Report

Kingsbury-Fort Edward Sites Engineering Report

General Electric Company
Schenectady, New York

April 1982

O'BRIEN & GERE

KINGSBURY - FORT EDWARD SITES

ENGINEERING REPORT

GENERAL ELECTRIC COMPANY
SCHENECTADY, NEW YORK

APRIL, 1982

O'BRIEN & GERE ENGINEERS, INC.
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SYRACUSE, NEW YORK

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From: KEVIN J. WALTER

To:

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to Jim Eckl

re Kingsbury Ft Edward report; comment letter

KJW

yellow

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

Robert F. Flacke
Commissioner

Mr. Leo Collins
General Electric Company
One Nott Street
Schenectady, New York 12345

Subject: Kingsbury/Fort Edward Landfills
Closure Plans

Dear Mr. Collins:

As a result of our recent discussions I wish to clarify the Department's position with respect to several of the issues raised in my letter to you on May 28, 1982.

1. DEC requirements for closure of sanitary landfill

This Department's minimal requirements for closure of a sanitary landfill are presented in 6 NYCRR Part 360. In approving a proposed closure program for a sanitary landfill each specific site is evaluated to determine if the minimum requirements will be sufficient to protect the public and the environment. Furthermore, if a sanitary landfill were closed in accordance with the minimum requirements of Part 360 and then later found to pose a continuing hazard to human health or the environment, additional remedial measures would be required.

The closure program proposed by General Electric exceeds the minimum requirements of Part 360, i.e., the proposed program exceeds what would "normally" be required for closure of a sanitary landfill if no special public health or environmental quality concerns were known at the time of closure. Specifically General Electric's proposal to install vertical cutoff walls around the landfills would not normally be required. Proof rolling of the surface of the landfill has not normally been required. The proposed final cover is 18 inches thicker than would be normally required by the Department.

In accordance with NYCRR Part 360, this Department would normally consider the following acceptable for the closure of the Kingsbury and Fort Edward sites as sanitary landfills.

i - A final cover must be placed over the landfills. The cover must be at least twenty-four (24) inches in thickness, the upper six (6) inches of which shall be a soil of a composition suitable to sustain plant growth. The cover material shall be compacted and have a maximum coefficient of permeability of 1 x 10^{-5} cm/sec in order to reduce infiltration. The cover shall be graded to drain freely with a minimum slope of two (2) percent.

ii - A gas vent system must be installed beneath the final cover to control the methane gas generated within the landfill.

iii - A vegetative cover crop must be established on the final cover and maintained to prevent erosion.

iv - Because of known environmental concerns at these sites, a groundwater monitoring program would be required. As a minimum, the monitoring program would include the installation of three monitoring wells at each site; one up gradient and two down gradient of each site.

v - The sites must be maintained. Periodic inspections of the cover must be made and areas requiring reseeding and regrading properly attended to.

vi - Access to the closed sites must be controlled. Gates across existing access routes may prove to be sufficient.

Since the Kingsbury and Fort Edward landfills will not be closed as "normal" sanitary landfills, we will never know if the minimum requirements for closure specified in Part 360 would be sufficient to protect human health and the environment. However, for the purposes of preparing cost estimates for closure of the Kingsbury and Fort Edward landfills we believe the minimum requirements of Part 360 should serve as the basis. If General Electric accepts these minimum requirements for closure of sanitary landfills as the basis for developing cost estimates for the closure of the Kingsbury and the Fort Edward landfills as if they were normal sanitary landfills, then this Department has no need for a more rigorous assessment documenting the need for the more stringent closure program proposed by General Electric. Please refer to comments 1 and 2 on page 3 of my May 28, 1982, letter to you.

2. Leachate collection and treatment

Leachate collection and treatment must be considered integral parts of the closure program for landfills containing hazardous wastes. It is our assessment that the installation of vertical cutoff walls and the application of a clay cap will not eliminate infiltration into the landfills as stated in General Electric's "Engineering Report", April 1982, page 69.

It is our assessment that precipitation will continue to infiltrate the landfills after closure, although at a reduced rate. Because the cutoff walls impede the discharge of this infiltration, it is likely that water levels will rise within the landfills, saturating more of the waste, until a new equilibrium is established in which the amount of infiltration through the cap is balanced by the amount of leachate leaving through the cutoff walls. (This assessment assumes that there is a continuous stratum of low permeability beneath the sites).

Leachate collection systems within the enclosed landfills can be used to remove leachate from the landfills as it is generated, thereby reducing or eliminating the potential for continuing discharge of leachate from the sites. Since the cost for leachate collection and treatment is likely to be a substantial portion of the total cost for closure of the Kingsbury and Fort Edward landfills, leachate collection and treatment must be included in the preparation of the cost estimates for the "Industrial Landfill Closure" alternative.

3. Exploratory borings within the landfills

The effectiveness of the closure program proposed by General Electric depends upon the presence of a continuous stratum beneath the sites of sufficiently low permeability and sufficient thickness to protect the underlying and adjacent groundwater systems from leachate contamination, i.e. a "floor". Nearly all existing information describing subsurface conditions at the Kingsbury and Fort Edward landfills comes from exploratory borings completed at the perimeter of the sites. The existing information indicates that the depth to any clay layer(s) is quite variable and the clay beds are often interbedded with more permeable sand and gravel. For these reasons it is not clear to what depth the vertical cutoff walls must be installed to tie into a "floor" beneath the sites.

Specifically we are concerned that the vertical cutoff wall will be keyed into a clay bed which is not continuous beneath the sites. Either due to erosion or man's activities, portions of the clay bed beneath the landfill may have been removed exposing the more permeable sand and gravel beds to the leachate within the landfill. The more permeable sand and gravel layers may provide a means for leachate to escape from the landfill under the cutoff walls.

We feel additional data describing subsurface conditions at the Kingsbury and Fort Edward landfills are needed to properly design the closure program. Such data can be obtained by additional exploratory borings within the landfills.

We recognize General Electric's concern for worker safety in doing such work. We note that the Kingsbury and Fort Edward landfills contain primarily municipal refuse, and believe appropriate safety precautions will allow the work to be performed with risks reduced to an acceptable level. Acceptance of the proposed closure scheme without the information that will be obtained from borings within the sites, however, presents unacceptable risks.

I believe the above clarifies the positions presented in my May 28, 1982, letter to you. If you have any further questions on these issues I would be glad to meet with you or discuss them on the phone.

Sincerely,

Eldred Rich
Assistant Commissioner
for Environmental Quality

bcc: Norman H. Nosenchuck (2)
Thomas Monroe, Region 5
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SECTION 1 - INTRODUCTION

1.01 Background

This report presents the results of work accomplished by O'Brien & Gere Engineers, Inc., for the General Electric Company in connection with the development of remedial programs for two refuse disposal facilities known as the Kingsbury Landfill and the Fort Edward Landfill.

The Kingsbury Landfill is presently an active refuse disposal facility operated by the Town of Kingsbury, NY and serves the Town of Kingsbury and the Village of Hudson Falls. The landfill is reported to have been used as a disposal facility since the early 1930's. The General Electric Company had estimated that a total weight of 1900 tons of Industrial waste materials were removed from their manufacturing facilities and disposed of at the Kingsbury Landfill.

The Fort Edward Landfill is presently an active refuse disposal facility operated by the Town of Fort Edward, NY and serves the Town of Fort Edward and the Village of Fort Edward. The landfill is reported to have been used as a disposal facility since 1969. The General Electric Company had estimated that a total weight of 850 tons of industrial waste materials were removed from their manufacturing facilities and disposed of at the Fort Edward Landfill.

In 1967, conditions at the Kingsbury Landfill resulted in citizen complaints concerning leachate pollution from the landfill which affected adjacent property. Between 1967 and 1972, the reputed property owner adjacent to the Kingsbury Landfill initiated legal action against the Town of Kingsbury. The Town of Kingsbury attempted to divert surface water runoff from the landfill area and leachate from entering the adjacent property by utilizing a system of drainage ditches.

In 1975, the New York State Department of Environmental Conservation (NYSDEC) was advised, during the General Electric Company - NYSDEC PCB hearings, that the Kingsbury and Fort Edward landfills had been used as a final disposal site for polychlorinated biphenyls (PCBs). During 1975, the NYSDEC and the New York State Department of Health (NYSDOH) completed laboratory analyses of surface water, leachate, and soil sediment samples from the Kingsbury Landfill and adjacent areas. These results are included in Appendix I.

Between 1977 and 1979, the NYSDEC retained the services of Weston Environmental Consultants and Wehran Engineering, P.C., to investigate the two landfills. In 1980, Dunn Geoscience Corporation was contracted by NYSDEC to evaluate the compliance of the Fort Edward Landfill with the criteria established in the Resource Conservation and Recovery Act (RCRA). The six parameters that were compared to the maximum contaminant levels as per 40 Code of Federal Regulations (CFR) Part 257, were Cadmium, Chromium, Lead, Selenium, Mercury and Nitrate. The conclusion of the Dunn Geoscience evaluation was that the Fort Edward Landfill did comply with RCRA Part 257 criteria, but that the downgradient wells showed elevated values for some parameters suggesting that leachate from the Fort Edward Landfill may be entering the groundwater system. The results of laboratory analyses of various media completed by these three investigations are included in Appendix I.

The waste materials disposed of at these landfills by the General Electric Company are reported to contain PCBs in the form of scrap capacitors. In accordance with the terms of the General Electric Company - NYSDEC Agreement dated September 24, 1980, it was mutually agreed that the General Electric Company would be responsible for the cost of any final remedial plan for 86.7 percent and 78.7 percent of the industrial waste disposed of at the Kingsbury Landfill and Fort Edward landfill, respectively.

1.02 General Site Description

The Kingsbury Landfill is located in the Town of Kingsbury, western Washington County, New York. Access to the landfill is from Burgoyne Avenue via Feedertow Road. The intersection of these roadways is in the Village of Hudson Falls, New York. The Feedertow Canal runs approximately parallel with the Feedertow Road and flows southeasterly to the old Champlain Canal.

The Fort Edward Landfill is located approximately 1200 feet southwest of the Kingsbury Landfill, across the Feedertow Canal. The Fort Edward Landfill is located in the Town of Fort Edward, New York, with access from Burgoyne Avenue at approximately the intersection of Burgoyne Avenue and Wilbur Street. The general location of the two landfills is shown on Figure 1, Location Map.

The reputed owner of the land on which the Kingsbury Landfill is located is Jeanne Murphy. The landfill is adjoined by property reputedly owned by Mario Sassone, James D. Sherman, Howard Burch and Robert Liebig, and the State of New York (Old Champlain Canal Lands).

The reputed owner of the land on which the Fort Edward Landfill is located is the Town of Fort Edward, with adjoining property reputedly owned by Margaret Dexter.

An aerial location plan, showing the approximate property boundaries in relation to the landfills is included as Figure 2. The Kingsbury and Fort Edward landfills occupy areas of approximately 14 acres and 18 acres, respectively. Each of these landfills is currently operated as an active municipal landfill.

Surface water drainage from the landfills and adjacent areas and leachate from the landfills discharges through a series of small springs and streams and flow into the Feedertow Canal (H-321) which separates the two landfills. Leachate is defined as liquid which has been in contact with or passed through solid waste (refuse). This Feedertow Canal discharges into the Old Champlain Canal (H-321A), which flows into the Champlain Canal (H-319A) and ultimately into the Hudson River.

The topography of the two landfill areas is constantly changing as operation continues. The Kingsbury Landfill is currently trapezoidal in shape with a maximum height of 60 to 70 feet above the surrounding terrain. The Fort Edward Landfill is currently an irregular area with a maximum height of 20 to 30 feet above pre-landfill terrain. Access to both landfills is restricted, as vehicular roadways for municipal use are regulated by gates. However, other vehicular roadways surrounding both landfills do exist.

1.03 Previous Reports

Several previous engineering reports and studies which discuss the Kingsbury and Fort Edward Landfills have been prepared. These reports have been reviewed during the course of this study. A listing of these and other sources of information utilized during this investigation is presented in Appendix A.

1.04 Agreement with New York State

In September, 1980, the General Electric Company, in a negotiated agreement with NYSDEC, agreed to implement or provide for remedial action at seven disposal facilities in the Hudson River Valley, including the Kingsbury and Fort Edward Landfills. In accordance with the terms of the agreement, the General Electric Company will develop and submit a final plan for implementation of a remedial program at the Kingsbury and Fort Edward landfills. In addition, the agreement requires an evaluation of remedial program alternatives which would be required if hazardous wastes had not been disposed of at the landfills. The stated goal of the remedial program is to abate any significant current and future releases or migration of hazardous waste from the landfills.

Under the terms of the agreement, the General Electric Company is to conduct field investigations at each landfill to determine the hydrogeology of each site, the areal and vertical extent of wastes present at each site, the physical state of the wastes at each site, the means by which wastes have been released or may be released from each site and the extent to which wastes have been released or have migrated from each site. The term "site" is defined as the horizontal and vertical limits of the waste deposits.

1.05 Authorization and Scope

On August 5, 1981, the General Electric Company authorized O'Brien & Gere Engineers, Inc., to perform field investigations at the Kingsbury and Fort Edward Landfills, to develop and evaluate alternatives for securing the sites, and to prepare an engineering report, including therein the recommended remedial program.

This engineering report develops remedial programs for each municipal landfill and specifies the incremental costs for dealing with "hazardous waste materials" insofar as they are shown to affect the cost of the recommended alternative.

This engineering report, prepared upon completion of the field investigations, includes the following:

1. All data from the field investigations
2. Description of alternative remedial programs
3. Selection of a recommended remedial program
4. Implementation schedule and preliminary plan
5. Preliminary cost estimate of remedial program implementation
6. Identification of all property to which access is required.
7. Program for continuing site maintenance.
8. Monitoring plan to measure the remedial program effectiveness.

SECTION 2 - REGIONAL BACKGROUND INFORMATION

2.01 Soils

The Soils Association map of Washington County, New York (Ref. 8) indicates that the Kingsbury and Fort Edward landfills are located in or adjacent to the physiographic area designated as the Hudson-Champlain lowland. This area is a broad bedrock depression filled with soil material deposited during the retreat of the glaciers. The bedrock in the vicinity of the landfills consists of the Snake Hill formation, a shale of the early Paleozoic era.

Most of this Hudson-Champlain lowland was occupied by a succession of glacial lakes. Many of the soils in the area were formed from glacial melt water deposits, and include soils formed from the clay deposits of glacial Lake Vermont and an estuary of the Champlain Sea. Where large deltas were formed from the tributaries of glacial Hudson River flowing into these glacial lakes, sandy and gravelly deltaic deposits can be found. On the outer fringes of the delta deposits are thin sandy deposits underlain by lake-laid or estuarine clays.

The Kingsbury and Fort Edward landfills are underlain by lacustrine clay and silt deposits known as the Vergennes and Kingsbury soil series. These clay rich soils are overlain by the Oakville soil series which are composed of sandy soils derived from glacial lake deltas. The thickness of this sand deposit varies from a few feet to as much as 60 feet.

2.02 Hydrogeological Conditions

Geology

The bedrock formation in the Hudson-Champlain lowland in the area of the Kingsbury and Fort Edward landfills is the Snake Hill formation, a shale bedrock formed during the Middle Ordovician period. The maximum thickness of this formation is reported to be 600 feet (Ref. 3).

A large continental glacier many thousands of feet thick covered this area as recently as 15,000 years ago and was responsible for the present topography. As the glacier, which moved initially in a southwesterly direction, began to melt, large volumes of water rushed from the melting ice, carrying and sorting large quantities of entrained glacial debris. The lowland areas just south of the melting ice often became lakes that filled with the finest clay particles sorted from the glacier's load. The lacustrine clays of glacial Lake Vermont are the prominent soil deposits in the vicinity of the Kingsbury and Fort Edward landfills.

Cushman (Ref. 3) reports that the outwash gravel and sand deposit of the glacial Hudson River extends south and east of the Village of Hudson Falls. This material terminates in the lake clay at an elevation of approximately 300 feet above sea level. The outwash gravel and sand deposits, together with the delta deposits, are believed to be the most productive aquifers in Washington County.

Groundwater Availability

According to Cushman (Ref. 3), the bedrock formation has a low effective primary porosity and storage, and the transmission of water is controlled by joints and cleavage planes. The size of the joint openings is small and the groundwater yield from the wells drilled into the bedrock, for which records are available, ranges from 0.5 to 35 gallons per minute (gpm).

Water in lacustrine clay deposits is found in the pore spaces between individual particles. The lacustrine clay yields water very slowly, and few wells in Washington County obtain water from this material. Where the lacustrine clay underlies a thickness of sand and gravel along a river valley, a series of springs may originate at the contact of the clay with the overlying gravel and sand.

Groundwater in outwash gravel and sand deposits is found in pore spaces between the particles of gravel and sand. These deposits are considered to be the most productive aquifers in Washington County. The average yield for properly constructed wells penetrating gravel and sand is approximately 100 gpm (Ref. 3).

SECTION 3 - FIELD INVESTIGATIONS

3.01 General

This section presents the results of the field investigations conducted at the Kingsbury and Fort Edward landfills between August, 1981 and January, 1982. The field work included:

1. Survey Control - to update and revise existing photogrammetric mapping by adding the location and elevation of work completed during this investigation by O'Brien & Gere Engineers, including groundwater monitoring wells, surface water flow monitoring stations, and other related features.
2. Test Borings - to determine the underlying soil profile and characteristics.
3. In-situ Permeability Tests - to determine the groundwater flow rates through the saturated soils underlying areas adjacent to the landfills.
4. Groundwater Monitoring Wells - to establish a groundwater profile in order to determine groundwater flow gradient and direction of flow, and to establish the type and concentration of any contaminants that may be migrating into the groundwater adjacent to the sites.
5. Surface Water Flow Monitoring and Sampling - to determine runoff rates and to detect contaminant losses through erosional losses or leachate flow from the sites.
6. Leachate Sampling - to determine if the leachate discharging from the base of each landfill contained contaminants attributable to municipal, industrial and/or hazardous waste materials.

Figure 3, the Existing Site Plan, presents the following information for the Kingsbury and Fort Edward landfills:

- Updated topographic (photogrammetric) information;
- Location of test borings, piezometers, and groundwater monitoring wells;
- Location of the surface water flow monitoring and sampling stations;
- Location of groundwater monitoring wells installed by others. These wells were used to monitor the elevation of the groundwater table.
- Location of the leachate sample locations.

3.02 Safety Protocol

A safety protocol was implemented at the Kingsbury and Fort Edward landfills during all field investigations including the drilling of test borings, the installation of groundwater monitoring wells, the conductance of in-situ permeability testing, the installation of surface water flow monitoring stations, and the sampling of groundwater and surface water. The safety equipment utilized included:

- Dual carbon filter respirators
- Protective goggles
- Rubber gloves (disposed of daily)
- Acid resistant suits (disposed of daily)
- Protective boots
- Hard hats

Safety equipment disposed of daily was buried at each landfill.

A Scott Air Pak and an emergency eyewash station were available at each landfill for use if needed.

3.03 Survey Control

Photogrammetric mapping of the Kingsbury and Fort Edward landfills was completed in 1980 for the NYSDEC. A copy of this mapping, including updated information completed as a portion of this field investigation, is presented as Figure 3.

The elevations for the bench marks, the tops of well casings, ground elevations at the wells, and elevations of the weirs were obtained in this study and were based upon National Geodetic Vertical datum of 1929.

Ground surface elevations ranged from approximately 270 feet (above mean sea level) at the top of the Kingsbury landfill to approximately 170 feet at the base of the Fort Edward landfill. These elevations reflect the situation at the time of the photogrammetric mapping in 1980. The Feedertow Canal, which separates the two landfills, drops from an elevation of approximately 250 feet to an elevation of approximately 150 feet, as it passes between the two landfills.

3.04 Test Borings

Between August, 1981 and September, 1981, a total of 21 soil borings were drilled (#1,2,2A,3,4,4A,5,6,6A,7,8,8A,9,9A,10,11,12,13,13A, 14,14A). The location of these test borings are shown on Figure 3. The soil borings were completed using a variety of drilling equipment including conventional hollow stem augers and flush joint casing. Split spoon samples were generally taken continuously for the first (10) feet below existing grade, and thereafter at five (5) foot intervals, unless a change in soil stratum was detected, in which case additional samples were collected. The soil samples were taken with a 24-inch long, 1-5/8" outside diameter (O.D.) split spoon sampler driven by a 140-pound hammer falling 30 inches. The drilling logs for the test borings are presented in Appendix B.

The test boring logs present the results of visual interpretations made by representatives of Parratt-Wolff, Inc. of the subsurface material samples recovered during the test boring program. All samples recovered were re-evaluated visually in the laboratory by Parratt-Wolff, Inc. and O'Brien & Gere geologists. In addition, 13 samples were chosen for physical gradation analysis. The thirteen samples chosen for gradation analysis are marked by an asterisk in the test boring logs.

The subsurface materials encountered at the sites are consistent with those reported in the <u>Soil Survey of Washington County</u> (Ref. 2), and <u>Groundwater Resources of Washington County</u> (Ref. 3)

All drilling equipment (augers, drill bits, casing, split spoon samplers, etc.) which was placed in a test boring hole was decontaminated to prevent potential cross contamination between borehole locations. Equipment decontamination procedures consisted of an initial wash using potable water to remove soil materials, a "swabbing" using a hexane-soaked towel, followed by a final rinse using distilled water. In instances where borings were drilled into the underlying impermeable layers, special drilling procedures were used. These procedures are included in Appendix E.

3.05 In-Situ Permeability Tests

In-situ permeability tests were conducted in 4 test borings (#2A,4A,8A, and 14A) to determine the permeability of the sand and clay-silt soils. Details concerning the permeability tests, and data interpretation are provided in Appendix F. A sectional diagram of each piezometer installation is shown on its corresponding test boring log in Appendix B. Boring 2A was converted to a groundwater monitoring well following the permeability test. The remaining 3 piezometers (4A, 8A, & 14A) remain at the landfills with a locking cover to protect the piezometer.

The in-situ permeability test conducted on the sand layer in test boring 14A was completed at a depth of 35 to 40 feet below existing grade. The permeability of the sand material exceeded the entrance flow and therefore was calculated to be greater than 1 X 10^{-4} centimeters per second (cm/sec) or 2.1 gallons per day per square foot (gpd/ft^2).

The in-situ permeability tests conducted on the clay-silt lacustrine deposit in test borings 2A, 4A and 8A were completed at the noted depths below existing grade with the following results:

Test Boring	Depth of Permeability Test ft	Calculated Permeability
2A	39 to 43 ft	6.0 X 10^{-7} cm/sec (0.013 gpd/ft^2)
4A	16 to 21 ft	1.2 X 10^{-6} cm/sec (0.025 gpd/ft^2)
8A	7 to 12 ft	2.0 X 10^{-7} cm/sec (0.004 gpd/ft^2)

3.06 Groundwater Monitoring Well Installation

Groundwater monitoring wells were installed in 18 test boreholes (#1,2,2A,3,4,5,6,6A,7,8,9,9A,10,11,12,13,13A,14) between August and

September 1981. The wells were constructed with varying lengths of 2-inch diameter PVC slotted screen. All pipe joints were press fitted or fastened with pop rivets. The annulus surrounding each well was backfilled with filtered, washed sand, and was sealed with bentonite clay. Each well was fitted with a locked cover set in concrete. The locations of the groundwater monitoring wells installed for this investigation are shown on Figure 3. A sectional diagram of each installed well is shown on its corresponding test boring log in Appendix B.

3.07 Surface Water Investigation

Surface water runoff and leachate discharge from the Kingsbury and Fort Edward landfills flows through a series of intermittent drainage streams and drainage ditches and eventually into the Feedertow Canal. Surface water flow monitoring stations were constructed on each of the three drainage streams which drain the two landfills. A 90° V-notch weir was installed across each of the three streams at the locations shown on Figure 3. (Stations 1, 2, and 3) These three intermittent streams appear to be the only surface water courses draining the two landfill areas.

From September 15, 1981 until November 17, 1981, continuously recording depth-of-flow monitors ("Dippers" as manufactured by Manning Corporation) were in service to record the depth of flow over each weir. These depths, converted to rate of flow, are plotted versus time and are shown on Figure 8 and Figure 9. Also shown on these figures are the rainfall intensities as measured with a continuously recording bucket-weighing rain gauge (Bendix Corporation) which was installed near the Fort Edward Landfill. The discontinuities that appear on Figures 8 and 9 are attributable to vandalism of the equipment and/or malfunction.

3.08 Leachate Investigation

Leachate has been discharging from the base of each of the landfills. This was confirmed by visual observations during this investigation and a review of the historical evidence. The sampling efforts and laboratory results completed by others are summarized in Appendix I. Previous studies have analyzed the leachate samples for PCB and in only one case, at the Kingsbury Landfill, have analyses been performed for municipal or hazardous components that may be in the leachate. As a portion of this field investigation, leachate samples were collected at two separate locations adjacent to the Kingsbury landfill. These samples were collected as grab samples from surface water which was discolored, apparently by leachate. These two sample locations are shown on Figure 3, as locations L1 and L2.

Since the surface water analytical results did not indicate elevated levels of any industrial contaminants for which the samples were analyzed, a second sampling effort was commenced on January 18-20, 1982 to obtain representative leachate samples. Two samples were collected from the Fort Edward landfill, samples L4 and L5, and one sample from the Kingsbury landfill, L3. The purpose of collecting these leachate samples was to determine if industrial and/or hazardous waste components in these landfills were migrating from the landfills via leachate flow.

3.09 Air Emission Investigations

Air samples were collected at the Kingsbury and Fort Edward landfills by RECRA Research, Inc., for a previous investigation in July, 1980. These samples were analyzed for PCBs, with the results shown in Appendix I. The results indicated the absence of PCB in a total of 6 air samples. No other air sampling effort was deemed necessary at either the Kingsbury or the Fort Edward landfills.

SECTION 4 - HYDROGEOLOGICAL ANALYSIS

4.01 General

The purpose of the hydrogeological analysis at the Kingsbury and Fort Edward Landfills was to identify how groundwater moves through the area and to evaluate the means by which these waters may contact and transport wastes from within the landfills to the environment beyond the limits of the site.

4.02 Groundwater Flow Patterns

Groundwater elevations were measured at each of the 18 groundwater monitoring wells installed during this investigation and at existing wells installed for NYSDEC as part of previous investigations. Table 1 presents this groundwater elevation data. This groundwater elevation information was used to develop groundwater flow patterns at the sites, as shown on Figure 7, Groundwater Contours. This figure presents groundwater flow patterns as developed from the November 6, 1981 elevation measurements and represents the configuration of the highest water table observed during the field investigation. The groundwater contours indicate that the groundwater flow leaves the two landfill areas in an easterly direction.

4.03 Groundwater Recharge

Groundwater recharge is defined as the water which is added to the groundwater system by direct seepage through the ground surface. Such recharge is that fraction of the total incident precipitation that penetrates the surface and percolates downward to the groundwater system. The amount of recharge varies widely, depending upon such factors as soil permeability, vegetation, slope, and climatic factors.

Groundwater recharge at the Kingsbury and Fort Edward landfills consists of direct infiltration onto the 14-acre and 18-acre areas for the Kingsbury and Fort Edward landfills, respectively. An estimated recharge area has been calculated to be 21 acres and 10 acres from a topographic map for areas adjacent to the Kingsbury and Fort Edward landfills respectively. Cushman (Ref. 3) reports that approximately 35 inches of precipitation falls on the Washington County regional area per year. Approximately 50 percent of this total precipitation is returned directly to the atmosphere by evapotranspiration. The balance is either removed as surface water runoff or percolates into the ground.

For the Washington County region, Reference 3 indicates an approximate groundwater recharge value of 9 inches per year (approximately 25% of the yearly precipitation). Assuming this recharge value of 9 inches per year, and a total estimated recharge area of 35 acres for Kingsbury and 28 acres for Fort Edward, the total groundwater recharge of the sites, and upgradient adjacent areas, would be an average daily rate of approximately 23,500 gallons per day (gpd) for Kingsbury and 18,800 gpd for Fort Edward.

4.04 Groundwater Flow Rates and Velocities

General

The quantity or flow (Q) of groundwater from the Kingsbury and Fort Edward landfill sites and underlying soils is governed by the hydraulic gradient (I) of the groundwater table, the cross-sectional area (A) through which it occurs, and the permeability (K) of the material through which the flow occurs in accordance with Darcy's Formula Q=KIA. The rate of flow, or velocity (V) of groundwater flow from beneath the site is dependent upon the hydraulic gradient (I), the permeability (K), and the specific yield (SY) of the material through which flow occurs in accordance with the equation V=KI/SY.

Groundwater Flow Beneath the Kingsbury Landfill

Groundwater flow beneath the Kingsbury Landfill site is primarily through the sand deposits and is in an east-southeasterly direction. Flow is estimated to be 20,000 gpd at a velocity of 0.67 ft/day based on the following:

- Cross Sectional Area (average saturated thickness) 20,000 ft^2 (20' deep x 1000' width)
- Hydraulic Gradient - 0.04 ft/ft (From Figure 7)
- Permeability - 25 gpd/ft^2 (Ref. 10)
- Specific Yield - 20% (Ref. 10)
- $Q = KIA = (25\ gpd/ft^2)(0.04\ ft/ft)(20{,}000\ ft^2) = 20{,}000\ gpd$
- $V = KI/SY = (25\ gpd/ft^2)(.04\ ft/ft)/(0.20)(7.48\ gal/ft^3) = 0.67\ ft/day$

Groundwater Flow Beneath the Fort Edward Landfill

Groundwater flow beneath the Fort Edward Landfill site is through the sand deposits as previously discussed and through the fill. Flow is in an easterly direction and is estimated to be 14,400 gpd at a velocity of 0.40 ft/day based on the following:

- Cross Sectional Area (saturated thickness) 24,000 ft^2 (20' deep x 1200' width)
- Hydraulic Gradient - 0.024 ft/ft (from Figure 7)
- Permeability - 25 gpd/ft^2 (Ref. 10)

- Specific Yield - 20% (Ref. 10)
- $Q = KIA = (25\ \mathrm{gpd/ft^2})(0.024\ \mathrm{ft/ft})(24{,}000\ \mathrm{ft^2}) = 14{,}400\ \mathrm{gpd}$
- $V = KI/SY = (25\ \mathrm{gpd/ft^2})(0.024\ \mathrm{ft/ft})/(0.20)(7.48\ \mathrm{gal/ft^3}) = 0.40\ \mathrm{ft/day}$

4.05 Summary

The total groundwater flow rates discharging beneath the Kingsbury and Fort Edward landfills in generally an easterly direction, during this field investigation, are approximately 20,000 gpd for Kingsbury and 14,400 gpd for Fort Edward.

Based on the concept of a water balance, the amount of water added to the groundwater system as recharge is balanced by an equal quantity that is discharged from the system as groundwater flow. As presented in a previous section total recharge to the sites and underlying soils is estimated at an average daily rate of 23,500 gpd for Kingsbury and 18,800 gpd for Fort Edward. A comparison of groundwater leaving the sites and adjacent areas with the groundwater recharge to the site and adjacent areas follows:

Kingsbury Landfill Site

Estimated Recharge into site	23,500 gpd
Calculated Groundwater flow leaving site	20,000 gpd
Estimated Difference	3,500 gpd

Fort Edward Landfill Site

Estimated Recharge into site	18,800 gpd
Calculated Groundwater flow leaving site	14,400 gpd
Estimated Difference	4,400 gpd

No estimate of surface water base flow is made due to the difficulty of accurately measuring this parameter at each of the landfills. However, some portion of the remaining difference between the recharge into the landfills and the groundwater flow leaving the landfills would consist of discharge from the landfill, adjacent areas, and underlying soils to surface water as base flow.

SECTION 5 - SAMPLING AND ANALYSIS PROCEDURES

5.01 General

The purpose of obtaining water quality samples at the Kingsbury and Fort Edward landfills was to identify chemical characteristics as follows:

- Groundwater downgradient and upgradient of the site,
- Surface water leaving the site and adjacent areas,
- Leachate discharging from the base of the landfills

This section presents the sampling and analysis program undertaken during the field investigation at the Kingsbury and Fort Edward landfills.

5.02 Groundwater Sampling and Analysis

During the sampling of groundwater, a strict sampling protocol was implemented to eliminate inadvertent introduction into the well (or sample) of substances which would lead to interferences, and thus inaccurate results from subsequent laboratory analysis. A description of the groundwater sampling procedure is given in Appendix C.

Between September 30 and October 2, 1981, groundwater samples were obtained from 16 of the 18 monitoring wells (2,2A,3,4,5,6, 6A,7,9,9A,10,11,12,13,13A,14). Wells 1 and 8 were dry at the time of sampling, precluding the collection of groundwater samples.

The samples obtained from wells 6 and 12 were analyzed for pH, Conductivity (Cond.) Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), and the EPA Priority Pollutants as listed in Appendix D.

The samples obtained from wells 2, 4, and 13 were analyzed for pH, Cond., BOD, COD, Benzene, Toluene, Xylene (BTX), PCB, Chlorides and Metals including Chromium (Cr), Lead (Pb), Nickel (Ni), Copper (Cu), and Zinc (Zn).

The samples obtained from wells 2A,3,5,6A,7,9,9A,10,11,13A, and 14 were analyzed for pH, Cond., BTX, PCB, chlorides, Cr, Pb, Ni, Cu, and Zn.

The results of these laboratory analyses of groundwater samples are presented in Table 2.

For verification of the September 30 to October 2, 1981 sampling and analytical results, groundwater samples were again collected from wells 1,2,2A, 3,4,5,6,6A,7,9,9A,10,11,12,13,13A, and 14 between November 3-6, 1981. Well 8 was again dry, which precluded the collection of a groundwater sample. Results of this sampling effort are also shown on Table 2.

To further identify the quality of the groundwater downgradient and adjacent to the Fort Edward landfill, groundwater samples were collected from wells 2, 5, 6 and 7, on January 18 to 20, 1982. These groundwater samples were analyzed for the following parameters:

PCB
Total Phenol
Formaldehyde
Methyl Ethyl Ketone
Methyl Iso Butyl Ketone
Acetone
Methanol
Ethanol
Iso Propyl Alcohol
Benzene
Toluene
Xylene
Trichloroethylene
Chlorobenzene

The results of these laboratory analyses of the groundwater samples collected during this sampling effort are presented in Table 2A.

5.03 Surface Water Sampling and Analysis

During a rainfall event on September 22, 1981, a series of surface water samples were collected from the three surface water flow monitoring stations. (Stations 1, 2, and 3). In addition, 4 other surface water locations were sampled, as shown on Figure 3. (Stations 4 through 7) These samples were obtained between 10:00 a.m. and 1:00 p.m., the approximate time that peak flow was attained at the 3 surface water flow monitoring stations.

On September 29, 1981, an additional series of stream samples were collected from the same 7 surface water locations previously identified. These samples were collected between 4:00 p.m. and 7:30 p.m., during the base flow condition.

A summary of the flow quantities for the Peak flow and Base flow in gallons per minute (gpm) is shown as follows:

Sampling Monitoring Station Number	Peak Flow Quantity	Base Flow Quantity
1	376. gpm	51. gpm
2	13. gpm	2. gpm
3	72. gpm	13. gpm

The peak and base flow samples from the 7 selected sampling locations were analyzed for pH, Cond., BTX, PCB, Cr, Pb, Ni, Cu, and Zn. The results of these analyses are presented in Table 3.

5.04 Leachate Sampling and Analysis

Leachate samples were collected from the Kingsbury landfill on October 22, 1981(L1 and L2). These grab samples were analyzed for the following parameters:

- BOD_5
- COD
- Total Organic Carbon
- Total Dissolved Solids
- Oil and Grease
- Nickel
- Zinc
- Iron
- PCB
- Benzene

Turbidity
Color
Odor
Arsenic
Toluene
Trichloroethylene
Total Phenol
Chlorobenzene

These two leachate samples were also analyzed for the remaining Priority Pollutants, as listed in Appendix D. The results of these analyses are presented in Table 4.

The leachate samples collected from the Kingsbury (L3) and Fort Edward landfill (L4 and L5) on January 18 to 20, 1982, were also grab samples. These leachate samples were analyzed for the following parameters:

PCB
Total Phenol
Formaldehyde
Methyl Ethyl Ketone
Methyl Iso Butyl Ketone
Acetone
Methanol
Ethanol
Iso Propyl Alcohol
Benzene
Toluene
Xylene
Trichloroethylene
Chlorobenzene

The results of these analyses are presented in Table 4.

5.05 Air Sampling and Analysis

Air samples were collected from the Kingsbury and Fort Edward landfills by Recra Research, Inc., for a previous investigation, on July 30, 1980. Three samples were collected at each landfill, 2 from the downwind direction and 1 from the upwind direction. The upwind sample was taken to provide as an ambient or control sample. Data obtained from this study is shown in Appendix I.

No airborne PCBs were detected in this sampling. Absence of PCBs in these air samples indicate that no significant environmental impacts would be expected from PCB volatilization at the landfills.

For this reason, no air sampling was performed during this investigation.

5.06 Soil Sampling and Analysis

Previous soil and sediment sampling and analysis had been conducted at the Kingsbury and Fort Edward Landfill Sites by Weston Environmental Consultants, Wehran Engineering, P.C., (Ref. 4 and 5) and NYSDEC.

