98.0	17.0	
250 R	11/02/89	15:43-15:45	15:27-15:29	14	0.0	1.0	0.5	4.0	>99.5	0.01	
300 R	11/02/89	15:46-15:50	14:30-14:32	14	0.0	0.0	0.6	FO	>99.7	0.0	
350 R	11/02/89	15:51-15:52	14:33-14:35	16	0.0	0.0	0.8	FO	>98.6	0.0	
400 R	11/02/89	14:53-14:56	14:36-14:38	15	0.0	7.8	0.3	3.8	>98.7	0.0	
50 L	11/23/89	12:08-12:14	11:56-11:58	10	0.2	0.3	0.2	10.0	00.1	0.0	
1500 +75											
00	10/31/89	12:11-12:15	11:59-12:01	10	0.8	0.4	2.2	FO	>98.0	0.0	
50 R	10/31/89	14:29-14:31	14:17-14:19	10	0.9	0.9	1.0	FO	>98.0	1.0	WATER DRAWN WITH PUMP
100 R	10/31/89	12:31-12:35	12:21-12:23	8	0.8	1.2	1.8	FO	>98.0	0.0	
150 R	10/31/89	12:37-12:41	12:24-12:26	11	0.8	0.4	1.6	FO	>98.0	0.0	
200 R	10/31/89	12:41-12:44	12:30-12:32	9	0.8	0.7	1.9	FO	26.0	0.0	
250 R	11/02/89	15:35-15:42	15:23-15:25	10	0.0	7.0	0.1	4.0	>99.3	0.0	
300 R	11/02/89	15:06-15:13	14:54-14:56	10	0.0	0.0	0.2	FO	>99.4	0.01	
350 R	11/02/89	15:00-15:03	14:48-14:50	10	0.0	0.0	0.1	FO	>97.9	0.05	
400 R	11/02/89	14:52-14:54	14:40-14:42	10	0.0	0.0	0.5	FO	>99.4	0.0	
450 R	11/02/89	14:46-14:49	14:34-14:36	10	0.0	0.0	0.2	4.2	>98.3	0.0	
50 L	11/23/89	12:02-12:08	11:49-11:51	11	0.2	0.2	0.2	0.0	00.3	0.0	
1600 +25											
00	10/31/89	14:34-14:40	14:21-14:23	11	0.9	0.6	1.0	FO	97.0	0.0	
50 R	10/31/89	14:42-14:45	14:26-14:28	14	0.9	3.9	1.2	FO	00.9	0.0	WATER AT 18"
100 R	10/31/89	14:49-14:52	14:37-14:39	10	0.9	0.4	1.1	FO	97.1	0.0	WATER AT 18", ORGANIC SMELL
150 R	10/31/89	15:00-15:02	14:48-14:50	10	0.7	0.2	1.3	FO	96.2	20.0	WATER AT 27"
200 R	10/31/89	15:12-15:14	15:00-15:02	10	0.7	0.5	0.9	FO	26.0	27.0	WATER AT 18"
250 R	11/02/89	14:07-14:10	13:56-13:58	9	0.0	0.0	0.5	0.2	>98.1	<00.1	OVA OPERATING INCORRECTLY, WATER AT 4"
300 R	11/02/89	14:16-14:19	14:03-14:05	11	0.0	0.0	0.5	FO	>99.7	00.0	OVA OPERATING INCORRECTLY
350 R	11/02/89	14:24-14:25	14:12-14:14	10	0.0	0.0	2.0	FO	>97.3	00.5	OVA OPERATING INCORRECTLY
400 R	11/02/89	14:29-14:31	14:17-14:19	10	0.0	-	0.5	FO	>99.3	<00.1	OVA OPERATING INCORRECTLY
450 R	11/02/89	14:32-14:35	14:20-14:22	10	0.0	1.6	0.5	FO	>97.9	<00.1	OVA OPERATING INCORRECTLY
50 L	11/23/89	11:55-12:02	11:38-11:40	15	0.2	0.5	0.0	0.0	00.1	0.0	

APPENDIX C
HERTEL LANDFILL REMEDIAL INVESTIGATION

SOIL GAS SURVEY RESULTS

					INSTRUMENT READINGS						
		SAMPLE	PURGE	EQUILIBRIUM	HNU (ppm)		OVA (ppm)				COMMENTS
STATION #	DATE	TIME	TIME	PERIOD (min)	BKGRD	READING	BKGRD	READING	% LEL	H2S (ppm)	
1600 +75											
00	10/31/89	16:20-16:24	16:05-16:07	10	1.0	4.4	2.7	85.0	>99.9	0.0	WATER AT 12"
50 R	10/31/89	16:11-16:18	15:59-16:01	10	0.9	0.7	1.1	FO	>98.0	0.0	
100 R	10/31/89	15:49-15:52	15:37-15:39	10	0.8	0.6	1.1	FO	>97.6	7.0	WATER AT 27"
150 R	10/31/89	15:35-15:38	15:24-15:26	9	1.1	0.8	1.5	FO	00.2	8.0	WATER AT 27"
200 R	10/31/89	15:26-15:32	15:12-15:14	12	0.8	0.9	1.0	FO	>97.6	15.0	WATER AT 27"
250 R	11/02/89	13:58-14:02	13:46-13:48	10	0.0	0.0	0.8	0.6	>98.0	<00.1	OVA OPERATING INCORRECTLY, WATER AT 8"
300 R	11/02/89	13:48-13:51	13:38-13:40	10	0.0	4.2	-	0.12	>97.8	<00.1	OVA OPERATING INCORRECTLY
350 R	11/02/89	13:45-13:47	13:35-13:37	10	0.0	0.0	-	-	>99.3	00.3	OVA OPERATING INCORRECTLY
400 R	11/02/89	13:43-13:45	13:32-13:34	11	0.0	0.0	-	-	>97.5	03.5	OVA OPERATING INCORRECTLY
450 R	11/02/89	13:39-13:42	13:29-13:31	10	0.0	0.0	-	-	>98.6	<00.1	OVA OPERATING INCORRECTLY
500 R	11/03/89	15:36-15:39	15:24-15:26	10	9.8	0.0	17.0	FO	>99.5	0.01	
550 R	11/03/89	15:40-15:45	15:28-15:30	10	9.8	11.6	6.0	9.3	>97.6	0.0	
50 L	11/23/89	11:48-11:54	11:33-11:35	13	0.2	0.2	0.3	1.4	00.1	0.0	
1700 +25											
00	10/31/89	16:39-16:41	16:27-16:29	10	1.2	6.8	1.4	FO	>94.4	0.0	WATER AT 12"
50 R	10/31/89	16:43-16:50	16:28-16:30	23	1.6	1.2	2.6	FO	175.0	6.0	
100 R	10/31/89	16:50-17:02	16:36-16:38	12	2.0	4.4	5.0	FO	250.0	0.0	WATER AT 12"
150 R	10/31/89	17:03-17:06	16:42-16:49	19	2.0	1.4	8.2	FO	>98.0	0.0	WATER AT 18"
200 R	10/31/89	17:06-17:09	16:50-16:52	14	2.6	1.3	7.2	FO	>98.5	1.0	
250 R	11/02/89	09:48-09:51	09:36-09:38	10	0.0	0.0	0.8	3.0	00.5	<00.1	
300 R	11/02/89	09:55-09:58	09:43-09:45	10	0.0	0.0	1.0	FO	>99.3	<00.1	
350 R	11/02/89	10:08-10:11	09:56-09:58	10	0.0	0.0	2.4	FO	80.0	*	* WATER IN TUBING
400 R	11/02/89	10:17-10:20	10:03-10:05	12	0.0	0.0	3.4	10.0	00.1	<00.1	
450 R	11/02/89	10:25-10:27	10:13-10:15	10	0.0	0.0	3.0	FO	>99.5	0.0	ROCKS AT 450 R, SAMPLE TAKEN AT 430 R
500 R	11/03/89	15:26-15:30	15:14-15:16	10	10.2	0.0	24.0	FO	>97.9	0.0	
550 R	11/03/89	15:20-15:24	15:08-15:10	10	9.8	5.2	40.0	FO	>98.3	0.0	
50 L	11/01/89	09:48-09:54	09:32-09:34	14	1.8	19.0	0.0	440.0	<00.6	0.0	

APPENDIX C
HERTEL LANDFILL REMEDIAL INVESTIGATION

SOIL GAS SURVEY RESULTS

STATION #	DATE	SAMPLE TIME	PURGE TIME	EQUILIBRIUM PERIOD (min)	INSTRUMENT READINGS HNU (ppm) BKGRD	HNU (ppm) READING	OVA (ppm) BKGRD	OVA (ppm) READING	% LEL	H2S (ppm)	COMMENTS
1700 +75											
00	10/31/89	08:52-08:57	08:43-08:45	7	1.3	0.0	1.2	FO	>96.6	0.7	
50 R	10/31/89	08:46-08:51	08:34-08:36	10	1.7	2.4	0.3	FO	00.7	0.0	
100 R	10/31/89	-	08:18-08:20	-							WATER AT 8", DID NOT SAMPLE THIS LOCATION
150 R	10/31/89	08:30-08:35	08:15-08:17	13	1.1	1.3	6.5	FO	>99.0	0.0	
200 R	10/31/89	08:23-08:29	08:10-08:12	11	1.1	0.0	0.0	FO	>98.2	0.0	
250 R	11/02/89	09:40-09:43	09:29-09:30	10	0.0	0.0	0.7	FO	>99.1	00.9	
300 R	11/02/89	09:32-09:36	09:20-09:22	10	0.0	0.0	5.0	3.0	>99.6	<00.1	
350 R	11/02/89	09:25-09:28	09:13-09:15	10	0.0	0.2	3.0	1.0	00.5	<00.1	
400 R	11/02/89	09:19-09:21	09:07-09:09	10	0.0	0.0	13.0	FO	00.0	<00.1	
450 R	11/02/89	09:09-09:12	08:57-08:59	10	0.0	0.8	10.0	FO	>98.0	00.5	ROCKS AT 18"
500 R	11/03/89	14:40-14:43	14:28-14:30	10	10.1	0.0	23.0	FO	>97.3	0.0	
550 R	11/03/89	14:45-14:47	14:33-14:35	10	10.4	4.4	9.0	FO	>97.4	0.0	SAMPLE TAKEN AT 15"
600 R	11/03/89	14:57-14:59	14:45-14:47	10	10.1	10.6	10.0	10.0	>99.4	0.0	
50 L	11/01/89	09:58-10:05	09:46-09:48	10	1.4	7.6	0.0	FO	12.0	0.0	
1800 +25											
00	10/31/89	09:00-09:03	08:48-08:50	10	1.3	19.4	7.7	FO	>99.7	0.0	
50 R	10/31/89	09:05-09:07	08:53-08:55	10	0.8	0.0	4.3	FO	>97.3	00.1	
100 R	10/31/89	09:10-09:14	08:58-09:00	10	1.0	2.9	3.0	3.4	>99.8	0.0	
150 R	10/31/89	09:14-09:16	09:02-09:04	10	1.5	0.0	2.0	FO	>86.5	0.0	
200 R	10/31/89	09:19-09:20	09:07-09:09	10	1.5	0.0	2.0	FO	>99.6	30.0	
250 R	11/02/89	08:30-08:34	08:18-08:20	10	1.0	0.9	1.0	FO	>98.6	<00.1	WATER AT 18"
300 R	11/02/89	-	-	-	-	-	-	-	-	-	WATER AT 6", NO SAMPLE TAKEN
350 R	11/02/89	08:41-08:45	08:29-08:31	10	0.5	0.8	0.6	FO	>97.4	<00.1	
400 R	11/02/89	08:50-08:54	08:38-08:40	10	0.2	0.7	1.8	FO	>97.5	<00.1	ROCKS AT 18"
450 R	11/02/89	09:03-09:07	08:51-08:53	10	0.4	0.6	0.3	140.0	>99.4	<00.1	ROCKS AT 18"
500 R	11/03/89	14:32-14:34	14:20-14:22	10	10.4	0.0	14.0	FO	>98.9	0.0	
550 R	11/03/89	14:21-14:27	14:09-14:11	10	10.2	10.4	15.0	FO	>98.0	0.0	
600 R	11/03/89	12:14-12:17	12:02-12:04	10	9.8	0.0	15.0	FO	>99.3	0.0	
650 R	11/03/89	12:08-12:10	11:55-11:58	10	9.1	12.5	0.2	800.0	<00.3	0.0	
50 L	11/01/89	10:05-10:13	09:52-09:54	11	0.8	15.8	0.0	0.0	<00.7	0.0	

APPENDIX C

HERTEL LANDFILL REMEDIAL INVESTIGATION

SOIL GAS SURVEY RESULTS

INSTRUMENT READINGS

STATION #	DATE	SAMPLE TIME	PURGE TIME	EQUILIBRIUM PERIOD (min)	HNU (ppm) BKGRD	HNU (ppm) READING	OVA (ppm) BKGRD	OVA (ppm) READING	% LEL	H2S (ppm)	COMMENTS
1800 +75											
00	10/31/89	09:50-	09:38-09:40	10	2.0	25.0	7.1	FO	>97.3	0.0	
50 R	10/31/89	09:43-09:46	09:31-09:33	10	1.8	0.0	1.1	FO	>99.0	12.0	
100 R	10/31/89	09:38-09:41	09:26-09:28	10	1.9	2.0	1.1	FO	>97.4	0.0	
150 R	10/31/89	09:34-	09:22-09:24	10	1.9	2.4	2.1	FO	>99.2	0.0	
200 R	10/31/89	09:25-09:27	09:13-09:15	10	1.7	2.1	1.9	FO	>97.8	0.0	
250 R	10/31/89	11:53-	11:41-11:43	10	2.0	0.0	0.0	FO	>97.7	244.0	
300 R	10/31/89	11:48-11:50	11:35-11:38	10	1.7	0.0	0.0	FO	>97.4	0.0	
350 R	10/31/89	11:42-11:45	11:30-11:32	10	1.3	0.0	0.0	FO	>99.5	0.0	
400 R	10/31/89	11:36-11:37	11:24-11:26	10	1.0	0.0	0.5	FO	>97.2	6.0	
450 R	10/31/89	11:32-11:35	11:20-11:22	10	0.4	0.0	0.0	FO	>98.8	5.0	ROCK AT 20"
500 R	11/03/89	11:44-11:47	11:32-11:34	10	8.4	0.0	2.0	FO	>99.4	0.0	
550 R	11/03/89	11:49-11:51	11:37-11:39	10	9.9	10.1	2.2	FO	<00.7	0.0	
600 R	11/03/89	11:56-11:59	11:44-11:46	10	8.9	11.1	0.2	190.0	<00.1	0.0	
650 R	11/03/89	12:01-12:05	11:49-11:51	10	9.1	12.0	0.2	36.0	<00.3	0.0	
50 L	11/01/89	10:19-10:27	10:00-10:02	12	0.6	16.5	30.0	36.0	<00.7	0.0	
1900 +25											
00	10/31/89	10:24-10:28	10:12-10:14	10	1.4	26.0	0.5	FO	>97.4	0.0	
50 R	10/31/89	10:29-10:34	10:17-10:19	10	4.0	16.4	0.0	FO	>99.6	15.0	
100 R	10/31/89	10:37-10:40	10:25-10:27	10	3.9	19.3	3.8	FO	>99.4	0.0	
150 R	10/31/89	10:41-10:43	10:29-10:31	10	1.8	0.0	0.7	FO	>99.6	0.0	
200 R	10/31/89	10:46-10:49	10:34-10:36	10	2.5	5.4	0.5	FO	>99.6	1.0	
250 R	10/31/89	10:50-10:53	10:38-10:40	10	2.3	6.8	0.0	FO	>97.4	0.0	
300 R	10/31/89	10:55-10:57	10:43-10:45	10	0.8	8.4	0.0	FO	>99.8	0.0	
350 R	10/31/89	11:00-	10:48-10:50	10	1.1	0.0	0.0	FO	>99.1	0.0	
400 R	10/31/89	11:11-	10:55-10:57	14	0.0	1.3	0.0	FO	>97.2	0.0	
450 R	10/31/89	11:23-11:25	11:10-11:12	11	0.0	0.0	0.0	FO	>99.9	0.0	
500 R	11/03/89	11:19-11:22	11:07-11:09	10	8.6	0.2	1.5	FO	>99.2	0.0	
550 R	11/03/89	11:22-11:26	11:10-11:12	10	9.2	0.0	24.0	FO	>99.1	0.0	ROCKS AT 550 R, SAMPLE TAKEN AT 535 R
600 R	11/03/89	11:28-11:34	11:16-11:18	10	9.01	11.2	1.1	FO	3.8	0.0	
650 R	11/03/89	11:22-11:24	11:34-11:	10	9.7	10.5	0.6	90.0	<00.1	0.0	
50 L	11/01/89	10:28-	10:11-10:13	15	1.8	15.6	19.0	FO	11.0	0.0	
1900 +75											
00	11/01/89	10:39-10:44	10:27-10:29	10	0.4	1.9	12.0	FO	>99.7	0.0	
50 R	11/01/89	11:20-11:25	11:08-11:10	10	0.0	0.5	5.2	FO	>99.5	11.0	
100 R		-	-	-	-	-	-	-	-	-	NO SAMPLE COLLECTED
150 R		-	-	-	-	-	-	-	-	-	NO SAMPLE COLLECTED

SOIL GAS SURVEY RESULTS

INSTRUMENT READINGS

STATION #	DATE	SAMPLE TIME	PURGE TIME	EQUILIBRIUM PERIOD (min)	HNU (ppm) BKGRD	HNU (ppm) READING	OVA (ppm) BKGRD	OVA (ppm) READING	% LEL	H2S (ppm)	COMMENTS
2000 +25											
00	11/01/89	10:46-10:50	10:34-10:36	10	0.2	0.0	6.4	FO	>97.3	1.0	GARBAGE SMELL
50 R	11/01/89	11:27-11:32	11:15-11:17	10	0.0	12.4	1.5	450.0	7.0	0.0	
100 R	11/01/89	12:08-12:16	11:56-11:58	10	0.0	0.0	0.0	FO	9.0	0.0	
150 R	11/01/89	12:16-12:22	12:02-12:04	12	0.0	1.4	0.0	FO	>99.5	0.0	
50 L	11/23/89	11:39-11:43	11:27-11:29	10	0.2	0.2	0.4	0.0	00.1	0.0	
2000 +75											
00	11/01/89	10:56-11:00	10:44-10:46	10	0.0	1.8	4.2	FO	>93.7	0.0	
50 R	11/01/89	14:33-14:44	14:19-14:23	10	0.0	2.4	3.0	FO	>99.3	2.0	
100 R	11/01/89	15:12-15:16	14:59-15:02	10	0.0	5.0	-	-	>99.4	0.0	OVA OPERATING INCORRECTLY
150 R	11/01/89	15:51-15:57	15:39-15:41	10	0.0	0.8	-	-	8.8	2.0	OVA OPERATING INCORRECTLY
200 R	11/01/89	16:03-16:05	15:51-15:53	10	0.0	0.0	-	-	>98.1	6.0	OVA OPERATING INCORRECTLY
250 R	11/07/89	-	-	-	-	-	-	-	-	-	STANDING WATER AT 6"; DID NOT SAMPLE
50 L	11/23/89	11:29-11:33	11:17-11:19	10	0.0	0.0	0.4	0.0	00.1	0.0	
2100 +25											
00	11/01/89	11:04-11:10	10:52-10:54	10	0.0	1.4	3.8	FO	>97.3	2.0	
50 R	11/01/89	-	-	-	-	-	-	-	-	-	WATER AT 3", DID NOT SAMPLE THIS LOCATION
100 R	11/01/89	16:21-16:23	16:09-16:11	10	0.0	1.4	-	-	>99.2	15.0	OVA OPERATING INCORRECTLY
150 R	11/01/89	16:31-16:43	16:19-16:21	10	0.0	30.0	0.0	680.0	0.6	0.0	ROCK AT 18"
200 R	11/01/89	16:44-16:48	16:29-16:31	11	0.0	0.4	0.0	FO	2.8	0.0	
250 R	11/07/89	16:47-16:50	16:35-16:37	10	0.8	0.0	20.0	FO	>97.9	0.0	
300 R	11/07/89	16:51-16:55	16:39-16:41	10	0.6	0.0	20.0	880.0	>98.0	0.0	
50 L	11/23/89	11:27-11:28	11:15-11:17	10	0.4	0.8	0.3	100.0	00.2	0.0	
2100 +75											
00	11/01/89	16:52-16:59	16:39-16:41	11	0.0	10.0	0.0	FO	3.2	0.0	
50 R	11/06/89	10:02-10:10	09:50-09:52	10	11.5	0.0	0.0	FO	>97.5	0.0	
100 R	11/06/89	10:11-10:16	09:59-10:01	10	12.0	2.4	4.0	FO	>86.0	0.0	
150 R	11/06/89	10:17-10:21	10:05-10:07	10	13.0	13.8	0.0	FO	>99.7	0.0	
200 R	11/06/89	10:24-10:27	10:12-10:14	10	12.2	12.2	0.0	FO	>99.7	0.0	
250 R	11/06/89	10:29-10:34	10:17-10:19	10	11.8	11.8	0.0	40.0	<97.3	0.0	ROCK AT 18"
300 R	11/06/89	10:35-10:42	10:23-10:25	10	10.2	13.6	0.0	0.0	>98.8	0.0	WATER IN HNU DISPLAY AREA
350 R	11/06/89	10:43-10:48	10:31-10:33	10	11.0	14.8	0.0	FO	>99.3	0.0	WATER IN HNU DISPLAY AREA
400 R	11/06/89	10:52-10:56	10:40-10:42	10	13.0	13.0	0.0	FO	>99.4	0.0	WATER IN HNU DISPLAY AREA, ROCK AT 20"
50 L	11/23/89	11:16-11:21	11:04-11:06	10	0.2	0.2	0.2	0.2	00.0	0.0	

APPENDIX C
HERTEL LANDFILL REMEDIAL INVESTIGATION

SOIL GAS SURVEY RESULTS

					INSTRUMENT READINGS						
		SAMPLE	PURGE	EQUILIBRIUM	HNU (ppm)		OVA (ppm)				COMMENTS
STATION #	DATE	TIME	TIME	PERIOD (min)	BKGRD	READING	BKGRD	READING	% LEL	H2S (ppm)	
2200 +25											
00 R	11/06/89	12:02-12:05	11:50-11:52	10	15.0	9.9	0.0	FO	>99.4	0.0	
50 R	11/06/89	11:55-11:59	11:43-11:45	10	16.0	15.0	0.0	25.0	>97.4	0.0	
100 R	11/06/89	11:47-11:52	11:35-11:37	10	12.0	6.0	0.0	FO	>99.2	2.0	
150 R	11/06/89	11:40-11:45	11:28-11:30	10	12.6	12.6	0.0	FO	>99.7	0.0	
200 R	11/06/89	-	-	-	-	-	-	-	-	-	WATER AT 4", DID NOT SAMPLE THIS LOCATION
250 R	11/06/89	11:33-11:37	11:21-11:23	10	14.0	14.0	0.0	100.0	>97.8	0.0	WATER IN HNU DISPLAY AREA, ROCK AT 18"
300 R	11/06/89	11:26-11:29	11:14-11:16	10	13.0	4.6	0.0	FO	>97.5	0.0	WATER IN HNU DISPLAY AREA
350 R	11/06/89	11:19-11:24	11:07-11:09	10	13.0	4.0	0.0	FO	>97.1	1.0	WATER IN HNU DISPLAY AREA
400 R	11/06/89	11:12-11:16	11:00-11:02	10	12.0	7.0	0.0	FO	>99.2	0.0	WATER IN HNU DISPLAY AREA, ROCK AT 20"
450 R	11/07/89	16:40-16:42	16:28-16:30	10	1.0	0.0	25.0	FO	>97.5	0.0	
50 L	11/23/89	-	-	-	-	-	-	-	-	-	ROCKS AT THIS LOCATION, DID NOT SAMPLE
2200 +75											
00 R	11/06/89	15:12-15:14	15:00-15:02	10	18.0	0.4	110.0	FO	>96.6	5.0	OXYGEN=2.4
50 R	11/06/89	15:18-15:21	15:06-15:08	10	16.8	0.8	15.0	FO	>97.7	2.0	OXYGEN=4.2
100 R	11/06/89	15:25-15:29	15:13-15:15	10	17.0	23.0	0.0	0.0	>97.5	0.0	OXYGEN=5.5
150 R	11/06/89	15:33-15:36	15:20-15:22	11	17.4	18.6	18.0	FO	>99.5	1.0	OXYGEN=6.0
200 R	11/06/89	15:42-15:45	15:30-15:32	10	17.6	18.6	7.0	FO	>99.3	0.0	
250 R	11/06/89	15:48-15:41	15:35-15:37	11	18.0	26.0	7.0	FO	>97.4	0.0	OXYGEN=19.9
300 R	11/06/89	15:43-15:47	15:40-15:42	11	18.6	22.0	2.4	0.0	>99.6	0.0	
350 R	11/06/89	16:00-16:04	15:48-15:50	10	18.8	19.5	0.0	FO	>99.0	0.0	
400 R	11/06/89	16:24-16:26	16:10-16:12	12	18.6	19.5	5.0	FO	00.8	0.0	OXYGEN=20.0, WATER IN SUCTION OF LEL AND HNU
450 R	11/07/89	16:18-16:20	16:04-16:06	12	2.5	0.0	30.0	FO	00.1	0.0	
500 R	11/07/89	16:30-16:33	16:18-16:20	10	4.5	1.5	30.0	FO	00.1	0.0	
50 L	11/23/89	11:10-11:15	10:57-10:59	11	0.0	0.0	0.2	34.0	00.2	0.0	
2300 +25											
00 R	11/07/89	09:45-09:48	09:33-09:35	10	9.5	4.8	2.0	FO	<00.1	0.0	
50 R	11/07/89	09:40-09:43	09:28-09:30	11	8.4	0.4	2.5	FO	00.5	0.0	
100 R	11/07/89	09:37-09:40	09:25-09:27	10	6.8	9.4	0.0	FO	01.5	0.0	OXYGEN=19.2
150 R	11/06/89	17:02-17:07	16:50-16:52	10	18.4	20.5	20.0	FO	02.2	0.0	OXYGEN=4.0
200 R	11/06/89	16:57-17:02	16:45-16:47	10	18.4	20.0	0.0	FO	00.7	0.0	
250 R	11/06/89	16:50 16:53	16:38-16:40	10	18.0	10.0	8.5	FO	09.6	0.0	OXYGEN=19.0
300 R	11/06/89	16:44 16:48	16:31-16:33	11	17.6	26.0	0.0	FO	00.7	0.0	OXYGEN=5.4
350 R	11/06/89	16:39 16:42	16:26-16:28	11	17.8	21.0	4.0	6.2	00.8	0.0	
400 R	11/06/89	16:33-16:37	16:21-16:23	10	17.0	0.6	80.0	FO	>99.7	4.0	OXYGEN=15.6
50 L	11/23/89	11:02-11:06	10:48-10:50	12	0.2	0.4	0.6	28.0	00.2	0.0	
100 L	11/23/89	11:07-11:10	10:51-10:53	14	0.2	0.2	0.6	0.0	00.2	0.0	

APPENDIX C
HERTEL LANDFILL REMEDIAL INVESTIGATION

SOIL GAS SURVEY RESULTS

STATION #	DATE	SAMPLE TIME	PURGE TIME	EQUILIBRIUM PERIOD (min)	HNU (ppm) BKGRD	HNU (ppm) READING	OVA (ppm) BKGRD	OVA (ppm) READING	% LEL	H2S (ppm)	COMMENTS
2300 +75											
00 R	11/07/89	09:57-09:59	09:45-09:47	10	6.8	13.0	0.0	4.2	00.2	0.0	
50 R	11/07/89	10:00-10:04	09:48-09:50	10	4.4	14.2	0.0	0.0	<00.1	0.0	
100 R	11/07/89	10:04-10:11	09:51-09:53	11	5.6	12.5	1.0	0.0	<00.1	0.0	
150 R	11/07/89	10:13-10:18	10:01-10:03	10	3.4	12.4	2.6	600.0	<00.1	0.0	
200 R	11/07/89	10:18-10:22	10:05-10:07	11	2.6	2.6	0.0	0.0	00.0	0.0	
250 R	11/07/89	10:33-10:36	10:21-10:23	10	1.8	0.0	0.0	FO	00.0	0.0	
300 R	11/07/89	10:39-10:42	10:27-10:29	10	1.8	1.2	0.0	FO	00.0	0.0	
350 R	11/07/89	14:53-14:56	14:41-14:43	10	3.5	14.0	0.0	FO	00.0	0.0	
400 R	11/07/89	14:58-15:07	14:46-14:48	10	4.5	15.2	0.0	0.0	00.0	0.0	
50 L	11/23/89	10:57-11:02	10:44-10:46	11	0.2	0.0	0.3	0.0	00.1	0.0	
100 L	11/23/89	10:51-10:56	10:39-10:41	10	0.2	0.3	1.0	0.0	00.2	0.0	
2400 +25											
00 R	11/07/89	11:28-	11:16-11:18	10	0.6	0.6	2.0	2.0	>97.5	0.0	
50 R	11/07/89	11:17-11:20	11:05-11:07	10	0.9	0.9	0.0	0.0	>99.3	0.0	
100 R	11/07/89	11:09-11:12	10:57-10:59	10	3.2	10.6	6.0	FO	>99.5	0.0	
150 R	11/07/89	10:55-11:01	10:43-10:45	10	1.3	10.8	0.0	1.8	>99.1	0.0	
200 R	11/07/89	10:50-10:54	10:38-10:40	10	2.1	7.3	0.0	FO	>99.3	0.0	
250 R	11/07/89	10:45-10:48	10:33-10:35	10	2.0	0.0	0.0	FO	<00.1	0.0	
300 R	-	-	-	-	-	-	-	-	-	-	NO DATA COLLECTED AT THIS LOCATION
350 R	11/07/89	15:13-15:16	15:01-15:03	10	3.0	10.0	0.0	0.0	00.0	0.0	
400 R	11/07/89	15:19-15:22	15:07-15:09	10	3.0	4.3	0.0	0.0	00.0	0.0	
450 R	11/07/89	15:24-15:28	15:11-15:13	11	2.9	10.8	0.0	0.0	00.0	0.0	
50 L	11/08/89	12:25-12:27	12:09-12:11	14	11.8	15.4	0.5	0.0	<01.0	<0.1	
50 L	11/23/89	10:29-10:35	10:12-10:14	15	0.0	0.0	2.0	0.6	00.1	0.0	RESAMPLED DUE TO INSTRUMENT MALFUNCTION ON 11/08
100 L	11/23/89	10:35-10:41	10:18-10:20	15	0.0	0.0	0.8	0.8	00.0	0.0	
150 L	11/23/89	-	-	-	-	-	-	-	-	-	WATER AT SURFACE, NO SAMPLE TAKEN
2400 +75											
00 R	11/07/89	12:23-12:26	12:11-12:13	10	1.2	6.0	0.0	0.0	00.0	0.0	
50 R	11/07/89	11:35-11:38	11:23-11:25	10	2.0	4.4	0.0	0.0	>99.4	0.0	
100 R	11/07/89	11:45-	11:33-11:35	10	2.0	6.4	0.5	0.5	>97.5	0.0	
150 R	11/07/89	11:40-11:52	11:36-11:38	12	2.1	20.0	3.0	3.5	00.0	0.0	
200 R	11/07/89	11:53-11:57	11:39-11:41	12	0.3	1.4	0.0	FO	00.0	0.0	
250 R	11/07/89	11:58-12:01	11:43-11:45	13	0.1	0.2	0.0	6.6	00.0	0.0	
300 R	11/07/89	15:43-	15:31-15:33	10	3.2	9.8	0.0	620.0	00.0	0.0	
350 R	11/07/89	15:37-15:41	15:25-15:27	10	4.0	16.8	0.0	12.0	00.0	0.0	
400 R	11/07/89	15:31-15:35	15:19-15:21	10	3.0	12.6	0.0	FO	00.0	0.0	
50 L	11/08/89	12:18-12:20	12:06-12:08	10	11.4	13.0	0.0	1.0	00.4	<0.1	
50 L	11/23/89	10:19-10:27	10:07-10:09	10	0.4	0.5	1.0	1.0	00.0	0.0	RESAMPLED DUE TO INSTRUMENT MALFUNCTION ON 11/08

APPENDIX C
HERTEL LANDFILL REMEDIAL INVESTIGATION

SOIL GAS SURVEY RESULTS

					INSTRUMENT READINGS						
STATION #	DATE	SAMPLE TIME	PURGE TIME	EQUILIBRIUM PERIOD (min)	HNU (ppm) BKGRD	HNU (ppm) READING	OVA (ppm) BKGRD	OVA (ppm) READING	% LEL	H2S (ppm)	COMMENTS
2500 +25											
350 R	11/7/89	15:53-15:56	15:39-15:41	12	4.4	16.2	2.5	900.0	00.1	0.0	
400 R	11/7/89	15:57-16:00	15:44-15:46	11	4.0	0.8	4.5	FO	00.1	0.0	
2500 +75											
350 R	11/7/89	16:02-	15:49-15:51	11	3.0	4.6	0.0	FO	00.0	0.0	

FO = FLAME OUT-UNABLE TO RECORD MEASUREMENT AS CONCENTRATION OF ORGANIC VAPORS EXCEEDED 1000 PPM AND EXTINQUISHED THE INSTRUMENT'S FLAME.

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX D

TEST PIT LOGS

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX D

TEST PIT LOGS

This appendix contains logs which describe the materials encountered and observations made during the test pit excavation. A total of seven exploratory test pits ("EP-") were excavated to determine the extent of fill. Eighteen other test pits ("TP-") were excavated to examine and characterize the fill in and around the identified disposal areas.

Typical Test Pit Log Description Items

- Test pit dimensions in feet
- Ambient air monitoring results
- Sample types and identification
- Geologic descriptions:

  Color: as observed

  Predominant grain size: clay, silt, sand (VF = very fine, F = fine, M = medium, C = coarse), gravel, cobbles, boulders, listed in capital letters (i.e., SILT).

  Secondary grain size: listed with estimate of one of the following proportions: "trace" (0-10%); "little" (10-20%); "some" (20-35%); "and" (35-50%).

- Other observations: presence of trash and types of waste; staining, sheen on water, depth to water, depth to base of fill.

THIS PAGE INTENTIONALLY LEFT BLANK

TEST PIT NO. EP-1

Site Name/Location: Hertel Landfill, Plattekill, NY

Rationale: Exploratory excavation near edge of known landfill area.

Date: December 7, 1989

Dimensions L X W X D (feet): 10.0 x 5.0 x 10.7

Location (NY State Grid): 614480 N, 580499 E

Ground Elevation (ft. above msl): 639.3

TAMS/TRC Inspectors: B. Penn, R. Remuglia, G. Murray.

Excavation Subcontractor: enroserv, inc., Daniel McCarthy (operator).

Background Instrument Readings: HNu – 0.0, LEL – 0.2, H2S – 000.

Sample types and ID number: No samples were collected.

DEPTH (ft. below grade)	DESCRIPTION (material, instrument readings)
0.0 – 0.5	Dark brown to black TOPSOIL, roots. Instrument readings at background levels.
0.5 – 2.5	Brown SILT, some f. sand, trace to little gravel. Instrument readings at background levels.
2.5 – 10.7	Dark brown F. SAND, little silt, little m. sand, trace gravel /boulders. Instrument readings at background levels.

CONCLUSION

There was no evidence of landfill activities at this location.
Native soils consisting of sand, silt and gravel were observed.

TEST PIT NO. EP-2

Site Name/Location: Hertel Landfill, Plattekill, NY

Rationale: Exploratory excavation to south of known landfill area.

Date: December 7, 1989

Dimensions L X W X D (feet): 10.0 x 5.0 x 6.3

Location (NY State Grid): 614090 N, 580304 E

Ground Elevation (ft. above msl): 643.2

TAMS/TRC Inspectors: R. Remuglia, B. Penn, G. Murray.

Excavation Subcontractor: enroserv, inc., Daniel McCarthy (operator).

Background Instrument Readings: HNu – 0.2, LEL – 0.2, H2S – 000.

Sample types and ID number: No samples collected.

DEPTH (ft. below grade)	DESCRIPTION (material, instrument readings)
0.0 – 1.0	Dark brown to black TOPSOIL, roots. Instrument readings at background levels.
1.0 – 3.4	Light brown F. SAND, little gravel/boulders, trace silt, loose to medium, damp. Instrument readings at background levels.
3.4 – 6.3	Green to light brown F. SAND and SILT, some m. gravel, layering and mottling present, medium dense, wet at 5.0'. Instrument readings at background levels.

CONCLUSION

There was no evidence of landfilling activities at this location.
Native soils consisting of sand, silt and gravel were observed.
A piezometer (EP-2) was installed in this excavation.

TEST PIT NO. EP-3

Site Name/Location: Hertel Landfill, Plattekill, NY

Rationale: Exploratory excavation away from known landfill area.

Date: December 6, 1989

Dimensions L X W X D (feet): 10.0 x 5.0 x 12.0

Location (NY State Grid): 613192 N, 580491 E

Ground Elevation (ft. above msl): 667.2

TAMS/TRC Inspectors: B. Penn, R. Remuglia, G. Murray.

Excavation Subcontractor: enroserv, inc., Daniel McCarthy (operator).

Background Instrument Readings: HNu – 0.0, LEL – 0.1, H2S – 002.

Sample Type and ID Number: No samples were collected.

DEPTH (ft. below grade)	DESCRIPTION (material, instrument readings)
0.0 – 2.0	Black TOPSOIL, root mass, 0–4"; Yellow-brown SILT and F. SAND, trace clay, gravel, boulders, loose. moist. Instrument readings at background levels.
2.0 – 6.0	Brown to orange-brown F. SAND, little gravel grading to boulders, trace to little silt, trace m. sand, blocky, medium dense, dry. Instrument readings at background levels.
6.0 – 12.0	Brown F. SAND, some to little gravel (angular to rounded), trace silt, m. sand, medium dense, moist at 9.0'. Water collecting at approximately 1.5' above bottom of pit.

CONCLUSION

There was no evidence of landfill activities observed at this location. Native soils consisting of sand, silt and gravel were observed.

TEST PIT NO. EP–4

Site Name/Location: Hertel Landfill, Plattekill, NY

Rationale: Exploratory excavation away from known landfill area.

Date: December 6, 1989

Dimensions L X W X D (feet): 10.0 x 5.0 x 7.7

Location (NY State Grid): 613224 N, 580109 E

Ground Elevation (ft. above msl): 658.1

TAMS/TRC Inspectors: B. Penn, R. Remuglia, G. Murray.

Excavation Subcontractor: enroserv, inc., Daniel McCarthy (operator).

Background Instrument Readings: HNu – 0.0, LEL – 0.1, H2S – 002.

Sample Type and ID Number: No samples were collected.

DEPTH (ft. below grade)	DESCRIPTION (material, instrument readings)
0.0 – 1.33	Black TOPSOIL, roots, 0–4"; Brown to orange–brown F. SAND, little silt, trace clay. Instrument readings at background levels.
1.33 – 4.0	Green–gray F. SAND, little gravel grading to boulders, little silt, m. sand mottled brown, medium dense, damp. Instrument readings at background levels.
4.0 – 7.7	Brown F. SAND, little gravel to boulders, little f. sand, trace silt, medium, moist at 6.0'. Water entering in test pit at 6.5'.

CONCLUSION

There was no evidence of landfilling activities observed at this location. Native soils consisting of sand, silt and gravel were observed. A piezometer (EP–4) was installed in the excavation. Attempts to collect Shelby tubes were unsuccessful.

TEST PIT NO. EP-5

Site Name/Location: Hertel Landfill, Plattekill, NY

Rationale: Exploratory excavation to south of known landfill area.

Date: December 7, 1989

Dimensions L X W X D (feet): 10.0 x 5.0 x 8.6

Location (NY State Grid): 613820 N, 580367 E

Ground Elevation: 647.1

TAMS/TRC Inspectors: B. Penn, R. Remuglia, G. Murray.

Excavation Subcontractor: enroserv, inc., Daniel McCarthy (operator).

Background Instrument Readings: HNu – 0.1, LEL – 0.1, H2S – 000.

Sample Type and ID Number: No samples were collected.

DEPTH (ft. below grade)	DESCRIPTION (material, instrument readings)
0.0 – 1.8	Black TOPSOIL, roots, and boulders. Instrument readings at background levels.
1.8 – 5.5	Green–gray F. SAND, trace gravel/boulders, silt, m. sand, medium dense, damp. Instrument readings at background levels.
5.5 – 8.5	Brown F. SAND, little to trace c. sand, tr. silt, tr. gravel/boulders, medium dense, wet at 7.8'. Instrument readings at background levels.

CONCLUSION

There was no evidence of landfill activities observed at this location. Native soils consisting of sand, silt and gravel were observed. A piezometer (EP-5) was installed in this excavation.

TEST PIT NO. EP-6

Site Name/Location: Hertel Landfill, Plattekill, NY

Rationale: Exploratory excavation to west of known landfill area.

Date: December 8, 1989

Dimensions L X W X D (feet): 10.0 x 5.0 x 8.9

Location (NY State Grid): 614847 N, 579909 E

Ground Elevation (ft. above msl): 678.3

TAMS/TRC Inspectors: B. Penn, R. Remuglia, G. Murray.

Excavation Subcontractor: enroserv, inc., Daniel McCarthy (operator).

Background Instrument Readings: HNu – 0.4, LEL – 0.0, H2S – 000.

Sample types and ID number: No samples were collected.

DEPTH (ft. below grade)	DESCRIPTION (material, instrument readings)
0.0 – 0.5	Dark brown to black TOPSOIL, roots. Instrument readings at background levels.
0.5 – 2.8	Brown to orange–brown F. SAND, little to trace silt, little gravel /boulders, trace m. to c. sand, medium dense, dry. Instrument readings at background levels.
2.8 – 8.9	Brown F. to C. SAND, trace silt, trace gravel/boulders, medium dense, damp. Instrument readings at background levels.
	Cannot advance beyond 8.9 feet due to large boulders at bottom and sides of test pit.

CONCLUSION

There was no evidence of landfill activities observed at this location. Native soils consisting of sand, silt and gravel were observed.

TEST PIT NO. EP-7

Site Name/Location: Hertel Landfill, Plattekill, NY

Rationale: Exploratory excavation to west of known landfill area.

Date: December 8, 1989

Dimensions L X W X D (feet): 10.0 x 5.0 x 9.7

Location (NY State Grid): 615125 N, 580139 E

Ground Elevation (ft. above msl): 681.1

TAMS/TRC Inspectors: R. Remuglia, B. Penn, G. Murray.

Excavation Subcontractor: enroserv, inc., Daniel McCarthy (operator).

Background Instrument Readings: HNu – 0.3, LEL – 0.2, H2S – 000.

Sample types and ID number: No samples were collected.

DEPTH (ft. below grade)	DESCRIPTION (material, instrument readings)
0.0 – 0.5	Dark brown to black TOPSOIL, roots. Instrument readings at background levels.
0.5 – 3.2	Light brown V.F. SAND, little m.–c. gravel/boulders, trace silt, medium dense. Instrument readings at background levels.
3.2 – 9.7	Brown F. to C. SAND, little gravel/boulders, medium dense, moist. Instrument readings at background levels.

CONCLUSION

There was no evidence of landfill activities observed at this location. Native soils consisting of sand, silt and gravel were observed.

TEST PIT NO. TP-1

Site Name/Location: Hertel Landfill, Plattekill, NY

Rationale: Test pit in paint waste area (disposal area #7)

Date: December 11, 1989

Dimensions L X W X D (feet): 10.0 x 5.0 x 11.9

Location (NY State Grid): 614816 N, 580849 E

Ground Elevation (ft. above msl): 622.5

TAMS/TRC Inspectors: B. Penn, C. Doak, G. Murray.

Excavation Subcontractor: enroserv, inc., Daniel McCarthy (operator).

Background Instrument Readings: HNu – 0.4, LEL – 0.1, H2S – 000.

Sample types and ID number: Soil sample: TP-1, 2.0'-3.0' below grade.
Waste sample: W-1, composite of waste pile excavated from test pit.

DEPTH (ft. below grade)	DESCRIPTION (material, instrument readings)
0.0 – 0.33	Brown TOPSOIL, roots.
0.33 – 1.6	Gray to red FILL – paint waste material, hardened, other mottled colors, 1-2 gallon capacity metal cans, crushed; Instrument readings, except HNu at background levels. HNu – 20.
1.6 – 2.8	Green-gray M. SAND, trace gravel, trace silt.
2.8 – 10.4	FILL – consisting of garbage, plastic bottles, metal debris, rubber tires. Only H2S at background level. HNu – 60, LEL – 0.9.
10.4 – 11.9	Brown SILT, trace f. sand, gravel, clay, trace white gastropod shells, upper 1.5 – 2.0" black-stained, spongy, peat-like.

CONCLUSION

Surficial paint waste deposits did not extend beyond 2.0' below grade, The paint deposits are underlain by typical municipal landfill-type wastes. Thickness of fill is 10.4 feet.

TEST PIT NO. TP–2

Site Name/Location: Hertel Landfill, Plattekill, NY

Rationale: Test pit in paint waste area (disposal area #7)

Date: December 12, 1989

Dimensions L X W X D (feet): 10.0 x 5.0 x 11.2

Location (NY State Grid): 614963 N, 580891 E

Ground Elevatiom (ft. above msl): 623.7

TAMS/TRC Inspectors: B. Penn, C. Doak, D. McCabe

Excavation Subcontractor: enroserv, inc., Daniel McCarthy (operator).

Background Instrument Readings: HNu – 0.2, LEL – 0.1, H2S – 000.

Sample types and ID number: Soil sample: TP–2, 2.0'–3.0' below grade.
Ground water sample: TP–2.

DEPTH (ft. below grade)	DESCRIPTION (material, instrument readings)
0.0 – 0.66	Brown TOPSOIL, roots, 0–5"; Brown SILT and F.SAND, trace gravel.
0.66 – 0.92	Green–gray F–M SAND, little to trace gravel, trace silt, trace paint waste.
0.92 – 10.6	FILL – landfill debris consisting of household refuse, and wood, plastic, glass, rubber, metal. Crushed 55–gallon drum observed at 4.0' below grade, much metal debris at 7.0', wet at 10.3'. Only H2S at background level. HNu–0.6, LEL–14.0. Elevated LEL concentrations were abated to safer levels (1.0–1.5).
10.6 – 11.2	Brown PEAT, many wood and plant fragments.

CONCLUSION

Little evidence of paint waste deposits extending this far to the north were observed. Material encountered was typical municipal landfill–type wastes. The thickness of fill is 10.6 feet.

TEST PIT NO. TP-3

Site Name/Location: Hertel Landfill, Plattekill, NY

Rationale: Test pit adjacent to oil-stained surface soils (disposal area #3)

Date: December 13, 1989

Dimensions L X W X D (feet): 10.0 x 5.0 x 12.0

Location (NY State Grid): 615112 N, 580764 E

Ground Elevation (ft above msl): 629.5

TAMS/TRC Inspectors: B. Penn, C. Doak, D. McCabe

Excavation Subcontractor: enroserv, inc., Daniel McCarthy (operator).

Background Instrument Readings: HNu - 0.4, LEL - 0.1, H2S - 000.

Sample types and ID number: Soil sample: TP-3, 12.0' below grade.

DEPTH (ft. below grade)	DESCRIPTION (material, instrument readings)
0.0 - 0.5	Brown TOPSOIL, roots.
0.5 - 1.7	Green-gray SAND and GRAVEL. Only H2S at background level. HNu-0.3, LEL-0.2.
1.7 - 3.7	Brown SAND, SILT and GRAVEL, some garbage debris including 1-gallon metal cans. Only H2S at background level. HNu - 0.3, LEL - 0.6.
3.7 - 12.0	FILL - consisting of household refuse, plastic, glass, wood, metal, cardboard, wet at 10.5'. Instrument readings as follows: HNu - 0.9 (at 5.0' below grade), LEL - 0.3, H2S - 001.

CONCLUSION

There was no evidence of drums or other materials that might possibly be related to the surficial oil-staining in disposal area #3. Typical municipal landfill-type deposits were observed. Thickness of fill is 12 feet at a minimum. Slumping of test pit walls during excavation precluded the advancement beyond 12.0' below grade.

TEST PIT NO. TP–4

Site Name/Location: Hertel Landfill, Plattekill, NY

Rationale: Test pit in disposal area #6.

Date: December 14, 1989

Dimensions L X W X D (feet): 10.0 x 5.0 x 16.5

Location (NY State Grid):615004 N, 580724 E

Ground Elevation (ft. above msl): 629.5

TAMS/TRC Inspectors: C. Doak, B. Penn, D. McCabe

Excavation Subcontractor: enroserv, inc., Daniel McCarthy (operator).

Background Instrument Readings: HNu – 0.1, LEL – 0.0, H2S – 001.

Sample types and ID number: Soil sample: TP–4, 16.5' below grade.

DEPTH (ft. below grade)	DESCRIPTION (material, instrument readings)
0.0 – 1.5	Brown TOPSOIL, roots, 0–12"; Gray–green F–M SAND, trace silt, trace cobbles. Instrument readings at background levels, except HNU. HNu – 1.5.
1.5 – 15.5	FILL – municipal landfill and household refuse, wire, soil, cardboard, cloth, boulders. Only HNu at background level. Instrument readings as follows: LEL – 0.4, H2S – 001.
15.5 – 16.5	Green–gray FINE SAND, trace silt.

CONCLUSION

Typical muncipal landfill–type wastes were observed in this area. Thickness of fill deposit is 15.5 feet.

TEST PIT NO. TP-5

Site Name/Location: Hertel Landfill, Plattekill, NY

Rationale: Test pit to the west of paint waste area (disposal area #7)

Date: December 13, 1989

Dimensions L X W X D (feet): 10.0 x 5.0 x 11.2

Location (NY State Grid): 614897 N, 580824 E

Ground Elevation (ft above msl): 623.6

TAMS/TRC Inspectors: B. Penn, C. Doak, D. McCabe

Excavation Subcontractor: enroserv, inc., Daniel McCarthy (operator).

Background Instrument Readings: HNu – 0.2, LEL – 0.3, H2S – 001.

Sample types and ID number: No samples were collected.

DEPTH (ft. below grade)	DESCRIPTION (material, instrument readings)
0.0 – 0.4	Brown TOPSOIL, roots. Instrument readings at background levels.
0.4 – 10.2	FILL – household refuse consisting of plastic, glass, wood, metal, cardboard, wet at 10.5'. Instrument readings as follows: HNu – 10.0 (at 10' below grade), LEL – 0.2, H2S – 001.
10.2 – 11.2	Brown PEAT.

CONCLUSION

No evidence of paint waste was observed extending to this location to the west of disposal area #7. Only typical municipal landfill–type household debris was observed at this location. The thickness of fill is 10.2 feet.

TEST PIT NO. TP-6

Site Name/Location: Hertel Landfill, Plattekill, NY

Rationale: Test pit to west of paint waste area (disposal area #7)

Date: December 14, 1989

Dimensions L X W X D (feet): 10.0 x 5.0 x 11.0

Location (NY State Grid): 614789 N, 580751 E

Ground Elevation (ft. above msl): 626.1

TAMS/TRC Inspectors: B. Penn, C. Doak, D. McCabe

Excavation Subcontractor: enroserv, inc., Daniel McCarthy (operator).

Background Instrument Readings: HNu - 0.1, LEL - 0.1, H2S - 001.

Sample types and ID number: No samples were collected.

DEPTH (ft. below grade)	DESCRIPTION (material, instrument readings)
0.0 - 0.25	Brown TOPSOIL, roots. Instrument readings at background levels.
0.25 - 1.2	Brown F. SAND and SILT, trace gravel. HNu -1.0, LEL - 0.1, H2S - 000.
1.2 - 10.0	FILL - household refuse consisting of plastic bags, metal, plastic, wood, (lumber at 8.0'), wet at 8.0'. Instrument readings at background levels, except LEL - 1.9 (9.0'-10.0' below grade), LEL levels dropped quickly.
10.0 - 11.0	Brown PEAT, plant fragments.

CONCLUSION

No evidence of paint waste was observed extending to this location, to the west of disposal area #7. Only typical municipal landfill-type household debris was noted at this location. The thickness of fill is 10.0 feet.

TEST PIT NO. TP-7

Site Name/Location: Hertel Landfill, Plattekill, NY

Rationale: Test pit in paint waste area (disposal area #7)

Date: December 15, 1989

Dimensions L X W X D (feet): 10.0 x 8.0 x 12.0

Location (NY State Grid): 614720 N, 580755 E

Ground Elevation (ft. above msl): 624.6

TAMS/TRC Inspectors: B. Penn, C. Doak, D. McCabe

Excavation Subcontractor: enroserv, inc., Daniel McCarthy (operator).

Background Instrument Readings: HNu - 0.1, LEL - 0.1, H2S - 001.

Sample types and ID number: Ground water sample: TP-7, collected from water at bottom of test pit.
Soil sample: TP-7, 4.0'-6.0' below grade.

DEPTH (ft. below grade)	DESCRIPTION (material, instrument readings)
0.0 - 1.5	Red-gray hardened paint-like material. HNu - 110, LEL - 0.4, H2S - 1.0.
1.5 - 4.0	FILL - municipal/industrial debris consisting of tires, cloth, plastic, wood. Only H2S at background level. HNu - 35, LEL - 0.3.
4.0 - 6.0	Blue-gray F. to M. SAND, little gravel, silt.
6.0 - 10.0	FILL - municipal waste, wet at approximately 9.0'. Only H2S at background level. HNu - 8, LEL - 0.3.
10.0 - 12.0	Brown PEAT, plant and root fragments.

CONCLUSION

Surficial paint waste deposits did not extend beyond 1.5 ft below grade. The paint waste deposits are underlain by typical municipal landfill-type materials. Approximate thickness of fill is 10.0 feet.

TEST PIT NO. TP-8

Site Name/Location: Hertel Landfill, Plattekill, NY

Rationale: Test pit in disposal area #1

Date: December 15, 1989

Dimensions L X W X D (feet): 10.0 x 5.0 x 5.0

Location (NY State Grid): 615487 N, 581156 E

Ground Elevation (ft. above msl): 615.1

TAMS/TRC Inspectors: B. Penn, C. Doak, D. McCabe

Excavation Subcontractor: enroserv, inc., Daniel McCarthy (operator)

Background Instrument Readings: HNu – 0.2, LEL – 0.2, H2S – 000.

Sample types and ID number: Leachate sample: TP-8, collected from water at bottom of test pit.
Soil sample: TP-8, 2.0'-3.0' below grade.

DEPTH (ft. below grade)	DESCRIPTION (material, instrument readings)
0.0 – 1.0	Topsoil and root zone.
1.0 – 2.0	Red-brown F. to M. SAND, trace silt.
2.0 – 3.5	Gray-brown F. to M. SAND, trace silt. Instruments readings at background levels.
3.5 – 4.5	Brown PEAT.
4.5 – 5.0	Gray-green F. SAND. Instruments readings at background levels.

CONCLUSION

Surficial waste material did not extend below grade. Thickness of fill is zero. This disposal area appears to be outside of the area of landfill activities.

TEST PIT NO. TP-9

Site Name/Location: Hertel Landfill, Plattekill, NY

Rationale: Test pit to south of observed surficial paint waste (disposal area #7) at center of subsurface magnetic anomaly.

Date: December 15, 1989

Dimensions L X W X D (feet): 15.0 x 8.0 x 10.8

Location (NY State Grid): 614615 N, 580623 E

Ground Elevation (ft. above msl): 627.9

TAMS/TRC Inspectors: B. Penn, C. Doak, D. McCabe

Excavation Subcontractor: enroserv, inc., Daniel McCarthy (operator).

Background Instrument Readings: HNu - 0.2, LEL - 0.3, H2S - 000.

Sample types and ID number: No samples were collected.

DEPTH (ft. below grade)	DESCRIPTION (material, instrument readings)
0.0 - 1.8	Brown TOPSOIL, underlain by green-gray SAND and GRAVEL. Instrument readings at background levels.
1.8 - 4.0	FILL - municipal garbage consisting of household debris, clothing, rigid plastic strips, cardboard. Instrument readings at background levels, except H2S - 6.0.
4.0 - 5.0	Green-gray SAND and GRAVEL.
5.0 - 10.8	FILL - municipal garbage and debris as above, one flattened 55 gal drum (unlabelled) located at 6.0'.
10.8	Green-gray SILT, trace clay, f. sand.

CONCLUSION

No evidence of paint waste extending to this area at or below grade was observed. Waste material was typical municipal landfill-type wastes. No evidence for the magnetic anomaly reported in this area was observed. The thickness of fill is 10.8'.

TEST PIT NO. TP-10

Site Name/Location: Hertel Landfill, Plattekill, NY

Rationale: Test pit at edge of disposal area #3 in center of buried magnetic anomaly. Empty drums located on the surface in this area.
Date: December 19, 1989

Dimensions L X W X D (feet): 20.0 x 10.0 x 6.0.

Location (NY State Grid): 615107 N, 5805525 E

Ground Elevation (ft. above msl): 622.3

TAMS/TRC Inspectors: B. Penn, C. Doak, S. Panter.

Excavation Subcontractor: enroserv, inc., Daniel McCarthy (operator).

Background Instrument Readings: HNu – 0.1, LEL – 0.0, H2S – 001.

Sample types and ID number: Waste sample: TP-10, composite collected from 2.0'–5.0' below grade.

DEPTH (ft. below grade)	DESCRIPTION (material, instrument readings)
0 – 1.5	Brown F. SAND and SILT, tr. gravel, garbage. All instrument readings at background levels.
1.5 – 5.0	FILL – municipal landfill debris consisting of household debris, plastic strips, wood, cardboard, small metal pipes. Instrument readings at background levels.
5.0 – 6.0	Brown PEAT (thin layer), underlain by gray–green SILT, trace pebbles, clay, wet.

CONCLUSION

Typical municipal landfill–type wastes were observed in this area.
No evidence for the magnetic anomaly reported in this area was observed.
Thickness of fill is 5.0 feet.

TEST PIT NO. TP-11

Site Name/Location: Hertel Landfill, Plattekill, NY

Rationale: Test pit at edge of disposal area #3 in center of
subsurface magnetic anomaly.
Date: December 19, 1989

Dimensions L X W X D (feet): 15.0 x 8.0 x 17.0

Location (NY State Grid): 625344 N, 580795 E

Ground Elevation (ft. above msl): 640.5

TAMS/TRC Inspectors: C. Doak, S. Panter, R. Remuglia.

Excavation Subcontractor: enroserv, inc., Daniel McCarthy (operator).

Background Instrument Readings: HNu - 0.0, LEL - 0.2, H2S - 001.

Sample types and ID number: Waste sample, TP-11, composite of debris.
Soil sample: TP-11, 17.0' below grade.

DEPTH (ft. below grade)	DESCRIPTION (material, instrument readings)
0 - 0.5	Brown TOPSOIL, wood and rocks.
0.5 - 16.5	FILL– municipal landfill, household debris, tires, wood, cloth, cardboard, paint can. Highest instrument readings at depth. Instrument readings as follows: HNu - 0.6 (12.0' below grade), LEL - 2.1 (8.5' below grade), H2S– at background level.
16.5 - 17.0	Gray–green F. to M. SAND, trace silt, moist.

CONCLUSION

Typical municipal landfill–type wastes at this area. No evidence for magnetic anomaly reported in this area was observed. Thickness of fill deposits is 16.5'.

TEST PIT NO. TP–12

Site Name/Location: Hertel Landfill, Plattekill, NY

Rationale: Test pit to investigate subsurface magnetic anomaly to east of disposal area #5.
Date: December 20, 1989

Dimensions L X W X D (feet): 15.0 x 8.0 x 16.0.

Location (NY State Grid): 614879 N, 580358 E

Ground Elevation (ft. above msl): 656.1

TAMS/TRC Inspectors: S. Panter, R. Remuglia, E. Kolm.

Excavation Subcontractor: enroserv, inc., Daniel McCarthy (operator).

Background Instrument Readings: HNu – 0.4, LEL – 0.1, H2S – 002.

Sample types and ID number: Soil sample: TP–12, 6.0' below grade.

DEPTH (ft. below grade)	DESCRIPTION (material, instrument readings)
0 – 2.0	Brown SILT, some clay, rocks.
2.0 – 16.0	FILL – municipal landfill, household debris, plastic, wood, cloth, aluminum sheet metal and light steel (2.0'– 3.0'), cardboard, some soil mixed in at 6 ft, steel pipe and heavy sheet metal and strip steel at 6.0 – 7.0'. Highest instrument readings at depth. Instrument readings are as follows: LEL – 1.7 (3.0'–5.0' below grade), H2S – 003 (6.0' – 14.0' below grade).

CONCLUSION

Typical municipal landfill–type wastes at this area. Metal debris observed within fill is likely explanation magnetic anomaly. Thickness of fill deposits is 16.0' at a minimum.

TEST PIT NO. TP-13

Site Name/Location: Hertel Landfill, Plattekill, NY

Rationale: Test pit to investigate subsurface magnetic anomaly
in vicinity of disposal area #4.
Date: December 20, 1989

Dimensions L X W X D (feet): 20.0 x 8.0 x 14.0.

Location (NY State Grid): 615163 N, 580390 E

Ground Elevation (ft. above msl): 652.4

TAMS/TRC Inspectors: S. Panter, R. Remuglia, E. Kolm.

Excavation Subcontractor: enroserv,inc., Daniel McCarthy (operator)

Background Instrument Readings: HNu – 0.2, LEL – 0.2, H2S – 003.

Sample types and ID number: Soil sample: TP-13, 13.5' below grade.

DEPTH (ft. below grade)	DESCRIPTION (material, instrument readings)
0 – 1.0	Brown-gray SILT, some clay, f. sand.
1.0 – 13.5	FILL – municipal landfill, household debris, plastic, glass, aluminum cans, some steel/tin, metal cans, green-gray silt and clay (1.0'– 7.0' below grade), paper. Highest instrument readings at depth. Instrument readings as follows: HNu – 3.0 (7.0'– 12.0' below grade), LEL – 1.4 (7.0'– 12.0' below grade), H2S – at background level.
13.5 – 14.0	Green-gray M. SAND, little to some silt, gravel, tr. clay, dry.

CONCLUSION

Typical municipal landfill-type wastes observed in this area. Metal debris observed within fill is possible explanation for magnetic anomaly identified within this area. Thickness of fill deposits is 13.5'.

TEST PIT NO. TP-14

Site Name/Location: Hertel Landfill, Plattekill, NY

Rationale: Test pit to investigate subsurface magnetic anomaly identified outside of the designated disposal areas.

Date: December 21, 1989

Dimensions L X W X D (feet): 15.0 x 8.0 x 6.0.

Location (NY State Grid): 614756 N, 580238 E

Ground Elevation (ft. above msl): 666.5

TAMS/TRC Inspectors: S. Panter, R. Remuglia, E. Kolm.

Excavation Subcontractor: enroserv, inc., Daniel McCarthy (operator).

Background Instrument Readings: HNu – 0.4, LEL – 0.2, H2S – 003.

Sample types and ID number: No samples were collected.

DEPTH (ft. below grade)	DESCRIPTION (material, instrument readings)
0 – 0.5	Brown SILT.
0.5 – 5.0	FILL– municipal and household refuse consisting of brown silt, some stones, stones, wood and plastic. Crushed steel drum at 2.0'. Instrument readings at background levels.
5.0 – 6.5	FILL – municipal and household refuse consisting of green–gray sand and silt mixed with garbage and wood. Garbage diminishing at this point. Ground water seepage at this point. Localized perched layer? Excavation halted.

CONCLUSION

Typical municipal landfill–type wastes were observed at this area. No metal debris observed within fill to explain magnetic anomaly identified in this area. Thickness of fill deposits is 6.5' at a minimum.

TEST PIT NO. TP–15

Site Name/Location: Hertel Landfill, Plattekill, NY

Rationale: Test pit to investigate subsurface magnetic anomaly
identified within the paint waste disposal area (area #7).

Date: December 21, 1989

Dimensions L X W X D (feet): 20.0 x 8.0 x 14.0.

Location (NY State Grid): 614922 N, 580883 E

Ground elevation (ft. above msl): 623.3

TAMS/TRC Inspectors: S. Panter, R. Remuglia, E. Kolm.

Excavation Subcontractor: enroserv, inc., Daniel McCarthy (operator).

Background Instrument Readings: HNu – 0.0, LEL – 0.1, H2S – 002.

Sample types and ID number: Ground water sample: TP–15.

DEPTH (ft. below grade)	DESCRIPTION (material, instrument readings)
0 – 1.0	Brown to green–gray SILT and SAND, some debris including a crushed drum. H2S and LEL at background levels, HNu – 0.4.
1.0 – 13.0	FILL – municipal landfill and household refuse consisting of plastic, metal pipes and metal sheeting (1.0' – 3.0' below grade), crushed steel drum (3.0' – 4.0' below grade), brown silt (4.0' – 8.0' below grade. Instrument readings as follows: HNu – O.4, LEL – 0.3, H2S – 003.
13.0 – 14.0	Brown PEAT and SILT.

CONCLUSION

Typical municipal landfill–type wastes observed at this area. Metal debris observed within fill is possible explanation for magnetic anomaly identified in this area. Thickness of fill deposits is 13.0'.

