ETE Sanitation And Landfill

Town Of Gainesville, New York

Final Remedial Investigation Report

NYSDEC Site #9-61-005
Work Assignment #D002925-24

Prepared For:

New York State
Department Of Environmental Conservation
50 Wolf Road, Albany, New York 12233

John P. Cahill
Commissioner

Prepared By:

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September 1998

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September 10, 1998

Mr. Shive Mittal, P.E.
Bureau of Western Remedial Action
Division of Environmental Remediation
NYSDEC
50 Wolf Road
Albany, New York 12233-7010

Subject: ETE Sanitation and Landfill
Remedial Investigation Report Comments and
Additional Surface Water / Sediment Sampling

Dear Mr. Mittal:

Camp Dresser and McKee, Inc. (CDM) has received your comments on the draft version of the ETE Sanitation and Landfill Remedial Investigation (RI) report. CDM is pleased to submit seven copies of the Final Remedial Investigation Report for your review. This report has been completed in accordance with the November 1997 Final RI/FS Work Plan.

Response to comments which warrant further explanation and are not specifically addressed in the RI, include:

Comment 3: Extent of Waste: Total quantity of waste material and quantity of waste below water should be specified.

Response: An estimate of the volume of waste has been provided. However this approximation is based on only two boring locations (MW-8S and PZ-3) completed in the landfilled portion of the site. Test pits were completed along the fringe areas of the waste mass and provide limited waste thickness data for the central portions of the site. In order to improve the accuracy of the "total volume of waste" calculations, additional soil borings would be required to determine the thickness of waste in various sections of the landfill.

Comment 14: The entrance to N/F Keenan's property is shown to be from the Town of Gainesville property. Is this correct?

Response: Based upon the survey completed by our subcontracor, YEC Inc., figure 3-2 accurately shows property boundaries for lots found adjacent to the landfill.

Comment 21: The west central portion of the landfill need not be treated as a hot spot at this point in time.

Response: At the request of NYSDEC, CDM will remove this recommendation from the RI report.

Comment 22: The additional round of surface water samples, and three to four surface water and sediment samples from the off-site drainage ditch leaving the northern property line during dry weather may be appropriate.

Response: At the request of the NYSDEC, CDM has provided the NYSDEC with a summary of supplemental remedial investigation work to be completed.

Comment 25: Plate V: Please include all VOC data for surface water / sediment on Plate V.

Response: Upon review of the VOC results for surface water and sediment, CDM in consultation with NYSDEC determined that revisions to this plate are unnecessary. No VOCs were detected in surface water samples and only a limited number of VOCs were detected in sediment samples. VOC detections in the sediment samples are shown in Table 4-4, Summary of Sediment Sample Detections.

Comment 26: Appendix B and C: to maintain the privacy of the individuals, DOH cover letters and questionnaires should be removed from the report.

Response: DOH cover letters addressed to private well owners have been removed from the Appendix A. Private well survey questionnaires have been removed from Appendix C and replaced with a private well identification list which includes only the street addresses of private wells identified by the survey.

If you have any questions, please do not hesitate to call me at 516-496-8400.

Very truly yours,

CAMP DRESSER & McKEE

/for

Thomas P. Fox, P.G.
Project Manager

cc: L. Guterman
B. Murtagh

Executive Summary

Camp Dresser & McKee (CDM) has been retained by the New York State Department of Environmental Conservation (NYSDEC) to prepare this Remedial Investigation (RI) Report for the ETE Landfill under the New York State Superfund Contract (Work Assignment #D002925-24). The RI was conducted between March and June 1998, in accordance with the NYSDEC Remedial Investigation/Feasibility Study (RI/FS) approved November 1998 work plan and Site Operations Plan. This RI Report discusses the findings of the RI and presents conclusions based on the results of the RI.

The objective of this remedial investigation was to determine the nature, extent and degree of contamination present at the ETE Sanitation and Landfill site and the potential health risks associated with site contaminants. Potential releases of contaminants from the site were considered with respect to surface water, sediment, soil, groundwater and air quality.

History and Physical Characteristics

- The ETE Sanitation and Landfill site is located in a rural area where private water wells and springs are used by residents for drinking water living within a one mile radius of the site.

- Operating as a private landfill by ETE Corporation from 1972 to 1979, industrial and municipal solid wastes were landfilled at the site. All landfilling activities ceased by 1979 though the landfill was not closed in accordance with NYSDEC regulations. Historical records document the disposal of drums containing leaded paint sludge and waste salt. Drummed plating wastes and solvents may have also been landfilled onsite. In 1991, NYSDEC performed a drum removal action at the site.

- The landfill was constructed on top of unconsolidated glacial sediments which are primarily composed of clay rich Glacial tills, with minor beds of more permeable sand and gravel. The hydraulic conductivity of native soils ranged from 10^{-4} to 10^{-6} cm/sec. The landfill appears to have been constructed in a natural depression running north to south between two small ponds, referred to as the North and South Pond.

- Groundwater flow direction is controlled by regional topography and local hydrogeology. In response to regional topography, groundwater tends to flow north-northeast towards the Cotton Creek valley. Local hydrogeologic effects on groundwater flow direction include local groundwater recharge due to the hydraulic head of the south pond and the slight mounding of water which occurs within the saturated waste. As a result, groundwater flow direction within the western portion of the site appears to be north-northwest. Surface water drainage from the landfill is generally south to north with surface water flowing into a small tributary of Cotton Creek located 0.75 miles north of the site.

Nature and Extent of Contamination

- *Extent of Waste*: Based on completed test pits and borings, approximately seven acres of the site contains landfilled material consisting of both municipal and industrial solid wastes. With only two borings drilled through the landfilled area of the site, only a rough approximation of the landfill volume could be made. The estimat volume of waste has been made using limited data points and should, therefore, be co ered a crude estimate of the volume of waste. It is estimated that the ETE Landfill cor s roughly 2.5 million cubic feet of waste. Approximately 1.5 million cubic feet of waste lies below the water table. These estimates assume that the central portion of the landfill averages a waste thickness of 12 feet with outlying waste areas averaging 5 feet in thickness. Waste appears to extend underneath the South Pond along the ponds northern edge into an offsite property. The extent of waste lying beneath the South Pond could not be accurately determined. Based upon limited site data, a crude estimate of the waste volume extending offsite was calculated to be 336,000 to 448,000 cubic feet of waste using waste thicknesses of 6 to 8 feet underlying the northern portion of the South Pond. No other offsite disposal areas were identified. The waste is approximately fifteen (15) feet thick within the center of the landfill and tends to thin towards the perimeter of the landfill. Due to the relatively shallow water table at the site, the majority of the waste is situated below the water table as the geologic cross sections in Plate II show. Wastes are covered with a silty clay soil approximately two to one foot in thickness, though waste is exposed within portions of the landfills northern slope.

- *Leachate Generation*: Infiltration of rainwater into the underlying municipal solid waste produces an estimated 5,325 gallons of leachate per day, based on simple computer model simulations. This estimate does not consider leachate generation through infiltration of groundwater or surface water which is estimated to contribute an additional 17,608 gallons of leachate. Therefore, the total production of leachate may be significantly higher due to groundwater and surface water contact with the landfilled materials. The calculation to determine leachate generations through infiltration of groundwater and surface water is an overly conservative estimate which assumes a stable water table, a uniform thickness of waste and the maximum width of the South Pond which can contribute water to leachate production.

- *Surface Water Characterization*: Offsite migration of contaminants via the surface water pathway is a significant concern given site surface water eventually discharges to Cotton Creek. Cotton Creek and Oatka Creek, in which Cotton Creek eventually flows into, are designated as Class-C surface waters and both used for recreational purposes. Additionally, surface water may be used as a potable water source downgradient of the site. Surface water leaving the landfill flows northward away from the South and North Ponds ultimately discharging into Cotton Creek. Sample results indicate impacts to surface water quality in the North Pond due to inorganic contaminants. Additionally, surface waters may be used as a potable water source downgradient of the site. Aluminum, iron and zinc were found at concentrations nearly ten times respective of Class C water quality standards. Sodium was found at approximately twice the concentration of upgradient samples in the eastern drainage channel which also drains the Town of Gainesville road salting operation located southeast of the site. Additionally, this sample exhibited a salinity concentration of 0.20 percent compared to 0.00 percent for the upgradient sample indicating the Town property may be contributing to the inorganic contamination observed within the eastern drainage channel.

  One surface water sample was taken from the South Pond. No exceedances of Class C water standards were noted. However, landfill wastes appear to extend into the South Pond.

- *Surface Water Sediment Characterization*: Volatile organic compounds (VOCs), acetone, methylene chloride, 2-butanone, ethylbenzene and xylene were detected in collected surface water sediment samples with the exception of SD-1 which is the most downgradient sample. The highest VOC contamination was observed within sediment samples collected from the North Pond with total VOC concentrations ranging from 65 ug/kg to 716 ug/kg. Additionally, the one sediment sample collected from the eastern drainage channel exhibited a total VOC concentration of 135 ug/kg. This data suggests that VOCs released from the landfill either through leachate discharge or groundwater discharge are accumulating within the organic rich surface water sediment downgradient of the landfill. Additionally, the one sediment sample collected from the South Pond contained acetone as well as methylene chloride, indicating that landfill wastes may be impacting this surface water body.

  NYSDEC currently does not have cleanup criteria for most VOCs detected within the sediment with the exception of ethyl benzene and xylene. Detected concentrations of both VOCs were below their respective cleanup criteria.

  A number of inorganic contaminants exceed NYSDEC sediment cleanup criteria within all collected sediment samples. The most prevalent contaminants being: copper, iron, manganese, and zinc. The most significant exceedances are observed in sediment collected from the North Pond and the eastern drainage channel with iron, manganese and zinc exceeding the NYSDEC's severe effect criteria for sediment contaminants. Based on contaminant distribution, the North Pond appears to act as a settling basin for inorganic contaminants, effectively minimizing impacts to downgradient surface water sediments.

- *Leachate Surface Soil Characterization*: Soils in the vicinity of SU-1, SU-2, SU-3, and SU-4 have been impacted by leachate seeps emanating from the north toe of the landfill. The detected concentrations of VOCs and semivolatile organics were highest in SU-1 and SU-2 located along the western portion of the north toe seepage face. However, the only exceedance for NYSDEC soil cleanup criteria for VOCs and semivolatiles was xylene at SU-1. The VOCs identified at SU-1 and SU-2 are similar to VOCs detected within monitoring well MW-8S and gas probe GP-4, both of which are upgradient of the samples. SU-4 was the only location where significant inorganic contamination was observed with barium, cobalt, manganese and selenium exceeding soil cleanup objectives.

- *Test Pit Soil Sample Result*: Four soil samples were collected during the completion of the 17 test pits. VOCs were detected within all collected samples at concentrations below respective NYSDEC soil cleanup standards. VOCs detected included acetone, 2-butanone, ethylbenzene and xylene. A number of inorganic contaminants were present within the soil samples above soil cleanup standards, including: arsenic, beryllium, copper, iron, nickel and zinc. In general, the contaminant concentrations detected within the four soil samples would not be considered indicative of an industrial/hazardous waste release and would be considered typical of contamination observed within a municipal solid waste landfill.

- *Groundwater Characterization*: Groundwater transport of contaminants from the landfill is the most significant offsite migration pathway given the proximity of the landfill to a number of private wells located downgradient of the site. Additionally, contaminants within groundwater may discharge to surface water bodies downgradient of the landfill, such as Cotton Creek, that are used as a source of drinking water or for recreational purp ses.

Contaminant distribution within site groundwater indicates that the majority of contamination is limited to the landfill wastes located within the west central portion of the landfill and in downgradient shallow groundwater. Exceedances of NYSDEC GA groundwater standards were most frequently noted in monitoring wells screened within the landfill wastes and shallow water table aquifer. Clay-rich glacial tills which comprise a majority of site stratigraphy appear to limit the downward vertical migration of groundwater contamination within the site. Several VOCs were observed in all deep, downgradient, monitoring wells indicating that some vertical contaminant migration is occurring. However, no exceedances of Class-GA groundwater standards for VOCs were observed in the deep monitoring wells.

Monitoring well MW-8S, screened in the shallow water table aquifer and waste, exhibited the highest observed volatile organic concentrations within the landfill, with a total VOC concentration of 5,394 ug/l . The majority of VOCs detected within groundwater are known to be used in paint manufacturing and as paint solvents and are likely attributable to the documented disposal of drummed paint sludge.

The areal distribution of the groundwater VOC plume is not completely defined. Groundwater may flow in a north- northwestern direction downgradient from monitoring well MW-8S, where numerous VOC exceedances were noted. No monitoring wells are located north-northwest of MW-8S. Additionally, downgradient shallow groundwater wells, MW-3S, MW-7S and MW-9S all exhibit VOC contamination in excess of GA groundwater standards.

Inorganic contaminants found in excess of NYSDEC GA groundwater standards included: antimony, barium, cadmium, iron, lead, magnesium, manganese, sodium and thalium. As with VOCs, the greatest inorganic contamination is observed within and immediately downgradient of the landfill. However, with the exception of sodium and iron, landfill related inorganic contaminants do not appear to be significantly impacting water quality within the deep monitoring wells. Heavy metals such as lead and cadmium would not be expected to migrate offsite due to their relatively low mobility. Data from downgradient wells MW-7 and MW-9 support this assumption with no heavy metal contaminants observed above GA groundwater standards.

Based on their relatively high mobility and observed concentrations within groundwater, the principal contaminants of concern in the groundwater include: acetone, 2-butanone, benzene, 4-Methyl-2-pentanone, 2-hexanone, toluene, trichloroethene, 1,2-dichloroethene, chlorobenzene, ethylbenzene, xylenes, phenol, 2-methylphenol, 4-methylphenol and 2,4-Dimethylphenol. Though the listed contaminants are relatively mobile within groundwater, the majority tend to degrade through biodegradation processes under favorable aerobic conditions.

- *Soil Gas Characterization*: Soil gas analysis was limited to VOCs. VOCs were detected in all four of the temporary soil gas probes sampled. The highest concentrations observed were at gas probe GP-4, with a total VOC concentration of 113,490 ppbv.

Landfill gas concentrations found in the eastern gas probe location, GP-2 and GP-3, indicates that landfill gas production is minimal near this portion of the landfill or that landfill gas is not capable of migrating upward into this area of the landfill due to an impermeable layer or water saturated soils. The western portion of the site near GP-4 and GP-1 is actively producing gas indicative of the methane fermentation phase of landfill gas production. Offsite migration of landfill gas was not investigated during completion of this RI but is not considered a significant migration pathway based on the landfill site setting and surrounding land use.

GP-4 is located approximately 180 feet northeast of GW-8S which exhibited the most significant VOC contamination within groundwater/leachate. Based on these results, the west-central portion of the landfill appears to contain the most significant VOC observed within the site.

- *Investigation of Potential Drum Disposal*: The geophysical survey of the site was completed in three study grid areas which were selected based upon previous work completed at the site and in consultation with NYSDEC. The geophysical survey and test pits completed at the site located one drum within test pit TP-4 containing leaded paint sludge and a several crushed empty drums. Most of the areas identified by the geophysical survey as high concentration metal areas did not contain drums only metal objects such as metal piping and a sink. A number of crushed or rusted empty drums were identified within the northeastern portion of the landfill.

Qualitative Risk Assessment

A qualitative risk assessment was conducted for the ETE Sanitation and Landfill site to determine the potential risks and hazards that chemicals detected at the site may pose to human health under current and future conditions in the absence of remediation. All chemicals detected in each medium were compared to risk-based concentrations to identify the chemicals of concern (COCs), i.e., those chemicals that present the highest risk potential. The list of COCs was limited to ten chemicals for each medium and COCs were identified for the groundwater, air and soil/sediment media.

Potential health risks associated for current site conditions include ingestion and inhalation of groundwater from an onsite private well, inhalation of ambient air for a trespasser and ingestion, or inhalation of surface soil and sediment for a trespasser. Potential health risks for future use conditions which conservatively assumes that the landfill would be used for residential property include ingestion and inhalation of groundwater, ingestion and/or inhalation of surface soil and inhalation of ambient air.

It should be pointed out that this risk assessment has utilized conservative assumptions in estimating potential current and future risks to public health due to chemical contamination arising from the landfill. First, the risks discussed are only potential risks, not actual risks. It is not known if anyone is currently drinking water that has been contaminated by the landfill or if there is anyone who consistently (35 times per year) trespasses over the landfill. Likewise, the future estimates of risk are only potential risks that could occur if remediation does not occur. All risk estimates are based on long term, i.e. 30 year, exposure to chemicals from the landfill. Since contamination from the landfill has not been present for 30 years, the current potential risks are overestimated.

Recommendations

- Given the extent of the leachate plume is not fully defined and the proximity of the landfill to private drinking water supplies, CDM recommends that the installation of two additional offsite well clusters be considered as part of pre-design field activities. One well cluster should be located northwest of the MW-8 monitoring well cluster between the landfill and private wells located along Miller Road. The second well cluster should be located downgradient from the landfill between the MW-3 well cluster and the private well located at 4344 Route 19, where trace levels (less than 0.5 ug/L) of toluene were detected in 1995. Both well clusters can be used for long term groundwater monitoring of the landfill, after closure. Following the installation of the two well clusters, one round of groundwater samples should be collected from all monitoring wells. Analysis of samples should include VOCs, semi-VOCs, metals and key leachate indicator parameters.

- As part of the RI, CDM in consultation with the NYSDEC recommends that the following private wells be sampled by the NYSDOH: 4470 Jordan Rd. (Id# 3), 4770 Jordan Rd. (ID#5) 4740 Miller Road (Id#18). Private well groundwater samples will be analyzed for VOCs. The locations of these wells are shown in Figure 3-1 in Section 3.0 of this report.

- Following the completion of the RI/FS, a long term annual or bi-annual groundwater monitoring plan should be instituted to ensure that drinking water resources in the vicinity of the landfill remain unimpacted by landfill contaminants. The monitoring plan should be based upon the remedial action chosen.

- One additional round of surface water samples should be taken in order to determine surface water quality during base flow conditions. Previous sampling events were conducted during late-winter/early-spring when surface runoff is the greatest. Samples would be collected during the summer or early fall and after several days of dry weather to reduce any diluting effects of stormwater runoff or snowmelt might have on the sample results. In addition to samples from the North Pond and eastern drainage channel, water samples should be collected from Cotton Creek in order to assess the potential of landfill impacted groundwater discharging to this surface water body.

- Prior to undertaking final closure and capping of the landfill, the extent and volume of waste which extends within the South Pond should be determined as part of predesign field investigations. Excavating within the pond can be accomplished using an excavator with an extension arm of at least 20 feet. However, the extent of excavation will be limited to the depth of water and the effective "reach" of the excavator as well as the stability of the pond edge.

In accordance with the approved RI/FS Work Plan, the objective of the FS will be to resolve several engineering issues and to refine the selected presumptive remedies. Based on the RI, the site currently represents a potential risk to human health and the environment; therefore, the No Action Alternative is not acceptable. Consolidating and capping the landfill with appropriate leachate and landfill gas controls is the preferred presumptive remedy. With this presumptive remedy, the engineering issues that require further evaluation under the FS include:

- Consolidating waste within the landfill, including wastes within the South Pond, as well as the feasibility of placing contaminated North Pond sediments on the landfill before capping;
- Reducing leachate generation through surface water controls, including the possibility of draining the North and South Ponds;
- Reducing leachate generation through groundwater diversion and/or hydraulic containment;
- The selection of active or passive landfill gas controls;
- The most appropriate cap design which will cost effectively contain the waste, and
- If selected as a hot spot, how to effectively remediate contamination within the west-central portion of the landfill.

As part of the landfill closure, institutional controls such as placing a fence around the site and deed restrictions to adjoining properties are recommended.

ETE Sanitation And Landfill

Town Of Gainesville, New York

Final Remedial Investigation Report

NYSDEC Site #9-61-005
Work Assignment #D002925-24

Prepared For:

New York State
Department Of Environmental Conservation
50 Wolf Road, Albany, New York 12233

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Commissioner

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September 1998

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Section 1
Introduction

1.1 Project Objective

Camp Dresser & McKee (CDM) has been retained by the New York State Department of Environmental Conservation to prepare this Remedial Investigation (RI) Report for the ETE Sanitation and Landfill Site under the New York State Superfund Standby Contract (Work Assignment # D002925-24). This RI Report discusses the findings and presents conclusions based on the results of the RI conducted between March and April, 1998 in accordance with the NYSDEC Remedial Investigation/Feasibility Study RI/FS Work Plan and Site Operations Plan (SOP) approved November 11, 1997 (CDM, 1997 a, b).

The purpose of this RI/FS is to define the nature and extent of surface and subsurface contamination in order to refine the presumptive remedies approach to closing the ETE Landfill that will be utilized in the Feasibility Study (FS).

The specific objectives of the ETE Landfill Remedial Investigation (RI) were to:

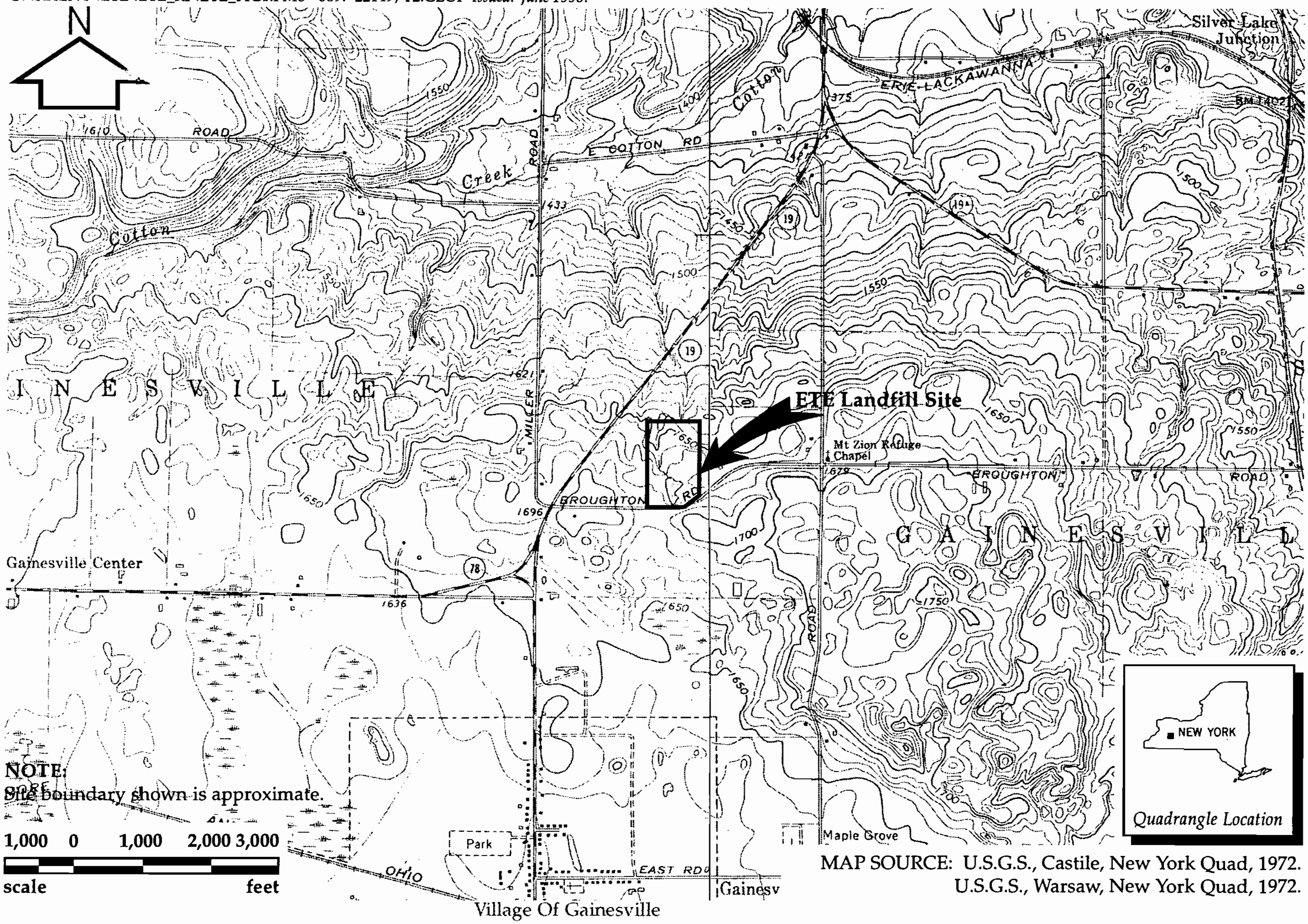
- Identify all private wells within a 1 mile radius of the site.
- Identify and locate former disposal areas, and determine if an interim remedial measure (IRM) is necessary.
- Refine the site's hydrogeologic model via subsurface soil sampling and aquifer testing.
- Determine the nature and extent of contamination in groundwater and subsurface soils, surface water and sediment, and surface soils impacted by leachate.

The findings of the RI will be used to develop and prepare a focused Feasibility Study (FS) in which presumptive remedies for landfill closure will be refined. Presumptive remedies are preferred technologies for common categories of sites, based on historical patterns of remedy selection and EPA/NYSDEC scientific and engineering evaluation of performance data on technology application. Presumptive remedies for municipal landfill sites primarily address containment of the landfill mass, source area control, and collection/treatment of landfill leachate and gas, as required. The use of presumptive remedies speeds up cleanup actions by using the program's past experiences to streamline site investigations. The findings of the RI will assist in refining the presumptive remedy approach at the ETE Landfill.

1.2 Site Location

The ETE Sanitation and Landfill Site is located in a rural agricultural area on Broughton Road in the Town of Gainesville, New York, approximately 1 mile north of the Village of Gainesville, as shown in Figure 1-1.

O:\KALNY\ETE\ETE_RI\ETE_FIG1.PM6 0897-22149/T2.GEOP *Issued: June 1998.*



MAP SOURCE: U.S.G.S., Castile, New York Quad, 1972.
U.S.G.S., Warsaw, New York Quad, 1972.

Figure 1-1
Site Location
ETE Sanitation and Landfill Remedial Investigation

CDM Camp Dresser & McKee

The twenty (20) acre site is surrounded by woodland buffer which separates the landfill from undeveloped agricultural land on all sides of the landfill. To the south of the landfill, Broughton Road runs east to west. To the west, Route 19 runs north to south. Two ponds are located within the study area and are found at the southern property line, South Pond, and along the northern property line, North Pond (also known as the Leachate Collection Pond). The extent of waste accounts for seven (7) acres of the twenty (20) acre site. The Town of Gainesville Highway Department Garage is located in the southeast corner of the investigation area. See Plate I for a detailed map of the investigation area.

1.3 Site Background

The ETE Sanitation and Landfill Site was operated by the ETE Corporation from 1972 to 1979. Currently the site is listed as a class 2 landfill on the State Registry of Inactive Hazardous Waste Sites. The site has been characterized as a Class 2 landfill because of the presence of hazardous waste which presents a significant threat to public health and the environment. The ETE Site was non permitted (operated without a NYSDEC permit to operate) private landfill which accepted municipal and industrial waste from surrounding towns in Wyoming County.

The property was owned by ETE Corporation which declared bankruptcy in 1979 after a complaint was brought against the corporation for defying a New York State Supreme Court Order to cease all landfill operations. According to tax records Don B. Iwanicki is acting Trustee in Bankruptcy of Refuse Unlimited, Inc., a successor in interest to ETE Landfill, Inc. (Wyoming County Clerks Office, Liber 554, Page 222). Documented closure of the landfill has not been identified to date.

The landfill was in violation of NYSDEC regulations for sanitary landfills for the entire time of its operation. Violations cited by NYSDEC included refuse burned onsite; refuse not spread, compacted, and covered; refuse protruding through the cover soils; insufficient grading; uncontrolled release of leachate; and blowing paper.

Almore Corporation of Warsaw, New York, disposed approximately 150 tons of leaded paint sludge onsite. Plating wastes from Mallory Timers in Warsaw, New York may have also been disposed onsite. Additional industrial waste included halite (table salt) and possibly other salts produced by Morton Salt. An estimated 4 to 5 truckloads of salt were disposed per week for an undetermined length of time according to site inspection reports completed by NYSDEC (URS Consultants, 1990).

1.4 Previous Environmental Investigations and Remediation

The New York State Department of Environmental Conservation (NYSDEC) conducted a number of site inspections between 1987 and 1990 during which soil, surface water, waste and tap water samples from nearby residences were collected and analyzed for hazardous waste constituents. Based on site history, findings of the site inspections and sample results, NYSDEC elected to perform a Preliminary Site Assessment (PSA) of the site in 1990 and a Second Phase PSA in May of 1993. The PSAs included the collection of onsite sediment, leachate and soil samples in addition to the installation and sampling of seven groundwater monitoring wells.

URS Consultants, Inc. completed a data records search and assessment, an initial site inspection and based upon their findings classified the site as a Class 2A inactive hazardous waste site. A drum removal activity was completed in September 1991. Drums found onsite were sampled prior to their removal. Drums were found to contain leaded paint sludge and industrial solvents including: 1,2 Dichloroethane, carbon tetrachloride, trichloroethane and 2-butanone (methyl ethyl ketone). Engineering Science completed a second PSA for the NYSDEC in February 1994. Engineering-Science Inc. conducted field studies and completed the second phase of the preliminary site assessment. Work included the installation of seven monitoring wells and the collection of: one leachate sample, one sediment sample, three surface soil samples, four subsurface soil samples and seven groundwater samples. Using the USEPA PA-score program the ETE Landfill scored a 34. These investigations indicate that hazardous wastes have been disposed onsite, groundwater standards have been violated, and the contaminants have migrated into nearby surface waters.

The disposal of industrial waste including leaded paint sludge, salt and possibly plating wastes were identified as sources of contamination during these initial investigations. Data generated from these previous investigations assisted CDM in developing the Remedial Investigation/Feasibility Study (RI/FS) scope of work and provided some insight into the fate and transport of site contaminants.

Section 2
Physical Characteristics of the Study Area

2.1 Topography

Regional topography slopes downward to the north to slightly northwest to the small stream valley occupied by Cotton Creek. The highest point on the landfill lies approximately 1680 feet above mean sea level with Cotton Creek at an elevation of 1380 feet above mean sea level. Cotton Creek runs northeast and discharges into Oatka Creek, a major tributary of the Genesee River.

The landfilled portion of the site is slightly elevated relative to the surrounding land. The surrounding topography can be described as a humocky terrain, with evidence of small glacial kettle lakes southeast of the site. The site lies on the northwest side of what appears to be a northwest to southeast trending moraine marking the final advance of glaciers responsible for scouring the valleys now occupied by Silver Lake and Oatka Creek. Unconsolidated soils found onsite consist of poorly stratified very fine sands, silts and clays deposited by glacial ice and/or glacial meltwaters.

The site vegetation is dominated by grasses, immature trees and shrubs, with mature trees forming an outline around the landfilled portion of the property. Debris protrudes through the ground cover in certain portions of the landfill, particularly along the steep-sloping north and northeast toes of the landfill. Total relief at the site is approximately 55 feet from south to north with 13 feet of elevation change occurring at the landfill toe. The local topography has been modified by landfilling activities.

2.2 Geology and Hydrogeology

2.2.1 Site Geology

Soils found at the ETE Landfill were deposited by glaciers which covered this area of New York during the Wisconsin stage of glaciation in this region. Sediments in this part of Wyoming County are likely to be composed of a Wisconsin moraine sediments and/or ice contact stratified drift (Van Diver, 1997). Soils in the vicinity of the ETE site are Bath-Valois gravelly loams and the Mardin Channery silt loam (USDA, 1974). These soils are characterized by deep, well-drained low lime soils on hill slopes and concave areas or depressions, respectively (USDA, 1974).

Boring logs from monitoring well installations conducted by CDM and Engineering Science indicate that the subsurface material is primarily composed of poorly stratified glacial till comprised of poorly sorted very fine sands, silts, gravels and occasional clay lenses. Copies of all RI monitoring well boring logs are provided in Appendix A. Glacial till found at the site is a characteristic of lodgement and melt-out type tills. Lodgement tills are formed by the plastering of glacial debris on the underlying bedrock surface by the sliding base of a moving glacier via meltout and mechanical processes. Sediment material derived from the local bedrock appears to increase in abundance towards this lower portion of the substratum. Meltout tills form as the glacier reaches its stagnation point and begins to melt. Sediment-rich glacial ice begins to melt forming gradational contacts as various sediment debris bands once present in the glacial ice, are deposited on top of the lodgement till as the supporting glacial ice began to melt. Gravel clasts are a mix of bedrock materials found north of the site and include siltstone, shales and dolomites of Devonian age. Both slug testing and grain size characterization indicate that the material is primarily a very fine sandy silt with a permeability ranging from 10^{-5} to 10^{-3} cm/sec. The glacially derived unconsolidated sediment overlies bedrock, which was not encountered during drilling activities conducted during the RI. A well log from the Town of Silver Springs' municipal well, located 3 miles from the site, indicates that glacial overburden is approximately one hundred and sixty feet thick (160 ft) near the site. This well log is shown in Appendix A. Glacial deposits overlie gray to light gray colored shale possibly belonging to the West Falls Group of Upper Devonian shales and sandstones exposed in a cliff face of the Letchworth State Park located 6.5 miles east of the site.

Fill materials found at the site are primarily composed of municipal solid waste. Drilling logs indicate that the fill material was occasionally blanketed with cover soil taken from an onsite borrow areas. However, it does not appear that a cover soils were spread over the municipal waste on a regular basis.

Information gathered during the hydrogeologic investigation has been compiled in the form of geologic cross sections. Plate II show a north to south cross section A-A' and an east to west cross section B-B'. Contacts between the various units were often gradational and are therefore shown as inferred contacts.

The geologic cross sections were created by compiling boring log data collected during recent and past investigations. Monitoring wells used to construct the cross sections are shown along with their corresponding well screen intervals. Piezometric/potentiometric head measurements are also plotted for two of six synoptic water level rounds conducted in May and June 1998. The contour maps are shown in Plate III and IV.

When considering the potential for migration of chemical constituents in groundwater, these cross sections can be used to predict major flow paths at the site. The hydrogeology of the ETE Landfill can be broken down into five distinct geologic units which are grouped according to soil type. These soil types are found at various depths across the site commonly found in glaciated regions. The distribution of sediment types is best shown in the cross sections which are shown in Plate II.

Stratigraphic Unit	Soil Descriptions	Hydraulic Conductivity (cm/sec)
■ Unit 1:	Alternating layers of brown silt, little sand and gravel with brown medium-fine sand with silt and gravel, loose, poorly sorted.	10^{-4} to 10^{-5} (a)
■ Unit 2:	Gray silt and very fine sand, little clay, little pebbles, medium to no plasticity, poorly sorted.	10^{-4} to 10^{-6} (b)
■ Unit 3:	Gray fine to medium sand and silt, occasionally containing pebbles and cobbles, low plasticity, poorly sorted.	10^{-4} (a)

■ Unit 4:	Gray-tan/Brown fine sand and silt, with orange mottling, loose, poor to well sorting.	10^{-5}	(a)
■ Unit 5:	Greenish-gray, medium to coarse sands, sandstone fragments, pebbles, cobbles, boulders, loose, poorly sorted.	10^{-1} to 10^{-3}	(b)
■ Municipal and Industrial Solid Waste	Primarily household trash and some construction debris. This unit also includes potential sources of hazardous materials such as lead paint sludge and chemical solvents.	Highly Variable	

(a) Hydraulic conductivity from onsite slug testing.

(b) Hydraulic conductivity range from Fetter, 1994, p. 98.

Site hydrogeology is dominated by the low permeable Unit 2, which appears to be interbedded with occasional beds of Unit 3 providing the more permeable horizontal flow path for contaminants traveling in the deeper flow regime. Unit 3 is a discontinuous unit of coarser grained materials. These were likely deposited by periodic high energy glaciofluvial meltwater events. Deposits of this type are highly variable and often times do not conform to "straight line" stratigraphic correlations. At the site, the contact between Unit 3 and the surrounding units should be considered gradational both vertically and horizontally. The cross sections appear to show Unit 3 as a glaciofluvial "channelized" deposit trending in a NW to SE direction.

Shallow flow is dominated by the alternating layers of silt and very fine sand which comprise Unit 1. Horizontal groundwater flow is likely to be controlled by the very thin (less than 0.5 inch thick) lenses of very fine to fine sand interbedded within the less permeable silt component of Unit 1. Generally, more permeable glacial sediments were found along the western border of the landfilled area. High water production rates were noted in the MW-1 and MW-8 deep wells which are screened in coarser sands and gravels. Water production rates from these wells averaged approximately 1.5 gallons per minute (gpm) whereas other monitoring wells typically produced less than 0.5 gpm.

2.2.2 Site Hydrogeology

Site hydrogeology is influenced by both regional and local hydrogeologic processes acting upon groundwater flow at the landfill. The regional hydrogeology is controlled by topography. Groundwater in this region tends to flow north to northeast towards Cotton Creek. Cotton Creek is likely to derive its baseflow from groundwater flowing northward. The topographic high controlling groundwater flow is composed of glacial moraine material which trends from NW to SE between the towns of Silver Spring and Gainesville. Small ponds and swampy areas are found locally at elevations corresponding to the South Pond elevation suggesting that the pond may be a product of a natural spring along the northeast facing slope of this glacial moraine.

A shallow water table aquifer is present in the unconsolidated sediments found at the site. Stratified deposits of clay and silt provide discontinuous confining layers for the shallow water table to perch upon. Water levels in the shallow and deep monitoring well pairs indicated a slight downward vertical gradient. Piezometric heads measured in the shallow monitoring wells were approximately one foot higher than water levels in corresponding deep wells.

Groundwater level contour maps of the shallow flow regime are shown for two synoptic water level rounds and appear in Plate III and Plate IV, respectively.

The South Pond is likely to be recharged from regional groundwater flow and to a lesser degree, surface water runoff. The South Pond appears to act as an area of local groundwater recharge for the landfill. The hydraulic head of the South Pond increases the hydraulic gradient acting on local groundwater flow and is likely to promote horizontal flow in the shallow groundwater table aquifer from south to north towards the north toe of the landfill where numerous leachate seeps are observed.

Data presented in Plate III and Plate IV indicates shallow groundwater flow from the landfill is in a north to northeast direction. However, local deviation to the northwest appears to occur near the MW-8 well cluster. This slight deviation in groundwater flow direction is likely the result of groundwater mounding within the landfill. Groundwater mounding occurs as the highly permeable municipal solid waste becomes saturated with groundwater and infiltrated water from precipitation (Watson et al. 1993, pp 106-107). As a result, the artificial "bubble", or mound of water forms within the landfilled area. As mounding increases the differential head between the center of the landfill and the surrounding area, groundwater flow radiates away from the center portion of the landfill towards the landfill perimeter. The groundwater mound appears to have resulted in the formation of a small artificial groundwater "divide", which diverts a small portion of leachate enriched groundwater to the northwest . The majority of leachate enriched groundwater flows to the northeast from the center of the landfill towards the MW-3 well cluster.

Hydraulic heads for monitoring wells screened in the deeper glacial formations are shown on the geologic cross-sections in Plate II. The data presented indicates a slight to moderate downward vertical hydraulic gradient. This gradient promotes vertical groundwater flow from the shallow water table aquifer to the deeper glacial aquifer and ultimately into the underlying fractured bedrock.

2.2.3 HELP Modeling of Leachate Production

The amount of leachate produced at the ETE Landfill was estimated using EPA's Hydrologic Evaluation of Landfill Performance Model - Version III (HELP) (Schroeder et al., 1994). The HELP computer program is a quasi-two-dimensional hydrologic model of water movement across, into, through, and out of the landfill. The model accepts various soil, weather, and design data to account for the effects of surface storage, snowmelt, runoff, infiltration, evapotranspiration, vegetative growth, soil moisture storage and lateral and vertical drainage.

Leachate from the ETE Landfill is produced by groundwater inflow and when rainfall falls on the landfill surface, infiltrates into the ground and flows vertically downward through the waste. A infiltrated rainfall and groundwater pass through the waste, the water is assumed to become contaminated.

The HELP model is only capable of calculating leachate produced via infiltration of rainfall. The model says nothing about the volume of leachate produced from groundwater which flows through the waste mass. The waste at the ETE Landfill is highly saturated and lies below the present water table across much of the southern portion of the site. Therefore, the results of the HELP model should be considered an estimated volume of leachate produced at this landfill. Leachate production may be several orders of magnitude greater than the HELP model results.

The landfill was modeled as a seven (7) acre landfill with a uniform waste thickness of fifteen (15) feet or one hundred and eighty (180) inches and a cover thickness of two (2) feet. Actual thickness of waste varies across the site but fifteen (15) feet was used as conservative estimate since this was the maximum thickness of waste encountered at MW-8. Cover material over the landfilled portion of the site was assigned the properties of a silty clay. Waste was assigned the properties of a typical municipal waste as given by the HELP model. The degree of vegetative cover was developed based upon field observation. The "maximum leaf area index", was estimated to be 0.5 between bareground and a poor to moderate stands of grass. The model was run for a five year span using the default precipitation and weather data provided for Buffalo, New York.

A summary of the results of the HELP model are given in Table 2-1. A complete summary of the model input and output is found in Appendix H. The average annual infiltration to and leachate generated from rainfall infiltration into the waste containing area of the site was estimated to be approximately 5325 gallons/day. The primary purpose of the HELP model is to assist in the comparison of landfill capping design alternatives as judged by their ability to minimize leakage of rainfall through the waste. Therefore, caution should be used when considering the HELP model calculated rate of leachate generation as a design condition. In the case of the ETE Landfill, leachate generation is significantly increased due to groundwater flow through the landfill mass.

To estimate the volume of leachate produced by groundwater flow through the landfill mass, the rate of water seepage from the South Pond was estimated using Darcy's law. This calculation assumes that horizontal flow out of the South Pond and through the landfill will be dominated by the fill material which is generally more permeable than the native glacial sediments observed at the site. As water from the South Pond infiltrates into the waste material, leachate is produced. Darcy's law can be used to determine the daily volume of water released from the South Pond and can be expressed as follows:

$Q = -K A (dh/dl)$ where,

Q= gal./day
K= gal./ft^2 *day = 71 gal./ft^2 *day
(determined by permeability testing of fill material at piezometer, PZ-3)
A= width of the south pond (400 ft.) * thickness of waste (15 ft.) = 6000 ft.^{2}

$$(-dh)/dl = \text{ft./ft.} = \frac{\text{Change in hydraulic head from the South Pond to North Pond (-31ft.)}}{\text{Length of flow path from South Pond to North Pond (750 ft.)}}$$

Table 2-1
Summary of HELP Model Results
ETE Sanitation and Landfill
Remedial Investigation

Runoff			Evapotranspiration			Leakage Through Waste		
Inches	Cubic Feet	Percent	Inches	Cubic Feet	Percent	Inches	Cubic Feet	Percent
5.08	129,007.76	13.20	24.58	624,572.94	63.90	10.23	259,845.06	26.58

Average annual rainfall for the simulation was 38.47 inches based on 5 year default precipitation values calculated by the HELP model.

Based upon this calculation, the South Pond contributes approximately 17,608 gallons of water per day which potentially can become leachate as the it passes through the waste material. This rough calculation to determine infiltration rates from the South Pond is an overly conservative estimate which assumes a stable water table, a uniform thickness of waste and the maximum width of the South Pond which can contribute water to leachate production.

2.3 Surface Water and Site Drainage

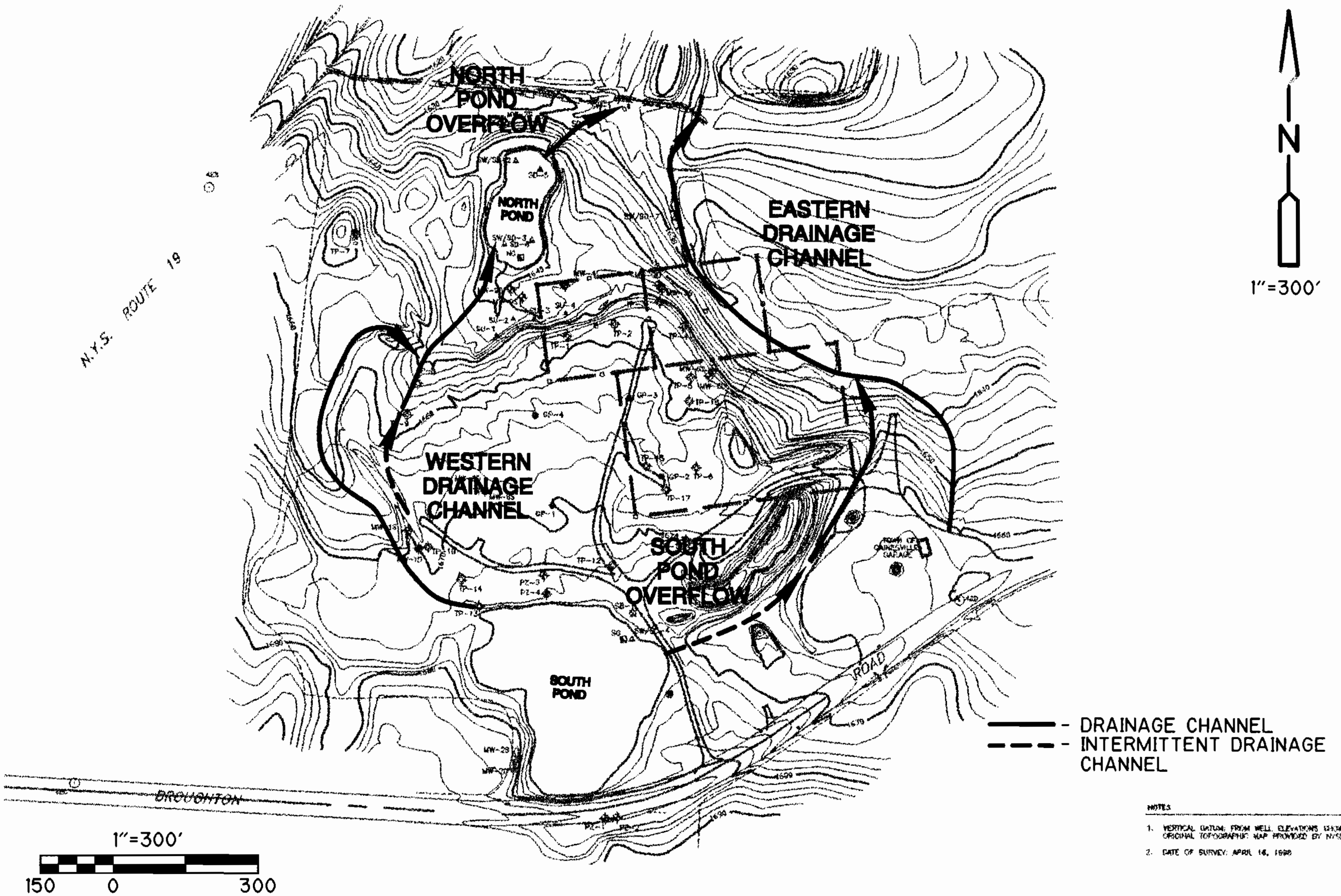
Surface water bodies and drainage features are shown in Figure 2-1.

Two ponds are located on site. The South Pond and North (Leachate Collection) Pond are shown in Plate I. The South Pond, approximately 3.5 acres in size, is drained by two seasonal tributaries. The primary tributary, the western drainage channel, drains water north to northwest along the western perimeter of the landfill within the confines of a wooded area which divides the landfilled area from the adjacent property to the west. During periods of heavy precipitation, the South Pond's secondary discharge is due east, across the access road into the eastern drainage channel -- a seasonal tributary which runs along the eastern boundary of the site.

The North Pond, approximately 0.5 acres in size, (also known as the Leachate Collection Pond) appears to be fed by three sources of recharge; the western drainage channel fed by the South Pond discharge, which runs along the western margin of the landfill and turns east just north of the landfill, discharging water into the North Pond; leachate seeps emanating from the landfill's north toe that flow directly into the North Pond; and direct source of recharge from groundwater infiltration. Surface water is discharged from the North Pond via the North Pond overflow stream, located in the northeast corner of the North Pond. From this location water flows offsite and to the north towards Cotton Creek which is located approximately 0.75 miles north of the site.

A water supply dam used by the Village of Warsaw for drinking water is located upstream from where the landfill's surface water enters Cotton Creek (NYSDOH, 1982). Upstream from the water supply dam, Cotton Creek is classified as a Class A waterbody suitable as a public drinking water source (NYSDEC, 1991). Downstream from the supply dam, where site surface waters enter, Cotton Creek is classified as a Class C water body suitable for fishing, fish propagation and primary contact recreation (NYSDEC, 1991). Cotton Creek flows east at this point where it eventually discharges into Oatka Creek. Oatka Creek flows north and discharges into the Genesee River. Oatka Creek is a Class C water body upstream from the Village of Warsaw (NYSDEC, 1985). According to NYSDEC, Oatka Creek supports moderate fishing pressure and has a wild brown trout population that is augmented by NYSDEC stocking of approximately 1,850 brown trout annually.

The seasonal tributary bordering the eastern portion of the site and fed by the South Pond overflow, drains much of the area located southeast of the landfill. The tributary appears to be impacted by runoff from the Town of Gainesville Garage area. At the garage area, a gravel-salt mixture is stored in uncovered stock piles. Precipitated salt-residue is visible along small runoff channels entering this seasonal tributary suggesting that surface water runoff from the adjacent Town of Gainesville property is impacting the quality of water entering the tributary.



NOTES

1. VERTICAL DATUM FROM WELL ELEVATIONS SHOWN ON ORIGINAL TOPOGRAPHIC MAP PROVIDED BY NYSDEC.
2. DATE OF SURVEY: APRIL 14, 1998

Figure 2-1
Surface Water And Site Drainage Features
ETE Sanitation And Landfill Remedial Investigation

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During the 1998 field investigation, numerous bodies of standing water were observed on the landfilled portion of the site. The result of heavy snowfall and rainfall, numerous 10 to 20 foot wide puddles were observed lying in topographic lows on the ungraded landfill surface and may provide a minor source of recharge to the underlying formations.

2.4 Water Supply

2.4.1 Public Water Supply

The population of the Town of Gainesville is supplied with drinking water from private wells in the glacial aquifer (URS, 1990). The Village of Silver Springs is supplied with water from two springs and two wells. The wells are located 2 miles east of the ETE site. One of the two wells is drilled into sand and gravel of the Pleistocene age. The other well is screened in the Middle Devonian aquifer, probably shale (Putney, personnel communication, 1998). The Letchworth Central Schools, are located approximately 2 miles south of the ETE site, are also supplied with water from wells screened in the Pleistocene sand and gravel aquifer (URS, 1990).

Silver Lake, located approximately 4 miles northeast of the ETE Sanitation and Landfill Site, is a water source for the Village of Perry and for several other communities in neighboring counties (NYSDOH, 1961; USDA, 1974). The Village of Warsaw obtains its water from Cotton Creek located approximately 2.25 miles northwest of the ETE Site (NYSDOH, 1982).

2.4.2 Private Water Supply

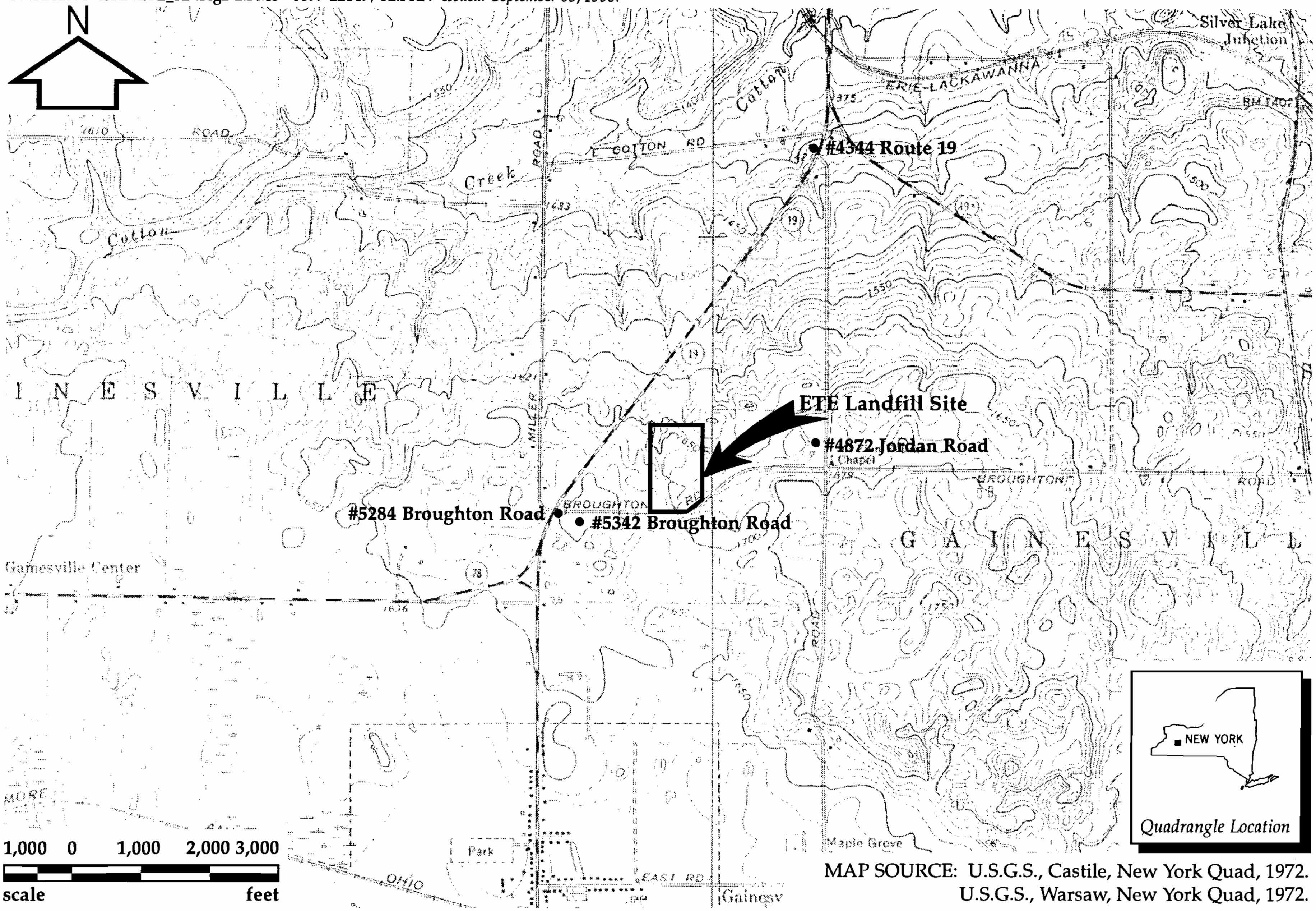
As part of the remedial investigation, a private well survey was conducted by CDM. A one mile radius was established using a USGS topographic map of the area. In the field, CDM personnel identified a total of forty-seven (47) homes within a one mile radius of the site where private wells might be located. Approximately half of these locations are located hydraulically downgradient from the landfill. Twenty-five (25) private well locations were identified by returned questionnaires. The majority of the Town of Gainesville and surrounding population are supplied with drinking water from private wells screened in unconsolidated glacial deposits. The average depth of private wells located downgradient from the landfill is 70 feet below grade.

The Village of Silver Springs is supplied by water from two springs wells and two wells located 2 miles east of the ETE site. One of the wells is located in unconsolidated glacial material and the other is located in shale bedrock.

Domestic well water from kitchen taps of various properties located in the vicinity of the ETE site were analyzed in 1989, 1991, 1993, 1995 and 1997 by the New York State Department of Health (NYSDOH). Lab sample results for these residential wells are included in Appendix B. Private wells sampled by the NYSDOH are listed below and shown in Figure 2-2. Due to the numerous typos found on the lab results in Appendix B, corrected addresses have been provided:

In 1997:

Sample Location	Summary of Results	Address Correction
4344 Route 19	Non-detect for all parameters analyzed	Mislabelled, 7344 Route 19



MAP SOURCE: U.S.G.S., Castile, New York Quad, 1972.
U.S.G.S., Warsaw, New York Quad, 1972.

Figure 2-2
Private Well Sample Locations
ETE Sanitation And Landfill Remedial Investigation

CDM Camp Dresser & McKee

5342 Broughton Rd.	Non-detect for all parameters analyzed	Mislabelled, 8342 Broughton
5284 Broughton Rd.	Non-detect for all parameters analyzed	

In 1995:

Sample Location	Summary of Results	Address Correction
4344 Route 19	Toluene detected, 0.5 ug/l	Mislabelled, 7344 Route 19
5342 Broughton Rd.	Non-detect for all parameters analyzed	
5284 Broughton Rd.	Non-detect for all parameters analyzed	

In 1993:

Sample Location	Summary of Results	Address Correction
4344 Route 19	Non-detect for all parameters analyzed	
5342 Broughton Rd.	Non-detect for all parameters analyzed	Mislabelled, 5642 Broughton
5284 Broughton Rd.	Non-detect for all parameters analyzed	

In 1991:

Sample Location	Summary of Results	Address Correction
4872 Jordan Rd.	Non-detect for all parameters analyzed	
5342 Broughton Rd.	Non-detect for all parameters analyzed	Mislabelled, 5642 Broughton

In 1989:

Sample Location	Summary of Results
4344 Route 19	Non-detect for all parameters analyzed
5342 Broughton Rd.	Non-detect for all parameters analyzed
5284 Broughton Rd.	Non-detect for all parameters analyzed

Iron was found in excess of NYSDEC screening criteria for drinking water in two residential wells. In 1995, a volatile organic compound, toluene, was found at trace levels (less than 0.5 ug/l) in one well located at north of the site. This in the only detection of volatile organics found in the private well samples taken to date by the NYSDOH.

As part of this remedial investigation, private wells located within a one mile radius of the site were identified. A summary of the private well survey findings is provided in Section 3.1. Private well surveys returned to CDM have been submitted to NYSDEC.

2.5 Land Use

Wyoming County is predominantly agricultural. Diary farming and grain and forage used in dairy farming are the predominant agricultural enterprises (USGS, 1974). Other agricultural activities include maple products, dried beans, and potatoes. The principal manufacturing industries located in the county within the last 25 years include cutlery, time clocks, knit goods, electronic parts, and manufacturers of various other metal, wood, and plastic parts. In addition, a salt mine is located in the Village of Silver Spring, less than 5 miles northeast of Gainesville (Engineering Science, 1994).

Section 3
Investigation Methods

The following investigation methods were used during the Phase I Remedial investigation. A summary of the completed activities appears in Table 3-1.

3.1 Private Well Survey

CDM prepared a private well questionnaire and distributed it to homeowners/business owners within a one mile radius of the site. Forty seven (47) homes were determined to be within the one mile radius. However, seventy-one (71) private well questionnaires were distributed in the field covering an area approximately 1.25 mile radius from the center of the site. This extended survey area was performed to ensure complete coverage over the area of interest.

Completed questionnaires were forwarded to CDM, who collated and organized all of the responses before they were submitted to the NYSDEC. To date, thirty-one (31) surveys have been received.

Figure 3-1 shows the private well survey area of a 1-mile radius surrounding the site. Also shown are the locations of all homes within the 1-mile radius where private well surveys were distributed and those homes where the existence of a private well was confirmed. A list of private wells identification numbers and corresponding addresses is provided in Appendix C.

As part of the RI private well survey subtask, CDM was to complete a review of the NYSDEC well database to locate private wells within a one mile radius. NYSDEC-Region 9, however, does not maintain a database of private wells. CDM also contacted the Wyoming County Health Department and found that no private well database exists for Wyoming County, New York.

As part of this remedial investigation the collection of three water samples from private wells numbered 3, 5 and 18 on Figure 3-1 is planned. NYSDOH will perform the sampling of these wells. Analysis of the private well samples will include VOCs only.

3.2 Surface Water, Sediment and Surface Soil Sampling

3.2.1 Surface Water Sampling

Surface water samples were collected at the four proposed sample locations and one additional sample location all shown in Plate I. One sample (SW-1) was taken from the North Pond outfall approximately 75 feet northeast of the pond's northern shoreline. Two samples (SW-2, SW-3) were collected from the North Pond (leachate collection pond). One sample (SW-4) was taken from the South Pond. The additional sample (SW-7) was taken from the eastern drainage channel running along the northeastern perimeter of the landfill downstream from leachate seeps observed along the eastern slope of the landfill (near the MW-3 well cluster).

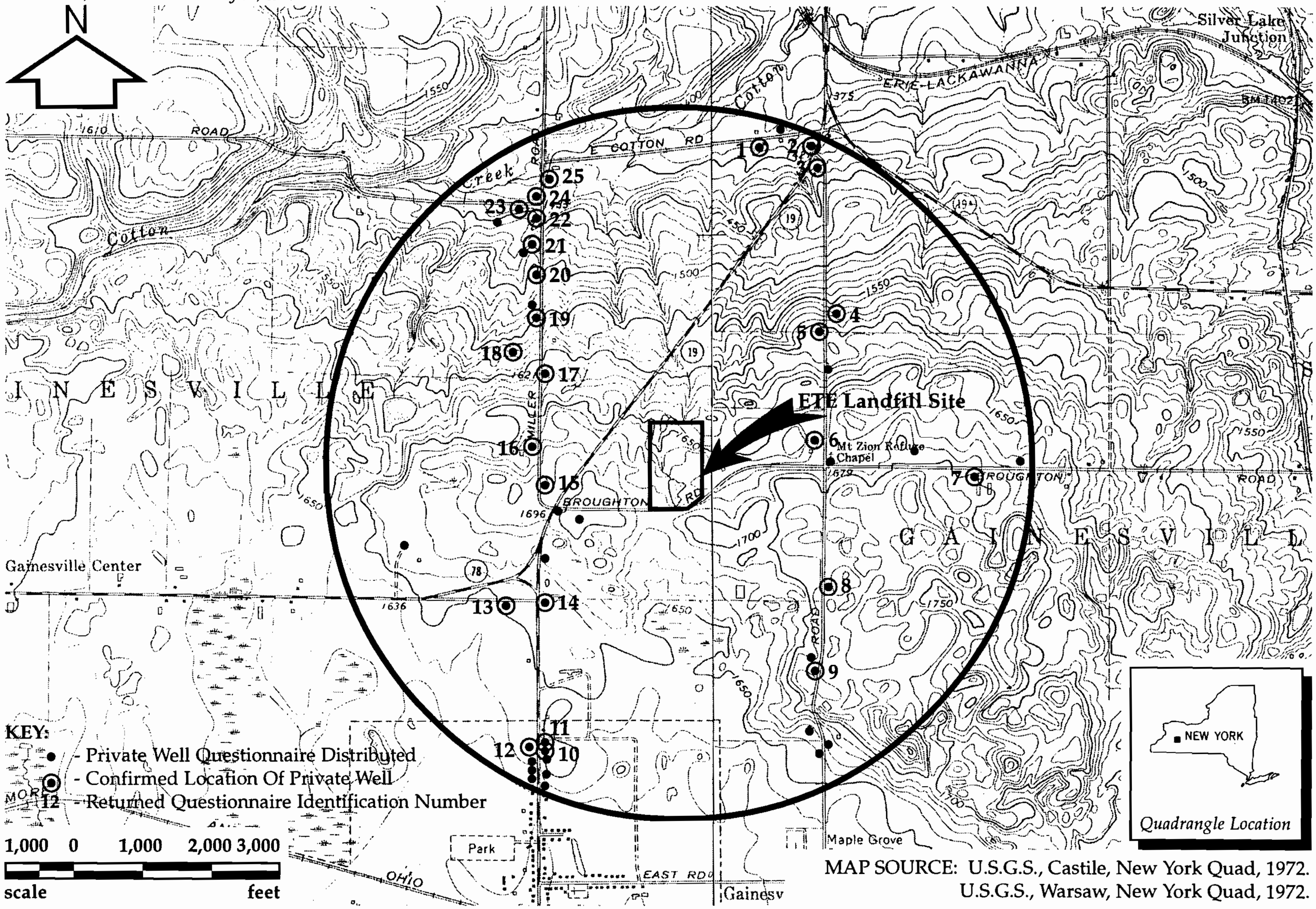
Samples were analyzed for TCL volatile organics, TAL metals, cyanide and hardness. Field parameters, temperature, salinity, pH, conductivity, dissolved oxygen and total depth of water for

Table 3-1
Summary of Work Completed
ETE Sanitation & Landfill Site
Remedial Investigation
Wyoming County, New York

SAMPLE LOCATION	SAMPLE TYPE	SAMPLE MATRIX	MONITORING/ ANALYTICAL PARAMETERS	MONITORING/ SAMPLING Completed
Subtask 2-2 LEACHATE, SURFACE WATER AND SEDIMENT CHARACTERIZATION				
o Surface Water (5 locations)	Grab (Van Dorn Sampler)	Aqueous	o TCL Organics o TAL Metals o Cyanide o Hardness	5 samples at selected locations
o Surface Water Sediment (7 locations)	Coring Tube	Sediment	o TCL Organics o TAL Metals o Cyanide o Total Organic Carbon	7 samples at selected locations
o Leachate Surface Soil (4 locations)	Grab	Soil	o TCL Organics o TAL Metals o Cyanide	4 samples at selected locations near leachate seeps
Subtask 2-3 GEOPHYSICAL SURVEY, SUBSURFACE SOIL TESTING (TEST PITS)				
o Geophysical Survey	Magnetometer	NA	o Magnetic Field Strength	Three study areas completed
o Seventeen Test Pits	Field Screening	Soil	o VOCs	All excavated test pit soil. (a)
	Grab	Soil	o TCL Organics o TAL Metals o Cyanide	4 samples collected
o Contingency Plan for Waste Characterization	Grab	Drum Contents	o TCLP o Waste Characterization	One sample collected
o One additional soil boring (SB-1)	Field Screening	Soil	o VOCs	To determine extent of waste
Subtask 2-4 MONITORING WELL INSTALLATION				
o Well Clusters/ Piezometers #1 and #2	Split Spoon	Soil	o VOCs	Cont. split spooning. (a) (b)
o Well Development	Grab	Aqueous	o pH, Turb., Cond., DO	Until readings stabilize.
o Piezometer #3: Near South Pond	Split Spoon	Soil	o VOCs	Continuous split spooning. (a)
o Piezometer #4	Split Spoon	Soil	o VOCs	Continuous split spooning. (a)
Subtask 2-5 GROUNDWATER SAMPLING				
o Water Level Monitoring (11 new wells/piez. and 8 existing wells)	NA	NA	o Water level	6 rounds of water levels in 3 mor
o Existing Monitoring Well Sampling - 7 wells	Grab	Aqueous	o pH, Cond., Temp., DO	Four readings at each well.
	Grab	Aqueous	o Volatile Organic Analysis o TAL Metals	1 round
o New Monitoring Well Sampling - 8 wells	Grab	Aqueous	o pH, Cond., Temp., DO	Four readings at each well.
	Grab	Aqueous	o TCL Organics o TAL Metals o Cyanide	1 round
Subtask 2-6 AQUIFER RESPONSE (SLUG) TESTING				
o In-Situ Permeability (Slug) Testing	NA	NA	o Permeability	10 wells tested
Subtask 2-7 SOIL VAPOR / LFG CHARACTERIZATION				
o Temporary Soil Gas Probes	Summa Canister	Air	o TO-14 VOCs	4 sample locations (1 round)
	Headspace	Air	o %CH4, %CO2, LEL, H2S	4 sample locations (1 round)

NOTES:
a) Soils were screened in the field for total organic vapors using a PID.
b) Split spoon samples were collected continuously along entire depth of 1 deep well per cluster.

File: o:\ete\tab3-1.xls
09/08/98



MAP SOURCE: U.S.G.S., Castile, New York Quad, 1972.
U.S.G.S., Warsaw, New York Quad, 1972.

Figure 3-1
Private Well Survey Locations - 1 Mile Radius
ETE Sanitation And Landfill Remedial Investigation

each sample location were also recorded. All results are discussed in Section 4.1.1, Surface Water Sample Results.

3.2.2 Sediment Sampling

A total of seven (7) sediment samples were collected and analyzed. One sample (SD-1) was collected in the tributary outfall draining the North Pond. Four sediment samples (SD-2, SD-3, SD-5, SD-6) were collected from the North Pond. One sample (SD-4) was collected from the South Pond and another sample (SD-7) was taken from the seasonal stream running along the northeast perimeter of the landfill. All sediment samples were obtained from approximately 0" to 6" below the sediment surface. Field observations made during sediment sampling and a summary of samples analyzed for full TCL organics, TAL metals and cyanide appear in Section 4.1.2, Sediment Sample Results.

3.2.3 Surface Soil Sampling

Four surface soil samples (SU-1, SU-2, SU-3, SU-4) were collected downgradient of leachate seeps emanating from the north toe of the landfill. Stressed vegetation and discolored soils were observed along a 200 foot wide area just north of the landfill. Uncovered garbage and a salt precipitate were sometimes observed in this area during the course of the remedial investigation. Site photographs of the seepage face are included in Appendix D. These seeps flow overland to the North Pond (leachate pond) and have visibly impacted the vegetation and soils in that area. Samples were collected from 0" to 2" below the ground surface after removing any debris or vegetation on the soil surface. Surface soil samples were analyzed for full TCL organics, TAL metals, and cyanide. All results are discussed is 4.1.3, Leachate Surface Soil Sample Results.

3.3 Geophysical Survey, Subsurface Soil Testing/Test Pits

3.3.1 Geophysical Survey

A geophysical survey was performed in an effort to locate any buried drums that may be a contributing source of soil and groundwater contamination. A magnetic survey was completed by Geophysics GPR International using a gradiometer. Readings of the total magnetic field and the vertical magnetic gradient strength were recorded along with the grid coordinates established for three geophysical grids shown in Plate I.

The survey was completed in three areas identified as having drums in the 1994 PSA by Engineering Science. Each suspect area was marked out using a 10 foot grid and node spacing at which magnetic field strengths were measured. Based on the results of the geophysical survey, eleven test pit locations were selected to clarify magnetic anomalies observed during the geophysical investigation. Of these eleven selected, seven were completed. Three were not completed due to access limitations along the steep northeast slope of the landfill near MW-3 and one was not completed because the anomaly was detected at the eastern-most boundary of the site in an undisturbed marshy area along the eastern stream's flow path making this an unlikely drum disposal area and limiting access with a backhoe. Geophysics GPR International's report which describes their finding appears in Appendix E. A summary of findings appears in Section 4.3.1.

Test pits selected by the geophysical survey for the purpose of locating buried drums were typically 15 feet by 15 feet and up to 6-8 feet deep. Test pit depth was limited by the extremely shallow water table. Test pits were excavated to approximately one foot below the water table. Below this depth, slope instability problems were encountered increasing the chance of cave-in or collapse of the test pit.

3.3.2 Test Pits/Subsurface Soil Sampling

In addition to the seven test pits described previously, ten (10) test pits and one soil boring were completed to determine the nature and extent of solid waste buried at the landfill. Additional test pits completed to determine the extent of waste along the margins of the landfill were typically excavated as 20 to 40 foot trenches approximately (3) feet in width and depth.

CDM inspected and logged the type of wastes encountered in each test pit. Test pit logs appear in Appendix B. One full drum was encountered in test pit number four (TP-4) and a sample from the drum was collected for hazardous waste characterization.

Test pit soils were screened for the presence of volatile organic compounds (VOCs) using a photo ionization detector (PID). PID readings are recorded on the test pit logs included in Appendix B.

Subsurface soil samples were taken from four test pits based on field monitoring results and visual observations made during excavation activities. The following is a summary of subsurface soil samples taken:

- TP-4: soil sample (TP-4:6) from six (6) feet below grade after uncovering a drum at 5 feet below grade containing solidified paint. Solvent odors and a PID reading of 119 ppm were observed.

- TP-2: soil sample (TP-2:5) from five (5) feet below grade after observing black stained soil and a PID reading of 9 ppm in the 4 to 5 foot interval.

- TP-9: soil sample (TP-9:2) from two (2) feet below grade along the western margin of the landfill where small iron stained leachate seeps were observed on the ground surface.

- TP-13: soil sample (TP-13:6) from six feet below grade within the waste mass abutting the northern shore of the South Pond.

One shallow soil boring, SB-1, was completed to determine the extent of waste at the landfill. SB-1 was completed just northeast of the South Pond at the direction of the onsite NYSDEC representative. No waste was encountered in this borehole which was completed to a depth of 8 feet. SB-2 (p2-4) was completed to a depth of 50 feet. This boring was completed to determine the type of soils found just north of the South Pond to assist in determining the feasibility of constructing hydraulic controls in this area. A copy of both boring logs can be found in Appendix A.

3.4 Monitoring Well Installation and Development

3.4.1 Well Installation

Four groundwater monitoring well clusters, with one shallow and one deep well in each cluster and three piezometers were installed using the hollow stem auger drilling method. Using split spoon samples to characterize subsurface soil, well screen depths were adjusted from the proposed depths so that well screens were set within the most permeable sediments. Construction of groundwater monitoring wells and piezometers was identical, consisting of a 2-inch diameter schedule 40 PVC well screen ten feet in length with a slot size of .010" and Granusil 2400 filter pack. Monitoring well construction diagrams can be found in Appendix A. Table 3-2 shows all well construction data for both the previously existing wells and the newly installed monitoring wells and piezometers. All well and piezometer locations are shown in Plate 1. The following is a summary of wells and piezometers installed during this remedial investigation:

- MW-6S Total depth below grade = 20 feet
  MW-6D Total depth below grade = 74.5 feet
- MW-7S Total depth below grade = 15 feet
  MW-7D Total depth below grade = 45 feet
- MW-8S Total depth below grade = 20 feet
  MW-8D Total depth below grade = 72 feet
- MW-9S Total depth below grade = 15 feet
  MW-9D Total depth below grade = 74 feet
- PZ-1 Total depth below grade = 15 feet
- PZ-2 Total depth below grade = 54 feet
- PZ-3 Total depth below grade = 20 feet

3.4.2 Well Development

All wells including existing and newly installed monitoring wells and piezometers were developed using a handbailer and/or a submersible pump. Typically, shallow wells were handbailed and surge blocked to remove fine silt from the well screen interval. The deeper monitoring wells and piezometers were developed using a three-step approach involving handbailing, surging and development with a submersible pump.

Well development was intended to continue until a turbidity of 50 NTUs or less was achieved. However, this turbidity range often times was not obtainable due to the prevalence of very fine sand and silt in the geologic formation encountered onsite. One well cluster, MW-9, was developed for an extended period of time. Nearly four and a half hours of development was performed on both the shallow and deep well at this cluster. Only slight improvements in turbidity were noted in the final two and a half hours of development.

Table 3-2
Monitoring Well Construction Data Summary
ETE Sanitation and Landfill Remediation Investigation, Gainesville, New York

Well ID No.	*Material*	*Diam. (in)*	*Top of PVC Casing Elevation (ft MSL)*	*Surface Elevation (ft MSL)*	*Screened Interval (ft MSL)*			*Screened Interval (ft BLG)*			*Date Installed*	*Study*	*Hydrogeologic Unit*
MW-1S	PVC	2.00	1672.11	1669.70	1662.7	to	1652.7	7.0	to	17.0	03/24/93	PSA	Shallow Water Table Aquifer
MW-1D	PVC	2.00	1672.18	1669.60	1637.1	to	1627.1	32.5	to	42.5	04/01/93	PSA	Deep Aquifer
MW-2S	PVC	2.00	1684.63	1681.90	1674.4	to	1664.4	7.5	to	17.5	04/08/93	PSA	Shallow Water Table Aquifer
MW-2D	PVC	2.00	1684.29	1682.00	1644.5	to	1634.5	37.5	to	47.5	04/09/93	PSA	Deep Aquifer
MW-3S	PVC	2.00	1648.90	1646.10	1638.6	to	1628.6	7.5	to	17.5	04/05/93	PSA	Shallow Water Table Aquifer
MW-3D	PVC	2.00	1648.80	1646.10	1614.1	to	1604.1	32.0	to	42.0	04/07/93	PSA	Deep Aquifer
MW-4	PVC	2.00	1647.01	1643.80	1638.8	to	1628.8	5.0	to	15.0	03/24/93	PSA	Shallow Water Table Aquifer
PZ-1	PVC	2.00	1681.81	1682.36	1677.4	to	1667.4	5.0	to	15.0	03/24/98	RI	Shallow Water Table Aquifer
PZ-2	PVC	2.00	1682.22	1682.32	1638.3	to	1628.3	44.0	to	54.0	03/26/98	RI	Deep Aquifer
PZ-3	PVC	2.00	1675.62	1673.05	1663.1	to	1653.1	10.0	to	20.0	03/05/98	RI	Fill / Shallow Water Table Aquifer
MW-6S	PVC	2.00	1655.69	1653.33	1643.3	to	1633.3	10.0	to	20.0	03/10/98	RI	Shallow Water Table Aquifer
MW-6D	PVC	2.00	1657.63	1655.24	1590.7	to	1580.7	64.5	to	74.5	03/12/98	RI	Deep Aquifer
MW-7S	PVC	2.00	1634.60	1632.12	1627.1	to	1617.1	5.0	to	15.0	03/17/98	RI	Shallow Water Table Aquifer
MW-7D	PVC	2.00	1634.60	1632.43	1587.4	to	1597.4	45.0	to	35.0	03/18/98	RI	Deep Aquifer
MW-8S	PVC	2.00	1671.26	1668.66	1658.7	to	1648.7	10.0	to	20.0	03/05/98	RI	Fill / Shallow Water Table Aquifer
MW-8D	PVC	2.00	1671.02	1668.85	1606.9	to	1596.9	62.0	to	72.0	03/09/98	RI	Deep Aquifer
MW-9S	PVC	2.00	1645.07	1642.67	1637.7	to	1627.7	5.0	to	15.0	03/20/98	RI	Shallow Water Table Aquifer
MW-9D	PVC	2.00	1644.32	1641.96	1578.0	to	1568.0	64.0	to	74.0	03/20/98	RI	Deep Aquifer

Following consultation with NYSDEC, it was determined that each well would be developed a minimum of 2 hours each with additional deve' ··ment time allotted for those wells determined to be problematic. Table 3-3 provides a summary well development performed on all of the monitoring wells and piezometers.

3.5 Groundwater Sampling

One round of groundwater samples was collected from the seven existing monitoring wells and the eight newly installed RI monitoring wells. Sampling of the wells was initiated on March 31, 1998 following well development and slug testing of selected wells. Prior to sampling each well was purged using a submersible pump or hand bailer. Purging consisting of excavating three to five well volumes from each well. CDM conducted field measurements of pH, conductivity, temperature, dissolved oxygen, salinity and turbidity during purging of each well. Table 3-3 shows the final readings obtained during purging activities.

Wells were given time to recharge following the three to five volume purge. This also allowed time for the suspended fraction of silt to settle out. To obtain turbidity free samples, a hand bailer was slowly and carefully lowered into the upper portion of the well's water column. This portion of the water column tends to be free of suspended material as silt settles to the bottom of the well. One well, MW-7S, was slightly cloudy and appeared to be well above the 50 NTU criteria for TAL metals analysis. In this case, both a TAL metals analysis and a filtered metals analysis were performed. All other water samples were clear and contained no suspended silt. At the direction of NYSDEC only an unfiltered analysis of the remaining samples was performed.

The eight newly installed RI wells were analyzed for full TCL Organics, TAL metals and cyanide. Analysis of samples collected from the seven existing wells was limited to TCL volatile organics and TAL metals.

Six rounds of synoptic water levels were completed over a three month period. Water levels were measured at 7 pre-existing wells, 8 RI wells, 3 piezometer and the surface water staff gauge located in the north and south ponds. The first three rounds were taken at one week intervals for three weeks beginning April 30, 1998. The remaining three rounds of water level readings were taken at irregular time intervals for a total of six rounds of synoptic water levels. Table 3-4 provides a summary of all water level data collected by CDM.

3.6 Aquifer Response (Slug) Testing

Ten (10) slug tests were performed at existing and newly installed monitoring wells to determine the hydraulic conductivity of the geologic formations found at the site. CDM and NYSDEC selected wells to be slug tested which would provide information on the changes in hydraulic conductivity across the landfilled area. Based on this consideration, the following wells were selected: MW-1S, PZ-3, MW-4, MW-6S, MW-6D, MW-7S, MW-8D, MW-9S, MW-9D. Table 3-5 provides a summary of the results obtained using the Bouwer and Rice Method (1986 and 1989) for determining hydraulic conductivities from slug tests.

Table 3-3
Summary of Well Development
ETE Sanitation and Landfill

Development Summary					Field Parameters Summary						
					Final Reading During 3-5 Well Volume Purge*						
Well ID #	**Date Developed**	**Hours Developed**	**Development Method**	**Approx. Gallons Removed**	**DO** (mg/l)	**pH**	**Temp** (C)	**Salinity** (%)	**Cond** (mS/cm)	**Turb.** (NTU)	**Total Purge** (gal.)
MW-1S	2/26/98	1.00	Bailer	15.00	5.57	7.30	9.30	0.01	0.50	999	7.25
MW-1D	3/26/98	2.00	Bailer/*Sub	136.00	2.07	7.31	11.20	0.03	0.79	85	42.50
MW-2S	3/27/98	2.00	Bailer	20.00	9.34	7.30	6.20	0.01	0.58	999	5.50
MW-2D	3/27/98	2.00	Bailer	56.00	6.58	7.58	9.10	0.01	0.62	999	18.00
MW-3S	3/26/98	2.50	Bailer	30.00	4.36	7.10	8.20	0.12	2.28	250	5.50
MW-3D	3/26/98	2.50	Bailer/*Sub	23.00	3.85	7.25	11.10	0.84	14.70	>999	13.50
MW-4S	3/12,26/98	4.25	Bailer	25.00	3.38	6.74	8.60	1.83	30.20	>999	11.00
MW-6S	3/16/98	2.00	Bailer	15.00	8.03	7.79	7.90	0.02	0.64	999	6.00
MW-6D	3/16/98	2.00	Bailer	62.00	1.04	7.80	9.70	0.01	0.34	999	42.00
MW-7S	3/25/98	2.00	Bailer	35.00	2.61	7.66	6.80	0.26	5.17	999	12.00
MW-7D	3/25/98	2.00	Bailer/*Sub	33.00	5.21	13.40	10.00	1.30	21.00	290	26.00
MW-8S	3/13/98	1.00	Bailer	30.00	1.20	6.26	10.00	4.00	77.50	999	9.50
MW-8D	3/13/98	2.00	Bailer/*Sub	140.00	2.00	7.81	11.00	0.04	0.93	10	55.00
MW-9S	3/25/98	4.50	Bailer	31.00	4.80	6.15	8.40	4.00	100.00	>999	10.00
MW-9D	3/25/98	4.50	Bailer/*Sub	99.00	0.38	7.76	11.60	0.01	0.54	878	29.00
PZ-2	3/27/98	1.50	Bailer	NR	No sample taken.						
PZ-1	3/27/98	1.50	Bailer	NR	No sample taken.						
PZ-3	3/16/98	2.00	Bailer/*Sub	51.00	No sample taken.						

*Denotes Submersible Pump
NR: Not recorded.

*Wells were allowed to recharge overnight to reduce the turbidity of groundwater samples.

Table 3-4
Synoptic Water Level Measurements
ETE Sanitation and Landfill
Remedial Investigation

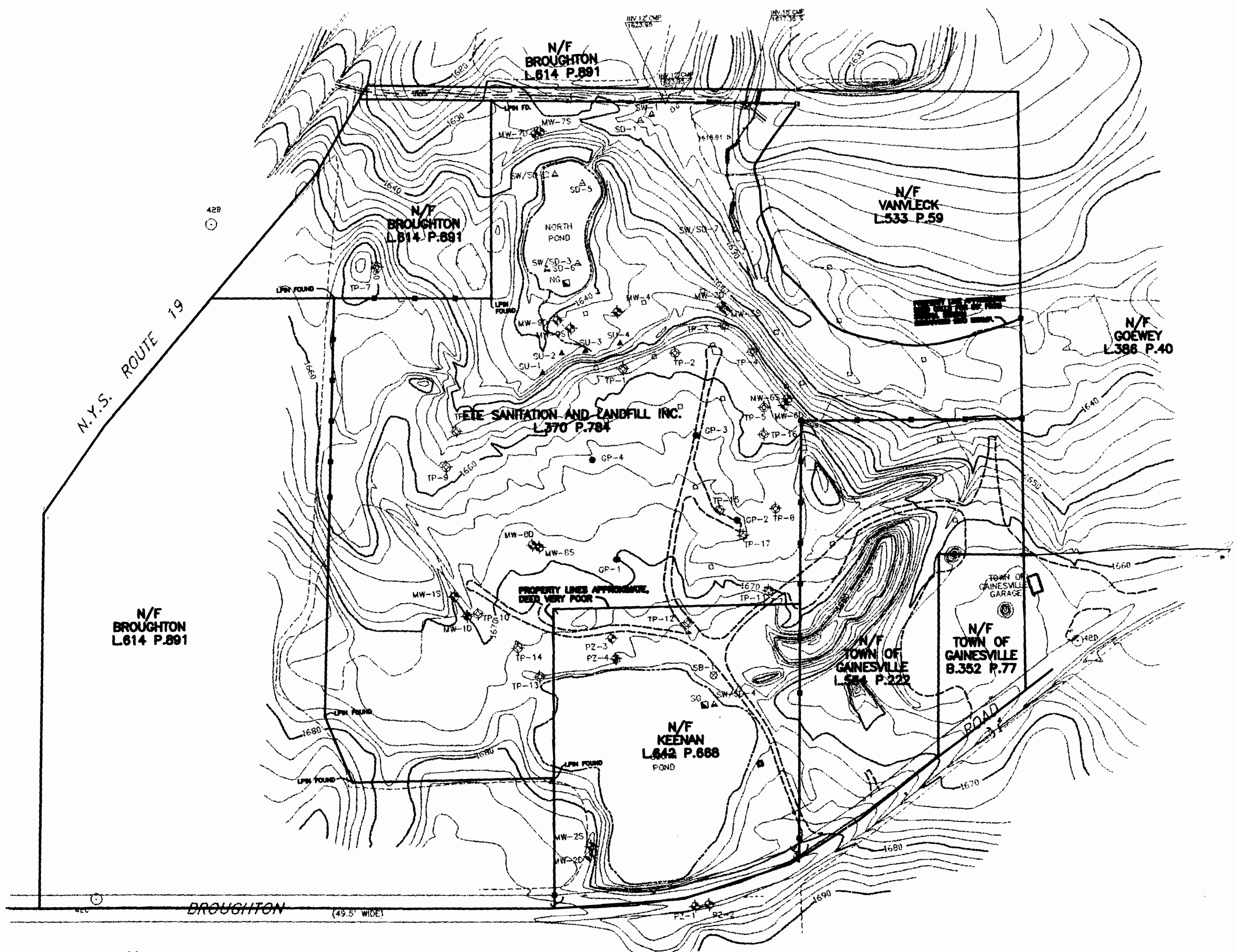
Well ID No.	Top of PVC Casing Elevation (ft MSL)	April 30, 1998		May 7, 1998		May 13, 1998		May 27, 1998		June 4, 1998		June 16, 1998	
		Depth to Water from Top of PVC (ft)	Elevation of Water Surface (ft MSL)	Depth to Water from Top of PVC (ft)	Elevation of Water Surface (ft MSL)	Depth to Water from Top of PVC (ft)	Elevation of Water Surface (ft MSL)	Depth to Water from Top of PVC (ft)	Elevation of Water Surface (ft MSL)	Depth to Water from Top of PVC (ft)	Elevation of Water Surface (ft MSL)	Depth to Water from Top of PVC (ft)	Elevation of Water Surface (ft MSL)
MW-1S	1672.11	4.69	1667.42	4.65	1667.46	4.49	1667.62	6.14	1665.97	5.64	1666.47	5.24	1662.18
MW-1D	1672.18	6.50	1665.68	6.59	1665.59	6.20	1665.98	7.24	1664.94	7.20	1664.98	7.23	1658.45
MW-2S	1684.63	12.09	1672.54	12.19	1672.44	12.76	1671.87	12.44	1672.19	12.46	1672.17	12.61	1659.93
MW-2D	1684.29	12.89	1671.40	13.16	1671.13	12.55	1671.74	13.37	1670.92	13.53	1670.76	13.75	1657.65
MW-3S	1648.90	11.98	1636.92	12.31	1636.59	10.72	1638.18	12.63	1636.27	12.55	1636.35	12.36	1624.56
MW-3D	1648.80	14.05	1634.75	14.43	1634.37	14.08	1634.72	14.94	1633.86	15.16	1633.64	15.39	1619.36
MW-4	1647.01	5.02	1641.99	4.98	1642.03	4.53	1642.48	6.33	1640.68	5.88	1641.13	5.51	1636.48
MW-6S	1655.69	17.99	1637.70	18.39	1637.30	16.71	1638.98	18.63	1637.06	18.86	1636.83	19.09	1618.61
MW-6D	1657.63	12.66	1644.97	13.03	1644.60	12.85	1644.78	13.49	1644.14	13.81	1643.82	14.28	1630.69
MW-7S	1634.60	4.02	1630.58	4.13	1630.47	3.27	1631.33	5.55	1629.05	5.82	1628.78	5.99	1624.59
MW-7D	1634.60	9.76	1624.84	10.08	1624.52	9.00	1625.60	10.15	1624.45	10.38	1624.22	10.56	1614.28
MW-8S	1671.26	7.41	1663.85	7.39	1663.87	7.64	1663.62	7.65	1663.61	7.55	1663.71	8.01	1655.84
MW-8D	1671.02	7.74	1663.28	7.94	1663.08	7.61	1663.41	8.42	1662.60	8.42	1662.60	8.51	1654.77
MW-9S	1645.07	4.77	1640.30	4.71	1640.36	4.28	1640.79	5.64	1639.43	5.68	1639.39	5.45	1634.85
MW-9D	1644.32	1.78	1642.54	2.21	1642.11	2.19	1642.13	2.91	1641.41	3.36	1640.96	3.91	1638.63
PZ-1	1681.81	4.74	1677.07	5.39	1676.42	4.55	1677.26	5.91	1675.90	6.38	1675.43	7.12	1669.95
PZ-2	1682.22	14.01	1668.21	14.41	1667.81	14.33	1667.89	14.72	1667.50	14.92	1667.30	15.58	1652.63
PZ-3	1675.62	4.59	1671.03	4.69	1670.93	4.71	1670.91	5.10	1670.52	5.09	1670.53	5.16	1665.87
	Top of Staff Gauge			*DTW**		*DTW**		*DTW**		*DTW**		*DTW**	
North Pond	1641.95	ND		3.65	1638.30	ND		ND		ND		ND	
South Pond	1675.66	ND		3.37	1672.29	3.23	1672.43	3.60	1672.06	3.68	1671.98	3.75	1671.91

ND: No staff gauge data. For April 30, 1998 round, the staff gauges were not yet installed. On May 13, 1998, the North Pond staff gauge was damaged and a reading could not be taken.
DTW*: Depth to water from top of staff gauge which reads 5.0 ft.

Table 3-5
Calculated Hydraulic Conductivity of Geologic Units Screened
(Bouwer and Rice Method, 1986, 1989)
ETE Sanitation and Landfill
Remedial Investigation

Well / Piezometer	Geologic Unit Screened		Slug In Calculated K (cm/sec)	Slug Out Calculated K (cm/sec)	Average Calculated K (cm/sec)
PZ-1	Layered Brown Silt, little sand and gravel, with Brown Medium to Fine Sand, with silt and gravel	(Unit 1)	4.30E-04	2.00E-04	**3.15E-04**
PZ-3	Fill and layered Brown Silt, little sand and gravel, with Brown medium to fine Sand with silt and gravel	(Unit 1/Fill)	1.90E-03	4.80E-03	**3.35E-03**
MW-1S	Gray-Tan/Brown Fine Sand and Silt	(Unit 4)	2.90E-05	1.88E-05	**2.39E-05**
MW-4	Layered Brown Silt, little sand and grave, with Brown Medium to Fine Sand, with silt and gravel	(Unit 1)	5.10E-05	2.44E-05	**3.77E-05**
MW-6S	Layered Brown Silt, little sand and gravel, with Brown Medium to Fine Sand, with silt and gravel	(Unit 1)	4.20E-04	4.30E-04	**4.25E-04**
MW-6D	Gray Silt and Fine Sand, little clay, little pebbles, and Gray Fine to Medium Sand and Silt	(Unit 2/3)	1.30E-04	1.35E-04	**1.33E-04**
MW-7S	Layered Brown Silt, little sand and gravel, with Brown Medium to Fine Sand, with silt and gravel and Gray Fine to Medium Sand and Silt	(Unit 1/3)	5.40E-05	1.30E-04	**9.20E-05**
MW-8D	Gray Fine to Medium Sand and Silt and Greenish-Gray Medium to Coarse Sands, with siltstone fragments, pebbles and cobbles.	(Unit 3/5)	6.70E-05	2.00E-04	**1.34E-04**
MW-9S	Layered Brown Silt, little sand and gravel, with Brown Medium to Fine Sand, with silt and gravel	(Unit 1)	3.49E-05	1.84E-05	**2.67E-05**
MW-9D	Gray Fine to Medium Sand and Silt, occasionally containing pebbles and cobbles	(Unit 3)	5.08E-04	5.08E-04	**5.08E-04**

S:\0897\22149\RI\ PROPRTY 06/22/98 15:15:18 1:01:55 Robert Gencorelli



1"=200'

100 0 100 200

CDM Camp Dresser & McKee

LEGEND

▫	HUB SET
———	PROPERTY LINE
N/F VANVLECK L.533 P.59	PROPERTY OWNERSHIP (N/F-NOW OR FORMERLY) (L-LIBER, P-PAGE)
———	EASEMENT
— — —	TRAIL

NOTES

1. VERTICAL DATUM: FROM WELL ELEVATIONS SHOWN ON ORIGINAL TOPOGRAPHIC MAP PROVIDED BY NYSDEC
2. DATE OF SURVEY: APRIL 16, 1998

Figure 3-2
Site Property And Adjacent Lots
ETE Sanitation And Landfill Remedial Investigation

3.7 Site Survey Update

YEC Inc., subcontractor for CDM, provided an update of the existing ETE Landfill base map. YEC Inc. conducted a deed search in order to accurately locate the property boundaries of the site property and adjacent property lots. Property boundaries were staked in the field using wooden hubs set in the ground. The locations of the site and adjacent properties are shown in Figure 3-2.