These soil samples were analyzed for PCBs and the results are presented in Appendix I. All analytical results generated by these investigations have been reviewed and evaluated. The data is of sufficient quantity to deem further soil sampling and analysis unnecessary. The recommended remedial program at both the Kingsbury and Fort Edward landfills include provisions for abating any release of soil contaminants.

SECTION 6 - RESULTS

6.01 General

The results of the field investigations are presented in Table 1 through Table 4 of this report. Groundwater elevations and results of groundwater quality, surface water quality and leachate quality analyses are presented in these tables with the data summarized in the following section.

6.02 Soil Borings and Monitoring Well Results

The Kingsbury and Fort Edward landfills were found to be located directly above a varying thickness of sandy deltaic deposits. Beneath this sand is a lacustrine clay with a permeability of approximately 5×10^{-7} cm/sec.

The groundwater monitoring wells indicate that the existing groundwater table and the apparent bottom of refuse are very close to the same elevation, and in several locations the groundwater is in direct contact with the refuse. While no monitoring wells were installed directly through the fill in this investigation, information from the Weston and Wehran Studies (Ref. 4 and 5) and the historical information support this conclusion. Table 1, Groundwater Elevations, indicates the elevation of the groundwater table at the various wells. The groundwater elevations were measured on several occasions over the course of the field investigation. The maximum change in groundwater elevation of 6.0 feet was observed in monitoring well B-23 at the Kingsbury Landfill during this investigation.

The soil borings also indicate that the lacustrine clay deposits are directly at the earth's surface at the borings located downgradient of the landfills. These clay deposits, at the interface with the deltaic sands, cause groundwater and leachate to emerge as surface springs.

6.03 Groundwater Sample Results

The results of the two rounds of sampling of 17 groundwater monitoring wells are shown in Table 2, together with the existing New York State groundwater quality standards. There were six samples that were at or beyond acceptable pH limits for groundwater and one instance (Well Number 9A) where PCB was detected at a concentration level above the groundwater standard. There were also 10 samples where benzene was detected in groundwater samples. In addition, there were 15 other groundwater samples where either Toluene or Xylene were detected.

A priority pollutant analyses was conducted on two groundwater samples, one from each monitoring well, Well 12 (Kingsbury) and Well 6 (Fort Edward). These two wells are considered to be downgradient to each of the landfills. One of the priority pollutants that was detected was in Well 12, which contained chlorobenzene at a concentration of 0.13 ppm. Both Well 12 and Well 16 contained detectable concentrations of benzene: 0.005 ppm in Well 6 and 0.002 ppm in Well 12. Well 6 also contained 0.002 ppm of toluene. No other priority pollutants were detected or quantified at the appropriate detection limits.

From the groundwater sampling effort of four groundwater wells at the Fort Edward Landfill conducted between January 18 to 20, 1982, phenols were detected in Wells 6 and 7; Benzene was detected only in Well 7; Toluene was detected in three of the wells, Wells 2, 6, and 7; Xylene was detected in Well 7. In addition, trichloroethylene was detected at 8 ppb in Well 6, which is below the New York State Groundwater Standards. These results are shown on Table 2A, together with the New York State Groundwater Quality Standards.

The results of previous groundwater analysis by other studies, is shown in Appendix I. These results are for PCB analyses and exhibit levels of concentration greater than those concentrations detected for filtered samples as part of this study. The groundwater samples collected by others were, in general, analyzed as unfiltered samples (for PCBs), which may be the reason for differences in concentrations of PCB. Also, differences in time of collection of sample, different locations of sample collection, and variations in sampling techniques may contribute to differences observed. In any event, the proposed remedial program will prevent groundwater from contacting the refuse, and prevent transport of contaminants from the landfill.

Table I-2 of Appendix I also enumerates laboratory analyses conducted by others of groundwater samples, which were analyzed for select metals.

6.04 Surface Water Sample Results

The three surface water monitoring stations and four other surface water sample locations were sampled during peak and base flow. The laboratory results of these 7 sample locations, for peak and base flows are shown in Table 3. Surface water samples were not filtered prior to analysis. Chromium was detected in one surface water sample; nickel was detected in 3 surface water samples; copper was detected in one surface water sample; zinc was detected in 12 of the surface water samples, including the upgradient sample (Location 5). PCB, Benzene, Toluene, Xylene and Lead were not detected in any of the surface water samples collected.

Surface water samples analyzed for PCB, as completed by previous studies, are shown in Appendix I. Differences in the method of collection of samples, different flow rates and quantity of surface water, differences in sample locations and other variables no doubt account for the higher concentration of PCBs noted by others. In any event, the proposed remedial program to be implemented at the Kingsbury and Fort Edward landfills will eliminate the migration of any contaminated groundwaters or leachates from discharging into surface waters.

6.05 Leachate Sample Results

Two leachate samples were collected from the Kingsbury landfill on October 22, 1981. The results of the analyses shown in Table 4, indicate that the leachate had contaminants equivalent to leachate being produced at a typical municipal solid waste facility (See Table H-1). The leachate samples did not contain any detectable concentrations of PCB, chlorobenzene, total phenols, trichloroethylene, benzene, or toluene.

In order to determine if other industrial wastes were migrating from the Kingsbury and Fort Edward landfills, 3 additional leachate samples were collected - one from the Kingsbury landfill (L3) and two from the Fort Edward landfill (L4 and L5). PCBs were detected in each sample, with concentrations of 12 ppb, 55.8 ppb and 7.7 ppb for samples L3, L4, and L5, respectively. In addition, three other chemicals were also detected: formaldehyde (0.13 ppm), chlorobenzene (0.102 ppm), and benzene (5 ppb), all from sample location L3.

While large concentrations of municipal contaminants were not detected during this investigation, leachate is visually evident at both the Kingsbury and and the Fort Edward Landfill. The Kingsbury Landfill has a long history of leachate generation and impacts upon the environment. As indicated previously, legal action had been initiated by an adjacent property owner relative to the leachate migrating from the Kingsbury Landfill into the pond. The Kingsbury Landfill was cited under the Open Dum Criteria of RCRA for violations of RCRA Surface Water (40 CFR Part 257.3-3) Disease (40 CFR Part 257.3-6) Criteria in a letter from NYSDEC to the Kingsbury Town Supervisor, dated September 24, 1981.

The Fort Edward Landfill does not have the long history of leachate generation and migration, but there have been several citizen complaints and inspection reports citing leachate pollution of the groundwater. During this investigation, visual observations indicated the presence of leachate at this landfill.

The results of the previous laboratory analyses of leachate samples for PCBs by other studies are shown in Appendix I. Results indicate levels of PCB consistent with or above those detected for this investigation. In addition, one leachate sample from the Kingsbury Landfill was analyzed for other components. The results of this analysis is also shown in Appendix I. Location of leachate sampling point, method of sample collection, flow rate and quantity of leachate, and other variables may no doubt contribute to the differences in the results. The recommended remedial program will mitigate the release of leachate from both the Kingsbury and Fort Edward landfills.

6.06 Air Sampling Results

No air samples were collected as part of this investigation. Appendix I contains the results of PCB analyyses of air samples conducted by others at the Kingsbury and Fort Edward Landfills. PCBs were not detected in this earlier study.

6.07 Soil Sampling Results

No soil samples were analyzed for PCBs as part of this investigation. Appendix I contains the results of PCB laboratory analysis of soil samples conducted by others at the Kingsbury and Fort Edward Landfills.

SECTION 7 - CONTAMINATION TRANSPORT MECHANISMS

7.01 General

As stated previously, the goal of the remedial program is to abate any significant current and future releases of hazardous wastes from the landfills. The sampling and analyses that were conducted as part of this investigation, and studies conducted by others, indicate that organic compounds and metals are of primary concern. Transport mechanisms by which these contaminants may be released from the landfills include groundwater migration, erosion transport, and leachate transport. Each of these transport modes and its significance at the Kingsbury and Fort Edward landfills is discussed below.

7.02 Groundwater Migration

To determine the type and concentration of chemical contaminants which may be released, from the Kingsbury and Fort Edward Landfills, groundwater samples were collected for analysis as previously discussed. Table 2 and Table 2A present the analytical results of these investigations.

The direction and rate of groundwater flow beneath the two landfills occurs through the identified underlying soil strata at flow rates and velocities as previously discussed. Assuming groundwater flow rates leaving the site and underlying soils are in generally an east-southeasterly direction at 20,000 gallons per day (GPD) through the sand stratum at the Kingsbury Site and 14,400 GPD in generally an easterly direction through the sand stratum at the Fort Edward Site, the quantities of identified contaminants leaving the sites and underlying soils are as follows:

KINGSBURY LANDFILL
(WELL NO. 12)

Groundwater Contaminant Concentration	Quantity of contaminant leaving landfill, via groundwater transport, lbs/year
COD	
Avg. Concentration of 251 ppm	15281 lbs/year
Purgeable Priority Pollutants	
Chlorobenzene	
Total Concentration of 0.13 PPM	7.9 lbs/year
Phenols	
(Priority Pollutant Analyses)	No contamination identified
No detectable concentrations	
Metals	
(Zn) - Table 2	
Total Concentration of 0.10 PPM	6.1 lbs/year
Benzene, Toluene, Xylene (BTX)	
Table 2	
Total Concentration of 0.002 PPM	0.12 lbs/year
PCBs	
Table 2	
Total Concentration of< 0.01 PPB	No contamination identified

FORT EDWARD LANDFILL
(WELL NO. 6)

Groundwater Contaminant Concentration	Quantity of contaminant leaving landfill via groundwater transport, lbs/year
COD	
Avg. Concentration of 109 ppm	4778 lbs/year
Purgeable Priority Pollutants	
Trichloroethylene - .008 ppm	0.35 lbs/year
Phenols	
(Priority Pollutant Analysis)	0.31 lbs/year
0.007 ppm	
Metals	
(Cr) - Table 2	
Total Concentration of 0.01 PPM	0.44 lbs/year

BTX	
Table 2	
Total Concentration of 0.007 PPM	0.31 lbs/year
PCB	
Table 2	
Total Concentration of < 0.01 PPB	No contamination identified

7.03 Erosion Transport

A potential exists for the loss of contaminants from the sites due to erosion during periods of high surface water runoff. To determine the type and concentration of chemical contaminants which may be released, or may migrate from the site, surface water samples were collected for analysis as previously discussed. Table 3 presents the data from laboratory analysis of these surface water samples.

Although these data are insufficient to predict the loss of wastes from the site during all peak and base flow conditions, they indicate that such loss was insignificant at the time of sampling.

7.04 Leachate Transport

Leachate, as previously defined, may contribute to the transport of dissolved materials from a landfill. As the waste decomposes, organic acids are formed. The percolation of precipitation and the water generated from the decomposition processes may create a leachate which can transport municipal and industrial components to the edge of the landfill. It was observed that leachate is being produced at both of these landfills. The chemical analysis of surface waters, into which the leachate flows, was insufficient to predict the losses of wastes from each landfill. The chemical analysis of the leachates indicated that minor concentrations of municipal and/or industrial components were being transported from each landfill.

7.05 Summary

Information gathered shows insignificant quantities of contaminants are being released from both the Kingsbury and Fort Edward landfills through the three previously identified transport modes. A fourth mode of transport of PCBs, volatilization, was not considered significant at the Kingsbury or Fort Edward landfills based on previous air samples obtained by Recra Research, Inc., for NYSDEC on July 30, 1980.

In general, the data are not sufficient to provide more than an approximation of the relative amounts of contaminants released by each transport mode. What is important is that the recommended remedial program will include optimal provisions for abating further contaminant release by each transport mode.

SECTION 8 - REMEDIAL PROGRAM CRITERIA REGULATIONS AND EXISTING CONDITIONS

8.01 Discussion of Remedial Program Criteria

The agreement between General Electric Company and NYSDEC identifies the items to be included in this engineering report, as discussed in Section 1.04.

The closure requirements of a non-permitted municipal solid waste landfill or a landfill which had received hazardous wastes are not specifically detailed in any New York State regulation. The permit requirements promulgated under Article 27, Title 6 of the New York State Environmental Conservation Law, (ECL) Part 360 do require certain operational and closure procedures for landfills that have received an operational permit with respect to these regulations.

The closure requirements for permitted landfills which have received a permit under Part 360 regulations are established as part of the permit procedure and are subject to the approval of NYSDEC. The general requirement requires that leachate from a solid waste management facility shall not be allowed to drain or discharge into surface water, except as provided by a discharge permit, and shall not contravene groundwater quality standards established by NYSDEC under ECL Section 17-0301.

Some of the other pertinent criteria and guidelines relating to solid waste management facilities are shown in Table 8-1 on the following page. A portion of the conditions necessary for properly operating permitted solid waste management facilities in New York State and the existing conditions at each of these two landfills are shown.

The regulations indicate, in a general way, that municipal solid waste management faciltiies must meet minimum closure measures, subject to the approval of NYSDEC, which shall include "at least two feet of final cover, an established grass cover crop, and sufficient grading to direct water off the fill area so as to minimize infiltration and preclude ponding." (Part 360, 360.8.a.21) The final cover is further defined as being a compacted layer of cover material at least 24" thick of which the lower portion should restrict infiltration to the equivalent of that achieved by eighteen inches of soil at a hydraulic conductivity (coefficient of permeability) of 10^{-5} cm/sec or less.

In addition, the facility must be properly closed and maintained so as to prevent adverse environmental or health impacts such as, but not limited to, contravention of surface or groundwater quality standards, gas migration, odors, and vectors. (360.8.a.21)

TABLE 8-1

COMPARISON OF REGULATORY CRITERIA FOR SANITARY LANDFILL AND SECURE LANDBURIAL FACILITIES AND EXISTING CONDITIONS AT KINGSBURY AND FORT EDWARD LANDFILLS

	REGULATORY CRITERIA		EXISTING CONDITIONS	
Criteria	Sanitary Landfill	Secure Landburial Facility	Kingsbury Landfill	Fort Edward Landfill
1. Required vertical separation distance to seasonal high groundwater table or bedrock	At least 5.0 feet (360.8.b.1.i)	At least 10.0 feet (360.8.c.12.i.b)	Groundwater table within 5.0 feet of the bottom of the refuse	Groundwater table is at or very near to the elevation of the bottom of the refuse
2. Required distance fill areas or excavations to property boundary	No closer than 50 feet (360.8.b.1.xii)	No closer than 50 feet (360.8.c.12.i.e)	Refuse within 50 feet of easterly property boundary	Refuse within 50 feet of property boundary on northerly side of landfill
3. Final cover requirements	At least 24" thick of cover material at least equivalent to 18" of soil at a hydraulic conductivity of 10^{-5} cm/sec or less. Minimum slope of 2% (360.1.d.32)	Impermeable cap, thickness and composition to be determined; hydraulic conductivity of 10^{-7} cm/sec or less (360.8.c.12.ii.d)	Daily cover being applied using existing sand	Daily cover being applied using existing sand
4. Access	Access controlled by suitable means (360.8.a.6)	Restrict access to secure landburial facility (360.8.c.12.v.d.5)	Access controlled on a gate but other roadways exist	Access controlled by a gate and steep topography, but other roadways exist
5. Leachate	Not allowed to drain or discharge into surface waters, shall not contravene groundwater quality standards (360.8.a.3)	Collection and treatment of leachate shall be provided (360.8.c.12.v.d.2)	Leachate drains from site	Leachate drains from site
6. Required distance to flood plain	Shall not be operated or constructed on flood plains (360.8.a.20)	At least 5.0 feet above flood plain (360.8.c.12.i.d)	Landfill not located within flood plain as per flood hazard boundary map dated 9/7/79	Landfill is not located within flood plain
7. Decomposition Gases	Decomposition gases shall be controlled(360.8.b.1.vi)	Gas venting required (360.8.c.12.ii.f)	No gas venting exist	No gas venting exist
8. Closure	Subject to the approval of NYSDEC.at least 2 feet of final cover, an established grass cover, and sufficient grading to minimize infiltration and preclude ponding. (360.8.a.21)	Subject to approval of NYSDEC. Placement of final cover, control of pollutant migration, control surface water infiltration, prevent erosion. (360.8.c.12.v)	To be closed	To be closed

SECTION 9 - MUNICIPAL LANDFILL CLOSURE ALTERNATIVES

9.01 General

The alternatives available for closure of the Kingsbury and Fort Edward municipal landfills are limited, due to the large volume of municipal solid waste disposed at each landfill. The major alternatives which were considered and evaluated for closure include:

1. No action
2. Off-site disposal
3. In-place containment

The criteria used for the evaluation of the alternatives include technical feasibility, ease of implementation, and compliance with regulatory requirements.

The primary objective of the remedial program selected for implementation is to abate significant current and future releases or migration of wastes from the sites. The remedial program must include provisions for maintenance and monitoring, as well as collection, treatment and disposal of any leachate. (Ref. 1)

9.02 Regulatory Requirements

There are several federal and state statutes and regulations which address solid waste disposal, govern the operation, and/or, to a lesser degree, deal with the closure of a landfill that has received municipal solid waste. Those which are applicable are:

1. The Solid Waste Disposal Act, Public Law 89-272
2. The Resource Conservation and Recovery Act (RCRA), Public Law 94-580
3. The New York State Environmental Conservation Law (ECL)

Solid Waste Disposal Act

On October 20, 1965, the 89th Congress passed legislation designated as Public Law 89-272, which became known as the "Solid Waste Disposal Act". This law was amended by the Resource Recovery Act of 1970, Public Law 91-512, on October 26, 1970. The law was further amended by Public Law 93-14 on April 9, 1973. The purpose of these laws was to authorize research and development programs with respect to solid waste disposal. The laws specifically dealt with grants to assist in the safe and efficient disposal of solid waste, and established programs to effectively deal with problems of solid waste generation, including the establishment of guidelines for solid waste disposal facilities.

RCRA

The Resource Conservation and Recovery Act of 1976, Public Law 94-580, was enacted into law on October 21, 1976 by the 94th Congress. The law further amended the Solid Waste Disposal Act. The purpose of this law is to provide technical and financial assistance for the development of management plans and facilities for the recovery of energy and other resources from discarded materials and for the safe disposal of discarded materials and to regulate the management of hazardous waste. Subtitle D of this law required the Environmental Protection Agency (EPA) to establish criteria for sanitary landfills and required that solid waste disposal facilities that did not meet the criteria to either close or upgrade the facility to meet the criteria. The requirements of closure are not specifically detailed, but protection of the health, safety and welfare of the population and mitigation of environmental impacts is implicit.

The EPA developed criteria for classification of solid waste disposal facilities and practices. These requirements, established under the RCRA law, are set forth in 40 CFR 257 and establish the criteria as required in RCRA to determine which solid waste facilities and practices may pose a reasonable probability of adverse effects upon health or the environment. These criteria relate to floodplains, endangered species, surface water, groundwater, application of waste to land used for food-chain crops, disease, air and safety. Facilities not meeting these criteria constitute open dumping, which are prohibited under Public Law 94-580.

ECL

In New York State, Article 27, Title 6 of the Official Compilation of Codes, Rules and Regulations (6NYCRR Part 360) establishes minimum requirements for the construction and operation of solid waste management facilities. These regulations are known as Part 360, Solid Waste Management Facilities and revised regulations became effective on March 9, 1982. The regulations address closure of landfills which are permitted under these requirements. The only general criteria for closure of a municipal landfill is cited in Section 360.8.a.21. This portion of the regulations requires proper closure and maintenance of the solid waste facility so as to prevent adverse environmental or health impacts such as contravention of surface or groundwater quality standards, gas migration, odors, and vectors.

In addition to the solid waste regulations, there are also groundwater standards established under Title 6, Official Compilation of Codes, Rules and Regulations, Part 703. The Groundwater Classifications Quality Standards and Effluent Standards and/or Limitations were established to prevent pollution of groundwaters and to protect the groundwater for use as a potable water.

9.03 No Action

This alternative was not considered as being appropriate due to the production of leachate at each site. The production of leachate at each of these landfills has been documented by NYSDEC inspection reports and citizen complaints. Closure of each of these landfills will require some action to protect the environment.

9.04 Off-Site Disposal

The alternative of off-site disposal was considered but rejected, due to the large volume of solid waste at each site. Approximately 920,000 cubic yards (yd^3) of solid waste are deposited in the Kingsbury landfill and 540,000 yd^3 are deposited in the Fort Edward landfill. The idea of excavating the waste and transporting it to another off-site disposal facility (landfill or incinerator) does not appear to be a viable alternative.

9.05 In-place Containment

The implementation of this alternative would require isolating the solid waste materials from the environment to mitigate mechanisms capable of transporting wastes from the landfills. This would require the installation of a cover over the landfills, grading of the site to promote movement of surface water, installation of a gas venting system and application of topsoil and a vegetative cover to the site as required by 6 NYCRR, Part 360. Since leachate is allegedly being generated at both landfills, and since 6 NYCRR, Part 360.8.a.21 prohibits contravention of surface and ground water standards, a mechanism of either eliminating refuse contact with ground water, or leachate collection and treatment, normally would be required. Undoubtedly municipal waste components are being dissolved in the groundwaters and entering the groundwater system. This is referenced in the study conducted by Dunn Geoscience.

The Kingsbury and Fort Edward landfills are underlain by lacustrine clay deposits. As previously discussed transport of contaminated water, or leachate, occurs at the interface of the sand materials and the lacustrine clay. As can be seen on the cross sections, (Figures 4, 5, and 6) the groundwater table was less than 5.0 feet beneath the bottom of refuse at the two landfills as measured on November 6, 1981. To prevent the future development and/or movement of leachate from the landfill, the following remedial programs would be successful:

1. Construction of a cap, which is impermeable, over each landfill, with a vertical cutoff wall installed around the entire perimeter of each landfill, to divert groundwater flow, and properly constructed to seal into the underlying lacustrine clay.
2. Covering each of the landfills with existing sand material presently being used for daily cover, and collection and treatment of any leachate generated prior to discharging of the treated water from the two landfills.

Both of the following remedial programs involve on-site containment. In order to effectively install either type of cover or cap where compaction equipment is necessary, side slopes at the Kingsbury landfill will need to be stabilized so that equipment may operate on acceptable slopes. The material that may be utilized to extend the slope may consist of refuse fill, sand, or other suitable stable material.

1. <u>Cap Landfill and Install Vertical Cutoff Walls to Lacustrine Clay</u>

An impermeable cap material could be installed over each landfill using a variety of materials including: concrete, asphalt, native or imported clay, bentonite, or a synthetic membrane. Clay materials for the use as the cap could be borrowed from adjacent, contaminant-free areas, or transported from nearby clay sources.

In conjunction with the cap, impermeable cutoff walls, extending the cap to the lacustrine clay beneath the landfills, could be installed around the perimeter of the landfills to provide a vertical barrier. This would eliminate the movement of any existing leachate from the landfills and prevent horizontal groundwater recharge from areas upgradient of the landfills. Materials of construction for the cutoff walls could consist of a bentonite/soil mixture, soil/cement, or a cement/bentonite mixture. A vertical cutoff wall would provide permanent isolation of the refuse from ground or surface water and would not require maintenance in the future.

Leachate currently in contact with the refuse would be isolated from the surrounding environment by construction of the cap and vertical cutoff walls. In order to monitor the effectiveness of the remedial programs, downgradient groundwater monitoring wells would be installed to allow for the collection of samples for chemical analyses. These analyses would be compared over time to evaluate the remedial program's effectiveness.

Surface water drainage from the sites, and adjacent areas will be by a system of drainage channels. They would be installed around the perimeter of the landfills to divert any surface water away from the completed landfills. Drainage swales on the completed landfills will drain rainfall from the landfills quickly to the drainage channels.

Any decomposition gases generated within the landfill will be properly controlled by the installation of a gas venting network through the impermeable cap. These gas venting trenches and pipes would be allowed to vent to the atmosphere, provided that concentrations of explosive gases are not detected during a monitoring program.

2. Cover Site, Collect and Treat Leachate

A cover would be installed utilizing the sand material, which is now utilized as a daily cover material. This material would then be placed over each of the previously graded landfills.

In conjunction with this cover, a leachate collection and treatment system could be installed. The leachate collection system would be comprised of a series of collection trenches and pipes located hydraulically downgradient of each landfill to intercept the leachate and groundwater discharging from the landfills. Leachate and groundwater collected would be treated to meet point source discharge requirements. The leachate treatment system would be properly designed and constructed based upon bench model studies of the existing leachate.

Surface drainage from the landfills, and from adjacent drainage basins would be properly controlled by a system of drainage channels around the perimeter of the sites to divert any surface water away from the completed landfills.

In order to monitor the effectiveness of the leachate collection system from either of the closed landfills, downgradient monitoring wells would be installed to allow for the collection of groundwater samples for chemical analysis. These analyses would be compared over time to evaluate the remedial program's effectiveness.

9.06 Summary of Alternatives

Closure of the Kingsbury and Fort Edward Landfills as municipal landfills can best be accomplished by in-place containment, in accordance with the current regulatory requirements. The alternative of no action was judged as not acceptable due to the long history of environmental impact by each of these landfills. In addition, the regulatory requirements mandate an acceptable closure procedure, and specific closure measures are subject to the approval of NYSDEC.

The alternative of off-site disposal may be technically feasible; however, a new landfill or an on-site or off-site incinerator would require the approval of the regulatory agency, and implementation would be difficult due to the large volume of municipal waste that would need to be excavated. In addition to the municipal solid waste, large volumes of cover material would be excavated with the refuse for an off-site disposal alternative. Exposure to uncovered refuse and excavation in a municipal refuse site can be dangerous. Regulatory acceptance of excavation of either or both of these municipal landfill sites may be difficult to obtain, due to the probable odor and transportation problems.

The history of leachate generation at each of the landfills and the fact that the groundwater is in contact with the bottom of the refuse indicates that the solid waste must either be isolated from future contact with the ground and surface water, or the leachate and groundwater be collected and treated to meet discharge standards.

The alternative of in-place containment is the generally accepted closure procedure for municipal landfills. The regulatory requirements for such closure are technically feasible and can be implemented with reasonable ease. Steep slopes and close proximity to property boundaries and the Feedertow Canal would require special design considerations in the closure plan, but in general, this type of construction would present very few problems. Regulatory acceptance of such a technique is a primary reason for selecting this method of closure since the regulations implicitly indicate closure by in-place containment.

Accordingly, in-place containment of wastes at the Kingsbury and Fort Edward landfills is the recommended remedial program for closure as municipal solid waste landfills.

The recommended remedial program for the Kingsbury and the Fort Edward municipal landfill closure consists of the following components: regrading, construction of a vertical cutoff wall to lacustrine clay, construction of a gas collection and ventilation system, application of an impermeable cap using a local clay material, application of topsoil and seeding, and maintenance and monitoring for a 5-year period following completion of construction. The vertical cutoff walls would provide positive isolation of the solid waste from the groundwater. Recharge to and discharge from each of the landfills due to groundwater and surface water would be eliminated. Leachate currently within the limits of each landfill will be permanently isolated from the surrounding environment.

SECTION 10 - INDUSTRIAL WASTE LANDFILL CLOSURE ALTERNATIVES

10.01 General

In situations where existing municipal solid waste landfills have received substantial quantities of industrial wastes, the closure of the landfills may necessitate additional efforts beyond that which is necessary for a municipal solid waste facility to sufficiently isolate the wastes from the environment. The major categories of alternatives that were considered for potential implementation at each landfill include:

1. Off-site disposal of wastes
2. In-place containment of wastes

The criteria used in the evaluation of alternatives include: compatibility with stated program goals; technical feasibility; ease of implementation; and potential for regulatory agency acceptance.

The primary objective of the remedial program selected for implementation is to abate significant current and future releases or migration of waste from the Kingsbury and Fort Edward landfills.

10.02 Regulatory Requirements

There are a number of Federal and State laws and regulations governing hazardous waste disposal sites. Those which are applicable to this project are as follows:

1. Toxic Substances Control Act (TSCA)
2. The Resource Conservation and Recovery Act (RCRA)
3. The New York Environmental Conservation Law (ECL)

TSCA

Under the provisions of TSCA, a final rule dealing with the disposal of PCB, (40 CFR, Part 761, Subpart B) has been promulgated. Subpart B of TSCA does not require that PCB and PCB items landfilled prior to February 17, 1978, be removed for disposal. However, if such items are removed from the disposal site, they must be burned in an approved incinerator or deposited in an approved chemical waste landfill. PCB defined under TSCA pertains to any substance, mixture, or item with a concentration of 50 PPM or greater of PCB, measured on a dry weight basis. On October 30, 1980 the U.S. Court of Appeals vacated the 50 PPM concentration regulatory limit, finding no evidence in the administrative record to support the provision. As an interim measure, to provide PCB regulation during EPA study, and new rule promulgation, the 50 PPM concentration limit currently remains in effect.

RCRA

RCRA regulations do not specifically require the removal of hazardous wastes from landfill sites, but do require the proper management of hazardous wastes to protect human health and the environment. RCRA regulations establish procedures for identifying hazardous wastes and provide a list of wastes considered to be hazardous in 40 CFR Part 261. Closure and post-closure requirements of landfills accepting hazardous wastes are identified in 40 CFR Part 265. The requirements do not give any specific criteria, but rather identify end product standards. Some of the items which need to be addressed in the closure plans include:

1. Prevention of pollutant migration via groundwater, surface water and air;

2. Prevention of surface water infiltration;
3. Prevention of erosion;
4. Maintenance of the final cover;
5. Maintenance and monitoring of any leachate collection, removal, and treatment system;
6. Maintenance and monitoring of any gas collection and control system;
7. Restriction of access.

ECL

The New York State Environmental Conservation Law, Article 27, Title 6 establishes the requirements for the operation and closure of all solid waste management facilities. Hazardous waste management facilities have recently been further regulated pursuant to Article 27, Title 7 and 9 of the Environmental Conservation Law, in 6 NYCRR, Part 360, Solid Waste Management Facilities regulations. Secure landburial facilities are further identified as a land disposal facility meeting the design and operational requirements of Part 360 for the proper disposal of hazardous wastes in a landfill. The closure and post closure requirements are stipulated with respect to end products, and are essentially the same items as are incorporated in RCRA, as noted above. The pertinent provisions of Part 360 have been previously discussed, relative to closure requirements.

10.03 Off-site Disposal

Disposal of the wastes to an off-site facility, either to a secure landburial facility or to an incinerator, would require the excavation of the municipal and industrial wastes, containerization, and transportation to the off-site facility.

At the present time, there are two EPA-permitted secure landburial facilities operating in the Northeast which can accept solid hazardous wastes. Both of these facilities, located in Niagara County, New York, are operated by firms which specialize in the management of hazardous wastes, and who could be directly contacted for all phases of such a project. Each facility is currently accepting solid hazardous wastes, but landfill space may be limited within the near future.

The volume of material that would be required to be excavated from these two landfills is estimated to be 920,000 yd^3 from the Kingsbury landfill and 540,000 yd^3 from the Fort Edward landfill. If wastes were to be excavated, they would be transported to the off-site facility in enclosed 20 yd^3 to 30 yd^3 refuse containers. A licensed hazardous waste transporter would be required for this phase of the work, as well as completion of the appropriate hazardous waste manifest forms. All work done would require completion in accordance with all RCRA D.O.T. regulations and NYSDEC regulations regarding hazardous waste transportation. These latter regulations, 6 NYCRR, Part 365, are for the use, reporting and recordkeeping requirements associated with the Hazardous Waste Manifest System, and Related Standards for Generators, Transporters and Facilities Dealing with Hazardous Wastes.

Extreme care would have to be taken to minimize the loss of waste material during the excavation and transfer operations because of the probability of volatilization from freshly exposed deposits and the possibility of erosional losses during rainfall events. Following removal of the contaminated wastes, the existing landfill areas would be restored by regrading, application of topsoil, and seeding.

This alternative would be compatible with existing Federal and State regulations, and would likely receive regulatory agency approval. The alternative is technically feasible, although safe implementation would be difficult to achieve due to the hazards associated with the possible excavation of drums and solid hazardous wastes containing unknown chemical constituents. The technical feasibility is additionally made difficult by restricted construction activities to ensure that wastes are not lost from the landfill areas during the excavation and containerization to volatilization or erosional loss.

10.04 In-Place Containment

The successful implementation of this alternative requires that contaminated materials be prevented from discharging from the site to the surrounding environment. The final plan for implementation of in-place containment must, therefore, include provisions to abate the release of waste via groundwater, and erosion, which have been identified as the possible methods of migration from these landfills. This can be accomplished by:

1. Installation of an impermeable cap and vertical cutoff walls to alter surface water and groundwater flow patterns to preclude future contact with the refuse fill and eliminate waste transport or,
2. Cover each landfill to limit infiltration of precipitation and treat groundwater, surface water, and leachate that contacts the refuse fill prior to discharge from the landfills.

These two remedial programs are:

1. Cap Each Landfill, Install Vertical Cutoff Walls to Lacustrine Clay Layer

Before placement of a cap material over each of the sites, the areas to be capped would be suitably graded. An impermeable cap material could be installed over each site using a variety of materials including: concrete, asphalt, native or imported clay, bentonite, or a synthetic membrane. Preliminary evaluations have shown that the native clay material can effect a low relative permeability. Clay materials for the cap could be borrowed from adjacent, contaminant free areas or transported from nearby sources.

In conjunction with the cap, impermeable vertical cutoff walls could be installed around the sites, and constructed to seal into the cap and into the impermeable lacustrine clay. This would eliminate the movement of existing leachate from either landfill and prevent horizontal groundwater recharge from areas upgradient of the landfills. Materials of construction for the cutoff walls could consist of a bentonite/soil mixture, soil/cement, or a cement/bentonite mixture.

This remedial program, in order to determine the remedial program's effectiveness will need to monitor the migration of leachate from either landfill by the installation of downgradient monitoring wells to allow for the collection of samples for laboratory analyses.

To insure satisfactory surface water drainage from each landfill area, and the adjacent drainage basin, a system of drainage swales would be installed as an integral part of the cap and drainage ditches would be constructed around the perimeter of each site to divert upland drainage away from the landfills.

2. Cap Each Landfill, Collect and Treat Leachate

Before placement of a cover material the areas to be covered would be suitably graded. An impermeable cap as discussed previously, would then be placed.

In conjunction with the cap, a leachate collection and treatment system located hydraulically downgradient would be installed to intercept groundwater and to drain leachate and groundwater to a leachate treatment facility. Leachate collected would be treated to meet point source discharge requirements. The leachate treatment system would be comprised of activated carbon contactors and appurtenances.

To insure satisfactory surface drainage from each of the landfills and the adjacent drainage basin, a system of drainage channels would be installed around the perimeter of each site. To monitor the effectiveness of the leachate collection system, downgradient groundwater monitoring wells would be installed to allow for groundwater elevation monitoring and the collection of groundwater samples for chemical analysis.

In-place containment of the wastes would, if properly implemented, satisfy the goal of the Kingsbury and Fort Edward landfill remedial program. Both in-place alternatives are technically feasible, and implementation would involve fairly well recognized construction and treatment techniques. Each in-place alternative is compatible with existing Federal and State regulations, and would be likely to receive regulatory agency acceptance.

10.05 Summary of Alternatives

The two identified alternatives, Off-site Disposal and In-place Containment would, if properly implemented, satisfy the goal of the Kingsbury and Fort Edward landfill remedial program. It is anticipated that both alternatives would likely receive prompt regulatory approval.

The primary advantage of in-place containment is that existing waste material would not be disturbed. Off-site disposal would require the excavation and transfer of wastes, which may be hazardous, requiring an extensive safety program. Excavation and handling of these materials would additionally increase the exposure, and therefore, the potential for release of chemical residuals into the environment. The critical period of exposure would be during the excavation phase, when contaminated deposits, now buried below the surface, would be exposed to the environment. A rainstorm of long duration, or strong winds from any direction during the period when hazardous materials are exposed, could result in a loss of chemicals to the environment. The potential for volatilization of chemicals increases, particularly during the warmer summer weather, if the hazardous wastes are exposed during this period.

The historical information which was reviewed during this field investigation indicated that disposal of drums with industrial and/or hazardous wastes was documented at both these landfills. The safe implementation of an off-site disposal alternative would be very difficult to achieve due to hazards that may be associated with excavation of drums containing unknown chemical constituents, particularly after the drums had been buried for an extended period of time.

Another advantage of an in-place remedial program is that no additional resources, such as land, are irretrievably committed to the project beyond the area presently being utilized.

In-place containment could take the form of capping the two landfills with an impermeable material and installation of a vertical cutoff wall to the lacustrine clay. Another alternative would be to cover the two landfills with an impermeable material and to collect and treat leachate that may continue to be generated. Leachate treatment would require a point source discharge, which requires a discharge permit. The leachate treatment system would consist of carbon contactors, to consistently meet the discharge limitations. This system would require frequent maintenance and monitoring to assure that the carbon is effectively removing the contaminants and that discharge limitations are being met. Operational and maintenance costs would vary directly as the levels of contaminants in the leachate varied.

The installation of an impermeable cap and construction of vertical cutoff walls around the Kingsbury and Fort Edward landfills would abate the discharge of waste materials from the two landfills without requiring excessive maintenance and/or monitoring. In view of the ease of implementation of this alternative, cap placement and installation of vertical cutoff walls to the lacustrine clay is the recommended alternative for securing the Kingsbury and Fort Edward landfills.