TEST PIT NO. TP–16

Site Name/Location: Hertel Landfill, Plattekill, NY

Rationale: Test pit to investigate subsurface magnetic anomaly identified outside of any of the designated disposal areas.
Date: December 20, 1989

Dimensions L X W X D (feet): 20.0 x 8.0 x 14.0.

Location (NY State Grid): 614796 N, 580372 E

Ground Elevation (ft. above msl): 654.9

TAMS/TRC Inspectors: S. Panter, R. Remuglia, E. Kolm.

Excavation Subcontractor: enroserv, inc., Daniel McCarthy (operator).

Background Instrument Readings: HNu – 0.2, LEL – 0.2, H2S – 003.

Sample types and ID number: Soil sample: TP–16, 3.5' – 5.0' below grade.

DEPTH (ft. below grade)	DESCRIPTION (material, instrument readings)
0 – 1.0	Brown SILT, little sand.
1.0 – 3.0	Brown SILT, little sand, mixed with wood, concrete, metal pipe, and crushed hot water heater. HNu and H2S at background levels, LEL – 0.8.
3.0 – 5.0	Red–brown matted ROOTS (3.0' – 3.5' below grade); green–gray M. SAND and SILT, little clay, some gravel, mixed with household refuse, paper, metal pipe.
5.0 – 14.0	FILL – municipal landfill, household debris, plastic, glass, mixed with green–gray sand. Instrument readings at 12.0' below grade as follows: HNu – 2, LEL – 0.6, H2S – 003.

CONCLUSION

Typical municipal landfill–type wastes observed at this area. Metal debris observed within fill is possible explanation for magnetic anomaly. Thickness of fill deposits is 14.0' at a minimum.

TEST PIT NO. TP-17

Site Name/Location: Hertel Landfill, Plattekill, NY

Rationale: Test pit to investigate subsurface magnetic anomaly identified outside of any of the designated disposal areas.
Date: December 21, 1989

Dimensions L X W X D (feet): 20.0 x 8.0 x 16.0.

Location (NY State Grid): 614650 N, 580315 E

Ground Elevation (ft. above msl): 654.9

TAMS/TRC Inspectors: S. Panter, R. Remuglia.

Excavation Subcontractor: enroserv, inc., Daniel McCarthy (operator).

Background Instrument Readings: HNu – 0.4, LEL – 0.7, H2S – 003.

Sample types and ID number: No samples were collected.

DEPTH (ft. below grade)	DESCRIPTION (material, instrument readings)
0 – 0.5	Brown SILT, some f. sand.
0.5 – 5.0	FILL – green-gray sand and silt mixed with wood and metal pieces, plastic and ash. Instrument readings as follows: HNu – 1.0, LEL – 0.8, H2S – 003.
5.0 – 16.0	FILL – municipal landfill type waste and household refuse. 16.0' is maximum reach of backhoe without benching. Therefore excavation discontinued.

CONCLUSION

Typical municipal landfill-type wastes observed in this area. No metal debris observed within fill to explain magnetic anomaly. Thickness of fill deposits is 16.0' at a minimum.

TEST PIT NO. TP-18

Site Name/Location: Hertel Landfill, Plattekill, NY

Rationale: Test pit to investigate disposal area #4

Date: December 22, 1989

Dimensions L X W X D (feet): 25.0 x 8.0 x 16.5.

Location (NY State Grid): 615281 N, 580556 E

Ground Elevation (ft. above msl): 638.1

TAMS/TRC Inspectors: S. Panter, G. Murray.

Excavation Subcontractor: enroserv, inc., Daniel McCarthy (operator).

Background Instrument Readings: HNu – 0.7, LEL – 0.1, H2S – 003.

Sample types and ID number: No samples were collected.

DEPTH (ft. below grade)	DESCRIPTION (material, instrument readings)
0 – 1.0	Brown SILT, some sand, little clay.
1.0 – 3.0	Fill – brown silt and stones mixed with metal cans, household refuse, plastic and ash.
3.0 – 16.0	FILL – household refuse, cloth, sheet metal, paper, tires, large rock fragments (5.0' – 8.0' below grade), silt and clay (8.0' – 16.0' below grade). Only H2S at background level, HNu – 0.5, LEL – 0.7.
16.0 – 16.5	Green–gray SAND and SILT, some gravel, little clay.

CONCLUSION

Typical municipal landfill–type wastes observed in this area.
Thickness of fill deposits is 16.0'.

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX E

TEST BORING/MONITORING WELL LOGS

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX E
TEST BORING/MONITORING WELL LOGS

This appendix contains the geologic logs for the 20 borings and the well construction diagrams for the 19 monitoring wells and four piezometers installed by WC Services.

Typical Well Log Description Items

- Depth below ground level in feet (FTBGL). Samples taken generally in 2-foot increments.

- Split Spoon Sampler Blow Counts: Number of blows of a 140-pound hammer necessary to drive a split spoon 6 inches. Weight of hammer (WOH), is applicable if the spit spoon sank under the weight of the 140-lb hammer without requiring a 30" drop.

- Rock Coring, Rate of Penetration (ROP): The time to core through one foot of rock, recorded in minutes.

- Geologic Descriptions:

  Color: as observed

  Predominant grain size: clay, silt, sand (VF = very fine, F = fine, M = medium, C = coarse), gravel, cobbles, boulders, listed in capital letters (i.e., SILT).

  Secondary grain size: listed with estimate of one of the following proportions: "trace" (0-10%); "little" (10-20%); "some" (20-35%); "and" (35-50%).

- Other observations: Location of water table based on soil saturation. Evidence of contamination: odor, color, oil sheen, etc.

- Well Construction:

  Riser: Diameter, material (PVC or stainless steel), schedule, depth to base

  Screen: Top, bottom, diameter, material, slot size

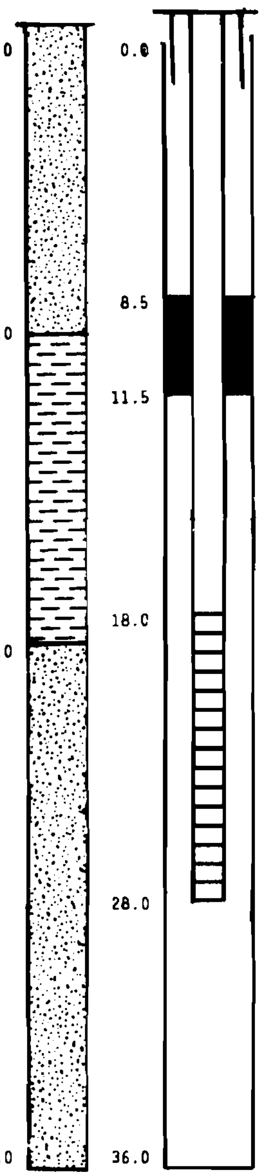
  Sandpack: Top, bottom

  Seal: Material, depth interval

THIS PAGE INTENTIONALLY LEFT BLANK

BORING NO.:	MW-1S	BORING DEPTH:	36.0 FT	DATE STARTED:	01/18/90
PROJECT NO.:	6171-Q91	CONTRACTOR:	W.C. SERVICES	DATE COMPLETED:	03/02/90
PROJECT:	HERTEL LANDFILL	DRILLERS:	D. GAUGHAN/E. ANGELO	DEPTH TO WATER:	25.87 FT BTOC ON 09/12/90
CLIENT:	U.S. EPA	TRC/TAMS INSPECTOR:	B.PENN/C.DOAK/J.KACZOR	GROUND ELEVATION:	679.9 FT MSL
LOCATION:	PLATTEKILL, N.Y.	DRILLING METHOD:	SEE NOTES BELOW	LOCATION:	N 614833.50 E 579972.75

DEPTH (FTBGL)	BLOWS[1] ROP[2]	SOIL DESCRIPTION* * Composite log of several drilling attempts; see drilling notes below	LITHOLOGY	WELL CONSTRUCTION
				Locking Cover
0-2	40 100/6	No Recovery. 0-2". Lt brn SILT, some crs to f sand, some f gravel, leaves and roots, moist. Cobbles at 2".	0.0	0.0
				Cement/Bentonite Grout
		Cobble at 4.5', wet soil on top of cobble.		
5-7	23 17 23 14	17" Recovery. Lt brn crs to f SAND, some clayey silt, little crs to f gravel, very dense, moist. Cobble at 7.0'.		2" SS Riser
				8.5
		Cobble at 9.2'.	9.0	Bentonite Seal
10-12	90 54 80 32	13" Recovery. Lt brn to tan crs to f SAND and SILT, little crs to f gravel, very dense, moist. Fractured cobble at 10', wet soil on top of cobble.		11.5 op of Sand Pack
		Cobble at 13.5'.		
15-17	30 30 22 100/6	Lt brn med to f SAND and SILT, little crs to f gravel, very dense, moist. Fractured Cobbles.		
17	7 MIN 8 MIN 6 MIN	Difficult drilling at 17.0'. Rock Core R-1 from 17.0'-21.0'. 18" Recovery. Gray crs grained SANDSTONE boulders, 2" to 8" sections.	19.0	18.0 Top of Screen
21	4 MIN	Break through boulder.		2" SS Screen 10 Slot
				Sand Pack
26		Water (blown out of borehole with air while drilling) at approximately 26.0'.		
		Sample from air return from 19.0'-34.0'. Brn f to med SAND, tr to little silt, tr to little gravel (rounded).		28.0 Bottom of Well
34		Bedrock/Boulder encountered at 34.0'.		
			36.0	36.0 Bottom of Hole



Bottom of Boring at 36.0 Ft

Drilling Notes:

01/18/90

Begin augering with 3 1/4" ID Hollow Stem Augers (HSA), refusal at 0.6".

DEPTH (FTBGL)	BLOWS[1] ROP[2]	SOIL DESCRIPTION* * Composite log of several drilling attempts; see drilling notes below	LITHOLOGY	WELL CONSTRUCTION

01/18/90 Continued
Set up on new MW-1S location, 3.0' to the south. Augered to 17.0' using 3 1/4" ID hollow stem augers. Drilling difficult at 17.0'.

01/19/90
Attempt Nx Core from 17.0'-21.0'. Verify presence of boulder. Borehole collapsed to 15.0'.

01/23/90
Redrill in same borehole with 6 1/4" ID hollow stem augers to 18.0', drive cap on lead auger breaks off in borehole. Advance to 19.0', second drive cap breaks in borehole. Annulus around drive cap sealed with bentonite plug. Augers left in borehole. Drill rig pulled off borehole.

01/24/90
Attempt to pull augers from borehole. 3rd drive cap is broken off in borehole. Borehole is secured with bentonite plug in bottom of augers and tops of augers secured with duct tape and custody seals. Drill rig pulled off location until later date.

02/08/90
Augered to 12'10" at new MW-1S location, approximately 30.0' north of 01/24/90 MW-1S location, with 6 1/4" ID hollow stem augers, refusal. Borehole backfilled with cuttings. Set up on new MW-1S location, 5.0' to the south of previous attempt. Augered to 12'4", refusal. Borehole backfilled with cuttings. Set up on new MW-1S location, 15.0' to the southwest.

02/09/90
Augered to 17.0' with 6 1/4" ID hollow stem augers, refusal. Soil samples taken for chemical analysis. Driller's water sample collected at this location.

03/01/90
Drilling resumed at MW-1S location, 7th attempt, using 5" OD Air Hammer. Borehole advanced to depth of 36.0 ft below grade.

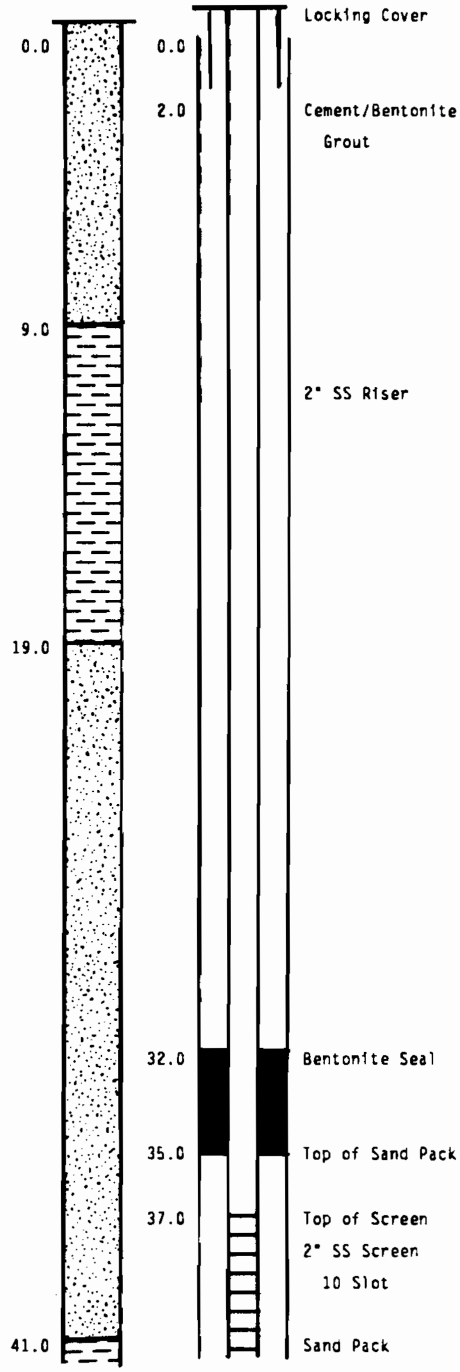
06/06/90
6 1/4" ID hollow stem augers drive cap used to pull 6 1/4" ID hollow stem augers previously abandoned in borehole on 01/24/90 at MW-1S location.

Footnotes:
1 - 140 lb hammer over a 30" drop, recorded per 6".
2 - Rate of Penetration-the time to core through 1.0' of rock, recorded in minutes.

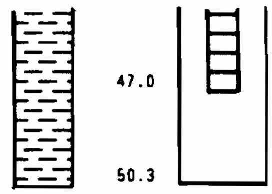
BORING NO.:	MW-1D	BORING DEPTH:	50.3 FT	DATE STARTED:	04/11/90
PROJECT NO.:	6171-091	CONTRACTOR:	W.C. SERVICES	DATE COMPLETED:	04/13/90
PROJECT:	HERTEL LANDFILL	DRILLERS:	J. STEPHENSON	DEPTH TO WATER:	28.77 FT BTOC ON 09/12/90
CLIENT:	U.S. EPA	TAMS INSPECTOR:	J.KACZOR	GROUND ELEVATION:	682.2 FT MSL
LOCATION:	PLATTEKILL, N.Y.	DRILLING METHOD:	7 3/8" TUBEX SYSTEM	LOCATION:	N 614888.64 E 579983.60

DEPTH (FTBGL)	SOIL DESCRIPTION* * Composite log of several drilling attempts; see drilling notes below * Logged from cuttings from air return
0-2	FOR SUBSURFACE INFORMATION FROM 0 TO 20' REFER TO BORING LOG MW-1S
5-7	
10-12	Boulders encountered from 10.1' to 11.4'.
	Boulders encountered from 13.6' to 15.1'.
15-17	
21	Brn silty SAND, some f gravel, moist. Boulders encountered from 21.0' to 24.5'.
26	Brn med to f SAND, some silt, tr f gravel, moist. Water enters casing at 27.0'.
30	Brn crs to f SAND, little silt, little f gravel.
34	Boulder encountered at 34.0'.
35	Brn crs to f SAND, some silt, tr f gravel, moist to wet, (grades to med and f sand, less f gravel).
37	Brn crs to f SAND, little f gravel, little silt, wet.
40	
42	Brn f SAND, silty, occasional gravel, dense, moist.

LITHOLOGY WELL CONSTRUCTION



DEPTH (FTBGL)	SOIL DESCRIPTION* * Composite log of several drilling attempts; see drilling notes below * Logged from cuttings from air return	LITHOLOGY	WELL CONSTRUCTION
45			
			47.0 Bottom of Well
48	Brn f SAND, silty, very dense, moist to wet.		Granular Bentonite
49			Seal
50	Brn sandy clay, mottled with lt brn sandy clay, dense.	50.3	50.3 Bottom of Hole



Bottom of Boring at 50.3 ft

Drilling Notes:

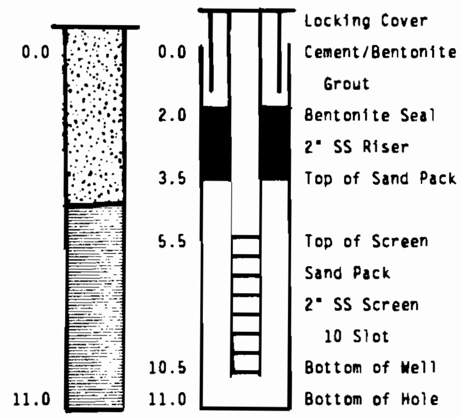
04/12/90

Split spoon sample collected at 50.0' because bedrock was not encountered during drilling. Split spoon sample collected from 50.0-52.0' to characterize geology. No bedrock encountered. Well set at 47.0'. Borehole backfilled with granular bentonite from 52.0-49.0'.

BORING NO.:	MW-2S	BORING DEPTH:	11.0 FT	DATE STARTED:	01/17/90
PROJECT NO.:	6171-091	CONTRACTOR:	W.C. SERVICES	DATE COMPLETED:	01/17/90
PROJECT:	HERTEL LANDFILL	DRILLERS:	D. GAUGHAN	DEPTH TO WATER:	9.40 FT BTOC ON 09/12/90
CLIENT:	U.S. EPA	TAMS INSPECTOR:	J. KACZOR	GROUND ELEVATION:	622.40 FT MSL
LOCATION:	PLATTEKILL, N.Y.	DRILLING METHOD:	3 1/4" ID HOLLOW STEM AUGERS	LOCATION:	N 616276.77 E 581327.65

DEPTH (FTBGL)	BLOWS[1]	SOIL DESCRIPTION* * Composite log of several drilling attempts; see drilling notes below
0-1	8 5	6" Recovery. Lt brn crs to f SAND, little silt, little f gravel, trace leaves and roots, med dense, moist.
1-3	10 11 4 4	15" Recovery. Lt brn m to f SAND, and SILT, trace f gravel, med dense, moist. Grades finer with depth.
3-5	10 10 29 12	6" Recovery. Lt brn crs to f gravel, some crs to f sand, little clayey silt, very dense. Saturated lens at 4".
5-7	2 9 10 11	15" Recovery. Lt brn mottled grn tan SILT, some crs to f sand, trace f gravel, stiff, moist.
7-8	10 36	12" Recovery. Lt brn SILT, some crs to f gravel, little crs to f sand, very hard, moist (vesicles). Chatter at 8.5'.
8-10	19 22 24 26	8" Recovery. Lt brn to tan SILT and crs to f SAND, trace f gravel, v dense, wet.
10-12	100/6	5" Recovery. Lt brn SILT, some m to f sand, some crs gravel, (fractured cobble), very dense, moist.

LITHOLOGY WELL CONSTRUCTION



Bottom of Boring at 11.0 ft

Drilling Notes:

01/17/90

Augered to 7.0' in MW-2S pilot borehole, observe water in bottom of hole. Decide to collect soil samples for chemical analysis from 5.0' to 7.0' interval. Pilot hole is backfilled with cuttings and bentonite. Augered to 3.0' at MW-2S location, refusal. Drill rig moved to new MW-2S location, 3.0' to the south. Augered to 5.0'. Perched water lens (2" thickness) observed at approximately 3.0'. Could not collect split spoon sample as the OD of the split spoon was greater then the ID of the augers. Augered to 9.0', refusal. Borehole is backfilled to 2.0' with cuttings. Drill rig moved 20.0' to the north, augers advanced to 1.0', refusal. Drill rig moved 12.0' to the southeast. Augers advanced to 11.0', refusal. Borehole left open to monitor groundwater. Move drill rig 5.0' south. Collect soil samples for chemical analysis from 6.0' to 8.0'. Borehole is backfilled with cuttings. MW-2S is set at location of the 4th drilling attempt (approximately 6.0' to the northeast of the 1st attempt).

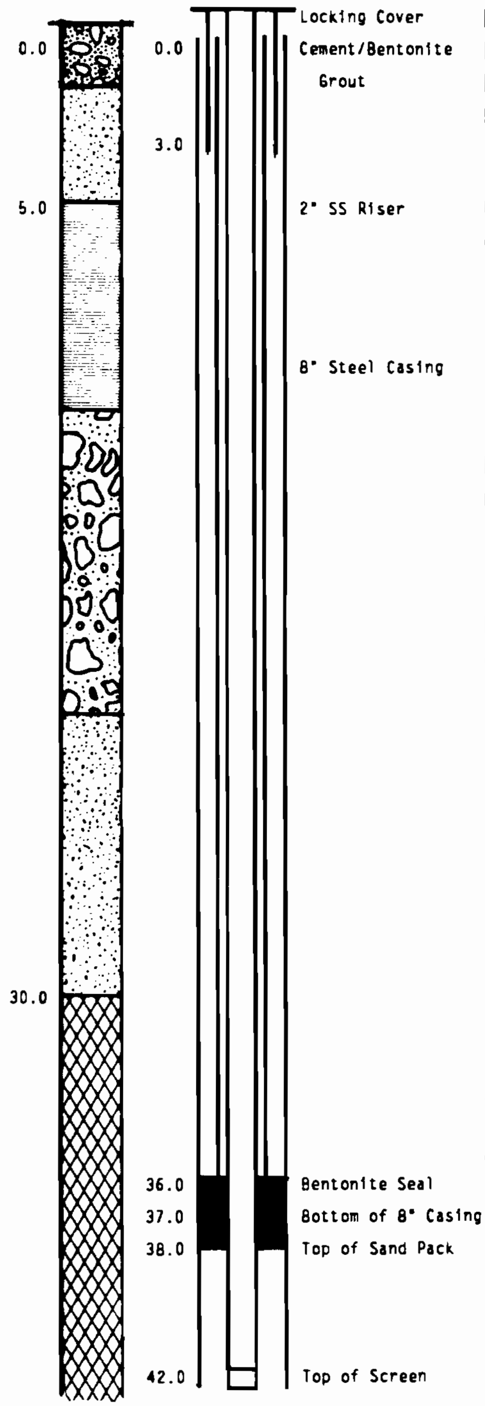
Footnotes:

1 - 140 lb hammer over a 30" drop, recorded per 6".

BORING NO.:	MW-2D	BORING DEPTH:	52.0 FT	DATE STARTED:	01/24/90
PROJECT NO.:	6171-091	CONTRACTOR:	W.C. SERVICES	DATE COMPLETED:	05/18/90
PROJECT:	HERTEL LANDFILL	DRILLERS:	D. GAUGHAN/J. STEVENSON	DEPTH TO WATER:	9.76 FT BTOC ON 09/12/90
CLIENT:	U.S. EPA	TAMS/TRC INSPECTOR:	J. KACZOR/B.PENN	GROUND ELEVATION:	621.0 FT MSL
LOCATION:	PLATTEKILL, N.Y.	DRILLING METHOD:	SEE NOTES BELOW	LOCATION:	N 616224.22
					E 581327.35

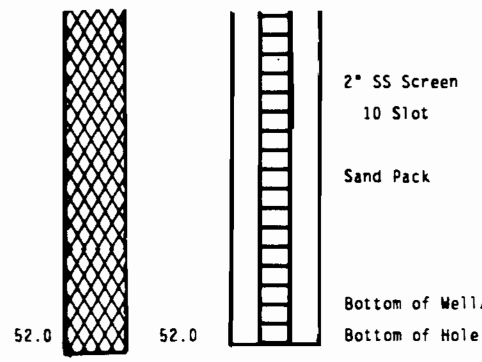
DEPTH (FTBGL)	BLOWS[1] ROP[2]	SOIL DESCRIPTION* * Composite log of several drilling attempts; see drilling notes below
0-1	8 5	6" Recovery. Lt brn crs to f SAND, little silt, little f gravel, trace leaves and roots, med dense, moist.
1-3	10 11 4 4	15 " Recovery. Lt brn m to f SAND, and SILT, trace f gravel, m dense, moist. Grades finer with depth.
3-5	10 10 29 12	6" Recovery. Lt brn crs to f GRAVEL, some crs to f sand, little clayey silt, very dense, moist. Saturated lens at 4".
5-7	2 9 10 11	15" Recovery. Lt brn mottled grn tan SILT, some crs to f sand, trace f gravel, stiff, moist.
7-8	10 36	12" Recovery. Lt brn SILT, some crs to f gravel, little crs to f sand, very hard, moist (vesicles). Rocks encountered at 8.5'.
8-10	19 22 24 26	8" Recovery. Lt brn to tan SILT and crs to f SAND, trace f gravel, v dense, wet.
10-10.5	100/6	5" Recovery. Lt brn SILT, some m to f sand, some crs gravel, (fractured cobble), very dense, moist.
10.5-14.0	7 Min 9 Min	Rock Core R-1 from 10.5'-14.0'. 4.8" Recovery. Dk gray GRAYWACKE boulders from 10.5' to 11.5' and 12.0' to 14.0', soft sand seams between boulders.
12.2-17.2	6 Min 4 Min 6 Min	Rock Core R-2 from 12.2'-17.2'. 6" Recovery. Dk gray SANDSTONE boulders 12.6'-13.6' and gray-grn calcareous sandstone 15.7'-16.7'.
		Set 8" steel casing to 13.5'
21		Hard at 21.0'-23.0'.
22		Sample collected from air return. Brn m-c SAND, some f-m gravel, tr silt.
		Sample collected from air return. Brn f-m SAND, little f-c gravel, little to tr silt.
26		Advance 3 3/8" roller bit with pure Wyoming Bentonite drilling mud from 12.2' to 26.0'.
		Samples from 30.0'-37.0' collected from air return.
30		Brn to red-brn to gray f to med grained SANDSTONE (50%), wht QTZ (50%), opaque, amorphous, tr qtz crystals.
32		Brn to red-brn to gray f to med grained SANDSTONE.
33		Same as above with increasing amounts of dk gray shale.
34		Dk gray SHALE.
35		Increasing amounts of gray sandstone.
36		Gray SANDSTONE.
37		Gray SANDSTONE (50 %) and wht QTZ (50 %), tr calcite frags.
38	28 MIN	Rock Core R-1 from 38.0'-41.0'. 21" Recovery. Dk gray to lt gray SANDSTONE,
39	18 MIN	slightly weathered, hard (graywacke ?), 2" seams of gray shale, 1" seam
40	15 MIN	of slightly weathered quartz.
41		Rock Core R-2 from 41.0-46.0'. 18" Recovery. Lt to blue-gray f to med

LITHOLOGY WELL CONSTRUCTION



DEPTH (FTBGL)	BLOWS[1] ROP[2]	SOIL DESCRIPTION* * Composite log of several drilling attempts; see drilling notes below
42	7 MIN	grained SANDSTONE (graywacke ?), hard, slightly weathered, closely
43	12 MIN	spaced discontinuities along bedding planes (dip - 30 , well sorted,
44	17 MIN	poorly cemented).
45	20 MIN	
46	28 MIN	Rock Core R-3 from 46.0'-50.0'. 18" Recovery. Lt to blue-gray f
47	20 MIN	grained SANDSTONE (graywacke), hard, slightly weathered, closely
48	12 MIN	spaced midangle discontinuities along bedding planes. Planes well
49	8 MIN	defined, well sorted.
50	8 MIN	
52		Advanced borehole to 52.0' to allow for settlement of cuttings.

LITHOLOGY WELL CONSTRUCTION



Bottom of Boring at 52.0 ft

Drilling Notes:

01/24/90

8 1/4" ID hollow stem augers advanced to 9.5', difficult drilling; attempt to break through using smaller augers, continue drilling at this location. 3 1/4" ID hollow stem augers advanced to 10.6', boulders (?) encountered. Attempt Nx Core.

01/25/90

Nx Core from 10.5' to 14.0'. Advance 3 1/4" ID hollow stem augers in same borehole in an attempt to break through. Refusal. Readvance using 5 5/8" tricone bit to clean out borehole. Advance from 10.5' to 11.5'.

01/26/90

At same location, continue with 5 5/8" tricone bit. Borehole cleaned out from 11.5' to 13.0'.

01/27/90

Rig pulled off borehole until additional drilling equipment is obtained.

02/06/90

Begin drilling with mud rotary at same borehole. 7 7/8" bit advanced from 8.0' to 12.5'; 6" steel casing set inside 8 1/4" ID hollow stem augers. Pull 8 1/4" ID HSA prior to the placement of a 3.0'-4.0' bentonite seal to set 6" casing.

02/07/90

Nx Core inside 6" casing from 12.2' to 17.2'.

02/08/90

Borehole collapses to 12.7'. 3 3/8" tricone bit used to ream out borehole from 12.2' to 17.2'. Breakthrough at 18.9'. Advance to 26.0'.

02/09/90

Because borehole is not vertical, decide to abandon. Borehole collapsed to 5.0' after 6" casing was removed. Borehole backfilled with cuttings and bentonite.

DEPTH (FTBGL)	BLOWS[1] ROP[2]	SOIL DESCRIPTION* * Composite log of several drilling attempts; see drilling notes below	LITHOLOGY	WELL CONSTRUCTION

02/22/90

At new MW-2D location, 15.0' to the south of the 1st attempt, 5 1/2" Air hammer advanced from 7.0' to 18.0'.

03/21/90

Begin 3rd attempt at MW-2D location using Tubex system.

03/22/90

Advance tubex system to 19.0', mechanical problems halt drilling.

04/02/90

Some collapse of borehole from 03/22/90. Advance in same borehole to 17.0'. Mechanical problems halt drilling.

04/03/90

Advance 10.0' in same borehole to a depth below grade of 27.0' using Tubex system.

04/09/90

Advance tubex system in same borehole to 36.0' below grade.

04/10/90

Set 4" casing in borehole using 5.0' bentonite seal placed in annulus between 4" and 6" casing. Pull 6" casing from hole and tremie grout from top of bentonite to grade.

05/17/90

7 3/8" Air hammer with casing advanced from grade to 38.0'. Sediment from borehole cleaned out using rollerbit from 29.5' to 38.0'. Begin Nx Core at 38.0'.

05/18/90

Pull drill rods, collapse of 20" in borehole. Readvance borehole to 52.0' to account for any future collapse. Well set at 52.0'.

Footnotes:

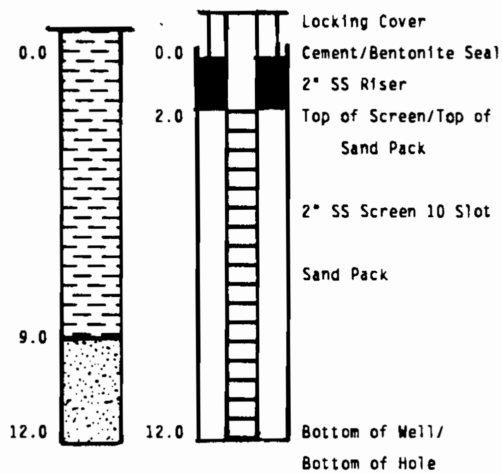
1 - 140 lb hammer over a 30" drop, recorded per 6".

2 - Rate of Penetration-the time to core through 1.0' of rock, recorded in minutes.

BORING NO.:	MW-3S	BORING DEPTH:	12.0 FT	DATE STARTED:	02/14/90
PROJECT NO.:	6171-091	CONTRACTOR:	W.C. SERVICES	DATE COMPLETED:	02/14/90
PROJECT:	HERTEL LANDFILL	DRILLERS:	E. ANGELO	DEPTH TO WATER:	5.76 FT BTOC ON 09/12/90
CLIENT:	U.S. EPA	TRC INSPECTOR:	C. DOAK	GROUND ELEVATION:	636.1 FT MSL
LOCATION:	PLATTEKILL, N.Y.	DRILLING METHOD:	3 1/4" ID HOLLOW STEM AUGERS	LOCATION:	N 614885.93 E 580362.69

DEPTH (FTBGL)	BLOWS[1]	SOIL DESCRIPTION
0-2	1 2 4 5	13.5" Recovery. Organic debris, 0-4"; Brn-gray SILT and f to crs SAND, trace f gravel, little clay, moist, 4-13.5". Water observed in borehole at 3.0' and seeping in from southwest side of borehole. Difficult drilling past 5.0'.
5-7	5 17 23 14	6" Recovery. Brn f to crs SAND and SILT, some rock fragments, saturated.
10-12	15 12 9 9	11" Recovery. Brn f to crs SAND, little silt, trace rock fragments and f gravel, saturated.

LITHOLOGY   WELL CONSTRUCTION



Bottom of Boring at 12.0 ft

Drilling Notes:

01/16/90

Advance 3 1/4" ID hollow stem augers to 3.0' in MW-3S pilot borehole. Water observed at 22" below grade. Decide to collect soil sample for chemical analysis from 0-22" interval. Pilot hole is backfilled with cuttings. MW-3S soil sample collected for chemical analysis at nearby MW-3S location. Following sample collection, drill rig moved off location until later date.

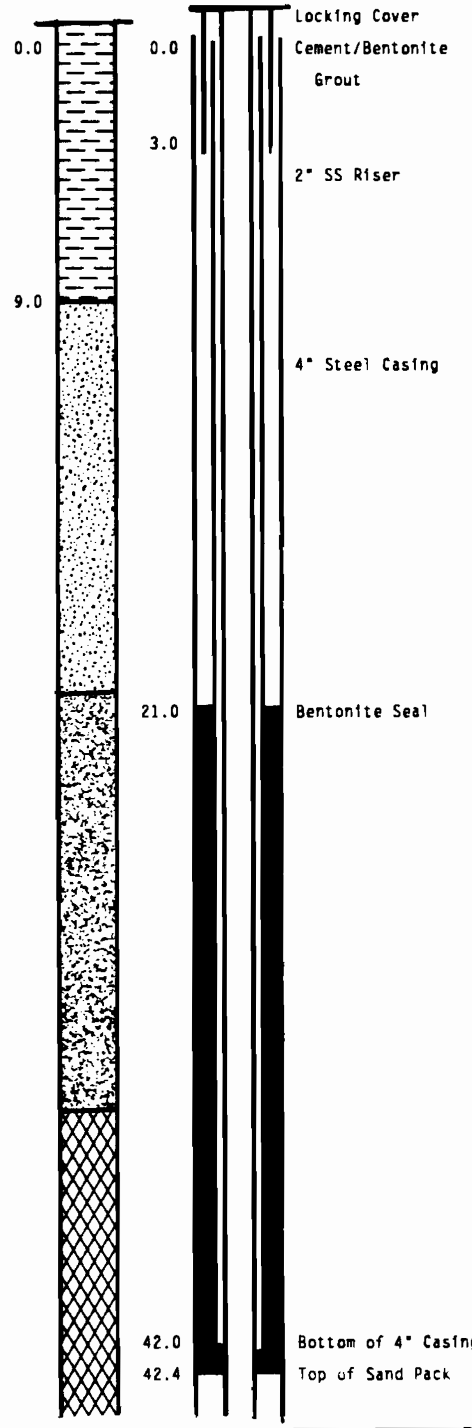
Footnotes:

1 - 140 lb hammer over a 30" drop, recorded per 6".

BORING NO.:	MW-3D	BORING DEPTH:	54.0 FT	DATE STARTED:	04/17/90
PROJECT NO.:	6171-Q91	CONTRACTOR:	W.C. SERVICES	DATE COMPLETED:	05/02/90
PROJECT:	HERTEL LANDFILL	DRILLERS:	D. GAUGHAN/J. STEVENSON	DEPTH TO WATER:	4.00 FT BTOC ON 09/12/90
CLIENT:	U.S. EPA	TAMS/TRC INSPECTOR:	J. KACZOR/B.PENN	GROUND ELEVATION:	634.1 FT MSL
LOCATION:	PLATTEKILL, N.Y.	DRILLING METHOD:	SEE NOTES BELOW	LOCATION:	N 614262.34 E 580393.50

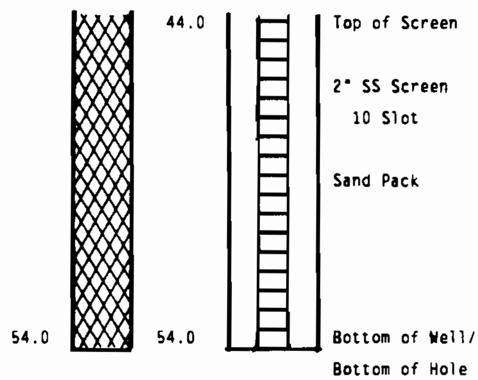
DEPTH (FTBGL)	BLOWS[1] ROP[2]	SOIL DESCRIPTION* * Composite log of several drilling attempts; see drilling notes below * Logged from cuttings from air return
		FOR SUBSURFACE INFORMATION FROM 0-15' REFER TO BORING LOG MW-3S
15-18		Brn SAND and SILT, occasional gravel.
18-21		Brn crs SAND and F GRAVEL, some f sand to silt, wet.
22-24		Grades crser, brn f. GRAVEL, some crs-f sand, subangular to rounded, variegated colors, and composition.
24-25		Same as above, except very dense.
28-30		Same as above except gray, angular, increasing amounts of fine to medium sand. Boulders 29-32'.
30-32		Gray, crs SAND and GRAVEL (angular to subrounded), little f sand and silt.
34-35		Gray to brn med to crs SAND, little gravel (subrounded to rounded), tr to little silt and f sand. Wet at 35.0'.
		Dk gray f to med grained SANDSTONE, rounded, with a weathered exterior appearance. -Some brn silt. Top of weathered bedrock(?).
37-39		Gray f grained SANDSTONE.
40		Gray to green-gray SANDSTONE.
		Gray SANDSTONE and brn SHALE.
42	11 MIN	Rock Core R-1 from 42.0'-46.0'. 7.2 " Recovery. Gray SANDSTONE
	10 MIN	
	11.5 MIN	

LITHOLOGY WELL CONSTRUCTION



DEPTH (BGL)	BLOWS[1] ROP[2]	SOIL DESCRIPTION* * Composite log of several drilling attempts; see drilling notes below * Logged from cuttings from air line
46		End R-1.
47	6 MIN	Begin R-2. 69.6" Recovery. Rock Core R-2 from 47.0'-54.0'. Gray GRAYWACKE and dk grey SHALE
48	14 MIN	
49	16 MIN	
50	15.5 MIN	
51	4 MIN	
52	4 MIN	
53	6.5 MIN	
54	4 MIN	
		Bottom of Boring at 54.0'

LITHOLOGY WELL CONSTRUCTION



Drilling Notes:

04/17/90
Advance 7 3/8" Air hammer (Tubex system) and install 6" ID flush joint steel casing to 24.0'. Air hammer blocked, drilling stopped for this date.

04/18/90
Resume drilling at same location from 24.0'-29.0'. Air hammer blocked, drilling stopped for this date.

04/19/90
Continue drilling in same borehole at approximately 30.0', advance to 34.0'. Air hammer blocked, drilling stopped for this date.

04/20/90
Can not unplug air hammer, decide to pull casing from borehole, borehole abandoned, grout from 12.0' to surface.

04/23/90
Begin drilling MW-3D at new location 6' to the N using 7 3/8" Air Hammer, (Tubex method). Refusal at this location. Begin drilling at new MW-3D location 2' to the E using 7 3/8" Air hammer (Tubex method), advance to 3.0'. Bit becomes disengaged in borehole. Attempt to retrieve from borehole.

04/24/90
Bit is retrieved, continue drilling in same borehole, advance to 12.0', bit becomes disengaged in borehole again.

04/25/90
Bit is retrieved, drilling is continued in same borehole, advance to 25.0'.

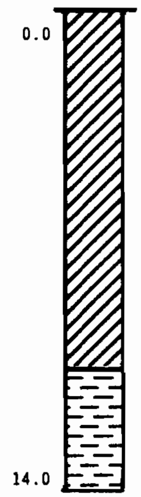
04/26/90
Advance in same borehole to 42.0'.

05/02/90
MW-3D is set at 54.0'.

BORING NO.:	MW-4S	BORING DEPTH:	14 FT	DATE STARTED:	02/01/90
PROJECT NO.:	6171-091	CONTRACTOR:	W.C. SERVICES	DATE COMPLETED:	02/02/90
PROJECT:	HERTEL LANDFILL	DRILLERS:	J. HART	DEPTH TO WATER:	
CLIENT:	U.S. EPA	TRC INSPECTOR:	C.DOAK	GROUND ELEVATION:	
LOCATION:	PLATTEKILL, N.Y.	DRILLING METHOD:	6 1/4" ID HOLLOW STEM AUGERS	LOCATION:	

DEPTH (FTBGL)	BLOWS[1]	SOIL DESCRIPTION* * Composite log of several drilling attempts; see drilling notes below
0-2	23 19 21 22	9" Recovery. Snow, sticks, and organic debris, 0-3"; Red-brn and gray SILT, tr f to med sand, tr rock frags and f gravel, moist, 3-9".
5-7	15 14 14 22	10" Recovery. Brn-gray SILT and f to crs SAND, tr clay, tr f gravel and rock frags, saturated, 0-4"; Refuse (paper, cardboard, printed book pages, plastic and metal), 4-10".
10-11.5	22 19 29 32	Refuse (paper), 0-6"; Red-brn f to med SAND lenses in gray SILT matrix, some f gravel, 6-8"; Gray SILT, tr f gravel and rk frags, tr f sand and clay, 8-14"; ROCK frags,(rock in nose of spoon), 14-16". Bottom of fill at 10.5'.
11.5-13	102 90	24" Recovery. Grn-gray SILT and f to med SAND, tr f gravel rk frag, and clay, 0-12"; same as above except little clay, moist, 12-24".

LITHOLOGY



Bottom of Boring at 14.0 ft

Drilling Notes:

02/01/90

Augered to 11.5', refusal. Borehole is plugged with a 2.0' bentonite seal, then backfilled to ground surface.

02/02/90

Set up on new MW-4S location, approximately 3.5' to the southeast of 1st attempt. Augered to 9.5', refusal. Borehole backfilled with cuttings. Drill rig set up on 3rd MW-4S location, approximately 3.0' to the southeast. Augered to 1.0', refusal. Drill rig set up on new MW-4S location, 40.0' to the northeast of 3rd attempt. No drilling perfromed at this location. Decision made not to set well at this location.

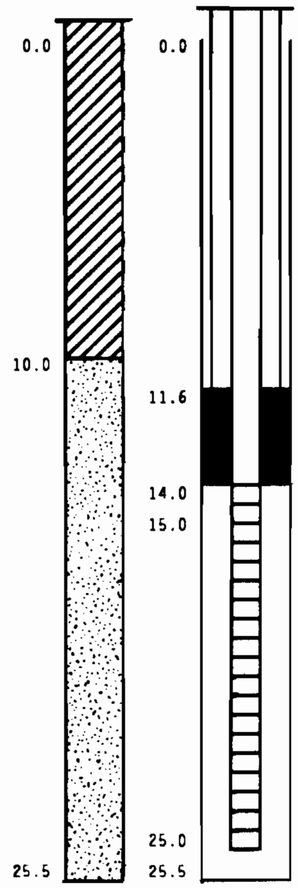
Footnotes:

1 - 140 lb hammer over a 30" drop, recorded per 6".

BORING NO.:	MW-5S	BORING DEPTH:	25.0 Ft	DATE STARTED:	01/19/90
PROJECT NO.:	6171-091	CONTRACTOR:	W.C. SERVICES	DATE COMPLETED:	02/06/90
PROJECT:	HERTEL LANDFILL	DRILLERS:	D. GAUGHAN/E. ANGELO	DEPTH TO WATER:	20.94 FT BTOC ON 09/12/90
CLIENT:	U.S. EPA	TRC INSPECTOR:	B.PENN/J.KACZOR/C.DOAK	GROUND ELEVATION:	654.6 FT MSL
LOCATION:	PLATTEKILL, N.Y.	DRILLING METHOD:	SEE NOTES BELOW	LOCATION:	N 615114.05 E 580383.32

DEPTH (FTBGL)	BLOWS[1] ROP[2]	SOIL DESCRIPTION* * Composite log of several drilling attempts; see drilling notes below
0-2	148 70 65 64	19" Recovery. Brn f SAND and SILT, some gravel (angular), tr plastic, 0-8"; Grn-gray f SAND and SILT, little gravel, 8-17"; Grn-gray med-f SAND, tr gravel, 17-19".
10-12	27 28 52 66	20" Recovery. Brn garbage type material, 0-4"; Grn-gray f to med SAND, little silt, little gravel, angular, dense, damp, 4-20".
12-14	18 42 49 58	20" Recovery. Grn-gray f to med SAND, little silt and gravel, dense, damp to moist, 0-20".
17-19	88 32 25 60	18" Recovery. Gray-grn med to f SAND, some silt, tr f gravel, very dense, moist.
22.5-24.5	67 82 76 100/5	24" Recovery. Brn f to crs SAND, little f gravel, tr rock frags in a 3"-5" lense.
		Bottom of Boring at 25.5 ft

LITHOLOGY WELL CONSTRUCTION



Drilling Notes:

01/19/90

Augered to 1.25' with 6 1/4" hollow stem augers, refusal. Borehole abandoned. Set up on new MW-5S location, 5' to the north of 1st attempt. Augered to 15", refusal. Borehole abandoned.

01/23/90

Drill rig set up 5.0' to the south of previous attempt. Augered to 3.0' with 6 1/4" hollow stem augers, refusal. Borehole abandoned and backfilled with cuttings. Drill rig is set up on new MW-5S location, 15.0' to the south. Augered to 14.0', pulled up augers, set 8" steel casing through fill to 13.7'. Casing grouted in place.

01/31/90

Water level in hole at 13.5' prior to drilling. Advance 3 1/4" hollow stem stem augers to 20.0'. Augers removed to check the condition of the bit, borehole collapsed to 14.1'.

DEPTH (FTBGL)	BLOWS[1] ROP[2]	SOIL DESCRIPTION* * Composite log of several drilling attempts; see drilling notes below	LITHOLOGY	WELL CONSTRUCTION
		02/01/90		
		Water level in hole at 13.4'. Borehole is reamed out to 20.0' using 3 1/4" hollow stem augers. After allowing to equilibrate, water level in borehole is 12.6'. Because the water was 2.0' inside 8" steel casing, and the fact that the casing was spinning with subsequent drilling, the decision was made to abandoned the borehole due to a questionable seal at the bottom of the casing. 8.0' of 8" steel casing remains in the ground. Cement/Bentonite slurry was placed from 15.0' to the ground surface. Begin augering with 8 1/4" hollow stem augers at new MW-5S location 12' to northeast. Advance 8 1/4" ID hollow stem augers to 13.0'.		
		02/02/90		
		Set 8' steel casing to 14.0', approximately 1.0' below the bottom of the fill. A 3.0' granular bentonite seal used to set casing. Cement/bentonite grout from 11.0' to ground surface.		
		02/06/90		
		Augered through 8" steel casing using 3 1/4" ID hollow stem augers. Set MW-5 at 25.0'.		

Footnotes:

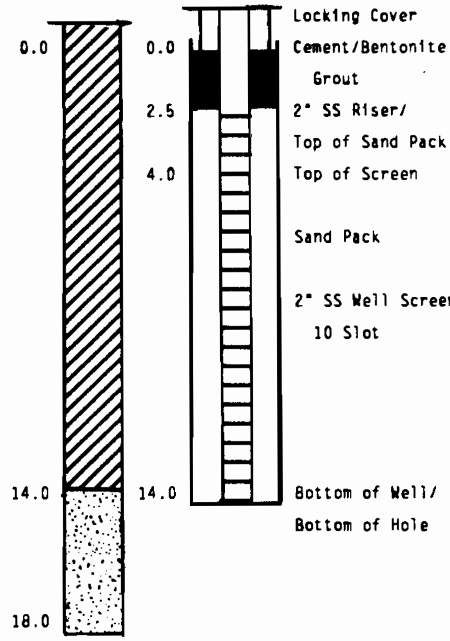
1 - 140 lb hammer over a 30" drop, recorded per 6".

2 - Rate of Penetration-the time to core through 1.0' of rock, recorded in minutes.

BORING NO.:	MW-6S	BORING DEPTH:	14.0 FT	DATE STARTED:	01/16/90
PROJECT NO.:	6171-091	CONTRACTOR:	W.C. SERVICES	DATE COMPLETED:	01/17/90
PROJECT:	HERTEL LANDFILL	DRILLERS:	J. HART	DEPTH TO WATER:	11.81 FT BTOC ON 09/12/90
CLIENT:	U.S. EPA	TRC INSPECTOR:	C.DOAK	GROUND ELEVATION:	631.0 FT MSL
LOCATION:	PLATTEKILL, N.Y.	DRILLING METHOD:	SEE NOTES BELOW	LOCATION:	N 615117.36 E 580720.53

DEPTH (FTBGL)	BLOWS[1]	SOIL DESCRIPTION* * Composite log of several drilling attempts; see drilling notes below
0-2	78 49 60 62	18" Recovery. Lt Brn f to crs SAND, tr silt, moist, 0-9"; Blk organic debris and refuse (paper and plastic), 9-17"; Gray-grn f SAND and SILT, tr rock frags throughout sample, 17-18".
5-7	18 14 16 20	10" Recovery. Red-brn f to crs SAND, tr silt and rock frags., saturated, organic debris, 0-3"; Gray-grn f SAND and SILT, tr rock frags., moist, 7-10".
7-9	9 4 32 39	6" Recovery. Gray grn f SAND and SILT, refuse throughout sample.
9-11	18 18 11 20	21" Recovery. Gray-grn f to crs SAND and SILT and refuse, 0-2"; Refuse (paper) 0-16"; Grn-gray silt, tr f sand, tr clay and rock frags., moist, 16-21".
11-13	12 23 11 50	11" Recovery. Gray grn SILT, tr f sand and clay, rk frags and refuse throughout sample.
14-16	12 14 10 17	12" Recovery. Red-brn SILT and f-crs SAND, tr f gravel, 0-2"; Grn-gray SILT and CLAY, tr f sand, tr rock and wood frags, tr red-brn silt mottled throughout, saturated, 2-12".
16-18	17 20 27 33	24" Recovery. Gray-grn SILT and CLAY, some f gravel and rock frags, tr f sand, saturated. Organic debris from 10-13".

LITHOLOGY WELL CONSTRUCTION



Bottom of Boring at 14.0 ft

Drilling Notes:

01/16/90

Auger to 2.0' with 6 1/4" ID hollow stem augers, refusal. Drill rig moved 3.0' to the west. Borehole is backfilled with cuttings. Advance 6 1/4" ID hollow stem augers to 2.5' below grade, refusal. Metal observed on augers, borehole is backfilled with cuttings. Move drill rig 12.0' to the southeast of 2nd MW-6S location. Auger to 12.5' with 6 1/4" ID hollow stem augers, refusal. Borehole is grouted from 12.5' below grade to 9.5' below grade, and backfilled with cuttings.

01/17/90

Drill rig set up 10.0' to the southeast of 3rd MW-6S location. Advance 3 1/4" ID hollow stem augers to 14.0' below grade. Two continous split spoon samples are collected from 14.0'-16.0' and from 16.0'-18.0' to verify the bottom of fill. MW-6S is set at 14.0'. Bentonite seal placed in bottom of hole to seal split spoon holes, prior to well construction.

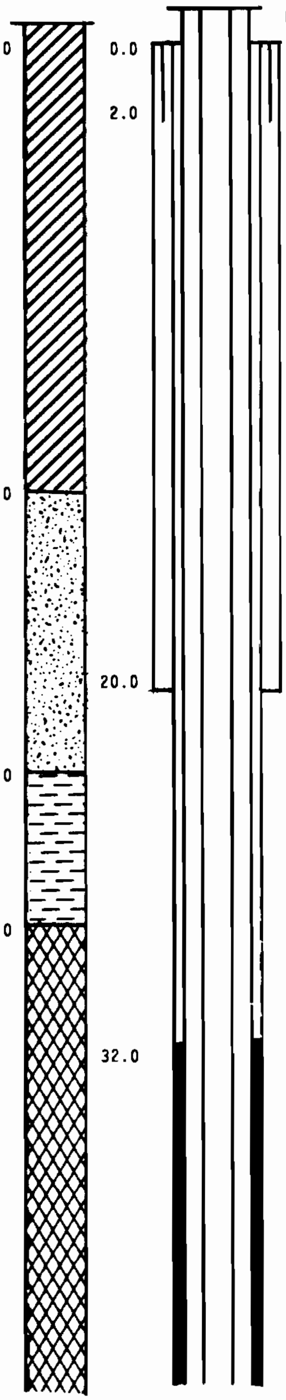
Footnotes:

1 - 140 lb hammer over a 30" drop, recorded per 6".

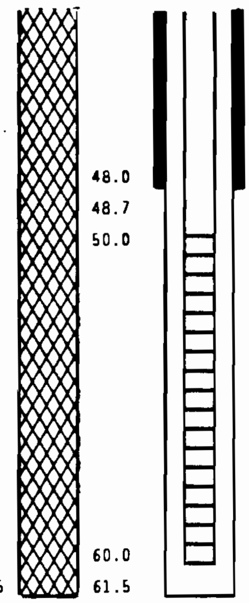
BORING NO.:	MW-6D	BORING DEPTH:	60.0 FT	DATE STARTED:	04/03/90
PROJECT NO.:	6171-091	CONTRACTOR:	W.C. SERVICES	DATE COMPLETED:	06/05/90
PROJECT:	HERTEL LANDFILL	DRILLERS:	D. GAUGHAN	DEPTH TO WATER:	15.43 FT BTOC ON 09/12/90
CLIENT:	U.S. EPA	TAMS INSPECTOR:	J.KACZOR	GROUND ELEVATION:	630.70 FT MSL
LOCATION:	PLATTEKILL, N.Y.	DRILLING METHOD:	SEE NOTES BELOW	LOCATION:	N 615115.76 E 580739.53

DEPTH (FTBGL)	BLOWS[1] ROP[2]	SOIL DESCRIPTION* * Composite log of several drilling attempts; see drilling notes below	
		FOR SUBSURFACE INFORMATION FROM 0 TO 14' REFER TO BORING LOG MW-6S	0.0
		Boulders encountered from 10.1' to 11.4'.	
		Boulders encountered from 13.6' to 15.1'.	
14-16	1 1/18"	16" Recovery. Gray-grn SILT and crs to f SAND, tr f gravel, very soft, saturated; bottom 4" mottled brn.	14.0
16-18	1 1/12" 2	19" Recovery. Same as above but grading crser. 2" silty clay lens, little f sand, refuse (paper) at 16.2', saturated.	
18-20	8 6 6 15	9" Recovery. Gray-grn crs to f SAND, some silt, little f gravel and rock frags, med dense, tr refuse (cloth), wet, chatter at 18.5'.	
20-22	7 8 10 78	12" Recovery. Gray-grn crs to f SAND, some crs to f gravel, some silt, med dense, wet.	
22-24	25 12 12 23	20" Recovery. Same as above, grading finer, 0-16"; Lt brn mottled gray-grn crs-f silty sand, dense, 16-20".	23.0
24-26	23 57 87 100/3	20" Recovery. Lt brn crs-f silty SAND, little crs-f gravel, very dense, wet (gravel consists of igneous rock frags.).	
26-27.5	100/5	5" Recovery. Same as above.	
27.5-28	100/0	No Recovery. Drilling difficult at approx 28.0'.	
28-30		Sample collected from air return. Lt gray f to med grained SANDSTONE and lt brn med grained SANDSTONE and lt brn SHALE, tr disseminated pyrite.	28.0
30			
31		Rock Core R-1 from 32.5'-36.3'. 18" Recovery. Gray SANDSTONE, slighty weathered, hard, gravel 0-3"; Brn silty seam 5-8". Little resistance to coring.	
32.5			
33	4 MIN		
34	3 MIN		
35	3 MIN		
36		Rock Core R-2 from 36.3'-40.9'. No Recovery.	
37	4.5 MIN		
38	6.5 MIN		
39	6.5 MIN	Soft seam at 39.5', significant water loss.	
40	5.5 MIN		
41	21.5 MIN		
42			

LITHOLOGY WELL CONSTRUCTION



DEPTH (FTBGL)	BLOWS[1] ROP[2]	SOIL DESCRIPTION* * Composite log of several drilling attempts; see drilling notes below	LITHOLOGY	WELL CONSTRUCTION
43				
44				
45				
46				
47				
48	3.5 MIN	Rock Core R-3 from 48.2'-52.8'. 27" Recovery. Gray-blue med-f grain	48.0	Bottom of 4" Casing
49	2 MIN	SANDSTONE (graywacke), hard, slighty weathered, interlayered with brn	48.7	Top of Sand Pack
50	1.8 MIN	crs-med SANDSTONE, moderately weathered, occasional very thin clay	50.0	Top of Screen
51	2 MIN	seam, poorly cemented.		
52	4 MIN	Core barrel blocked at 52.8. Rock Core R-4 from 52.8'-58.1'. 26"		
53	2 MIN	Recovery. Same as gray-blue med-f grained SANDSTONE above. Soft from		
54	2.5 MIN	53.5-54.5'.		
55	2.5 MIN	Hard from 55.0'-55.25'.		Sand Pack
56	2.5 MIN	Wash becomes more gray at 56.5'.		
57	4 MIN			2" SS Screen
58	3.25 MIN	Core barrel blocked at 58.1'.Rock Core R-5 from 58.1'-60.1'. 21"		10 Slot
59	2.25 MIN	Recovery. Brn f-med SANDSTONE, hard, moderately weathered, occasional		
60		vertical fracture, surface weathered to blk grading to gray at bottom	60.0	Bottom of Well
61		8".	61.5 61.5	Bottom of Hole



Bottom of Boring at 61.5 ft

Drilling Notes:

01/30/90

6 1/4" ID hollow stem augers advanced to 19.0'. 14" steel casing to spun with drill rig to 19.0'. Casing grouted in place.

02/14/90

3 1/4" ID hollow stem augers advanced through 14" ID Casing from 7.5' below grade to 27.5'. Drilling difficult, no advancement made. Decision made to discontinue drilling until alternative drilling method can be employed.

02/20/90

Redrill using 6 1/4" ID hollow stem augers through 14" casing to 26.5', refusal. Borehole sealed with grout, augers pulled from borehole.

05/03/90

Advance 7 3/8" OD Air hammer (Tubex system) 6" ID casing to 33.0'. Set 4" casing. Annulus around 4" casing and 6" casing tremie grouted with bentonite/cement slurry from 33.0'-20.0'. 6" ID casing removed from borehole.

05/04/90

Complete tremie grout of annulus from 20.0' below grade to 3.0' below grade.

DEPTH (FTBGL)	BLOWS[1] ROP[2]	SOIL DESCRIPTION* * Composite log of several drilling attempts; see drilling notes below	LITHOLOGY	WELL CONSTRUCTION

05/14/90

Begin Nx Core from 32.0'-35.8'.

05/15/90

Continue Nx Core from 36.0'-40.9'. No Recovery during second run from 36.0'-40.9'. Diamond bit and lifter casing lost in borehole. Advance 3 7/8" ID roller bit to 42.0' to reem out lost bit.

05/30/90

4" Steel Casing pulled from borehole. Tubex system advanced to 48.0'.

06/01/90

4" Steel Casing set at 48.0'. Nx Core and 3 7/8" ID tricone advanced from 48.0'-61.5'.

Footnotes:

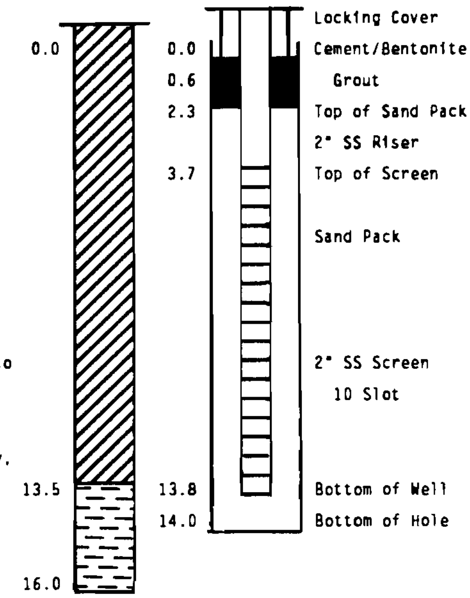
1 - 140 lb hammer over a 30" drop, recorded per 6".

2 - Rate of Penetration-the time to core through 1.0' of rock, recorded in minutes.

BORING NO.:	MW-7S	BORING DEPTH:	14.0 FT	DATE STARTED:	01/17/90
PROJECT NO.:	6171-091	CONTRACTOR:	W.C. SERVICES	DATE COMPLETED:	01/18/90
PROJECT:	HERTEL LANDFILL	DRILLERS:	J. HART	DEPTH TO WATER:	14.40 FT BTOC ON 09/12/90
CLIENT:	U.S. EPA	TRC INSPECTOR:	C.OOAK	GROUND ELEVATION:	640.6 FT MSL
LOCATION:	PLATTEKILL, N.Y.	DRILLING METHOD:	3 1/4" ID HOLLOW STEM AUGERS	LOCATION:	N 614860.14 E 580525.09

DEPTH (FTBGL)	BLOWS[1]	SOIL DESCRIPTION* * Composite log of several drilling attempts; see drilling notes below
0-2	30 18 10 30	16.5" Recovery. Ice, topsoil and organic debris, 0-3"; Brn f to crs SAND, some f gravel, tr silt, 3-16.5". Refuse throughout sample.
2-4	17 24 18 58	12" Recovery. Grn f to crs SAND, tr silt and f gravel. Metal debris in nose of spoon.
4-6	21 20 45 92	15" Recovery. Refuse (paper, plastic, glass), wood fragments 7-8".
6-8	21 33 42 46	No Recovery.
8-10	6 6 4 3	4" Recovery. Gray f to med GRAVEL, tr rock frags, some f to crs SAND, tr silt, saturated, tr paper refuse.
10-12	0 6 4 4	10" Recovery. Refuse (paper and plastic) with 1/4" lenses of grn-gray f to med SAND and SILT, tr rock frags.
12-14	7 4 9 82	11" Recovery. Organic debris, 0-2"; Grn-gray f to med SAND and SILT, refuse (paper, plastic), tr rk frags, 2-7"; Brn f SAND and SILT, tr clay, f gravel, tr rk frags, 7-11".
14-16	20 29 33 42	19" Recovery. Grn-gray f to med SAND and SILT, tr clay, f gravel and rock frags., moist.

LITHOLOGY WELL CONSTRUCTION



Bottom of hole at 14.0 ft

Drilling Notes:

01/17/90

Augered to 4.0' with 3 1/4" ID hollow stem augers, refusal. Metal observed in spoon and hole. Borehole is backfilled with cuttings. Drill rig set up on MW-7S location 5.0' to the east of 1st attempt.

01/18/90

3 1/4" ID hollow stem augers advanced to 9'8", refusal. Borehole is sealed with a 1.0' bentonite seal and backfilled with a mixture of bentonite and cuttings. Grout was placed from 1.0' below grade to the ground surface. Drill rig is set up on new MW-7S location approximately 15.0' to the northeast of the 2nd attempt. Advance 3 1/4" ID hollow stem augers to 4.0' below grade, refusal. Metal observed in spoon and borehole. Drill rig moved to 4th MW-7S location, approximately 12.0' north of 3rd attempt. Augered to 14.0' with 3 1/4" ID hollow stem augers. Split spoon sample taken from 14.0' to 16.0'.

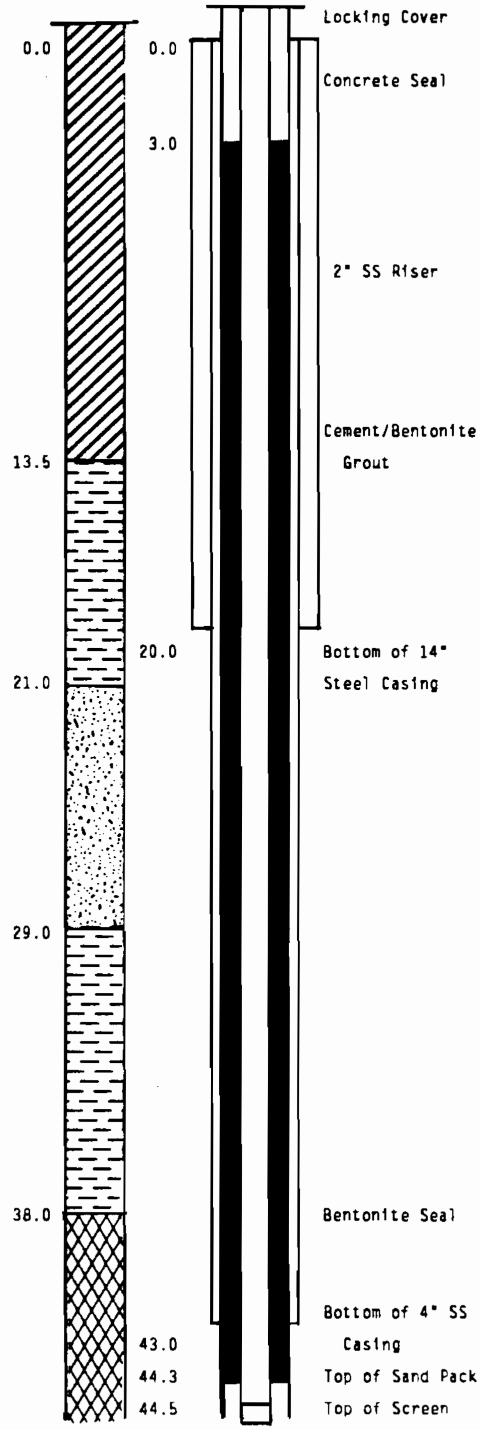
Footnotes:

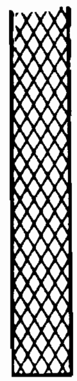
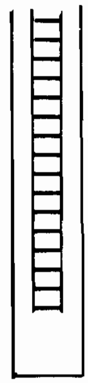
1 - 140 lb hammer over a 30" drop, recorded per 6".