YEC Inc. encountered some difficulty in accurately determining the property boundaries for the Keenan property, (site of the South Pond) due to the poor boundary description found in the deed. The property line for the northeast corner of the site between the ETE Landfill and the Vanleck property also presented some surveying problems. The deed describes the Vanleck's western property line as 50' from the small stream. This area is currently a swampy region making an exact determination of the property line very difficult, if not impossible.

YEC Inc. also established two control monuments to be used for future surveying needs. The monuments were installed along Broughton Road near the southwestern and southeastern corners of the Keenan property. In addition to the two control monuments, a metal spike was driven into a tree located just northeast of the MW-9D to provide elevation control in the southern portion of the site.

YEC surveyed the location of all RI sample points including monitoring wells, soil borings, sediment samples, soil samples and surface water samples. Surface water sample locations were surveyed to the nearest shoreline point from which the sample was taken. The sample location's estimated distance from the surveyed shoreline point are shown in Plate I. The elevation of all monitoring well casings was established to within 0.01 feet based on the USGS datum. The interior PVC casings on all of the wells and piezometers have been marked to provide a measuring level for future groundwater elevation measurements.

The depth of the North and South Pond was determined by conducting twelve sounding measurements in the South Pond and ten measurements in the North Pond. Four measurements were taken in each pond to determine sediment thickness within each pond. Thicknesses ranged from 0.2-0.5 feet in the South Pond and 0.9-1.7 in the North Pond. Figure 3-3 is a contour map showing bottom elevations and measurements of sediment thickness in both Ponds.

YEC was responsible for establishing three geophysical survey grids which were used by Geophysics GPR Inc. to conduct a magnetometer survey. The locations of four corners, center lines and the center point of each grid area was surveyed. Additional points of the grid were located using a coordinate system starting at origin 0 feet north by 0 feet east for Grid 1, 2 and 3.

Staff gauges were installed in the North and South Pond to be used in conjunction with water level elevations obtained in the shallow monitoring wells and piezometers. The staff gauge in the North Pond was destroyed following inclement weather conditions in May 1998.

3.8 Soil Gas Survey

A limited soil gas survey was performed to collect data needed to design a suitable gas venting system. One round of soil gas samples was collected through the use of temporary soil gas probes

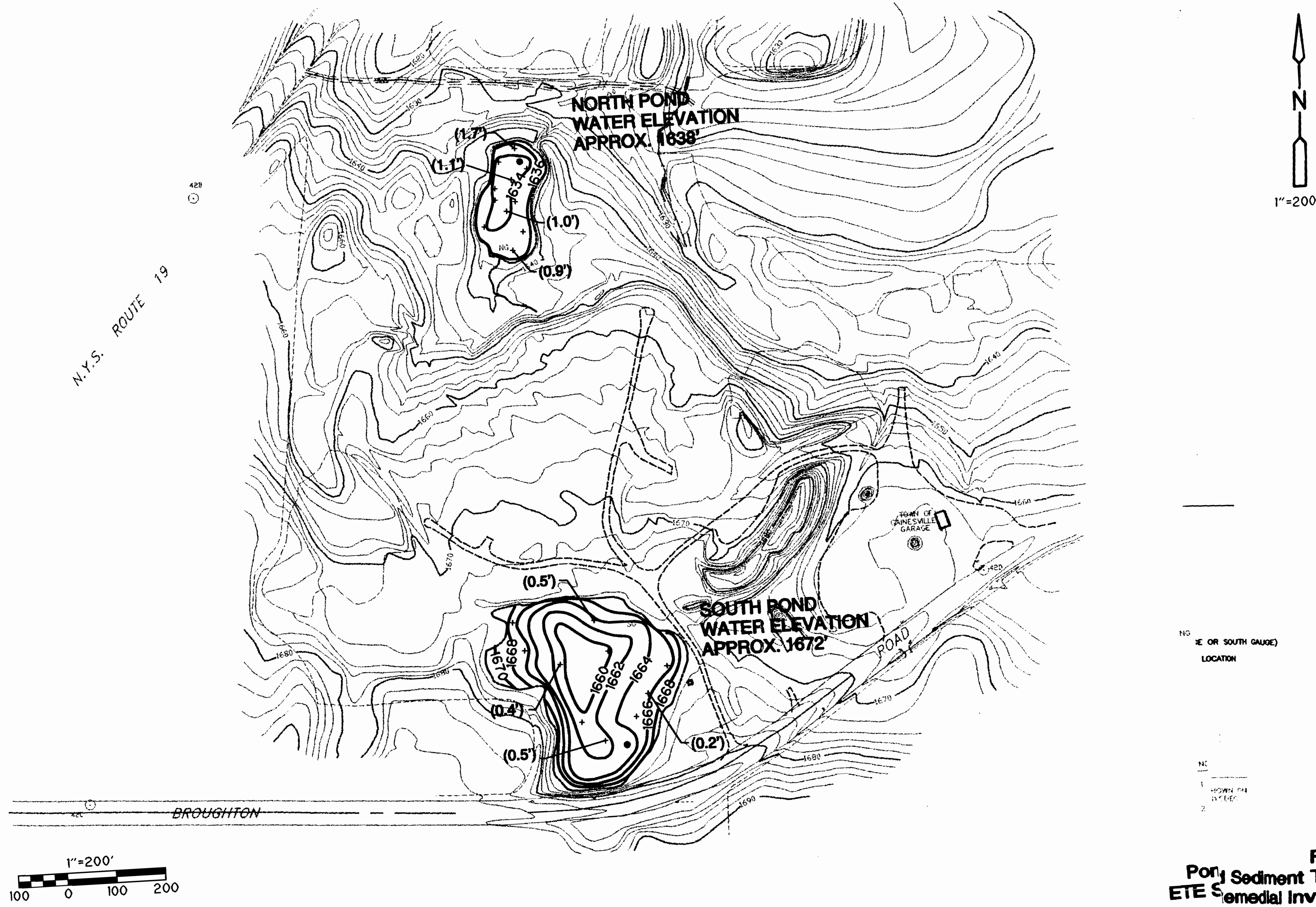


Figure
Pon| Sediment Thickn
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CDM Camp Dresser & McKee

and summa canisters. The soil gas probes (GP-1 thru GP-4) each had a dedicated tip connected to a Teflon sampling tube. The probes were manually driven to a depth of 3 to 4 feet below grade. Soil gas samples were collected via Summa Canisters and analyzed for VOCs by EPA method TO-14. Field measurements were taken to monitor % methane, % carbon dioxide, lower explosive limit and % oxygen levels at each of the gas probe locations. Results of the soil gas survey ware discussed in Section 4.4 of this report.

3.9 Data Validation and Usability

Based upon the intended use of the data, the following analytical data received independent validation by a third party:

- Test pit soil samples
- Leachate seep soil samples
- Surface water samples
- Sediment samples
- Groundwater samples

The primary objective of the field investigation was to obtain reproducible, defensible data of sufficient quality and quantity to achieve the RI objectives of determining the extent and type of contaminants at ETE Landfill and to perform a baseline risk assessment. In order to do this, data quality objectives were incorporated in the planning of the RI in accordance with regulatory guidelines. To meet the data quality objectives for the sample data, field and laboratory procedures for sample collection and analysis were followed in accordance with the approved RI/FS Standard Operations Plan.

Based on the third party validation, data were generally within acceptable quality control specifications. Both quantitative and qualitative analyses were acceptable. However, certain compounds, compound groups, and or a majority of compounds in one sample were additionally qualified or rejected after being reviewed by the data validator. A summary of the significant findings of the completed validation follows:

Test Pit Subsurface Soil Samples

- Volatile Organic Compounds

  Low concentrations of methylene chloride and acetone were detected in the field blank. Therefore, these compounds were negated or qualified as estimated when detected in a sample according to EPA data validation guidelines.

- Semivolatiles

  Sample TP-2:5: The recovery of the last internal standard in the initial analysis of this sample was less than the 50% quality assurance limit. This sample was reanalyzed according to the NYSDEC ASP requirements but the last two internal standards were still less than the 50% quality assurance limit. As a result, the data validator recommended using the data from the first analysis with the following qualifier:

The compounds which were quantitated against the last internal standard in the initial analysis were flagged with the "J" qualifier indicating concentrations are estimated.

- TAL Inorganic and Cyanide: No data validation problems were found with the results of this sample delivery group.

- Pesticides/PCBs: Many problems were found with compounds eluting above their retention time windows both in the standards and in the matrix spike and matrix spike duplicate. The raw data and chromatograms were reviewed and the retention time problems did not appear to affect the usability of the data. No peaks appeared to have been overlooked. Therefore, the pesticide/PCB results did not require any special qualification.

Leachate Seep Surface Soil Samples

- Volatile Organics

Sample SU-1, SU-3 and SU-4: The recoveries of all the internal standards were less than the 50% quality assurance limits (29%, 30%, 25%) in the initial undiluted analysis of this sample. All of the data for the sample was flagged with the "J" qualifier and should be considered estimated values.

The SU-1 sample was diluted and reanalyzed due to the high concentrations of ethylbenzene and xylene. The recoveries of all of the internal standards were less than 25% (17%, 22%, and 22%) in the reanalysis of this sample. The problems with the internal standard recoveries may be due to a laboratory technical problem. The data for the diluted sample, with the exception of ethylbenzene and xylene, were rejected. The concentration of ethylbenzene and xylene obtained from the diluted samples were retained for use but are qualified DJ, indicating the sample is diluted and estimated. The blind duplicate sample for SU-1, labeled as SU-1 DUP, also required dilution, however, all diluted values were retained and qualified as estimated ("J").

The SU-3 sample was reanalyzed due to failure of meeting internal standards. However, the reanalysis identified lower concentrations of methylene chloride (3.2 ug/kg vs. 18 ug/kg), ethylbenzene (13U ug/kg vs. 48 ug/kg) and xylene (34 ug/kg vs. 132 ug/kg). Based on the results, the data validator recommended using the initial data with the understanding that (analysis) they would be qualified as estimated ("J").

Sample SU-4 was reanalyzed and all of the internal standard recoveries were less than 25%, therefore, the data for reanalysis were rejected. Data from the initial analysis were used for the final reporting but are considered estimated.

- Semivolatile Organics

No problems were found with the reported analytical results of any of the samples of this delivery group which would affect the end use of the data.

- Pesticide and PCB Analysis

  No problems were found with the reported analytical sample results of any of the samples of this delivery group which would affect the end use of the data

Sediment Samples Volatile Organics

Sample SD-1: During the initial analysis, the recoveries of all the internal standards were less than 25% (12%, 16% & 17%). The compounds which were not detected in the sample were rejected, therefore all of these would be considered to be unusable. Due to the failure in meeting the internal standards the sample was reanalyzed. The data from the second analysis was used for the final reporting of the data for this sample. No detections were noted, but all values were qualified as estimated ("J").

Sample SD-2: The recoveries of the first two internal standards were less than 25% (15% and 24%). The compounds which were not detected in the sample, which were quantitated against these two internal standards were rejected, and are considered to be unusable. The data from the second analysis was used for the final reporting of the data for this sample but were qualified with "J", indicating an estimated value.

Sample SD-6: The recoveries of all the internal standards where less than 25% (19%, 24% & 23%). The compounds which were not detected in the sample were rejected, and are considered to be unusable. These were flagged with the "J" qualifier. This sample was reanalyzed and data from the second analysis was used for the final reporting of the data for this sample but were qualified as estimated ("J").

The concentration of acetone in the original sample was 98 ug/kg, but the acetone concentration was 540 ug/kg when the sample was reanalyzed. This was above the linear range of the analysis. The data from the second analysis was used since only the recovery of the first internal standard was just below the 50% quality assurance limit (48%). This sample should have been diluted and reanalyzed. It was flagged with the "J" qualifier which means that the concentrations is an estimated value.

- Semivolatile Organics

  No problems were found with the reported results which would affect the end use of the data.

- TAL Inorganic and Cyanide

  No problems were found with the reported results of any of the samples of this sample delivery group which would affect the end use of the data.

Surface Water Samples

- Volatile Organics

Acetone (11 ug/l) and methylene chloride (4 ug/l) were detected in the one field blank associated with the samples of this delivery group. The values of methylene chloride and acetone were negated if they were less than five times the value reported in the field blank.

- TAL Inorganics and Cyanide

  No problems were found with the reported results of any of the samples of this sample delivery group.

Groundwater Samples

- Volatile and Semivolatile Organics

  A low concentration of xylene (2 ug/l-estimated) was detected in the field blank associated with this sample delivery group. This compound was negated or qualified from the samples of this delivery group according to the standard EPA data validation procedures due to its presence in the trip blank.

  Sample MW-8S: The recoveries of all three system monitoring compounds were above the quality assurance limits in the initial undiluted analysis of this sample. The sample was analyzed at a dilution due to high concentrations of several compounds and all of the system monitoring compounds recoveries were within the required quality assurance limits. The data for the initial analysis of this sample was flagged with the "J" qualifier, indicating an estimated value. Quantities obtained from the dilute sample analysis were used for the compounds: 2-butanone, 4-methyl-2-pentanone, and toluene. The data validator determined that the initial analysis for the remaining compounds was more accurate.

- TAL Inorganic and Cyanide Analysis

  No problems were found with the reported results of any of the samples of this sample delivery group which would affect the end use of the data.

- Pesticides/PCBs

  Problems were found with compounds eluting above their retention time windows, however, the raw data and chromatograms were reviewed by the data validator and the retention time problems did not appear to affect the usability of the data.

3.10 Quality Control Samples

To meet the QA objectives, various QC measures are performed. These QC measures include the collection of QC samples such as trip blanks, field blanks, and field duplicates. These QC samples measure possible factors that would influence the results reported for the environmental samples. Each type of QC sample and the associated results are discussed below.

Trip Blanks

Trip blanks for water samples were used to determine if any on-site atmospheric contamination was present to affect the sample vials or if any cross contamination occurred during shipment of the sample containers. Trip blanks were prepared immediately prior to the sampling event, kept with the environmental samples, and were handled in the same manner as the environmental samples. They consisted of volatile organic analyte (VOA) vials filled with demonstrated analyte-free water preserved to the proper pH. Trip blanks were analyzed for TCL VOCs only and the data was then used to assess potential volatile contamination introduced to the samples during handling and shipment.

- Surface Water: No compounds were detected in the one trip blank associated with the samples of this delivery group.

- Groundwater Samples: A low concentration of xylene (2 ug/l) was detected in the one trip blank associated with this sample delivery group. This compound was negated or qualified from the samples of this delivery group according to the standard EPA data validation procedures. The data validator must report data with a negate qualifier because the analysis of concentration reported for these compounds are accurate. However, the concentration of a compound measured is more than likely due to lab contamination and is not present in the groundwater.

- Leachate Seep, Sediment and Test Pit Subsurface Soil Sampling: No trip blanks were taken for these sample delivery groups.

Field Blanks

Field blanks (also known as rinsate or equipment blanks) are used to assess the potential contamination introduced to environmental samples due to improper equipment decontamination. Field blanks also measure any possible contamination introduced to the sample media due to the decontamination procedure itself.

In the field, demonstrated analyte-free water was passed through decontaminated sample equipment, collected in empty, certified clean sample containers, and preserved and packaged accordingly.

- Surface Water: Acetone (11 ug/l) and methylene chloride (4 ug/l) were detected in the one field blank associated with the samples of this delivery group. The values of methylene chloride and acetone were negated as they were less than five times the value reported in the field blank.

- Groundwater Samples: A low concentration of xylene (2 ug/l) was detected in the one field blank associated with this sample delivery group. This compound was negated or qualified from the samples of this delivery group according to the standard EPA data validation procedures due to its presence in the trip blank.

- Leachate Seep Surface Soil and Sediment Samples: Field blanks were not taken for these sample delivery groups.

- Test Pit Subsurface Soil Samples: Low concentrations of methylene chloride and acetone were detected in the field 'ank. These compounds were negated or qualified whenever they were detected in a sa ple according to the EPA data validation guidelines.

Duplicates

Field duplicate samples were collected and analyzed to assess the overall precision of the field sampling effort. Duplicate samples were collected and analyzed at a frequency of 5% or one out of every 20 samples or less of similar matrix.

Subsurface Soil Samples: Sample results indicate close agreement between the blind duplicate samples for both organic and inorganic compounds.

Leachate Seep Soil Sample: Overall, sample results indicate close agreement between the blind duplicate samples taken. However, the second sample taken SU-1 (DUP) shows slightly lower levels for both inorganic and organic compounds. This is likely the result of taking surface soils from a slightly deeper interval which has not been impacted by leachate seeps to the degree that the initial sample of very near surface (less than 1 inch below grade) soils was subjected to.

Surface Water Sample: The surface water sample duplicate taken at sample location SW-7 showed very close agreement between samples for both the volatile and inorganic compounds that were analyzed.

Sediment Samples: The sediment duplicate sample taken at sample location SD-7 was lower in concentrations of acetone, 2-Butanone and the semivolatile compounds, di-n-butylphthalate. Inorganic compounds, however, were nearly identical in concentration.

Groundwater Samples: The groundwater sample duplicate results obtained from the monitoring well, MW-9D showed close agreement for all of the parameters analyzed.

Section 4

Nature and Extent of Contamination

This section discusses the nature and distribution of organic and inorganic constituents associated with the ETE Landfill. To aid risk management decisions regarding the need to remediate the site and to assist in developing presumptive remedies for the site, this section of the report focuses on constituents identified as chemicals of concern (COCs) in the soil, sediment, water and air, at the site.

Screening criteria for these various media were developed using the appropriate standards, criteria and guidance (SCGs) documents provided by NYSDEC as applicable SCGs for the ETE Landfill site. Screening criteria are employed during site characterization because contaminants detected below regulatory standards are not likely to be targeted for remediation.

Screening criteria were used to identify areas where disposal activities at the landfill have introduced hazardous constituents into the environment. The need for altering the presumptive remedy approach will be determined by the results of the qualitative risk assessment. If no unacceptable risk is indicated under existing conditions, remedial alternatives beyond the minimum presumptive remedies will not be evaluated during the feasibility study.

The following standards, criteria and guidance documents were used to screen the environmental samples collected at the landfill:

New York State Regulatory Document	Application
■ 6 NYCRR Part 257 - Air Quality Standards	applicable air quality standards
■ Technical guidance for screening contaminated sediments; 7/94	surface water sediments screening levels
■ TAGM HWR-92-4046 Determination of Soil Cleanup Objectives and Cleanup Levels, 1/24/94	soil cleanup goals
■ TOGS 1.1.1 - Ambient Water Quality Standards & Guidance Values; 10/93	compilation of ambient water quality and guidance values for New York State waters; groundwater and surface water
■ 6 NYCRR Part 608 - Use and Protection of Waters	protection of certain classified streams
■ 6 NYCRR Part 371 - Identification and Listing of Hazardous Wastes; 1/14/95	State hazardous waste regulations

- ` CFR 261-261 Identification and Listing ·Hazardous V ıste; 2/12/97 — F. ˡeral hazardous waste determinations

4.1 Surface Water, Surface Water Sediment and Leachate Soil Sampling

4.1.1 Surface Water Sample Results

Surface water results from ETE Landfill were screened against the New York State ambient water quality standards for Class C waters. Class C waters are defined as those surface waters suitable for fish propagation. This screening criteria was selected in light of the fact that water discharging from the North (Leachate collection) Pond enters Cotton Creek 0.78 miles downgradient from the site. Cotton Creek has been classified as a Class C body of water by the NYSDEC. Class C water standards do not exist for certain chemical compounds. For these compounds the more stringent drinking water standards for Class A surface water and Class GA groundwater were used to screen the sample results. Surface water sample locations are shown in Plate I. Surface water feature names are shown in Figure 2-1 in Section 2.

A summary of all surface water sample detections are shown in Table 4-1. Table 4-2 provides a summary of detections for surface water compounds with hardness dependent screening criteria. A summary of field parameters measured at the surface water sample locations is provided in Table 4-3. Exceedances of NYSDEC SCGs are shown in Plate VI along with sediment sample exceedances

Background Surface Water Quality

A background sample, SW-4, was taken from the South Pond in order to assess surface water quality upgradient or the landfill. However, test pit data indicates landfill waste likely exists beneath the South Pond; and, therefore, water quality within the South Pond may be impacted by the landfill. However, no Class C water standards were exceeded in SW-4.

Volatiles

As shown in Table 4-1, all detections of volatile organic compounds were negated, following QA/QC review by a third party data validator, due to their presence in the field blank associated with this sample delivery group.

Inorganics

Inorganic data clearly indicate impacts to surface water quality in the North Pond and eastern drainage channel. Aluminum, iron, manganese, sodium and zinc are found in excess of NYSDEC's Standard for Class-C water at all downgradient sample locations.

The mean sodium concentration of North American freshwaters is 9 mg/l (Wentzel 1983). Sodium was observed at concentrations well above the referenced average concentration in all surface water sample: ·ncluding the background sample taken from the South Pond. Runoff from road salting commo..y occurring along Broughton Road during the winter months may be the source of the elevated sodium concentration observed in the upgradient South Pond sample, SW-4. However, as previously discussed, landfill waste likely extends into the South Pond and therefore the elevated

Table 4-1
Summary of Surface Water Sample Detections
Organic and Inorganic Compounds
ETE Sanitation and Landfill
Remedial Investigation

Client Sample ID		SW-1			SW-2			SW-3			Background SW-4			SW-7			SW-7 (DUP)			FB-3398		
Sample Collection Date		3/5/98			3/5/98			3/5/98			3/5/98			3/5/98			3/5/98			3/5/98		
Sample Matrix		WATER			WATER			WATER			WATER			WATER			WATER			WATER		
Units		ug/L			ug/L			ug/L			ug/L			ug/L			ug/L			ug/L		
	NYSDEC Standard for Class C Water* (ug/L)	MDL	CONC	Q	MDL	CONC	Q	MDL	CONC	Q	MDL	CONC	Q	MDL	CONC	Q	MDL	CONC	Q	MDL	CONC	Q
TCL Volatile Organics																						
Methylene Chloride	5**	10	4.3	JN	10	4.1	JN	10	5.7	JN	10	5.7	JN	10	3.8	JN	10	6	JN	10	3.9	JN
Acetone	50**	10	4.2	JN	10	16	N	10	ND		10	6.1	JN	10	ND		10	8.4	JN	10	11	N
TCL Inorganics																						
Aluminum	100	5	**423.23**		5	**271.39**		5	**511.77**		5	15.9	B	5	**246.17**		5	**250**		5	25.77	B
Barium	1000**	1	75.23	BEJ	1	69.07	BEJ	1	50.6	BEJ	1	4.7	BEJ	1	59.09	BEJ	1	56.6	BEJ	1	ND	
Calcium	NA	11	46096		11	45635		11	42111		11	22900		11	66847		11	67762		11	74.78	B
Chromium	11	1	1.69	B	1	1.65	B	1	1.55	B	1	ND		1	1.49	B	1	ND		1	ND	
Iron	300	16	**3244**		16	**4798.9**		16	**4248**		16	122		16	**751.3**		16	**716.52**		16	66.68	B
Magnesium	35000**	14	8503.6		14	8310		14	8690		14	3600	B	14	11367		14	11416		14	82.24	B
Manganese	300**	1	**464.2**		1	**311.37**		1	246.34		1	65		1	235.43		1	230.41		1	ND	
Potassium	NA	20	6637.3		20	6828.7		20	3046.7	B	20	1030	B	20	6880.4		20	6026		20	43.47	B
Sodium	20000***	90	**258120**		90	**286860**		90	**85045**		18	**32700**		360	**655080**		180	**596430**		18	199.83	B
Vanadium	14	1	1.51	B	1	1.4	B	1	1.96	B	1	ND		1	1.29	B	1	ND		1	ND	
Zinc	30	1	**42.1**		1	**39.26**		1	**37.09**		1	13.7	B	1	22.7		1	13.46	B	1	15.45	B
Hardness (ppm)	NA		150			149			142			72			214.5			215			2	

Note:
BOLD: Exceeds the NYSDEC criteria for Class C water.
Standards taken from NYSDEC, T.O.G.S 1.1.1, "Ambient Water Quality Standards and Guidance Values," 10/93
*Cotton Creek is classified by New York State as a class C water body. Cotton Creek receives all surface water discharging from the ETE Sanitation and Landfill site.
**Standard is for class A water. A class C water standard does not exist.
***Standard is for class GA water. No surface water standard exists.
NA: No standard applicable MDL: Method detec MDL: Method detection limit ND: Non-detect Q: Laboratory qualifier
N: The value reported was less than 5 times (10 times for the common EPA contaminants) the value in the field or trip blank. The reported value was negated due to probable contamination.
J: The value reported is an estimated concentration. E: Estimated value. Analyte concentration exceeds the calibrated range of the GC/MS instrument.
B:The reported value was obtained from a reading that was less than the Contract Required Detection Limit, but greater to or equal to the instrument detection limit.

Table 4-2
Surface Water Samples with
Hardness Dependent Screening Criteria
ETE Sanitation and Landfill
Remedial Investigation

	Client Sample ID	SW-1				SW-2				SW-3			
	Sample Collection Date	3/5/98				3/5/98				3/5/98			
	Sample Matrix	WATER				WATER				WATER			
	Units	ug/L				ug/L				ug/L			
Compound	NYSDEC Standard for Class C Water* (ug/L)	Calc. Class C Standard (ug/L)	MDL	CONC	Q	Calc. Class C Standard (ug/L)	MDL	CONC	Q	Calc. Class C Standard (ug/L)	MDL	CONC	Q
Copper	exp(0.8545[ln (ppm hardness)]-1.465)	16.72	1	**21.1**	B	16.62	1	**25.7**		15.95	1	**22.5**	B
Lead	exp(1.266[ln (ppm hardness)]-4.661)	5.38	2	2.3	BJ	5.33	2	ND		5.02	2	2.2	BJ
Nickel	exp(0.76[ln (ppm hardness)]+1.06)	130.07	1	3.4	B	129.41	1	3.1	B	124.76	1	2.8	B
Hardness (ppm)	NA			150				149				142	

	Client Sample ID	SW-4				SW-7				FB-3398				SW-7(DUP)			
	Sample Collection Date	3/5/98				3/5/98				3/5/98				3/5/98			
	Sample Matrix	WATER				WATER				WATER				WATER			
	Units	ug/L				ug/L				ug/L				ug/L			
Compound	NYSDEC Standard for Class C Water* (ug/L)	Calc. Class C Standard (ug/L)	MDL	CONC	Q	Calc. Class C Standard (ug/L)	MDL	CONC	Q	Calc. Class C Standard (ug/L)	MDL	CONC	Q	Calc. Class C Standard (ug/L)	MDL	CONC	Q
Copper	exp(0.8545[ln (ppm hardness)]-1.465)	8.93	1	**18.1**	B	22.70	1	**89.2**		0.42	1	**14.5**	B	22.74	1	19.6	B
Lead	exp(1.266[ln (ppm hardness)]-4.661)	2.12	2	ND		8.46	2	4.2	J	0.02	2	ND		8.48	2	ND	
Nickel	exp(0.76[ln (ppm hardness)]+1.06)	74.46	1	1.6	B	170.70	1	1.7	B	4.89	1	1.7	B	171.00	1	1.8	B
Hardness (ppm)	NA			72				214.5				2				215	

Note:
BOLD: Exceeds the NYSDEC standard for class C water
Standards taken from NYSDEC, T.O.G.S 1.1.1, "Ambient Water Quality Standards and Guidance Values," 10/93
*Cotton Creek is classified by New York State as a class C water body. Cotton Creek receives all surface water discharging from the ETE Sanitation and Landfill site.
NA: No standard applicable MDL: Method detection limit CONC: Concentration
Q: Laboratory qualifier ND: Non-Detect
B:The reported value was obtained from a reading that was less than the Contract Required Detection Limit, but greater to or equal to the instrument detection limit.
J: The value reported is an estimated concentration.

Table 4-3
Summary of Surface Water Field Parameters
ETE Sanitation and Landfill
Remedial Investigation

Date of Sampling	Approx. Depth of Water (ft)	Turbidity	Temp (C)	DO (mg/l)	pH	Salinity (%)	Cond (mS/cm)
SW-1 3/3/98	0.50	Slightly turbid	3.40	8.41	6.80	0.08	1.96
SW-2 3/3/98	4.50	Clear to yellow	3.30	8.74	6.66	0.07	1.61
SW-3 3/3/98	3.00	clear to slightly turbid	2.20	7.45	6.02	0.02	0.67
SW-4 3/3/98	4.50	clear-no sediment	4.10	7.58	8.50	0.00	0.33
SW-7 3/3/98	0.83	clear-slightly yellow	4.90	10.61	6.83	0.20	4.14

Note:
DO - Dissolved Oxygen
Cond - Conductivity

sodium may be also associated with landfill wastes. As discussed in Section 1.0, waste salt was one of the wastes routinely disposed at the site. Elevated sodium levels were found at SW-1, SW-2, and SW-3 located in the North (Leachate Collection) Pond which receives runoff and leachate directly from the seepage face found along the north toe of the ETE Landfill. Dried salt was also observed on the disposable cover boots worn by workers after completing work near the landfill's north seepage face.

The highest sodium concentration observed was from SW-7 taken from the eastern drainage channel running along the eastern property boundary. The highest field measured salinity was also recorded at this sample location. The extremely high salinity measurement obtained may partly be the result of the Town of Gainesville Highway Department's operations. Located just southeast of the landfill, this area is used to store uncovered piles of road salt and gravel. A salt precipitate is visible over the entire Town storage area and stressed vegetation is visible in ditches which drain water from this area into the eastern drainage channel. Photographs of this area are provided in Appendix D, photographs 9 and 10.

Aluminum, iron and zinc were found in excess of New York state standards for Class C waters at samples taken downgradient of the waste mass. Concentrations for these compounds in the North Pond and the eastern drainage channel were at least ten times higher than concentrations observed at SW-4, the upgradient (or background) sample site located in the South Pond.

Field measurements taken during surface water sampling show that surface water downgradient from the landfill may be impacted by leachate. Using the SW-4 sample location as the upgradient location, we see increases in salinity and conductivity levels at downgradient sample locations.

4.1.2 Surface Water Sediment Sample Results

Regulatory agencies are still in the process of defining concentrations of constituents in sediment that can be used to assess environmental sediment quality. NYSDEC and the Division of Fish and Wildlife published a guidance document entitled, "Technical Guidance for Screening Contaminated Sediment, November 1993". Although this document is not a standard or policy, it does describe a methodology for determining sample or site-specific criteria for non-polar organic compounds based upon the equilibrium portioning approach. This methodology is based upon the hypothesis that toxics in sediments exert effects, either toxicity or bioaccumulation, to the extent that the chemical becomes bio-available in a sediment's interstitial (pore) water (NYSDEC, 1993). A summary of all surface water sediment sample detections appears in Table 4-4. Sediment sample locations are shown in Plate I. A summary of sediment field observations made during sampling activities are shown in Table 4-5.

Surface Water Sediment Background Sample

A sediment sample was taken from the South Pond to provide a representative background sediment sample. Sediment sample, SD-4 was taken from the northeast corner of the South Pond. Methylene chloride (14 ug/kg-estimated), acetone (57 ug/kg) and one semivolatile, di-n-butylpthalate (140 ug/kg-estimated) were detected in the sediment. The elevated concentration of di-n-butylpthalate found in SD-4 was the highest concentration detected for this compound in all of the sediment samples analyzed. As with the surface water sample collected from the South Pond, the

Table 4-4
Summary of Surface Water Sediment Sample Detections
Volatile and Semivolatile Organics
ETE Sanitation and Landfill
Remedial Investigation

										Background Sediment		
Client Sample ID		**SD-1**			**SD-2**			**SD-3**			**SD-4**	
Sample Collection Date		3/5/98			3/5/98			3/5/98			3/5/98	
Sample Matrix		SOIL			SOIL			SOIL			SOIL	
Units		ug/Kg			ug/Kg			ug/Kg			ug/Kg	
	MDL	CONC	Q	MDL	CONC	Q	MDL	CONC	Q	MDL	CONC	Q
TCL Volatile Organics												
Methylene Chloride	10	ND	J	10	ND	J	10	ND		10	14	J
Acetone	10	ND	J	10	84	J	10	53		10	57	
2-Butanone	10	ND	J	10	23	J	10	12	J	10	ND	
* Ethylbenzene	10	ND	J	10	9.5	J	10	ND		10	ND	
* Xylenes(total)	10	ND	J	10	41		10	ND		10	ND	
TCL Semivolatiles												
Di-n-butylphthalate	485	60	J		ND			ND		917	140	J

Client Sample ID		**SD-5**			**SD-6**			**SD-7**			**SD-7 (DUP)**	
Sample Collection Date		3/5/98			3/5/98			3/5/98			3/5/98	
Sample Matrix		SOIL			SOIL			SOIL			SOIL	
Units		ug/Kg			ug/Kg			ug/Kg			ug/Kg	
	MDL	CONC	Q	MDL	CONC	Q	MDL	CONC	Q	MDL	CONC	Q
TCL Volatile Organics												
Methylene Chloride	10	ND		10	ND	J	10	ND		10	ND	
Acetone	10	339		10	538	J	10	112		10	ND	
2-Butanone	10	68		10	104	J	10	23	J	10	ND	
* Ethylbenzene	10	56		10	12	J	10	ND		10	ND	
* Xylenes(total)	10	254		10	62	J	10	ND		10	ND	
TCL Semivolatiles												
Di-n-butylphthalate	750	110	J	717	80	J	1138	140	J		ND	

Note:
*: Sediment screening criteria calculated on Table 4-6.
For all other volatile and semivolatile compounds, no screening criteria exist. (NYSDEC, "Technical Guidance for Screening Contaminated Sediment," 22 Nov. 1993)
ND: Non-detect Q: Laboratory qualifier
MDL: Method detection limit CONC: Concentration
J: The reported value was determined to be estimated following QA/QC review.

Table 4-4 (cont'd)
Surface Water Sediment Sample Summary of Detections
Inorganic Compounds
ETE Sanitation and Landfill
Remedial Investigation

Sample ID			SD-1			SD-2			SD-3			SD-4		
Sample Date			3/5/98			3/5/98			3/5/98			3/5/98		
Sample Matrix			SOIL			SOIL			SOIL			SOIL		
Units			mg/Kg			mg/Kg			mg/Kg			mg/Kg		
	Lowest Effect Level* (mg/kg)	Severe Effect Level* (mg/kg)	MDL	CONC	Q	MDL	CONC	Q	MDL	CONC	Q	MDL	CONC	Q
TCL Inorganics														
Aluminum	---	---	1	12886.73		2	27511.37		1	9504.96		3	15355.80	
Antimony	2.0	25.0	0.87	ND		1	1.87	B	1	1.84	B	1.6	ND	
Arsenic	6.0	33.0	1	7.30		2	5.75		1	**6.54**		2	**7.86**	
Barium	---	---	0	63.81		0	137.64		0	74.96		1	61.04	B
Beryllium	---	---	0	0.62	B	0	1.27	B	0	0.50	B	1	0.81	B
Cadmium	0.6	9.0	0.29	ND		0	**1.46**	B	0.27	ND		0.53	ND	
Calcium	---	---	3	2202.95		4	11978.82		3	17118.87		6	7087.85	
Chromium	26.0	110.0	0	15.73		0	**32.38**		0	15.20		1	21.69	
Cobalt	---	---	0	7.73	B	0	11.04	B	0	6.50	B	1	10.57	B
Copper	16.0	110.0	0	**20.36**	EJ	0	**38.55**	EJ	0	**26.36**	EJ	1	**50.52**	EJ
Iron	20000.0	40000.0	5	25194.10		6	**51274.51**		4	**49611.35**		9	**31990.06**	
Lead	31.0	110.0	1	12.75		1	29.99		1	18.64		1	**32.70**	
Magnesium	---	---	4	2866.11		5	4290.59		4	3283.40		7	5698.34	
Manganese	460.0	1100.0	0	929.50		0	**1067.10**		0	**1007.69**		1	**664.36**	
Mercury	0.2	1.3	0.14	ND		0.18	ND		0.14	ND		0.28	ND	
Nickel	16.0	50.0	0	18.87		0	**38.00**		0	**18.91**		1	**32.09**	
Potassium	---	---	6	1240.56	BEJ	8	2341.45	EJ	5	1142.33	BEJ	11	1681.88	BEJ
Selenium	---	---	1.2	ND		1.5	ND		1.1	ND		2.1	ND	
Silver	1.0	2.2	0.29	ND		0.38	ND		0.27	ND		0.53	ND	
Sodium	---	---	5	969.59	BEJ	7	8325.10	EJ	5	2479.83	EJ	10	463.15	BEJ
Thallium	---	---	1.4	ND		1.9	ND		1	1.81	B	2.7	ND	
Vanadium	---	---	0	24.98		0	35.05		0	18.44		1	33.30	
Zinc	120.0	270.0	0	91.85		0	**687.88**		0	**390.16**		1	**139.26**	
Cyanide	---	---	0.37	ND		0.48	ND		0.35	ND		0.69	ND	
SOLIDS, PERCENT	---	---		67.81			50.96			70.52			36.33	
TOC	---	---	100	63633		100	1944		100	208766		100	273052.00	

*Reference: NYSDEC, "Technical Guidance for Screening Contaminated Sediment," 22 Nov. 1993

135 :Exceeds the lowest effect level.

661 :Exceeds the severe effect level.

ND: Non-detect

---: No standard applicable   MDL: Method detection limit   Q: Laboratory qualifier   CONC: Concentration

B:The reported value was obtained from a reading that was less than the Contract Required Detection Limit, but greater to or equal to the instrument detection limit.

E: The reported value is estimated because of the presence of interference.

J: The reported value was determined to be estimated following QA/QC review.

Table 4-4 (cont'd)
Surface Water Sediment Sample Summary of Detections
Inorganic Compounds
ETE Sanitation and Landfill
Remedial Investigation

		Sample ID	SD-5			SD-6			SD-7			SD-7(DUP)		
		Sample Date	3/5/98			3/5/98			3/5/98			3/5/98		
		Sample Matrix	SOIL			SOIL			SOIL			SOIL		
		Units	mg/Kg			mg/Kg			mg/Kg			mg/Kg		
	Lowest Effect Level* (mg/kg)	Severe Effect Level* (mg/kg)	MDL	CONC	Q	MDL	CONC	Q	MDL	CONC	Q	MDL	CONC	Q
TCL Inorganics														
Aluminum	---	---	2	23711.71		2	17587.04		3	17344.83		3	14477.93	
Antimony	2.0	25.0	1.3	ND		1	1.81	B	2.1	ND		2	ND	
Arsenic	6.0	33.0	2	3.07	B	2	**6.46**		3	**22.19**		3	**20.68**	
Barium	---	---	0	107.33		0	75.08	B	1	818.14		1	970.07	
Beryllium	---	---	0	0.95	B	0	0.81	B	1	0.91	B	1	0.87	B
Cadmium	0.6	9.0	0.44	ND		0	0.59	B	1	**0.69**	B	1	**0.77**	B
Calcium	---	---	5	9275.23		5	7400.00		8	16667.59		8	17905.52	
Chromium	26.0	110.0	0	**28.68**		0	25.87		1	22.66		1	18.48	
Cobalt	---	---	0	9.35	BJ	0	10.53	BB	1	12.67	B	1	11.84	B
Copper	16.0	110.0	0	**35.02**	EJ	0	**32.00**	EJ	1	**36.14**	EJ	1	**32.66**	EJ
Iron	20000.0	40000.0	7	**42594.14**		7	**37546.87**		11	**61220.69**		11	**53917.93**	
Lead	31.0	110.0	1	23.56		1	26.29		1	**31.44**		1	28.68	
Magnesium	---	---	6	4636.94		6	4488.12		10	4115.03		10	3720.55	
Manganese	460.0	1100.0	0	**594.95**		0	**760.99**		1	**22991.03**		1	**23608.28**	
Mercury	0.2	1.3	0.2	ND		0.21	ND		0.34	ND		0.31	ND	
Nickel	16.0	50.0	0	**29.46**	J	0	**30.38**		1	**29.37**		1	**26.48**	B
Potassium	---	---	9	2136.53	BEJ	8	2121.43	BBEJ	14	2180.14	BEJ	14	1795.93	BEJ
Selenium	---	---	1.7	ND		1.7	ND		3	14.09	J	3	15.48	J
Silver	1.0	2.2	0.44	ND		0.42	ND		0.69	ND		0.68	ND	
Sodium	---	---	8	6870.27	E	8	5167.17	EJ	12	4334.41	EJ	12	4409.38	EJ
Thallium	---	---	2.2	ND		2.1	ND		3.4	ND		3.4	ND	
Vanadium	---	---	0	33.18		0	30.98		1	32.96	B	1	27.42	B
Zinc	120.0	270.0	0	**302.63**		0	**349.55**		1	**213.73**		1	**186.45**	
Cyanide	---	---	0.56	ND		0.54	ND		0.85	ND		0.86	ND	
SOLIDS, PERCENT	---	---		44.41			46.32			29.05			29.04	
TOC	---	---	100	128489		100	116705		100	21005		100	239814	

*Reference: NYSDEC, "Technical Guidance for Screening Contaminated Sediment," 22 Nov. 1993

135 :Exceeds the lowest effect level.
661 :Exceeds the severe effect level.

ND: Non-detect
---: No standard applicable   MDL: Method detection limit   Q: Laboratory qualifier   CONC: Concentration
B:The reported value was obtained from a reading that was less than the Contract Required Detection Limit, but greater to or equal to the instrument detection limit.
E: The reported value is estimated because of the presence of interference.
J: The reported value was determined to be estimated following QA/QC review.

Table 4-5
Summary of Sediment Sample Field Parameters
ETE Sanitation and Landfill
Remedial Investigation

Date of Sampling	Sediment Description	OVM Reading (ppm)
SD-1 3/3/98	Saturated brown to olive green silty clay, some fine to medium sand, little to trace of organics.	0.0
SD-2 3/3/98	Black organic clay and silt, slightly grey toward bottom of sample.	0.0
SD-3 3/3/98	Dark brown-olive green silt, little clay and saturated organic material.	0.0
SD-4 3/3/98	Black to slightly brown organic silt.	0.0
SD-5 3/3/98	Black to slightly brown-grey organic silt and clay.	0.0
SD-6 3/3/98	Saturated black organic silt, little clay, and traces of fine sand.	0.0
SD-7 3/3/98	Dark brown to slightly black organic silt, trace sand with decomposed leaves and twigs.	0.0

Note:
OVM - Organic Vapor Meter

use of this sediment sample as a representative of background conditions is questionable due to the discovery of landfill wastes extending beneath the South Pond. However, 2-butanone, ethylbenzene and xylenes (total) were all non-detect at SD-4. Five of the six downgradient sample locations contained at least one of these three compounds. This fact does provide some evidence that the landfill is impacting sediment downgradient from the landfill by the release of volatile organic compounds.

Volatiles and Semivolatiles

Volatile organic compounds (VOCs), acetone, methylene chloride, 2-butanone, ethylbenzene and xylene were detected in all collected sediment samples with the exception of SD-1 which is the most downgradient surface water sample. The highest VOC contamination was observed within sediment samples collected from the North Pond with total VOC concentrations ranging from 65 ug/kg to 717 ug/kg. Additionally, the one sediment sample collected from the eastern drainage channel exhibited a total VOC concentration of 135 ug/kg. This data suggests that VOCs released from the landfill either through leachate discharge or groundwater discharge are accumulating within the organic rich surface water sediment downgradient of the landfill. Additionally, the one sediment sample collected from the South Pond exhibited a trace level of acetone at 57 ug/kg as well as methylene chloride, indicating that landfill wastes are likely impacting this surface water body.

NYSDEC currently does not have cleanup criteria for most VOCs detected within the sediment with the exception of ethyl benzene and xylene. Sediment screening criteria for these two volatile compounds were calculated using total organic carbon concentrations at each sample location. Screening criterion are shown in Table 4-6. Detected concentrations within all samples of both VOCs were below their respective cleanup criteria.

Inorganics

To establish a screening criteria for metals in sediment, New York State established two levels of protection. These are the Lowest Effect Level and the Severe Effect Level. The Lowest Effect Level indicates a level of sediment contamination that can be tolerated by the majority of benthic organisms, but still causes toxicity to a few species (NYSDEC, 1993). The Severe Effect Level indicates the concentration at which pronounced disturbance of the sediment dwelling community can be expected (NYSDEC, 1993).

Metals occur in a variety of forms in aquatic sediments. Some are natural, while others have been introduced by human activity. Very low concentrations of most metals are required nutrients for living organisms, but in excess concentrations, metals can be harmful (Rand and Petrocelli, 1985). The properties that metals exhibit in water depend largely on the form in which the metal occurs (Manahan, 1991). These include:

- dissolved as free ions and complexes:
- as particulates:

  a. inorganic precipitates such as hydroxides, sulfides, carbonates, and sulfates;
  b. sorbed onto or complexed with high molecular weight organic compounds or clay particles;

Table 4-6
Sediment Screening Criteria for Volatile Organics
ETE Sanitation and Landfill
Remedial Investigation

Sample Location: SD-2

TOC (mg/kg)	1,944
TOC (% OC/kg)	0.19%
foc (gOC/kg)	1.94

Parameter (Units)	Levels of Protection: Benthic Acute Toxicity (ug/kg)	Levels of Protection: Benthic Chronic Toxicity (ug/kg)	Detected Concentration 3/5/98 (ug/kg)
Volatiles			
Ethylbenzene	417.96	46.66	9.5
Xylene	2,435.83	270.22	41.0

Note: No exceedances observed for ethylbenzene or xylene.

Sample Location: SD-5

TOC (mg/kg)	128,489
TOC (% OC/kg)	12.85%
foc (gOC/kg)	128.49

Parameter (Units)	Levels of Protection: Benthic Acute Toxicity (ug/kg)	Levels of Protection: Benthic Chronic Toxicity (ug/kg)	Detected Concentration 3/5/98 (ug/kg)
Volatiles			
Ethylbenzene	27,625.14	3,083.74	56.0
Xylene	160,996.72	17,859.97	254.0

Sample Location: SD-6

TOC (mg/kg)	116,705
TOC (% OC/kg)	11.67%
foc (gOC/kg)	116.71

Parameter (Units)	Levels of Protection: Benthic Acute Toxicity (ug/kg)	Levels of Protection: Benthic Chronic Toxicity (ug/kg)	Detected Concentration 3/5/98 (ug/kg)
Volatiles			
Ethylbenzene	25,091.58	2,800.92	12.0
Xylene	146,231.37	16,222.00	62.0

Notes:
TOC: Total Organic Carbon
foc: fraction of organic carbon

Reference:
Proposed revisions to the "Technical Guidance for Screening Contaminated Sediment," provided in personal communication from NYSDEC, 5/15/98.
Sediment quality screening criteria were computed using acute and chronic toxicity values for sediment in freshwater.

- mixed or sorbed to bottom sediments;
- incorporated into the tissues of biota (NYSDEC, 1993).

Table 4-4 includes the summary of detections for inorganic contaminants found in sediments from the South and North Ponds, the North Pond outfall and the eastern drainage channel. Exceedances of NYSDEC SCGs are shown in Plate V along with surface water exceedances.

Sample SD-4 taken upgradient (background) from the landfill, exceeded the lowest effect level for arsenic, copper, iron, lead, manganese, nickel and zinc. No severe effect level exceedances are seen in the upgradient (background) sediment sample. Sediment samples downgradient from the waste mass indicate increased levels of iron and zinc, at concentrations exceeding the severe effect levels.

Heavy metals were detected in landfill sediments. The severity and distribution of heavy metal concentrations exceeding screening criteria were varied making it difficult to identify a discrete source of contamination. The heavy metal chromium was found at concentrations exceeding the lowest effect level in the northern portion of the North Pond at SD-2 and SD-5. No exceedances were seen in the background sample, the eastern drainage channel or the southern portion of the North Pond. Cadmium concentrations exceeding corresponding criteria were found in SD-7 and SD-2 only. Lead concentrations exceeding criteria were observed at SD-4 and SD-7.

Sediment sample SD-1 was taken downgradient from the North Pond in the North Pond outfall channel. This sample exceeded the lowest effect level for copper only. Compared with the sediment samples taken from the North Pond, sediment downgradient from the pond shows a reduction in the frequency and severity of inorganic exceedances. Based upon this observation, it appears that the North Pond acts as a settling basin for inorganic contaminants effectively minimizing impacts to downgradient sediment quality.

4.1.3 Leachate Surface Soil Sample Results

Surface soils collected along the northern toe of the landfill within areas of obvious leachate seeps were screened against the New York State soil cleanup objectives and cleanup levels for the remediation of hazardous waste sites. Detected compounds were screened against these standards which are the clean up "goal" following remediation of soils impacted by contamination.

A summary of all soil sample detections from samples SU-1, SU-2, SU-3 and SU-4 are provided in Table 4-7. All exceedances of NYSDEC's SCGs are shown in Plate VII along with subsurface test pit samples exceedances.

Volatiles and Semivolatiles Organics

The organic compounds most frequently detected in the surface soil were acetone, ethylbenzene, xylene, di-n-butylpthalate, and bis(2-ethylhexyl) pthalate. NYSDEC soil cleanup objectives were exceeded at one sample location, SU-1 for xylene at a concentration of 1,224 ug/l. The elevated concentration of xylene suggests that a source area may exist directly upgradient from SU-1. The

Table 4-7
Summary of Leachate Seep Surface Soil Sample Detections
ETE Sanitation and Landfill
Remedial Investigation

Sample ID	NYSDEC Rec. Soil Cleanup Objectives* (ug/kg)	SU-1			SU-1 (DUP)			SU-2			SU-3			SU-4		
Sample Collection Date		3/6/98			3/6/98			3/6/98			3/6/98			3/6/98		
Sample Matrix		SOIL			SOIL			SOIL			SOIL			SOIL		
Units		ug/Kg			ug/Kg			ug/Kg			ug/Kg			ug/Kg		
		MDL	CONC	Q	MDL	CONC	Q	MDL	CONC	Q	MDL	CONC	Q	MDL	CONC	Q
TCL Volatiles																
Acetone	200	10	118		10	109	J	10	116		10	18	J	10	11	J
2-Butanone	300	33	ND		30	ND	J	10	121		13	ND		24	ND	R
1,2-Dichloropropane	**	10	38	J	10	ND	J	10	ND		10	ND		10	ND	
1,,2-Trichloroethane	**	10	ND		10	61	J	10	ND		10	ND		10	ND	
4-Methyl-2-Pentanone	1000	33	ND		30	ND	J	10	9.5	J	13	ND		24	ND	
Ethylbenzene	5500	10	430	DJ	10	310	J	15	ND		10	48		24	ND	
Xylenes(total)	1200	10	**1206**	DJ	10	**1224**	J	15	ND		10	111	J	24	ND	
TCL Semivolatiles																
Di-n-butylphthalate	8100	1100	ND		970	350	J	492.54	110	J	412.5	50	J	785.71	120	J
Flouranthene	**	1100	ND		970	ND		330	500	J	410	ND		790	ND	
bis(2-Ethylhexyl)phthalate	50000	1100	7290		970	1900		2462.7	11150	D	410	ND		790	ND	
Di-n-octylphthalate	50000	1100	400	J	970	ND		490	ND		410	ND		790	ND	

TCL Pesticides / PCBs
Non-Detect for all soil samples analyzed.

Notes:
*NYSDEC, TAGM 4046, "Determination of Soil Cleanup Objectives and Cleanup Levels", Jan. 24, 1994
**No criteria provided in TAGM 4046.
BOLD = Exceeds NYSDEC recommended soil cleanup objective. ND: Non-detect MDL: Method Detection Limit CONC: Concentration
Q: Laboratory qualifier R: This value was rejected following QA/QC review of the laboratory analytical data.
J: Indicates an estimated value. D: This qualifier identifies all compounds indentified in an analysis at a secondary dilution factor.

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Table 4-7
Summary of Leachate Seep Surface Soil Sample Detections
ETE Sanitation and Landfill
Remedial Investigation

	Sample ID	**SU-1**			**SU-1 (DUP)**			**SU-2**			**SU-3**			**SU-4**		
	Sample Collection Date		3/6/98			3/6/98			3/6/98			3/6/98			3/6/98	
	Sample Matrix		soil			SOIL			soil			soil			soil	
	Units		mg/kg			mg/kg			mg/kg			mg/kg			mg/kg	
	NYSDEC Rec. Soil Cleanup Objectives* (mg/kg)	MDL	CONC	Q	MDL	CONC	Q	MDL	CONC	Q	MDL	CONC	Q	MDL	CONC	Q
TCL Inorganics																
Aluminum	33000**	3.24	**35114.67**		2.89	22285.55		1.45	2887.7		1.2	7812.25		2.3	14017.7	
Antimony	NA	1.94	2.49	B	1.7	ND		0.87	3.16	B	0.72	ND		1.38	1.9	B
Arsenic	7.5	2.59	**13.53**		2.31	7.69		1.16	**7.53**		0.96	5.12		1.84	**16.28**	
Barium	300	0.65	248.35		0.58	251.38		0.29	95.74		0.24	15.37	B	0.46	**4118.56**	
Beryllium	0.16	0.65	**0.87**	B	0.58	ND		0.29	**0.37**	B	0.24	ND		0.46	**0.81**	B
Cadmium	10	0.65	1.69	B	0.58	0.91	B	0.29	ND		0.24	0.25	B	0.46	ND	
Calcium	130 - 35,000**	7.12	**39512.67**		6.36	**88542.8**		3.2	**45410.4**		2.64	22048.25		5.06	10592.82	
Chromium	50	0.65	41.29		0.58	39.66		0.29	12.77		0.24	12.7		0.46	22.41	
Cobalt	30	0.65	23.94	B	0.58	12.2	B	0.29	4.69	B	0.24	5.46	B	0.46	**77.24**	
Copper	25	0.65	**165.82**		0.58	**146.02**		0.29	17.38		0.24	**39.94**		0.46	**46.7**	
Iron	2,000	10.36	**120260**		9.25	**126366**		4.65	**111313**		3.85	**22922**		7.36	**55842.1**	
Lead	400***	1.29	156.29		1.16	153.76		0.58	17.54		0.48	33.6		0.92	24.92	
Magnesium	100 - 5,000**	9.06	**6071.2**		8.1	3380.06		4.07	3620.74		3.37	**6878**		6.44	4706.03	
Manganese	50 - 5,000**	0.65	1028.07		0.58	1369.32		0.29	2548.36		0.24	407.78		2.3	**42074.2**	
Mercury	0.1	0.32	ND		0.3	ND		0.13	ND		0.12	ND		0.24	ND	
Nickel	13	0.65	**60.81**		0.58	**39.33**		0.29	**15.16**		0.24	**18.72**		0.46	**56.31**	
Potassium	8,500 - 43,000**	12.94	3123.07	B	11.57	1424.01	B	5.81	1194.16	B	4.81	1242.6	B	9.2	2495.6	
Selenium	2	2.6	ND		2.3	ND		1.2	ND		0.96	ND		1.84	**23.08**	
Silver	NA	0.65	7.57		0.58	1.81	B	0.29	ND		0.24	ND		0.46	1.33	B
Sodium	6,000 - 8,000	11.65	**17538.67**		10.41	**16104.4**		5.23	4.7		4.33	1302.13		8.28	**8405.74**	
Thallium	NA	3.2	ND		2.9	ND		1.45	1.48	B	1.2	ND		2.3	ND	
Vanadium	150	0.65	37.62		0.58	17.5	B	0.29	15.9		0.24	16.56		0.46	29.73	
Zinc	20	0.65	**1888.93**		0.58	1024.07		0.29	**99.61**		0.24	**81.55**		0.46	**128.84**	
Cyanide	Site specific	0.83	ND		0.72	ND		0.37	ND		0.31	ND		0.6	ND	

Notes:
*NYSDEC, TAGM #4046, "Determination of Soil Cleanup Objectives and Cleanup Levels", Jan. 24, 1994
**Natural range of soils for eastern United States, McGovern, NYSDEC, 1984 as given in TAGM #4046.
***USEPA's Interim Lead Hazard Guidance for residential screening levels.
BOLD = Exceeds NYSDEC recommended soil cleanup objective. ND: Non-detect NA: No applicable standard
MDL: Method Detection Limit CONC: Concentration Q: Laboratory qualifier
B:The reported value was obtained from a reading that was less than the Contract Required Detection Limit, but greater to or equal to the instrument detection limit.

concentration of organic compounds were generally higher in SU-1 and SU-2, than in SU-3 and SU-4. Overall, volatile and semivolatile concentrations detected in the samples decreased from west to east along the seepage face (from SU-1 to SU-4). Total organic compounds detected are as follows:

Sample Location	Total Organic Concentrations (ug/kg)		
	Volatiles	Semivolatiles	Total
SU-1	6,547	7,690	14,237
SU-2	246.5	11,760	12,006
SU-3	198	50	248
SU-4	11	120	131

Inorganics

Inorganic compounds found in excess of the NYSDEC recommended soil cleanup objectives included: aluminum, arsenic, barium, beryllium, calcium, copper, iron, magnesium, manganese, nickel, selenium, sodium and zinc.

With inorganic concentrations decreasing west to east, surface samples SU-1, SU-2 and SU-3 show the same trend observed in organic compound concentrations. SU-1, (the western most sample location) exceeded the recommended soil cleanup objective for ten inorganic compounds. SU-2 exceeded cleanup objectives for six inorganic compounds and SU-3 for five.

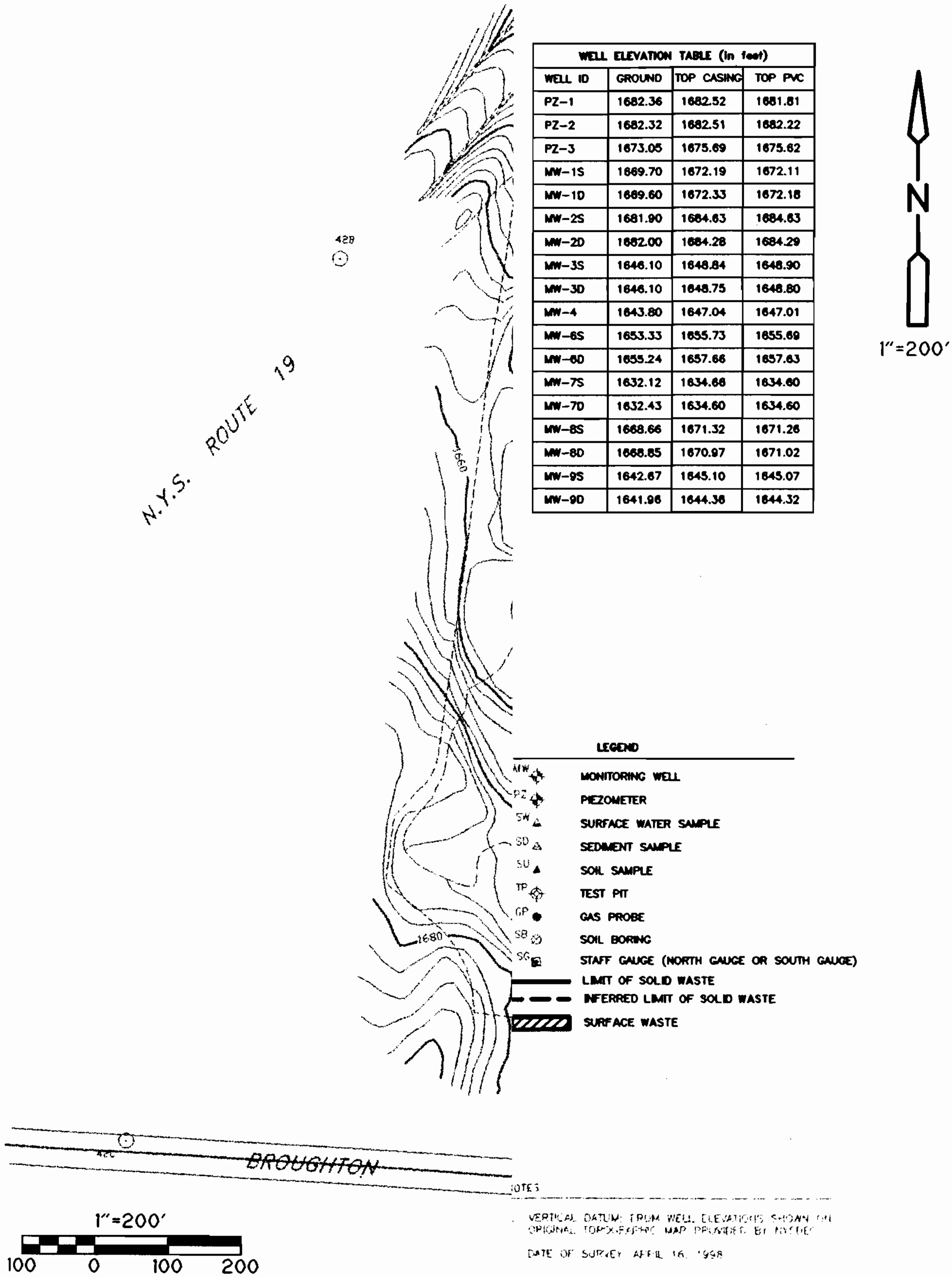
However, SU-4 shows some of the highest concentrations of inorganic substances and does not fit in with the west to east decreasing concentration trend. Barium, cobalt, manganese and selenium were detected at SU-4 at concentrations above the cleanup objective. SU-4 was the only location where these four compounds were found in excess of the cleanup objective. The range and concentration of inorganic constituents in SU-4 suggest a potential source of metal contamination within the northeastern portion of the landfill. The source may be the resulting drums and other metal debris presently exposed within this area of the site.

4.2 Geophysical Survey Test Pits and Subsurface Soil Testing

The geophysical survey, test pits and subsurface soil testing were used to characterize the nature and extent of municipal and industrial waste found at the ETE Landfill. From this work, the limits of solid waste were determined and appear in Figure 4-1. There is approximately seven (7) acres of landfilled material which is approximately fifteen feet thick (15) near the center of the landfill. Waste thickness thins toward the perimeter of the landfilled area. Test pit TP-13 as well as previously completed borings indicate that wastes extend into the northern portion of the South Pond. However, due to the limits of excavation into the pond, the extent of the wastes could not be determined.

4.2.1 Geophysical Survey Results

Magnetic surveys were conducted by Geophysics GPR International under contract with CDM. The geophysical surveys, covering approximately five acres, were conducted on February 3 and 4, 1998. The objective of these surveys was to located buried ferrous objects (i.e. drums).



WELL ELEVATION TABLE (in feet)			
WELL ID	GROUND	TOP CASING	TOP PVC
PZ-1	1682.36	1682.52	1681.81
PZ-2	1682.32	1682.51	1682.22
PZ-3	1673.05	1675.69	1675.62
MW-1S	1669.70	1672.19	1672.11
MW-1D	1669.60	1672.33	1672.18
MW-2S	1681.90	1684.63	1684.63
MW-2D	1682.00	1684.28	1684.29
MW-3S	1646.10	1648.84	1648.90
MW-3D	1646.10	1648.75	1648.80
MW-4	1643.80	1647.04	1647.01
MW-6S	1653.33	1655.73	1655.69
MW-6D	1655.24	1657.66	1657.63
MW-7S	1632.12	1634.66	1634.60
MW-7D	1632.43	1634.60	1634.60
MW-8S	1668.66	1671.32	1671.26
MW-8D	1668.85	1670.97	1671.02
MW-9S	1642.67	1645.10	1645.07
MW-9D	1641.96	1644.36	1644.32

LEGEND

- MW MONITORING WELL
- PZ PIEZOMETER
- SW SURFACE WATER SAMPLE
- SD SEDIMENT SAMPLE
- SU SOIL SAMPLE
- TP TEST PIT
- GP GAS PROBE
- SB SOIL BORING
- SG STAFF GAUGE (NORTH GAUGE OR SOUTH GAUGE)
- LIMIT OF SOLID WASTE
- INFERRED LIMIT OF SOLID WASTE
- SURFACE WASTE

NOTES

. VERTICAL DATUM: FROM WELL ELEVATIONS SHOWN ON ORIGINAL TOPOGRAPHIC MAP PROVIDED BY NYSDEC

DATE OF SURVEY APRIL 16, 1998

CDM Camp Dresser & McKee

Figure 4-1
Limits Of Solid Waste
Landfill And Sanitation Remedial Investigation

There are three areas of interest which were identified as potential drum disposal areas during preliminary site assessments of the site and in consultation with NYSDEC. The first investigated area, Area 1 , is located along the northerly area of the site and is approximately 44, 100 square feet in size. Area 2 is located immediately east of and adjacent to Area 1 and covers approximately 52,500 square feet. Area 3 is located immediately south of and adjacent to Area 3 and covers approximately 131,750 square feet. All three areas are square to rectangular-shaped and shown as Grid 1 (Area 1), Grid 2 (Area 2) and Grid 3 (Area 3) on Plate I. The total magnetic field strength and magnetic gradient strength map are included in Geophysics GPR's report which appears in its complete form in Appendix E. Anomaly interpretation maps which summarize the gradient strength maps are also shown in Appendix E.

Grid area 1 lacks significant concentrations of ferrous objects with the exception of isolated, shallow single-point targets. The center of the area is characterized by a easterly-westerly band of surface ferrous objects. This band of surface ferrous objects falls along the east-west line formed by the northern limit of the landfill. Partially buried, rusted and crushed drums were noted in this area. Drums were inspected by CDM and found to be empty or to be partially filled with sediment. No readings above background levels were noted when the drums were screened with an organic vapor meter.

The southerly portion of grid area 1 is characterized by a uniform concentration of buried ferrous objects at depths generally greater than six feet below ground surface. The southerly portion of area 1 overlies the main landfill area. Based on test pits completed, anomalies are believed to be associated with the type of municipal soil waste buried in this area and not a drum disposal area.

The high metal concentration areas in the southern portion of grid area 1 were investigated during the completion of test pits, TP-1 and TP-2 and results are discussed in Section 4.2.2.

Grid area 2 is generally lacking significant concentrations of ferrous objects excepting isolated, shallow single point targets in the easterly and northerly portions of the study grid. The northeast corner of the landfill is well defined by this area of investigation. Mature stands of trees are located just north and east of this corner, providing further evidence that no landfilling activities have occurred in these areas.

The center of grid area 2 is characterized by a northerly-southerly band consisting of surface ferrous objects. This center area marks the eastern extent of the ETE Landfill. Surface ferrous objects include partially buried, rusted, crushed and empty 55-gallon drums piled along the steep slope of the landfill's east toe. Other observed metal objects include household appliances and metal tracking similar in shape to railroad tracks.

The west portion of grid area 2 is characterized by a uniform concentration of buried ferrous objects at depths generally greater than six feet below ground surface. This area overlies the main section of the landfill. Test pits, TP-3 and TP-4, where completed in these anomaly areas to investigate the type of metal wastes buried in these high metal concentration anomaly zones. Results are discussed in Section 4.2.2, Test Pit Results.

Grid area 3's eastern portion is characterized by several concentrations of surface ferrous objects and numerous, shallow single-point targets. Shallow single-point targets are not likely to be buried drums. These anomalies are representative of near surface, very small metal masses in a localized area and may be caused by boulders containing ferrous magnetic material. This area of the site does not appear to be disturbed by landfilling activities based on the existence of mature stands of trees surrounding a wet marsh area

The western portion of grid area 3 is characterized by a uniform concentration of buried ferrous objects at depths generally greater than six feet below ground surface. This uniform concentration appears to mark the eastern extent of the landfill. Test pits completed in this area confirm the limits of waste inferred by the results of the geophysical investigation. Test pits, TP-5, TP-6, TP-15, TP-16 and TP-17, were completed to investigate the nature of high metal concentration anomaly areas identified. Results are discussed in the following section, 4.2.2, Test Pit Results.

4.2.2 Test Pit Results

Test pits were completed to investigate the nature of high ferrous concentration anomalies identified during the geophysical investigation and to determine the limits of waste. The depth of test pits was limited due to the high water table conditions which made excavation past 8 feet very difficult. Test pit logs found in Appendix B provide a brief description of materials encountered during test pit excavation. Figure 4-1, Limits of Solid Waste, was created using the information gathered from test pitting activities. Based on test pit findings, waste covers approximately seven acres of the landfill property.

Both municipal solid and industrial/commercial wastes were encountered during excavation of test pits. Co-mingled industrial and municipal solid waste was observed in test pits completed in the northeast and north end of the landfill (TP-1, TP-2, TP-3, TP-4, TP-5). Test pits completed in the southern and western portions of the landfill generally encountered municipal soil waste composed of household trash items such as plastic bags, food containers and paper waste (TP-8, TP-9, TP-10, TP-13). Typically, the municipal waste was covered by a silty clay cover material which was typically 1 to 2 feet thick.

The southern most extent of the landfill is the only portion of the waste mass which has not been fully determined. From the data gathered from PZ-3, PZ-4, and TP-13, it appears that solid waste extends under the northern section of the South Pond. Test pit, TP-13, was completed at the northwest corner of the South Pond shoreline. Waste uncovered along the shoreline of the South Pond was greater than six feet thick, indicating that it is highly likely that waste extends under the pond. Air bubbles (possibly methane), were observed in the north end of the South Pond (see site photos Appendix D) providing further evidence that waste may be found underneath the pond.

Investigation of Potential Drum Disposal Areas

Potential drum disposal areas were identified during the geophysical investigation of Area 1, Area 2 and Area 3 shown in Plate I. TP-1 and TP-2 were completed to identify the source of areas with high concentrations of ferrous objects in grid area 1. No drums were encountered in TP-1. A large piece of 3 foot by 3 foot metal sheeting was removed from this pit and likely to be the cause of the anomaly identified. In TP-2, a 30 gallon crushed drum was encountered one foot below grade. The drum was empty and had no distinguishable marks or labels. A layer of organic black-stained oil soil was encountered at 4 feet below grade. A soil sample TP-2:5 was taken from the bottom portion of this layer. [See photo in Appendix D]. Results are discussed in Section 4.2.3, Subsurface Soil Sample Results. TP-3 and TP-4 were completed to investigate anomalies identified during the geophysical magnetometer survey. No subsurface source was identified in TP-3. However, metal scraps and empty crushed 55 gallon drums were noted at the ground surface between the surveyed TP-3 location and the MW-3 well cluster.

At TP-4, a drum containing solidified paint was uncovered approximately 3 1/2 feet below grade. A solvent odor was noted and a reading of 119 ppm was obtained on the organic vapor meter when the drum contents were scanned through an opening in the side of the drum. A waste characterization sample, WC-1 was collected to determine if the drum contents were hazardous. Table 4-8 provides a summary of the waste characterization. A Toxicity Characteristics Leaching Procedures (TCLP) analysis was performed on the waste sample. This procedure is used to determine the concentration of compounds which would leach from the waste in the presence of an acetic acid solution with a pH of 5 similar to acidic leachate found in landfills. Federal hazardous waste characterization criteria are also provided in this table. Sample results indicate that leachate produced from the contents are not hazardous. A soil sample from below the drum was also taken TP-4:6', to determine if the drum had characteristically leached chemicals into the underlying soil layers. Results are discussed in Section 4.2.3 Subsurface Soil Sample Results.

In addition to the drum uncovered, metal tracking, similar to a railroad track, was uncovered in test pit, TP-4. This helped explain the high metal content anomaly found in this section of study Area 2.

Study Area 3 was investigated to identify the source of high metal content anomalies found in the western portion of this area. TP-5, TP-6, TP-15, TP-16, TP-17 were excavated in an effort to identify drum disposal locations and to determine the limits of waste. No drums were identified in the Area 3 test pits. TP-5 did contain a large industrial sized metal sink and TP-16 contained scrap metal, construction and demolition waste. No easily identifiable source of the high metal content anomaly could be identified in the other test pits excavated in Area 3.

The remaining test pits were completed to accurately determine the limits of solid waste. Stakes were placed at the observed limit of waste and later surveyed. The Limits of Solid Waste are shown in Figure 4-1 and is based on the test pit logs found in Appendix B.

4.2.3 Subsurface Soil Sample Results

Subsurface soil samples were collected based upon the nature of waste encountered during test pit excavation, visual observations and readings on the organic vapor meter above ambient conditions. A total of four subsurface soil samples were taken from the seventeen test pit locations. No background subsurface soil samples were taken. A summary of the detections can be found in Table 4-9 along with the New York State Cleanup objectives for soil. Plate VII provides a figure showing the locations of the sample locations and the compounds found in excess of the New York State criteria.

Table 4-8
TCLP Waste Characterization Sample Summary
ETE Sanitation and Landfill
Remedial Investigation

Client Sample ID	WC-1		
	(from Test Pit 4)		
Sample Collection Date	3/12/98		
Sample Matrix	water		
Units	ug/L		
	MDL	CONC	Q
TCL Volatile Organics			
Vinyl Chloride	50	ND	
1,1-Dichloroethene	50	ND	
Chloroform	50	ND	
1,2-Dichloroethane	50	ND	
2-Butanone	50	ND	
Carbon Tetrachloride	50	ND	
Trichloroethene	50	ND	J
Benzene	50	ND	
Tetrachloroethene	50	ND	
Chlorobenzene	50	ND	
TCL Semivolatiles			
1,4-Dichlorobenzene	100	ND	
2-Methylphenol	100	ND	
3+4-Methyphenols	100	ND	
Hexachloroethane	100	ND	
Nitrobenzene	100	ND	
Hexachlorobutadiene	100	ND	
2,4,6-Trichlorophenol	100	ND	
2,4,5-Trichlorophenol	250	ND	
2,4-Dinitrotoluene	100	ND	
Hexachlorobenzene	100	ND	
Pentachlorophenol	250	ND	
Pyridine	100	ND	
TCL Herbicides			
2,4-D	5	ND	
SILVEX	5	ND	
2,4,5-T	5	ND	

Client Sample ID	WC-1	
Sample Collection Date	3/11/98	
Sample Matrix	solid	
Units		
	MDL	Sample Result
SOLIDS, PERCENT		66.84
CORROSIVITY		5.4
IGNITIBILITY		>100.0
SULFIDE-REACTIVITY	53	53
CYANIDE-REACTIVITY	<1.04	1.05

ND: Non-detect
MDL: Method detection limit
J: The reported value was determined to be estimated following QA/QC review.
Q: Laboratory qualifier
CONC: Concentration

Table 4-8
TCLP Waste Characterization Sample Summary
ETE Sanitation and Landfill
Remedial Investigation

Sample ID		**WC-1**		
		(from Test Pit 4)		
Sample Collection Date	**Hazardous Waste**	3/12/98		
Sample Matrix	**Characterization**	waste		
Units	**Criteria*** (ug/L)	ug/L		
		MDL	CONC	Q
TCL Inorganics				
Aluminum	---		NA	
Antimony	---		NA	
Arsenic	5,000.0	0.4	4.8	B
Barium	100,000.0	0.1	151	B
Beryllium	---		NA	
Cadmium	---	1	ND	
Calcium	---		NA	
Chromium	5,000.0	0.1	129	
Cobalt	---		NA	
Copper	---		NA	
Iron	---		NA	
Lead	5,000.0	0.2	2700	
Magnesium	---		NA	
Manganese	---		NA	
Mercury	---	0.2	ND	
Nickel	---		NA	
Potassium	---		NA	
Selenium	---	4	ND	
Silver	---	1	ND	
Sodium	---		NA	
Thallium	---		NA	
Vanadium	---		NA	
Zinc	---		NA	
Cyanide	---		NA	

NA: Parameter not analyzed.
*: 40 CFR 261-261, "Identification and Listing of Hazardous Waste," February 12, 1997

ND: Non-detect
MDL: Method detection limit
Q: Laboratory qualifier
CONC: Concentration
B:The reported value was obtained from a reading that was less than the Contract Required Detection Limit, but greater to or equal to the instrument detection limit.

Table 4-9
Summary of Test Pit Soil Sample Detections
Organic Compounds, Pesticides and PCBs
ETE Sanitation and Landfill
Remedial Investigation

Sample ID		**TP-9:2'**			**TP-9:2' DUP**			**TP-13:6'**			**TP-2:5'**			**TP-4:6'**			**FB-31198**		
Sample Collection Date		3/12/98			3/12/98			3/12/98			3/12/98			3/12/98			3/12/98		
Sample Matrix		soil			soil			soil			soil			soil			water		
Units		ug/Kg			ug/Kg			ug/Kg			ug/Kg			ug/Kg			ug/L		
	NYSDEC Rec. Soil Cleanup Objectives* (ug/kg)	MDL	CONC	Q	MDL	CONC	Q	MDL	CONC	Q	MDL	CONC	Q	MDL	CONC	Q	MDL	CONC	Q
TCL Volatile Organics																			
Methylene Chloride	100	12	ND		12	ND		14	ND		13	ND		12	ND		10	11	J
Acetone	200	10	28	JN	10	24	JN	10	130	J	10	67	JN	10	16	JN	10	7	J
2-Butanone	300	12	ND		12	ND		14	ND		10	18		12	ND		10	ND	J
Ethylbenzene	5500	12	ND		12	ND		10	43		10	15		12	ND		10	ND	J
Xylenes(total)	1200	10	12		12	12		10	361		10	85		12	ND		10	ND	J
TCL Semivolatiles																			
Naphthalene	13000	400	ND		400	ND		460	ND		418	50	J	400	ND				
Di-n-butylphthalate	8100	400	ND		400	ND		460	ND		418	420		400	ND				
bis(2-Ethylhexyl)phthalate	50000	400	ND		400	ND		460	ND		418	50	J	400	ND				
TCL Pesticides / PCBs			ND			ND			ND			ND			ND			ND	

Notes:
*NYSDEC, TAGM 4046, "Determination of Soil Cleanup Objectives and Cleanup Levels", Jan. 24, 1994
MDL: Method Detection Limit CONC: Concentration ND: Non-detect Q: Laboratory qualifier
N: The value reported was less than 5 times (10 times of the common EPA contaminants) the value in the field or trip blank.
The reported value was negated due to probable contamination.
J: The value reported is an estimated concentration.
E: Estimated value. Analyte concentration exceeds the calibrated range of the GC/MS instrument.

Table 4-9 (cont'd)
Test Pit Soil Sample Summary of Detections Inorganic
ETE Sanitation and Landfill
Remedial Investigation

Sample ID		TP-13:6'			TP-9:2'			TP-9:2' DUP			TP-2:5'			TP-4:6'		
Sample Collection Date		3/12/98			3/12/98			3/12/98			3/12/98			3/12/98		
Sample Matrix		soil			soil			soil			soil			soil		
Units		mg/kg			mg/kg			mg/kg			mg/kg			mg/kg		
	NYSDEC Rec. Soil Cleanup Objectives* (mg/kg)	MDL	CONC	Q	MDL	CONC	Q	MDL	CONC	Q	MDL	CONC	Q	MDL	CONC	Q
TCL Inorganics																
Aluminum	33000**	1.36	13362.88		1.18	14287.33		1.17	12773.65		1.23	6116.5		1.18	14450.61	
Antimony	NA	0.81	ND		0.71	1.1	B	0.7	ND		0.74	1.5	B	0.71	0.83	B
Arsenic	7.5	1.09	**9.64**		0.95	6.94		0.94	6.8		0.99	**14.58**		0.94	**10.32**	
Barium	300	0.27	47.76	B	0.24	66.72		0.23	62.57		0.25	74.86		0.24	49.85	
Beryllium	0.16	0.27	**0.56**	B	0.24	**0.59**	B	0.23	**0.63**	B	0.25	**0.3**	B	0.24	**0.66**	B
Cadmium	10	0.27	0.33	B	0.24	ND		0.23	ND		0.25	2.14		0.24	ND	
Calcium	130 - 35,000**	2.99	12882.83		2.6	2514.84		2.58	2323.76		2.71	**76073.6**		2.6	2145.3	
Chromium	50	0.27	19.12		0.24	20.09		0.23	18.4		0.25	17.52		0.24	18.27	
Cobalt	30	0.27	9.11	B	0.24	8.97	B	0.23	8.13	B	0.25	4.82	B	0.24	11.1	B
Copper	25	0.27	**33.47**		0.24	23.05		0.23	22.01		0.25	**29.89**		0.24	**30.27**	
Iron	2,000	4.35	**26786.7**		3.78	**24362**		3.76	**23112.1**		3.94	**28093.9**		3.78	**27486.6**	
Lead	400***	0.54	36.68		0.47	13.78		0.47	16.07		0.49	121.17		0.47	42.18	
Magnesium	100 - 5,000**	3.8	**5352.63**		3.31	4145.72		3.29	3699.4		3.45	**23966.2**		3.31	4303.16	
Manganese	50 - 5,000**	0.27	546.18		0.24	554.74		0.23	509.34		0.25	472.56		0.24	339.25	
Mercury	0.1	0.14	ND		0.12	ND		0.12	ND		0.13	ND		0.12	ND	
Nickel	13	0.27	**25.07**		0.24	**24.23**		0.23	**22.75**		0.25	**17.59**		0.24	**25.8**	
Potassium	8,500 - 43,000**	5.43	1455.76		4.73	2106.92		4.7	2048.22		4.93	1662.77		4.72	1459.27	
Selenium	2	1.1	ND		0.95	ND		0.94	ND		0.99	ND		0.94	ND	
Silver	NA	0.27	ND		0.24	ND		0.23	ND		0.25	0.31	B	0.24	ND	
Sodium	6,000 - 8,000	4.89	233.53	BEJ	4.26	298.02	BEJ	4.23	287.23	BEJ	4.44	452.87	BEJ	4.25	366.03	BE
Thallium	NA	1.36	1.41	B	1.18	1.38	BJ	1.2	ND		1.2	ND		1.2	ND	
Vanadium	150	0.27	24.47		0.24	24.69		0.23	22.96		0.25	13.65		0.24	25.51	
Zinc	20	0.27	**143.62**		0.24	**144.93**		0.23	**129.77**		0.25	**362.39**		0.24	**91.02**	
Cyanide	Site specific	0.34	ND		0.3	ND		0.3	ND		0.31	ND		0.3	ND	

Notes:
*NYSDEC, TAGM #4046, "Determination of Soil Cleanup Objectives and Cleanup Levels", Jan. 24, 1994
**Natural range of soils for eastern United States, McGovern, NYSDEC, 1984 as given in TAGM #4046.
***USEPA's Interim Lead Hazard Guidance for residential screening levels.
BOLD = Exceeds NYSDEC recommended soil cleanup objective. ND= Non Detect
NA: No standard applicable MDL: Method detection limit CONC: Concentration Q: Laboratory qualifier
B:The reported value was obtained from a reading that was less than the Contract Required Detection Limit, but greater to or equal to the instrument detection limit.
E: The reported value is estimated because of the presence of interference.
J: The reported value was determined to be estimated following QA/QC review.

Volatile and Semivolatile Organics

No volatile or semivolatile organics were found in excess of NYSDEC's recommended soil clean up objectives. A number of volatile organic compounds were detected within the samples at concentrations below soil cleanup objectives, including acetone, 2-butanone, ethylbenzene and xylene. Acetone was detected in one sample at an estimated concentration of 130 ug/Kg. Xylene was the most common compound detected in samples collected from test pits 9, 13 and 2. The highest concentration of xylene was 361 ug/Kg detected in TP-13: 6', followed by TP-2: 5' (85 ug/Kg) and TP-9: 2' (12 ug/Kg).

Semivolatiles were detected in only one sample, TP-2: 5'. Semivolatiles detected include napthalene (50 ug/Kg), di-n-butylpthalate (420 ug/Kg) and bis(2-ethylhexyl)pthalate at an estimated concentration of 50 ug/kg.

The subsurface soil sample, TP-2:5', was taken from the "black organic oil stained" soil observed from 4-5 feet below grade. The only semivolatile compounds detected in the subsurface were found in TP-2:5' indicating that the presence of semivolatiles may be related to the contents of the buried, but now empty plastic drum and/or the 30 gallon metal drum uncovered in this test pit.

Pesticides/PCBs

No pesticides or PCB's were detected in the subsurface soil samples taken at the ETE Landfill.

Inorganics

Shallow subsurface soils show evidence of having been impacted by landfilled materials. Metals found in excess of the NYSDEC recommended soil cleanup objective include: arsenic, beryllium, calcium, copper, iron, magnesium, nickel and zinc. Subsurface soil samples taken from different areas of the landfill all show similar concentrations and compounds in excess of soil cleanup objectives. Concentrations observed within the four samples would not be indicative of an industrial waste hazardous waste source area.

4.2.4 Waste Characterization Results

During the excavation of test pit TP-4, a drum containing solidified paint sludge was uncovered. At the direction of the onsite NYSDEC representative, a sample of the sludge was taken and analyzed for Toxic Characteristic Leaching Procedure (TCLP) parameters to determine if the waste would be considered characteristically hazardous.

A summary of the TCLP sample results appears in Table 4-8 along with the maximum allowable concentration of contaminants for the toxicity characteristic. Waste which exceeds these maximum allowable concentrations is considered to be hazardous. Based on the results of sample, WC-1, the contents of the drum found in test pit TP-4, are not considered characteristically "hazardous".

4.3 Groundwater Sample Results

Groundwater samples were compared with NYSDEC criteria for the protection of class GA water, suitable for human consumption. Screening criteria guidance values used were taken from NYSDEC's guidance document, "Ambient Water Quality Standards and Guidance Values", October

Table 4-10
Summary of Groundwater Sample Detections for Existing Wells
Volatile Organics
ETE Landfill and Sanitation
Remedial Investigation

Client Sample ID		MW-1D			MW-1S			MW-2D			MW-2S			MW-3D			MW-3S			MW-4S		
Sample Collection Date		4/2/98			4/2/98			4/3/98			4/3/98			4/1/98			4/1/98			4/1/98		
Sample Matrix		water			water			water			water			water			water			water		
Units		ug/L			ug/L			ug/L			ug/L			ug/L			ug/L			ug/L		
	Screening Standard for GA Water (ug/L)	MDL	CONC	Q	MDL	CONC	Q	MDL	CONC	Q	MDL	CONC	Q	MDL	CONC	Q	MDL	CONC	Q	MDL	CONC	Q
TCL Volatile Organics																						
Vinyl Chloride	2.0	10	ND		10	ND		10	ND		10	ND		10	ND		10	**16**		10	ND	
Chloroethane	50.0*	10	ND		10	ND		10	ND		10	ND		10	ND		10	**10**		10	ND	
Methylene Chloride	5.0	10	ND		10	ND		10	ND		10	ND		10	ND		10	ND		10	ND	
Acetone	50.0	10	ND		10	ND		10	ND		10	ND		10	ND		10	ND		10	ND	
Carbon Disulfide	50.0	10	ND		10	ND		10	ND		10	ND		10	ND		10	ND		10	ND	
1,2-Dichloroethene(total)	0.6*	10	ND		10	ND		10	ND		10	ND		10	ND		10	**108**		10	ND	
2-Butanone	50.0	10	ND		10	ND		10	ND		10	ND		10	ND		10	ND		10	ND	
Trichloroethene	5.0	10	ND		10	ND		10	ND		10	ND		10	ND		10	**50**		10	ND	
Benzene	1.0*	10	ND		10	ND		10	ND		10	ND		10	ND		10	ND		10	ND	
4-Methyl-2-Pentanone	50.0	10	ND		10	ND		10	ND		10	ND		10	ND		10	ND		10	ND	
2-Hexanone	50.0	10	ND		10	ND		10	ND		10	ND		10	ND		10	ND		10	ND	
Tetrachloroethene	5.0	10	ND		10	ND		10	ND		10	ND		10	ND		10	ND		10	ND	
Toluene	5.0	10	ND		10	ND		10	ND		10	ND		10	ND		10	ND		10	ND	
Chlorobenzene	5.0	10	ND		10	ND		10	ND		10	ND		10	ND		10	ND		10	ND	
Ethylbenzene	5.0	10	2.1	J	10	2.1	J	10	ND		10	ND		10	ND		10	ND		10	ND	
Styrene	5.0	10	ND		10	ND		10	ND		10	ND		10	ND		10	ND		10	ND	
Xylenes(total)	5.0	10	4.8	JN	10	4.7	JN	10	ND		10	4.8	JN	10	4.5	JN	10	4.5	JN	10	2.3	JN

NOTES:
*New 1998 standard, NYSDEC Revised Parts 6 NYCRR Parts 700-706, "Groundwater Standards," March 1998.
SOURCE: New York State DEC Water Quality Standards and Guidance Values
BOLD: Exceeds NYSDEC criteria for class GA groundwater MDL: Method detection limit CONC: Concentration Q: Laboratory qualifier
ND: Non-detect J: Indicates an estimated value.
N: The value reported was less than 5 times (10 times for the common EPA contaminants) the value in the field or trip blank. The reported value was negated due to probable contamination.
E: Estimated value. Analyte concentration exceeds the calibrated range of the GC/MS instrument.

Table 4-10 (cont'd)
Summary of Groundwater Sample Detections for Existing Wells Inorganics
ETE Sanitation and Landfill
Remedial Investigation

								Background Well			Background Well											
	Client Sample ID	MW-1D			MW-1S			MW-2D			MW-2S			MW-3D			MW-3S			MW-4S		
	Sample Collection Date	4/2/98			4/2/98			4/3/98			4/3/98			4/1/98			4/1/98			4/1/98		
	Sample Matrix	WATER			WATER			WATER			WATER			WATER			WATER			WATER		
	Units	ug/L			ug/L			ug/L			ug/L			ug/L			ug/L			ug/L		
	Screening Standard for GA Water (ug/L)	MDL	CONC	Q	MDL	CONC	Q	MDL	CONC	Q	MDL	CONC	Q	MDL	CONC	Q	MDL	CONC	Q	MDL	CONC	Q
TCL Inorganics																						
Aluminum	NA	6	152	B	6	306		6	504		6	779		6	1530		6	73.4	B	6	38.2	B
Antimony	3	5	ND		5	**7**	B	5	ND		5	ND		5	ND		5	ND		5	ND	
Arsenic	25	6	ND		6	ND		6	ND		6	ND		6	ND		6	ND		6	ND	
Barium	1000	1	150	B	1	10.7	B	1	102	B	1	32	B	1	**2250**		1	69	B	1	679	
Beryllium	3	1	1	B	1	1.2	B	1	1.3	B	1	1.5	B	1	ND		1	ND		1	ND	
Cadmium	5*	1	ND		1	1	B	1	ND		1	ND		1	ND		1	ND		1	**8.9**	
Calcium	NA	23	87500		23	44300		23	69900		23	86500		23	318000		23	110000		23	230000	
Chromium	50	1	ND		1	2.6	B	1	1.2	B	1	1.3	B	1	4.5	B	1	19.1		1	ND	
Cobalt	NA	1	ND		1	ND		1	ND		1	ND		1	3.9	B	1	ND		1	9.1	B
Copper	200	1	8.1	B	1	6.8	B	1	23.9	B	1	38.5		1	30.2		1	12.2	B	1	30.5	
Iron	300	18	**1780**		18	**667**		18	**943**		18	**1730**		18	**6500**		18	161		18	**525**	
Lead	25	2	ND		2	ND		2	2.2	B	2	3.3		2	5.9		2	ND		2	ND	
Magnesium	35000	31	14000		31	7500		31	18100		31	18200		31	**88400**		31	19800		31	**74000**	
Manganese	300	1	**409**		1	33.6		1	72.1		1	36		1	**578**		1	**903**		1	**10200**	
Mercury	0.7*	0.2	ND		0.2	ND		0.2	ND		0.2	ND		0.2	ND		0.2	ND		0.2	ND	
Nickel	100*	1	2.9	B	1	2.8	B	1	1.4	B	1	2.7	B	1	9.8	B	1	4	B	1	16.8	B
Potassium	NA	44	1730	B	44	291	B	44	2220	B	44	754	B	44	18200		44	21100		440	140000	
Selenium	10	4	ND		4	ND		4	ND		4	ND		4	ND		4	ND		4	7.6	
Silver	50	2	ND		2	ND		2	ND		2	ND		2	ND		2	ND		2	ND	
Sodium	20000	100	**45300**		100	10300		100	12700		100	13200		1000	**2000000**		100	**303000**		1000	**4220000**	
Thallium	0.5*	6	ND		6	ND		6	ND		6	ND		6	ND		6	ND		6	ND	
Vanadium	NA	1	ND		1	1.7	B	1	1.4	B	1	1.4	B	1	2.3	B	1	ND		1	ND	
Zinc	2000*	2	13.2	B	2	7.2	B	2	9.9	B	2	15.4	B	2	18.5	B	2	4	B	2	3.3	B
Cyanide	200*																					

NOTES:

SOURCE: New York State DEC TOGS 1.1.1,"Ambient Water Quality Standards and Guidance Values," 10/93

BOLD: Exceeds NYSDEC criteria for class GA groundwater ND: Non-detect

NA: No standard applicable MDL: Method detection limit CONC: Concentration

*New 1998 standard, NYSDEC Revised Parts 6 NYCRR Parts 700-706, "Groundwater Standards," March 1998.

B:The reported value was obtained from a reading that was less than the Contract Required Detection Limit, but greater to or equal to the instrument detection limit.

E: The reported value is estimated because of the presence of interference.

J: The reported value was determined to be estimated following QA/QC review.