SECTION 11 - RECOMMENDED REMEDIAL PROGRAM - MUNICIPAL LANDFILL CLOSURE

11.01 General

In this section the recommended closure plan for the Kingsbury and Fort Edward landfills as a municipal landfill is presented. For the purpose of describing the remedial program and monitoring plan, the site will be defined as the horizontal and vertical limits containing municipal refuse. The remedial program is based on in-place containment of the municipal refuse including an impermeable cap with a vegetative cover, vertical cutoff walls, and a surface water drainage system. The purpose of these facilities is to isolate the waste material from the surrounding environment and to prevent the recharge or discharge of leachate from the landfill. The plan also includes provisions for maintenance of the facilities, and monitoring to measure effectiveness of the remedial program.

A cross section through the Kingsbury and Fort Edward landfills of the proposed Remedial Program for Municipal Landfill Closure is shown as Figure 10. The cross section is based upon topography using aerial photography in 1980. The topography of both landfills is constantly changing due to continued operation as municipal solid waste disposal areas.

11.02 Site Preparation

The steep side slopes at the Kingsbury landfill will require regrading on all slopes to provide a workable base on which the permanent impermeable cap can be applied. The borrow material from the spoil during the vertical cutoff wall installation, and/or borrow from the existing sand deposits located west of the landfill may be used for the regrading operation. Miscellaneous piles of refuse deposits most recently placed, and therefore not containing hazardous wastes, may be regraded to simplify the entire regrading operation.

The Fort Edward landfill does not have the steep side slopes as at the Kingsbury landfill. Sufficient quantities of sand, now used for daily cover near the landfill, may be utilized for regrading the site. Regrading of the site can be accomplished with relative ease using standard construction techniques.

A proof rolling is recommended for both landfills to minimize future vertical displacement due to differential settlement. This proof rolling can be best accomplished using a 30-ton compactor.

Any miscellaneous refuse located on or beyond the limits of the landfills will be collected and buried within the site. While there is a minimal amount of vegetation growing on each of these landfills now, regrading of the landfills will undoubtedly disturb some adjacent vegetation. Any trees and brush within the limits of the landfill will be removed, and any tree stumps will be ground to grade to avoid subsequent differential settlement.

11.03 Final Cover

Following site preparation, the landfills will be covered with a material that will meet the closure requirements of 6NYCRR Part 360. The regulations require a cover of material at least 24 inches thick with the lower 18" a material to restrict infiltration to the equivalent of a hydraulic conductivity of 10^{-5} cm/sec. or less. The upper 6" of this cover should be of a suitable composition to sustain plant growth. It has been reported that the average frost penetration in the Washington County area is 30 inches. Therefore, the recommended final cover will consider the freeze-thaw cycle and the impact upon an impermeable cover.

The recommended final cover material to be applied to the Kingsbury and Fort Edward landfills is therefore a 3 foot cover of local clay, compacted to meet the regulatory requirements, with 6 inches of topsoil placed on the completed landfill surface.

Each of the completed covers will be seeded to establish a vegetative growth for the control of erosion. The selected seed mix will be comprised of a species adapted to the northeast, which have dense, shallow root systems, have acid pH tolerance, and are resistant to extremes of wet and dry.

The surface of each completed landfill cover will incorporate a system of drainage swales designed to promote surface runoff from the landfills into adjacent drainage channels.

11.04 Surface Drainage

Due to the continual use of the Kingsbury and Fort Edward landfills, the final elevations have not been established. Surface water drainage channels will be installed on each site on the final cover to carry surface water rapidly to a natural drainage channel. Upland diversion drainage channels will be constructed to divert flow away from either the Kingsbury or the Fort Edward landfill and discharge surface runoff to a natural drainage channel.

During the construction activity, and for a period of time until vegetation can be established, sedimentation basins at both the Kingsbury and Fort Edward landfills will be maintained. These basins will collect surface runoff from the landfills and allow the suspended solids to settle prior to the water being discharged to natural drainage system.

11.05 Groundwater Control System

It has been determined that the groundwater table is vertically less than 5.0 feet from the bottom of refuse at both the Kingsbury and the Fort Edward landfills. To provide effective isolation of the landfill, vertical cutoff walls will be recommended to be constructed of soil/bentonite, soil/cement, or cement/bentonite. Material excavated during installation of the cutoff walls around the entire perimeter of each landfill will be used in the construction of the cutoff walls or used during initial grading of the site, dependent on the physical characteristics of the excavated material.

11.06 Effect of Containment on Leachate

After placement of the final cover, and installation of the vertical cutoff walls, recharge to and discharge from each landfill due to groundwater and surface water infiltration will be eliminated. Leachate currently within the limits of the site will be permanently isolated from the surrounding environment. The continual production of leachate, as it now exists at these two landfills, will be mitigated by this remedial program.

11.07 Methane Gas Ventilation

Since the Kingsbury and Fort Edward landfills are active landfills, and receive large quantities of municipal refuse, a gas venting system will be recommended at each landfill. These gas vents will be constructed on a grid network, and if sufficient testing prove the gases not to be explosive, the vents will direct decomposition gases to the atmosphere. The sand materials used for daily cover will allow any decomposition gases to reach the gas vent trenches, and the gases, if any, can be properly controlled. Gas vents can be constructed through the clay cover and properly sealed to limit infiltration through the cover.

11.08 Physical Site Security

Access to the Kingsbury and Fort Edward landfills will be controlled by a gate on the access roads and appropriate signs surrounding the site to warn of the possible dangers.

11.09 Maintenance Program

The extent of routine maintenance activities required to ensure the continued efficacy of the Kingsbury and Fort Edward Remedial Program is minimal. The requirements for monitoring the effectiveness of the program are somewhat more extensive and are discussed separately.

A large proportion of the long-term maintenance effort will involve mowing the vegetation on the completed cover. No trees, shrubs, or brush should be allowed to germinate or establish on the completed landfills. Periodic inspection of the site will reveal any problems of erosion, differential settlement, insect or rodent damage, and disease, or thinning of vegetation which will require correction. Those areas where vegetation appears to be thinning out over time will require occasional overseeding to keep the cover as dense and uniform as possible. If differential settlement should occur, even after proof rolling of the landfill and compaction of the cover material, additional soil should be made available at the site to provide for a continuation of satisfactory cover material.

11.10 Monitoring Program

The purpose of undertaking monitoring activities is to measure the effectiveness of the remedial program and to ascertain whether wastes are being released from the landfill.

The monitoring activities described herein are those recommended for the first year following completion of the remedial program. At the end of that period, sufficient data will have been collected to allow NYSDEC to evaluate and amend as necessary the frequency of sampling and analysis for the remainder of the post closure period.

1. Cover Erosion - Minor erosion of the cover may occur due to unavoidable imperfections in the placement of the vegetative cover, and differential settlement that may occur. This minor erosion does not constitute failure of the system, and will be remedied under the program of routine maintenance previously described. Any erosion of the cover, which is severe enough to permit exposure of refuse fill could obviously be detected by visual observation. It is recommended that a thorough visual inspection of the area be made at one-month intervals for the first year, until a vegetative growth has been established. The newly seeded area will be most susceptible to erosion during severe rainstorms, so the site should be inspected after any storm having an intensity greater than 0.25 inches/hour for a duration exceeding 3 hours. Any damage to the final cover should be repaired promptly.

2. <u>Monitoring of Groundwater Behavior</u> - In order to assess the integrity of the remedial program at each landfill, it is recognized that downgradient groundwater should be examined to ascertain the long-term changes in contaminant concentration.

It is recommended that 2 downgradient groundwater monitoring wells be installed at each landfill or to utilize those groundwater monitoring wells that were installed as part of this investigation and remain after the remedial construction activity. In addition, an upgradient groundwater monitoring well at each landfill should be installed, or utilize an existing upgradient groundwater monitoring well at each landfill. The location of these wells will be specified in the final plan. The groundwater from these wells will be monitored for elevation and groundwater samples collected on a quarterly basis. These samples will be analyzed for the following parameters:

Chlorides
Specific Conductivity
Total Organic Carbon
pH
Total Iron
Total Dissolved Solids

This practice will be reduced and ultimately terminated when warranted by the data.

SECTION 12 - RECOMMENDED REMEDIAL PROGRAM - INDUSTRIAL WASTE LANDFILL CLOSURE

12.01 General

On-site containment is the recommended remedial program for closure of the Kingsbury and Fort Edward landfills as industrial waste landfills. In this section, the preliminary recommended closure plan for the Kingsbury and Fort Edward landfills is presented. The remedial program is very similar to that remedial program recommended for the municipal landfill closure remedial program.

A cross section through the Kingsbury and Fort Edward landfills of the proposed Remedial Program for Industrial Landfill Closure is shown on Figure 11.

12.02 Site Preparation

The items mentioned in Section 11.02 are relevant to on site containment of an industrial waste landfill. The landfill surfaces need to be regraded to acceptable slopes as previously discussed, with proof rolling prior to regrading.

Special care needs to be taken in the proof rolling phase to avoid crushing of any drums that may be buried within the landfill and cannot be visually observed. A safety plan and a contingency plan will need to be developed as part of the remedial action contract documents.

12.03 Final Cap

Following site preparation, it is recommended that the site be covered with an impermeable cap of local clay, which shall be compacted in uniform lifts. The effectiveness of the cap is dependent on the ability of the clay material to retain its as-placed impervious state when subjected to the long-term cyclic effects of exposure to the environment. The in-place soils will be of acceptable composition and thickness and have a hydraulic conductivity, or permeability, of 1 X 10^{-7} cm/sec or less.

Each winter, the upper zone of the cap will be subjected to freezing. In frost-susceptible soils the formation of ice lenses, and the subsequent thawing of the ice lenses in the spring, can leave cracks in the material which could raise the average permeability of the soil mass. The degree of ice lens formation is related to the availability of free water and the size of the pore space in the soil. At these two landfill locations, ice lens formation should not be a serious problem because the water table will be substantially below the elevation of the final cover. In the Washington County area, the average depth of frost penetration is about 30 inches. Construction of a cap with a total thickness of 36" together with a 6" topsoil cover will provide at least 1 foot of unaffected clay layer, minimizing the possibility of cracking of the impervious layer due to annual freeze/thaw action.

Another potential area of concern is differential settlement of the cap. As described earlier, proof rolling the existing surface will densify any remaining shallow zones or loose soil. The finished cap should be sufficiently flexible to accommodate additional differential settlements that may occur due to consolidation.

The completed cap will be seeded with a shallow root grass cover tolerant of the conditions which exist in the northeast.

12.04 Surface Drainage

Surface drainage will be addressed in the same manner as discussed in Section 11.04. Material that is excavated for the construction of surface water drainage channels and diversion ditches will be used to regrade the site prior to the installation of the impermeable cap.

Continuous sampling by means of a 24-hour composite sampler will be performed at a new sampling location southeasterly of each landfill throughout the construction period. These samples will be retained and if at any time during construction, it is determined that a spill or similar problem may have occurred, appropriate water samples will be selected and analyzed.

During the construction activity, and for a period of time until a final vegetative cover can be firmly established, sedimentation basins will be operated and maintained.

12.05 Groundwater Control System

As discussed in Section 11.05, the groundwater table was determined to be within 5.0 feet of the bottom of refuse at both the Kingsbury landfill and the Fort Edward landfill.

In order to provide effective isolation of the landfills from the groundwater, and to prevent recharge from and discharge to the groundwater system, vertical cutoff walls constructed of soil/bentonite , soil/cement, or cement/bentonite will be installed around the entire perimeter of each landfill. Material that is excavated during the installation of the cutoff walls will be used in the construction of the vertical cutoff walls, if the soils are found to be acceptable for that purpose. This excavated soil may also be used during initial grading of the site, or as a final cover material over the site dependent upon the physical characteristics of the material.

12.06 Effect of Containment on Leachate

After placement of the impermeable cap on each landfill and the installation of the vertical cutoff walls, recharge to and discharge from each of the landfills due to groundwater and surface water infiltration will be eliminated. Leachate currently within the limits of each of the landfills will be permanently isolated from the surrounding environment.

12.07 Ventilation of Gases

Since the Kingsbury and Fort Edward landfills continue to be active disposal facilities, and to receive large quantities of municipal solid waste, methane gas may be produced and may continue to be produced after the closure of the landfills. While no other organic or PCB volatilization has been identified at the two landfills, the gas vent system to be installed will be constructed so that any gases generated will pass through a carbon filtration system. This air filtration system has been demonstrated to remove organic contaminants in the air and will assure that any gases generated in the landfills, will be controlled and effectively filtered.

12.08 Physical Site Security

The physical security measures recommended for an industrial waste landfill require the installation of an impassable barrier around the entire perimeter of each landfill to prevent persons from entering the landfills and engaging in activities which could comprise the integrity of the remedial program. To effectively control access, a complete perimeter fence will be installed at each landfill site, beyond the limits of the construction. Appropriate warning signs will be installed along the fence.

12.09 Maintenance Program

The extent of routine maintenance activities required to ensure the continued efficacy of the Kingsbury and Fort Edward Remedial Program is essentially the same as outlined in Section 11.09. The requirements for monitoring these two landfill sites is somewhat more extensive and will be discussed in Section 12.10. A maintenance program for the security fence will need to be developed to assure that the fences and signs remain in place. A maintenance program for replacement of the carbon filtration units on the gas venting system will be developed to insure that excess pressures are not being developed, and that the carbon filters are replaced when indicated as saturated.

12.10 Monitoring Program

The purpose of developing a monitoring program is to be able to measure the effectiveness of the remedial program and to ascertain if the goal of the program is being met, i.e. to abate any significant current and future releases or migration of hazardous wastes from the landfills.

1. Cap Erosion - The monitoring activities described in Section 11.10, Cap Erosion will also apply to the cap erosion monitoring program to be recommended for the industrial landfill closure remedial program.
2. Monitoring of Groundwater Behavior - In order to assess the integrity of the remedial program at the Kingsbury and Fort Edward landfills, it is recognized that downgradient

groundwater should be examined to determine what long range changes in contaminant concentrations are occurring.

It is recommended that 3 downgradient groundwater monitoring wells be installed at each landfill, or to utilize those properly constructed groundwater monitoring wells that were installed as part of this investigation and remain after the construction work. In addition, one upgradient groundwater monitoring well should be installed at each landfill site, or to utilize an existing upgradient well at each landfill. The location of these wells will be specified in the final plan.

The samples from these groundwater monitoring wells will be collected quarterly, and the elevation of the groundwater will also be monitored following the completion of the construction phase. The groundwater samples from the wells will be analyzed for the following parameters:

Specific Conductance
Chlorides
Total Organic Carbon
pH
Total Dissolved Solids
Total Iron
Benzene, Toluene, Xylene, (BTX)
PCBs
Chlorobenzene

This practice will be reduced and ultimately terminated when warranted by the data.

SECTION 13 - REQUIRED EASEMENTS AND IMPLEMENTATION SCHEDULE

13.01 Required Easements

At this time, it is anticipated that easements from three parcels of land would be required for the implementation of the remedial program at the Kingsbury landfill. Those reputed property owners are: Mario Sassone, James D. Sherman, Howard Burch and Robert Liebig. The Kingsbury landfill is located on property reputedly owned by Jeanne Murphy, and leased by the Town of Kingsbury.

At the Town of Fort Edward landfill, it is anticipated that easements of two parcels of land would be required from Margaret Dexter, and an unknown property owner located southerly of the Fort Edward landfill.

13.02 Implementation Schedule

The schedule for implementation for the review of the recommended remedial programs at the Kingsbury and Fort Edward landfills is dictated largely by the time constraints for review of the engineering documents, as specified in the agreement between General Electric Company and NYSDEC. The implementation schedule for the actual construction of the remedial program will be dictated by the time of closure of the two presently operating landfills.

A listing of the various tasks to be accomplished and the maximum time limits imposed by the General Electric Company - NYSDEC agreement are as follows:

Review Engineering Report (NYSDEC)	60 days
Respond to Review Comments (GE)	60 days
Review Revised Report (NYSDEC)	30 days
Prepare Final Plans (GE)	60 days
Review Final Plans (NYSDEC)	60 days
Respond to Review Comments (GE)	60 days
Review Revised Plans (NYSDEC)	30 days

On this basis, a preliminary project implementation schedule has been developed and is shown in bar graph form on the following page. This schedule assumes that the maximum time allotted for each item will be used, so the date shown for completion of review of the revised plans by the NYSDEC actually represents the "worst case" situation. If a minimum amount of time is spent on review and revision of engineering reports and plans, it is possible that the project could be completed three to six months earlier.

KINGSBURY-FORT EDWARD SITES
REMEDIAL PROGRAMS
REGULATORY APPROVAL SCHEDULE

WORK ITEM	MAXIMUM DURATION	1982									1983						
		A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J
Field Investigations	---																
Engineering Report Through	4/1/82																
DEC Approval of Eng. Report	60 days	■	■														
Revise Engineering Report	60 days			■	■												
DEC Approval of Revised Engineering Report	30 days					■											
Engineering Plans & Specs	60 days						■	■									
DEC Approval of Engineering Plans & Specs	60 days								■	■							
Revise Eng. Plans & Specs	60 days										■	■					
DEC Approval of Revised Engineering Plans & Specs	30 days												■				

SECTION 14 - SUMMARY

14.01 Summary

The results of the field investigations which were conducted at the Kingsbury and Fort Edward landfills are summarized in Section 6. A brief summary of this engineering report is:

1. The Kingsbury landfill contains about 920,000 yd^3 of solid waste material and the area of the site is approximately 14 acres. The Fort Edward landfill contains about 540,000 yd^3 of solid waste material and the area of the site is about 18 acres. The depth of fill at the Kingsbury landfill may be as great as 60 to 70 feet. The depth of fill at the Fort Edward landfill is approximately 20 to 30 feet.
2. Monitoring, sampling, and analyses of the groundwaters were undertaken to define groundwater flow patterns and rates, and to estimate the magnitude of migration of wastes via the groundwater flow systems. In both the Kingsbury landfill and the Fort Edward landfill, groundwaters were determined to exist at depths not greater than 5 feet from the bottom of solid waste. As a result of this study, PCBs were detected in only one groundwater sample. Measurable quantities of organics have been shown to discharge from each landfill by the groundwater transport mechanism.
3. Monitoring, sampling and analyses were undertaken to define the potential for erosional losses of waste materials by discharge to surface water runoff. It has been determined that the loss of waste materials through this transport mechanism

was insignificant during peak and base flow conditions at the time of sampling.

4. Sampling and analyses of the leachates that are generated at the Kingsbury and Fort Edward Landfills were undertaken to determine if leachate was a major transport mechanism. Measurable concentration levels of municipal and industrial components have been detected in the leachate adjacent to the Kingsbury landfill. While no analytical data is available regarding municipal components in the leachate at the Fort Edward Landfill, the leachate does contain industrial waste components. However, surface water samples taken at locations beyond the bases of each landfill, indicates insignificant concentration levels.
5. Three remedial option programs were evaluated for the municipal landfill closure alternative: no action, off-site disposal, and in-place containment. The criteria used to evaluate these alternatives include: Technical feasibility, Ease of implementation, and Compliance with regulatory requirements. In-place containment for both the Kingsbury landfill and the Fort Edward landfill is the recommended remedial program for closure of the municipal landfills.
6. Two remedial option program were evaluated for the industrial waste landfill closure alternatives: Off-site disposal and in-place containment. The criteria used in the evaluation of these alternatives include: Compatibility with state program goals, Technical feasibility, Ease of implementation, and Compliance with regulatory requirements. In-place containment for the

Kingsbury and Fort Edward landfills is the recommended remedial program for closure of the industrial waste landfills.

7. Two in-place containment alternative remedial programs were evaluated for each landfill. Capping each landfill and installing a vertical cutoff wall to lacustrine clay is the recommended remedial program at both Kingsbury and Fort Edward landfills because of the effectiveness of the remedial program, the ease of implementation, and the minimal maintenanc required.

8. A preliminary plan for in-place containment of the Kingsbury and Fort Edward landfills is presented for a municipal landfill. The remedial program for the municipal landfill includes a cover of local clay compacted to meet regulatory requirements, installation of vertical cutoff walls, surface water diversion and drainage, gas collection and venting program, and application of topsoil and seeding of the final landfill cover. The remedial program also includes provisions for maintenance of the two landfills and a monitoring program to measure the remedial program effectiveness.

9. A preliminary plan for in-place containment of the Kingsbury and Fort Edward landfills for an industrial waste landfill is also presented. This remedial program includes a cap of an impermeable local clay compacted to meet regulatory requirements, installation of vertical cutoff walls to lacustrine clay, surface water diversion and drainage, gas collection and treatment system, and establishment of a vegetative cover. The remedial program also includes provisions for operation and

maintenance of the two landfills and a monitoring program to measure the remedial program effectiveness.

10. The preliminary implementation schedule calls for final approval of the Engineering Plans and Specifications by April 1, 1983.

11. The preliminary estimate of construction costs, including contingencies, of the recommended remedial programs are summarized below. The first year maintenance and monitoring costs, and subsequent years' monitoring and maintenance costs, are also summarized below. All costs are shown in 1982 dollars:

	Kingsbury Landfill	Fort Edward Landfill
Municipal Landfill Closure		
Estimated Construction Costs	$1,086,000	$1,223,000
- 1st Year Maintenance and Monitoring	24,500	24,500
- Subsequent Years' Maintenance and Monitoring 4 yrs @$10,500/yr	42,000	42,000
Total Estimated Present Worth	$1,152,500	$1,289,500
Industrial Landfill Closure		
Estimated Construction Costs	$1,225,200	$1,369,600
- 1st Year Maintenance and Monitoring	28,200	28,200
- Subsequent Years' Maintenance and Monitoring 29 yrs @$14,200/yr	411,800	411,800
- 30 yrs operating cost @ $1750/yr	52,500	52,500
Total Estimated Present Worth	$1,717,700	$1,862,100

Respectfully submitted,

O'BRIEN & GERE ENGINEERS, INC.

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Senior Vice President

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TABLE 1

GROUNDWATER ELEVATIONS

Monitoring Well No.	Ground Surface Elevation	Approximate Well Depth (feet)	Measured Groundwater Elevation (Above M.S.L.)			
			9/11/81	10/1/81	10/14/81	11/4 - 11/6/8
1	268.9	44	---	DRY	DRY	227.40
2	201.7	40	---	192.29	192.89	192.69
2A	201.8	50	---	191.89	192.29	190.89
3	178.7	20	---	173.40	173.40	173.80
4	180.8	20	---	178.96	179.01	179.31
5	179.5	19	---	172.64	173.39	175.24
6	181.7	24	---	179.15	179.45	179.45
6A	181.4	45	---	172.59	171.29	175.39
7	200.8	24	---	193.39	193.59	194.19
8	236.1	18	DRY	DRY	DRY	DRY
9	212.6	30	199.88	200.48	200.48	200.88
9A	212.6	33	194.71	200.51	200.56	200.51
10	197.6	33	184.08	184.68	184.58	184.58
11	169.3	20	164.10	166.20	166.40	167.35
12	180.4	20	176.81	177.61	177.61	178.11
13	189.1	20	184.06	185.74	185.94	186.34
13A	188.9	30	183.46	183.76	181.35	183.86
14	238.7	45	201.66	202.16	201.81	202.94
RFW-1	227.2	---	---	223.82	223.72	---
RFW-2	227.8	65	----DESTROYED--			
RFW-3	173.5	20	---	171.83	172.03	171.83
RFW-4	174.4	20	----	165.92	166.67	170.12
RFW-7	171.3	25	---	166.30	166.30	168.90
RFW-8	189.8	19	---	DRY	DRY	DRY
U01	---	---	---	---	---	---
D01	181.8	---	---	---	181.60	181.70
D02	---	---	---	---	---	---
B-20	214.3	30	---	---	---	---
B-21	189.2	24	---	182.64	182.94	183.14
B-22	194.7	40	---	181.72	182.02	181.92
B-23	191.7	30	---	177.05	183.05	183.05
B-24	192.5	35	---	186.15	186.20	186.35

NOTES:

1. "RFW" notations refer to groundwater wells installed by Weston Environmental Consultants for NYSDEC during previous engineering investigations.

2. "U" and "D" notations refer to wells installed by Dunn Geoscience Corp. for NYSDEC during previous engineering investigations.

3. "B" notations refer to groundwater wells installed by Wehran Engineering, P.C., for NYSDEC during previous engineering investigations.

4. "---" notations refer to data not ascertained.

TABLE 2

LABORATORY ANALYSIS OF GROUNDWATER SAMPLES

Monitoring Well No.	Geologic Column	pH	Conductivity (umhos/cm)	PCB (PPB)	Benzene (PPM)	Toluene (PPM)	Xylene (PPM)	Chromium (PPM)	Lead (PPM)	Nickel (PPM)	Copper (PPM)	Zinc (PPM)	TOC (PPM)	BOD$_5$ (PPM)	COD (PPM)	Chlorides (PPM)
1	clay -	--	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	silt	7.7	240.	<0.01	<0.001	<0.001	<0.001	<0.01	<0.01	<0.01	0.05	0.28	16.	---	---	< 1.
2	sand	8.4	900.	<0.01	<0.001	<0.001	<0.001	<0.01	<0.01	<0.01	0.01	0.02	20.	50.	190.	36.
		8.3	950.	<0.01	<0.001	<0.001	0.001	<0.01	<0.01	<0.01	<0.01	0.14	< 1.	11.	91.	27.
2A	clay -	7.9	550.	<0.01	<0.001	<0.001	<0.001	<0.01	<0.01	<0.01	<0.01	<0.01	70.	---	---	18.
	silt	7.1	600.	<0.01	<0.001	<0.001	<0.001	<0.01	<0.01	<0.01	<0.01	0.05	60.	---	---	12.
3	clay -	7.9	900.	<0.01	<0.001	<0.001	<0.001	<0.01	<0.01	<0.01	<0.01	<0.01	< 1.	---	---	60.
	silt	7.1	1000.	<0.01	<0.001	0.001	<0.001	<0.01	<0.01	<0.01	<0.01	0.07	30.	---	---	61.
4	clay -	8.3	410.	<0.01	<0.001	<0.001	<0.001	<0.01	<0.01	<0.01	<0.01	<0.01	50.	90.	110.	25.
	silt	7.0	500.	<0.01	<0.001	<0.001	<0.001	<0.01	<0.01	<0.01	<0.01	0.07	< 1.	< 1.	22.	39.
5	clay -	8.0	300.	<0.01	<0.001	0.007	<0.001	<0.01	<0.01	<0.01	<0.01	0.01	12.	---	---	6.
	silt	7.2	360.	<0.01	<0.001	<0.001	0.005	<0.01	<0.01	<0.01	<0.01	0.04	< 1.	---	---	2.
6	sand	6.9	1300.	<0.01	<0.001	<0.001	<0.001	0.01	<0.01	<0.01	<0.01	<0.01	30.	4.	157.	65.
		6.7	1350.	<0.01	0.005	0.002	<0.001	<0.01	<0.01	<0.01	<0.01	<0.01	< 1.	7.	60.	71.
6A	clay -	7.6	210.	<0.01	<0.001	0.013	<0.001	<0.01	<0.01	<0.01	0.01	0.02	690.	---	---	14.
	silt	6.2	185.	<0.01	<0.001	<0.001	<0.001	0.01	<0.01	<0.01	0.02	0.12	120.	---	---	4.
7	sand	6.8	320.	<0.01	0.007	2.1	0.15	<0.01	<0.01	<0.01	<0.01	0.01	41.	---	---	8.
		6.6	325.	<0.01	0.004	0.740	0.05	<0.01	<0.01	<0.01	<0.01	0.08	15.	---	---	6.
9	sand	7.1	700.	<0.01	<0.001	<0.001	<0.001	<0.01	<0.01	<0.01	0.01	0.02	< 1.	---	---	45.
		6.5	850.	<0.01	<0.001	<0.001	<0.001	<0.01	<0.01	<0.01	<0.01	0.06	60.	---	---	41.
9A	clay -	8.7	1400.	<0.01	<0.001	<0.001	<0.001	<0.01	<0.01	<0.01	<0.01	0.04	35.	---	---	39.
	silt	6.4	270.	5.2	<0.001	<0.001	<0.001	<0.01	<0.01	<0.01	<0.01	0.07	2.	---	---	47.
10	sand	7.1	700.	<0.01	0.005	<0.001	<0.001	<0.01	<0.01	<0.01	0.01	0.01	40.	---	---	81.
		6.5	700.	<0.01	0.003	0.002	<0.001	<0.01	<0.01	<0.01	<0.01	0.17	80.	---	---	75.
11	clay -	7.4	395.	<0.01	<0.001	<0.001	<0.001	<0.01	<0.01	<0.01	<0.01	<0.01	22.	---	---	14.
	silt	7.4	480.	<0.01	<0.001	<0.001	<0.001	<0.01	<0.01	<0.01	<0.01	0.05	3.	---	---	18.
12	sand	6.7	2000.	<0.01	<0.001	<0.001	<0.001	<0.01	<0.01	0.04	0.01	0.03	100.	10.	305.	260.
		6.8	1700.	<0.01	0.002	<0.001	<0.001	<0.01	<0.01	<0.01	<0.01	0.10	60.	17.	197.	200.
13	sand	6.9	1000.	<0.01	0.006	<0.001	<0.001	<0.01	<0.01	<0.01	0.01	0.01	< 1.	4.	62.	122.
		6.6	1000.	<0.01	0.008	<0.001	<0.001	<0.01	<0.01	<0.01	<0.01	0.14	30.	20.	47.	122.
13A	clay -	7.3	450.	<0.01	<0.001	<0.001	<0.001	<0.01	<0.01	<0.01	0.01	<0.01	31.	---	---	76.
	silt	7.4	600.	<0.01	<0.001	<0.001	<0.001	<0.01	<0.01	<0.01	<0.01	0.09	11.	---	---	80.
14	sand	7.4	1600.	<0.01	0.068	0.92	0.06	<0.01	<0.01	0.13	0.01	0.04	770.	1250.	2290.	83.
		6.4	1720.	<0.01	0.570	0.570	0.130	<0.01	<0.01	0.07	<0.01	0.21	95.	1700.	2000.	104.
GW STANDARDS		6.5-8.5	---	0.1	ND	---	---	0.05	0.025	---	1.0	5.0	---	---	---	250.

NOTES:

1. These results contain data from two rounds of sampling by O'Brien & Gere Engineers. The unshaded data for each well sample is from the first round (9/30-10/2/81), and the shaded data for each well sample is from the second round (11/3-11/6/81).
2. ND - Not Detectable.
3. "---" - Not Ascertained
4. Results from a third round of samples collected during 1/18-1/20/82 from monitoring wells No. 2, 5, 6, and 7 for select parameters appears in Table 2A.
5. All groundwater samples were filtered prior to PCB analysis.
6. GW Standards - New York State Groundwater Classifications Quality Standards and Effluent Standards and/or Limitations.

TABLE 2A

LABORATORY ANALYSIS OF GROUNDWATER SAMPLES

COLLECTED JANUARY 18-20, 1982

Monitoring Well Number	Phenol (PPM)	PCB (PPB)	Benzene (PPB)	Toluene (PPB)	Xylene (PPB)	Trichloroethyl (PPB)
2	< 0.001	< 0.01	< 1.0	2.0	< 1.0	< 1.0
5	< 0.001	< 0.01	< 1.0	< 1.0	< 1.0	< 1.0
6	0.007	< 0.01	< 1.0	1.0	< 1.0	8.0
7	0.069	< 0.01	3.0	110.	23.	< 1.0
N.Y.S.G.W. Standards	0.001	0.1	ND			10.

NOTES:

1. These samples were obtained from an additional groundwater sampling effort from January 18, 1982 to January 20, 1982 by O'Brien & Gere Engineers.
2. PCB Aroclors include 1016/1242, 1254, and 1260
3. All groundwater samples were filtered prior to PCB analysis.
4. Samples were also analyzed for the following parameters, which were not detected or quantified at the appropriate detection limit:

Chlorobenzene	1.0 PPB
Methyl Ethyl Ketone	0.1 PPM
Methyl Iso Butyl Ketone	0.1 PPM
Acetone	0.1 PPM
Methanol	0.1 PPM
Ethanol	0.1 PPM
Iso Propyl Alcohol	0.1 PPM
Formaldehyde	0.1 PPM

5. NYS G.W. Standards - New York State Groundwater Classifications Quality Standards and Effluent Standards and/or limitations
6. ND - Not Detectable.

TABLE 3

LABORATORY ANALYSIS OF SURFACE WATER SAMPLES

Sampling Identification	pH	Conductivity (umhos/cm)	Benzene (PPM)	Toluene (PPM)	Xylene (PPM)	PCBs (PPB)	Chromium (PPM)	Lead (PPM)	Nickel (PPM)	Copper (PPM)	Zinc (PPM)	Chloride (PPM)	Total Organic Carbon (PPM)
1 (Peak Flow)	6.8	320.	<0.005	<0.005	<0.005	<0.01	<0.01	<0.01	<0.01	<0.01	0.07	60.	32.
1 (Base Flow)	6.3	400.	<0.005	<0.005	<0.005	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	54.	24.
2 (Peak Flow)	7.7	275.	<0.005	<0.005	<0.005	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	117.	50.
2 (Base Flow)	7.0	700.	<0.005	<0.005	<0.005	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	99.	61.
3 (Peak Flow)	7.3	600.	<0.005	<0.005	<0.005	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	52.	25.
3 (Base Flow)	7.2	330.	<0.005	<0.005	<0.005	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	56.	25.
4 (Peak Flow)	7.5	60.	<0.005	<0.005	<0.005	<0.01	<0.01	<0.01	<0.01	<0.01	0.04	8.	7.
4 (Base Flow)	6.7	45.	<0.005	<0.005	<0.005	<0.01	<0.01	<0.01	<0.01	<0.01	0.07	5.	4.
5 (Peak Flow)	8.2	60.	<0.005	<0.005	<0.005	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	7.	7.
5 (Base Flow)	7.6	55.	<0.005	<0.005	<0.005	<0.01	<0.01	<0.01	<0.01	<0.01	0.05	6.	6.
6 (Peak Flow)	7.4	160.	<0.005	<0.005	<0.005	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	8.	22.
6 (Base Flow)	6.7	390.	<0.005	<0.005	<0.005	<0.01	0.03	<0.01	0.09	0.03	0.14	37.	76.
7 (Peak Flow)	7.4	820.	<0.005	<0.005	<0.005	<0.01	<0.01	<0.01	0.09	<0.01	0.03	160.	27.
7 (Base Flow)	6.8	1100.	<0.005	<0.005	<0.005	<0.01	<0.01	<0.01	0.09	<0.01	0.04	197.	53.

NOTES:

1. Peak flow samples were obtained on 9/22/81 and base flow samples were obtained on 9/29/81 by O'Brien & Gere Engineers.
2. PCB Aroclors include 1016/1242, 1254, 1260
3. Surface water samples were not filtered prior to analysis.