BORING NO.:	MW-7D	BORING DEPTH:	54.5 FT	DATE STARTED:	02/14/90, 05/08/90
PROJECT NO.:	6171-091	CONTRACTOR:	W.C. SERVICES	DATE COMPLETED:	02/16/90, 05/29/90
PROJECT:	HERTEL LANDFILL	DRILLERS:	D. GAUGHAN	DEPTH TO WATER:	20.57 FT BTOC ON 09/12/90
CLIENT:	U.S. EPA	TAMS/TRC INSPECTOR:	J. KACZOR	GROUND ELEVATION:	640.5 FT MSL
LOCATION:	PLATTEKILL, N.Y.	DRILLING METHOD:	SEE NOTES BELOW	LOCATION:	N 614867.68 E 580527.97

DEPTH (FTBGL)	BLOWS[1] ROP[2]	SOIL DESCRIPTION* * Composite log of several drilling attempts; see drilling notes below
		FOR SUBSURFACE INFORMATION FROM 0-16' REFER TO BORING LOG MW-7S
0-16		
20-21	11 8	10" Recovery. Gray-grn crs-f SILTY SAND, tr f gravel, med dense, wet.
21-22	9 10	12" Recovery. Gray-grn crs-f SAND, some silt, little crs-f gravel, med dense, saturated.
25-27	21 27 34 35	15" Recovery. Gray-grn crs-f SAND, some crs-f gravel (angular rock frags), little silt, very dense, wet.
		Difficult drilling from 26.0'-30.0'.
30-32	WOH	No Recovery. Run up in augers is a SILTY SAND, saturated.
35-37	WOH	No Recovery. Same as 30.0'-32.0' above.
37-38		Difficult drilling 36.0'-38.0'.
41.5		Sample collected from air return. Brn rock frags containing clay.
42-43		Sample collected from air return. Lt gray med-f grained SANDSTONE, weathered to rust brn, soft seam 42.0'- 43.0'.

LITHOLOGY WELL CONSTRUCTION



DEPTH (FTBGL)	BLOWS[1] ROP[2]	SOIL DESCRIPTION* * Composite log of several drilling attempts; see drilling notes below	LITHOLOGY	WELL CONSTRUCTION
45	6 3/4 MIN	37.2" Recovery. Lt gray f-med SANDSTONE, closely spaced mid-angle		
46	9 MIN	discontinuities along well defined planes, slighty weathered,		2" SS Screen
47	5 3/4 MIN	hard.		10 Slot
48	5 MIN	Rock Core R-2 from 50.0'-54.1'. 40.8" Recovery. Same as above except		
49	6 1/2 MIN	lt blue to gray in color, slighty weathered to fresh.		Sand Pack
50	7 MIN			
51	9 1/3 MIN			
52	9 1/3 MIN			
53	6 MIN			
54	22 MIN	Core barrel blocked at 54.1'.		54.5 Bottom of Well
55	5 MIN	Rock Core R-3 from 55.0'-56.0'. 24" Recovery. Same as above with		
56	5 MIN	gravel at the top 3".	56.5	Bottom of Hole

Bottom of boring at 56.5 ft

Drilling Notes:

01/30/90

Begin drilling pilot hole with 6 1/4" ID hollow stem augers. Advance to 13.0' below grade.

01/31/90

Continue augering in same borehole to 19.0'. 14" steel casing spun in place to 19.0' below grade.

02/14/90

3 1/4" ID hollow stem augers advanced to 29.0' inside 14" steel casing.

02/15/90

In same borehole, 3 1/4" ID hollow stem augers advanced to 38.3', refusal. Pull 3 1/4" ID hollow stem augers from borehole. Redrill using 6 1/4" ID hollow stem augers in order to Nx Core. Advance to 24.0' below grade.

02/16/90

Advance 6 1/4" ID hollow stem augers to 29.0'. Refusal.

05/07/90

5 1/2" OD Air hammer advanced inside 6 1/4" ID hollow stem augers in same borehole from 27.0'. Stop drilling to tend to equipment. No advancement made this date.

05/08/90

Decide to pull 6 1/4" ID hollow stem augers from borehole. Borehole collapsed to 21.0' below grade. Advance 6" steel casing inside borehole from 21.0' to 44.0' using 7 3/8" tubex system.

05/09/90

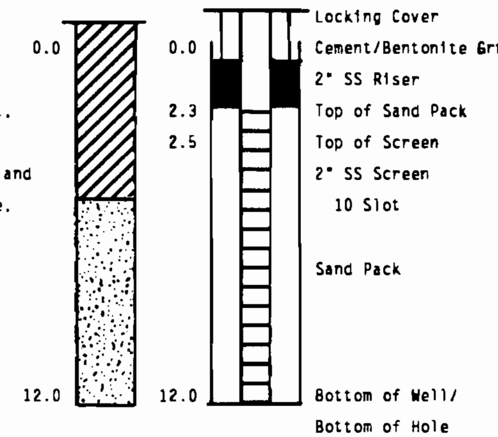
4" stainless steel casing set at 43.0'. 4" SS casing grouted in place with cement/bentonite slurry.

DEPTH (FTBGL)	BLOWS[1] ROP[2]	SOIL DESCRIPTION* * Composite log of several drilling attempts; see drilling notes below	LITHOLOGY	WELL CONSTRUCTION
		05/25/90		
		Ream out borehole from 35.0' to 44.0' with 3 7/8" tricone bit before coring. Begin Nx Core.		
		05/29/90		
		Continue Nx Core to 56.5'. Settlement of cuttings to 54.5'. Well MW-7D set at 54.5'.		
		Footnotes:		
		1 - 140 lb hammer over a 30" drop, recorded per 6".		
		2 - Rate of penetration-the time to core through 1.0' of rock, recorded in minutes.		

BORING NO.:	MW-8S	BORING DEPTH:	13.0 FT	DATE STARTED:	01/24/90
PROJECT NO.:	6171-091	CONTRACTOR:	W.C. SERVICES	DATE COMPLETED:	01/24/90
PROJECT:	HERTEL LANDFILL	DRILLERS:	J. HART	DEPTH TO WATER:	4.53 FT BTOC ON 09/12/90
CLIENT:	U.S. EPA	TRC INSPECTOR:	B. PENN	GROUND ELEVATION:	619.3 FT MSL
LOCATION:	PLATTEKILL, N.Y.	DRILLING METHOD:	6 1/4" ID HOLLOW STEM AUGERS	LOCATION:	N 615337.85 E 580862.86

DEPTH (FTBGL)	BLOWS[1]	SOIL DESCRIPTION
0-2	18 6 7 9	10" Recovery. Brn FILL material consisting of refuse (cardboard, glass), silt and f sand, moist.
2-4	4 2 2 14	4" Recovery. Brn FILL material consisting of refuse, moist, 0-2"; Rock, wet, 2-4".
4-6	9 11 31 45	18" Recovery. Rock and FILL material, 0-1"; Mottled grn-gray to brn f SAND and SILT, tr clay, 1-4"; Brn f SAND, little silt, tr f gravel (angular), dense, wet, 4-18".
6-8	12 20 24 61	No Recovery.
8-10	6 34 47 34	17" Recovery. Brn to rust-brn f SAND, tr silt, tr gravel, occasional lenses of m and f sand at 11" and 15", medium dense, wet.
10-12		Difficult drilling past 11.5'. Boulder. Refusal at 12.4'.

LITHOLOGY WELL CONSTRUCTION



Bottom of Boring 12.4 ft

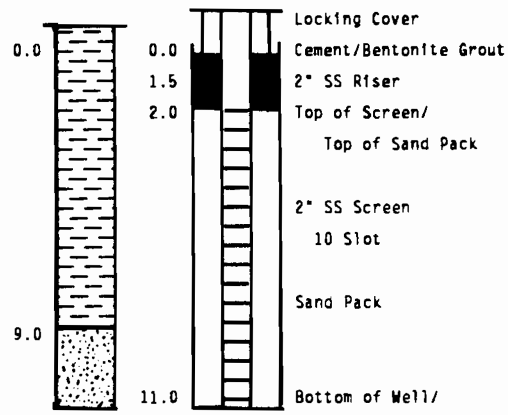
Footnotes:

1 - 140 lb hammer over a 30" drop, recorded per 6".

BORING NO.:	MW-9S	BORING DEPTH:	11.0 FT	DATE STARTED:	02/23/90
PROJECT NO.:	6171-Q91	CONTRACTOR:	W.C. SERVICES	DATE COMPLETED:	02/26/90
PROJECT:	HERTEL LANDFILL	DRILLERS:	E. ANGELO	DEPTH TO WATER:	1.37 FT BTOC ON 09/12/90
CLIENT:	U.S. EPA	TRC INSPECTOR:	J. KACZOR	GROUND ELEVATION:	622.4 FT MSL
LOCATION:	PLATTEKILL, N.Y.	DRILLING METHOD:	3 1/4" ID HOLLOW STEM AUGERS	LOCATION:	N 614461.60
					E 580633.16

DEPTH (FTBGL)	BLOWS[1]	SOIL DESCRIPTION
0-2		8" Recovery. Blk SILT and CLAY, tr f sand, roots and leaves, very soft, saturated, 0-2"; Gray-grn f-med CLAYEY SAND, loose, wet, 2-7".
		Boulder 2.0'-3.5'.
5-7		3" Recovery. Lt brn crs-f SILTY SAND, med dense, wet.
10-11	26 100/5	6" Recovery. Lt brn crs-f SAND, little silt, tr crs-f gravel, very dense, wet; boulder at 11.0'.
		Bottom of Boring at 11.0 ft

LITHOLOGY ' WELL CONSTRUCTION



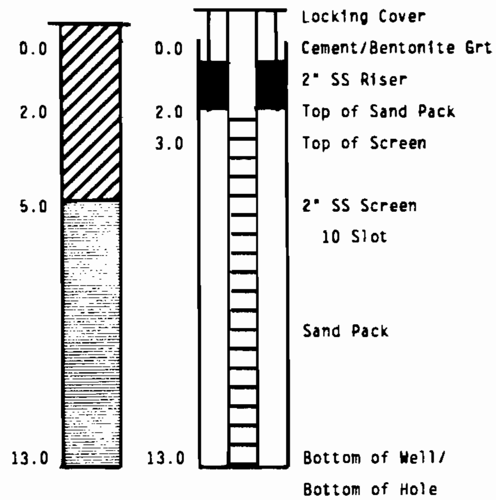
Footnotes:

1 - 140 lb hammer over a 30" drop, recorded per 6".

BORING NO.:	MW-10S	BORING DEPTH:	13.0 FT	DATE STARTED:	03/07/90
PROJECT NO.:	6171-091	CONTRACTOR:	W.C. SERVICES	DATE COMPLETED:	03/07/90
PROJECT:	HERTEL LANDFILL	DRILLERS:	J. STEVESON	DEPTH TO WATER:	1.62 FT BTOC ON 09/12/90
CLIENT:	U.S. EPA	TRC INSPECTOR:	B. PENN	GROUND ELEVATION:	616.0 FT MSL
LOCATION:	PLATTEKILL, N.Y.	DRILLING METHOD:	3 1/4" ID HOLLOW STEM AUGERS	LOCATION:	N 614689.04 E 580782.08

DEPTH (FTBGL)	BLOWS[1] ROP[2]	SOIL DESCRIPTION
		Auger 2.0' through fill material used as platform in swamp area.
3-4	1 0 1 0	9" Recovery. Brn med GRAVEL and m-c SAND, loose, saturated. Fill material as above.
5-7	WOR WOH WOH WOH	24" Recovery. Brn-dk brn SILT, little to some plant frags, tr gravel, lrg tree frag. (11-12"), saturated 0-12". Brn SILT, tr-little plant frags., tr-f gravel, 12-24".
10-12	WOH WOH	24" Recovery. Gray SILT, very soft, saturated, 0-14"; Gray SILT, tr clay, soft, 'sticky', saturated, 14-24".
		Bottom of Boring at 13.0 ft

LITHOLOGY WELL CONSTRUCTION



Footnotes:

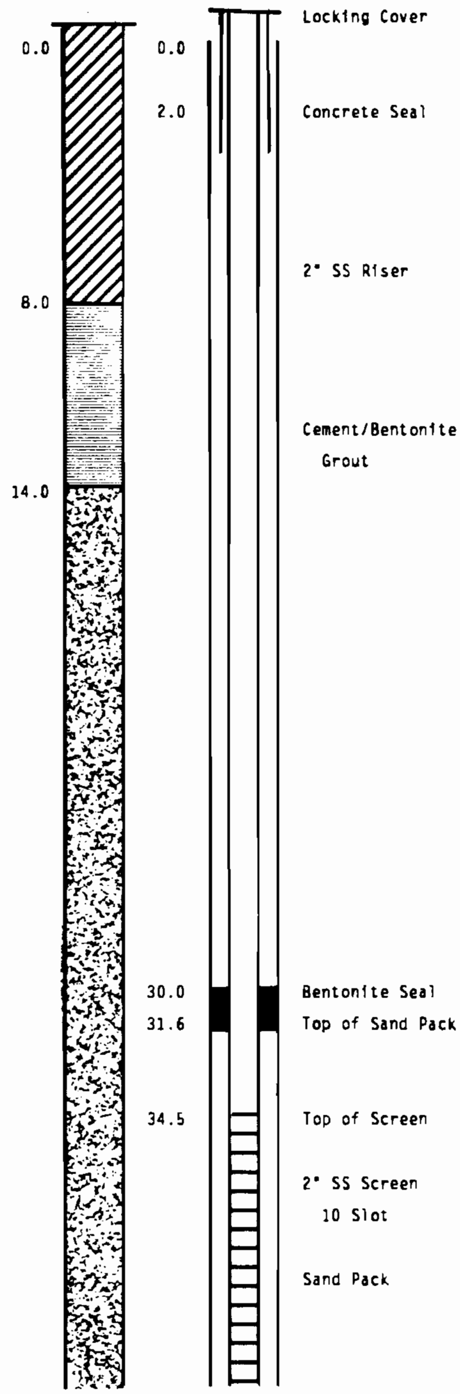
1 - 140 lb hammer over a 30" drop, recorded per 6".

2 - The time to core through 1.0' of rock, recorded in minutes.

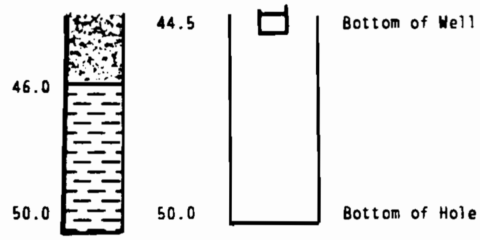
BORING NO.:	MW-10D	BORING DEPTH:	50.0 FT	DATE STARTED:	05/11/90
PROJECT NO.:	6171-091	CONTRACTOR:	W.C. SERVICES	DATE COMPLETED:	05/17/90
PROJECT:	HERTEL LANDFILL	DRILLERS:	J. STEVENSON	DEPTH TO WATER:	4.67 FT BTOC ON 09/12/90
CLIENT:	U.S. EPA	TRC INSPECTOR:	B.PENN	GROUND ELEVATION:	618.8 FT MSL
LOCATION:	PLATTEKILL, N.Y.	DRILLING METHOD:	SEE NOTES BELOW	LOCATION:	N 614686.19 E 580756.02

DEPTH (FTBGL)	BLOWS[1] ROP[2]	SOIL DESCRIPTION* * Composite log of several drilling attempts; see drilling notes below * Logged from cuttings from air return
		FOR SUBSURFACE INFORMATION FROM 0-12' REFER TO BORING LOG MW-10S
13-14		Gray SILT.
14-15		Gray GRAVEL and C SAND, tr silt.
15-17		Brn-gray C SAND and GRAVEL, tr med sand, silt.
		Crs SAND and F GRAVEL, some f sand to silt, wet.
20-21		Gray C SAND and GRAVEL, gravel variegated.
22-23		
23-24		Difficult drilling at 23.0'-24.0'.
24-25		
25-26		Same as 20.0'-21.0' above.
27-28		Gray C SAND and GRAVEL, tr f sand and silt.
29-30		Same as 27.0'-28.0' above.
32-33		Gray M-C SAND and GRAVEL, tr f sand, silt.
34-35		Same as 32.0'-33.0' above.
37-38		Same as 32.0'-33.0' above.
38-40		Same as 32.0'-33.0' above.
40-41		Same as 32.0'-33.0' above.
42-44		Same as 32.0'-33.0' above.

LITHOLOGY WELL CONSTRUCTION



DEPTH (FTBGL)	BLOWS[1] ROP[2]	SOIL DESCRIPTION* * Composite log of several drilling attempts; see drilling notes below * Logged from cuttings from air return	LITHOLOGY	WELL CONSTRUCTION
46-47		Brn SAND and SILT.		
47-49		Brn SILT and F SAND.		
49-50		Brn SILT and F SAND, tr gravel.		



Bottom of Boring at 50.0 ft

Drilling Notes:

05/11/90

Drilled to 23.0'-24.0' with 7 3/8" OD Air Hammer.(Tubex system). Difficult drilling, cuttings indicate on bedrock surface. 4" stainless steel casing tremie grouted in place to 28.8' below grade.

05/14/90

Attempt Nx core, verified not on bedrock.

05/15/90

Pull 4" casing and move to new MW-10D location approximately 4.0' to southwest. Begin drilling using Tubex system at 2nd MW-10D location.

05/17/90

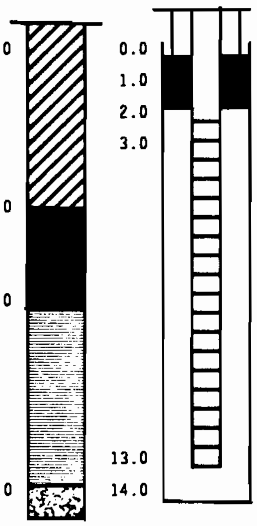
Decision made to set well at 46.0' as the geologic change encountered below 46.0' is not indicative of bedrock. Well set at 44.5' due to cave in of borehole to this depth.

Footnotes:

1 - 140 lb hammer over a 30" drop, recorded per 6".

2 - Rate of Penetration-the time to core through 1.0' of rock, recorded in minutes.

BORING NO.:	MW-11S	BORING DEPTH:	14.0 FT	DATE STARTED:	03/08/90
PROJECT NO.:	6171-091	CONTRACTOR:	W.C. SERVICES	DATE COMPLETED:	03/08/90
PROJECT:	HERTEL LANDFILL	DRILLERS:	J. STEVENSON	DEPTH TO WATER:	3.52 FT BTOC ON 09/12/90
CLIENT:	U.S. EPA	TRC INSPECTOR:	B. PENN	GROUND ELEVATION:	617.3 FT MSL
LOCATION:	PLATTEKILL, N.Y.	DRILLING METHOD:	3 1/4" ID HOLLOW STEM AUGERS	LOCATION:	N 614934.36 E 580933.01



DEPTH (FTBGL)	BLOWS[1]	SOIL DESCRIPTION	LITHOLOGY	WELL CONSTRUCTION	
					Locking Cover
0-2	4 8	8" Recovery. FILL material consisting of household refuse (plastic, paper,	0.0	0.0	Cement/Bentonite Grt
	9 3	glass), brn silt and sand. Brick fragments and household refuse (plastic)		1.0	2" SS Riser
		5-7".		2.0	Top of Sand Pack
2-4	3 2	6" Recovery. Same as above, saturated.		3.0	Top of Screen
	1 1				
4-6	1 1	12" Recovery. FILL material consisting of brick fragments and refuse	5.0		
	1 1	(glass, plastic) and brn SAND and SILT, 0-5"; Blk-brn PEAT and SILT,			
		tree frags, 5-12".			2" SS Well Screen
6-8	1 2	14" Recovery. Blk-brn PEAT and SILT, occasional tree frags.	8.0		10 Slot
	2 2				
8-10	1 1	14" Recovery. Brn-blk PEAT and SILT, 0-2"; Brn SILT, tr gravel, wood and			Sand Pack
	2 2	plant frags, 2-9"; Gray SILT, tr clay, sticky, saturated, 9-14".			
10-12	2 2	18" Recovery. Gray SILT, tr clay, sticky, saturated.			
	2 2			13.0	Bottom of Well/
12-14	2 1	15" Recovery. Gray SILT, tr. clay, 0-12"; Gray f-med SAND, tr gravel, tr	14.0	14.0	Bottom of Hole
	3 11	silt, 12-15".			

Bottom of Boring at 14.0 ft

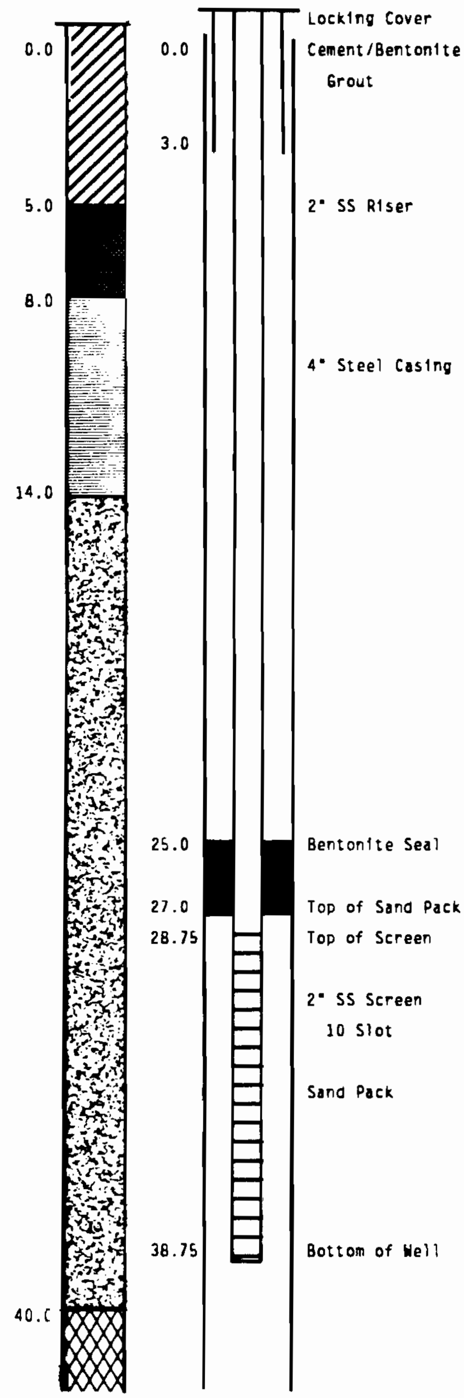
Footnotes:

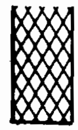
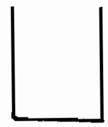
1 - 140 lb hammer over a 30" drop, recorded per 6".

BORING NO.:	MW-11D	BORING DEPTH:	46.0 FT	DATE STARTED:	05/18/90
PROJECT NO.:	6171-091	CONTRACTOR:	W.C. SERVICES	DATE COMPLETED:	05/23/90
PROJECT:	HERTEL LANDFILL	DRILLERS:	J. STEVENSON	DEPTH TO WATER:	4.52 FT BTOC ON 09/12/90
CLIENT:	U.S. EPA	TRC INSPECTOR:	B.PENN	GROUND ELEVATION:	618.4 FT MSL
LOCATION:	PLATTEKILL, N.Y.	DRILLING METHOD:	7 3/8" TUBEX SYSTEM	LOCATION:	N 614920.42 E 580921.67

DEPTH (FTBGL)	SOIL DESCRIPTION* * Logged from cuttings from air return
	FOR SUBSURFACE INFORMATION FROM 0-14' REFER TO BORING LOG MW-11S
15-16	Gray f-crs GRAVEL, little med sand, tr silt.
19-20	Same as above.
22-23	Same as above.
24-25	Same as above.
26-27	Gray crs SAND and GRAVEL, tr f sand, silt.
30-31	Same as 26.0'-27.0' above.
33-34	Same as 26.0'-27.0' above.
36-37	Same as 26.0'-27.0' above.
39-40	Gray med-crs SAND, little gravel, tr silt. Bedrock encountered at 40.0'.
41-42	Brn SANDSTONE.
42-43	Gray-brn SANDSTONE.
43-44	Brn SANDSTONE.

LITHOLOGY WELL CONSTRUCTION



DEPTH (FTBGL)	SOIL DESCRIPTION* * Logged from cuttings from air return	LITHOLOGY	WELL CONSTRUCTION
45-46	Gray SANDSTONE.	 46.0	 46.0 Bottom of Hole

Bottom of Boring at 46.0 ft

Drilling Notes:

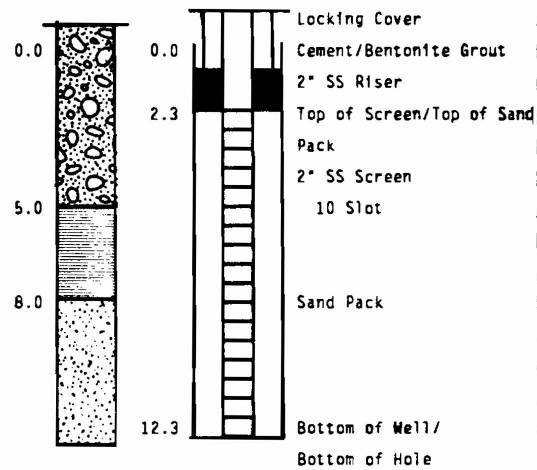
05/22/90

Advance 7 3/8" OD Tubex system to 46.0' below grade. Pull equipment from hole, observe bit broke off and left in bottom of borehole within the bedrock. Decision made to set well in overburden (38.75'), instead of redrilling borehole. Bottom 7.25' of borehole from 46.0'-38.75' is sealed with bentonite prior to setting MW-11D.

BORING NO.:	MW-12S	BORING DEPTH:	12.3 FT	DATE STARTED:	01/11/90
PROJECT NO.:	6171-091	CONTRACTOR:	W.C. SERVICES	DATE COMPLETED:	01/12/90
PROJECT:	HERTEL LANDFILL	DRILLERS:	D. GAUGHAN	DEPTH TO WATER:	5.47 FT BTOC ON 09/12/90
CLIENT:	U.S. EPA	TRC INSPECTOR:	C.DOAK	GROUND ELEVATION:	618.6 FT MSL
LOCATION:	PLATTEKILL, N.Y.	DRILLING METHOD:	3 1/4" ID HOLLOW STEM AUGERS	LOCATION:	N 615249.05 E 581008.30

DEPTH (FTBGL)	BLOWS[1]	SOIL DESCRIPTION* * Composite log of several drilling attempts; see drilling notes below
0-2	16 20 8 4	8" Recovery. Snow, ice, red-brn f to med SAND, some silt, some rock frags.
4-6	6 7 9 10	16" Recovery. Brn-gray f to med SAND and SILT, tr clay and rk frags., moist, 0-6"; Grn-gray SILT, some clay with f sand, tr rk frags, lt brn silt mottled with sand, 6-16".
9-11	4 8 11 11	14" Recovery. Brn f to med SAND, some crs sand, little silt, saturated.
		Bottom of Boring at 12.3 ft

LITHOLOGY WELL CONSTRUCTION



Drilling Notes:

01/11/90

Augered to 1.0', refusal. Borehole backfilled with cuttings. Drill rig moved to new MW-12 location, 12' to the northwest. Auger to 2.0', refusal. Borehole is backfilled with cuttings.

01/12/90

Drill rig set up at new MW-12 location, 10' south of 1st attempt. Advance to 2.0', refusal. Metal debris observed in borehole. Abandoned borehole, backfill with cuttings. Set up at new MW-12 location, 20' to the northwest (approx. 15' north of the trailer). Attempt to auger to 13.0' to set well. Refusal at 12.3'. MW-12 set at 12.3' at this location.

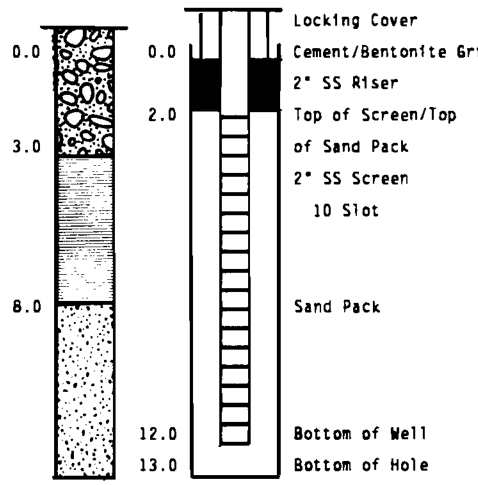
Footnotes:

1 - 140 lb hammer over a 30" drop, recorded per 6".

BORING NO.:	MW-13S	BORING DEPTH:	13.0 FT	DATE STARTED:	01/11/90
PROJECT NO.:	6171-091	CONTRACTOR:	W.C. SERVICES	DATE COMPLETED:	01/11/90
PROJECT:	HERTEL LANDFILL	DRILLERS:	D. GAUGHAN	DEPTH TO WATER:	3.34 FT BTDC ON 09/12/90
CLIENT:	U.S. EPA	TRC INSPECTOR:	C.DOAK	GROUND ELEVATION:	615.6 FT MSL
LOCATION:	PLATTEKILL, N.Y.	DRILLING METHOD:	3 1/4" ID HOLLOW STEM AUGERS	LOCATION:	N 615488.77 E 581173.23

DEPTH (FTBGL)	BLOWS[1]	SOIL DESCRIPTION
0-2	10 10 14 100/6	18" Recovery. Ice, snow, top soil with organic debris, gray SILT and f to crs SAND, some rock frags, 0-12"; Wood, 12-18".
5-7	2 3 4 6	9" Recovery. Gray SILT, some f sand, tr clay and rock frags, tr wood and organic debris, saturated.
9-11	9 10 14 12	7" Recovery. Gray f to med SAND, some silt, tr rock frags, saturated.
		Bottom of Boring at 13.0 ft

LITHOLOGY WELL CONSTRUCTION

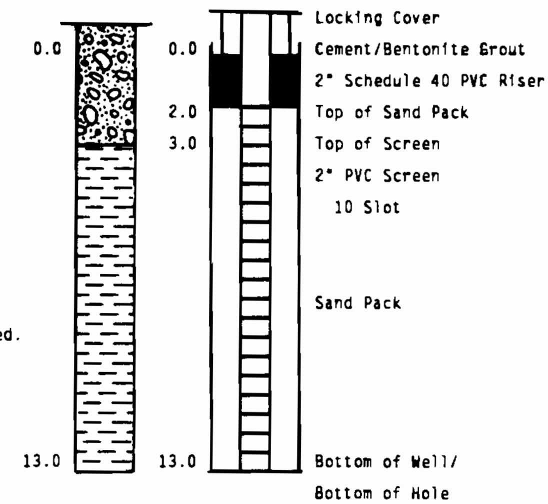


Footnotes:
1 - 140 lb hammer over a 30" drop, recorded per 6".

BORING NO.:	P-1	BORING DEPTH:	13.0 FT	DATE STARTED:	01/10/90
PROJECT NO.:	6171-091	CONTRACTOR:	W.C. SERVICES	DATE COMPLETED:	01/11/90
PROJECT:	HERTEL LANDFILL	DRILLERS:	D. GAUGHAN	DEPTH TO WATER:	3.54 FT BTOC ON 09/12/90
CLIENT:	U.S. EPA	TRC INSPECTOR:	C.DOAK	GROUND ELEVATION:	616.4 FT MSL
LOCATION:	PLATTEKILL, N.Y.	DRILLING METHOD:	3 1/4" ID HOLLOW STEM AUGERS	LOCATION:	N 615698.45 E 581242.20

DEPTH (FTBGL)	BLOWS[1]	SOIL DESCRIPTION* * Composite log of several drilling attempts; see drilling notes below
0-2	7 7 10 42	8" Recovery. Dk brn crs SAND and top soil, organic debris, snow and ice, tr silt and rock frags.
4-6	34 17 14 22	10" Recovery. Gray-grn SILT and f SAND modeled with lt brn silt, tr clay and rock frags., saturated.
9-11	9 9 3 6	8" Recovery. Gray f SAND and SILT, tr clay and rock frags., saturated.
		Bottom of Boring at 13.0 ft

LITHOLOGY WELL CONSTRUCTION



Drilling Notes:

01/10/90

Augered to 3.0' with 3 1/4" ID hollow stem augers, refusal. Drill rig set up approximately 3.0' northeast of 1st attempt.

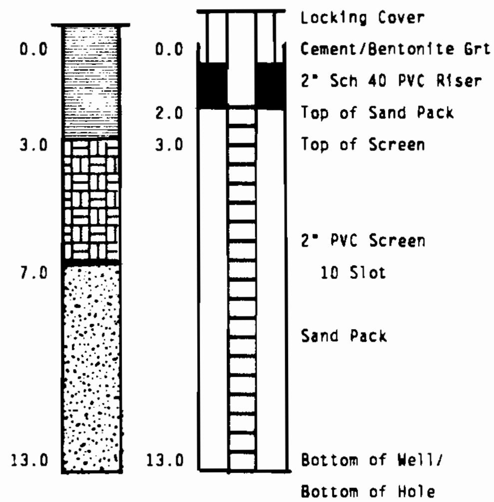
Footnotes:

1 - 140 lb hammer over a 30" drop, recorded per 6".

BORING NO.:	P-2	BORING DEPTH:	13.0 FT	DATE STARTED:	01/29/90
PROJECT NO.:	6171-091	CONTRACTOR:	W.C. SERVICES	DATE COMPLETED	01/30/90
PROJECT:	HERTEL LANDFILL	DRILLERS:	D. GAUGHAN	DEPTH TO WATER	9.71 FT BTOC ON 09/12/90
CLIENT:	U.S. EPA	TAMS INSPECTOR:	J. KACZOR	GROUND ELEVATION:	637.8 FT MSL
LOCATION:	PLATTEKILL, N.Y.	DRILLING METHOD:	3 1/4" ID HOLLOW STEM AUGERS	LOCATION:	N 614494.82
					E 580428.61

DEPTH (FTBGL)	BLOWS[1]	SOIL DESCRIPTION* * Composite log of several drilling attempts; see drilling notes below
0-2	5 5 15 59	18" Recovery. Lt brn to tan SILT, tr crs sand, tr roots and fibers, stiff moist.
4-6	5 15 15 13	20" Recovery. Lt brn f sandy CLAY, tr f gravel, very stiff, wet. (Clay content greater in the bottom 8")
9-11	15 18 21 26	14" Recovery. Grn f SAND, little silt, little f gravel, dense, wet.
		Bottom of Boring 13.0 ft

LITHOLOGY WELL CONSTRUCTION



Drilling Notes:

01/29/90

Auger to 4.0' with 3 1/4" ID hollow stem augers. Drive cap is snapped off. Drilling stopped for this date.

01/30/90

Augered to 7.0' with 3 1/4" ID hollow stem augers, refusal. Borehole abandoned and backfilled with bentonite. Drill rig set up on new P-2 location, approximately 15.0' north of previous attempt.

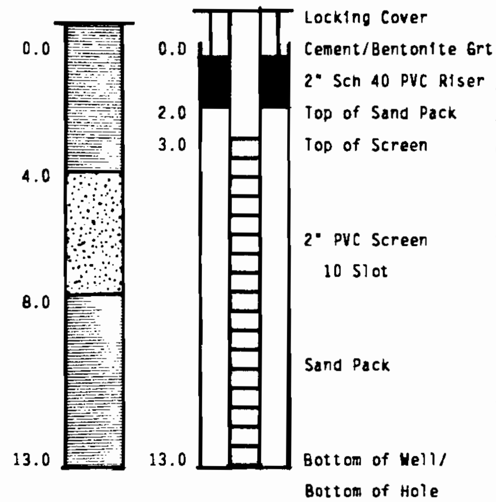
Footnotes:

1 - 140 lb hammer over a 30" drop, recorded per 6".

BORING NO.:	P-3	BORING DEPTH:	13.0 FT	DATE STARTED:	2/12/90
PROJECT NO.:	6171-091	CONTRACTOR:	W.C. SERVICES	DATE COMPLETED:	2/12/90
PROJECT:	HERTEL LANDFILL	DRILLERS:	E. ANGELO	DEPTH TO WATER:	2.28 FT BTOC ON 09/12/90
CLIENT:	U.S. EPA	TRC INSPECTOR:	C. DOAK	GROUND ELEVATION:	629.5 FT MSL
LOCATION:	PLATTEKILL, N.Y.	DRILLING METHOD:	3 1/4" ID HOLLOW STEM AUGERS	LOCATION:	N 614175.86 E 580519.34

DEPTH (FTBGL)	BLOWS[1]	SOIL DESCRIPTION
0-2	1 3 2 3	7.5" Recovery. Organic material (twigs, leaves, etc.), 0-1.5"; Brn SILT and f to med SAND, tr f gravel, 1.5-6.0"; Gray-grn SILT and f to crs SAND, tr rock frags, 6.0-7.5". Standing water observed in hole at 6-8".
5-7	6 5 10 100/5.5	9" Recovery. Brn f to crs SAND, some silt and f gravel, saturated, 0-5": Brn f to crs SAND and SILT, some f gravel, little clay, saturated, 5-9".
10-12	2 9 14 15	6" Recovery. Brn SILT, some f to crs sand and f gravel, tr clay, tr rock frags., saturated.

LITHOLOGY WELL CONSTRUCTION



Bottom of Boring 13.0 ft

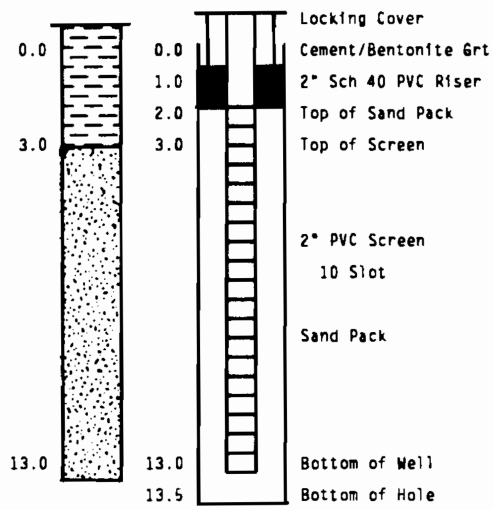
Footnotes:

1 - 140 lb hammer over a 30" drop, recorded per 6".

BORING NO.:	P-4	BORING DEPTH:	13.5 FT	DATE STARTED:	02/13/90
PROJECT NO.:	6171-091	CONTRACTOR:	W.C. SERVICES	DATE COMPLETED:	02/13/90
PROJECT:	HERTEL LANDFILL	DRILLERS:	E. ANGELO	DEPTH TO WATER:	6.09 FT BTOC ON 09/12/90
CLIENT:	U.S. EPA	TAMS INSPECTOR:	J. KACZOR	GROUND ELEVATION:	647.3 FT MSL
LOCATION:	PLATTEKILL, N.Y.	DRILLING METHOD:	3 1/4" ID HOLLOW STEM AUGERS	LOCATION:	N 614048.35 E 580187.70

DEPTH (FTBGL)	BLOWS[1]	SOIL DESCRIPTION
0-2	2 1 1 8	16" Recovery. Dk brn SILT, some med to f sand, very soft, moist (roots, leaves, topsoil), 0-3"; Tan silty CLAY, some med to f sand, very soft, moist, 3-16".
5-7	55 16 10 8	10" Recovery. Gray-grn mottled tan and brn, med to f SAND, some silt, tr med gravel, med dense, wet.
10-12	4 10 7 15	11" Recovery. Gray-grn crs to f SAND, some silt, med dense, wet.
		Bottom of Boring at 13.5 ft

LITHOLOGY WELL CONSTRUCTION



Footnotes:
1 - 140 lb hammer over a 30" drop, recorded per 6".

APPENDIX F

SUMMARY OF WATER LEVEL MEASUREMENTS FOR MONITORING WELLS, PIEZOMETERS AND STAFF GAGES

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX F

HERTEL LANDFILL REMEDIAL INVESTIGATION
U.S. ENVIRONMENTAL PROTECTION AGENCY - REGION II
ALTERNATIVE REMEDIAL CONTRACTING STRATEGY

SUMMARY OF WATER LEVEL MEASUREMENTS FOR
MONITORING WELLS, PIEZOMETERS AND STAFF GAGES

Date of Measurement	Location ID Numbers											
	MW-1S	MW-1D	MW-2S	MW-2D	MW-3S	MW-3D	MW-5S	MW-6S	MW-6D	MW-7S	MW-7D	MW-8
01/15/90	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
01/24/90	ND	ND	11.42	ND	ND	ND	ND	12.56	ND	13.06	ND	ND
01/25/90	ND	ND	ND	ND	ND	ND	ND	13.08	ND	13.95	ND	ND
02/02/90	ND	ND	4.63	ND	ND	ND	ND	9.06	ND	13.19	ND	4.13
02/09/90	ND	ND	5.01	ND	ND	ND	18.33	10.26	ND	12.90	ND	4.23
02/16/90	ND	ND	5.53	ND	4.19	ND	18.53	10.25	ND	14.13	ND	4.18
02/21/90	ND	ND	6.27	ND	4.42	ND	18.70	10.21	ND	13.50	ND	4.32
02/28/90	ND	ND	5.93	ND	4.74	ND	18.87	10.12	ND	ND	ND	4.33
03/09/90	25.05	ND	6.79	ND	4.15	ND	19.20	10.36	ND	ND	ND	4.33
03/19/90	25.32	ND	6.17	ND	4.16	ND	19.85	10.86	ND	ND	ND	4.21
04/02/90	24.47	ND	5.59	ND	4.11	ND	18.92	10.47	ND	13.77	ND	4.28
04/11/90	24.08	ND	6.10	ND	3.88	ND	18.64	10.02	ND	13.92	ND	4.22
04/18/90	24.30	27.91	6.65	ND	4.09	ND	18.42	10.50	ND	13.97	ND	4.26
04/24/90	25.23	28.35	7.37	ND	ND	ND	19.93	11.00	ND	14.11	ND	4.39
05/03/90	25.37	28.46	6.94	ND	5.02	2.87	20.71	11.39	ND	14.02	ND	4.29
05/10/90	25.04	28.10	7.03	ND	4.82	2.74	20.27	11.08	ND	13.98	ND	4.30
05/15/90	24.58	27.59	5.73	ND	4.50	2.43	19.20	10.62	ND	13.71	ND	4.12
05/22/90	23.54	26.59	5.22	6.86	4.35	2.15	18.36	10.13	ND	13.67	ND	4.10
05/31/90	24.38	27.56	5.94	6.99	4.57	2.46	18.41	10.37	ND	13.83	18.94	4.08
06/11/90[1]	25.44	28.44	7.90	8.63	5.35	ND	19.91	10.52	15.00	14.24	19.76	4.26
08/20/90[2]	24.43	27.48	6.85	7.69	5.0	2.9	18.52	10.2	14.5	12.80	19.0	4.20
09/05/90	25.87	28.77	9.40	9.76	5.76	4.00	20.94	11.81	15.43	14.40	20.57	4.53
10/29/90	26.63	29.56	9.09	9.54	5.16	3.76	21.87	12.77	15.66	14.12	21.31	4.33

MW = Monitoring Well
P = Drilled Piezometer
EP = Test Pit Piezometer
SWL = Staff Gage
ND = No Data

All monitoring wells, drilled piezometers and test pit piezometer measurements are referenced to the top of the inside casing, except for MW-W1S which is referenced to the top of the outer casing.

All staff gage measurements are referenced to top of nail head on side or top of staff gage.

All measurements represent depth to water (in feet) from reference point.

APPENDIX F

HERTEL LANDFILL REMEDIAL INVESTIGATION
U.S. ENVIRONMENTAL PROTECTION AGENCY - REGION II
ALTERNATIVE REMEDIAL CONTRACTING STRATEGY

SUMMARY OF WATER LEVEL MEASUREMENTS FOR
MONITORING WELLS, PIEZOMETERS AND STAFF GAGES

(Continued)

Date of Measurement	Location ID Numbers									
	MW-9S	MW-10S	MW-10D	MW-11S	MW-11D	MW-12S	MW-13S	MW-W1S	MW-W1D	MW-W2S
01/15/90	ND	ND	ND	ND	ND	ND	ND	7.26	6.20	2.37
01/24/90	ND	ND	ND	ND	ND	4.96	3.60	7.08	6.04	2.29
01/25/90	ND	ND	ND	ND	ND	4.68	3.26	ND	ND	ND
02/02/90	ND	ND	ND	ND	ND	4.85	2.77	6.67	5.65	1.77
02/09/90	ND	ND	ND	ND	ND	5.02	3.09	6.75	5.63	2.72
02/16/90	ND	ND	ND	ND	ND	4.55	2.94	6.12	5.57	1.74[3]
02/21/90	ND	ND	ND	ND	ND	5.16	3.35	6.88	5.78	1.76[3]
02/28/90	ND	ND	ND	ND	ND	5.06	3.18	8.61	5.88	1.82[3]
03/09/90	1.55	1.64	ND	3.16	ND	5.20	3.34	6.93	5.85	1.97
03/19/90	1.73	1.69	ND	3.31	ND	5.01	3.16	6.86	5.80	2.06
04/02/90	1.59	1.69	ND	3.28	ND	5.13	3.22	6.85	5.79	1.89
04/11/90	1.51	1.67	ND	3.20	ND	5.12	3.14	6.86	5.73	1.88
04/18/90	1.59	1.67	ND	3.33	ND	5.18	3.26	6.94	5.86	2.05
04/24/90	1.59	1.67	ND	3.41	ND	5.26	3.37	7.04	5.95	2.09
05/03/90	1.62	1.54	ND	3.49	ND	5.22	3.33	7.01	5.94	2.18
05/10/90	1.57	1.62	ND	3.35	ND	5.21	3.25	6.38	5.87	2.07
05/15/90	1.52	1.63	ND	3.28	ND	5.08	3.19	6.83	5.76	2.09
05/22/90	1.46	1.64	4.14	2.71	ND	5.06	3.13	6.77	5.68	2.02
05/31/90	1.47	1.62	4.16	2.66	3.94	5.10	3.12	6.82	5.74	2.06
06/11/90[1]	1.63	1.63	4.37	2.293	4.25	5.37	3.53	6.53	6.01	2.27
08/20/90[2]	1.24	1.57	4.32	3.58	4.10	5.08	3.00	6.36	5.87	2.19
09/05/90	1.37	1.62	4.67	3.52	4.52	5.47	3.34	7.26	6.25	2.66
10/29/90	1.28	1.40	4.56	3.26	4.60	5.25	3.04	7.06	6.05	2.48

ND = No Data

[1] Measurements during June 11, 12, and 13.

[2] Measurements during August 20, 21, and 22.

[3] Frozen, measurement to top of ice.

APPENDIX F

HERTEL LANDFILL REMEDIAL INVESTIGATION
U.S. ENVIRONMENTAL PROTECTION AGENCY - REGION II
ALTERNATIVE REMEDIAL CONTRACTING STRATEGY

SUMMARY OF WATER LEVEL MEASUREMENTS FOR
MONITORING WELLS, PIEZOMETERS AND STAFF GAGES

(Continued)

Date of Measurement	Location ID Numbers								
	MW-W2D	MW-W3S	P-1	P-2	P-3	P-4	EP-2	EP-4	EP-5
01/15/90	2.11	18.88	ND	ND	ND	ND	ND	ND	ND
01/24/90	2.04	18.63	3.46	ND	ND	ND	ND	ND	ND
01/25/90	ND	ND	3.14	ND	ND	ND	ND	ND	ND
02/02/90	1.60	15.73	3.40	6.73	ND	ND	ND	ND	ND
02/09/90	1.47	15.84	3.36	4.69	ND	ND	ND	ND	ND
02/16/90	1.47[3]	16.42	3.24	ND	1.90	4.40	ND	ND	ND
02/21/90	1.58[3]	16.60	3.39	7.10	1.95	4.37	ND	ND	ND
02/28/90	1.50[3]	16.83	3.37	7.51	1.94[3]	4.53	ND	ND	ND
03/09/90	1.68[3]	17.29	3.38	8.10	1.87[3]	4.80	ND	ND	ND
03/19/90	1.79	17.46	3.38	8.29	2.09	4.38	ND	ND	ND
04/02/90	1.69	16.77	3.36	7.15	2.06	4.42	ND	ND	ND
04/11/90	1.60	16.44	3.05	6.76	2.05	4.60	5.76	4.51	3.41
04/18/90	1.82	17.12	3.39	7.79	2.13	4.82	5.97	4.60	3.48
04/24/90	1.86	17.53	3.38	8.27	2.08	5.02	6.21	4.70	3.62
05/03/90	1.94	17.54	3.35	8.25	2.08	4.58	5.75	4.66	ND
05/10/90	1.84	17.13	3.39	7.98	2.02	4.74	5.76	4.66	3.42
05/15/90	1.85	16.70	3.34	7.04	2.01	4.20	5.34	4.37	ND
05/22/90	1.77	15.92	3.31	5.90	1.96	4.22	5.39	ND	3.30
05/31/90	1.87	16.81	3.36	6.35	2.01	4.43	5.53	4.42	3.35
06/11/90[1]	2.03	17.56	ND	ND	ND	ND	ND	ND	ND
08/20/90[2]	1.91	16.55	ND	7.92	2.06	ND	ND	ND	ND
09/05/90	2.40	17.96	3.54	9.71	2.28	6.09	6.86	ND	4.46
10/29/90	2.25	18.83	3.44	9.95	2.07	5.50	6.33	4.67	3.91

ND = No Data

[1] Measurements during June 11, 12, and 13.

[2] Measurements during August 20, 21, and 22.

[3] Frozen, measurement to top of ice.

APPENDIX F

HERTEL LANDFILL REMEDIAL INVESTIGATION
U.S. ENVIRONMENTAL PROTECTION AGENCY - REGION II
ALTERNATIVE REMEDIAL CONTRACTING STRATEGY

SUMMARY OF WATER LEVEL MEASUREMENTS FOR
MONITORING WELLS, PIEZOMETERS AND STAFF GAGES

(Continued)

Date of Measurement	Location ID Numbers								
	SWL-2	SWL-3	SWL-4	SWL-5	SWL-6	SWL-7	SWL-8	SWL-9	SWL-10
01/15/90	ND	ND	ND	ND	ND	ND	ND	ND	ND
01/24/90	ND	ND	ND	ND	ND	ND	ND	ND	ND
01/25/90	ND	ND	ND	ND	ND	ND	ND	ND	ND
02/02/90	ND	ND	ND	ND	ND	ND	ND	ND	ND
02/09/90	ND	ND	ND	ND	ND	ND	ND	ND	ND
02/16/90	ND	ND	ND	ND	ND	ND	ND	ND	ND
02/21/90	ND	ND	ND	ND	ND	ND	ND	ND	ND
02/28/90	ND	ND	ND	ND	ND	ND	ND	ND	ND
03/09/90	ND	ND	ND	ND	ND	ND	ND	ND	ND
03/19/90	ND	ND	ND	ND	ND	ND	ND	ND	ND
04/02/90	ND	ND	ND	ND	ND	ND	ND	ND	ND
04/11/90	ND	0.52	1.09	1.96	2.42	2.17	2.20	1.94	1.40
04/18/90	ND	0.59	1.19	2.02	2.41	2.24	ND	1.92	1.44
04/24/90	ND	0.60	1.27	2.06	2.44	2.27	ND	1.89	1.47
05/03/90	3.01	0.56	1.26	2.07	2.46	2.29	2.25	2.07	1.46
05/10/90	1.95	0.56	1.20	2.05	2.39	2.29	2.24	1.90	1.49
05/15/90	1.94	0.57	1.12	2.04	2.42	2.27	2.22	1.96	1.40
05/22/90	1.88	0.49	0.98	2.00	2.41	2.33	2.13	1.98	1.39
05/31/90	1.94	0.47	1.07	2.06	2.41	2.27	2.20	1.99	1.40
06/11/90	ND	ND	ND	ND	ND	ND	ND	ND	ND
08/10/90	ND	ND	ND	ND	ND	ND	ND	ND	ND
09/05/90	ND	0.65	1.13	2.14	ND	2.35	ND	1.60	1.66
10/29/90	1.97	0.50	1.26	2.08	2.29	2.27	2.35	1.33	1.54

ND = No Data

APPENDIX G

HYDRAULIC TESTING RESULTS/ANALYSIS

THIS PAGE INTENTIONALLY LEFT BLANK

HYDRAULIC TESTING RESULTS/ANALYSIS

Slug Extraction Test Analysis

The slug test analyses utilize a computer program presented by Thompson (1987) to solve Cedergren's (1977) equation for hydraulic conductivity:

$$K = \frac{r^2}{2L\,(t_2 - t_1)} \ln\left(\frac{L}{R}\right) \ln \frac{H_1}{H_2}$$

where

K	=	hydraulic conductivity
r	=	casing radius
L	=	intake length
R	=	intake radius
H_1, H_2	=	hydraulic heads at two points in time (t_1, t_2)
t_2, t_1	=	time since slug removal

The data sets for each test are presented in this appendix. The portion of the complete data set that best described a straight line was utilized for calculating the hydraulic conductivity using the computer program and is presented along with the calculated value for hydraulic conductivity. In many cases this was accomplished by eliminating either early or late-time data. Variations in calculated hydraulic conductivities from different straight line portions of the plotted data sets (early and late time) varied as much as an order of magnitude (MW-5S, MW-11S, MW-12S). In some cases, water level recovery was rapid and most of the water level recovery was complete in the first 10 to 30 seconds of the recovery period. In some shallow well tests, however, this rapid early-time recharge may have come from the gravel pack rather than the formation. For this reason, the more-pronounced later-time straight-line portions of the plotted data sets were used for calculations in addition to the early-time data.

These slug tests and analyses are considered to provide order-of-magnitude estimates of hydraulic conductivities. It should be noted that slug tests measure the properties of small portions of the aquifer and can be influenced by well construction and degree of well development.

Short-term Pumping Test Analysis

These tests were conducted by pumping the monitor wells at a constant rate for approximately 1 hour. The equation used for analysis is developed from the Theis non-equilibrium equation as modified by Cooper and Jacob (Driscoll, 1986):

$$T = \frac{264\ Q}{\Delta s}$$

where

T = coefficient of transmissivity in gallons per day per foot
Q = pumping rate in gallons per minute
Δs = slope of the time-drawdown graph over one log cycle

Converting transmissivity from units of gallons per day per foot to feet per day, the resulting equation is:

$$T = \frac{35\ Q}{\Delta s}$$

There are some assumptions in the original Theis equation not fulfilled in the field tests (i.e., confined, homogeneous, isotropic aquifer; fully penetrating well). However, use of the Theis equation provides an estimation of transmissivity given the limited duration of the tests. Emphasis was placed on early-time data in the examination of the data and calculation of transmissivity.

To provide an estimate of hydraulic conductivity from the calculated transmissivities, the following equation was used:

$$K = {}^{T}/_{b}$$

where

K = hydraulic conductivity in ft/day
T = transmissivity in ft^2/day
b = saturated aquifer thickness in feet

The lengths of the screen and gravel pack in the boreholes were used in place of the full saturated aquifer thicknesses (b), as the screens and gravel packs did not fully penetrate the aquifers.

Water Level Recovery Analysis

The water level recovery data from the short-term pumping tests were analyzed using Theis' recovery method (Driscoll, 1986), which utilizes the same equations as the pumping test analysis. When placing a straight line through each plotted data set (s' vs log t/t'), preference was given to late-time data (Kruseman, 1970).

THIS PAGE INTENTIONALLY LEFT BLANK

HERTEL LANDFILL

WELL NUMBER: MW-1S
STANDPIPE RADIUS (INCHES) = 1.45
INTAKE RADIUS (INCHES) = 2.5
LENGTH OF INTAKE (FEET) = 6
DEPTH TO TOP OF INTAKE (FEET) = 24
DEPTH TO STATIC WATER LEVEL (FEET) = 24.95
DEPTH TO PURGE WATER LEVEL (FEET) = 26.76

TIME (SECONDS)	WATER LEVEL (FEET)	DRAWDOWN (FEET)	H/H0
15	25.12	0.17	9.392259E-02
19.8	25.1	0.15	8.287308E-02
25.2	25.08	0.13	.0718227
30	25.07	0.12	6.629795E-02
34.8	25.06	0.11	6.077319E-02
40.2	25.05	0.10	5.524757E-02

UNCONFINED AQUIFER

K = 0.3E-02 cm/sec
= 55.0 gpd/ft2
= 0.9E-04 ft/sec
= 7.4 ft/day

REGRESSION COEFFICIENT = -.9946595

HERTEL LANDFILL

WELL NUMBER: MW-1S

STANDPIPE RADIUS (INCHES) = 1.45

INTAKE RADIUS (INCHES) = 2.5

LENGTH OF INTAKE (FEET) = 6

DEPTH TO TOP OF INTAKE (FEET) = 24

DEPTH TO STATIC WATER LEVEL (FEET) = 24.95

DEPTH TO PURGE WATER LEVEL (FEET) = 26.76

TIME (SECONDS)	WATER LEVEL (FEET)	DRAWDOWN (FEET)	H/HO
10.2	25.18	0.23	.127072
15	25.12	0.17	9.392259E-02
19.8	25.1	0.15	8.287308E-02
25.2	25.08	0.13	.0718227
30	25.07	0.12	6.629795E-02
34.8	25.06	0.11	6.077319E-02
40.2	25.05	0.10	5.524757E-02
45	25.02	0.07	3.867416E-02
49.8	25	0.05	2.762379E-02
55.2	25	0.05	2.762379E-02
60	24.99	0.04	2.209903E-02
70.2	24.98	0.03	1.657427E-02
79.8	24.98	0.03	1.657427E-02
90	24.98	0.03	1.657427E-02
100.2	24.96	0.01	5.523893E-03
109.8	24.96	0.01	5.523893E-03
120	24.951	0.00	5.523028E-04

UNCONFINED AQUIFER

K = 0.5E-02 cm/sec
= 98.6 gpd/ft2
= 0.2E-03 ft/sec
= 13.2 ft/day

REGRESSION COEFFICIENT = -.9395021

HERTEL LANDFILL

WELL NUMBER: MW-2S
STANDPIPE RADIUS (INCHES) = 1.6
INTAKE RADIUS (INCHES) = 3
LENGTH OF INTAKE (FEET) = 7
DEPTH TO TOP OF INTAKE (FEET) = 6.8
DEPTH TO STATIC WATER LEVEL (FEET) = 6.56
DEPTH TO PURGE WATER LEVEL (FEET) = 8.75

TIME (SECONDS)	WATER LEVEL (FEET)	DRAWDOWN (FEET)	H/H0
45	7.05	0.49	.2237442
49.8	7.03	0.47	.214612
55.2	7.02	0.46	.2100458
60	7	0.44	.2009132
70.2	6.98	0.42	.191781
79.8	6.96	0.40	.1826484
90	6.94	0.38	.1735161
100.2	6.92	0.36	.1643835
109.8	6.91	0.35	.1598174
120	6.89	0.33	.1506848
135	6.87	0.31	.1415525
150	6.86	0.30	.1369864
165	6.84	0.28	.1278542
180	6.83	0.27	.1232877

UNCONFINED AQUIFER

K = 0.6E-03 cm/sec
= 12.1 gpd/ft2
= 0.2E-04 ft/sec
= 1.6 ft/day

REGRESSION COEFFICIENT = -.9937516

HERTEL LANDFILL

WELL NUMBER: MW-2S

STANDPIPE RADIUS (INCHES) = 1.6

INTAKE RADIUS (INCHES) = 3

LENGTH OF INTAKE (FEET) = 7

DEPTH TO TOP OF INTAKE (FEET) = 6.8

DEPTH TO STATIC WATER LEVEL (FEET) = 6.56

DEPTH TO PURGE WATER LEVEL (FEET) = 8.75

TIME (SECONDS)	WATER LEVEL (FEET)	DRAWDOWN (FEET)	H/HO
10.2	7.63	1.07	.4885845
15	7.39	0.83	.3789953
19.8	7.25	0.69	.3150685
25.2	7.17	0.61	.2785388
30	7.13	0.57	.2602739
34.8	7.1	0.54	.2465752
40.2	7.07	0.51	.2328768
45	7.05	0.49	.2237442

UNCONFINED AQUIFER

K = 0.3E-02 cm/sec
= 56.6 gpd/ft2
= 0.9E-04 ft/sec
= 7.6 ft/day

REGRESSION COEFFICIENT = -.9437022

HERTEL LANDFILL

WELL NUMBER: MW-3S
STANDPIPE RADIUS (INCHES) = 1.6
INTAKE RADIUS (INCHES) = 3
LENGTH OF INTAKE (FEET) = 10.3
DEPTH TO TOP OF INTAKE (FEET) = 5
DEPTH TO STATIC WATER LEVEL (FEET) = 4.94
DEPTH TO PURGE WATER LEVEL (FEET) = 8.850001

TIME (SECONDS)	WATER LEVEL (FEET)	DRAWDOWN (FEET)	H/H0
15	7.46	2.52	.6445011
25.2	6.95	2.01	.5140665
30	6.76	1.82	.4654732
34.8	6.62	1.68	.4296675
40.2	6.46	1.52	.3887467
49.8	6.19	1.25	.3196931
60	5.9	0.96	.2455243
75	5.76	0.82	.2097187

UNCONFINED AQUIFER

K = 0.2E-02 cm/sec
= 39.9 gpd/ft2
= 0.6E-04 ft/sec
= 5.3 ft/day

REGRESSION COEFFICIENT = -.9952101

HERTEL LANDFILL

WELL NUMBER: MW-5S
STANDPIPE RADIUS (INCHES) = 1.6
INTAKE RADIUS (INCHES) = 3
LENGTH OF INTAKE (FEET) = 8.140001
DEPTH TO TOP OF INTAKE (FEET) = 16
DEPTH TO STATIC WATER LEVEL (FEET) = 18.86
DEPTH TO PURGE WATER LEVEL (FEET) = 22.04

TIME (SECONDS)	WATER LEVEL (FEET)	DRAWDOWN (FEET)	H/HO
45	19.71	0.85	.267295
49.8	19.69	0.83	.2610059
55.2	19.67	0.81	.2547166
60	19.65	0.79	.248427
70.2	19.63	0.77	.2421378
79.8	19.61	0.75	.2358486
90	19.58	0.72	.2264148
100.2	19.55	0.69	.2169805

UNCONFINED AQUIFER

K = 0.4E-03 cm/sec
= 8.8 gpd/ft2
= 0.1E-04 ft/sec
= 1.2 ft/day

REGRESSION COEFFICIENT = -.9960189

HERTEL LANDFILL

WELL NUMBER: MW-5S
STANDPIPE RADIUS (INCHES) = 1.6
INTAKE RADIUS (INCHES) = 3
LENGTH OF INTAKE (FEET) = 8.140001
DEPTH TO TOP OF INTAKE (FEET) = 16
DEPTH TO STATIC WATER LEVEL (FEET) = 18.86
DEPTH TO PURGE WATER LEVEL (FEET) = 22.04

TIME (SECONDS)	WATER LEVEL (FEET)	DRAWDOWN (FEET)	H/HO
10.2	20.76	1.90	.597484
15	20.33	1.47	.4622639
19.8	20.02	1.16	.3647795

UNCONFINED AQUIFER

K = 0.6E-02 cm/sec
= 126.2 gpd/ft2
= 0.2E-03 ft/sec
= 16.9 ft/day

REGRESSION COEFFICIENT = -.9997327

HERTEL LANDFILL

WELL NUMBER: MW-8S
STANDPIPE RADIUS (INCHES) = 2.5
INTAKE RADIUS (INCHES) = 6
LENGTH OF INTAKE (FEET) = 9.8
DEPTH TO TOP OF INTAKE (FEET) = 4.4
DEPTH TO STATIC WATER LEVEL (FEET) = 4.53
DEPTH TO PURGE WATER LEVEL (FEET) = 8.439999

TIME (SECONDS)	WATER LEVEL (FEET)	DRAWDOWN (FEET)	H/H0
19.8	5.01	0.48	.1227622
25.2	5	0.47	.1202046
30	4.99	0.46	.117647
34.8	4.98	0.45	.1150895
40.2	4.97	0.44	.1125319
45	4.96	0.43	.1099744
49.8	4.95	0.42	.1074168
55.2	4.95	0.42	.1074168
60	4.94	0.41	.1048593
70.2	4.93	0.40	.1023017
79.8	4.92	0.39	.0997442
90	4.92	0.39	.0997442
100.2	4.91	0.38	.0971866
109.8	4.9	0.37	9.462911E-02

UNCONFINED AQUIFER

K = 0.6E-03 cm/sec
= 11.9 gpd/ft2
= 0.2E-04 ft/sec
= 1.6 ft/day

REGRESSION COEFFICIENT = -.9784674

HERTEL LANDFILL

WELL NUMBER: MW-9S
STANDPIPE RADIUS (INCHES) = 1.6
INTAKE RADIUS (INCHES) = 3
LENGTH OF INTAKE (FEET) = 9.5
DEPTH TO TOP OF INTAKE (FEET) = 4
DEPTH TO STATIC WATER LEVEL (FEET) = 1.19
DEPTH TO PURGE WATER LEVEL (FEET) = 5.1