Table 4-11
Summary of Groundwater Sample Detections for New Monitoring Wells
Volatiles, Semivolatiles, Pesticides and PCBs
ETE Sanitation and Landfill
Remedial Investigation

Client Sample ID		MW-6D			MW-6S			MW-7D			MW-7S			MW-8D			MW-8S		
Sample Collection Date		4/2/98			4/2/98			4/3/98			4/3/98			4/2/98			4/2/98		
Sample Matrix		water			water			water			water			water			water		
Units		ug/L			ug/L			ug/L			ug/L			ug/L			ug/L		
	Screening Standard for GA Water (ug/L)	MDL	CONC	Q	MDL	CONC	Q	MDL	CONC	Q	MDL	CONC	Q	MDL	CONC	Q	MDL	CONC	Q
TCL Volatile Organics																			
Vinyl Chloride	2.0	10	ND		10	ND		10	ND		10	ND		10	ND		10	ND	
Chloroethane	50.0*	10	ND		10	ND		10	ND		10	ND		10	ND		10	4	J
Methylene Chloride	5.0	10	ND		10	ND		10	2.4	J	10	ND		10	ND		10	**56**	J
Acetone	50.0	10	10		10	ND		10	9.8	J	10	33		10	11		10	**1009**	E
Carbon Disulfide	50.0	10	ND		10	ND		10	ND		10	ND		10	2.2	J	10	ND	
1,2-Dichloroethene(total)	0.6*	10	ND		10	ND		10	ND		10	ND		10	ND		10	**8.8**	J
2-Butanone	50.0	10	35		10	ND		10	ND		10	**89**		10	14		10	**2231**	ED
Trichloroethene	5.0	10	ND		10	ND		10	ND		10	ND		10	ND		10	ND	J
Benzene	1.0*	10	ND		10	ND		10	ND		10	ND		10	ND		10	**15**	J
4-Methyl-2-Pentanone	50.0	10	9.9	J	10	ND		10	ND		10	8.1	J	10	ND		10	**316**	D
2-Hexanone	50.0	10	2.7	J	10	ND		10	ND		10	ND		10	ND		10	**68**	
Tetrachloroethene	5.0	10	ND		10	ND		10	ND		10	ND		10	ND		10	ND	
Toluene	5.0	10	ND		10	ND		10	ND		10	ND		10	ND		10	**245**	D
Chlorobenzene	5.0	10	ND		10	ND		10	ND		10	ND		10	ND		10	ND	
Ethylbenzene	5.0	10	ND		10	ND		10	ND		10	ND		10	ND		10	**60**	
Xylenes(total)	5.0	10	4.7	JN	10	5.3	JN	10	2.5	JN	10	ND		10	2.6	JN	10	**219**	J
TCL Semivolatile																			
Phenol	1.0	10	ND		10	ND		10	ND		10	ND		10	ND		10	**79**	
2-Methylphenol	50.0*	10	ND		10	ND		10	ND		10	ND		10	ND		10	21	
4-Methylphenol	50.0*	10	ND		10	ND		10	ND		10	ND		10	ND		995	**995**	D
2,4-Dimethylphenol	1.0	10	ND		10	ND		10	ND		10	ND		10	ND		10	**19**	J
Naphthalene	10.0	10	ND		10	ND		10	ND		10	ND		10	ND		10	ND	
Dimethylphthalate	50.0	10	ND		10	ND		10	ND		10	ND		10	2.3	J	10	ND	
Diethylphthalate	50.0	10	ND		10	ND		10	ND		10	ND		10	14		10	43	
Di-n-butylphthalate	50.0	10	ND		10	ND		10	ND		10	ND		10	2.3	J	10	ND	
bis(2-Ethylhexyl)phthalate	5.0*	10	2.3	J	10	ND		10	ND		10	ND		10	1.1	J	10	**5.9**	J
TCL Pesticides/PCBs																			
Heptachlor	0.04*	0.05	0.016	JP	0.05	0.012	JP	0.05	ND		0.05	ND		0.05	0.034	JP	0.05	0.005	JP

NOTES:
*New 1998 standard, NYSDEC Revised Parts 6 NYCRR Parts 700-706, "Groundwater Standards," March 1998.
SOURCE: New York State DEC TOGS 1.1.1,"Ambient Water Quality Standards and Guidance Values," 10/93
BOLD: Exceeds NYSDEC criteria for class GA groundwater MDL: Method detection limit
ND: Non-Detect Q: Laboratory qualifier CONC: Concentration
N: The value reported was less than 5 times (10 times for the common EPA contaminants) the value in the field or trip blank. The reported value was negated due to probable contamination.
J: Indicates an estimated value. D: Indentifies all compounds identified in an analysis at a secondary dilution factor.
P: Indicates a >25% difference for detected concentrations between the two GC columns. The lower of the two values is reported.
E: Estimated value. Analyte concentration exceeds the calibrated range of the GC/MS instrument.

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Table 4-11
Summary of Groundwater Sample Detections for New Monitoring Wells
Volatiles, Semivolatiles, Pesticides and PCBs
ETE Sanitation and Landfill
Remedial Investigation

Client Sample ID		MW-9D			MW-9DDUP			MW-9S			TB 33198		FB 331998		
Sample Collection Date		4/1/98			4/1/98			4/1/98			4/1/98		4/1/98		
Sample Matrix		water			water			water			water		water		
Units		ug/L			ug/L			ug/L			ug/L		ug/L		
	Screening Standard for GA Water (ug/L)	MDL	CONC	Q	MDL	CONC	Q	MDL	CONC	Q	MDL	CONC	MDL	CONC	Q
TCL Volatile Organics															
Vinyl Chloride	2.0	10	ND		10	ND		10	ND		10	ND	10	ND	
Chloroethane	50.0*	10	ND		10	ND		10	ND		10	ND	10	ND	
Methylene Chloride	5.0	10	ND		10	ND		10	**5.2**	J	10	ND	10	ND	
Acetone	50.0	10	ND		10	ND		10	**64**		10	ND	10	ND	
Carbon Disulfide	50.0	10	ND		10	ND		10	ND		10	ND	10	ND	
1,2-Dichloroethene(total)	0.6*	10	ND		10	ND		10	ND		10	ND	10	ND	
2-Butanone	50.0	10	ND		10	ND		10	**129**		10	ND	10	ND	
Trichloroethene	5.0	10	ND		10	ND		10	ND		10	ND	10	ND	
Benzene	1.0*	10	ND		10	ND		10	ND		10	ND	10	ND	
4-Methyl-2-Pentanone	50.0	10	ND		10	ND		10	ND		10	ND	10	ND	
2-Hexanone	50.0	10	ND		10	ND		10	ND		10	ND	10	ND	
Tetrachloroethene	5.0	10	ND		10	ND		10	ND		10	ND	10	ND	
Toluene	5.0	10	ND		10	ND		10	ND		10	ND	10	ND	
Chlorobenzene	5.0	10	ND		10	ND		10	ND		10	ND	10	ND	
Ethylbenzene	5.0	10	ND		10	ND		10	ND		10	ND	10	ND	
Styrene	5.0	10	ND		10	ND		10	ND		10	ND	10	ND	
Xylenes(total)	5.0	10	2.1	JN	10	4.5	JN	10	2.3	JN	10	2.14	10	2.5	JN
TCL Semivolatiles															
Phenol	1.0	10	ND		10	ND		10	**100**	EJ			10	ND	
2-Methylphenol	50.0*	10	ND		10	ND		10	ND				10	ND	
4-Methylphenol	50.0*	10	ND		10	ND		10	49	J			10	ND	
2,4-Dimethylphenol	1.0	10	ND		10	ND		10	ND				10	ND	
Naphthalene	10.0	10	ND		10	ND		10	ND				10	ND	
Dimethylphthalate	50.0	10	ND		10	ND		10	ND				10	ND	
Diethylphthalate	50.0	10	ND		10	1.4	J	10	ND				10	ND	
Di-n-butylphthalate	50.0	10	1.2	J	10	1.1	J	10	ND				10	ND	
bis(2-Ethylhexyl)phthalate	5.0*	10	2.6	J	10	2.3	J	10	1.9	J			10	ND	
Heptachlor	0.04*	0.05	0.017	JP	0.05	ND		0.05	ND				0.05	ND	

NOTES:
*New 1998 standard, NYSDEC Revised Parts 6 NYCRR Parts 700-706, "Groundwater Standards," March 1998.
SOURCE: New York State DEC TOGS 1.1.1,"Ambient Water Quality Standards and Guidance Values," 10/93
BOLD: Exceeds NYSDEC criteria for class GA groundwater   MDL: Method detection limit
ND: Non-Detect   Q: Laboratory qualifier   CONC: Concentration
N: The value reported was less than 5 times (10 times for the common EPA contaminants) the value in the field or trip blank. The reported value was negated due to probable contamination.
J: Indicates an estimated value.   D: Indentifies all compounds identified in an analysis at a secondary dilution factor.
P: Indicates a >25% difference for detected concentrations between the two GC columns. The lower of the two values is reported.
E: Estimated value. Analyte concentration exceeds the calibrated range of the GC/MS instrument.

Table 4-11 (cont'd)
Summary of Groundwater Sample Detections for New Monitoring Wells
Inorganics
ETE Sanitation and Landfill
Remedial Investigation

Client Sample ID		MW-6D			MW-6S			MW-7D			MW-7S			MW-7S(F)			FB 331998		
Sample Collection Date		4/2/98			4/2/98			4/3/98			4/3/98			4/3/98			4/1/98		
Sample Matrix		WATER			WATER			WATER			WATER			WATER			WATER		
Units		UG/L			UG/L			UG/L			UG/L			UG/L [Filtered] Reanalyzed on 6/30/1998*			ug/L		
											Reanalyzed on 6/30/98								
	Screening Standard for GA Water (ug/L)	MDL	CONC	Q	MDL	CONC	Q	MDL	CONC	Q	MDL	CONC	Q	MDL	CONC	Q	MDL	CONC	Q
TCL Inorganics																			
Aluminum	NA	6	1044.9		6	2016.8		6	236.13		6	4120		6	158		6	46.43	B
Antimony	3	5	ND		5	ND		5	ND		5	ND		5	ND		5	ND	
Arsenic	25	6	ND		6	ND		6	ND		6	9.8	B	6	ND	B	6	ND	
Barium	1000	1	122.07	B	1	28.6	B	1	467.1		1	53.4	B	1	50	B	1	ND	
Beryllium	3	1	1.3	B	1	1.3	B	1	1.32	B	1	ND		1	ND		1	ND	
Cadmium	5*	1	ND		1	ND		1	ND		1	ND		1	ND		1	ND	
Calcium	NA	23	47121		23	64439		23	429150		23	15200		23	21000		23	364.9	B
Chromium	50	1	5.26	B	1	4.7	B	1	17.9		1	5.7	B	1	ND	B	1	1.2	B
Cobalt	NA	1	ND		1	1.1	B	1	ND		1	2.8	B	1	ND	B	1	ND	
Copper	200	1	33.14		1	25.9		1	4.9	B	1	38.9		1	43.2		1	11.76	B
Iron	300	18	**2235**		18	**4062**		18	247		18	**7920**		18	284		18	105.51	
Lead	25	2	16.1		2	4.7		2	2	B	2	5.7		2	2.5	B	2	ND	
Magnesium	35000	31	12140		31	14109		31	1669	B	31	2340	B	31	3190	B	31	56.14	B
Manganese	300	1	104.78		1	121.35		1	5.5	B	1	**381**		1	266		1	1.41	B
Mercury	0.7*	0.2	ND		0.2	ND		0.2	ND		0.2	ND		0.2	ND		0.2	ND	
Nickel	100*	1	5.05	B	1	4.6	B	1	2.26	B	1	12.7	B	1	5.3	B	1	1.31	B
Potassium	NA	44	2586.8	B	44	2156.4	B	440	80000		44	4160	B	44	5020		44	ND	
Selenium	10	4	ND		4	ND		4	ND		4	4.5	B	4	ND		4	ND	
Silver	50	2	ND		2	ND		2	ND		2	ND		2	ND		2	ND	
Sodium	20000	100	13557		100	**33994**		1000	**2390700**		100	**444000**		100	**603000**		100	1126.1	B
Thallium	0.5*	6	ND		6	ND		6	ND		6	ND		6	7.6	B	6	ND	
Vanadium	NA	1	1.65	B	1	3.97	B	1	10.4	B	1	6.5	B	1	1.5	B	1	ND	
Zinc	2000*	2	35.11		2	24.37		2	ND		2	78.4		2	41		2	4.67	B
Cyanide	200*	5	ND		5	ND		5	ND		5	ND			NA		5	ND	

SOURCE: New York State DEC TOGS 1.1.1,"Ambient Water Quality Standards and Guidance Values," 10/93
*New 1998 standard from NYSDEC Revised Parts 6 NYCRR Parts 700-706, "Groundwater Standards," March 1998.
BOLD: Exceeds NYSDEC criteria for class GA groundwater   ND: Non-Detect
NA: No standard applicable   MDL: Method detection limit   CONC: Concentration
B:The reported value was obtained from a reading that was less than the Contract Required Detection Limit, but greater to or equal to the instrument detection limit.
J: The reported value was determined to be estimated following QA/QC review.
Reanalysis of sample MW-7s and MW-7s (filtered) was performed at the request of CDM. The initial results for MW-7S (filtered) were mislabeled.

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Table 4-11 (cont'd)
Summary of Groundwater Sample Detections for New Monitoring Wells
Inorganics

ETE Sanitation and Landfill
Remedial Investigation

Client Sample ID		MW-8D			MW-8S			MW-9D			MW-9DDUP			MW-9S		
Sample Collection Date		4/2/98			4/2/98			4/1/98			4/1/98			4/1/98		
Sample Matrix		WATER			WATER			WATER			WATER			WATER		
Units		UG/L			UG/L			UG/L			UG/L			UG/L		
	Screening Standard for GA Water (ug/L)	MDL	CONC	Q	MDL	CONC	Q	MDL	CONC	Q	MDL	CONC	Q	MDL	CONC	Q
TCL Inorganics																
Aluminum	100	6	1038.3		6	2355.1		6	1132.9		6	943.9		6	ND	
Antimony	3	5	ND		5	**5.64**	B	5	ND		5	ND		5	ND	
Arsenic	25	6	ND		6	ND		6	ND		6	ND		6	ND	
Barium	1000	1	59.88	B	1	**1198.8**		1	297.51		1	296.83		1	**5217**	
Beryllium	3	1	1.23	B	1	ND		1	1.13	B	1	1.1	B	1	ND	
Cadmium	5*	1	ND		1	**8.86**		1	ND		1	ND		1	1.6	B
Calcium	NA	23	27614		23	155590		23	74159		23	75574		23	298.71	
Chromium	50	1	9.98	B	1	3.35	B	1	3.61	B	1	3.51	B	1	ND	
Cobalt	NA	1	ND		1	3.34	B	1	ND		1	ND		1	8.73	B
Copper	200	1	44		1	ND		1	65.64		1	72.92		1	20.82	B
Iron	300	18	**597.03**		18	**181040**		18	**3981.6**		18	**3851.5**		18	**6673.5**	
Lead	25	2	12.4		2	**51.92**		2	15.45		2	18.53		2	ND	
Magnesium	35000	31	7478.7		31	**43710**		31	15713		31	16015		31	**58497**	
Manganese	300	1	16.24		1	**7514.8**		1	144.19		1	145.58		1	**2721.2**	
Mercury	0.7*	0.2	ND		0.2	ND		0.2	ND		0.2	ND		0.2	ND	
Nickel	100*	1	2.3	B	1	11.5	B	1	4.39	B	1	4.23	B	1	22.51	B
Potassium	NA	44	16079		440	248290		44	2715.5	B	44	2822.5	B	440	286320	
Selenium	10	4	ND		4	ND		4	ND		4	ND		4	ND	
Silver	50	2	ND		2	ND		2	ND		2	ND		2	ND	
Sodium	20000	100	**112730**		5000	**16635500**		100	**26373**		100	**27822**		5000	**31054500**	
Thallium	0.5*	6	ND		6	ND		6	ND		6	ND		6	**11.89**	
Vanadium	NA	1	6.52	B	1	16.23	B	1	1.45	B	1	1.92	B	1	4.59	B
Zinc	2000*	2	26		2	22.88		2	47.92		2	52.47		2	ND	
Cyanide	200*	5	ND		5	ND		5	ND		5	ND		5	ND	

SOURCE: New York State DEC TOGS 1.1.1,"Ambient Water Quality Standards and Guidance Values," 10/93
*New 1998 standard from NYSDEC Revised Parts 6 NYCRR Parts 700-706, "Groundwater Standards," March 1998.
BOLD: Exceeds NYSDEC criteria for class GA groundwater ND: Non-Detect
NA: No standard applicable MDL: Method detection limit CONC: Concentration
B:The reported value was obtained from a reading that was less than the Contract Required Detection Limit, but greater to or equal to the instrument detection limit.
J: The reported value was determined to be estimated following QA/QC review.

1993. A summary of detections, including non-exceedance sample results, can be found in Table 4-10 for existing wells and in Table 4-11 for the wells installed as part of this RI. Compounds found in excess of the screening criteria are displayed in Plate VI.

Groundwater sample results indicate that the groundwater beneath and surrounding the ETE Landfill contains volatile, semivolatile and inorganic compounds in excess of the Class GA water standard for groundwater. The highest concentrations of chemical compounds were observed at MW-8S which is screened within the municipal/industrial waste.

Background Groundwater Quality

Groundwater samples taken from the MW-2 well cluster are representative of background groundwater quality. Groundwater flow is generally south to north-northeast across the site. The MW-2 well cluster is located upgradient from the waste mass. The groundwater sample taken from MW-2S did not contain any volatile compounds. The only exceedance of Class GA water standards was for iron detected in MW-2S groundwater at a concentration of 1,730 ug/l. No volatile organics were detected in the sample collected from the corresponding deep well at this location, MW-2D. At well MW-2D, iron was found to exceed Class GA standards at a concentration of 943 ug/l. This may indicate that ambient water quality is naturally high in iron. Iron concentrations within uncontaminated groundwater can vary significantly due to geochemical processes and mineral content of the aquifer material. Iron concentrations of 1,000 to 5,000 ug/l in groundwater are common (Driscoll, 1989).

Volatile and Semivolatile Compounds

In general, groundwater samples from the wells screened in the shallow water table aquifer and/or fill material exceeded a broader range of organic compounds at higher concentrations than those wells screened in the deeper aquifer. The highest number of organic compounds with the highest concentrations were detected in MW-8S, which is screened in the municipal/industrial waste. Organic compounds included methylene chloride (56 ug/l), acetone (1,009 ug/l), 1,2-Dichloroethene (8.8 ug/l), 2-butanone (2,231 ug/l), benzene (15 ug/l), 4-methyl-2-pentanone (316 ug/l), 2-hexanone (68 ug/l), toluene (245 ug/l), ethylbenzene (60 ug/l), xylene (219 ug/l), phenol (79 ug/l), 4-methylphenol (995 ug/l), 2,4-dimethylphenol (19 ug/l) and bis(2-ethylhexyl)pthalate (5.9 ug/l).

Many of these contaminants, including methylene chloride, acetone, 2-butanone, toluene and xylene are known to be used in paint manufacturing and as paint solvents and may be associated with the documented disposal of drummed paint sludge.

Groundwater samples from MW-9S and 3S, both situated north and hydraulically downgradient of MW-8S, revealed the presence of organic contamination at concentrations exceeding NYSDEC GA groundwater standards. These compounds included vinyl chloride (16 ug/l), chloroethane (10 ug/l), 1,2-dichloroethene (108 ug/l) and trichloroethene (50 ug/l) in the groundwater sample from MW-3S. The groundwater sample from MW-9S revealed methylene chloride (5.2 ug/l-estimated), acetone (64 ug/l), and 2-butanone (129 ug/l) exceeding NYSDEC GA groundwater standards. Phenol (100 ug/l) was also found to exceed the GA standard in MW-9S.

Low concentrations of volatile organic compounds were detected in the most downgradient well, MW-7S. These included acetone (33 ug/l) and 4-methyl-2-pentanone at an estimated concentration of 8.1 ug/l. The concentration of 2-butanone in MW-7S (89 ug/l) exceeded the Class GA standard.

Volatile organic compounds were also detected in the deep wells at concentrations below GA standards including:

Volatile Compound	Concentration and Monitoring Well
■ Ethylbenzene:	(2.1 ug/l) in MW-1D*
■ Acetone:	(10 ug/l) in MW-6D
	(9.8 ug/l) in MW-7D*
	(11 ug/l) in MW-8D
■ 2-Butanone:	(35 ug/l) in MW-6D
	(14 ug/l) in MW-8D
■ 4-Methyl-2-Pentanone:	(9.9 ug/l) in MW-6D*
■ 2-Hexanone:	(2.7 ug/l) in MW-6D*
■ Bis (2-ethylhexyl)pthalate:	(2.3 ug/l) in MW-6D*
	(1.1 ug/l) in MW-8D*
	(2.6 ug/l) in MW-9D
■ Dimethylphthalate:	(2.3 ug/l) in MW-8D*
■ Diethylphthalate	(14 ug/l) in MW-8D
■ Di-n-butylpthalate	(2.3 ug/l) in MW-8D*
	(1.2 ug/l) in MW-9D*

*estimated concentration

Pesticides/PCBs

The pesticide heptachlor was the only pesticide detected in all of the groundwater samples tested. Heptachlor concentrations were all less than 0.035 ug/l. This pesticide may be related to agricultural uses practiced in the area and is found in both the shallow and deep aquifers at concentrations below GA water standards. No PCBs were detected within collected groundwater samples.

Inorganics

Inorganic exceedances generally mimicked the trend of detections seen with volatile and semivolatile organics. The most frequent and highest exceedances were seen in the shallow screened monitoring wells and MW-8S. Iron and sodium were the most common compounds found in excess of the state standards. Sodium levels increased dramatically from upgradient monitoring wells. The deep background well MW-2D had a sodium concentration of 12,700 ug/l, whereas the most downgradient deep well, MW-7D contained 2,390,700 ug/l of sodium. The relatively high concentration of sodium within MW-8S as well as other shallow downgradient wells is likely attributable to the documented landfilling of waste salt.

Heavy metals were detected in many of the groundwater samples. Concentrations exceeding NYSDEC's GA groundwater standards were observed for the heavy metal compounds: barium, cadmium and lead. Barium was detected at wells MW-3D, MW-8S and MW-9S in excess of GA standards. Cadium was detected at wells MW-4S and MW-8S with lead found in excess of GA standards at MW-8S. During the drilling of MW-8S, red paint was encountered on the split spoon samples .d may help to explain the high lead concentration observed at this monitoring well. As discussed in Section 1.0, drummed leaded paint sludge was documented as being disposed at the landfill during it's operation.

4.4 Soil Gas Results

Landfill gas is composed of both principal gases, found in large amounts as well as trace gas constituents. This portion of the RI was completed to characterize the nature of landfill gas production. Field screening of the temporary soil gas probes were used to determine the percent concentration of a few principal gases including, carbon dioxide (CO_2), methane (CH_4), and oxygen (0_2). In addition, the LEL, or lower explosive limit, was measured to determine the explosive nature of the landfill gas produced at the ETE Landfill. See Plate I for the location of GP-1 through GP-4.

The soil gas field screening results appear in Table 4-12. The results indicate that the western portion of the ETE Landfill is actively producing landfill gas. The percent concentration of the principal gases measured indicates that GP-1 and GP-4 (both in the western portion of the landfill) are in the methane fermentation phase of landfill gas production. This phase is characterized by very low levels of Oxygen, Carbon Dioxide of 80-50%, and Methane concentrations of approximately 50-65% (Tchobanoglous et al., 1993, p.385). During this phase microorganisms convert acetic acid and hydrogen to methane and carbon dioxide. With the acids and hydrogen gas produced by the acid formers converted to methane and carbon dioxide, the pH within the landfill will rise to neutral values in the range of 6.8 - 8.0. (Tchobanoglous et al., 1993, p.387). This is the range of pH values observed within leachate and leachate impacted groundwater at the ETE Landfill.

The concentrations found in the eastern gas probe locations, GP-2 and GP-3, indicates that either landfill gas production is not occurring near this portion of the landfill or that landfill gas is not capable of migrating upward in this area of the landfill due to an impermeable layer or water saturated soils. Organic rich household waste was encountered with less frequency in the eastern portion of the site and may also play a role in the almost ambient air concentrations observed in gas probe, GP-2 and GP-3.

Trace gas constituents were characterized using summa canister sampling of the temporary soil gas probes. A summary of detections for the soil gas samples appears in Table 4-13. Analysis of soil gas samples was limited to volatile organic compounds (VOCs). VOC concentrations found at gas probe, GP-4, were several orders of magnitude higher in concentration than the other gas probe locations.

Total VOC concentrations detected in the TO-14 analysis for the four soil gas sample locations were:

Table 4-12
Soil Gas Field Screening Results
ETE Sanitation and Landfill
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Round I - Soil Gas Probe Sampling May 13, 1998								
Gas Probe	LEL (%)		CH4 (%)		CO2 (%)		O2 (%)	
	Peak	Sustained	Peak	Sustained	Peak	Sustained	Peak	Sustained
GP-1	***	***	62.7	62.6	37.4	37.2	0.2	0.2
GP-2	2	2	0.1	0.1	0	0	21.3	21.3
GP-3	2	2	0.2	0.1	0	0	21.2	21.2
GP-4	***	***	72.3	71.8	26.6	25.9	0.2	1.4

Round II - Soil Gas Probe Sampling May 16, 1998								
Gas Probe	LEL (%)		CH4 (%)		CO2 (%)		O2 (%)	
	Peak	Sustained	Peak	Sustained	Peak	Sustained	Peak	Sustained
GP-1*	110	110	187	5.3	3	3	19.2	19.2
GP-2	6	6	0.4	0.3	0	0	21.4	21.4
GP-3	4	4	0.4	0.2	0	0	20.6	20.6
GP-4	***	***	73.3	33.8	26.6	12.6	0.2	11.2

***: LEL reading is greater than the instruments maximum detection limit.
Temporary soil gas probes screened using a Landtech landfill gas analyzer.
*:Water encountered in the soil gas probe during field screening.

Table 4-13
Summary of Soil Gas Sample Detections
ETE Sanitation and Landfill
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Compound	GP-1 (ppbv)		GP-2 (ppbv)		GP-3 (ppbv)		GP-4 (ppbv)	
	Rpt. Limit	Conc.	Rpt. Limit	Conc.	Rpt. Limit	Conc.	Rpt. Limit	Conc.
Freon 12	0.94	1.2	0.82	ND	0.81	ND	150	ND
Chloroethane	0.94	2	0.82	ND	0.81	ND	150	ND
Chloromethane	0.94	ND	0.82	0.85	0.81	0.86	150	ND
Methylene Chloride	0.94	ND	0.82	1	0.81	ND	150	ND
Benzene	0.94	19	0.82	ND	0.81	ND	150	ND
Toluene	0.94	4.1	0.82	3.5	0.81	1.2	150	1600
Ethyl Benzene	0.94	160	0.82	ND	0.81	2.7	150	6300
m,p-Xylene	0.94	500	0.82	1	0.81	8.5	150	19000
o-Xylene	0.94	13	0.82	ND	0.81	4.6	150	11000
1,3,5-Trimethylbenzene	0.94	11	0.82	ND	0.81	4.9	150	10000
1,2,4-Trimethylbenzene	0.94	24	0.82	ND	0.81	12	150	25000
Propylene	3.7	42	0.82	ND	3.2	ND	580	ND
Acetone	3.7	ND	3.3	9.2	3.2	7.5	580	ND
Hexane	3.7	17	3.3	ND	3.2	ND	580	ND
Cyclohexane	3.7	10	3.3	ND	3.2	ND	580	590
4-Ethyltoluene	3.7	21	3.3	ND	3.2	19	580	40000
Ethanol	3.7	ND	3.3	22	3.2	ND	580	ND
Heptane	3.7	13	3.3	ND	3.2	ND	580	ND

Gas Probe Location	Total Organic Concentration (parts per billion by volume)
GP-1	837.30
GP-2	37.55
GP-3	61.26
GP-4	113,490.00

GP-4 is located approximately 180 feet northeast of GW-8S which exhibited the most significant VOC concentrations within shallow groundwater. Based on these results, the west-central portion of the landfill appears to contain the most significant VOC contamination observed within the site.

Section 5
Conceptual Contaminant Transport

One of the main objectives of this RI was to evaluate the potential contaminant transport pathways operating at the ETE Landfill. Based on site conditions, the primary transport pathways that will control offsite migration of contaminants from the site include:

- Transport of mobile liquid contaminants directly from waste and soils into groundwater;
- Transport of landfill leachate into groundwater;
- Transport of contaminants into surface water via direct leachate discharge, surface runoff, wind blown dust, or through leachate-enriched groundwater discharge;
- Transport of contaminants from contaminated surface water and groundwater into surface water sediments;
- Landfill gas migration and windblown dust entering the atmosphere and,
- Uptake of Chemical Contaminants present in soil, surface water and sediment by biota.

A conceptual model of contaminant transport pathways is shown in Figure 5-1.

Due to the proximity of the landfill to a number of private drinking water sources, the most significant release mechanism is the transportation of contaminants via the groundwater pathway. Contaminated groundwater will migrate offsite in the direction of natural groundwater flow and potentially impact private drinking water sources downgradient (north) of the landfill. A secondary concern is the discharge of contaminated groundwater and surface water to downgradient surface water bodies that are used for recreational uses such as fishing.

Another potential contaminant transport is landfill gas contaminants traveling offsite through the atmosphere. Wind blown dust is not considered a significant migration pathway since the site is heavily vegetated with only a few areas of open ground existing within the landfilled area.

5.1 Groundwater

To predict the persistence and potential migration of contaminants in groundwater, it is necessary to identify which contaminants that are likely to leach, degrade, or volatilize. This depends on a given chemical's physical and chemical properties and the properties of the media through which it migrates.

With the exception of several chlorinated hydrocarbons detected at low concentrations within several monitoring wells and soil samples, the majority of organic contaminants detected within soil, groundwater and soil gas are volatile organic compounds with densities of less than one. For organic compounds, such as petroleum hydrocarbons, with densities less than that of water (<1), referred to as Light Non-aqueous Phase Liquids (LNAPLs), the contaminant will tend to spread out

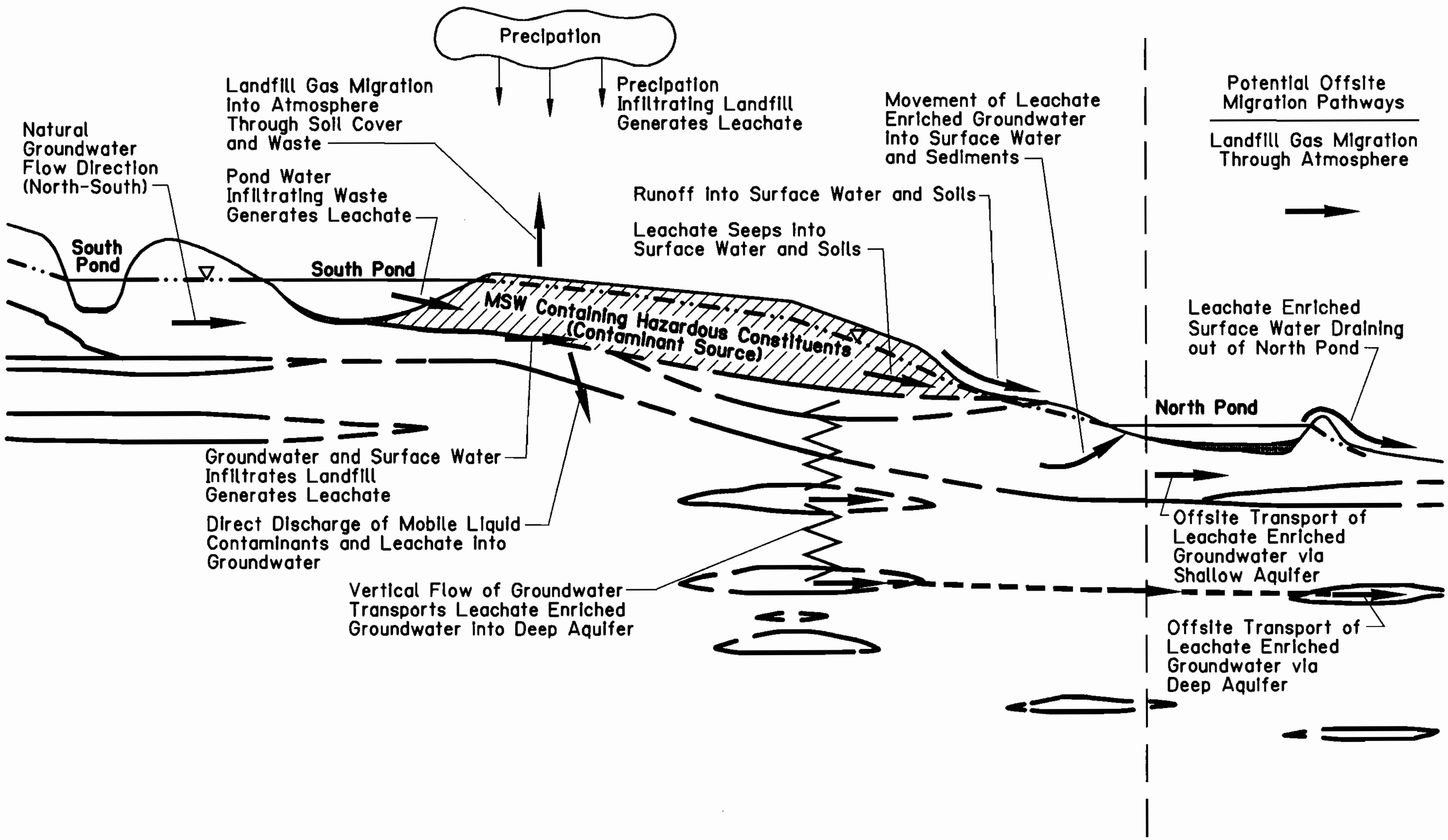

Figure 5-1
Conceptual Model of Contaminant Sources, Transport Mechanisms and Migration Pathways
ETE Sanitation And Landfill Remedial Investigation

along the water table forming a floating layer or free phase of material. Therefore, if a significant release of a pure phase occurred within the landfill, a floating layer of LNAPL should have been detected within monitoring wells screened within the landfill or during excavation of the test pits. No free phase floating LNAPL was evident during the completion of field activities. However, a heavy petroleum odor and heavy sheen was observed within MW-8S and PZ-3 indicating that a pure phase LNAPL release has occurred within this area, of the landfill. However, the release may not have been large enough to create a free phase floating layer, or the free phase layer was not intercepted by the monitoring network. If an LNAPL was present this material would dissolve into the groundwater flowing along the bottom of the floating LNAPL creating a plume of dissolved contaminants downgradient from the LNAPL.

High concentrations of contaminants in the groundwater, both at the perimeter and beneath the landfill, are often indicative of a source area of contamination within the landfill. Often these source areas are where concentrated NAPLs are pooled or adsorbed to the waste materials and soils.

Experience at NAPL sites across the country has shown that where NAPL exists in the ground, concentrations observed in the groundwater are at least 1 percent of the aqueous solubility of the contaminant, and usually more on the order of 5 to 10 percent (Cohen, 1992).

Based on the concentrations of VOCs detected in MW-8S, all contaminants are at concentrations well below their respective solubilities given the most significant contaminants have relatively high aqueous solubilities. For example, the most prevalent contaminant, 2-butanone, was detected at a relatively high concentration of 2.231 mg/l; however, its aqueous solubility is 353,000 mg/l (Montgomery 1990).

Contaminants can also enter groundwater through the discharge of leachate containing dissolved contaminants. As precipitation, surface water and groundwater infiltrate through the landfill waste mass it will react chemically and biologically with the solid waste. Biological reactions occur continuously in the landfill environment with anaerobic reactions predominating due to the lack of oxygen, though aerobic reactions will occur under certain conditions. Concurrently with biological decomposition will be chemical decomposition, where leaching and other processes will result in the addition of contaminants to the downward moving leachate. Organic matter decomposing under aerobic conditions produces carbon dioxide which combines with the leaching water to form carbonic acid. This, in turn, reacts upon metals in the refuse increasing the concentration of the reacted metals within the leachate. Highly soluble ionic cations and anions are readily dissolved from solid waste and placed into solution into the water moving through the landfill, greatly increasing the concentration of these ions in the landfill leachate.

The inorganic contamination present within downgradient groundwater, surface water and surface water sediment are likely the result of this contaminant pathway.

Groundwater flow velocity was calculated using hydraulic gradients calculated from the water table contour maps, the average value of hydraulic conductivities determined by slug testing and an estimated sediment porosity, an estimated value for groundwater flow velocity, or Darcian Velocity (ft/day) was calculated for groundwater transport in the unconsolidated glacial sediments at the

ETE Landfill. The Darcian Velocity is derived using a modified form of the Darcy's Law which governs flow through porous media. The modified form is:

$$V = \frac{K * I}{n}$$

where:

V= Darcian Velocity (Groundwater Velocity) (ft/day)
I= Hydraulic Gradient (ft/ft)
K= Hydraulic Conductivity (ft/day)
n= Porosity of the Aquifer Sediments (percent)

Using this method, horizontal groundwater velocities in the glacial sediments were calculated and range from 0.55 ft/day to 1.64 ft/day. An average hydraulic gradient of 0.04 ft/ft was calculated by determining the slope of the water table surface across the south to north extent of the landfill. A porosity of 35% was estimated based upon ranges provided by Freeze and Cherry (1979) for silty sands. The site average hydraulic conductivity of 1.6×10^{-4} ft/sec was calculated from slug testing completed on all of the onsite wells and piezometers. The lower range of the flow velocity, 0.55 ft/day was calculated using a hydraulic conductivity average which excluded the slug testing results of the piezometer, PZ-3 and MW-8S, which are both screened directly in the highly permeable solid waste, and therefore, is likely to be a closer estimate of the actual groundwater flow through the Glacial Sand units. Note that the calculated Darcian velocity is a very rough estimate of actual groundwater flow within an aquifer. Due to the complex nature of site stratigraphy, groundwater velocities will vary greatly. However, monitoring wells were screened within the more permeable Glacial Sand formations, therefore the flow velocities should be conservatively high.

The water solubility of a substance is a critical property affecting environmental fate. Highly soluble chemicals can be rapidly leached from the wastes and soils and are generally mobile in groundwater, whereas low soluble compounds, such as heavy metals, have a relatively low mobility within groundwater. As discussed previously, liquid contaminants such as waste solvents may flow under the influence of gravity directly from the landfill mass into the surrounding soils and groundwater.

As discussed, the Darcian velocity represents a conservative estimate for site groundwater flow velocity. Compounds transported in groundwater undergo several chemical and physical processes which act to impede their rates of migration flow such as sorption, redox reactions, volatilization and complexation reaction. Sorption is the most important process in slowing the migration rates of chemicals. Therefore, contaminant sorption coefficients are used to estimate the groundwater migration rates.

The organic carbon partition coefficient (Koc) reflects the propensity of an organic compound to sorb to the organic matter found in soil and therefore, governs the degree of dissolution and mobility for the compound in the groundwater. Chemicals that sorb onto organic materials in an aquifer (i.e. organic carbon) are retarded in their movement in groundwater. Therefore, the greater the organic carbon partition coefficient, the greater the reduction in the mobility of the compound.

The normal range of Koc values extends from $1x10^{-7}$ to 10^{-7} with higher values indicating greater sorption potential. The soil-water partition coefficient (Kd) relates the adsorption of the compound to the soil. The Kd has been calculated by normalizing, the Koc against the organic carbon content (foc) of the aquifer, as follows (Lyman, 1983).

Kd= Koc*foc

where,

Kd=soil water partition coefficient
Koc=carbon solution distribution.
foc=fraction of organic carbon

Note that the organic carbon fraction (Foc) of the glacial sediments with the study area was not obtained as part of this investigation. However, foc, for glacial material is typically low, approximately 0.01% by weight. Using Kd in conjunction with other aquifer properties, the relative retardation of a compound relative to the velocity of groundwater can be estimated by the following equation (Freeze and Cherry, 1979):

$$Rd = V/VC = \frac{1 + B * Kd}{n}$$

Where

Rd= Retardation factor
Vc= Velocity of retarded contaminant
V= Average Darcian velocity of groundwater (1.64 ft/day)
B= Bulk density of aquifer material (1.55 gm/cm^3)
Kd= Calculated soil-water partition coefficient.
n= porosity (35%)

The calculated Kd parameters for each of the compounds, retardation rates (Rd) were calculated for the contaminants of interest at the ETE Landfill. A bulk density of 1.55 gm/cm^{-3} was used as a reasonable estimate for a moderately tight silty sand material (Brady, 1974). Table 5-1 provides a summary of the estimated transport velocities calculated for those compounds detected in the groundwater.

By examining the calculated contaminant transport velocities we gain an understanding of which chemicals are expected to be found at the leading edge of the ETE's Landfill's leachate plume. Volatile organics, acetone and 2-butanone, are transported through the aquifer almost at the same velocity of the groundwater undergoing little to no retardation. The analytical data supports this conclusion. At monitoring well, MW-7S, 2-butanone is the only organic compound found in excess of NYSDEC GA groundwater standards. Additionally acetone was also observed at MW-7S but below GA standards. Well MW-7S, is the most downgradient well onsite. Upgradient from MW-7S, monitoring well MW-9S exhibited concentrations of methylene chloride, acetone and 2-butanone, all of which are transported without undergoing significant retardation.

VOCs detected near the MW-8S, which undergo higher rates of retardation such as 2-hexanone and toluene are not detected downgradient in MW-9S. This indicates that retardation may be playing a role in reducing the migration rate of many chemicals which comprise the leachate plume. However, based on the observed potentiometric head within the shallow water table aquifer and contaminant distribution, it is possible that groundwater within the western portion of the landfill, within the area of MW-8S, is migrating in a more northwesterly direction and therefore, not being entirely characterized by downgradient monitoring wells.

In general, retardation rates for semivolatile compounds (SVOCs) tend to be higher than retardation rates of volatile organics. However, the analytical data suggest that both phenol and the 2- and 4-methylphenol compounds are present downgradient from MW-8S. Both phenol and 4-methylphenol are found in excess of class GA water standards at MW-9S.

Based on their relatively high mobility and observed concentrations within groundwater, the detected VOCs and SVOCs are the principal contaminants of concern, including:

- Acetone
- 2-Butanone
- Benzene
- 4-Methyl-2-pentanone
- 2-Hexanone
- Toluene
- Trichloroethene
- 1,2-Dichloroethane
- Chlorobenzene
- Ethylbenzene
- Xylenes (total)
- Phenol
- 2-Methylphenol
- 4-Methylphenol
- 2,4-Dimethylphenol

Though the above contaminants are relatively mobile in groundwater, the majority will tend to degrade through biodegradation processes under favorable aerobic conditions.

The observed VOC distribution within site groundwater clearly indicates the majority of contamination is limited to the landfill wastes and shallow glacial sands comprising the shallow water table aquifer. The relatively clay rich glacial tills which comprise the majority of site stratigraphy appear to limit the downwind vertical migration of groundwater contaminants within the site. However, trace levels of several VOCs were observed in all deep downgradient monitoring wells indicating some vertical contaminant migration has occurred.

Based on the estimated groundwater flow velocity and retardation factors, contaminant migration rates of the most mobile contaminants are estimated to be between 0.40 and 0.50 ft/day. Using an estimated release date of 1978, based on the disposal history of the site, the most mobile contaminants would have migrated 2,900 and 3,650 feet downgradient of the site. A number of private wells are located downgradient of the site between 2,400 and 6,000 feet north of the site. Sampling

Table 5-1
Estimated Retardation Factors and Relative Contaminant Velocities for Organic Compounds
ETE Landfill and Sanitation
Remedial Investigation

Compounds	Kd (Koc*foc)	Retardation Factor (Rd)	Range of Relative Contaminant Velocities (ft/day)	
			*Groundwater Velocity = 1.64 ft/day	*Groundwater Velocity = 0.55 ft/day
Volatiles				
Vinyl Chloride	0.0002	1.00	1.64	0.5494
Chloroethane	0.0003	1.00	1.64	0.5492
Methylene Chloride	0.001	1.00	1.63	0.5479
Acetone	0.000	1.00	1.64	0.5499
Carbon Disulfide	0.025	1.11	1.48	0.4949
1,2-Dichloroethene(total)	0.006	1.03	1.60	0.5360
2-Butanone	0.000	1.00	1.64	0.5497
Trichloroethene	0.006	1.03	1.59	0.5347
Benzene	0.005	1.02	1.61	0.5383
4-Methyl-2-Pentanone	0.001	1.00	1.64	0.5485
2-Hexanone	0.013	1.06	1.55	0.5190
Tetrachloroethene	0.026	1.12	1.47	0.4926
Toluene	0.011	1.05	1.56	0.5234
Chlorobenzene	0.005	1.02	1.61	0.5386
Ethylbenzene	0.010	1.04	1.57	0.5277
Styrene	0.074	1.33	1.23	0.4141
Xylenes(total)	0.013	1.06	1.55	0.5203
Semivolatiles				
Phenol	0.003	1.01	1.62	0.5435
2-Methylphenol	0.002	1.01	1.62	0.5447
4-Methylphenol	0.005	1.02	1.61	0.5383
2,4-Dimethylphenol	0.012	1.05	1.56	0.5228
Naphthalene	0.013	1.06	1.55	0.5203
Dimethylphthalate	0.004	1.02	1.61	0.5398
Diethylphthalate	0.007	1.03	1.59	0.5336
Di-n-butylphthalate	0.138	1.61	1.02	0.3413
bis(2-Ethylhexyl)phthalate	10.0	45.29	0.04	0.0121

Notes:
Assumed foc= 0.01% by weight
Estimated porosity= 35%
Bulk Density= 1.55 gm/cm^3
Rd= 1+ (Bulk Dens. * Kd) / Porosity
* Groundwater velocities calculated using hydraulic conductivities obtained from onsite slug testing.
Lower groundwater velocity is an average of all wells except those screened in fill.
Higher velocity includes wells screened in fill.
Organic Koc values used in the Kd calculation obtained
from Groundwater Chemical Desk Reference, 1990.

of private wells performed by the New York State Department of Health indicates all downgradient private wells to be free of VOCs, with the exception of one well located approximately 2,600 feet north of the site which exhibited a toluene concentration of 0.5 ug/l. Due to the trace concentration observed and the common nature of toluene (toluene is a constituent of gasoline and other petroleum products), the presence of the toluene observed at this private well cannot be conclusively attributed to the site.

The lack of VOCs within downgradient residential wells may be the result of a number of factors, including:

- The contaminants are degraded to non-detectable concentrations before reaching the residential wells;

- The release of VOCs had not occurred immediately after being placed within the landfill, i.e. VOCs were in the form of drummed wastes and failure of the drums occurred sometime after being buried;

- Groundwater flow and contaminant migration rates are significantly lower than the conservative estimates;

- The private wells are not screened within the glacial aquifer zones that have been impacted by the landfill (i.e., the plume has missed the wells); or

- The majority of contaminated groundwater is discharging to surface waters before reaching the private wells.

The relative mobility of an inorganic compound within an aquifer system is dependent on many complex factors including: extent of fixation, positive and negative adsorption, exclusion, complex formation and reaction kinetics (Dragon, 1988). Therefore, the estimating the mobility using the Kd method can only provide a rough approximation for inorganic compounds without the other factors being considered.

A variety of factors affect the mobility of metals in soil/water systems, including:

- The overall solubility of the metal in question (varies with mineral species)
- the presence of water (soil moisture content),
- the presence of other complexing chemicals in solution,
- the pH and oxidation/reduction potential, which affect the speciation of all metals and complexing agents,
- the temperature, and soil properties, such as cation exchange, the presence of hydrous oxides of iron and magnesium, and the presence of organic matter.

Because of the wide range of soil conditions in the environment and the resulting high variability of certain physical parameters, it is difficult to predict the mobility of metals. Soil sorption constants may vary over several orders of magnitude for a given metal in different soils and/or under different environmental conditions. Thus, there is no single sorption constant describing the binding of metals in solution to soils and no unique mobility holds for all environmental conditions.

Metals with relatively high solubilities such as sodium, and to a lesser degree, magnesium travel with the landfill leachate and into the surrounding groundwater and surface waters with little to no attenuation. For this reason, these cations along with several anions are generally recognized as good leachate indicator parameters. It is likely that these metals are migrating into offsite groundwater.

Within the site, iron (Fe) and manganese (Mn) concentrations appear to be in excess of natural background conditions expected for groundwater and surface water. Due to the reducing nature of the landfill environment, the more soluble reduced forms of these metals are present within the leachate and groundwaters immediately downgradient of the landfill. However, as leachate impacted groundwater returns to ambient oxygen levels (increased redox potential) these metals will quickly precipitate out of the groundwater in the form of oxide and hydroxide minerals. This reduction in Fe and Mn concentrations will occur even more quickly when leachate discharges to the ground surface through seeps. Oxidation of Fe and Mn is most evident around leachate seeps along the north toe of the landfill where a brown-red sludge like material covers the ground.

Low concentrations of several heavy metals including lead, barium and cadmium were present within onsite monitoring wells. In general, the mobility of heavy metals under natural geochemical environments is very low due to mineral precipitation removing dissolved metal species from the groundwater. Due to their relatively low concentrations and immobility, heavy metals are not considered to be of significant concern.

In summary, the areal distribution of the VOC plume in the shallow glacial flow regime is not completely defined. Groundwater may flow in a north to northwest direction downgradient from monitoring well, MW-8S, where numerous VOC exceedances were noted. No monitoring wells are located northwest of MW-8S. Additionally, downgradient wells MW-3S and MW-7S exhibit VOCs in excess of class GA water standards. Based on available information, the dominant factors influencing offsite migration of the contaminants of concern are groundwater velocity, retardation rates and the propensity of the contaminants to naturally degrade within the aquifer system.

5.2 Surface Water

The second major contaminant transport pathway is the transport of contaminants into surface water through direct leachate seep discharge, surface runoff, or through leachate enriched groundwater discharge. This contaminant transport pathway appears to be active along the northern and northeastern toe of the landfill. Along the steep slope marking the extent of the landfill there is iron staining (brown-red sludge material), salt deposits and seeps discharging leachate into the North Pond. Surface water samples collected downgradient of the landfill from the North Pond and eastern drainage channel clearly indicates impact from inorganic contaminants. Additionally, surface water sediment samples collected from the North Pond exhibit metals concentrations significantly above NYSDEC cleanup criteria. This indicates dissolved metals present within leachate seeps and impacted groundwater that enter the north pond are likely precipitating out of the surface water due to changes in geochemistry and accumulating within the pond sediments. Additionally, a number of VOCs including 2-butanone, acetone, ethyl benzene and xylenes were detected in the north pond sediments, indicating VOCs are accumulating within the organic-rich sediments.

As discussed in section 2.3, the north pond discharges to a tributary of Cotton Creek which is located approximately 0.75 miles north of the site. Cotton Creek is a Class C surface water and considered suitable for fish propagation. Cotton Creek is a tributary of Oatka Creek which, according to NYSDEC information, is subject to moderate fishing pressure. NYSDEC annually stocks Oatka Creek with Brown Trout and produces 10-20 lbs/acre of wild Brown Trout.

5.3 Landfill Gas

Gases are generated within a landfill through the anaerobic decomposition of organic materials with the predominant gases being carbon dioxide and methane. Migration of landfill gases along with any volatilized VOCs will be governed by pressure gradients created through the gas generation within the landfill and the permeability and moisture content of the landfill material and soil. Saturated soil and low permeable clay soils are not transmissive of landfill gas and therefore will retard its movement. Conversely, sandy soils with high porosities and low moisture content will allow landfill gas to readily migrate from the landfill gas source into surrounding areas. The extent of offsite migration of gas is also controlled by the permeability of cover materials. Areas that are primarily paved with asphalt and concrete have the potential for landfill gas to migrate substantial distances. Whereas, in areas with no cover, migration will likely be limited to gas seeping out into the atmosphere.

Landfill gas migration through the subsurface is not a significant pathway of contaminant transport. Landfill gas tends to migrate in the unsaturated zone with preferential flow in the horizontal direction. Surrounded by undeveloped land, landfill gas migration does not pose a serious threat to surrounding homes. The nearest home is located approximately 1500 feet from the center of the landfill. Most land surrounding the landfilled area is uncovered and vegetated allowing soil gas to be released into the atmosphere before traveling large distances within the soil.

Additionally, the landfill is almost entirely surrounded by surface water bodies which tend to limit the lateral migration of landfill gas. Along the western and eastern perimeter of the landfill, drainage channels exist which effectively reduce the thickness of the unsaturated zone (and landfill migration pathway) to zero. The North and South Pond limit migration of landfill gas along the much of the remaining landfill perimeter.

Section 6
Human Health Risk Assessment

This baseline human health risk assessment presents a qualitative evaluation of the potential risks and hazards to human health that may exist at the ETE Sanitation Landfill site currently and in the future in the absence of any remediation (i.e., no action). This assessment is based on the site data generated from the field sampling activities conducted as part of the remedial investigation from December 1997 through June 1998. The risk assessment has been prepared in accordance with USEPA Region II and other USA EPA risk assessment guidance documents and the on-line data bases listed below:

- Risk Assessment Guidance for Superfund Part A Human Health Evaluation Manual (RAGS) (USEPA, 1989)
- Superfund Exposure Assessment Manual (USEPA, 1988)
- Guidance for Data Useability in Risk Assessment (USEPA, 1992)
- Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors (USEPA, 1991)
- Supplemental Guidance to RAGS; Calculating the Concentration Term (USEPA, 1992)
- EPA Region III Risk -Based Concentration Table and supporting documentation (USEPA, April 1, 1998)

6.1 Data Evaluation

In this first step of the qualitative risk assessment, the results of the sampling and analysis conducted to characterize the conditions at the ETE Sanitation and Landfill site are evaluated and a subset of the various chemicals identified is selected for detailed analysis.

6.1.1 Sampling and Analytical Results

The environmental media that were sampled during the RI include groundwater, surface water, sediment, surface soil, soil gas, subsurface soil, and waste. The chemical results for each sample were presented in Section 4 and discussed in Section 5. For this qualitative risk assessment, the chemical results for all media sampled except for subsurface soil and waste will be assessed for potential contribution to human health risks. Under baseline (i.e. No action) conditions there would be no human exposure to chemicals detected in the subsurface soil or the waste drums encountered below the surface of the landfill.

6.1.2 Selection of Chemicals of Concern

Due to the large number of site chemicals detected through the completion of the RI, the number of chemicals retained for qualitative analysis in this risk assessment was reduced to the most significant (i.e., the greatest contributors to the risks/hazards at the site). Rather than the elaborate relative concentration toxicity screening method of RAGS, a more streamlined screening was performed for this qualitative risk assessment. This approach is consistent with the approved RI/FS work plan.

For the screening, the maximum concentration of each chemical for each media was compared to a risk-based concentration for that media. The lowest of either the RI screening criteria used in Section 4 (if the criteria was risk-based) or the concentrations developed by Region III EPA, as found on their Risk-Based Concentration (RBC) Table, dated April 1, 1998, was used. (The RBC Table contains chemical concentrations that have resulted when standard toxicity factors are combined with "standard" exposure assumptions to obtain a concentration that will produce a Hazard Quotient of 1 or a lifetime cancer risk of 1 in a million.) If the maximum concentration exceeded the screening number for that medium, the contaminant was retained for the risk assessment. If a specific contaminant did not exceed its screening number for any medium, the contaminant was dropped from the risk assessment. The final list of chemicals of concern is presented on Table 6-1 and is further discussed below.

Groundwater: A total of 15 groundwater samples (excluding duplicates and reanalyses) were obtained from the on and offsite monitoring wells. Tables 4-10 and 4-11 presented a listing of the chemicals detected in groundwater. These tables were reviewed and the risk screening described above was performed, comparing the maximum concentration detected for each chemical to the applicable RBC or SCG for the drinking water pathway. The screening identified 10 chemicals of concern for the groundwater pathway, as presented on Table 6-1. Table 6-2 presents a summary of the groundwater data for these chemicals of concern.

Surface Water: A total of five surface water samples were obtained and analyzed for TCL volatile organics, TAL metals and cyanide, as shown on Table 4-1 and 4-2. The risk screening was performed and no chemicals of concern were identified.

Surface Soil and Sediment: Sediment samples were combined with surface soil samples to evaluate potential impacts from surficial soils at the landfill because the contamination found in the sediment appeared similar in type and amount to that found in the surface soil samples and two sediment samples were more like soil samples in that they were from drainage pathways that were dry much of the year. A total of four surface soil samples and seven sediment samples were obtained and analyzed for TCL organics and TAL, as shown on Tables 4-4 and 4-7. The risk screening was performed and a list of chemicals of concern for surface soil and sediment is presented on Table 6-1.

Soil Vapor: A total of 4 soil vapor samples were obtained from 4 different locations during the one round of soil gas sampling, as shown on Table 4-12. The risk screening was performed and the list of chemicals of concern for the soil vapor pathway is presented on Table 6-1.

6.2 Exposure Assessment

In the second step of the risk assessment, the Exposure Assessment, qualitative estimates of the magnitude, frequency, duration and routes of human exposure to the chemical contaminants at the site are made. Pathways through which chemical contaminants could possibly migrate from potential sources to existing and potential future receptors are identified. Receptor groups that might potentially be exposed as a result of the presence of the chemicals in the environment are identified and the exposure point concentration is estimated. Unlike quantitative risk assessments, the next step, calculation of daily chemical intakes via ingestion, dermal contact or inhalation is not

Table 6-1
Chemicals of Concern
ETE Sanitation and Landfill
Remedial Investigation

Media: **Groundwater**

vinyl chloride
methylene chloride
1,2 dichloroethene
2-butanone (MEK)
trichloroethene
benzene
ethylbenzene
phenol
lead
manganese

Media: **Air**

methylene chloride
benzene
toluene
ethyl benzene
m&p-xylene
o-xylene
trimethylbenzene
cyclohexane

Media: **Surface Soil/Sediment**

Arsenic
Barium
Beryllium
Chromium
Cobalt
Copper
Iron
Manganese
Nickel
Selenium

Table 6-2
Frequency of Groundwater Detections
ETE Sanitation and Landfill
Remedial Investigation

Parameter	Frequency of Detection	Range of Detected Concentrations (ug/l)		Location of Maximum Detection	Range of Non-Detect Concentrations	
		Minimum	Maximum		Minimum	Maximum
TCL Volatile organics						
vinyl chloride	1 of 15	16	16	MW-3S	10	10
methylene chloride	3 of 15	2.4	59	MW-8S	10	10
1,2 dichloroethene	2 of 15	9	108	MW-3S	10	10
2-butanone	5 of 15	14	3379	MW-8S	10	10
trichloroethene	2 of 15	4	50	MW-3S	10	10
benzene	1 of 15	15	15	MW-8S	10	10
ethylbenzene	3 of 15	2.1	60	MW-8S	10	10
TCL Semi-Volatile Organics						
phenol	2 of 8	79	100	MW-9S	10	10
TCL Inorganics						
Lead	10 of 15	2	51.9	MW-8S	2	2
Manganese	15 of 15	5.5	10200	MW-4S	1	1

performed. The exposure point concentrations will be used directly in Section 6.4 to estimate the potential risks for the site.

6.2.1 Identification of Exposure Pathways

An exposure pathway must consist of four elements to be complete:

- a source and mechanism of chemical release
- a retention or transport medium
- a point of potential human contact with the contaminated medium (called an exposure point)
- an exposure route (i.e., ingestion) at the contact point

The source of the chemical contamination at the ETE Sanitation and Landfill site is the waste material that was disposed of in drums or placed directly onto the soils throughout the landfill during the period of operation of the landfill, as described in Section 1. These waste materials have migrated to environmental media through the release and transport mechanisms described in Section 5.0 and have resulted in the following contaminated or potentially contaminated media at the site:

- surface soil
- subsurface soil
- surface water
- sediment
- groundwater
- ambient air

Points of potential human exposure to the contaminated media are both onsite (on the landfill property) and offsite.

Onsite Potential Exposure Points

Currently, there are no residences on or immediately surrounding the landfill. However, the portion of the landfill property bordering the South Pond, from Broughton Road to the western spur of the landfill access road, was recently purchased by a private owner, possibly for residential purposes. The landfill is not fenced or restricted from general access. Therefore, people may walk over the landfill during recreational activities such as fishing or hunting and children may play on the landfill or wade in its ponds. The Town of Gainsesville garage is located on the southeast corner of the landfill. However, observation during the RI field activities indicates that town workers spend little time at the garage.

Offsite Potential Exposure Points

Farmland is actively worked about 100 feet west of the landfill and 50 feet north of the landfill. Farm workers could potentially be exposed to volatile organic emissions or windblown contaminated dusts emitted from the landfill. While the closest public water supply wells are 2 miles east or 2 miles south of the landfill, almost all the residents within the Town of Gainesville obtain their water supply from private wells. The closest private well is 1000 feet east of the landfill. The closest private well downgradient from the landfill is about 1500 feet northwest, along Miller

Road. In addition, surface water is also used as a public drinking water supply. The Village of Silver Springs, located 2 miles east of the landfill uses natural springs in addition to wells and the Village of Warsaw, 2.25 miles northwest uses Cotton Creek , albeit upstream from where the landfill discharge enters the creek. While the RI did not measure groundwater contamination in the vicinity of the nearest residences to the northwest, the contaminant fate and transport model developed for the site indicates that the contaminant plume could have traveled that far.

While the highest exposures will most likely occur to onsite trespassers, there are several residences within 2,000 feet of the landfill which could be exposed to contaminated media from the site via air and groundwater or when visiting or trespassing the landfill property. Routes of human exposure to site contamination include ingestion, inhalation and dermal contact with contaminated soils, water and air. In addition, there is a possibility that humans could ingest contaminants that have become concentrated in the tissues of fish from the onsite ponds and streams and deer who frequent the landfill.

Accordingly, there are several important exposure pathways at the site:

Current Exposures: Under current conditions, the exposed human receptors for the site include trespassing adults who may come into contact with contaminated media at the site while hunting, fishing or hiking, trespassing children who play on the site, ingestion/inhalation of groundwater contaminants by nearby residents, Town workers when they frequent the adjacent garage and farm workers in the adjacent fields to the west and north.

Future Exposures: Under potential future conditions, the landfill property could be used as residential property. The potential future adult and child residents may inadvertently ingest, dermally contact and/or inhale contaminated surface soil, leachate or sediment from the site. In addition, these same residents may ingest or dermally contact contaminated surface water or groundwater from the site or inhale volatile organic compounds released from use of contaminated household water. Finally, the potential future residents of the site may inhale or dermally contact volatile organic compounds from soil gas released into the outside ambient air or released indoors. Ingestion and dermal exposure to contaminated surface water, sediment and leachate via recreational contact within the stream and pond is expected to be lower than the above named pathways.

For this qualitative risk assessment only the pathways with available risk-based chemical concentrations will be evaluated in detail. Table 6-3 presents the potential exposure pathways for the ETE Sanitation and Landfill site by media/scenario and receptors and indicates a 'yes" next to those selected for further qualitative analysis.

6.2.2 Exposure Concentrations

Given the size of the landfill, the limited number of samples obtained during the RI cannot possibly represent the full range of concentrations of chemicals present. Following guidance in the Supplemental Guidance to RAGS (1992), for media where less than 10 samples are obtained, the likelihood that higher concentrations could be found elsewhere is high. For these media, the maximum detected concentration of each chemical of concern will be used to represent the exposure point concentration. Where more than 10 samples are available for a medium (for the groundwater

Table 6-3
Potential Exposure Pathways
ETE Sanitation and Landfill
Remedial Investigation

Matrix	Receptor Populations(s)	Exposure Routes	Retained for Qualitative Analysis	Justification
Present Use Scenarios				
Surface Soil and Sediment	Trespassers	Ingestion	Yes	Since the landfill is not fenced trespassers may be exposed to contaminated surface soil and sediment.
		Inhalation	Yes	
		Dermal Contact	Yes	
Groundwater	Area Residents	Ingestion	Yes	Area residents currently use the groundwater for their water supply. Based on site conditions and current monitoring well data, private wells may be affected.
		Inhalation	Yes	
		Dermal Contact	Yes	
Air	Trespassers	Inhalation	Yes	Since the landfill is not fenced trespassers may be exposed to air emissions from the landfill.
		Dermal Contact	Yes	
	Area Residents	Inhalation	No	Exposure to area residents is expected to be much less than for onsite trespassers because of dispersion.
		Dermal Contact	No	
Future Use Scenarios				
Surface Soil and Sediment	Residents	Ingestion	Yes	Should the landfill be developed as a residential property potential future exposure of residents to surface soil and sediment could be significant.
		Inhalation	Yes	
		Dermal Contact	Yes	
	Trespassers	Ingestion	No	While exposure to future trespassers is possible exposure is expected to be much less than for onsite residents.
		Inhalation	No	
		Dermal Contact	No	
Groundwater	Residents	Ingestion	Yes	Exposure to site contaminants via use of the groundwater as a potable water supply could be significant.
		Inhalation	Yes	
		Dermal Contact	Yes	

Table 6-3
Potential Exposure Pathways
ETE Sanitation and Landfill
Remedial Investigation

Matrix	Receptor Populations(s)	Exposure Routes	Retained for Qualitative Analysis	Justification
Future Use Scenarios (cont'd)				
Groundwater (cont'd)				
	Area Residents	Ingestion	No	While exposure of future area residents to groundwater
		Inhalation	No	contamination is a possibility, the exposure is
		Dermal Contact	No	expected to be much less than for onsite residents.
Air	Residents	Ingestion	Yes	Exposure to site contaminants via the air pathway
		Inhalation	Yes	is a possibility for future residents.
		Dermal Contact	Yes	
	Area Residents	Ingestion	No	While exposure of future area residents to air
		Inhalation	No	contamination from the landfill is a possibility, the exposure
		Dermal Contact	No	is expected to be much less than for onsite residents.

medium at this site), the 95% upper confidence limit (UCL) on the arithmetic mean for the data was calculated, assuming the data was lognormally distributed.

Since it is unlikely that the soil gas concentrations measured at the landfill will be directly contacted by current or potential future occupants, ambient air concentrations were estimated. To estimate an airborne contaminant emission rate for each chemical of concern detected in the soil gas sampling, we have used an equation developed by Thibodeaux (Equation 2-8 of Superfund Exposure Assessment Manual). The equation was developed to estimate toxic vapor releases from co-disposal landfills; that is, facilities containing toxic wastes in combination with municipal or sanitary wastes. These landfills generate landfill gases (CH_4, CO_2, etc) because of their high organic content. The convective sweep of the landfill gases accelerates the upward migration and release to the atmosphere of the volatile compounds associated with the toxic substances also buried in the landfill. The equation is below:

$Ei = CiV_yA$
where
Ei = emission rate (g/sec)
Ci = concentration of compound I in the soil pore spaces (g/cc)
V_y = landfill gas velocity (cm/sec) Assumed to be 1.63 x 10-3 cm/sec by Thibodeaux (1981)
A = area of landfill (cm^2)

The contaminant specific emission rate is then put into an atmospheric fate equation developed by Turner (Equation 3-1 of Superfund Exposure Assessment Manual) to obtain the ground level ambient air concentration of contaminants at selected points on a centerline of a plume directly downwind from a ground-level source. The equation for this model is as follows:

Cx = Ei/3.14 Dx DyU
where
Cx = concentration of substance at a distance x from site (g/m3)
Ei = release rate of substance from the site (g/sec)
Dx = Dispersion coefficient in the cross wind direction (m)
Dy = Dispersion coefficient in the vertical direction (m)
U = mean wind speed (m/sec) Annual average wind speed assumed to be 3 m/second

The dispersion coefficients were estimated from Tables 3-5 and 3-6 of the Superfund Exposure Assessment Manual using the most stable stability class (F) and assuming a downwind distance of 0.1km which was 4 m for Dx and 2.5 m for Dy, the lowest available for each direction. The method suggests using a default wind speed of 3 meters per second as a conservative estimate of annual average wind speed. Table 6-4 presents the spreadsheet calculating Ei and Cx for each chemical of concern.

It should be noted that the above simplified procedures incorporate the following additional assumptions:

- Steady-state condition, i.e. windspeed is steady, toxic substance release is continuous,wind direction is steady.

Table 6-4
Air Pathway Calculations
ETE Sanitation and Landfill
Remedial Investigation

Contaminant	Molecular Weight	Highest conc.(ppbv)	Highest conc.(ug/m3)	Ci Highest Conc. (g/cc)	Vy (cm/sec)	Area (cm2)	Ei (g/sec)	Cx Recept. Conc (g/m3)	Cx Recept. Conc ug/m3	AirGuide1 AGC(ug/m3)	
methylene chloride*	84.9	75	259.90	2.60E-10	1.63E-03	2.83E+08	1.20E-04	1.27E-06	1.27E+00	2.70E+01	
benzene*	78.1	75	239.08	2.39E-10	1.63E-03	2.83E+08	1.10E-04	1.17E-06	1.17E+00	1.20E-01	EXCEEDS
toluene	92.1	1600	6014.69	6.01E-09	1.63E-03	2.83E+08	2.78E-03	2.95E-05	2.95E+01	4.00E+02	
ethyl benzene	106.2	6300	27308.57	2.73E-08	1.63E-03	2.83E+08	1.26E-02	1.34E-04	1.34E+02	1.00E+03	
m&pXylene	106.2	19000	82359.18	8.24E-08	1.63E-03	2.83E+08	3.80E-02	4.04E-04	4.04E+02	3.00E+02	EXCEEDS
o-Xylene	106.2	11000	47681.63	4.77E-08	1.63E-03	2.83E+08	2.20E-02	2.34E-04	2.34E+02	7.00E+02	
trimethylbenzene	120.2	35000	171714.29	1.72E-07	1.63E-03	2.83E+08	7.93E-02	8.41E-04	8.41E+02	2.90E+02	EXCEEDS
cyclohexane	84.2	590	2027.67	2.03E-09	1.63E-03	2.83E+08	9.36E-04	9.94E-06	9.94E+00	2.40E+02	

Note:
Ei = Ci Vy A
where Ei = emission rate (g/sec)
Ci = concentration of compound i in the soil pore spaces (g/cc)
Vy = landfill gas velocity (cm/sec). Assumed to be 1.63 E -03 cm/sec Thibodeaux (1981).
A = area of landfill waste (cm2)
C x= Ei/3.14 (Dx)(Dy) (U)
where Cx = concentration of substance in air at a distancc from site (g/m3)
Ei = release rate of substance from the site (g/sec)
Dx = dispersion coefficient in cross wind direction (m) used 4 m, lowest available
Dy = dispersion coefficient in vertical direction (m) used 2.5 m, lowest available
U = average wind speed (assumed to be 3 m/sec)

* = used 1/2 detection limit of sample with highest gas concentration since compound present in lowere concentrations in other samples.

- Longitudinal dispersion is negligible (i.e. substance is traveling at the wind speed in the downwind direction).
- All removal and decay processes are disregarded.
- The substance is distributed normally, both in vertically and in the crosswind direction.
- The air is homogeneous at all heights above the ground and no obstructions to wind flowor dispersion exist other than at the ground.

Also, the presence of saturated soils will tend to reduce the rate of volatile chemicals released from landfills. The landfill gas emission estimate does not take into consideration the reduction of gas emissions, especially soluble gases, generated at sties with moist or wet soils.

6.3 Toxicity Assessment

The toxicity assessment presents the general toxicological properties of the selected chemicals of concern using toxicological human health effects data. Each chemical can produce a wide variety of human health effects. While only certain chemicals produce potential carcinogenic effects, all chemicals have the potential to produce noncarcinogenic effects, depending on the type and duration of exposure. The USEPA has developed a qualitative weight-of-evidence classification system in which available data for a chemical are evaluated to determine the likelihood that the agent is a human carcinogen depending upon the results of both cellular and animal laboratory experiments and epidemiological studies. The system is described below:

Group	Description
A	Human Carcinogen.
B1	Probable Human Carcinogen, Limited human data are available.
B2	Probable Human Carcinogen. Sufficient evidence of carcinogenicity in animals and inadequate or no evidence in humans.
C	Possible Human Carcinogen.
D	Not Classifiable as to human carcinogenicity.
E	Evidence of noncarcinogenicity for humans.

Two measures used to quantify the toxic effects of a chemical on human health include a chemical's carcinogenic slope factor (SF) and noncarcinogenic reference dose (RfD). Slope factors and reference doses/concentrations are obtained from USEPAs IRIS data base or HEAST tables .

The carcinogenic slope factors are used to estimate an upper bound probability of an individual developing cancer as a result of a lifetime of exposure to a particular level of a potential carcinogen. Slope factors are calculated by USEPA's Carcinogen Assessment Group and are usually the upper 95th percent confidence limit of the slope of the dose-response curve determined by laboratory or epidemiological studies. The slope factor is expressed in (mg/kg-day)-1 or risk per mg/kg-day.

To determine the potential health hazards associated with exposure to noncarcinogens, the estimated intake of a chemical can be compared to its reference dose. A chronic reference dose is defined as an estimate (with an uncertainty spanning possibly an order of magnitude or greater) of a daily exposure level for the human population, including sensitive subpopulations, that is likely to be without an appreciable risk of deleterious effects during a lifetime.

Toxicity values and their applicable exposure concentration limits for chemicals of concern are presented on Table 6-5.

6.4 Risk Characterization

Typically in risk assessments the exposure point concentration is combined with the frequency and duration of exposure to obtain an estimated intake or dose to the receptor and this dose is then compared to the reference dose or multiplied by the slope factor to obtain a quantitative estimate of carcinogenic and noncarcinogenic risks. For this qualitative risk assessment, the lowest of either the applicable regulatory criteria (NYSDEC Recommended Soil Cleanup Objectives (NYSDEC, TAGM #4046) or Air Guide-1 AGCs) or the risk-based concentrations (RBC) developed by USEPA Region III were used. The risk based concentrations were developed using a target cancer risk of 10-6 and target hazard quotient of 1 and standard default risk assessment assumptions (USEPA, 1991) including: 350 day exposure frequency, 30 year exposure duration, 70 year averaging time for carcinogens, 70 kg body weight for adult and 15 kg weight for child, 2 l/day tap water ingestion for adults, 1 l/day tap water ingestion for children, 100 mg/day soil ingestion for adult and 200 mg/day for children, 20 m3/day inhalation rate for adults and 12 m3/day for children.

Potential risks associated with exposure to the chemicals of concern at the ETE Sanitation and Landfill site for the exposure pathways discussed in section 6.2.3 are qualitatively determined by comparing the exposure point concentration to the lowest risk concentration for each media. For the drinking water, soil ingestion and fish pathways, the exposure point concentrations are used directly. For the air pathway, the ambient air concentrations were estimated from soil gas concentrations as discussed in Section 6.2.2. To reflect the lower exposure frequency for the onsite trespassers under the current use scenarios, the lowest risk concentration were multiplied by 100. This reflects the assumption that trespassers are exposed to the site contaminants for only 2.4 hours/day for only 35 days per year, rather than the 24 hours/day, 350 day per year exposure assumed by the RBCs or SGCs.

Table 6-6 presents the risk characterization for the current use scenarios from chemicals of concern for each medium at the ETE Sanitation and Landfill site. As shown on the table, ingestion and inhalation of groundwater, inhalation of ambient air and ingestion or inhalation of surface soil and sediment present potential risks to area residents and current trespassers at the site. These potential risks are due to trimethylbenzene for the air pathway and arsenic, barium, manganese, nickel and selenium for the soil/sediment ingestion and inhalation pathways, and vinyl chloride, methylene chloride, trichloroethylene, benzene, lead and manganese for the groundwater pathway.

Table 6-7 presents the risk characterization for the future use scenarios. As shown on the table, ingestion of groundwater, ingestion and/or inhalation of surface soil and inhalation of ambient air present potential risks to potential future residents at the site. The chemicals driving the risk for these scenarios are benzene, trimethylbenzene and xylene for the air pathway, vinyl chloride, methylene chloride, trichloroethylene, benzene, lead and manganese for the groundwater pathway and arsenic, barium, beryllium, cobalt, copper, iron, manganese, nickel and selenium for the surface soil/sediment ingestion and inhalation pathways.

Table 6-7
Risk Characterization
Future Use Scenarios
ETE Sanitation and Landfill
Remedial Investigation

Media	Receptor Population	Exposure Route	Contaminant	Receptor Concentration	Region III RBCs	Regulatory Guideline	Lowest Risk Concentration FUTURE	Potential Risk? Future
Air	Future Residents	Inhalation		(ug/m3)	(ug/ 3)	AirGuide1 AGC(ug/m3)	(ug/m3)	
			methylene chloride	1.27	3.8	27	3.8	No
			benzene	1.17	0.22	0.12	0.12	Yes
			toluene	29.5	420	400	400	No
			ethyl benzene	134	1100	1000	1000	No
			m&p xylene	404	7300	300	300	Yes
			o-xylene	234	7300	700	700	No
			trimethylbenzee	841	6.2	290	6.2	Yes
			cyclohexane	9.94	NA	240	240	No
Groundwater	Future Residents	Ingestion		(ug/l)	(ug/l)	Drinking Water MCL (ug/l)	(ug/l)	
			vinyl chloride	6.6	0.019	2	0.019	Yes
			methylene chloride	10.7	4.1	NA	4.1	Yes
			1,2 dichlorethene	14.8	55	70	55	No
			2-butanone(MEK)	755	1900	NA	1900	No
			trichloroethylene	9.8	1.6	5	1.6	Yes
			benzene	6.5	0.36	5	0.36	Yes
			ethylbenzene	11	1300	700	700	No
			phenol	100	22000	NA	22000	No
			lead	27	NA	15	15	Yes
			manganese	45087	730	NA	730	Yes
Surface soil/ Sediment	Future Residents	Ingestion Inhalation		(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	
			arsenic	22.19	0.41	7.5	0.41	Yes
			barium	4118	5500	300	300	Yes
			beryllium	1.27	160	0.16	0.16	Yes
			chromium	41	390	50	50	No
			cobalt	77	4700	30	30	Yes
			copper	165	3100	25	25	Yes
			iron	126366	23000	2000	2000	Yes
			manganese	42074	1600	5000	1600	Yes
			nickel	60.81	41000	13	13	Yes
			selenium	23	10000	2	2	Yes

Table 6-6
Risk Characterization for Present Use Scenarios
ETE Sanitation and Landfill
Remedial Investigation

Media	Receptor Population	Exposure Route	Contaminant	Receptor Concentration	Region III RBCs	Regulatory Guideline	Lowest Risk Concentration CURRENT (Adjusted for lower exposure frequency and duration)	Potential Risk? Current
				(ug/m3)	(ug/ 3)	AirGuide1 AGC(ug/m3)		
Air	Current Trespassers	inhalation	methylene chloride	1.27	3.8	27	380	No
			benzene	1.17	0.22	0.12	12	No
			toluene	29.5	420	400	40000	No
			ethyl benzene	134	1100	1000	100000	No
			m&p xylene	404	7300	300	30000	No
			o-xylene	234	7300	700	70000	No
			trimethylbenzene	841	6.2	290	620	Yes
			cyclohexane	9.94	NA	240	24000	No
Surface Soil/ Sediment	Current Trespassers	ingestion inhalation		(mg/kg)	(mg/kg)	NYSDEC Rec. Soil Cleanup (mg/kg)	(mg/kg)	
			arsenic	22.19	0.41	7.5	4.1	Yes
			barium	4118	5500	300	3000	Yes
			beryllium	1.27	160	0.16	1.6	No
			chromium	41	390	50	500	No
			cobalt	77	4700	30	300	No
			copper	165	3100	25	250	No
			iron	126366	23000	2000	20000	Yes
			manganese	42074	1600	5000	16000	Yes
			nickel	60.81	41000	13	130	Yes
			selenium	23	10000	2	20	Yes
Groundwater	Future Residents	Ingestion		(ug/l)	(ug/l)	Drinking Water MCL (ug/l)	(ug/l)	
			vinyl chloride	6.6	0.019	2	0.019	Yes
			methylene chloride	10.7	4.1	NA	4.1	Yes
			1,2 dichlorethene	14.8	55	70	55	No
			2-butanone(MEK)	755	1900	NA	1900	No
			trichloroethylene	9.8	1.6	5	1.6	Yes
			benzene	6.5	0.36	5	0.36	Yes
			ethylbenzene	11	1300	700	700	No
			phenol	100	22000	NA	22000	No
			lead	27	NA	15	15	Yes
			manganese	45087	730	NA	730	Yes

Table 6-5
Toxicity Data
ETE Sanitation and Landfill
Remedial Investigation

		Risk-Based Concentrations						
Chemical	**CAS**	**Oral Ref. Dose (mg/kg-day)**	**Oral Slope Factor (1/mg/kg-day)**	**Inhalation Ref. Dose (mg/kg-day)**	**Inhalation Slope Factor (1/mg/kg-day)**	**Drinking Water (ug/l)**	**Ambient Air (ug/l)**	**Residential Soil (mg/kg)**
Volatiles								
benzene	71432	3.00E-03	2.90E-02	1.70E-03	2.90E-02	3.60E-01	2.20E-01	2.20E+01
2-butanone (MEK)	78933	6.00E-01	-	2.86E-01	-	1.93E-03	1.00E+03	4.70E+04
cyclohexane	110543	NA	NA	NA	NA	NA	NA	NA
1,2 dichloroethene	540590	9.00E-03	-	-	-	5.50E+01	3.30E+01	7.00E+02
ethyl benzene	100414	1.00E-01	-	2.90E-01	-	1.30E+03	3.30E+01	7.00E+02
methylene chloride	75092	6.00E-02	7.50E-03	8.60E-01	1.65E-03	4.1	3.8	8.50E+01
phenol	108952	6.00E-01	-	-	-	2.20E+04	2.20E+03	4.70E+04
toluene	108843	2.00E-01	-	1.14E-01	-	7.50E+02	4.20E+02	1.60E+04
trichloroethene	79016	6.00E-03	1.10E-02	-	6.00E-03	1.6	1	5.80E+01
trimethylbenzene	95636/108678	5.00E-02	-	1.70E-03	-	1.20E+01	6.2	3.90E+03
m&p-xylene	108383/106423	2	-	-	-	1.20E+04	7.30E+03	1.60E+05
o-xylene	95474	2	-	-	-	1.20E+04	7.30E+03	1.60E+05
vinyl chloride	75014	-	1.9	-	3.00E-01	1.90E-02	2.10E-02	3.40E-01
Inorganics								
Arsenic	7440382	3.00E-04	1.5	-	1.51E+01	4.20E-02	4.10E-04	4.30E-01
Barium	7440393	7.00E-02	-	1.40E-04	-	2.60E+03	5.10E-01	5.50E+03
Beryllium	7440417	2.00E-03	-	5.70E-06	8.4	7.30E+01	7.50E-04	1.60E+02
Chromium (as VI)	18540299	5.00E-03	-	1.00E-07	4.10E+01	1.80E+02	1.50E-04	3.90E+02
Cobalt	7440484	6.00E-02	-	-	-	2.20E+03	2.20E+02	4.70E+03
Copper	7440508	4.00E-02	-	-	-	1.50E+03	1.50E+02	3.10E+03
Iron	7439896	3.00E-01	-	-	-	1.10E+04	1.10E+03	2.30E+04
Lead	7439921	NA	NA	NA	NA	NA	NA	NA
Manganese (Non-Food)	7439965	2.00E-02	-	1.43E-05	-	7.30E+02	5.20E-02	1.60E+03
Nickel	7440020	2.00E-02	-	-	-	7.30E+02	7.30E+01	6.00E+02
Selenium	7782492	5.00E-03	-	-	-	1.80E+02	1.80E+01	3.90E+02

It should be pointed out that this risk assessment has utilized conservative assumptions in estimating potential current and future risks to public health due to chemical contamination arising from the landfill. First, the risks discussed are only potential risks, not actual risks. It is not known if anyone is currently drinking water that has been contaminated by the landfill or if there is anyone who consistently (35 times per year) trespasses over the landfill. Likewise, the future estimates of risk are only potential risks that could occur if remediation does not occur. Since the landfill will be closed in accordance with NYSDEC Part 360 regulations, the surface soil capped and landfill gas and groundwater contamination controlled, the future potential risks evaluated in this assessment will not be realized. Second, all risk estimates are based on long term, i.e. 30 year, exposure to chemicals from the landfill. Since contamination from the landfill has not been present for 30 years, the current potential risks are overestimated.

Additional specific conservatisms included in this risk assessment include:

- The current potential risks estimated for area residents due to groundwater consumption are overestimated since the onsite groundwater data was used to calculate the exposure point concentration. The concentration in the private wells downgradient from the landfill would be much lower due to the retardation processes discussed in Section 5 such as dispersion, adsorption, volatilization, etc.

- The current potential risks estimated for the trespasser and the future potential risks estimated for the future onsite resident are overestimated because the highest soil and soil gas concentrations measured were used, rather than an average concentration for the whole landfill, which would be more realistic of potential exposures.

- Also, it is unlikely that any one individual would be exposed to the landfill contaminants for the length of time (2.5 hours) and frequency (35 days per year for 30 years) estimated in this assessment.

- Finally, the ambient air contamination estimates are dependent on an assumption that the landfill gas within the ETE Landfill is similar in generation rate and amount of soil moisture to other municipal solid waste (MSW) landfills. Since the landfill is smaller than most MSW landfills and since much of the waste is below the water table, this assumption may be too conservative.

6.5 Uncertainties in Risk Assessment

As in any risk assessment, the qualitative estimate of potential carcinogenic risks and noncarcinogenic health effects of the ETE Sanitation and Landfill site have numerous associated uncertainties. In general, the primary areas of uncertainty include the following:

Environmental Data
Exposure pathway assumptions
Toxicological Data

Errors in the environmental data used may stem from sampling biases such that the samples are not representative of the average conditions at the site. Alternately laboratory analytical errors could result in misidentification of compounds or incorrect quantification of chemicals.

The lack of site specific exposure measurements requires that estimates of exposure be made on the basis of literature values and/or professional judgement. The use of the highest contaminant concentration will tend to overestimate the risks for the site. The lack of knowledge concerning the fate and transport of chemicals in the groundwater system has led to the assumption that a potable well would receive the highest concentrations measured in the monitoring wells located on the site, not accounting for reduction in concentration due to dispersion, dilution, or degradation. This results in an overestimate of the potential risk. Conservative estimates were made of chemical emissions from the landfill which do not take into account the effect of moist or wet soils in reducing the chemical flux rate. Also, conservative assumptions concerning dispersion of the chemicals once emitted may not be appropriate given the location of the site within the Finger Lake region and in an area of considerable elevation changes. Again, these assumptions would tend to result in an overestimate of the potential risks.

Finally, toxicological data uncertainty is one of the largest sources of error in any risk assessment. Numerous uncertainties are associated with USEPA derived toxicity values including using dose-response information from effects observed at high doses in animals to predict adverse health effects from low level exposures to humans.

Section 7
Fish and Wildlife Impact Analysis

This Fish and Wildlife Impact Analysis for Inactive Hazardous Waste Sites (Step 1) was conducted pursuant to requirements set forth by the New York State Department of Environmental Conservation (NYSDEC) in their October 1994 guidance document. The purpose of this analysis was to identify fish and wildlife resources and their habitats surrounding the ETE landfill site and to observe whether they potentially have been or are presently being affected by contaminants originating onsite. Information in the form of maps, descriptions of the site and surrounding area, and available resource documents were reviewed by CDM. The information was essential in ultimately identifying potential pathways of contaminant migration that may affect fish and wildlife resources in the surrounding area.

In addition to the area walkover, CDM reviewed available records concerning documented fish and wildlife resources within the area surrounding the site. CDM requested information regarding NYSDEC Significant Habitats (as defined by New York State Natural Heritage Program), habitats supporting rare, threatened, or endangered species, wetlands, wild or scenic rivers and streams, land designated for the protection of natural ecosystems or game management, and native flora and fauna species for the area were obtained or reviewed.

The following agencies were contacted in an effort to obtain information regarding cover types, toxics, plant and animal distributions, endangered species, and significant habitats.

- United States Department of the Interior - Fish and wildlife Service
- New York State DEC- Division of Fish and Wildlife
- New York Natural Heritage Program
- United States Department of Agriculture - Soil Conservation Service
- Iriquois National Wildlife Refuge
- NYSDEC - Wildlife Pathology Unit
- NYSDEC - Toxic Substances Monitoring Program

7.1 Topographic and Ecological Site Description

CDM representatives conducted the area walkover of the ETE landfill site and surrounding area in June of 1998. The entire site was examined. The area surrounding the site was almost exclusively composed of small farms interspersed with woodland. Several wetlands (federally delineated) as well as open fields were observed within a half-mile of the site.

The site vegetation is dominated by grasses, immature trees and shrubs, with mature trees forming an outline around the landfilled portion of the property. Debris protrudes through the ground cover in certain portions of the landfill, particularly along the steep-sloping north and northeast toes of the landfill.

The ETE landfill site and surrounding property consists of gently rolling hills with area topography generally sloping to the north. The elevation of the landfill is between 1,650 and 1,680 feet above mean sea level.

According to the Wyoming County soil survey, the original forests within the County, consisted of white pine, hard maple, beech, basswood, ash, hickory and oak. Wetter soils had stands with more red maple and American elm, while hemlock was dominant in some of the deeper gullies. Small areas of virgin forest still remain.

The second-growth forests consist principally of maple and beech, but considerable numbers of wild black cherry, basswood and ash are also present. Hemlock is dominant in some of the wetter areas. Most of the oaks are on the slopes above the Genesee River. Originally, the chestnut trees and recently the American elm have been virtually eliminated by disease.

The original forests were open and comparatively free of underbrush, but the present forests have an underbrush of witch hazel and alder.

Where idle fields are allowed to revert to trees, the better drained soils generally are covered by hawthorn, aspen, white ash, maple or beech. White pine also regenerates if it grows in nearly wooded tracts. Wet soils revert mostly to soft maple. Large areas that were formerly used for crops have been planted to coniferous trees, mainly Scotch pine, Norway spruce and white spruce.

Many areas of sugar maple are scattered across the county. Most of these are managed for syrup and other maple products.

Wildlife is a valuable natural resource in Wyoming County. Populations of white-tailed deer, ruffed grouse, wild turkey, gray squirrels, cottontail rabbits, and rin-necked pheasants are abundant in the county. Game species and songbirds are also an important wildlife resource.

The kind and amount of wildlife that live in a given area are closely related to land use; to the kinds, amounts, and patterns of vegetation; and to the supply and distribution of water.

7.2 Covertype Map

Review of photocopies of aerial photographs provided by the County of Wyoming Farm Service Bureau, dated 1994 and 1996 indicate that land within a one-half mile radius of the site is comprised of a mixture of agricultural fields and woodland. Figure 7-1 is a cover type map of the land surrounding the ETE landfill site. Approximately 60 to 65 percent of land within a one-half mile radius of the site consists of agricultural land and open fields. Approximately 30 percent of the land is made up of woodland. Several small ponds are located within the site as well as to the east of the site. A small area of freshwater wetlands are located immediately north of the site situated adjacent to the north pond. According to U.S. Fish and Wildlife Source Wetlands map for Wyoming County, a larger area of wetlands is located approximately 1,000 feet south of the site.

7.3 Topographic Map and Site Drainage

Regional topography slopes downward to the north to slightly northwest to the small stream valley occupied by Cotton Creek. See Figure 1-1 for a topographic map of the site and surrounding area. The highest point on the landfill lies approximately 1,680 feet above mean sea level with Cotton

O:\KALNY\ETE\ETE_RI\ETE_FIG1.PM6 0897-22149/T2.GEOP *Issued: June 1998.*

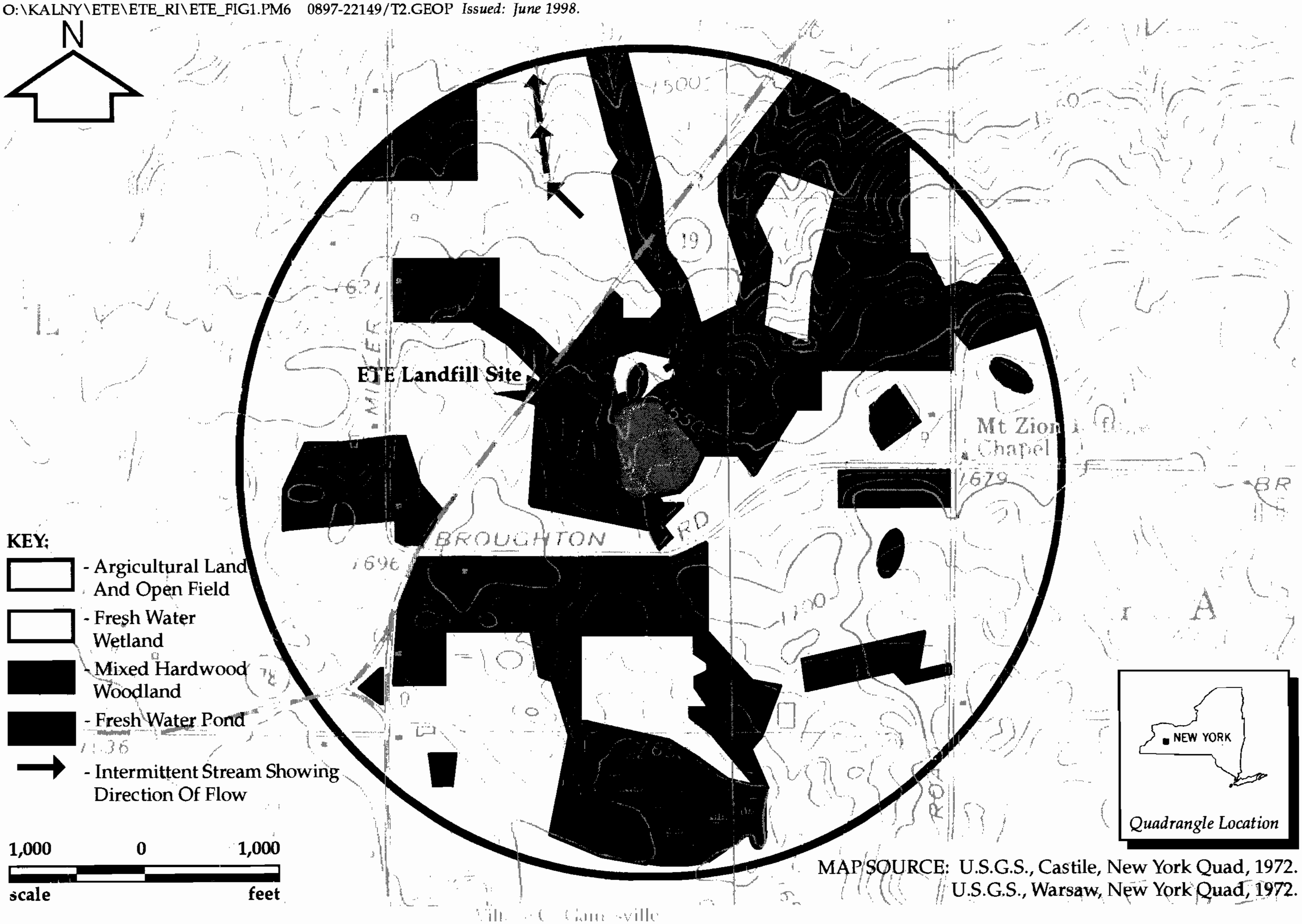

Figure 7-1
Cover Type Map
ETE Sanitation And Landfill Remedial Investigation

CDM Camp Dresser & McKee

Creek at an elevation of 1,380 feet above mean sea level. Cotton Creek runs northeast and discharges into Oatka Creek, a major tributary of the Genesee River.