TABLE 4

LABORATORY ANALYSIS OF LEACHATE SAMPLES

Chemical Parameter	Leachate 1 (Kingsbury)		Leachate 2 (Kingsbury)		Leachate 3 (Kingsbury)		Leachate 4 (Fort Edward)		Leachate 5 (Fort Edward)	
BOD_5	20.	PPM	30.	PPM	---		---		---	
COD	220.	PPM	6580.	PPM	---		---		---	
TOC	40.	PPM	90.	PPM	---		---		---	
TDS	320.	PPM	580.	PPM	---		---		---	
Oil & Grease	8.	PPM	27.	PPM	---		---		---	
Turbidity	31.	Units	1.5	Units	---		---		---	
Color	5.	Units	80.	Units	---		---		---	
Odor	2.	Units	2.	Units	---		---		---	
Arsenic	<0.01	PPM	0.06	PPM	---		---		---	
Nickel	<0.01	PPM	0.08	PPM	---		---		---	
Zinc	<0.01	PPM	0.10	PPM	---		---		---	
Iron	38.2	PPM	128.	PPM	---		---		---	
Benzene	<0.01	PPM	< 0.01	PPM	5.0	PPB	<1.0	PPB	<1.0	PPB
Toluene	<0.01	PPM	< 0.01	PPM	<1.0	PPB	<1.0	PPB	<1.0	PPB
Trichloroethylene	<0.01	PPM	< 0.01	PPM	<1.0	PPB	<1.0	PPB	<1.0	PPB
Chlorobenzene	<0.01	PPM	< 0.01	PPM	102.0	PPB	<1.0	PPB	<1.0	PPB
PCBs	<0.01	PPB	< 0.01	PPB	12.	PPB	55.8	PPB	7.7	PPB
Formaldehyde	---		---		0.13	PPM	<0.1	PPM	<0.1	PPM

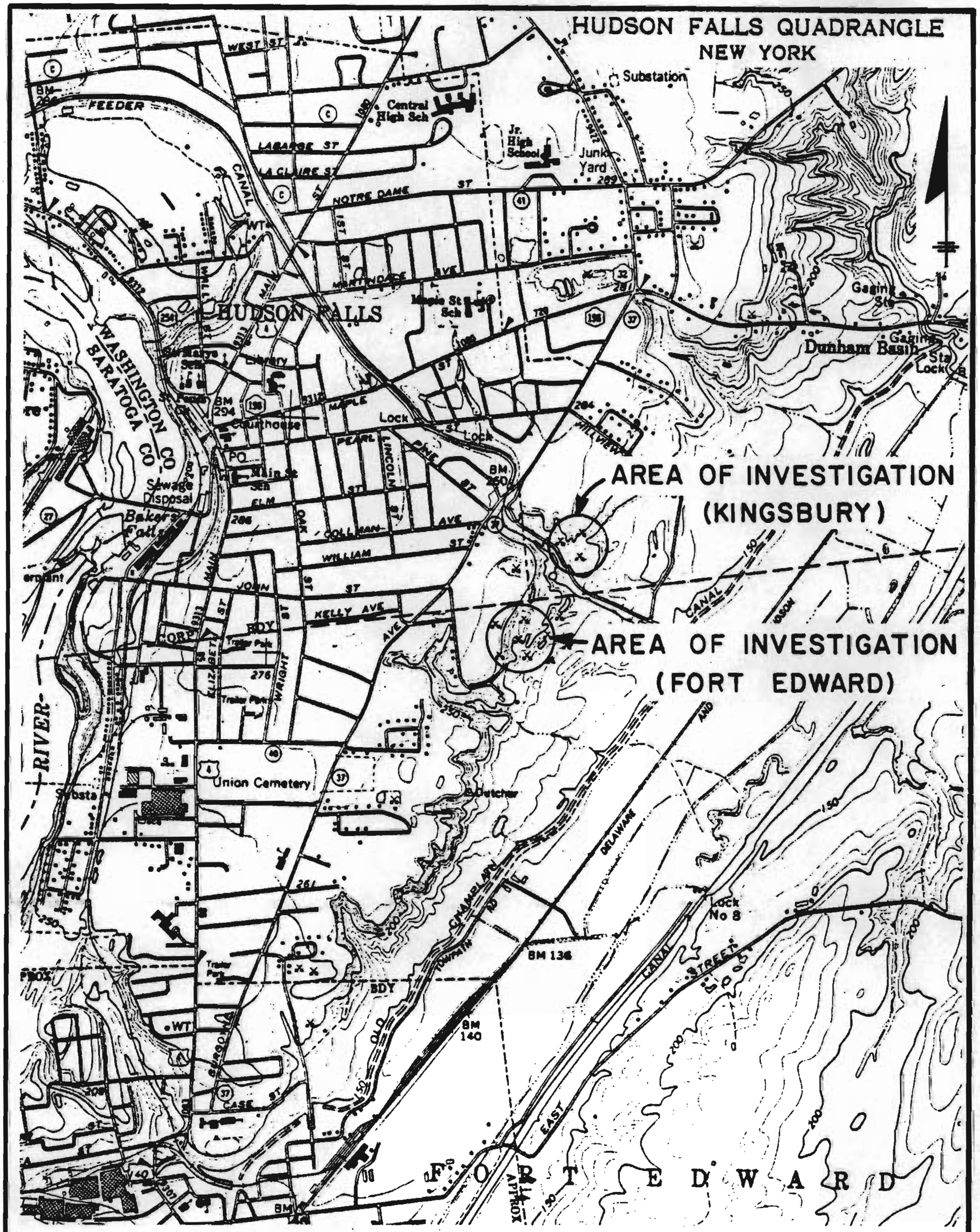
NOTES:

1. Leachate samples 1 and 2 were obtained on 10/22/81 by O'Brien & Gere Engineers and analyzed for the EPA Priority Pollutants in addition to those parameters indicated above. Priority pollutant parameters not listed above were not detected or quantified at the standard analytical detection limits.
2. Leachate samples 3, 4, and 5 were obtained 1/18-20/82 by O'Brien & Gere Engineers.
3. Leachate samples 3, 4, and 5 were analyzed for the following parameters and were not detected or quantified at the noted standard analytical detection limit.

Phenols	0.001	PPM
Methyl Ethyl Ketone	0.1	PPM
Methyl Iso Butyl Ketone	0.1	PPM
Acetone	0.1	PPM
Methanol	0.1	PPM
Ethanol	0.1	PPM
Iso Propyl Alcohol	0.1	PPM
Xylene	1.0	PPB

4. "---" Not Analyzed
5. Leachate samples were not filtered prior to analysis.

FIGURE 1



LOCATION MAP

SCALE IN FEET

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET


U.S. RTE. 4
VILLAGE OF HUDSON FALLS
JOHN ST.
MAIN ST.


ELMER B. GI
(REPUTED OWNER)
JAMES D. SHER
(REPUTED OWNER
MARIO SASSONE
(REPUTED OWNER)
JEANNE MURP
(REPUTED OWN
BURGOYNE AVE.
HUDSON FALLS
FORT EDWARD
INVES

BURCH &
LIEBIG
OWNER)
OF INVESTIGATION
INGSBURY)
INGSBURY
WARD
IGATION

FIGURE 2

LEGEND

— — — —	APPROXIMATE PROPERTY LINE
▬ ▬ ▬ ▬	APPROXIMATE CORPORATE LINE

NOTE:
AERIAL PHOTOGRAPH
FLOWN 1980

KINGSBURY - FORT EDWARD

AERIAL LOCATION PLAN

(APPROXIMATE)
SCALE IN FEET

400 0 400

O'BRIEN & GERE

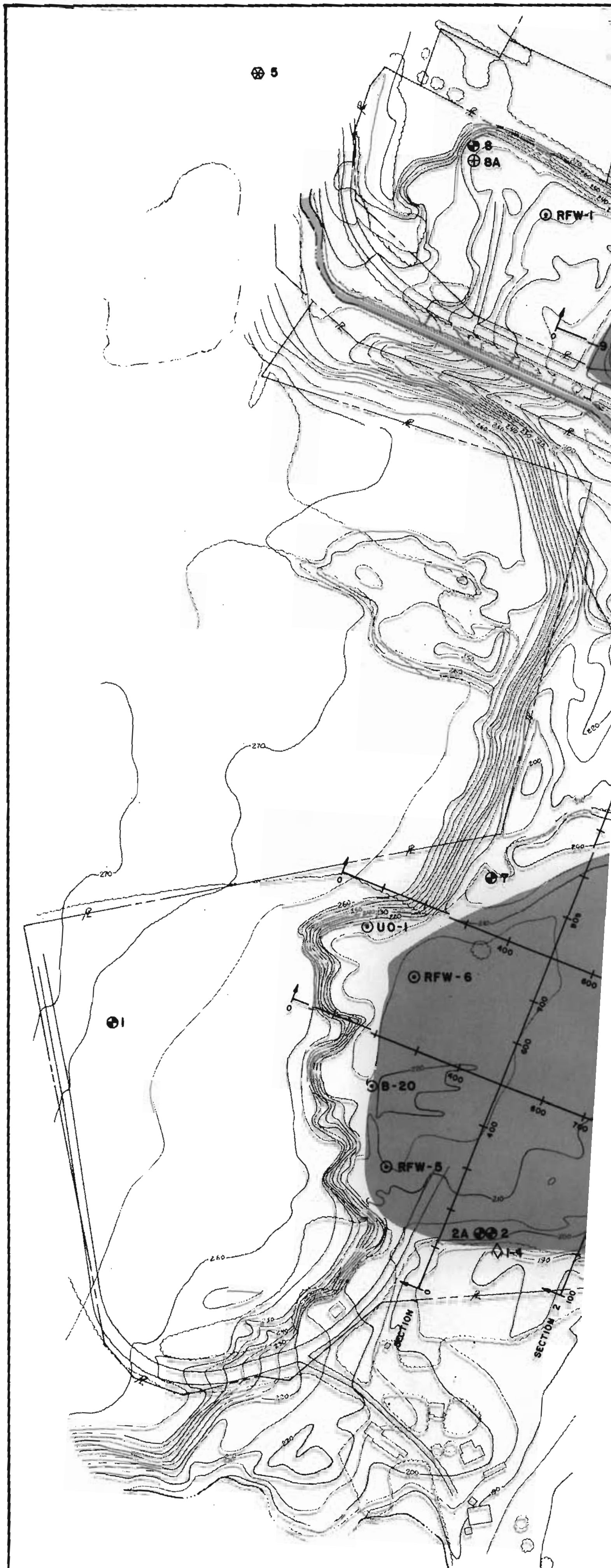
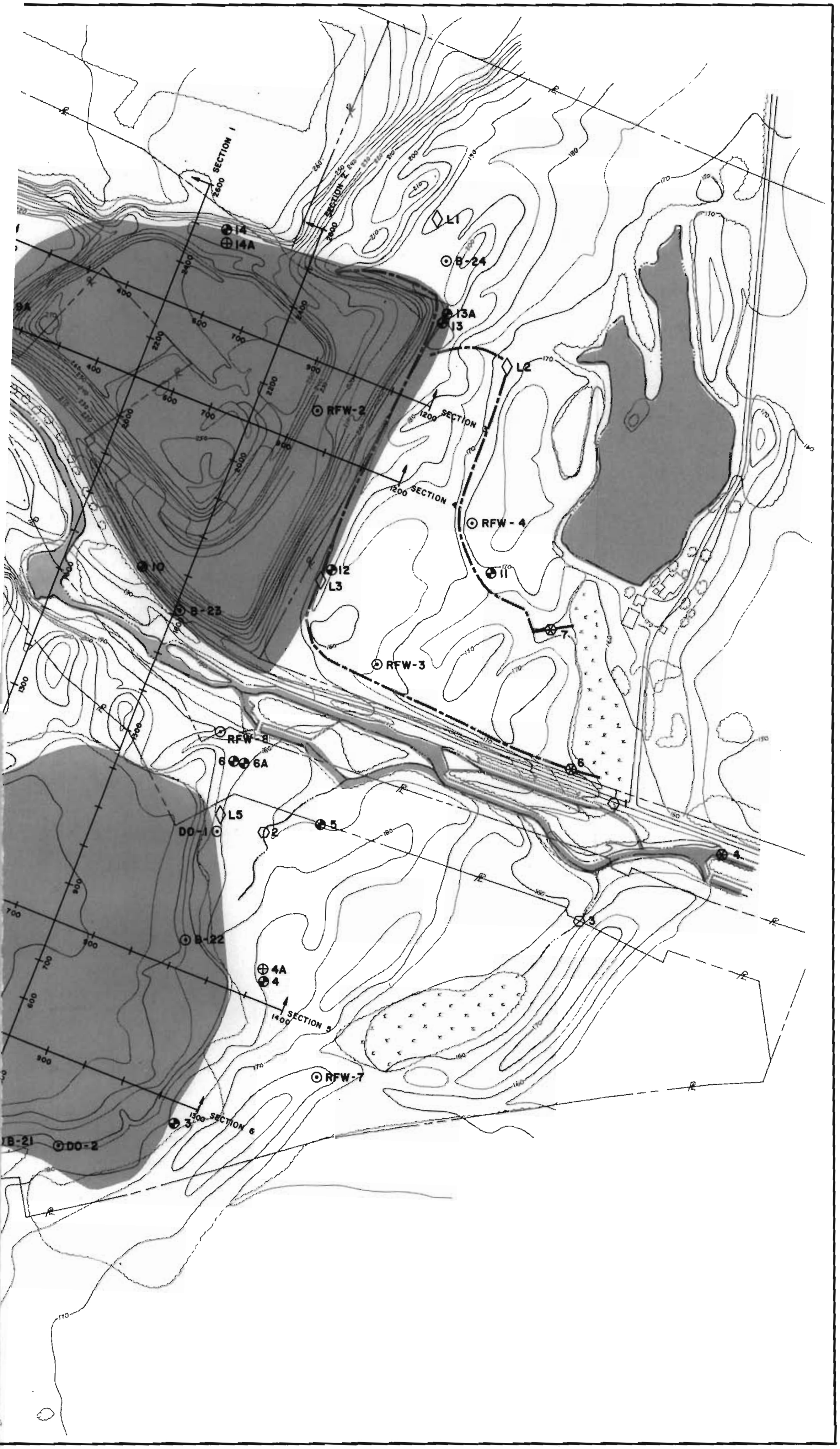

5
8
8A
RFW-1
T
UO-1
RFW-6
1
B-20
RFW-5
2A
2
I-4
270
260
250
240
230
220
210
200
190
400
600
800
700
SECTION
SECTION 2

FIGURE 3



LEGEND

◐	TEST BORING W/GROUNDWATER MONITORING WELL
⊕	PIEZOMETER
⊙	GROUNDWATER MONITORING WELL (INSTALLED BY OTHERS)
⬡	SURFACE WATER FLOW MONITORING STATION
⊛	SURFACE WATER SAMPLING LOCATION
◇	LEACHATE SAMPLING LOCATION
~140~	CONTOUR LINE
- - - -	APPROXIMATE PROPERTY LINE
—·—	DRAINAGE DITCH
—···—	STREAM (OR WATERS EDGE)
⁎ ⁎ ⁎	SWAMP
▬	APPROXIMATE LIMITS OF SITE
▬	SURFACE WATER

NOTES:

1. WELL RFW-2, RFW-5, RFW-6 & B-20 WERE DESTROYED PRIOR TO THIS FIELD INVESTIGATION.
2. TOPOGRAPHIC SURVEY COMPLETED IN 1980 BY OTHERS FOR NYSDEC. LOCATION OF WELLS & WEIRS ESTABLISHED AS A PORTION OF THIS FIELD INVESTIGATION.

KINGSBURY - FORT EDWARD

SITE PLAN

SCALE IN FEET

200 0 200

O'BRIEN & GERE

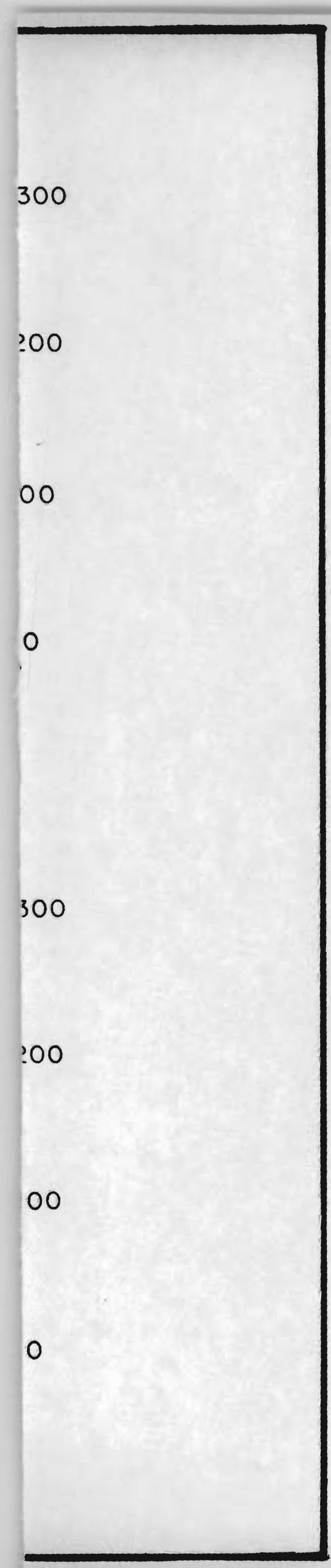


FIGURE 4

LEGEND

WELL # 000.00'

G.W.T. ELEV. 11/6/81

▨ APPROX. LIMITS OF REFUSE FILL

NOTES:

1. REFER TO FIGURE 3 FOR THE TOPOGRAPHIC LOCATION OF GROUNDWATER WELLS. THE WELLS AS SHOWN HERE MAY NOT BE IN THE EXACT PLANE OF THE CROSS – SECTION.
2. GROUNDWATER AND SUBSURFACE PROFILES ARE BASED ON INTERMITTENT DATA POINTS AND THEREFORE MAY NOT REPRESENT THE DETAILED CONFIGURATIONS SHOWN

KINGSBURY - FORT EDWARD

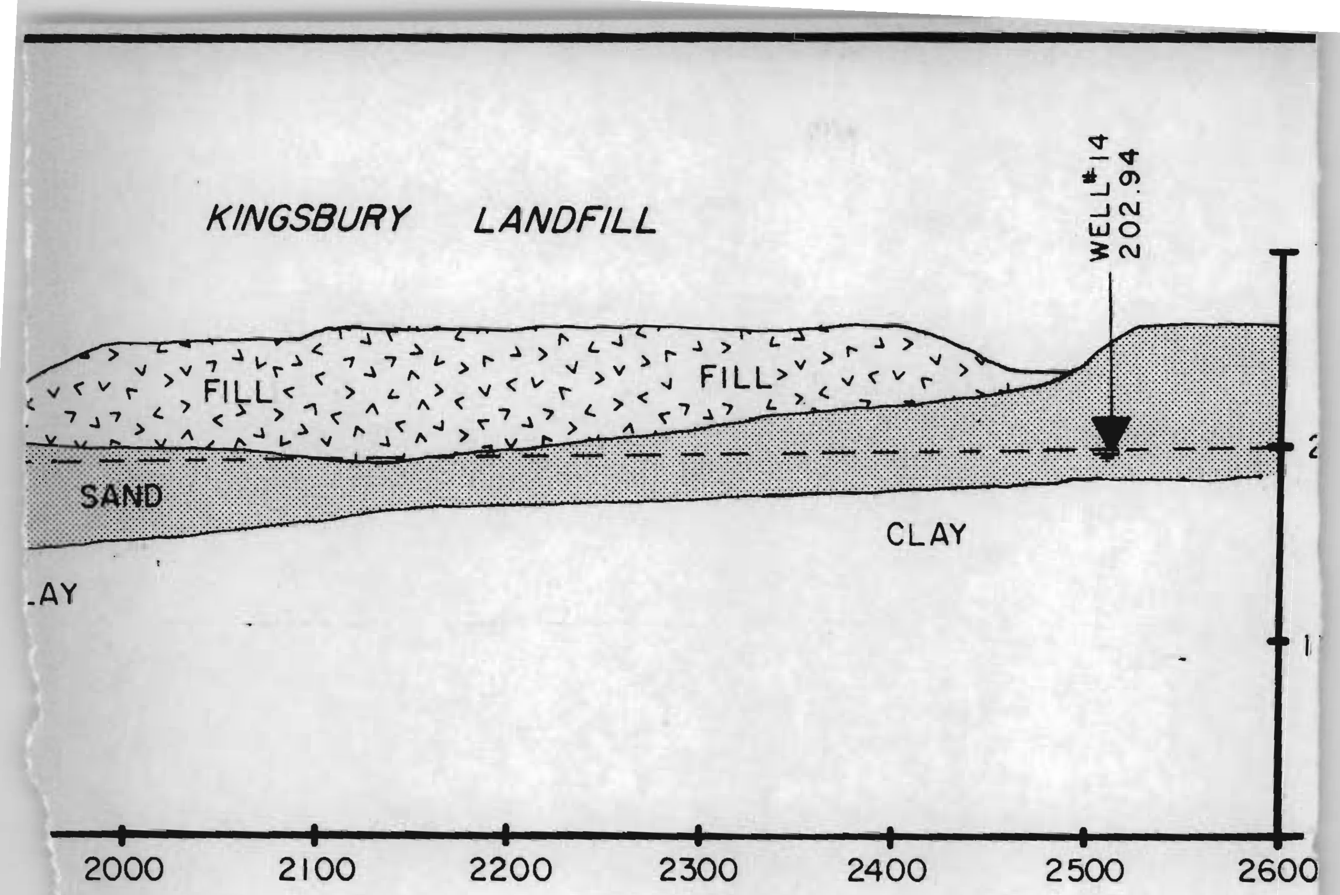
CROSS SECTION
1, 2

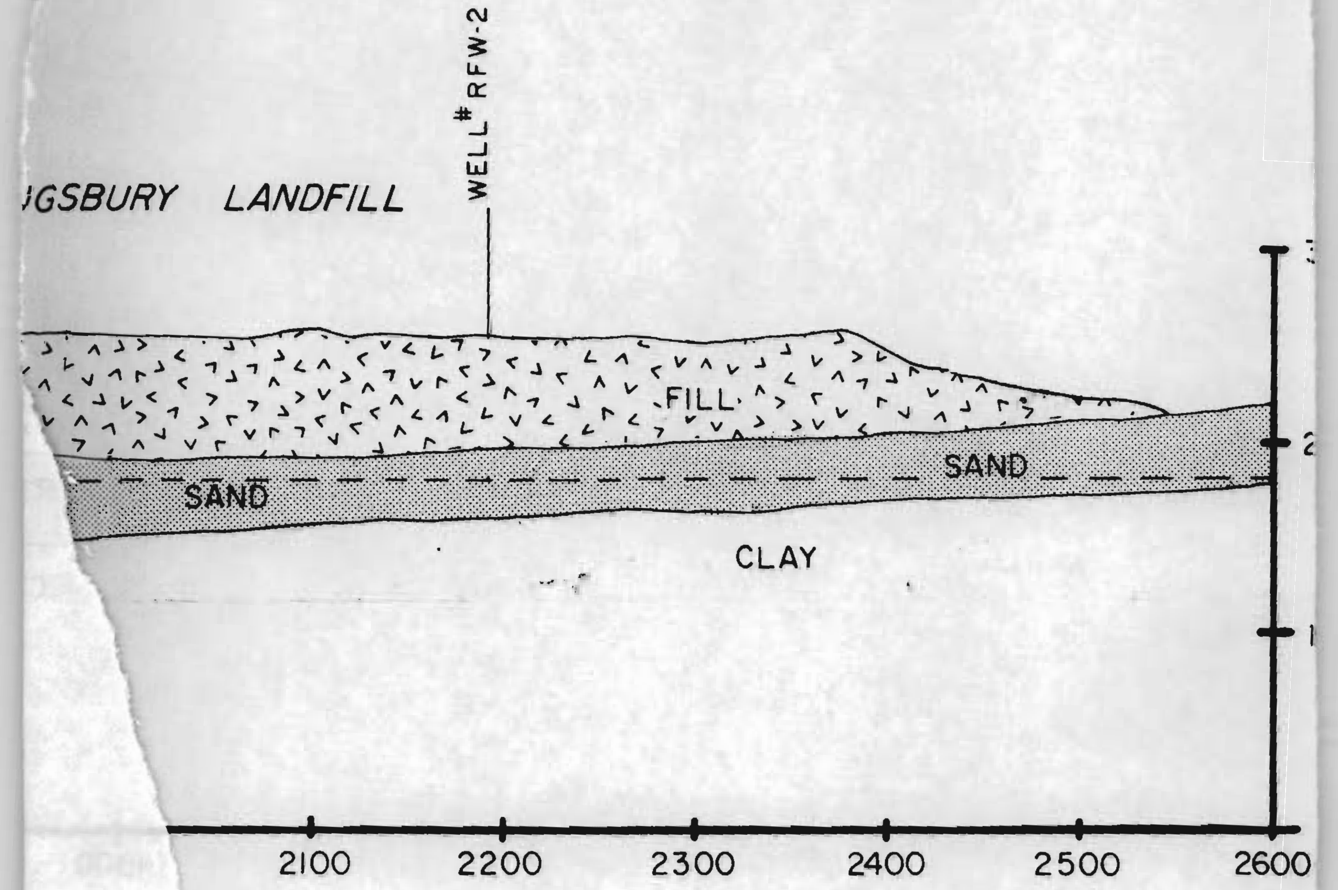
SCALE IN FEET

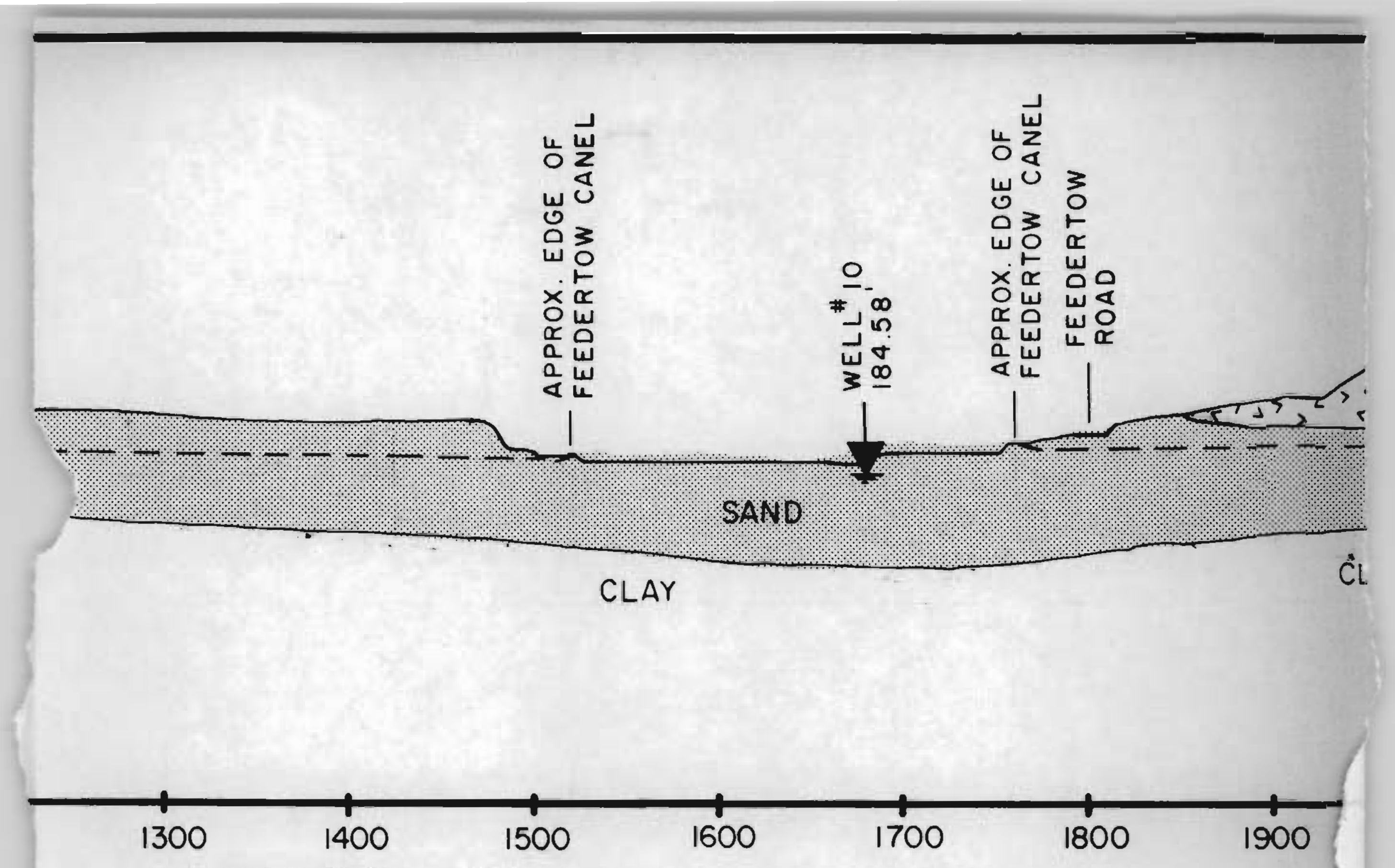
VERT. & HORT.

100 0 100

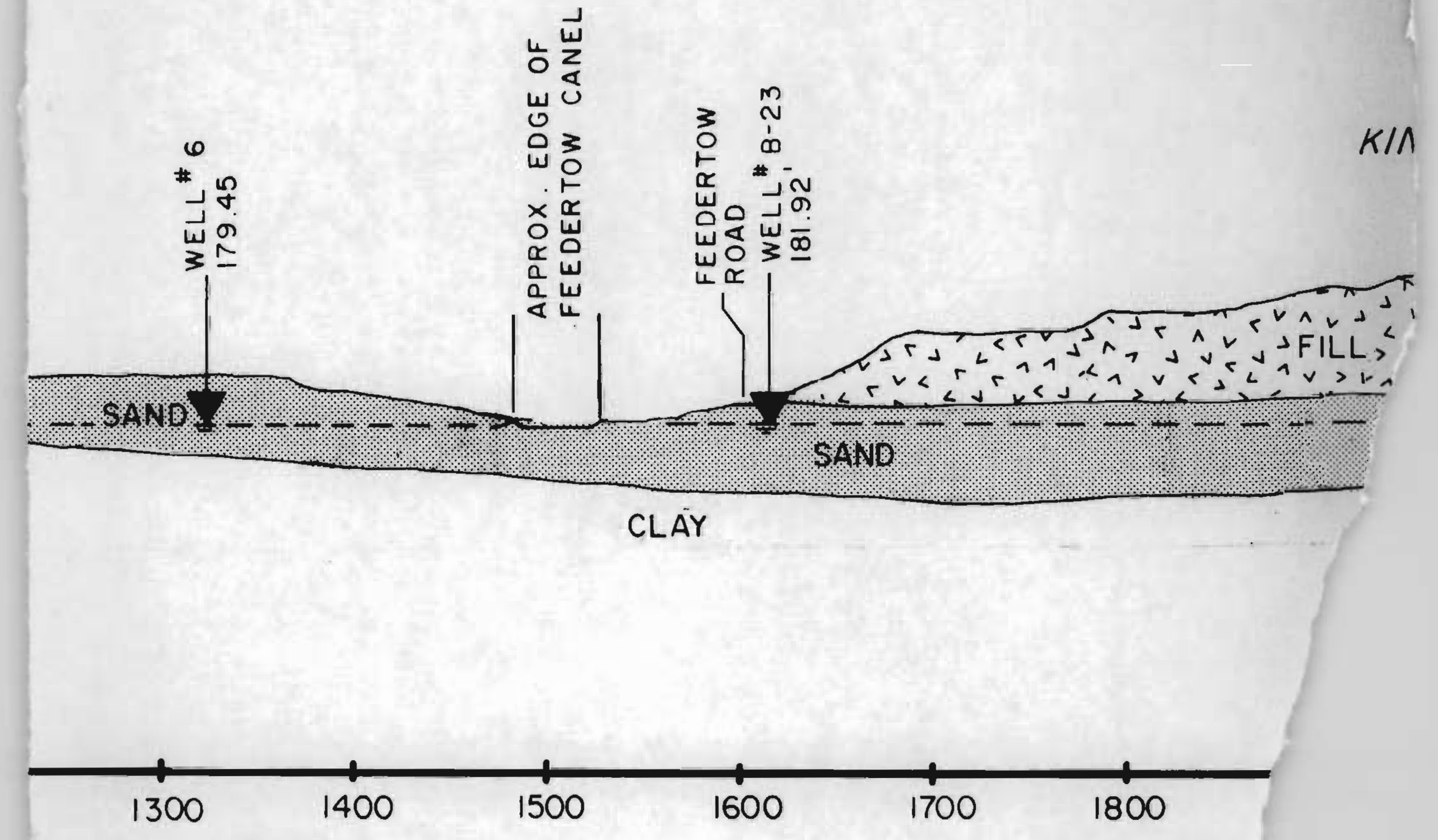
O'BRIEN & GERE


KINGSBURY LANDFILL
WELL# 14
202.94
FILL
FILL
SAND
CLAY
LAY
2000
2100
2200
2300
2400
2500
2600

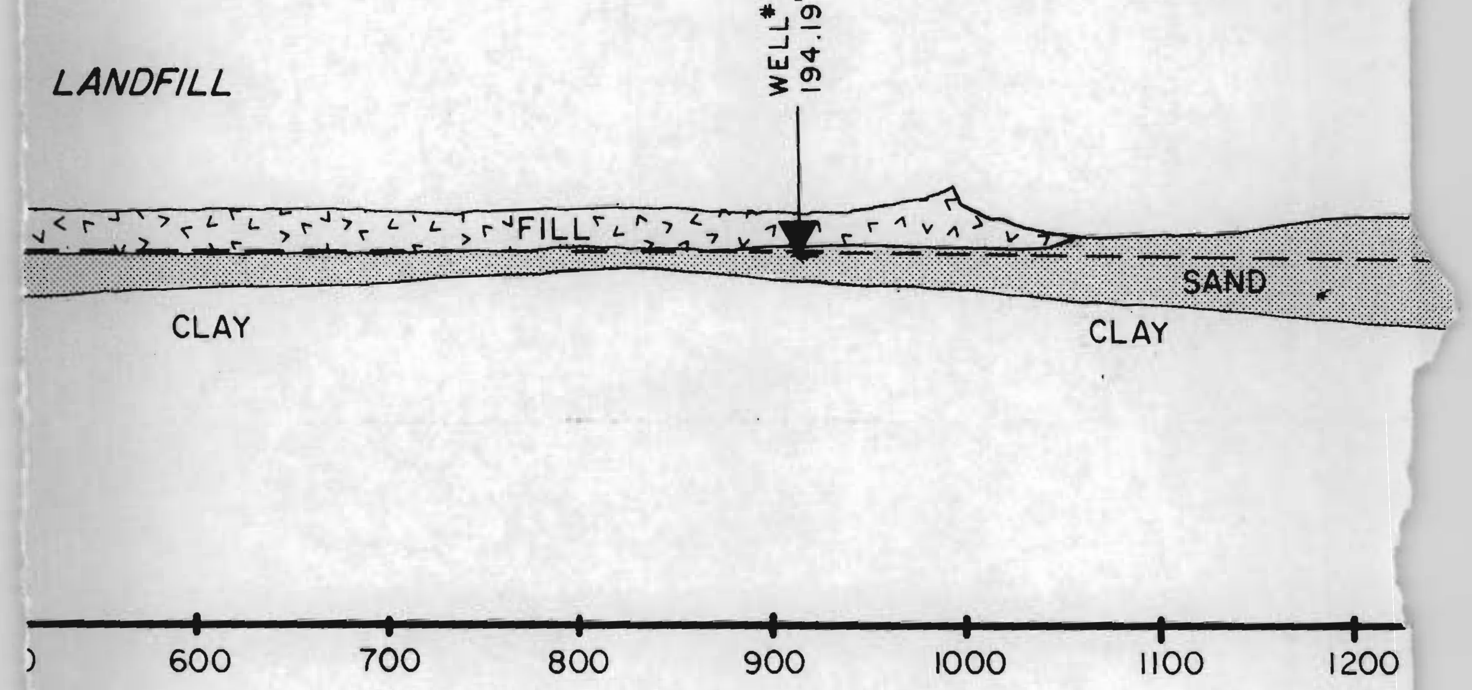

GSBURY LANDFILL
WELL# RFW-2
FILL
SAND
SAND
CLAY
2100
2200
2300
2400
2500
2600

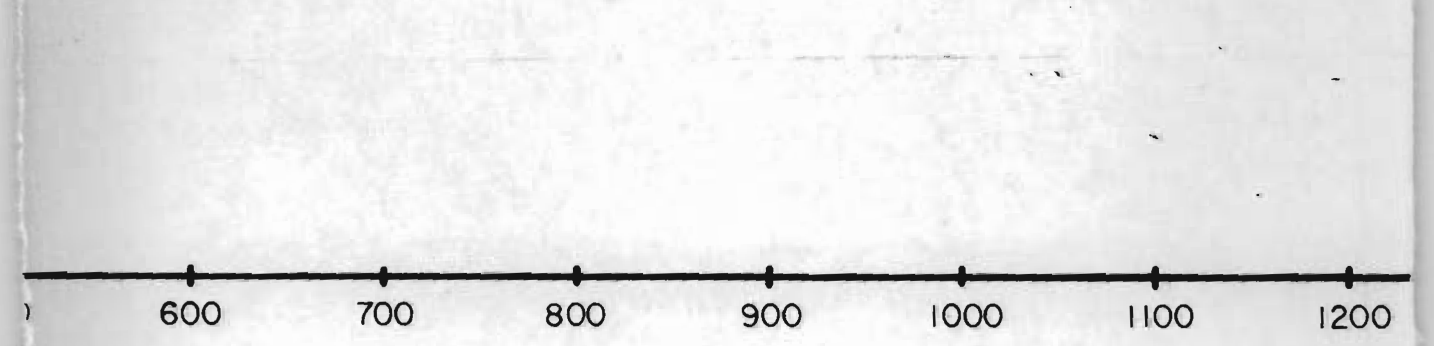


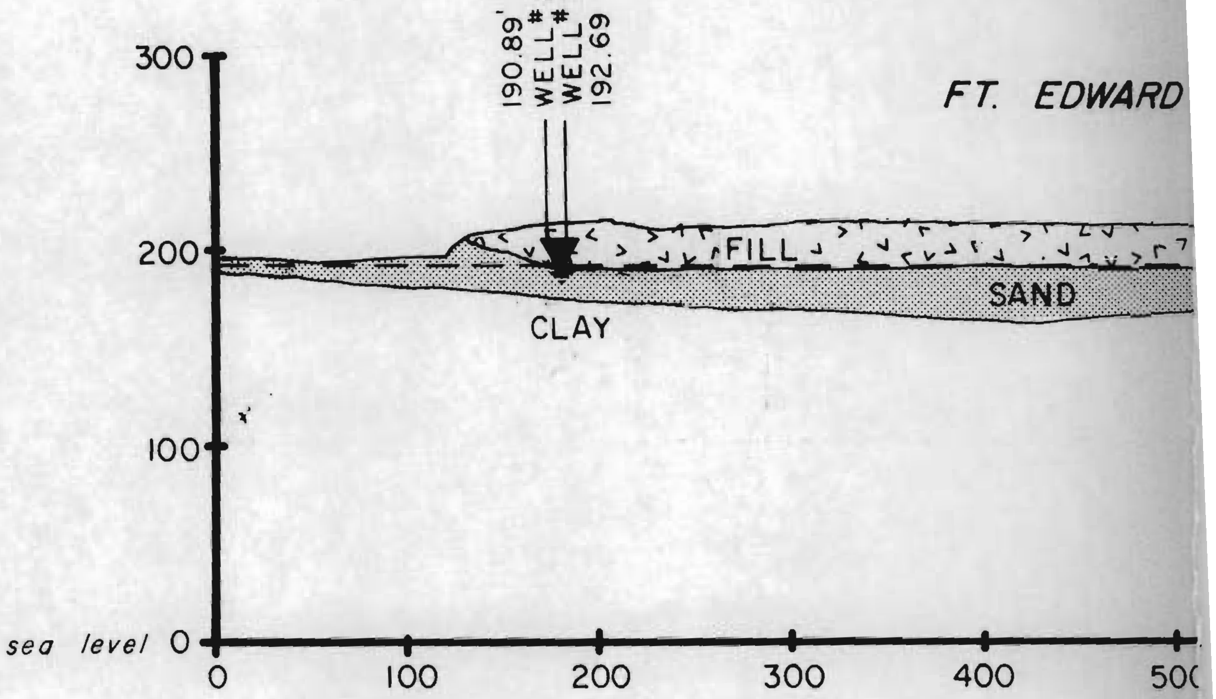
SECTION 1

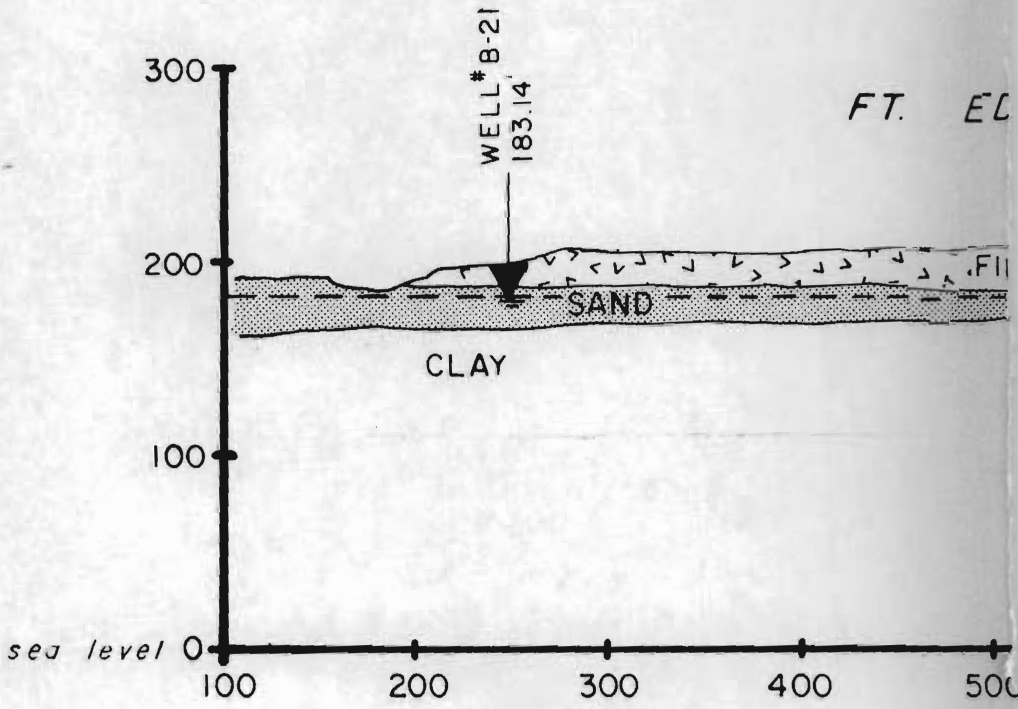


SECTION 2


LANDFILL
WELL # 7
194.19'
FILL
SAND
CLAY
CLAY
600
700
800
900
1000
1100
1200


WARD LANDFILL
FILL
CLAY
CLAY
600
700
800
900
1000
1100
1200


FT. EDWARD
190.89'
WELL # 2A
WELL # 2
192.69
FILL
SAND
CLAY
300
200
100
sea level 0
0
100
200
300
400
50