TIME (SECONDS)	WATER LEVEL (FEET)	DRAWDOWN (FEET)	H/H0
4.8	4.52	3.33	.8516624
10.2	4.47	3.28	.8388747
15	4.43	3.24	.8286445
19.8	4.39	3.20	.8184143
25.2	4.36	3.17	.8107418
30	4.33	3.14	.803069
34.8	4.3	3.11	.7953965
40.2	4.28	3.09	.7902815
45	4.25	3.06	.7826088
49.8	4.24	3.05	.7800511
55.2	4.21	3.02	.7723786
60	4.19	3.00	.7672635
70.2	4.16	2.97	.7595908
79.8	4.11	2.92	.7468031
90	4.07	2.88	.736573
100.2	4.03	2.84	.7263428
109.8	3.99	2.80	.7161125
120	3.95	2.76	.7058825
135	3.9	2.71	.6930946
150	3.85	2.66	.680307
165	3.82	2.63	.6726343
180	3.79	2.60	.6649617

UNCONFINED AQUIFER

K = 0.1E-03 cm/sec
= 3.1 gpd/ft2
= 0.5E-05 ft/sec
= 0.4 ft/day

REGRESSION COEFFICIENT = -.9935618

HERTEL LANDFILL

WELL NUMBER: MW-10S
STANDPIPE RADIUS (INCHES) = 1.6
INTAKE RADIUS (INCHES) = 3
LENGTH OF INTAKE (FEET) = 11
DEPTH TO TOP OF INTAKE (FEET) = 3.2
DEPTH TO STATIC WATER LEVEL (FEET) = 1.54
DEPTH TO PURGE WATER LEVEL (FEET) = 5.45

TIME (SECONDS)	WATER LEVEL (FEET)	DRAWDOWN (FEET)	H/HO
15	3.55	2.01	.5140665
19.8	3.5	1.96	.5012788
25.2	3.46	1.92	.4910486
30	3.43	1.89	.4833761
34.8	3.4	1.86	.4757034
40.2	3.37	1.83	.4680307
45	3.34	1.80	.4603581
49.8	3.31	1.77	.4526855
55.2	3.29	1.75	.4475704
60	3.26	1.72	.4398977
70.2	3.22	1.68	.4296676
79.8	3.18	1.64	.4194374
90	3.14	1.60	.4092072
100.2	3.11	1.57	.4015345
109.8	3.08	1.54	.3938619
120	3.04	1.50	.3836317
135	3	1.46	.3734016
150	2.96	1.42	.3631714

UNCONFINED AQUIFER

K = 0.2E-03 cm/sec
= 5.0 gpd/ft2
= 0.8E-05 ft/sec
= 0.7 ft/day

REGRESSION COEFFICIENT = -.9931262

HERTEL LANDFILL

WELL NUMBER: MW-11S
STANDPIPE RADIUS (INCHES) = 1.6
INTAKE RADIUS (INCHES) = 3
LENGTH OF INTAKE (FEET) = 11
DEPTH TO TOP OF INTAKE (FEET) = 4
DEPTH TO STATIC WATER LEVEL (FEET) = 3.25
DEPTH TO PURGE WATER LEVEL (FEET) = 7.16

TIME (SECONDS)	WATER LEVEL (FEET)	DRAWDOWN (FEET)	H/H0
40.02	3.42	0.17	4.347835E-02
45	3.42	0.17	4.347835E-02
49.998	3.41	0.16	4.092075E-02
55.0002	3.41	0.16	4.092075E-02
60	3.4	0.15	3.836316E-02
70.02001	3.39	0.14	3.580566E-02
79.98	3.38	0.13	3.324816E-02
90	3.38	0.13	3.324816E-02
100.02	3.37	0.12	3.069046E-02
109.998	3.37	0.12	3.069046E-02
120	3.37	0.12	3.069046E-02
135	3.36	0.11	2.813297E-02

UNCONFINED AQUIFER

K = 0.4E-03 cm/sec
= 9.3 gpd/ft2
= 0.1E-04 ft/sec
= 1.2 ft/day

REGRESSION COEFFICIENT = -.9729296

HERTEL LANDFILL

WELL NUMBER: MW-11S
STANDPIPE RADIUS (INCHES) = 1.6
INTAKE RADIUS (INCHES) = 3
LENGTH OF INTAKE (FEET) = 11
DEPTH TO TOP OF INTAKE (FEET) = 4
DEPTH TO STATIC WATER LEVEL (FEET) = 3.25
DEPTH TO PURGE WATER LEVEL (FEET) = 7.16

TIME (SECONDS)	WATER LEVEL (FEET)	DRAWDOWN (FEET)	H/HO
10.002	3.86	0.61	.1560102
15	3.66	0.41	.1048594
19.998	3.57	0.32	.0818414
25.002	3.51	0.26	6.649623E-02
30	3.47	0.22	5.626603E-02
34.998	3.44	0.19	4.859334E-02
40.02	3.42	0.17	4.347835E-02

UNCONFINED AQUIFER

K = 0.4E-02 cm/sec
= 81.0 gpd/ft2
= 0.1E-03 ft/sec
= 10.8 ft/day

REGRESSION COEFFICIENT = -.9784644

HERTEL LANDFILL

WELL NUMBER: MW-12S
STANDPIPE RADIUS (INCHES) = 1.6
INTAKE RADIUS (INCHES) = 3
LENGTH OF INTAKE (FEET) = 9.42
DEPTH TO TOP OF INTAKE (FEET) = 4
DEPTH TO STATIC WATER LEVEL (FEET) = 5.16
DEPTH TO PURGE WATER LEVEL (FEET) = 8.84

TIME (SECONDS)	WATER LEVEL (FEET)	DRAWDOWN (FEET)	H/H0
34.998	7.02	1.86	.5054349
40.02	6.98	1.82	.4945653
45	6.95	1.79	.4864131
49.98	6.92	1.76	.4782609
55.002	6.89	1.73	.4701087
60	6.86	1.70	.4619566
70.02001	6.81	1.65	.4483695
79.8	6.77	1.61	.4375001
90	6.73	1.57	.4266306
100.02	6.69	1.53	.415761
109.98	6.66	1.50	.4076087
120	6.63	1.47	.3994565
135	6.59	1.43	.3885871
150	6.56	1.40	.3804348

UNCONFINED AQUIFER

K = 0.3E-03 cm/sec
= 5.5 gpd/ft2
= 0.9E-05 ft/sec
= 0.7 ft/day

REGRESSION COEFFICIENT = -.9915439

HERTEL LANDFILL

WELL NUMBER: MW-12S
STANDPIPE RADIUS (INCHES) = 1.6
INTAKE RADIUS (INCHES) = 3
LENGTH OF INTAKE (FEET) = 9.42
DEPTH TO TOP OF INTAKE (FEET) = 4
DEPTH TO STATIC WATER LEVEL (FEET) = 5.16
DEPTH TO PURGE WATER LEVEL (FEET) = 8.84

TIME (SECONDS)	WATER LEVEL (FEET)	DRAWDOWN (FEET)	H/HO
10.02	7.82	2.66	.7228262
15	7.53	2.37	.6440218
20.04	7.31	2.15	.5842391

UNCONFINED AQUIFER

K = 0.2E-02 cm/sec
= 47.0 gpd/ft2
= 0.7E-04 ft/sec
= 6.3 ft/day

REGRESSION COEFFICIENT = -.9986354

HERTEL LANDFILL

WELL NUMBER: MW-W1S
STANDPIPE RADIUS (INCHES) = 1.6
INTAKE RADIUS (INCHES) = 3
LENGTH OF INTAKE (FEET) = 10
DEPTH TO TOP OF INTAKE (FEET) = 7
DEPTH TO STATIC WATER LEVEL (FEET) = 6.95
DEPTH TO PURGE WATER LEVEL (FEET) = 10.86

TIME (SECONDS)	WATER LEVEL (FEET)	DRAWDOWN (FEET)	H/H0
10.2	9.93	2.98	.7621484
15	9.49	2.54	.6496163
19.8	9.100001	2.15	.5498725
25.2	8.8	1.85	.4731458
30	8.63	1.68	.4296676
34.8	8.49	1.54	.3938618
40.2	8.33	1.38	.3529412
45	8.24	1.29	.3299231
49.8	8.15	1.20	.3069053
55.2	8.060001	1.11	.2838878
60	7.98	1.03	.263427
70.2	7.85	0.90	.230179
79.8	7.74	0.79	.2020459
90	7.65	0.70	.1790282
100.2	7.56	0.61	.1560101
109.8	7.49	0.54	.1381073
120	7.43	0.48	.1227621
135	7.35	0.40	.1023017
150	7.27	0.32	8.184151E-02
165	7.2	0.25	6.393863E-02
180	7.14	0.19	4.859325E-02

UNCONFINED AQUIFER

K = 0.1E-02 cm/sec
  = 31.2 gpd/ft2
  = 0.5E-04 ft/sec
  = 4.2 ft/day

REGRESSION COEFFICIENT = -.9935571

HERTEL LANDFILL

WELL NUMBER: MW-W1S
STANDPIPE RADIUS (INCHES) = 1.6
INTAKE RADIUS (INCHES) = 3
LENGTH OF INTAKE (FEET) = 10
DEPTH TO TOP OF INTAKE (FEET) = 7
DEPTH TO STATIC WATER LEVEL (FEET) = 6.95
DEPTH TO PURGE WATER LEVEL (FEET) = 10.86

TIME (SECONDS)	WATER LEVEL (FEET)	DRAWDOWN (FEET)	H/H0
10.2	9.93	2.98	.7621484
15	9.49	2.54	.6496163
19.8	9.100001	2.15	.5498725

UNCONFINED AQUIFER

K = 0.3E-02 cm/sec
= 72.0 gpd/ft2
= 0.1E-03 ft/sec
= 9.6 ft/day

REGRESSION COEFFICIENT = -.9999267

HERTEL LANDFILL

WELL NUMBER: MW-W2S
STANDPIPE RADIUS (INCHES) = 1.6
INTAKE RADIUS (INCHES) = 3
LENGTH OF INTAKE (FEET) = 6
DEPTH TO TOP OF INTAKE (FEET) = 6
DEPTH TO STATIC WATER LEVEL (FEET) = 2.28
DEPTH TO PURGE WATER LEVEL (FEET) = 6.19

TIME (SECONDS)	WATER LEVEL (FEET)	DRAWDOWN (FEET)	H/H0
4.999998	5.89	3.61	.9232736
10	5.69	3.41	.8721228
15	5.54	3.26	.8337595
20	5.39	3.11	.7953963
25	5.26	2.98	.7621484
30	5.14	2.86	.7314577
35	5.02	2.74	.7007673
40	4.91	2.63	.6726342
45	4.82	2.54	.6496163
50	4.7	2.42	.6189258
55.00002	4.6	2.32	.5933503
60	4.52	2.24	.57289
70.00001	4.35	2.07	.5294117
79.99999	4.19	1.91	.4884911
90	4.05	1.77	.4526855
100.0002	3.91	1.63	.4168798
109.8	3.79	1.51	.3861892
120	3.67	1.39	.3554987

UNCONFINED AQUIFER

K = 0.1E-02 cm/sec
= 24.8 gpd/ft2
= 0.4E-04 ft/sec
= 3.3 ft/day

REGRESSION COEFFICIENT = -.9995825

HERTEL LANDFILL

WELL NUMBER: MW-W3S
STANDPIPE RADIUS (INCHES) = 1.6
INTAKE RADIUS (INCHES) = 3
LENGTH OF INTAKE (FEET) = 23
DEPTH TO TOP OF INTAKE (FEET) = 17.23
DEPTH TO STATIC WATER LEVEL (FEET) = 17.23
DEPTH TO PURGE WATER LEVEL (FEET) = 21.59

TIME (SECONDS)	WATER LEVEL (FEET)	DRAWDOWN (FEET)	H/H0
0	21.59	4.36	1
10.2	21.41	4.18	.9587153
15	21.32	4.09	.9380732
19.8	21.2	3.97	.9105507
25.2	21.11	3.88	.8899082
30	21	3.77	.864679
34.8	20.91	3.68	.8440368
40.2	20.82	3.59	.8233943
45	20.73	3.50	.8027521
49.8	20.64	3.41	.78211
55.2	20.55	3.32	.7614678
60	20.49	3.26	.7477062
70.2	20.27	3.04	.6972478
79.8	20.16	2.93	.6720181
90	20	2.77	.6353212
100.2	19.86	2.63	.6032111
109.8	19.7	2.47	.5665141
120	19.61	2.38	.5458716

UNCONFINED AQUIFER

K = 0.3E-03 cm/sec
= 5.8 gpd/ft2
= 0.9E-05 ft/sec
= 0.8 ft/day

REGRESSION COEFFICIENT = -.9995886

HERTEL LANDFILL

WELL NUMBER: MW-2D
STANDPIPE RADIUS (INCHES) = 1
INTAKE RADIUS (INCHES) = 2
LENGTH OF INTAKE (FEET) = 14
DEPTH TO TOP OF INTAKE (FEET) = 41
DEPTH TO STATIC WATER LEVEL (FEET) = 7.56
DEPTH TO PURGE WATER LEVEL (FEET) = 11.47

TIME (SECONDS)	WATER LEVEL (FEET)	DRAWDOWN (FEET)	H/H0
10.2	10	2.44	.624041
15	9.63	2.07	.5294118
19.8	9.310001	1.75	.4475707
25.2	9.020001	1.46	.3734019
30	8.770001	1.21	.3094633
34.8	8.55	0.99	.253197
40.2	8.36	0.80	.2046035
45	8.24	0.68	.173913
49.8	8.12	0.56	.1432226
55.2	8.03	0.47	.1202046
60	7.95	0.39	9.974438E-02
70.2	7.84	0.28	7.161131E-02
79.8	7.76	0.20	5.115114E-02
90	7.71	0.15	3.836325E-02
100.2	7.68	0.12	3.069056E-02

UNCONFINED AQUIFER

K = 0.1E-02 cm/sec
= 24.6 gpd/ft2
= 0.4E-04 ft/sec
= 3.3 ft/day

REGRESSION COEFFICIENT = -.998172

HERTEL LANDFILL

WELL NUMBER: MW-3D
STANDPIPE RADIUS (INCHES) = 1
INTAKE RADIUS (INCHES) = 2
LENGTH OF INTAKE (FEET) = 11.6
DEPTH TO TOP OF INTAKE (FEET) = 44.4
DEPTH TO STATIC WATER LEVEL (FEET) = 2.69
DEPTH TO PURGE WATER LEVEL (FEET) = 6.6

TIME (SECONDS)	WATER LEVEL (FEET)	DRAWDOWN (FEET)	H/HO
15	6.23	3.54	.905371
19.8	6.2	3.51	.8976983
24.6	6.19	3.50	.8951408
30	6.18	3.49	.8925831
34.8	6.16	3.47	.8874681
40.2	6.15	3.46	.8849106
45	6.14	3.45	.8823529
55.2	6.12	3.43	.8772379
64.8	6.1	3.41	.8721228
75	6.08	3.39	.8670078
85.2	6.06	3.37	.8618926
94.8	6.04	3.35	.8567776
105	6.02	3.33	.8516623
120	6	3.31	.8465474
135	5.98	3.29	.8414324
150	5.95	3.26	.8337596
165	5.97	3.28	.8388746
180	5.94	3.25	.8312021
195	5.92	3.23	.8260871
210	5.89	3.20	.8184143
225	5.87	3.18	.8132993
255	5.83	3.14	.8030691
285	5.79	3.10	.7928389

UNCONFINED AQUIFER

K = 0.2E-04 cm/sec
= 0.4 gpd/ft2
= 0.6E-06 ft/sec
= 0.1 ft/day

REGRESSION COEFFICIENT = -.9908429

HERTEL LANDFILL

WELL NUMBER: MW-6D
STANDPIPE RADIUS (INCHES) = 1
INTAKE RADIUS (INCHES) = 2
LENGTH OF INTAKE (FEET) = 11.3
DEPTH TO TOP OF INTAKE (FEET) = 51.7
DEPTH TO STATIC WATER LEVEL (FEET) = 14.58
DEPTH TO PURGE WATER LEVEL (FEET) = 18.49

TIME (SECONDS)	WATER LEVEL (FEET)	DRAWDOWN (FEET)	H/HO
15	17.4	2.82	.7212275
19.998	17.18	2.60	.6649618
24.996	16.97	2.39	.6112531
30	16.77	2.19	.5601024
34.9998	16.59	2.01	.5140667
40.0002	16.42	1.84	.4705884
45	16.35	1.77	.4526855
55.0002	16.17	1.59	.4066498
60	16.09	1.51	.3861894
70.02001	15.9	1.32	.3375961
90	15.63	1.05	.2685425
100.02	15.53	0.95	.2429667
109.998	15.43	0.85	.2173913
120	15.35	0.77	.1969309
135	15.25	0.67	.1713556
150	15.17	0.59	.1508952
165	15.11	0.53	.1355498
180	15.06	0.48	.1227623

UNCONFINED AQUIFER

K = 0.4E-03 cm/sec
= 9.1 gpd/ft2
= 0.1E-04 ft/sec
= 1.2 ft/day

REGRESSION COEFFICIENT = -.9942536

HERTEL LANDFILL

WELL NUMBER: MW-6D

STANDPIPE RADIUS (INCHES) = 1

INTAKE RADIUS (INCHES) = 2

LENGTH OF INTAKE (FEET) = 11.3

DEPTH TO TOP OF INTAKE (FEET) = 51.7

DEPTH TO STATIC WATER LEVEL (FEET) = 14.58

DEPTH TO PURGE WATER LEVEL (FEET) = 18.49

TIME (SECONDS)	WATER LEVEL (FEET)	DRAWDOWN (FEET)	H/HO
15	17.4	2.82	.7212276
19.998	17.18	2.60	.6649618
24.996	16.97	2.39	.6112531
30	16.77	2.19	.5601024
34.9998	16.59	2.01	.5140667
40.0002	16.42	1.84	.4705884

UNCONFINED AQUIFER

K = 0.7E-03 cm/sec
= 14.3 gpd/ft2
= 0.2E-04 ft/sec
= 1.9 ft/day

REGRESSION COEFFICIENT = -.9999099

HERTEL LANDFILL

WELL NUMBER: MW-7D
STANDPIPE RADIUS (INCHES) = 1
INTAKE RADIUS (INCHES) = 2
LENGTH OF INTAKE (FEET) = 10.2
DEPTH TO TOP OF INTAKE (FEET) = 47
DEPTH TO STATIC WATER LEVEL (FEET) = 20.57
DEPTH TO PURGE WATER LEVEL (FEET) = 24.05

TIME (SECONDS)	WATER LEVEL (FEET)	DRAWDOWN (FEET)	H/H0
19.8	22.7	2.13	.6120694
25.2	22.54	1.97	.5660928
30	22.38	1.81	.5201148
34.8	22.25	1.68	.4827592
40.2	22.14	1.57	.4511497
45	22.05	1.48	.4252876
49.8	21.96	1.39	.3994256
55.2	21.88	1.31	.3764371
60	21.81	1.24	.356322
70.2	21.63	1.06	.304598
79.8	21.53	0.96	.2758624
90	21.44	0.87	.2500003
100.2	21.36	0.79	.2270118
109.8	21.29	0.72	.2068972
120	21.24	0.67	.1925288

UNCONFINED AQUIFER

K = 0.5E-03 cm/sec
= 10.5 gpd/ft2
= 0.2E-04 ft/sec
= 1.4 ft/day

REGRESSION COEFFICIENT = -.9957512

HERTEL LANDFILL

WELL NUMBER: MW-7D

STANDPIPE RADIUS (INCHES) = 1

INTAKE RADIUS (INCHES) = 2

LENGTH OF INTAKE (FEET) = 10.2

DEPTH TO TOP OF INTAKE (FEET) = 47

DEPTH TO STATIC WATER LEVEL (FEET) = 20.57

DEPTH TO PURGE WATER LEVEL (FEET) = 24.05

TIME (SECONDS)	WATER LEVEL (FEET)	DRAWDOWN (FEET)	H/HO
4.8	23.54	2.97	.8534492
15	22.97	2.40	.6896555
19.8	22.7	2.13	.6120694

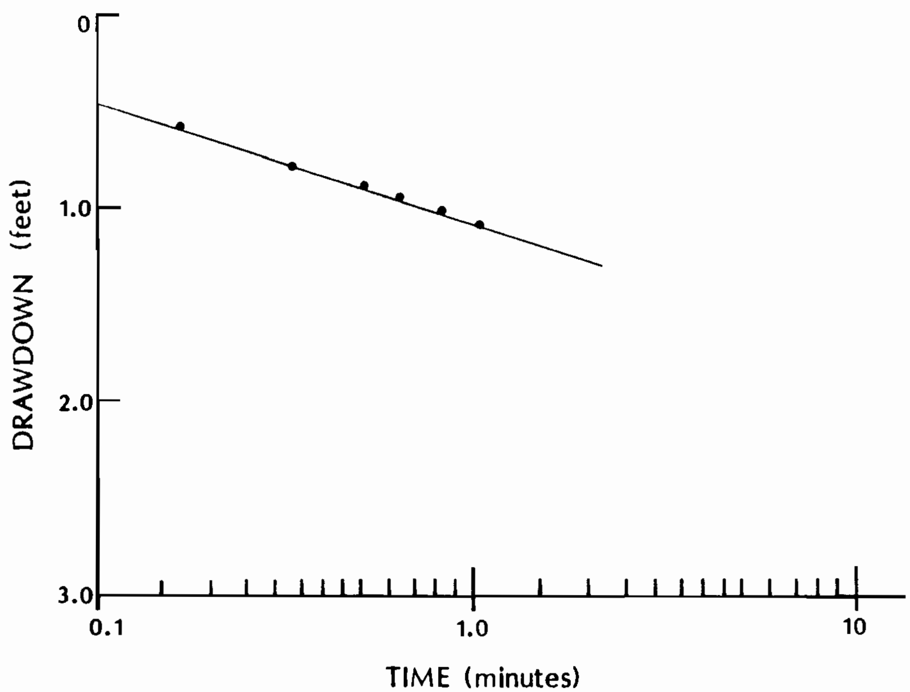
UNCONFINED AQUIFER

K = 0.9E-03 cm/sec
= 19.9 gpd/ft2
= 0.3E-04 ft/sec
= 2.7 ft/day

REGRESSION COEFFICIENT = -.9990532

PUMPING TEST ANALYSIS

WELL MW-13S



Pumping Test

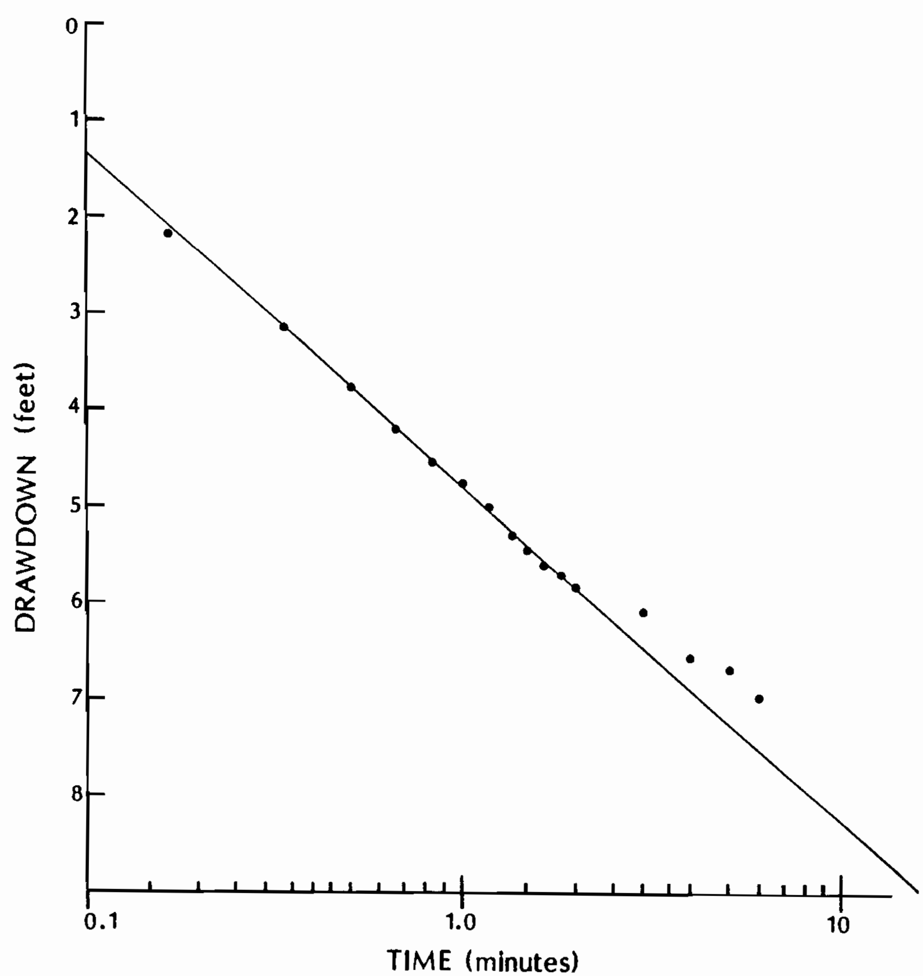
$$T = \frac{35Q}{\Delta S} = \frac{35\ (2.4)}{.62} = 135.5\ ft^2/day$$

$$K = \frac{T}{b} = \frac{135.5}{11} = 12.3\ ft/day$$

where:

Q = discharge rate, in gallons per minute
ΔS = drawdown in feet, for one log cycle
T = transmissivity, in $feet^2/day$
b = saturated thickness, in feet
K = hydraulic conductivity in feet/day

PUMPING TEST ANALYSIS
WELL MW-10D



Pumping Test

$$T = \frac{35Q}{\Delta S} = \frac{35\ (4.6)}{3.48} = 46.3\ ft^2/day$$

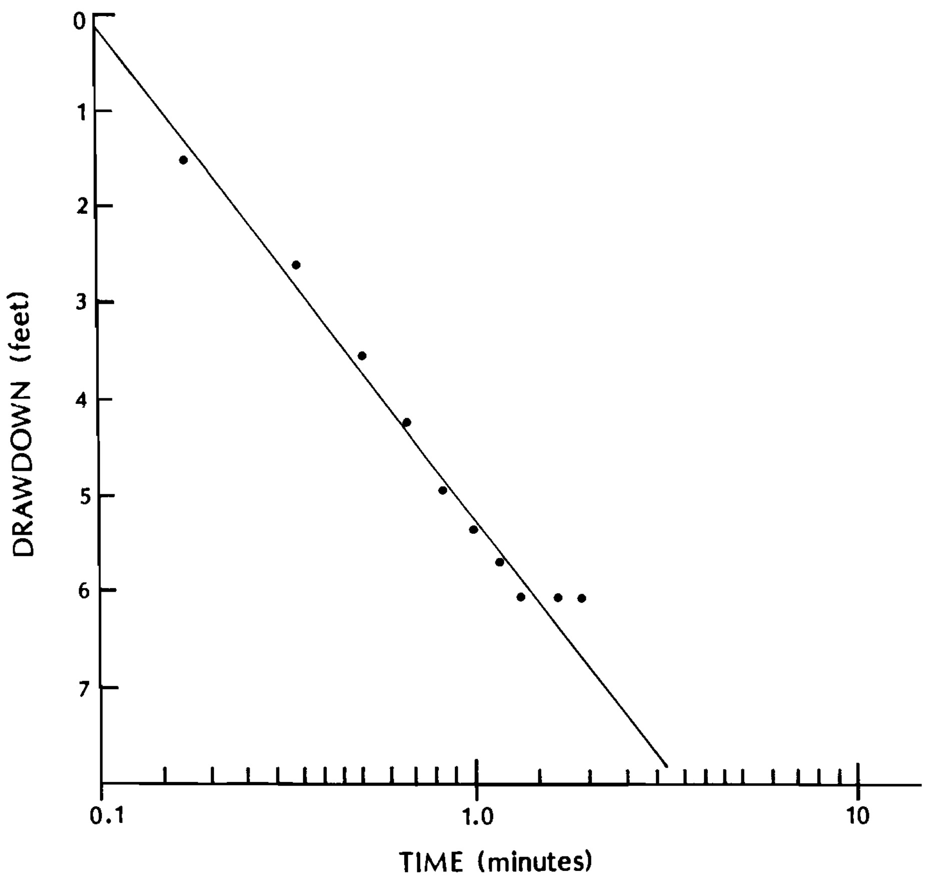
$$K = \frac{T}{b} = \frac{46.3}{18.4} = 2.5\ ft/day$$

where:

Q = discharge rate, in gallons per minute
ΔS = drawdown in feet, for one log cycle
T = transmissivity, in $feet^2/day$
b = saturated thickness, in feet
K = hydraulic conductivity in feet/day

PUMPING TEST ANALYSIS

WELL MW-11D



Pumping Test

$$T = \frac{35Q}{\Delta S} = \frac{35\ (4)}{5.90} = 23.7\ ft^2/day$$

$$K = \frac{T}{b} = \frac{23.7}{11.75} = 2.0\ ft/day$$

where:

Q = discharge rate, in gallons per minute

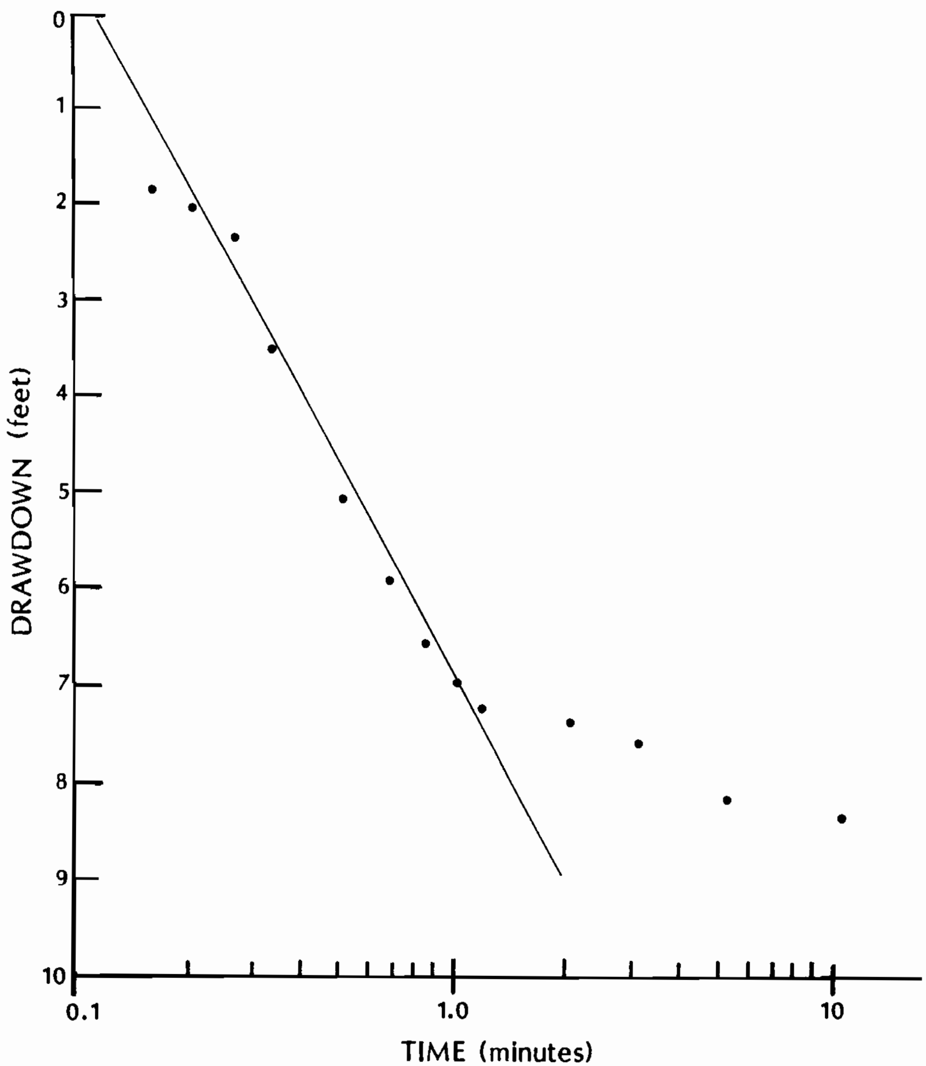
ΔS = drawdown in feet, for one log cycle

T = transmissivity, in $feet^2/day$

b = saturated thickness, in feet

K = hydraulic conductivity in feet/day

PUMPING TEST ANALYSIS
WELL MW-W1D



Pumping Test

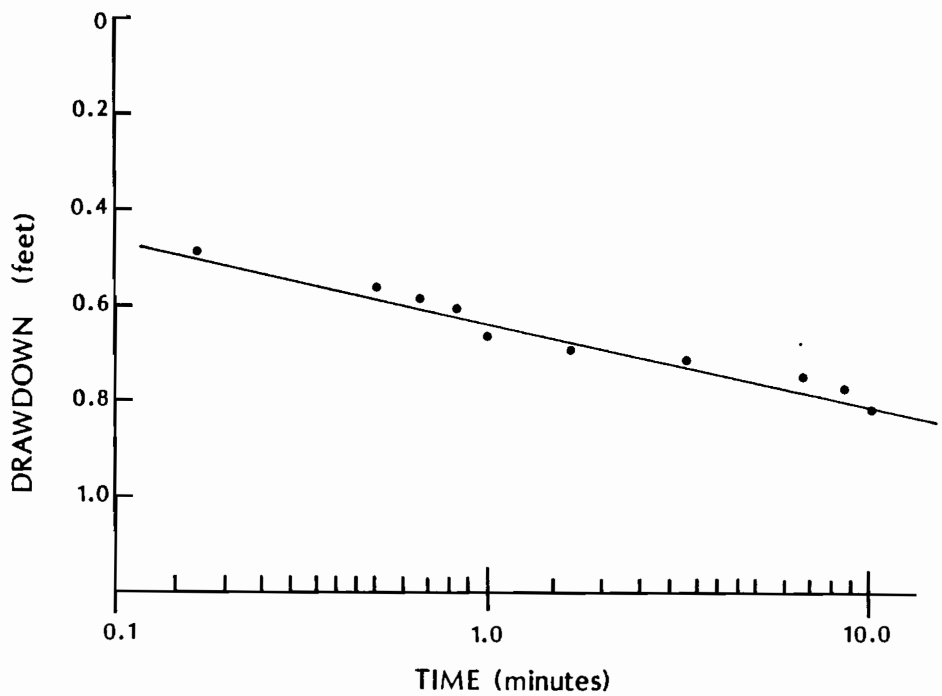
$$T = \frac{35Q}{\Delta S} = \frac{35\ (1.6)}{6.48} = 8.64\ ft^2/day$$

$$K = \frac{T}{b} = \frac{8.64}{13} = 0.66\ ft/day$$

where:

Q = discharge rate, in gallons per minute
ΔS = drawdown in feet, for one log cycle
T = transmissivity, in $feet^2/day$
b = saturated thickness, in feet
K = hydraulic conductivity in feet/day

PUMPING TEST ANALYSIS
WELL MW-W2D



<u>Pumping Test</u>

$$T = \frac{35Q}{\Delta S} = \frac{35\ (7.5)}{0.18} = 1458.3\ ft^2/day$$

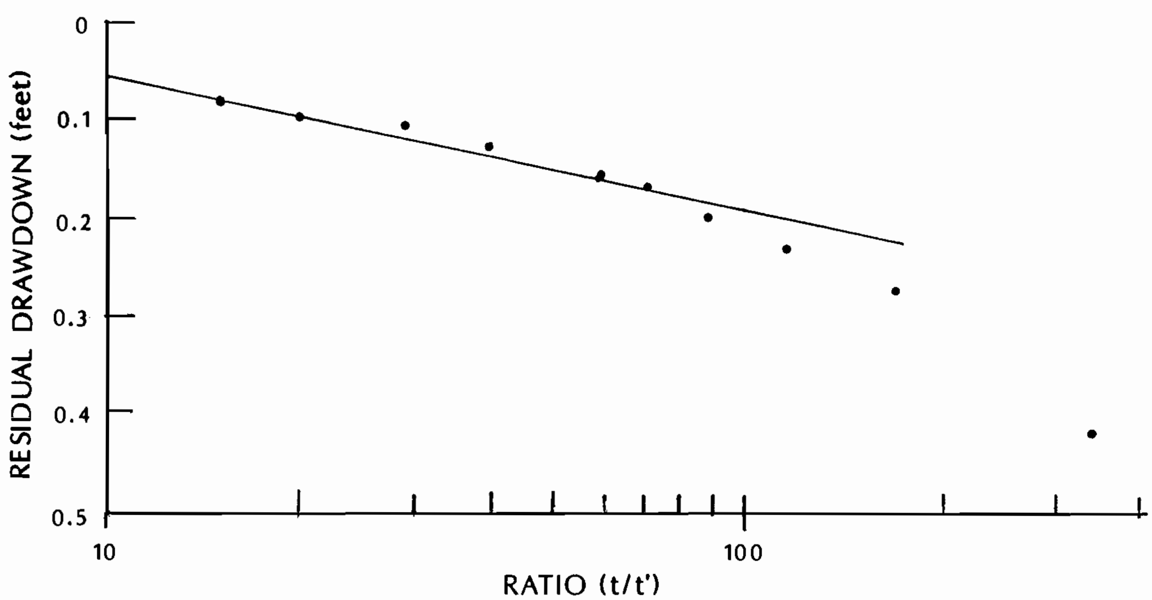
$$K = \frac{T}{b} = \frac{1458.3}{9} = 162\ ft/day$$

where:

Q = discharge rate, in gallons per minute
ΔS = drawdown in feet, for one log cycle
T = transmissivity, in $feet^2/day$
b = saturated thickness, in feet
K = hydraulic conductivity in feet/day

RECOVERY TEST ANALYSIS

WELL MW-13S



Recovery Test

$$T = \frac{35Q}{\Delta S} = \frac{35\ (2.4)}{0.13} = 646\ ft^2/day$$

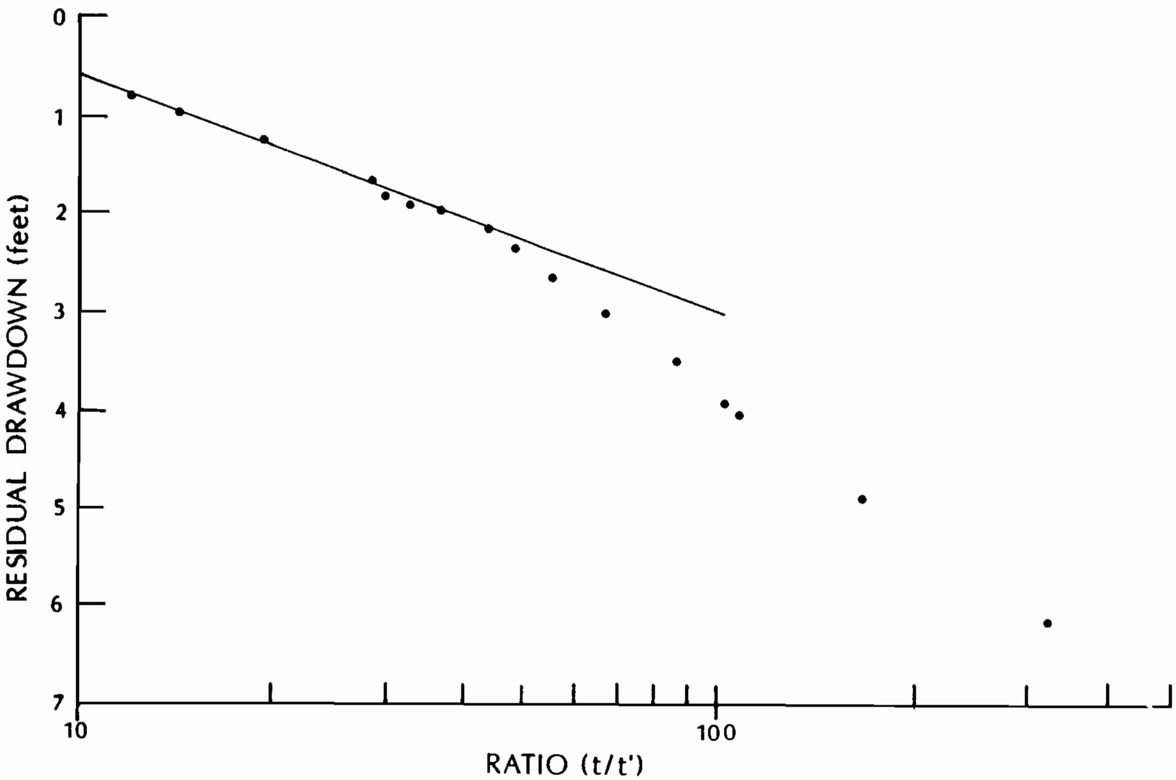
$$K = \frac{T}{b} = \frac{646}{10} = 64.6\ ft/day$$

where:

Q = discharge rate, in gallons per minute
ΔS = residual drawdown in feet, for one log cycle
T = transmissivity, in $feet^2/day$
b = saturated thickness, in feet
K = hydraulic conductivity in feet/day
t = time since pump started
t' = time since pump stopped

RECOVERY TEST ANALYSIS

WELL MW-10D



Recovery Test

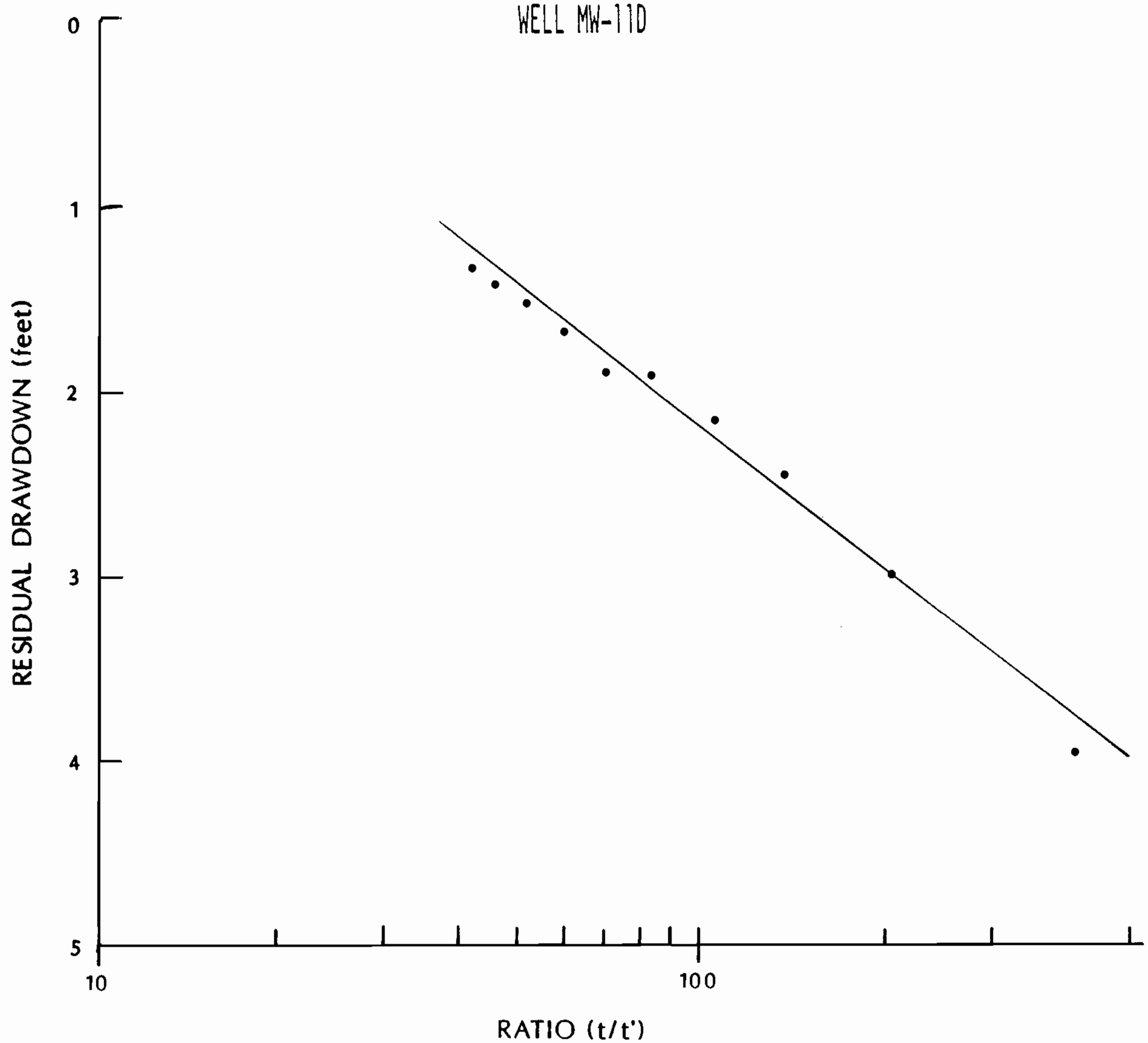
$$T = \frac{35Q}{\Delta S} = \frac{35\ (4.6)}{2.4} = 67.1\ ft^2/day$$

$$K = \frac{T}{b} = \frac{67.1}{18.4} = 3.6\ ft/day$$

where:

Q = discharge rate, in gallons per minute
ΔS = residual drawdown in feet, for one log cycle
T = transmissivity, in feet^2/day
b = saturated thickness, in feet
K = hydraulic conductivity in feet/day
t = time since pump started
t' = time since pump stopped

RECOVERY TEST ANALYSIS
WELL MW-11D



Recovery Test

$$T = \frac{35Q}{\Delta S} = \frac{35\ (4)}{2.33} = 60.1\ \text{ft}^2/\text{day}$$

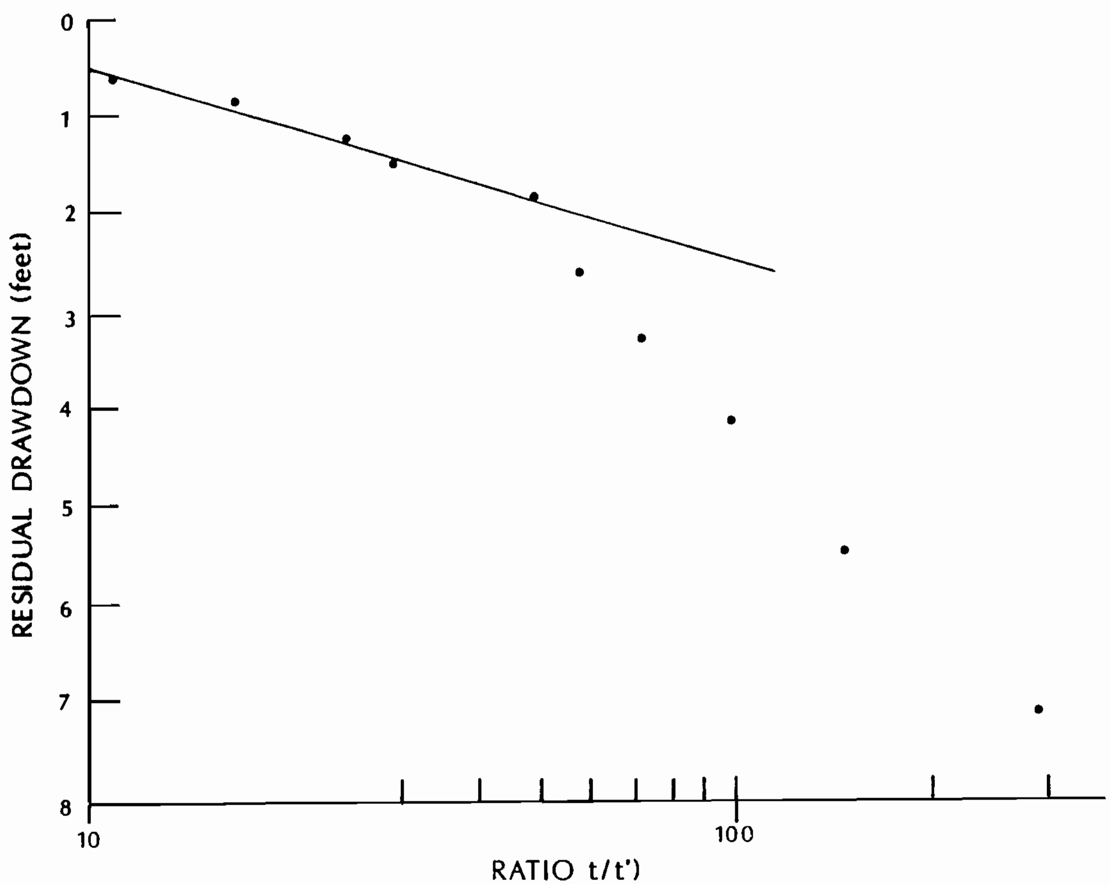
$$K = \frac{T}{b} = \frac{60.1}{11.75} = 5.1\ \text{ft/day}$$

where:

Q = discharge rate, in gallons per minute
ΔS = residual drawdown in feet, for one log cycle
T = transmissivity, in feet^2/day
b = saturated thickness, in feet
K = hydraulic conductivity in feet/day
t = time since pump started
t' = time since pump stopped

RECOVERY TEST ANALYSIS

WELL MW-W1D



<u>Recovery Test</u>

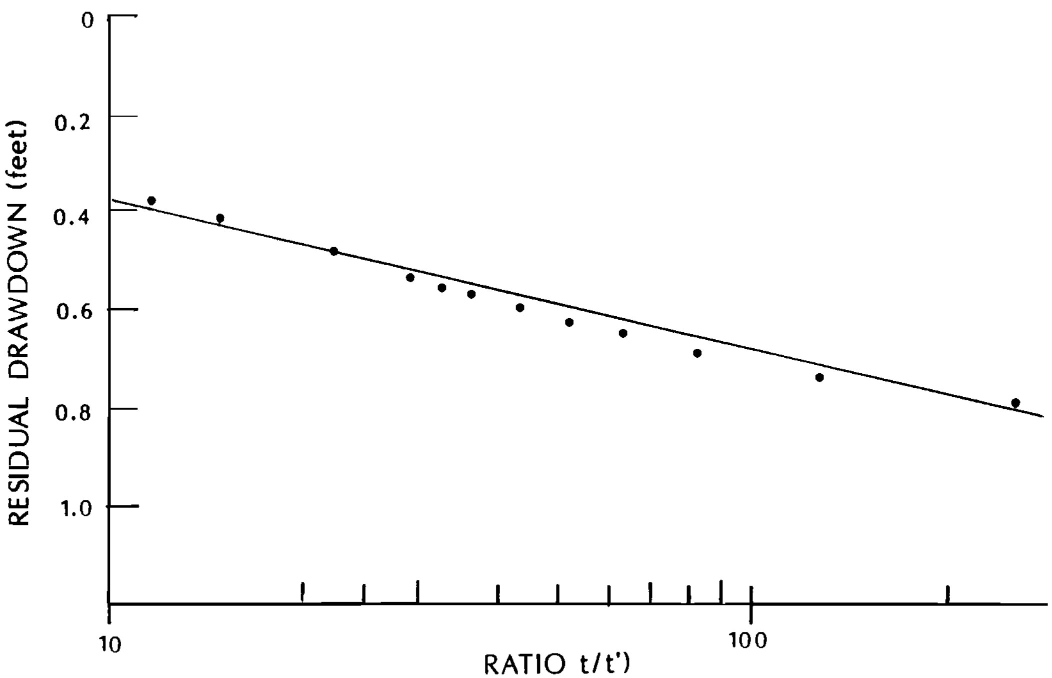
$$T = \frac{35Q}{\Delta S} = \frac{35\ (1.6)}{1.8} = 31.1\ ft^2/day$$

$$K = \frac{T}{b} = \frac{31.1}{13} = 2.4\ ft/day$$

where:

Q = discharge rate, in gallons per minute
ΔS = residual drawdown in feet, for one log cycle
T = transmissivity, in feet^2/day
b = saturated thickness, in feet
K = hydraulic conductivity in feet/day
t = time since pump started
t' = time since pump stopped

RECOVERY TEST ANALYSIS
WELL MW-W2D



<u>Recovery Test</u>

$$T = \frac{35Q}{\Delta S} = \frac{35\ (7.5)}{0.31} = 846$$

$$K = \frac{T}{b} = \frac{846}{9} = 94 \quad \text{ft/day}$$

where:

Q = discharge rate, in gallons per minute
ΔS = residual drawdown in feet, for one log cycle
T = transmissivity, in $feet^2$/day
b = saturated thickness, in feet
K = hydraulic conductivity in feet/day
t = time since pump started
t' = time since pump stopped

APPENDIX H

ECOLOGICAL INVESTIGATION RESULTS/ANALYSIS

THIS PAGE INTENTIONALLY LEFT BLANK

HERTEL ECOLOGICAL INVESTIGATION

I. INTRODUCTION

The purpose of the ecological investigation is to provide baseline information on the biological resources of the Hertel Landfill Site (Hertel). The study was designed to document existing floral and faunal species, with particular emphasis placed on any threatened, rare, endangered, or protected species, and to identify and classify the wetlands on-site.

The field investigation entailed the following sampling/surveying components:

- macroinvertebrates
- birds
- mammals
- herpetofauna
- vegetation
- wetlands identification

The scope of work also called for the surveying of fish in the on-site stream. However, due to its narrow, shallow and very intermittent nature, it was determined by field scientists that no fish existed in the stream. Due to the numerous snags and emergent vegetation present, seining for fish in the ponded wetland area on-site was impossible. In lieu of this, small fish traps were set in the pond. No fish were collected, nor were any observed, although numerous aquatic newts were collected in the traps.

Field activities were conducted in two parts. In October, 1989, the following surveys were conducted: macroinvertebrates, mammal trapping, wetlands and incidental mammal, bird and herpetofaunal observations. In May, 1990, the investigation included intensive avian, herpetofauna, and vegetation surveys, as well as incidental mammal observations.

II. MAJOR COMMUNITY TYPES

A total of five community types were identified on-site. They are: old field; forested upland; forested wetland; stream; and open water (pond). The vegetation directly correlates to the habitat and distribution of animals which have been identified on-site. Particular vegetation and topography attract species that are specialized or adapted for each particular ecological niche. Below is a brief description of each community type.

1. Old Field

The old field is limited to the extent of the landfill located on the Hertel site. Its boundaries are the pond to the north and naturally occurring vegetation surrounding the field. The old field is dominated by opportunistic species which are indicative of disturbed and road side areas. Within the field, there are a few scattered trees and an area directly in the center where a dense cluster of shrubs are growing. The remainder of the field varies from barren to densely vegetated with herbaceous perennials.

2. Forested Upland

The forested upland is diverse in ecotones or forest subtypes. It is the dominant community on-site. Most areas have a dense canopy, a mixed shrub layer and a greatly varied herbaceous layer or none at all. The topography varies greatly here from steep area with rock out cropping to flat areas.

3. Forested Wetland

The forested wetland is located in a depressional basin in the south west of the site. The vegetation species in this community are more uniformly distributed than the previously mentioned communities, with the exception of the herbaceous layer, which is dictated by the topography. For example, in areas of standing water, tussock sedge were present, but in soggy areas, sphagnum moss and various hydrophytic perennials and annuals were found.

4. Stream

An intermittent stream runs though the site draining from the forested wetland north eastward across and off the site. Along its course, the stream varies from a very narrow ravine-like corridor, to a broad open area where the center course slows down and meanders around exposed bedrock and trees. It is in the quiescent area or where water overflows, that hydrophytic shrubs and herbaceous species were found.

5. Open Water (Pond)

The ponded wetland area is in the northern section of the site. It contains floating, submergent and emergent vegetation. It also contains numerous tree stumps and snags. It is the only extensive open water area on-site.

III. METHODOLOGIES

A. Background Information

The first stage of the ecological investigation was conducted in October 1989. Prior to field sampling, pertinent background information was obtained which included the Clintondale USGS quadrangle, New York Department of Environmental Conservation (DEC) wetland mapping (no National Wetland Inventory mapping is currently available), the Ulster County Soil Survey, and documentation from the DEC Wildlife Resource Center regarding the existence of endangered species and significant habitats on-site. October 3, 1989 correspondence from the DEC indicate that no protected species or habitats had been identified on the Hertel site to-date. However, the correspondence does state that "the absence of data does not necessarily mean that rare or endangered elements, natural communities or other significant habitats do not exist on or adjacent to the [Hertel] site, but rather that our files currently do not contain any information which indicates the presence of these."

B. Macroinvertebrates

Benthic macroinvertebrate samples were collected throughout the site, in order to characterize resident macroinvertebrate communities both upstream, adjacent to and downstream of the landfill as well as in the on-site pond.

A total of twenty macroinvertebrate samples were collected in October 1989 at the Hertel site. At the on-site stream, six sampling stations were established - two upstream (US-A and US-B), two contiguous with the landfill (IS-A and IS-B) and two downstream from the landfill (DS-A and DS-B). At each station, three replicate samples were collected, for a total of eighteen samples (6 stations x 3 replicates). Additionally, two stations were established within the ponded area on-site, from which, one sample each was collected (Figure 1).

In addition to documenting resident macroinvertebrate population on-site, TAMS also wanted to compare differences in community composition at different points in the stream respective to the landfill. To accomplish this, it was ensured that similar habitats were sampled in each area. Of the two sampling stations established in each area (upstream, adjacent to landfill and downstream), one station exhibited no flow (ponded areas) and had a mucky, organic substrate, while the second station was characterize by slow to moderate flow and a sandy/silty substrate with leaf matter, rocks, and tree branches. Listed below is a more detailed description of each sampling station.

STATION US - A (UPSTREAM STATION # 1)

-- No stream flow - ponded area
-- Substrate highly organic - many decaying leaves, twigs

-- Preponderance of thick algae and duck weed

-- Heavily shaded

-- Depth of water - 2 feet or less

STATION US - B (UPSTREAM STATION # 2)

-- Moderate stream flow

-- Sand/silt substrate with rocks and decaying leaves

-- Heavily shaded

-- Depth of water - 18 inches or less

STATION IS - A (INTERMEDIATE = ADJACENT TO LANDFILL # 1)

-- Slow to moderate stream flow

-- Sand/silt substrate with many decaying leaves

-- Heavily shaded

-- Depth of water - 18 inches or less

-- Substrate coated with a rusty, flocculent material - suspected algal growth indicative of stressed conditions

STATION IS - B (INTERMEDIATE = ADJACENT TO LANDFILL # 2)

-- No stream flow - ponded area

-- Substrate mucky and organic - many decaying leaves and twigs

-- Heavily shaded

-- Water depth approximately 1 foot

-- Sediments coated with rusty, flocculent material mentioned above

STATION DS - A (DOWNSTREAM STATION # 1)

-- Slow to moderate stream flow

-- Sand/silt substrate with rocks, decaying leaves, and tree branches

-- Heavily shaded
-- Sediments coated with rusty flocculent material mentioned above

STATION DS - B

-- No stream flow-ponded area
-- Mucky, organic substrate with some rocks, tree branches and dead leaves
-- Approximately 1 foot deep
-- Heavily shaded

Stream samples were collected with a Surber bottom sampler. The Surber sampler consists of a square metal frame enclosing a known area (0.1 f^2), with a net trailing out from it, swept downstream by the current. To collect a sample, the frame was placed firmly into the substrate, ensuring that there were no gaps. The substrate within the frame was then disturbed, such that all organisms within the sediment were dislodged and thus carried into the net by the current. Any rocks or vegetation within the frame were also carefully scrubbed and examined for animal life. The organisms and material that had washed into the net were then placed into a labeled jar with a 10 percent buffered formalin preservative solution, for future laboratory analysis.

To augment the quantitative Surber sampling data, and to adequately sample areas that had no water flow (e.g., the ponded area), the D-net "kick sampling" technique was utilized. Using this technique, a specified area was delineated in the field and the substrate was "kicked" or otherwise disturbed. A net was then swept through the area to collect the sample. The material was then placed into a labeled jar, with buffered formalin solution, for future laboratory analysis. A clear distinction was made in the field notes as to which samples were collected with the D-net technique as opposed to those collected via the Surber net.

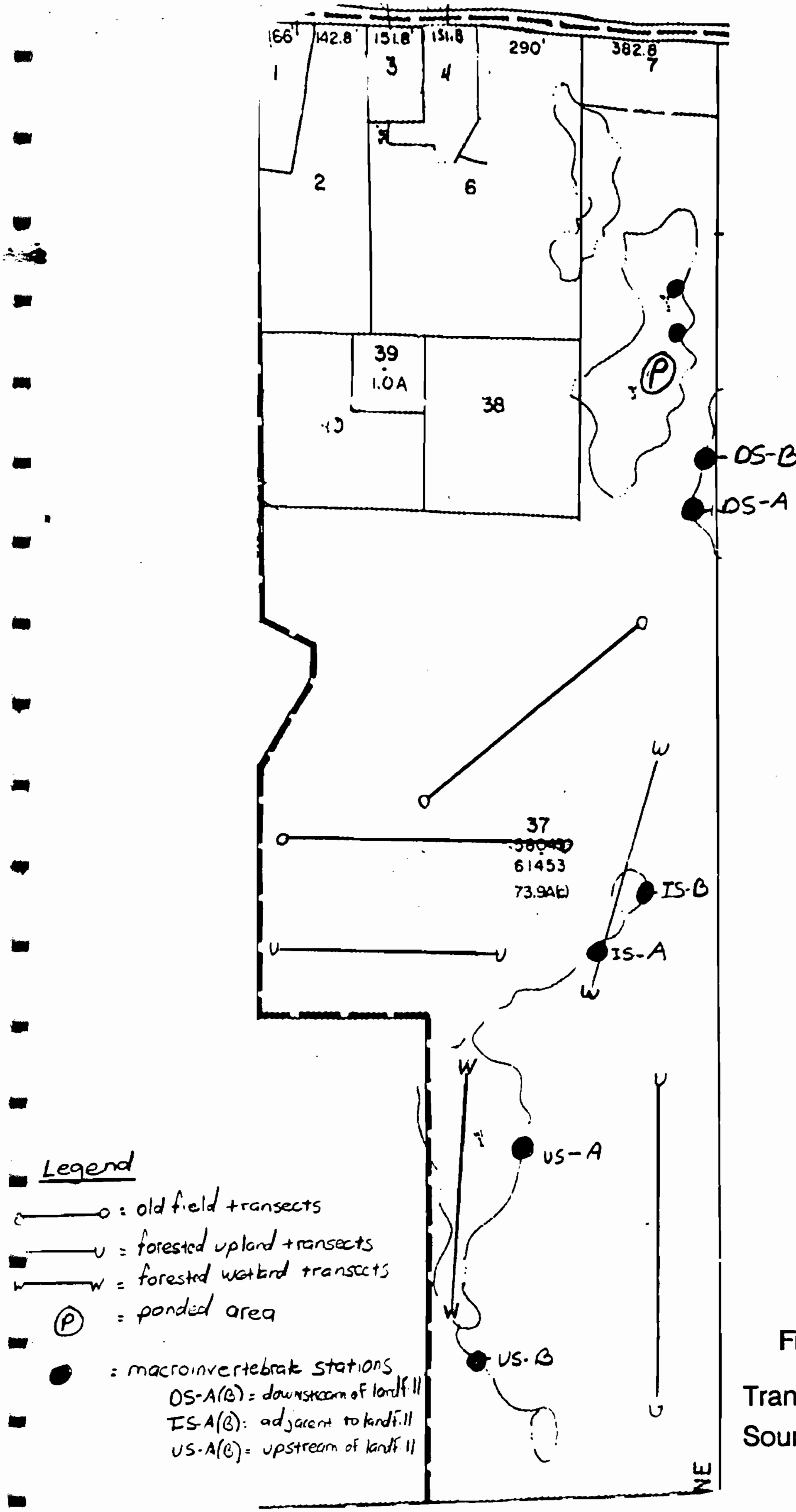


Figure 1

Transect Location Map

Source: Town of Plattekill Tax Map

In the laboratory, each sample was washed through a U.S. Standard No. 30 sieve to remove any fine sediment and the formalin. The sample was then placed in a white enamel pan, filled approximately one-third full of water. The sample was sorted using a low-power scanning lens or magnifying lamp. All organisms removed from the sample were identified under a microscope to the lowest practical taxon by an experienced aquatic ecologist, using various keys and guides. For comparative purpose and quality control, the identified specimens were stored in a reference collection. Additionally, subsequent to complete sorting of a sample, the remaining material was placed back into a labeled jar with preservative solution, for possible future quality control checks.

To maximize the information generated from the raw data, several approaches were used for data analysis. Community structure was evaluated by examining species richness (number of taxa), the number of individuals, species diversity, and equitability (all reviewed in USEPA, 1973), at each station. The number of taxa and number of individuals were easily tabulated from the raw data. Species diversity (d) was determined using the Shannon-Weaver function, which was defined by the 1973 USEPA document as follows:

$$\bar{d} = C/N\ (N \log N - \Sigma ni \log 10\ ni)$$

where C = 3.321928 (converts base 10 log to base 2); N = total number of individuals and ni = the number of individuals in a given taxon. To evaluate the relative importance of certain organisms at a station, the ni/N ratio was used by itself and termed "percent relative abundance." Equitability was calculated using the formula $e = S^1/S$, where S is the total number of taxa and S^1 is the maximum theoretical number of taxa expected from a community with the given diversity. Equitability is a measure of evenness; the higher the equitability, the more even the distribution of individuals among the component taxa. Equitability (e) as calculated, may range from 0 to 1 except in the unusual situations where the distribution in the sample is more equitable than the theoretical maximum distribution (which is based upon McArthur's "broken stick" model which is described in USEPA, 1973). Such an eventuality will result in values of e greater than 1.0, and this occasionally occurs in samples containing only a few specimens with several taxa represented. The 1973 USEPA document further points out that the estimate of d and e improves with increased sample size, and samples containing less than 100 specimens should be evaluated with caution, if at all.