The landfilled portion of the site is slightly elevated relative to the surrounding land. The surrounding topography can be described as a humocky terrain, with evidence of small glacial kettle lakes southeast of the site. The site lies on the northwest side of what appears to be a northwest to southwest trending moraine marking the final advance of glaciers responsible for scouring the valleys now occupied by Silver Lake and Oatka Creek. Unconsolidated soils found onsite consist of poorly stratified very fine sands, silts and clays deposited by glacial ice and/or glacial meltwaters.

In general, site drainage is to the north. Figure 2-1 is a site map showing surface drainage. Surface runoff from the landfill as well as leachate seeps drain directly into the north pond which drains offsite into a small tributary stream of Cotton Creek located approximately 0.75 north of the site.

7.4 Fish and Wildlife Resources

CDM requested lists and cover type descriptions from the previously mentioned agencies. Only a few agencies responded with the necessary specific information regarding species lists and successional descriptions. The Iriquois National Wildlife Refuge was a valuable resource providing most of the fish, plant and wildlife information. The New York State DEC and the USDA Soil Conservation Service did provide some limited, but useful information in this area.

A discussion of the information received from various sources and the results of the site walkover are discussed in the following sections.

According to the NYSDEC Wildlife Resource Center and the United States Department of the Interior Fish and Wildlife Service, there were no documented sightings of endangered, threatened or special concern wildlife species, or rare plant, animal or natural community concerns at the subject site. Although the NYSDEC records indicate no sightings of endangered, threatened, rare, or special concern wildlife species within a half-mile radius, this does not preclude their existence in the area, rather their files do not currently contain information which would indicate their presence.

7.5 Field Observations

A site visit was conducted in June of 1998 by CDM biologists. During the site visit, local flora as well as land use patterns were documented. Additionally, personnel conducting field work at the site were asked to document sightings of flora and fauna, when the opportunity existed. Table 7.5.1 lists the observed and expected vegetation on the landfill. Table 7.5.2 lists the observed and expected fauna on the landfill. Information from expected flora and fauna comes from the New York State Department of Environmental Conservation, the Iriquois National Wildlife Refuge located in Alabama, New York and the USDA Soil Conservation Service.

7.6 Surface Waters

As indicated in the topographic map, there are two main surface water bodies located in the vicinity of the ETE landfill. These two bodies of water are called the north pond and the south pond. As discussed previously, site surface water as well as leachate seeps discharge directly to the north pond which drains to a small tributary of Cotton Creek. Cotton Creek is a main tributary of Oakta Creek which is documented as supporting a wild Brown Trout population as well as being stocked with approximately 1,850 Yearly Brown Trout by the NYSDEC. According to NYSDEC, Oakta Creek receives moderate fishing pressure.

7.7 Wetlands

Freshwater wetlands are present within a 0.5 mile radii of the site in Figure 7-1.

In addition to the noted areas of wetlands identified in Figure 7-1, patches of phragmites distributed throughout the ETE landfill indicate the presence of wetlands with a pattern of seasonal wetness.

Table 7-1 lists all observed and expected flora within the ETE Landfill site and vicinity.

7.8 Forested Areas

Forested areas onsite and areas adjacent to the landfill consist mainly of Quaking Aspen trees. A number of Black Locust, Cherry, and Ash trees can also be found on or around the site. Forested areas in the immediate vicinity of the site consist of relatively small patches of woods of less than five acres in area.

The original forest communities in Wyoming county before the first settlers arrived consisted of White Pine, Hard Maple, Beech, Basswood, Ash, Hickory, Chestnut and Oak. Red maple, American Elm and Hemlock were common in the wetter areas.

Secondary succession forests consist mostly of maple, beech, black cherry and Basswood. The original forests were open and comparatively free of underbrush. The forests found today commonly have an underbrush of witch hazel and alder.

Table 7-1 lists all observed and expected flora within the ETE Landfill site and vicinity.

7.9 Open Space

Due to the extensive farming in the area, there is a large amount of open space around the ETE landfill. In the immediate vicinity of the landfill there are a number of agricultural fields interlaced with forested areas. This pattern continues for many miles into the surrounding areas.

7.10 Developed Areas

Within a 0.5 mile radius of the landfill there are only several residential homes and associated farm buildings. Residential areas near the landfill consist of farm houses which are present in a density of no more than one house per 60 acres. Located immediate east of the site is the Town of Gainsville Highway Department Storage area. The Town stores sand and road salt at this location.

7.11 Documented Fish and Wildlife

As previously noted, the Iriquois National Wildlife Refuge and the New York State DEC was consulted with respect to documented fish and wildlife resources. The information gathered was used to compile lists of observed and expected species presented in Table 7-.2.

The site visit in June of 1998 was primarily focused on plant identification, however, birds and other wildlife were noted when they were encountered.

Upon immediate entry onto the site Whitetail Deer and Raccoon tracks were identified. The field team did not observe any fish within the north or south ponds located adjacent to site. However, this does not preclude the possibility that fish, amphibians, crustaceans and other animals live in these ponds. A Great Blue Heron was "flushed" from the South Pond by the field crew early on in the day. This may point to the possibility of the presence of fish in these waters.

According to the Soil Conservation Service, there are healthy populations of White tailed Deer, Ruffed Grouse, Wild Turkey, Gray Squirrels, Cottontail Rabbits, and Ring necked Pheasants in the county. Game Species of songbirds are also an important wildlife resource. The kind and amount of wildlife that live in a given area are closely related to land use, patterns of vegetation, and availability of water.

7.12 Significant Habitats and Communities

CDM requested information from the previously mentioned agencies regarding significant habitats and communities. No agencies indicated that the ETE Landfill or any areas immediately surrounding the landfill are considered significant habitats or contain significant plant or animal communities.

7.13 Observations of Stress

The vegetative community on the landfill exhibits vegetation that are clear indicators of disturbed areas. The presence of mugwort and goldenrods throughout the site are prevalent. These plants are common and abundant in disturbed areas. There are also large patches of honeysuckle, phragmites and cattail. The species of trees found on the site along with the small shrubs and plants clearly indicate a primary or early succession.

Other indicators of stress include the presence of leachate runoff at the base of the landfill. Also at the base of the landfill, there is a white crusty salt deposit which limits the growth of vegetation in and around the surrounding area.

7.14 Value to Fauna

The areas surrounding the landfill serve as excellent habitats for Deer, grouse, turkey, squirrels, rabbits and pheasants. A large number of songbirds, waterfowl and game species either pass through or reside in Wyoming county throughout the year. Local parks and Wildlife Refuges act a valuable breeding grounds for fragile species requiring specific habitats for breeding and finding food.

7.15 Value to Humans

In general, the human population around the ETE landfill is low. The presence of farming, however, indicates the area is used by humans as a primary source of income. The farms also contribute to open space, valuable to humans for its aesthetic quality.

Open space often lends itself to hunting and fishing. In this area hunting and fishing are recreational sports that are of great value to many people. Local lakes and streams are stocked with fish, such as the Oakta Creek which is a wild brown trout fishery. Local parks are tributes to the open space and scenery in the area, while the farmlands are both scenic and add economic value to the area, supporting many families in the communities.

7.16 Applicable Fish and Wildlife Regulatory Criteria

NYSDEC has established soil clean-up criteria for the protection of humans, however, an equivalent is not yet available for the protection of wildlife (NYSDEC memorandum from A. Shroff to A. Joseph, 2/28/90). In addition, there are no federally established soil values for the protection of wildlife. Recently, EPA has released the Wildlife Exposure Handbook Volumes I and II. This hand book provides exposure factors for evaluating risks to a number of terrestrial as well as aquatic species. These values could be useful in an ecological risk assessment approach to determine risks to fish and wildlife.

NYSDEC has established water quality criteria for waters of the state (6 NYCRR Parts 702 & 703). These criteria are applicable for determining levels of contaminants in surface waters that are protective of most aquatic organisms. Additionally, NYSDEC has issued a Technical and Operational Guidance Series (TOGS 1. 1. 1) which develops ambient water quality standards and guidance values for the protection of aquatic life.

Sediment criteria which is protective of benthic macro invertebrates (from chronic and acute toxicity) and wildlife (from bioaccumulation) is detailed in the NYSDEC Division of Fish and Wildlife Sediment Criteria (November, 1993).

Action-specific criteria relevant to the protection of fish and wildlife resources have been included to introduce restrictions, limitations, and controls for specific treatment and disposal activities that may be proposed as part of a Feasibility Study to accompany the Remedial Investigation.

Table 7-1
Observed and Expected Flora
ETE Sanitation and Landfill
Fish and Wildlife Impact Analysis
(X=observed during site visit)

	Agrimony	*Agrimonia gryposepala*
	Alfalfa	*Medicago staiva*
	Arrowhead	*Sagittaria latifolia*
	Aster, Arrow-Leaved	*Aster sagittifolius*
	Aster, Calico	*Aster lateriflorus*
	Aster, Flat-top white	*Aster umbellatus*
	Aster, Heart-Leaved	*Aster cordifolius*
	Aster, Heath	*Aster ericoides*
	Aster, Large-Leaved	*Aster macrophyllus*
	Aster, lowrie	*Aster lowrieanus*
	Aster, New England	*Aster novae-angilae*
	Aster, Purple-Stemmed	*Aster puniceus*
X	Aster, Smooth	*Aster laevis*
	Aster, Tradescant's	*aster tradescanti*
	Aster, White Wood	*Aster divaricatus*
	Aster, Willow	*Aster praealtus*
	Avens	*Geum canadense*
	Avens, Rough	*Geum virginianum*
	Baneberry, Red	*Actaea rubra*
	Baneberry, White	*Actaea pachypoda*
	Basil	*Satureja vulgaris*
	Bedstraw, Fragrant	*Gallium triflorum*
	Beggar Ticks	*Bidens frondosa*
	Bergamot, Wild	*Monarda fistulosa*
	Bindweed, Field	*Convolvulus arvensis*
	Bindweed, Hedge	*Convolvulus sepium*
X	Birds-Foot Trefoil	*Lotus corniculatus*
X	Bittersweet Nightshade	*Solanum dulcamara*
	Bittersweet, Climbing	*Celastrus scandens*
X	Blackberry	*Rubus allegheniensis*
	Black-Eyed Susan	*Rudbeckia Hirta*
	Bloodroot	*Sanguinaria canadensis*
X	Blue Flag	*Iris Versicolor*
	Boneset	*Eupatorium perfoliatum*
	Bouncing Bet (some double)	*Saponaria officinalis*
	Buckwheat	*Fgagopyrum sagittatum*
	Bugle	*Ajuga reptans*
	Bur Marigold, Nodding	*Bidens cernua*
	Bur-reed, Giant	*Sparganium eurycarpum*
	Bur-reed, Nuttall's	*Sparganium americanum*
	Butter and Eggs	*Linaria vulgaris*
X	Buttercup	*Ranunculus sp.*

Table 7-1
(continued)

	Buttercup, Bristly	*Ranunculus pensylvanicus*
	Buttercup, Common	*Ranunculus acris*
	Buttercup, Cursed	*Ranunculus sceleratus*
	Buttercup, Kidney leaf	*Ranunculus abortivus*
	Buttonbush	*Cephalanthus occidentalis*
	Canada Mayflower	*Mianthemum canadense*
	Cardinal Flower	*Lobelia cardinalis*
	Carrion-Flower	*Smilax herbacea*
	Catchfly, Night Flowering	*Silene Noctiflora*
	Catnip	*Nepeta cataria*
X	Cattail, Common	*Typha latifolia*
	Centuary, European	*Centaurium umbellatum*
	Chamomile, Field	*Anthemis arvensis*
	Cheeses, Common Mallow	*Malva Neglecta*
	Chickweed, Common	*Stelleria media*
	Chicory	*Cichorium intybus*
	Choke Cherry	*Prunus virginiana*
	Cicely, Sweet	*Osmorhiza claytonii*
X	Cinquefoil, Common	*Potentilla simplex*
	Cinquefoil, Rough-fruited	*Potentilla recta*
X	Cleavers	*Galium aparine*
	Clover, Alsike	*Trifolium hybridum*
	Clover, Hop	*Trifolium agrarium*
X	Clover, Red	*Trifolium pratense*
	Clover, White	*Trifolium repens*
	Clover, White Sweet	*Melilotus alba*
	Coltsfoot	*Tussilago farfara*
	Cow Vetch	*Vicia cracca*
	Cranberry, Highbush	*Viburnum trilobum*
	Creeping Bellflower	*Campanula rapunculoides*
	Cress, Winter	*Barbarea vulgaris*
	Cucumber Root, Indian	*Medeola virginiana*
	Cucumber, Wild	*Echinocystis lobata*
	Currant, Red	*Ribes sativum*
X	Daisy, Ox-Eye	*Chrysanthemum leucanthemum*
X	Dames Rocket	*Hesperis matronalis*
X	Dandelion	*Taraxicum officinale*
	Day Lily	*hemerocallis fulva*
	Deptford Pink	*Dianthus armeria*
X	Dock, Curled	*Rumex Crispus*
X	Dogbane, Clasping Leaved	*Apocynum Sibiricum*
	Dogwood, Flowering	*Cornus Florida*
	Dogwood, Panicled	*Cornus racemosa*
	Dogwood, Red Osier	*Cornus stolonifera*
	Dogwood, Silky	*Cornus amomum*
	Enchanter's Nightshade	*Circaea quadrisulcata*
	Evening Lychnis	*Lychnis alba*

Table 7-1
(continued)

	Evening Primrose	*Oenothera biennis*
	Everlasting Pea	*Lathyrus latifolius*
	False Pimpernel	*Linderia dubia*
	Field Peppergrass	*lapidium Campestre*
	Fleabane, Daisy	*Erigerin annuus*
	Fleabane, Philadelphia	*Erigerion philadelphicus*
X	Fox Grape	*Vitis labrusca*
X	Forget-Me-Not	*Myosotis scorpioides*
X	Fragmites	
	Germander	*Teucrium canadense*
	Goatsbeard	*Tragopogon pratensis*
	Goldenrod, Canada	*Solidago canadensis*
	Goldenrod, Early	*Solidago juncea*
X	Goldenrod, Lance-Leaved	*Solidago graminifolia*
	Goldenrod, Late	*Solidago gigantea*
	Goldenrod, Rough Stemmed	*Solidago rugosa*
	Goldenrod, Tall	*Solidago altissima*
	Goldenrod, Zig-Zag	*Solidago flexicaulis*
	Goldthread	*Coptis groenlandica*
	Goosefoot, Maple Leaved	*Chenopodium hybridum*
	Greenbrier	*Smilax rotundifolia*
	Ground Ivy	*Glechoma hederacea*
X	Hawkweed, Field	*Hieracium pratense*
	Hawkweed, Hairy	*Hieracium gronovii*
X	Hawkweed, Orange	*Hieracium aurantiacum*
	Hempweed, Climbing	*Mikanka scandens*
X	Honeysuckle, American Fly	*Lonicera canadensis*
	Honeysuckle, Smooth-leaved	*Lonicera dioica*
	Honeysuckle, Tartarian	*Lonicera tartarica*
	Hop Clover, Low	*Trifolium procumbens*
	Hop Clover, Yellow	*Trifolium agrarium*
	Indian Pipe	*Monotropa uniflora*
	Indiand Tobacco	*Lobelia inflata*
	Iris, Yellow	*Iris pseudacorus*
	Jack-In-The-Pulpit	*Ariasaema triphyllum*
	Joe Pye-Weed, Spotted	*Eupatorium maculatum*
	King Devil	*Hieracium pratense*
	Knapweed, Brown	*Centaurea jacea*
	Ladies Tresses, Nodding	*Spiranthes cernua*
	Lettuce, Hairy	*Lactuca hirsuta*
	Lilac, Purple	*Syringa vulgaris*
	Lily Of The Valley	*Convallaria majalis*
	Lizards Tail	*Saururus cernuus*
	Loosestrife, Fringed	*Lysimachia ciliata*
	Madder, Wild	*Galium mullogo*
	Mallow, Musk	*Malva moschata*
	Mayapple	*Podophyllum pelatum*

Table 7-1
(continued)

	Mayweed	*Anthemis cotula*
	Meadow Rue, Early	*Thalictrum dioicum*
	Meadow Rue, Purple	*Thalictrum dasycarpum*
	Meadow Rue, Tall	*Thalictrum polygamum*
X	Milkweed, Common	*Asclepias syriaca*
	Milkweed, Swamp	*Asclepias incarnata*
	Mint	*Mentha arvensis*
	Mint, Curled	*Mentha crispa*
	Monkey-Flower	*Mimulus ringens*
	Moth Mullein	*Verbascum blattaria*
	Motherwort	*Leonurus cardiaca*
	Mouintain Mint, Narrow-Wood	*Pycnanthemum tenuifolium*
X	Mugwort	*Artemisia sp.*
X	Mullein, Common	*verbascum thaspus*
	Mullein, Moth	*Verbascum blattaria*
X	Multiflora Rose	*Rosa Multiflora*
	Mustard, Black	*Brassica nigra*
	Nettle, Tall	*Urtica Procera*
	New England Aster	*Aster novae-angliae orpine*
	Orpinz	*Sedum telephium*
	Partridge Berry	*Mitchella repens*
	Peppermint	*Mentha piperita*
	Periwinkle	*Vinca minor*
	Pineapple-Weed	*Pastinaca sativa*
X	Plantain, Broad-Leaved	*Plantago major*
X	Plantain, English	*Plantago lanceolata*
	Plantain, Water	*Alisma triviale*
X	Poision Ivy	*Toxicodendron radicans*
	Pokeweed	*Phytolacca americana*
	Purslane	*Matricaria marticarioides*
	Pyrola, One-sided	*Pyrola secunda*
X	Queen Annes Lace	*Daucus carota*
X	Ragweed, Common	*Ambrosia artemisiifolia*
X	Ragweed, Great	*Ambrosia trifida*
	Raspberry, Dwarf	*Rubus pubescens*
	Sandwort, Thyme-Leaved	*Arenaria serphyllifolia*
	Sasparilla, Wild	*Aralia nudicaulis*
	Selfheal/Heal-All	*Prunella vulgaris*
	Shadbush	*Amelanchier canadensis*
	Sheep Sorrel	*Rumex acetosella*
	Shepherd's Purse	*Capsella bursa pastoris*
	Silverrod	*Solidago bicolor*
	Skullcap, Mad-dog	*Scutellaria laterifolia*
X	Smartweed, Mild Water Pepper	*Polygonum hydropiperoides*
	Smartweed, Pale	*Polygonum lapathifolium*
	Smartweed, Pennsylvania	*Polygonum pensylvanicum*
	Smartweed, Swamp	*Polygonum coccineum*

Table 7-1
(continued)

	Snakeroot, White	*Eupatorium rugosum*
	Sneezeweed	*Helenium autumnale*
	Solomon Seal, Starry False	*Similacina stellata*
	Solomon's Seal, False	*Smilacina racemosa*
	Sow Thistle, Common	*Hypericum perforatum*
	Sow Thistle, Field	*Sonchus arvensis*
	Spearmint	*Mentha spicata*
X	Speedwell, Common	*Veronica officinalis*
	Speedwell, Corn	*Veronica arvensis*
	Speedwell, Thyme Leaved	*Veronica serphyllifolia*
	Spicebush	*Lindera benzoin*
	Spurge, Cypress	*Euphorbia cyparissas*
	Squill	*Scilla sibirica*
	St. Johnswort, Canada	*Portulaca oleracea*
	St. Johnswort, Common	*Hypericum canadense*
	St. Johnswort, Marsh	*Triadenum virginicum*
	Stonecrop, Ditch	*Penthorum sedoides*
	Strawberry, Barren	*Waldsteinia fragarioides*
X	Strawberry, Common	*Fragraria virginiana*
	Strawberry, Wood	*Fragraria vesca*
	Sunflower, Showy	*Helianthus laetiflorus*
	Tear Thumb Arrow-Wood	*Polygonum sagittatum*
	Teasel, Common	*Dipsacus sylvestris*
X	Thistle	*Cirsium sp.*
	Thistle, Bull	*Cirsium vulgare*
	Thistle, Canada	*Cirsium arvense*
	Tick Trefoil, Showy	*Desmodium canadense*
	Toothwort, Cut-leaved	*Dentaria lacinata*
	Toothwort, Pepperwort	*Dentaria dyphilla*
X	Touch-Me-Not	*Impatiens sp.*
	Touch-Me-Not, Pale	*Impatiens pallida*
	Touch-Me-Not, Spotted	*Impatiens biflora*
	Trillium, Red	*Trillium erectum*
	Trillium, White	*Trillium grandiflorium*
	Trout Lily	*Erythronium americanum*
	Turtlehead	*Chelone glabra*
	Valerian	*Valerian officinalis*
	Vervain, Blue	*Verbana hastata*
	Vervain, White	*Verbena urticifolia*
	Vetch, Cow	*Vicia cracca*
X	Vibirnum, Arrow-Wood	*Viburnum dentatum*
	Vibirnum, Maple-Leaved	*Viburnum acerifolium*
	Vibirnum, Nannyberry	*Viburnum lentago*
X	Violet	*Viola sp.*
	Violet, Dog	*Viola conspersa*
	Violet, Long-spurred	*Viola rostrata*
	Violet, Northern White	*Viola Pallens*

Table 7-1
(continued)

	Violet, Smooth Yellow	*Viola eriocarpa*
	Virgin's Bower	*Clematis virginiana*
	Voilet, Common Blue	*Viola papilionacea*
	Water Cress	*Nasturtium officinale*
	Water Hemlock	*Cicuta maculata*
	Water Hemlock, Bulb-bearing	*Cicuta bulbifera*
	Water Horehound, Cut leaved	*Lycopus americanus*
	Water Pepper	*Polygonum hydropiper*
	White-Top, Slender	*Erigeron strigosus*
	Wild White Licorice	*Galium circaezans*
	Willow Herb, Hairy	*Epilobium hirsutum*
	Willow Herb, Northern	*Epilobium ciliatum*
	Winterberry	*Ilex verticillata*
	Witch Hazel	*Hamamelis virginiana*
	Wood Sorrel	*Oxalis stricta*
X	Yarrow	*Achillea millefolium*
	Yellow Sweet Clover	*Melilotus officinalis*
	Ferns	
	Boott's	*Dypoteris x boottii*
	Bracken	*Pteridium aquilinum*
	Christmas	*Polystichum acrostichoides*
	Cinnamon	*Osmunda cinnamomea*
	Grape Fern, Autumn	*Botrychium dissectum var obliquum*
	Grape Fern, Dissected	*Botrychium dissectum*
	Hayscented	*Dennstaedtia punctilobula*
	Lady	*Athyrium filix-femina*
	Maidenhair	*Adiantum pedatum*
	Marsh	*Thelypteris palustris*
	New York	*Thelypteris noveboracensis*
	Royal	*Osmunda regalis*
	Sensitive	*Onoclea sensibilis*
	Wood Evergreen	*Dryopteris intermedia*
	Wood, Marginal	*Drypoteris marginalis*
	Wood, Spinuloss	*Drypopteris spinulosa*

Trees
Observed Onsite

X	Quaking Aspen	*Populus tremuloides*
X	Black locust	*Robinia pseudoacacia*
X	Staghorn Sumac	*Rhus typhina*
X	White Pine	*Pinus strobus*
X	Pine	*Pinus sp.*
X	Black Cherry	*Prunus serotina*
X	Sweet Cherry	*Prunus avium*
X	Spruce	*Picea sp.*

Table 7-2
Observed and Expected Fauna
ETE Sanitation and Landfill
Fish and Wildlife Impact Analysis

Mammals

	Virginia Opossum	*Didelphis marsupialis*
	Masked Shrew	*Sorex cinereus*
	Shorttail Shrew	*Blarina brevicauda*
	Hairytail Mole	*Parascalops breweri*
	Starnose Mole	*Condylura cristata*
	Little Brown Myotis	*Myotis lucifugus*
	Big Brown Bat	*Eptesicus fuscus*
	Red Bat	*Lasiurus borealis*
	Keen Myotis	*Myotis keeni*
	Small-Footed Myotis	*Myotis subulatus*
	Silver Haired Bat	*Lasionycteris noctivagans*
	Eastern Pipistrelle	*Pipistrellus subflavus*
	Hoary Bat	*Lasiurus cinereus*
	Eastern Cottontail	*Sylvilagus floridanus*
	Snowshoe Hare	*Lepus americanus*
	Eastern Chipmunk	*Tamias striatus*
	Woodchuck	*Marmota monax*
	Eastern Grey Squirrel	*Sciurus carolinensus*
	Red Squirrel	*Tamiasciurus hudsonicus*
	Southern Flying Squirrel	*Glaucomys volans*
	Northern Flying Squirrel	*Glaucomys sabrinus*
	Beaver	*Castor canadensis*
X	Deer Mouse	*Peromyscus manicultatus*
	White Footed Mouse	*Peromyscus leucopus*
	Meadow Vole	*Microtus pennsylvanicus*
	Muskrat	*Ondatra zibethicus*
	Norway Rat	*Rattus norvegicus*
	House Mouse	*Mus musculus*
	Meadow Jumping Mouse	*Zapus hudsonius*
	Woodland Jumping Mouse	*Napaeozapus insignis*
	Porcupine	*Erethizon dorsatum*
	Coyote	*Canus latrans*
	Red Fox	*Vulpes fulva*
	Grey Fox	*Urocyon cinereoargenteus*
X	Raccoon	*Procyon lotor*
	Shorttail Weasel	*Mustela ermina*
	Longtail Weasel	*Mustela frenata*
	Mink	*Mustela vision*
	Siriped Skunk	*Memphitis memphitis*
	River Otter	*Lutra canadensis*
	Bobcat	*Lynx rufus*
X	Whitetail Deer	*Odocoileus virginianus*

Table 7-2
(continued)

Birds

	Common Loc	*Gavia immer*
	Pied-billed Grebe	*Podilymbus podiceps*
	Horned Grebe	*Podiceps auritus*
	Red-necked grebe	*Podiceps grisegena*
	Double-crested Cormorant	*Phalacrocorax auritus*
	American Bittern	*Botaurus lentiginosus*
	Least Bittern	*Ixobrychus exilis*
X	Great Blue Heron	*Ardea herodias*
	Black crowned Night-Heron	*Nycticorax nyticorax*
	Tundra Swan	
	Greater White-fronted Goose	*Anser albifrons*
	Snow Goose	*Chen caerulescens*
	Barnacle Goose	*Branta leucopsis*
X	Canada Goose	*Branta canadensis*
	Wood Duck	*Aix sponsa*
	Green-winged Teal	*Anas crecca*
	American Black Duck	*Anas rubripes*
	Mallard	*Anas platyrhynchos*
	Northern Pintail	*Anas acuta*
	Blue-winged Teal	*Anas discors*
	Northern Shoveler	*Anas clypeata*
	Gadwall	*Anas strepera*
	American Wigeon	*Anas americana*
	Canvasback	*Aythya valisineria*
	Redhead	*Aythya americana*
	Ring-necked Duck	*Aythya collaris*
	Greater Scaup	*Aythya marila*
	Lesser Scaup	*Aythya affinis*
	Oldsquaw	*Clangula hyemalis*
	Black Scoter	*Melanitta nigra*
	Surf Scoter	*Melanitta perspicillata*
	White-winged Scoter	*Melanitta deglandi*
	Common Goldeneye	*Bucephala clangula*
	Bufflehead	*Bucephala albeola*
	Hooded Merganser	*Lophodytes cucullatus*
	Common Merganser	*Mergus merganser*
	Red-breasted Merganser	*Mergus serrator*
	Ruddy Duck	*Oxyura jamaicensis*
X	Turkey Vulture	*Cathartes aura*
	Osprey	*Pandion haliaetus*
	Bald Eagle	*Haliaeetus leucocephalus*
	Northern Harrier	*Circus cyaneus*
	Sharp-shinned Hawk	*Accipiter striatus*
	Cooper's Hawk	*Accipiter cooperii*
	Northern Goshawk	*Accipiter gentilis*

Table 7-2
(continued)

Red-shouldered Hawk	*Buteo lineatus*
Broad-winged Hawk	*Buteo platypterus*
Red-tailed hawk	*Buteo brachyurus*
Rough-legged Hawk	*Buteo lagopus*
Golden Eagle	*Aquila chrysaetos*
American Kestrel	*Falco sparverius*
Turkey Vulture	*Cathartes aura*
Peregrine Falcon	*Falco peregrinus*
Ring-necked Pheasant	*Phanianus colchicus*
Ruffed Grouse	*Bonasa umbellus*
Wild Turkey	*Meleagris gallopavo*
Yellow Rail	*Coturnicops noveboracensis*
King Rail	*Rallus elegans*
Virginia Rail	*Rallus limicola*
Sora	*Porazana carolina*
Common Moorhen	
American Coot	*Fulica americana*
Black-bellied Plover	*Pluvialis squatarola*
Lesser Golden-Plover	*Pluvialis dominica*
Semipalmated Plover	*Charadrius semipalmatus*
Killdeer	*Charadrius vociferus*
Greater Yellowlegs	*Tringa melanoleuca*
Lesser Yellowlegs	*Tringa flavipes*
Solitary Sandpiper	*Tringa solitaria*
Spotted Sandpiper	*Actitis macularia*
Upland Sandpiper	*Bartramia longicauda*
Ruddy Turnstone	*Arenaria interpres*
Semipalmated Sandpiper	*Calidris pusilla*
Least Sandpiper	*Calidris minutilla*
White-rumped Sandpiper	*Calidris fuscicollis*
Pectoral Sandpiper	*Calidris melanotos*
Dunlin	*Calidris alpina*
Stilt Sandpiper	*Micropalama himantopus*
Short-billed Dowitcher	*Limnodromus griseus*
Long-billed Dowitcher	*Limnodromus scolopaceus*
Common Snipe	*Capella gallinago*
American Woodcock	*Philohela minor*
Wilsons Phalarope	*Steganopus Tricolor*
Red-necked Phalarope	
Bonaparte's Gull	*Larus philadelphia*
Ring-billed Gull	*Larus delawarensis*
Herring Gull	*Larus argentatus*
Great Black-backed Gull	*Larus marinus*
Caspian Tern	*Sterna caspia*
Common Tern	*Sterna hirundo*
Black Tern	*Chlidonias niger*
Rock Dove	*Columba livia*

Table 7-2
(continued)

Mourning Dove	*Zenaida macroura*
Black-billed Cuckoo	*Coccyzus eruthropthalmus*
Yellow -billed Cuckoo	*Coccyzus americanus*
Barn Owl	*Tyto alba*
Eastern Screech-Owl	*Otus asio*
Great Horned Owl	*Bubo virginianus*
Snowy Owl	*Nyctea scandiaca*
Barred Owl	*Strix varia*
Short-eared Owl	*Asio flammeus*
Northern Saw-whet Owl	*Aegolius acadicus*
Common Nighthawk	*Chordeiles minor*
Whip-poor-will	*Caprimulgus vociferus*
Chimney Swift	*Chaetura pelagica*
Ruby-throated Hummingbird	*Archilochus colubris*
Belted Kingfisher	*Megaceryle alcyon*
Red-headed Woodpecker	*Melanerpes erythrocephalus*
Red-bellied Woodpecker	*Melanerpes carolinus*
Yellow-bellied Sapsucker	*Sphyrapicus varius*
Downy Woodpecker	*Picoides pubescens*
Hairy Woodpecker	*Picoides villosus*
Northern Flicker	*Colaptes auratus*
Pileated Woodpecker	*Dryocopus pileatus*
Eastern Wood-Pewee	
Alder Flycatcher	*Empidonax alnorum*
Willow Flycatcher	*Empidonax traillii*
Least Flycatcher	*Empidonax minimus*
Eastern Phoebe	*Sayornis phoebe*
Great Crested Flycatcher	*Myiarchus crinitus*
Eastern Kingbird	*Tyrannus tyrannus*
Horned Lark	*Eremophila alpestris*
Purple Martin	*Progne subis*
Tree Swallow	*Iridoprocne bicolor*
Northern Rough-winged Swallow	*Stelgidopteryx ruficollis*
Bank Swallow	*Riparia riparia*
Cliff Swallow	*Petrochelidon pyrrhonota*
Barn Swallow	*Hirundo rustica*
Blue Jay	*Cyanocitta cristata*
American Crow	*Corvus brachyrhynchos*
Black-capped Chickadee	*Parus atricapillus*
Tufted Titmouse	*Parus bicolor*
Red-breasted Nuthatch	*Sitta canadensis*
Brown Creeper	*Certhia familiaris*
Carolina Wren	*Thryothorus ludovicianus*
House Wren	*Troglodytes aedon*
Winter Wren	*Troglodytes troglodytes*
Sedge Wren	*Cistothorus platensis*
Marsh Wren	*Cistothorus palustris*

Table 7-2
(continued)

Golden-crowned Kinglet	*Regulus satrapa*
Ruby-crowned kinglet	*Regulus calendula*
Blue-gray Gnatcatcher	*Polioptila caerulea*
Eastern Bluebird	*Sialia sialis*
Veery	*Catharus fuscescens*
Gray-cheeked Thrush	*Catharus minimus*
Swainson's Thrush	*Catharus ustulatus*
Hermit Thrush	*Catharus guttatus*
Wood Thrush	*Hylocichla mustelina*
American Robin	*Turdus migratorius*
Gray Catbird	*Dumetella carolinensis*
Northern Mockingbird	*minimus polyglottos*
Brown Thrasher	*Toxostoma rufum*
American Pipit	*Anthus spinoletta*
Bohemian Waxwing	*Bombycilla garrulus*
Cedar Waxwing	*Bombycilla cedrorum*
Northern Shrike	*Lanius excubitor*
European Starling	*Sturnus vulgaris*
Solitary Vireo	*Vireo solitarius*
Yellow-throated Vireo	*Vireo flavifrons*
Warbling Vireo	*Vireo gilvus*
Philadelphia Vireo	*Vireo philadelphicus*
Red-Eyed Vireo	*Vireo olivaceus*
Blue-winged Warbler	*Vermivora pinus*
Golden-winged Warbler	*Vermivora chrysoptera*
Tennessee Warbler	*Vermivora peregrina*
Orange-crowned Warbler	*Vermivora celata*
Nashville Warbler	*Vermivora ruficapilla*
Northern Parula	*Parula americana*
Yellow Warbler	*Dendroica petechia*
Chestnut-sided Warbler	*Dendroica pensylvanica*
Magnolia Warbler	*Dendroica magnolia*
Cape May Warbler	*Dendroica tigrina*
Black-throated Blue Warbler	*Dendroica caerulescens*
Yellow-rumped Warbler	*Dendroica coronata*
Black-throated Green Warbler	*Dendroica virens*
Blackburnian Warbler	*Dendroica fusca*
Pine Warbler	*Dendroica pinus*
Palm Warbler	*Dendroica palmarum*
Bay-breasted Warbler	*Dendroica castanea*
Blackpoll Warbler	*Dendroica striata*
Cerulean Warbler	*Dendroica cerulea*
Black-and-white Warbler	*Mniotilta varia*
American Redstart	*Setophaga ruticilla*
Prothonotary Warbler	*Protonotaria citrea*
Ovenbird	*Seiurus aurocapillus*
Northern Waterthrush	*Seiurus motacilla*

Table 7-2
(continued)

Mourning Warbler	*Oporornis philadelphia*
Common Yellowthroat	*Geothlypis trichas*
Hooded Warbler	*Wilsonia citrina*
Wilson's Warbler	*Wilsonia pusilla*
Canada Warbler	*Wilsonia canadensis*
Yellow-breasted Chat	*Icteria virens*
Scarlet Tanager	*Piranga olivacea*
Northern Cardinal	*Cardinalis cardinalis*
Rose-breasted Grosbeak	*Pheucticus ludovivianus*
Indigo Bunting	*Passerina cyanea*
Rufous-sided Towhee	*Pipilo erythrophthalmus*
American Tree Sparrow	*Spizella arborea*
Chipping Sparrow	*Spizella passerina*
Field Sparrow	*Spizella pusilla*
Vesper Sparrow	*Pooecetes gramineus*
Savannah Sparrow	*Passerculus sandwichensis*
Grasshopper Sparrow	*Ammodramus savannarum*
Henslow's Sparrow	*Ammodramus henslowii*
Fox Sparrow	*Passerella iliaca*
Song Sparrow	*Melospiza melodia*
Swamp Sparrow	*Melospiza georgiana*
White-throated Sparrow	*Zonotrichia albicollis*
White-crowned Sparrow	*Zonotrichia leucophrys*
Dark-eyed Junco	*Junco hyemalis*
Lapland Longspur	*Calcarius lapponicus*
Snow Bunting	*Plectrophenax nivalis*
Bobolink	*Dolichonyx oryzivorus*
Red-winged Blackbird	*Agelaius phoeniceus*
Eastern Meadowlark	*Sturnella magna*
Rusty Blackbird	*Euphagus carolinus*
Common Grackle	*Quiscalus quiscula*
Brown-headed Cowbird	*Molothrus ater*
Northern Oriole	*Icterus galbula*
Pine Grosbeak	*Pinicola enucleator*
Purple Finch	*Carpodacus purpureus*
House Finch	*Carpodacus mexicanus*
Common Redpoll	*Carduelis flammea*
Pine Siskin	*Carduelis pinus*
American Goldfinch	*Carduelis tristis*
Evening Grosbeak	*Hesperiphona vespertina*
House Sparrow	*Passer domesticus*
Accidentals	
Red-throated Loon	*Gavia stellata*
Eared Grebe	*Podiceps nigricollis*
Snowy Egret	*Egretta thula*
Little Blue Heron	*Florida caerulea*
Glossy Ibis	*Plegadis falcinellus*

Table 7-2
(continued)

Fulvous Whistling-Duck	*Dendrocygna bicolor*
Brant	*Branta bernicla*
Eurasian Wigeon	*Anas penelope*
Merlin	*Falco columbarius*
Gyrfalcon	*Falco rusticolus*
Sandhill Crane	*Grus canadensis*
American Avocet	*Recurvirostra americana*
Willet	*Catoptrohorus semipalmatus*
Whimbrel	*Numenius phaeopus*
Hudsonian Godwit	*Limosa haemastica*
Red Knot	*Calidris canutus*
Sanderling	*Calidris alba*
Western Sandpiper	*Calidris mauri*
Baird's Sandpiper	*Calidris bairdii*
Ruff	*Philomachis pugnax*
Lesser Black-backed Gull	*Larus fuscus*
Glaucous Gull	*Larus hyperboreus*
Black-legged Kittiwake	*Rissa tridactyla*
Forster's Tern	*Sterna forsteri*
Long-eared Owl	*Asio otus*
Three-toed Woodpecker	*Picoides tridactylus*
Acadian Flycatcher	*Empidonax virescens*
Loggerhead Shrike	*Lanius ludovicianus*
White-eyed Vireo	*Vireo griseus*
Summer Tanager	*Piranga rubra*
Lincoln's Sparrow	*Melospiza lincolnii*
Yellow -headed Blackbird	*Xanthocephalus xanthocephalus*
Orchard Oriole	*Icterus spurius*
Red crossbill	*Loxia curvirostra*
White-winged Crossbill	*Loxia leucoptera*

Fish

Brown Trout	*Salmo trutta*
Redside Dace	*Ccinostomas elongatus*
White Sucker	*Catostomus commersoni*
Northern Hog Sucker	*Hypentelium nigricans*
Blacknose Dace	*Rhinichthys atratulus*
Longnose Dace	*Rhinichthys cataractae*
Pearl Dace	*Margariscus margarita*
Central Stoneroller	*Campostoma anomalum*
Rainbow Darter	*Etheostoma caeruleum*
Fantail Darter	*Etheostoma flabellare*
Johnny Datrter	*Etheostoma nigrum*
Common Shiner	*Luxilus cornutus*
Creek Chub	*Semotilus atromaculatus*
Bluntnose Minnow	*Pimephales notatus*

Table 7-2
(continued)

	Fathead Minnow	*Pimephales promelas*
	Stonecat	*Noturus flavus*
	Green Sunfish	*Lepomis cyanellus*
	Pumpkinseed	*Lepomis gibbosus*
	Rockbass	*Ambloplites rupestris*
	Brown Bullhead	*Ameirurus nebulosus*

Reptiles

	Snapping Turtle	*Chelydra serpentina*
	Painted Turtle	*Chrysemys picta*
	Wood Turtle	*Clemmys insculpta*
	Bog Turtle	*Clemmys muhlenbergi*
	Blandings Turtle	*Emydoidea blandingi*
	Map Turtle	*Graptemys geographica*
	Spiney Softshell	*Trionyx spiniferus*
	Ringneck Snake	*Diadophis punctatus*
	Rat Snake	*Elaphe obsoleta*
	Milk Snake	*lampropeltis triagulum*
	Northern Water Snake	*Nerodia sipedon*
	Smooth Green Snake	*Opheodrys vernalis*
	Brown Snake	*Storeria dekayi*
	Redbelly Snake	*Storeria occipitomaculata*
	Eastern Ribbon Snake	*Thamnophis sauritus*
X	Common Garter Snake	*Thamnopis sitralis*
	Timber Rattlesnake	*Crotalus horridus*

Amphibians

	Blue Spotted Salamander	*Ambystoma laterale*
	Spotted Salamander	*Ambystoma maculatum*
	Dusky Salamander	*Desmoganthus fuscus*
	Mountain Dusky Salamander	*Desmoganthus ochrophaeus*
	Two-Lined Salamander	*Eurycea bislineata*
	Spring Salamander	*Gyrinophilus porphyriticus*
	Four Toed Salamander	*Hermidacttylium scutatum*
	Redback Salamander	*Plethodon cinereus*
	Mudpuppy	*Necturus maculosus*
	Red Spotted Newt	*Notophthalmus viridescens*
	American Toad	*Bufo americanus*
	Spring Peeper	*Hyla crucifer*
	Gray Treefrog	*Hyla versicolor*
	Bullfrog	*Rana catasbeiana*
	Green Frog	*Rana clamitans*
	Pickerel Frog	*Rana palustris*
	Northern Leopard Frog	*Rana pipiens*
	Mink Frog	*Rana septentrionalis*
	Wood Frog	*Rana sylvatica*

Section 8
Conclusions and Recommendations

The objective of the Remedial Investigation was to determine the nature, extent and degree of contamination present at the ETE Sanitation and Landfill site. Potential releases of contaminants from the site were then considered with respect to surface water, sediment, soil, groundwater and air quality. The RI evaluated the potential impact of site contaminants to human health.

The ultimate goal of the RI was to provide enough data to select the most appropriate presumptive remedy for the site and identify engineering issues associated with the remedy that require further evaluation under the Feasibility Study.

The ETE Sanitation Landfill site was a privately operated landfill which received municipal and industrial wastes from 1972 to 1979. The site is located in a rural area of Wyoming County, New York. Private wells and, to a lesser degree, springs are used by residents as a potable water supply within a one-mile radius of the site. All landfilling ceased by 1979, though the landfill was not closed in accordance with NYSDEC regulations. Waste drums containing leaded paint sludge and waste salt were documented as being disposed at the site. It is suspected that plating wastes and solvents were also disposed at the site. In 1991, NYSDEC performed a drum removal operation at the site.

The landfill was constructed on top of unconsolidated clay rich glacial tills containing minor beds of more permeable sands and gravel. Landfill topography generally slopes to the north. Surface water drainage as well as groundwater flow is consistent with topography with flow generally being from south to north. Surface runoff from the site flows into a small tributary of Cotton Creek located 0.75 north of the site. Groundwater flows north and may eventually discharge to downgradient surface water such as Cotton Creek.

RI data indicates approximately seven acres of the site contains landfilled waste. The maximum thickness of the waste is approximately 15 feet at the center of the landfill and tends to thin towards the perimeter of the landfill. The waste is covered with a silty clay soil between one and two feet thick, although waste is exposed within portions of the landfills northern slope. A portion of the landfilled material is found offsite in the vicinity of the South Pond and is believed to extend under the northern portion of the South Pond. With only two borings drilled through the landfilled area of the site, only a rough approximation of the landfill volume could be made. The estimated volume of waste has been made using limited data points and should, therefore, be considered a crude estimate of the volume of waste. It is estimated that the ETE Landfill contains roughly 2.5 million cubic feet of waste. Approximately 1.5 million cubic feet of waste lies below the water table. These estimates assume that the central portion of the landfill averages a waste thickness of 12 feet with outlying waste areas averaging 5 feet in thickness.

RI data indicates that landfill contaminants have impacted surface water quality downgradient (north) of the site primarily by inorganic contaminants aluminum, iron, and zinc. Additionally, surface water sediment downgradient of the site have been impacted by volatile organic compounds (VOCs), including acetone, methylene chloride, 2-butanone, ethylbenzene and xylene, and inorganic contaminants, including iron, manganese and zinc. Data indicates leachate seeps flowing into the north pond contain similar VOCs and inorganic contaminants identified within downgradient surface waters. Offsite migration of surface water contaminants via the surface water pathway is a significant concern given downgradient surface water, i.e. Cotton Creek, is used for recreational purposes as well as a source of drinking water.

Contaminant distribution within site groundwater indicates that the majority of contamination is limited to the landfill wastes located within the west-central portion of the landfill and the downgradient shallow groundwater. Exceedances of NYSDEC GA groundwater standards were most frequently noted in monitoring wells screened within the landfill wastes and shallow water table aquifer. Clay-rich glacial tills which comprise a majority of site stratigraphy appear to limit the downward vertical migration of groundwater contamination within the site. However, several VOCs were observed in all deep, downgradient, monitoring wells indicating that some vertical contaminant migration is occurring.

Monitoring well MW-8S, screened in the shallow water table aquifer and waste, exhibited the highest observed volatile organic concentrations within the landfill, with a total VOC concentration of 5,394 ug/l. Groundwater may flow in a north-northwestern direction downgradient from monitoring well MW-8S, where numerous VOC exceedances were noted. No monitoring wells are located north-northwest of MW-8S. Additionally, downgradient shallow groundwater wells, MW-3S, MW-7S and MW-9S all exhibited VOC contamination in excess of GA groundwater standards.

The principal contaminants of concern in the groundwater include: acetone, 2-butanone, benzene, 4-methyl-2-pentanone, 2-hexane, toluene, trichloroethene, 1,2-dichloroethene, chlorobenzene, ethylbenzene, xylenes, phenol, 2-methylphenol, 4-methylphenol and 2,4-dimethylphenol. Though the listed contaminants are relatively mobile within groundwater, the majority tend to degrade through biodegradation processes under favorable aerobic conditions.

Based on the RI data, the extent of the VOC plume has not been fully defined.

Inorganic contaminants found in excess of NYSDEC GA groundwater standards included: antimony, barium, cadmium iron, lead, magnesium, manganese, sodium and thalium. As with VOCs, the greatest inorganic contamination is observed within and immediately downgradient of the landfill. However, with the exception of sodium and iron, landfill related inorganic contaminants do not appear to be significantly impacting water quality within the deep monitoring wells. Heavy metals such as lead and cadmium would not be expected to migrate offsite due to their relatively low mobility. Data from downgradient wells MW-7 and MW-9 support this assumption with no heavy metal contaminants observed above GA groundwater standards.

Groundwater transport of landfill contaminants from the landfill is the most significant offsite migration pathway given the proximity of the landfill to a number of private wells located downgradient of the site. Additionally, contaminants within groundwater may discharge to surface water bodies downgradient of the landfill, such as Cotton Creek, that are used as a source of drinking water or for recreational purposes.

Landfill gas production appears to be minimal in the eastern portion of the landfill. However, landfill gas may not be capable of migrating upward into this area of the landfill due to an impermeable layer or water saturated soils. The west-central portion of the landfill appears to be actively producing gas. VOC analysis of four soil gas samples indicated VOCs to be present within landfill gas. The highest concentration being observed at GW-4 with a total VOC concentration of 113,490 ppbv. Offsite migration of landfill gas was not investigated during completion of this RI but is not considered a significant migration pathway based on the landfill site setting and surrounding land use.

Geophysical investigations of the northeastern portion of the landfill and followup test pits did not identify any areas containing numerous full drums of wastes. A number of crushed and rusted drums were located and one drum was located containing paint sludge; however, waste characterization analysis of the drum contents indicated the waste to be non-hazardous. The majority of VOCs detected within the site have been associated with paint manufacturing and paint solvents and may be attributed to the documented disposal of drummed paint sludge. Other VOCs identified at the site are known to be used as industrial solvents and/or are constituents of petroleum products such as gasoline. Additionally, the high levels of sodium and other inorganic contaminants present within leachate, groundwater and surface water may be attributable to waste salt landfilled at the site.

The most significant contamination present within the site has been identified within the west-central portion of the landfill encompassing groundwater monitoring well MW-8S and soil gas probe GP-4. High levels of VOCs within groundwater/leachate and landfill gas were identified within this area. This area may represent a source area of contamination and may warrant treatment as a hot spot in accordance with EPA guidance documents for conducting remedial investigations at municipal landfills.

Potential health risks associated with current site conditions include ingestion and inhalation of onsite groundwater, inhalation of ambient air for a trespasser and ingestion, or inhalation of surface soil and sediment for a trespasser. Potential health risks for future use conditions which conservatively assumes that the landfill would be used for residential property include ingestion and inhalation of groundwater, ingestion and/or inhalation of surface soil and inhalation of ambient air.

Note that the qualitative risk assessment is highly conservative in that, for most cases, the maximum contaminant level of each compounds was compared to risk based assumptions. The current and future condition scenarios both assume that onsite groundwater will be used a drinking water source given all groundwater data is site-specific. In reality, onsite groundwater is not used for drinking water. There is a potential for landfill contaminants affecting downgradient private well water in the future if the landfill were to remain in its present condition.

Given the RI findings, CDM recommends the following:

- Given the extent of the leachate plume is not fully defined and the proximity of the landfill to private drinking water supplies, CDM recommends that the installation of two additional offsite well clusters be considered as part of pre-design field activities. One well cluster should be located northwest of the MW-8 monitoring well cluster between the landfill and private wells located along Miller Road. The second well cluster should be located downgradient from the landfill between the MW-3 well cluster and the private well located at 4344 Route 19, where trace levels (less than 0.5 ug/L) of toluene were detected in 1995. Both well clusters can be used for long term groundwater monitoring of the landfill, after closure. Following the installation of the two well clusters, one round of groundwater samples should be collected from all monitoring wells. Analysis of samples should include VOCs, semi-VOCs, metals and key leachate indicator parameters.

- As part of the RI, CDM in consultation with the NYSDEC recommends that the following private wells be sampled by the NYSDOH: 4470 Jordan Rd. (Id# 3), 4770 Jordan Rd. (ID#5) 4740 Miller Road (Id#18). Private well groundwater samples will be analyzed for VOCs. The locations of these wells are shown in Figure 3-1 in Section 3.0 of this report.

- Following the completion of the RI/FS, a long term annual or bi-annual groundwater monitoring plan should be instituted to ensure that drinking water resources in the vicinity of the landfill remain unimpacted by landfill contaminants. The monitoring plan should be based upon the remedial action chosen.

- One additional round of surface water samples should be taken in order to determine surface water quality during base flow conditions. Previous sampling events were conducted during late-winter/early-spring when surface runoff is the greatest. Samples would be collected during the summer or early fall and after several days of dry weather to reduce any diluting effects of stormwater runoff or snowmelt might have on the sample results. In addition to samples from the North Pond and eastern drainage channel, water samples should be collected from Cotton Creek in order to assess the potential of landfill impacted groundwater discharging to this surface water body.

- Prior to undertaking final closure and capping of the landfill, the extent and volume of waste which extends within the South Pond should be determined as part of predesign field investigations. Excavating within the pond can be accomplished using an excavator with an extension arm of at least 20 feet. However, the extent of excavation will be limited to the depth of water and the effective "reach" of the excavator as well as the stability of the pond edge.

In accordance with the approved RI/FS Work Plan, the objective of the FS will be to resolve several engineering issues and to refine the selected presumptive remedies. Based on the RI, the site currently represents a potential risk to human health and the environment; therefore, the No Action Alternative is not acceptable. Consolidating and capping the landfill with appropriate leachate and landfill gas controls is the preferred presumptive remedy. With this presumptive remedy, the engineering issues that require further evaluation under the FS include:

- Consolidating waste within the landfill, including wastes within the South Pond, as well as the feasibility of placing contaminated North Pond sediments on the landfill before capping;

- Reducing leachate generation through surface water controls, including the possibility of draining the North and South Ponds;
- Reducing leachate generation through groundwater diversion and/or hydraulic containment;
- The selection of active or passive landfill gas controls;
- The most appropriate cap design which will cost effectively contain the waste, and
- If selected as a hot spot, how to effectively remediate contamination within the west-central portion of the landfill.

As part of the landfill closure, institutional controls such as placing a fence around the site and deed restrictions to adjoining properties are recommended.

Section 9
References

Camp Dresser & McKee. Nov. 1997. Final Work Plan Remedial Investigation/Feasibility Study, ETE Landfill, Town of Gainesville, New York, NYSDEC Site #9-61-005, Work Assignment #D002925-24. Prepared for New York State Department of Environmental Conservation.

Camp Dresser & McKee. Nov. 1997. Final Site Operations Plan/Quality Assurance Project Plan Remedial Investigation/Feasibility Study, ETE Landfill, Town of Gainesville, New York, NYSDEC Site #9-61-005, Work Assignment #D002925-24. Prepared for New York State Department of Environmental Conservation.

Engineering-Science Inc., 1994. Preliminary Site Assessment: ETE Sanitation and Landfill, Gainesville, Wyoming County. Prepared for the New York State Department of Environmental Conservation

Eyles, N., 1983. Glacial Geology. Pergamon Press Ltd.

Fetter, C.W., 1994. Applied Hydrogeology. Macmillan College Publishing Company, Inc.

Fetter, C.W., 1993. Contaminant Hydrogeology. Macmillan College Publishing Company, Inc.

Freeze, Allan, 1979. Groundwater. Prentice-Hall, Inc..

Hem, John, 1989. Study and Interpretation of the Chemical Characteristics of Natural Water. U.S. Geological Survey Water-Supply Paper 2254.

Howard, Philip H., 1989. Handbook of Environmental Fate and Exposure Data for Organic Chemicals. Volume 1: Large Production and Priority Pollutants. Lewis Publishers, Inc.

Howard, Philip H., 1990. Handbook of Environmental Fate and Exposure Data for Organic Chemicals. Volume 2: Solvents. Lewis Publishers, Inc.

Montgomery, John H., and L. Welkom, 1990. Groundwater Chemicals Desk Reference. Lewis Publishers, Inc.

New York State Department of Environmental Conservation, 1993. Technical Guidance for Screening Contaminated Sediment.

New York State Department of Environmental Conservation, 1993. Ambient Water Quality Standards and Guidance Values. Division of Water Technical and Operational Guidance Series 1.1.1.

New York State Department of Environmental Conservation, 1994. Determination of Soil Cleanup Objectives and Cleanup Levels. HWR-94-4046.

New York State Department of Conservation, 1995. 6 NYCRR Part 371: Identification and Listing of Hazardous Wastes.

URS Consultants, Inc., 1990. Preliminary Site Assessment: ETE Sanitation and Landfill Gainesville, Wyoming County. Prepared for the New York State Department of Environmental Conservation.

U.S. Environmental Protection Agency (EPA).1991. Conducting Remedial Investigations/Feasibility Studies for CERCLA Municipal Landfill Sites. Washington D.C.

Tchobanoglous, George, H. Theisen, and S. Vigil, 1993. Integrated Solid Waste Management: Engineering Principles and Management Issues. McGraw-Hill, Inc.

Watson, Ian, and A. Burnett, 1993. Hydrology: an Environmental Approach - Theory and Applications of Groundwater and Surface Water for Engineers and Geologists. Buchanan Books Cambridge.

CDM Camp Dresser & McKee

General Notes for Boring Logs

1. Soil boring logs, notes and other data shown are the results of personal observations, field readings, and interpretations made by Camp Dresser and McKee. Records kept by the onsite geologist form the basis of all logs. Subsurface materials have been archived at the site and can be reviewed.

2. Explanation of the classification and terms:

Size Component Terms		Proportion by Weight
Boulder	Larger than 8 inches	Major component is shown
Cobble	8 inches to 3 inches	with all letters capitalized.
Gravel -- coarse	3 inches to 1 inch	
-- medium	1 inch to 3/8 inch	Minor component percentage
-- fine	3/8 inch to 4.76 mm	terms of total sample are:
		and 45 to 50 percent
Sand -- Coarse	4.76 mm to 2.00 mm (#10 sieve)	with 20 to 40 percent
-- medium	2.00 mm to 0.42 mm (#40 sieve)	some 20 to 30 percent
-- fine	0.42 mm to 0.074 mm (#200 sieve)	little 10 to 20 percent
Silt and Clay	Finer than 0.074 mm	trace 1 to 10 percent

a. Gradation Terms - The terms coarse, medium and fine are used to describe gradation of Sand and Gravel.

b. The terms used to describe the various soil components and proportions are arrived at by visual estimates of the recovered soil samples. Other terms are used when the recovered samples are not truly representative of the natural materials, such as "fill material."

c. Some commonly used abbreviations include:
SAA; Same as Above. Split spoon soil type is very similar in appearance to the split spoon taken above.
Brown-red: read "brown to red."
w/, tr.: with, trace
fn., cr.: fine, coarse
Low plast.: Low plasticity
w.s., p.s.: well sorted, poorly sorted

Penetration Resistance

COHESIONLESS SOILS		*COHESIVE SOILS*	
Blows Per Feet	Relative Density	Blows Per Feet	Consistency
0 to 4	Very Loose	0 to 2	Very Soft
4 to 10	Loose	2 to 4	Soft
10 to 30	Medium Dense	4 to 8	Medium Stiff
30 to 50	Dense	8 to 15	Stiff
Over 50	Very Dense	10 to 30	Very Stiff
		Over 30	Hard

a. Penetration resistance was determined using a 300 lb. Hammer for 3" diameter split spoons and a 140 lb. Hammer for 2" diameter split spoons. Blowcounts were recorded for four 6" intervals on a 2 foot splitspoon.

CDM

environmental en· ·ɜers, scientists,
planners & mana. .ıent consultants

LOG OF BORING

BORING #: **SB-1**
Page 1 of 1
Permit #:
Job #: 0897-22149

Project ETE Landfill
Location Gainesville, New York
Date Drilled 3/25/98
Drilling Co.: SJB Drilling Services
Total Depth 8 ft.
Method Used: Hollow Stem Augering
Inspector Brian Murtagh
Organic Vapor Inst: OVM Model 580B TEI Inc.
Water elv: approx. 3 ft.

Depth (feet)	Sample No.	Blows/6" 140 lbs.	Sample Inter.	Adv/Rec	Org. Vap (ppm)	Sample Description	Strata Change	Remarks (time)
		1	0-2'	19"	0.0			this boring completed to investigate the limits of solid waste
		4						
1						moist tan brown slightly gray SILTY med.-cr. SAND, little-trace gravel, trace clay, low plasticity-no plasticity,		
		4						
		4						
2								
		1	2-4'	6"	0.0			
		2				wet brown slightly tan SILTY SAND, little-trace clay and gravel, poor sorting		
3								
		3						
		2						
4								
		1	4-6'	12"	0.0			
		1				wet medium-coarse SILTY SAND, little gravel, loose, no plasticity, native material		
5								
		1						
		1						
6								
		1	6-8'	18"	0.0			
		1				tan brown very fine to fine SILTY SAND trace gravel, moderate sorting, definitely native material		
7								
		1						
		2						
8								
						End of Borehole		

CDM

environmental engineers, scientists,
planners & management consultants

BORING # **SB-2 (PZ-4)**
Page 1 of 3

LOG OF BORING

Project: ETE Landfill | Location: Gainesville, New York | Permit #:
Date Drilled: 3/4/98 | Drilling Co.: SJB Drilling Services | Job #: 0897-22149
Total Depth: 50' | Method Used: Hollow Stem Augering
Inspector: Brian Murtagh | Organic Vapor Inst: OVM Model 580B TEI Inc. | Water elv: approx. 7 ft.

Depth (feet)	Sample No.	Blows/6" 140 lbs.	Sample Inter.	Adv/Rec	Org. Vap (ppm)	Sample Description	Strata Change	Remarks (time)
2		1, 2, 4, 8	0-2'	21"	0.0	0-1':moist-wet brown CLAY, little to some silt, tr. sand & very fn. gravels; 1-2':moist-wet gray olive green SILT little to tr. clay, tr. angular fn. gravels		No piezometer installed at this location
4		8, 6, 4, 3	2-4'	12"	0.0	2-3':moist-wet brown SILTY CLAY, little sand & gravel, med. plastic.; 3-4':MSW (paper, plastic, wood)		
6		2, 2, 5, 9	4-6'	18"	0.0	4-6':moist brown-olive-gray CLAY w/ silt, tr. fine angular gravel, tr. MSW med. to low plastic.		
8		8, 18, 11, 11	6-8'	8"	0.0	very wet MSW and brown SILT w/ fn.-cr. sand, tr. gravels		At 8' below grade, 2.5 - 5.0 OVM reading in the breathing zone
10		8, 4, 50, 50/0"	8-10'			8-12: wet MSW and black organic SILT, very loose material		
12		50/4"	10-12'	3"	0.0			
14		11, 5, 12, 1	12-14'	14"	0.0	12-14 :moist to wet dark olive green brown CLAY w/ silt, little fn. sand		[possibly native]
16		11, 3, 8, 2	14-16'	4"	0.0			
18		3, 3, 4, 3	16-18'	8"	0.0	moist lt. brown-olive gray SILTY CLAY and dk. ang. shale GRAVEL, matrix is med. plastic., v. poorly sorted		
20		2, 3, 6, 16	18-20'	15"	0.0	18-18.25':dry moist gray SILTY CLAY w/ ang. gravel		
22		5, 16, 16, 9	20-22'	14"	0.0	18.25-24':moist brn. olive gray SILTY CLAY and ang. GRAVEL, little fn.-med. sand v. poor sort. matrix has med-high plasticity., firm		
		2, 2, 6, 9	22-24'	2"	0.0			

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BORING #: **SB-2 (PZ-4)**

Permit #:

LOG OF BORING

Project ETE Landfill Location Gainesville, New York

Depth (feet)	Sample No.	Blows/6" 140 lbs.	Sample Inter.	Adv/Rec	Org. Vap (ppm)	Sample Description	Strata Change	Remarks (time)
26		3 2 3 5	24-26'	12"	0.0	moist gray to olive gray CLAYEY fn.-med. SAND and FN. GRAVEL, little silt [gravels are dk. gray siltstone and dolomite]		No piezometer installed at this location.
28		4 7 8 9	26-28'	15"	0.0	moist gray SILTY CLAY and angular GRAVEL, tr. to little fn. sand, v. poorly sorted, no bedding, matrix is high plast.		
30		4 4 4 4	28-30'	18"	0.0	wet gray to dk. gray SILTY fn.-med SAND and GRAVEL ang. to sub ang., tr. clay, v. poorly sorted, soft		
32		3 5 5 5	30-32'	10"	0.0	gray to dk. gray CLAY and subrnd. to subangular GRAVEL, little fn. sand, little silt, firm, v. poorly sorted		
34		13 13 11 8	32-34'	15'"	0.0	32-36: moist gray SILTY CLAY and subrn. GRAVEL, little fn.-med sands, v. poor sorting, firm		
36		8 9 11 48	34-36'	10"	0.0			
38		22 9 8 4	36-38'	13"	0.0	damp gray subang. to ang. GRAVEL w/ clay and silt matrix		
40		2 5 4 5	38-40'	16"	0.0	moist gray SILT and v. fn. GRAVEL, w/ fn. sand, little clay, low plasticity, v. poorly sorted		
42		6 8 6 6	40-42'	18"	0.0	40-46: moist gray to dk. gray SILT w/ to little fn. subang. gravels, little clay and sand v. poorly sorted		
44		11 8 9 9	42-44'	15"	0.0			
46			44-46'		0.0			
		2 6 9 10	46-48'	16"	0.0	moist gray v. fn. SANDY SILT, little v. fn. black gravel, little clay, v. poorly sorted, low plastic.		

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BORING #: **SB-2 (PZ-4)**
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Permit #:

LOG OF BORING

Project ETE Landfill   Location Gainesville, New York

Depth (feet)	Sample No.	Blows/6" 140 lbs.	Sample Inter.	Adv/Rec	Org. Vap (ppm)	Sample Description	Strata Change	Remarks (time)
		6	48-50'	20"	0.0	v. wet gray SILT and v. fn. GRAVEL,		
		8				little fn.-med. sand, little clay, tacky		
		16				v. poorly sorted		
50		18						
						End of Borehole		
						No piezometer installed at		
						this location.		

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BORING # **PZ-1 / PZ-2**
Page 1 of 3

LOG OF BORING

Project	ETE Landfill	Location	Gainesville, New York
Date Drilled	3/23/98	Drilling Co.:	SJB Drilling Services
Total Depth	58'	Method Used:	Hollow Stem Augering
Inspector	Brian Murtagh	Organic Vapor Inst:	OVM Model 580B TEI Inc.

Permit #:
Job #: 0897-22149
Water elv: approx. 6 ft.

Depth (feet)	Sample No.	Blows/6" 140 lbs.	Sample Inter.	Adv/Rec	Org. Vap (ppm)	Sample Description	Strata Change	Remarks (time)
2		1, 3, 4, 50/4"	0-2'	20"	0.0	0 - 1.85:brown-lt.brn. gray SILT, trace clay, tr. sand, tr. organics, low plast. 1.85-2.5:black dry SHALE derived ASPHALT		
4		45, 23, 14, 11	2-4'	21"	0.0	2.5-3.5:dry gray SILTSTONE GRAVEL fill material 3.5-4:moist brown SILT, little med. sand, tr. fine gravels, v.poor sort, fill		
6		3, 4, 3, 3	4-6'	15"	0.0	4-5:wet brown to rust brn. SILTY SAND tr. clay, tr. gravel, low plast., poor sort. 5-6:moist brn to rust brn CLAY, some silt, little gravel, tr. fn. sand, hi-med. plast.		
8		2, 2, 4, 9	6-8'	22"	0.0	6-6.25:v. wet brn.-rust brn. fn.-med. SILTY SAND, tr. gravel, tr. clay 6.25-8:moist brn-rust brn. SILT w/clay little v. fn. snad, tr. fn. grav, med-hi plast		
10		6, 8, 15, 19	8-10'	15"	0.0	wet brown-tan brn. v. fn. SANDY SILT little fn.-cr. gravel, tr. clay, low to no plasticity		PZ-1 screen: 18'-8' b.g.
12		8, 9, 8, 9	10-12'	4"	0.0	10-13.5: wet brown SILT, little clay, w/ v.fn-cr. sand, tr. gravel, med plasticity, v. poor sorting, loose, tacky		
14		7, 12, 15, 16	12-14'	10"	0.0	13.5-14:moist to damp gray brown SILT, w/clay, tr. black shale gravels, med.-high plast., mod.-poor sorting		
16		12, 8, 7, 12	14-16'	18"	0.0	14-17.5: moist brn.-rust brn. SILT, some v. fn.-med. sand (.25" lenses),		
18		12, 29, 16, 14	16-18'	20"	0.0	little submd.-subang. gravel, tr. clay 17.5-18: moist gray SILTSTONE, little to trace. gray brn. silt matrix		drilling through large gravel
20		7, 6, 7, 12	18-20'	18"	0.0	damp to wet gray SILT, little-some v. fn. sand, little clay, tr. rnd-submd gravel, low to no plasticity, v. poor sorting		
22		12, 15, 18, 15	20-22'	2"	0.0	wet light gray SILTSTONE in nose of split spoon		
		12, 14, 13, 20	22-24'	8"	0.0	wet gray SILT-V.FN. SAND, some to w/clay, little submd-subang. gravel med.-low plasticity		

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BORING #: **PZ-1 / PZ-2**
Page 2 of 3
Permit #:

LOG OF BORING

Project ETE Landfill   Location Gainesville, New York

Depth (feet)	Sample No.	Blows/6" 140 lbs.	Sample Inter.	Adv/Rec	Org. Vap (ppm)	Sample Description	Strata Change	Remarks (time)
		5	24-26'	8"	0.0			
		7						
		9						
26		11						
		9	26-28'	10"	0.0	24-30: damp to wet gray SILT, with very fine to coarse sand, little to some gravel, little to trace clay, very low plasticity, very poor sorting		
		13						
		12						
28		21						
		16	28-30'	3"	0.0			
		18						
		20						
30		17						
		8	30-32'	20"	0.0			
		7						
		8				30-34: damp-wet gray SILT-V.FN. SAND, trace medium sand lens (.15"), little fine gravel, trace to no clay, very low plasticity		
32		10						
		7	32-34'	18"	0.0			
		10						
		11						
34		17						
		9	34-36'	19"	0.0	damp-wet very fine SANDY SILT, some fine gravel, trace-little fn.-cr. sand, trace clay, v. low plast., poor sorting		
		9						
		11						
36		13						
		11	36-38'	19"	0.0	damp-wet gray SILT, some to w. v.fn. sand, little subang. gravel, trace clay, low plasticity, occasional 0.15" lens of med-cr. sand		
		11						
		10						
38		13						
		4	38-40'	18"	0.0			
		9						
		11				38-42: moist gray SILT, little-trace clay, little-trace ang.-subang. gravel, low plasticity		
40		10						
		3	40-42'	19"	0.0			
		10						
		10						
42		12						
		12	42-44'	16"	0.0	moist-damp gray SILT, some-little clay, little subang-ang. gravel, little v.fn. to med. sand		
		15						
		18						
44		16						
		8	44-46'	20"	0.0	moist-wet gray SILT, little-trace clay, little-trace subang. gravel (dk. shale) with occasional .25"-1" med-cr. sand lenses		
		8						
		12						
46		14						
		22	46-48'	24"	0.0	wet gray v.fine to coarse SAND, little silt, trace to no clay, moderate sorting, no plasticity		
		17						
		19						
		25						

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LOG OF BORING

Project ETE Landfill Location Gainesville, New York

BORING #: **PZ-1 / PZ-2**

Permit #:

Depth (feet)	Sample No.	Blows/6" 140 lbs.	Sample Inter.	Adv/Rec	Org. Vap (ppm)	Sample Description	Strata Change	Remarks (time)
50		22 25 28 26	48-50'	16"	0.0	moist-damp gray v.fn.-med. SILTY SAND some fine ang.-subang. gravel, little-tr. clay, v. poor sorting, v. low plasticity		
52		12 16 15 15	50-52'	6"	0.0	damp gray SILT and GRAVEL, trace to little clay, some to with v.fine-fine sand, very low plasticity, v. poor sorting, gravel is angular to subangular		
54		20 18 22 23	52-54'	22"	0.0	moist gray SILTY CLAY, little-some gravel, little-trace v.fn.-fn. sand, poor sorting, med-high plasticity		
56		11 12 15 20	54-56'	0"		no sample recovered		
58		26 34 26 35	56-58'	16"	0.0	moist gray SILTY CLAY, little-trace very fine-fine sand, little subangular-angular gravel.		PZ-2 screen: 54'-44' b.g.
						End of Borehole		

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BORING #: **PZ-3**
Page 1 of 1
Permit #:
Job #: 0897-22149

LOG OF BORING

Project: ETE Landfill
Location: Gainesville, New York
Date Drilled: 3/4/98
Drilling Co.: SJB Drilling Services
Total Depth: 10 ft.
Method Used: Hollow Stem Augering
Inspector: Brian Murtagh
Organic Vapor Inst: OVM Model 580B TEI Inc.
Water elv: approx. 3 ft.

Depth (feet)	Sample No.	Blows/6" 140 lbs.	Sample Inter.	Adv/Rec	Org. Vap (ppm)	Sample Description	Strata Change	Remarks (time)
		1	0-2'	13"	8.6	0-0.5':brownish red SILTY CLAY, trace sand, med. plast.		
1		6				0.5-2':moist gray to olive green CLAY and SHALE GRAVEL fragments		
		3						
2		3						
		5	2-4'	17"	0.0	wet MSW (plastic, newpaper)		
3		4						
		3						
4		3						
		2	4-6'	17"	0.0	wet MSW (paper), w/ brown CLAY matrix, trace sand		
5		2						
		2						
6		9						
		8	6-8'	18"	40.0	6-7': moist to wet MSW (plastic, glass) little gray silt matrix		10 ppm
7		9						
		11				7-7.5: moist to wet brown SILTY CLAY, tr. sand, low plasticity, cover material		40 ppm
8		9				7.5-8': wet MSW (plastic, paper, glass)		
		8	8-10'	18"	0.0	very wet MSW, some black organic silt, some brown clayey silt matrix		Oxygen level in augers= 15.2%
9		9						
		11						
10		9						
						End of Borehole		

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BORING # **MW-6**

LOG OF BORING

Project: ETE Landfill | Location: Gainesville, New York | Permit #:
Date Drilled: 3/10/98 | Drilling Co.: SJB Drilling Services | Job #: 0897-22149
Total Depth: 80' | Method Used: Hollow Stem Augering
Inspector: Brian Murtagh | Organic Vapor Inst: OVM Model 580B TEI Inc. | Water elv: approx. 14'

Depth (feet)	Sample No.	Blows/6" 140 lbs.	Sample Inter.	Adv/Rec	Org. Vap (ppm)	Sample Description	Strata Change	Remarks (time)
2		1 1 1 1	0-2'	12"	0.0	dry brn. to rusty brn. SILT, tr. organics tr. clay, well sorted, cover material		
4		3 7 6 6	2-4'	14"	0.0	dry light tan brn. SILT, tr. organics, well sorted		
6		6 8 6 10	4-6'	8"	0.0	tan brn. to dk. brn. SILT, tr. gravel (green gray siltstone ang.-subang.)		
8		6 6 12 14	6-8'	6"	0.0	dry rust brn. SILT, little tr. fn. sand, tr. qtz. gravel in nose of split spoon		
10		3 4 3 4	8-10'	14"	0.0	8-8.5:dk. brn. v. fn. SANDY SILT, tr. grav.. 8.5-9':moist-wet tan brn. SILTY v. fn. SAND, tr. grav. 9-10:dk. brn. to brn. SILT, tr.-little v. fn. sand, tr. gravel (red brn siltstone)		
12		3 4 3 4	10-12'	7"	0.0	moist damp brn SILTY CLAY, little-fn. sand, tr.-little sub ang. gravels, v. poor sorting, med. plasticity		
14		4 3 2 2	12-14'	14"	0.0	12-13.5: moist-damp brn.-tan brn. CLAYEY SILT, little fn.-med. sand, tr. gravels, low plast. 13.5-14: damp tn. brn. fn.-med. SAND, w/ some silt		
16		1 1 1 2	14-16'	12"	0.0	14-14.75: wet tan brn. SILTY SAND & GRAVEL, tr. clay, loose, poor sort. 14.75-15.5: SILTY CLAY, tr. grav & sand 15.5-16:tan v. fn. SANDY SILT, well sort.		
18		3 4 4 4	16-18'	18"	0.0	16-19: v. wet tan brn. SILTY v. fn. SAND well sorted		
20		9 6 7 8	18-20'	14"	0.0	19-20: moist to damp tan red brn. SILT, tr. to little clay & gravel, tr. sand, low plast.		
22		Not recorded	20-22'	Not recorded	0.0	moist to wet tan brown SILTY v. fn. SAND, little grn. gray ang.-subang. siltstone, mod sort., v. low plast.		MW-6S screened: 20'-10' b.g.
		15 50/4"	22-24'	8"	0.0	moist to damp brown olive grn. gray CLAYEY SAND and GRAVEL, some silt, med. plast., v. poor sort.		cuttings turning brown gray around 23.5'

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BORING #: **MW-6**
Page 2 of 4
Permit #:

LOG OF BORING

Project ETE Landfill Location Gainesville, New York

Depth (feet)	Sample No.	Blows/6" 140 lbs.	Sample Inter.	Adv/Rec	Org. Vap (ppm)	Sample Description	Strata Change	Remarks (time)
26		12 15 15 12	24-26'	18"	0.0	24-25.5:dry-moist brn. to rust brn. SILT some med. sand and gravel, low plast. 25.5-26:dry gray-olive gray SILT little shale gravel, tr. v. fn. sands		
28		3 10 10 8	26-28'	19"	0.0	moist to wet SILTY v. fn. SAND, tr. little clay, tr. fn. gravels, low plast, poor to mod sorting		
30		1 3 6 7	28-30'	17"	0.0	moist to damp bm v. fn SANDY SILT, little clay, tr. gravels, then fn.-v.fn. sand and silty clay lenses		
32		3 6 7 8	30-32'	16"	0.0	30-33: moist gray SILTY v. fn. SAND, little gravel, tr. clay, poor-mod. sort., v. low plast.		
34		8 10 20 18	32-34'	15"	0.0	moist gray v. fn. SANDY SILT, little grav. tr. clay		
36		3 6 8 11	34-36'	17"	0.0	moist gray v. fn.-fn. SANDY SILT, little v. fn. submd gravels, tr. clay, low plast. poor sorting		
38		8 11 17 13	36-38'	6"	0.0	wet to moist gray CLAYEY v.fn. -fn. SAND, some silt, little fn. gravels, low plast., v. poor sorting		
40		9 7 9 9	38-40'	13"	0.0	moist gray SILTY fn.-med. SAND, some clay, little rnd to submd gravel, low plasticity, v. poor sorting, firm	3/11/98	
42		18 13 18 21	40-42'	12"	0.0	dry gray SILT, little-tr. submd. gravel, tr. med-fn. sand, v. low plastic.		
44		18 15 16 18	42-44'	24"	0.0	saturated gray SILT, little-tr. med. sand tr. gravels, tr. clay, no plasticity		
46		1 5 8 10	44-46'	10"	0.0	same as above w/clay, low-high plasticity		
		18 12 11 15	46-48'	16"	0.0	moist gray v.fn. SANDY SILT, little-tr. fn. md. gravels, tr. clay, poor to mod. sorting		

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BORING #: **MW-6**
Page 3 of 4
Permit #:

LOG OF BORING

Project ETE Landfill   Location Gainesville, New York

Depth (feet)	Sample No.	Blows/6" 140 lbs.	Sample Inter.	Adv/Rec	Org. Vap (ppm)	Sample Description	Strata Change	Remarks (time)
50		3 8 13 8	48-50'	6"	0.0	wet-moist gray SILT, some v. fn. sand tr. ang.-subang. gravels, no plast., poor-mod sorting		
52		1 10 31 25	50-52'	6"	0.0	damp gray CLAYEY SILT, some ang. gravels, low plast. firm.		
54		12 12 15 49	52-54'	19"	0.0	damp gray CLAYEY v. fn. SAND to SILT, some-little subrnd-subang. gravels, low plast., v. poorly sorted		
56		10 14 8 11	54-56'	8"	0.0	moist gray v. fn. SANDY SILT, tr. clay little rnd.-subrnd. gravel, v. poor sort. low plasticity		
58		8 10 9 11	56-58'	12"	0.0	56-56.75: wet gray fn.-cr. SAND and FN. GRAVEL, w/silt, tr. clay, loose 56.75-58: moist-dry gray SILT, tr. - little v. fn. sand, tr. fn. gravels		
60		3 7 10 10	58-60'	14"	0.0	moist gray SILTY v.fn-med. SAND, little gravel, tr. sand, no plast., poor sorting		
62		3 12 11 15	60-62'	6"	0.0	damp-wet gray CLAYEY v. fn. SAND to SILT, tr. gravels, low plast., v. poor sorting.		
64		10 15 16 18	62-64'	12"	0.0	moist-dry gray CLAYEY SILT, some v. fn. sand, tr. gravel, low-med. plast. v. poor sorting		
66		8 8 12 16	64-66'	14"	0.0	64-65.75:moist gray SILT w/ clay, little v. fn. sand, tr. gravel, med. plast., v. poor sorting 65.75-66:wet gray fn.-cr. SAND w/ silt, tr. clay & gravel, loose, no plast.		
68		15 11 11 15	66-68'	14"	0.0	dry gray SILT, little v. fn. sand, little clay, little gravel, low-v.low plast.		
70		4 12 5 5	68-70'	2"	0.0	moist gray CLAYEY SILT to V. FN. SAND, tr. gravel, med-high plast., poor sorting		
		4 7 7 12	70-72'	12"	0.0	70-74: damp gray SILT, little v. fn. sand, tr.-little clay, tr. subrnd gravels, poor sorting, v. low plasticity		MW-6D screen setting 74.5'-64.5' below grade.

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BORING #: **MW-6**

Permit #:

LOG OF BORING

Project ETE Landfill Location Gainesville, New York

Depth (feet)	Sample No.	Blows/6" 140 lbs.	Sample Inter.	Adv/Rec	Org. Vap (ppm)	Sample Description	Strata Change	Remarks (time)
72		4 8 12 12	72-74'	3"	0.0	70-74: damp gray SILT, little v. fn. sand, tr.-little clay, tr. submd gravels, poor sorting, v. low plasticity		MW-6D screen setting 74.5'-64.5' below grade.
74		1 1 9 7	74-76'	14"	0.0	74-75.5:wet gray SILTY fn.-med. SAND some clay, tr. gravels, v. poor sort. 75.5-76:wet gray v.fn.-med. SAND, w/silt, little gravel, tr. clay		
76		5 7 14 13	76-78'	16"	0.0	damp to wet gray SILT w/ some clay little v.fn. sand, tr. gravel, med.-high plasticity, v. poor sorting		
78		1 5 9 17	78-80'	20"	0.0	dry gray CLAY, little silt, tr. gravel high plasticity, mod.-well sorted		
80						End of borehole		

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BORING # **MW-7**
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LOG OF BORING

Project: ETE Landfill | Location: Gainesville, New York | Permit #:
Date Drilled: 3/13/98 | Drilling Co.: SJB Drilling Services | Job #: 0897-22149
Total Depth: 72' | Method Used: Hollow Stem Augering
Inspector: Brian Murtagh / Tom Hom | Organic Vapor Inst: OVM Model 580B TEI Inc. | Water elv: approx. 3 ft.

Depth (feet)	Sample No.	Blows/6" 140 lbs.	Sample Inter.	Adv/Rec	Org. Vap (ppm)	Sample Description	Strata Change	Remarks (time)
2		2, 3, 4, 5	0-2'	8"	0.0	0-1: damp rusty brown SILT, tr. v. fn. sand, tr. organics, low plast. 1-2: moist rusty brn. fn.-cr. SAND well sorted, black peppering of sand		
4		6, 7, 6, 5	2-4'	6"	0.0	2-4.5: damp to wet brn. SILT, some-little fn.-cr. sand, tr. fn. gravel poor sort., low plast.		@3' cuttings are wet.
6		1, 1, 1, 3	4-6'	12"	0.0	moist-wet gray brn. SILT & med. SAND, w/ thin 1/4" gray clay lenses, v. poor sorting, med. plasticity		MW-7S well screen: 15'-5' b.g.
8		2, 2, 11, 10	6-8'	15"	0.0	damp gray-olive brn. SILT, w/ clay, some fn.-cr. sand, tr. gravel, low-high plasticity, v. poor sorting		appears to be mixed fill material from 6-8'.
10		8, 15, 40, 19	8-10'	12"	0.0	damp-wet brown to rust brn. fn.-med. SANDY SILT, tr. gravels (gray-grn. siltstone/dolomite), poor sorting.		
12		14, 43, 19, 10	10-12'	8"	0.0	damp-moist olive gray SILTSTONE GRAVEL & fn.-v.cr. SAND		
14		16, 26, 29, 27	12-14'	18"	0.0	12-12.5': moist-dry gray SILT, little-tr. v.fn. sand, tr. gravel, poor-mod sorting 12.5-14: moist brn. to rust brn. SILT, fn.-v.cr. sand, some gravel, v. poor sort.		
16		4, 9, 9, 10	14-16'	17"	0.0	14-15:moist brn. olive SILT, little-tr. v. fn. sand, tr. gravel, tr. clay, low plast. 15-16:moist gray SILT, little-tr. v.fn. sand tr. gravel and clay, low-no plasticity		
18		10, 12, 9, 12	16-18'	19"	0.0	16-24: moist gray SILT, trace gravel, trace very fine sand, trace clay, mod.-poor sorting, thin 1/8"-1/2" lenses of v. fn. sand from 16-20'		
20		4, 7, 8, 10	18-20'	20"	0.0			
22		5, 9, 11, 13	20-22'	22"	0.0			
		5, 9, 12, 20	22-24'	24"	0.0			

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BORING #: **MW-7**
Page 2 of 3
Permit #:

LOG OF BORING
Project ETE Landfill   Location Gainesville, New York

Depth (feet)	Sample No.	Blows/6" 140 lbs.	Sample Inter.	Adv/Rec	Org. Vap (ppm)	Sample Description	Strata Change	Remarks (time)
		5	24-26'	23"	0.0	moist-wet gray brn. SILT, trace clay, trace fine sand		
		8						
		10						
26		14						
		14	26-28'	22"	0.0	moist wet gray brn. SILT		
		13						
		15						
28		20						
		14	28-30'	20"	0.0			
		16						
		18						
30		21				28-32: moist-wet gray brn. SILT, trace small angular gravel		
		11	30-32'	15"	0.0			
		11						
		10						
32		12						
		5	32-34'	16"	0.0	wet gray brown SILT & CR. SAND, trace small angular gravel		
		8						
		11						MW-7D well screen:
34		14						45'-35' b.g.
		3	34-36'	14"	0.0	wet gray brn SANDY SILT & CLAY, trace large subang. gravel		
		8						
		17						
36		20						
		26	36-38'	18"	0.0	wet gray brn. SILT, small-large GRAVEL (siltstone)		
		27						
		12						
38		11						
		9	38-40'	2"	0.0	wet gray brn. CLAYEY SILT, moderate plasticity.		
		9						
		12						
40		12						
		1	40-42'	22"	0.0	wet gray brn. SILT, some v. fn. sand		
		3						
		6						
42		10						
		10	42-44'	24"	0.0	same as above except 2" lense of lt. gray CLAYEY SILT		
		14						
		13						
44		15						
		4	44-46'	10"	0.0	wet gray brn. SILT, trace clay, 1" lens of lt. gray CLAY & GRAVEL, low plast.		
		12						
		32						
46		31						
		26	46-48'	22"	0.0	wet gray brn. SILT, tr. clay, tr. small gravels, low plasticity		
		14						
		10						
		19						

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BORING #: MW-7
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Permit #:

LOG OF BORING

Project ETE Landfill   Location Gainesville, New York

Depth (feet)	Sample No.	Blows/6" 140 lbs.	Sample Inter.	Adv/Rec	Org. Vap (ppm)	Sample Description	Strata Change	Remarks (time)
48		26 14 10 19	46-48'	22"	0.0	wet gray brn. SILT, trace clay, lens of clay & gravel, low plasticity		
50		11 11 13 26	48-50'	18"	0.0			
52		8 12 15 16	50-52'	17"	0.0			
54		13 18 21 20	52-54'	20"	0.0			
56		31 24 16 17	54-56'	8"	0.0	48-58': wet gray brn. SILT, trace clay, trace small rnd-subrnd black gravels		
58		12 19 58/3"	56-58'	24"	0.0			
60		6 9 12 9	58-60'	11"	0.0	wet gray brn. SILT, little clay, some sm. to med. rnd. gravel		
62		3 6 8 10	60-62'	17"	0.0	60-66': wet gray brn. SILT tr. clay, trace		
64		3 6 9 12	62-64'	18"	0.0	small subang. gravels, med plasticity		
66		2 3 2 3	64-66'	4"	0.0			
68		7 15 20 21	66-68'	24"	0.0	wet gray brn. SANDY SILT, 2" lens of gray grn. silt and gravel, 1" lens of black organics, 2" silty sand and med. gravels		organic odor noted
		23 44 45 50/4"	68-70'	24"	0.0	damp gray green SILT, low plasticity, friable, dense End of Borehole @ 70'		

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BORING # **MW-8**

LOG OF BORING

Project: ETE Landfill
Location: Gainesville, New York
Permit #:
Date Drilled: 3/5/98
Drilling Co.: SJB Drilling Services
Job #: 0897-22149
Total Depth: 78'
Method Used: Hollow Stem Augering
Inspector: Brian Murtagh
Organic Vapor Inst: OVM Model 580B TEI Inc.
Water elv: approx. 12 ft.

Depth (feet)	Sample No.	Blows/6" 140 lbs.	Sample Inter.	Adv/Rec	Org. Vap (ppm)	Sample Description	Strata Change	Remarks (time)
		1	0-2'	14"	0.0	moist lt. brn. to olive SILT, w. very fn.		black staining @ 2'
		4				to fn. sand, little clay, tr. gravel		
		1						
2		2						
		8	2-4'	19"	6.0	2-2.5': wet MSW; 2.5-3':dry gray olive		
		4				green SILT, little v. fn. sand, tr. gravel		
		3				3'-3.5': MSW (plastic, newpaper)		
4		2				3.5-4': dry gray olive green SILT, little v. fn. sand, tr. gravel		
		5	4-6'	6"	0.0	moist MSW w/ silty matrix, red paint		LEL=50%
		2				staining on split spoon		O2=15.5%
		3						H2S=0.0 ppm
6		4						
		6	6-8'	4"	0.0	MSW w/ olive gray SILT w/ clay		
		7				matrix		
		9						
8		8						
		5	8-10'	12"	7.0	8-8.25: dry olive green SANDY SILT		
		5				tr. clay, tr. gravel, loose fill.		
		9				8.25-9.75: black stained MSW		
10		8				9.75-10: dry rusty brn. olive v. fn. SANDY SILT, tr. clay		
		5	10-12'	15"	1.0	moist brn. to olive SILT, tr. fn.-med.		
		4				sand, tr. MSW (styrofoam, wood, etc.)		
		4						
12		3						
		3	12-14'	16"	2.0	14-15.75': wet MSW (plastic, metal,		apparent
		4				paper), oil staining noted		water table @ 12'
		5						
14		5						
		6	14-16'	18"	1.0			
		4				15.75'-16': dry gray olive green SILT		
		5				tr. clay, may be native material		
16		3						
		3	16-18'	12"	0.0	16-17.75': moist-dry tan brn. SILT,		
		4				tr.-little clay, tr. subrnd. gravel,		
		5				tr. root frag; 17.75-18': grading		
18		4				to a SANDY SILT		
		4	18-20'	14"	0.0	moist-dry tan orange brn. SILT, little		
		3				sand, tr. clay, tr. blk. shale frag., poor		Install MW-8s
		5				sorting, mottle with v. fn. gray sand		screen: 20'-10' b.g.
20		7						
		4	20-22'	12"	0.0	moist-damp lt. brn-olive tan		3/6/98 cont'd
		6				v. fn. SANDY SILT, tr. subang. gravel		sampling
		4				and clay, low plast., poorly sorted		
22		5				[TILL: no bedding visible]		
		5	22-24'	18"	0.0	Same as above except grading to		
		7				med-cr. SANDY SILT, some gravel		
		7						
		6						

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BORING #: **MW-8**
Page 2 of 4
Permit #:

LOG OF BORING

Project ETE Landfill Location Gainesville, New York

Depth (feet)	Sample No.	:ows/6" :0 lbs.	Sample Inter.	Adv/Rec	Org. Vap (ppm)	Sample Description	Strata Change	Remarks (time)
		5	24-26'	12"	0.0	moist brn. to dk. olive brn. SILTY CLAY		
		5				some v. fn. sand, little subrnd-subang.		
		6				gravels, poorly sorted, matrix has med.		
26		6				plastic.		
		6	26-28'	14"	0.0	Same as above, except grades to a		
		9				sandy silt for a 2" thickness		
		9						
28		9						
		7	28-30'	10"	0.0			
		7						
		13				28-32: moist brn to rusty olive brn. SILTY		
30		17				V. FN. -CR. SAND, little ang. to subang.		
		4	30-32'	4"	0.0	gravel, tr. clay, no plast., poorly sort.		
		10						
		11						
32		12						
		7	32-34'	20"	0.0	32-32.5: v. wet brn peppared black		
		8				fn.-cr. SAND, little silt, little fn. gravels		
		8				32.5-33:wet multicolored fn.-cr.		
34		10				SAND and GRAVEL, tr. silt, no plast.		
		6	34-36'	12"	0.0	33-38': moist gray v. fn. SANDY SILT		strange odor noted
		8				tr. to little clay, tr. subang. gravels,		at 36'. Check inside
		9				low-med. plast., v. poorly sort., fining		augers. LEL=75%
36		14				downward grading		H2S=2 ppm,
		10	36-38'	12"	0.0			O2=17.8%,
		13						venting augers
		20						
38		20						
		10	38-40'	15"	0.0	moist-damp gray to slightly brn. SILTY		gravels are shale,
		12				FN-CR. SAND, tr. clay, some-little ang.		siltstone, dolomite
		38				to subrnd. gravels, v. low plast, poor		
40		15				sorting		
		13	40-42'	14"	0.0	40-43: wet gray v.fn.-fn. SAND,		
		14				w/silt, little to some gravels,		
		14				no plast., poor sort.		
42		14						
		8	42-44'	17"	0.0			
		26						
		10				43-46: gray SILTY v.fn.-cr. SAND, little		
44		12				gravel, little clay, stiff, low plast., v. poor		
		8	44-46'	13"	0.0	sorting		
		14						
		40						
46		12						
		8	46-48'	24"	0.0	46-46.5: wet gray v. fn. SANDY SILT		
		10				tr. grav., firm, v. poor sort.		
		11				46.5-48: wet gray SILTY SAND, tr. clay		
		12				tr. fn. ang. grav., loose to firm, fining downward.		