FT. E
WELL # B-21
183.14'
FI
SAND
CLAY
300
200
100
sea level 0
100
200
300
400
50

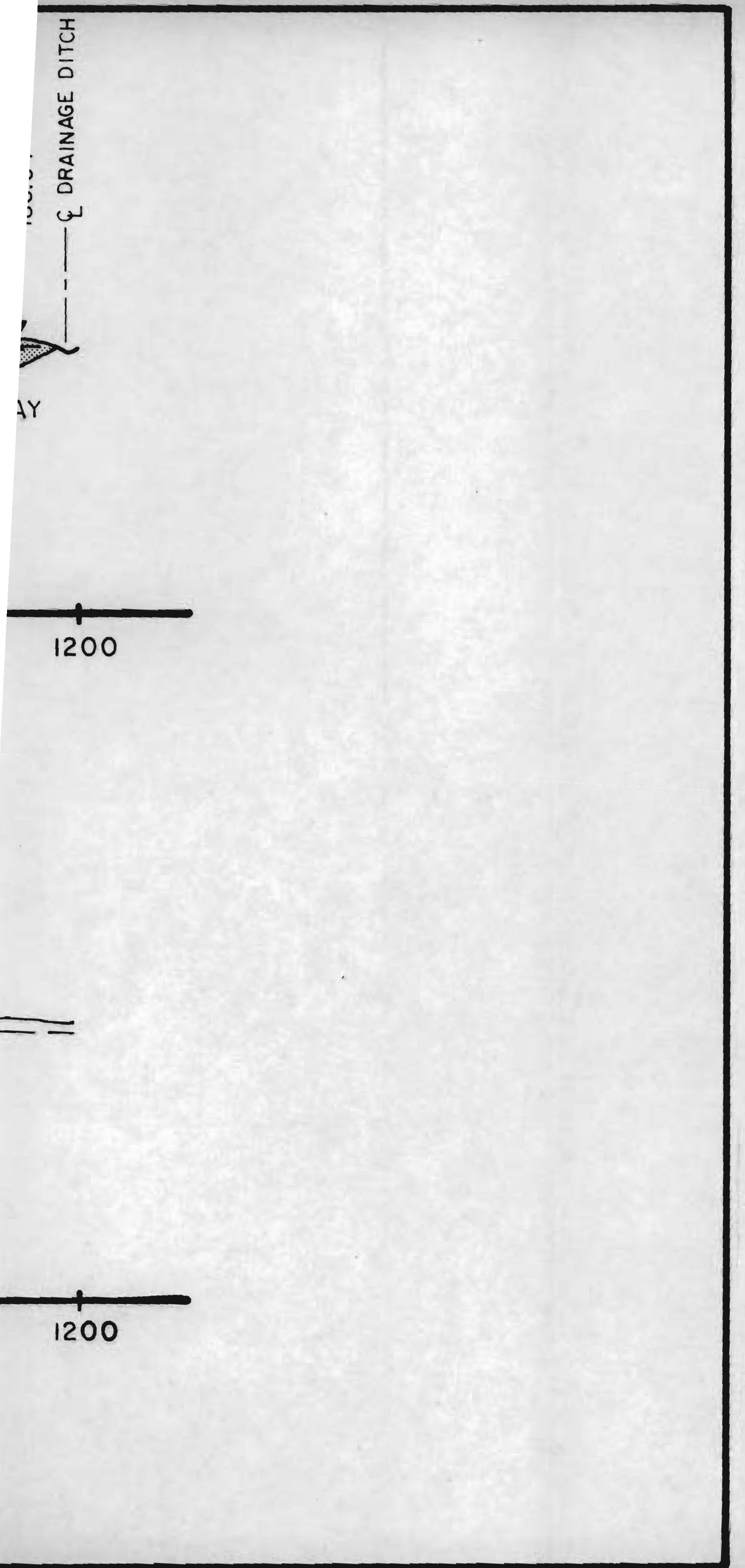


FIGURE 5

LEGEND

WELL # 000.00'

G.W.T. ELEV.
11/6/81

▨ APPROX. LIMITS
OF REFUSE FILL

NOTES:

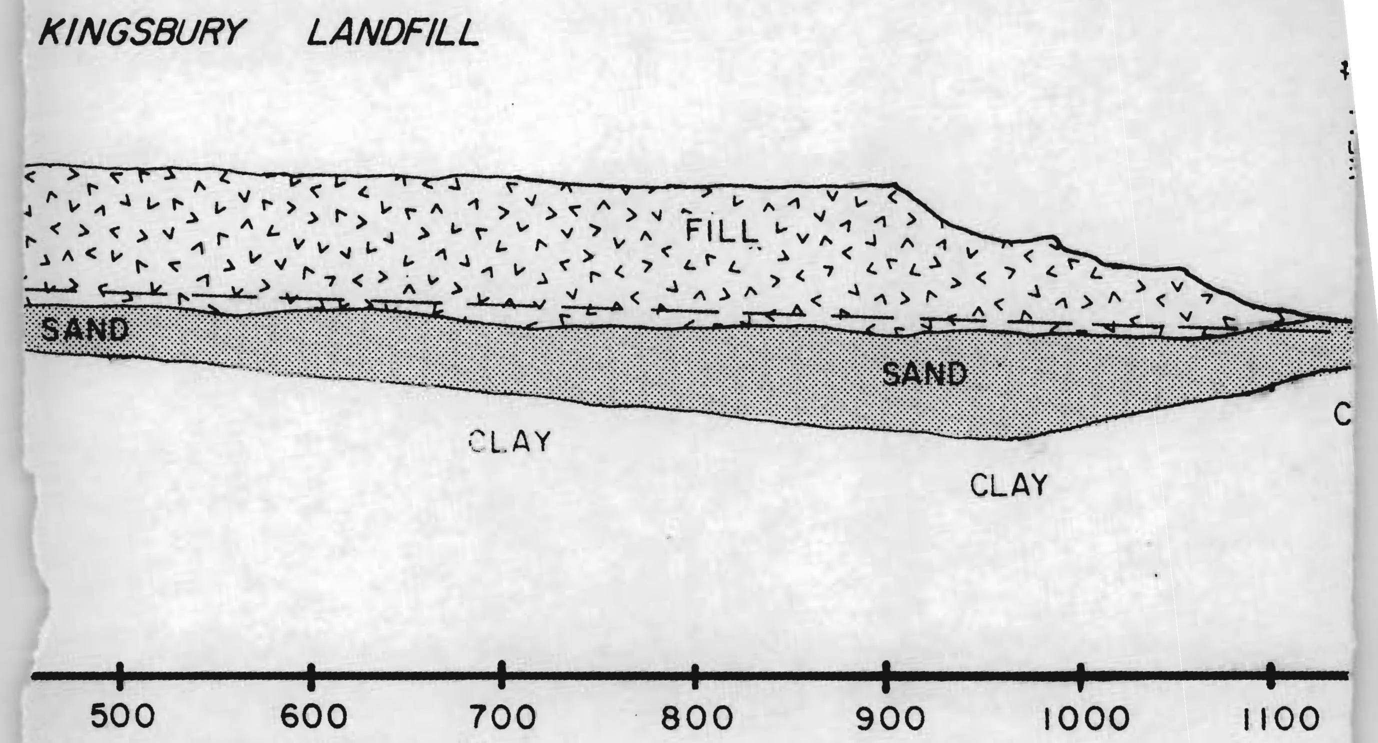
1. REFER TO FIGURE 3 FOR THE TOPOGRAPHIC LOCATION OF GROUNDWATER WELLS. THE WELL AS SHOWN HERE MAY NOT BE IN THE EXACT PLANE OF THE CROSS - SECTION.
2. GROUNDWATER AND SUBSURFACE PROFILES ARE BASED ON INTERMITTENT DATA POINTS AND THEREFORE MAY NOT REPRESENT THE DETAILED CONFIGURATIONS SHOWN.

KINGSBURY - FORT EDWAF

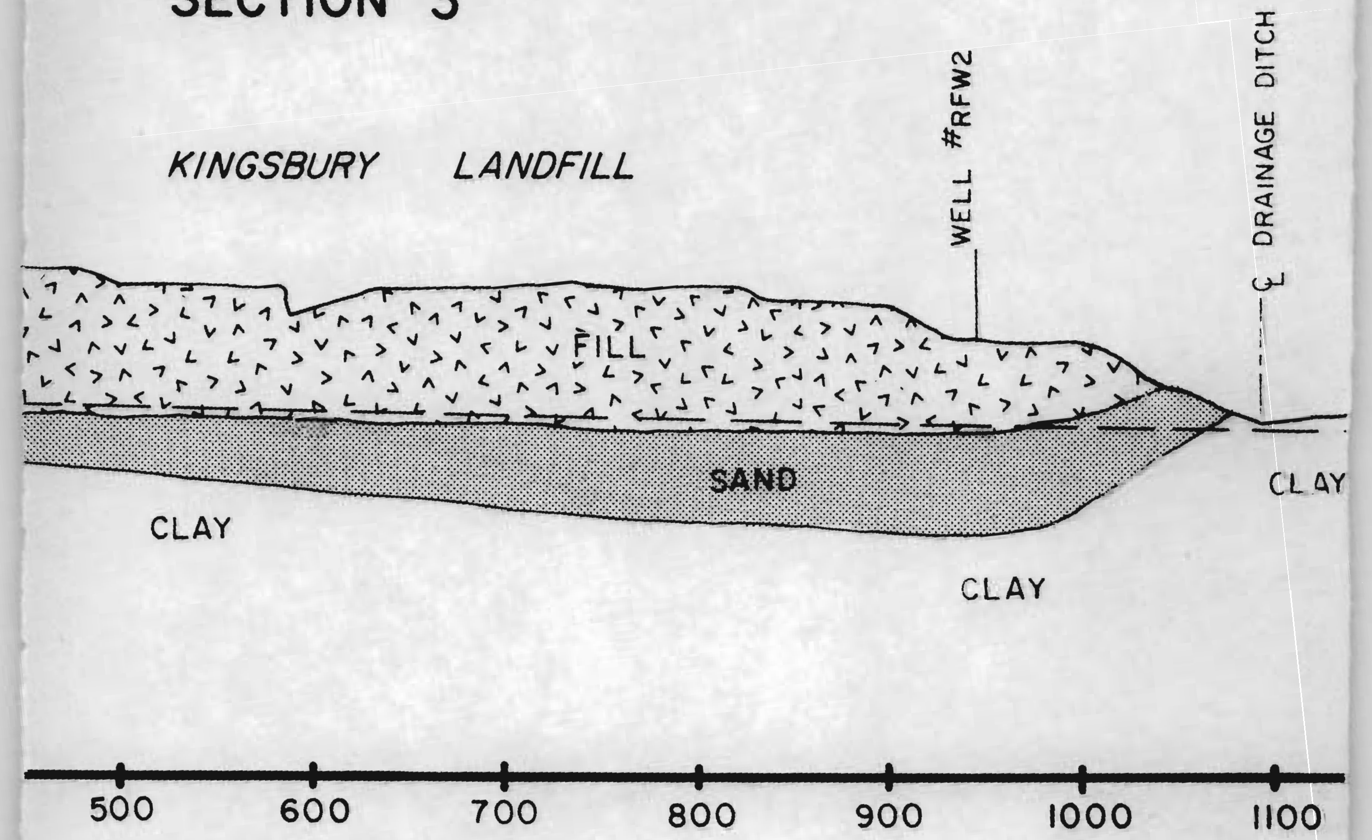
CROSS SECTION
3,4

SCALE IN FEET
VERT. & HORT.
100 0 100

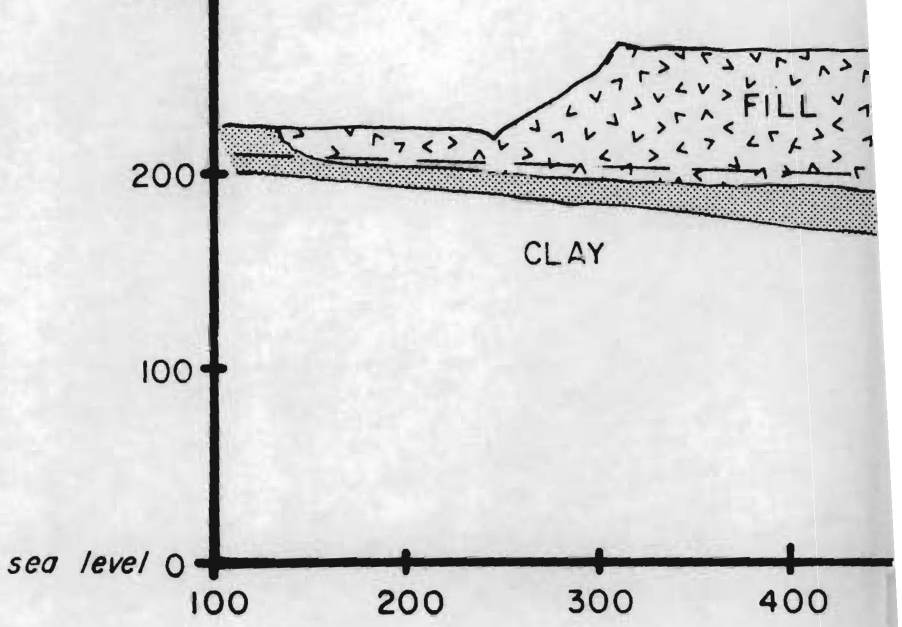
O'BRIEN & GERE

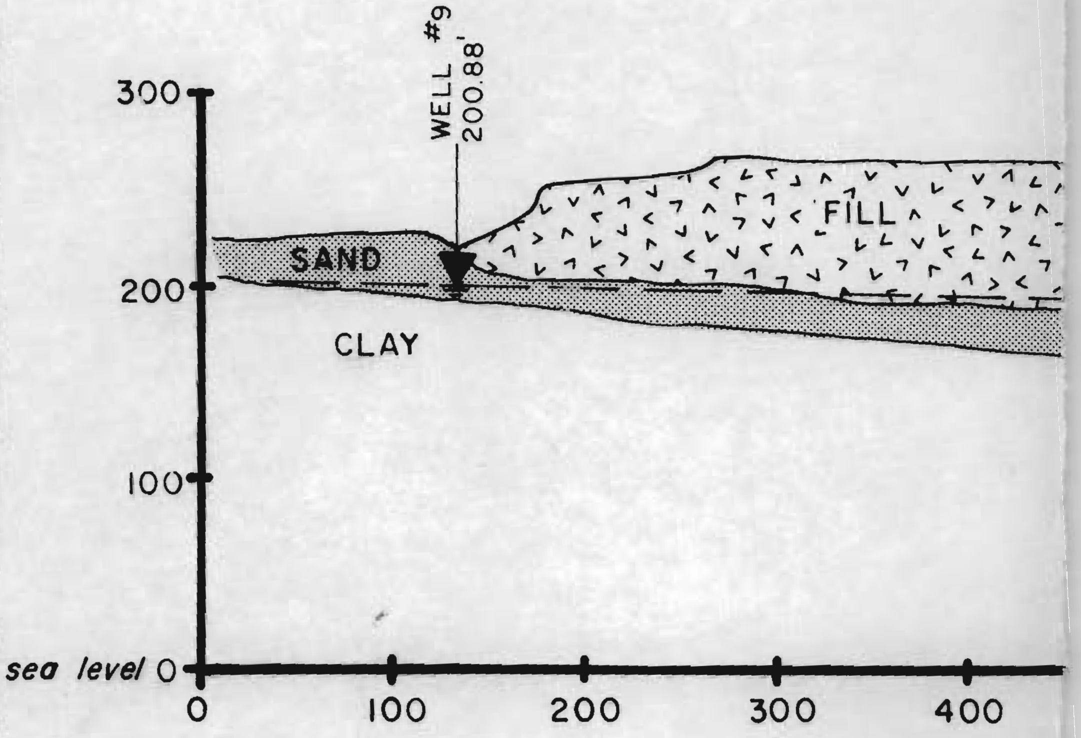


SECTION 3



SECTION 4


300
200
100
sea level 0
100
200
300
400
FILL
CLAY


WELL #9
200.88'
300
200
100
sea level 0
0
100
200
300
400
SAND
FILL
CLAY

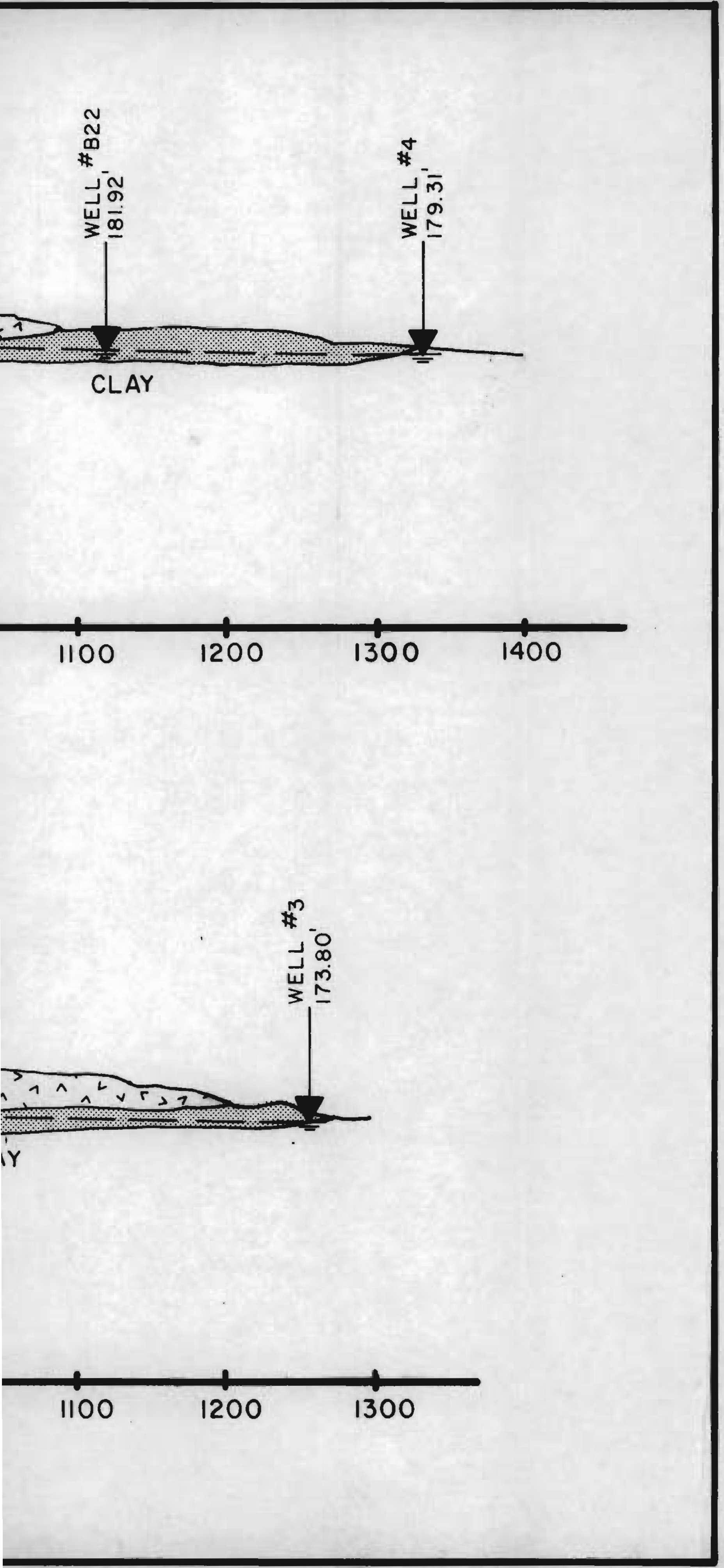
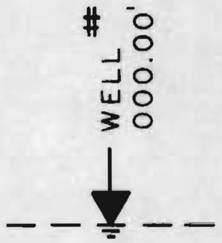


FIGURE 6

LEGEND



G.W.T. ELEV.
11/6/81

▨ APPROX. LIMITS
OF REFUSE FILL

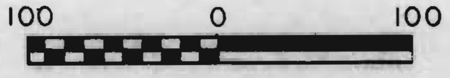
NOTES:

1. REFER TO FIGURE 3 FOR THE TOPOGRAPHIC LOCATION OF GROUNDWATER WELLS. THE WELL AS SHOWN HERE MAY NOT BE IN THE EXACT PLANE OF THE CROSS - SECTION.
2. GROUNDWATER AND SUBSURFACE PROFILES ARE BASED ON INTERMITTENT DATA POINTS AND THEREFORE MAY NOT REPRESENT THE DETAILED CONFIGURATIONS SHOWN.

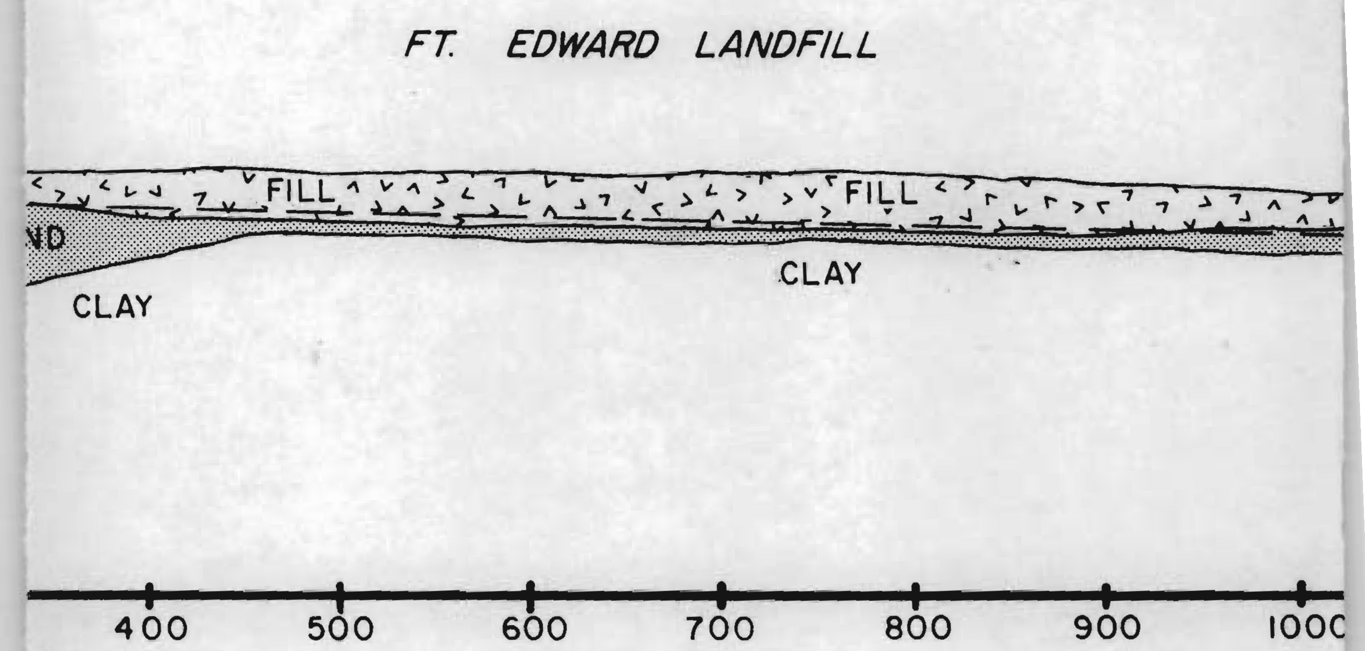
KINGSBURY - FORT EDWAR

CROSS SECTION
5 , 6

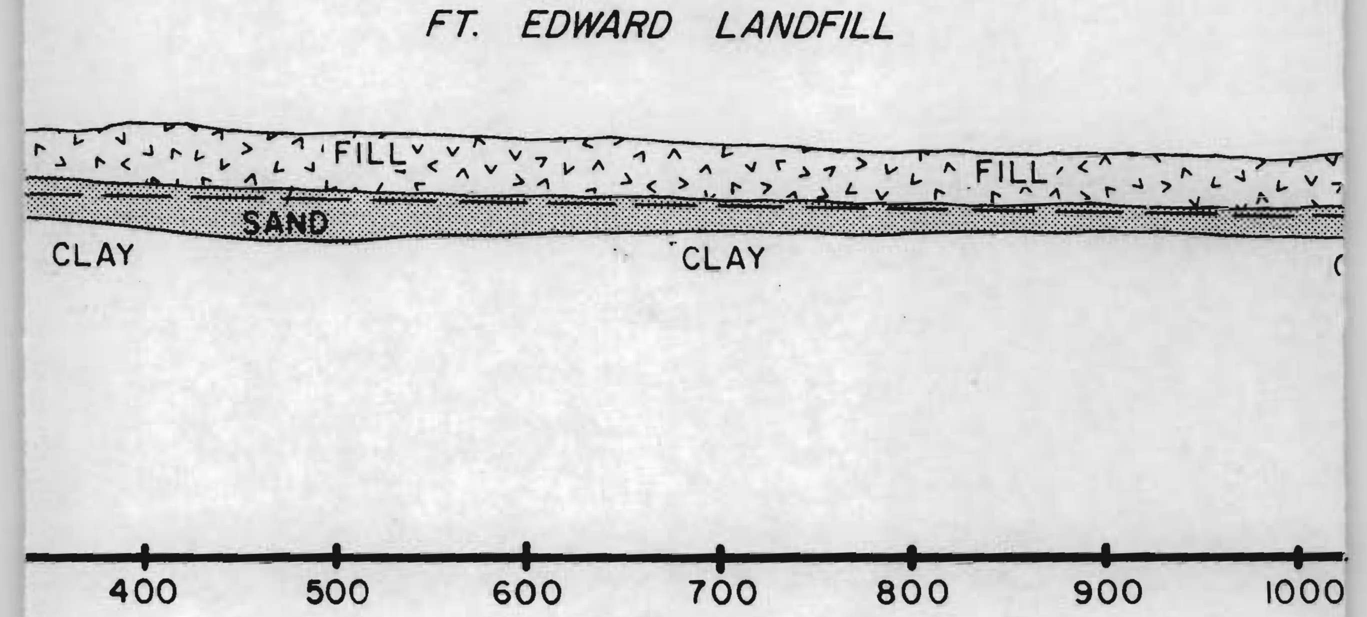
SCALE IN FEET
VERT. & HORT.



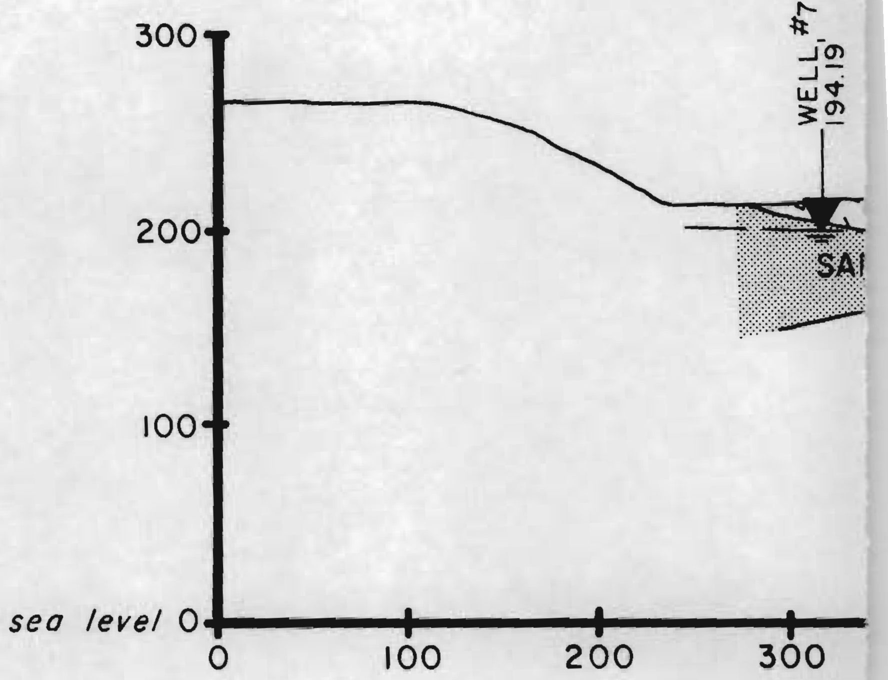
O'BRIEN & GERE

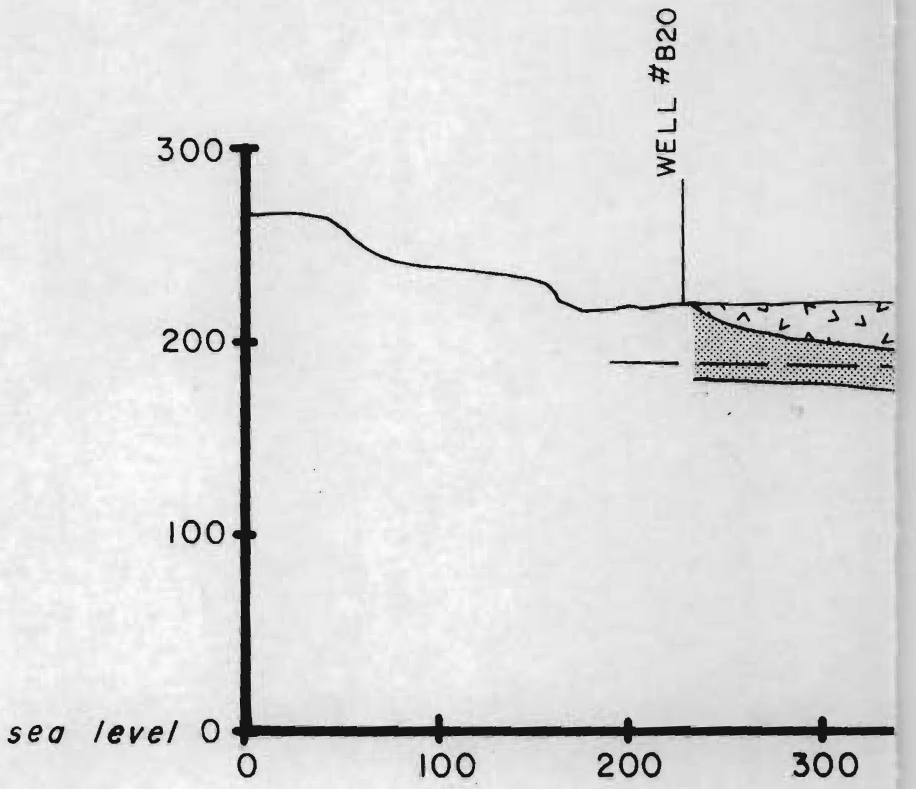


SECTION 5



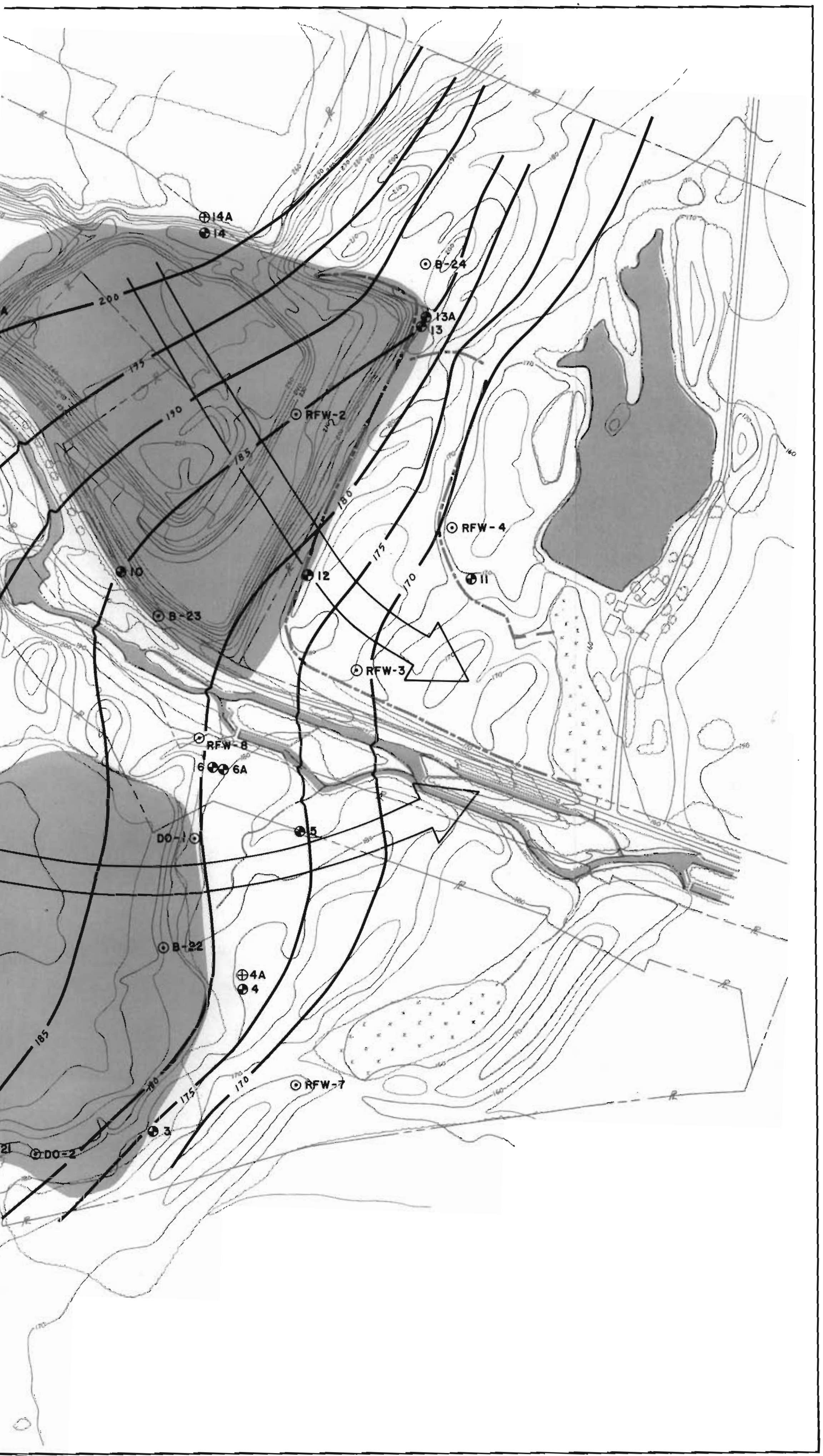
SECTION 6


WELL #7
194.19'
SA
300
200
100
sea level 0
0
100
200
300


WELL #B20
300
200
100
sea level 0
0
100
200
300

7
UO-1
RFW-15
1
B-20
RFW-5
2A
2
200
195
270
260
250
230
220
210
190

FIGURE 7



LEGEND

●	TEST BORING W/GROUNDWATER MONITORING WELL
⊕	PIEZOMETER
⊙	GROUNDWATER MONITORING WELL (INSTALLED BY OTHERS)
⇨	GROUNDWATER FLOW LINE
━	GROUNDWATER EQUIPOTENTIAL LINE
	CONTOUR LINE
	APPROXIMATE PROPERTY LINE
	DRAINAGE DITCH
	STREAM (OR WATERS EDGE)
	SWAMP
▨	APPROXIMATE LIMITS OF SITE
▨	SURFACE WATER

NOTES:

1. WELL RFW-2, RFW-5, RFW-6 & B-20 WERE DESTROYED PRIOR TO THIS FIELD INVESTIGATION.
2. TOPOGRAPHIC SURVEY COMPLETED IN 1980 BY OTHERS FOR NYSDEC. LOCATION OF WELLS & WEIRS ESTABLISHED AS A PORTION OF THIS FIELD INVESTIGATION.
3. GROUNDWATER CONTOURS ARE BASED ON WIDELY SPACED DATA POINTS AND THEREFORE MAY NOT REPRESENT THE DETAILED CONFIGURATION OF THE WATER TABLE AT ALL POINTS THE GROUNDWATER CONTOURS ARE DERIVED FROM WATER LEVEL DATA COLLECTED IN NOV. 1981.