C. Birds

An intensive avian survey was conducted in May, 1990. The survey was conducted by establishing two ecological inventory transects per vegetative cover type (i.e., old field, forested wetland, and forested upland) and performing a strip census of birds. Resident and transient birds on the project site were identified using sight and sound observations, along with other available evidence including feathers, eggs and nests. Wide angle binoculars and avian taxonomic guides were utilized and only positive identifications were recorded in the field notes.

Ecologists conducted ten-minute bird counts at 500-foot intervals along each transect. Additionally, daily observations (30-minute surveying periods) were conducted at the ponded area, to document water-dependent avian utilization (i.e. waterfowl or wading birds) of the site. All bird surveys were performed in the morning (commencing just before dawn) or in the early evening, for three sample periods.

In addition to the structured transect survey discussed above, less rigid bird observations were conducted on-site in October 1989, when other ecological work was being performed. The autumn observations were conducted to document those species which might be seasonal migrants to the area.

D. Mammals

Small and medium-sized mammals on-site were inventoried using paired, baited live traps set along ecological transect lines. Two 300-foot transect lines per cover type (old field, forested upland and forested wetland) were established. Paired and baited HAV-A-HART and Sherman Box Traps were set at 100-foot intervals along each line.

The traps were set for three consecutive nights during each of the two weeks of sampling. All traps were checked in the early morning in order to identify and release all mammals contained within as soon as possible.

In addition to trapping, mammals were surveyed through direct (actual sightings) and indirect (tracks, burrows, dens, tree rubs and scat) observations.

E. Herpetofauna

Herpetofauna were surveyed by searching suitable habitats including stream banks, ponded areas, underneath logs and rocks, in leaf litter, and on sun-exposed rocks and outcroppings. Searches were conducted in various types of weather, but certain groups were sought most intensively when conditions were optional for them (i.e., warm, sunny days for turtles and snakes; warm evenings for frogs and toads). Additionally, eleven, two-gallon pit traps, with logs set in place to serve as barriers, were set in appropriate habitats on warm, damp nights, for a period of three nights. The pit traps were checked in the early morning in order to identify and release any organisms contained within as soon as possible.

F. Vegetation

Three dominant communities present at the Hertel site were identified as open field, upland forest, and wetland forest. These communities were sampled along transect lines randomly picked thorough the communities without any bias to particular individual species. Two transects were established (Figure 1) varying in length from 250 to 1000 feet, depending on the extent of the community. Each transect, regardless of length, had at least two observation points, at which specific species were logged.

At each observation point, the overstory trees were identified within a 30-foot radius. Each tree at or over 4.0 inches DBH (Diameter Breast Height) was identified by species and its relative basal area was estimated. All tree saplings (under 4.0 inches DBH and over 4.5 feet tall) and shrubs (less than 20 feet tall with several stems) within a 30-foot radius were identified. All woody and non-woody plants under 4.5 feet in height were included in the herb layer. Herbs were sampled within a 5-foot radius plot. Woody vines were counted within a 30-foot radius of the observation point. Visual estimates of percent areal cover were calculated for each observed species in the sapling/shrub, herb, and woody vine vegetation layers.

Each vegetation layer was separately evaluated as to its dominant species. Criteria used were basal areas for trees, and percent areal cover for saplings/shrubs, herbs, and vines, in each respective sampling plot. The dominant species were determined, listed, and assigned a wetland indicator status. The indicator status was made according to National List of Plant Species that Occur in Wetlands (Northeast) (USFWS, 1988). Special attention was given to identifying and documenting plants identified in the DEC list of Protected Native Plants.

G. Wetlands

To determine the extent of jurisdictional wetlands subject to Section 404 of the Clean Water Act which is regulated by the U.S. Army Corps of Engineers (COE), wetlands were delineated pursuant to the Federal Manual for Identifying and Delineating Jurisdictional Wetlands (January 1989) (Manual).

A determination of the extent of regulatory jurisdiction, pursuant to the New York State Department of Environmental Conservation guidance was also made utilizing the Freshwater Wetlands Mapping Technical Methods Statement (1986).

Corps of Engineers Guidance

The COE regulates "waters of the United States" pursuant to Section 404 of the Clean Water Act. The term "waters of the United States" includes navigable lakes, rivers and streams, tributaries to navigable waters, including all waters which are subject to the ebb and flow of the tide, interstate waters and tributaries, wetlands adjacent to any of the above and all other waters of the U. S. not identified above, including isolated wetlands and lakes, intermittent streams and other waters, the degradation or destruction of which could affect interstate or foreign commerce.

The interpretation of interstate commerce is broad and extends to waters which are presently used, or have been used in the past, or may be susceptible to be used by interstate or foreign travelers for recreation, waters from which fish or shellfish are or could be taken and sold in interstate commerce or foreign commerce, waters which are or could be used by industries in interstate commerce and waters which are or could be used by migratory birds or waterfowl.

COE define wetlands for regulatory purposes as:

> "THOSE AREAS THAT ARE INUNDATED OR SATURATED BY SURFACE OR GROUNDWATER AT A FREQUENCY AND DURATION SUFFICIENT TO SUPPORT, AND THAT UNDER NORMAL CIRCUMSTANCES DO SUPPORT, A PREVALENCE OF VEGETATION TYPICALLY ADAPTED FOR LIFE IN SATURATED SOIL CONDITIONS. WETLANDS GENERALLY INCLUDE SWAMPS, MARSHES, BOGS AND SIMILAR AREAS."

The Manual presents technical guidelines to identify wetlands and distinguish them from non-wetlands. In order to apply the guidelines, the Manual provides a set of scientific methods and supporting information. A positive indication of wetlands must be present for all three parameters: vegetation; soils; and hydrology -- the so-called "three-parameter" approach. (In this respect, the COE standards differs from the delineation methodology used for wetlands developed by the New York State Department of Environmental Conservation which requires that a positive indication be present for only <u>one</u> of the three parameters - vegetation).

To meet the vegetation test for a wetland, greater than 50 percent of the dominant vegetation must consist of plant species considered to be obligate hydrophyte, facultative wetland or facultative. Obligate hydrophyte species are generally found <u>only</u> in wetlands (more than 99 percent of the time). Facultative wetland species are <u>usually</u> found in wetlands (more than 67 to 99 percent of the time). The least restrictive indicator is facultative, i.e., plant species that sometimes occur in wetlands (more than 33 percent and up to 67 percent of the time), but may also be found commonly in uplands. The U.S. Fish and Wildlife Service has published lists of species classified according to their facultative - obligate status for each region of the United States.

Hydric soils are those that in an undrained condition are saturated, flooded or ponded long enough during the growing season to develop anaerobic conditions that favor the growth and regeneration of hydrophytic vegetation. Wetland soil indicators (in decreasing order of reliability) are considered present in the following situations: when it is an organic soil (peat or muck); when saturation occurs that retard aerobic decomposition of the organic surface (histic epipedon); when soils have sulfidic material; when an aquic or peraquic moisture regime is present; when soils exhibit reducing conditions, when certain soil colors (chroma) are present, when the soil is on the list of hydric soils developed by the National Technical Committee on Hydric Soils, or when iron or manganese concretions more than 2mm in diameter occur within 7.5 cm of the surface. In non-sandy soils, the colors of various soil components are often the most diagnostic indicators. Characteristics are gleyed or gray-color soils or soils with bright mottling or low matrix chroma. Since soil color is not a good indicator in sandy soils, the Manual indicated that wetlands indicators for such soils are: high organic matter content; organic pans at a point around the commonly occurring depth to water table; or streaking of subsurface layers with organic matter.

Wetland hydrology encompasses all hydrologic characteristics of areas that, during an average rainfall, are inundated or have soils saturated for some point in time during the growing season. The hydrologic indicator is often the least exact and most difficult to determine in the field. Several types of data, such as recorded stream and flood data as well as visual observations of soil saturation, drainage patterns within wetlands, water-marks and the like, are indicative of wetland hydrology.

The Manual provides step-by-step methods for both routine and comprehensive delineations of wetlands, guidelines on handling atypical situations (e.g., man-induced wetlands or natural events such as beaver dams), recommendations for determining if normal environmental conditions are present, and forms for recording data.

Field investigations took place in mid-October 1989 by a wetlands ecologist. During the field investigation, eighteen observation points from three wetland areas were selected in order to accurately represent the characteristics of the site. The location of each observation point was marked in the field and identified by a three digit reference number. The first digit designated an observation point (0), distinguishing it from upland/wetland boundary markers. The second digit corresponded to the sequential observation point numbers which include both an upland and wetland component. The location of each component was selected in order to quantify the characteristics of the upland and wetland communities. If the observation point was located in an upland adjacent to the wetland, a 'U' followed the number. A 'W' in this position indicated that the point was within the boundary of the wetland. For example, 0-3-U indicates the third observation point encountered (0-3), characterizing the upland community (U).

IV. RESULTS

A. Macroinvertebrates

A.1 General

Benthic invertebrates are organisms which spend at least a portion of their life cycles within or upon available substrates in a waterbody. Due to their limited mobility and relatively long life spans, benthic invertebrates are often used as indicators of the prevailing environmental conditions. Invertebrate community responses to environmental perturbations are useful in assessing the impact of municipal, industrial, oil and agricultural wastes, as well as impacts from other land uses on natural water bodies. Situations in which change in the patterns of benthic community structure can occur include organic loading, toxic chemical pollution, and physical disruption of habitat.

Organic pollution usually restricts the invertebrate community to few taxa with low equitability or evenness. Pollution by toxic chemicals or physical disruption of habitat may severely limit the entire benthic community. Generally, a healthy ecosystem contains a variety of benthic species with a more equal representation of the major taxonomic groups.

A.2 Survey Results

The benthic macroinvertebrate survey resulted in the collection of 25 taxa at the Hertel site (Table A-1). The dominant organisms were insect larvae, molluscs, and oligochaetes (segmented worms).

The organisms collected were compared with published lists (USEPA, 1973 and Illinois Environmental Protection Agency, 1989) to determine their pollution tolerance classifications. The U.S. Environmental Protection Agency (1973) defines these classifications as follows:

TABLE A-1

MACROINVERTEBRATE TAXA PRESENCE/ABSENCE SUMMARY
HERTEL SITE - OCTOBER, 1989

MACROINVERTEBRATE	STATION						
	US-A	US-B	IS-A	IS-B	DS-A	DS-B	P
NEMATODA (ROUNDWORMS)		X					
TURBELLARIA (FLATWORMS)			X	X	X		
ANNELIDA (SEGMENTED WORMS)							
Lumbriculidae	X	X	X	X		X	
CRUSTACEA							
Caecidotea	X		X	X	X	X	X
Hyallella							X
Harpacticoida					X	X	
COLLEMBOLA (SPRINGTAILS)							
Isotomurus					X		
ODONATA (DRAGONFLIES)							
Pachydiplax							X
Pantala							X
HEMIPTERA (BUGS)							
Corixidae							X
MEGALOPTERA (ALDERFLIES)							
Sialis			X		X	X	
TRICHOPTERA (CADDISFLIES)							
Lepidostoma	X	X	X	X	X	X	X
Phryganeidae	X						
COLEOPTERA (BETTLES)							
Elimidae						X	
Dytiscus	X		X		X	X	X
DIPTERA (FLIES, MIDGES)							
Tipula	X	X	X				X
Bittacomorpha			X	X	X	X	
Culicinae							X
Chironomous	X		X	X		X	X
Palpomyia		X	X		X	X	
Empididae				X			

TABLE A-1 (Continued)

MACROINVERTEBRATE TAXA PRESENCE/ABSENCE SUMMARY
HERTEL SITE - OCTOBER, 1989

MACROINVERTEBRATE	STATION						
	US-A	US-B	IS-A	IS-B	DS-A	DS-B	P
GASTROPODS (SNAILS)							
Physella	X		X			X	
Gyraulus							X
MOLLUSCS (CLAMS/MUSSELS)							
Pisidium				X	X	X	
Sphaerium	X	X	X	X	X	X	X

US-A(B) = Upstream from landfill
IS-A(B) = Intermediate (contiguous with landfill)
DS-A(B) = Downstream from landfill
P = Pond

-- Tolerant: Organisms frequently associated with gross organic contamination and are generally capable of thriving under anaerobic conditions.

-- Facultative: Organisms having a wide range of tolerance and frequently are associated with moderate levels of organic contamination.

-- Intolerant: Organisms that are not found associated with even moderate levels of organic contaminants and are generally intolerant of even moderate reductions in dissolved oxygen.

Of the 25 taxa, 22 are considered facultative and three are tolerant (Lumbriculidae-Oligochaete worm, Chironomous and Physella). No intolerant organisms were identified.

Table A-2 indicates the percent relative abundance of taxa at each sampling station. At Station US-A, three taxa accounted for 93 percent of the total individuals collected, with the ubiquitous midge larvae (Chironomous) representing 66 percent of the total catch. Representation was more equitable at the other upstream station (US-B) with six different taxa accounting for 97 percent of the total catch and no one clear dominant.

Four different taxa accounted for 89 percent of the total individuals collected at Station IS-A, with the freshwater clam (Sphaerium) comprising 57 percent. Similarly, five taxa represented 85 percent of the catch at IS-B, although at this station, the midge larvae (Chironomous) was the dominant.

Abundance was well distributed among the different taxonomic groups at the downstream stations. Nine taxa accounted for 85 percent of the total catch with two species of clams dominating (Pisidium - 21.7 percent and Sphaerium - 20.3 percent) at Station DS-A. At Station DS-B, seven taxa accounted for 95 percent of

TABLE A-2

PERCENT RELATIVE ABUNDANCE OF MACROINVERTEBRATE TAXA AT EACH STATION - HERTEL SITE, OCTOBER 1989

MACROINVERTEBRATE	STATION						
	US-A	US-B	IS-A	IS-B	DS-A	DS-B	P
NEMATODA		*					
TURBELLARIA		8.6	*	*			
Lumbriculidae	8.5	14.3	22.3	20.0			
Caecidotea	*		*	*	8.7	38.1	8.5
Hyallela							30.5
Harpacticoida					4.3	*	
Isotomurus					2.9		
Pachydiplax							5.1
Pantala							16.9
Corixidae							3.4
Sialis			*		10.1	10.5	
Lepidostoma	*	25.8	*	3.2	4.3	2.2	*
Phryganeidae	*						
Elimidae						*	
Dytiscus	*		*		2.9	4.4	8.5
Tipula	*	11.4	*				*
Bittacomorpha			*	6.2	10.1	*	
Culicinae							*
Chironomous	66.3		*	44.6		2.2	6.8
Palpomyia		28.6	5.8		*	*	
Empididae			4.1				
Physella	*		*			*	

TABLE A-2 (Continued)

PERCENT RELATIVE ABUNDANCE OF MACROINVERTEBRATE
TAXA AT EACH STATION - HERTEL SITE, OCTOBER 1989

MACROINVERTEBRATE	STATION						
	US-A	US-B	IS-A	IS-B	DS-A	DS-B	P
Gyraulus							11.9
Pisidium				*	21.7	15.5	
Sphaerium	18.5	8.6	57.0	10.8	20.3	20.4	3.4

US-A (B) = upstream from landfill

IS-A (B) = intermediate (contiguous with landfill)

DS-A (B) = downstream from landfill

P = pond

* = was observed at that station, but comprised less than 2% of the total individuals collected

the total individuals collected, with the aquatic sowbug (Caecidotea) dominating, accounting for 38 percent.

Abundance was also well distributed among the different taxonomic groups at the pond site, with nine taxa accounting for 95 percent of the total catch. The dominant taxon here was the freshwater shrimp, or "scud" (Hyallela) which accounted for 30.5 percent.

Inspection of Table A-3 reveals that the number of macroinvertebrate taxa collected at each area of the stream (upstream, adjacent and downstream of the landfill) is equivalent (12, 13 and 13, respectively). The total number of individuals collected at each area (305, 186 and 250) is similar, particularly when it is taken into account that of the 305 individuals collected upstream, 179 were the gregarious midge larvae (Chironomous).

Table A-4 presents the species richness (number of taxa), number of individuals, species diversity and equitability values at each station. At the six stream stations, species diversity (d) ranged from a low of 1.5 at upstream station (US-A) to a high of 2.8 at downstream station (DS-A). The highest species diversity value however occurred at the pond, with a value of 3.1. The lowest equitability measurement (e) was also at upstream station (US-A) while the highest equitability value was at the other upstream station (US-B). The 1973 USEPA manual points out that estimates of d and e improve with increased sample size, and that samples containing less than 100 specimens should be evaluated with caution, if at all. Upstream station - US-B, intermediate stream station - IS-B, downstream station - DS-A, and the pond had less than 100 specimens. The remaining stations had greater than 100 specimens.

The 1973 USEPA manual discusses a study in which the author evaluated results calculated from data that numerous authors had collected from a variety of polluted and unpolluted waters. The author found that in unpolluted waters, d was generally between 3 and 4, whereas in polluted water, d was generally less than 1. In this

TABLE A-3

TOTAL NUMBER OF MACROINVERTEBRATE TAXA AND INDIVIDUALS TAKEN AT EACH AREA OF THE STREAM

AREA OF STREAM	TOTAL NO. OF TAXA	TOTAL NO. OF INDIVIDUALS
UPSTREAM OF LANDFILL (Stations US-A, US-B)	12	305
ADJACENT TO LANDFILL (Stations IS-A, IS-B)	13	186
DOWNSTREAM OF LANDFILL (Stations DS-A, DS-B)	13	250

Note: For each area, one station was sampled with a Surber and the other was sampled with a D-net (e.g., all three replicates at Station IS-A were sampled with a Surber and all replicates at IS-B were sampled with a D-net). Surber used in sections of stream with flowing water, D-net used in calm, ponded areas.

TABLE A-4

MACROINVERTEBRATE SPECIES RICHNESS, NUMBER OF INDIVIDUALS, SPECIES DIVERSITY AND EQUITABILITY - HERTEL SITE - OCTOBER, 1989

STATION	TECHNIQUE(*)	SPECIES RICHNESS (NO. OF TAXA)	NO. OF INDIVIDUAL	SPECIES DIVERSITY (d)	EQUITABILITY
US-A	D-net	10	270	1.5	0.40
US-B	Surber	7	35	2.5	1.14
IS-A	Surber	12	121	1.9	0.42
IS-B	D-net	9	65	2.3	0.77
DS-A	Surber	10	69	2.8	1.00
DS-B	D-net	13	181	2.6	0.62
Pond	D-net	12	59	3.1	1.00

US-A(b) = Upstream from landfill
IS-A(b) = Intermediate (adjacent) to landfill
DS-A(b) = Downstream from landfill
* The technique used was dependent upon whether or not that area of the stream had flowing water. The Surber can not be used effectively or accurately when there is no flow. Many sections of the stream at Hertel had no flow.

Hertel study, the species diversity values ranged between 1.5 and 3.1. The manual (USEPA, 1973) states that where degradation is at slight to moderate levels, lacks the sensitivity to demonstrate differences. Equitability (e) on the contrary, has been found to be very sensitive to even slight levels of degradation. Equitability levels below 0.5 have not been encountered in certain streams known to be unaffected by oxygen-demanding wastes, and in such streams, e generally ranges between 0.6 and 0.8. Even slight levels of degradation have been found to reduce equitability below 0.5 and generally to a range of 0.0 to 0.3. The equitability values at the Hertel stream range from 0.4 to 1.1. There are four equitability values that were calculated based on less than 100 specimens. Of these four values, three are 1.0 or greater, and the fourth value is .77. As the manual states, these four values should be viewed with caution. The other values (0.4 at upstream station US-A, 0.4 at intermediate station IS-A and 0.6 at downstream station DS-B) are valid measures and indicate that there is slight degradation, although this degradation also exists upstream from the landfill. Species diversity and equitability values in general, were similar at each of the stations - upstream, adjacent to and downstream from the landfill.

B. Birds

A total of 45 bird species have been identified on the Hertel site (Table B-1). None of these species has federally protected status. However, the red-shouldered hawk (Buteo lineatus) is listed under the New York State Environmental Conservation Law as a threatened species.

The observed species can be categorized in six major taxonomic groups. The distribution of the observed species among the groups is indicated in Table B-2. The most common group observed was the passerines (perching birds). Thirty-two passerine species were identified which account for 71 percent of the total species recorded. Five of the observed species belong to the water-dependent taxonomic groups (i.e., wading birds, waterfowl and shorebirds). These species were only observed at the large ponded area at the site's northern boundary (Table B-2).

TABLE B-1

COMPLETE LIST OF AVIAN SPECIES OBSERVED AT THE HERTEL SITE

WADING BIRDS

Great blue heron	Ardea herodias
Green heron	Butorides striatus

WATERFOWL

Canada goose	Branta canadensis
Mallard	Anas platyrhynchos

SHOREBIRDS

Spotted sandpiper	Actitis macularia

RAPTORS

*Red-shouldered hawk	Buteo lineatus
Broad-winged hawk	Buteo platypterus
American kestral	Falco sparverius

NONPASSERINE LAND BIRDS

Common bobwite	Colinus virginianus
Mourning dove	Zenaida macroura
Belted kingfisher	Megaceryle alcyon
Common flicker	Colaptes auratus
Downy woodpecker	Picoides pubescens

PASSERINE BIRDS

Eastern kingbird	Tyrannus tyrannus
Eastern phoebe	Sayornis phoebe
Tree swallow	Iridoprocne bicolor
Chimney swift	Chaetura pelagica
American crow	Corvus brachyrhynchos
Bluejay	Cyanocitta cristata
Black-capped chickadee	Parus atricapillus
Tufted titmouse	Parus bicolor
White-breasted nuhatch	Sitta carolinensis
House wren	Troglodytes aedon
Gray catbird	Dumetella carolinensis

TABLE B-1 (Continued)

COMPLETE LIST OF AVIAN SPECIES OBSERVED AT THE HERTEL SITE

Northern mockingbird	Mimus polyglottos
American robin	Turdus migratorius
Veery	Catharus fuscescens
Cedar waxwing	Bombycilla cedrorum
Black-throated blue warbler	Dendroica caerulescens
Yellow-rumped warbler	Dendroica coronata
Yellow warbler	Dendroica petechia
Common yellowthroat	Geothylpis trichas
Red-winged blackbird	Agelaius pheoniceus
Common grackle	Quiscalus quiscula
European starling	Sturnus vulgaris
Northern oriole	Icterus galbula
Scarlet tanager	Piranga olivacea
Northern cardinal	Cardinalis cardinalis
American goldfinch	Carduelis tristis
Rose-breasted grosbeak	Pheucticus ludovicianus
White-throated sparrow	Zonotrichia albicollis
American tree sparrow	Spizella arborea
Savannah sparrow	Passerculus sandwichensis
Song sparrow	Melospiza melodia
Field sparrow	Spizella pusilla

* = New York State threatened species

TABLE B-2

AVIAN SPECIES OBSERVED IN EACH COMMUNITY TYPE - MAY 1990
LINE-TRANSECT SURVEY - HERTEL SITE

COMMON NAME	SCIENTIFIC NAME	COMMUNITY TYPE			
		OF	FU	FW	P
WADING BIRDS					
Great blue heron	Ardea herodia				X
WATERFOWL					
Canada goose	Branta canadensis				X
Mallard	Anas platyrhynchos				X
SHOREBIRDS					
Spotted sandpiper	Actitis macularia				X
RAPTORS					
Red-shouldered hawk	Buteo lineatus	X	X		
NONPASSERINE LAND BIRDS					
Common bobwhite	Colinus virginianus				X
Mourning dove	Zenaida macroura	X			
Common flicker	Colaptes auratus	X	X	X	X
Downy woodpecker	Picoides pubescens		X	X	X
PASSERINE BIRDS					
Tree swallow	Iridoprocne bicolor	X	X	X	X
American crow	Corvus brachyrhynchos	X	X	X	X
Bluejay	Cyanocitta cristata			X	
Black-capped chickadee	Parus atricapillus			X	
Tufted titmouse	Parus bicolor		X		
White-breasted nuthatch	Sitta carolinensis	X			
Gray catbird	Dumetella carolinensis	X		X	X
Northern mocking bird	Mimus polyglottos	X	X		
American robin	Turdus migratorius	X	X	X	X
Veery	Catharus fuscescens			X	
Black-throated blue warbler	Dendroica caerulescens		X	X	
Yellow warbler	Dendroica petechia	X		X	
Common yellowthroat	Geothlypis trichas	X		X	

TABLE B-2 (Continued)

AVIAN SPECIES OBSERVED IN EACH COMMUNITY TYPE - MAY 1990
LINE-TRANSECT SURVEY - HERTEL SITE

COMMON NAME	SCIENTIFIC NAME	COMMUNITY TYPE			
		OF	FU	FW	P
PASSERINE BIRDS					
Red-winged blackbird	Agelaius phoeniceus	X	X	X	X
Northern oriole	Icterus galbula	X			
Scarlet tanager	Piranga olivacea		X	X	
Northern cardinal	Cardinalis cardinalis	X	X		
American goldfinch	Carduelis tristis	X			
Rose-breasted grosbeak	Pheucticus ludovicianus		X		
White-throated sparrow	Zonatrichia albicollis	X			
Savannah sparrow	Passerculus sandwichensis	X			
Song sparrow	Melospiza melodia	X		X	
Field sparrow	Spizella pusilla		X		

OF = Old field
FU = Forested upland
FW = Forested wetland
P = Pond

Inspection of Table B-2 reveals that the number of species observed at each community type is similar. The number of species observed at the old field, forested upland, forested wetland, and pond is 18, 14, 15 and 12, respectively. It is noted that five species were only observed at the pond (great blue heron, Canada goose, mallard, spotted sandpiper and common bobwhite), the mourning dove and Northern oriole were only observed at the old field, the veery, bluejay and black-capped chickadee were only observed at the forested wetland, and the tufted titmouse, rose-breasted grosbeak and field sparrow were only observed at the forested upland.

Table B-3 indicates the number of sightings of each bird species during the transect survey. The most numerous type of bird observed on the Hertel site was the red-winged blackbird (n=87) followed by the American crow (53), American robin (31), tree swallow (23) and bluejay (20). These five passerines account for approximately 68 percent of the total individuals recorded.

C. <u>Mammals</u>

A total of ten mammal species have been identified on the Hertel site (Table C-1). None of these species has a federal or New York state protected status. The species observed are characteristically found in Northeastern old fields and deciduous forests. In terms of commercial and recreational valve to humans, there are two mammal species of interest - the white-tailed deer, which has become the most plentiful game animal in eastern Northern America, and the mink, whose pelt is highly valued. Most of the pelts used commercially, however, come from minks raised on ranches.

Investigation of the food requirements of each of the ten species identified reveals that there is an equitable representation of trophic levels. There are three primary consumers/herbivores (eastern cottontail, gray squirrel, and white-tailed deer), four omnivores (eastern chipmunk white-footed mouse, racoon and striped skunk), and three carnivores (mink, short-tailed shrew and cat).

TABLE B-3

NUMBER OF SIGHTINGS OF EACH BIRD SPECIES DURING MAY 1990 LINE - TRANSECT SURVEY - HERTEL SITE

SPECIES	SIGHTINGS
Great blue heron	1
Canada goose	4
Mallard	3
Spotted sandpiper	2
Red-shouldered hawk	2
Common bobwhite	1
Mourning dove	4
Common flicker	11
Downy woodpecker	12
Tree swallow	23
American crow	53
Bluejay	20
Black-capped chickadee	4
Tufted titmouse	3
White-breasted nuthatch	1
Gray catbird	8
Northern mockingbird	5
American robin	31
Veery	1
Black-throated blue warbler	4
Yellow warbler	1
Common yellowthroat	2
Red-winged blackbird	87
Northern oriole	7
Scarlet tanager	3
Northern cardinal	5
American goldfinch	1
Rose-breasted grosbeak	3
White-throated sparrow	1
Savannah sparrow	1
Song sparrow	11
Field sparrow	2

TABLE C-1

COMPLETE LIST OF MAMMAL SPECIES OBSERVED AT THE HERTEL SITE

Common Name	Scientific Name
Short-tailed shrew	Blarina brevicauda
Eastern cottontail	Sylvilagus floridanus
Eastern chipmunk	Tamias striatus
Gray squirrel	Sciurus carolinensis
White-footed mouse	Peromyscus leucopus
Racoon	Procyon lotor
Striped skunk	Mephitis mephitis
Mink	Mustela vison
Domestic cat	Felis domesticus
White-tailed deer	Odocoileus virginianus

Table C-2 shows the distribution of captured mammal species among each of the three community types. Three species were captured in the old field (eastern cottontail, striped skunk, and domestic cat), two species were captured in the forested wetland (white-footed mouse and racoon), and only the racoon was trapped in the forested upland. The most numerous mammal collected during the trapping survey was the white-footed mouse, with ten individuals collected at the forested wetland.

D. Herpetofauna

A total of nine herpetilian species have been identified on the Hertel site, comprised of five amphibian and four reptilian species (Table D-1). The amphibians include one salamander (Eastern newt), one toad (American toad), and three frog species (green frog, wood frog and spring peeper). The reptiles observed include two turtle species (snapping turtle and painted turtle) and two snake species (racer and common garter snake). None of the species observed have a federal or state protected status.

No herpetilian species were captured in the pit traps. Only insects and crayfish were collected in those traps. All herpetofaunal data collected were based on intensive searches and subsequent observations of herpetiles on-site.

The eastern newt was the most numerous amphibian observed on the site. It was observed in ponded areas, in quiet areas of the stream, within the forested wetland and in damp woodlands. Both the terrestrial and aquatic eastern newt forms were observed. When baited minnow traps were placed in the large ponded area at the site's northern boundary, numerous aquatic eastern newts were captured, including mating newts.

The most numerous frog species encountered on-site was the green frog. Green frogs were found in the stream and in wet areas throughout the site. Additionally, numerous green frog tadpoles were observed. They were even found in ephemeral

TABLE C-2

MAMMALS CAPTURED AT EACH COMMUNITY TYPE - OCTOBER 1990 MAMMAL TRAPPING SURVEY

COMMON NAME	SCIENTIFIC NAME	COMMUNITY TYPE		
		OF	FU	FW
Eastern cottontail	Sylvilagus floridanus	4		
White-footed mouse	Peromyscus leucopus			10
Racoon	Procyon lotor		3	1
Striped skunk	Mephitis mephitis	4		
Domestic cat	Felis domesticus	1		

OF = OF
FU = Forested Upland
FW = Forested Wetland

TABLE D-1

COMPLETE LIST OF HERPETOFAUNA OBSERVED AT THE HERTEL SITE

Common Name	Scientific Name
AMPHIBIANS	
Eastern Newt (Eft)	Notophthalmus viridescens
Green frog	Rana clamitans
Wood frog	Rana sylvatica
American toad	Bufo americanus
Spring peeper	Hyla crucifer
REPTILES	
Snapping turtle	Chelydra serpentina
Painted turtle	Chrysemys picta
Racer	Coluber constrictor
Common garter snake	Thamnophis sirtalis

wet depressions which were recently created by heavy machinery moving through the site.

While not as abundant, wood frogs, spring peepers and American toads were also observed throughout the site. Numerous mating American toads were encountered.

Painted turtles were observed exclusively at the large pond. Greater than fifty individuals were counted on a given sunny day, sunning on exposed rocks, or snags extending from the pond. Snapping turtles were not abundant, as only two individuals were observed.

The two snake species that were identified were not abundant. Racers were sighted twice, both times swimming out of large, wet depressions and into a wooded area. The common garter snake was observed in the old field and in the forested upland.

E. Vegetation

E.1 Introduction

The Hertel site is located in the physiograph region of the Hudson River Valley in which the topography varies from flatlands to gently and steep rolling hills. The substrata consists of metaphorphic or sedimentally rock formations; usually sandstone, shale, limestone and granite.

Within this geographic region, a large diversity of communities exists. In particular, the two principal communities which occur on site are beech-maple mesic forest with inclusions of Hemlock-northern hardwood forest as a subtype, and red maple-hardwood swamp. These forested uplands exist in "rich, moist, well drained soils, usually acid soils and mid-elevation slopes on moist, well-drained sites at the margins of swamps" (Rescke, 1990). The forested wetlands or red maple-hardwood swamp "occurs in poorly drained depressions throughout NY State - usually on inorganic soils".

In addition to the two natural communities classified on site, there is an additional community which is classified as a cultural community by the DEC. "The cultural subsystem includes communities that are either created and maintained by human activities, or are modified by human influences to such a degree that the physical information of the substrate, or the biological composition of the resident community is substantially different from the character of the substrate or community as it existed prior to human influence" (Rescke, 1990). Specifically, this area is classified as landfill/dump. This classification is described as: "A man-made site that has been cleared or excavated, where garbage is disposed. The bulk of the material in the landfill or dump is organic and biodegradable, although some inorganic material (plastic, glass, metal, etc.) is usually present" (Rescke, 1990) and, in the case of this landfill, a larger diversity of materials may exist.

E.2 Survey Results

A complete list of species observed on the Hertel site is included as Table E.1. In addition, 13 species are listed in the DEC 193.3, Protected Native Plants list (see Table E.2), pursuant to section 9-1503 of the Environmental Conservation Law. Eleven species are listed under clause "(d) exploitably vulnerable native plants likely to become threatened in the near future throughout all or a significant portion of their ranges within the state if casual factors continue unchecked." One is listed under clause "(e) rare native plants that have from 20 to 35 extant sites or 3,000 to 5,000 individuals state", and one is listed under clause "(b) endangered native plants in danger of extinction throughout all or a significant portion of their ranges within the state and requiring remedial action to prevent such extinction." No federally listed threatened or endangered species were found during field studies on the site.

TABLE E.1

COMPLETE PLANTS SPECIES LIST

Scientific Name	Common Name	Wetland Indicator Status*	NY State Protection Status**
Acer rubrum	red maple	FAC	
Acer saccharinum	silver maple	FACW	
Acer saccharum	sugar maple	FACU	
Actaea pachypoda	white baneberry	—	
Adiantum pedatum	maidenhair fern	FAC-	(d)
Alliaria officinalis	garlic mustard	FACU	
Amelanchier arborea	downy serviceberry	FAC	
Andropogon scoparius	little bluestem	FACU-	
Anemonella thalictoroides	rue-anemone	—	
Arisaema triphyllum	jack-in-the-pulpit	FACW-	
Asclepias syriaca	common milkweed	—	
Athyrium Filix-femina	lady fern	FAC	
Betula alleghaniensis	yellow birch	FAC	
Betula lenta	sweet birch	FACU	
Betula papyrifera	paper birch	FACU	
Betula populifolia	gray birch	FAC	
Caltha palustris	marsh marigold	OBL	
Carex stricta	tussock sedge	OBL	
Carpinus carolina	american hornbeam	FAC	
Caulophyllum thalictroides	blue cohosh	—	
Carya ovata	shagbark hickory	FACU-	
Carya tomentosa	mockernut	—	
Cephalanthus occidentalis	buttonbush	OBL	
Clintonia umbellulata	white clintonia	—	
Cornus florida	flowering dogwood	FACU-	
Cornus stolonifera	red-osier dogwood	FACW+	
Crataegus sp.	hawthorn	—	
Cypripedium acaule	moccasin flower	FACU	
Cypripedium reginae	showy lady's-slipper	FACW	(d)
Dennstaedtia punctilobula	hayscented fern	—	(d)
Daucus carota	wild carrot	—	(d)
Equisetum pratense	meadow horsetail	FACW	
Fagus grandifolia	american beech	FACU	(e)
Fragaria virginiana	common wood strawberry	—	
Fraxinus pennsylvanica	green ash	FACW	
Gaultheria procumbens	teaberry	FACU	
Geranium maculatum	wild geranium	—	
Gerardia purpurea	purple gerardia	FACW-	
Geum sp.	avens	—	
Hamamelis virginiana	witch-hazel	FAC-	
Hepatica americana	round-lobed hepatica	—	
Hybanthus concolor	green violet	FACU-	
Hypericum perforatum	common St. Johnswort	—	
Ilex verticillata	common winterberry	FACW+	(d)
Impatiens capensis	spotted touch-me-not	FACW	
Iris versicolor	blue flag	OBL	
Juglans nigra	black walnut	FACU	
Liatris borealis	New England blazing-star	—	
Lindera benzoin	spicebush	FACW	
Liriodendron tulipifera	tulip tree	FACU	
Lonicera sp.	honeysuckle	—	

Table E.1

COMPLETE PLANTS SPECIES LIST

Scientific Name	Common Name	Wetland Indicator Status*	NY State Protection Status**
Lotus corniculatus	birdsfoot trefoil	FACU-	
Lycopodium annotinum	stiff clubmoss	FAC	(d)
Lycopodium inundatum	bog clubmoss	OBL	(d)
Lycopodium obscurum	tree clubmoss	FACU	(d)
Lythrum salicaria	purple loosestrife	FACW+	
Maianthemum canadense	wild lily-of-the valley	FAC-	
Medeola virginiana	indian cucumber root	—	
Melilotus alba	white sweet clover	FACU-	
Mitella diphylla	miterwort	FACU	
Nasturtium officinale	winter cress	OBL	
Nyssa sylvatica	black gum	FAC	
Onoclea sensibilis	sensitive fern	FACW	
Osmunda cinnamomea	cinnamon fern	FACW	
Osmunda regalis	royal fern	OBL	
Panax trifolium	dwarf ginseng	—	
Parthenocissus quinquefolia	virginia creeper	FACU	
Phragmites australis	common reed	FACW	
Pinus strobus	eastern white pine	FACU	
Platanus occidentalis	sycamore	FACW-	
Polygonum cuspidatum	japanese knotweed	FACU-	
Polygonum sagittatum	tear-thumb	OBL	
Polygonatum biflorum	solomon's-seal	—	
Polystichum acrostichoides	christmas fern	FACU-	
Populus alba	white poplar	—	
Populus deltoides	eastern cottonwood	FAC	
Populus tremula	quaking aspen	FACU	
Potentilla palustris	marsh cinquefoil	OBL	
Potentilla simplex	common cinquefoil	FACU	
Prunus serotina	black cherry	FACU	
Pteridium aquilinum	bracken fern	FACU	(d)
Pyrola sp.	wintergreen	—	
Pyrus malus	apple	—	
Quercus alba	white oak	FACU	
Quercus bicolor	swamp white oak	FACW-	
Quercus coccinea	scarlet oak	WL	
Quercus palustris	pin oak	FACW	
Quercus phellos	willow oak	FAC+	(b)
Quercus prinus	chestnut oak	—	
Quercus rubra	red oak	FACU-	
Quercus velutina	black oak	—	
Rhododendron sp.	rhododendron	—	
Rhus typhina	staghorn sumac	—	
Robina pseudoacacia	black locust	FACU-	
Rosa multiflora	multiflora rose	FACU	
Rubus idaeus	raspberry	FACU-	
Rudbeckia hirta	black-eyed susan	FAC	
Rumex acetosella	sorrel	FACU	
Salix nigra	black willow	FACW+	
Sambucus canadensis	elderberry	FACW-	
Sassafras albidum	sassafras	FACW-	
Senecio aureus	golden ragwort	FACW	
Smilacina mimosa	false solomon's-seal	FACU-	
Smilacina stellata	starry solomon's-seal	FACW	
Smilax rotundifolia	common greenbrier	FAC	
Solidago giganta	late goldenrod	FACW	
Solidago stricta	wandlike goldenrod	FACW	
Sphagnum sp.	sphagnum moss	—	
Symplocarpus foetidus	skunk cabbage	OBL	

Table E.1

COMPLETE PLANTS SPECIES LIST

Scientific Name	Common Name	Wetland Indicator Status*	NY State Protection Status**
Taraxacum officinale	dandelion	FACU-	
Toxicodendron radicans	poison ivy	FAC	
Trientalis borealis	starflower	FAC	
Trifolium repens	white clover	FACU-	
Trillium erectum	red trillium	FACU-	(d)
Trillium undulatum	painted trillium	FACU	(d)
Tsuga canadensis	eastern hemlock	FACU	
Typha latifolia	broad-leaved cattail	OBL	
Ulmus americana	american elm	FACW-	
Ulmus rubra	slippery elm	FAC-	
Uvularia grandiflora	large-flowered bellwort	—	
Vaccinium angustifolium	lowbush blueberry	FACU-	
Vaccinium corymbosum	highbush blueberry	—	
Viburnum acerifolium	maple-leaf viburnum	—	
Viburnum dentatum	arrowwood	FAC	
Viburnum prunifolium	blackhaw	FACU	
Viola sp.	violet	—	
Vitis sp.	grape	—	

Protected Status (DEC)

(b) - native plants in danger of extinction throughout all or a significant portion of their range.

(d) - exploitably vulnerable native plant.

(e) - rare native plants that have from 20 to 35 extant sites or 3,000 and 5,000 individuals statewide.

* - US Department of the Interior, Fish and Wildlife Service. May 1988. National list of plant species that occur in wetlands: Northeast Region 1.

** - NYS Department of Environmental Conservation, Division of Lands and Forests. Protected Native Plants.

TABLE E.2

DEC PROTECTED NATIVE PLANTS WHICH WERE IDENTIFIED ON THE HERTEL SITE

SCIENTIFIC NAME	COMMON NAME	PROTECTED STATUS	COMMUNITY
1. Adiantum pedatum	maiden hair fern	(d)	FW(S)
2. Cypripedium acaule	moccasin flower	(d)	FU
3. Cypripedium reginae	showy lady's-slipper	(d)	FW(S)
4. Dennstaedtia punctilobula	hayscented fern	(d)	FU
5. Equisetum pratense	meadow horsetail	(e)	FW
6. Ilex verticillata	common winterberry	(d)	FW
7. Lycopodium annotinum	stiff clubmoss	(d)	FU
8. Lycopodium inundatum	bog clubmoss	(d)	FW(S)
9. Lycopodium obscurum	tree clubmoss	(d)	FU
10. Pteridium aquilinum	braken fern	(d)	FU
11. Quercus phellos	willow oak	(b)	FU
12. Trillium erectum	red trillium	(d)	FU
13. Trillium undulatum	painted trillium	(d)	FU

Status

(b) - native plants in danger of extinction throughout all or a significant portion of their range.

(d) - exploitably vulnerable native plant.

(e) - rare native plants that have from 20 to 35 extant sites or 3,000 to 5,000 individuals statewide.

Communities

FW(S) - Forested wetland limited to stream habitat.

FU - Forested upland.

FW - Forested wetland.

1. <u>Forested Upland</u>

The forested upland or beech-maple mesic forest which appears to not have been disturbed, comprises two-thirds of the site from the extent of the landfill to the southern boundary. The canopy layer varied in dominance from one observation point to the next, but the shrub layer was fairly uniform of species and the herbaceous layer varied in dominance and frequency.

Table E.3 provides a list of dominant species which represents the species observed at observation points within the upland community forest. Several DEC protected species were found in this community.

2. <u>Forested Wetland</u>

The red maple-hardwood swamp forest is located on the western boundary south of the landfill and is approximately 6 acres in size. This area varies greatly in topography - from water filled shallows, spongy saturated sphagnum mats to dense tussocks and running water. Much of this area had very shallow soil or exposed bedrock.

Much of the canopy was dominated by red maple (<u>Acer rubrum</u>) with some inclusions of black gum (<u>Nyssa sylvatica</u>) or silver maple (<u>Acer saccharinum</u>) and slippery elm (<u>Ulmus rubra</u>). In the shrub layer arrowwood (<u>Viburnum dentatum</u>) was uniformly distributed along with other hydrophytic shrub species. The herbaceous layer was the most diverse layer in the wetland and included a variety of hydrophytic herbaceous species. The stream habitat consisted of a mixture of upland tree species along the bank, but within the stream channel, and over flow areas, hydrophytic shrubs such as spicebush (<u>Lindera benzoin</u>) and button bush (<u>Cephalanthus occidentalis</u>) and hydrophytic herbs such as blue flag (<u>Iris versicolor</u>), royal fern (<u>Osmunda regalis</u>) and skunk cabbage (<u>Symplocarpus foetidus</u>) were commonly present. Table E.4 provides a list of dominant species found within both the wetlands and stream communities.

TABLE E.3

FORESTED UPLAND DOMINANT SPECIES

TREES

Fagus grandifolia	american beech
Acer saccharum	sugar maple
Betula alleghaniensis	yellow birch
Betula lenta	black birch
Quercus rubra	red oak
Pinus strobus	eastern white pine
Tsuga canadensis	eastern hemlock
Lirodendron tulipifera	tulip poplar

SAPLINGS/SHRUBS

Hamamelis virginiana	witch hazel
Prunus serotina	black cherry
Viburnum dentatum	arrowwood
Carpinus carolina	american hornbeam
Fagus grandifolia	american beech

HERBS

Smilacina racemosa	false solomon's-seal
Actaea pachypoda	white baneberry
Polystichum acrostichoides	christmas fern
Arisaema triphyllum	jack-in-the-pulpit
Caulophyllum thalictroides	blue cohosh
Medeola virginiana	indian cucumber-root
Trillium erectum	red trillium
Uvularia grandiflora	large flowered bellwort
Maianthemum canadense	wild lily-of-the-valley
Cypripedium acaule	moccasin flower

TABLE E.4

FORESTED WETLAND DOMINANT SPECIES

TREES

Acer rubrum	red maple
Ulmus rubra	slippery elm
Acer saccharum	silver maple
Quercus bicolor	swamp white oak
Nyssa sylvatica	black gum

SAPLINGS/SHRUBS

Lindera benzoin	spicebush
Ilex verticillata	winterberry
Virburnum dentatum	arrowwood
Acer rubrum	red maple
Ulmus americana	american elm
Cornus stolonifera	red-osier dogwood
Cephalanthus occidentalis	button bush

HERBS

Osmunda regalis	royal fern
Osmunda cinnamomea	cinnamon fern
Symplocarpus foetidus	skunk cabbage
Impatiens capensis	spotted touch-me-not
Carex stricta	tussock sedge
Lycopodium inundatum	bog clubmoss
Polygonum sagittatum	tear-thumb
Cypripedium reginae	showy lady's-slipper
Iris versicolor	blue flag

3. Open Field

The landfill/dump area has been recolonized with a variety of opportunistic plant species in all vegetative layers. Vegetatively, this area has been classified as "old field". The fringe of the field was dominated by quaking aspen (Populus tremula). A few saplings were likewise scattered throughout the middle of the old field which was densely vegetated with sapling and shrub species.

Shrubs dominated much of the center of the field and included staghorn sumac (Rhus typhina), multifora rose (Rose multiflora) and black locust (Robina pseudoacacia) saplings. The herbaceous layer consisted of roadside weeds species indicative of disturbed areas such as common reed (Phragmites australis) common milkweed (Asclepias syriara) and white sweet clover (Melilotus alba). Table E.5 provides a list of dominant plant species present in the old field community.

TABLE E.5

OPEN FIELD DOMINANT SPECIES

TREES

Rhus typhina	staghorn sumac
Populus tremula	quaking aspen
Prunus serotina	black cherry
Robina pseudoacacia	black locust
Polygonum cuspidatum	japanese knotweed

HERBS

Melilotus alba	white sweet clover
Andropogon scoparius	little bluestem
Solidago gigantea	late goldenrod
Alliaria officinalis	garlic mustard
Taraxacum officinale	dandelion
Asclepias syriaca	common milkweed
Phragmites australis	common reed
Liatris borealis	New England blazing star

F. Wetlands

Wetland Inventory Maps

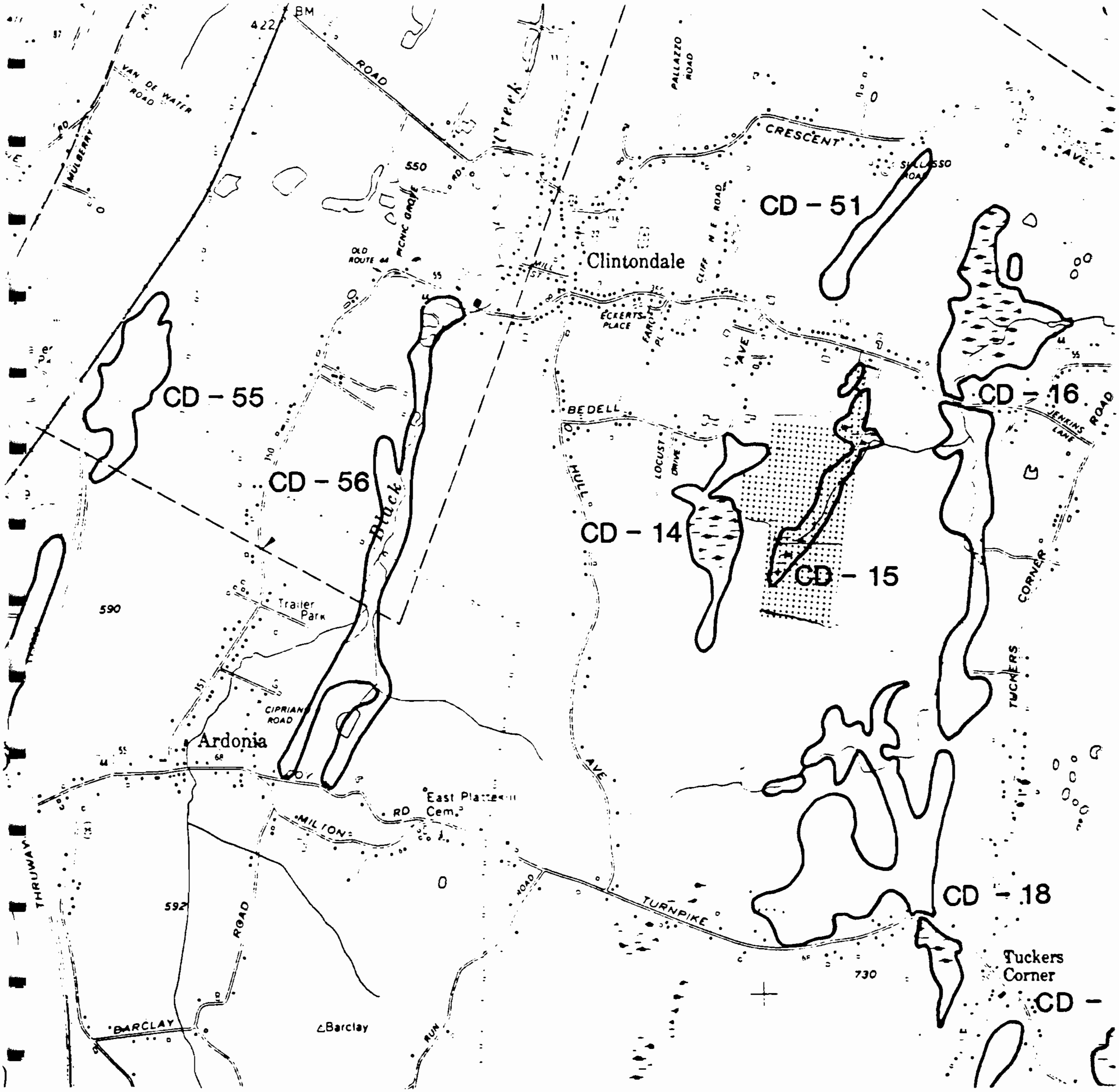
U. S. Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) maps, and DEC Wetland Inventory Maps provide guidance on the configuration, location and type of wetlands found within a given area of coverage. The subject parcel is located within the Clintondale, NY USGS topographic quadrangle map. The NWI map for this quadrangle has not, as of the writing of this report, been prepared. The DEC wetland map for the Clintondale, NY quadrangle does identify regulated wetlands on the parcel (Figure 2).

The DEC is responsible for mapping freshwater wetlands that are 12.4 acres in size or larger, or those smaller wetlands that are of unusual local importance (Environmental Conservation Law, Article 24). Because the detail shown on wetland inventory maps is limited by their scale (1:24,000) and by the identification method used, the delineation of wetland areas need to be more precisely determined in the field.

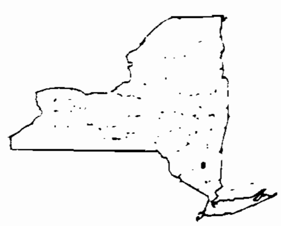
Soils

Ulster County Soil Survey

The parcel is identified on atlas sheet 123 of the Ulster County Soil Survey (Figure 3). Five soil mapping units are listed by the Soil Conservation Service on this site. These units are: Canandaigua silt loam, tilt substrate (Cd); Bath-Nassau complex, 8-25% slope (BnC); Bath-Nassau Rock outcrop complex, hilly (BOD); Lyons-Atherton complex, very stony (LY); and Volusia, very stony soils, gently sloping (VSB). Canandaigua loam, Lyons loam and Volusia loam are considered hydric soils (USDA, 1988).



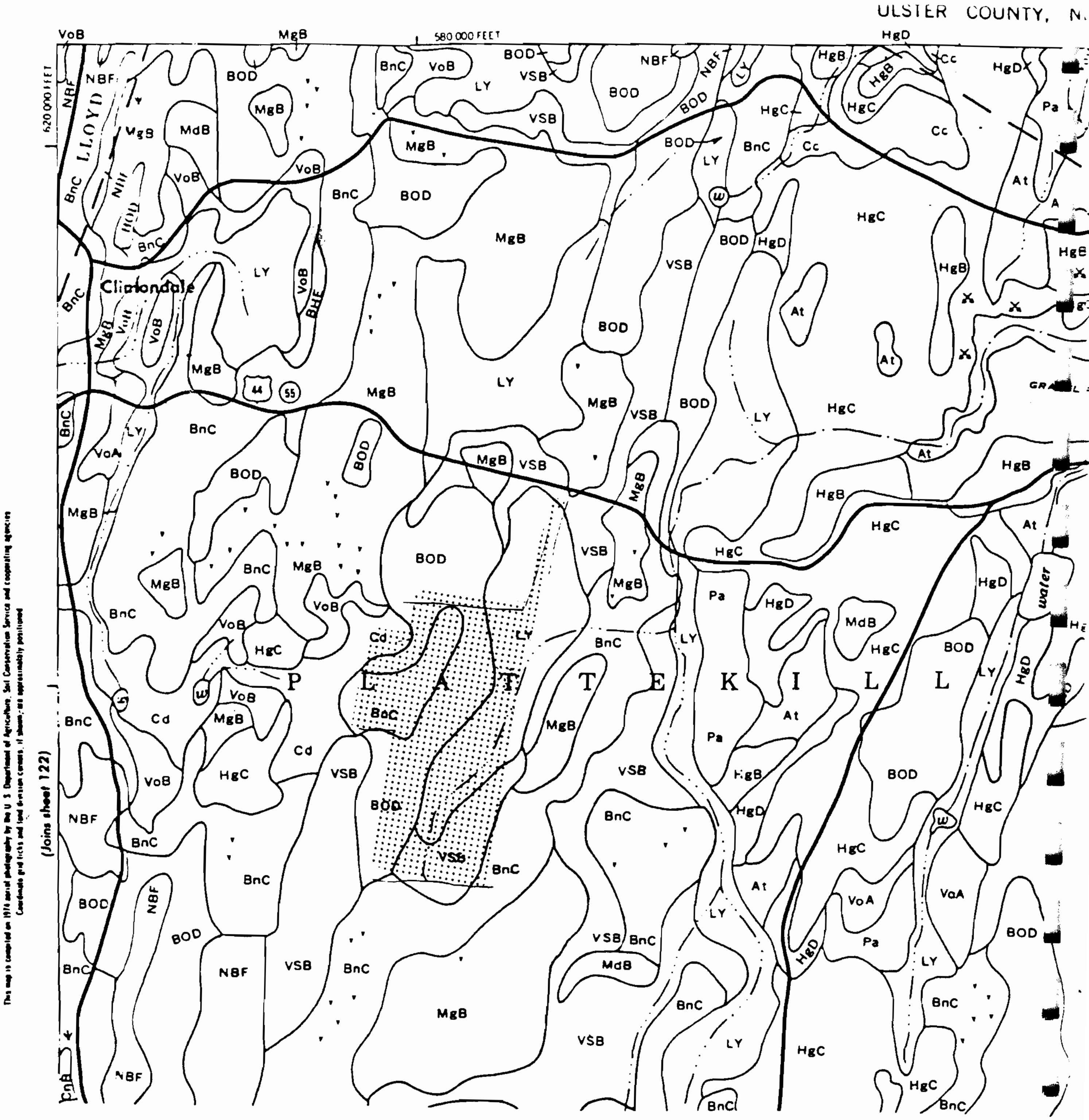
Site Location



QUADRANGLE LOCATION

Figure 2

New York State
Freshwater Wetland Map
Clintondale Quadrangle



Site Location

Figure 3

Ulster County Soil Survey

It should be noted that the scale of the Ulster County soil survey is too small for the detail needed in a wetlands delineation. The mapping units of the soil survey do not show inclusions (too small to be shown at the mapping scale) nor are boundaries sufficiently precise for the purposes of wetlands delineation. The soil survey, however, does provide indications of the kinds of soils to be expected and the location of areas likely to possess hydric soils. The precise location of hydric and non-hydric soils, and the location of the wetland/upland boundary must be determined in the field in order to provide the level of precision necessary for a wetlands delineation.

Results of Soil Field Investigation

Eighteen soil borings were made on the parcel using a hand auger and examined in detail. The boring sites were selected to be representative of major non-hydric and hydric soil areas (Table F.1). In addition to these borings, many additional borings were made to identify the limit of hydric soils and facilitate the determination of the wetland/upland boundary. In most instances, the field investigation supported the soil mapping units identified on the Ulster County Soil Survey. Three major areas of hydric soils were identified on this parcel. In most instances the hydric/non-hydric zones were clearly defined.

Hydrology

Wetland hydrology was observed on the parcel during the field investigations. Table F.1 summarizes the hydrological findings. On the parcel, three areas possessed hydrologic characteristics typical of wetlands. Wetland "A" and "B" are associated with the on-site stream while wetland "C" is a result of the access road impeding surface waters and creating a large ponded area. Matted leaves, hummocky soil, inundation and saturated soils within a depth of 12 inches provided clear evidence of wetland conditions. When either inundation or shallow depth to saturated soils was observed, it was interpreted as direct evidence of wetland hydrology. Generally this occurred in most of the wetland areas.

Table F.1

Summary of Soils and Hydrology Investigations

Observation Point	Matrix Color 10-16"	Mottle Colors	Hydric Soil	Wetland Hydrology	Remarks
0-1-U	10YR 5/4	------	No	No	Bath-Nassau
0-1-W	5Y 6/1	------	Yes	Yes	Lyons; gleyed; very poorly drained
0-2-U	10YR 5/4	------	No	No	Bath-Nassau;rock outcrop
0-2-W	5Y 6/1	------	Yes	Yes	Lyons; surface ponding
0-3-U	10YR 5/4	------	No	No	Bath-Nassau;rock outcrop
0-3-W	------ ----	------	Yes	Disturbed	
0-4-U	10YR 5/3	------	No	No	Bath-Nassau;rock outcrop
0-4-W	5Y 5/1	------	Yes	Yes	Lyons-Atherton; very poorly drained
0-5-U	10YR 6/4	------	No	No	Bath-Nassau; well drained
0-5-W	5Y 5/1	------	Yes	Yes	Canandaigua? Ponded
0-6-U	10YR 5/4	------	No	No	Bath-Nassau;rock outcrop
0-6-W	10YR 4/1	10YR 6/4	Yes	Yes	Lyons, hummocky, gleyed
0-7-U	10YR 6/4	------	No	No	Bath-Nassau;rock outcrop
0-7-W	5Y 5/1	------	Yes	Yes	Lyons; gleyed
0-8-U	10YR 5/4	------	No	No	Bath-Nassau
0-8-W	5Y 5/1	------	Yes	Yes	Lyons; gleyed; stream
0-9-U	10YR 5/1	------	No	No	Bath-Nassau
0-9-W	10YR 5/1	10YR 6/4	Yes	Yes	Lyons

Vegetation

Table F.2 provides an overall list of plant species identified on site. The site is comprised of several plant communities including: beech-maple mesic forest with inclusions of hemlock-northern pine forest, old field and three areas containing hydrophytic plant communities. In wetland areas "A" and "B", the plant communities are dominated by forested red maple swamp (Acer rubrum). Emergent herbaceous wetlands are present within the open pond community (Area "C"). The forested wetlands are dominated by slippery elm (Ulmus rubra) and red maple in the overstory, spicebush (Lindera benzoin) in the understory and cinnamon fern (Osmunda cinnamomea) in the herbaceous layer. The emergent wetland contained various hydrophytes including sedges (Carex sp.), common reed (Phragmites australis), cattail (Typha sp.) and purple loosestrife (Lythrum salicaria). Table F.3 provides a list of dominant plant species found at each observation point and identifies each wetland area (A through C).

Table F.2
Plant Species List

COMMON NAME	SCIENTIFIC NAME	REGIONAL[1] INDICATOR STATUS
Red Maple	Acer rubrum	FAC
Downy Service-berry	Amelanchier arborea	FAC-
Lady Fern	Athyrium filix-femina	FAC
Yellow Birch	Betula alleghaniensis	FAC
Sweet Birch	Betula lenta	FACU
Paper Birch	Betula papyrifera	FAC
Gray Birch	Betula populifolia	FAC
Sedge	Carex sp.	---
Tussock Sedge	Carex stricta	OBL
Ironwood	Carpinus caroliniana	FAC
Shagbark Hickory	Carya ovata	FACU-
Flowering Dogwood	Cornus florida	FACU-
Red-osier Dogwood	Cornus stolonifera	FACW
Hawthorn	Crataegus sp.	----
Beech	Fagus grandifolia	FAC+,FACU
Green Ash	Fraxinus pennsylvanica	FACW
Avens	Geum sp.	----
Witch-Hazel	Hamamelis virginiana	FAC-
Jewelweed	Impatiens capensis	FACW
Blueflag	Iris versicolor	OBL
Spicebush	Lindera benzoin	FACW-
Tulip	Liriodendron tulipifera	FACU
Stiff Clubmoss	Lycopodium annotinum	UPL
Tree Clubmoss	Lycopodium obscurum	FACU
Purple Loosestrife	Lythrum salicaria	FACW
Cinnamon Fern	Osmunda cinnamomea	FAC
Royal Fern	Osmunda regalis	OBL
Sensitive Fern	Onoclea sensibilis	FACW
Virginia Creeper	Parthenocissus quinquefolia	FAC
Common Reed	Phragmites australis	FACW
White Pine	Pinus strobus	FACU
Sycamore	Platanus occidentalis	FACW-
Tear-Thumb	Polygonum sagittatum	OBL
Christmas Fern	Polystichum acrostichoides	FACU-
Eastern Cottonwood	Populus deltoides	FAC
Black Cherry	Prunus serotina	FACU
Bracken Fern	Pteridium aquilinum	FACU
Wintergreen	Pyrola sp.	----
Apple	Pyrus malus	NL
White Oak	Quercus alba	FACU-

Table F.2
(continued)

Plant Species List

COMMON NAME	SCIENTIFIC NAME	REGIONAL[1] INDICATOR STATUS
Swamp White Oak	Quercus bicolor	FACW+
Pin Oak	Quercus palustris	FACW
Chestnut Oak	Quercus prinus	UPL
Red Oak	Quercus rubra	FACU-
Raspberry	Rubus idaeus	FAC-
Black Willow	Salix nigra	FACW+
Elderberry	Sambucus canadensis	FACW-
Sassafras	Sassafras albidum	FACU-
Common Greenbrier	Smilax rotundifolia	FAC
Zig Zag	Solidago gigantea	FACU
Sphagnum Moss	Sphagnum sp.	----
Skunk Cabbage	Symplocarpus foetidus	OBL
Poison Ivy	Toxicodendron radicans	FAC
Broad-leaf Cattail	Typha latifolia	OBL
Slippery Elm	Ulmus rubra	FAC
Lowbush Blueberry	Vaccinium angustifolium	FACU-
Highbush Blueberry	Vaccinium corymbosum	FACW-
Maple-leaf Viburnum	Viburnum acerifolium	UPL
Arrow-wood	Viburnum dentatum	FAC
Black-haw	Viburnum prunifolium	FACU
Grape	Vitis spp.	----

1 Indicator Status: OBL = Obligate; FACW = Facultative Wetland; FAC = Facultative; FACU = Facultative Upland; UPL = Obligate Upland; NA = No Agreement; NL = Not Listed; (---) plant only identified to genus, thus, no species specific indicator; (+) = more frequently found in wetlands; (-) = less frequently found in wetlands.