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BORING #: **MW-8**

Permit #:

LOG OF BORING

Project ETE Landfill Location Gainesville, New York

Depth (feet)	Sample No.	Blows/6" 140 lbs.	Sample Inter.	Adv/Rec	Org. Vap (ppm)	Sample Description	Strata Change	Remarks (time)
		7	48-50'	19"	0.0	moist gray v. fn. SANDY SILT, some		
		7				clay, tr. to no gravel, med. plast.		
		7				poor sorting.		
50		8						
		1	50-52'	14"	0.0	50-51:moist gray CLAYEY SILT, tr. v.		
		2				fn. sand, tr. grav.,med plast, poor sort.		
		8				51-52:moist gray SILTY v.fn.-fn. SAND		
52		4				tr. gravels, tr. clay, v. low plast., poor sorting		
		15	52-54'	3"	0.0	v. wet gray CLAYEY fn.-med. SAND		
		20				and SILT, w/ gravel, loose material,		
		20				low plast, v. poor sort., tacky		
54		23						
		7	54-56'	15"	0.0	moist-dry gray SILTY v.fn-fn. SAND,		
		13				little-tr. gravel, tr. clay, poor sorting,		
		18				v. low plast., compacted material.		
56		26						
		19	56-58'	12"	0.0	56-57:dry gray-red brn. SILT, tr. clay		
		22				tr. gravel and v. fn. sand, low plast.		
		22				57-58:dry gray-dk. gray SILT, little clay		
58		22				little grav, tr. sand, low plast, stiff		
		4	58-60'	14"	0.0	moist gray SILTY CLAY, tr. to little		
		6				gravel, tr. v. fn sand, med-high plast		
		7						
60		9						
		2	60-62'	8"	0.0	60-62.75: v. wet gray fn.-cr. SAND &		
		6				GRAVEL some silt, loose		
		8						
62		9						
		9	62-64'	15"	0.0	62.75-63: red brn. v. fn. SILTY SAND		
		10				tr.-little clay, low plast.		
		9				63-64: moist-dry gray SILTY v.fn.-fn.		
64		11				SAND, little gravel, tr. clay		
		2	64-66'	10"	0.0	wet gray to black gray fn.-cr. SAND		
		1				w/ silt, well sort.		
		2						
66		5						
		9	66-68'	17"	0.0	66-67:moist gray v. fn. SANDY SILT		
		12				tr.-little clay, tr. gravels, poor sort		
		11				67-68: moist to wet gray SILT, little clay		thin lamination
68		11				tr. v. fn. sand, med-well sort.		bedding visible
		1	68-70'	12"	0.0	wet gray SILT, some clay, med-high		
		6				plast., well sort., v. thin lamination bed.		
		7						
68		11						
		30	70-72'	8"	0.0	70-71:gray wet GRAVEL, little clay and		
		32				silt matrix, poor sort, loose		MW-8D screen
		14				71-72:moist gray CLAYEY fn.-med.		setting 72'-62' b.g.
72		10				SAND, some silt, med. plast, mod. sort.		

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BORING #: **MW-8**

Permit #:

LOG OF BORI

Project ETE Landfill   Location Gainesville, New York

Depth (feet)	Sample No.	Blows/6" 140 lbs.	Sample Inter.	Adv/Rec	Org. Vap (ppm)	Sample Description	Strata Change	Remarks (time)
74		13 14 15 16	72-74'	12"	0.0	saturated tacky wet gray v. fn. SANDY SILT, some clay, tr. gravels, med.-high plast, poor-mod. sort.		
76		1 4 7 7	74-76'	13"	0.0	74-78: moist gray v. fn. SILTY SAND, little little-tr. clay, little fn. gravels, med.-low plast., poor-mod. sort.		
78		5 8 9 8	76-78'	14"	0.0			
						End of borehole		

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BORING # **MW-9**
Page 1 of 4
Permit #:
Job #: 0897-22149
Water elv: approx.4 ft.

LOG OF BORING

Project ETE Landfill
Date Drilled 3/19/98
Total Depth 76'
Inspector Tom Horn

Location Gainesville, New York
Drilling Co.: SJB Drilling Services
Method Used: Hollow Stem Augering
Organic Vapor Inst: OVM Model 580B TEI Inc.

Depth (feet)	Sample No.	Blows/6" 140 lbs.	Sample Inter.	Adv/Rec	Org. Vap (ppm)	Sample Description	Strata Change	Remarks (time)
2		1 2 2 1	0-2'	6"	0.0	wet dk. brown SANDY SILT, trace organics, tr. clay		
4		1 2 4 3	2-4'	20"	0.0	wet brown SANDY SILT, medium plasticity		
6		1 7 12 12	4-6'	12"	0.0	wet brown SANDY SILT, trace small angular gravel		MW-9S screen: 15'-5' b.g.
8		10 9 10 10	6-8'	14"	0.0	damp brown SANDY SILT, some red brown subrnd. gravel		
10		17 12 10 11	8-10'	6"	0.0	damp brown SANDY SILT and brown red GRAVEL		
12		5 7 9 11	10-12'	20"	0.0	damp brown SILT, little very fine sand, some small-med. gravel		
14		5 7 10 11	12-14'	24"	0.0	12-13: wet lt. brown-orange-brown SILT, little fine sand 13-14: wet lt. brn. SILT and angular GRAVEL, little v. fine sand,		
16		14 10 10 10	14-16'	24"	0.0	wet brown-light brown SILT and med. SAND, tr. coarse sand		
18		6 8 9 9	16-18'	22"	0.0	wet brown-light brown SILT and med. to cr. SAND		
20		5 6 8 11	18-20'	18"	0.0	damp light brown SILT and med.-cr. SAND, trace clay		
22		6 8 9 10	20-22'	15"	0.0	damp brown SILT and med. SAND, tr. clay, tr. angular med. gravel, medium plasticity		
		12 30 48 21	22-24'	20"	0.0	moist tan-lt. gray SILT, dense, low plasticity, 3" diam. siltstone gravel		

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BORING #: MW-9

Permit #:

LOG OF BORING

Project ETE Landfill   Location Gainesville, New York

Depth (feet)	Sample No.	Blows/6" 140 lbs.	Sample Inter.	Adv/Rec	Org. Vap (ppm)	Sample Description	Strata Change	Remarks (time)
		12	24-26'	14"	0.0	damp lt. gray SILT, dense, low plast.		
		10				tr. sm. rnd-submd gravel		
		10						
26		10						
		4	26-28'	14"	0.0	26-30: wet pale lavender-red-tan SILT		
		6						
		9						
28		9						
		6	28-30'	2"	0.0			
		8						
		9						
30		11						
		5	30-32'	18"	0.0	damp tan gray SILT, trace small gravel		
		11				trace siltstone		
		13						
32		12						
		22	32-34'	20"	0.0	damp tan gray SILT, trace subrnd.		
		22				gravel, tr. brick red gravel		
		22						
34		18						
		11	34-36'	15"	0.0	wet tan-gray SILT, trace siltstone,		
		15				trace small rounded gravel		
		23						
36		24						
		11	36-38'	18"	0.0	wet gray brown SILT and med. angular		
		14				GRAVEL		
		14						
38		17						
		10	38-40'	12"	0.0	damp gray SILT, trace fine sand, trace		
		12				med. subangular gravel		
		9						
40		10						
		14	40-42'	10"	0.0	wet gray brown SILT, little very fine		
		14				sand, trace fine sand		
		16						
42		20						
		19	42-44'	0"	0.0	no recovery		
		18						
		23						
44		22						
		8	44-46'	10"	0.0	wet gray brown SILT, some med.		
		9				angular gravel		
		10						
46		12						
		9	46-48'	12"	0.0	wet gray brown SILT, some small-med.		
		12				angular gravel		
		11						
		12						

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BORING #: **MW-9**

Permit #:

LOG OF BORING

Project ETE Landfill   Location Gainesville, New York

Depth (feet)	Sample No.	Blows/6" 140 lbs.	Sample Inter.	Adv/Rec	Org. Vap (ppm)	Sample Description	Strata Change	Remarks (time)
50		13 10 9 9	48-50'	12"	0.0	wet gray brown SILT, trace fine sand, trace small angular gravel		
52		1 3 7 6	50-52'	18"	0.0	wet gray brown SILT, some clay, trace coarse gravel		
54		10 13 13 11	52-54'	20"	0.0	wet gray brown SILT, trace very fine sand, trace clay		
56		8 10 10 11	54-56'	24"	0.0	wet gray brown SILT, with sm. - med. subrounded gravel, dense		
58		8 10 18 22	56-58'	10"	0.0	wet gray brown SILT, some sm.-med. subrounded gravels		
60		8 19 17 13	58-60'	0"	0.0			no recovery
62		6 4 7 9	60-62'	0"	0.0			no recovery
64		9 10 12 13	62-64'	8"	0.0	wet gray brown SILT, trace medium subangular gravel		
66		1 5 11 19	64-66'	12"	0.0	wet brown gray SILT, trace small rounded gravels		
68		29 33 35 50	66-68'	8"	0.0	wet brown CLAYEY SILT		
70		4 16 18 18	68-70'	14"	0.0	wet brown clay SILT with olive green siltstone gravel, some med. sand.		
		3 15 45 41	70-72'	12"	0.0	wet gray very fine to coarse SAND		

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LOG OF BORING

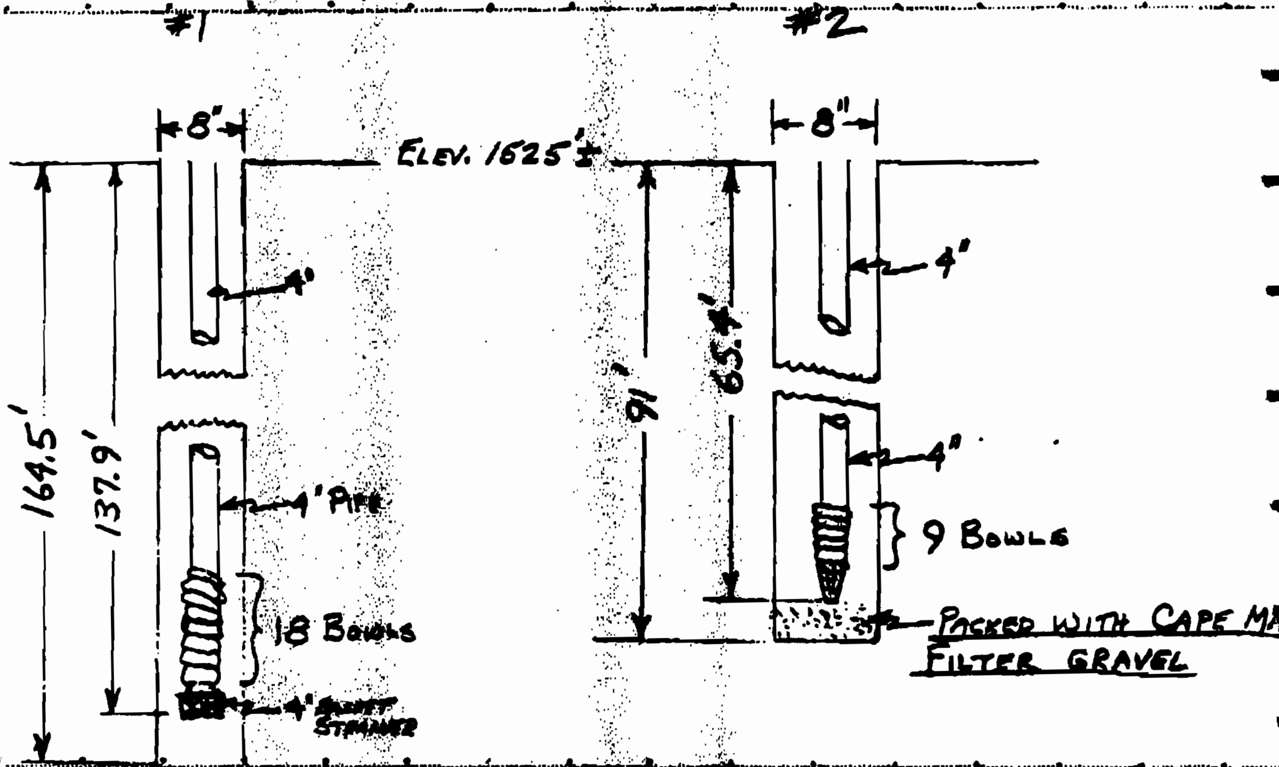
Project ETE Landfill   Location Gainesville, New York

BORING #: **MW-9**
Page 4 of 4
Permit #:

Depth (feet)	Sample No.	ws/6" 0 lbs.	Sample Inter.	Adv/Rec	Org. Vap (ppm)	Sample Description	Strata Change	Remarks (time)
74		26 32 50 53	72-74'	19"	0.0	wet gray very fine to coarse SAND, trace small subangular gravel		MW-9D screen: 74'-64' b.g.
76		29 50/3"	74-76'	4"	0.0	wet green gray SILT and SILTSTONE		
						End of borehole		

Village of Silver Springs, New York

Water Supply Well Log



WELL NO. 1

DRILLED 1952 BY CRANSTON. RATED AT 115 g.p.m.
PUMP - U.S. VERT. TURBINE SERIAL # SN 18918 RATED AT 112 g.p.m.
@ 188' T.D.H. @ 1800 RPM TOTAL DEPTH 242'

WELL NO. 2

DRILLED & TESTED 1958 BY CRANSTON. RATED AT 175 g.p.m.
175 g.p.m. PUMPED FOR 12 HRS. WITH 2¼ FT. DRAWDOWN.
PUMP - WORTHINGTON VERT. TURBINE SERIAL # VTP-349 RATED
AT 125 g.p.m. @ 100' T.D.H. @ 1760 RPM TOTAL DEPTH 91'

LOG OF WELL NO. P - 1 (1957)
VILLAGE OF SILVER SPRINGS, NEW YORK

PROPERTY: George Hume (later purchased by Village)

LOCATION: 284.0' W. from Village incorporation line (outside)
241.5' N. from CL of Church Street (extended)
323.0' W. from B & O RR track
185.5' W. from Hume 1¼" private driven well 24.15' deep
142.0' S. from N. property line
Town of Gainesville, Wyoming County, New York

ELEVATION: 1525' approx. Castile Quad. (31,680)

CREW: H. Pickard, driller; G. Barkley, helper. (Stardrill #72)

DATE STARTED: July 26, 1957 — June 18, 1958

DATE COMPLETED: December 9, 1957 — July 7, 1958

HOLE DIAMETERS: 10" drive pipe to 96' (pulled after well completed)
8" drive pipe to 164.59' (cemented outside of 8" pipe)
8" uncased borehole to 242' depth.

FIRST WATER @ 32' depth.

BEDROCK @ 161' depth.

TEST SCREEN SET FROM 73.6' to 82.25' depth.

PUMPING TEST: 115 GPM @ 91' P.L. (completed) Static level approx. 6.0' ab. gr.

FROMATIONS	TOP	BOTTOM	THICK.
Top soil, clay, some gravel	0.0'	32.0'	32.0'
Sand & gravel, W. B.	32.0	40.0	8.0
Clay, very fine sand	40.0	52.0	12.0
Sand & gravel, thin layer clay, W.B.	52.0	91.0	39.0
Clay, large % sand & gravel	91.0	104.0	13.0
Clay, some sand & gravel, gray	104.0	131.0	27.0
Clay, gray, soft	131.0	137.0	6.0
Clay, some fine gravel, light-gray	137.0	147.0	10.0
Clay, some fine gravel, yellowish-brown	147.0	161.0	14.0
Bedrock	161.0		
Shale, gray, soft	161.0	182.0	21.0
Shale, gray, harder	182.0	189.0	7.0
Shale, gray, soft (W.B.)	189.0	201.0	12.0
Shale, gray, harder	201.0	203.0	2.0
Shale, gray, alternating hard & soft layers (W.B. 201-9)	203.0	232.0	29.0
Shale, light-gray, hard, odor of nat. gas	232.0	236.0	4.0
Shale, gray, soft	236.0	242.0	6.0

Total Depth: 242.0'

CRANSTON WATER SUPPLY
DANSVILLE, NEW YORK

(Cont'd. Next Page)

LOG OF WELL NO. P - 2 ('58)
VILLAGE OF SILVER SPRINGS, NEW YORK

PROPERTY: George Hume (later purchase by Village)

LOCATION: 11.5' W. from Well P - 1
295.5' W. from Village incorporation line (outside)
334.5' W. from B. & O. RR track
197.0' W. from Hume 1¼" private driven well 24.15' deep
132.5' S. from N. property line.
Town of Gainesville, Wyoming County, New York

ELEVATION: 1525' approx. Castile Quad. (31,680 scale)

CREW: H. Pickard, driller; G. Barclay, helper. (Stardrill 72).

DATE STARTED: May 16, 1958

DATE COMPLETED: June 18, 1958

HOLE DIAMETERS: 16" borehole W/casing to 22' depth, pulled when 12" cemented.
12" outer or sheath casing to 82.09'
8" inner casing, top of back-off collar 59.65'

SCREEN SET FROM: 82' to 90.8' depth on 8" pipe.
Screen 8" ID silicon-bronze, slot #125, 8.0' slot-section, bottom silicon-bronze plate closed, top 8", 8-pitch thrd.
No. 5 Cape May filter gravel used for gravel filter, top of filter gravel 72.05'.

PUMPING TEST: June 13, 1958, with airlift system obtained 175 GPM @ 27.8' P.L. with drawdown in 8" Deep Well 11.5' away 2.25' after 12 hours continuous pumping.
Water clear and without turbidity.

FORMATIONS	TOP	BOTTOM	THICK.
Top soil, clay, some gravel	0.0'	32.0'	32.0'
Sand & gravel, some clay, W.B.	32.0	47.0	15.0
Clay, very fine sand	47.0	55.0	8.0
Clay, sand, fine gravel, W.B.	55.0	63.0	8.0
Sand & gravel, thin layers clay, W.B.	63.0	91.0	28.0

Total Depth: 91.0'

REMARKS: Screen set at depth interval given above and Cape May filter gravel fed during agitation process. Water cleared readily and after few days of agitation; and well developed normally with filter gravel feeding as it should around screen.

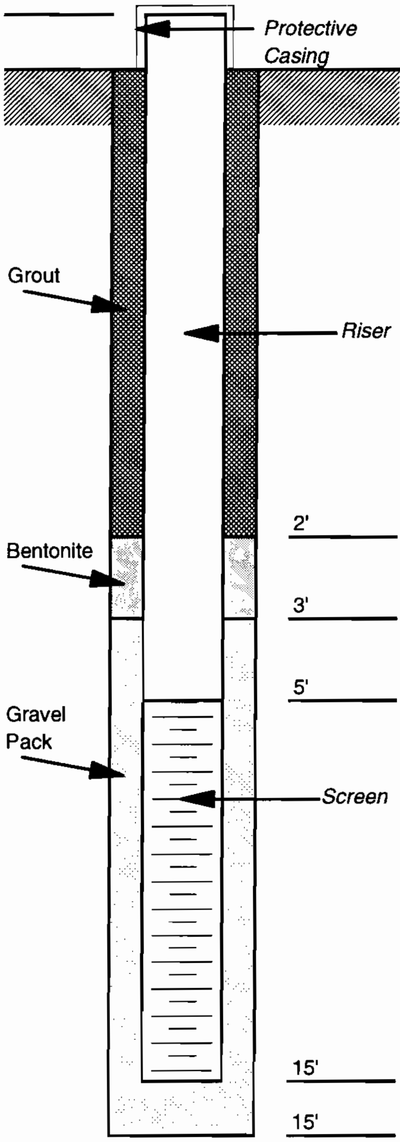
CRANSTON WATER SUPPLY
DANSVILLE NEW YORK
January 23, 1960

CDM
environmental engineers, scientists,
planners & management consultants

WELL CONSTRUCTION SUMMARY

Project: ETE Landfill
Location: Gainesville, New York
Well No.: **PZ-1**
Permit No.:

TOC elev.:



Type Monitoring Well

DRILLING SUMMARY

Drilling Company: SJB Drilling Services
Drillers: Art and Dale
Drill Rig/Model: Central Mine Equip. Comp. FN160
Borehole Diameters: 7.5"
Drilling Fluid: None
Bits/Depths: Drill bit is 7" in diam.
Total Depth: 18'
Depth To Water: 3.22'
Supervisor Geologist: Brian Murtagh

WELL DESIGN

Casing Material:	sched. 40 PVC	Diameter:	2"
Screen Size:	10 foot	Diameter:	2"
Slot Size:	.010"	Setting:	18'-8'
Filter Material:	Granusil 2400 (single 0)	Setting:	18'-6'
Seals Material:	Med. Bentonite Chips	Setting:	6'-4'
Grout:	Portland-Bentonite Mix	Setting:	4'-grade
Surface Casing Material:	flush mount	Setting:	at grade

TIME LOG

	Started	Completed
Drilling:	3/24/98	3/24/98
Installation:	3/24/98	3/24/98
Development:	3/27/98	3/27/98

WELL DEVELOPMENT

Method: Handbail (2 hrs. total)
Static Depth to Water: 3.22'
Pumping Depth To Water:
Pumping Rate:
Spec. Capacity:
Volume Pumped: approx. 30 gal.

CDM

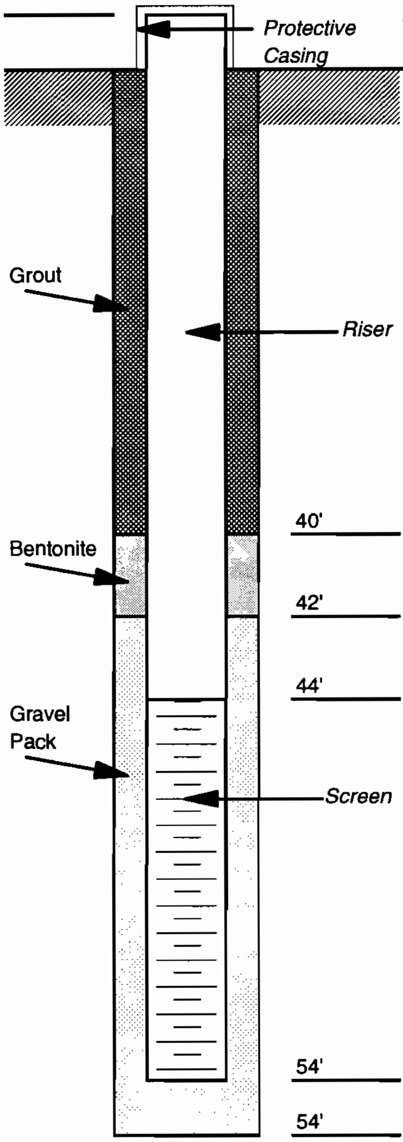
environmental engineer[illegible] scientists,
planners & managemer[illegible] consultants

WELL CONSTRUCTION SUMMARY

Project: ETE Landf[illegible] ____ Location: Gainesville, New York

Well No.: **PZ-2**
Permit No.: ____

TOC elev.: ____



Type Monitoring Well

DRILLING SUMMARY

Drilling Company: SJB Drilling Services Drillers: Art and Dale
Drill Rig/Model: Central Mine Equip. Comp. FN160
Borehole Diameters: 7.5" Drilling Fluid: None
Bits/Depths: Drill bit is 7" in diam.
Total Depth: 58' Depth To Water: ____
Supervisor Geologist: Brian Murtagh

WELL DESIGN

Casing Material:	sched. 40 PVC	Diameter:	2"
Screen Size:	10 foot	Diameter:	2"
Slot Size:	.010"	Setting:	54'-44'
Filter Material:	Granusil 2400 (single 0)	Setting:	54'-42'
Seals Material:	Med. Bentonite Chips	Setting:	42'-39'
Grout:	Portland-Bentonite Mix	Setting:	39'-grade
Surface Casing Material:	flush mount	Setting:	at grade

TIME LOG

	Started	Completed
Drilling:	3/23/98	3/26/98
Installation:	3/26/98	3/26/98
Development:	3/27/98	3/27/98

WELL DEVELOPMENT

Method: Handbail (2 hrs. total)
Static Depth to Water: 4.0'
Pumping Depth To Water: ____
Pumping Rate: ____ Spec. Capacity: ____
Volume Pumped: approx. 30 gal.

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WELL CONSTRUCTION SUMMARY

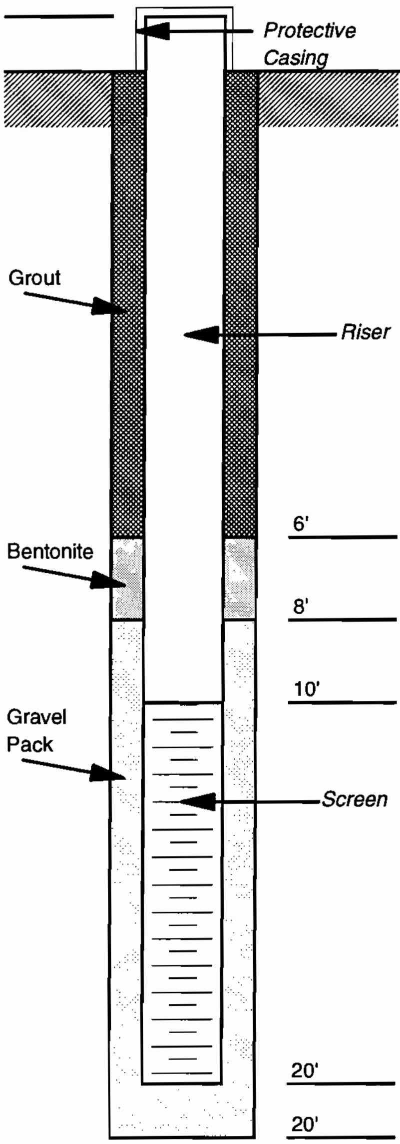
Project: ETE Landfill

Location: Gainesville, New York

Well No.: **PZ-3**

Permit No.:

TOC elev.:



Type Monitoring Well

DRILLING SUMMARY

Drilling Company: SJB Drilling Services
Drillers: Art and Dale
Drill Rig/Model: Central Mine Equip. Comp. FN160
Borehole Diameters: 7.5"
Drilling Fluid: None
Bits/Depths: Drill bit is 7" in diam.
Total Depth: 20'
Depth To Water:
Supervisor Geologist: Brian Murtagh

WELL DESIGN

Casing Material:	sched. 40 PVC	Diameter:	2"
Screen Size:	10 foot	Diameter:	2"
Slot Size:	.010"	Setting:	20'-10'
Filter Material:	Granusil 2400 (single 0)	Setting:	20'-8'
Seals Material:	Med. Bentonite Chips	Setting:	8'-6'
Grout:	Portland-Bentonite Mix	Setting:	6'-grade
Surface Casing Material:	Procasing stickup	Setting:	above grade

TIME LOG

	Started	Completed
Drilling:	3/5/98	3/5/98
Installation:	3/5/98	3/5/98
Development:	3/16/98	3/16/98

WELL DEVELOPMENT

Method: Handbail and submersible pump (2 hrs. total)
Static Depth to Water: 4.35'
Pumping Depth To Water:
Pumping Rate: 1 gpm
Spec. Capacity:
Volume Pumped: 51 gal.

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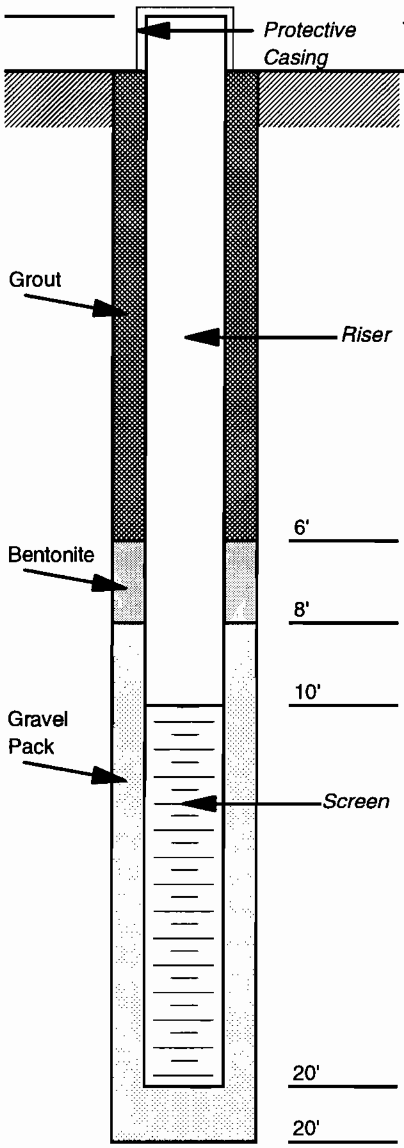
WELL CONSTRUCTION SUMMARY

Project: ETE Landfill   Location: Gainesville, New York   Well No.: **MW-6S**

Permit No.:

TOC elev.:



Type Monitoring Well

DRILLING SUMMARY

Drilling Company: SJB Drilling Services   Drillers: Art and Dale

Drill Rig/Model: Central Mine Equip. Comp. FN160

Borehole Diameters: 7.5"   Drilling Fluid: None

Bits/Depths: Drill bit is 7" in diam.

Total Depth: 20'   Depth To Water:

Supervisor Geologist: Brian Murtagh

WELL DESIGN

Casing Material:	sched. 40 PVC	Diameter:	2"
Screen Size:	10 foot	Diameter:	2"
Slot Size:	.010"	Setting:	20'-10'
Filter Material:	Granusil 2400 (single 0)	Setting:	20'-8'
Seals Material:	Med. Bentonite Chips	Setting:	8'-6'
Grout:	Portland-Bentonite Mix	Setting:	6'-grade
Surface Casing Material:	Procasing stickup	Setting:	above grade

TIME LOG

	Started	Completed
Drilling:	3/10/98	3/10/98
Installation:	3/10/98	3/10/98
Development:	3/16/98	3/16/98

WELL DEVELOPMENT

Method: Handbail and submersible pump (2 hrs. total)

Static Depth to Water: 14.0'

Pumping Depth To Water:

Pumping Rate: 0.2 gpm   Spec. Capacity:

Volume Pumped: 15 gal.

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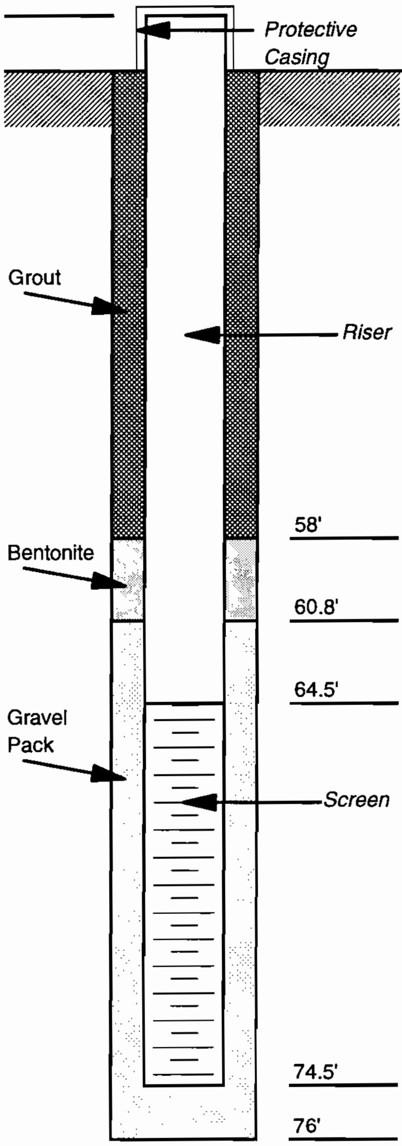
WELL CONSTRUCTION SUMMARY

Project: ETE Landfill   Location: Gainesville, New York   Well No.: **MW-6D**
Permit No.:

TOC elev.:

Type Monitoring Well



DRILLING SUMMARY

Drilling Company: SJB Drilling Services   Drillers: Art and Dale
Drill Rig/Model: Central Mine Equip. Comp. FN160
Borehole Diameters: 7.5"   Drilling Fluid: None
Bits/Depths: Drill bit is 7" in diam.
Total Depth: 76'   Depth To Water:
Supervisor Geologist: Brian Murtagh

WELL DESIGN

Casing Material:	sched. 40 PVC	Diameter:	2"
Screen Size:	10 foot	Diameter:	2"
Slot Size:	.010"	Setting:	74.5'-64.5'
Filter Material:	Granusil 2400 (single 0)	Setting:	76'-60.8'
Seals Material:	Med. Bentonite Chips	Setting:	60.8-58.0'
Grout:	Grout/Bentonite Mix	Setting:	58'-grade
Surface Casing Material:	Procasing stickup	Setting:	above grade

TIME LOG

	Started	Completed
Drilling:	3/10/98	3/12/98
Installation:	3/12/98	3/12/98
Development:	3/16/98	3/16/98

WELL DEVELOPMENT

Method: Handbail and submersible pump (2 hrs. total)
Static Depth to Water: 12.0'
Pumping Depth To Water:
Pumping Rate: 0.5 gpm   Spec. Capacity:
Volume Pumped: 62 gal.

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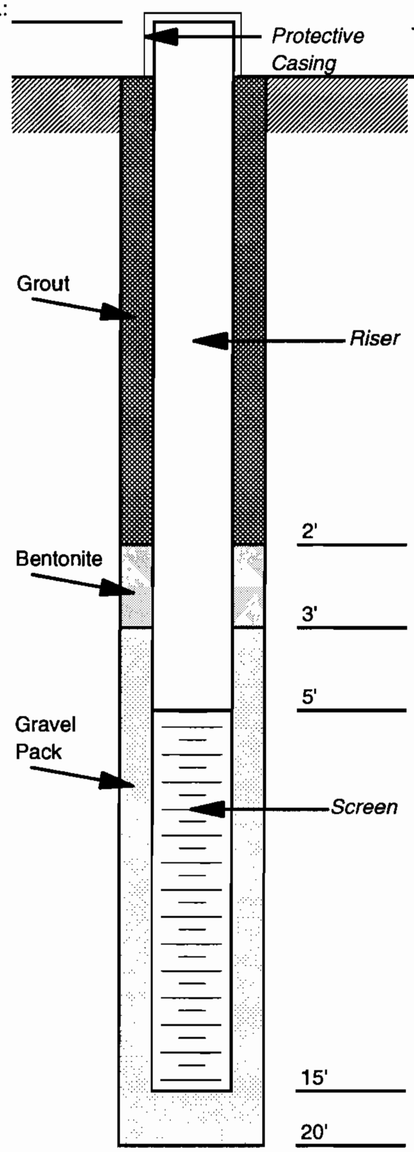
WELL CONSTRUCTION SUMMARY

Project: ETE Landfill   Location: Gainesville, New York   Well No.: **MW-7S**
Permit No.:

TOC elev.:



Type Monitoring Well

DRILLING SUMMARY

Drilling Company: SJB Drilling Services   Drillers: Art and Dale
Drill Rig/Model: Central Mine Equip. Comp. FN160
Borehole Diameters: 7.5"   Drilling Fluid: None
Bits/Depths: Drill bit is 7" in diam.
Total Depth: 20'   Depth To Water:
Supervisor Geologist: Brian Murtagh

WELL DESIGN

Casing Material:	sched. 40 PVC	Diameter:	2"
Screen Size:	10 foot	Diameter:	2"
Slot Size:	.010"	Setting:	15'-5'
Filter Material:	Granusil 2400 (single 0)	Setting:	20'-3'
Seals Material:	Med. Bentonite Chips	Setting:	3'-2'
Grout:	Portland-Bentonite Mix	Setting:	2'-grade
Surface Casing Material:	Procasing stickup	Setting:	above grade

TIME LOG

	Started	Completed
Drilling:	3/17/98	3/17/98
Installation:	3/17/98	3/17/98
Development:	3/25/98	3/25/98

WELL DEVELOPMENT

Method: Handbail (2 hrs. total)
Static Depth to Water: 3.3'
Pumping Depth To Water:
Pumping Rate: Spec. Capacity:
Volume Pumped: 35 gal.

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WELL CONSTRUCTION SUMMARY

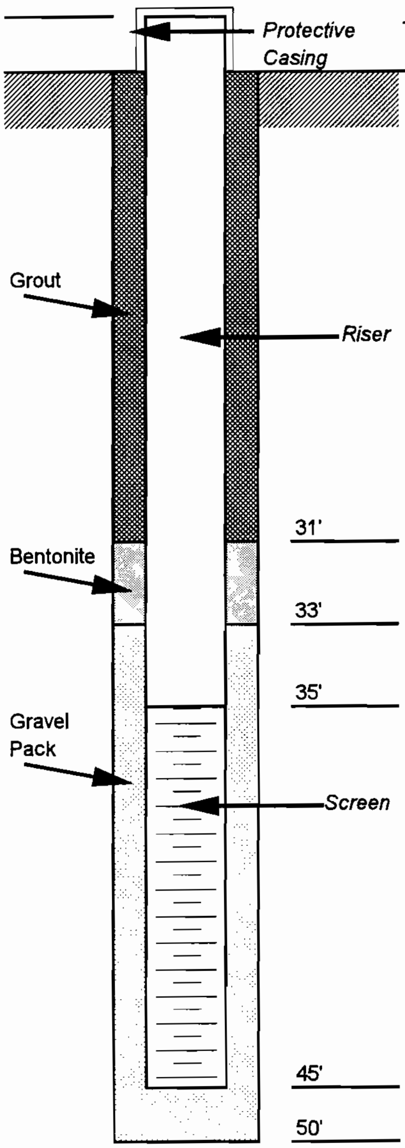
Project: ETE Landfill

Location: Gainesville, New York

Well No.: **MW-7D**

Permit No.:

TOC elev.:



Typ Monitoring Well

DRILLING SUMMARY

Drilling Company: SJB Drilling Services
Drillers: Art and Dale
Drill Rig/Model: Central Mine Equip. Comp. FN160
Borehole Diameters: 7.5"
Drilling Fluid: None
Bits/Depths: Drill bit is 7" in diam.
Total Depth: 72.5'
Depth To Water:
Supervisor Geologist: Tom Horn

WELL DESIGN

Casing Material:	sched. 40 PVC	Diameter:	2"
Screen Size:	10 foot	Diameter:	2"
Slot Size:	.010"	Setting:	45'-35'
Filter Material:	Granusil 2400 (single 0)	Setting:	50'-33'
Seals Material:	Med. Bentonite Chips	Setting:	33'-31'
Grout:	Grout/Bentonite Mix	Setting:	31'-grade
Surface Casing Material:	Procasing stickup	Setting:	above grade

TIME LOG

	Started	Completed
Drilling:	3/13/98	3/17/98
Installation:	3/17/98	3/18/98
Development:	3/25/98	3/25/98

WELL DEVELOPMENT

Method: Handbail and submersible pump (2 hrs. total)
Static Depth to Water: 9.7'
Pumping Depth To Water:
Pumping Rate:
Spec. Capacity:
Volume Pumped: 33 gal.

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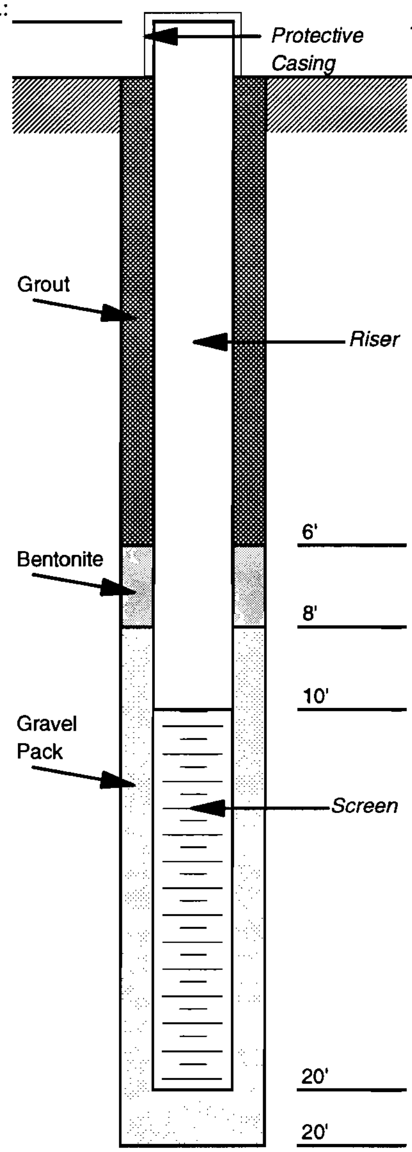
environmental engineers, scientists,
planners & management consultants

WELL CONSTRUCTION SUMMARY

Project: ETE Landfill | Location: Gainesville, New York | Well No.: **MW-8S**
Permit No.:

TOC elev.:



Type Monitoring Well

DRILLING SUMMARY

Drilling Company: SJB Drilling Services | Drillers: Art and Dale
Drill Rig/Model: Central Mine Equip. Comp. FN160
Borehole Diameters: 7.5" | Drilling Fluid: None
Bits/Depths: Drill bit is 7" in diam.
Total Depth: 20' | Depth To Water:
Supervisor Geologist: Brian Murtagh

WELL DESIGN

Casing Material:	sched. 40 PVC	Diameter:	2"
Screen Size:	10 foot	Diameter:	2"
Slot Size:	.010"	Setting:	20'-10'
Filter Material:	Granusil 2400 (single 0)	Setting:	20'-8'
Seals Material:	Med. Bentonite Chips	Setting:	8'-6'
Grout:	Portland-Bentonite Mix	Setting:	6'-grade
Surface Casing Material:	Procasing stickup	Setting:	above grade

TIME LOG

	Started	Completed
Drilling:	3/5/98	3/5/98
Installation:	3/5/98	3/5/98
Development:	3/13/98	3/13/98

WELL DEVELOPMENT

Method: Handbail (1.5 hrs. total)
Static Depth to Water: 7.0'
Pumping Depth To Water:
Pumping Rate: | Spec. Capacity:
Volume Pumped: 30 gal.

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WELL CONSTRUCTION SUMMARY

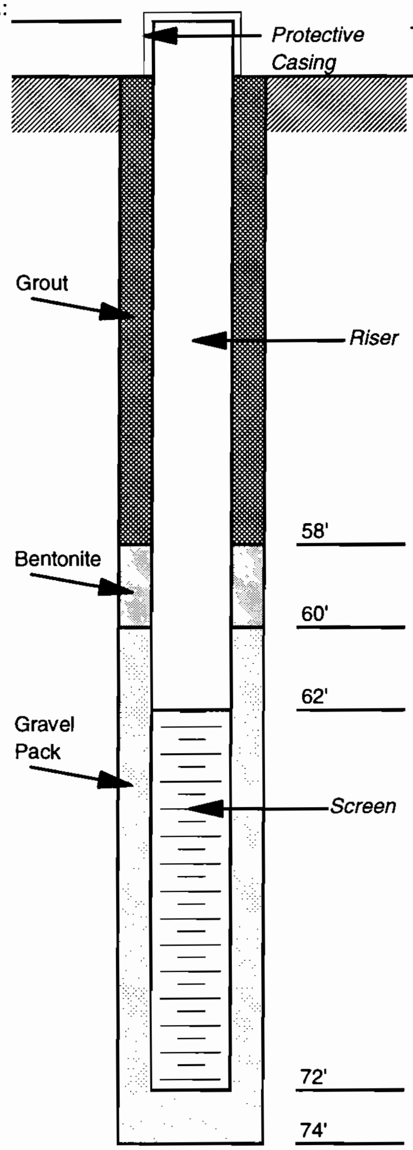
Project: ETE Landfill

Location: Gainesville, New York

Well No.: **MW-8D**

Permit No.:

TOC elev.:



Type Monitoring Well

DRILLING SUMMARY

Drilling Company: SJB Drilling Services   Drillers: Art and Dale
Drill Rig/Model: Central Mine Equip. Comp. FN160
Borehole Diameters: 7.5"   Drilling Fluid: None
Bits/Depths: Drill bit is 7" in diam.
Total Depth: 72'   Depth To Water:
Supervisor Geologist: Brian Murtagh

WELL DESIGN

Casing Material:	sched. 40 PVC	Diameter:	2"
Screen Size:	10 foot	Diameter:	2"
Slot Size:	.010"	Setting:	72'-62'
Filter Material:	Granusil 2400 (single 0)	Setting:	74'-60'
Seals Material:	Med. Bentonite Chips	Setting:	60'-58'
Grout:	Grout/Bentonite Mix	Setting:	58'-grade
Surface Casing Material:	Procasing stickup	Setting:	above grade

TIME LOG

	Started	Completed
Drilling:	3/6/98	3/9/98
Installation:	3/9/98	3/9/98
Development:	3/13/98	3/13/98

WELL DEVELOPMENT

Method: Handbail and submersible pump (2 hrs. total)
Static Depth to Water: 7.0'
Pumping Depth To Water:
Pumping Rate: 1.66 gpm   Spec. Capacity:
Volume Pumped: 140 gal.

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environmental engineers, scientists,
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WELL CONSTRUCTION SUMMARY

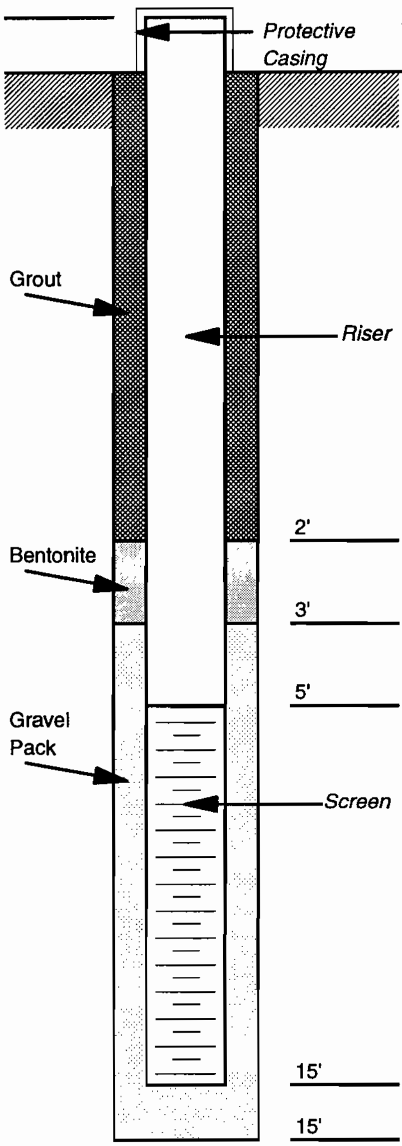
Project: ETE Landfill

Location: Gainesville, New York

Well No.: **MW-9S**

Permit No.:

TOC elev.:



Type: Monitoring Well

DRILLING SUMMARY

Drilling Company: SJB Drilling Services
Drillers: Art and Dale
Drill Rig/Model: Central Mine Equip. Comp. FN160
Borehole Diameters: 7.5"
Drilling Fluid: None
Bits/Depths: Drill bit is 7" in diam.
Total Depth: 15'
Depth To Water: 1.7'
Supervisor Geologist: Tom Horn

WELL DESIGN

Casing Material:	sched. 40 PVC	Diameter:	2"
Screen Size:	10 foot	Diameter:	2"
Slot Size:	.010"	Setting:	15'-5'
Filter Material:	Granusil 2400 (single 0)	Setting:	15'-3'
Seals Material:	Med. Bentonite Chips	Setting:	3'-2'
Grout:	Portland-Bentonite Mix	Setting:	2'-grade
Surface Casing Material:	Procasing stickup	Setting:	above grade

TIME LOG

	Started	Completed
Drilling:	3/20/98	3/20/98
Installation:	3/20/98	3/20/98
Development:	3/25/98	3/26/98

WELL DEVELOPMENT

Method: Handbail (4.5 hrs. total)
Static Depth to Water: 1.7'
Pumping Depth To Water:
Pumping Rate:
Spec. Capacity:
Volume Pumped: 31 gal.

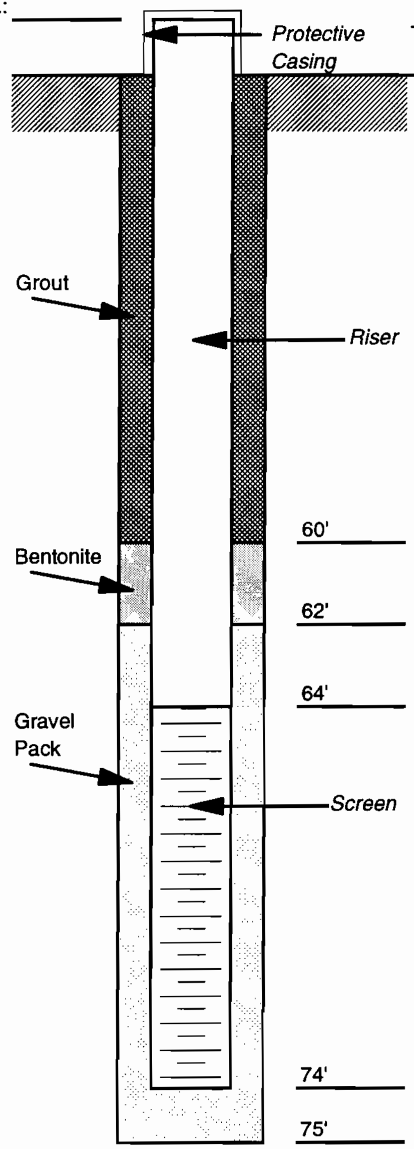
CDM

environmental engineers, scientists,
planners & management consultants

WELL CONSTRUCTION SUMMARY

Project: ETE Landfill   Location: Gainesville, New York   Well No.: **MW-9D**
Permit No.:

TOC elev.:



Type Monitoring Well

DRILLING SUMMARY

Drilling Company: SJB Drilling Services   Drillers: Art and Dale
Drill Rig/Model: Central Mine Equip. Comp. FN160
Borehole Diameters: 7.5"   Drilling Fluid: None
Bits/Depths: Drill bit is 7" in diam.
Total Depth: 75'   Depth To Water: 0.7'
Supervisor Geologist: Tom Horn

WELL DESIGN

Casing Material:	sched. 40 PVC	Diameter:	2"
Screen Size:	10 foot	Diameter:	2"
Slot Size:	.010"	Setting:	74'-64'
Filter Material:	Granusil 2400 (single 0)	Setting:	75'-62'
Seals Material:	Med. Bentonite Chips	Setting:	62'-60'
Grout:	Grout/Bentonite Mix	Setting:	60'-grade
Surface Casing Material:	Procasing stickup	Setting:	above grade

TIME LOG

	Started	Completed
Drilling:	3/18/98	3/20/98
Installation:	3/20/98	3/20/98
Development:	3/25/98	3/26/98

WELL DEVELOPMENT

Method: Handbail and submersible pump (4.5 hrs. total)
Static Depth to Water: 0.7'
Pumping Depth To Water:
Pumping Rate: .10 gpm   Spec. Capacity:
Volume Pumped: 99 gal.

New York State Department of Environmental Conservation
Division of Environmental Remediation, Region 9
270 Michigan Avenue, Buffalo, New York, 14203-2999
Phone: (716) 851-7220 FAX: (716) 851-7226

John P. Cahill
Commissioner

May 13, 1998

Mr. Thomas Fox
Camp, Dresser & McKee
100 Crossways Park Drive West
Suite 415
Woodbury, New York 11797

Dear Mr. Fox:

ETE Sanitation and Landfill
Site # 961005
Private Well Sampling Data

Find enclosed all sampling data for private wells in the immediate vicinity of the ETE Landfill. These wells are located across the road from the landfill, to the south or up gradient.

Included are the following: Years sampled - 1989, 1991, 1993, 1995, and 1997.

If there are any questions, please call me at 716/851-7220.

Sincerely,

Gerald F. Pietraszek
Sr. Engineering Geologist

GFP:sz

Enclosures

cc: Mr. Shive Mittal, NYSDEC - Albany
Mr. Richard Tuers, NYS DOH - Albany

WADSWORTH CENTER

PAGE 1 RESULTS OF EXAMINATION FINAL REPORT

SAMPLE ID: 9701781 SAMPLE RECEIVED:97/08/29/ CHARGE: 8.00
PROGRAM: 110:STATE SUPERFUND ANALYTICAL SERVICES
SOURCE ID: DRAINAGE BASIN: GAZETTEER CODE:6056
POLITICAL SUBDIVISION:GAINESVILLE COUNTY:WYOMING
LATITUDE: . LONGITUDE: . Z DIRECTION:
LOCATION: 961005 ETE SANITATION LANDFILL
DESCRIPTION:[redacted],7344 RT 19
REPORTING LAB: TOX:LAB FOR ORGANIC ANALYTICAL CHEMISTRY
TEST PATTERN: 5022W:VOLATILE ORGANICS IN WATER
SAMPLE TYPE: 110:PRIVATE WATER SUPPLY - DRIVEN WELL
TIME OF SAMPLING: 97/08/26 13:48 DATE PRINTED:97/09/11

ANALYSIS: 5022W VOLATILE ORGANICS IN WATER-EPA 502.2 (DES 310-33)
DATE PRINTED: 97/09/11 FINAL REPORT

PARAMETER	RESULT
DICHLORODIFLUOROMETHANE (FREON-12)	< 0.5 MCG/L
CHLOROMETHANE	< 0.5 MCG/L
VINYL CHLORIDE	< 0.5 MCG/L
BROMOMETHANE	< 0.5 MCG/L
CHLOROETHANE	< 0.5 MCG/L
TRICHLOROFLUOROMETHANE (FREON-11)	< 0.5 MCG/L
1,1-DICHLOROETHENE	< 0.5 MCG/L
METHYLENE CHLORIDE (DICHLOROMETHANE)	< 0.5 MCG/L
TRANS-1,2-DICHLOROETHENE	< 0.5 MCG/L
1,1-DICHLOROETHANE	< 0.5 MCG/L
2,2-DICHLOROPROPANE	< 0.5 MCG/L
CIS-1,2-DICHLOROETHENE	< 0.5 MCG/L
CHLOROFORM	< 0.5 MCG/L
BROMOCHLOROMETHANE	< 0.5 MCG/L
1,1,1-TRICHLOROETHANE	< 0.5 MCG/L
1,1-DICHLOROPROPENE	< 0.5 MCG/L
CARBON TETRACHLORIDE	< 0.5 MCG/L
1,2-DICHLOROETHANE	< 0.5 MCG/L
BENZENE	< 0.5 MCG/L
TRICHLOROETHENE	< 0.5 MCG/L
1,2-DICHLOROPROPANE	< 0.5 MCG/L
BROMODICHLOROMETHANE	< 0.5 MCG/L
DIBROMOMETHANE	< 0.5 MCG/L
CIS-1,3-DICHLOROPROPENE	< 0.5 MCG/L
TOLUENE	< 0.5 MCG/L
TRANS-1,3-DICHLOROPROPENE	< 0.5 MCG/L
1,1,2-TRICHLOROETHANE	< 0.5 MCG/L
1,3-DICHLOROPROPANE	< 0.5 MCG/L
TETRACHLOROETHENE	< 0.5 MCG/L

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NYS ELAP ID'S: 10762(INORGANIC,NUCLEAR) 10763(ORGANIC) 10765(BACTERIOLOGY)
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NY STATE DEP'T. HEALTH SUBMITTED BY:TUERS
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WADSWORTH CENTER

PAGE 2 RESULTS OF EXAMINATION FINAL REPORT

SAMPLE ID: 9701781 SAMPLE RECEIVED:97/08/29/ CHARGE: 8.00
POLITICAL SUBDIVISION:GAINESVILLE COUNTY:WYOMING
LOCATION: 961005 ETE SANITATION LANDFILL
TIME OF SAMPLING: 97/08/26 13:48 DATE PRINTED:97/09/11

PARAMETER	RESULT
DIBROMOCHLOROMETHANE	< 0.5 MCG/L
1,2-DIBROMOETHANE (EDB)	< 0.5 MCG/L
CHLOROBENZENE	< 0.5 MCG/L
1,1,1,2-TETRACHLOROETHANE	< 0.5 MCG/L
ETHYLBENZENE	< 0.5 MCG/L
M/P-XYLENE	< 0.5 MCG/L
O-XYLENE	< 0.5 MCG/L
STYRENE	< 0.5 MCG/L
ISOPROPYLBENZENE (Cumene)	< 0.5 MCG/L
BROMOFORM	< 0.5 MCG/L
1,1,2,2-TETRACHLOROETHANE	< 0.5 MCG/L
1,2,3-TRICHLOROPROPANE	< 0.5 MCG/L
N-PROPYLBENZENE	< 0.5 MCG/L
BROMOBENZENE	< 0.5 MCG/L
1,3,5-TRIMETHYLBENZENE	< 0.5 MCG/L
O-CHLOROTOLUENE	< 0.5 MCG/L
P-CHLOROTOLUENE	< 0.5 MCG/L
TERT-BUTYLBENZENE	< 0.5 MCG/L
1,2,4-TRIMETHYLBENZENE	< 0.5 MCG/L
SEC-BUTYLBENZENE	< 0.5 MCG/L
4-ISOPROPYLTOLUENE (p-Cymene)	< 0.5 MCG/L
1,3-DICHLOROBENZENE	< 0.5 MCG/L
1,4-DICHLOROBENZENE	< 0.5 MCG/L
N-BUTYLBENZENE	< 0.5 MCG/L
1,2-DICHLOROBENZENE	< 0.5 MCG/L
1,2-DIBROMO-3-CHLOROPROPANE	< 0.5 MCG/L
1,2,4-TRICHLOROBENZENE	< 0.5 MCG/L
HEXACHLOROBUTADIENE (C-46)	< 0.5 MCG/L
NAPHTHALENE	< 0.5 MCG/L
1,2,3-TRICHLOROBENZENE	< 0.5 MCG/L
PH OF VOLATILE ALIQUOT	2

**** END OF REPORT ****

WADSWORTH CENTER

 RESULTS OF EXAMINATION FINAL REPORT

SAMPLE ID: 9701782 SAMPLE RECEIVED:97/08/29/ CHARGE: 8.00
PROGRAM: 110:STATE SUPERFUND ANALYTICAL SERVICES
SOURCE ID: DRAINAGE BASIN: GAZETTEER CODE:6056
POLITICAL SUBDIVISION:GAINESVILLE COUNTY:WYOMING
LATITUDE: . LONGITUDE: . Z DIRECTION:
LOCATION: 961005 ETE SANITATION LANDFILL
DESCRIPTION:[redacted]., 8342 BOUGHTON RD., SILVER SPRINGS
REPORTING LAB: TOX:LAB FOR ORGANIC ANALYTICAL CHEMISTRY
TEST PATTERN: 5022W:VOLATILE ORGANICS IN WATER
SAMPLE TYPE: 110:PRIVATE WATER SUPPLY - DRIVEN WELL
TIME OF SAMPLING: 97/08/26 14:02 DATE PRINTED:97/09/11

ANALYSIS: 5022W VOLATILE ORGANICS IN WATER-EPA 502.2 (DES 310-33)
DATE PRINTED: 97/09/11 FINAL REPORT

PARAMETER	RESULT
DICHLORODIFLUOROMETHANE (FREON-12)	< 0.5 MCG/L
CHLOROMETHANE	< 0.5 MCG/L
VINYL CHLORIDE	< 0.5 MCG/L
BROMOMETHANE	< 0.5 MCG/L
CHLOROETHANE	< 0.5 MCG/L
TRICHLOROFLUOROMETHANE (FREON-11)	< 0.5 MCG/L
1,1-DICHLOROETHENE	< 0.5 MCG/L
METHYLENE CHLORIDE (DICHLOROMETHANE)	< 0.5 MCG/L
TRANS-1,2-DICHLOROETHENE	< 0.5 MCG/L
1,1-DICHLOROETHANE	< 0.5 MCG/L
2,2-DICHLOROPROPANE	< 0.5 MCG/L
CIS-1,2-DICHLOROETHENE	< 0.5 MCG/L
CHLOROFORM	< 0.5 MCG/L
BROMOCHLOROMETHANE	< 0.5 MCG/L
1,1,1-TRICHLOROETHANE	< 0.5 MCG/L
1,1-DICHLOROPROPENE	< 0.5 MCG/L
CARBON TETRACHLORIDE	< 0.5 MCG/L
1,2-DICHLOROETHANE	< 0.5 MCG/L
BENZENE	< 0.5 MCG/L
TRICHLOROETHENE	< 0.5 MCG/L
1,2-DICHLOROPROPANE	< 0.5 MCG/L
BROMODICHLOROMETHANE	< 0.5 MCG/L
DIBROMOMETHANE	< 0.5 MCG/L
CIS-1,3-DICHLOROPROPENE	< 0.5 MCG/L
TOLUENE	< 0.5 MCG/L
TRANS-1,3-DICHLOROPROPENE	< 0.5 MCG/L
1,1,2-TRICHLOROETHANE	< 0.5 MCG/L
1,3-DICHLOROPROPANE	< 0.5 MCG/L
TETRACHLOROETHENE	< 0.5 MCG/L

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

NYS ELAP ID'S: 10762(INORGANIC,NUCLEAR) 10763(ORGANIC) 10765(BACTERIOLOGY)
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WADSWORTH CENTER

 RESULTS OF EXAMINATION FINAL REPORT

SAMPLE ID: 9701782 SAMPLE RECEIVED:97/08/29/ CHARGE: 8.00
POLITICAL SUBDIVISION:GAINESVILLE COUNTY:WYOMING
LOCATION: 961005 ETE SANITATION LANDFILL
TIME OF SAMPLING: 97/08/26 14:02 DATE PRINTED:97/09/11

PARAMETER	RESULT
DIBROMOCHLOROMETHANE	< 0.5 MCG/L
1,2-DIBROMOETHANE (EDB)	< 0.5 MCG/L
CHLOROBENZENE	< 0.5 MCG/L
1,1,1,2-TETRACHLOROETHANE	< 0.5 MCG/L
ETHYLBENZENE	< 0.5 MCG/L
M/P-XYLENE	< 0.5 MCG/L
O-XYLENE	< 0.5 MCG/L
STYRENE	< 0.5 MCG/L
ISOPROPYLBENZENE (Cumene)	< 0.5 MCG/L
BROMOFORM	< 0.5 MCG/L
1,1,2,2-TETRACHLOROETHANE	< 0.5 MCG/L
1,2,3-TRICHLOROPROPANE	< 0.5 MCG/L
N-PROPYLBENZENE	< 0.5 MCG/L
BROMOBENZENE	< 0.5 MCG/L
1,3,5-TRIMETHYLBENZENE	< 0.5 MCG/L
O-CHLOROTOLUENE	< 0.5 MCG/L
P-CHLOROTOLUENE	< 0.5 MCG/L
TERT-BUTYLBENZENE	< 0.5 MCG/L
1,2,4-TRIMETHYLBENZENE	< 0.5 MCG/L
SEC-BUTYLBENZENE	< 0.5 MCG/L
4-ISOPROPYLTOLUENE (p-Cymene)	< 0.5 MCG/L
1,3-DICHLOROBENZENE	< 0.5 MCG/L
1,4-DICHLOROBENZENE	< 0.5 MCG/L
N-BUTYLBENZENE	< 0.5 MCG/L
1,2-DICHLOROBENZENE	< 0.5 MCG/L
1,2-DIBROMO-3-CHLOROPROPANE	< 0.5 MCG/L
1,2,4-TRICHLOROBENZENE	< 0.5 MCG/L
HEXACHLOROBUTADIENE (C-46)	< 0.5 MCG/L
NAPHTHALENE	< 0.5 MCG/L
1 ,3-TRICHLOROBENZENE	< 0.5 MCG/L
Ph OF VOLATILE ALIQUOT	2

**** END OF REPORT ****

WADSWORTH CENTER

PAGE 1 RESULTS OF EXAMINATION FINAL REPORT

SAMPLE ID: 9701783 SAMPLE RECEIVED:97/08/29/ CHARGE: 8.00
PROGRAM: 110:STATE SUPERFUND ANALYTICAL SERVICES
SOURCE ID: DRAINAGE BASIN: GAZETTEER CODE:6056
POLITICAL SUBDIVISION:GAINESVILLE COUNTY:WYOMING
LATITUDE: . LONGITUDE: . Z DIRECTION:
LOCATION: 961005 ETE SANITATION LANDFILL
DESCRIPTION:[redacted]., BOUGHTON RD., SILVER SPRINGS
REPORTING LAB: TOX:LAB FOR ORGANIC ANALYTICAL CHEMISTRY
TEST PATTERN: 5022W:VOLATILE ORGANICS IN WATER
SAMPLE TYPE: 110:PRIVATE WATER SUPPLY - DRIVEN WELL
TIME OF SAMPLING: 97/08/26 14:18 DATE PRINTED:97/09/11

ANALYSIS: 5022W VOLATILE ORGANICS IN WATER-EPA 502.2 (DES 310-33)
DATE PRINTED: 97/09/11 FINAL REPORT

PARAMETER	RESULT
DICHLORODIFLUOROMETHANE (FREON-12)	< 0.5 MCG/L
CHLOROMETHANE	< 0.5 MCG/L
VINYL CHLORIDE	< 0.5 MCG/L
BROMOMETHANE	< 0.5 MCG/L
CHLOROETHANE	< 0.5 MCG/L
TRICHLOROFLUOROMETHANE (FREON-11)	< 0.5 MCG/L
1,1-DICHLOROETHENE	< 0.5 MCG/L
METHYLENE CHLORIDE (DICHLOROMETHANE)	< 0.5 MCG/L
TRANS-1,2-DICHLOROETHENE	< 0.5 MCG/L
1,1-DICHLOROETHANE	< 0.5 MCG/L
2,2-DICHLOROPROPANE	< 0.5 MCG/L
CIS-1,2-DICHLOROETHENE	< 0.5 MCG/L
CHLOROFORM	< 0.5 MCG/L
BROMOCHLOROMETHANE	< 0.5 MCG/L
1,1,1-TRICHLOROETHANE	< 0.5 MCG/L
1,1-DICHLOROPROPENE	< 0.5 MCG/L
CARBON TETRACHLORIDE	< 0.5 MCG/L
1,2-DICHLOROETHANE	< 0.5 MCG/L
BENZENE	< 0.5 MCG/L
TRICHLOROETHENE	< 0.5 MCG/L
1,2-DICHLOROPROPANE	< 0.5 MCG/L
BROMODICHLOROMETHANE	< 0.5 MCG/L
DIBROMOMETHANE	< 0.5 MCG/L
CIS-1,3-DICHLOROPROPENE	< 0.5 MCG/L
TOLUENE	< 0.5 MCG/L
TRANS-1,3-DICHLOROPROPENE	< 0.5 MCG/L
1,1,2-TRICHLOROETHANE	< 0.5 MCG/L
1,3-DICHLOROPROPANE	< 0.5 MCG/L
TETRACHLOROETHENE	< 0.5 MCG/L

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II UNIVERSITY PLACE - RM. 205
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SUBMITTED BY:TUERS

WADSWORTH CENTER

PAGE 2 RESULTS OF EXAMINATION FINAL REPORT

SAMPLE ID: 9701783 SAMPLE RECEIVED:97/08/29/ CHARGE: 8.00
POLITICAL SUBDIVISION:GAINESVILLE COUNTY:WYOMING
LOCATION: 961005 ETE SANITATION LANDFILL
TIME OF SAMPLING: 97/08/26 14:18 DATE PRINTED:97/09/11

PARAMETER	RESULT
DIBROMOCHLOROMETHANE	< 0.5 MCG/L
1,2-DIBROMOETHANE (EDB)	< 0.5 MCG/L
CHLOROBENZENE	< 0.5 MCG/L
1,1,1,2-TETRACHLOROETHANE	< 0.5 MCG/L
ETHYLBENZENE	< 0.5 MCG/L
M/P-XYLENE	< 0.5 MCG/L
O-XYLENE	< 0.5 MCG/L
STYRENE	< 0.5 MCG/L
ISOPROPYLBENZENE (Cumene)	< 0.5 MCG/L
BROMOFORM	< 0.5 MCG/L
1,1,2,2-TETRACHLOROETHANE	< 0.5 MCG/L
1,2,3-TRICHLOROPROPANE	< 0.5 MCG/L
N-PROPYLBENZENE	< 0.5 MCG/L
BROMOBENZENE	< 0.5 MCG/L
1,3,5-TRIMETHYLBENZENE	< 0.5 MCG/L
O-CHLOROTOLUENE	< 0.5 MCG/L
P-CHLOROTOLUENE	< 0.5 MCG/L
TERT-BUTYLBENZENE	< 0.5 MCG/L
1,2,4-TRIMETHYLBENZENE	< 0.5 MCG/L
SEC-BUTYLBENZENE	< 0.5 MCG/L
4-ISOPROPYLTOLUENE (p-Cymene)	< 0.5 MCG/L
1,3-DICHLOROBENZENE	< 0.5 MCG/L
1,4-DICHLOROBENZENE	< 0.5 MCG/L
N-BUTYLBENZENE	< 0.5 MCG/L
1,2-DICHLOROBENZENE	< 0.5 MCG/L
1,2-DIBROMO-3-CHLOROPROPANE	< 0.5 MCG/L
1,2,4-TRICHLOROBENZENE	< 0.5 MCG/L
HEXACHLOROBUTADIENE (C-46)	< 0.5 MCG/L
NAPHTHALENE	< 0.5 MCG/L
1,2,3-TRICHLOROBENZENE	< 0.5 MCG/L
PH OF VOLATILE ALIQUOT	2

**** END OF REPORT ****

WADSWORTH CENTER

 RESULTS OF EXAMINATION FINAL REPORT

SAMPLE ID: 9502669 SAMPLE RECEIVED:95/11/10/ CHARGE: 8.00
PROGRAM: 110:STATE SUPERFUND ANALYTICAL SERVICES
SOURCE ID: DRAINAGE BASIN: GAZETTEER CODE:6056
POLITICAL SUBDIVISION:GAINESVILLE COUNTY:WYOMING
LATITUDE: . LONGITUDE: . Z DIRECTION:
LOCATION: 461005 ETE SANITATION LANDFILL
DESCRIPTION:[redacted], 4344 STATE RT 94, SILVER SPRINGS
REPORTING LAB: DEDP:DIV. ENVIRONMENTAL DISEASE PREVENTION - ACCESSION LAB
TEST PATTERN: 5022W:VOLATILE ORGANICS IN WATER
SAMPLE TYPE: 110:PRIVATE WATER SUPPLY - DRIVEN WELL
TIME OF SAMPLING: 95/11/09 13:25 DATE PRINTED:95/11/21

ANALYSIS: 5022W VOLATILE ORGANICS IN WATER-EPA 502.2 (DES 310-33)
DATE PRINTED: 95/11/21 FINAL REPORT

-----------PARAMETER-----------	----------RESULT----------------
DICHLORODIFLUOROMETHANE (FREON-12)	< 0.5 MCG/L
CHLOROMETHANE	< 0.5 MCG/L
VINYL CHLORIDE	< 0.5 MCG/L
BROMOMETHANE	< 0.5 MCG/L
CHLOROETHANE	< 0.5 MCG/L
TRICHLOROFLUOROMETHANE (FREON-11)	< 0.5 MCG/L
1,1-DICHLOROETHENE	< 0.5 MCG/L
METHYLENE CHLORIDE (DICHLOROMETHANE)	< 0.5 MCG/L
TRANS-1,2-DICHLOROETHENE	< 0.5 MCG/L
1,1-DICHLOROETHANE	< 0.5 MCG/L
2,2-DICHLOROPROPANE	< 0.5 MCG/L
CIS-1,2-DICHLOROETHENE	< 0.5 MCG/L
CHLOROFORM	< 0.5 MCG/L
BROMOCHLOROMETHANE	< 0.5 MCG/L
1,1,1-TRICHLOROETHANE	< 0.5 MCG/L
1,1-DICHLOROPROPENE	< 0.5 MCG/L
CARBON TETRACHLORIDE	< 0.5 MCG/L
1,2-DICHLOROETHANE	< 0.5 MCG/L
BENZENE	< 0.5 MCG/L
TRICHLOROETHENE	< 0.5 MCG/L
1,2-DICHLOROPROPANE	< 0.5 MCG/L
BROMODICHLOROMETHANE	< 0.5 MCG/L
DIBROMOMETHANE	< 0.5 MCG/L
CIS-1,3-DICHLOROPROPENE	< 0.5 MCG/L
TOLUENE	0.5 MCG/L [PL]
TRANS-1,3-DICHLOROPROPENE	< 0.5 MCG/L
1,1,2-TRICHLOROETHANE	< 0.5 MCG/L
1,3-DICHLOROPROPANE	< 0.5 MCG/L
TETRACHLOROETHENE	< 0.5 MCG/L
DIBROMOCHLOROMETHANE	< 0.5 MCG/L

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NY STATE DEP'T. HEALTH
II UNIVERSITY PLACE - RM. 205
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SUBMITTED BY:TUERS

RESULTS OF EXAMINATION FINAL REPORT

SAMPLE ID: 9502669 SAMPLE RECEIVED:95/11/10/ CHARGE: 8.00
POLITICAL SUBDIVISION:GAINESVILLE COUNTY:WYOMING
LOCATION: 461005 ETE SANITATION LANDFILL
TIME OF SAMPLING: 95/11/09 13:25 DATE PRINTED:95/11/21

PARAMETER	RESULT
1,2-DIBROMOETHANE (EDB)	< 0.5 MCG/L
CHLOROBENZENE	< 0.5 MCG/L
1,1,1,2-TETRACHLOROETHANE	< 0.5 MCG/L
ETHYLBENZENE	< 0.5 MCG/L
M/P-XYLENE	< 0.5 MCG/L
O-XYLENE	< 0.5 MCG/L
STYRENE	< 0.5 MCG/L
ISOPROPYLBENZENE (Cumene)	< 0.5 MCG/L
BROMOFORM	< 0.5 MCG/L
1,1,2,2-TETRACHLOROETHANE	< 0.5 MCG/L
1,2,3-TRICHLOROPROPANE	< 0.5 MCG/L
N-PROPYLBENZENE	< 0.5 MCG/L
BROMOBENZENE	< 0.5 MCG/L
1,3,5-TRIMETHYLBENZENE	< 0.5 MCG/L
O-CHLOROTOLUENE	< 0.5 MCG/L
P-CHLOROTOLUENE	< 0.5 MCG/L
TERT-BUTYLBENZENE	< 0.5 MCG/L
1,2,4-TRIMETHYLBENZENE	< 0.5 MCG/L
SEC-BUTYLBENZENE	< 0.5 MCG/L
4-ISOPROPYLTOLUENE (p-Cymene)	< 0.5 MCG/L
1,3-DICHLOROBENZENE	< 0.5 MCG/L
1,4-DICHLOROBENZENE	< 0.5 MCG/L
N-BUTYLBENZENE	< 0.5 MCG/L
1,2-DICHLOROBENZENE	< 0.5 MCG/L
1,2-DIBROMO-3-CHLOROPROPANE	< 0.5 MCG/L
1,2,4-TRICHLOROBENZENE	< 0.5 MCG/L
HEXACHLOROBUTADIENE (C-46)	< 0.5 MCG/L
NAPHTHALENE	< 0.5 MCG/L
1,2,3-TRICHLOROBENZENE	< 0.5 MCG/L
PH OF VOLATILE ALIQUOT	2

**** END OF REPORT ****

WADSWORTH CENTER

E 1 RESULTS OF EXAMINATION FINAL REPORT

PLE ID: 9502668 SAMPLE RECEIVED:95/11/10/ CHARGE: 8.00
GRAM: 110:STATE SUPERFUND ANALYTICAL SERVICES
RCE ID: DRAINAGE BASIN: GAZETTEER CODE:6056
ITICAL SUBDIVISION:GAINESVILLE COUNTY:WYOMING
ITUDE: . LONGITUDE: . Z DIRECTION:
ATION: 461005 ETE SANITATION LANDFILL
CRIPTION:[redacted] 5284 BOUGHTON RD., SILVER SPRINGS
ORTING LAB: DEDP:DIV. ENVIRONMENTAL DISEASE PREVENTION - ACCESSION LAB
T PATTERN: 5022W:VOLATILE ORGANICS IN WATER
IPLE TYPE: 110:PRIVATE WATER SUPPLY - DRIVEN WELL
E OF SAMPLING: 95/11/09 13:13 DATE PRINTED:95/11/21

LYSIS: 5022W VOLATILE ORGANICS IN WATER-EPA 502.2 (DES 310-33)
DATE PRINTED: 95/11/21 FINAL REPORT

PARAMETER	RESULT
CHLORODIFLUOROMETHANE (FREON-12)	< 0.5 MCG/L
LOROMETHANE	< 0.5 MCG/L
NYL CHLORIDE	< 0.5 MCG/L
OMOMETHANE	< 0.5 MCG/L
LOROETHANE	< 0.5 MCG/L
ICHLOROFLUOROMETHANE (FREON-11)	< 0.5 MCG/L
1-DICHLOROETHENE	< 0.5 MCG/L
THYLENE CHLORIDE (DICHLOROMETHANE)	< 0.5 MCG/L
ANS-1,2-DICHLOROETHENE	< 0.5 MCG/L
1-DICHLOROETHANE	< 0.5 MCG/L
2-DICHLOROPROPANE	< 0.5 MCG/L
S-1,2-DICHLOROETHENE	< 0.5 MCG/L
LOROFORM	< 0.5 MCG/L
OMOCHLOROMETHANE	< 0.5 MCG/L
1,1-TRICHLOROETHANE	< 0.5 MCG/L
-DICHLOROPROPENE	< 0.5 MCG/L
RBON TETRACHLORIDE	< 0.5 MCG/L
2-DICHLOROETHANE	< 0.5 MCG/L
ZENE	< 0.5 MCG/L
CHLOROETHENE	< 0.5 MCG/L
2-DICHLOROPROPANE	< 0.5 MCG/L
OMODICHLOROMETHANE	< 0.5 MCG/L
ROMOMETHANE	< 0.5 MCG/L
S-1,3-DICHLOROPROPENE	< 0.5 MCG/L
LUENE	< 0.5 MCG/L
NS-1,3-DICHLOROPROPENE	< 0.5 MCG/L
,2-TRICHLOROETHANE	< 0.5 MCG/L
3-DICHLOROPROPANE	< 0.5 MCG/L
RACHLOROETHENE	< 0.5 MCG/L
ROMOCHLOROMETHANE	< 0.5 MCG/L

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NY STATE DEP'T. HEALTH SUBMITTED BY:TUERS
II UNIVERSITY PLACE - RM. 205
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WADSWORTH CENTER

 RESULTS OF EXAMINATION FINAL REPORT

SAMPLE ID: 9502668 SAMPLE RECEIVED:95/11/10/ CHARGE: 8.00
POLITICAL SUBDIVISION:GAINESVILLE COUNTY:WYOMING
LOCATION: 461005 ETE SANITATION LANDFILL
TIME OF SAMPLING: 95/11/09 13:13 DATE PRINTED:95/11/21

PARAMETER	RESULT
1,2-DIBROMOETHANE (EDB)	< 0.5 MCG/L
CHLOROBENZENE	< 0.5 MCG/L
1,1,1,2-TETRACHLOROETHANE	< 0.5 MCG/L
ETHYLBENZENE	< 0.5 MCG/L
M/P-XYLENE	< 0.5 MCG/L
O-XYLENE	< 0.5 MCG/L
STYRENE	< 0.5 MCG/L
ISOPROPYLBENZENE (Cumene)	< 0.5 MCG/L
BROMOFORM	< 0.5 MCG/L
1,1,2,2-TETRACHLOROETHANE	< 0.5 MCG/L
1,2,3-TRICHLOROPROPANE	< 0.5 MCG/L
N-PROPYLBENZENE	< 0.5 MCG/L
BROMOBENZENE	< 0.5 MCG/L
1,3,5-TRIMETHYLBENZENE	< 0.5 MCG/L
O-CHLOROTOLUENE	< 0.5 MCG/L
P-CHLOROTOLUENE	< 0.5 MCG/L
TERT-BUTYLBENZENE	< 0.5 MCG/L
1,2,4-TRIMETHYLBENZENE	< 0.5 MCG/L
SEC-BUTYLBENZENE	< 0.5 MCG/L
4-ISOPROPYLTOLUENE (p-Cymene)	< 0.5 MCG/L
1,3-DICHLOROBENZENE	< 0.5 MCG/L
1,4-DICHLOROBENZENE	< 0.5 MCG/L
N-BUTYLBENZENE	< 0.5 MCG/L
1,2-DICHLOROBENZENE	< 0.5 MCG/L
1,2-DIBROMO-3-CHLOROPROPANE	< 0.5 MCG/L
1,2,4-TRICHLOROBENZENE	< 0.5 MCG/L
HEXACHLOROBUTADIENE (C-46)	< 0.5 MCG/L
NAPHTHALENE	< 0.5 MCG/L
1,2,3-TRICHLOROBENZENE	< 0.5 MCG/L
PH OF VOLATILE ALIQUOT	2

**** END OF REPORT ****

WADSWORTH CENTER

PAGE 1 RESULTS OF EXAMINATION FINAL REPORT

SAMPLE ID: 9502667 SAMPLE RECEIVED:95/11/10/ CHARGE: 8.00
PROGRAM: 110:STATE SUPERFUND ANALYTICAL SERVICES
SOURCE ID: DRAINAGE BASIN: GAZETTEER CODE:6056
POLITICAL SUBDIVISION:GAINESVILLE COUNTY:WYOMING
LATITUDE: . LONGITUDE: . Z DIRECTION:
LOCATION: 461005 ETE SANITATION LANDFILL
DESCRIPTION:[redacted], 5342 BOUGHTON RD., SILVER SPRINGS
REPORTING LAB: DEDP:DIV. ENVIRONMENTAL DISEASE PREVENTION - ACCESSION LAB
TEST PATTERN: 5022W:VOLATILE ORGANICS IN WATER
SAMPLE TYPE: 110:PRIVATE WATER SUPPLY - DRIVEN WELL
TIME OF SAMPLING: 95/11/09 12:55 DATE PRINTED:95/11/19

ANALYSIS: 5022W VOLATILE ORGANICS IN WATER-EPA 502.2 (DES 310-33)
DATE PRINTED: 95/11/17 FINAL REPORT

PARAMETER	RESULT
DICHLORODIFLUOROMETHANE (FREON-12)	< 0.5 MCG/L
CHLOROMETHANE	< 0.5 MCG/L
VINYL CHLORIDE	< 0.5 MCG/L
BROMOMETHANE	< 0.5 MCG/L
CHLOROETHANE	< 0.5 MCG/L
TRICHLOROFLUOROMETHANE (FREON-11)	< 0.5 MCG/L
1,1-DICHLOROETHENE	< 0.5 MCG/L
METHYLENE CHLORIDE (DICHLOROMETHANE)	< 0.5 MCG/L
TRANS-1,2-DICHLOROETHENE	< 0.5 MCG/L
1,1-DICHLOROETHANE	< 0.5 MCG/L
2,2-DICHLOROPROPANE	< 0.5 MCG/L
CIS-1,2-DICHLOROETHENE	< 0.5 MCG/L
CHLOROFORM	< 0.5 MCG/L
BROMOCHLOROMETHANE	< 0.5 MCG/L
1,1,1-TRICHLOROETHANE	< 0.5 MCG/L
1,1-DICHLOROPROPENE	< 0.5 MCG/L
CARBON TETRACHLORIDE	< 0.5 MCG/L
1,2-DICHLOROETHANE	< 0.5 MCG/L
BENZENE	< 0.5 MCG/L
TRICHLOROETHENE	< 0.5 MCG/L
1,2-DICHLOROPROPANE	< 0.5 MCG/L
BROMODICHLOROMETHANE	< 0.5 MCG/L
DIBROMOMETHANE	< 0.5 MCG/L
CIS-1,3-DICHLOROPROPENE	< 0.5 MCG/L
TOLUENE	< 0.5 MCG/L
TRANS-1,3-DICHLOROPROPENE	< 0.5 MCG/L
1,1,2-TRICHLOROETHANE	< 0.5 MCG/L
1,3-DICHLOROPROPANE	< 0.5 MCG/L
TETRACHLOROETHENE	< 0.5 MCG/L
DIBROMOCHLOROMETHANE	< 0.5 MCG/L

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

:OPIES SENT TO: CO(2), RO(1), LPHE(1), FED( ), INFO-P( ), INFO-L( )

G. ANDERS CARLSON
BUR. ENVIRONMENTAL EXPOSURE INVESTIGAT.
NY STATE DEP'T. HEALTH
II UNIVERSITY PLACE - RM. 205
ALBANY ***INTERAGENCY MAIL***

SUBMITTED BY:TUERS

0258 NEW YORK STATE DEPARTMENT OF HEALTH 097

WADSWORTH CENTER

PAGE 2 RESULTS OF EXAMINATION FINAL REPORT

SAMPLE ID: 9502667 SAMPLE RECEIVED:95/11/10/ CHARGE: 8.00
POLITICAL SUBDIVISION:GAINESVILLE COUNTY:WYOMING
LOCATION: 461005 ETE SANITATION LANDFILL
TIME OF SAMPLING: 95/11/09 12:55 DATE PRINTED:95/11/19

PARAMETER	RESULT
1,2-DIBROMOETHANE (EDB)	< 0.5 MCG/L
CHLOROBENZENE	< 0.5 MCG/L
1,1,1,2-TETRACHLOROETHANE	< 0.5 MCG/L
ETHYLBENZENE	< 0.5 MCG/L
M/P-XYLENE	< 0.5 MCG/L
O-XYLENE	< 0.5 MCG/L
STYRENE	< 0.5 MCG/L
ISOPROPYLBENZENE (Cumene)	< 0.5 MCG/L
BROMOFORM	< 0.5 MCG/L
1,1,2,2-TETRACHLOROETHANE	< 0.5 MCG/L
1,2,3-TRICHLOROPROPANE	< 0.5 MCG/L
N-PROPYLBENZENE	< 0.5 MCG/L
BROMOBENZENE	< 0.5 MCG/L
1,3,5-TRIMETHYLBENZENE	< 0.5 MCG/L
O-CHLOROTOLUENE	< 0.5 MCG/L
P-CHLOROTOLUENE	< 0.5 MCG/L
TERT-BUTYLBENZENE	< 0.5 MCG/L
1,2,4-TRIMETHYLBENZENE	< 0.5 MCG/L
SEC-BUTYLBENZENE	< 0.5 MCG/L
4-ISOPROPYLTOLUENE (p-Cymene)	< 0.5 MCG/L
1,3-DICHLOROBENZENE	< 0.5 MCG/L
1,4-DICHLOROBENZENE	< 0.5 MCG/L
N-BUTYLBENZENE	< 0.5 MCG/L
1,2-DICHLOROBENZENE	< 0.5 MCG/L
1,2-DIBROMO-3-CHLOROPROPANE	< 0.5 MCG/L
1,2,4-TRICHLOROBENZENE	< 0.5 MCG/L
HEXACHLOROBUTADIENE (C-46)	< 0.5 MCG/L
NAPHTHALENE	< 0.5 MCG/L
1,2,3-TRICHLOROBENZENE	< 0.5 MCG/L
PH OF VOLATILE ALIQUOT	2

**** END OF REPORT ****

4344 Route 19

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

GE 2 RESULTS OF EXAMINATION REPORT MAILED OUT

IPLE ID: 932470 SAMPLE RECEIVED:93/10/15/ CHARGE: 10.00
LITICAL SUBDIVISION:GAINESVILLE COUNTY:WYOMING
CATION: ETE SANITATION 961005
IE OF SAMPLING: 93/10/14 11:52 DATE REPORTED:93/10/24

----------PARAMETER-----------	----------RESULT----------------
T41209 TETRACHLOROETHENE	< 0.5 MCG/L
T44909 DIBROMOCHLOROMETHANE	< 0.5 MCG/L
T60409 1,2-DIBROMOETHANE (EDB)	< 0.5 MCG/L
T40909 CHLOROBENZENE	< 0.5 MCG/L
T21009 1,1,1,2-TETRACHLOROETHANE	< 0.5 MCG/L
T51009 ETHYLBENZENE	< 0.5 MCG/L
T51309 M/P-XYLENE	< 0.5 MCG/L
T51409 O-XYLENE	< 0.5 MCG/L
T85409 STYRENE	< 0.5 MCG/L
T85309 ISOPROPYLBENZENE (Cumene)	< 0.5 MCG/L
T42109 BROMOFORM	< 0.5 MCG/L
T51809 1,1,2,2-TETRACHLOROETHANE	< 0.5 MCG/L
T31009 1,2,3-TRICHLOROPROPANE	< 0.5 MCG/L
T51109 N-PROPYLBENZENE	< 0.5 MCG/L
T51209 BROMOBENZENE	< 0.5 MCG/L
T85809 1,3,5-TRIMETHYLBENZENE	< 0.5 MCG/L
T50409 O-CHLOROTOLUENE	< 0.5 MCG/L
T50609 P-CHLOROTOLUENE	< 0.5 MCG/L
T85609 TERT-BUTYLBENZENE	< 0.5 MCG/L
T85909 1,2,4-TRIMETHYLBENZENE	< 0.5 MCG/L
T86209 SEC-BUTYLBENZENE	< 0.5 MCG/L
T86009 4-ISOPROPYLTOLUENE (p-Cymene)	< 0.5 MCG/L
T49709 1,3-DICHLOROBENZENE	< 0.5 MCG/L
T44209 1,4-DICHLOROBENZENE	< 0.5 MCG/L
T86309 N-BUTYLBENZENE	< 0.5 MCG/L
T44109 1,2-DICHLOROBENZENE	< 0.5 MCG/L
T38209 1,2-DIBROMO-3-CHLOROPROPANE	< 0.5 MCG/L
T44009 1,2,4-TRICHLOROBENZENE	< 0.5 MCG/L
T52509 HEXACHLOROBUTADIENE (C-46)	< 0.5 MCG/L
T65609 NAPHTHALENE	< 0.5 MCG/L
T43909 1,2,3-TRICHLOROBENZENE	< 0.5 MCG/L
T01800 PH OF VOLATILE ALIQUOT	2
T02200 PH WAS NOT AS LOW AS REQUIRED BY METH	[NR]

**** END OF REPORT ****

0005 NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER FOR LABORATORIES AND RESEARCH

PAGE 1 RESULTS OF EXAMINATION REPORT MAILED OUT

;AMPLE ID: 932471 SAMPLE RECEIVED:93/10/15/ CHARGE: 10.00
PROGRAM: 110:STATE SUPERFUND ANALYTICAL SERVICES
SOURCE ID: DRAINAGE BASIN:04 GAZETTEER CODE:6056
'OLITICAL SUBDIVISION:GAINESVILLE COUNTY:WYOMING
LATITUDE: . LONGITUDE: . Z DIRECTION:
LOCATION: ETE SANITATION 961005
'ESCRIPTION:[redacted], 5342 BROUGHTON RD., GAINSVILLE
EPORTING LAB: TOX:LAB FOR ORGANIC ANALYTICAL CHEMISTRY
TEST PATTERN: 5022W:VOLATILE ORGANICS IN WATER
AMPLE TYPE: 120:PRIVATE WATER SUPPLY - DRILLED WELL
'IME OF SAMPLING: 93/10/14 12:14 DATE REPORTED:93/10/24

ANALYSIS: 5022W VOLATILE ORGANICS IN WATER-EPA 502.2 (DES 310-33)
ATCH ID: 5022W9310211139 DEFAULT MULTIPLIER: 1.0
DATE REPORTED: 93/10/24 REPORT MAILED OUT
AROM-AN DATE OF ANALYSIS CM 93/10/19

-----------PARAMETER-----------		----------RESULT----------
T70209	DICHLORODIFLUOROMETHANE (FREON-1	< 0.5 MCG/L
T62009	CHLOROMETHANE	< 0.5 MCG/L
T41009	VINYL CHLORIDE	< 0.5 MCG/L
T61809	BROMOMETHANE	< 0.5 MCG/L
T61909	CHLOROETHANE	< 0.5 MCG/L
T61709	TRICHLOROFLUOROMETHANE (FREON-11	< 0.5 MCG/L
T50909	1,1-DICHLOROETHENE	< 0.5 MCG/L
T23809	METHYLENE CHLORIDE (DICHLOROMETH	< 0.5 MCG/L
T61209	TRANS-1,2-DICHLOROETHENE	< 0.5 MCG/L
T51909	1,1-DICHLOROETHANE	< 0.5 MCG/L
T18209	2,2-DICHLOROPROPANE	< 0.5 MCG/L
T87609	CIS-1,2-DICHLOROETHENE	< 0.5 MCG/L
T39009	CHLOROFORM	< 0.5 MCG/L
T17209	BROMOCHLOROMETHANE	< 0.5 MCG/L
T23609	1,1,1-TRICHLOROETHANE	< 0.5 MCG/L
T18309	1,1-DICHLOROPROPENE	< 0.5 MCG/L
T36609	CARBON TETRACHLORIDE	< 0.5 MCG/L
T50809	1,2-DICHLOROETHANE	< 0.5 MCG/L
T34409	BENZENE	< 0.5 MCG/L
T41109	TRICHLOROETHENE	< 0.5 MCG/L
T61309	1,2-DICHLOROPROPANE	< 0.5 MCG/L
T38909	BROMODICHLOROMETHANE	< 0.5 MCG/L
T88709	DIBROMOMETHANE	< 0.5 MCG/L
T61409	CIS-1,3-DICHLOROPROPENE	< 0.5 MCG/L
T39209	TOLUENE	< 0.5 MCG/L
T61509	TRANS-1,3-DICHLOROPROPENE	< 0.5 MCG/L
T51709	1,1,2-TRICHLOROETHANE	< 0.5 MCG/L
T11209	1,3-DICHLOROPROPANE	< 0.5 MCG/L

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OPIES SENT TO: CO(2), RO(1), LPHE(1), FED( ), INFO-P( ), INFO-L( )

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* *
* * SUBMITTED BY:BONARSKI
* *
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06 NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER FOR LABORATORIES AND RESEARCH

GE 2 RESULTS OF EXAMINATION REPORT MAILED OUT

MPLE ID: 932471 SAMPLE RECEIVED:93/10/15/ CHARGE: 10.00
LITICAL SUBDIVISION:GAINESVILLE COUNTY:WYOMING
CATION: ETE SANITATION 961005
ME OF SAMPLING: 93/10/14 12:14 DATE REPORTED:93/10/24

----------PARAMETER-----------	-----------RESULT-----------------
T41209 TETRACHLOROETHENE	< 0.5 MCG/L
T44909 DIBROMOCHLOROMETHANE	< 0.5 MCG/L
T60409 1,2-DIBROMOETHANE (EDB)	< 0.5 MCG/L
T40909 CHLOROBENZENE	< 0.5 MCG/L
T21009 1,1,1,2-TETRACHLOROETHANE	< 0.5 MCG/L
T51009 ETHYLBENZENE	< 0.5 MCG/L
T51309 M/P-XYLENE	< 0.5 MCG/L
T51409 O-XYLENE	< 0.5 MCG/L
T85409 S RENE	< 0.5 MCG/L
T85309 ISOPROPYLBENZENE (Cumene)	< 0.5 MCG/L
T42109 BROMOFORM	< 0.5 MCG/L
T51809 1,1,2,2-TETRACHLOROETHANE	< 0.5 MCG/L
T31009 1,2,3-TRICHLOROPROPANE	< 0.5 MCG/L
T51109 N-PROPYLBENZENE	< 0.5 MCG/L
T51209 BROMOBENZENE	< 0.5 MCG/L
T85809 1,3,5-TRIMETHYLBENZENE	< 0.5 MCG/L
T50409 O-CHLOROTOLUENE	< 0.5 MCG/L
T50609 P-CHLOROTOLUENE	< 0.5 MCG/L
T85609 TERT-BUTYLBENZENE	< 0.5 MCG/L
T85909 1,2,4-TRIMETHYLBENZENE	< 0.5 MCG/L
T86209 SEC-BUTYLBENZENE	< 0.5 MCG/L
T86009 4-ISOPROPYLTOLUENE (p-Cymene)	< 0.5 MCG/L
T49709 1,3-DICHLOROBENZENE	< 0.5 MCG/L
T44209 1,4-DICHLOROBENZENE	< 0.5 MCG/L
T86309 N-BUTYLBENZENE	< 0.5 MCG/L
T44109 1,2-DICHLOROBENZENE	< 0.5 MCG/L
T38209 1,2-DIBROMO-3-CHLOROPROPANE	< 0.5 MCG/L
T44009 1,2,4-TRICHLOROBENZENE	< 0.5 MCG/L
T52509 HEXACHLOROBUTADIENE (C-46)	< 0.5 MCG/L
T65609 NAPHTHALENE	< 0.5 MCG/L
T43909 1,2,3-TRICHLOROBENZENE	< 0.5 MCG/L
T01800 PH OF VOLATILE ALIQUOT	2
T02200 PH WAS NOT AS LOW AS REQUIRED BY METH	[NR]

**** END OF REPORT ****

0007 NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER FOR LABORATORIES AND RESEARCH

PAGE 1 RESULTS OF EXAMINATION REPORT MAILED OUT

SAMPLE ID: 932469 SAMPLE RECEIVED:93/10/15/ CHARGE: 10.00
PROGRAM: 110:STATE SUPERFUND ANALYTICAL SERVICES
SOURCE ID: DRAINAGE BASIN:04 GAZETTEER CODE:6056
POLITICAL SUBDIVISION:GAINESVILLE COUNTY:WYOMING
LATITUDE: . LONGITUDE: . Z DIRECTION:
LOCATION: ETE SANITATION 961005
DESCRIPTION:[redacted] 5284 Broughton Rd
REPORTING LAB: TOX:LAB FOR ORGANIC ANALYTICAL CHEMISTRY
TEST PATTERN: 5022W:VOLATILE ORGANICS IN WATER
SAMPLE TYPE: 120:PRIVATE WATER SUPPLY - DRILLED WELL
TIME OF SAMPLING: 93/10/14 12:03 DATE REPORTED:93/10/24

ANALYSIS: 5022W VOLATILE ORGANICS IN WATER-EPA 502.2 (DES 310-33)
BATCH ID: 5022W9310211139 DEFAULT MULTIPLIER: 1.0
DATE REPORTED: 93/10/24 REPORT MAILED OUT
AROM-AN DATE OF ANALYSIS CM 93/10/19

-----------PARAMETER-----------		----------RESULT----------
T70209	DICHLORODIFLUOROMETHANE (FREON-1	< 0.5 MCG/L
T62009	CHLOROMETHANE	< 0.5 MCG/L
T41009	VINYL CHLORIDE	< 0.5 MCG/L
T61809	BROMOMETHANE	< 0.5 MCG/L
T61909	CHLOROETHANE	< 0.5 MCG/L
T61709	TRICHLOROFLUOROMETHANE (FREON-11	< 0.5 MCG/L
T50909	1,1-DICHLOROETHENE	< 0.5 MCG/L
T23809	METHYLENE CHLORIDE (DICHLOROMETH	< 0.5 MCG/L
T61209	TRANS-1,2-DICHLOROETHENE	< 0.5 MCG/L
T51909	1,1-DICHLOROETHANE	< 0.5 MCG/L
T18209	2,2-DICHLOROPROPANE	< 0.5 MCG/L
T87609	CIS-1,2-DICHLOROETHENE	< 0.5 MCG/L
T39009	CHLOROFORM	< 0.5 MCG/L
T17209	BROMOCHLOROMETHANE	< 0.5 MCG/L
T23609	1,1,1-TRICHLOROETHANE	< 0.5 MCG/L
T18309	1,1-DICHLOROPROPENE	< 0.5 MCG/L
T36609	CARBON TETRACHLORIDE	< 0.5 MCG/L
T50809	1,2-DICHLOROETHANE	< 0.5 MCG/L
T34409	BENZENE	< 0.5 MCG/L
T41109	TRICHLOROETHENE	< 0.5 MCG/L
T61309	1,2-DICHLOROPROPANE	< 0.5 MCG/L
T38909	BROMODICHLOROMETHANE	< 0.5 MCG/L
T88709	DIBROMOMETHANE	< 0.5 MCG/L
T61409	CIS-1,3-DICHLOROPROPENE	< 0.5 MCG/L
T39209	TOLUENE	< 0.5 MCG/L
T61509	TRANS-1,3-DICHLOROPROPENE	< 0.5 MCG/L
T51709	1,1,2-TRICHLOROETHANE	< 0.5 MCG/L
T11209	1,3-DICHLOROPROPANE	< 0.5 MCG/L

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

COPIES SENT TO: CO(2), RO(1), LPHE(1), FED( ), INFO-P( ), INFO-L( )

SUBMITTED BY:BONARSKI

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

RESULTS OF EXAMINATION   REPORT MAILED OUT

.MPLE ID: 932469   SAMPLE RECEIVED:93/10/15   CHARGE: 10.00
LITICAL SUBDIVISION:GAINESVILLE   COUNTY:WYOMING
CATION: ETE SANITATION 961005
ME OF SAMPLING: 93/10/14 12:03   DATE REPORTED:93/10/24

----------PARAMETER----------	----------RESULT----------
T41209 TETRACHLOROETHENE	< 0.5 MCG/L
T44909 DIBROMOCHLOROMETHANE	< 0.5 MCG/L
T60409 1,2-DIBROMOETHANE (EDB)	< 0.5 MCG/L
T40909 CHLOROBENZENE	< 0.5 MCG/L
T21009 1,1,1,2-TETRACHLOROETHANE	< 0.5 MCG/L
T51009 ETHYLBENZENE	< 0.5 MCG/L
T51309 M/P-XYLENE	< 0.5 MCG/L
T51409 O-XYLENE	< 0.5 MCG/L
T85409 STYRENE	< 0.5 MCG/L
T85309 ISOPROPYLBENZENE (Cumene)	< 0.5 MCG/L
T42109 BROMOFORM	< 0.5 MCG/L
T51809 1,1,2,2-TETRACHLOROETHANE	< 0.5 MCG/L
T31009 1,2,3-TRICHLOROPROPANE	< 0.5 MCG/L
T51109 N-PROPYLBENZENE	< 0.5 MCG/L
T51209 BROMOBENZENE	< 0.5 MCG/L
T85809 1,3,5-TRIMETHYLBENZENE	< 0.5 MCG/L
T50409 O-CHLOROTOLUENE	< 0.5 MCG/L
T50609 P-CHLOROTOLUENE	< 0.5 MCG/L
T85609 TERT-BUTYLBENZENE	< 0.5 MCG/L
T85909 1,2,4-TRIMETHYLBENZENE	< 0.5 MCG/L
T86209 SEC-BUTYLBENZENE	< 0.5 MCG/L
T86009 4-ISOPROPYLTOLUENE (p-Cymene)	< 0.5 MCG/L
T49709 1,3-DICHLOROBENZENE	< 0.5 MCG/L
T44209 1,4-DICHLOROBENZENE	< 0.5 MCG/L
T86309 N-BUTYLBENZENE	< 0.5 MCG/L
T44109 1,2-DICHLOROBENZENE	< 0.5 MCG/L
T38209 1,2-DIBROMO-3-CHLOROPROPANE	< 0.5 MCG/L
T44009 1,2,4-TRICHLOROBENZENE	< 0.5 MCG/L
T52509 HEXACHLOROBUTADIENE (C-46)	< 0.5 MCG/L
T65609 NAPHTHALENE	< 0.5 MCG/L
T43909 1,2,3-TRICHLOROBENZENE	< 0.5 MCG/L
T01800 PH OF VOLATILE ALIQUOT	2
T02200 PH WAS NOT AS LOW AS REQUIRED BY METH	[NR]

**** END OF REPORT ****

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER FOR LABORATORIES AND RESEARCH
4872 Jordan Road

RESULTS OF EXAMINATION — FINAL REPORT

SAMPLE ID: 912435 SAMPLE RECEIVED:91/07/12/ CHARGE: 15.00
POLITICAL SUBDIVISION:GAINESVILLE COUNTY:WYOMING
LOCATION: 961005 ETE SANITATION
TIME OF SAMPLING: 91/07/10 10:00 DATE PRINTED:91/08/06

PARAMETER	RESULT
1,2,3-TRICHLOROPROPANE	< 0.5 MCG/L
1,1,2,2-TETRACHLOROETHANE	< 0.5 MCG/L
TETRACHLOROETHENE	< 0.5 MCG/L
CHLOROBENZENE	< 0.5 MCG/L
BROMOBENZENE	< 0.5 MCG/L
O-CHLOROTOLUENE	< 0.5 MCG/L
P-CHLOROTOLUENE	< 0.5 MCG/L
1,3-DICHLOROBENZENE	< 0.5 MCG/L
1,2-DICHLOROBENZENE	< 0.5 MCG/L
1,4-DICHLOROBENZENE	< 0.5 MCG/L
PH OF HALOGENATED ALIQUOT	2.