KINGSBURY – FORT EDWARD

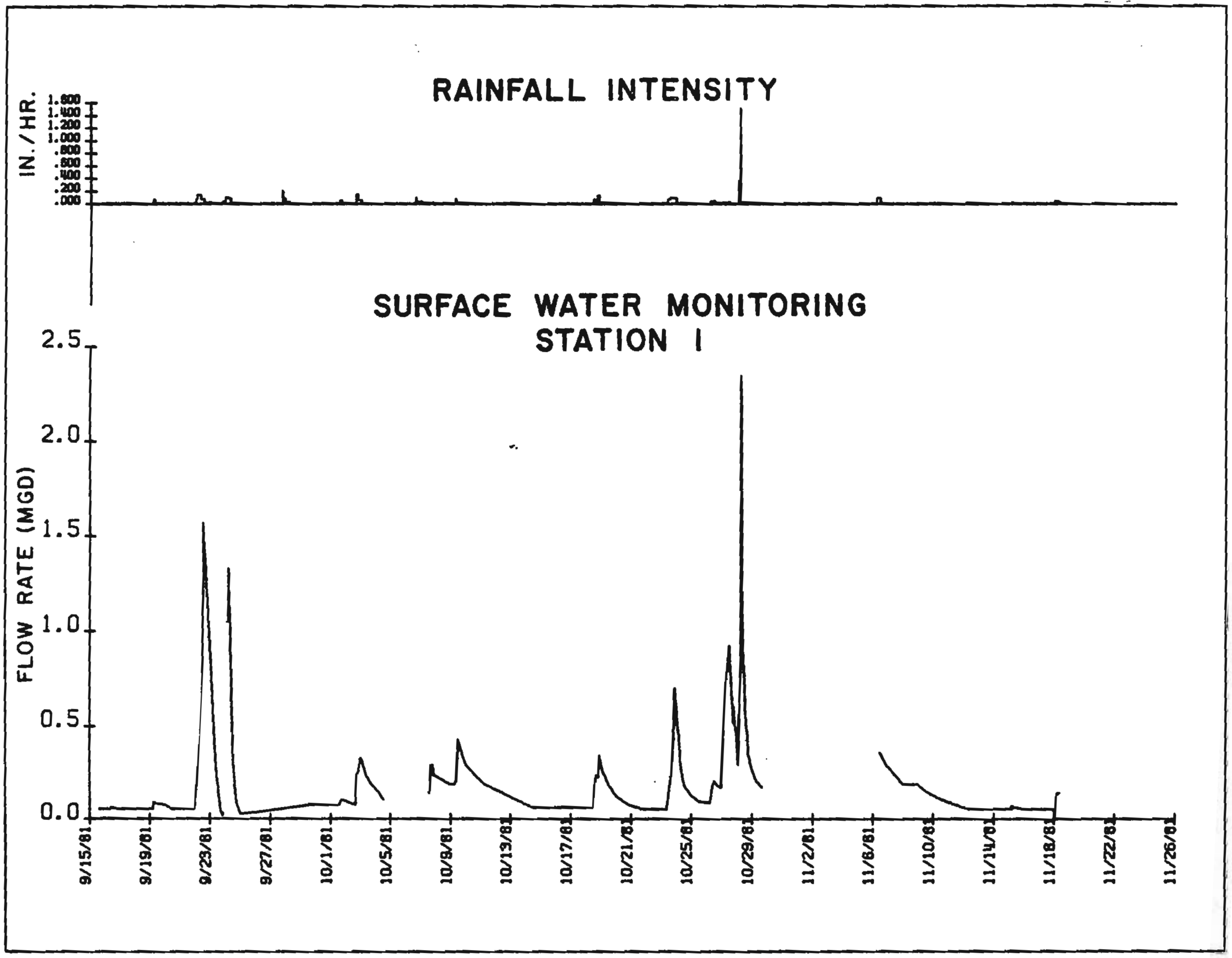
GROUNDWATER CONTOURS

SCALE IN FEET

200 0 200

O'BRIEN & GERE

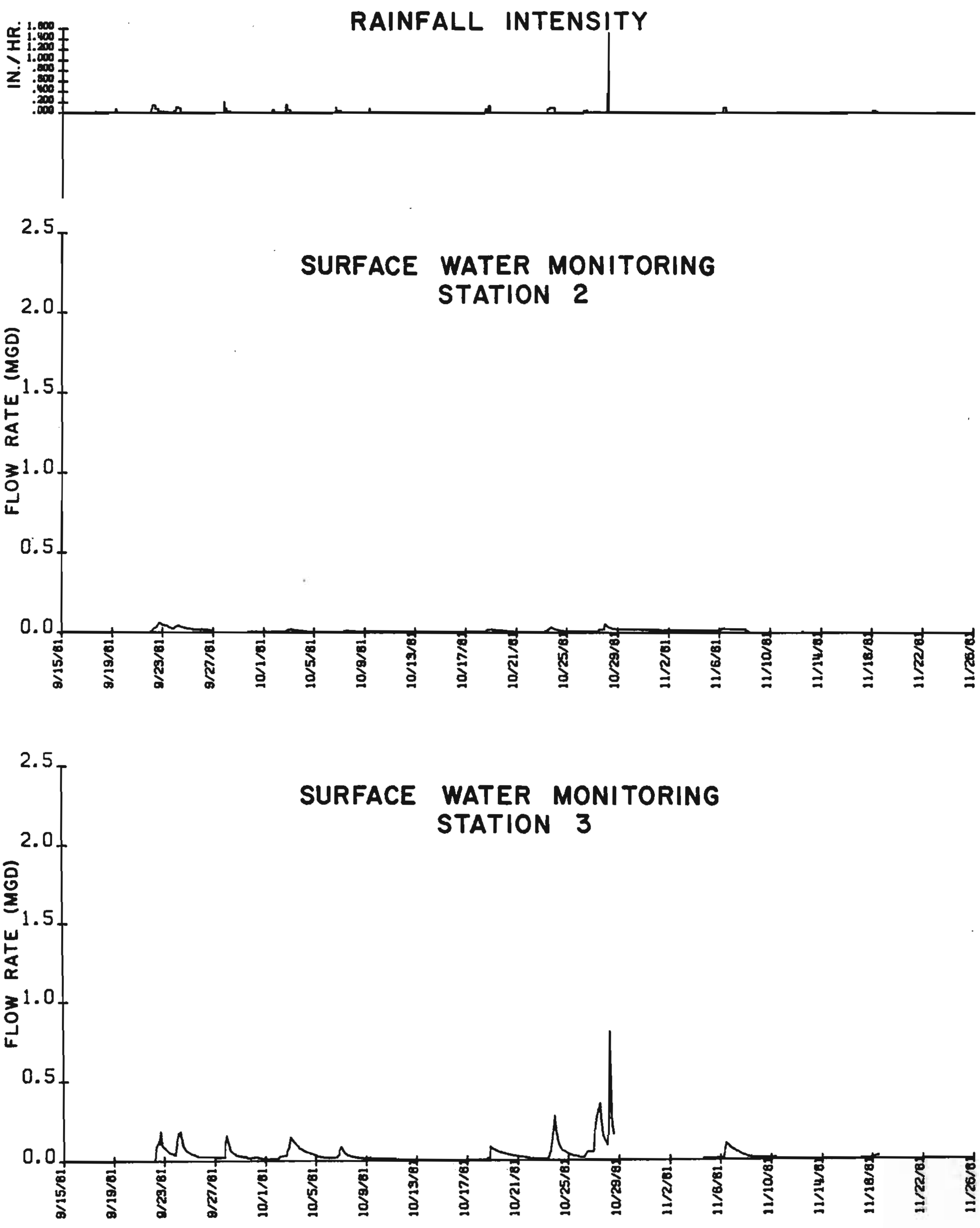
FIGURE 8



RAINFALL INTENSITY

SURFACE WATER MONITORING STATION I

FIGURE 9



O'BRIEN & GERE

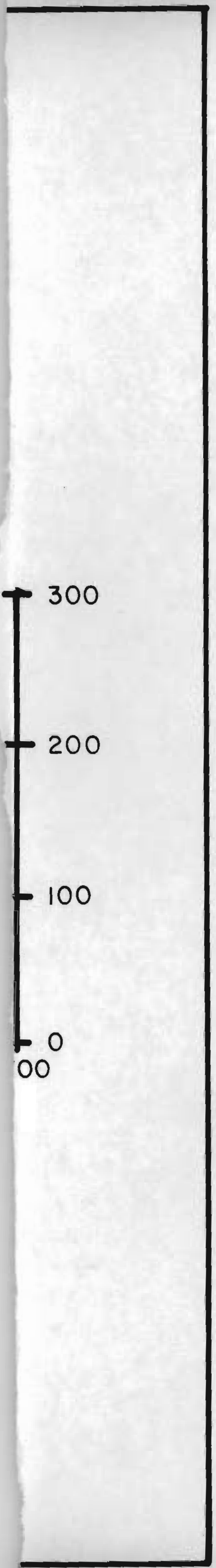


FIGURE 10

LEGEND

— — —	ANTICIPATED GROUND-WATER TABLE
▨	APPROX. LIMITS OF REFUSE FILL

NOTE:

GROUNDWATER AND SUBSURFACE PROFILES ARE BASED ON INTERMITTENT DATA POINTS AND THEREFORE MAY NOT REPRESENT THE DETAILED CONFIGURATIONS SHOWN.

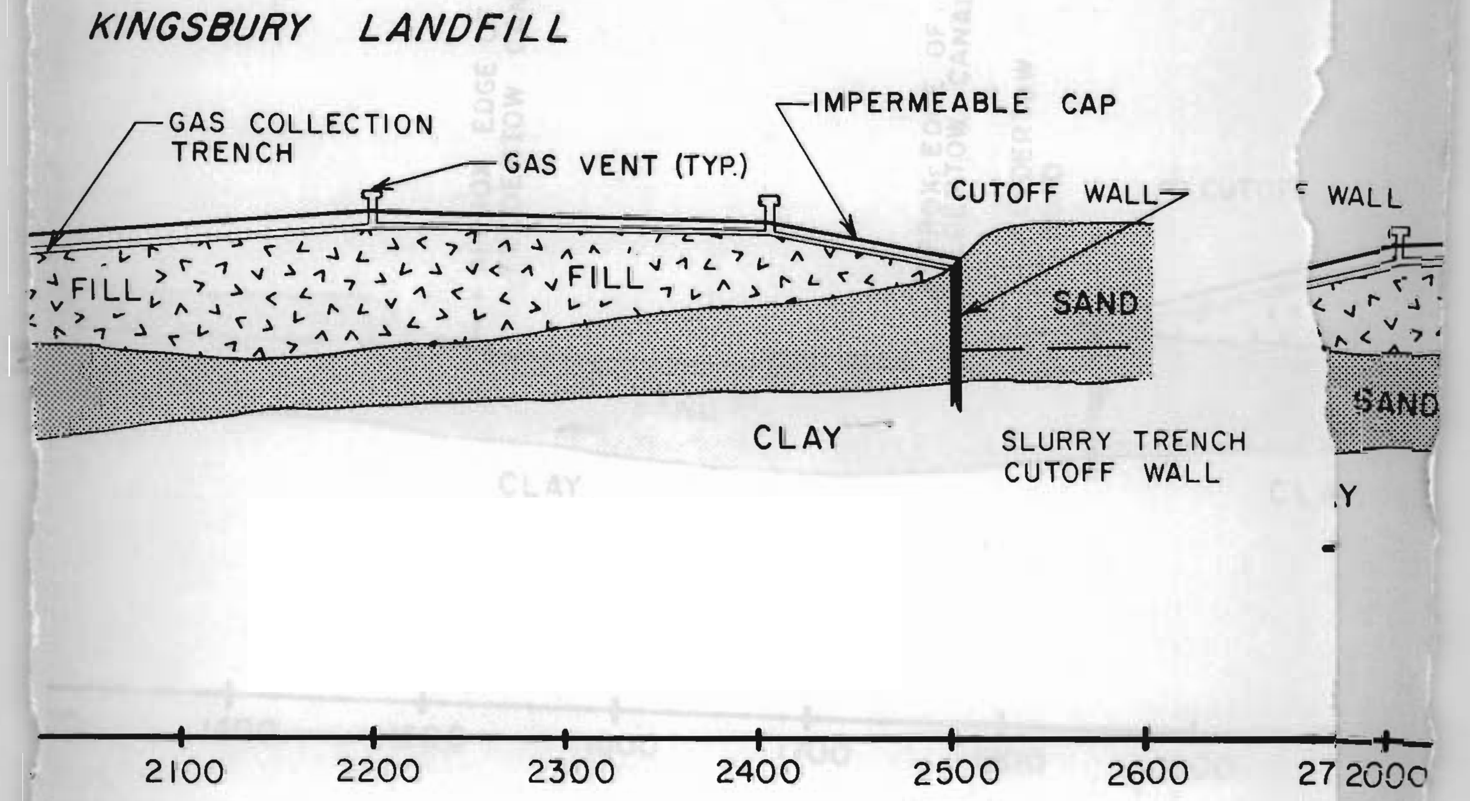
KINGSBURY - FORT EDWARD

PROPOSED REMEDIAL PROGRAM
MUNICIPAL LANDFILL
CROSS SECTION I

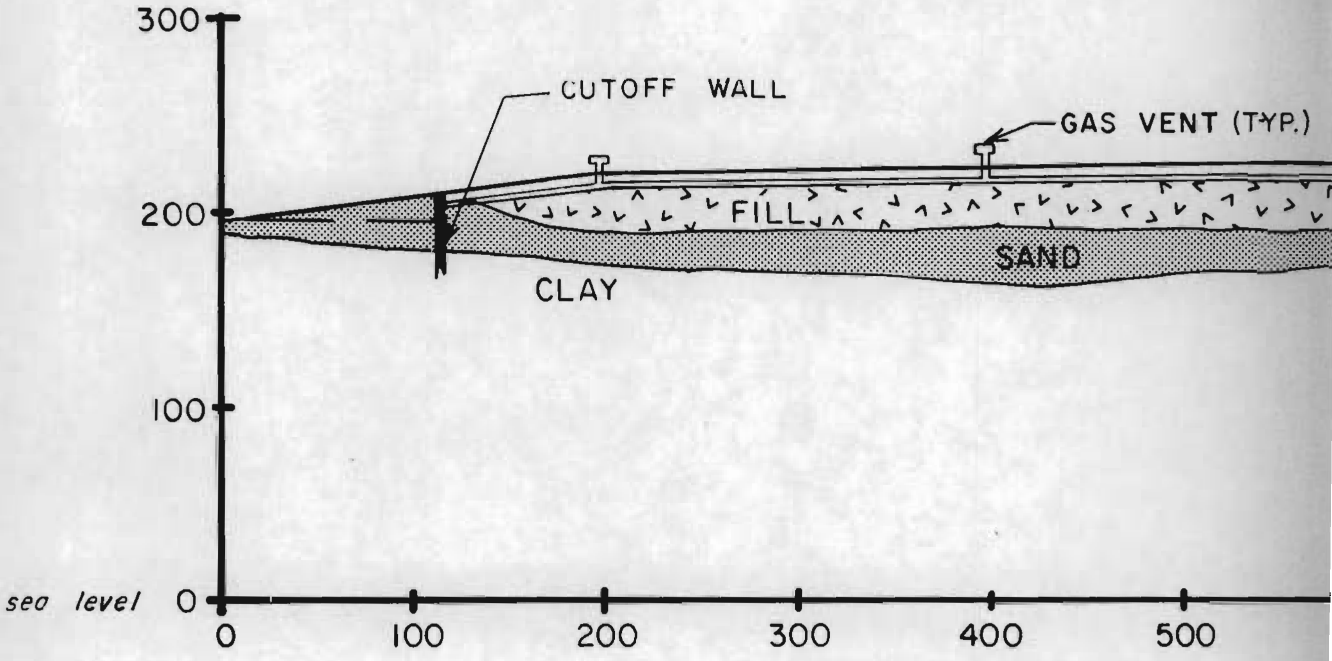
SCALE IN FEET
VERT. & HORT.

100 0 100

O'BRIEN & GERE

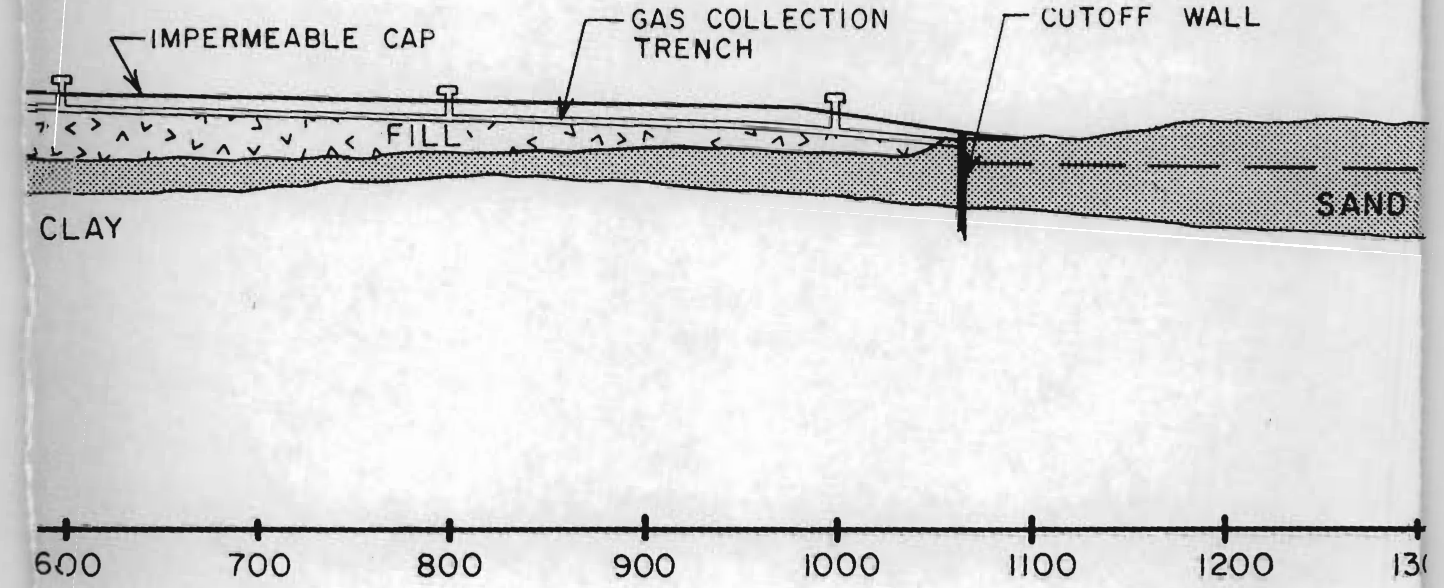

KINGSBURY LANDFILL
GAS COLLECTION TRENCH
GAS VENT (TYP.)
IMPERMEABLE CAP
CUTOFF WALL
FILL
FILL
SAND
CLAY
SLURRY TRENCH CUTOFF WALL
WALL
SAND
2100
2200
2300
2400
2500
2600
27
2000

FT. EDWARD LA



300
200
100
sea level 0
CUTOFF WALL
GAS VENT (TYP.)
FILL
SAND
CLAY
0
100
200
300
400
500

FILL


IMPERMEABLE CAP
GAS COLLECTION TRENCH
CUTOFF WALL
FILL
CLAY
SAND
600
700
800
900
1000
1100
1200
13

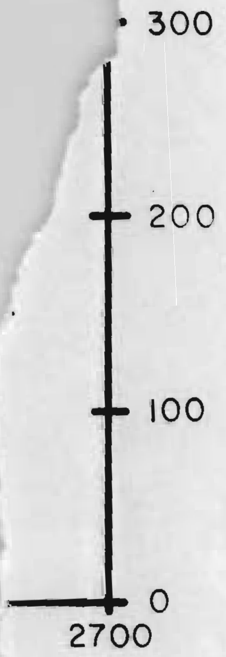


FIGURE 11

LEGEND

— — —	ANTICIPATED GROUNDWATER TABLE
▨	APPROX. LIMITS OF REFUSE FILL

NOTE:

GROUNDWATER AND SUBSURFACE PROFILES ARE BASED ON INTERMITTENT DATA POINTS AND THEREFORE MAY NOT REPRESENT THE DETAILED CONFIGURATIONS SHOWN.

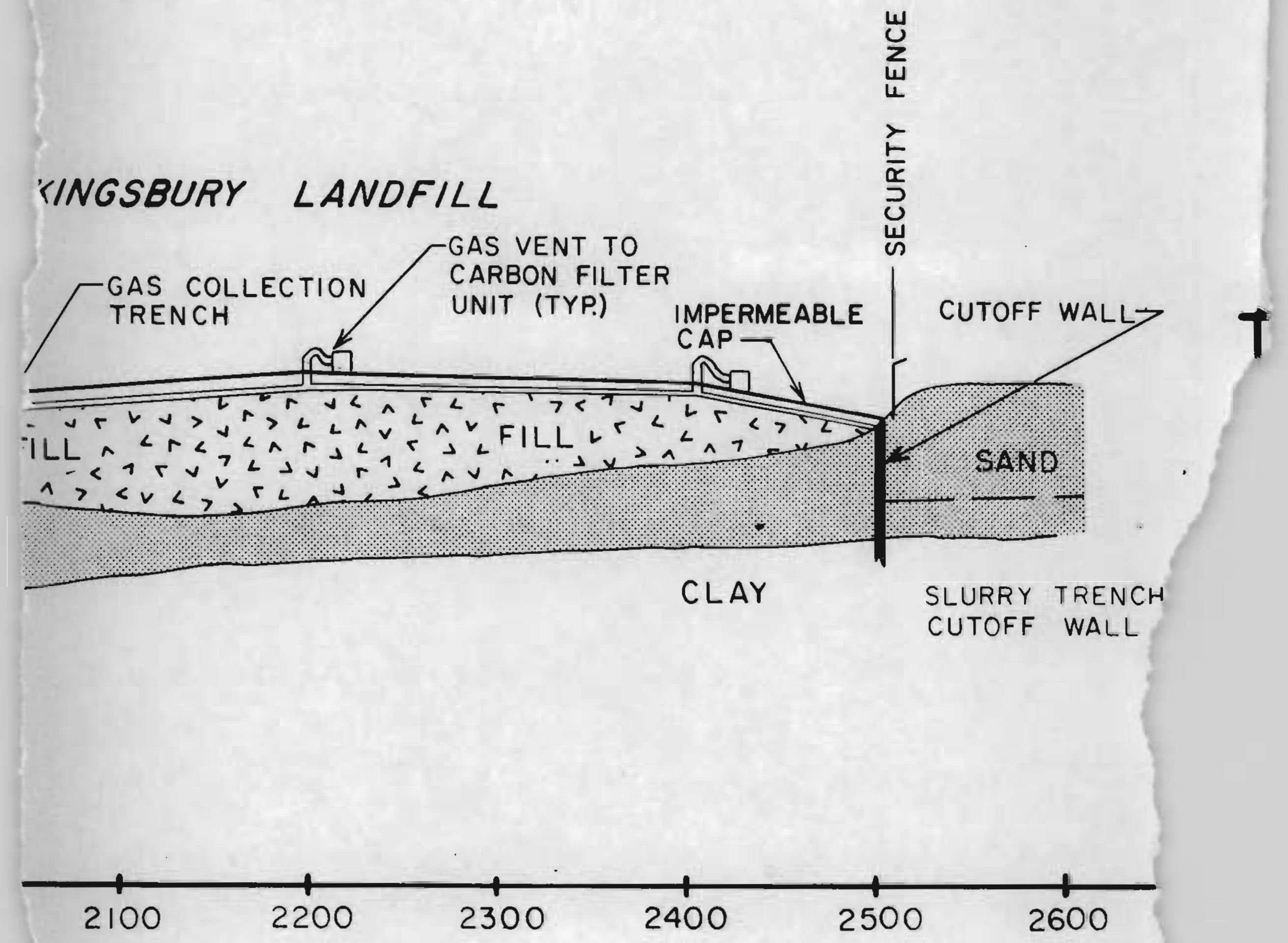
KINGSBURY - FORT EDWARD

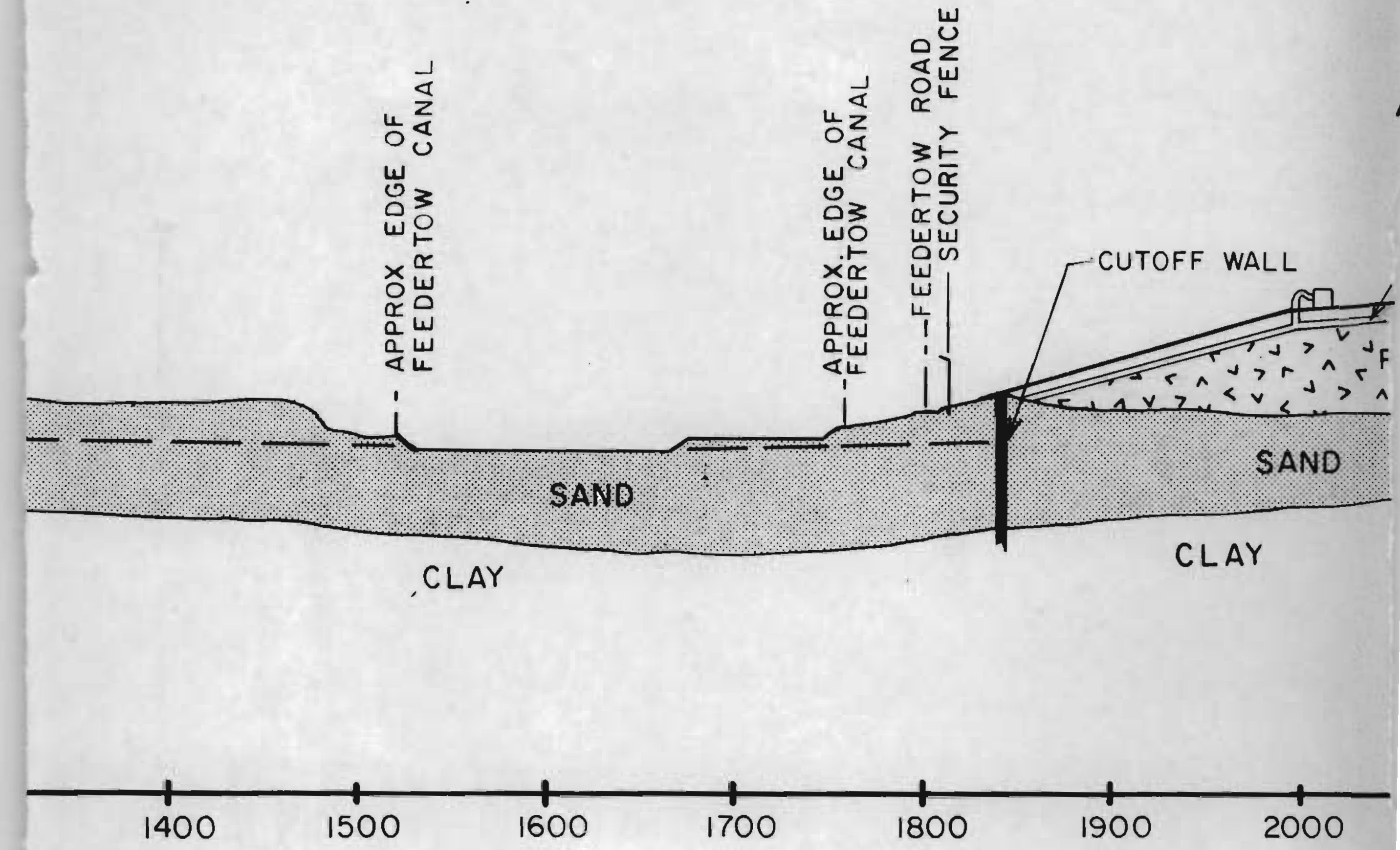
PROPOSED REMEDIAL PROGRAM
INDUSTRIAL LANDFILL
CROSS SECTION I

SCALE IN FEET
VERT. & HORT.

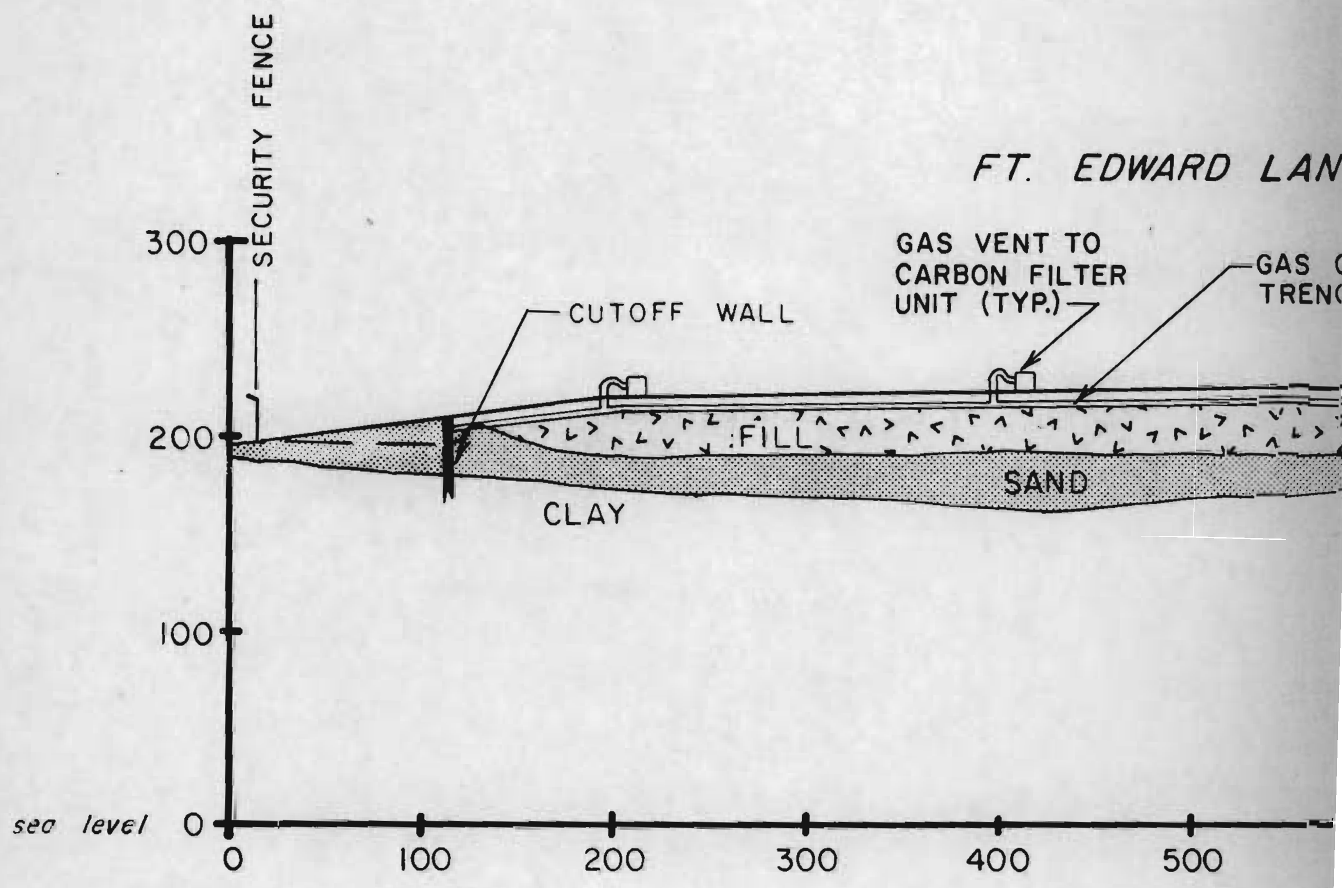
100 0 100

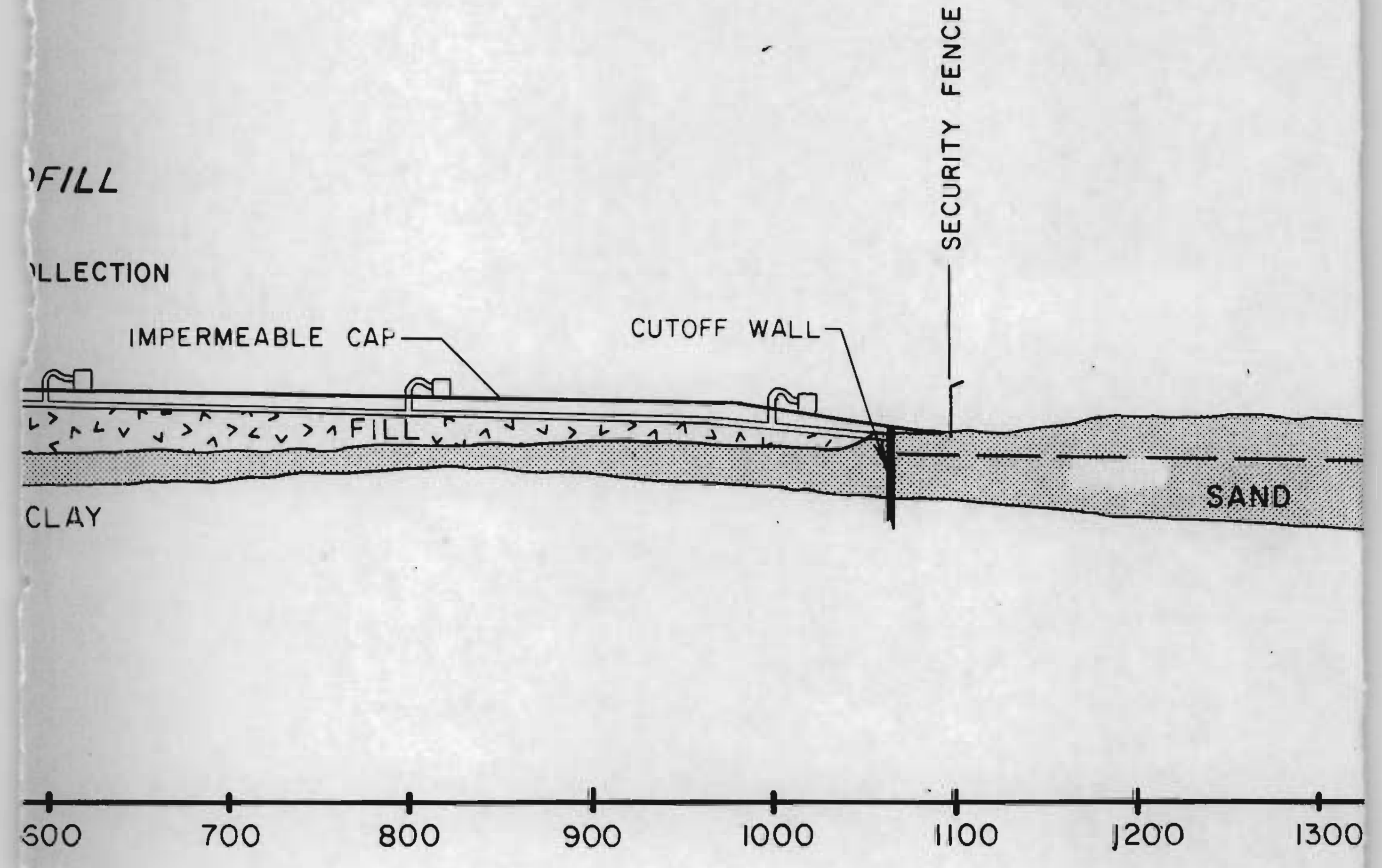
O'BRIEN & GERE


KINGSBURY LANDFILL
GAS COLLECTION TRENCH
GAS VENT TO CARBON FILTER UNIT (TYP.)
IMPERMEABLE CAP
SECURITY FENCE
CUTOFF WALL
ILL
FILL
SAND
CLAY
SLURRY TRENCH CUTOFF WALL
2100
2200
2300
2400
2500
2600


APPROX EDGE OF FEEDERTOW CANAL
APPROX. EDGE OF FEEDERTOW CANAL
FEEDERTOW ROAD
SECURITY FENCE
CUTOFF WALL
SAND
CLAY
SAND
CLAY
1400
1500
1600
1700
1800
1900
2000

ECTION I


FT. EDWARD LAN
SECURITY FENCE
GAS VENT TO CARBON FILTER UNIT (TYP.)
GAS C
TRENC
CUTOFF WALL
FILL
SAND
CLAY
300
200
100
sea level 0
0
100
200
300
400
500



ʼFILL
ʼLLECTION
IMPERMEABLE CAP
CUTOFF WALL
SECURITY FENCE
FILL
CLAY
SAND
600
700
800
900
1000
1100
1200
1300
S

APPENDIX A

SOURCES OF INFORMATION

APPENDIX A

SOURCES OF INFORMATION

1. Agreement between General Electric Company, and New York State Department of Environmental Conservation - September 24, 1980.