Table F.3

Dominant Plant Species

OBSERV. POINT	HYDROPHYT VEGETATION	COMMON NAME	SCIENTIFIC NAME	VEG[1] LAYER	REG INDIC[2] STATUS
WETLAND 'A'					
O-1-W-A	Yes	Pin Oak	Quercus palustris	T	FACW
	(90%)[3]	Red Maple	Acer rubrum	T,S	FAC
		Red Oak	Quercus rubra	T	FACU-
		Arrowwood	Viburnum dentatum	S,H	FAC
		Com. Winterberry	Ilex verticillata	S	FACW+
		Highbush Blueberry	Vaccinium corymbosum	S	FACW-
		Bog Clubmoss	Lycopodium inundatum	H	OBL
		Sensitive Fern	Onoclea sensibilis	H	FACW
O-1-U-A	No	Red Oak	Quercus rubra	T	FACU-
	(30%)	Quaking Aspen	Populus tremula	T,S,H	FACU
		Red Maple	Acer rubrum	T	FAC
		Downy Service-berry	Amelanchier arborea	S	FAC-
		Black-haw	Viburnum prunifolium	S	FACU
		Black cherry	Prunus serotina	H	FACU
		Lowbush Blueberry	Vaccinium angustifolium	H	FACU-
		Poison Ivy	Toxicodendron radicans	V	FAC
O-2-W-A	Yes	Pin Oak	Quercus palustris	S	FACW
	(100%)	Red Maple	Acer rubrum	S	FAC
		Highbush Blueberry	Vaccinium corymbosum	S	FACW-
		Red-osier Dogwood	Cornus stolonifera	S	FACW+
		Arrow-wood	Viburnum dentatum	S	FAC
		Cinnamon Fern	Osmunda cinnamomea	H	FACW
		Purple Loosestrife	Lythrum salicaria	H	FACW+
		Bog Clubmoss	Lycopodium inundatum	H	OBL
		Tussock Sedge	Carex stricta	H	OBL
		Sensitive Fern	Onoclea sensibilis	H	FACW
O-2-U-A	No	Scarlet Oak	Quercus coccinea	T	NL
	(13%)	Red Oak	Quercus rubra	T	FACU-
		White Oak	Quercus alba	T,S	FACU-
		Downy Service-berry	Amelanchier arborea	S	FAC-
		Black-haw	Viburnum prunifolium	S	FACU
		Black Cherry	Prunus serotina	H	FACU
		Lowbush Blueberry	Vaccinium angustifolium	H	FACU-

Table F.3 (cont'd)

Dominant Plant Species

OBSERV. POINT	HYDROPHY VEGETATION	COMMON NAME	SCIENTIFIC NAME	VEG[1] LAYER	REG INDIC[2] STATUS
O-3-W-A	Yes (100%)	Red-osier Dogwood	Cornus stolonifera	S	FACW+
		Com. Winterberry	Ilex verticillata	S	FACW+
		Highbush Blueberry	Vaccinium corymbosum	S	FACW-
		Arrow-wood	Viburnum dentatum	S	FAC
		Purple Loosestrife	Lythrum salicaria	H	FACW+
		Tussock Sedge	Carex stricta	H	OBL
		Sensitive Fern	Onoclea sensibilis	H	FACW
		Lady Fern	Athyrium Filix-femina	H	FAC
		Willow-leaf Goldenrod	Solidago stricta	H	FACW
O-3-U-A	No (20%)	Scarlet Oak	Quercus coccinea	T	NL
		White Oak	Quercus alba	T,S,H	FACU-
		Downy Service-berry	Amelanchier arborea	T,S	FAC-
		Black Cherry	Prunus serotina	S,H	FACU
		Maple-leaf Viburnum	Viburnum acerifolium	S,H	UPL
O-4-W-A	Yes (100%)	Swamp White Oak	Quercus bicolor	T	FACW+
		Red Maple	Acer rubrum	T,S	FAC
		Elm	Ulmus americana	T	FACW-
		Highbush Blueberry	Vaccinium corymbosum	S,H	FACW-
		Arrow-wood	Viburnum dentatum	S,H	FAC
		Sensitive Fern	Onoclea sensibilis	H	FACW
		Tussock Sedge	Carex stricta	H	OBL
O-4-U-A	No (45%)	Red Maple	Acer rubrum	T,S	FAC
		Red Oak	Quercus rubra	T	FACU-
		Scarlet Oak	Quercus coccinea	T	NL
		Downy Service-berry	Amelanchier arborea	S	FAC-
		Black-haw	Viburnum prunifolium	S,H	FACU
		Black Cherry	Prunus serotina	H	FACU
		Raspberry	Rubus idaeus	H	FAC-
WETLAND 'B'					
O-1-W-B	Yes (90%)	Red Maple	Acer rubrum	T,S	FAC
		Elm	Ulmus americana	T	FACW-
		Pin Oak	Quercus palustris	T	FACW
		Arrow-wood	Viburnum dentatum	S,H	FAC
		Red-osier Dogwood	Cornus stolonifera	S	FACW+
		Buttonbush	Cephalanthus occidentalis	S	OBL
		Marsh Cinquefoil	Potentilla palustris	H	OBL
		Bog Clubmoss	Lycopodium inundatum	H	OBL
		Common Greenbrier	Smilax rotundifolia	V	FAC
		Sphagnum Moss	Sphagnum sp.	H	----

Table F.3 (cont'd)

Dominant Plant Species

OBSERV. POINT	HYDROPHYT VEGETATION	COMMON NAME	SCIENTIFIC NAME	VEG[1] LAYER	REG INDIC[2] STATUS
O-1-U-B	No (45%)	Red Oak	Quercus rubra	T,S	FACU-
		Red Maple	Acer rubrum	T,S	FAC
		White Oak	Quercus alba	T	FACU-
		Downy Service-berry	Amelanchier arborea	S,H	FAC-
		Shagbark Hickory	Carya ovata	S	FACU-
		Maple-leaf Viburnum	Viburnum acerifolium	S	UPL
		Lowbush Blueberry	Vaccinium angustifolium	H	FACU-
		Black Cherry	Prunus serotina	H	FACU
		Raspberry	Rubus idaeus	H	FAC-
		Poison Ivy	Toxicodendron radicans	V	FAC
O-2-W-B	Yes (100%)	Red Maple	Acer rubrum	T	FAC
		Arrow-wood	Viburnum dentatum	S	FAC
		Buttonbush	Cephalanthus occidentalis	S	OBL
		Purple Loosestrife	Lythrum salicaria	H	FACW+
		Sensitive Fern	Onoclea sensibilis	H	FACW
		Bog Clubmoss	Lycopodium inundatum	H	OBL
O-2-U-B	No (30%)	Red Maple	Acer rubrum	T,S	FAC
		Scarlet Oak	Quercus coccinea	T	NL
		Red Oak	Quercus rubra	T	FACU-
		Downy Service-berry	Amelanchier arborea	S	FAC-
		Black-haw	Viburnum prunifolium	S,H	FACU
		Black Cherry	Prunus serotina	H	FACU
		Lowbush Blueberry	Vaccinium angustifolium	H	FACU-
		Virginia Creeper	Parthenocissus quinquefolia	V	FACU

1. Vegetation Layer: T=Trees; S=Shrubs and Saplings; H=Herb; V=Vines

2. Regional Indicators: OBL=Obligate Wetland; FACW=Facultative Wetland; FAC=Facultative; FACU=Facultative Upland; UPL=Obligate Upland; NA=No Agreement; NL=Not Listed; (---) plant only identified to genus, thus, no species specific indicator.
(+)=more frequently found in wetlands; (-)=less frequently found in wetlands

3. Percent (%) figure indicates proportion of dominant plant species with wetland indicator status of FAC, FACW or OBL.

Conclusions

Using the COE approach (Manual) and the DEC technical statement, wetlands were identified and mapped on the parcel. The parcel contains a total of approximately 10.3 acres of freshwater wetlands. Wetland area "A" is approximately 2.2 acres. Wetland area "B" extends beyond the property boundary. 2.3 acres are located within the site. Both wetlands are Palustrine Broad-leaved Deciduous Forested (PF01) as classified by the U.S. Fish and Wildlife Service (Cowardin, et al; 1979). Wetland area "C" is the largest wetland on site containing 5.8 acres of Palustrine Emergent (PEM) wetland.

Noting the difference of wetland size between the DEC findings, as presented on their Clintondale Quadrangle (Figure 2) and the resulting map of TAMS' Findings (Figure 4); it is merely due to the methodologies used in the identification of wetlands. As previously mentioned the DEC base their findings on one parameter only, that being hydrophytic vegetation. TAMS personnel use the EPA approved federal manual in which 3 parameters must be identified. The fact that 3 parameters must be met as apposed to one parameter may be a limiting factor and the basis of size in this case.

However, it must be kept in mind that both methods are identified; no matter how accurately; according to interpretation. See Figure 4 for comparison of wetlands. Although the aforementioned wetland methodologies differed at the time of TAMS field work at Hertel, it may not remain that way. According to DEC personnel they are in the process of redefining NYS wetland regulations, notably the methods for identifying wetlands; changing the 1 parameter to meet the federal criteria of 3 parameters.

V. SUMMARY

This investigation was conducted to provide baseline information on the biological resources of the Hertel Site. Its intent was to document existing floral and faunal species, particularly protected species, and to identify wetlands on-site.

The macroinvertebrate survey resulted in the collection of 25 taxa at the Hertel site. The dominant organisms were insect larvae, molluscs and oligochaete worms. The taxa collected range from being facultatively tolerant to tolerant of pollution stress, according to USEPA and Illinois Environmental Protection Agency definitions. In general, the relative abundance of organisms was well distributed among the different taxonomic groups at all three areas of the stream (upstream, adjacent, and downstream of the landfill). Additionally, the total number of taxa and individuals collected at each area were similar. Species diversity and equitability values, in general, were similar at each of the areas; upstream, adjacent and downstream of the landfill.

A total of 45 bird species were identified on the Hertel Site. None of these species has federally protected status, although the red-shouldered hawk is listed under the New York State Environmental Conservation Law as a threatened species. There was a similar number of species distributed in each of the site's community types. Passerines were the dominant taxonomic group on-site, accounting for 71 percent of the total species recorded.

A total of ten mammal species were identified on the Hertel site, none of which have federal or state protected status. The species observed are characteristic of Northeastern old fields and deciduous forests. Investigation of the food requirements of each of the species reveals that there is an equitable representation of trophic levels, i.e., herbivores (primary consumers), omnivores, and carnivores (secondary consumers).

A total of nine herptilian species were identified, comprised of five amphibian and four reptilian species. None have federal or state protected status. The eastern newt and the green frog were the dominant herpetofaunal species on-site.

A total of 128 vegetative species were observed and identified on the site. These included trees, shrubs, saplings and herbaceous species represented by the diversity of communities. Thirteen of these species are currently protected in the state of New York, but none are federally threatened or endangered.

The wetlands on-site as identified by TAMS include approximately 10+ acres of forested wetlands and emergent wetlands regulated by the COE; as dictated by the results of the three parameter approach. In addition, these wetlands have been identified according to the NYSDEC wetlands mapping as "regulated wetlands" although they are only a portion of the total acreage of DEC identified wetlands onsite.

BIBLIOGRAPHY

Braun, L. 1950. Deciduous Forests of Eastern North American New York: Hafner Press.

Cowardin, L. M., V. Carter, F. C. Golet, and E. T. La Roe. December 1979. Classification of Wetlands and Deepwater Habitats of the United States. FWS/OBS-79/31, U.S. Fish and Wildlife Service, Office of Biological Services, Washington, D.C.

DEC. 189. Correspondence from Mr. Burrel Buffington, NYSDEC Significant Habitat Unit, dated October 3, 1989, to Christine M. Ross, TAMS Consultants, Inc.

Illinois Environmental Protection Agency. 1989. Biological Stream Characterization (BSC): A Biological Assessment of Illinois Stream Quality. Springfield, Illinois.

Lull, W. 1968. A Forest Atlas of the Northeast. North Eastern Forest Exp. Sta. Upper Dover, Pennsylvania.

Munsell Color. 1975. Munsell Soil Color Charts. Baltimore, Maryland. N.Y.

Rescke Carol. 1990 New York State Depart. of Environmental Conservation, New York Natural Heritage Program. Ecological Communities of New York State.

Schick, Kevin. Dec. 1978. The Vegetation of New York State.

U.S. Department of Agriculture. 1979. Soil Conservation Service. Ulster County Soil Survey.

U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, and U.S.D.A. Soil Conservation Service. 1989. Federal Manual for Identifying and Delineating Jurisdictional Wetlands. Washington, D.C.

U.S. Department of Agriculture. Soil Conservation Service New York 1988. Hydric Soils Syracuse, N.Y.

U.S. Department of Interior. 1983. User Notes for National Wetland Inventory Maps.

U.S. Environmental Protection Agency. 1973. Biological Field and Laboratory Methods for Measuring the Quality of Surface Waters and Effluents. Documents-EPA-670/4-73-001. National Environmental Research Center, Cincinnati, Ohio.

U.S. Fish and Wildlife Service. 1988. National List of Plant Species That Occur in Wetlands: Northeast.

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD

THIS PAGE INTENTIONALLY LEFT BLANK

Tech | 5203 | Hertel

PF

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD[1]

Field Investigator(s): DAVID GRIGGS Date: 10/24/89
Project/Site: HERTEL State: NY County: ULSTER
Applicant/Owner: ______ Plant Community #/Name: O-1-U
Note: If a more detailed site description is necessary, use the back of data form or a field notebook.

Do normal environmental conditions exist at the plant community?
Yes ✓ No ____ (If no, explain on back)
Has the vegetation, soils, and/or hydrology been significantly disturbed?
Yes ✓ No ____ (If yes, explain on back) - Disturbance associated with site history.

VEGETATION

	Dominant Plant Species	Indicator Status	Stratum		Dominant Plant Species	Indicator Status	Stratum
1.	Acer rubrum	FAC	Tree/S	11.			
2.	Fraxinus sp.	—	T	12.			
3.	Tsuga canadensis	FACU	T/S	13.			
4.	Fagus grandifolia	FACU	S	14.			
5.	Lindera benzoin	FACW-	Shrub	15.			
6.	Lycopodium obscurum	UPL	H	16.			
7.	Polystichum acrostichoides	FACU-	H	17.			
8.	Liriodendron Tulipifera	FACU	H	18.			
9.				19.			
10.	Toxicodendron radicans	FAC	V	20.			

Percent of dominant species that are OBL, FACW, and/or FAC 37.5
Is the hydrophytic vegetation criterion met? Yes ____ No X
Rationale: ______

SOILS

Series/phase: Bath-Nassau Subgroup:[2] ______
Is the soil on the hydric soils list? Yes ____ No X Undetermined ____
Is the soil a Histosol? Yes ____ No X Histic epipedon present? Yes ____ No X
Is the soil: Mottled? Yes ____ No X Gleyed? Yes ____ No X
Matrix Color: 10YR 5/4 Mottle Colors: ______
Other hydric soil indicators: ______
Is the hydric soil criterion met? Yes ____ No X
Rationale: DISTURBED 15-20 yrs - well-drained

HYDROLOGY

Is the ground surface inundated? Yes ____ No X Surface water depth: ______
Is the soil saturated? Yes ____ No X
Depth to free-standing water in pit/soil probe hole: ______
List other field evidence of surface inundation or soil saturation.

Is the wetland hydrology criterion met? Yes ____ No X
Rationale: ______

JURISDICTIONAL DETERMINATION AND RATIONALE

Is the plant community a wetland? Yes ____ No X
Rationale for jurisdictional decision: ______

[1] This data form can be used for the Hydric Soil Assessment Procedure and the Plant Community Assessment Procedure.
[2] Classification according to "Soil Taxonomy."

DATA FORM 2 - VEGETATION-COMPREHENSIVE DETERMINATION

Project Name: HERTEL Job No.
State: N.Y. County: ULSTER Town: PLATTEKILL Time:
Observation point: O-1-U Date: 10/24/99 Photo:
Location: WETLAND "A" Determined by: DAVID GRIGGS

VEGETATION LAYER

	TREES	DBH	TOTAL BASAL AREA	RANK
1	Fagus grandifolia	4"		4
2	Acer rubrum	4"/3"/7"/8"/9"/8½"		1
3				
4	Fraxinus sp.	10"/10"		2
5				
6	Tsuga canadensis	18"		3
7				
8				
9				
10				

	HERBS	MIDPOINT OF % COVER CLASS	RANK
1	Rudus sp.	5	4
2			
3	Polystichum acrostichoides	25	2
4	Lireodendron tulipifera	10	3
5			
6	Lycopodium amotinum	40	1
7	Vida sp.	5	5
8			
9			
10			

	SAPLINGS/SHRUBS	MIDPOINT OF HEIGHT CLASS	TOTAL HEIGHT CLASS	%	RANK
1	Tsuga canadensis	12+		40	2
2					
3	Fagus grandifolia	4-6'		25	3
4	Acer rubrum	12+		10	4
5	Lindera benzoin	6-8'		70	1
6		4-6'			
7	Crataegus sp.			10	5
8					
9					
10					

	WOODY VINES	NUMBER OF STEMS	RANK
1	Toxicodendron radicans	5	1
2			
3			
4			
5			
6			
7			
8			
9			
10			

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD[1]

Field Investigator(s): DAVID GRIGGS Date: 10/24/89
Project/Site: HERTEL State: NY County: Ulster
Applicant/Owner: ______ Plant Community #/Name: O-1-W
Note: If a more detailed site description is necessary, use the back of data form or a field notebook.

Do normal environmental conditions exist at the plant community?
Yes X No ___ (If no, explain on back)
Has the vegetation, soils, and/or hydrology been significantly disturbed?
Yes ___ No X (If yes, explain on back)

VEGETATION

	Dominant Plant Species	Indicator Status	Stratum		Dominant Plant Species	Indicator Status	Stratum
1.	Acer rubrum	FAC	Tree	11.			
2.	Betula lenta	FACU	Tree	12.			
3.	Betula lutea	FAC	Tree	13.			
4.	Lindera benzoin	FAC	Shrub	14.			
5.	Viburnum dentatum	FAC	Shrub	15.			
6.	Sphagnum sp.	—	H	16.			
7.	Carex stricta	OBL	H	17.			
8.	Symplocarpus foetidus	OBL	H	18.			
9.	Osmunda cinnamomea	FACW	H	19.			
10.				20.			

Percent of dominant species that are OBL, FACW, and/or FAC 87.5
Is the hydrophytic vegetation criterion met? Yes X No ___
Rationale: ______

SOILS

Series/phase: Lyons Subgroup:[2] ______
Is the soil on the hydric soils list? Yes X No ___ Undetermined ___
Is the soil a Histosol? Yes ___ No X Histic epipedon present? Yes ___ No X
Is the soil: Mottled? Yes ___ No X Gleyed? Yes X No ___
Matrix Color: 5Y6/1 Mottle Colors: ______
Other hydric soil indicators: Shallow to Bedrock - CLAY-LOAM
Is the hydric soil criterion met? Yes X No ___
Rationale: poorly drained to very poorly drained

HYDROLOGY

Is the ground surface inundated? Yes X No ___ Surface water depth: 2"-3"
Is the soil saturated? Yes X No ___
Depth to free-standing water in pit/soil probe hole: ______
List other field evidence of surface inundation or soil saturation. Water ponding in depressions
Is the wetland hydrology criterion met? Yes X No ___
Rationale: ______

JURISDICTIONAL DETERMINATION AND RATIONALE

Is the plant community a wetland? Yes X No ___
Rationale for jurisdictional decision: ______

[1] This data form can be used for the Hydric Soil Assessment Procedure and the Plant Community Assessment Procedure.
[2] Classification according to "Soil Taxonomy."

DATA FORM 2 - VEGETATION-COMPREHENSIVE DETERMINATION

roject Name: HERTEL Job No.
tate: NEW YORK County: ULSTER Town: PLATTEKILL Time:
bservation point: O-1-W Date: 10|24|89 Photo:
ocation: WETLAND "A" Determined by: DAVID GRIGGS

EGETATION LAYER

	TREES	DBH	TOTAL BASAL AREA	RANK
1	Acer rubrum	11"/8"/18"/15"		1
2	Betula lenta	10"/8"/10"/12"		2
3				
4	Betula lutea	6"/8"/8"		3
5				
6				
7				
8				
9				
10				

	HERBS	MIDPOINT OF % COVER CLASS	RANK
1	Carex stricta	50	2
2			
3	Sphagnum mass	70	1
4	Symplocarpus foetidus	10	4
5			
6	Osmunda cinnamomea	30	3
7			
8			
9			
10			

	SAPLINGS/SHRUBS	MIDPOINT OF HEIGHT CLASS	TOTAL HEIGHT CLASS	%	RANK
1	Lindera benzoin	8'-10'		60	1
2					
3	Viburnum dentatum	6'-8'		40	2
4					
5					
6					
7					
8					
9					
10					

	WOODY VINES	NUMBER OF STEMS	RANK
1	N/A		
2			
3			
4			
5			
6			
7			
8			
9			
10			

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD[1]

Field Investigator(s): DAVID GRIGGS Date: 10/24/89
Project/Site: HERTEL State: NY County: ULSTER
Applicant/Owner: ______ Plant Community #/Name: O-2-U
Note: If a more detailed site description is necessary, use the back of data form or a field notebook.

Do normal environmental conditions exist at the plant community?
Yes X No ___ (If no, explain on back)
Has the vegetation, soils, and/or hydrology been significantly disturbed?
Yes X No ___ (If yes, explain on back) - Soils disturbed

VEGETATION

	Dominant Plant Species	Indicator Status	Stratum		Dominant Plant Species	Indicator Status	Stratum
1.	Pinus strobus	FACU	T	11.			
2.	Tsuga canadensis	FACU	T	12.			
3.	Betula lutea	FAC	T	13.			
4.	Betula lenta	FACU	T	14.			
5.	Lindera benzoin	FACW-	Sh	15.			
6.	Vaccinium angustifolium	FACU	Sh	16.			
7.	Nyssa sylvatica	FAC	Sapling	17.			
8.	Mitchella repens	FACU	H	18.			
9.	Polystichum acrostichoides	FACU-	H	19.			
10.				20.			

Percent of dominant species that are OBL, FACW, and/or FAC 33%
Is the hydrophytic vegetation criterion met? Yes ___ No X
Rationale: ______

SOILS

Series/phase: Bath-Nassau Subgroup:[2] ______
Is the soil on the hydric soils list? Yes ___ No X Undetermined ___
Is the soil a Histosol? Yes ___ No X Histic epipedon present? Yes ___ No X
Is the soil: Mottled? Yes ___ No X Gleyed? Yes ___ No X
Matrix Color: 10YR 5/4 Mottle Colors: ______
Other hydric soil indicators: ______
Is the hydric soil criterion met? Yes ___ No X
Rationale: Pale Yellow with [illegible] outcrop.

HYDROLOGY

Is the ground surface inundated? Yes ___ No X Surface water depth: ______
Is the soil saturated? Yes ___ No X
Depth to free-standing water in pit/soil probe hole: ______
List other field evidence of surface inundation or soil saturation.

Is the wetland hydrology criterion met? Yes ___ No X
Rationale: ______

JURISDICTIONAL DETERMINATION AND RATIONALE

Is the plant community a wetland? Yes ___ No X
Rationale for jurisdictional decision: ______

[1] This data form can be used for the Hydric Soil Assessment Procedure and the Plant Community Assessment Procedure.
[2] Classification according to "Soil Taxonomy."

DATA FORM 2 - VEGETATION-COMPREHENSIVE DETERMINATION

roject Name: HERTEL Job No.
tate: NY County: ULSTER Town: PLATTEKILL Time:
bservation point: O-2-U Date: 10/24/89 Photo:
ocation: WETLAND "A" Determined by: DAVID GRIGGS

EGETATION LAYER

	TREES	DBH	TOTAL BASAL AREA	RANK
1	Pinus strobus	10"/12"/8'		1
2				
3	Tsuga canadensis	8"/6"/5"/4"/8"		2
4	Betula lutea	6½"/5"/5½		3
5	Betula lenta	6/5/3		4
6				
7				
8				
9				
10				

	HERBS	MIDPOINT OF % COVER CLASS	RANK
1	Mitchella repens	15	2
2			
3	Polystichum acrostichoides	40	1
4	Leaf litter –		
5			
6			
7			
8			
9			
10			

	SAPLINGS/SHRUBS	MIDPOINT OF HEIGHT CLASS	TOTAL HEIGHT CLASS	%	RANK
1	Fagus grandifolia			20	3
2					
3	Lindera benzoin			40	1
4	Vaccinium angustifolium			30	2
5					
6	Nyssa sylvatica			10	4
7					
8					
9					
10					

	WOODY VINES	NUMBER OF STEMS	RANK
1	N/A		
2			
3			
4			
5			
6			
7			
8			
9			
10			

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD[1]

Field Investigator(s): DAVID GRIGGS Date: 10/24/[illegible]
Project/Site: HERTEL State: NY County: ULSTER
Applicant/Owner: ______ Plant Community #/Name: O-2-W
Note: If a more detailed site description is necessary, use the back of data form or a field notebook.

Do normal environmental conditions exist at the plant community?
Yes ✓ No ____ (If no, explain on back)
Has the vegetation, soils, and/or hydrology been significantly disturbed?
Yes ✓ No ____ (If yes, explain on back) Soils disturbed

VEGETATION

	Dominant Plant Species	Indicator Status	Stratum		Dominant Plant Species	Indicator Status	Stratum
1.	Acer rubrum	FAC	T	11.			
2.	Betula lutea	FAC	T	12.			
3.	Lindera benzoin	FACW-	Shrub	13.			
4.	Viburnum dentatum	FAC	Shrub	14.			
5.	Sphagnum	—	—	15.			
6.	Osmunda cinnamomea	FACW	H	16.			
7.	Onoclea sensibilis	FACW	H	17.			
8.				18.			
9.				19.			
10.				20.			

Percent of dominant species that are OBL, FACW, and/or FAC 100
Is the hydrophytic vegetation criterion met? Yes X No ____
Rationale: ______

SOILS

Series/phase: Lyons Subgroup:[2] ______
Is the soil on the hydric soils list? Yes X No ____ Undetermined ______
Is the soil a Histosol? Yes X No ____ Histic epipedon present? Yes ____ No ____
Is the soil: Mottled? Yes ____ No X Gleyed? Yes X No ____
Matrix Color: 5Y 6/1 Mottle Colors: ______
Other hydric soil indicators: ______
Is the hydric soil criterion met? Yes X No ____
Rationale: ______

HYDROLOGY

Is the ground surface inundated? Yes X No ____ Surface water depth: ______
Is the soil saturated? Yes X No ____
Depth to free-standing water in pit/soil probe hole: ______
List other field evidence of surface inundation or soil saturation.

Is the wetland hydrology criterion met? Yes X No ____
Rationale: ______

JURISDICTIONAL DETERMINATION AND RATIONALE

Is the plant community a wetland? Yes X No ____
Rationale for jurisdictional decision: ______

[1] This data form can be used for the Hydric Soil Assessment Procedure and the Plant Community Assessment Procedure.
[2] Classification according to "Soil Taxonomy."

2ppm above on ground (0.4)

DATA FORM 2 - VEGETATION-COMPREHENSIVE DETERMINATION

roject Name: HERTEL Job No.
tate: NY County: ULSTER Town: PLATTEKILL Time:
bservation point: O-2-W Date: 10/24/99 Photo:
ocation: WETLAND "A" Determined by: DAVID GRIGGS

EGETATION LAYER

	TREES	DBH	TOTAL BASAL AREA	RANK
1	Acer rubrum	8"/10"/12"/15"/9"		1
2				
3	Betula lutea	8"/3"		2
4				
5				
6				
7				
8				
9				
10				

	HERBS	MIDPOINT OF % COVER CLASS	RANK
1	Osmunda cinnamomea	40	2
2	Sphagnum sp.	60	1
3			
4	Carex stricta	20	4
5	Onoclea sensibilis	30	3
6			
7			
8			
9			
10			

	SAPLINGS/SHRUBS	MIDPOINT OF HEIGHT CLASS	TOTAL HEIGHT CLASS	%	RANK
1	Lindera benzoin	4-6'		60	1
2					
3	Viburnum dentatum	6-8'		30	2
4	Cornus sp.	4-6'		10	3
5					
6					
7					
8					
9					
10					

	WOODY VINES	NUMBER OF STEMS	RANK
1	N/A		
2			
3			
4			
5			
6			
7			
8			
9			
10			

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD[1]

Field Investigator(s): DAVID GRIGGS Date: 10/24/89
Project/Site: HERTEL State: NY County: ULSTER
Applicant/Owner: Plant Community #/Name: O-3-U

Note: If a more detailed site description is necessary, use the back of data form or a field notebook.

Do normal environmental conditions exist at the plant community?
Yes ✓ No ____ (If no, explain on back)
Has the vegetation, soils, and/or hydrology been significantly disturbed?
Yes ✓ No ____ (If yes, explain on back) Soils

VEGETATION

Dominant Plant Species	Indicator Status	Stratum	Dominant Plant Species	Indicator Status	Stratum
1. Pinus strobus	FACU	Tree	11.		
2. Betula lenta	FACU	Tree/S	12.		
3. Viburnum acerifolium	UPL	Shrub	13.		
4. Vaccinium angustifolium	FACU	Shrub	14.		
5. Polystichum acrostichoides	FACU-	H	15.		
6. Rubus idaeus	FAC-	H	16.		
7.			17.		
8.			18.		
9.			19.		
10.			20.		

Percent of dominant species that are OBL, FACW, and/or FAC 0
Is the hydrophytic vegetation criterion met? Yes ____ No X
Rationale:

SOILS

Series/phase: Bath-Nassau Rock outcrop Subgroup:[2]
Is the soil on the hydric soils list? Yes ____ No X Undetermined ____
Is the soil a Histosol? Yes ____ No X Histic epipedon present? Yes ____ No X
Is the soil: Mottled? Yes ____ No X Gleyed? Yes ____ No ✓
Matrix Color: 10YR 5/4 Mottle Colors:
Other hydric soil indicators:
Is the hydric soil criterion met? Yes ____ No X
Rationale:

HYDROLOGY

Is the ground surface inundated? Yes ____ No X Surface water depth:
Is the soil saturated? Yes ____ No X
Depth to free-standing water in pit/soil probe hole:
List other field evidence of surface inundation or soil saturation.

Is the wetland hydrology criterion met? Yes ____ No X
Rationale:

JURISDICTIONAL DETERMINATION AND RATIONALE

Is the plant community a wetland? Yes ____ No X
Rationale for jurisdictional decision:

[1] This data form can be used for the Hydric Soil Assessment Procedure and the Plant Community Assessment Procedure.
[2] Classification according to "Soil Taxonomy."

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD[1]

Field Investigator(s): DAVID GRIGGS Date: 10/24/89
Project/Site: HERTEL State: NY County: ULSTER
Applicant/Owner: ______ Plant Community #/Name: O-3-W
Note: If a more detailed site description is necessary, use the back of data form or a field notebook.

Do normal environmental conditions exist at the plant community?
Yes ___ No ✓ (If no, explain on back)
Has the vegetation, soils, and/or hydrology been significantly disturbed?
Yes ✓ No ___ (If yes, explain on back)

Historic disturbance - mature white pine in wetlands, soils mixed up, depressions scattered

---

VEGETATION

Dominant Plant Species	Indicator Status	Stratum	Dominant Plant Species	Indicator Status	Stratum
1. Pinus strobus	FACU	T	11.		
2. Lindera benzoin	FACW-	Sh	12.		
3. Viburnum dentatum	FAC	Sh	13.		
4. Osmunda cinnamomea	FACW	H	14.		
5.			15.		
6.			16.		
7.			17.		
8.			18.		
9.			19.		
10.			20.		

Percent of dominant species that are OBL, FACW, and/or FAC 75
Is the hydrophytic vegetation criterion met? Yes X No ___
Rationale: ______

SOILS

Series/phase: ______ Subgroup:[2] ______
Is the soil on the hydric soils list? Yes ___ No ___ Undetermined X
Is the soil a Histosol? Yes ___ No X Histic epipedon present? Yes ___ No X
Is the soil: Mottled? Yes ___ No X Gleyed? Yes ___ No X
Matrix Color: ______ Mottle Colors: ______
Other hydric soil indicators: ______
Is the hydric soil criterion met? Yes X No ___
Rationale: ______

HYDROLOGY

Is the ground surface inundated? Yes X No ___ Surface water depth: ______
Is the soil saturated? Yes X No ___
Depth to free-standing water in pit/soil probe hole: ______
List other field evidence of surface inundation or soil saturation.

Is the wetland hydrology criterion met? Yes X No ___
Rationale: ______

JURISDICTIONAL DETERMINATION AND RATIONALE

Is the plant community a wetland? Yes X No ___
Rationale for jurisdictional decision: ______

[1] This data form can be used for the Hydric Soil Assessment Procedure and the Plant Community Assessment Procedure.
[2] Classification according to "Soil Taxonomy."

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD[1]

Field Investigator(s): DAVID GRIGGS Date: 10/25/89
Project/Site: HERTEL State: NY County: ULSTER
Applicant/Owner: ______ Plant Community #/Name: 8-4-U
Note: If a more detailed site description is necessary, use the back of data form or a field notebook.

Do normal environmental conditions exist at the plant community?
Yes X No ____ (If no, explain on back)
Has the vegetation, soils, and/or hydrology been significantly disturbed?
Yes ____ No X (If yes, explain on back)

VEGETATION

	Dominant Plant Species	Indicator Status	Stratum		Dominant Plant Species	Indicator Status	Stratum
1.	Liriodendron tulipifera	FAC	Tree	11.			
2.	Acer rubrum	FAC	T;Sapling	12.			
3.	Ulmus rubra	FAC	Tree	13.			
4.	Hamamelis virginiana	FAC-	Shrub	14.			
5.	Lindera benzoin	FACW-	Shrub	15.			
6.	Quercus alba	FACU-	Shrub	16.			
7.	Polystichum acro-			17.			
8.	stichoides	FACU-	Herb	18.			
9.	Solidago gigantea	FACU	Herb	19.			
10.	Athyrium filix-femina	FAC	Herb	20.			

Percent of dominant species that are OBL, FACW, and/or FAC 45%
Is the hydrophytic vegetation criterion met? Yes ____ No X
Rationale: percentage

SOILS

Series/phase: Bath Nassau Subgroup:[2] ______
Is the soil on the hydric soils list? Yes ____ No X Undetermined ____
Is the soil a Histosol? Yes ____ No X Histic epipedon present? Yes ____ No X
Is the soil: Mottled? Yes ____ No X Gleyed? Yes ____ No X
Matrix Color: 10YR 5/3 Mottle Colors: ______
Other hydric soil indicators: ______
Is the hydric soil criterion met? Yes ____ No X
Rationale: DARK LAYER - ROCK OUTCROP

HYDROLOGY

Is the ground surface inundated? Yes ____ No X Surface water depth: ______
Is the soil saturated? Yes X No ____
Depth to free-standing water in pit/soil probe hole: 24" saturated @ 18"
List other field evidence of surface inundation or soil saturation.

Is the wetland hydrology criterion met? Yes ____ No X
Rationale: ______

JURISDICTIONAL DETERMINATION AND RATIONALE

Is the plant community a wetland? Yes ____ No X
Rationale for jurisdictional decision: ______

[1] This data form can be used for the Hydric Soil Assessment Procedure and the Plant Community Assessment Procedure.
[2] Classification according to "Soil Taxonomy."

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD[1]

Field Investigator(s): DAVID GRIGGS Date: 10/25/89
Project/Site: HERTEL State: NY County: ULSTER
Applicant/Owner: ____ Plant Community #/Name: O-4-W
Note: If a more detailed site description is necessary, use the back of data form or a field notebook.

Do normal environmental conditions exist at the plant community?
Yes X No ____ (If no, explain on back)
Has the vegetation, soils, and/or hydrology been significantly disturbed?
Yes ____ No X (If yes, explain on back)

VEGETATION

	Dominant Plant Species	Indicator Status	Stratum		Dominant Plant Species	Indicator Status	Stratum
1.	Acer rubrum	FAC	T/S	11.			
2.	Vaccinium corymbosum	FACW-	Shrub	12.			
3.	Carpinus caroliniana	FAC	Shrub	13.			
4.	Lindera benzoin	FACW-	Shrub	14.			
5.	Lythrum salicaria	FACW+	HERB	15.			
6.	Sphagnum moss	—	HERB	16.			
7.	Carex stricta	OBL	HERB	17.			
8.	Toxicodendron radicans	FAC	HERB	18.			
9.				19.			
10.				20.			

Percent of dominant species that are OBL, FACW, and/or FAC 100
Is the hydrophytic vegetation criterion met? Yes X No ____
Rationale: ____

SOILS

Series/phase: Lyons / Atherton Subgroup:[2] ____
Is the soil on the hydric soils list? Yes X No ____ Undetermined ____
Is the soil a Histosol? Yes ____ No ____ Histic epipedon present? Yes ____ No X
Is the soil: Mottled? Yes ____ No X Gleyed? Yes X No ____
Matrix Color: 5Y5/1 Mottle Colors: ____
Other hydric soil indicators: SANDY
Is the hydric soil criterion met? Yes X No ____
Rationale: ____

HYDROLOGY

Is the ground surface inundated? Yes X No ____ Surface water depth: surface ponding
Is the soil saturated? Yes X No ____
Depth to free-standing water in pit/soil probe hole: ____
List other field evidence of surface inundation or soil saturation.

Is the wetland hydrology criterion met? Yes X No ____
Rationale: ____

JURISDICTIONAL DETERMINATION AND RATIONALE

Is the plant community a wetland? Yes X No ____
Rationale for jurisdictional decision: ____

[1] This data form can be used for the Hydric Soil Assessment Procedure and the Plant Community Assessment Procedure.
[2] Classification according to "Soil Taxonomy."

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD[1]

Field Investigator(s): DAVID GRIGGS Date: 10/25/89
Project/Site: HERTEL State: NY County: ULSTER
Applicant/Owner: Plant Community #/Name: O-5-U
Note: If a more detailed site description is necessary, use the back of data form or a field notebook.

Do normal environmental conditions exist at the plant community?
Yes ✓ No ____ (If no, explain on back)
Has the vegetation, soils, and/or hydrology been significantly disturbed?
Yes ____ No ✓ (If yes, explain on back)

VEGETATION

	Dominant Plant Species	Indicator Status	Stratum		Dominant Plant Species	Indicator Status	Stratum
1.	Acer rubrum	FAC	T/S	11.			
2.	Tsuga canadensis	FACU	Tree/S	12.			
3.	Viburnum acerifolium	UPL	Shrub	13.			
4.	Polystichum acrostich-			14.			
5.	oides	FACU-	HERB	15.			
6.	Toxicodendron radicans	FAC	Vine	16.			
7.				17.			
8.				18.			
9.				19.			
10.				20.			

Percent of dominant species that are OBL, FACW, and/or FAC 40
Is the hydrophytic vegetation criterion met? Yes ____ No ✓
Rationale:

SOILS

Series/phase: Bath-Nassau Subgroup:[2]
Is the soil on the hydric soils list? Yes ____ No ✓ Undetermined ____
Is the soil a Histosol? Yes ____ No ✓ Histic epipedon present? Yes ____ No ✓
Is the soil: Mottled? Yes ____ No ✓ Gleyed? Yes ____ No ✓
Matrix Color: 10YR 6/4 Mottle Colors:
Other hydric soil indicators:
Is the hydric soil criterion met? Yes ____ No ✓
Rationale:

HYDROLOGY

Is the ground surface inundated? Yes ____ No ✓ Surface water depth:
Is the soil saturated? Yes ____ No ✓
Depth to free-standing water in pit/soil probe hole:
List other field evidence of surface inundation or soil saturation.

Is the wetland hydrology criterion met? Yes ____ No ✓
Rationale:

JURISDICTIONAL DETERMINATION AND RATIONALE

Is the plant community a wetland? Yes ____ No ✓
Rationale for jurisdictional decision:

[1] This data form can be used for the Hydric Soil Assessment Procedure and the Plant Community Assessment Procedure.
[2] Classification according to "Soil Taxonomy."

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD[1]

Field Investigator(s): DAVID GRIGGS Date: 10/25/89
Project/Site: HERTEL State: NY County: ULSTER
Applicant/Owner: ______ Plant Community #/Name: O-5-W
Note: If a more detailed site description is necessary, use the back of data form or a field notebook.

Do normal environmental conditions exist at the plant community?
Yes ✓ No ____ (If no, explain on back)
Has the vegetation, soils, and/or hydrology been significantly disturbed?
Yes ____ No ✓ (If yes, explain on back)

VEGETATION

	Dominant Plant Species	Indicator Status	Stratum		Dominant Plant Species	Indicator Status	Stratum
1.	Acer rubrum	FAC	Sapling	11.			
2.	Vaccinium corymbosum	FACW-	Shrub	12.			
3.	Carpinus caroliniana	FAC	Shrub	13.			
4.	Quercus bicolor	FACW+	Sapling	14.			
5.	Lindera benzoin	FACW-	Shrub	15.			
6.	Osmunda cinnamomea	FACW	HERB	16.			
7.	Sphagnum sp	—	HERB	17.			
8.				18.			
9.				19.			
10.				20.			

Percent of dominant species that are OBL, FACW, and/or FAC 100
Is the hydrophytic vegetation criterion met? Yes X No ____
Rationale: ______

SOILS

Series/phase: Canandaigua ? Subgroup:[2] ______
Is the soil on the hydric soils list? Yes ✓ No ____ Undetermined ______
Is the soil a Histosol? Yes ____ No ____ Histic epipedon present? Yes ✓ No ____
Is the soil: Mottled? Yes ____ No ✓ Gleyed? Yes ✓ No ____
Matrix Color: 5Y5/1 Mottle Colors: ______
Other hydric soil indicators: ______
Is the hydric soil criterion met? Yes ✓ No ____
Rationale: ______

HYDROLOGY

Is the ground surface inundated? Yes ✓ No ____ Surface water depth: -3" dep - Ponded
Is the soil saturated? Yes X No ____
Depth to free-standing water in pit/soil probe hole: ______
List other field evidence of surface inundation or soil saturation.

Is the wetland hydrology criterion met? Yes ✓ No ____
Rationale: ______

JURISDICTIONAL DETERMINATION AND RATIONALE

Is the plant community a wetland? Yes ✓ No ____
Rationale for jurisdictional decision: ______

[1] This data form can be used for the Hydric Soil Assessment Procedure and the Plant Community Assessment Procedure.
[2] Classification according to "Soil Taxonomy."

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD[1]

Field Investigator(s): DAVID GRIGGS Date: 10/25/89
Project/Site: HERTEL State: NY County: ULSTER
Applicant/Owner: Plant Community #/Name: 0-6-U
Note: If a more detailed site description is necessary, use the back of data form or a field notebook.

Do normal environmental conditions exist at the plant community?
Yes X No ___ (If no, explain on back)
Has the vegetation, soils, and/or hydrology been significantly disturbed?
Yes ___ No X (If yes, explain on back)

VEGETATION

	Dominant Plant Species	Indicator Status	Stratum		Dominant Plant Species	Indicator Status	Stratum
1.	Pinus strobus	FACU	T	11.			
2.	Acer rubrum	FAC	T/S	12.			
3.	Hamamelis virginiana	FAC	Shrub	13.			
4.	Lycopodium obscurum	FACU	Herb	14.			
5.	Pyrola sp	FAC	Herb	15.			
6.				16.			
7.				17.			
8.				18.			
9.				19.			
10.				20.			

Percent of dominant species that are OBL, FACW, and/or FAC 40
Is the hydrophytic vegetation criterion met? Yes ___ No X
Rationale:

SOILS

Series/phase: Bath-Nassau Rockoutcrop Subgroup:[2]
Is the soil on the hydric soils list? Yes ___ No X Undetermined ___
Is the soil a Histosol? Yes ___ No X Histic epipedon present? Yes ___ No X
Is the soil: Mottled? Yes ___ No X Gleyed? Yes ___ No X
Matrix Color: 10YR 3/4 Mottle Colors:
Other hydric soil indicators:
Is the hydric soil criterion met? Yes ___ No X
Rationale:

HYDROLOGY

Is the ground surface inundated? Yes ___ No X Surface water depth:
Is the soil saturated? Yes ___ No X
Depth to free-standing water in pit/soil probe hole:
List other field evidence of surface inundation or soil saturation.

Is the wetland hydrology criterion met? Yes ___ No X
Rationale:

JURISDICTIONAL DETERMINATION AND RATIONALE

Is the plant community a wetland? Yes ___ No X
Rationale for jurisdictional decision:

[1] This data form can be used for the Hydric Soil Assessment Procedure and the Plant Community Assessment Procedure.
[2] Classification according to "Soil Taxonomy."

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD[1]

Field Investigator(s): DAVID GRIGGS Date: 10/25/89
Project/Site: HERTEL State: NY County: ULSTER
Applicant/Owner: Plant Community #/Name: O-6-W
Note: If a more detailed site description is necessary, use the back of data form or a field notebook.

Do normal environmental conditions exist at the plant community?
Yes X No ___ (If no, explain on back)
Has the vegetation, soils, and/or hydrology been significantly disturbed?
Yes ___ No X (If yes, explain on back)

VEGETATION

Dominant Plant Species	Indicator Status	Stratum	Dominant Plant Species	Indicator Status	Stratum
1. Carex spp.	—	Herb	11.		
2. Carex stricta	OBL	Herb	12.		
3. Onoclea sensibilis	FACW	Herb	13.		
4. Sambucus canadensis	FACW-	Herb/Shr	14.		
5. Acer rubrum	FAC	Sapling	15.		
6.			16.		
7.			17.		
8.			18.		
9.			19.		
10.			20.		

Percent of dominant species that are OBL, FACW, and/or FAC 100
Is the hydrophytic vegetation criterion met? Yes X No ___
Rationale:

SOILS

Series/phase: Lyons Subgroup:[2]
Is the soil on the hydric soils list? Yes X No ___ Undetermined ___
Is the soil a Histosol? Yes ___ No X Histic epipedon present? Yes ___ No ___
Is the soil: Mottled? Yes X No ___ Gleyed? Yes ___ No X
Matrix Color: 10YR 4/1 Mottle Colors: 10YR 6/4
Other hydric soil indicators: HUMMOCKY
Is the hydric soil criterion met? Yes ___ No ___
Rationale:

HYDROLOGY

Is the ground surface inundated? Yes ___ No X Surface water depth:
Is the soil saturated? Yes X No ___
Depth to free-standing water in pit/soil probe hole: 2"
List other field evidence of surface inundation or soil saturation.

Is the wetland hydrology criterion met? Yes X No ___
Rationale:

JURISDICTIONAL DETERMINATION AND RATIONALE

Is the plant community a wetland? Yes X No ___
Rationale for jurisdictional decision:

[1] This data form can be used for the Hydric Soil Assessment Procedure and the Plant Community Assessment Procedure.
[2] Classification according to "Soil Taxonomy."

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD[1]

Field Investigator(s): DAVID GRIGGS Date: 10/25/89
Project/Site: HERTEL State: NY County: ULSTER
Applicant/Owner: ______ Plant Community #/Name: O-7-U
Note: If a more detailed site description is necessary, use the back of data form or a field notebook.

Do normal environmental conditions exist at the plant community?
Yes ____ No X (If no, explain on back) – Disturbed vegetation young
Has the vegetation, soils, and/or hydrology been significantly disturbed?
Yes ____ No X (If yes, explain on back)

VEGETATION

	Dominant Plant Species	Indicator Status	Stratum		Dominant Plant Species	Indicator Status	Stratum
1.	Rubus Idaeus	FAC-	HERB/Shrub	11.			
2.	Acer rubrum	FAC	Sapling/T	12.			
3.	Liriodendron tulipifera	FACU	T/Sapl	13.			
4.	Solidago gigantea	FACU	HERB	14.			
5.	Populus deltoides	FAC	Sapling	15.			
6.	Platanus occidentalis	FACW-	Sapling	16.			
7.				17.			
8.				18.			
9.				19.			
10.				20.			

Percent of dominant species that are OBL, FACW, and/or FAC 33
Is the hydrophytic vegetation criterion met? Yes ____ No X
Rationale: ______

SOILS

Series/phase: Bath-Nassau Subgroup:[2] ______
Is the soil on the hydric soils list? Yes ____ No X Undetermined ______
Is the soil a Histosol? Yes ____ No X Histic epipedon present? Yes ____ No X
Is the soil: Mottled? Yes ____ No X Gleyed? Yes ____ No X
Matrix Color: 10YR 6/4 Mottle Colors: ______
Other hydric soil indicators: ______
Is the hydric soil criterion met? Yes ____ No X
Rationale: ______

HYDROLOGY

Is the ground surface inundated? Yes ____ No X Surface water depth: ______
Is the soil saturated? Yes ____ No X
Depth to free-standing water in pit/soil probe hole: ______
List other field evidence of surface inundation or soil saturation.

Is the wetland hydrology criterion met? Yes ____ No X
Rationale: ______

JURISDICTIONAL DETERMINATION AND RATIONALE

Is the plant community a wetland? Yes ____ No X
Rationale for jurisdictional decision: ______

---

[1] This data form can be used for the Hydric Soil Assessment Procedure and the Plant Community Assessment Procedure.
[2] Classification according to "Soil Taxonomy."

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD[1]

Field Investigator(s): DAVID GRIGGS   Date: 10/25/89
Project/Site: HERTEL   State: NY   County: ULSTER
Applicant/Owner: ______   Plant Community #/Name: 0-7-W
Note: If a more detailed site description is necessary, use the back of data form or a field notebook.

Do normal environmental conditions exist at the plant community?
Yes ____ No X (If no, explain on back) → Disturbed - dumping
Has the vegetation, soils, and/or hydrology been significantly disturbed?
Yes ____ No X (If yes, explain on back)

VEGETATION

	Dominant Plant Species	Indicator Status	Stratum		Dominant Plant Species	Indicator Status	Stratum
1.	Salix nigra	FACW+	T/Sapl	11.	Osmunda regalis	OBL	HERB
2.	Viburnum dentatum	FAC	SHRUB	12.	Polygonum sagittatum	OBL	HERB
3.	Phragmites communis	FACW	SHRUB	13.			
4.	Carpinus caroliniana	FAC	Sapling	14.			
5.	Lindera benzoin	FACW-	Shrub	15.			
6.	Sphagnum sp	—	HERB	16.			
7.	Athyrium filix-femina	FAC	HERB	17.			
8.	Impatiens capensis	FACW	HERB	18.			
9.	Sambucus canadensis	FACW-	HERB	19.			
10.	Ulmus rubra	FAC	HERB	20.			

Percent of dominant species that are OBL, FACW, and/or FAC 100
Is the hydrophytic vegetation criterion met? Yes X No ____
Rationale: ______

SOILS

Series/phase: Lyons   Subgroup:[2] ______
Is the soil on the hydric soils list? Yes X No ____ Undetermined ______
Is the soil a Histosol? Yes ____ No X Histic epipedon present? Yes ____ No X
Is the soil: Mottled? Yes ____ No X Gleyed? Yes X No ____
Matrix Color: 5Y 5/1   Mottle Colors: ______
Other hydric soil indicators: ______
Is the hydric soil criterion met? Yes X No ____
Rationale: ______

HYDROLOGY

Is the ground surface inundated? Yes ____ No X Surface water depth: ______
Is the soil saturated? Yes X No ____
Depth to free-standing water in pit/soil probe hole: 3"
List other field evidence of surface inundation or soil saturation.

Is the wetland hydrology criterion met? Yes X No ____
Rationale: ______

JURISDICTIONAL DETERMINATION AND RATIONALE

Is the plant community a wetland? Yes X No ____
Rationale for jurisdictional decision: ______

[1] This data form can be used for the Hydric Soil Assessment Procedure and the Plant Community Assessment Procedure.
[2] Classification according to "Soil Taxonomy."

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD[1]

Field Investigator(s): DAVID GRIGGS Date: 10/25/89
Project/Site: HERTEL State: NY County: ULSTER
Applicant/Owner: ______ Plant Community #/Name: O-8-U
Note: If a more detailed site description is necessary, use the back of data form or a field notebook.

Do normal environmental conditions exist at the plant community?
Yes X No ____ (If no, explain on back)
Has the vegetation, soils, and/or hydrology been significantly disturbed?
Yes ____ No X (If yes, explain on back)

VEGETATION

	Dominant Plant Species	Indicator Status	Stratum		Dominant Plant Species	Indicator Status	Stratum
1.	Quercus prinus	UPL	Tree	11.	Solidago gigantea	FACU	HERB
2.	Quercus rubra	FACU-	Tree	12.	Pteridium aquilinum	FACU	HERB
3.	Betula alleghaniensis	FAC	Tree	13.	Mitchella repens	FACU	Herb
4.	Betula lenta	FACU	Tree	14.			
5.	Acer rubrum	FAC	Tree	15.			
6.	Quercus alba	FACU-	Tree	16.			
7.	Amelanchier arborea	FAC-	Sapling	17.			
8.	Carpinus caroliniana	FAC	Sapling	18.			
9.	Viburnum acerifolium	UPL	Shrub	19.			
10.	Hamamelis virginiana	FAC-	Shrub	20.			

Percent of dominant species that are OBL, FACW, and/or FAC 2/13
Is the hydrophytic vegetation criterion met? Yes ____ No X
Rationale:

SOILS

Series/phase: Bath-Nassau Subgroup:[2]
Is the soil on the hydric soils list? Yes ____ No X Undetermined ____
Is the soil a Histosol? Yes ____ No X Histic epipedon present? Yes ____ No X
Is the soil: Mottled? Yes ____ No X Gleyed? Yes ____ No X
Matrix Color: 10YR 5/4 Mottle Colors:
Other hydric soil indicators:
Is the hydric soil criterion met? Yes ____ No X
Rationale:

HYDROLOGY

Is the ground surface inundated? Yes ____ No X Surface water depth:
Is the soil saturated? Yes ____ No X
Depth to free-standing water in pit/soil probe hole:
List other field evidence of surface inundation or soil saturation.

Is the wetland hydrology criterion met? Yes ____ No X
Rationale:

JURISDICTIONAL DETERMINATION AND RATIONALE

Is the plant community a wetland? Yes ____ No X
Rationale for jurisdictional decision:

[1] This data form can be used for the Hydric Soil Assessment Procedure and the Plant Community Assessment Procedure.
[2] Classification according to "Soil Taxonomy."

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD[1]

Field Investigator(s): David Griggs Date: 10/25/89
Project/Site: HERTEL State: NY County: Ulster
Applicant/Owner: ______ Plant Community #/Name: 0-8-W
Note: If a more detailed site description is necessary, use the back of data form or a field notebook.

Do normal environmental conditions exist at the plant community?
Yes X No ____ (If no, explain on back)
Has the vegetation, soils, and/or hydrology been significantly disturbed?
Yes ____ No X (If yes, explain on back)

VEGETATION

	Dominant Plant Species	Indicator Status	Stratum		Dominant Plant Species	Indicator Status	Stratum
1.	Acer rubrum	FAC	T/Sap	11.			
2.	Quercus bicolor	FACW+	T	12.			
3.	Lindera benzoin	FACW-	Shrub	13.			
4.	Vaccinium corymbosum	FACW-	Shrub	14.			
5.	Viburnum dentatum	FAC	Shrub	15.			
6.	Phragmites australis	FACW	Shrub	16.			
7.	Sphagnum sp	—	HERB	17.			
8.	Carex stricta	OBL	HERB	18.			
9.	Iris versicolor	OBL	HERB	19.			
10.	Onoclea sensibilis	FACW	HERB	20.			

Percent of dominant species that are OBL, FACW, and/or FAC 100
Is the hydrophytic vegetation criterion met? Yes X No ____
Rationale: ______

SOILS

Series/phase: Lyons Subgroup:[2] ______
Is the soil on the hydric soils list? Yes X No ____ Undetermined ______
Is the soil a Histosol? Yes ____ No ____ Histic epipedon present? Yes ____ No X
Is the soil: Mottled? Yes ____ No X Gleyed? Yes X No ____
Matrix Color: 5Y 5/1 Mottle Colors: ______
Other hydric soil indicators: ______
Is the hydric soil criterion met? Yes X No ____
Rationale: ______

HYDROLOGY

Is the ground surface inundated? Yes X No ____ Surface water depth: stream -
Is the soil saturated? Yes X No ____
Depth to free-standing water in pit/soil probe hole: ______
List other field evidence of surface inundation or soil saturation.

Is the wetland hydrology criterion met? Yes X No ____
Rationale: ______

JURISDICTIONAL DETERMINATION AND RATIONALE

Is the plant community a wetland? Yes X No ____
Rationale for jurisdictional decision: ______

[1] This data form can be used for the Hydric Soil Assessment Procedure and the Plant Community Assessment Procedure.
[2] Classification according to "Soil Taxonomy."

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD[1]

Field Investigator(s): David Griggs Date: 10/25/89
Project/Site: HERTEL State: NY County: Ulster
Applicant/Owner: ________ Plant Community #/Name: 0-9-U
Note: If a more detailed site description is necessary, use the back of data form or a field notebook.

Do normal environmental conditions exist at the plant community?
Yes X No ____ (If no, explain on back)
Has the vegetation, soils, and/or hydrology been significantly disturbed?
Yes ____ No X (If yes, explain on back)

VEGETATION

Dominant Plant Species	Indicator Status	Stratum	Dominant Plant Species	Indicator Status	Stratum
1. Quercus prinus	UPL	Tree	11.		
2. Sassafras albidum	FACU-	T/Sapling	12.		
3. Prunus serotina	FACU	T/Sapling	13.		
4. Betula lenta	FACU	Sapling	14.		
5. Betula alleghaniensis	FAC	Sapl.	15.		
6. Rosa sp.	—	Sapling	16.		
7. Pteridium aquilinum	FACU	Herb	17.		
8. Polystichum acrostichoides	FACU-	Herb	18.		
9.			19.		
10.			20.		

Percent of dominant species that are OBL, FACW, and/or FAC 1/8
Is the hydrophytic vegetation criterion met? Yes ____ No X
Rationale: ________

SOILS

Series/phase: Bath-Nassua Subgroup:[2] ________
Is the soil on the hydric soils list? Yes ____ No X Undetermined ____
Is the soil a Histosol? Yes ____ No X Histic epipedon present? Yes ____ No X
Is the soil: Mottled? Yes ____ No X Gleyed? Yes ____ No X
Matrix Color: 10YR 5/4 Mottle Colors: ________
Other hydric soil indicators: Pale yellow loamy
Is the hydric soil criterion met? Yes ____ No ____
Rationale: ________

HYDROLOGY

Is the ground surface inundated? Yes ____ No X Surface water depth: ________
Is the soil saturated? Yes ____ No X
Depth to free-standing water in pit/soil probe hole: ________
List other field evidence of surface inundation or soil saturation.

Is the wetland hydrology criterion met? Yes ____ No X
Rationale: ________

JURISDICTIONAL DETERMINATION AND RATIONALE

Is the plant community a wetland? Yes ____ No X
Rationale for jurisdictional decision: ________

[1] This data form can be used for the Hydric Soil Assessment Procedure and the Plant Community Assessment Procedure.
[2] Classification according to "Soil Taxonomy."

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD[1]

Field Investigator(s): David Griggs Date: 10/25/89
Project/Site: HERTEL State: NY County: Ulster
Applicant/Owner: ________ Plant Community #/Name: O-9-W
Note: If a more detailed site description is necessary, use the back of data form or a field notebook.

Do normal environmental conditions exist at the plant community?
Yes X No ____ (If no, explain on back)
Has the vegetation, soils, and/or hydrology been significantly disturbed?
Yes ____ No X (If yes, explain on back)

VEGETATION

	Dominant Plant Species	Indicator Status	Stratum		Dominant Plant Species	Indicator Status	Stratum
1.	Betula alleghaniensis	FAC	Tree	11.			
2.	Acer rubrum	FAC	T/Sapling	12.			
3.	Lindera benzoin	FACW-	Shrub	13.			
4.	Sambucus canadensis	FACW-	Shrub	14.			
5.	Iris versicolor	OBL	Herb	15.			
6.	Impatiens capensis	FACW	Herb	16.			
7.				17.			
8.				18.			
9.				19.			
10.				20.			

Percent of dominant species that are OBL, FACW, and/or FAC 100
Is the hydrophytic vegetation criterion met? Yes X No ____
Rationale: ________

SOILS

Series/phase: Lyons Subgroup:[2] ________
Is the soil on the hydric soils list? Yes X No ____ Undetermined ____
Is the soil a Histosol? Yes ____ No ____ Histic epipedon present? Yes ____ No X
Is the soil: Mottled? Yes X No ____ Gleyed? Yes ____ No X
Matrix Color: 10YR 5/1 Mottle Colors: 10YR 6/4
Other hydric soil indicators: ________
Is the hydric soil criterion met? Yes X No ____
Rationale: ________

HYDROLOGY

Is the ground surface inundated? Yes X No ____ Surface water depth: @ surface
Is the soil saturated? Yes X No ____
Depth to free-standing water in pit/soil probe hole: ________
List other field evidence of surface inundation or soil saturation.

Is the wetland hydrology criterion met? Yes X No ____
Rationale: ________

JURISDICTIONAL DETERMINATION AND RATIONALE

Is the plant community a wetland? Yes X No ____
Rationale for jurisdictional decision: ________

[1] This data form can be used for the Hydric Soil Assessment Procedure and the Plant Community Assessment Procedure.
[2] Classification according to "Soil Taxonomy."

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD[1]

Field Investigator(s): David Griggs Date: 10/25/89
Project/Site: HERTEL State: NY County: Ulster
Applicant/Owner: ________ Plant Community #/Name: O-8-W
Note: If a more detailed site description is necessary, use the back of data form or a field notebook.

Do normal environmental conditions exist at the plant community?
Yes X No ____ (If no, explain on back)
Has the vegetation, soils, and/or hydrology been significantly disturbed?
Yes ____ No X (If yes, explain on back)

VEGETATION

	Dominant Plant Species	Indicator Status	Stratum		Dominant Plant Species	Indicator Status	Stratum
1.	Acer rubrum	FAC	T/Sap	11.			
2.	Quercus bicolor	FACW+	T	12.			
3.	Lindera benzoin	FACW-	Shrub	13.			
4.	Vaccinium corymbosum	FACW-	Shrub	14.			
5.	Viburnum dentatum	FAC	Shrub	15.			
6.	Phragmites australis	FACW	Shrub	16.			
7.	Sphagnum sp.	—	HERB	17.			
8.	Carex stricta	OBL	HERB	18.			
9.	Iris versicolor	OBL	HERB	19.			
10.	Onoclea sensibilis	FACW	HERB	20.			

Percent of dominant species that are OBL, FACW, and/or FAC 100
Is the hydrophytic vegetation criterion met? Yes X No ____
Rationale: ________

SOILS

Series/phase: Lyons Subgroup:[2] ________
Is the soil on the hydric soils list? Yes X No ____ Undetermined ____
Is the soil a Histosol? Yes ____ No ____ Histic epipedon present? Yes ____ No X
Is the soil: Mottled? Yes ____ No X Gleyed? Yes X No ____
Matrix Color: 5Y 5/1 Mottle Colors: ________
Other hydric soil indicators: ________
Is the hydric soil criterion met? Yes X No ____
Rationale: ________

HYDROLOGY

Is the ground surface inundated? Yes X No ____ Surface water depth: stream -
Is the soil saturated? Yes X No ____
Depth to free-standing water in pit/soil probe hole: ________
List other field evidence of surface inundation or soil saturation.

Is the wetland hydrology criterion met? Yes X No ____
Rationale: ________

JURISDICTIONAL DETERMINATION AND RATIONALE

Is the plant community a wetland? Yes X No ____
Rationale for jurisdictional decision: ________

[1] This data form can be used for the Hydric Soil Assessment Procedure and the Plant Community Assessment Procedure.
[2] Classification according to "Soil Taxonomy."

DATA FORM
ROUTINE ONSITE DETERMINATION METHOD[1]

Field Investigator(s): David Griggs Date: 10/25/89
Project/Site: HERTEL State: NY County: Ulster
Applicant/Owner: ______ Plant Community #/Name: 0-9-W
Note: If a more detailed site description is necessary, use the back of data form or a field notebook.

Do normal environmental conditions exist at the plant community?
Yes X No ____ (If no, explain on back)
Has the vegetation, soils, and/or hydrology been significantly disturbed?
Yes ____ No X (If yes, explain on back)

VEGETATION

	Dominant Plant Species	Indicator Status	Stratum		Dominant Plant Species	Indicator Status	Stratum
1.	Betula alleghaniensis	FAC	Tree	11.			
2.	Acer rubrum	FAC	T/Sapl	12.			
3.	Lindera benzoin	FACW-	Shrub	13.			
4.	Sambucus Canadensis	FACW-	Shrub	14.			
5.	Iris versicolor	OBL	Herb	15.			
6.	Impatiens capensis	FACW	Herb	16.			
7.				17.			
8.				18.			
9.				19.			
10.				20.			

Percent of dominant species that are OBL, FACW, and/or FAC 100
Is the hydrophytic vegetation criterion met? Yes X No ____
Rationale: ______

SOILS

Series/phase: Lyons Subgroup:[2] ______
Is the soil on the hydric soils list? Yes X No ____ Undetermined ____
Is the soil a Histosol? Yes ____ No ____ Histic epipedon present? Yes ____ No X
Is the soil: Mottled? Yes X No ____ Gleyed? Yes ____ No X
Matrix Color: 10YR 5/1 Mottle Colors: 10YR 6/4
Other hydric soil indicators: ______
Is the hydric soil criterion met? Yes X No ____
Rationale: ______

HYDROLOGY

Is the ground surface inundated? Yes X No ____ Surface water depth: @ surface
Is the soil saturated? Yes X No ____
Depth to free-standing water in pit/soil probe hole: ______
List other field evidence of surface inundation or soil saturation.