ANALYSIS: 5031 AROMATIC PURGEABLES, EPA METHOD 503.1 (DES 310-22)
DATE REPORTED: 91/07/19 REPORT MAILED OUT

PARAMETER	RESULT
BENZENE	< 0.5 MCG/L
TOLUENE	< 0.5 MCG/L
ETHYLBENZENE	< 0.5 MCG/L
P-XYLENE	< 0.5 MCG/L
M-XYLENE	< 0.5 MCG/L
O-XYLENE	< 0.5 MCG/L
ISOPROPYLBENZENE (CUMENE)	< 0.5 MCG/L
STYRENE	< 0.5 MCG/L
N-PROPYLBENZENE	< 0.5 MCG/L
TERT-BUTYLBENZENE	< 0.5 MCG/L
M-CHLOROTOLUENE	< 0.5 MCG/L
1,3,5-TRIMETHYLBENZENE	< 0.5 MCG/L
1,2,4-TRIMETHYLBENZENE	< 0.5 MCG/L
4-ISOPROPYLTOLUENE (P-CYMENE)	< 0.5 MCG/L
SEC-BUTYLBENZENE	< 0.5 MCG/L
N-BUTYLBENZENE	< 0.5 MCG/L
HEXACHLOROBUTADIENE (C-46)	< 0.5 MCG/L
1,2,4-TRICHLOROBENZENE	< 0.5 MCG/L
NAPHTHALENE	< 0.5 MCG/L
1,2,3-TRICHLOROBENZENE	< 0.5 MCG/L
PH OF AROMATIC ALIQUOT	2

**** END OF REPORT ****

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER FOR LABORATORIES AND RESEARCH
#5342 Broughton Rd.

RESULTS OF EXAMINATION

FINAL REPORT

SAMPLE ID: 912434 SAMPLE RECEIVED:91/07/12/ CHARGE: 15.00
POLITICAL SUBDIVISION:GAINESVILLE COUNTY:WYOMING
LOCATION: 961005 ETE SANITATION
TIME OF SAMPLING: 91/07/10 09:40 DATE PRINTED:91/08/06

PARAMETER	RESULT
1,2,3-TRICHLOROPROPANE	< 0.5 MCG/L
1,1,2,2-TETRACHLOROETHANE	< 0.5 MCG/L
TETRACHLOROETHENE	< 0.5 MCG/L
CHLOROBENZENE	< 0.5 MCG/L
BROMOBENZENE	< 0.5 MCG/L
O-CHLOROTOLUENE	< 0.5 MCG/L
P-CHLOROTOLUENE	< 0.5 MCG/L
1,3-DICHLOROBENZENE	< 0.5 MCG/L
1,2-DICHLOROBENZENE	< 0.5 MCG/L
1,4-DICHLOROBENZENE	< 0.5 MCG/L
PH OF HALOGENATED ALIQUOT	2.

ANALYSIS: 5031 AROMATIC PURGEABLES, EPA METHOD 503.1 (DES 310-22)
DATE REPORTED: 91/07/19 REPORT MAILED OUT

PARAMETER	RESULT
BENZENE	< 0.5 MCG/L
TOLUENE	< 0.5 MCG/L
ETHYLBENZENE	< 0.5 MCG/L
P-XYLENE	< 0.5 MCG/L
M-XYLENE	< 0.5 MCG/L
O-XYLENE	< 0.5 MCG/L
ISOPROPYLBENZENE (CUMENE)	< 0.5 MCG/L
STYRENE	< 0.5 MCG/L
N-PROPYLBENZENE	< 0.5 MCG/L
TERT-BUTYLBENZENE	< 0.5 MCG/L
M-CHLOROTOLUENE	< 0.5 MCG/L
1,3,5-TRIMETHYLBENZENE	< 0.5 MCG/L
1,2,4-TRIMETHYLBENZENE	< 0.5 MCG/L
4-ISOPROPYLTOLUENE (P-CYMENE)	< 0.5 MCG/L
SEC-BUTYLBENZENE	< 0.5 MCG/L
N-BUTYLBENZENE	< 0.5 MCG/L
HEXACHLOROBUTADIENE (C-46)	< 0.5 MCG/L
1,2,4-TRICHLOROBENZENE	< 0.5 MCG/L
NAPHTHALENE	< 0.5 MCG/L
1,2,3-TRICHLOROBENZENE	< 0.5 MCG/L
PH OF AROMATIC ALIQUOT	2

**** END OF REPORT ****

0506

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

PAGE 1 RESULTS OF EXAMINATION FINAL REPORT

SAMPLE ID: 911001686 SAMPLE RECEIVED:91/07/12/12 CHARGE: 5.00
PROGRAM: 110:STATE SUPERFUND ANALYTICAL SERVICES
SOURCE ID: DRAINAGE BASIN: GAZETTEER CODE:6056
POLITICAL SUBDIVISION:GAINESVILLE COUNTY:WYOMING
LATITUDE: . LONGITUDE: . Z DIRECTION:
LOCATION: 961005 ETE SANITATION
DESCRIPTION:[redacted] 5342BROAUHTON RD GAINESVILLE NY 14550
REPORTING LAB: 10:LABORATORY OF INORGANIC ANALYTICAL CHEMISTRY - ALBANY
TEST PATTERN: 10-001:SAFE DRINKING WATER ACT - METALS ONLY
SAMPLE TYPE: 120:PRIVATE WATER SUPPLY - DRILLED WELL
TIME OF SAMPLING: 91/07/10 09:40 DATE PRINTED:91/08/06

ANALYSIS: ICP-1 ICP GROUPING 1

PARAMETER	RESULT
MERCURY	< 0.2 MCG/L
ARSENIC	< 10. MCG/L
SELENIUM	< 5. MCG/L
LEAD	< 10. MCG/L
BERYLLIUM	< 1. MCG/L
SILVER	< 10. MCG/L
BARIUM	124. MCG/L
CADMIUM	< 5. MCG/L
COBALT	< 5. MCG/L
CHROMIUM	< 5. MCG/L
COPPER	43. MCG/L
IRON	46. MCG/L
MANGANESE	< 5. MCG/L
NICKEL	< 5. MCG/L
STRONTIUM	116. MCG/L
TITANIUM	< 5. MCG/L
VANADIUM	< 5. MCG/L
ZINC	66. MCG/L
MOLYBDENUM	< 20. MCG/L
ANTIMONY	< 80. MCG/L
TIN	< 50. MCG/L
THALLIUM	< 80. MCG/L
ALUMINUM	< 100. MCG/L
CALCIUM	89.5 MG/L
POTASSIUM	1.1 MG/L
MAGNESIUM	22.8 MG/L
SODIUM	49.9 MG/L

**** END OF REPORT ****

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ALBANY, NY 12237 INTERAGENCY MAIL

0662 NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER FOR LABORATORIES AND RESEARCH

PAGE 1 RESULTS OF EXAMINATION FINAL REPORT

SAMPLE ID: 8950[illegible] SAMPLE RECEIVED:89/11/16/ CHARGE: 15.00
PROGRAM: 110: STATE SUPERFUND ANALYTICAL SERVICES
SOURCE ID: DRAINAGE BASIN: GAZETTEER CODE:5056
POLITICAL SUBDIVISION:CANISTEO COUNTY:STEUBEN
LATITUDE: . LONGITUDE: . Z DIRECTION:
LOCATION: (T)GAINSVILLE, ETE SANITATION LF (#961005)
DESCRIPTION:[redacted],5284 BROUGHTON RD., KITCHEN TAP
REPORTING LAB: TOX:LAB FOR ORGANIC ANALYTICAL CHEMISTRY
TEST PATTERN: VOL3:PURGEABLES - HALOGENATED AND AROMATICS
SAMPLE TYPE: 120:PRIVATE WATER SUPPLY - DRILLED WELL
TIME OF SAMPLING: 89/11/14 12:30 DATE PRINTED:89/12/01

ANALYSIS: VH05021 VOLATILE HALOGENATED ORGANICS (DES 310-29)
DATE PRINTED: 89/12/01 FINAL REPORT

PARAMETER	RESULT
CHLOROMETHANE	< 0.5 MCG/L
BROMOMETHANE	< 0.5 MCG/L
VINYL CHLORIDE	< 0.5 MCG/L
DICHLORODIFLUOROMETHANE (FREON-12)	< 0.5 MCG/L
CHLOROETHANE	< 0.5 MCG/L
METHYLENE CHLORIDE (DICHLOROMETHANE)	< 0.5 MCG/L
TRICHLOROFLUOROMETHANE (FREON-11)	< 0.5 MCG/L
1,1-DICHLOROETHENE	< 0.5 MCG/L
1,1-DICHLOROETHANE	< 0.5 MCG/L
TRANS-1,2-DICHLOROETHENE	< 0.5 MCG/L
CIS-1,2-DICHLOROETHENE	< 0.5 MCG/L
CHLOROFORM	< 0.5 MCG/L
1,2-DICHLOROETHANE	< 0.5 MCG/L
DIBROMOMETHANE	< 0.5 MCG/L
1,1,1-TRICHLOROETHANE	< 0.5 MCG/L
CARBON TETRACHLORIDE	< 0.5 MCG/L
BROMODICHLOROMETHANE	< 0.5 MCG/L
2,3-DICHLOROPROPENE	< 0.5 MCG/L
1,2-DICHLOROPROPANE	< 0.5 MCG/L
CIS-1,3-DICHLOROPROPENE	< 0.5 MCG/L
TRICHLOROETHENE	< 0.5 MCG/L
1,3-DICHLOROPROPANE	< 0.5 MCG/L
DIBROMOCHLOROMETHANE	< 0.5 MCG/L
TRANS-1,3-DICHLOROPROPENE	< 0.5 MCG/L
1,1,2-TRICHLOROETHANE	< 0.5 MCG/L
1,2-DIBROMOETHANE (EDB)	< 0.5 MCG/L
2-CHLOROETHYLVINYL ETHER	< 0.5 MCG/L
BROMOFORM	< 0.5 MCG/L
1,1,1,2-TETRACHLOROETHANE	< 0.5 MCG/L
1,2,3-TRICHLOROPROPANE	< 0.5 MCG/L

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

RESULTS OF EXAMINATION FINAL REPORT

SAMPLE ID: 895014 SAMPLE RECEIVED:89/11/16/ CHARGE: 15.00
POLITICAL SUBDIVISION:CANISTEO COUNTY:STEUBEN
LOCATION: (T)GAINSVILLE, ETE SANITATION LF (#961005)
TIME OF SAMPLING: 89/11/14 12:30 DATE PRINTED:89/12/01

PARAMETER	RESULT
1,1,2,2-TETRACHLOROETHANE	< 0.5 MCG/L
TETRACHLOROETHENE	< 0.5 MCG/L
PENTACHLOROETHANE	< 0.5 MCG/L
1-CHLOROCYCLOHEXENE-1	< 0.5 MCG/L
CHLOROBENZENE	< 0.5 MCG/L
BIS(2-CHLOROETHYL)ETHER	< 0.5 MCG/L
1,2-DIBROMO-3-CHLOROPROPANE	< 0.5 MCG/L
BROMOBENZENE	< 0.5 MCG/L
O-CHLOROTOLUENE	< 0.5 MCG/L
BIS(2-CHLOROISOPROPYL)ETHER	< 0.5 MCG/L
1,3-DICHLOROBENZENE	< 0.5 MCG/L
1,2-DICHLOROBENZENE	< 0.5 MCG/L
1,4-DICHLOROBENZENE	< 0.5 MCG/L

ANALYSIS: 5031 AROMATIC PURGEABLES, EPA METHOD 503.1 (DES 310-22)
DATE PRINTED: 89/12/01 FINAL REPORT

PARAMETER	RESULT
BENZENE	< 0.5 MCG/L
TOLUENE	< 0.5 MCG/L
ETHYLBENZENE	< 0.5 MCG/L
P-XYLENE	< 0.5 MCG/L
M-XYLENE	< 0.5 MCG/L
O-XYLENE	< 0.5 MCG/L
CUMENE	< 0.5 MCG/L
STYRENE	< 0.5 MCG/L
P-BROMOFLUOROBENZENE	< 0.5 MCG/L
N-PROPYLBENZENE	< 0.5 MCG/L
TERT-BUTYLBENZENE	< 0.5 MCG/L
P-CHLOROTOLUENE	< 0.5 MCG/L
M-CHLOROTOLUENE	< 0.5 MCG/L
1,3,5-TRIMETHYLBENZENE	< 0.5 MCG/L
1,2,4-TRIMETHYLBENZENE	< 0.5 MCG/L
P-CYMENE	< 0.5 MCG/L
CYCLOPROPYLBENZENE	< 0.5 MCG/L
SEC-BUTYLBENZENE	< 0.5 MCG/L
N-BUTYLBENZENE	< 0.5 MCG/L
2,3-BENZOFURAN	< 0.5 MCG/L
HEXACHLOROBUTADIENE (C-46)	< 0.5 MCG/L
1,2,4-TRICHLOROBENZENE	< 0.5 MCG/L
NAPHTHALENE	< 0.5 MCG/L
1,2,3-TRICHLOROBENZENE	< 0.5 MCG/L
PH OF AROMATIC ALIQUOT	2.

**** END OF REPORT ****

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

RESULTS OF EXAMINATION

FINAL REPORT

SAMPLE ID: 895015 SAMPLE RECEIVED:89/11/16/ CHARGE: 15.00
PROGRAM: 110:STATE SUPERFUND ANALYTICAL SERVICES
SOURCE ID: DRAINAGE BASIN: GAZETTEER CODE:5056
POLITICAL SUBDIVISION:CANISTEO COUNTY:STEUBEN
LATITUDE: . LONGITUDE: . Z DIRECTION:
LOCATION: (T)GAINSVILLE, ETE SANITATION LF (#961005)
DESCRIPTION:[redacted].,4344 RTE 19, KITCHEN TAP
REPORTING LAB: TOX:LAB FOR ORGANIC ANALYTICAL CHEMISTRY
TEST PATTERN: VOL3:PURGEABLES - HALOGENATED AND AROMATICS
SAMPLE TYPE: 120:PRIVATE WATER SUPPLY - DRILLED WELL
TIME OF SAMPLING: 89/11/14 13: DATE PRINTED:89/12/01

ANALYSIS: VH05021 VOLATILE HALOGENATED ORGANICS (DES 310-29)
DATE PRINTED: 89/12/01 FINAL REPORT

------------PARAMETER------------	----------RESULT----------
CH[illegible]ETHANE	< 0.5 MCG/L
BR[illegible]ANE	< 0.5 MCG/L
VI[illegible]RIDE	< 0.5 MCG/L
DICH[illegible]DIFLUOROMETHANE (FREON-12)	< 0.5 MCG/L
CHLOROETHANE	< 0.5 MCG/L
METHYLENE CHLORIDE (DICHLOROMETHANE)	< 0.5 MCG/L
TRICHLOROFLUOROMETHANE (FREON-11)	< 0.5 MCG/L
1,1-DICHLOROETHENE	< 0.5 MCG/L
1,1-DICHLOROETHANE	< 0.5 MCG/L
TRANS-1,2-DICHLOROETHENE	< 0.5 MCG/L
CIS-1,2-DICHLOROETHENE	< 0.5 MCG/L
CHLOROFORM	< 0.5 MCG/L
1,2-[illegible]ICHLOROETHANE	< 0.5 MCG/L
DI[illegible]MOMETHANE	< 0.5 MCG/L
1,1,1-TRICHLOROETHANE	< 0.5 MCG/L
CARBON [illegible]TRACHLORIDE	< 0.5 MCG/L
BROMODI[illegible]OROMETHANE	< 0.5 MCG/L
2,3-DIC[illegible]OPROPENE	< 0.5 MCG/L
1,2-DICH[illegible]OPROPANE	< 0.5 MCG/L
CIS-1,3-DICHLOROPROPENE	< 0.5 MCG/L
TRICHLOROETHENE	< 0.5 MCG/L
1,3-DICHLOROPROPANE	< 0.5 MCG/L
DIBROMOCHLOROMETHANE	< 0.5 MCG/L
TRANS-1,3-DICHLOROPROPENE	< 0.5 MCG/L
1,1,2-TRICHLOROETHANE	< 0.5 MCG/L
1,2-DIBROMOETHANE (EDB)	< 0.5 MCG/L
2-CHLOROETHYLVINYL ETHER	< 0.5 MCG/L
BROMOFORM	< 0.5 MCG/L
1,1,1,2-TETRACHLOROETHANE	< 0.5 MCG/L
1,2,3-TRICHLOROPROPANE	< 0.5 MCG/L

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[illegible]OPIE[illegible] SENT TO: CO(2), RO(1), LPHE(1), FED( ), INFO-P( ), INFO-L( )

RONALD TRAMONTANO, PE
BUR. ENVIRONMENTAL EXPOSURE INVESTIGAT.
NY STATE DEP'T. HEALTH
II UNIVERSITY PLACE
[illegible]LBANY, NY 12237 INTERAGENCY MAIL

SUBMITTED BY:WEISS

SAMPLE ID: 895015 SAMPLE RECEIVED:89/11/16/ CHARGE: 15.00
POLITICAL SUBDIVISION:CANISTEO COUNTY:STEUBEN
LOCATION: (T)GAINSVILLE, ETE SANITATION LF (#961005)
TIME OF SAMPLING: 89/11/14 13: DATE PRINTED:89/12/01

------------PARAMETER-----------	----------RESULT----------
1,1,2,2-TETRACHLOROETHANE	< 0.5 MCG/L
TETRACHLOROETHENE	< 0.5 MCG/L
PENTACHLOROETHANE	< 0.5 MCG/L
1-CHLOROCYCLOHEXENE-1	< 0.5 MCG/L
CHLOROBENZENE	< 0.5 MCG/L
BIS(2-CHLOROETHYL)ETHER	< 0.5 MCG/L
1,2-DIBROMO-3-CHLOROPROPANE	< 0.5 MCG/L
BROMOBENZENE	< 0.5 MCG/L
O-CHLOROTOLUENE	< 0.5 MCG/L
BIS(2-CHLOROISOPROPYL)ETHER	< 0.5 MCG/L
1,3-DICHLOROBENZENE	< 0.5 MCG/L
1,2-DICHLOROBENZENE	< 0.5 MCG/L
1,4-DICHLOROBENZENE	< 0.5 MCG/L

ANALYSIS: 5031 AROMATIC PURGEABLES, EPA METHOD 503.1 [illegible]
DATE PRINTED:89/12/01 FINAL REPORT

------------PARAMETER-----------	----------RESULT----------
BENZENE	< 0.5 MCG/L
TOLUENE	< 0.5 MCG/L
ETHYLBENZENE	< 0.5 MCG/L
P-XYLENE	< 0.5 MCG/L
M-XYLENE	< 0.5 MCG/L
O-XYLENE	< 0.5 MCG/L
CUMENE	< 0.5 MCG/L
STYRENE	< 0.5 MCG/L
P-BROMOFLUOROBENZENE	< 0.5 MCG/L
N-PROPYLBENZENE	< 0.5 MCG/L
TERT-BUTYLBENZENE	< 0.5 MCG/L
P-CHLOROTOLUENE	< 0.5 MCG/L
M-CHLOROTOLUENE	< 0.5 MCG/L
1,3,5-TRIMETHYLBENZENE	< 0.5 MCG/L
1,2,4-TRIMETHYLBENZENE	< 0.5 MCG/L
P-CYMENE	< 0.5 MCG/L
CYCLOPROPYLBENZENE	< 0.5 MCG/L
SEC-BUTYLBENZENE	< 0.5 MCG/L
N-BUTYLBENZENE	< 0.5 MCG/L
2,3-BENZOFURAN	< 0.5 MCG/L
HEXACHLOROBUTADIENE (C-46)	< 0.5 MCG/L
1,2,4-TRICHLOROBENZENE	< 0.5 MCG/L
NAPHTHALENE	< 0.5 MCG/L
1,2,3-TRICHLOROBENZENE	< 0.5 MCG/L
PH OF AROMATIC ALIQUOT	2.

**** END OF REPORT ****

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

 RESULTS OF EXAMINATION FINAL REPORT

SAMPLE ID: 895013 SAMPLE RECEIVED:89/11/16/ CHARGE: 15.00
PROGRAM: 110:STATE SUPERFUND ANALYTICAL SERVICES
SOURCE ID: DRAINAGE BASIN: GAZETTEER CODE:6056
POLITICAL SUBDIVISION:GAINESVILLE COUNTY:WYOMING
LATITUDE: . LONGITUDE: . Z DIRECTION:
LOCATION: (T)GAINSVILLE, ETE SANITATION LANDFILL (#961005)
DESCRIPTION:[redacted].,5342 BROUGHTON RD.,
DESCRIPTION:PRIVATE WELL KITCHEN TAP WATER
REPORTING LAB: TOX:LAB FOR ORGANIC ANALYTICAL CHEMISTRY
TEST PATTERN: VOL3:PURGEABLES - HALOGENATED AND AROMATICS
SAMPLE TYPE: 120:PRIVATE WATER SUPPLY - DRILLED WELL
TIME OF SAMPLING: 89/11/14 11:45 DATE PRINTED:89/12/01

ANALYSIS: VH05021 VOLATILE HALOGENATED ORGANICS (DES 310-29)
DATE PRINTED: 89/12/01 FINAL REPORT

PARAMETER	RESULT
CHLOROMETHANE	< 0.5 MCG/L
BROMOMETHANE	< 0.5 MCG/L
VINYL CHLORIDE	< 0.5 MCG/L
DICHLORODIFLUOROMETHANE (FREON-12)	< 0.5 MCG/L
CHLOROETHANE	< 0.5 MCG/L
METHYLENE CHLORIDE (DICHLOROMETHANE)	< 0.5 MCG/L
TRICHLOROFLUOROMETHANE (FREON-11)	< 0.5 MCG/L
1,1-DICHLOROETHENE	< 0.5 MCG/L
1,1-DICHLOROETHANE	< 0.5 MCG/L
TRANS-1,2-DICHLOROETHENE	< 0.5 MCG/L
CIS-1,2-DICHLOROETHENE	< 0.5 MCG/L
CHLOROFORM	< 0.5 MCG/L
1,2-DICHLOROETHANE	< 0.5 MCG/L
DIBROMOMETHANE	< 0.5 MCG/L
1,1,1-TRICHLOROETHANE	< 0.5 MCG/L
CARBON TETRACHLORIDE	< 0.5 MCG/L
BROMODICHLOROMETHANE	< 0.5 MCG/L
2,3-DICHLOROPROPENE	< 0.5 MCG/L
1,2-DICHLOROPROPANE	< 0.5 MCG/L
CIS-1,3-DICHLOROPROPENE	< 0.5 MCG/L
TRICHLOROETHENE	< 0.5 MCG/L
1,3-DICHLOROPROPANE	< 0.5 MCG/L
DIBROMOCHLOROMETHANE	< 0.5 MCG/L
TRANS-1,3-DICHLOROPROPENE	< 0.5 MCG/L
1,1,2-TRICHLOROETHANE	< 0.5 MCG/L
1,2-DIBROMOETHANE (EDB)	< 0.5 MCG/L
2-CHLOROETHYLVINYL ETHER	< 0.5 MCG/L
BROMOFORM	< 0.5 MCG/L
1,1,1,2-TETRACHLOROETHANE	< 0.5 MCG/L

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NY STATE DEP'T. HEALTH SUBMITTED BY:WEISS
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ALBANY, NY 12237 INTERAGENCY MAIL

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

 RESULTS OF EXAMINATION FINAL REPORT

SAMPLE ID: 895013 SAMPLE RECEIVED:89/11/16/ CHARGE: 15.00
POLITICAL SUBDIVISION:GAINESVILLE COUNTY:WYOMING
LOCATION: (T)GAINSVILLE, ETE SANITATION LANDFILL (#961005)
TIME OF SAMPLING: 89/11/14 11:45 DATE PRINTED:89/12/01

PARAMETER	RESULT
1,2,3-TRICHLOROPROPANE	< 0.5 MCG/L
1,1,2,2-TETRACHLOROETHANE	< 0.5 MCG/L
TETRACHLOROETHENE	< 0.5 MCG/L
PENTACHLOROETHANE	< 0.5 MCG/L
1-CHLOROCYCLOHEXENE-1	< 0.5 MCG/L
CHLOROBENZENE	< 0.5 MCG/L
BIS(2-CHLOROETHYL)ETHER	< 0.5 MCG/L
1,2-DIBROMO-3-CHLOROPROPANE	< 0.5 MCG/L
BROMOBENZENE	< 0.5 MCG/L
O-CHLOROTOLUENE	< 0.5 MCG/L
BIS(2-CHLOROISOPROPYL)ETHER	< 0.5 MCG/L
1,3-DICHLOROBENZENE	< 0.5 MCG/L
1,2-DICHLOROBENZENE	< 0.5 MCG/L
1,4-DICHLOROBENZENE	< 0.5 MCG/L

ANALYSIS: 5031 AROMATIC PURGEABLES, EPA METHOD 503.1 (DES 310-22)
DATE PRINTED: 89/12/01 FINAL REPORT

PARAMETER	RESULT
BENZENE	< 0.5 MCG/L
TOLUENE	< 0.5 MCG/L
ETHYLBENZENE	< 0.5 MCG/L
P-XYLENE	< 0.5 MCG/L
M-XYLENE	< 0.5 MCG/L
O-XYLENE	< 0.5 MCG/L
CUMENE	< 0.5 MCG/L
STYRENE	< 0.5 MCG/L
P-BROMOFLUOROBENZENE	< 0.5 MCG/L
N-PROPYLBENZENE	< 0.5 MCG/L
TERT-BUTYLBENZENE	< 0.5 MCG/L
P-CHLOROTOLUENE	< 0.5 MCG/L
M-CHLOROTOLUENE	< 0.5 MCG/L
1,3,5-TRIMETHYLBENZENE	< 0.5 MCG/L
1,2,4-TRIMETHYLBENZENE	< 0.5 MCG/L
P-CYMENE	< 0.5 MCG/L
CYCLOPROPYLBENZENE	< 0.5 MCG/L
SEC-BUTYLBENZENE	< 0.5 MCG/L
N-BUTYLBENZENE	< 0.5 MCG/L
2,3-BENZOFURAN	< 0.5 MCG/L
HEXACHLOROBUTADIENE (C-46)	< 0.5 MCG/L
1,2,4-TRICHLOROBENZENE	< 0.5 MCG/L
NAPHTHALENE	< 0.5 MCG/L
1,2,3-TRICHLOROBENZENE	< 0.5 MCG/L
PH OF AROMATIC ALIQUOT	2.

**** END OF REPORT ****

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

 RESULTS OF EXAMINATION FINAL REPORT

SAMPLE ID: 895016 SAMPLE RECEIVED:89/11/16/ CHARGE: 15.00
PROGRAM: 110:STATE SUPERFUND ANALYTICAL SERVICES
SOURCE ID: DRAINAGE BASIN: GAZETTEER CODE:5056
POLITICAL SUBDIVISION:CANISTEO COUNTY:STEUBEN
LATITUDE: . LONGITUDE: . Z DIRECTION:
LOCATION: (T)GAINSVILLE, ETE SANITATION LF (#961005)
DESCRIPTION:FIELD BLANKS WITH 895013-895015 DATE PREPARED 10/30/89
REPORTING LAB: TOX:LAB FOR ORGANIC ANALYTICAL CHEMISTRY
TEST PATTERN: VOL3:PURGEABLES - HALOGENATED AND AROMATICS
SAMPLE TYPE: 297:FIELD BLANK / TRIP BLANK
TIME OF SAMPLING: 89/11/14 : DATE PRINTED:89/12/01

ANALYSIS: VH05021 VOLATILE HALOGENATED ORGANICS (DES 310-29)
DATE PRINTED: 89/12/01 FINAL REPORT

PARAMETER	RESULT
CHLOROMETHANE	< 0.5 MCG/L
BROMOMETHANE	< 0.5 MCG/L
VINYL CHLORIDE	< 0.5 MCG/L
DICHLORODIFLUOROMETHANE (FREON-12)	< 0.5 MCG/L
CHLOROETHANE	< 0.5 MCG/L
METHYLENE CHLORIDE (DICHLOROMETHANE)	< 0.5 MCG/L
TRICHLOROFLUOROMETHANE (FREON-11)	< 0.5 MCG/L
1,1-DICHLOROETHENE	< 0.5 MCG/L
1,1-DICHLOROETHANE	< 0.5 MCG/L
TRANS-1,2-DICHLOROETHENE	< 0.5 MCG/L
CIS-1,2-DICHLOROETHENE	< 0.5 MCG/L
CHLOROFORM	< 0.5 MCG/L
1,2-DICHLOROETHANE	< 0.5 MCG/L
DIBROMOMETHANE	< 0.5 MCG/L
1,1,1-TRICHLOROETHANE	< 0.5 MCG/L
CARBON TETRACHLORIDE	< 0.5 MCG/L
BROMODICHLOROMETHANE	< 0.5 MCG/L
2,3-DICHLOROPROPENE	< 0.5 MCG/L
1,2-DICHLOROPROPANE	< 0.5 MCG/L
CIS-1,3-DICHLOROPROPENE	< 0.5 MCG/L
TRICHLOROETHENE	< 0.5 MCG/L
1,3-DICHLOROPROPANE	< 0.5 MCG/L
DIBROMOCHLOROMETHANE	< 0.5 MCG/L
TRANS-1,3-DICHLOROPROPENE	< 0.5 MCG/L
1,1,2-TRICHLOROETHANE	< 0.5 MCG/L
1,2-DIBROMOETHANE (EDB)	< 0.5 MCG/L
2-CHLOROETHYLVINYL ETHER	< 0.5 MCG/L
BROMOFORM	< 0.5 MCG/L
1,1,1,2-TETRACHLOROETHANE	< 0.5 MCG/L
1,2,3-TRICHLOROPROPANE	< 0.5 MCG/L

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

COPIES SENT TO: CO(2), RO(1), LPHE(1), FED( ), INFO-P( ), INFO-L( )

RONALD TRAMONTANO, PE
BUR. ENVIRONMENTAL EXPOSURE INVESTIGAT.
NY STATE DEP'T. HEALTH
II UNIVERSITY PLACE
ALBANY, NY 12237 INTERAGENCY MAIL

SUBMITTED BY:WEISS

SAMPLE ID: 895016 SAMPLE RECEIVED:89/11/16/ CHARGE: 15.00
POLITICAL SUBDIVISION:CANISTEO COUNTY:STEUBEN
LOCATION: (T)GAINSVILLE, ETE SANITATION LF (#961005)
TIME OF SAMPLING: 89/11/14 : DATE PRINTED:89/12/01

PARAMETER	RESULT
1,1,2,2-TETRACHLOROETHANE	< 0.5 MCG/L
TETRACHLOROETHENE	< 0.5 MCG/L
PENTACHLOROETHANE	< 0.5 MCG/L
1-CHLOROCYCLOHEXENE-1	< 0.5 MCG/L
CHLOROBENZENE	< 0.5 MCG/L
BIS(2-CHLOROETHYL)ETHER	< 0.5 MCG/L
1,2-DIBROMO-3-CHLOROPROPANE	< 0.5 MCG/L
BROMOBENZENE	< 0.5 MCG/L
O-CHLOROTOLUENE	< 0.5 MCG/L
BIS(2-CHLOROISOPROPYL)ETHER	< 0.5 MCG/L
1,3-DICHLOROBENZENE	< 0.5 MCG/L
1,2-DICHLOROBENZENE	< 0.5 MCG/L
1,4-DICHLOROBENZENE	< 0.5 MCG/L

ANALYSIS: 5031 AROMATIC PURGEABLES, EPA METHOD 503.1 (DES 310-22)
DATE PRINTED: 89/12/01 FINAL REPORT

PARAMETER	RESULT
BENZENE	< 0.5 MCG/L
TOLUENE	< 0.5 MCG/L
ETHYLBENZENE	< 0.5 MCG/L
P-XYLENE	< 0.5 MCG/L
M-XYLENE	< 0.5 MCG/L
O-XYLENE	< 0.5 MCG/L
CUMENE	< 0.5 MCG/L
STYRENE	< 0.5 MCG/L
P-BROMOFLUOROBENZENE	< 0.5 MCG/L
N-PROPYLBENZENE	< 0.5 MCG/L
TERT-BUTYLBENZENE	< 0.5 MCG/L
P-CHLOROTOLUENE	< 0.5 MCG/L
M-CHLOROTOLUENE	< 0.5 MCG/L
1,3,5-TRIMETHYLBENZENE	< 0.5 MCG/L
1,2,4-TRIMETHYLBENZENE	< 0.5 MCG/L
P-CYMENE	< 0.5 MCG/L
CYCLOPROPYLBENZENE	< 0.5 MCG/L
SEC-BUTYLBENZENE	< 0.5 MCG/L
N-BUTYLBENZENE	< 0.5 MCG/L
2,3-BENZOFURAN	< 0.5 MCG/L
HEXACHLOROBUTADIENE (C-46)	< 0.5 MCG/L
1,2,4-TRICHLOROBENZENE	< 0.5 MCG/L
NAPHTHALENE	< 0.5 MCG/L
1,2,3-TRICHLOROBENZENE	< 0.5 MCG/L
PH OF AROMATIC ALIQUOT	5.

**** END OF REPORT ****

CDM Camp Dresser & McKee

consulting
engineering
construction
operations

100 Crossways Park West Drive, Suite 415
Woodbury, New York 11797
Tel: 516 496-8400 Fax: 516 496-8864

May 7, 1998

Mr. Shive Mittal, P.E.
Project Manager
Division of Environmental Remediation
New York State Department of Environmental Conservation
50 Wolf Road
Albany, New York 12233-7010

Subject: ETE Sanitation and Landfill Site RI/FS
Site No. 9-61-005
Private Well Survey Results

Dear Mr. Mittal:

Provided for your review is a map locating all private wells within a one-mile radius of the ETE Landfill Site identified through completed private well questionnaires that have been returned to CDM. To date, 31 out of 71 distributed questionnaires have been returned to CDM (approximately 43% return rate) with a total of 21 private wells identified within a one mile radius of the site. All 21 questionnaires for the identified wells have been included with the map.

The map identifies the approximate location of each resident within a one mile radius of the site and which resident returned a completed questionnaire indicating they own a well. Each private well has been designated with a number that corresponds with the respective completed questionnaire.

As part of the RI Private Well Survey Subtask, CDM contacted Mr. Gerald Pietraszek of the NYSDEC Region 9 office in order to review their private well database. However, Mr. Pietraszek indicated the Region 9 office does not maintain a database of private wells. Mr. Pietraszek will provide CDM with private well sample data associated with the most recent private well sampling conducted by the NYSDOH. Additionally, CDM contacted Mr. Gary Banarski of the Wyoming County Health Department who indicated that his department does not maintain private well records.

Per your direction, CDM will not be sampling any private wells as part of the RI; however, we will make recommendations as to which wells may warrant future sampling in the draft RI Report.

If you have any questions please do not hesitate to call.

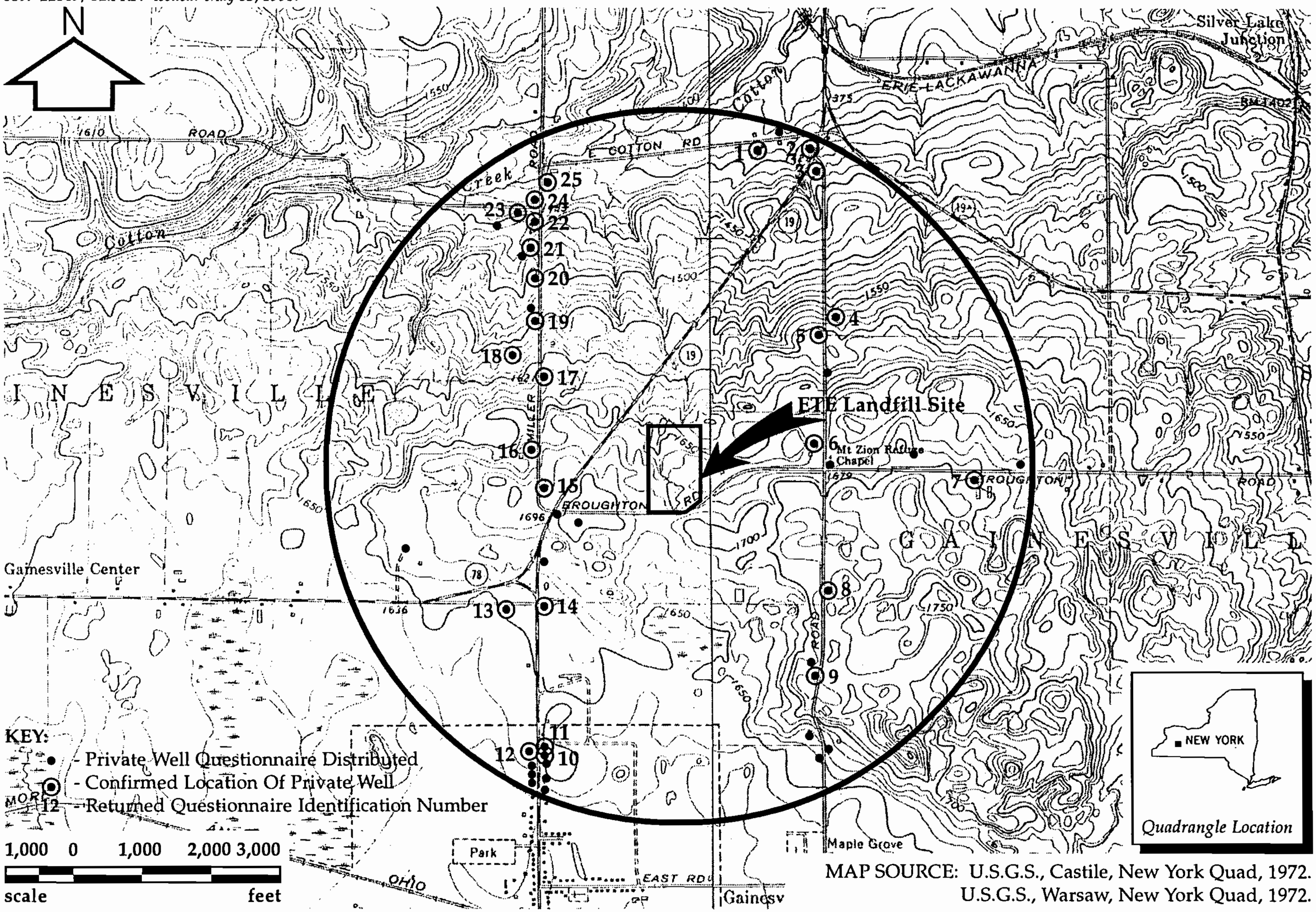
Very truly yours,

CAMP DRESSER & McKEE

Thomas P. Fox, P.G.
Project Manager

cc: L. Guterman
B. Murtagh
File 2.1.1/5

W:\ETE\RPREG9.WPD



MAP SOURCE: U.S.G.S., Castile, New York Quad, 1972.
U.S.G.S., Warsaw, New York Quad, 1972.

Figure 3-1
Private Well Survey Locations - 1 Mile Radius
ETE Sanitation And Landfill Remedial Investigation

Appendix C
Private Well Locations
ETE Sanitation and Landfill
Remedial Investigation

Well ID No.	Address
1	5434 Cotton Rd.
2	4344 State Rt. 19
3	4470 Jordan Rd.
4	4793 Jordan Rd.
5	4770 Jordan Rd.
6	4872 Jordan Rd.
7	5622 Broughton Rd.
8	4979 Jordan Rd.
9	5094 Jordan Rd.
10	39 N. Main St.
11	43 N. Main St.
12	46 N. Main St.
13	5248 Eddy Rd.
14	5001 Center Rd.
15	4873 Miller Rd.
16	4834 Miller Rd.
17	4763 Miller Rd.
18	4740 Miller Rd.
19	4710 Miller Rd.
20	4690 Miller Rd.
21	4670 Miller Rd.
22	4600 Miller Rd.
23	5236 Cotton Rd.
24	5233 Cotton Rd.
25	4579 Miller Rd.

Photo #1
Iron stained soils visible along the landfill's north toe (looking south).

Photo #2
The landfill's north toe seepage face; looking west.

Photo #3
Leachate seep surface soil sample SU-3 (Sample location marked with wood stake and orange flag).

Photo #4
Test Pit No. 2: Black-stained soil observed 2-4′ below grade. OVM reading = 9 ppm at 4′ below grade.

Photo #5
Surface waste littered over the southeast portion of the landfill (looking southeast towards the Town of Gainesville Highway Department garage obscured by the berm).

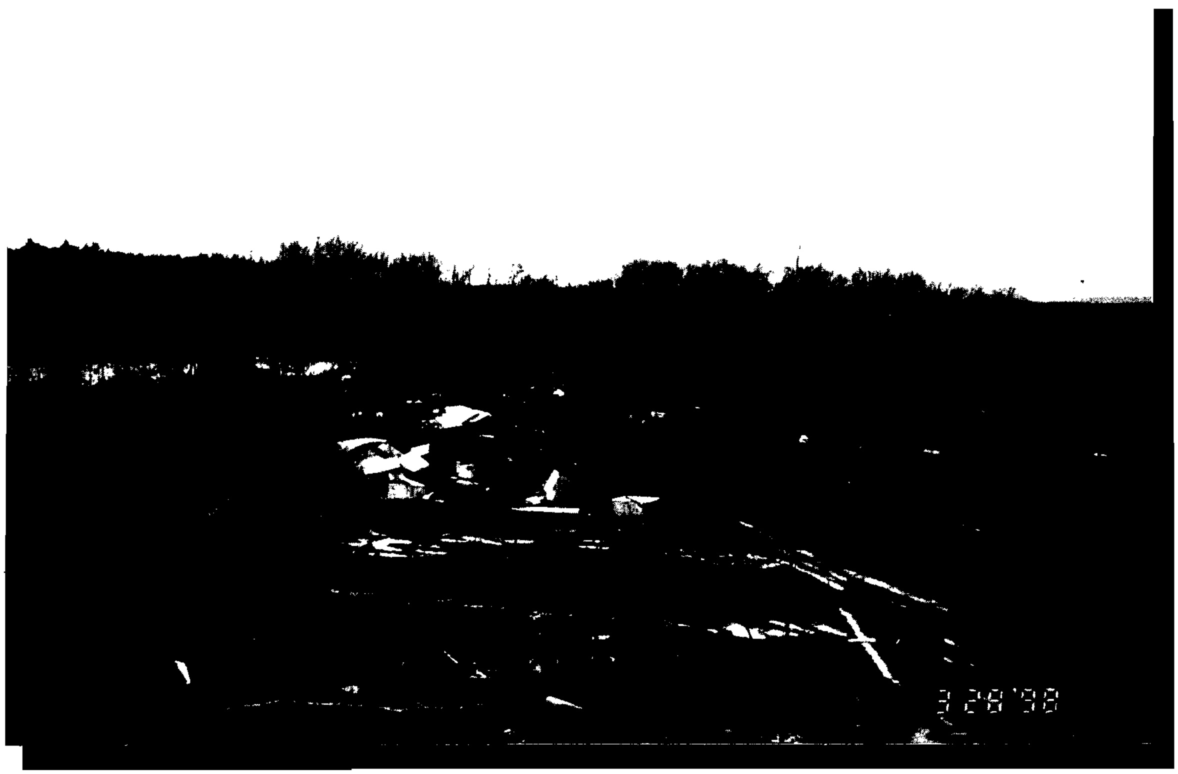


Photo #6
Looking west towards the South Pond. Broughton Road (left) and Route 19 (right) are visible.

Photo #7
The South Pond overflow (looking south).

Photo #8
Surface water and sediment sample location, SD/SW-7.

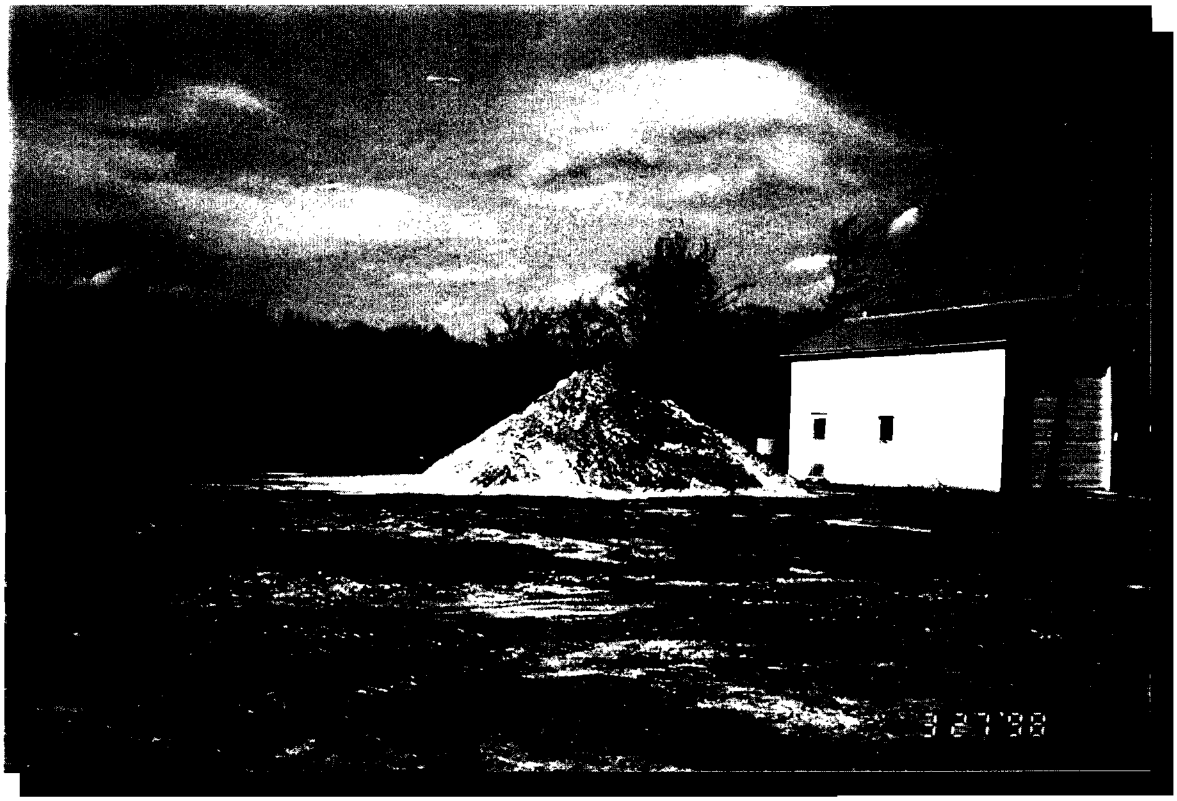


Photo #9
Uncovered road salt and salt precipitate visible near the Town of Gainesville garage (looking northeast).

Photo #10
Salt precipitate visible in the Town of Gainesville Highway Department's operations area (looking northwest).

GEOPHYSICS GPR INTERNATIONAL INC.

GEOPHYSICAL INVESTIGATION

ETE LANDFILL

TOWN OF GAINESVILLE, NEW YORK

Prepared for:

CAMP DRESSER & MCKEE, INC.
100 Crossways Park West, Suite 415
Woodbury, New York 11797

Prepared by:

GEOPHYSICS GPR INTERNATIONAL, INC.
13 Highland Circle, Suite E
Needham Heights, Massachusetts 02194

March 25, 1998

GPR No. B98197
NYSDEC No. 9-61-005

GEOPHYSICS GPR INTERNATIONAL INC.

13 Highland Circle, Suite E
Needham Heights, MA
02194-3031

Tel: (781) 455-0185
Fax: (781) 455-0522
E-mail: gprbos@aol.com

March 25, 1998

GPR Project No. B98197
NYSDEC No. 9-61-005

Mr. Brian Murtagh
Camp Dresser & McKee, Inc.
100 Crossways Park West, Suite 415
Woodbury, NY 11797-2012

Subject: Geophysical Surveys, ETE Landfill,
Broughton Road, Town of Gainesville, NY

Dear Mr. Murtagh:

In accordance with your General Contract, Geophysics GPR International, Inc. has conducted a geophysical investigation at the ETE landfill, Gainesville, NY.

This report contains the results of our findings, and is intended for the use of Camp Dresser & McKee and its client.

Sincerely,

GEOPHYSICS GPR INTERNATIONAL, INC.

L M Tyrala

Lester Tyrala,
District Manager

LMT/hp

Att: 1 Bound and 1 Unbound Report

GEOPHYSICAL INVESTIGATION

ETE LANDFILL

TOWN OF GAINESVILLE, NEW YORK

Presented to:

CAMP DRESSER & MCKEE, INC.
100 Crossways Park West, Suite 415
Woodbury, NY 11797

Presented by:

GEOPHYSICS GPR INTERNATIONAL, INC.
13 Highland Circle, Suite E
Needham Heights, Massachusetts 02194

March 25, 1998

GPR No. B98197
NYSDEC No. 9-61-005

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5.0	CONCLUSIONS	3

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Figure 2. Area 1: Total Magnetic Field Strength Map
Figure 3. Area 1: Gradient Strength Map
Figure 4. Area 1: Interpretation Map
Figure 5. Area 2: Total Magnetic Field Strength Map
Figure 6. Area 2: Gradient Strength Map
Figure 7. Area 2: Interpretation Map
Figure 8. Area 3: Total Magnetic Field Strength Map
Figure 9. Area 3: Gradient Strength Map
Figure 10. Area 3: Interpretation Map

1.0 INTRODUCTION

Magnetic surveys were conducted for Camp Dresser & McKee, Inc. (CDM) at the ETE landfill in the town of Gainesville, New York. The geophysical surveys, covering about five acres, were conducted February 3 and 4, 1998. The objective of these surveys was to locate buried ferrous objects.

The site, under the jurisdiction of the New York State Department of Environmental Conservation (NYSDEC), is located off of Broughton Road (Figure No. 1) near the Gainesville Garage. The areas of investigation are part of a large landfill.

There are three areas of interest. The first investigated area, Area 1, is located between along the northerly area of the site and is approximately 44,100 square feet. Area 2 is located immediately east of and adjacent to Area 1 and covers approximately 52,500 square feet. Area 3 is located immediately south of and adjacent to Area 3 and covers approximately 131,750 square feet. All three areas are square to rectangular-shaped.

2.0 METHODS OF INVESTIGATION

2.1 Magnetic (Gradiometric) Method

The magnetic method employs a proton precession magnetometer to measure the total magnetic field (TMF) strength. The TMF is the actual field strength, which consists of any buried ferrous source superimposed on that of the earth. Local variations in the earth's magnetic field strength depend on the presence of ferromagnetic material, such as iron and magnetite.

Changes in the magnetic field strength near such materials are attributed to induced and remanent magnetization. A ferromagnetic material acquires an induced magnetization when placed in an external magnetic field. Remanent magnetization is permanent magnetization, which may be acquired during the manufacturing of steel products.

A gradiometer was used during this investigation. A gradiometer is simply a magnetometer with two magnetic field sensors, one mounted at a fixed height above the other. Two measurements are then taken at each station. The difference in the magnetic strength between the upper and lower sensors is the vertical magnetic gradient (VMG).

The VMG provides several advantages over the TMF strength, including 1) improved lateral resolution of anomalies; 2) increased sensitivity to shallow magnetic sources; and 3) since readings are taken almost simultaneously, the measured gradient is independent of temporal magnetic fluctuations. Since the earth's magnetic field constantly changes over the course of a day, a dedicated base station is usually positioned near the site or at a point that is frequently returned to (looping method) to take repetitive readings in order to correct for this diurnal variation. A base station was used due to the moderate size of the investigated area.

3.0 DATA ACQUISITION

3.1 Equipment

The magnetic survey was accomplished using a Scintrex Envi-Mag gradiometer. Each reading of the total magnetic field and vertical magnetic gradient strength was automatically stored in the memory portion of the unit along with the coordinates of the station, time, date, drift between stations, and statistical error. The data were transferred to a computer for further processing, including diurnal variations.

3.2 Survey Design and Procedures

A general grid was established prior to the arrival of the GPR geophysicist by a civil surveyor retained by CDM. The GPR geophysicist established a specific grid at each of the three areas within which the gradiometric surveys were conducted. Grid nodes were marked with paint across the areas in orthogonal directions. Departures from the main grid occurred at one small interval of the surveyed areas, due to the presence of brush.

4.0 RESULTS

4.1 Gradiometric Surveys

The processed gradiometric data are presented as 11"x 17" color contour maps (Figure Nos. 2 and 3, and 5 and 6, and 8 and 9). The color plots allow rapid visual assimilation of the geophysical information. The contour maps show the variation of two parameters across the site: (1) total magnetic field (TMF) strength and (2) gradient strength.

Interpretation of the gradiometric data involved identifying the geophysical responses from surface features noted by the geophysicist. Many geophysical responses at this facility are clearly due to known objects, such as discarded ferrous objects. Several responses could not be explained by observed objects or features.

The total magnetic values are plotted in nanoteslas (Nt) and the vertical magnetic gradient in Nt per meter (Nt/m), standard units of magnetic flux density. Referring to the color contour map of the magnetic data, the highest value is shown in red in both figures, indicating the areas of the highest concentration of ferrous objects.

Analysis was made of the contoured gradiometric data, and several anomalous area were identified, that are made up of magnetic sources without visible ferrous objects. These areas are outlined on the Interpretation maps (Figure Nos. 4, 7 and 10). The areas have been marked out (see legend) according to type of response, such as, surface ferrous objects and subsurface concentrations.

Area 1

Area 1 is characterized by the northerly portion of the area generally lacking significant concentrations of ferrous objects excepting isolated, shallow single-point targets. The center of the area is characterized by a easterly-westerly band consisting of surface ferrous objects. The southerly portion of the area is characterized by a uniform concentration of buried ferrous objects at depths generally greater than six feet below ground surface.

Area 2

Area 2 is characterized by the easterly and northerly portions of the area generally lacking significant concentrations of ferrous objects excepting isolated, shallow single-point targets. The general center of the area is characterized by a northerly-southerly band consisting of surface ferrous objects. The westerly portion of the area is characterized by a uniform concentration of buried ferrous objects at depths generally greater than six feet below ground surface.

Area 3

Area 3 is characterized by the easterly portion of the area lacking concentrations of moderately buried ferrous objects, but with several concentrations of surface ferrous objects and numerous, shallow single-point targets. The westerly portion of the area is characterized by a uniform concentration of buried ferrous objects at depths generally greater than six feet below ground surface.

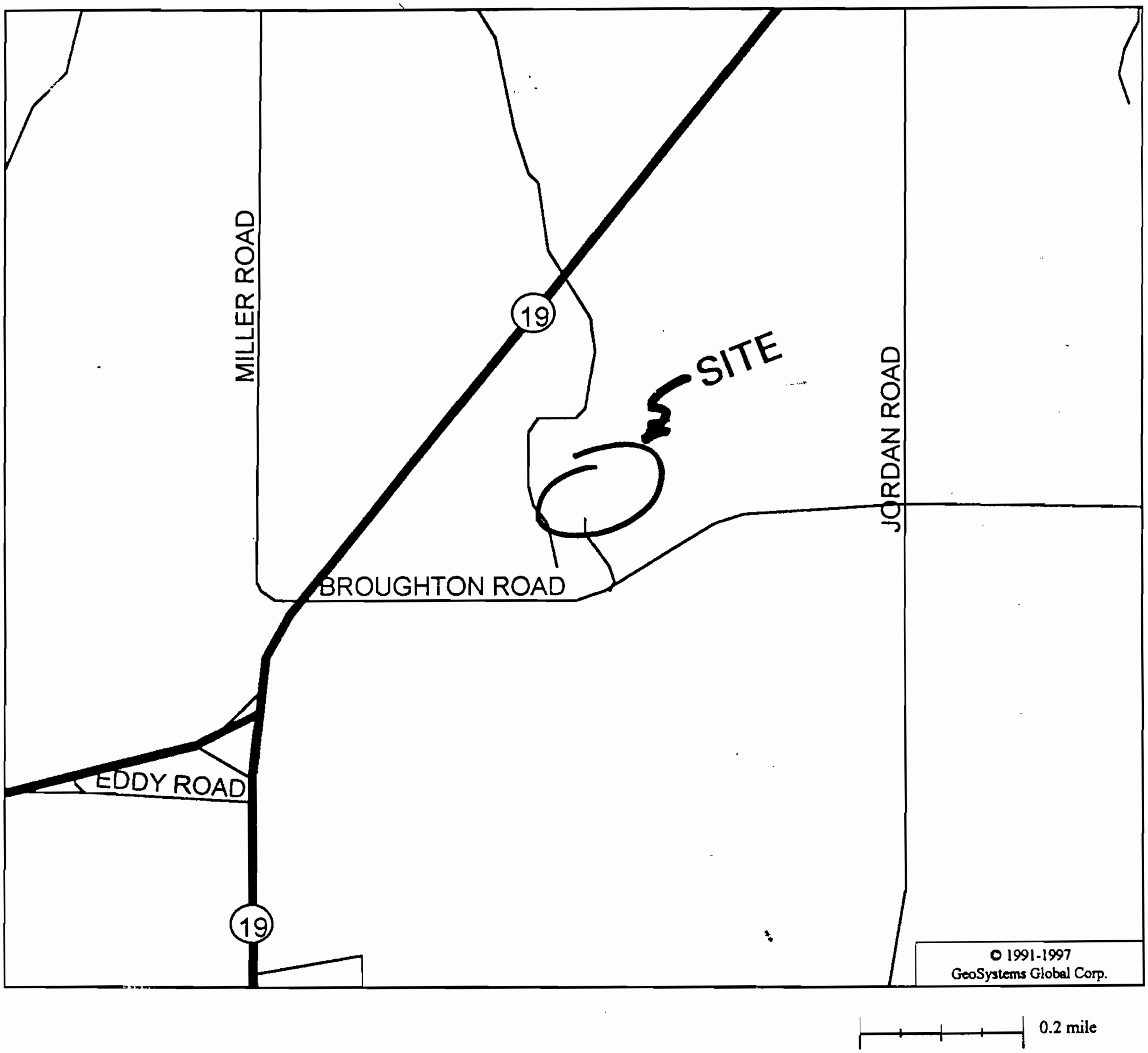
5.0 CONCLUSIONS

The results of the gradiometric survey conducted at this landfill indicated responses from known surface ferrous objects, buried ferrous objects, and possible buried debris. Both the total field and vertical magnetic gradient contour maps aided in the generation of interpretation maps of buried ferrous objects.

The subsurface complexity of the assessed area, due to the burial of many materials, control the identified magnetic anomalies. The recent excavations that been performed to date have confirmed the existence of buried drums, as well as other buried ferrous objects, at a number of locations shown on the interpretation maps.

file: c:\report\b98197\ete_site.doc

ETE SITE, ROUGHTON RD, GAINESVILLE, NY

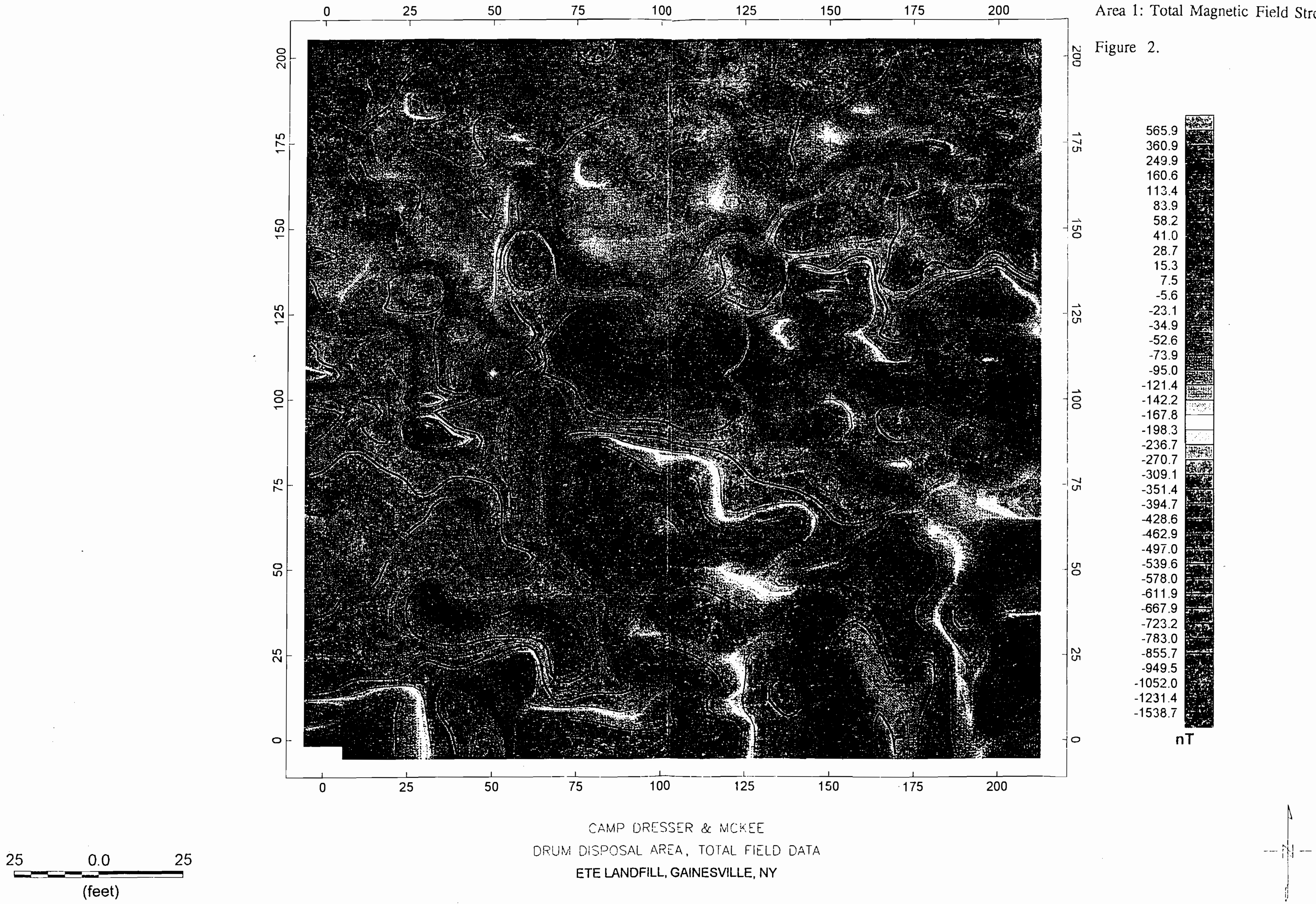


ETE Site Location Map

Figure 1.

Area 1: Total Magnetic Field Strength Map

Figure 2.



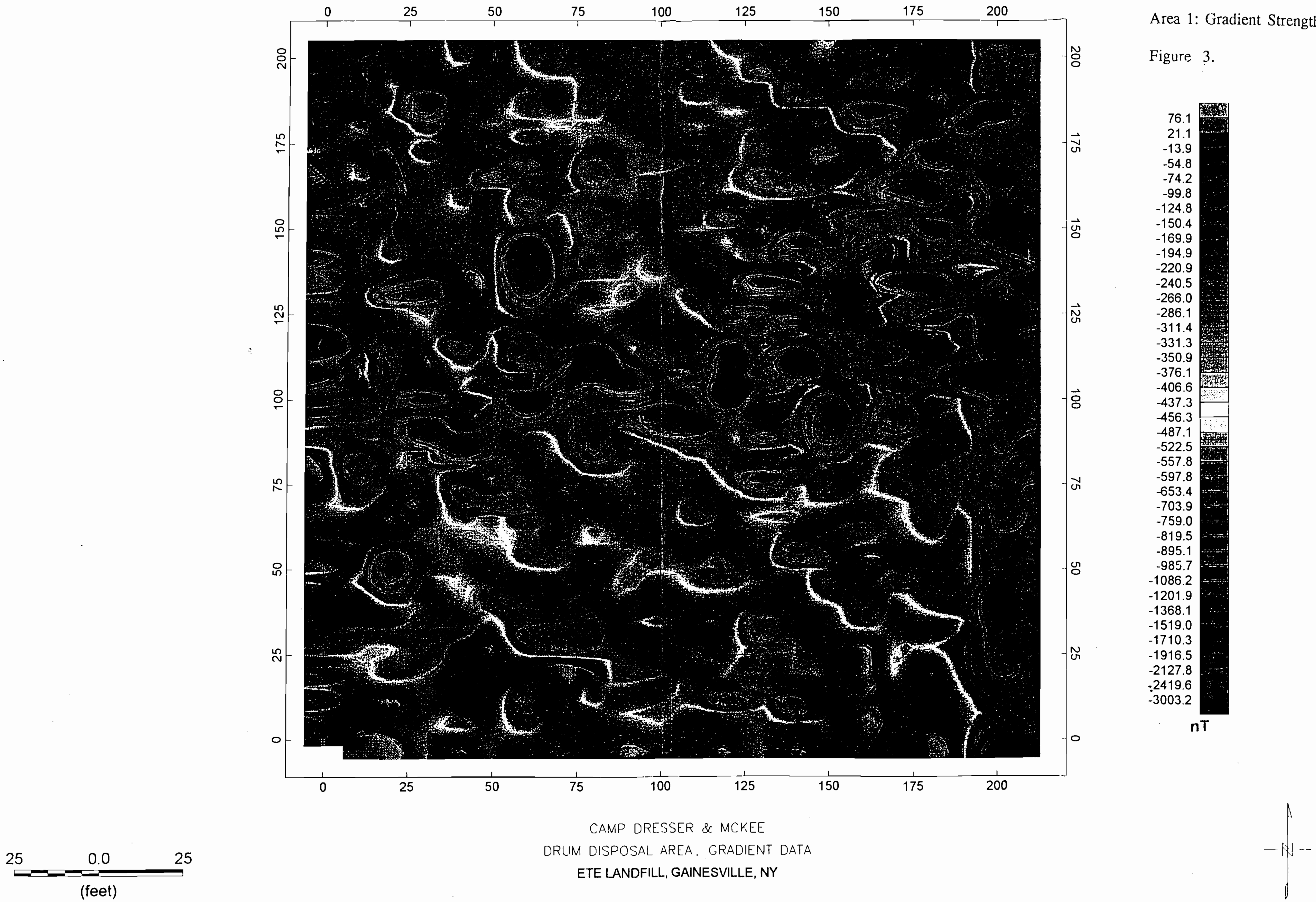
CAMP DRESSER & MCKEE

DRUM DISPOSAL AREA, TOTAL FIELD DATA

ETE LANDFILL, GAINESVILLE, NY

Area 1: Gradient Strength Map

Figure 3.



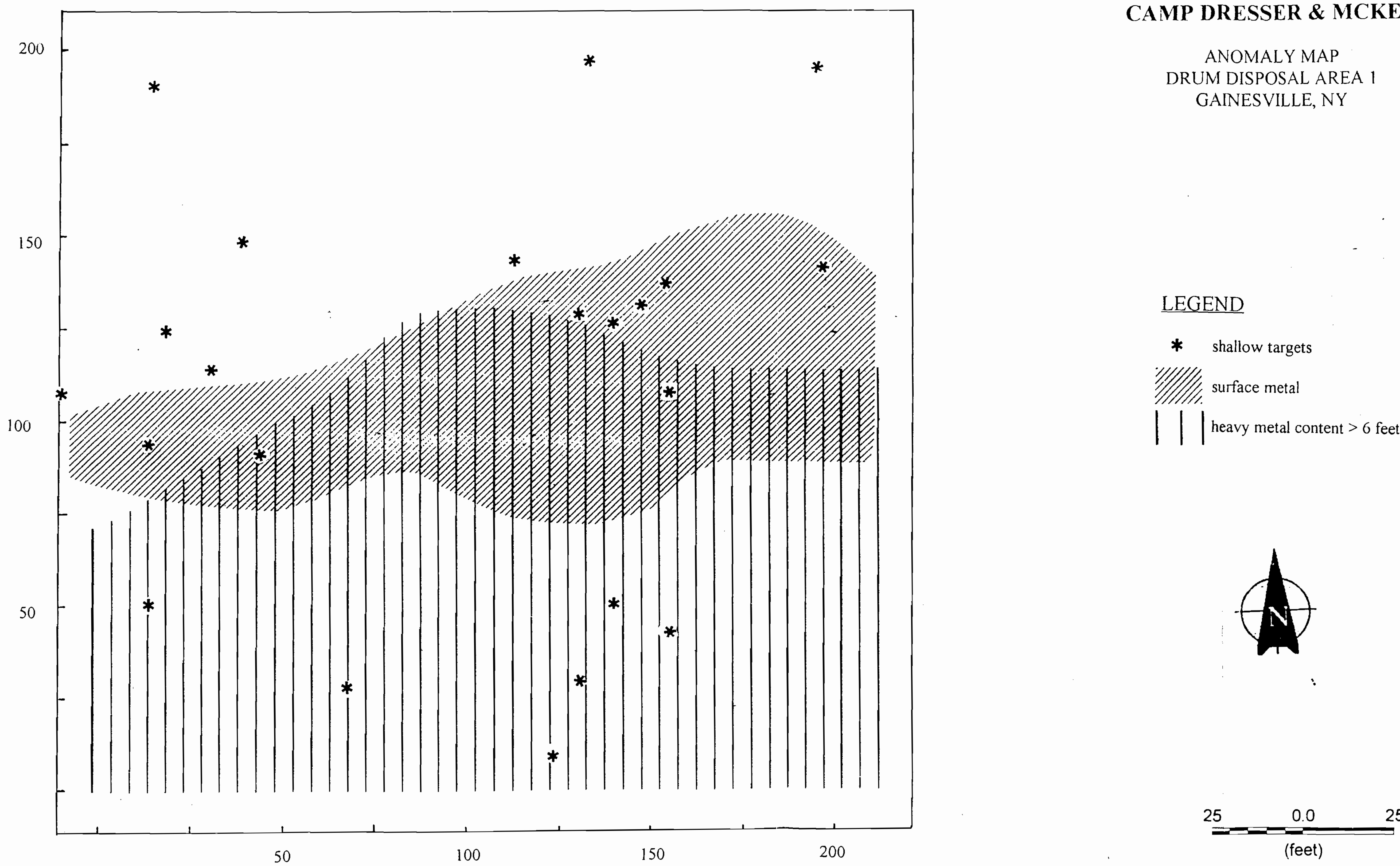
CAMP DRESSER & MCKEE
DRUM DISPOSAL AREA, GRADIENT DATA
ETE LANDFILL, GAINESVILLE, NY

Area 1: Interpretation Map

Figure 4.

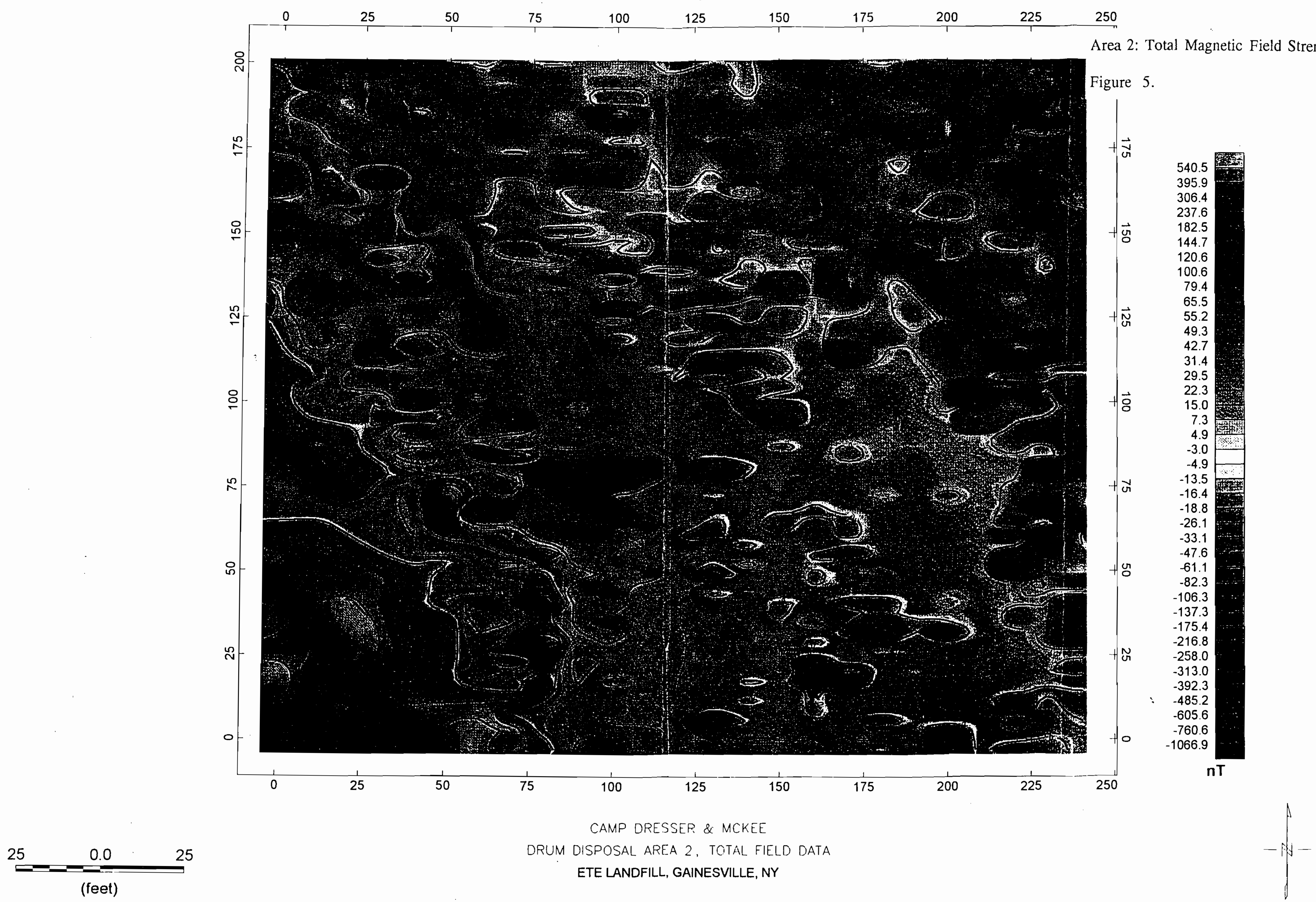
CAMP DRESSER & MCKEE

ANOMALY MAP
DRUM DISPOSAL AREA 1
GAINESVILLE, NY



Area 2: Total Magnetic Field Strength Map

Figure 5.



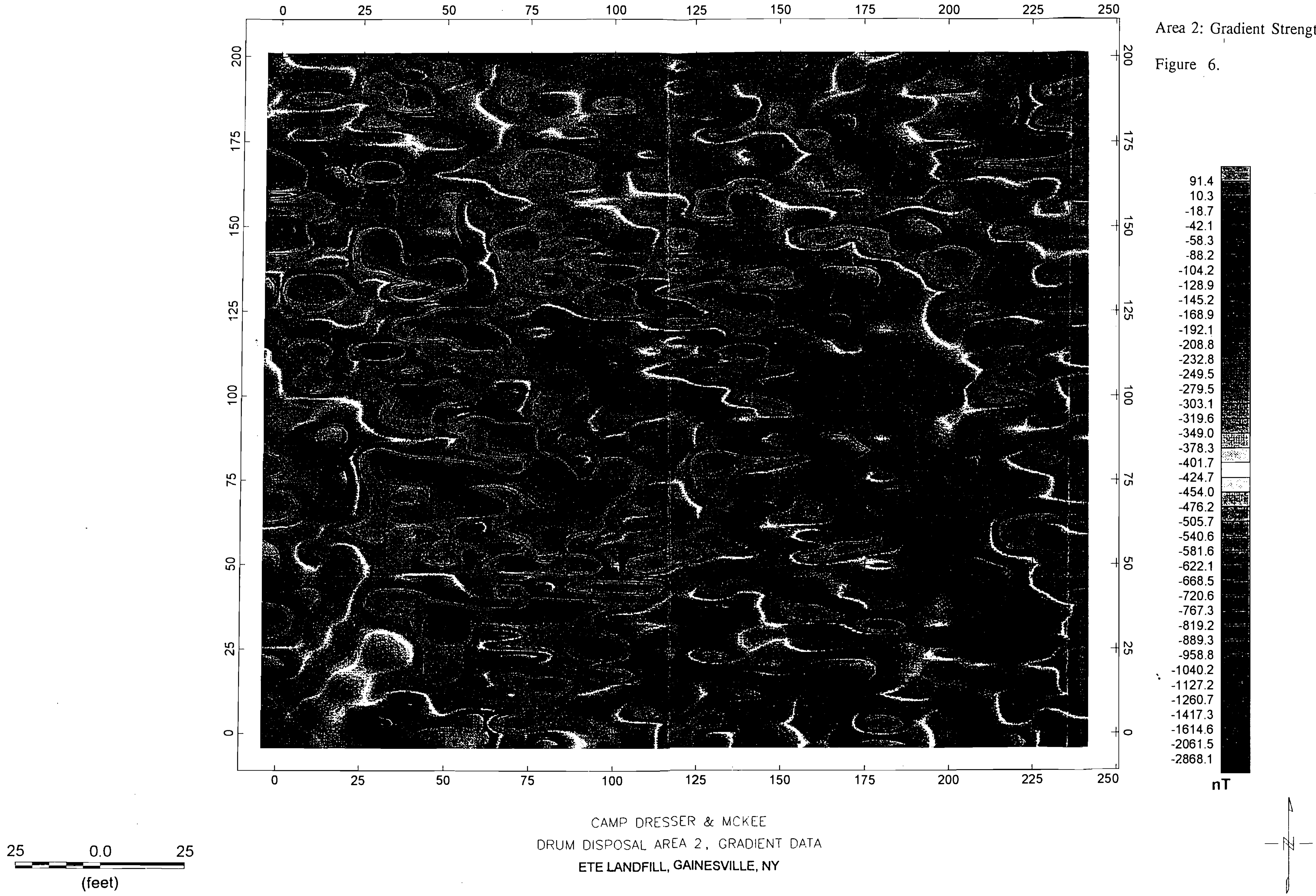
CAMP DRESSER & MCKEE

DRUM DISPOSAL AREA 2, TOTAL FIELD DATA

ETE LANDFILL, GAINESVILLE, NY

Area 2: Gradient Strength Map

Figure 6.



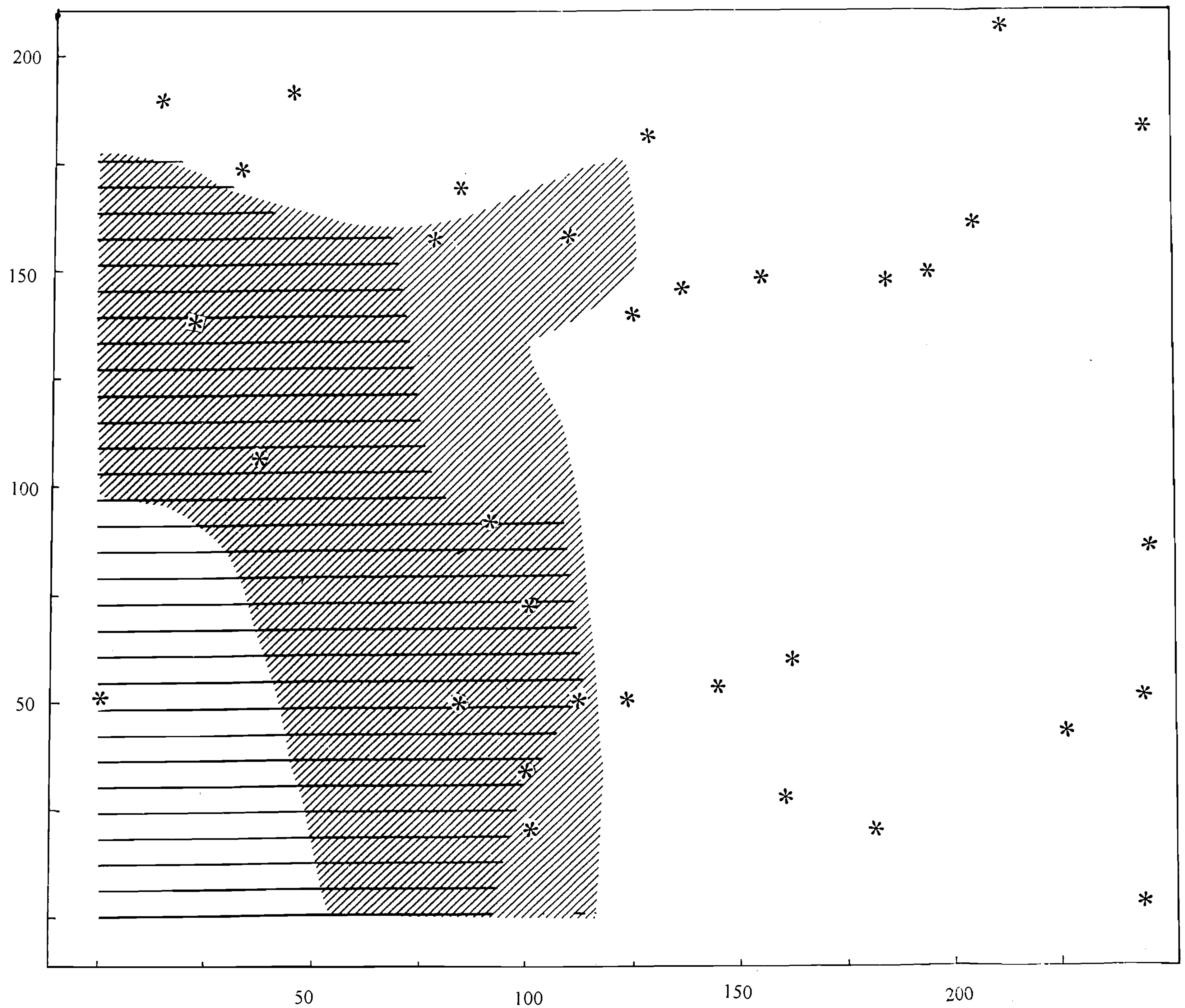
CAMP DRESSER & MCKEE

DRUM DISPOSAL AREA 2, GRADIENT DATA

ETE LANDFILL, GAINESVILLE, NY

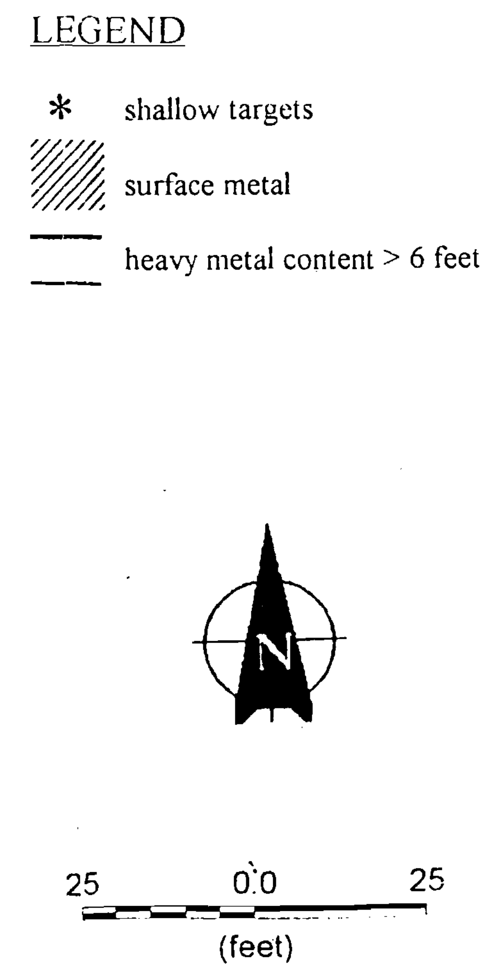
Area 2: Interpretation Map

Figure 7.