2. Soil Survey of Washington County, New York; U.S. Department of Agriculture, Soil Conservation Service, Washington, D.C., 1972

3. Groundwater Resources of Washington County; Cushman, R.V., U.S. Geological Survey in Cooperation with the Water Power and Control Commission, 1953

4. Migration of PCBs from Landfills, and Dredge Spoil Sites in the Hudson River Valley, NY - Final Report; Weston Environmental Consultants - Designers; West Chester, Pennsylvania, November, 1978

5. Conceptual Engineering Study of Five Disposal Sites Known to Have Received PCB Wastes - Final Report; Wehran Engineering, P.C., Middletown, NY, December, 1980

6. Open Dump Inventory Groundwater Quality Evaluation, Town of Ft. Edward SLF Facility No. 58S15, Ft. Edward, New York; Dunn Geoscience Corporation, Latham, New York, September 19, 1980

7. Hazardous Waste Disposal Sites in New York State, First Annual Report; NYSDEC and NYSDOH, Albany, New York, June, 1980

8. Soils Association Leaflet 6, Washington County Soils, Reeshon Feuer and Gordon A. Johnsgard, December, 1956

9. Surficial Geology of the Glens Falls Region, New York, by G. Gordon Connally, New York State Museum, Map and Chart Series No. 23.

10. Groundwater Resource Evaluation; William C. Walton, McGraw Hill, 1970

11. Procedures Manual for Groundwater Monitoring at Solid Waste Disposal Facilities, USEPA, EPA/530/SW-611, August, 1977

APPENDIX B

TEST BORING LOGS AND GROUNDWATER MONITORING DETAILS

parratt wolff inc

TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

#1

PROJECT Subsurface Investigation

LOCATION Kingsbury - Fort Edward Sites

DATE STARTED 9/9/81 **DATE COMPLETED** 9/9/81

HOLE NO. F-1-81-633

SURF. EL.

JOB NO. 81108

GROUND WATER DEPTH WHILE DRILLING 29.0'

BEFORE CASING REMOVED

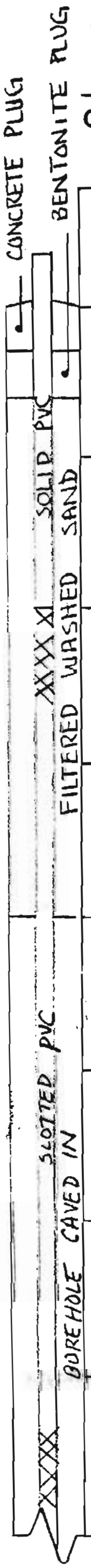
AFTER CASING REMOVED

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER

SHEET 1 **OF** 2
File #2289.016



DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	0.0'-	1		1/2		TOPSOIL	0.7'
	2.0'			2/3	4	Brown moist loose fine to medium SAND	
	2.0'-	2		3/3			
	4.0'			3/3	6		4.0'
5.0	4.0'-	3		4/4		Brown moist medium dense fine SAND	
	6.0'			6/6	10		
	6.0'-	4		5/5			
	8.0'			6/6	11		
	8.0'-	5		5/7			
10.0	10.0			9/10	16		
15.0							15.0'
	15.0'-	6		5/7		Brown moist medium dense fine to medium	
	16.5'			9	16	SAND	
20.0							
	20.0'-	7		8/6			
	21.5'			8	14		
25.0							
	25.0'-	8		7/5			
	26.5'			5	10		
WL ▼							29.0'
30.0						Gray wet soft CLAY, trace silt	
	30.0'-	9		2/2			
	31.5'			2	4		
35.0							
	35.0'-	10		2/2			
	36.5'			2	4		
40.0							

parratt wolff inc

TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

#1

PROJECT Subsurface Investigation

LOCATION Kingsbury - Fort Edward Sites

DATE STARTED 9/9/81 **DATE COMPLETED** 9/9/81

HOLE NO. F-1-81-633

SURF. EL.

JOB NO. 81108

GROUND WATER DEPTH WHILE DRILLING

BEFORE CASING REMOVED

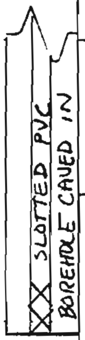
AFTER CASING REMOVED

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER

SHEET 2 OF 2
File #2289.016



DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH	GEOLOGIC COLUMN
	40.0'-	11		2/2		Gray wet soft CLAY, trace silt		CLAY - SILT
	41.5'			2/3	4			
	41.5'	12		3/3	6		43.0'	
	43.0'					Gray wet medium stiff CLAY, some fine to coarse sand, little fine gravel, trace silt		
45.0	44.0'-	13		17/19				
	45.5'			21	40		44.0'	
						Black moist hard CLAY, some silt with embedded fine to coarse sand and fine to coarse gravel		TILL
50.0						Bottom of Boring	45.5'	
						Note: Installed observation well to 44.0'.		

parratt wolff inc

TEST BORING LOG

#2

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

PROJECT Subsurface Investigation
LOCATION Kingsbury - Fort Edward Sites
DATE STARTED 8/28/81
DATE COMPLETED 8/28/81

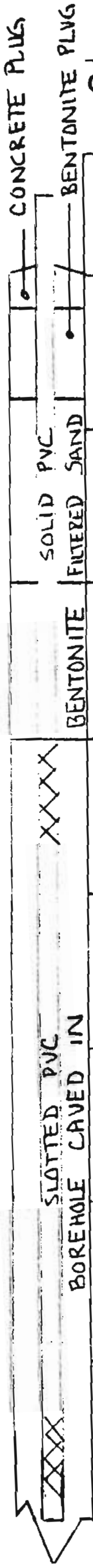
HOLE NO. F-2-81-621
SURF. EL.
JOB NO. 81108
GROUND WATER DEPTH WHILE DRILLING 12.0'
BEFORE CASING REMOVED 38.7'
AFTER CASING REMOVED

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER

SHEET 1 OF 2
File #2289.016



DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH	GEOLOGIC COLUMN
	0.0'-	1		1/1		Brown moist loose fine to medium SAND, trace silt, trace roots		
	2.0'			2/2	3			
	2.0'-	2		2/3				
	4.0'			3/3	6		4.0'	
5.0'	4.0'-	3		7/7		Brown moist medium dense fine to medium SAND, little fine to coarse gravel		FILL
	6.0'			3/3	10			
	6.0'-	4*		8/7			6.0'	
	8.0'			5/4	12	Brown moist medium dense to loose fine to coarse SAND, RUBBLE FILL and TRASH FILL		
	8.0'-	5		5/20				
10.0'	10.0'			8/5	28			
							11.5'	
▼ WL						Brown wet loose fine SAND, trace silt		SAND
15.0'								
	15.0'-	6		6/3				
	16.5			4	7		17.0'	
						Brown wet medium dense to loose fine to medium SAND		
20.0'								
	20.0'-	7		6/8				
	21.5'			5	13			
						Soil gradation analysis indicates this sample consists of clay, trace silt, trace fine to coarse sand.		
25.0'								
	25.0'-	8		5/5				
	26.5'			6	11			
30.0'								
	30.0'-	9		7/6				
	31.5'			6	12			
35.0'								
	35.0'-	10		3/4				
	36.5'			4	8			
40.0'								

* Soil gradation analysis of this sample is presented in Appendix G

parratt wolff inc

TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

#2

PROJECT Subsurface Investigation
LOCATION Kingsbury - Fort Edward Sites
DATE STARTED 8/28/81 **DATE COMPLETED** 8/28/81

HOLE NO. F-2-81-621
SURF. EL.
JOB NO. 81108
GROUND WATER DEPTH
WHILE DRILLING 12.0'
BEFORE CASING REMOVED 38.7'
AFTER CASING REMOVED

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER

SHEET 2 **OF** 2
File #2289.016

BOREHOLE CAVED IN

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH	GEOLOGIC COLUMN
	40.0'-	11		3/2		Gray moist soft CLAY, some silt	40.5'	CLAY - SILT
	41.5'			2	4	Bottom of Boring	41.5'	
45.0'						Note: Installed observation well to 40.0'.		

parratt wolff inc

TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

#2A

PROJECT Subsurface Investigation
Kingsbury - Fort Edward Sites

LOCATION

DATE STARTED 9/2/81 DATE COMPLETED 9/9/81

HOLE NO. F-2-A-81-626

SURF. EL.

JOB NO. 81108

GROUND WATER DEPTH
WHILE DRILLING 12.0'

BEFORE CASING
REMOVED

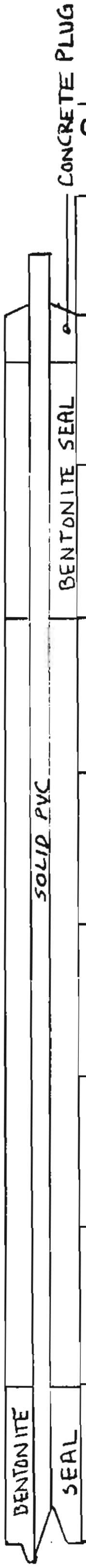
AFTER CASING
REMOVED

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HW

SHEET 1 OF 2
File #2289.016



DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH	GEOLOGIC COLUMN
						TRASH FILL		FILL
5.0								
10.0							10.0'	
						Brown moist fine to coarse SAND		SAND
▼ WL								
15.0								
20.0								
25.0								
30.0								
35.0								
	35.0'-	1		3/3			36.5'	
	37.0'			4/4	7	Gray wet medium stiff CLAY, trace silt with lenses of fine sand		CLAY-SILT
	37.0'-	2		2/2				
	39.0'			3/4	5			
40.0	39.0'-	3		3/3				

parratt wolff inc

TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

2A

PROJECT Subsurface Investigation
LOCATION Kingsbury - Fort Edward Sites
DATE STARTED 9/2/81 **DATE COMPLETED** 9/9/81

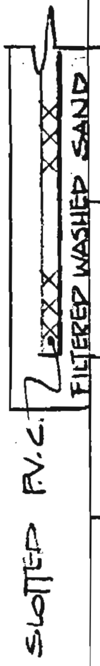
HOLE NO. F-2-A-81-626
SURF. EL.
JOB NO. 81108
GROUND WATER DEPTH WHILE DRILLING 12.0'
BEFORE CASING REMOVED
AFTER CASING REMOVED

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HW

SHEET 2 OF 2
File #2289.016



DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	41.0'			3/4	6	Gray wet medium stiff CLAY, trace silt with lenses of fine sand	
	41.0'-	4		3/3			
	43.0'			3/3	6		
45.0							
50.0							
	50.0'-	5		1/1			
	51.5'			2	3	Bottom of Boring	51.5'
55.0						Note: Installed 2.0' long piezometer with tip at 43.0' in 4Q sand pack from 43.0' to 39.0'. Installed compacted bentonite seal from 39.0' to 35.0', filled hole from 35.0 to surface with cuttings. After completing permeability test, removed piezometer and installed observation well to 50.0'.	

GEOLOGIC COLUMN

CLAY - SILT

parratt wolff inc

TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

#3

PROJECT Subsurface Investigation
Kingsbury - Fort Edward Sites
LOCATION
DATE STARTED 9/14/81 DATE COMPLETED 9/14/81

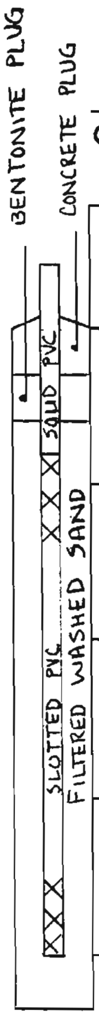
HOLE NO. F-3-81-636
SURF. EL.
JOB NO. 81108
GROUND WATER DEPTH
WHILE DRILLING Dry
BEFORE CASING REMOVED 17.0'
AFTER CASING REMOVED 17.0'

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

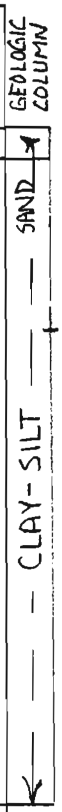
C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER

SHEET 1 OF 1
File #2289.016



DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	0.0'-	1		3/4		Brown moist loose fine SAND	1.0'
	2.0'			5/5	9	Brown moist stiff to very stiff CLAY,	
	2.0'-	2		4/5		trace silt, trace fine sand in lenses	
	4.0'			6/5	11	becoming gray at 18.0'	
5.0	4.0'-	3		3/5			
	6.0'			6/5	11		
	6.0'-	4		8/8			
	8.0'			8/8	16		
	8.0'-	5		7/9			
10.0	10.0'			9/8	18		
15.0							
	15.0'-	6		7/8			
▼ WL	16.5'			10	18		
20.0							
	20.0'-	7		8/10			
	21.5'			15	25	Bottom of Boring	21.5'
						Note: Installed observation well to 20.0'.	
25.0							



parratt wolff inc

TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

#4

PROJECT Subsurface Investigation
LOCATION Kingsbury - Fort Edward Sites

HOLE NO. F-4-81-634
SURF. EL.

DATE STARTED 9/10/81 **DATE COMPLETED** 9/10/81

JOB NO. 81108

GROUND WATER DEPTH WHILE DRILLING

BEFORE CASING REMOVED

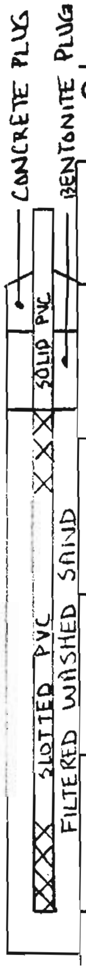
AFTER CASING REMOVED 19.5'

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER

SHEET 1 OF 1
File #2289.016



DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH	GEOLOGIC COLUMN
	0.0'-	1		2/4		TOPSOIL	0.5'	
	2.0'			4/5	8	Brown moist stiff CLAY, little fine to coarse sand, trace silt		CLAY - SILT
	2.0'-	2		5/7				
	4.0'			9/9	16			
5.0	4'-5'	3A		2/4			5.0'	
	5'-6'	3B		8/8	12	Gray-brown moist stiff CLAY with lenses of fine sand		
	6.0'-	4		8/8				
	8.0'			8/8	16			
	8.0'-	5		3/4				
10.0	10.0'			3/3	7			
15.0							15.0'	
	15.0'-	6		2/2		Gray wet soft CLAY, trace silt with lenses of fine sand		
	16.5'			2	4			
20.0 ▼								
WL	20.0'-	7		1/7				
	21.5'			2	9	Bottom of Boring	21.5'	
						Note: Installed observation well to 20.0' on completion.		
25.0								

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TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

#4A

PROJECT Subsurface Investigation

LOCATION Kingsbury - Fort Edward Sites

DATE STARTED 9/11/81 DATE COMPLETED 9/11/81

HOLE NO. F-4A-81-689

SURF. EL.

JOB NO. 81108

GROUND WATER DEPTH WHILE DRILLING

BEFORE CASING REMOVED

AFTER CASING REMOVED

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE

SHEET 1 OF 1
File #2289.016

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
						Drilled to 22.0' without sampling. Backfilled hole from 22.0' to 21.0' with bentonite slurry. Installed 2.0' long piezometer with tip at 19.5' in 4Q sand pack from 21.0' to 16.0'. Installed compacted bentonite pellet seal from 16.0' to 12.0;, filled hole from 12.0; to surface with cuttings.	
5.0							
10.0							
15.0							
20.0							
						Bottom of Boring	22.0'
25.0							

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FISHER ROAD
EAST SYRACUSE, N.Y. 13057

TEST BORING LOG

#5

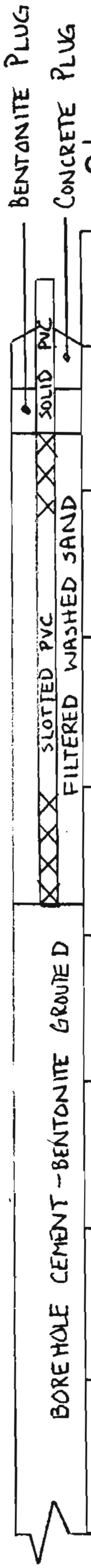
PROJECT	Subsurface Investigation
LOCATION	Kingsbury - Fort Edward Sites
DATE STARTED	9/17/81
DATE COMPLETED	9/17/81
HOLE NO.	F-5-81-637
SURF. EL.	
JOB NO.	81108
GROUND WATER DEPTH WHILE DRILLING	14.0'
BEFORE CASING REMOVED	60.0'
AFTER CASING REMOVED	

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

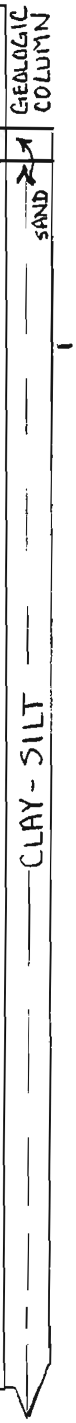
C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER

SHEET 1 OF 2
File #2289.016



DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	0.0'-	1		3/2		Brown moist loose fine SAND	1.0'
	2.0'			9/10	11	Brown moist very stiff to medium stiff CLAY, trace silt, trace fine sand in lenses becoming gray at 8.0'	
	2.0'-	2		9/10			
	4.0'			11/14	21		
5.0	4.0'-	3		3/2			
	6.0'			5/6	7		
	6.0'-	4		7/8			
	8.0'			9/8	17		
	8.0'-	5*		8/8			
10.0	10.0'			7/8	15		
						Gradation analysis indicates sample consists of clay, trace silt, trace fine to coarse sand.	
WL							
15.0							
	15-15.5'	6A		5/4			
	15.5'-	6B		3	7		
	16.5'						
20.0							
	20.0'-	7		3/4			
	21.5'			4	8		
25.0							25.0'
	25.0'-	8		2/2		Gray wet soft to very soft CLAY, trace silt, trace fine sand in lenses	
	26.5'			2	4		
30.0							
	30.0'-	9		1/1			
	31.5'			1	2		
35.0							
	35.0'-	10		1/1			
	36.5'			1	2		
40.0							



* Soil gradation analysis of this sample is presented in Appendix G.

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TEST BORING LOG

#5

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

PROJECT Subsurface Investigation

LOCATION Kingsbury - Fort Edward Sites

DATE STARTED 9/17/81 DATE COMPLETED 9/17/81

HOLE NO. F-5-81-637

SURF. EL.

JOB NO. 81108

GROUND WATER DEPTH WHILE DRILLING 14.0'

BEFORE CASING REMOVED 60.0'

AFTER CASING REMOVED

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER

SHEET 2 OF 2
File #2289.016

BOREHOLE CEMENT - BENTONITE GROUTED

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH	GEOLOGIC COLUMN
	40.0'-	11		1/1		Gray wet soft to very soft CLAY, trace silt, trace fine sand in lenses		CLAY - SILT
	41.5'			1	2			
45.0	45.0'-	12		1/2				
	46.5'			1	3			
50.0	50.0'-	13		1/1				
	51.5'			2	3			
55.0	55.0'-	14		1/1				
	56.5'			1	2			
60.0	60.0'-	15		1/2				
	61.5'			2	4			
65.0	65.0'-	16		1/2				
	66.5'			2	4			
70.0	70.0'-	17		1/1				
	71.5'			2	3	Bottom or Boring	71.5'	
75.0								

parratt wolff inc

TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

#6

PROJECT Subsurface Investigation
LOCATION Kingsbury - Fort Edward Sites
DATE STARTED 9/14/81 **DATE COMPLETED** 9/15/81

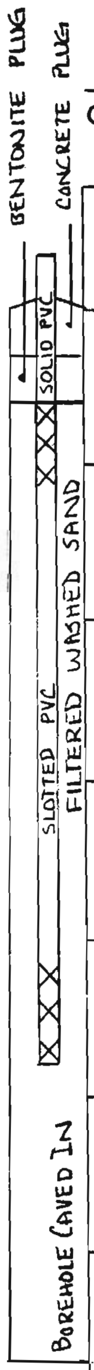
HOLE NO. F-6-81-638
SURF. EL.
JOB NO. 81108
GROUND WATER DEPTH WHILE DRILLING 4.0'
BEFORE CASING REMOVED 6.2'
AFTER CASING REMOVED 6.0'

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER

SHEET 1 OF 1
File #2289.016



DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH	GEOLOGIC COLUMN
	0.0'-	1		2/3		Black moist loose fine to coarse SAND, little silt		SAND
	2.0'			3/2	5		0.5'	
	2.0'-	2		4/5		Brown wet loose fine to medium SAND, trace silt		
WL ▼	4.0'			6/7	11			
5.0	4.0'-	3		4/4				
	6.0'			3/3	7		6.0'	
	6-7.5'	4A		1/2		Gray wet very soft CLAY, trace silt	7.5'	CLAY LENSE
	7.5-8'	4B		1/7	3	Gray moist loose fine SAND, little clay, trace silt		
	8.0'-	5		2/4				
10.0	10.0'			3/4	7		8.0'	
						Brown wet loose fine to medium SAND, trace silt		SAND
15.0							15.0'	
	15-16.5'	6		2/3		Gray wet medium dense fine to medium SAND		
	16.5'-	7		5/3	8			
	18.5'			3/6	9			
				8				
20.0							20.0'	
	20.0'-	8		3/5		Gray wet interbedded fine SAND and CLAY, trace silt		CLAY-SILT w/ SAND LENSES
	21.5'			8	13			
						Note: Sand rose 7.0' in casing after sampling at 25.0'		
25.0								
	25.0'-	9		7/9				
	26.5'			11	20	Gradation analysis indicates sample consists of clay, trace silt, trace fine to coarse sand.		
30.0							30.0'	
	30-31.5'	10*		2/3		Gray wet medium stiff CLAY, trace silt, trace fine sand in lenses		CLAY-SILT
	31.5'-	11		3/2	6			
	33.5'			2/3	5			
				2		Bottom of Boring	33.5'	
35.0								
						Note: Installed observation well to 24.0'.		

* Soil gradation analysis of this sample is presented in Appendix G.

parratt wolff inc

TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

PROJECT Subsurface Investigation

LOCATION Kingsbury - Fort Edward Sites

#6A

HOLE NO. F-6A-81-639

SURF. EL.

DATE STARTED 9/15/81 **DATE COMPLETED** 9/16/81

JOB NO. 81108

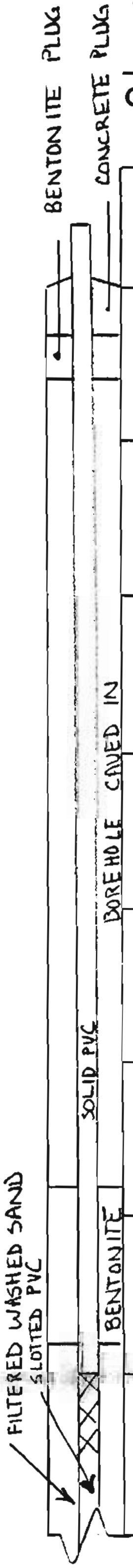
N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

GROUND WATER DEPTH
WHILE DRILLING SEE NOTE
BEFORE CASING REMOVED
AFTER CASING REMOVED

CASING TYPE - HW

SHEET 1 OF 2
File #2289.016



DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH	GEOLOGIC COLUMN
						Brown wet loose to medium dense fine to coarse SAND		SAND
5.0								
10.0								
15.0								
20.0								
25.0								
30.0							30.0'	
						Gray wet medium stiff CLAY, trace silt		CLAY - SILT
35.0								
	35.0'-	1		3/3				
	36.5'			3	6			
40.0								

parratt wolff inc

TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

PROJECT Subsurface Investigation
LOCATION Kingsbury - Fort Edward Sites

#6A

HOLE NO. F-6A-81-639
SURF. EL.
DATE STARTED 9/15/81 **DATE COMPLETED** 9/16/81
JOB NO. 81108

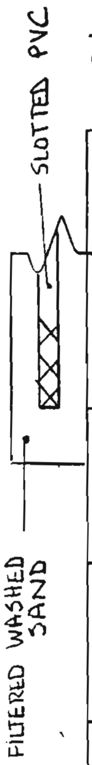
GROUND WATER DEPTH WHILE DRILLING SEE NOTE
BEFORE CASING REMOVED
AFTER CASING REMOVED

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HW

SHEET 2 OF 2
File #2289.016



DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH	GEOLOGIC COLUMN
	40.0'-	2*		2/3		Gray wet medium stiff CLAY, trace silt		CLAY - SILT
	41.5'			3	6	Gradation analysis indicates sample consists of clay, trace silt, trace fine to coarse sand.		
45.0								
	45.0'-	3		1/1				
	46.5'			1	2			
						Bottom of Boring	46.5'	
50.0						Note: Installed observation well to 45.0'. With casing at 40.0' for 1 hour - hole was dry. After 13 hours, water was at 28.5' in casing.		

* Soil gradation analysis of this sample is presented in Appendix G.

parratt wolff inc

TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

#7

PROJECT Subsurface Investigation
LOCATION Kingsbury - Fort Edward Sites
DATE STARTED 9/10/81 DATE COMPLETED 9/11/81

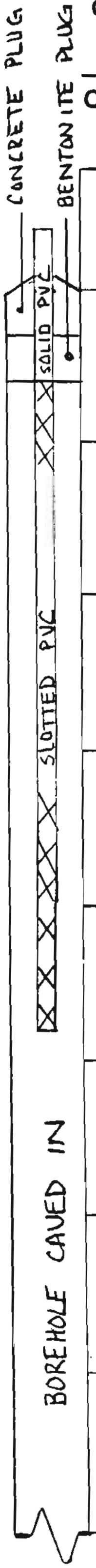
HOLE NO. F-7-81-635
SURF. EL.
JOB NO. 81108
GROUND WATER DEPTH
WHILE DRILLING 9.0'
BEFORE CASING REMOVED Casing @ 25' for 12 hrs - 9.0'
AFTER CASING REMOVED

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER

SHEET 1 OF 2
File #2289.016



DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	0.0'-	1		2/3		Brown moist to wet loose to medium dense fine to medium SAND	
	2.0'			5/4	8		
	2.0'-	2		4/4			
	4.0'			4/3	8		
5.0	4.0'-	3		5/4			
	6.0'			4/5	8		
	6.0'-	4		6/6			
	8.0'			5/5	11		
WL ▼	8.0'-	5		4/5			
10.0	10.0'			5/5	10		
						Gradation analysis indicates this sample consists of medium to fine sand, trace silt.	
15.0							
	15.0'-	6*		3/2			
	16.5'			2	4		
20.0							
	20.0'-	7*		3/5			
	21.5'			8	13		
25.0							
	25.0'-	8*		3/5			
	26.5'			5	10		
30.0							
	30.0'-	9		7/7			
	31.5'			10	17		
35.0							
	35.0'-	10		15/16			
	36.5'			17	33		
40.0							

* Soil gradation analysis of this sample is presented in Appendix G.

parratt wolff inc

TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

#7

PROJECT Subsurface Investigation

LOCATION Kingsbury - Fort Edward Sites

DATE STARTED 9/10/81 DATE COMPLETED 9/11/81

HOLE NO. F-7-81-635

SURF. EL.

JOB NO. 81108

GROUND WATER DEPTH

WHILE DRILLING 9.0'

BEFORE CASING REMOVED Casing @ 25' for 12 hrs. - 9.0'

AFTER CASING REMOVED

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER

SHEET 2 OF 2

File #2289.016

BOREHOLE CAVED IN

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH	GEOLOGIC COLUMN
	40.0'-	11		10/14		Brown wet dense to medium dense fine to medium SAND		SAND
	41.5'			17	31			
45.0								
	45.0'-	12		7/8				
	46.5'			8	16			
50.0							50.0'	
	50-51.5'	13		6/7		Gray wet stiff to very stiff CLAY, trace silt		CLAY-SILT
	51.5-53'	14		8/8	15			
				10/11	21			
						Bottom of Boring	53.0'	
55.0								
						Note: Installed observation well to 24.0'. Sand rose slightly in casing after sampling at 25.0', 30.0', 35.0' and 45.0'.		

parratt wolff inc

TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

#8

PROJECT Subsurface Investigation

LOCATION Kingsbury - Fort Edwatd Sites

DATE STARTED 8/25/81 DATE COMPLETED 8/25/81

HOLE NO. K-8-81-622

SURF. EL.

JOB NO. 81108

GROUND WATER DEPTH WHILE DRILLING Dry

BEFORE CASING REMOVED Dry

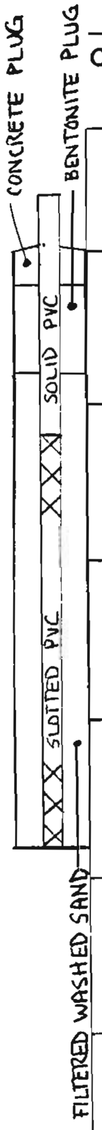
AFTER CASING REMOVED Dry

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER

SHEET 1 OF1
File #2289.016



DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH	GEOLOGIC COLUMN
	0.0'-	1		2/6		Brown moist medium dense fine to medium SAND		SAND
	2.0'			8/10	14			
	2.0'-	2		7/10				
	4.0'			12/13	22		4.0'	
5.0'	4.0'-	3		2/3		Gray wet soft CLAY , trace silt		CLAY-SILT
	6.0'			2/3	5			
	6.0'-	4*		3/3		Gradation analysis indicates this sample consists of clay, little silt, trace fine to coarse sand.		
	8.0'			3/3	6			
	8.0'-	5		2/2				
10.0'	10.0'			2/3	4			
	10.0'-	6		1/2				
	11.5'			2	4			
							14.0'	
15.0'						Gray moist medium dense SILT, some fine to coarse gravel, some fine to coarse sand, trace clay		
	15.0'-	7		5/6				
	16.5'			7	13		17.5'	
	16.5'-	8		9		Gray moist fine to coarse SAND and SILT, some fine to coarse gravel		
	18.0'			11/44	55			
20.0'	18.0'-	9		75		Bottom of Boring	18.5'	
	18.5'					Note: Installed observation well to 18.0'.		

* Soil gradation analysis of this sample is presented in Appendix G.

parratt wolff inc

TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

#8A

PROJECT Subsurface Investigation
LOCATION Kingsbury - Fort Edward Sites
DATE STARTED 9/8/81 DATE COMPLETED 9/8/81

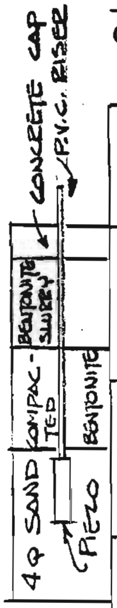
HOLE NO. K-8A-81
SURF. EL.
JOB NO. 81108
GROUND WATER DEPTH WHILE DRILLING
BEFORE CASING REMOVED
AFTER CASING REMOVED

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER

SHEET 1 OF 1



DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
						Drilled to 12.0' without sampling and installed piezometer	
5.0							
10.0							
						Bottom of Boring	12.0'
15.0						Note: Installed 2.0' long piezometer with tip at 9.5' in 4Q sand pack from 12.0' to 7.0'. Installed compacted bentonite seal from 7.0' to 4.0', bentonite slurry from 4.0' to 1.0'. Installed locking cover in 1.0' concrete plug at surface.	

parratt wolff inc

TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

#9

PROJECT Subsurface Investigation

LOCATION Kingsbury - Fort Edward Sites

DATE STARTED 8/25/81 DATE COMPLETED 8/25/81

HOLE NO. K-9-81-623

SURF. EL.

JOB NO. 81108

GROUND WATER DEPTH WHILE DRILLING 13.0'

BEFORE CASING REMOVED 15.2'

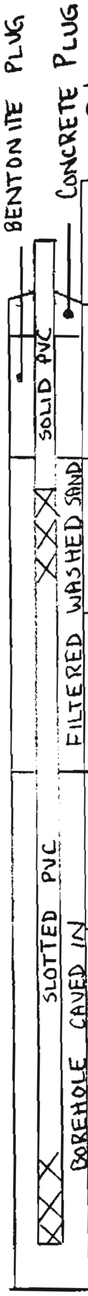
AFTER CASING REMOVED

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER

SHEET 1 OF1
File #2289.016



DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH	GEOLOGIC COLUMN
	0.0'-	1		1/1		Brown moist loose fine to medium SAND, some peat		
	2.0'			2/2	3			
	2.0'-	2		2/2				
	4.0'			2/3	4			
5.0'	4.0'-	3		2/2			5.5'	
	6.0'			3/5	5	Brown moist medium dense fine to coarse SAND		
	6.0'-	4		7/10				
	8.0'			10/10	20			
	8.0'-	5		5/8				
10.0'	10.0'			8/10	16			
	10.0'-	6		5/7				
	11.5'			8	15		13.0'	
WL						Brown wet medium dense coarse to fine SAND		
15.0'								
	15.0'-	7		2/3				
	16.5'			7	10			SAND
20.0'								
	20.0'-	8		7/10				
	21.5'			10	20	Gradation analysis indicates this sample consists of coarse to fine sand, trace silt.		
25.0'								
	25.0'-	9*		7/9				
	26.5'			11	20		28.5'	
	27.5'-	10		8/8				
30.0'	29.0'			8	16	Gray moist stiff CLAY, little fine to coarse sand, little fine to medium gravel, trace silt		
	30.0'-	11		3/5				
	31.5'			7	12	Bottom of Boring	31.5'	
						Note: Installed observation well to 30.0'.		
35.0'								CLAY-SILT

* Soil gradation analysis of this sample is presented in Appendix G.

parratt wolff inc

TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

#10

PROJECT Subsurface Investigation
LOCATION Kingsbury - Fort Edward Sites

DATE STARTED 8/27/81 DATE COMPLETED 8/27/81

HOLE NO. K-10-81-625
SURF. EL.
JOB NO. 81108
GROUND WATER DEPTH
WHILE DRILLING 13.0'
BEFORE CASING REMOVED
AFTER CASING REMOVED

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER

SHEET 1 OF 2
File #2289.016

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	0.0'-	1		2/6		Brown moist dense fine SAND, little	
	2.0'			10/8	16	fine to coarse gravel, little topsoil	2.0'
	2.0'-	2		5/5		Brown moist medium dense fine to coarse	
	4.0'			4/4	9	SAND, trace silt	
5.0'	4.0'-	3		3/4			
	6.0'			4/5	8		
	6.0'-	4		5/7			
	8.0'			8/7	15		
	8.0'-	5		4/5			
10.0'	10.0'			5/6	10		
▼							13.0'
WL						Brown wet loose fine to medium SAND,	
15.0'						trace silt	
	15.0'-	6		2/3			
	16.5'			5	8		
20.0'							
	20.0'-	7		2/4			
	21.5'			4	8		
							23.0'
						Gray wet medium dense to loose coarse	
25.0'						to fine SAND	
	25.0'-	8		4/5			
	26.5'			8	13		
30.0'							
	30.0'-	9	No	4/5		Note: Made three attempts to recover	
	31.5'		Rec.	7	12	sample 9.	
35.0'							
	35.0'-	10		3/3			
	36.5'			4	7		
40.0'							

parratt wolff inc

TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

PROJECT Subsurface Investigation
LOCATION Kingsbury - Fort Edward Sites

#10

HOLE NO. K-10-81-625
SURF. EL.
DATE STARTED 8/27/81 DATE COMPLETED 8/27/81
JOB NO. 81108
GROUND WATER DEPTH
WHILE DRILLING 13.0'
BEFORE CASING REMOVED
AFTER CASING REMOVED

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER

SHEET 2 OF 2
File #2289.016

BORE HOLE CAVED IN

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH	GEOLOGIC COLUMN
	40.0'-	11		3/5		Gray wet medium dense to loose coarse to fine SAND		SAND
	41.5'			7	12			
45.0'	45.0'-	12		5/7				
	46.5'			8	15			
50.0'							50.0'	
	50.0'-	13		6/7		Gray wet medium dense fine to medium SAND		
	51.5'			9	16			
55.0'								
60.0'								
	60.0'-	14		3/4			61.0'	
	61.5'			5	9	Gray moist stiff SILT, CLAY and fine to coarse SAND		CLAY-SILT
						Bottom of Boring	61.5'	
65.0'						Note: Installed observation well to 33.0'.		

parratt wolff inc

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

TEST BORING LOG

#11

PROJECT Subsurface Investigation

LOCATION Kingsbury - Fort Edward Sites

DATE STARTED 9/3/81 DATE COMPLETED 9/3/81

HOLE NO. K-11-81-622

SURF. EL.