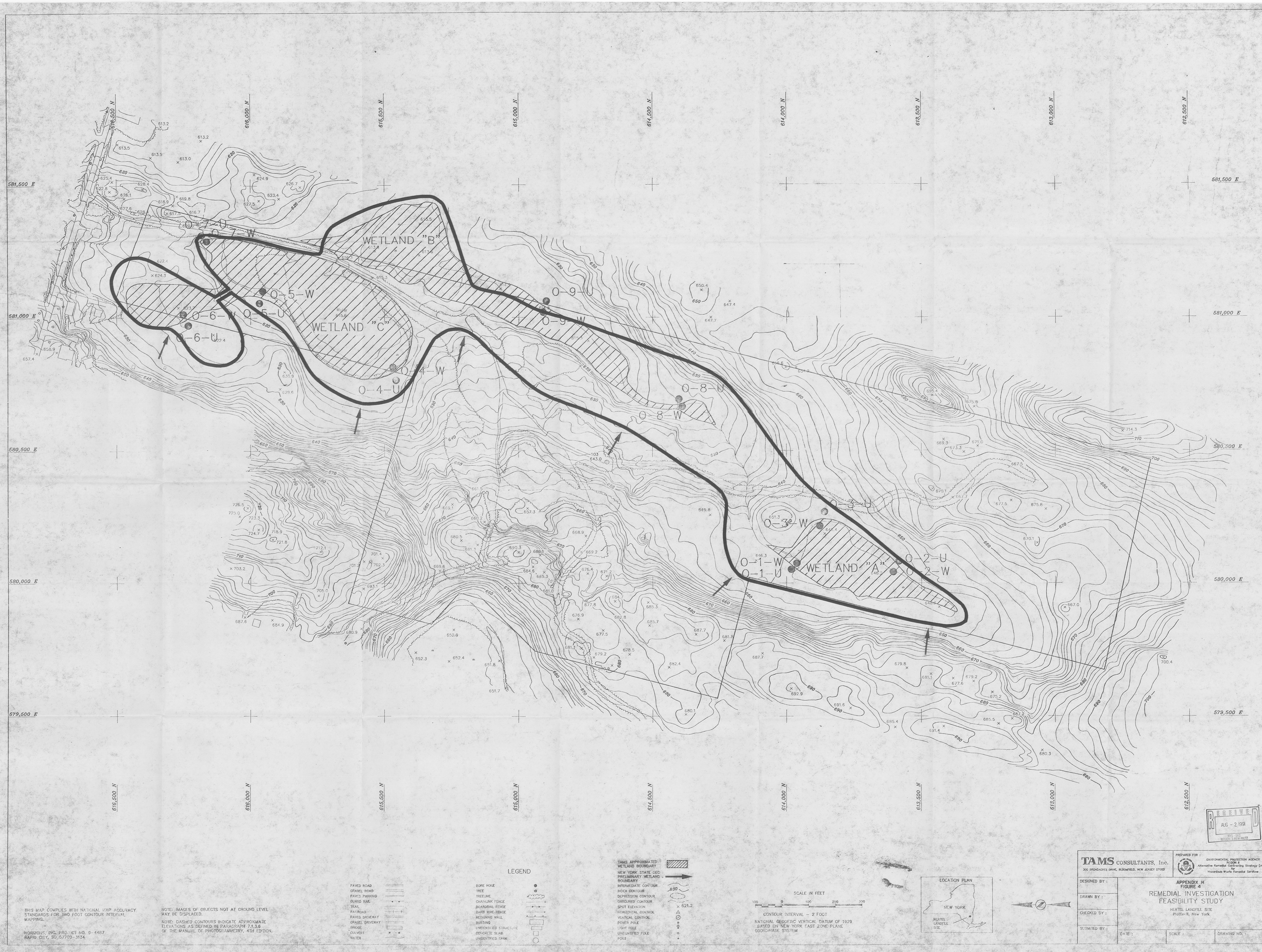
Is the wetland hydrology criterion met? Yes X No ____
Rationale: ______

JURISDICTIONAL DETERMINATION AND RATIONALE

Is the plant community a wetland? Yes X No ____
Rationale for jurisdictional decision: ______

[1] This data form can be used for the Hydric Soil Assessment Procedure and the Plant Community Assessment Procedure.
[2] Classification according to "Soil Taxonomy."

THIS PAGE INTENTIONALLY LEFT BLANK


WETLAND "A"
WETLAND "B"
WETLAND "C"
O-1-W
O-1-U
O-2-U
O-2-W
O-3-U
O-3-W
O-4-W
O-4-U
O-5-W
O-5-U
O-6-W
O-6-U
O-7-U
O-7-W
O-8-U
O-8-W
O-9-U
O-9-W
616,500 N
616,000 N
615,500 N
615,000 N
614,500 N
614,000 N
613,500 N
613,000 N
612,500 N
581,500 E
581,000 E
580,500 E
580,000 E
579,500 E
LEGEND
PAVED ROAD
GRAVEL ROAD
PAVED PARKING
GUARD RAIL
TRAIL
RAILROAD
PAVED DRIVEWAY
GRAVEL DRIVEWAY
BRIDGE
CULVERT
WATER
BORE HOLE
TREE
TREELINE
CHAINLINK FENCE
BOARDRAIL FENCE
BARB WIRE FENCE
RETAINING WALL
BUILDING
UNIDENTIFIED STRUCTURE
CONCRETE SLAB
UNIDENTIFIED TANK
TAMS APPROXIMATED WETLAND BOUNDARY
NEW YORK STATE DEC PRELIMINARY WETLAND BOUNDARY
INTERMEDIATE CONTOUR
INDEX CONTOUR
630
DEPRESSION CONTOUR
OBSCURED CONTOUR
SPOT ELEVATION
621.2
HORIZONTAL CONTROL
VERTICAL CONTROL
POWER POLE
LIGHT POLE
UNIDENTIFIED POLE
POST
THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS FOR TWO FOOT CONTOUR INTERVAL MAPPING.
HORIZONS, INC. PROJECT NO. 9-4487
RAPID CITY, SD 57709-3134
NOTE: IMAGES OF OBJECTS NOT AT GROUND LEVEL MAY BE DISPLACED.
NOTE: DASHED CONTOURS INDICATE APPROXIMATE ELEVATIONS AS DEFINED IN PARAGRAPH 7.1.3.6 OF THE MANUAL OF PHOTOGRAMMETRY, 4TH EDITION.
SCALE IN FEET
100
0
100
200
300
CONTOUR INTERVAL - 2 FOOT
NATIONAL GEODETIC VERTICAL DATUM OF 1929 BASED ON NEW YORK EAST ZONE PLANE COORDINATE SYSTEM
LOCATION PLAN
NEW YORK
HERTEL LANDFILL SITE
RECEIVED
AUG - 2 1991
NYS - DEC
REGION 3-NEW PALTZ
TAMS CONSULTANTS, Inc.
300 BROADACRES DRIVE, BLOOMFIELD, NEW JERSEY 07003
PREPARED FOR :
ENVIRONMENTAL PROTECTION AGENCY
REGION II
Alternative Remedial Contracting Strategy (ARCS)
for
Hazardous Waste Remedial Services
DESIGNED BY :
DRAWN BY :
CHECKED BY :
SUBMITED BY :
APPENDIX H
FIGURE 4
REMEDIAL INVESTIGATION
FEASIBILITY STUDY
HERTEL LANDFILL SITE
Plattekill, New York
DATE :
SCALE :
DRAWING NO. :

APPENDIX I

RISK ASSESSMENT METHODS

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX I

RISK ASSESSMENT METHODS

Three different exposure scenarios were included in the risk assessment for the Hertel Landfill Site. Trespasser scenarios involve exposures to the site as it currently exists, while 2 scenarios involve exposures related to potential future uses (construction and occupation of residences) at the site. The scenarios are briefly described below. Model equations and parameter values for each exposure pathway follow.

SCENARIO 1 - Current Use

Children may trespass on the site as it currently exists, and thereby play with contaminated soil, surface water and sediments. As a result, they may receive dermal and ingestion exposures to contaminants in soil, sediments, and surface water. It is assumed that children trespass onto the site on one-half of the non-school days (90 days per year), that children are unlikely to enter the site on a regular basis before the age of 9 due to its distance from residences, and regular exposures are not expected beyond the age of 18 due to changes in the use of recreational time.

Adults may trespass onto the site as it currently exists while tracking game or hiking. They may receive dermal and ingestion exposures to soil contaminants. In addition, they may occasionally wade into or accidentally fall into surface water, thus receiving dermal exposure to contaminants in surface water. It is assumed that adults may make 60 trips during a ~4 month season, with 3 weeks of vacation and all weekend days spent on-site. It is assumed that 25% of the time is spent on-site.

SCENARIO 2 - Future Use

In the future, construction workers may be involved in building homes on the site. Through excavation and site preparation activities, they could receive extensive inhalation exposure to contaminants in dust, as well as dermal and ingestion exposures to contaminants in soil. It is assumed that excavation and site preparation activities would last for a 6 month period, and that is no remediation of contaminants prior to the construction or prior to the residential (below) scenarios would occur.

SCENARIO 3 - Future Use

Children and adults may occupy residences on the site. Separate scenarios are constructed for each receptor. In both cases, the relevant exposure pathways are indoor and outdoor ingestion of dust/soil, outdoor dermal exposure to soil contaminants, outdoor inhalation of contaminants in dust, indoor inhalation of volatile organic compounds emanating from tap water, and dermal and ingestion exposures to contaminants in tap water. For children, parameter values for 0-6 year old children were selected, and exposure was assumed to take place over 6 years. For adults, exposure is assumed to occur for 30 years, and for both receptors, the exposure frequency is assumed to be 365 days/year.

EXPOSURE EQUATIONS

SCENARIO 1

1.1 - CHILDREN TRESPASSING AND PLAYING ON SITE - Current Use

- Dermal Contact with Chemicals in Water

  Equation:

$$\text{Absorbed Dose (mg/kg-day)} = \frac{CW \times SA \times PC \times ET \times EF \times ED \times CF}{BW \times AT}$$

where:

CW = Chemical Concentration in Water (mg/liter)
SA = Skin Surface Area Available for Contact (cm^2)
PC = Chemical-specific Dermal Permeability Constant (cm/hr)
ET = Exposure Time (hours/day)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Volumetric Conversion Factor for Water (1 liter/1000 cm^3)
BW = Body Weight (kg)
AT = Averaging Time (period over which exposure is averaged - days)

Specific Parameter Values:

SA = 6,800 cm^2, based upon immersion of legs, arms and hands during play activities; swimming is unlikely. This surface area is the mean for the 9 to 18 year old age groups
PC = 8.4 E-4 cm/hour, based upon the penetration rate of water across skin
ET = 4 hours/day, based upon the assumption that clothing will stay wet after playing at edge of pond
EF = 90 days/year, based upon playing with pond water on all days during the summer during which trespassing occurs
ED = 9 years, based upon age range of children likely to enter site
BW = 49 kg, which is the average for boys and girls in the 9-18 age group (EPA, 1990b)
AT = 3,285 days for non-cancer risks
25,550 days for cancer risks

- <u>Ingestion of Chemicals in Surface Water</u>

Equation:

$$\text{Intake (mg/kg-day)} = \frac{CW \times CR \times ET \times EF \times ED}{BW \times AT}$$

where:

CW = Chemical Concentration in Water (mg/liter)
CR = Contact Rate (liters/hour)
ET = Exposure Time (hours/event)
EF = Exposure Frequency (events/year)
ED = Exposure Duration (years)
BW = Body Weight (kg)
AT = Averaging Time (period over which exposure is averaged - days)

Specific Parameter Values:

CR = 0.05 l/hour
ET = 1 hour/day
EF = 90 days/year
ED = 9 years
BW = 49 kg (EPA, 1990b)

AT = 3,285 days for non-cancer risks
25,550 days for cancer risks

- Dermal Contact with Chemicals in Soil

Equation:

$$\text{Absorbed Dose (mg/kg-day)} = \frac{CS \times CF \times SA \times AF \times ABS \times EF \times ED}{BW \times AT}$$

where:

CS = Chemical Concentration in Soil (mg/kg)
CF = Conversion Factor (10^{-6} kg/mg)
SA = Skin Surface Area Available for Contact (cm^2/event)
AF = Soil to Skin Adherence Factor (mg/cm^2)
ABS = Absorption Factor (unitless)
EF = Exposure Frequency (events/year)
ED = Exposure Duration (years)
BW = Body Weight (kg)
AT = Averaging Time (period over which exposure is averaged - days)

Specific Parameter Values:

SA = 6,800 cm^2, based upon exposed arms, hands and legs
AF = 1.45 mg/cm^2, based upon commercial potting soil adherence to hands
ABS = 0.10 for organic compounds (Brown, 1984) and arsenic (ATSDR, 1989); 0.01 for inorganic compounds except arsenic
EF = 90 days/year, based upon trespassing on site in one-half of the non-school days during the year
ED = 9 years
BW = 49 kg (EPA, 1990b)
AT = 3,285 days for non-cancer risks
25,550 days for cancer risks

- Ingestion of Chemicals in Soil

Equation:

$$\text{Intake (mg/kg-day)} = \frac{CS \times IR \times CF \times FI \times EF \times ED}{BW \times AT}$$

where:

CS = Chemical Concentration in Soil (mg/kg)
IR = Ingestion Rate (mg soil/day)
CF = Conversion Factor (10^{-6} kg/mg)
FI = Fraction Ingested from Contaminated Source (unitless)
EF = Exposure Frequency (days/years)
ED = Exposure Duration (years)
BW = Body Weight (kg)
AT = Averaging Time (period over which exposure is averaged - days)

Specific Parameter Values:

IR = 100 mg/day, which is typical for this age group.
FI = 1.0, assuming 100% of soil ingestion occurs on site on days in which children enter the site
EF = 90 days/year
ED = 9 years
BW = 49 kg (EPA, 1990b)
AT = 3,285 days for non-cancer risks
25,550 days for cancer risks

1.2 - ADULTS TRESPASSING ON-SITE - Current Use

- Dermal Contact with Chemicals in Water

Equation:

$$\text{Absorbed Dose (mg/kg-day)} = \frac{CW \times SA \times PC \times ET \times EF \times ED \times CF}{BW \times AT}$$

where:

CW = Chemical Concentration in Water (mg/liter)
SA = Skin Surface Area Available for Contact (cm^2)
PC = Chemical-specific Dermal Permeability Constant (cm/hr)
ET = Exposure Time (hours/day)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Volumetric Conversion Factor for Water (1 liter/1000 cm^3)
BW = Body Weight (kg)
AT = Averaging Time (period over which exposure is averaged - days)

Specific Parameter Values:

SA = 5,500 cm^2, based upon total lower body exposure to contaminated water
PC = 8.4 E-4 cm/hour, based upon penetration of water across skin
ET = 4 hours/day, based upon the assumption that clothing stays wet after initial exposure (EPA, 1986)
EF = 5 days/year, based upon a high estimate of the number of contacts with surface water during a total of 60 trips/year
ED = 30 years, based upon national upper bound (90th percentile) residence at one location
BW = 70 kg
AT = 10,950 days for non-cancer risks
25,550 days for cancer risks

- <u>Dermal Contact with Chemicals in Soil</u>

Equation:

$$\text{Absorbed Dose (mg/kg-day)} = \frac{CS \times CF \times SA \times AF \times ABS \times EF \times ED}{BW \times AT}$$

where:

CS = Chemical Concentration in Soil (mg/kg)
CF = Conversion Factor (10^{-6} kg/mg)
SA = Skin Surface Area Available for Contact (cm^2/event)
AF = Soil to Skin Adherence Factor (mg/cm^2)
ABS = Absorption Factor (unitless)
EF = Exposure Frequency (events/year)
ED = Exposure Duration (years)
BW = Body Weight (kg)
AT = Averaging Time (period over which exposure is averaged - days)

Specific Parameter Values:

SA = 3,100 cm^2 based upon exposed arms and hands
AF = 1.45 mg/cm^2 based upon commercial potting soil adherence to hands
ABS = 0.10 for organic compounds (Brown, 1984) and arsenic (ATSDR, 1989); 0.01 for inorganic compounds except arsenic
EF = 60 days/year
ED = 30 years
BW = 70 kg
AT = 10,950 days for non-cancer risks
25,550 days for cancer risks

- <u>Ingestion of Chemicals in Soil</u>

Equation:

$$\text{Intake (mg/kg-day)} = \frac{CS \times IR \times CF \times FI \times EF \times ED}{BW \times AT}$$

where:

CS = Chemical Concentration in Soil (mg/kg)
IR = Ingestion Rate (mg soil/day)
CF = Conversion Factor (10^{-6} kg/mg)
FI = Fraction Ingested from Contaminated Source (unitless)
EF = Exposure Frequency (days/years)
ED = Exposure Duration (years)
BW = Body Weight (kg)
AT = Averaging Time (period over which exposure is averaged - days)

Specific Parameter Values:

- IR = 100 mg/day which is typical for outdoor activities for this age group
- FI = 1.0, assuming hunters spend 100% of time on site
- EF = 60 days/year
- ED = 30 years
- BW = 70 kg
- AT = 10,950 days for non-cancer risks
  25,550 days for cancer risks

SCENARIO 2: CONSTRUCTION WORKER EXPOSURE DURING CONSTRUCTION OF NEW HOMES ON SITE - Future Use

- Dermal Contact with Chemicals in Soil

Equation:

$$\text{Absorbed Dose (mg/kg-day)} = \frac{CS \times CF \times SA \times AF \times ABS \times EF \times ED}{BW \times AT}$$

where:

- CS = Chemical Concentration in Soil (mg/kg)
- CF = Conversion Factor (10^{-6} kg/mg)
- SA = Skin Surface Area Available for Contact (cm^2/event)
- AF = Soil to Skin Adherence Factor (mg/cm^2)
- ABS = Absorption Factor (unitless)
- EF = Exposure Frequency (events/year)
- ED = Exposure Duration (years)
- BW = Body Weight (kg)
- AT = Averaging Time (period over which exposure is averaged - days)

Specific Parameter Values:

- SA = 6,300 cm^2 for hands, forearms, upper arms, head, neck and a portion of the trunk
- AF = 1.45 mg/cm^2
- ABS = 0.10 for organic compounds (Brown, 1984) and arsenic (ATSDR, 1989); 0.01 for other inorganic compounds
- EF = 180 days/year
- ED = 1 year
- BW = 70 kg
- AT = 180 days for non-cancer risks
  25,550 days for cancer risks

- Ingestion of Chemicals in Soil

Equation:

$$\text{Intake (mg/kg-day)} = \frac{CS \times IR \times CF \times FI \times EF \times ED}{BW \times AT}$$

where:

CS = Chemical Concentration in Soil (mg/kg)
IR = Ingestion Rate (mg soil/day)
CF = Conversion Factor (10^{-6} kg/mg)
FI = Fraction Ingested from Contaminated Source (unitless)
EF = Exposure Frequency (days/years)
ED = Exposure Duration (years)
BW = Body Weight (kg)
AT = Averaging Time (period over which exposure is averaged - days)

Specific Parameter Values:

IR = 100 mg/day
FI = 1.0; all soil ingested comes from on-site sources
EF = 180 days/year
ED = 1 year
BW = 70 kg
AT = 180 days for non-cancer risks
25,550 days for cancer risks

- Inhalation of Airborne Chemicals Adsorbed to Dust

Equation:

$$\text{Intake (mg/kg-day)} = \frac{CD \times CS \times IR \times ET \times EF \times ED}{BW \times AT}$$

where:

CD = Ambient Dust Concentration
CS = Contaminant Concentration in Soil (mg/kg)
IR = Inhalation Rate (m^3/hour)
ET = Exposure Time (hours/day)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
BW = Body Weight (kg)
AT = Averaging Time (period over which exposure is averaged -- days)

Specific Parameter Values:

IR = 2 m^3/hour for adults under moderate exertion
ET = 8 hours/day
EF = 180 days/year
ED = 1 year
BW = 70 kg
AT = 180 days for non-cancer risks
25,550 days for cancer risks

SCENARIO 3: ADULTS AND CHILDREN LIVING ON SITE - Future Use

- Dermal Contact with Chemicals in Water

Equation:

$$\text{Absorbed Dose (mg/kg-day)} = \frac{CW \times SA \times PC \times ET \times EF \times ED \times CF}{BW \times AT}$$

where:

CW = Chemical Concentration in Water (mg/liter)
SA = Skin Surface Area Available for Contact (cm^2)
PC = Chemical-specific Dermal Permeability Constant (cm/hr)
ET = Exposure Time (hours/day)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
CF = Volumetric Conversion Factor for Water (1 liter/1000 cm^3)
BW = Body Weight (kg)
AT = Averaging Time (period over which exposure is averaged - days)

Specific Parameter Values:

SA = 18,150 cm^2 for adults (EPA, 1990b), 7,200 cm^2 for 2-6 year old children, for total body exposure
PC = 8.4 E-4 cm/hour, based upon penetration of water across skin (EPA, 1986)
ET = 12 minutes/day, bathing and showering time
EF = 365 days/year
ED = 30 years for adults, 6 years for children
BW = 70 kg for adults, 14.5 kg for children 0-6 years old
AT = 2,190 and 25,550 days for children non-cancer and cancer risks, respectively
10,950 and 25,550 days for adult non-cancer and cancer risks, respectively

- Dermal Contact with Chemicals in Soil

Equation:

$$\text{Absorbed Dose (mg/kg-day)} = \frac{CS \times CF \times SA \times AF \times ABS \times EF \times ED}{BW \times AT}$$

where:

CS = Chemical Concentration in Soil (mg/kg)
CF = Conversion Factor (10^{-6} kg/mg)
SA = Skin Surface Area Available for Contact (cm^2/event)
AF = Soil to Skin Adherence Factor (mg/cm^2)
ABS = Absorption Factor (unitless)
EF = Exposure Frequency (events/year)
ED = Exposure Duration (years)
BW = Body Weight (kg)
AT = Averaging Time (period over which exposure is averaged - days)

Specific Parameter Values:

SA = 9,440 cm^2 for adults, 3,146 cm^2 for 2-6 year old children, based upon exposure to the arms, hands and legs (EPA, 1990b)
AF = 1.45 mg/cm^2 based upon commercial potting soil adherence to hands
ABS = 0.10 for organic compounds (Brown, 1984) and arsenic (ATSDR, 1989); 0.01 for inorganic compounds except arsenic
EF = 365 days/year
ED = 30 years for adults, 6 years for children
BW = 70 kg for adults, 14.5 kg for children 0-6 years old
AT = 2,190 and 25,550 days for children non-cancer and cancer risks, respectively
10,950 and 25,550 days for adult non-cancer and cancer risks, respectively

- Ingestion of Chemicals in Soil and House Dust

Equation:

$$\text{Intake (mg/kg-day)} = \frac{CS \times IR \times CF \times FI \times EF \times ED}{BW \times AT}$$

where:

CS = Chemical Concentration in Soil (mg/kg)
IR = Ingestion Rate (mg soil/day)
CF = Conversion Factor (10^{-6} kg/mg)
FI = Fraction Ingested from Contaminated Source (unitless)
EF = Exposure Frequency (days/years)
ED = Exposure Duration (years)
BW = Body Weight (kg)
AT = Averaging Time (period over which exposure is averaged - days)

Specific Parameter Values:

IR = 100 mg/day for adults; 200 mg/day for children ages 1-6 years
FI = 1.0, all ingested soil and dust is contaminated
EF = 365 days/year
ED = 30 years for adults, 6 years for children
BW = 70 kg for adults, 14.5 kg for children 0-6 years old
AT = 2,190 and 25,550 days for children non-cancer and cancer risks, respectively
10,950 and 25,550 days for adult non-cancer and cancer risks, respectively

- Ingestion of Chemicals in Drinking Water

Equation:

$$\text{Intake (mg/kg-day)} = \frac{CW \times IR \times EF \times ED}{BW \times AT}$$

where:

- CW = Chemical Concentration in Water (mg/liter)
- IR = Ingestion Rate (liters/day)
- EF = Exposure Frequency (days/years)
- ED = Exposure Duration (years)
- BW = Body Weight (kg)
- AT = Averaging Time (period over which exposure is averaged -- days)

Specific Parameter Values:

- IR = 2.0 liters/day for adult, 0.756 liters/day children (EPA, 1990b)
- EF = 365 days/year
- ED = 30 years for adults, 6 years for children
- BW = 70 kg for adults, 14.5 kg for children 0-6 years old (EPA, 1990b)
- AT = 2,190 and 25,550 days for children non-cancer and cancer risks, respectively
  10,950 and 25,550 days for adult non-cancer and cancer risks, respectively

- <u>Inhalation of Airborne (Vapor Phase) Chemicals</u>

Equation:

$$\text{Intake (mg/kg-day)} = \frac{CA \times IR \times ET \times EF \times ED}{BW \times AT}$$

where:

- CA = Contaminant Concentration in Air (mg/m^3) - derived from volatilization during showering (Andelman, 1985)
- IR = Inhalation Rate (m^3/hour)
- ET = Exposure Time (hours/day)
- EF = Exposure Frequency (days/years)
- ED = Exposure Duration (years)
- BW = Body Weight (kg)
- AT = Averaging Time (period over which exposure is averaged -- days)

Specific Parameter Values:

- IR = 0.83 m^3/hour for adults, 0.83 m^3/hour for 6 year old children, light activity assumed (EPA, 1990b)
- ET = 24 hours/day
- ED = 30 years for adults, 6 years for children
- BW = 70 kg for adults, 14.5 kg for children 0-6 years old
- AT = 2,190 and 25,550 days for children non-cancer and cancer risks, respectively
  10,950 and 25,550 days for adult non-cancer and cancer risks, respectively

- Outdoor Inhalation of Airborne Chemicals Adsorbed to Dust

Equation:

$$\text{Intake (mg/kg-day)} = \frac{CD \times CS \times IR \times ET \times EF \times ED}{BW \times AT}$$

where:

CD = Ambient Dust Concentration
CS = Contaminant Concentration in Soil (mg/kg)
IR = Inhalation Rate (m^3/hour)
ET = Exposure Time (hours/day)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
BW = Body Weight (kg)
AT = Averaging Time (period over which exposure is averaged -- days)

Specific Parameter Values:

CD = Derived from fugitive dust generation (see below)
IR = 0.83 m^3/hour for adults, 0.83 m^3/hour for 6 year old children, light activity assumed
ET = 4 hours/day, time spent outdoors
EF = 365 days/year
ED = 30 years for adults, 6 years for children
BW = 70 kg for adults, 14.5 kg for children 0-6 years old
AT = 2,190 and 25,550 days for children non-cancer and cancer risks, respectively
10,950 and 25,550 days for adult non-cancer and cancer risks, respectively

EXPOSURE POINT MODELS

- Contaminant Volatilization (Andelman, 1985)

Equation:

$$C(sa)\ (\mu g/m^3) = \frac{FL \times C(w) \times VF \times t}{V}$$

where:

C(sa) = Concentration in bathroom during showering ($\mu g/m^3$)
C(w) = Concentration in shower water ($\mu g/l$)
FL = Flow rate of shower water (l/hr)
VF = Fraction of contaminant volatilized
t = One half duration of shower (hr)
V = Bathroom volume (m^3)

Specific Parameter Values:

$C(w)$ = Maximum site concentration
FL = 400 liter/hour
VF = 0.90
t = 0.1 hour
V = 12 $meter^3$

- Model Estimates of Fugitive Dust Generation

Emissions estimates were calculated for activities resulting in soil disturbance, such as heavy equipment operation and wind erosion which may occur over the site during the construction scenario.

The potentially significant components of fugitive dust at this site are:

1) wind erosion of dust from surfaces without vegetative cover, and
2) dust from loading/unloading of excavated soil.

Fugitive dust from wind erosion over exposed soil and from loading/unloading activities was calculated using (EPA, AP-42, 1985). Fugitive dust generation tables showing all model inputs, are presented in Table I-2. The data are summarized in Table I-1. The models are described below.

$$E = a \cdot I \cdot K \cdot C \cdot L \cdot V \cdot A \cdot T$$

where:

E = Emission rate (kg/day)

a = Fraction of total wind losses (wind erosion of soil) that remain suspended
I = Soil erodibility
C = Climatic factor
K = Soil roughness factor
L = Field length factor
V = Vegetative cover factor
A = Area of the site
T = Time conversion factor

Most of these values are specified in USEPA (1985) for worst-case treatments. The climatic factor is read from a map and multiplied by .01 as specified. The variables a and I are determined based on site soil characteristics. The following values were used:

a = 0.01
I = 134 tons $acre^{-1}$ yr^{-1}
K = 1 (worst-case for flat terrain)
V = 1 (no vegetative cover-worst case)
L = .7
C = 0.02
A = 10 acres (Scenario 2), 1 acre (Scenario 3)
T = 1 yr/365 days

TABLE I-1

FUGITIVE DUST EMISSION
RATES AND AMBIENT CONCENTRATION ESTIMATES

DUST EMISSION RATE (kg/day)

	Scenario 2	Scenario 3
Wind Erosion	4.6E-01	4.6E-02
Loading/Unloading	1.83E-02	NA
Total Dust Emission Rate	4.78E-01	4.6E-02
Dust Concentration (mg/m^3)	3.24E-03	1.04E-03

NA = Not Applicable

TABLE I-2

WIND EROSION - DUST EMISSION RATE

SCENARIO	VEGETATIVE COVER FACTOR (V')	UNSHELTERED FIELD WIDTH FACTOR (L')	CLIMATIC FACTOR (C)	SURFACE ROUGHNESS FACTOR (K)	SOIL ERODIBILITY (I) (ton/acre/year)	PORTION AS SUSPENDED PARTICULATES (a)	EMISSION FACTOR (E) (ton/acre/yr)	CONVERSION FACTOR (kg/ton)	EMISSION FACTOR (E) (kg/acre/year)	TIME CONSTANT (year/day)	AREA (acres)	WIND EROSION EMISSION RATE (kg/day)
2	1	0.7	0.02	1	134	0.010	1.9E-02	907.18	1.7E+01	0.0027	10	4.60E-01
3	1	0.7	0.02	1	134	0.010	1.9E-02	907.18	1.7E+01	0.0027	1	4.60E-02

LOADING & DUMPING - DUST EMISSION RATE

SCENARIO	MOISTURE CONTENT CONSTANT	MATERIAL MOISTURE CONTENT (M) (%)	WIND SPEED CONSTANT	MEAN WIND SPEED (U) (m/s)	PARTICLE SIZE CONSTANT	PARTICLE SIZE MULTIPLIER (k)	EMISSION FACTOR (E) (kg/Mg)	TIME (days)	DENSITY OF SOIL (D) (Mg/m3)	VOLUME OF SOIL EXCAVATED (m3)	LOADING/DUMPING EMISSION RATE (kg/day)
2	2	5	2.2	4.02	1.60E-03	0.74	7.2E-04	90	1.5	1529.1	1.83E-02

TOTAL FUGITIVE DUST CONCENTRATIONS

SCENARIO	WIND EROSION EMISSION RATE (kg/day)	LOADING/DUMPING EMISSION RATE (kg/day)	TOTAL EMISSION RATE (kg/day)	CONVERSION FACTOR (mg/kg)	CONVERSION FACTOR (day/sec)	BREATHING HEIGHT (m)	SITE WIDTH (m)	WIND SPEED (m/s)	DUST CONCENTRATION ON SITE (mg/m3)
2	4.60E-01	1.83E-02	4.78E-01	1.00E+06	1.16E-05	2	213	4.02	3.24E-03
3	4.60E-02	NA	4.60E-02	1.00E+06	1.16E-05	2	63.7	4.02	1.04E-03

The wind erosion emission rate is presented in Table I-1.

The second component is due to loading/unloading of soils due to excavation activities and can be accounted for by:

$$E = \frac{k \cdot (.0016) \cdot (U/2.2)^{1.3}}{(M/2)^{1.4}}$$

and

$$E_{ed} = V \cdot D \cdot E/T$$

where:

E = Emission factor due to loading/dumping (kg/Mg)
k = Particle size multiplier
U = Mean wind speed (m/s)
M = Soil moisture (%)
E_{ed} = Emission rate due to loading/dumping (kg/day)
V = Volume of soil excavated (m^3)
D = Density of soil (Mg/m^3)
T = Time conversion factor (days of excavation)

Using conservative assumptions and appropriate guidelines (EPA, AP-42, 1985):

k = .74
U = 4.02 m/s
M = 5%
V = 1,529.1 m^3
D = 1.5 Mg/m^3
T = 90 days

The emissions due to loading/dumping are presented in Table I-1.

Total fugitive emissions (from wind activity and loading/dumping) are also presented in Table I-1.

The dust concentration on site is calculated by:

$$Cs = \frac{E}{w \cdot W \cdot H} \cdot C_f$$

where:

Cs = Dust concentration on site (mg/m^3)
E = Total emission rate (kg/day)
w = Wind speed = 4.02 m/s
W = Width (entire site) = 213 m (Scenario 2), 64 m (Scenario 3)
H = Breathing height = 2 m
C_f = Factors for converting from days to seconds and from kg to mg

Total fugitive dust concentrations on site are shown in Table I-1.

The concentration of contaminant suspended in air is estimated by a simple ratio of contaminant concentration in soil to fugitive dust emissions:

$$A_c = CC \cdot C_s \cdot C_f$$

where:

A_c = Concentration of suspended contaminant (mg/m^3)
CC - Contaminant concentration in soil (mg/kg)
C_s = Dust concentration on site (mg/m^3)
C_f = Conversion factor (kg/mg)

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX J

DOSE, HAZARD INDEX RATIO, AND CANCER RISK ESTIMATES FOR ON-SITE EXPOSURES

THIS PAGE INTENTIONALLY LEFT BLANK

DOSE ESTIMATES FOR ON-SITE

(CURRENT AND FUTURE USE) EXPOSURES

J.1 Objective of this Appendix

This Appendix presents the details of the human health risk assessment for receptors at the Hertel Landfill. This technical Appendix assumes that the reader is familiar with the site in question and that the reader understands the fundamentals and practice of exposure and risk assessment.

Tables J-1 through J-5 present the detailed values and assumptions used to quantify the frequency, duration, and intensity of each of the activities that cause exposures in each scenario and for each pathway. The values and assumptions used for each scenario were prepared after discussion with EPA employees and in keeping with generally accepted values in the discipline of risk assessment; the values are not based on a detailed study of employment records or on-time budgets for the different groups of receptors considered. Further, the values for construction workes do not assume the use of personal protective equipment.

TABLE J-1
DERMAL CONTACT WITH CHEMICALS IN WATER - CHILDREN

CHEMICAL	ABSORBED DOSE (NONCANCER) (mg/kg/day)	ABSORBED DOSE (CANCER) (mg/kg/day)	95%CI CONC IN WATER (mg/liter)	SKIN SURFACE AREA (cm2)	PERMEABILITY CONSTANT (cm/hr)	EXPOSURE TIME (hours/day)	EXPOSURE FREQUENCY (days/year)	EXPOSURE DURATION (years)	CONVERSION FACTOR (1 liter/1000cm3)	BODY WEIGHT (kg)	AVERAGING TIME (NONCANCER) (days)	AVERAGING TIME (CANCER) (days)
INORGANICS												
Arsenic	5.26E-07	6.76E-08	0.005	6800	8E-04	4	90	9	0.001	49	3285	25550
VOLATILES												
Carbon Disulfide	5.91E-07	7.60E-08	0.0054	6800	8E-04	4	90	9	0.001	49	3285	25550
Chlorobenzene	6.46E-07	8.31E-08	0.0059	6800	8E-04	4	90	9	0.001	49	3285	25550
Ethylbenzene	4.93E-07	6.34E-08	0.0045	6800	8E-04	4	90	9	0.001	49	3285	25550
Toluene	5.04E-07	6.48E-08	0.0046	6800	8E-04	4	90	9	0.001	49	3285	25550
Xylenes	6.02E-07	7.74E-08	0.0055	6800	8E-04	4	90	9	0.001	49	3285	25550
SEMIVOLATILES												
1,4-Dichlorobenzene	1.09E-06	1.41E-07	1.00E-02	6800	8E-04	4	90	9	0.001	49	3285	25550
Benzo(a)anthracene	1.09E-06	1.41E-07	1.00E-02	6800	8E-04	4	90	9	0.001	49	3285	25550
Benzo(a)pyrene	1.09E-06	1.41E-07	1.00E-02	6800	8E-04	4	90	9	0.001	49	3285	25550
Benzo(b)fluoranthene	1.09E-06	1.41E-07	1.00E-02	6800	8E-04	4	90	9	0.001	49	3285	25550
Benzo(k)fluoranthene	1.09E-06	1.41E-07	1.00E-02	6800	8E-04	4	90	9	0.001	49	3285	25550
Bis(2-ethylhexyl)phthalate	5.91E-07	7.60E-08	5.40E-03	6800	8E-04	4	90	9	0.001	49	3285	25550
Butylbenzylphthalate	1.09E-06	1.41E-07	1.00E-02	6800	8E-04	4	90	9	0.001	49	3285	25550
Chrysene	1.09E-06	1.41E-07	1.00E-02	6800	8E-04	4	90	9	0.001	49	3285	25550
Dibenzo(a,h)anthracene	1.09E-06	1.41E-07	1.00E-02	6800	8E-04	4	90	9	0.001	49	3285	25550
Indeno(123cd)pyrene	1.09E-06	1.41E-07	1.00E-02	6800	8E-04	4	90	9	0.001	49	3285	25550
P-Cresol	1.93E-06	2.48E-07	1.76E-02	6800	8E-04	4	90	9	0.001	49	3285	25550
Acenapthene	1.09E-06	1.41E-07	1.00E-02	6800	8E-04	4	90	9	0.001	49	3285	25550
Anthracene	1.09E-06	1.41E-07	1.00E-02	6800	8E-04	4	90	9	0.001	49	3285	25550
Benzo(g,h,i)perylene	1.09E-06	1.41E-07	1.00E-02	6800	8E-04	4	90	9	0.001	49	3285	25550
Diethylphthalate	1.09E-06	1.41E-07	1.00E-02	6800	8E-04	4	90	9	0.001	49	3285	25550
Di-N-Butylphthalate	3.28E-07	4.22E-08	3.00E-03	6800	8E-04	4	90	9	0.001	49	3285	25550
Di-n-octylphthalate	3.28E-07	4.22E-08	3.00E-03	6800	8E-04	4	90	9	0.001	49	3285	25550
Fluoranthene	2.19E-07	2.82E-08	2.00E-03	6800	8E-04	4	90	9	0.001	49	3285	25550
Fluorene	1.09E-06	1.41E-07	1.00E-02	6800	8E-04	4	90	9	0.001	49	3285	25550
Naphthalene	4.38E-07	5.63E-08	4.00E-03	6800	8E-04	4	90	9	0.001	49	3285	25550
Phenanthrene	2.19E-07	2.82E-08	2.00E-03	6800	8E-04	4	90	9	0.001	49	3285	25550
Phenol	1.26E-06	1.62E-07	1.15E-02	6800	8E-04	4	90	9	0.001	49	3285	25550
Pyrene	2.19E-07	2.82E-08	2.00E-03	6800	8E-04	4	90	9	0.001	49	3285	25550
PESTICIDES/PCBs												
4,4'-DDD	1.09E-08	1.41E-09	1.00E-04	6800	8E-04	4	90	9	0.001	49	3285	25550
4,4'-DDE	1.09E-08	1.41E-09	1.00E-04	6800	8E-04	4	90	9	0.001	49	3285	25550
4,4'-DDT	1.09E-08	1.41E-09	1.00E-04	6800	8E-04	4	90	9	0.001	49	3285	25550

TABLE J-1
(continued)
INGESTION OF CHEMICALS IN SURFACE WATER - CHILDREN

CHEMICAL	INTAKE (NONCANCER) (mg/kg/day)	INTAKE (CANCER) (mg/kg/day)	95%CI CONC IN WATER (mg/liter)	INGESTION RATE (liters/day)	EXPOSURE FREQUENCY (days/year)	EXPOSURE DURATION (years)	BODY WEIGHT (kg)	AVERAGING TIME (NONCANCER) (days)	AVERAGING TIME (CANCER) (days)
INORGANICS									
Aluminum	2.17E-02	2.79E-03	86.22	0.05	90	9	49	3285	25550
Antimony	2.87E-06	3.69E-07	0.01	0.05	90	9	49	3285	25550
Arsenic	1.21E-06	1.55E-07	0.00	0.05	90	9	49	3285	25550
Barium	4.66E-04	6.00E-05	1.85	0.05	90	9	49	3285	25550
Beryllium	5.79E-07	7.44E-08	0.00	0.05	90	9	49	3285	25550
Cadmium	2.56E-05	3.29E-06	0.10	0.05	90	9	49	3285	25550
Chromium	6.79E-06	8.73E-07	0.03	0.05	90	9	49	3285	25550
Cobalt	2.34E-06	3.01E-07	0.01	0.05	90	9	49	3285	25550
Copper	1.62E-05	2.08E-06	0.06	0.05	90	9	49	3285	25550
Lead	1.11E-04	1.43E-05	0.44	0.05	90	9	49	3285	25550
Manganese	8.99E-03	1.16E-03	35.75	0.05	90	9	49	3285	25550
Mercury	1.51E-07	1.94E-08	0.00	0.05	90	9	49	3285	25550
Nickel	6.92E-06	8.90E-07	0.03	0.05	90	9	49	3285	25550
Selenium	7.05E-07	9.06E-08	0.00	0.05	90	9	49	3285	25550
Vanadium	2.47E-06	3.17E-07	0.01	0.05	90	9	49	3285	25550
Zinc	2.82E-03	3.62E-04	11.20	0.05	90	9	49	3285	25550
Cyanide	4.50E-06	5.79E-07	0.02	0.05	90	9	49	3285	25550
VOLATILES									
Carbon Disulfide	1.36E-06	1.75E-07	0.0054	0.05	90	9	49	3285	25550
Chlorobenzene	1.48E-06	1.91E-07	0.0059	0.05	90	9	49	3285	25550
Ethylbenzene	1.13E-06	1.46E-07	0.0045	0.05	90	9	49	3285	25550
Toluene	1.16E-06	1.49E-07	0.0046	0.05	90	9	49	3285	25550
Xylenes	1.38E-06	1.78E-07	0.0055	0.05	90	9	49	3285	25550
SEMIVOLATILES									
1,4-Dichlorobenzene	2.52E-06	3.23E-07	0.0100	0.05	90	9	49	3285	25550
Benzo(a)anthracene	2.52E-06	3.23E-07	0.0100	0.05	90	9	49	3285	25550
Benzo(a)pyrene	2.52E-06	3.23E-07	0.0100	0.05	90	9	49	3285	25550
Benzo(b)fluoranthene	2.52E-06	3.23E-07	0.0100	0.05	90	9	49	3285	25550
Benzo(k)fluoranthene	2.52E-06	3.23E-07	0.0100	0.05	90	9	49	3285	25550
Bis(2-ethylhexyl)phthalate	1.36E-06	1.75E-07	0.0054	0.05	90	9	49	3285	25550
Butylbenzylphthalate	2.52E-06	3.23E-07	0.0100	0.05	90	9	49	3285	25550
Chrysene	2.52E-06	3.23E-07	0.0100	0.05	90	9	49	3285	25550
Dibenzo(a,h)anthracene	2.52E-06	3.23E-07	0.0100	0.05	90	9	49	3285	25550
Indeno(123cd)pyrene	2.52E-06	3.23E-07	0.0100	0.05	90	9	49	3285	25550
p-Cresol	4.43E-06	5.69E-07	0.0176	0.05	90	9	49	3285	25550
Acenapthene	2.52E-06	3.23E-07	0.0100	0.05	90	9	49	3285	25550
Anthracene	2.52E-06	3.23E-07	0.0100	0.05	90	9	49	3285	25550
Benzo(g,h,i)perylene	2.52E-06	3.23E-07	0.0100	0.05	90	9	49	3285	25550
Diethylphthalate	2.52E-06	3.23E-07	0.0100	0.05	90	9	49	3285	25550
Di-N-Butylphthalate	7.55E-07	9.70E-08	0.0030	0.05	90	9	49	3285	25550
Di-n-octylphthalate	7.55E-07	9.70E-08	0.0030	0.05	90	9	49	3285	25550
Fluoranthene	5.03E-07	6.47E-08	0.0020	0.05	90	9	49	3285	25550
Fluorene	2.52E-06	3.23E-07	0.0100	0.05	90	9	49	3285	25550
Naphthalene	1.01E-06	1.29E-07	0.0040	0.05	90	9	49	3285	25550
Phenanthrene	5.03E-07	6.47E-08	0.0020	0.05	90	9	49	3285	25550
Phenol	2.89E-06	3.72E-07	0.0115	0.05	90	9	49	3285	25550
Pyrene	5.03E-07	6.47E-08	0.0020	0.05	90	9	49	3285	25550
PESTICIDES/PCBs									
4,4'-DDD	2.52E-08	3.23E-09	0.0001	0.05	90	9	49	3285	25550
4,4'-DDE	2.52E-08	3.23E-09	0.0001	0.05	90	9	49	3285	25550
4,4'-DDT	2.52E-08	3.23E-09	0.0001	0.05	90	9	49	3285	25550

TABLE J-1
(continued)
DERMAL CONTACT WITH CHEMICALS IN SOIL - CHILDREN

CHEMICAL	ABSORBED DOSE (NONCANCER) (mg/kg/day)	ABSORBED DOSE (CANCER) (mg/kg/day)	CONCENTRATION IN SOIL (mg/kg)	CONVERSION FACTOR (1E-6 kg/mg)	SKIN SURFACE AREA (cm2/event)	ADHERENCE FACTOR (mg/cm2)	ABSORPTION FACTOR (unitless)	EXPOSURE FREQUENCY (events/year)	EXPOSURE DURATION (years)	BODY WEIGHT (kg)	AVERAGING TIME (NONCANCER) (days)	AVERAGING TIME (CANCER) (days)
SEMIVOLATILES												
1,4-Dichlorobenzene	1.1E-05	1.4E-06	2.1692	1E-06	6800	1.45	0.10	90	9	49	3285	25550
Benzo(a)anthracene	3.8E-06	4.9E-07	0.7717	1E-06	6800	1.45	0.10	90	9	49	3285	25550
Benzo(a)pyrene	4.8E-06	6.2E-07	0.9659	1E-06	6800	1.45	0.10	90	9	49	3285	25550
Benzo(b)fluoranthene	4.6E-06	5.9E-07	0.9265	1E-06	6800	1.45	0.10	90	9	49	3285	25550
Benzo(k)fluoranthene	4.9E-07	6.3E-08	0.0980	1E-06	6800	1.45	0.10	90	9	49	3285	25550
Bis(2ethylhexyl)phthalate	8.1E-06	1.0E-06	1.6371	1E-06	6800	1.45	0.10	90	9	49	3285	25550
Butylbenzylphthalate	1.1E-05	1.4E-06	2.1692	1E-06	6800	1.45	0.10	90	9	49	3285	25550
Chrysene	4.3E-06	5.6E-07	0.8721	1E-06	6800	1.45	0.10	90	9	49	3285	25550
Dibenzoanthracene	1.1E-05	1.4E-06	2.1692	1E-06	6800	1.45	0.10	90	9	49	3285	25550
Indeno(123cd)pyrene	3.6E-06	4.6E-07	0.7170	1E-06	6800	1.45	0.10	90	9	49	3285	25550
p-Cresol	1.1E-05	1.4E-06	2.1692	1E-06	6800	1.45	0.10	90	9	49	3285	25550
Acenaphthene	3.1E-07	4.0E-08	0.0620	1E-06	6800	1.45	0.10	90	9	49	3285	25550
Anthracene	6.5E-07	8.3E-08	0.1300	1E-06	6800	1.45	0.10	90	9	49	3285	25550
Benzo(g,h,i)perylene	3.6E-06	4.6E-07	0.7200	1E-06	6800	1.45	0.10	90	9	49	3285	25550
Diethylphthalate	2.1E-07	2.7E-08	0.0430	1E-06	6800	1.45	0.10	90	9	49	3285	25550
Di-n-butylphthalate	4.5E-07	5.7E-08	0.0900	1E-06	6800	1.45	0.10	90	9	49	3285	25550
Dioctylphthalate	1.1E-05	1.4E-06	2.1692	1E-06	6800	1.45	0.10	90	9	49	3285	25550
Fluoranthene	1.1E-05	1.4E-06	2.2635	1E-06	6800	1.45	0.10	90	9	49	3285	25550
Fluorene	2.3E-07	2.9E-08	0.0460	1E-06	6800	1.45	0.10	90	9	49	3285	25550
Naphthalene	1.2E-05	1.5E-06	2.3548	1E-06	6800	1.45	0.10	90	9	49	3285	25550
Phenanthrene	5.7E-06	7.4E-07	1.1571	1E-06	6800	1.45	0.10	90	9	49	3285	25550
Phenol	1.1E-05	1.4E-06	2.1692	1E-06	6800	1.45	0.10	90	9	49	3285	25550
Pyrene	1.2E-05	1.5E-06	2.3202	1E-06	6800	1.45	0.10	90	9	49	3285	25550
INORGANICS												
Arsenic	2.3E-04	2.9E-05	45.40	1E-06	6800	1.45	0.10	90	9	49	3285	25550
VOLATILES												
Carbon disulfide	0.0E+00	0.0E+00		1E-06	6800	1.45	0.10	90	9	49	3285	25550
Chlorobenzene	0.0E+00	0.0E+00		1E-06	6800	1.45	0.10	90	9	49	3285	25550
Ethylbenzene	0.0E+00	0.0E+00		1E-06	6800	1.45	0.10	90	9	49	3285	25550
Toluene	0.0E+00	0.0E+00		1E-06	6800	1.45	0.10	90	9	49	3285	25550
Xylenes	0.0E+00	0.0E+00		1E-06	6800	1.45	0.10	90	9	49	3285	25550
PESTICIDES/PCBS												
4,4-DDD	1.9E-06	2.5E-07	0.3871	1E-06	6800	1.45	0.10	90	9	49	3285	25550
4,4-DDE	1.7E-06	2.2E-07	0.3416	1E-06	6800	1.45	0.10	90	9	49	3285	25550
4,4-DDT	2.4E-06	3.1E-07	0.4916	1E-06	6800	1.45	0.10	90	9	49	3285	25550

TABLE J-1
(continued)
INGESTION OF CHEMICALS IN SOIL - CHILDREN

CHEMICAL	INTAKE (NONCANCER) (mg/kg/day)	INTAKE (CANCER) (mg/kg/day)	CONC. IN SOIL (mg/kg)	INGESTION RATE (mg soil/day)	CONVERSION FACTOR (1E-6 kg/mg)	FRACTION INGESTED (unitless)	EXPOSURE FREQUENCY (days/year)	EXPOSURE DURATION (years)	BODY WEIGHT (kg)	AVERAGING TIME (NONCANCER) (days)	AVERAGING TIME (CANCER) (days)
SEMIVOLATILES											
1,4-Dichlorobenzene	1.1E-06	1.4E-07	2.1692	100	1E-06	1.00	90	9	49	3285	25550
Benzo(a)anthracene	3.9E-07	5.0E-08	0.7717	100	1E-06	1.00	90	9	49	3285	25550
Benzo(a)pyrene	4.9E-07	6.2E-08	0.9659	100	1E-06	1.00	90	9	49	3285	25550
Benzo(b)fluoranthene	4.7E-07	6.0E-08	0.9265	100	1E-06	1.00	90	9	49	3285	25550
Benzo(k)fluoranthene	4.9E-08	6.3E-09	0.0980	100	1E-06	1.00	90	9	49	3285	25550
Bis(2ethylhexyl)phthalate	8.2E-07	1.1E-07	1.6371	100	1E-06	1.00	90	9	49	3285	25550
Butylbenzylphthalate	1.1E-06	1.4E-07	2.1692	100	1E-06	1.00	90	9	49	3285	25550
Chrysene	4.4E-07	5.6E-08	0.8721	100	1E-06	1.00	90	9	49	3285	25550
Dibenzoanthracene	1.1E-06	1.4E-07	2.1692	100	1E-06	1.00	90	9	49	3285	25550
Indeno(123cd)pyrene	3.6E-07	4.6E-08	0.7170	100	1E-06	1.00	90	9	49	3285	25550
p-Cresol	1.1E-06	1.4E-07	2.1692	100	1E-06	1.00	90	9	49	3285	25550
Acenaphthene	3.1E-08	4.0E-09	0.0620	100	1E-06	1.00	90	9	49	3285	25550
Anthracene	6.5E-08	8.4E-09	0.1300	100	1E-06	1.00	90	9	49	3285	25550
Benzo(g,h,i)perylene	3.6E-07	4.7E-08	0.7200	100	1E-06	1.00	90	9	49	3285	25550
Diethylphthalate	2.2E-08	2.8E-09	0.0430	100	1E-06	1.00	90	9	49	3285	25550
Di-n-butylphthalate	4.5E-08	5.8E-09	0.0900	100	1E-06	1.00	90	9	49	3285	25550
Di-n-octylphthalate	1.1E-06	1.4E-07	2.1692	100	1E-06	1.00	90	9	49	3285	25550
Fluoranthene	1.1E-06	1.5E-07	2.2635	100	1E-06	1.00	90	9	49	3285	25550
Fluorene	2.3E-08	3.0E-09	0.0460	100	1E-06	1.00	90	9	49	3285	25550
Naphthalene	1.2E-06	1.5E-07	2.3548	100	1E-06	1.00	90	9	49	3285	25550
Phenanthrene	5.8E-07	7.5E-08	1.1571	100	1E-06	1.00	90	9	49	3285	25550
Phenol	1.1E-06	1.4E-07	2.1692	100	1E-06	1.00	90	9	49	3285	25550
Pyrene	1.2E-06	1.5E-07	2.3202	100	1E-06	1.00	90	9	49	3285	25550
INORGANICS											
Aluminum	9.7E-03	1.2E-03	19316.20	100	1E-06	1.00	90	9	49	3285	25550
Antimony	5.3E-06	6.8E-07	10.50	100	1E-06	1.00	90	9	49	3285	25550
Arsenic	2.3E-05	2.9E-06	45.40	100	1E-06	1.00	90	9	49	3285	25550
Barium	9.6E-05	1.2E-05	191.10	100	1E-06	1.00	90	9	49	3285	25550
Beryllium	5.0E-07	6.5E-08	1.00	100	1E-06	1.00	90	9	49	3285	25550
Cadmium	3.8E-06	4.9E-07	7.60	100	1E-06	1.00	90	9	49	3285	25550
Chromium	2.5E-04	3.3E-05	502.40	100	1E-06	1.00	90	9	49	3285	25550
Cobalt	9.3E-06	1.2E-06	18.40	100	1E-06	1.00	90	9	49	3285	25550
Copper	8.1E-05	1.0E-05	161.50	100	1E-06	1.00	90	9	49	3285	25550
Lead	2.9E-04	3.8E-05	581.50	100	1E-06	1.00	90	9	49	3285	25550
Manganese	8.7E-04	1.1E-04	1732.60	100	1E-06	1.00	90	9	49	3285	25550
Mercury	8.1E-07	1.0E-07	1.60	100	1E-06	1.00	90	9	49	3285	25550
Nickel	3.3E-05	4.2E-06	64.70	100	1E-06	1.00	90	9	49	3285	25550
Potassium	1.4E-03	1.8E-04	2810.70	100	1E-06	1.00	90	9	49	3285	25550
Selenium	1.3E-05	1.7E-06	26.80	100	1E-06	1.00	90	9	49	3285	25550
Vandium	1.6E-05	2.0E-06	31.30	100	1E-06	1.00	90	9	49	3285	25550
Zinc	9.2E-05	1.2E-05	183.00	100	1E-06	1.00	90	9	49	3285	25550
Cyanide	8.1E-07	1.0E-07	1.60	100	1E-06	1.00	90	9	49	3285	25550
PESTICIDES/PCBS											
4,4-DDD	1.9E-07	2.5E-08	0.3871	100	1E-06	1.00	90	9	49	3285	25550
4,4-DDE	1.7E-07	2.2E-08	0.3416	100	1E-06	1.00	90	9	49	3285	25550
4,4-DDT	2.5E-07	3.2E-08	0.4916	100	1E-06	1.00	90	9	49	3285	25550

TABLE J-2
DERMAL CONTACT WITH CHEMICALS IN WATER - ADULTS

CHEMICAL	ABSORBED DOSE (NONCANCER) (mg/kg/day)	ABSORBED DOSE (CANCER) (mg/kg/day)	CONC IN WATER (95%) (mg/liter)	SKIN SURFACE AREA (cm2)	PERMEABILITY CONSTANT (cm/hr)	EXPOSURE TIME (hours/day)	EXPOSURE FREQUENCY (days/year)	EXPOSURE DURATION (years)	CONVERSION FACTOR (1 liter/1000cm3)	BODY WEIGHT (kg)	AVERAGING TIME (NONCANCER) (days)	AVERAGING TIME (CANCER) (days)
INORGANICS												
Arsenic	1.7E-08	7.4E-09	0.00	5500	8.4E-04	4	5	30	0.001	70	10950	25550
VOLATILES												
Carbon Disulfide	2.0E-08	8.4E-09	0.0054	5500	8.4E-04	4	5	30	0.001	70	10950	25550
Chlorobenzene	2.1E-08	9.1E-09	0.0059	5500	8.4E-04	4	5	30	0.001	70	10950	25550
Ethylbenzene	1.6E-08	7.0E-09	0.0045	5500	8.4E-04	4	5	30	0.001	70	10950	25550
Toluene	1.7E-08	7.1E-09	0.0046	5500	8.4E-04	4	5	30	0.001	70	10950	25550
Xylenes	2.0E-08	8.5E-09	0.0055	5500	8.4E-04	4	5	30	0.001	70	10950	25550
SEMIVOLATILES												
1,4-Dichlorobenzene	3.6E-08	1.5E-08	0.0100	5500	8.4E-04	4	5	30	0.001	70	10950	25550
Benzo(a)anthracene	3.6E-08	1.5E-08	0.0100	5500	8.4E-04	4	5	30	0.001	70	10950	25550
Benzo(a)pyrene	3.6E-08	1.5E-08	0.0100	5500	8.4E-04	4	5	30	0.001	70	10950	25550
Benzo(b)fluoranthene	3.6E-08	1.5E-08	0.0100	5500	8.4E-04	4	5	30	0.001	70	10950	25550
Benzo(k)fluoranthene	3.6E-08	1.5E-08	0.0100	5500	8.4E-04	4	5	30	0.001	70	10950	25550
Bis(2-ethylhexyl)phthalate	2.0E-08	8.4E-09	0.0054	5500	8.4E-04	4	5	30	0.001	70	10950	25550
Butylbenzylphthalate	3.6E-08	1.5E-08	0.0100	5500	8.4E-04	4	5	30	0.001	70	10950	25550
Chrysene	3.6E-08	1.5E-08	0.0100	5500	8.4E-04	4	5	30	0.001	70	10950	25550
Dibenzo(a,h)anthracene	3.6E-08	1.5E-08	0.0100	5500	8.4E-04	4	5	30	0.001	70	10950	25550
Indeno(123cd)pyrene	3.6E-08	1.5E-08	0.0100	5500	8.4E-04	4	5	30	0.001	70	10950	25550
p-Cresol	6.4E-08	2.7E-08	0.0176	5500	8.4E-04	4	5	30	0.001	70	10950	25550
Acenapthene	3.6E-08	1.5E-08	0.0100	5500	8.4E-04	4	5	30	0.001	70	10950	25550
Anthracene	3.6E-08	1.5E-08	0.0100	5500	8.4E-04	4	5	30	0.001	70	10950	25550
Benzo(g,h,i)perylene	3.6E-08	1.5E-08	0.0100	5500	8.4E-04	4	5	30	0.001	70	10950	25550
Diethylphthalate	1.1E-08	4.6E-09	0.0100	5500	8.4E-04	4	5	30	0.001	70	10950	25550
Di-N-Butylphthalate	1.1E-08	4.6E-09	0.0030	5500	8.4E-04	4	5	30	0.001	70	10950	25550
Di-n-octylphthalate	1.1E-08	4.6E-09	0.0030	5500	8.4E-04	4	5	30	0.001	70	10950	25550
Fluoranthene	7.2E-09	3.1E-09	0.0020	5500	8.4E-04	4	5	30	0.001	70	10950	25550
Fluorene	3.6E-08	1.5E-08	0.0100	5500	8.4E-04	4	5	30	0.001	70	10950	25550
Naphthalene	1.4E-08	6.2E-09	0.0040	5500	8.4E-04	4	5	30	0.001	70	10950	25550
Phenanthrene	7.2E-09	3.1E-09	0.0020	5500	8.4E-04	4	5	30	0.001	70	10950	25550
Phenol	4.2E-08	1.8E-08	0.0115	5500	8.4E-04	4	5	30	0.001	70	10950	25550
Pyrene	7.2E-09	3.1E-09	0.0020	5500	8.4E-04	4	5	30	0.001	70	10950	25550
PESTCIDES/PCBs												
4,4'-DDD	3.6E-10	1.5E-10	0.0001	5500	8.4E-04	4	5	30	0.001	70	10950	25550
4,4'-DDE	3.6E-10	1.5E-10	0.0001	5500	8.4E-04	4	5	30	0.001	70	10950	25550
4,4'-DDT	3.6E-10	1.5E-10	0.0001	5500	8.4E-04	4	5	30	0.001	70	10950	25550

TABLE J-2
(continued)
DERMAL CONTACT WITH CHEMICALS IN SOIL - ADULTS

CHEMICAL	ABSORBED DOSE (NONCANCER) (mg/kg/day)	ABSORBED DOSE (CANCER) (mg/kg/day)	SOIL CONC 95%C1 (mg/kg)	CONVERSION FACTOR (1E-6 kg/mg)	SKIN SURFACE AREA (cm2/event)	ADHERENCE FACTOR (mg/cm2)	ABSORPTION FACTOR (unitless)	EXPOSURE FREQUENCY (events/year)	EXPOSURE DURATION (years)	BODY WEIGHT (kg)	AVERAGING TIME (NONCANCER) (days)	AVERAGING TIME (CANCER) (days)
SEMIVOLATILES												
1,4-Dichlorobenzene	2.29E-06	9.81E-07	2.17	1E-06	3100	1.45	0.10	60	30	70	10950	25550
Benzo(a)anthracene	8.15E-07	3.49E-07	0.77	1E-06	3100	1.45	0.10	60	30	70	10950	25550
Benzo(a)pyrene	1.02E-06	4.37E-07	0.97	1E-06	3100	1.45	0.10	60	30	70	10950	25550
Benzo(b)fluoranthene	9.78E-07	4.19E-07	0.93	1E-06	3100	1.45	0.10	60	30	70	10950	25550
Benzo(k)fluoranthene	1.03E-07	4.43E-08	0.10	1E-06	3100	1.45	0.10	60	30	70	10950	25550
Bis(2ethylhexyl)phthalate	1.73E-06	7.41E-07	1.64	1E-06	3100	1.45	0.10	60	30	70	10950	25550
Butylbenzylphthalate	2.29E-06	9.81E-07	2.17	1E-06	3100	1.45	0.10	60	30	70	10950	25550
Chrysene	9.21E-07	3.95E-07	0.87	1E-06	3100	1.45	0.10	60	30	70	10950	25550
Dibenzo(a,h)anthracene	2.29E-06	9.81E-07	2.17	1E-06	3100	1.45	0.10	60	30	70	10950	25550
Indeno(123cd)pyrene	7.57E-07	3.24E-07	0.72	1E-06	3100	1.45	0.10	60	30	70	10950	25550
p-Cresol	2.29E-06	9.81E-07	2.17	1E-06	3100	1.45	0.10	60	30	70	10950	25550
Acenaphthene	6.54E-08	2.80E-08	0.06	1E-06	3100	1.45	0.10	60	30	70	10950	25550
Anthracene	1.37E-07	5.88E-08	0.13	1E-06	3100	1.45	0.10	60	30	70	10950	25550
Benzo(ghi)perylene	7.60E-07	3.26E-07	0.72	1E-06	3100	1.45	0.10	60	30	70	10950	25550
Diethylphthalate	4.54E-08	1.95E-08	0.04	1E-06	3100	1.45	0.10	60	30	70	10950	25550
Di-n-butylphthalate	9.50E-08	4.07E-08	0.09	1E-06	3100	1.45	0.10	60	30	70	10950	25550
Di-n-octylphthalate	2.29E-06	9.81E-07	2.17	1E-06	3100	1.45	0.10	60	30	70	10950	25550
Fluoranthene	2.39E-06	1.02E-06	2.26	1E-06	3100	1.45	0.10	60	30	70	10950	25550
Fluorene	4.86E-08	2.08E-08	0.05	1E-06	3100	1.45	0.10	60	30	70	10950	25550
Naphthalene	2.49E-06	1.07E-06	2.35	1E-06	3100	1.45	0.10	60	30	70	10950	25550
Phenanthrene	1.22E-06	5.23E-07	1.16	1E-06	3100	1.45	0.10	60	30	70	10950	25550
Phenol	2.29E-06	9.81E-07	2.17	1E-06	3100	1.45	0.10	60	30	70	10950	25550
Pyrene	2.45E-06	1.05E-06	2.32	1E-06	3100	1.45	0.10	60	30	70	10950	25550
INORGANICS			(mg/kg)									
Arsenic	4.79E-05	2.05E-05	45.40	1E-06	3100	1.45	0.10	60	30	70	10950	25550
PESTICIDES/PCBS												
4,4'-DDD	4.09E-08	1.75E-08	0.3871	1E-06	3100	1.45	0.01	60	30	70	10950	25550
4,4'-DDE	3.61E-08	1.55E-08	0.3416	1E-06	3100	1.45	0.01	60	30	70	10950	25550
4,4'-DDT	5.19E-08	2.22E-08	0.4916	1E-06	3100	1.45	0.01	60	30	70	10950	25550