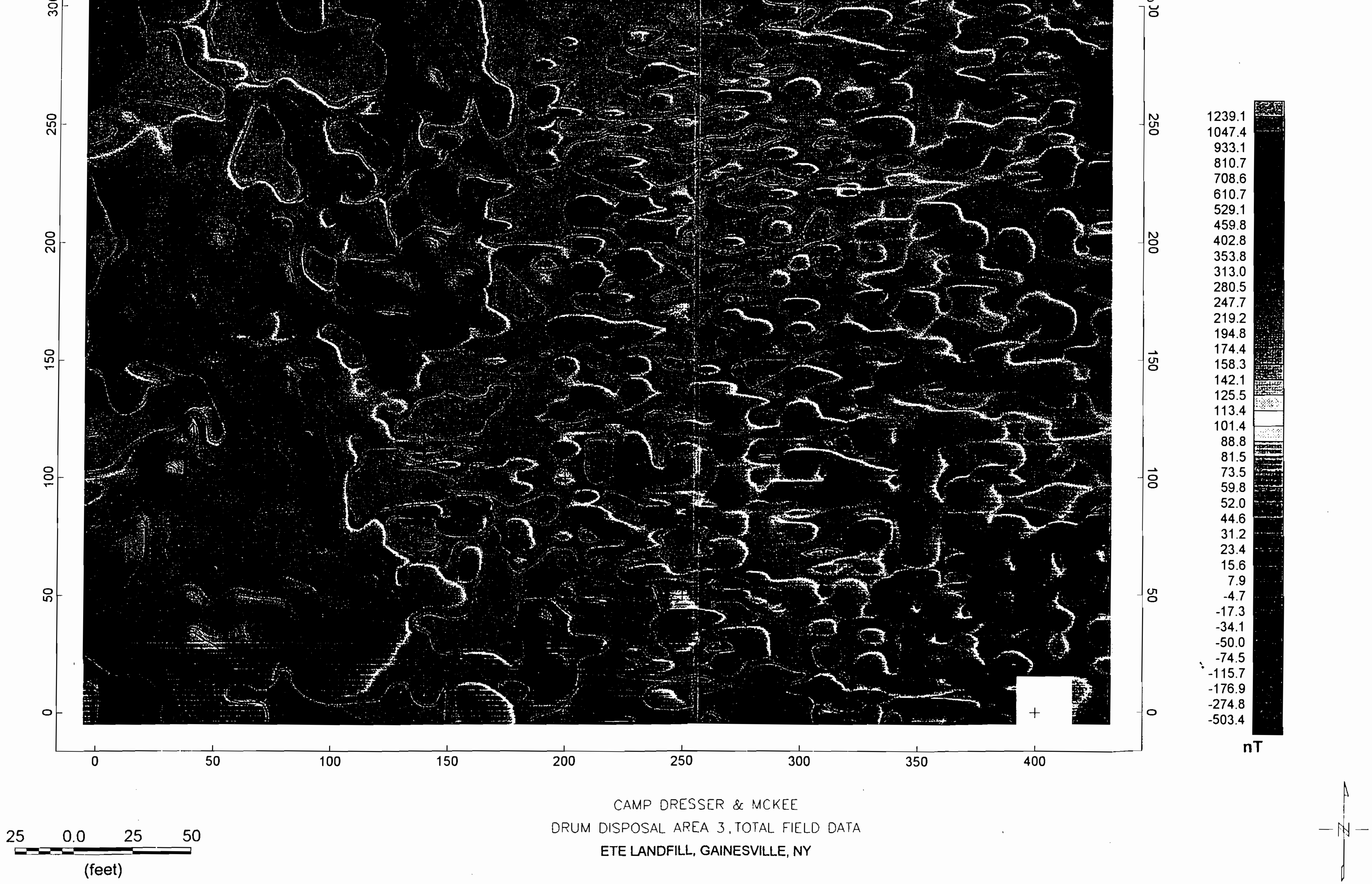
CAMP DRESSER & MCKEE

ANOMALY MAP
DRUM DISPOSAL AREA 2
GAINESVILLE, NY



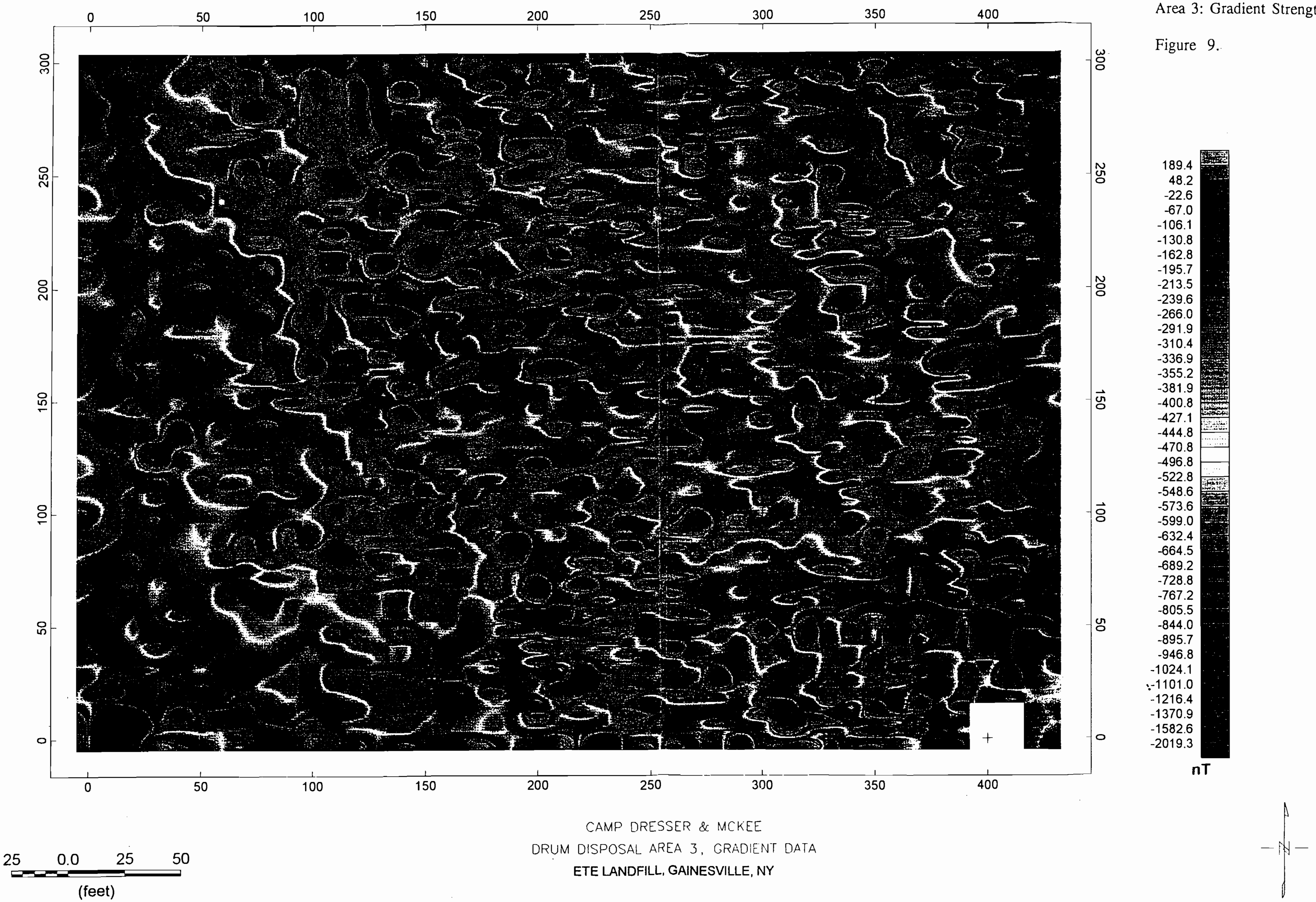
Area 3: Total Magnetic Field Strength Map

Figure 8.



Area 3: Gradient Strength Map

Figure 9.

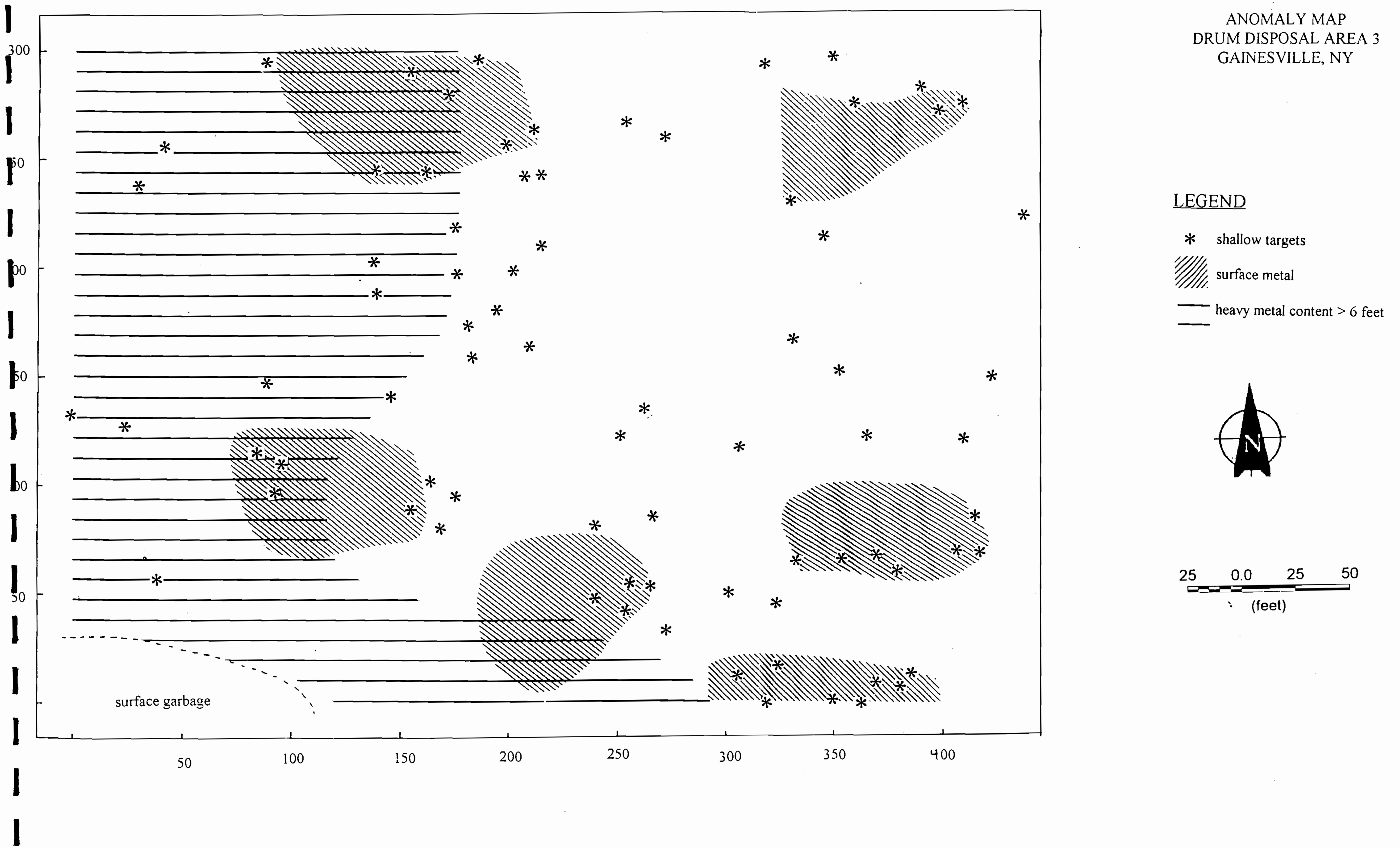


Area 3: Interpretation Map

Figure 10.

CAMP DRESSER & MCKEE

ANOMALY MAP
DRUM DISPOSAL AREA 3
GAINESVILLE, NY



CDM

environmental engineers, scientists,
planners & management consultants

LOG OF TEST PIT

TEST PIT #: **TP-1**

Project: ETE Sanitation and Landfill (NYSDEC)
Contractor: SJB Drilling Services
Date: 3/9/98
Inspector: Phil Nicholson

Location: Gainesville, NY
Operator: SJB
Method Used: Backhoe
Monitoring Instrument: Model 580B, TEI Inc. OVM

Page 1 of 1
Permit #:
Job #: 0897-22149

Depth (feet)	Sample No.	Org. Vap (ppm)	Sample Description	Strata Change	Remarks (time)
0–1		0.0	MSW (paper, plastic, glass)		Geophys. Survey Grid 1 N100' E40'. Pit is dug 20' south and 10' east and west.
1–2		0.0	MSW, wood		
2–3		0.0	MSW, rubber strips, metal sheet 3x3'		
3–4		0.0	3-6': MSW		
4–5					
5–6					water encountered at 6' BG
6			No waste located north of test pit.		
			End of Test Pit		

CDM

environmental engineers, scientists,
planners & management consultants

LOG OF TEST PIT

TEST PIT #: **TP-2**

Project: ETE Sanitation and Landfill (NYSDEC)
Contractor: SJB Drilling Services
Date: 3/9/98
Inspector: Phil Nicholson

Location: Gainesville, NY
Operator: SJB
Method Used: Backhoe
Monitoring Instrument: Model 580B, TEI Inc. OVM

Page 1 of 1
Permit #:
Job #: 0897-22149

Depth (feet)	Sample No.	Org. Vap (ppm)	Sample Description	Strata Change	Remarks (time)
0–1		0.0	0-4':MSW		Geophys. Survey Grid 1 110'N 160'E.
1–2		0.0	One 30 gal. crushed drum		
2–3		0.0	Plastic wire, empty plastic drum		
3–4		0.0	2 tires, wood black stained soil		
4–5		9.0	black stained oily soil		Collect sample for lab analysis. Black stained soil sampled.
5–6		0.0	MSW, wood, C&D black stained layer not present		
6–7		0.0	Scattered C&D waste, wet, MSW no longer present.		
			End of Test Pit		

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LOG OF TEST PIT

TEST PIT #: **TP-3**

Project: ETE Sanitation and Landfill (NYSDEC)
Contractor: SJB Drilling Services
Date: 3/9/98
Inspector: Phil Nicholson

Location: Gainesville, NY
Operator: SJB
Method Used: Backhoe
Monitoring Instrument: Model 580B, TEI Inc. OVM

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Permit #:
Job #: 0897-22149

Depth (feet)	Sample No.	Org. Vap (ppm)	Sample Description	Strata Change	Remarks (time)
		0.0	MSW, tires(3)		
1		0.0	MSW, wood		
2			End of Test Pit		Waste pile ends at N130 E30, Geophys. Survey Area 2.

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LOG OF TEST PIT

TEST PIT #: **TP-4**

Project: ETE Sanitation and Landfill (NYSDEC)
Contractor: SJB Drilling Services
Date: 3/9/98
Inspector: Phil Nicholson

Location: Gainesville, NY
Operator: SJB
Method Used: Backhoe
Monitoring Instrument: Model 580B, TEI Inc. OVM

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Permit #:
Job #: 0897-22149

Depth (feet)	Sample No.	Org. Vap (ppm)	Sample Description	Strata Change	Remarks (time)
		0.0	0-4.5': MSW (paper, plastic, glass)		Geophys. Survey Area 2 N75' E50'-55'
1		0.0	Construction debris		
2					
3			flat metal sheeting 2'x3'		
4	WC-1	119.0	Crushed 55 gal. drum contains solidified paint product, OVM reading=119 ppm in drum.		Solvent type odor from the crushed drum contents.
		0.0	Steel tracking (similar to railroad tracks) 10'x4" Waste ends approx. 4.5'.		Waste characterization sample taken of solidified paint. Soil
5		0.0	brown gray SILTY CLAY, trace sand and gravel		
6	TP-4:6'		End of Test Pit		soil sample taken from native material underneath the crushed 55 gal. drum.

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LOG OF TEST PIT

TEST PIT #: **TP-5**

Project: ETE Sanitation and Landfill (NYSDEC)
Contractor: SJB Drilling Services
Date: 3/9/98
Inspector: Phil Nicholson

Location: Gainesville, NY
Operator: SJB
Method Used: Backhoe
Monitoring Instrument: Model 580B, TEI Inc. OVM

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Permit #:
Job #: 0897-22149

Depth (feet)	Sample No.	Org. Vap (ppm)	Sample Description	Strata Change	Remarks (time)
		0.0	0-3.5': MSW (paper, plastic, glass), tire(1) Crushed 55 gal. drum containing solidified paint product (0ppm)		Geophys. Survey Area 3 N260' E150"
1					
2			industrial size steel sink		
3					
		0.0	end MSW at 3.5'		
		0.0	brown to tan brown SILT, trace gravel, trace clay		
4					
			End of Test Pit		

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LOG OF TEST PIT

TEST PIT #: **TP-6**

Project: ETE Sanitation and Landfill (NYSDEC)
Location: Gainesville, NY
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Contractor: SJB Drilling Services
Operator: SJB
Permit #:
Date: 3/10/98
Method Used: Backhoe
Job #: 0897-22149
Inspector: Phil Nicholson
Monitoring Instrument: Model 580B, TEI Inc. OVM

Depth (feet)	Sample No.	Org. Vap (ppm)	Sample Description	Strata Change	Remarks (time)
		0.0	Mostly native soil, large rocks, trace amount of MSW		Geophys. Survey Area 3 N90' E140'
1		0.0	Some plastic bags mixed in with silty fill material		
2		0.0	Some plastic bags mixed in with silty fill material		
3		0.0	native soil and large gravels		End of waste at approx. 3' Survey stake marks extent of waste.
4			End of Test Pit		

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LOG OF TEST PIT

TEST PIT #: **TP-7**

Project: ETE Sanitation and Landfill (NYSDEC)
Location: Gainesville, NY
Page 1 of 1
Contractor: SJB Drilling Services
Operator: SJB
Permit #:
Date: 3/10/98
Method Used: Backhoe
Job #: 0897-22149
Inspector: Phil Nicholson
Monitoring Instrument: Model 580B, TEI Inc. OVM

Depth (feet)	Sample No.	Org. Vap (ppm)	Sample Description	Strata Change	Remarks (time)
		0.0	0-4': Consolidated soil, no waste		Located west of north pond, three test pit excavations were performed in this area and no solid waste was encountered. Each pit was completed to a depth of 4 ft.
1					
2					
3					
4					
			End of Test Pit		

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LOG OF TEST PIT

TEST PIT #: **TP-8**

Project: ETE Sanitation and Landfill (NYSDEC)
Contractor: SJB Drilling Services
Date: 3/10/98
Inspector: Phil Nicholson

Location: Gainesville, NY
Operator: SJB
Method Used: Backhoe
Monitoring Instrument: Model 580B, TEI Inc. OVM

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Permit #:
Job #: 0897-22149

Depth (feet)	Sample No.	Org. Vap (ppm)	Sample Description	Strata Change	Remarks (time)
1		0.0	MSW (paper, plastic, glass)		Waste begins approx. 10 ft. east of the eastern drainage channel where the waste is approx. 2 ft. thick.
2		0.0	MSW		Waste becomes thicker to the east.
3		0.0	Native till		Survey stake marks extent of waste.
			End of Test Pit		

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LOG OF TEST PIT

TEST PIT #: **TP-9**

Project: ETE Sanitation and Landfill (NYSDEC)
Location: Gainesville, NY
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Contractor: SJB Drilling Services
Operator: SJB
Permit #:
Date: 3/10/98
Method Used: Backhoe
Job #: 0897-22149
Inspector: Phil Nicholson
Monitoring Instrument: Model 580B, TEI Inc. OVM

Depth (feet)	Sample No.	Org. Vap (ppm)	Sample Description	Strata Change	Remarks (time)
		0.0	Cover soil, no waste		Sample description for portion of excavation approx. 15' east of the surveyed staked location called TP-9.
1					
2	TP9-2	0.0	MSW(paper, plastic, glass)		
3		0.0	brown gray SILT with sand and gravel		
4			End of Test Pit		Survey stake marks extent of waste.

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LOG OF TEST PIT

TEST PIT #: **TP-10**

Project: ETE Sanitation and Landfill (NYSDEC)
Contractor: SJB Drilling Services
Date: 3/10/98
Inspector: Phil Nicholson

Location: Gainesville, NY
Operator: SJB
Method Used: Backhoe
Monitoring Instrument: Model 580B, TEI Inc. OVM

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Permit #:
Job #: 0897-22149

Depth (feet)	Sample No.	Org. Vap (ppm)	Sample Description	Strata Change	Remarks (time)
1		0.0	Cover soil		Test pit trench dug until limit of solid waste was determined.
2		0.0	MSW		
3		0.0	Native till soil		Survey stake marks extent of waste.
			End of Test Pit		

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LOG OF TEST PIT

TEST PIT #: **TP-11**

Project: ETE Sanitation and Landfill (NYSDEC)
Contractor: SJB Drilling Services
Date: 3/11/98
Inspector: Phil Nicholson

Location: Gainesville, NY
Operator: SJB
Method Used: Backhoe
Monitoring Instrument: Model 580B, TEI Inc. OVM

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Permit #:
Job #: 0897-22149

Depth (feet)	Sample No.	Org. Vap (ppm)	Sample Description	Strata Change	Remarks (time)
1		0.0	Appears to be native soil fill with trace amounts of plastic.		
2		0.0	Consolidated native soils No waste		
			End of Test Pit		

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LOG OF TEST PIT

TEST PIT #: **TP-12**

Project: ETE Sanitation and Landfill (NYSDEC)
Contractor: SJB Drilling Services
Date: 3/11/98
Inspector: Phil Nicholson

Location: Gainesville, NY
Operator: SJB
Method Used: Backhoe
Monitoring Instrument: Model 580B, TEI Inc. OVM

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Permit #:
Job #: 0897-22149

Depth (feet)	Sample No.	Org. Vap (ppm)	Sample Description	Strata Change	Remarks (time)
		0.0	0-3': Native silty sand and gravel		Test pit was dug along an east to west line until the extent of waste was determined. Survey stake indicates the location where waste was encountered.
1		0.0			
2		0.0			
3			End of Test Pit		

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LOG OF TEST PIT

TEST PIT #: **TP-13**

Project: ETE Sanitation and Landfill (NYSDEC)
Location: Gainesville, NY
Page 1 of 1
Contractor: SJB Drilling Services
Operator: SJB
Permit #:
Date: 3/11/98
Method Used: Backhoe
Job #: 0897-22149
Inspector: Phil Nicholson
Monitoring Instrument: Model 580B, TEI Inc. OVM

Depth (feet)	Sample No.	Org. Vap (ppm)	Sample Description	Strata Change	Remarks (time)
0–1		0.0	Sand, gravel		Located off the northwest corner of the South Pond.
1–2		0.0	Construction debris		
2–3		0.0	MSW(paper, plastic, glass), C&D		
3–4	TP13-6	0.0	MSW, C&D		
4–5		0.0	MSW, C&D		
5–6		0.0	MSW, C&D		Waste is >6 ft. thick at the shoreline of the South Pond. It is highly likely that waste extends beneath the pond.
			End of Test Pit		

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LOG OF TEST PIT TEST PIT #: **TP-14**

Project:	ETE Sanitation and Landfill (NYSDEC)	Location:	Gainesville, NY
Contractor:	SJB Drilling Services	Operator:	SJB
Date:	3/11/98	Method Used:	Backhoe
Inspector:	Phil Nicholson	Monitoring Instrument:	Model 580B, TEI Inc. OVM

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Permit #:
Job #: 0897-22149

Depth (feet)	Sample No.	Org. Vap (ppm)	Sample Description	Strata Change	Remarks (time)
		0.0	0-5': Consolitdated native soils, no waste		
1					
2					
3					
4					
5					Test pit dug in a SW to NE running trench. Survey stake marks the location where waste was encountered at 2' below grade.
			End of Test Pit		

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LOG OF TEST PIT

TEST PIT #: **TP-15**

Project: ETE Sanitation and Landfill (NYSDEC)
Contractor: SJB Drilling Services
Date: 3/11/98
Inspector: Phil Nicholson

Location: Gainesville, NY
Operator: SJB
Method Used: Backhoe
Monitoring Instrument: Model 580B, TEI Inc. OVM

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Permit #:
Job #: 0897-22149

Depth (feet)	Sample No.	Org. Vap (ppm)	Sample Description	Strata Change	Remarks (time)
1			Soil, gravel, cobbles		Geophys. Survey Area 3 N130' E0'
2			1-4': MSW		
3					
4					
5			Native till soil		Staked location for TP-15 does not mark the east edge of the waste. Waste ends at a slope located 25 foot east of the survey stake.
			End of test pit		

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LOG OF TEST PIT

TEST PIT #: **TP-16**

Project: ETE Sanitation and Landfill (NYSDEC)
Location: Gainesville, NY
Page 1 of 1
Contractor: SJB Drilling Services
Operator: SJB
Permit #:
Date: 3/11/98
Method Used: Backhoe
Job #: 0897-22149
Inspector: Phil Nicholson
Monitoring Instrument: Model 580B, TEI Inc. OVM

Depth (feet)	Sample No.	Org. Vap (ppm)	Sample Description	Strata Change	Remarks (time)
		0.0	0-3': MSW (paper, plastic, glass), scrap metal, tires		Test pit extends from east to west with waste ending in Area 3 N220' E140'.
1		0.0			
2		0.0			
3			End of Test Pit		Survey stake indicates the extent of waste.

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LOG OF TEST PIT

TEST PIT #: **TP-17**

Project: ETE Sanitation and Landfill (NYSDEC)
Contractor: SJB Drilling Services
Date: 3/11/98
Inspector: Phil Nicholson

Location: Gainesville, NY
Operator: SJB
Method Used: Backhoe
Monitoring Instrument: Model 580B, TEI Inc. OVM

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Permit #:
Job #: 0897-22149

Depth (feet)	Sample No.	Org. Vap (ppm)	Sample Description	Strata Change	Remarks (time)
			0-2': Soil		Geophys. Survey Area 3 N60' E50-30'
1			Construction waste		
2					
3			End of Test Pit		Survey stake indicates the extent of waste.

Appendix G: Data Validation Report

(Provided under separate cover)

MW-1S

Initial Water Level Elevation: 1667.70
Bottom of Well Screen : 1652.70

$L_e = 10$ ft change in head occurs in solid PVC pipe above screen

$L_w = 15$ ft water level to bottom of well

$H = 84$ ft. assumed depth to bedrock; has very minor effect on calcs.

$r_c = .083$ ft by definition, ½ the well diam. (2" well)

$r_w = .292$ ft by definition, ½ the borehole diameter (7")

$L_e/r_w = 34.25$ therefore dimensionless parameters are:
A = 2.5 B = 0.50 C = 2.2

when $L_w < H$ use $\ln R_e/r_w = \left[\frac{1.1}{\ln(L_w/r_w)} + \frac{A + B\ln\left[\frac{H - L_w}{r_w}\right]}{L_e/r_w}\right]$

$$\ln\frac{R_e}{r_w} = \left[\frac{1.1}{\ln(15/.292)} + \frac{2.5 + 0.5\ln\frac{84-15}{.292}}{34.25}\right]^{-1} = \left[0.43203\right]^{-1}$$

$$\ln\frac{R_e}{r_w} = 2.315$$

MW-1S slug out: from semilog plot of data
$Y_0 = 0.95$ $Y_t = 0.5$ $t = 13.84$ min.

$$K = \frac{r_c^2 \ln(R_e/r_w)}{2L_e} \frac{1}{t} \ln\frac{Y_0}{Y_t}$$

For Slug out:

$$K = \frac{(0.083)^2 (2.315)}{2 (10)} \frac{1}{13.84} \ln \frac{0.95}{0.5}$$

$$K = (0.000797)(0.0722)(0.642) = 3.69 \times 10^{-5} \text{ ft/min}$$

1 ft = 30.48 cm

$$K = 1.88 * 10^{-5} \text{ cm/sec}$$

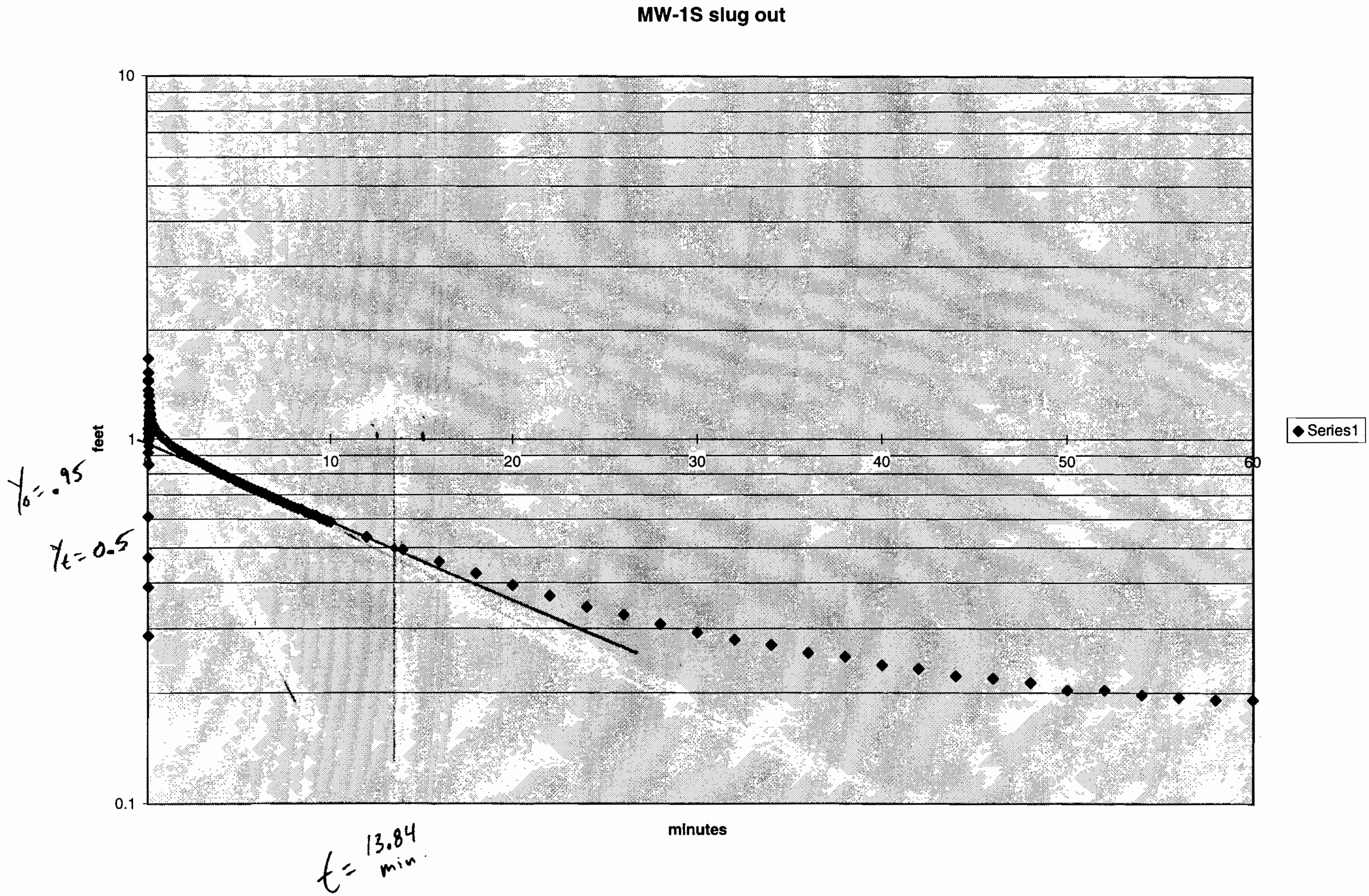
For Slug In MW-1S: $Y_0 = 1.0$ ft, $Y_t = 0.4$ ft, $t = 12.783$ min

$$K = (0.000797) \frac{1}{12.783} \ln \frac{1.0}{0.4}$$

$$K = (0.000797)(0.0782)(0.916) = 0.0000571 \text{ ft/min.}$$

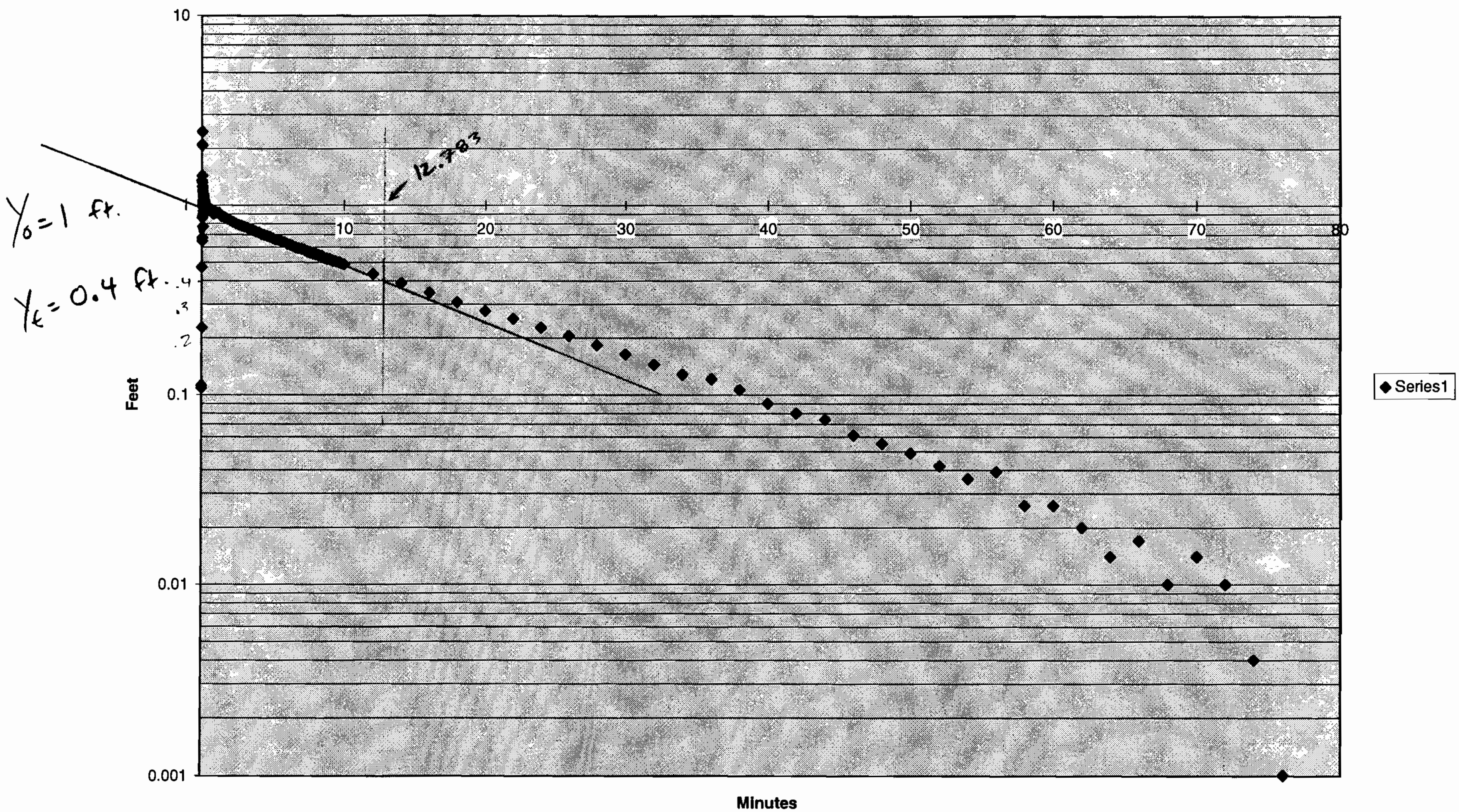
$$K = 2.9 * 10^{-5} \text{ cm/sec}$$

.45



MW-1S slug out
10
1
0.1
feet
10
20
30
40
50
60
minutes
Series1
$y_0 = .95$
$y_t = 0.5$
t = 13.84 min.

MW-1S Slug In



t=12.783 min

PZ-1

$L_e = 10$ ft

$L_w = 11.78'$ DTW = 3.22' 15' = Total Depth of well

$H = 84$ ft

$r_c = .083$ $L_e/r_w = 34.25$

$r_w = .292$

$$\ln \frac{R_e}{r_w} = \left[\frac{1.1}{\ln\left(\frac{11.78}{.292}\right)} + \frac{2.5 + 0.5 \ln \frac{84-11.78}{.292}}{34.25} \right]^{-1} = \left[0.450\right]^{-1}$$

$$\ln \frac{R_e}{r_w} = 2.22$$

From semilog plot of slug in:

$y_0 = 0.8$ ft $y_t = 0.1$ ft $t = 1.88$

$$K = \frac{(0.083)^2 (2.22)}{2(10)} \frac{1}{1.88} \ln \frac{0.8}{0.1}$$

$$(0.00076)\ (0.532)\ (2.08)$$

$K = 0.00084$ ft/min $= 0.000014$ ft/sec

$K = 4.3 * 10^{-4}$ cm/sec

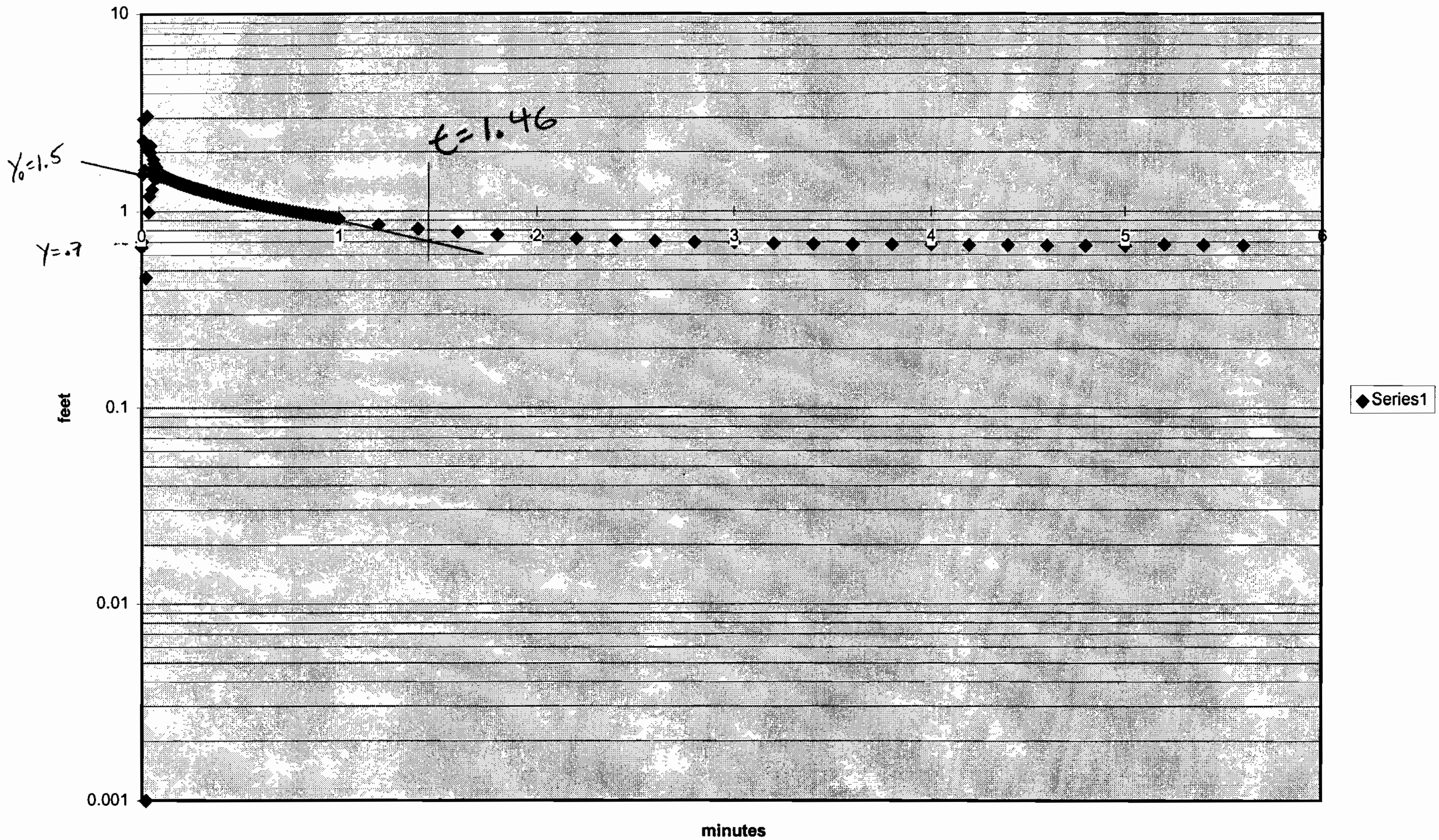
From semilog plot of slug out: $y_0 = 1.5$ ft, $y_t = .7$ ft, $t = 1.46$ min

$K = (0.00076)\ (0.685)\ (0.762)$

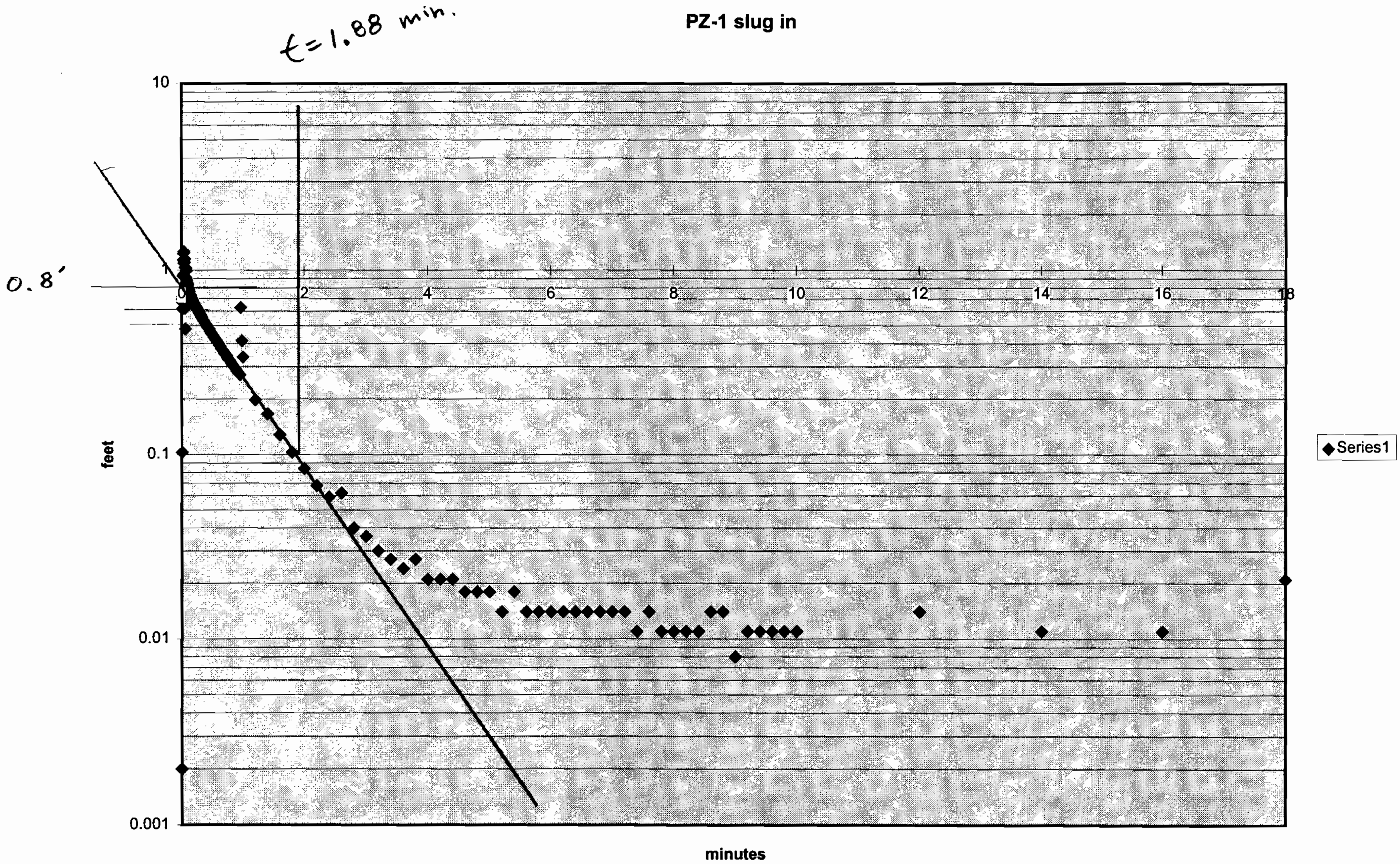
$K = 0.000397$ ft/min

$K = 2 * 10^{-4}$ cm/sec

PZ-1 slug out



PZ-1 in Chart 1



PZ-3

DTW = 4.34' fr. TOC
DTW = 1.84' fr. b. grade
Well depth = 20' fr. b. grade

L_e = 10 ft. change in level above screen

L_w = 20' − 1.84' = 18.2 ft.

H = 84 ft. assumed dpth to bedrx.

r_c = 0.083 ft L_e/r_w = 34.25   dimensionless parameters: A = 2.5, B = 0.50, C = 2.

r_w = .292 ft

when $L_w < H$ then $$\ln\frac{R_e}{r_w} = \left[\frac{1.1}{\ln(L_w/r_w)} + \frac{A + B\ln\left(\frac{H-L_w}{r_w}\right)}{L_e/r_w}\right]^{-1}$$

$$\ln\frac{R_e}{r_w} = \left[\frac{1.1}{\ln\frac{18.2}{.292}} + \frac{2.5 + 0.5\ln\left(\frac{84-18.2}{.292}\right)}{10/.292}\right]^{-1}$$

$$= \frac{1.1}{4.13} + \frac{2.5 + 0.5\,(5.418)}{34.25}$$

$$\ln\frac{R_e}{r_w} = [0.266 + 0.152]^{-1} = [.4183]^{-1}$$

$\ln\frac{R_e}{r_w} = 2.39$ then, $K = \frac{r_c^2 \ln(R_e/r_w)}{2L_e}\,\frac{1}{t}\,\ln\frac{Y_o}{Y_t}$

PZ-3 slug out

from semilog:

$$K = \frac{(0.083)^2\,(2.39)}{2\,(10)}\;\frac{1}{0.2}\;\ln\frac{1}{.095}$$

$Y_o = 1$

$Y_t = .095$

$t = 0.2$

$= (0.0008)\,(5)\,(2.354)$

K = 0.009 ft/min

$= 4.8 \times 10^{-3}$ cm/s

PZ3 slug in from semilog plot of data:

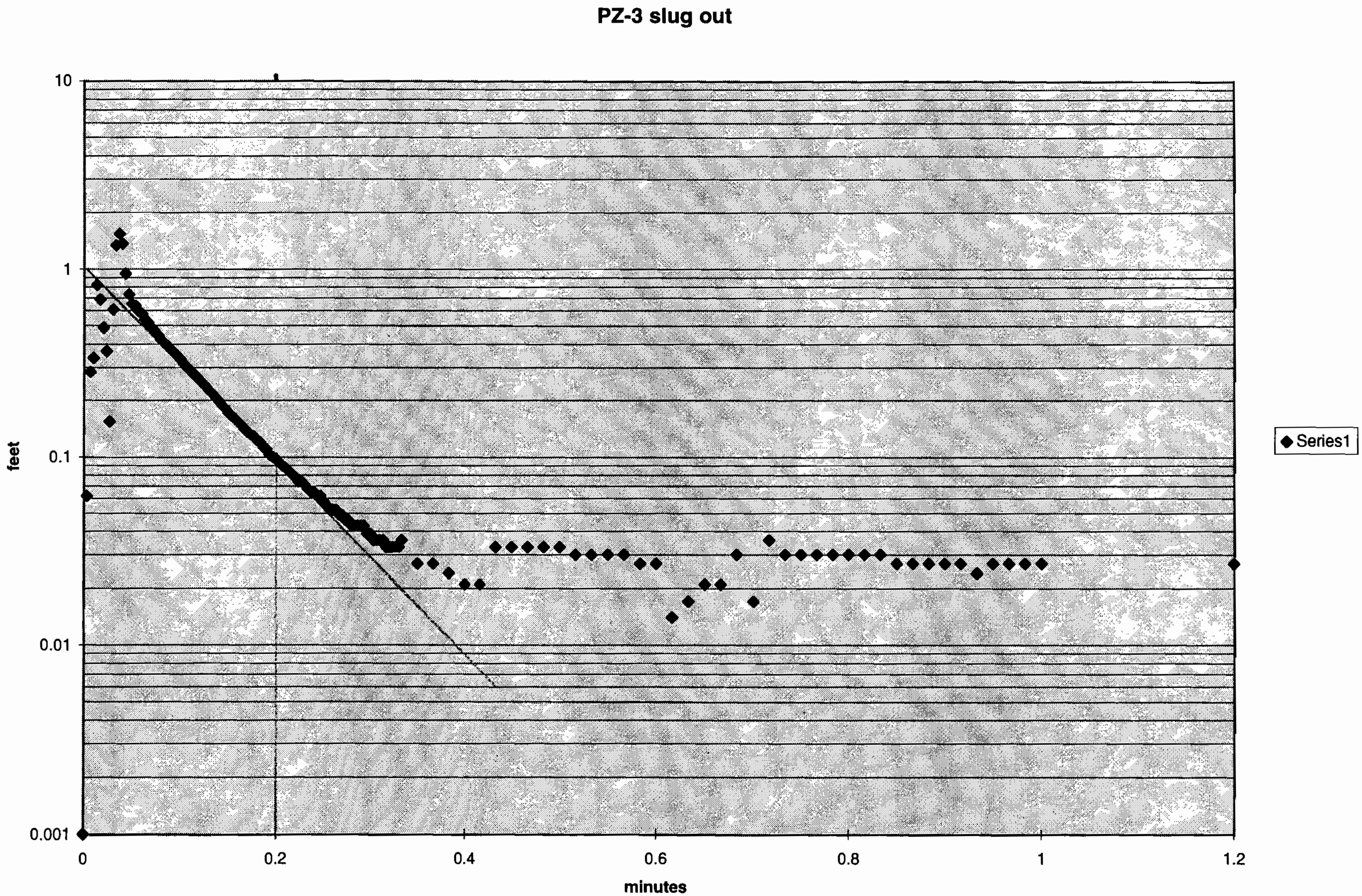
$y_0 = 0.2 \quad y_t = 0.02 \quad t = 0.5 \text{ min.}$

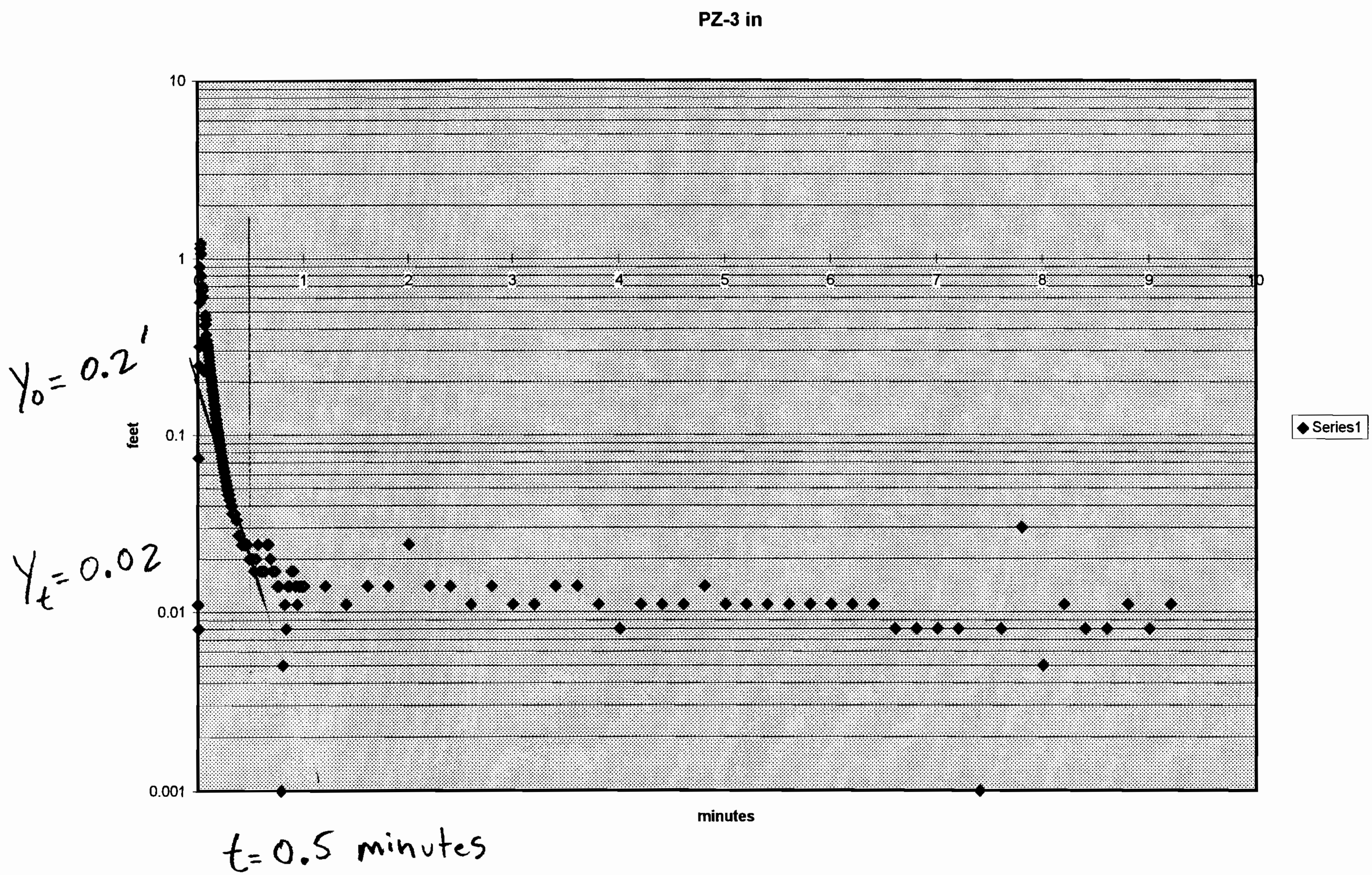
from previous page

$$K = (0.000823)\,\frac{1}{t}\,\ln\frac{y_0}{y_t}$$

$$K = (0.000823)(2)(2.302) = 0.00379 \text{ ft/min}$$

$$K = 1.9 * 10^{-3} \text{ cm/sec}$$


PZ-3 slug out
10
1
0.1
0.01
0.001
feet
0
0.2
0.4
0.6
0.8
1
1.2
minutes
Series1


PZ-3 in
10
1
0.1
0.01
0.001
feet
0
1
2
3
4
5
6
7
8
9
10
minutes
Series1
$Y_0 = 0.2'$
$Y_t = 0.02$
t = 0.5 minutes

CAMP DRESSER & McKEE | CLIENT NYSDEC | JOB NO. 0897 | COMPUTED BY BM
PROJECT ETE | DATE CHECKED | DATE 4/98
DETAIL MW 4 SLUG TEST | CHECKED BY | PAGE NO.

MW-4:

DTW = 4.45 ft. TOC   DTW = 1642.56 elevation
Bottom of well = 1628.8 elevation

$L_e = 10$ ft

$L_w = 1642.56 - 1628.8 = 14.56$ ft.

$H = 84$ ft.

$r_c = 0.083$ ft. $r_w = .292$ ft.

$L_e / r_w = 34.25$ ∴ parameters A = 2.5 B = 0.5, C = 2.2

calculated:

$\ln R_e/r_w = 2.30$

from semilog plot of slug test data for slug out:

$y_o = 1.2$ ft

$y_t = .7$ ft

$t = 8.787$ min.

$$K = \frac{r_c^2 \ln(R_e/r_w)}{2 L_e} \frac{1}{t} \ln \frac{y_o}{y_t}$$

$$K = \frac{0.0158}{20} \frac{1}{8.787} \ln\left(\frac{1.2}{.7}\right)$$ (.539)

$$= (0.00079)(0.1138)(.539)$$

$$K = 0.000048 \text{ ft/min}$$

$$= 0.0015 \text{ cm/min}$$

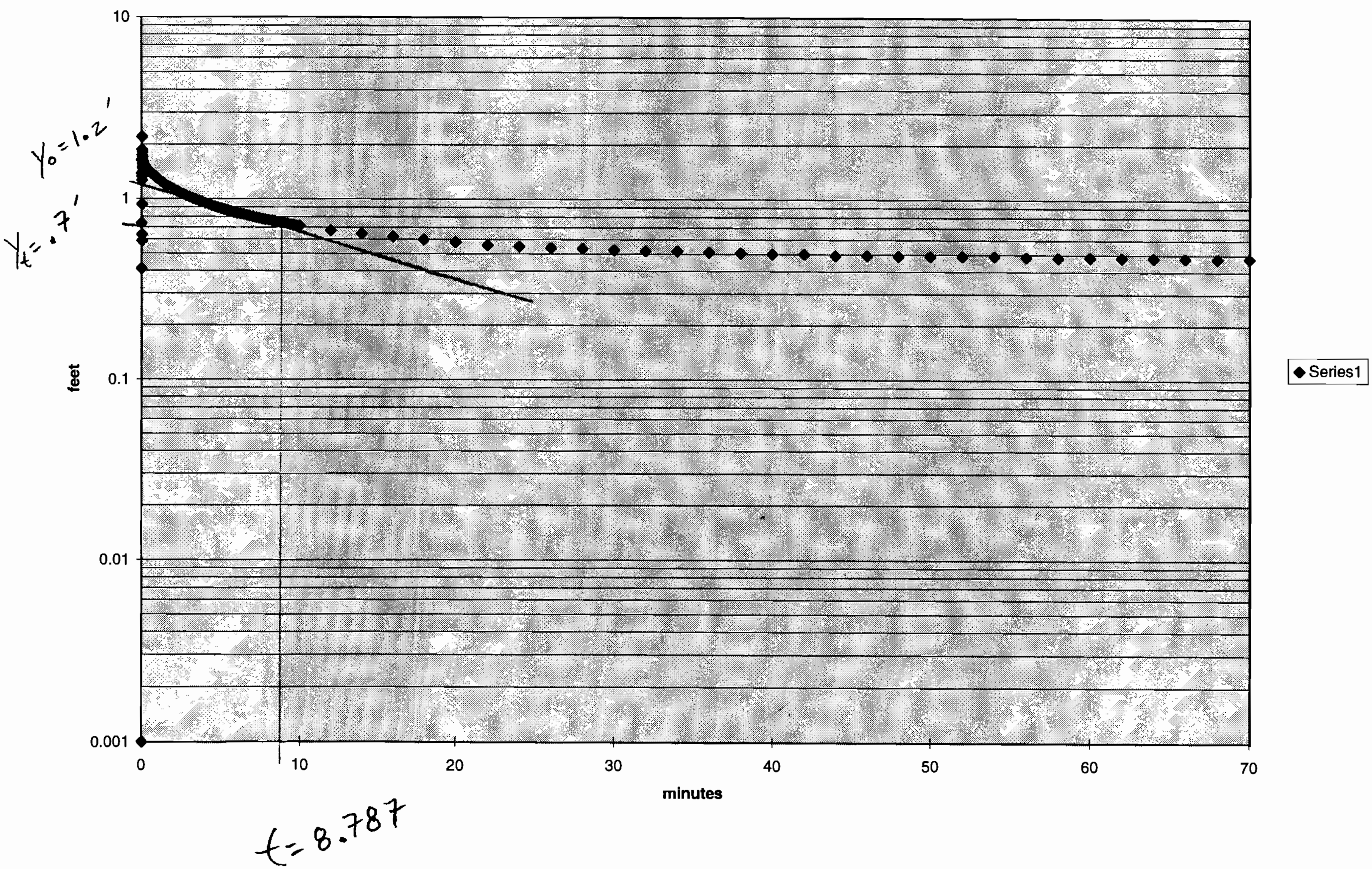
$$K = 2.44 * 10^{-5} \text{ cm/sec}$$

MW-4 slug in: from plot of data $y_o = 0.9$, $y_t = 0.3$, $t = 8.59$ min

$K = (0.00079)(0.116)(1.0986) = 0.0001$ ft/min

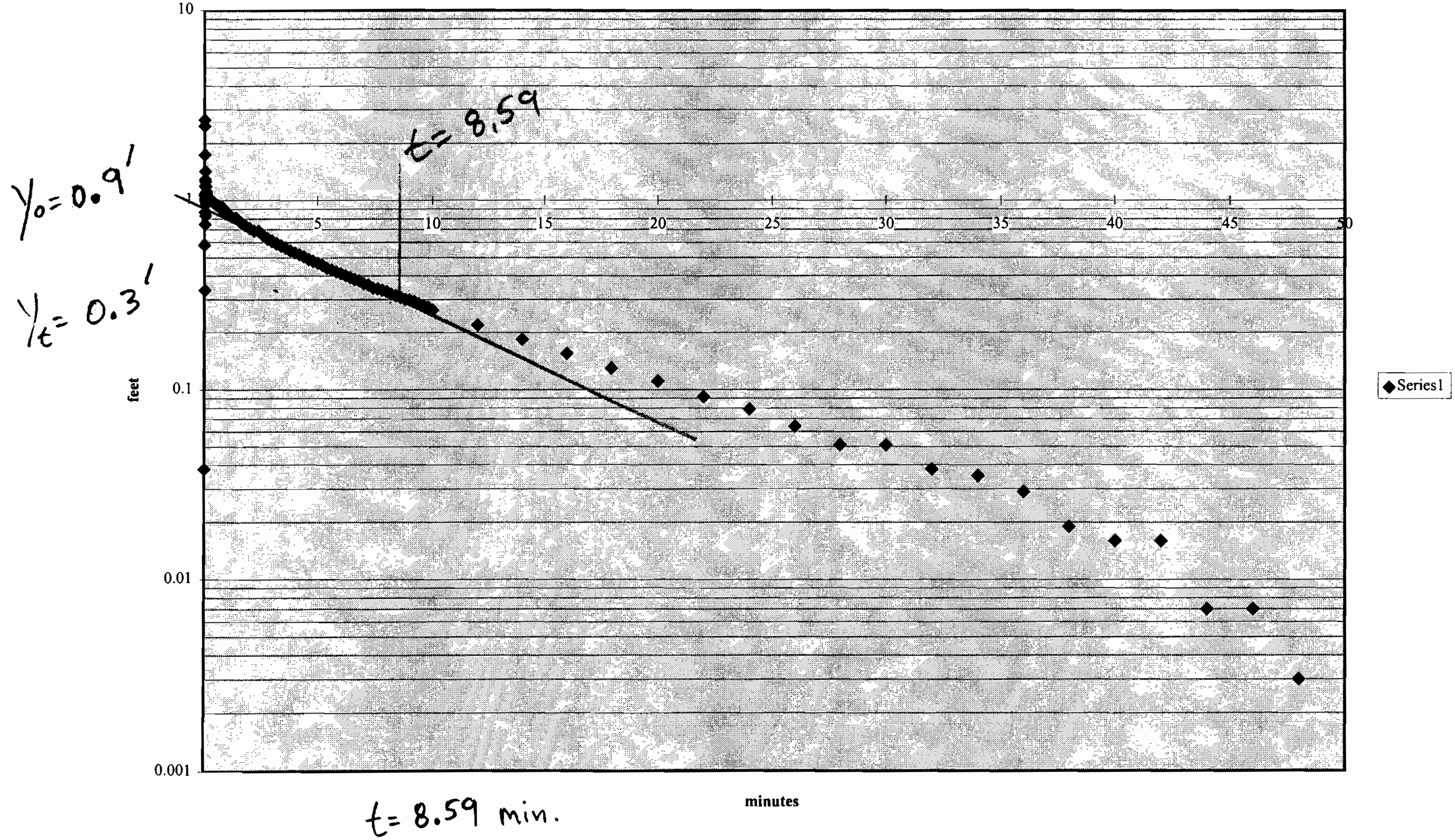
$K = 5.1 * 10^{-5}$ cm/sec

MW-4 slug out



10
1
0.1
0.01
0.001
feet
0
10
20
30
40
50
60
70
minutes
Series1
Y₀=1.2'
Yt=.7'
t=8.787

MW-4 slug in



10
1
0.1
0.01
0.001
feet
5
10
15
20
25
30
35
40
45
50
minutes
Series1
$t = 8.59$
$Y_o = 0.9'$
$Y_t = 0.3'$
$t = 8.59$ min.

MW-6S

DTW = 15.96' fr. toc
measured Total depth from TOC = 22' b.g.

Le = 10 ft but only $Le_{saturated}$ = 6.04 saturated at static

Lw = 22 - 15.96 = 6.04 ft

H = 84 ft. n = 30% porosity for gravel pack

r_c = 0.083 ft → corrected r_c for change in water level occuring within the screened portion of the well = $[(1-n)r_c^2 + n r_w^2]^{1/2}$

r_w = 0.292 ft

$r_{corrected} = [.0048 + .0256]^{1/2} = 0.174$ ft.

$Le/r_w = \frac{6.04}{.292} = 20.7$ then dimensionless parameters A, B, and C are: A = 2.25 B = 0.30 C = 1.75

calculated:

$$\ln \frac{Re}{rw} = \left[\frac{1.1}{\ln \frac{6.04}{.292}} + \frac{2.25 + 0.3 \ln \frac{84-6.04}{.292}}{20.7}\right]^{(-1)} = 1.81$$

$$K = \frac{r_c^2 \ln(Re/rw)}{2 Le} \frac{1}{t} \ln \frac{Y_o}{Y_t}$$

from semilog plot: Y_o = .2 ft
Y_t = .1 ft
t = 3.7 min

$$= \frac{(0.03)(1.81)}{12.08} \frac{1}{3.7} \ln \frac{.2}{.1}$$

$$= (.0045)(0.27)(0.693)$$

K = 0.000842 ft/min

K = 4.3 * 10^{-4} cm/sec

SLUG OUT

MW-6S

MW-6S slug in; from semilog plot of data:

$y_o = 0.3$ ft.

$y_t = 0.1$ ft.

$t = 6.0$ min.

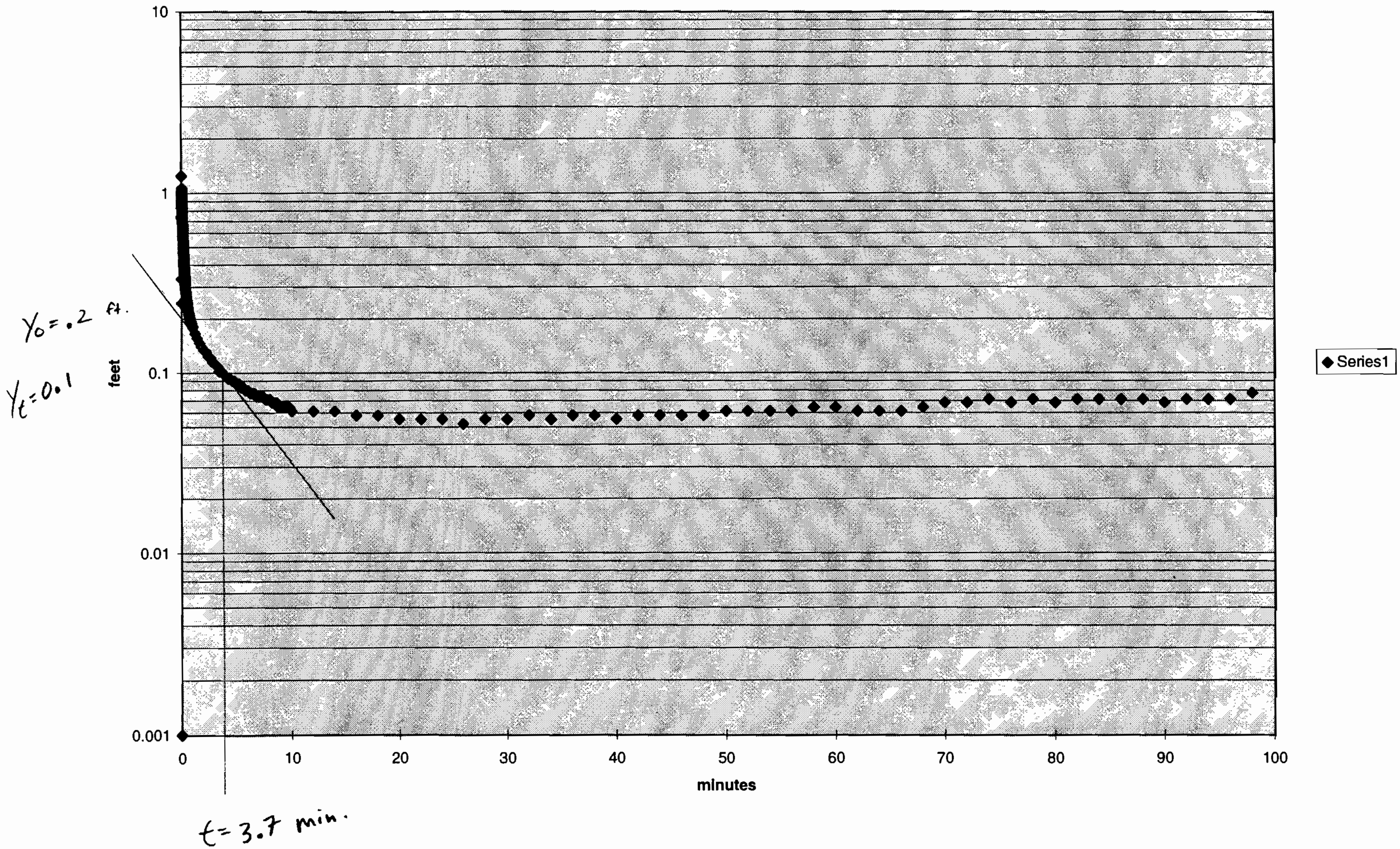
from previous page:

$$K = (.0045) \frac{1}{t} \ln \frac{y_o}{y_t}$$

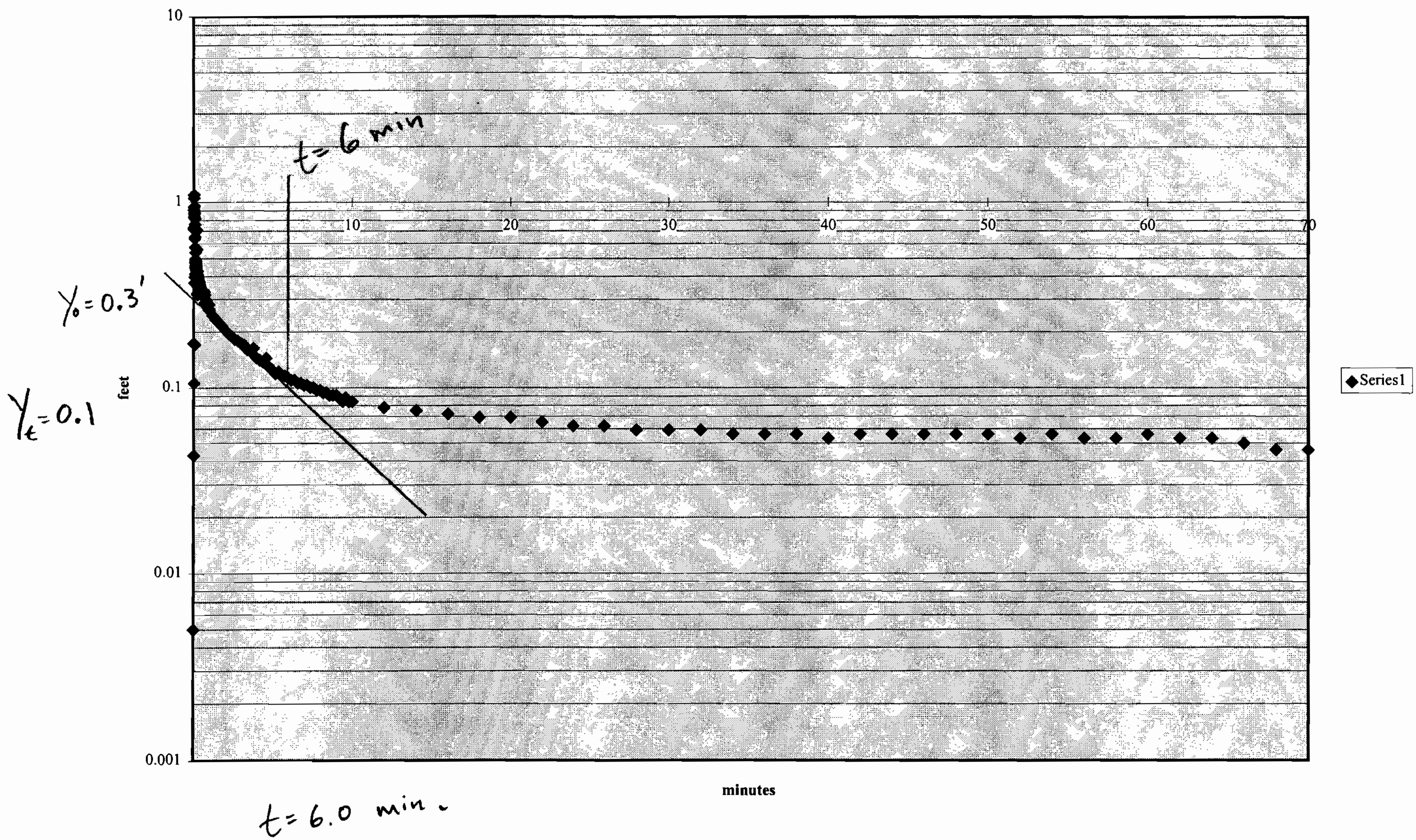
$$K = (.0045)(.167)(1.0986) = 0.000825 \text{ ft/min}$$

$$K = 4.2 * 10^{-4} \text{ cm/sec}$$

MW-6S slug out



MW-6S slug in


10
1
0.1
0.01
0.001
feet
10
20
30
40
50
60
70
minutes
Series1
t=6 min
Y_0=0.3'
Y_t=0.1
t=6.0 min.

CAMP DRESSER & McKEE

CLIENT: NYSDEC JOB NO.: 0897 COMPUTED BY: BM

PROJECT: ETE DATE CHECKED: DATE: 4/16/98

DETAIL: MW-6D SLUG TEST CHECKED BY: PAGE NO.: 1

MW-6D
slug out

initial DTW = 12.03 ft. fr. TOC = 9.53 ft. b.g.
Total well depth = 74.5 ft. b.g.

$L_e = 10$ ft.

$L_w = 74.5 - 9.53$ ft $= 64.97$ feet.

$H = 84$ ft.

$r_c = 0.083$ ft $r_w = .292$ ft

$L_e/r_w = 34.25$ ∴ $A = 2.5$ $B = 0.5$

calculated:

$\ln R_e/r_w = 2.963$

from semilog plot of slug test data:

$Y_o = 0.85$ ft. $Y_t = 0.06$ ft $t = 10.0$ min

$$K = \frac{r_c^2 \ln(R_e/r_w)}{2L_e} \frac{1}{t} \ln \frac{Y_o}{Y_t}$$

$K = (0.001)(0.10)(2.65) = 0.000265$ ft/min

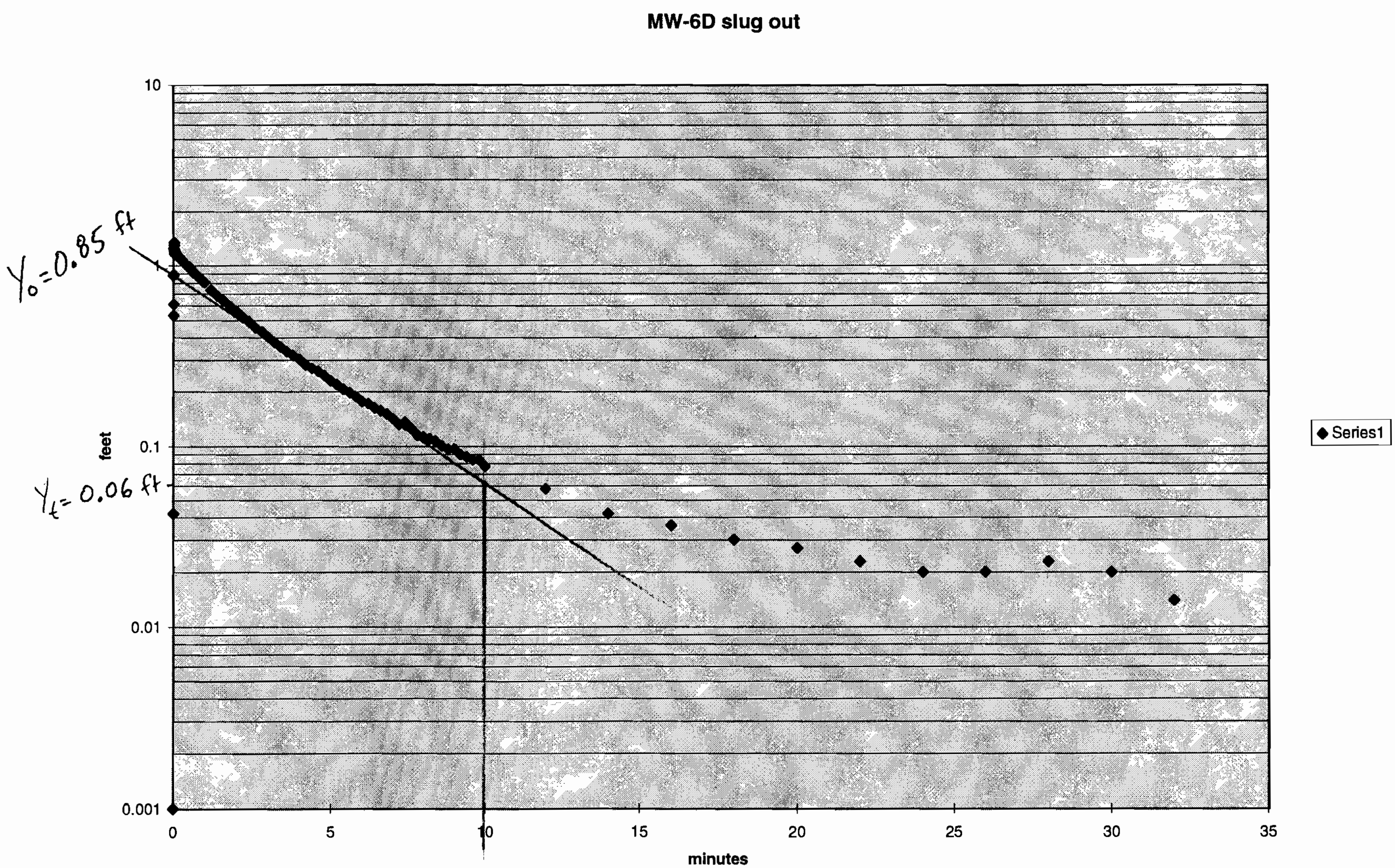
$K = 1.35 * 10^{-4}$ cm/sec for slug out

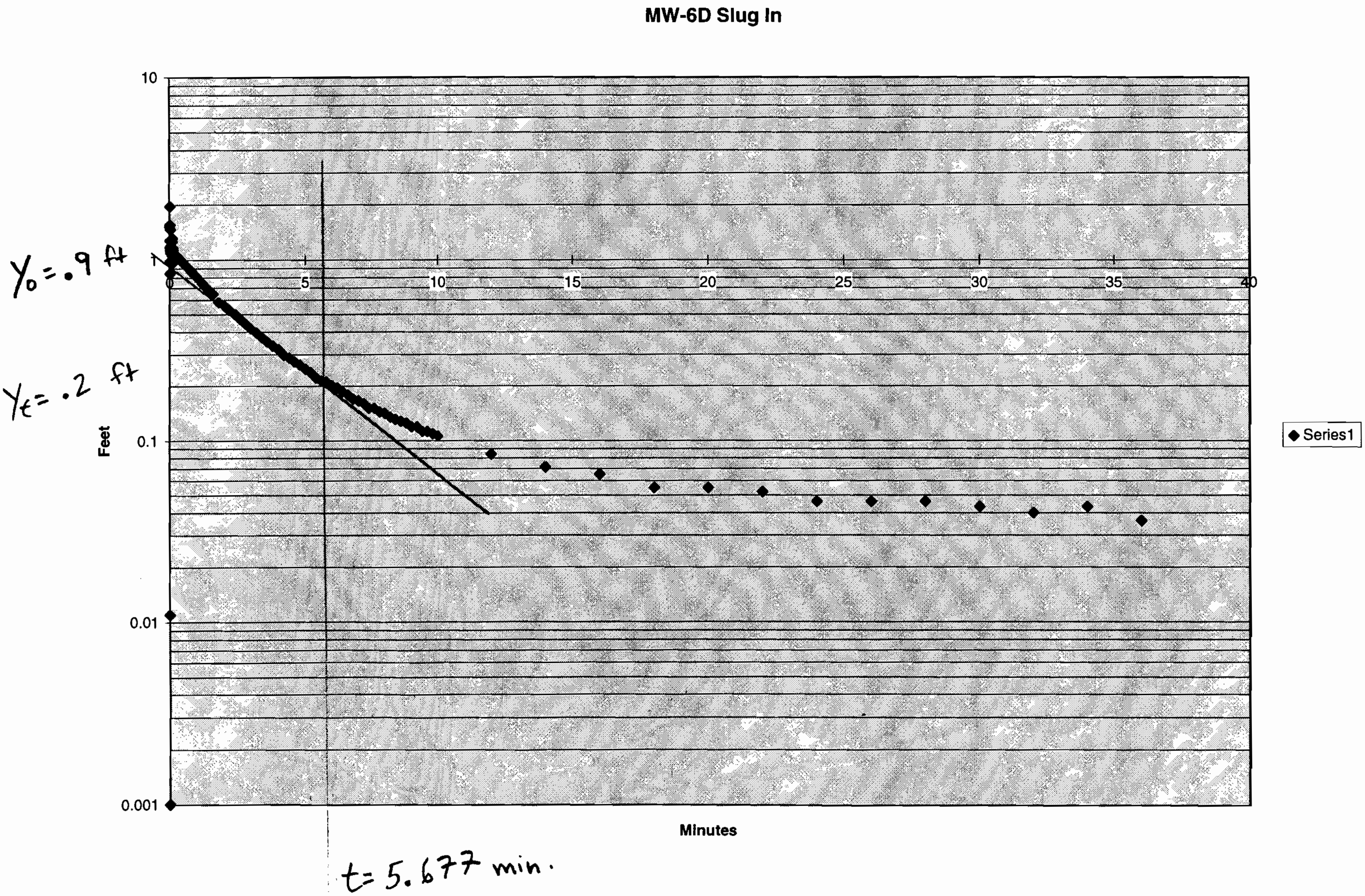
MW-6D slugin: from semilog plot: $Y_o = 0.9$ ft,
$Y_t = 0.2$ ft
$t = 5.677$ minutes

$K = (0.001)(0.176)(1.504)$

$K = 0.00026$ ft/min

$K = 1.3 * 10^{-4}$ cm/sec


MW-6D slug out
10
0.1
0.01
0.001
feet
0
5
10
15
20
25
30
35
minutes
Series1
Yo=0.85 ft
Yt=0.06 ft


MW-6D Slug In
10
0.1
0.01
0.001
Feet
0
5
10
15
20
25
30
35
40
Minutes
Series1
Yo = .9 ft
Yt = .2 ft
t= 5.677 min.

CAMP DRESSER & McKEE

CLIENT NYSDEC | JOB NO. 0897 | COMPUTED BY BM
PROJECT ETE | DATE CHECKED | DATE 4/16/98
DETAIL MW-7S SLUG TEST | CHECKED BY | PAGE NO. 1 of 2

MW-7S

DTW = 2.85' fr. TOC = 0.35 ft fr. grade
Total well depth fr. grade = 15 ft.

L_e = 10 ft. change in level occurs in solid casing

L_w = 15 ft − 0.35 ft = 14.65 ft

H = 84 ft.

r_c = 0.083 ft.

r_w = .292 ft.

$L_e/r_w = 34.25$

parameters
A = 2.5 B = 0.5
C = 2.2

calculated:

$$\ln \frac{R_e}{r_w} = 2.30$$

MW-7S slug out

A. from semilog line A (late time slope): $y_0 = .25'$, $y_t = .1'$
t = 10.26 min

$$K = \frac{r_c^2 \ln (R_e/r_w)}{2 L_e} \frac{1}{t} \ln \frac{y_0}{y_t}$$

$$K = (.00079)(0.0975)(0.9163) = 0.00007 \text{ ft/min}$$

$$K = 3.6 \times 10^{-5} \text{ cm/s}$$

B. from semilog line B (early time slope): $y_0 = .4'$
$y_t = .2'$
$t_B = 2.16$ min

$$K = (.00079)(0.463)(0.693)$$

$$K = 0.00025 \text{ ft/min}$$

$$K = 1.3 * 10^{-4} \text{ cm/sec.}$$

Use faster more conservative hydraulic conductivity, line B.

MW-7S SLUG IN

From semilog plot of data: $y_0 = .32$ ft

$y_t = .1$ ft

from previous page: $t = 8.64$ min.

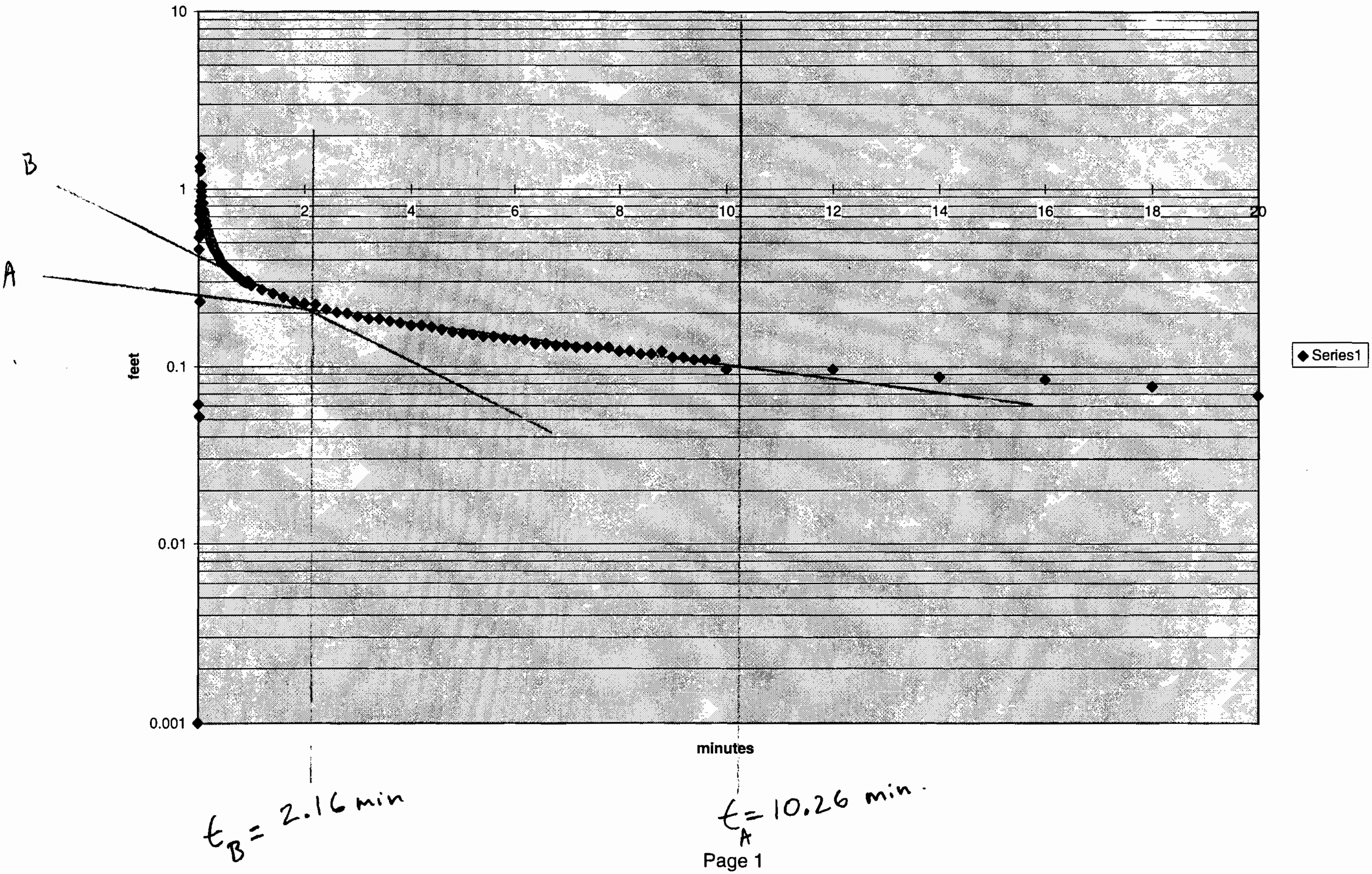
$$K = (.00079)\,\frac{1}{t}\,\ln\frac{y_0}{y_t}$$

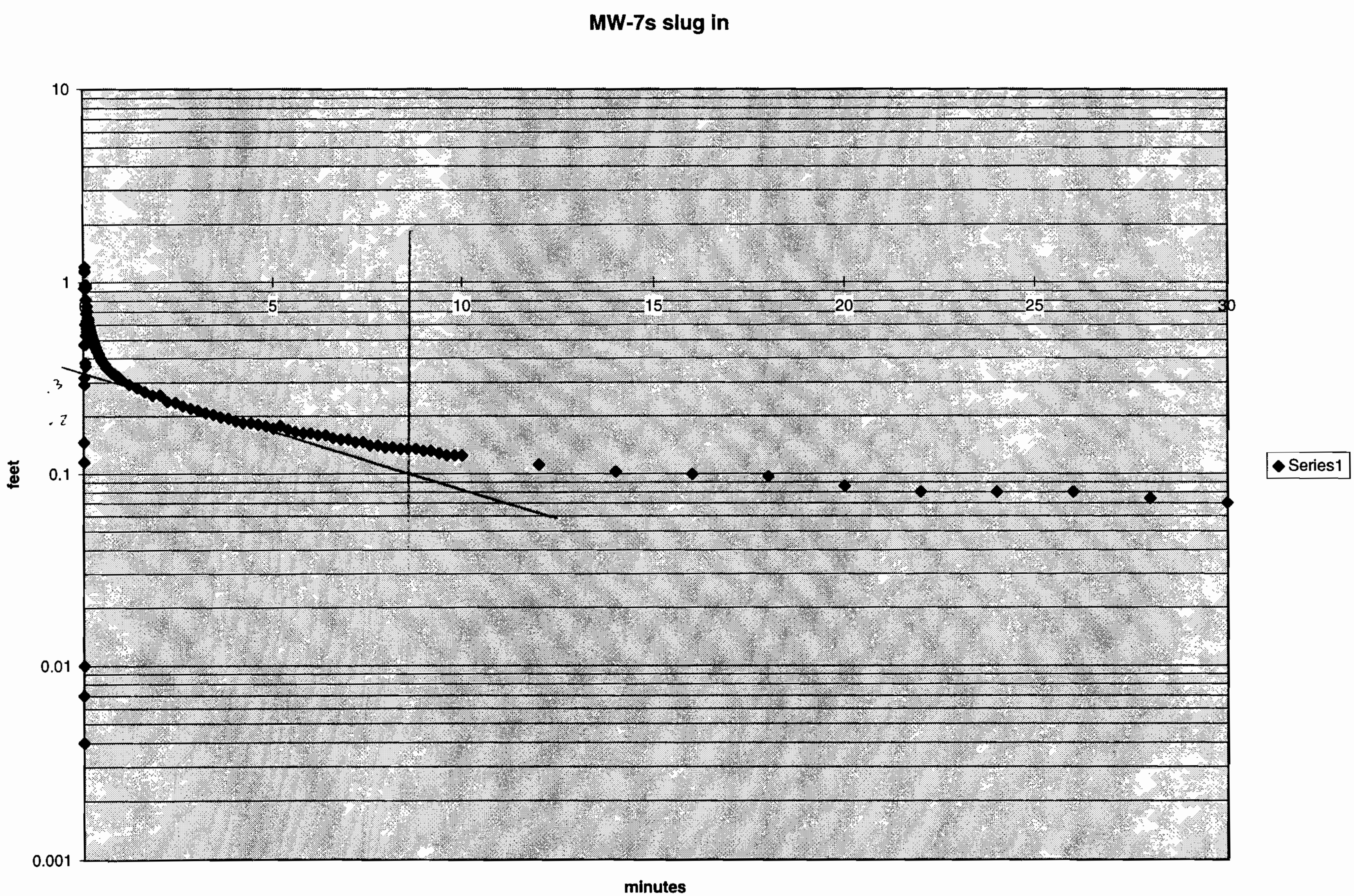
$$K = (.00079)(0.116)(1.163) = 0.000107 \text{ ft/min}$$

slug in:

$$K = 5.4 * 10^{-5} \text{ cm/sec}$$

MW-7S out


10
1
0.1
0.01
0.001
feet
2
4
6
8
10
12
14
16
18
20
minutes
Series1
B
A
t_B = 2.16 min
t_A = 10.26 min.