TABLE J-2
(continued)
INGESTION OF CHEMICALS IN SOIL - ADULTS

CHEMICAL	INTAKE (NONCANCER) (mg/kg/day)	INTAKE (CANCER) (mg/kg/day)	SOIL CONC 95%CI (mg/kg)	INGESTION RATE (mg soil/day)	CONVERSION FACTOR (1E-6 kg/mg)	FRACTION INGESTED (unitless)	EXPOSURE FREQUENCY (days/year)	EXPOSURE DURATION (years)	BODY WEIGHT (kg)	AVERAGING TIME (NONCANCER) (days)	AVERAGING TIME (CANCER) (days)
SEMIVOLATILES											
1,4-Dichlorobenzene	5.09E-07	2.18E-07	2.17	100	1E-06	1	60	30	70	10950	25550
Benzo(a)anthracene	1.81E-07	7.77E-08	0.77	100	1E-06	1	60	30	70	10950	25550
Benzo(a)pyrene	2.27E-07	9.72E-08	0.97	100	1E-06	1	60	30	70	10950	25550
Benzo(b)fluoranthene	2.18E-07	9.32E-08	0.93	100	1E-06	1	60	30	70	10950	25550
Benzo(k)fluoranthene	2.30E-08	9.86E-09	0.10	100	1E-06	1	60	30	70	10950	25550
Bis(2ethylhexyl)phthalate	3.84E-07	1.65E-07	1.64	100	1E-06	1	60	30	70	10950	25550
Butylbenzylphthalate	5.09E-07	2.18E-07	2.17	100	1E-06	1	60	30	70	10950	25550
Chrysene	2.05E-07	8.78E-08	0.87	100	1E-06	1	60	30	70	10950	25550
Dibenzo(a,h)anthracene	5.09E-07	2.18E-07	2.17	100	1E-06	1	60	30	70	10950	25550
Indeno(123cd)pyrene	1.68E-07	7.22E-08	0.72	100	1E-06	1	60	30	70	10950	25550
						1					
p-Cresol	5.09E-07	2.18E-07	2.17	100	1E-06	1	60	30	70	10950	25550
Acenaphthene	1.46E-08	6.24E-09	0.06	100	1E-06	1	60	30	70	10950	25550
Anthracene	3.05E-08	1.31E-08	0.13	100	1E-06	1	60	30	70	10950	25550
Benzo(ghi)perylene	1.69E-07	7.25E-08	0.72	100	1E-06	1	60	30	70	10950	25550
Diethylphthalate	1.01E-08	4.33E-09	0.04	100	1E-06	1	60	30	70	10950	25550
Di-n-butylphthalate	2.11E-08	9.06E-09	0.09	100	1E-06	1	60	30	70	10950	25550
Di-n-octylphthalate	5.09E-07	2.18E-07	2.17	100	1E-06	1	60	30	70	10950	25550
Fluoranthene	5.32E-07	2.28E-07	2.26	100	1E-06	1	60	30	70	10950	25550
Fluorene	1.08E-08	4.63E-09	0.05	100	1E-06	1	60	30	70	10950	25550
Naphthalene	5.53E-07	2.37E-07	2.35	100	1E-06	1	60	30	70	10950	25550
Phenanthrene	2.72E-07	1.16E-07	1.16	100	1E-06	1	60	30	70	10950	25550
Phenol	5.09E-07	2.18E-07	2.17	100	1E-06	1	60	30	70	10950	25550
Pyrene	5.45E-07	2.34E-07	2.32	100	1E-06	1	60	30	70	10950	25550
INORGANICS											
Aluminua	4.54E-03	1.94E-03	19316.20	100	1E-06	1	60	30	70	10950	25550
Antimony	2.47E-06	1.06E-06	10.50	100	1E-06	1	60	30	70	10950	25550
Arsenic	1.07E-05	4.57E-06	45.40	100	1E-06	1	60	30	70	10950	25550
Barium	4.49E-05	1.92E-05	191.10	100	1E-06	1	60	30	70	10950	25550
Beryllium	2.35E-07	1.01E-07	1.00	100	1E-06	1	60	30	70	10950	25550
Cadmium	1.78E-06	7.65E-07	7.60	100	1E-06	1	60	30	70	10950	25550
Chromiua	1.18E-04	5.06E-05	502.40	100	1E-06	1	60	30	70	10950	25550
Cobalt	4.32E-06	1.85E-06	18.40	100	1E-06	1	60	30	70	10950	25550
Copper	3.79E-05	1.63E-05	161.50	100	1E-06	1	60	30	70	10950	25550
Lead	1.37E-04	5.85E-05	581.50	100	1E-06	1	60	30	70	10950	25550
Manganese	4.07E-04	1.74E-04	1732.60	100	1E-06	1	60	30	70	10950	25550
Mercury	3.76E-07	1.61E-07	1.60	100	1E-06	1	60	30	70	10950	25550
Nickel	1.52E-05	6.51E-06	64.70	100	1E-06	1	60	30	70	10950	25550
Selenium	6.29E-06	2.70E-06	26.80	100	1E-06	1	60	30	70	10950	25550
Vandium	7.35E-06	3.15E-06	31.30	100	1E-06	1	60	30	70	10950	25550
Zinc	4.30E-05	1.84E-05	183.00	100	1E-06	1	60	30	70	10950	25550
Cyanide	3.76E-07	1.61E-07	1.60	100	1E-06	1	60	30	70	10950	25550
PESTICIDES/PCBS											
4,4-DDD	9.09E-08	3.90E-08	0.3871	100	1E-06	1	60	30	70	10950	25550
4,4-DDE	8.02E-08	3.44E-08	0.3416	100	1E-06	1	60	30	70	10950	25550
4,4-DDT	1.15E-07	4.95E-08	0.4916	100	1E-06	1	60	30	70	10950	25550

TABLE J-3
INHALATION OF CHEMICALS BORN ON DUST PARTICALS

CHEMICAL	INTAKE NONCANCER (mg/kg/day)	INTAKE CANCER (mg/kg/day)	DUST CONC. ON SITE (kg/m3)	CONC. IN SOIL (mg/kg)	INHALTION RATE (m3/hour)	EXPOSURE TIME (hours/day)	EXPOSURE FREQUENCY (days/year)	EXPOSURE DURATION (years)	BODY WEIGHT (kg)	AVG. TIME NONCANCER (days)	AVG. TIME CANCER (days)
INORGANICS											
	9.82E-06	6.92E-08	3.24E-09	13255.5	2	8	180	1	70	180	25550
Antimony	1.69E-08	1.19E-10	3.24E-09	22.8	2	8	180	1	70	180	25550
Arsenic	5.11E-09	3.60E-11	3.24E-09	6.9	2	8	180	1	70	180	25550
Barium	8.80E-08	6.20E-10	3.24E-09	118.8	2	8	180	1	70	180	25550
Beryllium	5.92E-10	4.17E-12	3.24E-09	0.8	2	8	180	1	70	180	25550
Cadmium	5.92E-10	4.17E-12	3.24E-09	0.8	2	8	180	1	70	180	25550
Chromium	1.36E-08	9.55E-11	3.24E-09	18.3	2	8	180	1	70	180	25550
Iron	1.80E-05	1.27E-07	3.24E-09	24278.1	2	8	180	1	70	180	25550
Manganese	9.26E-07	6.52E-09	3.24E-09	1250.2	2	8	180	1	70	180	25550
Nickel	1.56E-08	1.10E-10	3.24E-09	21.1	2	8	180	1	70	180	25550
Vanadium	1.24E-08	8.77E-11	3.24E-09	16.8	2	8	180	1	70	180	25550
Zinc	9.93E-08	7.00E-10	3.24E-09	134.1	2	8	180	1	70	180	25550
VOLATILES											
Carbon Disulfide	2.22E-12	1.57E-14	3.24E-09	0.0030	2	8	180	1	70	180	25550
Chlorobenzene	5.18E-12	3.65E-14	3.24E-09	0.0070	2	8	180	1	70	180	25550
Ethylbenzene	1.75E-11	1.23E-13	3.24E-09	0.0236	2	8	180	1	70	180	25550
Toluene	8.59E-12	6.05E-14	3.24E-09	0.0116	2	8	180	1	70	180	25550
Xylenes	3.12E-10	2.20E-12	3.24E-09	0.4218	2	8	180	1	70	180	25550
SEMIVOLATILES											
Bis(2-ethylhexyl)phthalate	4.73E-09	3.33E-11	3.24E-09	6.3869	2	8	180	1	70	180	25550
Di-N-Octylphthalate	1.48E-10	1.04E-12	3.24E-09	0.2000	2	8	180	1	70	180	25550
Butybenzylphthalate	1.78E-10	1.25E-12	3.24E-09	0.2400	2	8	180	1	70	180	25550
Phenanthrene	6.20E-10	4.36E-12	3.24E-09	0.8366	2	8	180	1	70	180	25550
Fluoranthene	1.00E-09	7.05E-12	3.24E-09	1.3511	2	8	180	1	70	180	25550
Pyrene	8.95E-10	6.30E-12	3.24E-09	1.2083	2	8	180	1	70	180	25550
Di-N-Butylphthalate	4.16E-09	2.93E-11	3.24E-09	5.6167	2	8	180	1	70	180	25550
Phenol	3.18E-09	2.24E-11	3.24E-09	4.2918	2	8	180	1	70	180	25550
p-cresol	2.52E-10	1.77E-12	3.24E-09	0.3400	2	8	180	1	70	180	25550
Fluoranthene	1.00E-09	7.05E-12	3.24E-09	1.3511	2	8	180	1	70	180	25550
Anthracene	1.11E-10	7.83E-13	3.24E-09	0.1500	2	8	180	1	70	180	25550
Fluorene	4.46E-10	3.14E-12	3.24E-09	0.6017	2	8	180	1	70	180	25550
Naphthalene	4.88E-10	3.44E-12	3.24E-09	0.6593	2	8	180	1	70	180	25550
Benzo(a)anthracene	3.19E-10	2.25E-12	3.24E-09	0.4311	2	8	180	1	70	180	25550
Benzo(a)pyrene	1.78E-10	1.25E-12	3.24E-09	0.2400	2	8	180	1	70	180	25550
Chrysene	3.19E-10	2.24E-12	3.24E-09	0.4302	2	8	180	1	70	180	25550
Benzo(b)fluoranthene	5.08E-10	3.58E-12	3.24E-09	0.6856	2	8	180	1	70	180	25550
Benzo(k)fluoranthene	2.89E-10	2.04E-12	3.24E-09	0.3908	2	8	180	1	70	180	25550

TABLE J-3
(continued)
DERMAL CONTACT WITH CHEMICALS IN SOIL

CHEMICAL	ABS. DOSE NONCANCER (mg/kg/day)	ABS. DOSE CANCER (mg/kg/day)	CONC. IN SOIL (mg/kg)	CONVERSION FACTOR (kg/mg)	SURFACE AREA SKIN (cm2/event)	ADHERENCE FACTOR (mg/cm2)	ABSORPTION FACTOR (unitless)	EXPOSURE FREQUENCY (days/year)	EXPOSURE DURATION (years)	BODY WEIGHT (kg)	AVG. TIME NONCANCER (days)	AVG. TIME CANCER (days)
SEMIVOLATILES												
Benzo(a)anthracene	5.63E-06	3.96E-08	0.4311	1.0E-06	6300	1.45	0.10	180	1	70	180	25550
Chrysene	5.61E-06	3.96E-08	0.4302	1.0E-06	6300	1.45	0.10	180	1	70	180	25550
Benzo(b)fluoranthene	8.95E-06	6.30E-08	0.6856	1.0E-06	6300	1.45	0.10	180	1	70	180	25550
Benzo(k)fluoranthene	5.10E-06	3.59E-08	0.3908	1.0E-06	6300	1.45	0.10	180	1	70	180	25550
Benzo(a)pyrene	3.13E-06	2.21E-08	0.2400	1.0E-06	6300	1.45	0.10	180	1	70	180	25550
Indeno(123cd)pyrene	5.60E-05	3.95E-07	4.2918	1.0E-06	6300	1.45	0.10	180	1	70	180	25550
Bis(2ethylhexyl)phthalate	8.33E-05	5.87E-07	6.3869	1.0E-06	6300	1.45	0.10	180	1	70	180	25550
Di-N-Octylphthalate	2.61E-06	1.84E-08	0.2000	1.0E-06	6300	1.45	0.10	180	1	70	180	25550
Butybenzylphthalate	3.13E-06	2.21E-08	0.2400	1.0E-06	6300	1.45	0.10	180	1	70	180	25550
P-Cresol	4.44E-06	3.13E-08	0.3400	1.0E-06	6300	1.45	0.10	180	1	70	180	25550
Naphthalene	8.60E-06	6.06E-08	0.6593	1.0E-06	6300	1.45	0.10	180	1	70	180	25550
Fluorene	7.85E-06	5.53E-08	0.6017	1.0E-06	6300	1.45	0.10	180	1	70	180	25550
Phenanthrene	1.09E-05	7.69E-08	0.8366	1.0E-06	6300	1.45	0.10	180	1	70	180	25550
Anthracene	1.96E-06	1.38E-08	0.1500	1.0E-06	6300	1.45	0.10	180	1	70	180	25550
Fluoranthene	1.76E-05	1.24E-07	1.3511	1.0E-06	6300	1.45	0.10	180	1	70	180	25550
Pyrene	1.58E-05	1.11E-07	1.2083	1.0E-06	6300	1.45	0.10	180	1	70	180	25550
Benzo(ghi)perylene	5.60E-05	3.95E-07	4.2918	1.0E-06	6300	1.45	0.10	180	1	70	180	25550
Di-n-butylphthalate	7.33E-05	5.16E-07	5.6167	1.0E-06	6300	1.45	0.10	180	1	70	180	25550
Phenol	5.60E-05	3.95E-07	4.2918	1.0E-06	6300	1.45	0.10	180	1	70	180	25550
INORGANICS												
Arsenic	9.00E-05	6.34E-07	6.9	1.0E-06	6300	1.45	0.10	180	1	70	180	25550
PESTICIDES/PCBS												
4,4-DDE	5.36E-07	3.78E-09	0.0411	1.0E-06	6300	1.45	0.10	180	1	70	180	25550
4,4-DDT	5.36E-07	3.78E-09	0.0411	1.0E-06	6300	1.45	0.10	180	1	70	180	25550

TABLE J-3
(continued)
INGESTION OF CHEMICALS IN SOIL

CHEMICAL	INTAKE NONCANCER (mg/kg/day)	INTAKE CANCER (mg/kg/day)	CONC. IN SOIL (mg/kg)	INGESTION RATE (mg soil/day)	CONVERSION FACTOR (10E-6 kg/mg)	FRACTION INGESTED (unitless)	EXPOSURE FREQUENCY (days/year)	EXPOSURE DURATION (years)	BODY WEIGHT (kg)	AVG. TIME NONCANCER (days)	AVG. TIME CANCER (days)
SEMIVOLATILES											
Benzo(a)anthracene	6.16E-07	4.34E-09	0.4311	100	1.0E-06	1	180	1	70	180	25550
Chrysene	6.15E-07	4.33E-09	0.4302	100	1.0E-06	1	180	1	70	180	25550
Benzo(b)fluoranthene	9.79E-07	6.90E-09	0.6856	100	1.0E-06	1	180	1	70	180	25550
Benzo(k)fluoranthene	5.58E-07	3.93E-09	0.3908	100	1.0E-06	1	180	1	70	180	25550
Benzo(a)pyrene	3.43E-07	2.42E-09	0.2400	100	1.0E-06	1	180	1	70	180	25550
Indeno(123cd)pyrene	6.13E-06	4.32E-08	4.2918	100	1.0E-06	1	180	1	70	180	25550
Bis(2ethylhexyl)phthalate	9.12E-06	6.43E-08	6.3869	100	1.0E-06	1	180	1	70	180	25550
Naphthalene	9.42E-07	6.64E-09	0.6593	100	1.0E-06	1	180	1	70	180	25550
Fluorene	8.60E-07	6.06E-09	0.6017	100	1.0E-06	1	180	1	70	180	25550
Phenanthrene	1.20E-06	8.42E-09	0.8366	100	1.0E-06	1	180	1	70	180	25550
Anthracene	2.14E-07	1.51E-09	0.1500	100	1.0E-06	1	180	1	70	180	25550
Fluoranthene	1.93E-06	1.36E-08	1.3511	100	1.0E-06	1	180	1	70	180	25550
Pyrene	1.73E-06	1.22E-08	1.2083	100	1.0E-06	1	180	1	70	180	25550
Benzo(ghi)perylene	6.13E-06	4.32E-08	4.2918	100	1.0E-06	1	180	1	70	180	25550
Diethylphthalate	1.57E-07	1.11E-09	0.1100	100	1.0E-06	1	180	1	70	180	25550
Di-n-butylphthalate	8.02E-06	5.65E-08	5.6167	100	1.0E-06	1	180	1	70	180	25550
Di-n-octylphthalate	2.86E-07	2.01E-09	0.2000	100	1.0E-06	1	180	1	70	180	25550
Butylbenzylphthalate	3.43E-07	2.42E-09	0.2400	100	1.0E-06	1	180	1	70	180	25550
P-Cresol	4.86E-07	3.42E-09	0.3400	100	1.0E-06	1	180	1	70	180	25550
Phenol	6.13E-06	4.32E-08	4.2918	100	1.0E-06	1	180	1	70	180	25550
INORGANICS											
Aluminium	1.89E-02	1.33E-04	13255.5	100	1.0E-06	1	180	1	70	180	25550
Antimony	3.26E-05	2.29E-07	22.8	100	1.0E-06	1	180	1	70	180	25550
Arsenic	9.86E-06	6.94E-08	6.9	100	1.0E-06	1	180	1	70	180	25550
Barium	1.70E-04	1.20E-06	118.8	100	1.0E-06	1	180	1	70	180	25550
Beryllium	1.14E-06	8.05E-09	0.80	100	1.0E-06	1	180	1	70	180	25550
Cadmium	1.14E-06	8.05E-09	0.80	100	1.0E-06	1	180	1	70	180	25550
Chromium	2.61E-05	1.84E-07	18.3	100	1.0E-06	1	180	1	70	180	25550
Cobalt	1.79E-05	1.26E-07	12.5	100	1.0E-06	1	180	1	70	180	25550
Copper	5.16E-05	3.63E-07	36.1	100	1.0E-06	1	180	1	70	180	25550
Lead	8.59E-05	6.05E-07	60.1	100	1.0E-06	1	180	1	70	180	25550
Manganese	1.79E-03	1.26E-05	1250.2	100	1.0E-06	1	180	1	70	180	25550
Mercury	0.00E+00	0.00E+00		100	1.0E-06	1	180	1	70	180	25550
Nickel	3.01E-05	2.12E-07	21.1	100	1.0E-06	1	180	1	70	180	25550
Selenium	5.71E-07	4.03E-09	0.4	100	1.0E-06	1	180	1	70	180	25550
Vandium	2.40E-05	1.69E-07	16.8	100	1.0E-06	1	180	1	70	180	25550
Zinc	1.92E-04	1.35E-06	134.1	100	1.0E-06	1	180	1	70	180	25550
PESTICIDES/PCBS											
4,4-DDE	5.87E-08	4.14E-10	0.0411	100	1.0E-06	1	180	1	70	180	25550
4,4-DDT	5.87E-08	4.14E-10	0.0411	100	1.0E-06	1	180	1	70	180	25550

TABLE J-4
DERMAL CONTACT WITH CHEMICALS IN SOIL

CHEMICAL	ABSORBED DOSE CHILD NONCANCER (mg/kg/day)	ABSORBED DOSE ADULT NONCANCER (mg/kg/day)	ABSORBED DOSE CHILD CANCER (mg/kg/day)	ABSORBED DOSE ADULT CANCER (mg/kg/day)	CONC. IN WATER (mg/liter)	SKIN SURFACE AREA CHILD (cm2/event)	SKIN SURFACE AREA ADULT (cm2/event)	DERMAL PERMEABILITY (cm/hr)	EXPOSURE TIME (hrs/day)	EXPOSURE FREQUENCY (days/year)	EXPOSURE DUR. CHILD (years)	EXPOSURE DUR. ADULT (years)	CONVERSION FACTOR (L/cm3)	BODY WT. CHILD (kg)	BODY WT. ADULT (kg)	AVG.TM.CHILD NONCANCER (days)	AVG.TM.ADULT NONCANCER (days)	AVG. TIME CANCER (days)
INORGANICS																		
Arsenic	1.83E-06	1.06E-06	1.57E-07	4.53E-07	0.024	7200	18150	8.4E-04	0.20	365	6	30	0.001	16.0	70	2190	10950	25550
VOLATILES																		
Chlorobenzene	5.95E-07	3.43E-07	5.10E-08	1.47E-07	0.008	7200	18150	8.4E-04	0.20	365	6	30	0.001	16.0	70	2190	10950	25550
Ethylbenzene	9.00E-07	5.19E-07	7.72E-08	2.22E-07	0.012	7200	18150	8.4E-04	0.20	365	6	30	0.001	16.0	70	2190	10950	25550
Toluene	7.48E-07	4.31E-07	6.41E-08	1.85E-07	0.010	7200	18150	8.4E-04	0.20	365	6	30	0.001	16.0	70	2190	10950	25550
Xylenes	1.15E-06	6.63E-07	9.86E-08	2.84E-07	0.015	7200	18150	8.4E-04	0.20	365	6	30	0.001	16.0	70	2190	10950	25550
SEMIVOLATILES																		
Benzo(a)anthracene	7.56E-07	4.36E-07	6.48E-08	1.87E-07	0.010	7200	18150	8.4E-04	0.20	365	6	30	0.001	16.0	70	2190	10950	25550
Benzo(a)pyrene	7.56E-07	4.36E-07	6.48E-08	1.87E-07	0.010	7200	18150	8.4E-04	0.20	365	6	30	0.001	16.0	70	2190	10950	25550
Benzo(b)fluoranthene	7.56E-07	4.36E-07	6.48E-08	1.87E-07	0.010	7200	18150	8.4E-04	0.20	365	6	30	0.001	16.0	70	2190	10950	25550
Benzo(k)fluoranthene	7.56E-07	4.36E-07	6.48E-08	1.87E-07	0.010	7200	18150	8.4E-04	0.20	365	6	30	0.001	16.0	70	2190	10950	25550
Bis(2ethylhexyl)phthalate	1.05E-06	6.04E-07	8.98E-08	2.59E-07	0.014	7200	18150	8.4E-04	0.20	365	6	30	0.001	16.0	70	2190	10950	25550
Chrysene	7.56E-07	4.36E-07	6.48E-08	1.87E-07	0.010	7200	18150	8.4E-04	0.20	365	6	30	0.001	16.0	70	2190	10950	25550
Indeno(123cd)pyrene	7.56E-07	4.36E-07	6.48E-08	1.87E-07	0.010	7200	18150	8.4E-04	0.20	365	6	30	0.001	16.0	70	2190	10950	25550
p-Cresol	1.29E-06	7.43E-07	1.10E-07	3.18E-07	0.017	7200	18150	8.4E-04	0.20	365	6	30	0.001	16.0	70	2190	10950	25550
Anthracene	7.56E-07	4.36E-07	6.48E-08	1.87E-07	0.010	7200	18150	8.4E-04	0.20	365	6	30	0.001	16.0	70	2190	10950	25550
Diethylphthalate	2.62E-05	1.51E-05	2.25E-06	6.47E-06	0.347	7200	18150	8.4E-04	0.20	365	6	30	0.001	16.0	70	2190	10950	25550
Di-N-Butylphthalate	7.56E-07	4.36E-07	6.48E-08	1.87E-07	0.010	7200	18150	8.4E-04	0.20	365	6	30	0.001	16.0	70	2190	10950	25550
Fluoranthene	7.56E-07	4.36E-07	6.48E-08	1.87E-07	0.010	7200	18150	8.4E-04	0.20	365	6	30	0.001	16.0	70	2190	10950	25550
Naphthalene	1.09E-06	6.29E-07	9.36E-08	2.70E-07	0.014	7200	18150	8.4E-04	0.20	365	6	30	0.001	16.0	70	2190	10950	25550
Phenanthrene	7.56E-07	4.36E-07	6.48E-08	1.87E-07	0.010	7200	18150	8.4E-04	0.20	365	6	30	0.001	16.0	70	2190	10950	25550
Phenol	1.00E-06	5.78E-07	8.60E-08	2.48E-07	0.013	7200	18150	8.4E-04	0.20	365	6	30	0.001	16.0	70	2190	10950	25550
Pyrene	7.56E-07	4.36E-07	6.48E-08	1.87E-07	0.010	7200	18150	8.4E-04	0.20	365	6	30	0.001	16.0	70	2190	10950	25550
PESTICIDES																		
4,4'-DDE	7.80E-09	4.49E-09	6.69E-10	1.93E-09	0.0001	7200	18150	8.4E-04	0.20	365	6	30	0.001	16.0	70	2190	10950	25550
4,4'-DDT	7.80E-09	4.50E-09	6.69E-10	1.93E-09	0.0001	7200	18150	8.4E-04	0.20	365	6	30	0.001	16.0	70	2190	10950	25550

TABLE J-4
(continued)
DERMAL CONTACT WITH CHEMICALS IN SOIL

CHEMICAL	ABSORBED DOSE CHILD NONCANCER (mg/kg/day)	ABSORBED DOSE ADULT NONCANCER (mg/kg/day)	ABSORBED DOSE CHILD CANCER (mg/kg/day)	ABSORBED DOSE ADULT CANCER (mg/kg/day)	CONC. IN SOIL (mg/kg)	CONVERSION FACTOR (10E-6 kg/mg)	SKIN SURFACE AREA CHILD (cm2/event)	SKIN SURFACE AREA ADULT (cm2/event)	ADHERENCE FACTOR (mg/cm2)	ABSORPTION FACTOR (unitless)	EXPOSURE FREQUENCY (days/year)	EXPOSURE DUR. CHILD (years)	EXPOSURE DUR. ADULT (years)	BODY WT. CHILD (kg)	BODY WT. ADULT (kg)	AVG.TM.CHILD NONCANCER (days)	AVG.TM.ADULT NONCANCER (days)	AVG. TIME CANCER (days)
SEMIVOLATILES																		
Benzo(a)anthracene	2.2E-05	1.5E-05	1.9E-06	6.5E-06	0.77	1.0E-06	3146	9440	1.45	0.10	365	6	30	16.0	70	2190	10950	25550
Chrysene	2.5E-05	1.7E-05	2.1E-06	7.3E-06	0.87	1.0E-06	3146	9440	1.45	0.10	365	6	30	16.0	70	2190	10950	25550
Benzo(b)fluoranthene	2.6E-05	1.8E-05	2.3E-06	7.8E-06	0.93	1.0E-06	3146	9440	1.45	0.10	365	6	30	16.0	70	2190	10950	25550
Benzo(k)fluoranthene	2.8E-06	1.9E-06	2.4E-07	8.2E-07	0.10	1.0E-06	3146	9440	1.45	0.10	365	6	30	16.0	70	2190	10950	25550
Benzo(a)pyrene	2.8E-05	1.9E-05	2.4E-06	8.1E-06	0.97	1.0E-06	3146	9440	1.45	0.10	365	6	30	16.0	70	2190	10950	25550
Indeno(123cd)pyrene	2.0E-05	1.4E-05	1.8E-06	6.0E-06	0.72	1.0E-06	3146	9440	1.45	0.10	365	6	30	16.0	70	2190	10950	25550
Bis(2ethylhexyl)phthalate	4.7E-05	3.2E-05	4.0E-06	1.4E-05	1.64	1.0E-06	3146	9440	1.45	0.10	365	6	30	16.0	70	2190	10950	25550
					2.17													
Naphthalene	6.7E-05	4.6E-05	5.8E-06	2.0E-05	2.35	1.0E-06	3146	9440	1.45	0.10	365	6	30	16.0	70	2190	10950	25550
Fluorene	1.3E-06	9.0E-07	1.1E-07	3.9E-07	0.05	1.0E-06	3146	9440	1.45	0.10	365	6	30	16.0	70	2190	10950	25550
Phenanthrene	3.3E-05	2.3E-05	2.8E-06	9.7E-06	1.16	1.0E-06	3146	9440	1.45	0.10	365	6	30	16.0	70	2190	10950	25550
Anthracene	3.7E-06	2.5E-06	3.2E-07	1.1E-06	0.13	1.0E-06	3146	9440	1.45	0.10	365	6	30	16.0	70	2190	10950	25550
Fluoranthene	6.5E-05	4.4E-05	5.5E-06	1.9E-05	2.26	1.0E-06	3146	9440	1.45	0.10	365	6	30	16.0	70	2190	10950	25550
Pyrene	6.6E-05	4.5E-05	5.7E-06	1.9E-05	2.32	1.0E-06	3146	9440	1.45	0.10	365	6	30	16.0	70	2190	10950	25550
Benzo(ghi)perylene	2.1E-05	1.4E-05	1.8E-06	6.0E-06	0.72	1.0E-06	3146	9440	1.45	0.10	365	6	30	16.0	70	2190	10950	25550
Acenapthene	1.8E-06	1.2E-06	1.5E-07	5.2E-07	0.06	1.0E-06	3146	9440	1.45	0.10	365	6	30	16.0	70	2190	10950	25550
Diethylphthalate	1.2E-06	8.4E-07	1.1E-07	3.6E-07	0.04	1.0E-06	3146	9440	1.45	0.10	365	6	30	16.0	70	2190	10950	25550
Di-n-butylphthalate	2.6E-06	1.8E-06	2.2E-07	7.5E-07	0.09	1.0E-06	3146	9440	1.45	0.10	365	6	30	16.0	70	2190	10950	25550
INORGANICS																		
Arsenic	1.3E-03	8.9E-04	1.1E-04	3.8E-04	45.40	1.0E-06	3146	9440	1.45	0.10	365	6	30	16.0	70	2190	10950	25550
PESTICIDES/PCBS																		
4,4-DDE	9.7E-06	6.7E-06	8.3E-07	2.9E-06	0.34	1.0E-06	3146	9440	1.45	0.10	365	6	30	16.0	70	2190	10950	25550
4,4-DDT	1.4E-05	9.6E-06	1.2E-06	4.1E-06	0.49	1.0E-06	3146	9440	1.45	0.10	365	6	30	16.0	70	2190	10950	25550

TABLE J-4
(continued)
INGESTION OF CHEMICALS IN SOIL AND HOUSE DUST

CHEMICAL	INTAKE CHILD NONCANCER (mg/kg/day)	INTAKE ADULT NONCANCER (mg/kg/day)	INTAKE CHILD CANCER (mg/kg/day)	INTAKE ADULT CANCER (mg/kg/day)	CONC. IN SOIL (mg/kg)	INGESTION RATE CHILD (mg/day)	INGESTION RATE ADULT (mg/day)	CONVERSION FACTOR (10E-6 kg/mg)	FRACTION INGESTED (unitless)	EXPOSURE FREQUENCY (days/year)	EXPOSURE DUR. CHILD (years)	EXPOSURE DUR. ADULT (years)	BODY WT. CHILD (kg)	BODY WT. ADULT (kg)	AVG.TM.CHILD NONCANCER (days)	AVG.TM.ADULT NONCANCER (days)	AVG. TIME CANCER (days)
SEMIVOLATILES																	
Benzo(a)anthracene	9.6E-06	1.1E-06	8.3E-07	4.7E-07	0.7717	200	100	1.0E-06	1.00	365	6	30	16.0	70	2190	10950	25550
Chrysene	1.1E-05	1.2E-06	9.3E-07	5.3E-07	0.8721	200	100	1.0E-06	1.00	365	6	30	16.0	70	2190	10950	25550
Benzo(b)fluoranthene	1.2E-05	1.3E-06	9.9E-07	5.7E-07	0.9265	200	100	1.0E-06	1.00	365	6	30	16.0	70	2190	10950	25550
Benzo(k)fluoranthene	1.2E-06	1.4E-07	1.1E-07	6.0E-08	0.0980	200	100	1.0E-06	1.00	365	6	30	16.0	70	2190	10950	25550
Benzo(a)pyrene	1.2E-05	1.4E-06	1.0E-06	5.9E-07	0.9659	200	100	1.0E-06	1.00	365	6	30	16.0	70	2190	10950	25550
Indeno(123cd)pyrene	9.0E-06	1.0E-06	7.7E-07	4.4E-07	0.7170	200	100	1.0E-06	1.00	365	6	30	16.0	70	2190	10950	25550
Bis(2ethylhexyl)phthalate	2.0E-05	2.3E-06	1.8E-06	1.0E-06	1.6371	200	100	1.0E-06	1.00	365	6	30	16.0	70	2190	10950	25550
Naphthalene	2.9E-05	3.4E-06	2.5E-06	1.4E-06	2.3548	200	100	1.0E-06	1.00	365	6	30	16.0	70	2190	10950	25550
Fluorene	5.8E-07	6.6E-08	4.9E-08	2.8E-08	0.0460	200	100	1.0E-06	1.00	365	6	30	16.0	70	2190	10950	25550
Anthracene	1.6E-06	1.9E-07	1.4E-07	8.0E-08	0.1300	200	100	1.0E-06	1.00	365	6	30	16.0	70	2190	10950	25550
Fluoranthene	2.8E-05	3.2E-06	2.4E-06	1.4E-06	2.2635	200	100	1.0E-06	1.00	365	6	30	16.0	70	2190	10950	25550
Pyrene	2.9E-05	3.3E-06	2.5E-06	1.4E-06	2.3202	200	100	1.0E-06	1.00	365	6	30	16.0	70	2190	10950	25550
Benzo(ghi)perylene	9.0E-06	1.0E-06	7.7E-07	4.4E-07	0.7200	200	100	1.0E-06	1.00	365	6	30	16.0	70	2190	10950	25550
Diethylphthalate	5.4E-07	6.1E-08	4.6E-08	2.6E-08	0.0430	200	100	1.0E-06	1.00	365	6	30	16.0	70	2190	10950	25550
Di-n-butylphthalate	1.1E-06	1.3E-07	9.6E-08	5.5E-08	0.0900	200	100	1.0E-06	1.00	365	6	30	16.0	70	2190	10950	25550
INORGANICS																	
Antimony	1.3E-04	1.5E-05	1.1E-05	6.4E-06	10.5	200	100	1.0E-06	1.00	365	6	30	16.0	70	2190	10950	25550
Arsenic	5.7E-04	6.5E-05	4.9E-05	2.8E-05	45.4	200	100	1.0E-06	1.00	365	6	30	16.0	70	2190	10950	25550
Barium	2.4E-03	2.7E-04	2.0E-04	1.2E-04	191.1	200	100	1.0E-06	1.00	365	6	30	16.0	70	2190	10950	25550
Beryllium	1.3E-05	1.4E-06	1.1E-06	6.1E-07	1.0	200	100	1.0E-06	1.00	365	6	30	16.0	70	2190	10950	25550
Cadmium	9.5E-05	1.1E-05	8.1E-06	4.7E-06	7.6	200	100	1.0E-06	1.00	365	6	30	16.0	70	2190	10950	25550
Chromium	6.3E-03	7.2E-04	5.4E-04	3.1E-04	502.4	200	100	1.0E-06	1.00	365	6	30	16.0	70	2190	10950	25550
Copper	2.0E-03	2.3E-04	1.7E-04	9.9E-05	161.5	200	100	1.0E-06	1.00	365	6	30	16.0	70	2190	10950	25550
Lead	7.3E-03	8.3E-04	6.2E-04	3.6E-04	581.5	200	100	1.0E-06	1.00	365	6	30	16.0	70	2190	10950	25550
Manganese	2.2E-02	2.5E-03	1.9E-03	1.1E-03	1732.6	200	100	1.0E-06	1.00	365	6	30	16.0	70	2190	10950	25550
Mercury	2.0E-05	2.3E-06	1.7E-06	9.8E-07	1.6	200	100	1.0E-06	1.00	365	6	30	16.0	70	2190	10950	25550
Nickel	8.1E-04	9.2E-05	6.9E-05	4.0E-05	64.7	200	100	1.0E-06	1.00	365	6	30	16.0	70	2190	10950	25550
Vandium	3.9E-04	4.5E-05	3.4E-05	1.9E-05	31.3	200	100	1.0E-06	1.00	365	6	30	16.0	70	2190	10950	25550
Zinc	2.3E-03	2.6E-04	2.0E-04	1.1E-04	183.0	200	100	1.0E-06	1.00	365	6	30	16.0	70	2190	10950	25550
PESTICIDES/PCBS																	
4,4-DDE	4.3E-06	4.9E-07	3.7E-07	2.1E-07	0.3416	200	100	1.0E-06	1.00	365	6	30	16.0	70	2190	10950	25550
4,4-DDT	6.1E-06	7.0E-07	5.3E-07	3.0E-07	0.4916	200	100	1.0E-06	1.00	365	6	30	16.0	70	2190	10950	25550

TABLE J-4
(continued)
INHALATION OF AIRBORNE (VAPOR PHASE) CHEMICALS

CHEMICAL	INTAKE CHILD NONCANCER (mg/kg/day)	INTAKE ADULT NONCANCER (mg/kg/day)	INTAKE CHILD CANCER (mg/kg/day)	INTAKE ADULT CANCER (mg/kg/day)	CONC. IN AIR (mg/m3)	INHALATION RATE (m3/hour)	EXPOSURE TIME (hours/day)	EXPOSURE FREQUENCY (days/year)	EXPOSURE DUR. CHILD (years)	EXPOSURE DUR. ADULT (years)	BODY WT. CHILD (kg)	BODY WT. ADULT (kg)	AVG.TM.CHILD NONCANCER (days)	AVG.TM.ADULT NONCANCER (days)	AVERAGING TIME (days)
VOLITILES															
Benzene	1.71E-04	3.91E-05	1.46E-05	1.67E-05	1.65E-02	0.83	0.2	365	6	30	16.0	70	2190	10950	25550
Xylenes	4.73E-04	1.08E-04	4.06E-05	4.64E-05	4.56E-02	0.83	0.2	365	6	30	16.0	70	2190	10950	25550
Ethylbenzene	3.71E-04	8.47E-05	3.18E-05	3.63E-05	3.57E-02	0.83	0.2	365	6	30	16.0	70	2190	10950	25550
Toluene	3.08E-04	7.04E-05	2.64E-05	3.02E-05	2.97E-02	0.83	0.2	365	6	30	16.0	70	2190	10950	25550
Chlorobenzene	2.45E-04	5.60E-05	2.10E-05	2.40E-05	2.36E-02	0.83	0.2	365	6	30	16.0	70	2190	10950	25550

TABLE J-4
(continued)
INDOOR INHALATION OF VOCs EMANATING FROM TAP WATER

CHEMICAL	Concentration in tap water (mg/L)	Flow Rate Of Shower Water (l/hr)	Fraction Of Contaminant Volatilized	One Half The Duration Of Shower (hr)	Bathroom Volume (m3)	Concentrartion In Bathroom (mg/m3)
VOLATILES						
Benzene	0.0055	400.0	0.9	0.1	12.0	1.6E-02
Chlorobenzene	0.0079	400.0	0.9	0.1	12.0	2.4E-02
Ethylbenzene	0.0119	400.0	0.9	0.1	12.0	3.6E-02
Toluene	0.0099	400.0	0.9	0.1	12.0	3.0E-02
Xylenes	0.0152	400.0	0.9	0.1	12.0	4.6E-02

TABLE J-4
(continued)
OUTDOOR INHALATION OF AIRBORNE CHEMICALS ADSORBED TO DUST

CHEMICAL	INTAKE CHILD NONCANCER (mg/kg/day)	INTAKE ADULT NONCANCER (mg/kg/day)	INTAKE CHILD CANCER (mg/kg/day)	INTAKE ADULT CANCER (mg/kg/day)	AMBIENT DUST CONC. (kg/m3)	CONC. IN SOIL (mg/kg)	INHALATION RATE (m3/hour)	EXPOSURE TIME (hours/day)	EXPOSURE FREQUENCY (days/year)	EXPOSURE DUR. CHILD (years)	EXPOSURE DUR. ADULT (years)	BODY WT. CHILD (kg)	BODY WT. ADULT (kg)	AVG.TM.CHILD NONCANCER (days)	AVG.TM.ADULT NONCANCER (days)	AVERAGING TIME (days)
SEMIVOLATILES																
Benzo(a)anthracene	1.67E-10	3.81E-11	1.43E-11	1.63E-11	1.04E-09	0.7717	0.83	4	365	6	30	16.0	70	2190	10950	25550
Chrysene	1.88E-10	4.30E-11	1.61E-11	1.84E-11	1.04E-09	0.8721	0.83	4	365	6	30	16.0	70	2190	10950	25550
Benzo(b)fluoranthene	2.00E-10	4.57E-11	1.71E-11	1.96E-11	1.04E-09	0.9265	0.83	4	365	6	30	16.0	70	2190	10950	25550
Benzo(k)fluoranthene	2.11E-11	4.83E-12	1.81E-12	2.07E-12	1.04E-09	0.0980	0.83	4	365	6	30	16.0	70	2190	10950	25550
Benzo(a)pyrene	2.08E-10	4.76E-11	1.79E-11	2.04E-11	1.04E-09	0.9659	0.83	4	365	6	30	16.0	70	2190	10950	25550
Indeno(123cd)pyrene	1.55E-10	3.54E-11	1.33E-11	1.52E-11	1.04E-09	0.7170	0.83	4	365	6	30	16.0	70	2190	10950	25550
Bis(2ethylhexyl)phthalate	3.53E-10	8.08E-11	3.03E-11	3.46E-11	1.04E-09	1.6371	0.83	4	365	6	30	16.0	70	2190	10950	25550
Naphthalene	5.08E-10	1.16E-10	4.36E-11	4.98E-11	1.04E-09	2.3548	0.83	4	365	6	30	16.0	70	2190	10950	25550
Fluorene	9.93E-12	2.27E-12	8.51E-13	9.72E-13	1.04E-09	0.0460	0.83	4	365	6	30	16.0	70	2190	10950	25550
Phenanthrene	2.50E-10	5.71E-11	2.14E-11	2.45E-11	1.04E-09	1.1571	0.83	4	365	6	30	16.0	70	2190	10950	25550
Anthracene	2.81E-11	6.41E-12	2.40E-12	2.75E-12	1.04E-09	0.1300	0.83	4	365	6	30	16.0	70	2190	10950	25550
Fluoranthene	4.88E-10	1.12E-10	4.19E-11	4.78E-11	1.04E-09	2.2635	0.83	4	365	6	30	16.0	70	2190	10950	25550
Pyrene	5.01E-10	1.14E-10	4.29E-11	4.90E-11	1.04E-09	2.3202	0.83	4	365	6	30	16.0	70	2190	10950	25550
Benzo(ghi)perylene	1.55E-10	3.55E-11	1.33E-11	1.52E-11	1.04E-09	0.7200	0.83	4	365	6	30	16.0	70	2190	10950	25550
Acenapthene	1.34E-11	3.06E-12	1.15E-12	1.31E-12	1.04E-09	0.0620	0.83	4	365	6	30	16.0	70	2190	10950	25550
Diethylphthalate	9.28E-12	2.12E-12	7.95E-13	9.09E-13	1.04E-09	0.0430	0.83	4	365	6	30	16.0	70	2190	10950	25550
Di-n-butylphthalate	1.94E-11	4.44E-12	1.66E-12	1.90E-12	1.04E-09	0.0900	0.83	4	365	6	30	16.0	70	2190	10950	25550
INORGANICS																
Aluminium	4.17E-06	9.53E-07	3.57E-07	4.08E-07	1.04E-09	19316.2	0.83	4	365	6	30	16.0	70	2190	10950	25550
Antimony	2.27E-09	5.18E-10	1.94E-10	2.22E-10	1.04E-09	10.5	0.83	4	365	6	30	16.0	70	2190	10950	25550
Arsenic	9.80E-09	2.24E-09	8.40E-10	9.60E-10	1.04E-09	45.4	0.83	4	365	6	30	16.0	70	2190	10950	25550
Barium	4.12E-08	9.43E-09	3.53E-09	4.04E-09	1.04E-09	191.1	0.83	4	365	6	30	16.0	70	2190	10950	25550
Beryllium	2.16E-10	4.93E-11	1.85E-11	2.11E-11	1.04E-09	1.0	0.83	4	365	6	30	16.0	70	2190	10950	25550
Cadmium	1.64E-09	3.75E-10	1.41E-10	1.61E-10	1.04E-09	7.6	0.83	4	365	6	30	16.0	70	2190	10950	25550
Chromium	1.08E-07	2.48E-08	9.29E-09	1.06E-08	1.04E-09	502.4	0.83	4	365	6	30	16.0	70	2190	10950	25550
Cobalt	3.97E-09	9.08E-10	3.40E-10	3.89E-10	1.04E-09	18.4	0.83	4	365	6	30	16.0	70	2190	10950	25550
Copper	3.49E-08	7.97E-09	2.99E-09	3.41E-09	1.04E-09	161.5	0.83	4	365	6	30	16.0	70	2190	10950	25550
Lead	1.25E-07	2.87E-08	1.08E-08	1.23E-08	1.04E-09	581.5	0.83	4	365	6	30	16.0	70	2190	10950	25550
Manganese	3.74E-07	8.55E-08	3.20E-08	3.66E-08	1.04E-09	1732.6	0.83	4	365	6	30	16.0	70	2190	10950	25550
Mercury	3.45E-10	7.89E-11	2.96E-11	3.38E-11	1.04E-09	1.6	0.83	4	365	6	30	16.0	70	2190	10950	25550
Nickel	1.40E-08	3.19E-09	1.20E-09	1.37E-09	1.04E-09	64.7	0.83	4	365	6	30	16.0	70	2190	10950	25550
Selenium	5.78E-09	1.32E-09	4.96E-10	5.67E-10	1.04E-09	26.8	0.83	4	365	6	30	16.0	70	2190	10950	25550
Vandium	6.75E-09	1.54E-09	5.79E-10	6.62E-10	1.04E-09	31.3	0.83	4	365	6	30	16.0	70	2190	10950	25550
Zinc	3.95E-08	9.03E-09	3.38E-09	3.87E-09	1.04E-09	183.0	0.83	4	365	6	30	16.0	70	2190	10950	25550
PESTICIDES/PCBS																
4,4-DDE	7.37E-11	1.68E-11	6.32E-12	7.22E-12	1.04E-09	0.3416	0.83	4	365	6	30	16.0	70	2190	10950	25550
4,4-DDT	1.06E-10	2.42E-11	9.09E-12	1.04E-11	1.04E-09	0.4916	0.83	4	365	6	30	16.0	70	2190	10950	25550

TABLE J-4
(continued)
INGESTION OF CHEMICALS IN DRINKING WATER

CHEMICAL	INTAKE CHILD NONCANCER (mg/kg/day)	INTAKE ADULT NONCANCER (mg/kg/day)	INTAKE CHILD CANCER (mg/kg/day)	INTAKE ADULT CANCER (mg/kg/day)	CONC. IN WATER (mg/liter)	INGESTION RATE CHILD (liters/day)	INGESTION RATE ADULT (liters/day)	EXPOSURE FREQUENCY (days/year)	EXPOSURE DUR. CHILD (years)	EXPOSURE DUR. ADULT (years)	BODY WT. CHILD (kg)	BODY WT. ADULT (kg)	AVG.TM.CHILD NONCANCER (days)	AVG.TM.ADULT NONCANCER (days)	AVG. TIME CANCER (days)
INORGANICS															
Aluminium	6.81E+00	4.12E+00	5.84E-01	1.77E+00	144.2	0.756	2.0	365	6	30	16.0	70	2190	10950	25550
Arsenic	1.15E-03	6.93E-04	9.83E-05	2.97E-04	0.0	0.756	2.0	365	6	30	16.0	70	2190	10950	25550
Barium	4.96E-02	3.00E-02	4.26E-03	1.29E-02	1.1	0.756	2.0	365	6	30	16.0	70	2190	10950	25550
Cadmium	1.77E-04	1.07E-04	1.51E-05	4.57E-05	0.0	0.756	2.0	365	6	30	16.0	70	2190	10950	25550
Chromium	1.59E-02	9.64E-03	1.37E-03	4.13E-03	0.3	0.756	2.0	365	6	30	16.0	70	2190	10950	25550
Copper	1.98E-02	1.19E-02	1.69E-03	5.12E-03	0.4	0.756	2.0	365	6	30	16.0	70	2190	10950	25550
Lead	1.08E-02	6.54E-03	9.27E-04	2.80E-03	0.2	0.756	2.0	365	6	30	16.0	70	2190	10950	25550
Manganese	7.60E+00	4.59E+00	6.51E-01	1.97E+00	160.8	0.756	2.0	365	6	30	16.0	70	2190	10950	25550
Mercury	3.49E-05	2.11E-05	2.99E-06	9.04E-06	0.0	0.756	2.0	365	6	30	16.0	70	2190	10950	25550
Nickel	8.60E-03	5.20E-03	7.37E-04	2.23E-03	0.2	0.756	2.0	365	6	30	16.0	70	2190	10950	25550
Vanadium	5.33E-03	3.22E-03	4.57E-04	1.38E-03	0.1	0.756	2.0	365	6	30	16.0	70	2190	10950	25550
Zinc	4.41E-02	2.66E-02	3.78E-03	1.14E-02	0.9	0.756	2.0	365	6	30	16.0	70	2190	10950	25550
VOLATILES															
Chlorobenzene	3.72E-04	2.25E-04	3.19E-05	9.63E-05	0.008	0.756	2.0	365	6	30	16.0	70	2190	10950	25550
Ethylbenzene	5.63E-04	3.40E-04	4.82E-05	1.46E-04	0.012	0.756	2.0	365	6	30	16.0	70	2190	10950	25550
Toluene	4.67E-04	2.83E-04	4.01E-05	1.21E-04	0.010	0.756	2.0	365	6	30	16.0	70	2190	10950	25550
Xylenes	7.19E-04	4.35E-04	6.16E-05	1.86E-04	0.015	0.756	2.0	365	6	30	16.0	70	2190	10950	25550
SEMIVOLATILES															
Benzo(a)anthracene	4.72E-04	2.86E-04	4.05E-05	1.22E-04	0.010	0.756	2.0	365	6	30	16.0	70	2190	10950	25550
Benzo(a)pyrene	4.72E-04	2.86E-04	4.05E-05	1.22E-04	0.010	0.756	2.0	365	6	30	16.0	70	2190	10950	25550
Benzo(b)fluoranthene	4.72E-04	2.86E-04	4.05E-05	1.22E-04	0.010	0.756	2.0	365	6	30	16.0	70	2190	10950	25550
Benzo(k)fluoranthene	4.72E-04	2.86E-04	4.05E-05	1.22E-04	0.010	0.756	2.0	365	6	30	16.0	70	2190	10950	25550
Bis(2-ethylhexyl)phthalate	6.55E-04	3.96E-04	5.61E-05	1.70E-04	0.014	0.756	2.0	365	6	30	16.0	70	2190	10950	25550
Chrysene	4.72E-04	2.86E-04	4.05E-05	1.22E-04	0.010	0.756	2.0	365	6	30	16.0	70	2190	10950	25550
Indeno(123cd)pyrene	4.72E-04	2.86E-04	4.05E-05	1.22E-04	0.010	0.756	2.0	365	6	30	16.0	70	2190	10950	25550
p-Cresol	8.05E-04	4.87E-04	6.90E-05	2.09E-04	0.017	0.756	2.0	365	6	30	16.0	70	2190	10950	25550
Anthracene	4.72E-04	2.86E-04	4.05E-05	1.22E-04	0.010	0.756	2.0	365	6	30	16.0	70	2190	10950	25550
Diethylphthalate	1.64E-02	9.90E-03	1.40E-03	4.24E-03	0.347	0.756	2.0	365	6	30	16.0	70	2190	10950	25550
Di-N-Butylphthalate	4.72E-04	2.86E-04	4.05E-05	1.22E-04	0.010	0.756	2.0	365	6	30	16.0	70	2190	10950	25550
Fluoranthene	4.72E-04	2.86E-04	4.05E-05	1.22E-04	0.010	0.756	2.0	365	6	30	16.0	70	2190	10950	25550
Naphthalene	6.83E-04	4.13E-04	5.85E-05	1.77E-04	0.014	0.756	2.0	365	6	30	16.0	70	2190	10950	25550
Phenol	6.27E-04	3.79E-04	5.37E-05	1.62E-04	0.013	0.756	2.0	365	6	30	16.0	70	2190	10950	25550
Pyrene	4.72E-04	2.86E-04	4.05E-05	1.22E-04	0.010	0.756	2.0	365	6	30	16.0	70	2190	10950	25550
PESTICIDES															
4,4'-DDE	4.88E-06	2.95E-06	4.18E-07	1.26E-06	0.0001	0.756	2.0	365	6	30	16.0	70	2190	10950	25550
4,4'-DDT	4.88E-06	2.95E-06	4.18E-07	1.26E-06	0.0001	0.756	2.0	365	6	30	16.0	70	2190	10950	25550

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX K

SURVEY DATA

THIS PAGE INTENTIONALLY LEFT BLANK

C.T. MALE ASSOCIATES, P.C.
50 CENTURY HILL DRIVE
LATHAM, NEW YORK 12110
(518) 786-7400

COMPILED: 09-16-90==>09:33:45

CTM PROJECT #: 90 - 3145
TAMS - HERTEL LANDFILL

PROJECT MANAGER: BRUCE E. WURZ

TEST PITS

LOCTN.	NORTHING	EASTING	ELEV.
TP-1	614816.07	580841.23	623.7
----	614822.46	580844.90	623.6
	614815.99	580857.23	621.4
	614810.59	580854.40	621.4
TP-2	614961.65	580863.74	623.5
----	614969.76	580867.09	623.4
	614964.93	580899.76	623.9
	614957.19	580896.67	623.9
TP-3	615107.46	580754.54	630.2
----	615118.55	580756.80	629.9
	615118.56	580775.10	628.3
	615105.71	580772.51	626.7
TP-4	614997.59	580716.03	629.7
----	615016.29	580722.27	629.7
	615011.95	580733.09	629.3
	614991.40	580727.45	629.2
TP-5	614903.30	580819.94	623.6
----	614898.72	580831.23	623.4
	614892.08	580826.91	623.7
	614895.57	580818.43	623.7
TP-6	614787.48	580758.85	625.1
----	614782.18	580753.39	625.7
	614790.44	580742.50	627.0
	614796.79	580749.04	626.5
TP-7	614722.90	580747.97	625.3
----	614728.63	580753.22	625.2
	614717.24	580763.20	624.4
	614710.24	580756.87	623.5
TP-8	615491.59	581168.22	615.4
----	615496.62	581159.95	614.9
	615477.66	581152.88	614.7

	615482.70	581145.42	615.2
TP-9	614621.14	580625.14	627.7
----	614617.49	580616.85	628.4
	614607.81	580620.92	627.8
	614613.00	580628.23	627.6
TP-10	615111.63	580534.97	640.0
-----	615099.19	580533.45	640.6
	615103.43	580513.00	640.7
	615116.10	580518.69	640.7
TP-11	615343.59	580807.54	622.4
-----	615355.30	580789.60	621.9
	615344.28	580782.01	622.5
	615332.96	580800.78	622.4
TP-12	614885.69	580354.94	656.1
-----	614878.00	580347.35	656.8
	614867.54	580361.77	656.2
	614881.22	580369.75	655.3
TP-13	615171.49	580380.21	653.3
-----	615151.75	580382.47	652.7
	615154.82	580399.33	652.5
	615176.56	580397.17	651.1
TP-14	614764.47	580240.17	666.5
-----	614756.06	580247.27	665.3
	614747.02	580236.37	666.7
	614756.23	580230.34	667.4
TP-15	614913.16	580880.55	622.9
-----	614917.45	580874.96	622.9
	614931.12	580885.55	623.8
	614926.70	580891.22	623.4
TP-16	614787.13	580369.76	656.6
-----	614795.90	580361.60	656.3
	614808.48	580373.59	656.4
	614796.32	580384.19	655.4
TP-17	614644.39	580305.88	655.0
-----	614654.82	580305.09	655.3
	614656.62	580324.56	654.9
	614645.06	580324.71	654.4
TP-18	615271.54	580561.40	638.4
-----	615282.64	580567.60	637.5
	615292.23	580551.28	637.6
	615279.79	580543.81	638.9

C.T. MALE ASSOCIATES, P.C.
50 CENTURY HILL DRIVE
LATHAM, NEW YORK 12110
(518) 786-7400

COMPILED: 09-18-90==>09:33:45

CTM PROJECT #: 90 - 3145
TAMS - HERTEL LANDFILL

PROJECT MANAGER: BRUCE E. WURZ

SURFACE SAMPLES

S.S.#	NORTHING	EASTING	ELEV.
1	615489.20	581147.53	616.1
2	615506.47	581107.89	615.5
3	615093.71	581002.87	615.9
4	615039.32	580926.25	623.6
5	615085.24	580752.03	629.7
7	615162.79	580533.84	640.6
9	615364.30	580623.57	624.8
10	614893.86	580706.19	629.6
11	614994.37	580712.87	629.8
12	614943.54	580504.32	640.6
13	614844.78	580865.07	622.2
16	614675.32	580695.00	624.0
18	614830.69	580737.31	627.5
19	614882.50	580860.81	623.3
20	615006.37	580249.02	659.4
21	615137.00	580284.13	661.8
22	614802.63	579869.13	676.7
23	615212.94	580420.43	649.5
24	615178.42	580366.97	654.8
25	613982.51	580379.04	641.3
26	613420.43	580214.94	659.4
27	613379.51	580326.52	666.6

MONITOR WELL LOCATIONS

LOCTN.	NORTHING	EASTING	ELEV.
MW-W1S	615179.72	581020.70	619.3 ==> GROUND
			622.37 ==> OUTSIDE CASING
			621.78 ==> INSIDE CASING
MW-W1D	615169.35	581029.90	619.0 ==> GROUND

C.T. MALE ASSOCIATES, P.C.
50 CENTURY HILL DRIVE
LATHAM, NEW YORK 12110
(518) 786-7400

COMPILED: 09-18-90==>09:33:45

CTM PROJECT #: 90 - 3145
TAMS - HERTEL LANDFILL

PROJECT MANAGER: BRUCE E. WURZ

SURFACE WATER / SEDIMENT SAMPLE LOCATIONS

SAMPLE #	NORTHING	EASTING	ELEV
1	614124.10	579274.87	669.4
2	614032.51	579458.90	672.4
3	614034.37	579567.57	672.5
4	613843.23	580025.20	644.8
5	614015.88	580126.98	644.5
6	614525.82	580068.24	616.7
7	614840.90	580975.11	614.3
8	615009.24	581051.73	614.4
9	615195.13	581158.11	613.4
10	615462.30	580851.17	615.1
11	615435.66	580933.51	615.4
12	615537.10	581066.39	614.2
13	615716.56	581211.03	613.5
14	615846.52	581207.66	613.2
15	615514.31	581332.88	612.9
16	615301.61	581454.67	612.2
17	615288.01	582028.09	578.1
18	615403.20	582362.08	555.9
19	615446.19	582739.02	563.7
20	615929.76	582474.75	563.2

C.T. MALE ASSOCIATES, P.C.
50 CENTURY HILL DRIVE
LATHAM, NEW YORK 12110
(518) 786-7400

COMPILED: 09-18-90==>09:33:45

CTM PROJECT #: 90 - 3145
TAMS - HERTEL LANDFILL

PROJECT MANAGER: BRUCE E. WURZ

EXPLORATION PITS

LOCTN.	NORTHING	EASTING	ELEV.
EP-1	614487.29	580406.77	638.6
	614479.55	580409.84	638.4
	614472.07	580393.17	639.9
	614483.71	580389.30	640.0
EP-2	614095.15	580294.60	643.5
	614081.66	580296.65	644.4
	614086.34	580314.29	642.6
	614099.31	580310.89	642.2
EP-3	613205.53	580450.24	665.5
	613190.85	580470.09	664.5
	613178.97	580480.19	668.8
	613193.84	580493.29	673.2
EP-4	613209.75	580108.04	658.1
	613219.20	580119.89	659.6
	613237.55	580109.95	657.8
	613232.81	580098.07	657.1
EP-5	613808.80	580382.13	647.9
	613829.70	580385.15	646.9
	613830.11	580352.00	646.6
	613811.10	580355.30	647.1
EP-6	614840.93	579907.51	678.0
	614849.35	579902.56	677.9
	614852.66	579911.44	678.7
	614842.95	579915.00	678.5
EP-7	615114.54	580148.10	680.7
	615122.12	580125.45	681.9
	615133.01	580130.25	682.1
	615128.50	580155.16	680.2

			621.29 ==> OUTSIDE CASING
			621.27 ==> INSIDE CASING
MW-1S	614833.50	579972.75	679.9 ==> GROUND
			682.49 ==> OUTSIDE CASING
			681.90 ==> INSIDE CASING
MW-1D	614888.64	579983.60	682.2 ==> GROUND
			685.27 ==> OUTSIDE CASING
			684.84 ==> INSIDE CASING
MW-W2S	614794.58	580879.46	616.4 ==> GROUND
			618.93 ==> OUTSIDE CASING
			618.61 ==> INSIDE CASING
MW-W2D	614788.41	580878.84	615.9 ==> GROUND
			618.37 ==> OUTSIDE CASING
			618.35 ==> INSIDE CASING
MW-2S	616276.77	581327.05	622.4 ==> GROUND
			625.04 ==> OUTSIDE CASING
			623.76 ==> INSIDE CASING
MW-2D	616224.22	581327.35	621.0 ==> GROUND
			624.12 ==> OUTSIDE CASING
			624.00 ==> INSIDE CASING
MW-W3S	614885.93	579634.77	673.6 ==> GROUND
			675.41 ==> OUTSIDE CASING
			675.07 ==> INSIDE CASING
MW-3S	614249.16	580362.69	636.1 ==> GROUND
			639.38 ==> OUTSIDE CASING
			639.27 ==> INSIDE CASING
MW-3D	614253.34	580393.50	634.1 ==> GROUND
			636.46 ==> OUTSIDE CASING
			636.29 ==> INSIDE CASING
MW-5S	615114.05	580383.32	654.6 ==> GROUND
			657.05 ==> OUTSIDE CASING
			656.56 ==> INSIDE CASING
MW-6S	615117.36	580720.53	631.0 ==> GROUND
			634.31 ==> OUTSIDE CASING
			632.86 ==> INSIDE CASING
MW-6D	615115.76	580739.53	630.7 ==> GROUND
			633.64 ==> OUTSIDE CASING
			633.62 ==> INSIDE CASING
MW-7S	614860.14	580525.09	640.6 ==> GROUND
			644.02 ==> OUTSIDE CASING
			642.40 ==> INSIDE CASING

MW-7D	614867.68	580527.97	640.5	==> GROUND
			643.43	==> OUTSIDE CASING
			643.18	==> INSIDE CASING
MW-8S	615337.85	580862.86	619.3	==> GROUND
			621.99	==> OUTSIDE CASING
			621.10	==> INSIDE CASING
MW-9S	614461.60	580633.16	622.4	==> GROUND
			625.51	==> OUTSIDE CASING
			624.31	==> INSIDE CASING
MW-10D	614686.19	580756.02	618.8	==> GROUND
			622.40	==> OUTSIDE CASING
			621.10	==> INSIDE CASING
MW-10S	614689.04	580782.08	616.0	==> GROUND
			617.85	==> OUTSIDE CASING
			617.17	==> INSIDE CASING
MW-11S	614934.36	580933.01	617.3	==> GROUND
			620.16	==> OUTSIDE CASING
			618.99	==> INSIDE CASING
MW-11D	614920.42	580921.67	618.4	==> GROUND
			622.30	==> OUTSIDE CASING
			620.96	==> INSIDE CASING
MW-12S	615249.05	581008.30	618.6	==> GROUND
			621.49	==> OUTSIDE CASING
			620.48	==> INSIDE CASING
MW-13	615488.77	581173.23	615.6	==> GROUND
			618.66	==> OUTSIDE CASING
			617.41	==> INSIDE CASING

LEACHATE SAMPLES

L.S.#	NORHTING	EASTING	ELEV.
21	614575.36	580665.59	617.9
22	614749.88	580850.90	624.4
23	614839.44	580907.85	614.9
24	615055.07	580991.95	614.0
25	615389.63	581123.06	612.8
26	614571.56	580344.55	637.5

PIEZOMETERS

METER#	NORTHING	EASTING	ELEV.
1	615698.45	581242.20	616.4 ==> GROUND
			618.75 ==> OUTSIDE CASING
			617.93 ==> INSIDE CASING
2	614494.82	580428.61	637.6 ==> GROUND
			640.31 ==> OUTSIDE CASING
			639.10 ==> INSIDE CASING
3	614175.66	580519.34	629.5 ==> GROUND
			632.81 ==> OUTSIDE CASING
			631.51 ==> INSDIE CASING
4	614046.35	580187.70	647.3 ==> GROUND
			650.73 ==> OUTSIDE CASING
			649.27 ==> INSIDE CASING

LOCTN.	NORTHING	EASTING	ELEV.
EP-2	614097.10	580299.56	642.8 ==> GROUND
			645.34 ==> TOP OF PIPE
EP-4	613217.95	580165.84	657.6 ==> GROUND
			661.63 ==> TOP OF PIPE
EP-5	613814.03	580364.55	646.6 ==> GROUND
			649.82 ==> TOP OF PIPE