$Y_o = .32$

$Y_t = .1$

t = 8.64 minutes

MW-8D

DTW = 7.08' fr. TOC
DTW = 4.58' fr. b. grade
well depth = 72' fr. b. grade

$L_e = 10'$ change in level above screen

$L_w = 72' - 4.58' = 67.42'$

$H = 84'$ assumed depth to bedrock

$r_c = 0.083$ ft (casing 2" pvc 2"/2)

$r_w = .292$ ft (well borehole diam. 7"/2)

$L_e/r_w = 34.25$ ∴ dimensionless parameters are: A = 2.5, B = 0.50, C = 2.2

when $L_w < H$ then $\ln \frac{R_e}{r_w} = \left[\frac{1.1}{\ln(L_w/r_w)} + \frac{A + B \ln\left[\frac{H - L_w}{r_w}\right]}{L_e/r_w} \right]^{-1}$

$$\ln \frac{R_e}{r_w} = \left[\frac{1.1}{\ln \frac{67.42}{.292}} + \frac{2.5 + 0.5 \ln \frac{84 - 67.42}{.292}}{34.25} \right]^{-1}$$

.2022 + $\frac{4.52}{34.25}$

$$\ln \frac{R_e}{r_w} = 2.993$$

$$K = \frac{r_c^2 \ln(R_e/r_w)}{2 L_e} \frac{1}{t} \ln \frac{Y_o}{Y_t}$$

MW-8D SLUG OUT:
from semilog graph:
$t = 4.3$
$Y_o = 0.11$
$Y_t = 0.02$

$$= \frac{.0069 * 2.993}{20} \frac{1}{4.3 \text{ min}} \ln \frac{0.11 \text{ ft}}{0.02 \text{ ft}}$$

$= (.00103)(0.232)(1.705) = 0.0004$ ft/min

$K = 2.0 \times 10^{-4}$ cm/s

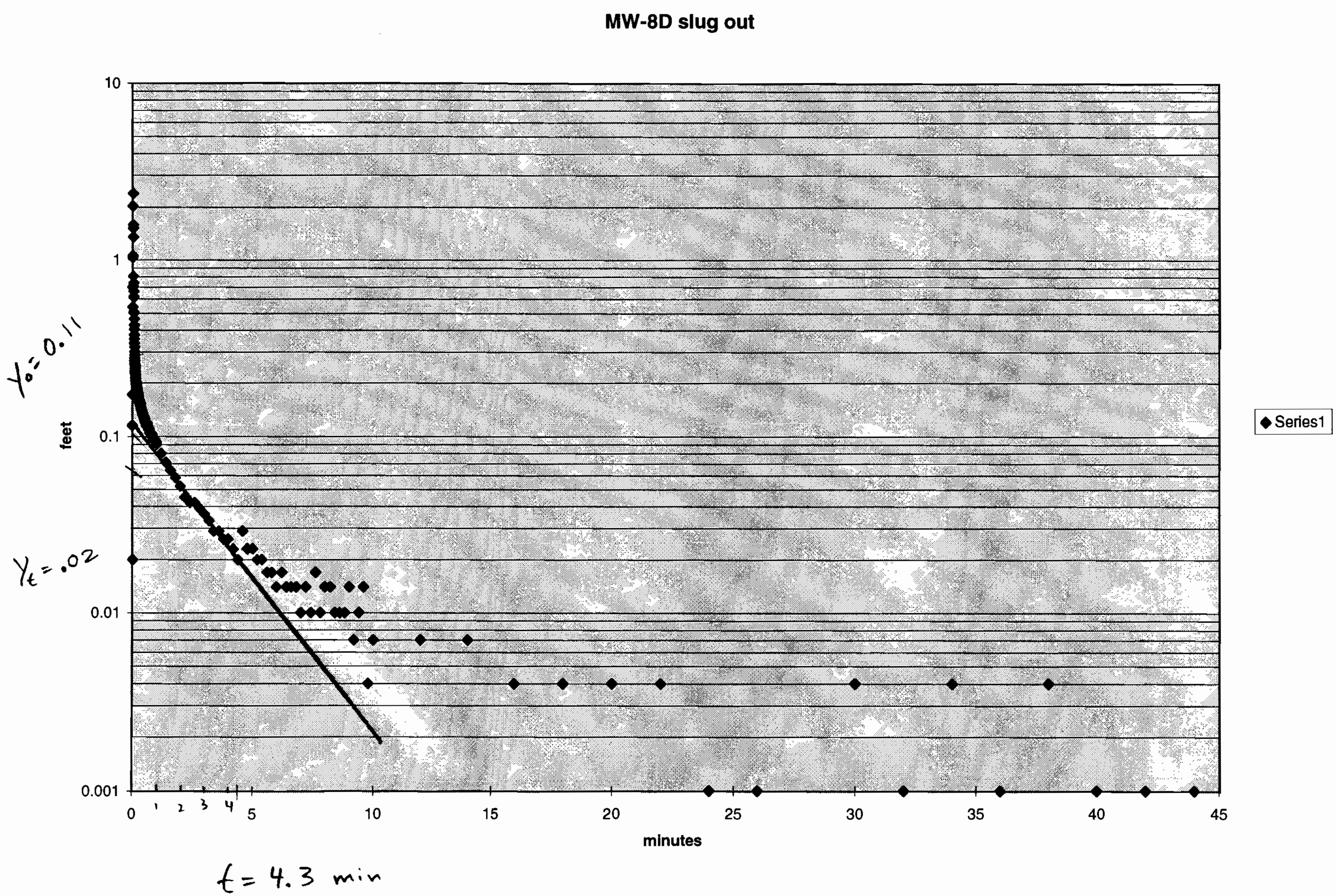
MW-8D slug in from semilog plot:

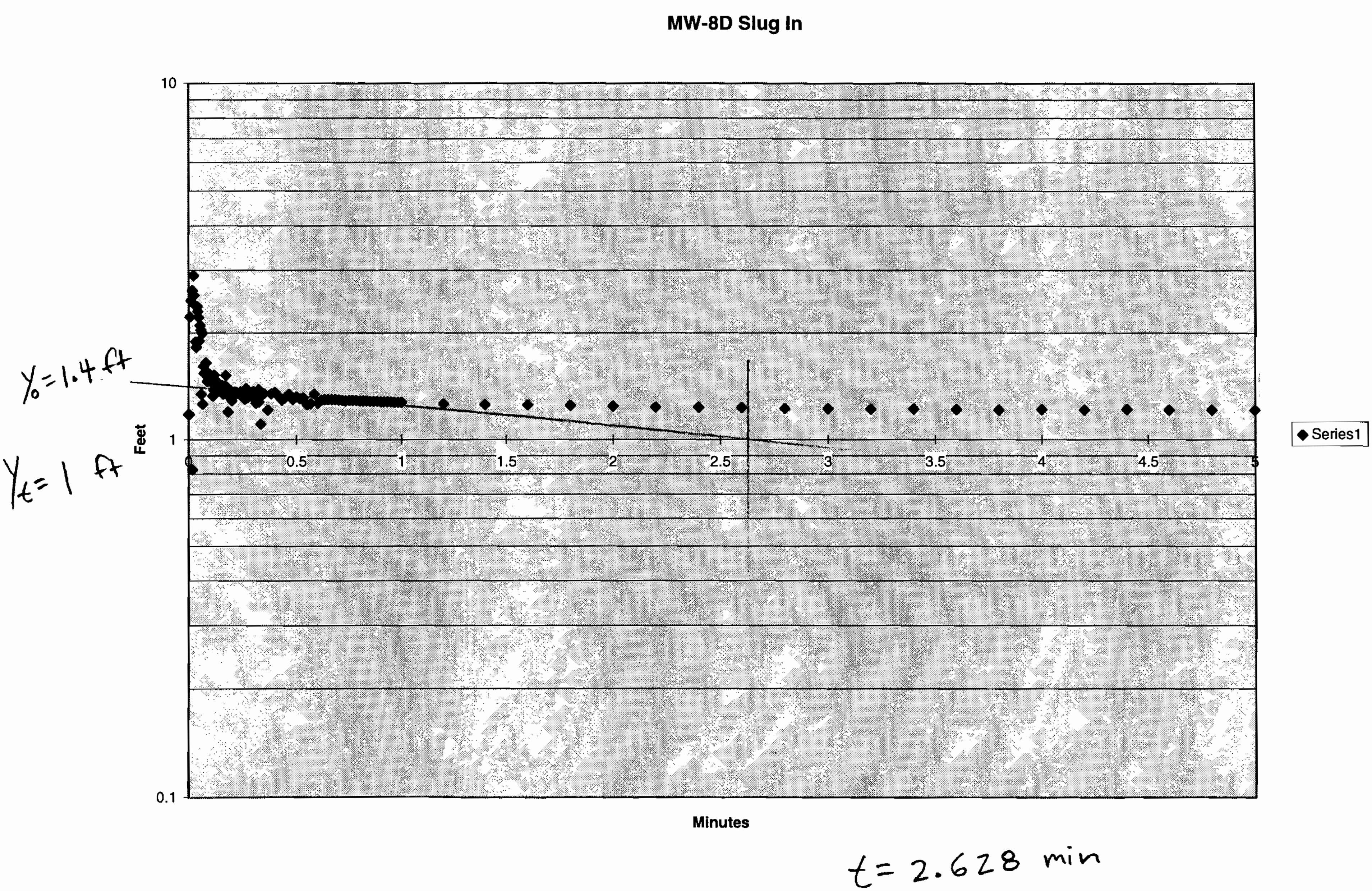
$Y_0 = 1.4$ ft, $Y_t = 1.0$ ft, $t = 2.628$ min.

$$K = \frac{(0.083)^2 (2.993)}{2(10)} \frac{1}{2.628} \ln \frac{1.4}{1.0}$$

$$K = (0.00103)(0.381)(0.336) = 0.00013 \text{ ft/min}$$

$$K = 6.70 * 10^{-5} \text{ cm/sec}$$


MW-8D slug out
10
1
0.1
0.01
0.001
feet
0
5
10
15
20
25
30
35
40
45
minutes
Series1
Yo = 0.11
Yt = .02
t = 4.3 min


MW-8D Slug In
10
1
0.1
Feet
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
Minutes
Series1
$Y_o = 1.4$ ft
$Y_t = 1$ ft
$t = 2.628$ min

MW-9S

DTW = 4.1 ft fr. TOC
DTW from grade = 1.6 ft. b.g.
Well depth from grade = 15 ft.

$L_e = 10$ ft   change in water level occurs above screened zone

$L_w = 15\text{ ft} - 1.6\text{ ft} = 13.4\text{ ft}$

$H = 84$ ft   assumed depth to bedrock

$r_c = 0.083$ ft. $r_w = .292$ ft

$L_e / r_w = 34.25$ ∴ parameters $A = 2.5$, $B = 0.5$, $C = 2.2$

$$\ln \frac{R_e}{r_w} = \left[\frac{1.1}{\ln \frac{13.4}{.292}} + \frac{2.5 + 0.5 \ln \frac{84 - 13.4}{.292}}{34.25} \right]^{-1}$$

$$\ln \frac{R_e}{r_w} = \left[\frac{1.1}{3.83} + \frac{2.5 + 2.74}{34.25} \right]^{-1} = 2.27$$

SLUG OUT:

from semilog plot of slug test data: $t = 18.21$ min
$y_0 = .7$ feet
$y_t = .3$ feet

$$K = \frac{r_c^2 \ln(R_e/r_w)}{2 L_e} \frac{1}{t} \ln \frac{y_0}{y_t}$$

$$= \frac{0.0156}{20} \frac{1}{18.21} (0.847) = (0.00078)(0.055)(0.847)$$

$K = 0.000036$ ft/min

$K = 1.84 \times 10^{-5}$ cm/sec   slug out

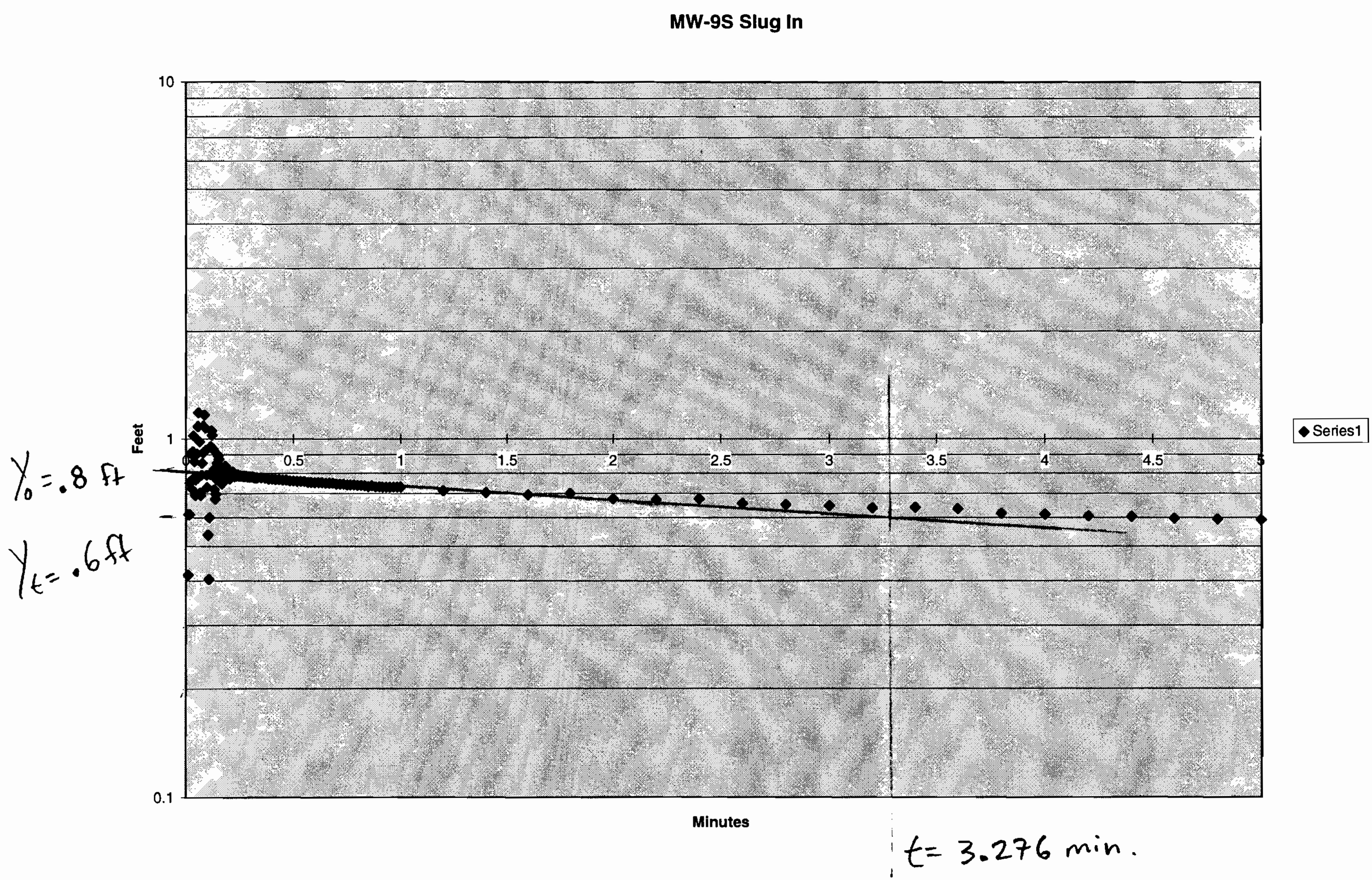
CAMP DRESSER & McKEE	CLIENT NYSDEC	JOB NO. 0897	COMPUTED BY BM
	PROJECT ETE	DATE CHECKED	DATE 4/16/98
	DETAIL MW-9S slug test	CHECKED BY	PAGE NO. 2 of 2

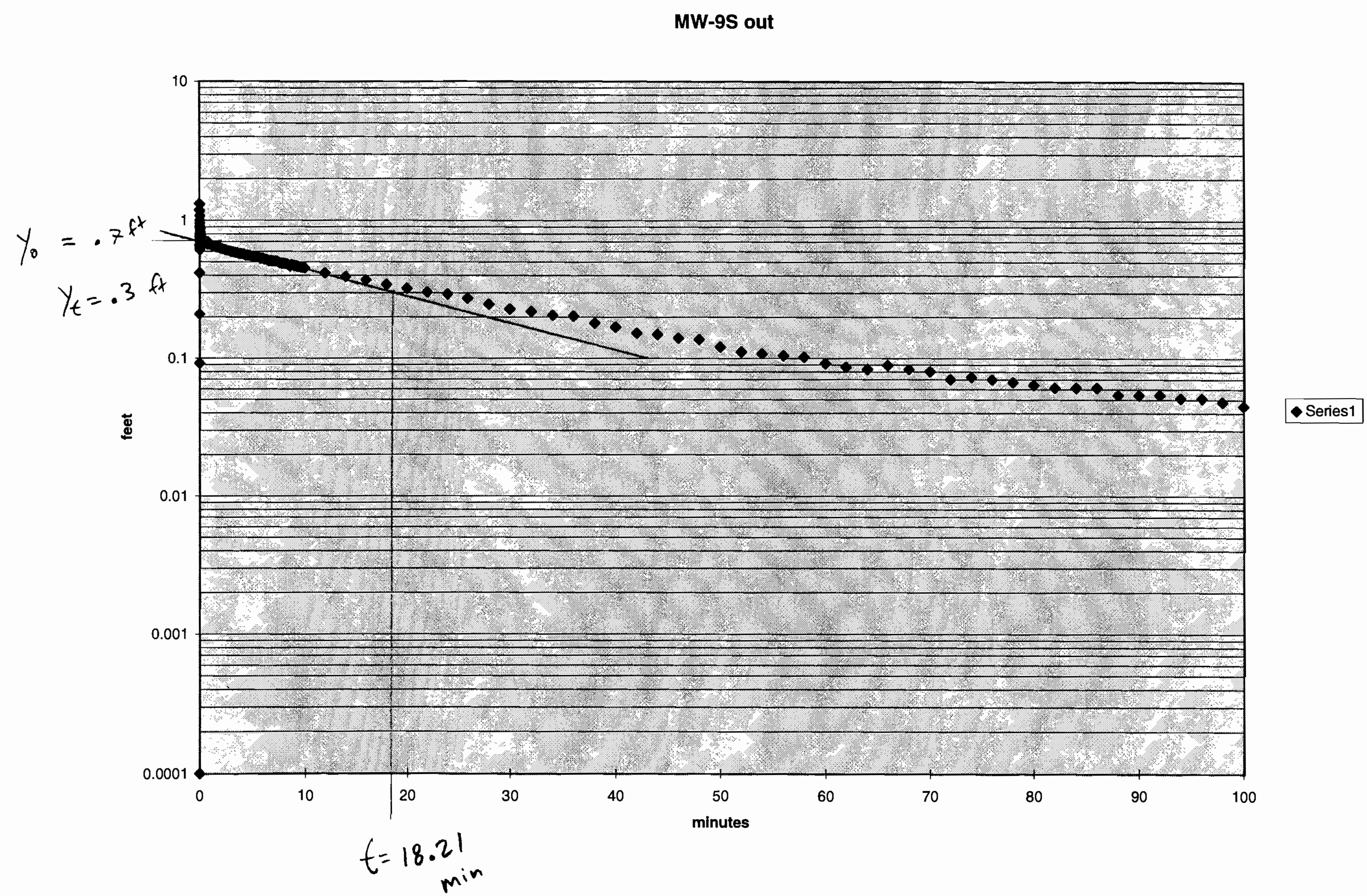
$$K = \frac{r_c^2 \ln(R_e/r_w)}{2 L_e} \frac{1}{t} \ln \frac{Y_o}{Y_t}$$

from semilog plot of data: $Y_o = 0.8$ ft $Y_t = 0.6$ ft
of Slug in $t = 3.276$ min.

$K = (0.000782)(0.305)(0.288) = 0.0000687$ ft/min

$K = 3.49 * 10^{-5}$ cm/sec slug in


MW-9S Slug In
10
1
0.1
Feet
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
Minutes
Series1
Y_0 = .8 ft
Y_t = .6 ft
t= 3.276 min.


MW-9S out
10
1
0.1
0.01
0.001
0.0001
feet
0
10
20
30
40
50
60
70
80
90
100
minutes
Series1
Yo = .7 ft
Yt = .3 ft
t = 18.21 min

CAMP DRESSER & McKEE

CLIENT: NYSDEC
PROJECT: ETE
DETAIL: MW-9D SLUG TEST

JOB NO. 0897
DATE CHECKED:
CHECKED BY:

COMPUTED BY: DM
DATE: 4/16/98
PAGE NO. 1

Slug out:

DTW = 1.15' fr. TOC = + 1.35 above grad.
Well depth = 74 ft. bel. grade

$L_e = 10$ ft

$L_w = 74 + 1.35 = 75.35$ ft

$H = 84$ ft.

$r_c = 0.083$ ft. $r_w = .292$ ft.

$L_e/r_w = 34.25$
$\therefore$ $A = 2.5$
$B = 0.5$

calculated:

$\ln R_e/r_w = 3.12$

from semilog plot of data: $y_0 = 1.0$ ft, $y_t = .3$ ft, $t = 1.145$ min

$$K = \frac{r_c^2 \ln(R_e/r_w)}{2 L_e} \frac{1}{t} \ln \frac{y_0}{y_t}$$

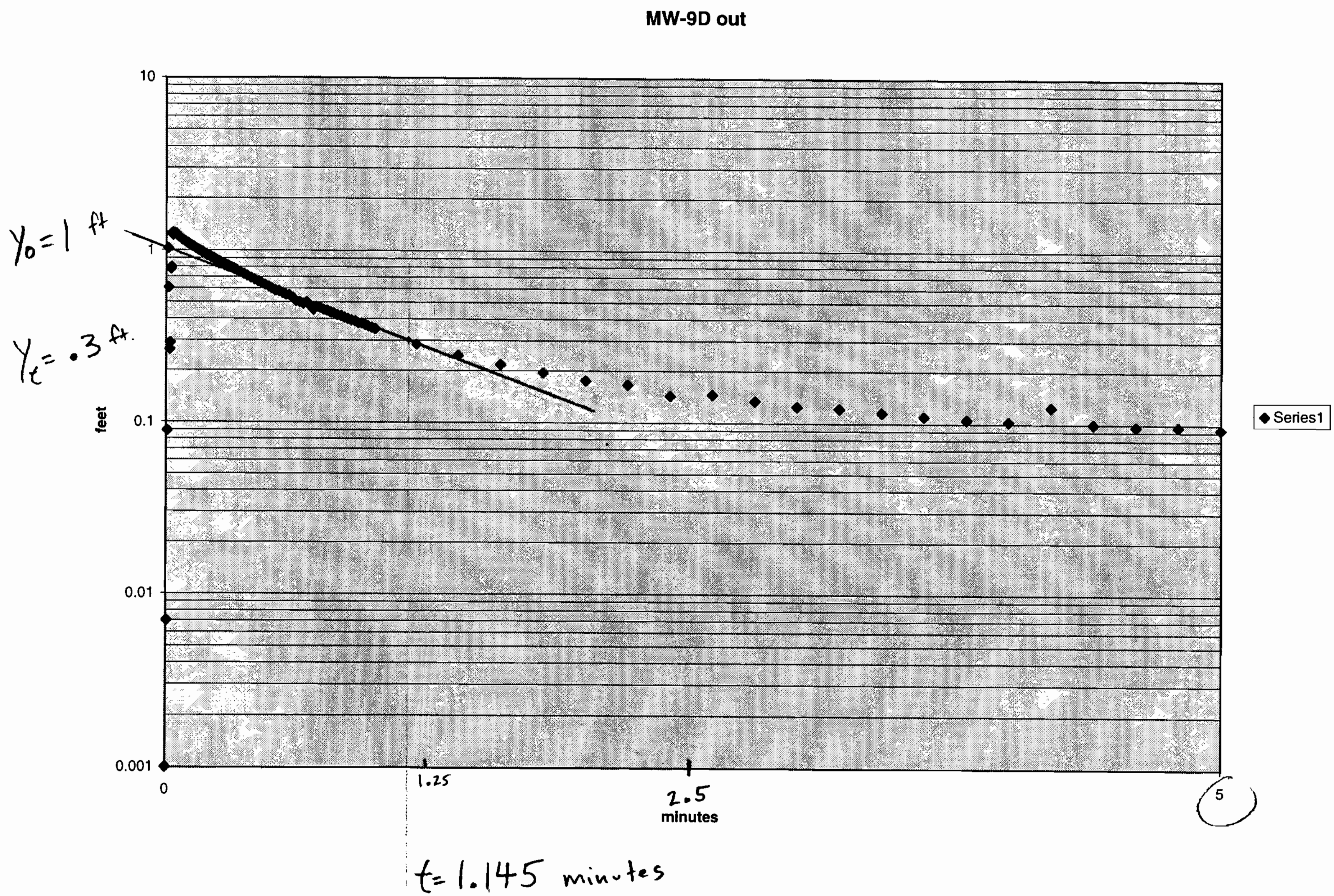
$$K = (0.001)(0.873)(1.204) = 0.001 \text{ ft/min.}$$

$$K = 5.08 * 10^{-4} \text{ cm/sec}$$

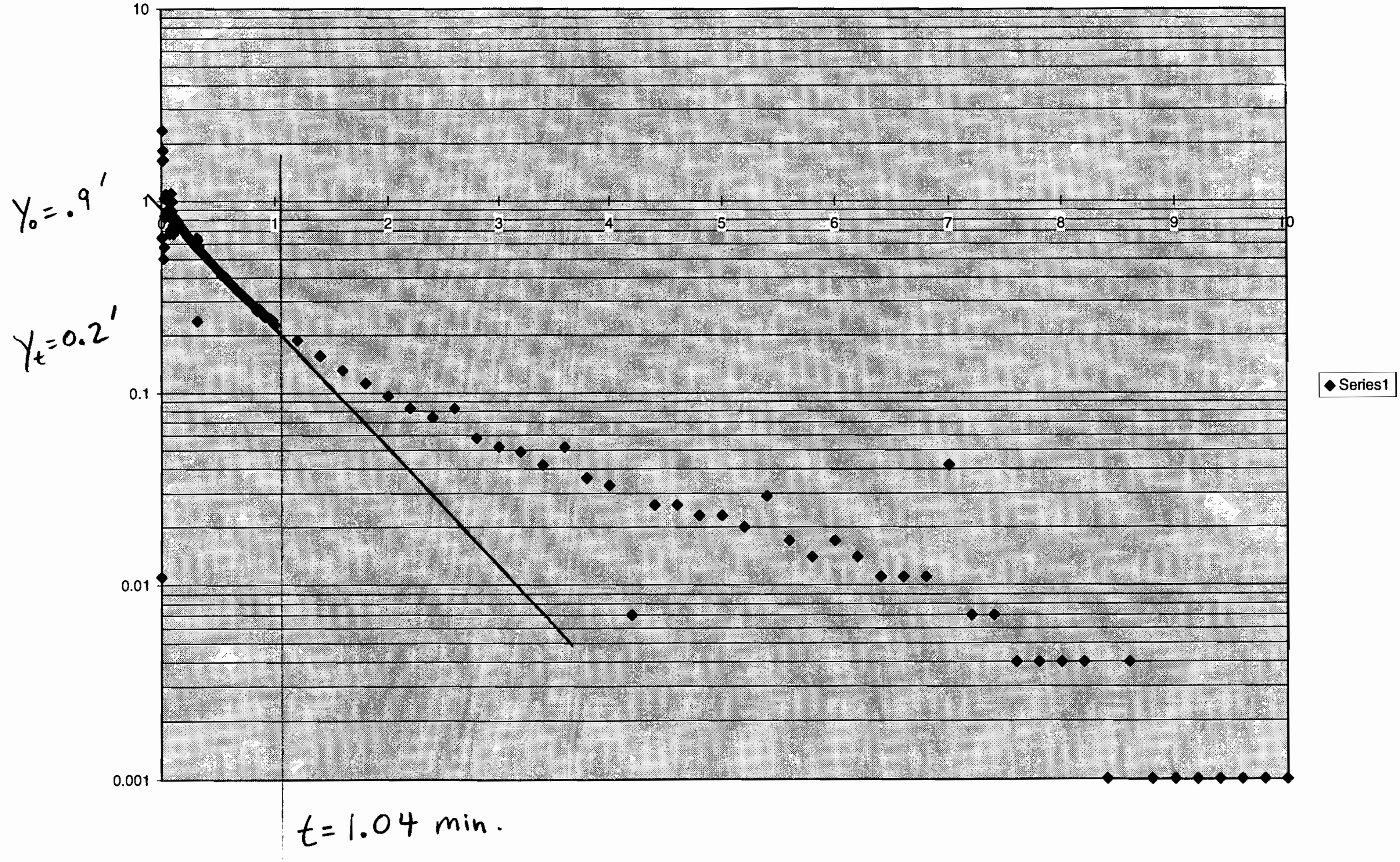
Slug in: from semilog plot: $y_0 = 0.9$ ft $y_t = 0.2$ ft $t = 1.04$ min

$$K = (0.001)(0.961)(1.504) = 0.001 \text{ ft/min}$$

$$K = 5.08 * 10^{-4} \text{ cm/sec}$$


MW-9D out
10
1
0.1
0.01
0.001
feet
0
1.25
2.5
5
minutes
Series1
$y_0 = 1$ ft
$y_t = .3$ ft.
t= 1.145 minutes

MW-9D Slug In



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**                                                                          **
**                                                                          **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE               **
**               HELP MODEL VERSION 3.01   (14 OCTOBER 1994)                **
**                  DEVELOPED BY ENVIRONMENTAL LABORATORY                   **
**                    USAE WATERWAYS EXPERIMENT STATION                     **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY              **
**                                                                          **
**                                                                          **
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******************************************************************************


PRECIPITATION DATA FILE:     C:\HELP3\etep.D4
TEMPERATURE DATA FILE:       C:\HELP3\etet.D7
SOLAR RADIATION DATA FILE:   C:\HELP3\etes.D13
EVAPOTRANSPIRATION DATA:     C:\HELP3\etee.D11
SOIL AND DESIGN DATA FILE:   C:\HELP3\etesoil2.D10
OUTPUT DATA FILE:            C:\HELP3\eteout.OUT


TIME:  17:39     DATE:   5/15/1998


******************************************************************************

     TITLE:  ETE Sanitation and Landfill

******************************************************************************


     NOTE:  INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
              COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.


                                      LAYER  1
                                      --------

                        TYPE 1 - VERTICAL PERCOLATION LAYER
                            MATERIAL TEXTURE NUMBER  12
           THICKNESS                   =      24.00   INCHES
           POROSITY                    =       0.4710 VOL/VOL
           FIELD CAPACITY              =       0.3420 VOL/VOL
           WILTING POINT               =       0.2100 VOL/VOL
           INITIAL SOIL WATER CONTENT  =       0.3834 VOL/VOL
           EFFECTIVE SAT. HYD. COND.   =  0.419999997000E-04 CM/SEC
       NOTE:  SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY  1.34
                FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.
```

LAYER 2

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	180.00 INCHES
POROSITY	=	0.6710 VOL/VOL
FIELD CAPACITY	=	0.2920 VOL/VOL
WILTING POINT	=	0.0770 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.3078 VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02 CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER	=	2.00	
FRACTION OF AREA ALLOWING RUNOFF	=	55.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	7.000	ACRES
EVAPORATIVE ZONE DEPTH	=	8.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	3.473	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	3.768	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	1.680	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	64.601	INCHES
TOTAL INITIAL WATER	=	64.601	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
BUFFALO NEW YORK

MAXIMUM LEAF AREA INDEX	=	0.50
START OF GROWING SEASON (JULIAN DATE)	=	126
END OF GROWING SEASON (JULIAN DATE)	=	285
AVERAGE ANNUAL WIND SPEED	=	12.10 MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	76.00 %
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	68.00 %
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	72.00 %
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	76.00 %

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR BUFFALO NEW YORK

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC

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3.02	2.40	2.97	3.06	2.89	2.72
2.96	4.16	3.37	2.93	3.62	3.42

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR BUFFALO NEW YORK

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
23.50	24.50	33.00	45.40	56.10	66.00
70.70	68.90	62.10	51.50	40.30	28.80

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR BUFFALO NEW YORK

STATION LATITUDE = 42.93 DEGREES

****

ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT
PRECIPITATION	42.58	1081957.500	100.00
RUNOFF	3.867	98258.531	9.08
EVAPOTRANSPIRATION	25.129	638525.437	59.02
PERC./LEAKAGE THROUGH LAYER 2	13.340675	338986.562	31.33
CHANGE IN WATER STORAGE	0.243	6187.329	0.57
SOIL WATER AT START OF YEAR	64.601	1641512.370	
SOIL WATER AT END OF YEAR	64.845	1647699.620	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.315	0.00

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ANNUAL TOTALS FOR YEAR 2

	INCHES	CU. FEET	PERCENT
PRECIPITATION	38.30	973203.187	100.00
RUNOFF	5.555	141158.969	14.50
EVAPOTRANSPIRATION	23.524	597737.062	61.42
PERC./LEAKAGE THROUGH LAYER 2	14.548346	369673.469	37.99
CHANGE IN WATER STORAGE	-5.327	-135366.234	-13.91
SOIL WATER AT START OF YEAR	64.845	1647699.620	
SOIL WATER AT END OF YEAR	58.294	1481256.620	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	1.223	31076.812	3.19
ANNUAL WATER BUDGET BALANCE	0.0000	-0.121	0.00

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ANNUAL TOTALS FOR YEAR 3

	INCHES	CU. FEET	PERCENT
PRECIPITATION	33.70	856317.312	100.00
RUNOFF	6.194	157377.281	18.38
EVAPOTRANSPIRATION	22.614	574614.000	67.10
PERC./LEAKAGE THROUGH LAYER 2	8.149817	207086.859	24.18
CHANGE IN WATER STORAGE	-3.257	-82761.148	-9.66
SOIL WATER AT START OF YEAR	58.294	1481256.620	
SOIL WATER AT END OF YEAR	55.897	1420339.000	
SNOW WATER AT START OF YEAR	1.223	31076.812	3.63
SNOW WATER AT END OF YEAR	0.363	9233.302	1.08
ANNUAL WATER BUDGET BALANCE	0.0000	0.315	0.00

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ANNUAL TOTALS FOR YEAR 4

	INCHES	CU. FEET	PERCENT
PRECIPITATION	39.77	1010555.310	100.00
RUNOFF	4.605	117014.516	11.58
EVAPOTRANSPIRATION	25.964	659753.062	65.29
PERC./LEAKAGE THROUGH LAYER 2	5.827373	148073.531	14.65
CHANGE IN WATER STORAGE	3.373	85714.406	8.48
SOIL WATER AT START OF YEAR	55.897	1420339.000	
SOIL WATER AT END OF YEAR	59.520	1512398.620	
SNOW WATER AT START OF YEAR	0.363	9233.302	0.91
SNOW WATER AT END OF YEAR	0.114	2888.025	0.29
ANNUAL WATER BUDGET BALANCE	0.0000	-0.194	0.00

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ANNUAL TOTALS FOR YEAR 5

	INCHES	CU. FEET	PERCENT
PRECIPITATION	37.99	965325.937	100.00
RUNOFF	5.164	131229.516	13.59
EVAPOTRANSPIRATION	25.668	652235.187	67.57
PERC./LEAKAGE THROUGH LAYER 2	9.264259	235404.828	24.39
CHANGE IN WATER STORAGE	-2.107	-53543.531	-5.55
SOIL WATER AT START OF YEAR	59.520	1512398.620	
SOIL WATER AT END OF YEAR	57.526	1461743.120	
SNOW WATER AT START OF YEAR	0.114	2888.025	0.30
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.073	0.00

****

****

AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 5

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	3.50	2.09	2.96	3.00	3.13	2.57
	3.32	4.19	3.91	3.05	3.51	3.24
STD. DEVIATIONS	1.02	1.09	1.20	1.32	0.99	1.09
	0.91	2.45	1.69	1.29	2.18	0.79
RUNOFF						
TOTALS	1.679	0.758	1.439	0.577	0.041	0.000
	0.000	0.000	0.038	0.000	0.022	0.522
STD. DEVIATIONS	1.432	0.533	1.364	0.791	0.092	0.000
	0.000	0.000	0.085	0.000	0.049	0.686
EVAPOTRANSPIRATION						
TOTALS	0.585	0.769	1.526	3.101	3.313	2.239
	2.797	3.331	2.775	1.940	1.514	0.691
STD. DEVIATIONS	0.127	0.224	0.115	0.475	0.922	0.957
	0.921	1.878	0.788	0.525	0.163	0.175
PERCOLATION/LEAKAGE THROUGH LAYER 2						
TOTALS	1.7936	0.8549	0.9393	0.9440	0.8810	0.8013
	0.7942	0.6372	0.6615	0.6637	0.5958	0.6597
STD. DEVIATIONS	1.3791	0.4426	0.3641	0.2502	0.3253	0.2210
	0.1573	0.2258	0.1393	0.2297	0.2246	0.1332

****

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 5

	INCHES	CU. FEET	PERCENT
PRECIPITATION	38.47 (3.225)	977471.8	100.00
RUNOFF	5.077 (0.8902)	129007.76	13.198
EVAPOTRANSPIRATION	24.580 (1.4478)	624572.94	63.897
PERCOLATION/LEAKAGE THROUGH FROM LAYER 2	10.22609 (3.63893)	259845.062	26.58338

CHANGE IN WATER STORAGE	-1.415 (3.3487)	-35953.84	-3.678

****

****

PEAK DAILY VALUES FOR YEARS 1 THROUGH 5

	(INCHES)	(CU. FT.)
PRECIPITATION	2.14	54377.402
RUNOFF	2.646	67243.3203
PERCOLATION/LEAKAGE THROUGH LAYER 2	0.142274	3615.18140
SNOW WATER	3.71	94262.2891
MAXIMUM VEG. SOIL WATER (VOL/VOL)		0.4710
MINIMUM VEG. SOIL WATER (VOL/VOL)		0.1746

****

****

FINAL WATER STORAGE AT END OF YEAR 5

LAYER	(INCHES)	(VOL/VOL)
1	8.8901	0.3704
2	48.6362	0.2702
SNOW WATER	0.000	

****
****

EPA/600/R-94/168a
September 1994

THE HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE (HELP) MODEL

USER'S GUIDE FOR VERSION 3

by

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Interagency Agreement No. DW21931425

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CINCINNATI, OHIO 45268

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		6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S) Paul Schroeder, Cheryl Lloyd, Paul Zappi[1] and Nadim Aziz[2]		8. PERFORMING ORGANIZATION REPORT NO.
9. PERFORMING ORGANIZATION NAME AND ADDRESS [1]U.S. Army Corps of Engineers WES, Vicksburg, MS 39180-6199 [2]Dept of Civil Engineering, Clemson University Clemson, SC 29634-0911		10. PROGRAM ELEMENT NO.
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Project Officer = Robert E. Landreth (513) 569-7871

16. ABSTRACT The Hydrologic Evaluation of Landfill Performance (HELP) computer program is a quasi-two-dimensional hydrologic model of water movement across, into, through and out of landfills. The model accepts weather, soil and design data. Landfill systems including various combinations of vegetation, cover soils, waste cells, lateral drain layers, low permeability barrier soils, and synthetic geomembrane liners may be modeled. The program was developed to conduct water balance analysis of landfills, cover systems, and solid waste disposal and containment facilities. As such, the model facilitates rapid estimation of the amounts of runoff, evapotranspiration, drainage, leachate collection, and liner leakage that may be expected to result from the operation of a wide variety of landfill designs. The primary purpose of the model is to assist in the comparison of design alternatives as judged by their water balances. The model, applicable to open, partially closed, and fully closed sites, is a tool for both designers and permit writers.

HELP Version 3 represents a significant advancement over the input techniques of Version 2. Users of the HELP model should find HELP Version 3 easy to use and should be able to use it for many purposes, such as preparing and editing landfill profiles and weather data. Version 3 facilitates use of metric units, international applications, and designs with geosynthetic materials.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
landfill	Hydrologic evaluation, HELP Model	

18. DISTRIBUTION STATEMENT RELEASE TO PUBLIC	19. SECURITY CLASS (This Report) UNCLASSIFIED	21. NO. OF PAGES 103
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EPA Form 2220-1 (Rev. 4-77) PREVIOUS EDITION IS OBSOLETE

ABSTRACT

The Hydrologic Evaluation of Landfill Performance (HELP) computer program is a quasi-two-dimensional hydrologic model of water movement across, into, through and out of landfills. The model accepts weather, soil and design data and uses solution techniques that account for the effects of surface storage, snowmelt, runoff, infiltration, evapotranspiration, vegetative growth, soil moisture storage, lateral subsurface drainage, leachate recirculation, unsaturated vertical drainage, and leakage through soil, geomembrane or composite liners. Landfill systems including various combinations of vegetation, cover soils, waste cells, lateral drain layers, low permeability barrier soils, and synthetic geomembrane liners may be modeled. The program was developed to conduct water balance analyses of landfills, cover systems, and solid waste disposal and containment facilities. As such, the model facilitates rapid estimation of the amounts of runoff, evapotranspiration, drainage, leachate collection, and liner leakage that may be expected to result from the operation of a wide variety of landfill designs. The primary purpose of the model is to assist in the comparison of design alternatives as judged by their water balances. The model, applicable to open, partially closed, and fully closed sites, is a tool for both designers and permit writers.

This report documents the solution methods and process descriptions used in Version 3 of the HELP model. Program documentation including program options, system and operating requirements, file structures, program structure and variable descriptions are provided in a separate report. Section 1 provides basic program identification. Section 2 provides a narrative description of the simulation model. Section 3 presents data generation algorithms and default values used in Version 3. Section 4 describes the method of solution and hydrologic process algorithms. Section 5 lists the assumptions and limitations of the HELP model.

The user interface or input facility is written in the Quick Basic environment of Microsoft Basic Professional Development System Version 7.1 and runs under DOS 2.1 or higher on IBM-PC and compatible computers. The HELP program uses an interactive and a user-friendly input facility designed to provide the user with as much assistance as possible in preparing data to run the model. The program provides weather and soil data file management, default data sources, interactive layer editing, on-line help, and data verification and accepts weather data from the most commonly used sources with several different formats.

HELP Version 3 represents a significant advancement over the input techniques of Version 2. Users of the HELP model should find HELP Version 3 easy to use and should be able to use it for many purposes, such as preparing and editing landfill profiles and weather data. Version 3 facilitates use of metric units, international applications, and designs with geosynthetic materials.

This report should be cited : follows

Schroeder, P. R., Dozier, T.S., Zappi, P. A., McEnroe, B. M., Sjostrom, J. W., and Peyton, R. L. (1994). "The Hydrologic Evaluation of Landfill Performance (HELP) Model: Engineering Documentation for Version 3," EPA/600/9-94/xxx, U.S. Environmental Protection Agency Risk Reduction Engineering Laboratory, Cincinnati, OH.

This report was submitted in partial fulfillment of Interagency Agreement Number DW21931425 between the U.S. Environmental Protection Agency and the U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS. This report covers a period from November 1988 to August 1994 and work was completed as of August 1994.

2. Landfill area *(Customary or Metric)*

3. Percentage of landfill area where runoff is possible

4. Method of initialization of moisture storage (user-specified or program initialized to near steady-state)

5. Initial snow water storage (optional, needed when moisture storage is user-specified)

3.3.2 Layer Data

1. Layer type (Four types of layers are permitted – 1) vertical percolation, 2) lateral drainage, 3) barrier soil liner and 4) geomembrane liner.)

2. Layer thickness *(Customary or Metric)*

3. Soil texture

   - Select from 42 default soil/material textures to get the following data.
     Porosity, in vol/vol
     Field capacity, in vol/vol
     Wilting point, in vol/vol
     Saturated hydraulic conductivity (cm/sec)

   - Select from user-built soil texture library to get the following data.
     Porosity, in vol/vol
     Field capacity, in vol/vol
     Wilting point, in vol/vol
     Saturated hydraulic conductivity (cm/sec)

   - Enter the following data for manual soil texture descriptions.
     Porosity, in vol/vol
     Field capacity, in vol/vol
     Wilting point, in vol/vol
     Saturated hydraulic conductivity (cm/sec)

4. Initial volumetric soil water content (storage), in vol/vol (optional, needed when initial moisture storage is user-specified)

5. Rate of subsurface inflow to layer *(Customary or Metric)*

3.3.3 Lateral Drainage Layer Design Data

TABLE 4. DEFAULT SOIL, WASTE, AND GEOSYNTHETIC CHARACTERISTICS

Classification			Total Porosity	Field Capacity	Wilting Point	Saturated Hydraulic Conductivity
HELP	USDA	USCS	vol/vol	vol/vol	vol/vol	cm/sec
1	CoS	SP	0.417	0.045	0.018	1.0×10^{-2}
2	S	SW	0.437	0.062	0.024	5.8×10^{-3}
3	FS	SW	0.457	0.083	0.033	3.1×10^{-3}
4	LS	SM	0.437	0.105	0.047	1.7×10^{-3}
5	LFS	SM	0.457	0.131	0.058	1.0×10^{-3}
6	SL	SM	0.453	0.190	0.085	7.2×10^{-4}
7	FSL	SM	0.473	0.222	0.104	5.2×10^{-4}
8	L	ML	0.463	0.232	0.116	3.7×10^{-4}
9	SiL	ML	0.501	0.284	0.135	1.9×10^{-4}
10	SCL	SC	0.398	0.244	0.136	1.2×10^{-4}
11	CL	CL	0.464	0.310	0.187	6.4×10^{-5}
12	SiCL	CL	0.471	0.342	0.210	4.2×10^{-5}
13	SC	SC	0.430	0.321	0.221	3.3×10^{-5}
14	SiC	CH	0.479	0.371	0.251	2.5×10^{-5}
15	C	CH	0.475	0.378	0.265	1.7×10^{-5}
16	Barrier Soil		0.427	0.418	0.367	1.0×10^{-7}
17	Bentonite Mat (0.6 cm)		0.750	0.747	0.400	3.0×10^{-9}
18	Municipal Waste (900 lb/yd³ or 312 kg/m³)		0.671	0.292	0.077	1.0×10^{-3}
19	Municipal Waste (channeling and dead zones)		0.168	0.073	0.019	1.0×10^{-3}
20	Drainage Net (0.5 cm)		0.850	0.010	0.005	$1.0 \times 10^{+1}$
21	Gravel		0.397	0.032	0.013	3.0×10^{-1}
22	L*	ML	0.419	0.307	0.180	1.9×10^{-5}
23	SiL*	ML	0.461	0.360	0.203	9.0×10^{-6}
24	SCL*	SC	0.365	0.305	0.202	2.7×10^{-6}
25	CL*	CL	0.437	0.373	0.266	3.6×10^{-6}
26	SiCL*	CL	0.445	0.393	0.277	1.9×10^{-6}
27	SC*	SC	0.400	0.366	0.288	7.8×10^{-7}
28	SiC*	CH	0.452	0.411	0.311	1.2×10^{-6}
29	C*	CH	0.451	0.419	0.332	6.8×10^{-7}
30	Coal-Burning Electric Plant Fly Ash*		0.541	0.187	0.047	5.0×10^{-5}
31	Coal-Burning Electric Plant Bottom Ash*		0.578	0.076	0.025	4.1×10^{-3}
32	Municipal Incinerator Fly Ash*		0.450	0.116	0.049	1.0×10^{-2}
33	Fine Copper Slag*		0.375	0.055	0.020	4.1×10^{-2}
34	Drainage Net (0.6 cm)		0.850	0.010	0.005	$3.3 \times 10^{+1}$

* Moderately Compacted

(Continued)

TABLE 4 (continued). DEFAULT SOIL, WASTE, AND GEOSYNTHETIC CHARACTERISTICS

Classification		Total Porosity	Field Capacity	Wilting Point	Saturated Hydraulic Conductivity
HELP	Geomembrane Material	vol/vol	vol/vol	vol/vol	cm/sec
35	High Density Polyethylene (HDPE)				2.0×10^{-13}
36	Low Density Polyethylene (LDPE)				4.0×10^{-13}
37	Polyvinyl Chloride (PVC)				2.0×10^{-11}
38	Butyl Rubber				1.0×10^{-12}
39	Chlorinated Polyethylene (CPE)				4.0×10^{-12}
40	Hypalon or Chlorosulfonated Polyethylene (CSPE)				3.0×10^{-12}
41	Ethylene-Propylene Diene Monomer (EPDM)				2.0×10^{-12}
42	Neoprene				3.0×10^{-12}

(concluded)

user-defined soil option accepts non-default soil characteristics for layers assigned soil type numbers greater than 42. This is especially convenient for specifying characteristics of waste layers. User-specified soil characteristics can be assigned any soil type number greater than 42.

When a default soil type is used to describe the top soil layer, the program adjusts the saturated hydraulic conductivities of the soils in the top half of the evaporative zone for the effects of root channels. The saturated hydraulic conductivity value is multiplied by an empirical factor that is computed as a function of the user-specified maximum leaf area index. Example values of this factor are 1.0 for a maximum LAI of 0 (bare ground), 1.8 for a maximum LAI of 1 (poor stand of grass), 3.0 for a maximum LAI of 2 (fair stand of grass), 4.2 for a maximum LAI of 3.3 (good stand of grass) and 5.0 for a maximum LAI of 5 (excellent stand of grass).

The manual option requires values for porosity, field capacity, wilting point, and saturated hydraulic conductivity. These and related soil properties are defined below.

Soil Water Storage (Volumetric Content): the ratio of the volume of water in a soil to the total volume occupied by the soil, water and voids.

Total Porosity: the soil water storage/volumetric content at saturation (fraction of total volume).

2. A curve number defined by the user and modified according to the surface slope and slope length of the landfill

3. A curve number is computed by the HELP model based on landfill surface slope, slope length, soil texture of the top layer, and the vegetative cover. Some general guidance for selection of runoff curve numbers is provided in Figure 2 (USDA, Soil Conservation Service, 1985).

Two of the options account for surface slope. The correlation between surface slope conditions and curve number were developed for slopes ranging from 1 percent to as high as 50 percent and for slope lengths ranging from 50 feet to 2000 feet.

3.8 OVERVIEW OF MODELING PROCEDURE

The hydrologic processes modeled by the program can be divided into two categories: surface processes and subsurface processes. The surface processes modeled are snowmelt, interception of rainfall by vegetation, surface runoff, and surface evaporation. The subsurface processes modeled are evaporation from soil profile, plant transpiration, unsaturated vertical drainage, barrier soil liner percolation, geomembrane leakage and saturated lateral drainage.

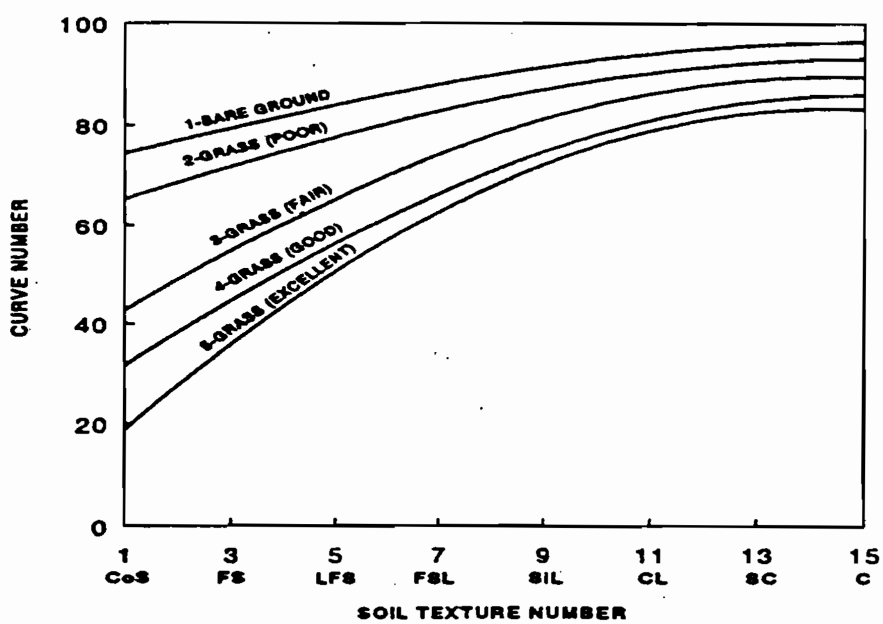


Figure 2. Relation between SCS Curve Number and Default Soil Texture Number for Various Levels of Vegetation

Daily infiltration into the landfill is determined indirectly from a surface water balance. Infiltration is assumed to equal the sum of rainfall, surface storage and snowmelt, minus the sum of runoff, additional storage in snowpack and evaporation of surface water. No liquid water is assumed to be held in surface storage from one day to the next except in the snowpack or when the top soil is saturated and runoff is not permitted. Each day, the free available water for infiltration, runoff, or evaporation from water on the surface is determined from the surface storage, discharge from the snowpack, and rainfall. Snowfall is added to the surface snow storage, which is depleted by either evaporation or melting. Snowmelt is added to the free available water and is treated as rainfall except that it is not intercepted by vegetation. The free available water is used to compute the runoff by the SCS rainfall-runoff relationship. The interception is the measure of water available to evaporate from the surface. Interception in excess of the potential evaporation is added to infiltration. Surface evaporation is then computed. Potential evaporation from the surface is first applied to the interception; any excess is applied to the snowmelt, then to the snowpack and finally to the groundmelt. Potential evaporation in excess of the evaporation from the surface is applied to the soil column and plant transpiration. The snowmelt and rainfall that does not run off or evaporate is assumed to infiltrate into the landfill along with any groundmelt that does not evaporate.

The first subsurface processes considered are soil evaporation and plant transpiration from the evaporative zone of the upper subprofile. A vegetative growth model accounts for the daily growth and decay of the surface vegetation. The other subsurface processes are modeled one subprofile at a time, from top to bottom, using a design-dependent time step ranging from 30 minutes to 6 hours. A storage-routing procedure is used to redistribute the soil water among the modeling segments that comprise the subprofile. This procedure accounts for infiltration or percolation into the subprofile and evapotranspiration from the evaporative zone. Then, if the subprofile contains a liner, the program computes the head on the liner. The head on the liner is then used to compute the leakage/percolation through the liner and, if lateral drainage is permitted above the top of the liner, the lateral drainage to the collection and removal system.

3.9 ASSUMPTIONS AND LIMITATIONS

3.9.1 Solution Methods

The modeling procedures documented in the previous section are necessarily based on many simplifying assumptions. Generally, these assumptions are reasonable and consistent with the objectives of the program when applied to standard landfill designs. However, some of these assumptions may not be reasonable for unusual designs. The major assumptions and limitations of the program are summarized below.

Runoff is computed using the SCS method based on daily amounts of rainfall and

WELL ID	GROUND	TOP CASING	TOP PVC
PZ-1	1682.36	1682.52	1681.81
PZ-2	1682.32	1682.51	1682.22
PZ-3	1673.05	1675.69	1675.62
MW-1S	1669.70	1672.19	1672.11
MW-1D	1669.60	1672.33	1672.18
MW-2S	1681.90	1684.63	1684.63
MW-2D	1682.00	1684.28	1684.29
MW-3S	1646.10	1648.84	1648.90
MW-3D	1646.10	1648.75	1648.80
MW-4	1643.80	1647.04	1647.01
MW-6S	1653.33	1655.73	1655.69
MW-6D	1655.24	1657.66	1657.63
MW-7S	1632.12	1634.66	1634.60
MW-7D	1632.43	1634.60	1634.60
MW-8S	1668.66	1671.32	1671.26
MW-8D	1668.85	1670.97	1671.02
MW-9S	1642.67	1645.10	1645.07
MW-9D	1641.96	1644.36	1644.32

WELL ELEVATION TABLE (In feet)

LEGEND

- MW — MONITORING WELL
- PZ — PIEZOMETER
- SW — SURFACE WATER SAMPLE
- SD — SEDIMENT SAMPLE
- SU — SOIL SAMPLE
- TP — TEST PIT
- GP — GAS PROBE
- SB — SOIL BORING
- NG OR SG — STAFF GAUGE (NORTH GAUGE OR SOUTH GAUGE)
- BENCHMARK

NOTES

1. VERTICAL DATUM: FROM WELL ELEVATIONS SHOWN ON ORIGINAL TOPOGRAPHIC MAP PROVIDED BY NYSDEC.
2. DATE OF SURVEY: APRIL 16, 1998

1" = 50'

50 0 100

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: B. MURTAGH
DRAWN BY: J. ZEGERS
SHEET CHK'D BY:
CROSS CHK'D BY:
APPROVED BY:
DATE: MAY 1998

CDM Camp Dresser & McKee
consulting engineering construction operations

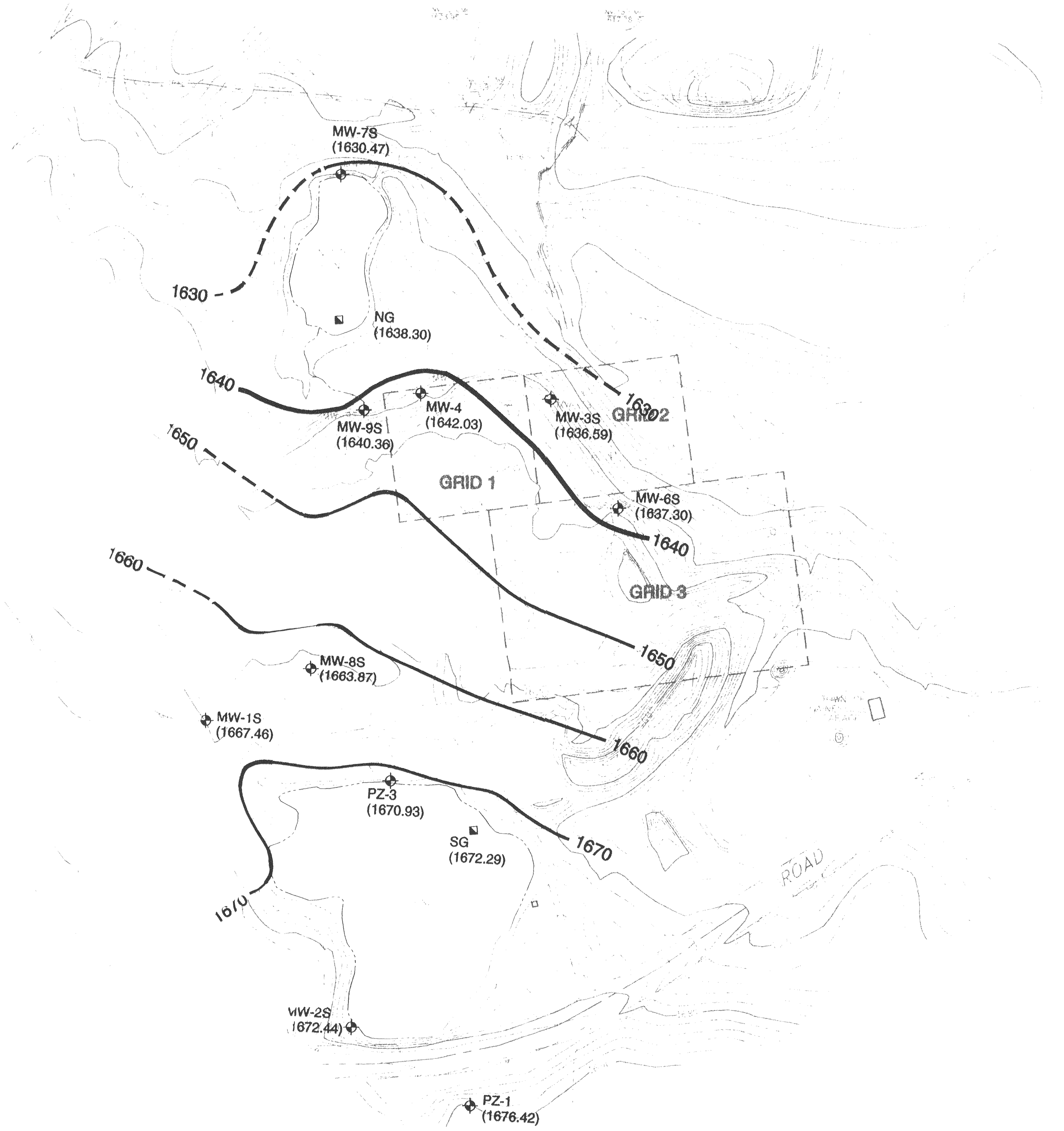
ETE SANITATION AND LANDFILL
WYOMING COUNTY, NEW YORK

REMEDIAL INVESTIGATION

SITE PLAN

PROJECT NO. 0897-22149
FILE NAME: SITEPLAN

PLATE NO.
1



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WELL ID	GROUND	TOP CASING	TOP PVC
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MW-1D	1669.60	1672.33	1672.18
MW-2S	1681.90	1684.63	1684.63
MW-2D	1682.00	1684.28	1684.29
MW-3S	1646.10	1648.84	1648.90
MW-3D	1646.10	1648.75	1648.80
MW-4	1643.80	1647.04	1647.01
MW-6S	1653.33	1655.73	1655.69
MW-6D	1655.24	1657.66	1657.63
MW-7S	1632.12	1634.66	1634.60
MW-7D	1632.43	1634.60	1634.60
MW-8S	1668.66	1671.32	1671.26
MW-8D	1668.85	1670.97	1671.02
MW-9S	1642.67	1645.10	1645.07
MW-9D	1641.96	1644.36	1644.32

LEGEND

MW-1S — MONITORING WELL

PZ-1 — PIEZOMETER

WATER TABLE ELEVATION CONTOUR, (IN FEET)

NG OR SG — STAFF GAUGE (NORTH GAUGE OR SOUTH GAUGE)

NOTES

VERTICAL DATUM: FROM WELL ELEVATIONS SHOWN ON ORIGINAL TOPOGRAPHIC MAP PROVIDED BY NYSDEC.

DATE OF SURVEY: APRIL 16, 1998

DESIGNED BY:	B. MURTAGH
DRAWN BY:	J. ZEGERS
SHEET CHK'D BY:	
CROSS CHK'D BY:	
APPROVED BY:	
DATE:	MAY 1998

REV. NO.	DATE	DRWN	CHKD	REMARKS

CDM Camp Dresser & McKee

consulting engineering construction operations

ETE SANITATION AND LANDFILL
WYOMING COUNTY, NEW YORK

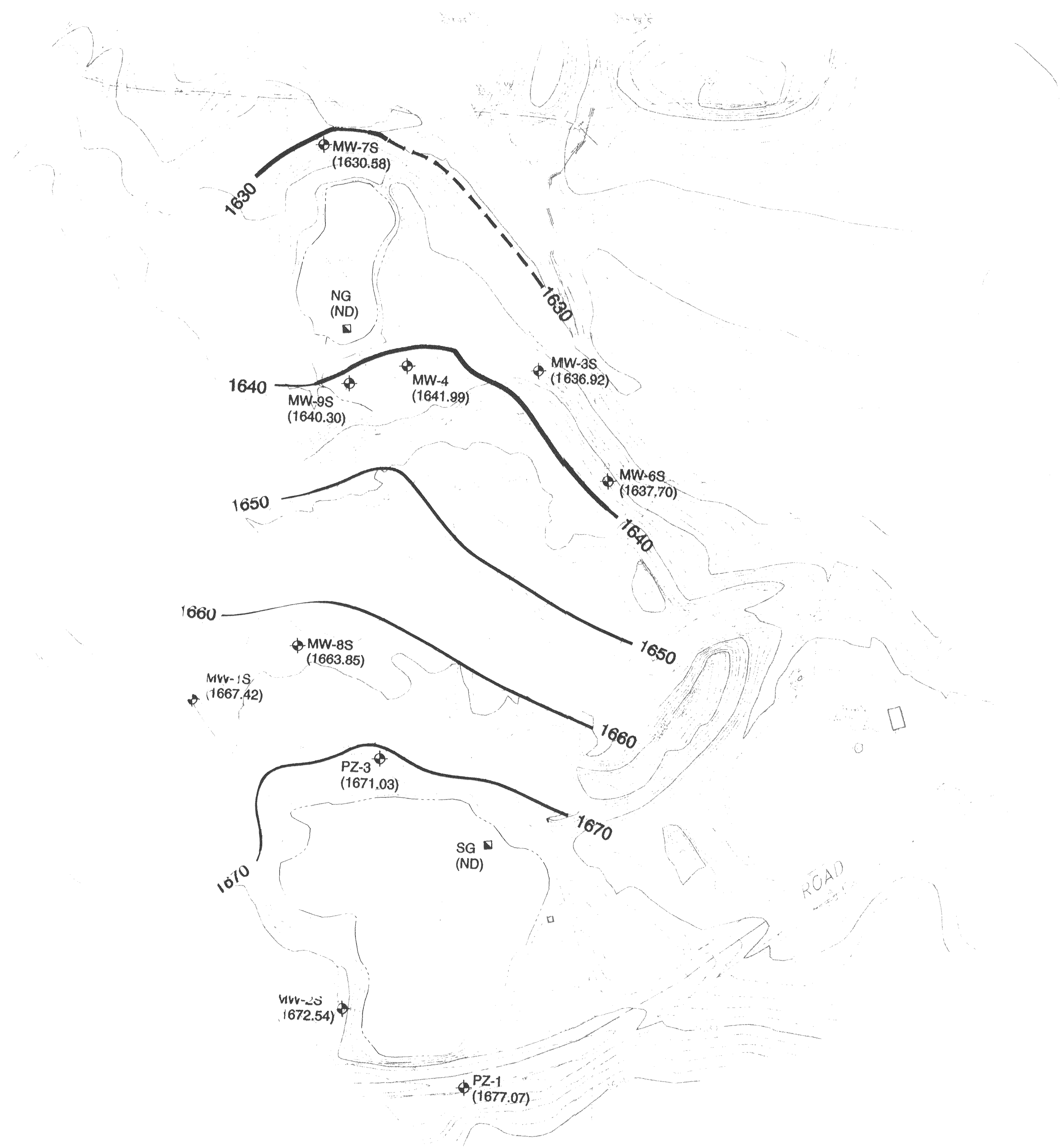
REMEDIAL INVESTIGATION

WATER TABLE ELEVATION

(MAY 7, 1998 SYNOPTIC LEVELS)

PROJECT NO. 0897-22149
FILE NAME: WTREL598

PLATE NO.
IV



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MW-7D	1632.43	1634.60	1634.60
MW-8S	1668.66	1671.32	1671.26
MW-8D	1668.85	1670.97	1671.02
MW-9S	1642.67	1645.10	1645.07
MW-9D	1641.96	1644.36	1644.32

LEGEND

MW-1S — MONITORING WELL
PZ-1 — PIEZOMETER
—— WATER TABLE ELEVATION CONTOUR (IN FEET)
NG OR SG — STAFF GAUGE (NORTH GAUGE OR SOUTH GAUGE)
ND — NO DATA

NOTES

VERTICAL DATUM FROM WELL ELEVATIONS SHOWN ON ORIGINAL TOPOGRAPHIC MAP PROVIDED BY NYSDEC.

DATE OF SURVEY: APRIL 16, 1998

50 0 100

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: B. MURTAGH
DRAWN BY: J. ZEGERS
SHEET CHK'D BY:
CROSS CHK'D BY:
APPROVED BY:
DATE: MAY 1998

CDM Camp Dresser & McKee
consulting engineering construction operations

ETE SANITATION AND LANDFILL
WYOMING COUNTY, NEW YORK

REMEDIAL INVESTIGATION

WATER TABLE ELEVATION
(APRIL 30, 1998 SYNOPTIC LEVELS)

PROJECT NO. 0897-22149
FILE NAME: WTREL498

PLATE NO.
III

SURFACE WATER SAMPLE
SEDIMENT SAMPLE
SOIL SAMPLE
TEST PIT
GAS PROBE
SOIL BORING
STAFF GAUGE (NORTH GAUGE OR SOUTH GAUGE)

SURFACE SOIL SAMPLE IDENTIFICATION
SAMPLE DATE
MATRIX
UNIT OF MEASUREMENT
MEASURED CONCENTRATION & LAB QUALIFIER

TEST PIT LOCATION AND INTERVAL SAMPLED (ft.)
SAMPLE DATE
MATRIX
UNIT OF MEASUREMENT
MEASURED CONCENTRATION & LAB QUALIFIER

ORIGINAL TOPOGRAPHIC MAP PROVIDED BY NYSDEC.

DATE OF SURVEY: APRIL 16, 1998.

PARAMETER NOTED IF IT EXCEEDS NYSDEC SCREENING CRITERIA FOR SOIL.
SOURCE: NYSDEC TAGM 4046, "DETERMINATION OF SOIL CLEANUP OBJECTIVES AND CLEANUP LEVELS," JANUARY 24, 1994

50 0 100

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: B. MURTAGH
DRAWN BY: R. GENCORELLI
SHEET CHK'D BY:
CROSS CHK'D BY:
APPROVED BY:
DATE: MAY 1998

CDM Camp Dresser & McKee
consulting engineering construction operations

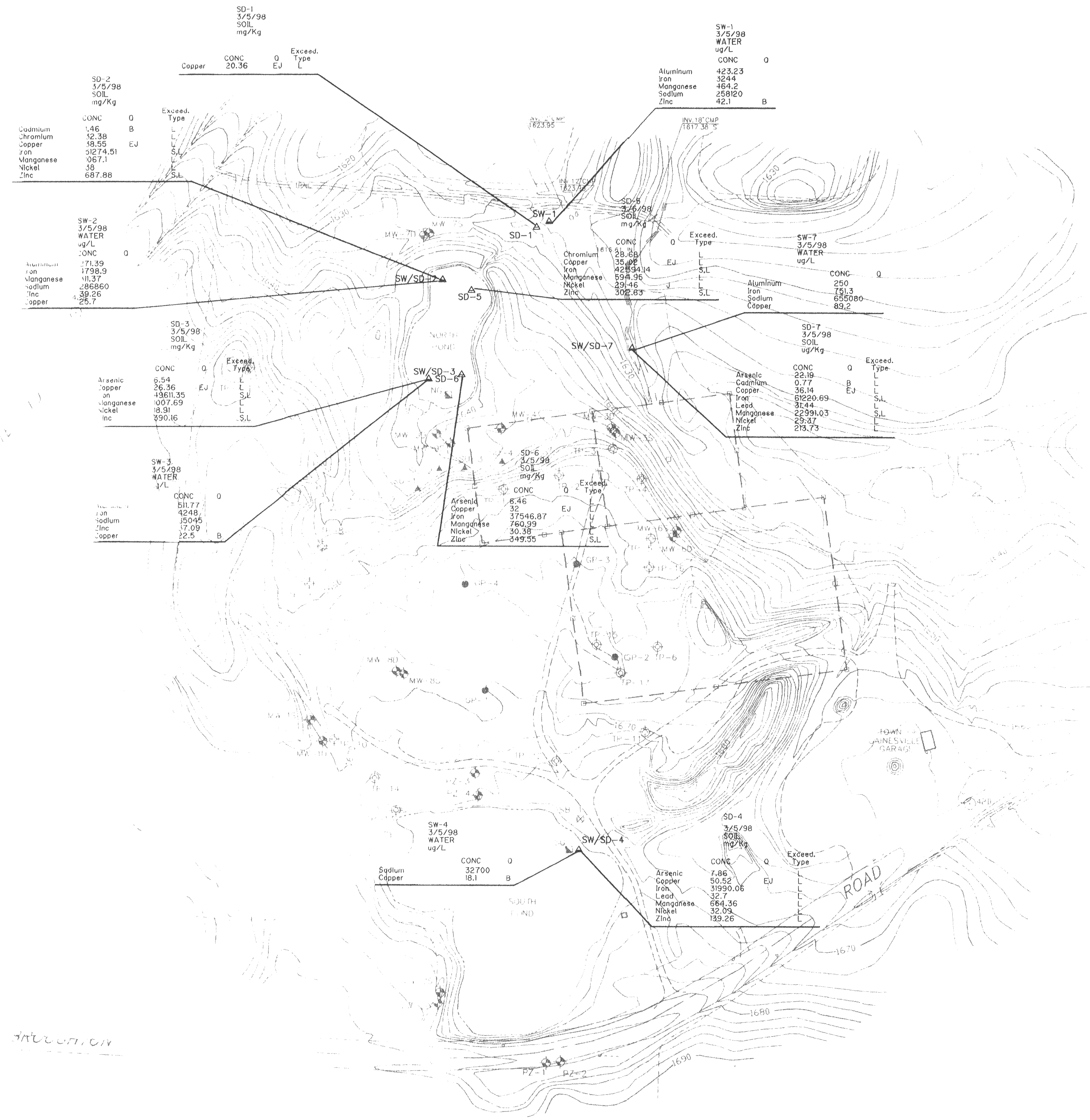
ETE SANITATION AND LANDFILL
WYOMING COUNTY, NEW YORK

REMEDIAL INVESTIGATION

SCG EXCEEDANCES IN SOIL: SURFACE SOIL AND SUBSURFACE SOIL

PROJECT NO. 0897-22149
FILE NAME: SCGSOIL

SHEET NO.
VII



LEGEND

- MONITORING WELL
- PIEZOMETER
- SURFACE WATER SAMPLE
- SEDIMENT SAMPLE
- SOIL SAMPLE
- TEST PIT
- GAS PROBE
- SOIL BORING
- STAFF GAUGE (NORTH GAUGE OR SOUTH GAUGE)

SEDIMENT OR SURFACE WATER SAMPLE IDENTIFICATION
SAMPLE DATE
MATRIX
UNIT OF MEASUREMENT
MEASURED CONCENTRATION & LAB QUALIFIER

EXCEEDANCES TYPE FOR SEDIMENT SAMPLES
L EXCEEDS THE LOWEST EFFECT LEVEL
S EXCEEDS THE SEVERE EFFECT LEVEL

NOTES:
1. VERTICAL DATUM ... ORIGINAL TOPOGRAPHIC MAP PROVIDED BY NYSDEC.
2. DATE OF SURVEY: APRIL 16, 1998.
3. SEDIMENT PARAMETER NOTED IF IT WAS FOUND IN EXCESS OF GUIDANCE VALUES PROVIDED IN NYSDEC's "TECHNICAL GUIDANCE FOR SCREENING CONTAMINATED SEDIMENT" NOVEMBER 22, 1993.
4. SURFACE WATER PARAMETER NOTED IF IT WAS FOUND IN EXCESS OF SCREENING CRITERIA DERIVED FROM NYSDEC'S "AMBIENT WATER QUALITY STANDARDS AND GUIDANCE VALUES", 10/93.
5. ALL SAMPLE DATA HAS UNDERGONE THIRD PARTY VALIDATION.

50 0 100

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: B. MURTAGH
DRAWN BY: R. GENCORELLI
SHEET CHK'D BY:
CROSS CHK'D BY:
APPROVED BY:
DATE: MAY 1998

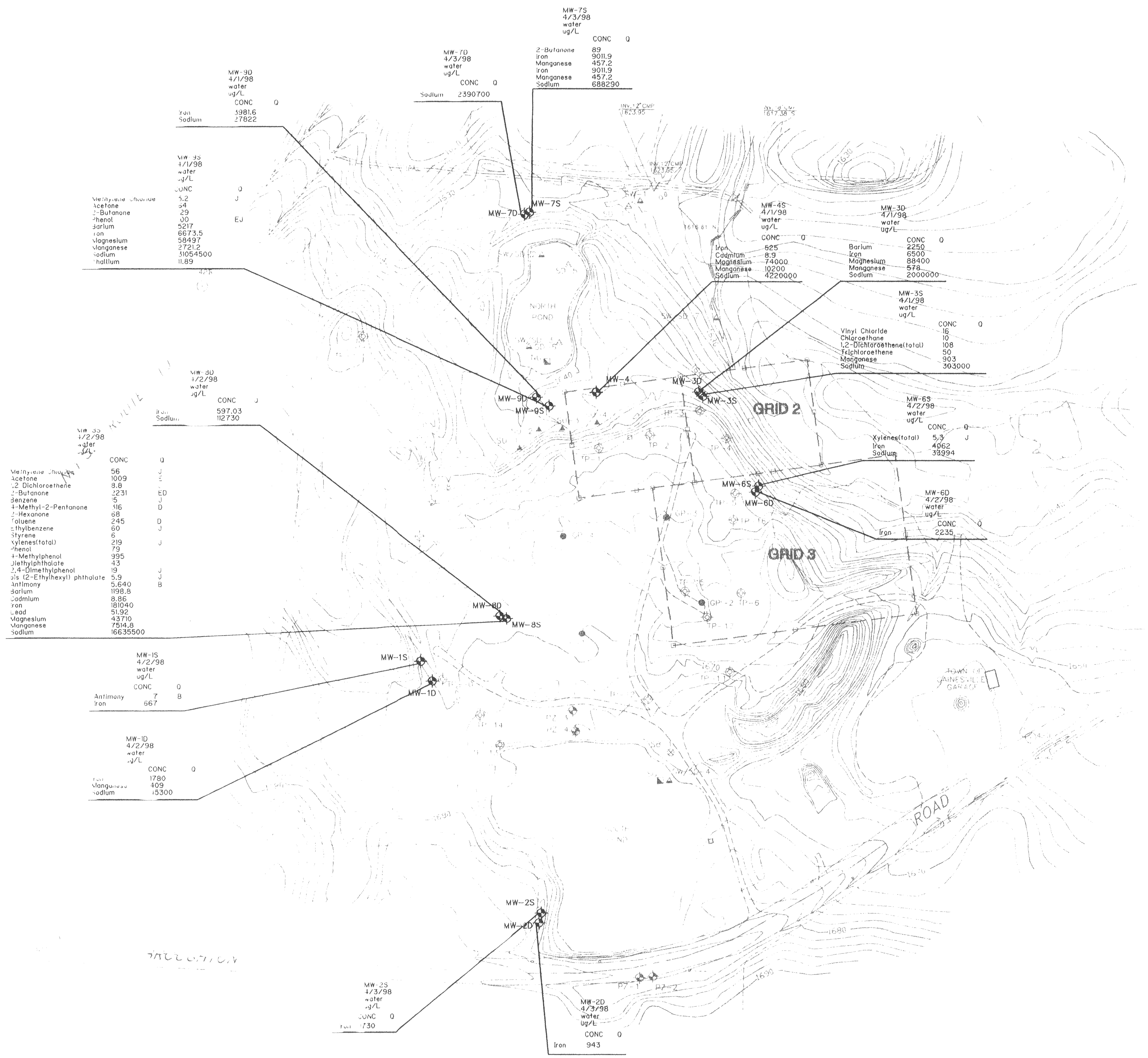
CDM Camp Dresser & McKee
consulting engineering construction operations

ETE SANITATION AND LANDFILL
WYOMING COUNTY, NEW YORK

REMEDIAL INVESTIGATION

SCG EXCEEDANCES IN SURFACE WATER AND SEDIMENT SAMPLES

PROJECT NO. 0897-22149
FILE NAME: SCGSED
PLATE NO.
V



WELL ELEVATION TABLE (in feet)

WELL ID	GROUND	TOP CASING	TOP PVC
PZ-1	1682.36	1682.52	1681.81
PZ-2	1682.32	1682.51	1682.22
PZ-3	1673.05	1675.69	1675.62
MW-1S	1669.70	1672.19	1672.11
MW-1D	1669.60	1672.33	1672.18
MW-2S	1681.90	1684.63	1684.63
MW-2D	1682.00	1684.28	1684.29
MW-3S	1646.10	1648.84	1648.90
MW-3D	1646.10	1648.75	1648.80
MW-4	1643.80	1647.04	1647.01
MW-6S	1653.33	1655.73	1655.69
MW-6D	1655.24	1657.66	1657.63
MW-7S	1632.12	1634.66	1634.60
MW-7D	1632.43	1634.60	1634.60
MW-8S	1668.66	1671.32	1671.26
MW-8D	1668.85	1670.97	1671.02
MW-9S	1642.67	1645.10	1645.07
MW-9D	1641.96	1644.36	1644.32

LEGEND

- MONITORING WELL
- PIEZOMETER
- SURFACE WATER SAMPLE
- SEDIMENT SAMPLE
- SOIL SAMPLE
- TEST PIT
- GAS PROBE
- SOIL BORING
- STAFF GAUGE (NORTH GAUGE OR SOUTH GAUGE)

MW-3D — MONITORING WELL IDENTIFICATION
4/2/98 — SAMPLE DATE
water — MATRIX
ug/L — UNIT OF MEASUREMENT
CONC Q — MEASURED CONCENTRATION & LAB QUALIFIER

NOTES:
VERTICAL ... ORIGINAL TOPOGRAPHIC MAP PROVIDED BY NYSDEC.
DATE OF SURVEY: APRIL 16, 1998.
PARAMETER NOTED IF IT EXCEEDS NYSDEC SCREENING CRITERIA FOR GA TYPE WATERS.
SOURCE: AMBIENT WATER QUALITY STANDARDS AND GUIDANCE VALUES, NYSDEC OCTOBER 1993.
ALL SAMPLE DATA HAS UNDERGONE THIRD PARTY VALIDATION.

50 0 100

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: B. MURTAGH
DRAWN BY: R. GENCORELLI
SHEET CHK'D BY:
CROSS CHK'D BY:
APPROVED BY:
DATE: MAY 1998

CDM Camp Dresser & McKee
consulting engineering construction operations

ETE SANITATION AND LANDFILL
WYOMING COUNTY, NEW YORK

REMEDIAL INVESTIGATION

SCG EXCEEDANCES IN GROUNDWATER

PROJECT NO. 0897-22149
FILE NAME: SCGGW

PLATE NO.
VI

WELL ELEVATION TABLE (In feet)

WELL ID	GROUND	TOP CASING	TOP PVC
PZ-1	1682.36	1682.52	1681.81
PZ-2	1682.32	1682.51	1682.22
PZ-3	1673.05	1675.69	1675.62
MW-1S	1669.70	1672.19	1672.11
MW-1D	1669.60	1672.33	1672.18
MW-2S	1681.90	1684.63	1684.63
MW-2D	1682.00	1684.28	1684.29
MW-3S	1646.10	1648.84	1648.90
MW-3D	1646.10	1648.75	1648.80
MW-4	1643.80	1647.04	1647.01
MW-6S	1653.33	1655.73	1655.69
MW-6D	1655.24	1657.66	1657.63
MW-7S	1632.12	1634.66	1634.60
MW-7D	1632.43	1634.60	1634.60
MW-8S	1668.66	1671.32	1671.26
MW-8D	1668.85	1670.97	1671.02
MW-9S	1642.67	1645.10	1645.07
MW-9D	1641.96	1644.36	1644.32

LEGEND

- MONITORING WELL
- PIEZOMETER
- SURFACE WATER SAMPLE
- SEDIMENT SAMPLE
- SOIL SAMPLE
- TEST PIT
- GAS PROBE
- SOIL BORING
- STAFF GAUGE (NORTH GAUGE OR SOUTH GAUGE)

NOTES

VERTICAL DATUM: FROM WELL ELEVATIONS SHOWN ON ORIGINAL TOPOGRAPHIC MAP PROVIDED BY NYSDEC.

DATE OF SURVEY: APRIL 16, 1998

50 0 100

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: B. MURTAGH
DRAWN BY: J. ZEGERS
SHEET CHK'D BY:
CROSS CHK'D BY:
APPROVED BY:
DATE: MAY 1998

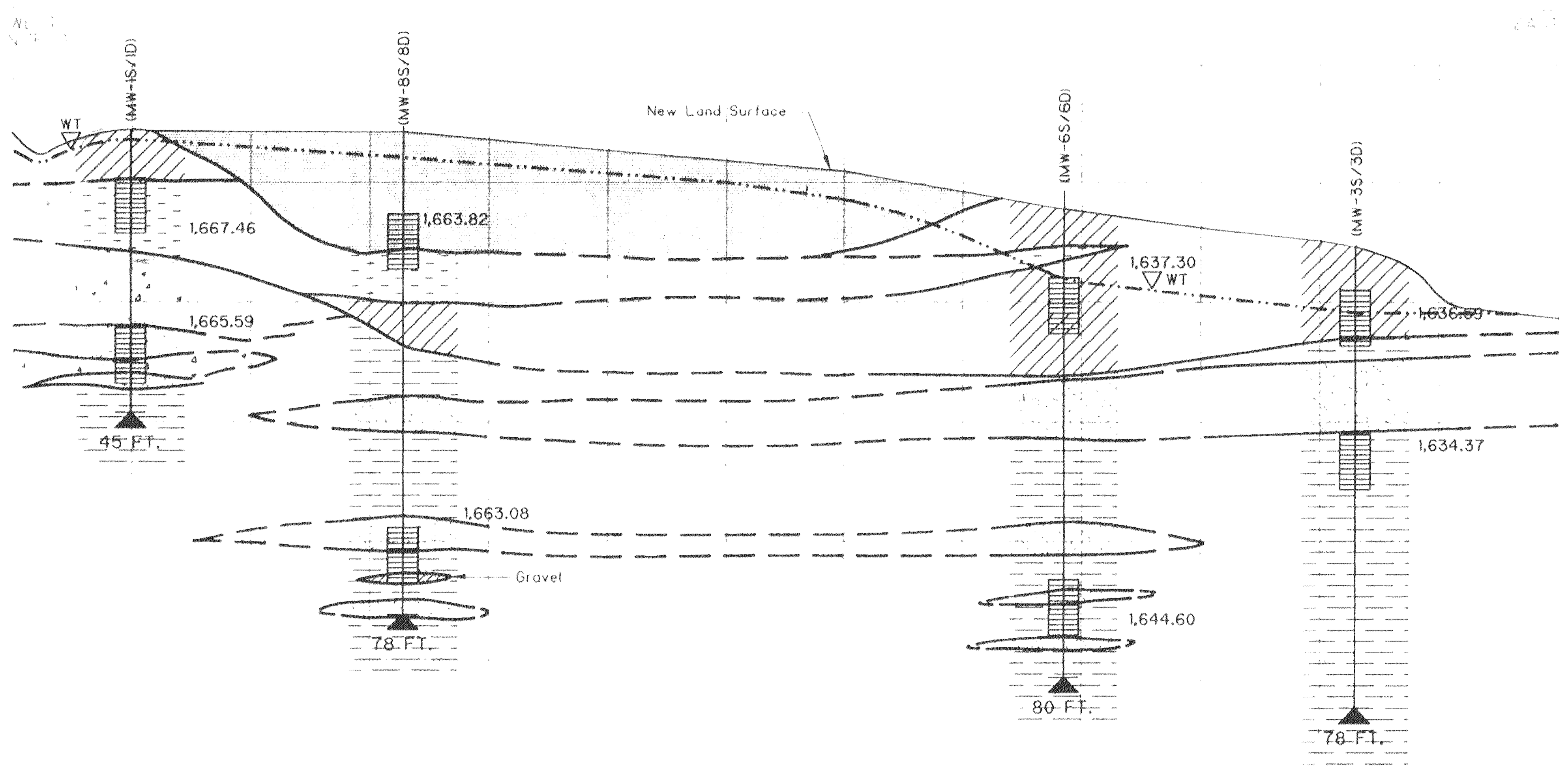
CDM Camp Dresser & McKee
consulting engineering construction operations

ETE SANITATION AND LANDFILL
WYOMING COUNTY, NEW YORK

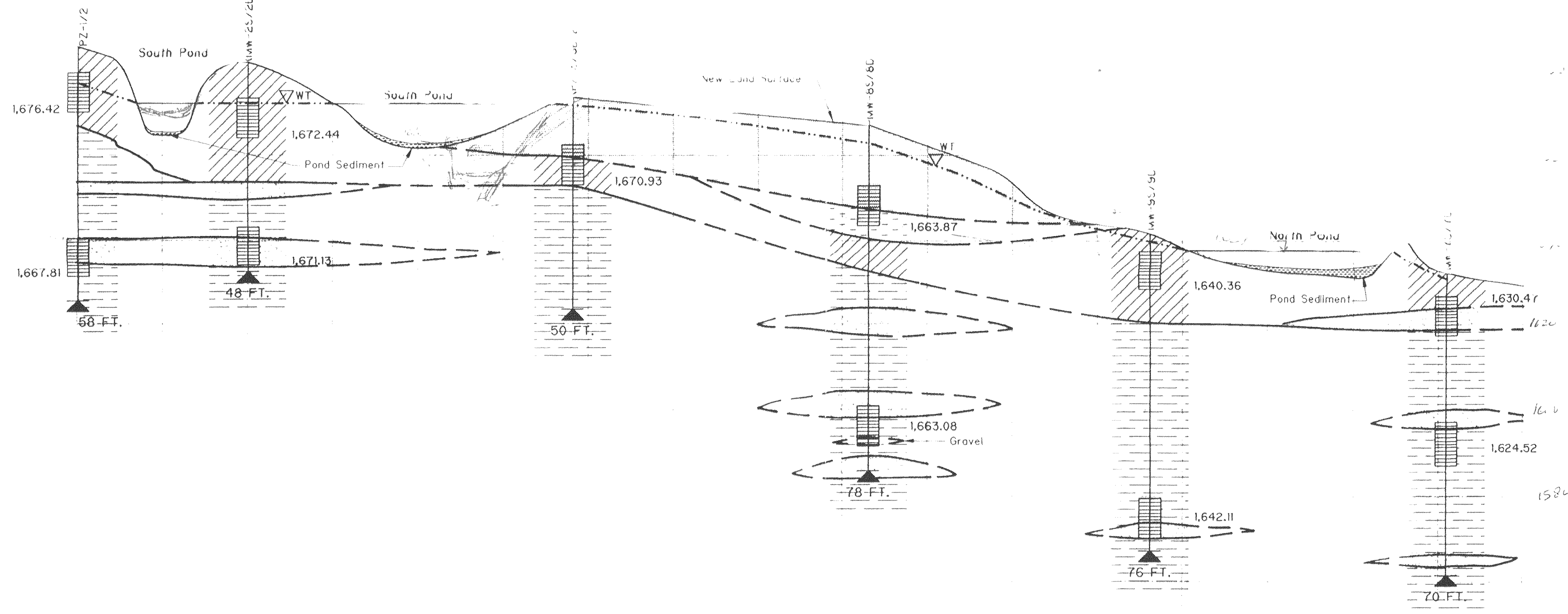
REMEDIAL INVESTIGATION

SITE PLAN

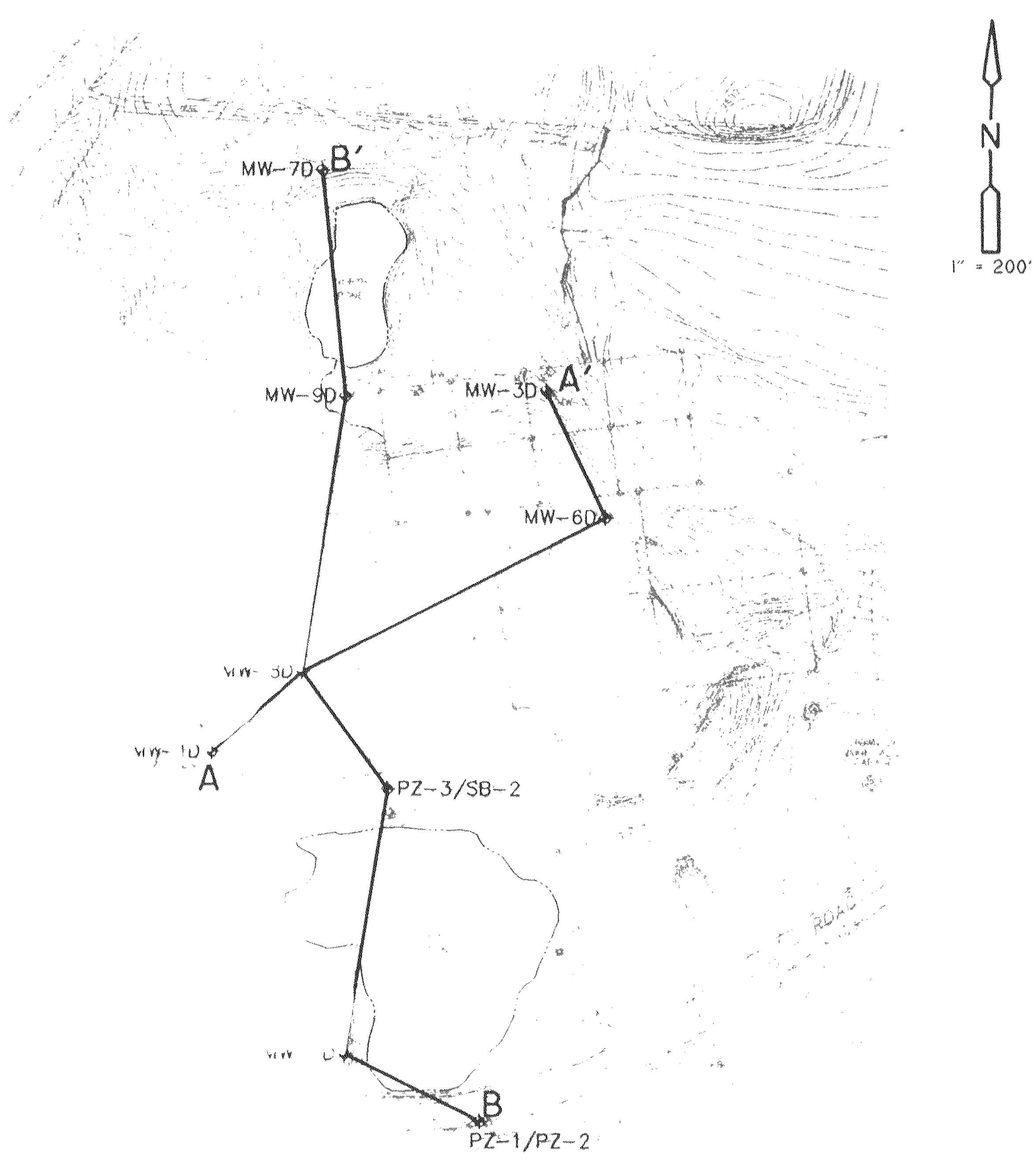
PROJECT NO. 0897-22149
FILE NAME: SITEPLAN
SHEET NO.



West To East Geologic Cross Section 1: A-A'



North To South Geologic Cross Section 2: B-B'



Cross Section Location Key Map

Stratigraphic Units

1 – Alternating Layers Of Brown Silt, Little Sand And Gravel With Brown Medium-Fine Sand With Silt And Gravel, Loose, Poorly Sorted

2 – Gray Silt And Fine Sand, Little Clay, Little Pebbles, Medium To No Plasticity, Poorly Sorted

3 – ... And Silt, Occasionally Containing Pebbles And Cobbles, Low Plasticity To Loose, Poorly Sorted

4 – Gray-Tan/Brown Fine Sand And Silt, With Orange Mottling, Loose, Poor To Well Sorted

5 – Greenish Gray Medium To Coarse Sands, ... Fragments, Pebbles, Cobbles, Boulders, Loose, Poorly Sorted

MSW – Municipal Solid Waste

1,646.20 Hydraulic Head Measurements Taken On May 7, 1998

78 FT. Termination Depth Of Boring

Inferred Contact (Contacts Gradational)

WT Water Table

SCALE:
Horizontal 1-Inch = 100 Feet
Vertical 1-Inch = 20 feet

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: B. MURTAGH
DRAWN BY: C. KALNY
SHEET CHK'D BY:
CROSS CHK'D BY:
APPROVED BY:
DATE: SEPTEMBER 1998

CDM Camp Dresser & McKee
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ETE SANITATION AND LANDFILL
WYOMING COUNTY, NEW YORK

REMEDIAL INVESTIGATION

WEST-EAST AND NORTH-SOUTH GEOLOGIC CROSS SECTIONS

PROJECT NO.:
FILE NAME: XSECT1

PLATE NO.
II