JOB NO. 81108

GROUND WATER DEPTH WHILE DRILLING

BEFORE CASING REMOVED

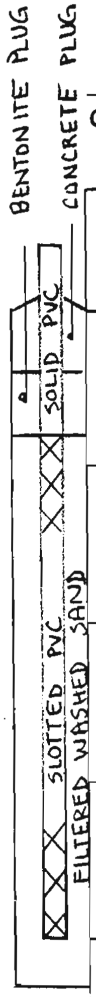
AFTER CASING REMOVED

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER

SHEET 1 OF 1
File #2289.016



DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH	GEOLOGIC COLUMN
	0.0'-	1		3/4		Brown moist stiff to hard CLAY and SILT,		CLAY - SILT
	2.0'			5/7	9	trace fine sand in lenses		
	2.0'-	2		9/10				
	4.0'			10/11	20			
5.0	4.0'-	3		8/10				
	6.0'			12/13	22			
	6.0'-	4		14/15				
	8.0'			13/15	28			
	8.0'-	5		10/14				
10.0	10.0'			15/17	29			
15.0								
	15-16'	6A		10/15				
	16.0'-	6B		18	33			
	16.5'							
20.0								
	20.0'-	7		12/17				
	21.5'			18	35	Bottom of Boring	21.5'	
						Note: Installed observation well to		
25.0						20.0'.		

parratt wolff inc

TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

#12

PROJECT Subsurface Investigation
LOCATION Kingsbury - Fort Edward Sites
DATE STARTED 9/1/81 DATE COMPLETED 9/1/81

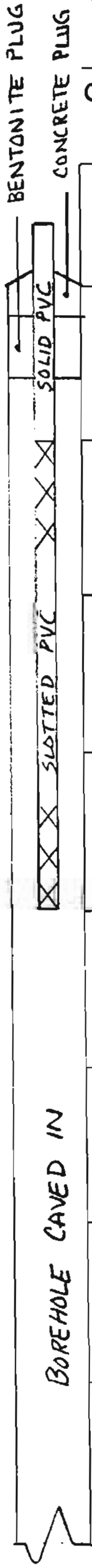
HOLE NO. K-12-81-628
SURF. EL.
JOB NO. 81108
GROUND WATER DEPTH WHILE DRILLING 4.0'
BEFORE CASING REMOVED w/casing @ 20' for 12 hrs-4'
AFTER CASING REMOVED

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER

SHEET 1 OF 2
File #2289.016



DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	0.0'-	1		1/2		Brown moist very loose to loose fine to coarse SAND, some trash fill	
	2.0'			6/4	8		
	2.0'-	2		1/1			
WL	4.0'			2/1	3		4.0'
5.0	4.0'-	3	No	1/1		Brown moist very loose fine to coarse SAND, trace silt	
	6.0'		Rec	2/2	3		
	6.0'-	4		2/1			
	8.0'			1/1	2		
	8.0'-	5	No	1/2			
10.0	10.0'		Rec	1/2	3		10.0'
						Gray wet medium dense coarse to fine SAND, trace silt	
						Gradation analysis indicates this sample consists of coarse to fine sand, trace silt.	
15.0							
	15-16''	6A*		4/5			
	16.0'-	6B*		7	12		
	16.5'						
20.0							
	20.0'-	7	No	6/8			
	21.5'		Rec	6	14		
25.0							
30.0							
35.0							35.0'
	35.0'-	8		4/5		Gray moist stiff SILT and CLAY	36.0'
	36.5'			8/8	13	Brown wet medium dense fine to medium SAND	
	36.5'-	9	No	6/12	18		
	38.0'		Rec				
40.0							

* Soil gradation analysis of this sample is presented in Appendix G.

parratt wolff inc

TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

#12

PROJECT Subsurface Investigation
LOCATION Kingsbury - Fort Edward Sites
DATE STARTED 9/1/81 DATE COMPLETED 9/1/81

HOLE NO. K-12-81-628
SURF. EL.
JOB NO. 81108
GROUND WATER DEPTH WHILE DRILLING 4.0'
BEFORE CASING REMOVED w/casing @ 20' for 12 hrs-4'
AFTER CASING REMOVED

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER

SHEET 2 OF 2
File #2289.016

BOREHOLE CAVED IN

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH	GEOLOGIC COLUMN
						Brown wet medium dense fine to medium SAND		SAND
45.0								
	45.0'-	10		7/9				
	47.0'			17/19	26			
50.0								
55.0								
60.0							60.0'	
	60.0'-	11		5/5		Gray moist stiff CLAY, trace silt		CLAY-SILT
	62.0'			6/7	11			
						Bottom of Boring	62.0'	
65.0						Note: Installed observation well to 20.0'.		

parratt wolff inc

TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

#13

PROJECT Subsurface Investigation
LOCATION Kingsbury - Fort Edward Sites
DATE STARTED 9/2/81 DATE COMPLETED 9/2/81

HOLE NO. K-13-81-629
SURF. EL.
JOB NO. 81108
GROUND WATER DEPTH WHILE DRILLING
BEFORE CASING REMOVED 14.0'
AFTER CASING REMOVED

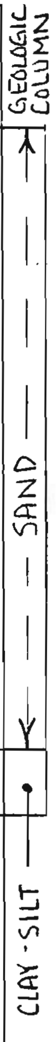
N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER

SHEET 1 OF 1
File #2289.016

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
	0.0'-	1		1/2		Brown dry loose fine to coarse SAND	
	2.0'			3/5	5		2.0'
	2.0'-	2		3/2		Black-gray wet loose fine to coarse	
	4.0'			2/1	4	SAND, trace silt	4.5'
5.0	4.0'-	3		3/4		Brown wet loose fine to coarse SAND,	
	6.0'			4/4	8	trace silt	
	6.0'-	4		3/3			
	8.0'			3/3	6		7.5'
	8.0'-	5		3/4		Gray wet loose to medium dense fine	
10.0	10.0'			3/4	7	SAND with lenses of clay and silt	
						Gradation analysis indicates this sample consists of coarse to fine sand, trace fine gravel, trace silt.	
WL ▼ 15.0							
	15.0'-	6*		5/10			
	16.5'			12	22		
20.0							20.0'
	20.0'-	7		4/6		Gray moist stiff CLAY, trace silt,	
	21.5'			7	13	trace fine sand in lenses	
						Bottom of Boring	21.5'
25.0						Note: Installed observation well to 20.0'.	



* Soil gradation analysis of this sample is presented in Appendix G.

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FISHER ROAD
EAST SYRACUSE, N.Y. 13057

TEST BORING LOG

#13A

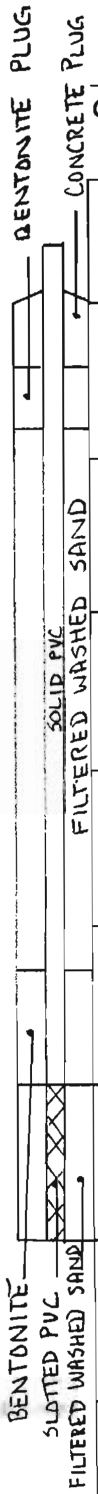
PROJECT Subsurface Investigation
LOCATION Kingsbury - Fort Edward Sites
DATE STARTED 9/3/81 DATE COMPLETED 9/3/81
HOLE NO. K-13-A-81-631
SURF. EL.
JOB NO. 81108
GROUND WATER DEPTH WHILE DRILLING
BEFORE CASING REMOVED
AFTER CASING REMOVED

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HW

SHEET 1 OF 1
File #2289.016



DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH
						Brown moist fine to coarse SAND	
5.0							
10.0							
15.0							
20.0							
							23.0'
	23.0'-	1		5/4		Gray wet medium stiff CLAY, little fine sand, trace silt	
25.0	25.0'			5/5	9		
	25.0'-	2		5/4			26.0'
	27.0'			4/4	8	Gray wet medium stiff CLAY, some fine sand	27.0'
	27.0'-	3		2/2		Gray wet loose SILT and fine to medium SAND	
	29.0'			3/3	5		
30.0						Bottom of Boring	30.0'
						Note: Installed observation well to 30.0'.	

SAND

CLAY - SILT

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TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

#14

PROJECT Subsurface Investigation
LOCATION Kingsbury - Fort Edward Sites
DATE STARTED 8/31/81 DATE COMPLETED 9/1/81

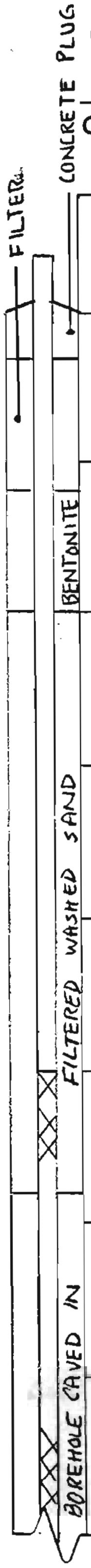
HOLE NO. K-14-81-632
SURF. EL.
JOB NO. 81108
GROUND WATER DEPTH WHILE DRILLING 30.5'
BEFORE CASING REMOVED w/casing @ 50' for 15 hrs.-36.8'
AFTER CASING REMOVED Hole caved at 28.0'

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER

SHEET 1 OF 2
File #2289.016



DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH	GEOLOGIC COLUMN
	0.0'-	1		1/2		Brown moist very loose fine to medium SAND		FILL
	2.0'			2/3	4			
	2.0'-	2		4/8				
	4.0'			4/3	12		3.5'	
5.0	4.0'-	3		6/8		Brown moist loose fine to medium SAND, some wood		
	6.0'			6/5	14		4.0'	
	6.0'-	4		8/7		Multi colored TRASH, including capacitors		
	8.0'			6/4	13			
	8.0'-	5		6/4			9.0'	
10.0	10.0'			2/1	6	Brown moist very loose fine to coarse SAND		SAND
15.0							15.0'	
	15.0'-	6		5/8		Brown moist medium dense fine to coarse SAND		
	16.5'			8	16			
20.0								
	20.0'-	7		5/8				
	21.5'			12	20			
25.0								
	25.0'-	8		6/11				
	26.5'			15	26			
30.0 ▼ WL							30.5'	
	30.0'-	9		6/9		Brown wet medium dense fine to medium SAND, little clay and silt in lenses		
	31.5'			12	21			
						Gradation analysis indicates this sample consists of medium to fine sand, some silt, trace clay.		
35.0								
	35.0'-	10 *		6/6				
	36.5'			9	15			
40.0								

* Soil gradation analysis of this sample is presented in Appendix G.

parratt wolff inc

TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

#14

PROJECT Subsurface Investigation

LOCATION Kingsbury - Fort Edward Sites

DATE STARTED 8/31/81 DATE COMPLETED 9/1/81

HOLE NO. K-14-81-632

SURF. EL.

JOB NO. 81108

GROUND WATER DEPTH
WHILE DRILLING 30.5'

BEFORE CASING REMOVED w/casing at 50 for 15 hrs.-36.8'

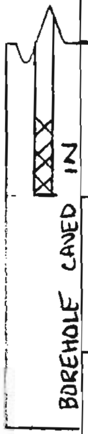
AFTER CASING REMOVED Hole caved at 28.0'

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER

SHEET 2 OF 2
File #2289.016



DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH	GEOLOGIC COLUMN
	40-41'	11A		3/5		Gray wet loose fine to medium SAND,		SAND
	41.0'-	11B		9	14	trace silt	41.0'	
	41.5'					Brown wet medium dense fine SAND		
45.0							45.0'	
	45.0'-	12		9/16		Brown wet dense fine to medium SAND,		
	46.5'			17	33	little clay in lenses		
50.0							50.0'	
	50.0'-	13		5/7		Brown wet medium dense fine to medium		
	51.5'			10	17	SAND		
						Bottom of Boring	51.5'	
55.0								

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TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

#14A

PROJECT Subsurface Investigation
LOCATION Kingsbury - Fort Edward Sites
DATE STARTED 9/1/81 DATE COMPLETED 9/1/81

HOLE NO. K-14A-81-630
SURF. EL.
JOB NO. 81108
GROUND WATER DEPTH WHILE DRILLING
BEFORE CASING REMOVED
AFTER CASING REMOVED

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER

SHEET 1 OF 2
File #2289.016

BENTONITE SEAL

BOREHOLE CHIPPINGS

BENTONITE SEAL

DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH	GEOLOGIC COLUMN
						Brown moist fine to coarse SAND and TRASH		FILL
5.0								
							7.0'	
						Brown moist fine to coarse SAND		SAND
10.0								
15.0								
20.0								
25.0								
30.0								
35.0								
40.0								

parratt wolff inc

TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

#14A

PROJECT Subsurface Investigation
LOCATION Kingsbury - Fort Edward Sites
DATE STARTED 9/1/81 DATE COMPLETED 9/1/81

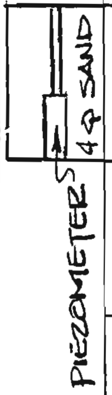
HOLE NO. K-14A-81-630
SURF. EL.
JOB NO. 81108
GROUND WATER DEPTH WHILE DRILLING
BEFORE CASING REMOVED
AFTER CASING REMOVED

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HOLLOW STEM AUGER

SHEET 2 OF 2
File #2289.016



DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH	GEOLOGIC COLUMN
45.0						Brown moist fine to coarse SAND		SAND
						Bottom of Boring	45.0'	
						Note: Installed 2" P.V.C. screen from 45.0' to 25.0', 2" P.V.C. riser from 25.0; to surface. Back-filled with 4Q sand from 45.0' to 10.0', bentonite seal from 10.0' to 6.0', sand from 6.0' to 1.5', concrete and locking standpipe from 1.5' to surface.		

parratt wolff inc

TEST BORING LOG

FISHER ROAD
EAST SYRACUSE, N.Y. 13057

#9A

PROJECT Subsurface Investigation
LOCATION Kingsbury - Fort Edward Sites
DATE STARTED 8/26/81 DATE COMPLETED 8/26/81

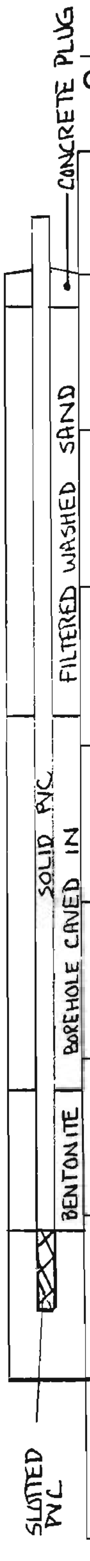
HOLE NO. K-9A-81-624
SURF. EL.
JOB NO. 81108
GROUND WATER DEPTH WHILE DRILLING
BEFORE CASING REMOVED
AFTER CASING REMOVED

N — NO. OF BLOWS TO DRIVE SAMPLER 12" W/140# HAMMER FALLING 30" — ASTM D-1586, STANDARD PENETRATION TEST

C — NO. OF BLOWS TO DRIVE CASING 12" W/ # HAMMER FALLING "/OR — % CORE RECOVERY

CASING TYPE - HW to 33.0'

SHEET 1 OF 1
File #2289.016



DEPTH	SAMPLE DEPTH	SAMPLE NUMBER	C	SAMPLE DRIVE RECORD PER 6"	N	DESCRIPTION OF MATERIAL	STRATA CHANGE DEPTH	GEOLOGIC COLUMN
5.0' 10.0' 15.0' 20.0' 25.0'						Spun casing down to 9.0'. Hit wood and concrete, pulled out and moved 5.0' offset. Spun HW casing down to 11.0', then drove casing to 28.5' with 140# hammer. Cleaned out and continuous sampling from 28.5 to 34.0'. Drove casing to 33.0' and cleaned out. Installed observation well to 33.0'.	28.5'	SAND
	28.5'-	1		5		Gray moist stiff CLAY, trace silt		CLAY-SILT
30.0'	30.0'			6/6	11			
	30.0'-	2		4/5				
	32.0'			7/7	14			
	32.0'-	3		4/5			33.5'	
	34.0'			7/12	12	Gray moist medium dense fine to coarse SAND, fine to coarse GRAVEL and SILT, little clay		
35.0'						Bottom of Boring	34.0'	

APPENDIX C

GROUNDWATER SAMPLING PROCEDURE

GROUNDWATER SAMPLING PROCEDURES

I. MATERIALS

1. Disposable Gloves
2. Plastic Sheeting - (10 ft by 10 ft minimum)
3. Bailers - (top filling) 1 - 1 1/2 inch O.D. aluminum, natural cork plugs
4. Polypropylene Rope
5. Distilled Water
6. Hexane Solvent
7. Clean Disposable Rags
8. 100' Steel Tape
9. Peristaltic Pump With Accessories
10. Polypropylene Tubing (1/4 - 1/2" diameter)
11. Insulated Transport Containers
12. Graduated Pail
13. Conductivity Meter
14. pH Meter
15. Dual Carbon Respirators with Organic Vapor Filters
16. Safety Glasses or Goggles
17. Appropriate Sampling Containers
18. 200 ml Beaker
19. Disposable Shoe Covers

II. GENERAL NOTES

The following general notes must be adheared to during all well developing and sampling operations:

1. Safety glasses or goggles must be worn at all times during well development or sampling to prevent splashing of potentially contaminated water into the eyes.
2. Respirators must be worn if a distinct chemical odor is observed.
3. Sampling of wells must be discontinued during precipitation periods (rain or snow).

III. GROUNDWATER WELL DEVELOPMENT

Prior to obtaining groundwater samples for laboratory analysis, all monitoring wells must be developed as described in the following paragraphs:

To obtain representative samples of groundwater from a groundwater monitoring well, all fine grained material and sediments that have settled in or around the well during installation should first be removed from the well (well development). This is accomplished by air surging, pumping or bailing groundwater from the well until it yields relatively sediment-free water.

The main precaution taken during well development is the use of new equipment and accessories for developing each well to avoid cross contamination of the wells. (i.e., during air surging, new lengths of polypropylene tubing and hose are required for each well; during pumping, new polypropylene tubing is required for each well and during bailing, a new bailer (and rope) is required for each well).

NOTE: Wells developed by air surging must be allowed to stabilize after development of a minimum of 10 days prior to sampling. Wells developed by bailing or pumping must be allowed to stabilize after development a minimum of three days prior to sampling.

IV. PROCEDURES

Use of the following procedures for the sampling of groundwater observation wells is dependent upon the depth of the well to be sampled. To obtain representative groundwater samples from wells installed to a depth greater than 25 feet, the bailing procedure should be used. To obtain representative groundwater samples from wells installed to a depth less than 25 feet, the bailing procedure or the pumping procedure can be used. Each of these procedures is explained in detail below.

A. Sampling Procedures (BAILER)

1. Identify the well and record the location on the Groundwater Sampling Field Log.
2. Cut a slit in one side of the plastic sheet, and slip it over and around the well creating a clean surface onto which the sampling equipment can be positioned. This clean working area should be a minimum of 10 feet by 10 feet. Use disposable shoe covers to prevent potential contamination material from contacting the plastic sheet.

Do not kick, transfer, drop, or in any way let soils or other materials fall onto this sheet unless it comes from inside the well. Do not place meters, tools, equipment, etc. on the sheet unless they have been cleaned first with a clean rag.

3. Put on a new pair of disposable gloves.
4. Clean the well cap with a clean rag, and remove the well cap, and plug placing both on the plastic sheet.
5. Clean the first ten feet of the steel 100 foot tape with a hexane soaked rag then rinse with distilled water, and measure the depth to the water table. Record this information on the Groundwater Sampling Field Log. (Attached)
6. Compute the volume of water in the well using the formulae, and information provided on the Groundwater Sampling Field Log. Record this volume on the Groundwater Sampling Field Log.
7. Attach enough polypropylene rope to a bailer to reach the bottom of the well, and lower the bailer slowly into the well making certain to submerge it only far enough to fill it completely.
8. Pull the bailer out of the well keeping the polypropylene rope on the plastic sheet. Empty the groundwater from the bailer into a new glass quart container and observe its appearance. Return the glass quart to its proper transport container. <u>Note</u>: This sample will not undergo

laboratory analysis, and is collected to observe the physical appearance of the groundwater only.

9. Record the physical appearance of the groundwater on the Groundwater Sampling Field Log.

10. Lower the bailer to the bottom of the well, and agitate the bailer up and down to resuspend any material settled in the well.

11. Initiate bailing the well from the well bottom making certain to keep the polypropylene rope on the plastic sheet. All groundwater should be dumped from the bailer into a graduated pail to measure the quantity of water removed from the well.

12. Continue bailing the well from the bottom until three times the volume of groundwater in the well has been removed, or until the well is bailed dry. If the well is bailed dry, allow sufficient time (several hours to overnight) for the well to recover before proceeding with Step 13. Record this information on the Groundwater Sampling Field Log.

13. Remove the sampling bottles from their transport containers, and prepare the bottles for receiving samples. Inspect all labels to insure proper sample identification. Sample bottles should be kept cool with their caps on until they are ready to receive samples. Arrange the sampling containers to allow for convenient filling. Always fill the containers labeled purgeable priority pollutant, or BTX analysis first.

14. Initiate sampling by lowering the bailer slowly into the well making certain to submerge it only far enough to fill it completely. Minimize agitation of the water in the well as best as possible. Fill each sample container following the instructions listed on Attachment A - Sample Containerization Procedures. Return each sample bottle to its proper transport container.
15. If the sample bottle cannot be filled quickly, keep them cool with their caps on until they are filled. The vials (3) labeled purgeable priority pollutant and BTX analysis should be filled from one bailer then securely capped. NOTE: Samples must not be allowed to freeze.
16. Record the physical appearance of the groundwater observed during sampling on the Groundwater Sampling Field Log.
17. After the last sample has been collected, record the date and time, and empty one bailer of water from the surface of the water in the well into the 200 ml beaker and measure and record the pH, and conductivity of the groundwater following the procedures outlined in the equipment operation manuals. Record this information on the Groundwater Sampling Field Log. The 200 ml beaker must then be rinsed with hexane, and distilled water prior to reuse.
18. Replace the well plug, and lock the well protection assembly before leaving the well location.

19. Place the bailer, polyproplyene rope, gloves, rags, and plastic sheeting into a plastic bag. The plastic bag should then be buried on-site at a preselected location.

B. Sampling Procedures (Pump)

1. Identify the well and record the location on the Groundwater Sampling Field Log.
2. Cut a slit in one side of the plastic sheet, and slip it over and around the well creating a clean surface onto which the sampling equipment can be positioned. This clean working area should be a minimum of 10 feet by 10 feet. Use disposable shoe covers to prevent potential contaminated material from contacting the plastic sheet. Do not kick, transfer, drop, or in any way let soils or other materials fall onto this sheet unless it comes from inside the well. Do not place meters, tools, equipment, etc. on the sheet unless they have been cleaned first with a clean rag.
3. Put on a new pair of disposable gloves.
4. Clean the well cap with a clean rag, and remove the well cap, and plug placing both on the plastic sheet.
5. Clean the first ten feet of the steel 100 foot tape with a hexane soaked rag then rinse with distilled water, and measure the depth to the water table. Record this information on the Groundwater Sampling Field Log (Attached).

6. Compute the volume of water in the well using the formulae, and information provided on the Groundwater Sampling Field Log. Record this volume on the Field Log.
7. Prepare the peristaltic pump for operation. Replace the short length of flexible silicone tubing in the pump head after each well sampling operation.
8. Attach a new length of polypropylene tubing to the flexible silicone tubing at the pump head. This polypropylene tubing must be long enough to reach the well bottom. <u>Note:</u> The maximum suction lift of the peristaltic pump is approximately 25 feet.
9. Start the pump and lower the suction end of the tubing into the well until the surface of the water is contacted. Remove approximately one half quart of this water from the surface of the well water into a new glass quart bottle. Observe the appearance of this water. Return this quart bottle to its proper transport container. <u>Note</u>: This sample will not undergo laboratory analysis, and is collected to observe the physical appearance of the groundwater only.
10. Record the physical appearance of the groundwater on the Groundwater Sampling Field Log.
11. Initiate pumping from the well into a graduated pail until three times the volume of water in the well has been removed or until the well is pumped dry. The suction end of the tubing should be raised and lowered in the well

during pumping to insure that water is entering the well from the entire length of the screened well casing. If the well is pumped dry, allow sufficient time (several hours to overnight) for the well to recover before proceeding. Record this information on the Groundwater Sampling Field Log.

12. Remove the sampling bottles from their transport containers, and prepare the bottles for receiving samples. Inspect all labels to insure proper sample identification. Sample bottles should be kept cool with their caps on until they are ready to receive samples. Arrange the sampling bottles to allow for convenient filling. Always fill the vials labeled purgeable priority pollutant, or BTX analysis first.

13. Continue pumping the well, with the suction end of the tubing now at a level just below the surface of the water in the well. Fill each sample container following the instructions listed on Attachment A - Sample Containerization Procedures. Return each sampling bottle to its proper transport container. Note: While filling the sample vial labeled purgeable priority pollutant or BTX analysis, insure that the suction end of the tubing is located at a sufficient depth below the surface of the water to insure air is not introduced while filling the vials.

14. If the sample bottles cannot be filled completely, keep them cool with their caps on until they are filled. NOTE: Samples must not be allowed to freeze.

15. Record the physical appearance of the groundwater observed during sampling on the Groundwater Sampling Field Log.
16. After the last sample has been collected, record the date and time, and pump from the surface of the water in the well into the 200 ml beaker, filling it approximately halfway, then measure and record the pH, and conductivity of the groundwater following the procedures outlined in the equipment operation manuals. Conductivity measurements should be taken first. Record this information on the Groundwater Sampling Field Log. The 200 ml beaker must then be rinsed with hexane and distilled water prior to reuse.
17. Replace the well plug, and lock the well protection assembly before leaving the well location.
18. Place the polypropylene tubing, silicone pump head tubing, gloves, rags, and plastic sheet into a plastic bag. The plastic bag should then be buried on-site at a preselected location.

SAMPLE CONTAINERIZATION PROCEDURES

	Lab Analysis	Container Description	Number of Containers	Collection Instructions
1.	Purgeable Priority Pollutants, BTX	40 ml Vial	3	1. The sample vial consists of 3 parts: a glass bottle, a teflon-faced septum, and a screw cap. 2. Remove the cap and septum, handling the septum by the edges only. 3. Carefully fill the vial to overflowing a slight crown of water remaining on top. 4. Slide the septum, teflon side (slippery side) down, onto the vial. 5. Replace the cap and tighten. 6. Invert the sample and lightly tap the cap on a solid surface. The absence of trapped air indicates a successful seal. If bubbles are present, open the bottle, add a few additional drops of sample and reseal the bottle as above. Continue until no entrapped air is present. 7. Keep the samples refrigerated or on ice.
2.	PCBs, Pesticides	glass gallon	1	Fill gallon bottle then cap.
3.	Metals	glass quart with preservative added	1	Fill quart bottle then cap.
4.	Acid/Base Neutral Priority Pollutants	glass gallon	1	Fill gallon bottle then cap. Keep the sample refrigerated or on ice.
5.	Cyanide	plastic quart with preservative added	1	Fill quart bottle then cap.

GROUNDWATER SAMPLING FIELD LOG

Sample Location ______________________________ Well No. __________

Sampled By: __________________________ Date __________ Time __________

Weather ____

A. Water Table

Well depth (from top of standpipe)____ Well elevation (top of standpipe)________

Depth to watertable (from top of standpipe)_____ Watertable elevation____________

Length of water column (LWC)_________ (feet)

Volume of water in well - 1 1/4" diameter wells = 0.064 x (LWC)___________gallons

2" diameter wells = 0.163 x (LWC) = ___________gallons

B. Physical Appearance At Start

Color________________ odor__________________ turbidity__________

Was an oil film or layer apparent?______________

C. Preparation of Well for Sampling

Amount of water removed before sampling ____________gallons

Did well go dry?________________

D. Physical Appearance During Sampling

Color________________ odor__________________ turbidity__________

Was an oil film or layer apparent?_______________

E. Well Sampling

Analysis	Bottle No.	Special Sampling Instructions
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

F. Conductivity ______________________________ pH ________________

APPENDIX D

EPA PRIORITY POLLUTANT LIST

APPENDIX D

EPA PRIORITY POLLUTANTS

A. Purgeable Priority Pollutants

1. Chloromethane
2. Vinyl chloride
3. Chloroethane
4. Benzene
5. Methylene chloride
6. Toluene
7. Bromomethane
8. 1, 1-dichloroethylene
9. t-1, 2-dichloroethylene
10. 1, 1-dichloroethane
11. 1, 2-dichloroethane
12. Ethylbenzene
13. 2-chloroethylvinyl ether
14. t-1, 3-dichloropropene
15. c-1, 3-dichloropropene
16. 1, 2-dichloropropane
17. Chlorobenzene
18. Chloroform
19. 1, 4-dichlorobutane
20. Bromochloromethane
21. Trichloroethylene
22. 1. 1. 1-trichloroethane
23. 1, 1, 2-trichloroethane
24. Trichlorofluoromethane
25. Carbon tetrachloride
26. 2-bromo-1-chloropropane
27. Bromodichloromethane
28. Tetrachloroethylene
29. 1, 1, 2, 2-tetrachloroethane
30. Chlorodibromomethane
31. Bromoform
32. Dichlorodiflouromethane

B. Base Neutral Priority Pollutants

1. Nitrobenzene
2. Naphthalene
3. N-Nitrosodi-n-propylamine
4. Isophorone
5. Bis(2-chloroethyl)ether
6. 1, 3-Dichlorobenzene
7. 1, 2-Dichlorobenzene
8. 1, 4-Dichlorobenzene
9. Acenaphthylene
10. Acenaphthene

11. 2-chloronaphthalene
12. Fluorene
13. Bis(2-chloroisopropyl) ether
14. Bis(2-chloroethoxy) methane
15. Anthracene
16. Phenanthrene
17. 1, 2, 4-Trichlorobenzene
18. 2, 6-Dinitrotoluene
19. 2, 4-Dinitrotoluene
20. 1, 2-Diphenylhydrazine
21. Benzidine
22. d_{10} - Anthracene
23. Dimethyl Phthalate
24. N-nitrosodiphenylamine
25. Pyrene
26. Fluoranthene
27. 4-Chlorophenyl phenyl ether
28. Diethylphthalate
29. Benzo(a)anthracene
30. Chrysene
31. Hexachloroethane
32. 4-Bromophenyl phenyl ether
33. Benzo(a) pyrene
34. 3, 3-Dichlorobenzidine
35. Benzo(b)fluoranthene
36. Benzo(k)fluoranthene
37. Hexachlorobutadiene
38. Hexachlorocyclopentadiene
39. Ideno (1,2,3-cd)pyrene
40. Benzo (g,h,i,)pyrene
41. Di-n-butyl phthalate
42. Dibenzo(a,h)anthracene
43. Hexachlorobenzene
44. Butyl bensyl phthalate
45. Bis(2-ethylhexyl)phthalate
46. Di-n-octylphthalate
47. N-nitroso dimethyl Amlne
48. Bis(chloromethyl)ether

C. Acid Priority Pollutants

1. Phenol
2. 2,4-dimethylphenol
3. 2-chlorophenol
4. 2-nitrophenol
5. 4-nitrophenol
6. 4-chloro-3-methylphenol
7. 2,4-dichlorophenol
8. 2,4-dinitrophenol
9. Pentafluorophenol
10. 2,4,6-trichlorophenol
11. 2-methyl-4,6-dinitrophenol

12. Pentachlorophenol
13. d_6 Phenol
14. 2-fluorophenol

D. Pesticide/PCB

1. -BHC
2. -BHC
3. -BHC
4. Heptachlor
5. -BHC
6. Aldrin
7. Heptachlor Epoxide
8. Endosulfan 1
9. 4,4'-DDE
10. Dieldrin
11. Endrin
12. 4,4'-DDD
13. Endosulfan 11
14. 4,4'-DDT
15. Endosulfan Sulfate
16. Endrin Aldehyde
17. Chlordane
18. Toxaphene
19. PCB-1221
20. PCB-1232
21. PCB-1016/1242
22. PCB-1248
23. PCB-1254
24. PCB-1260

E. Metals

1. Antimony
2. Arsenic
3. Beryllium
4. Cadmium
5. Chromium
6. Copper
7. Lead
8. Mercury
9. Nickel
10. Selenium
11. Silver
12. Thallium
13. Zinc

APPENDIX E

SPECIAL DRILLING PROCEDURES

SPECIAL DRILLING PROCEDURES

The procedures discussed in this attachment outline the requirements for installing a groundwater monitoring well in a groundwater zone lying beneath a contaminated perched groundwater zone.

1. Using a roller bit drilling apparatus with solid steel flush joint casing, drill from grade to a minimum depth of 3 feet into the existing impermeable layer separating the deep and perched groundwater zones. Soil samples should be recovered at a minimum of five foot intervals above the impermeable layer, and continuously when the layer is contacted to insure that the proper soil stratum has been contacted.

2. Clean any residual drilling spoils from the borehole and observe whether a successful seal has been made by pumping out any standing water in the casing, and noting if recovery occurs. If water continues to enter the casing, the seal may be ineffective and the steel casing should be advanced further into the impermeable layer until an effective seal can be obtained.

3. Once an effective seal has been obtained, the boring should be advanced into the deep groundwater zone using a clean roller bit apparatus. <u>Note:</u> If it is anticipated that the boring will

not stay open during the subsequent drilling (i.e., running sand), a solid steel flush joint casing within the outer casing should be advanced with the roller bit.

4. Retract the roller bit and proceed with Installation of the well. Install screened PVC casing to a selected depth below the impermeable layer. The remainder of the well casing should be solid PVC.

5. Backfill the annular space around the PVC well screen with filtered, washed sand. Plug the annular space around the solid PVC well casing over the entire depth of the borehole with bentonite as the casing is retracted.

6. Install a cast iron standpipe with cap and lock around the PVC well casing and concrete the standpipe base into position.

APPENDIX F

IN-SITU PERMEABILITY CURVES AND DATA INTERPRETATION

GENERAL ELECTRIC COMPANY
FORT EDWARD SITE

IN-SITU PERMEABILITY TEST
LOCATION #F-2A

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

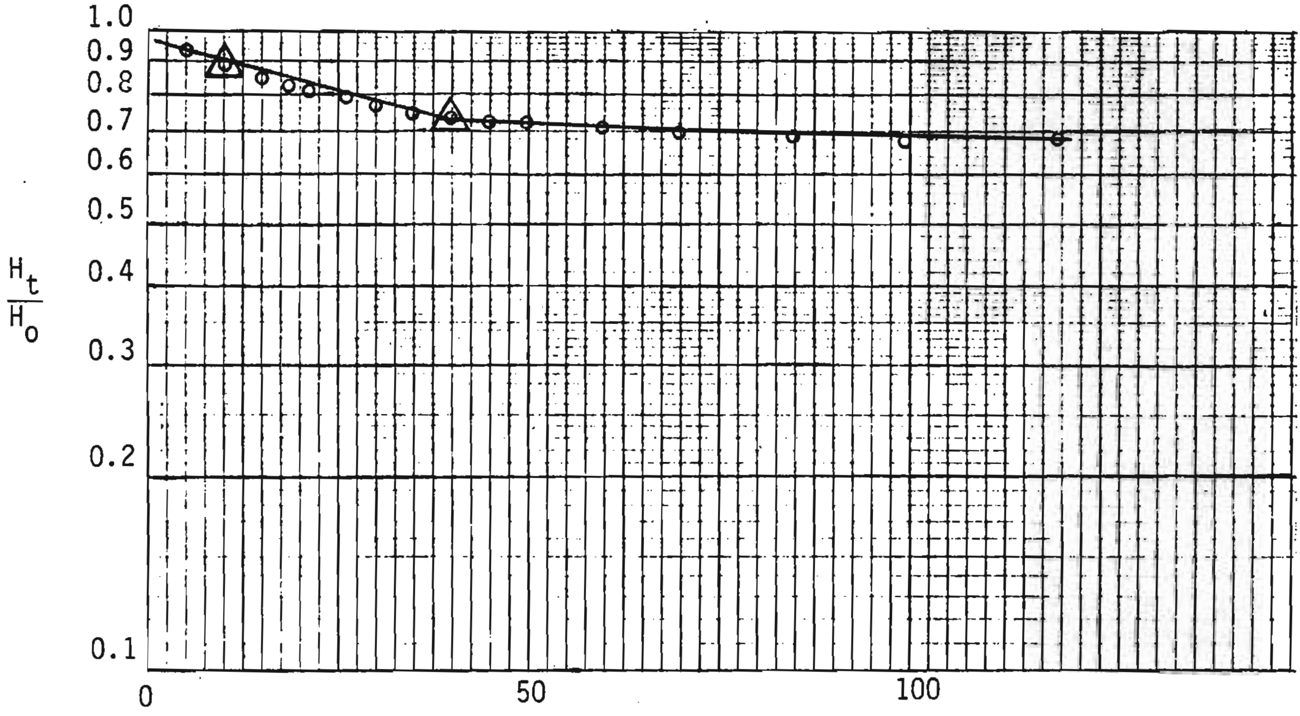
r = .95 cm.

L = 304.8 cm.

R = 5.08 cm.

H_o = 39.7 ft.

$K = 6.0 \times 10^{-7}$ cm/sec.



GENERAL ELECTRIC COMPANY
FORT EDWARD SITE

IN-SITU PERMEABILITY TEST
LOCATION #F.4A

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

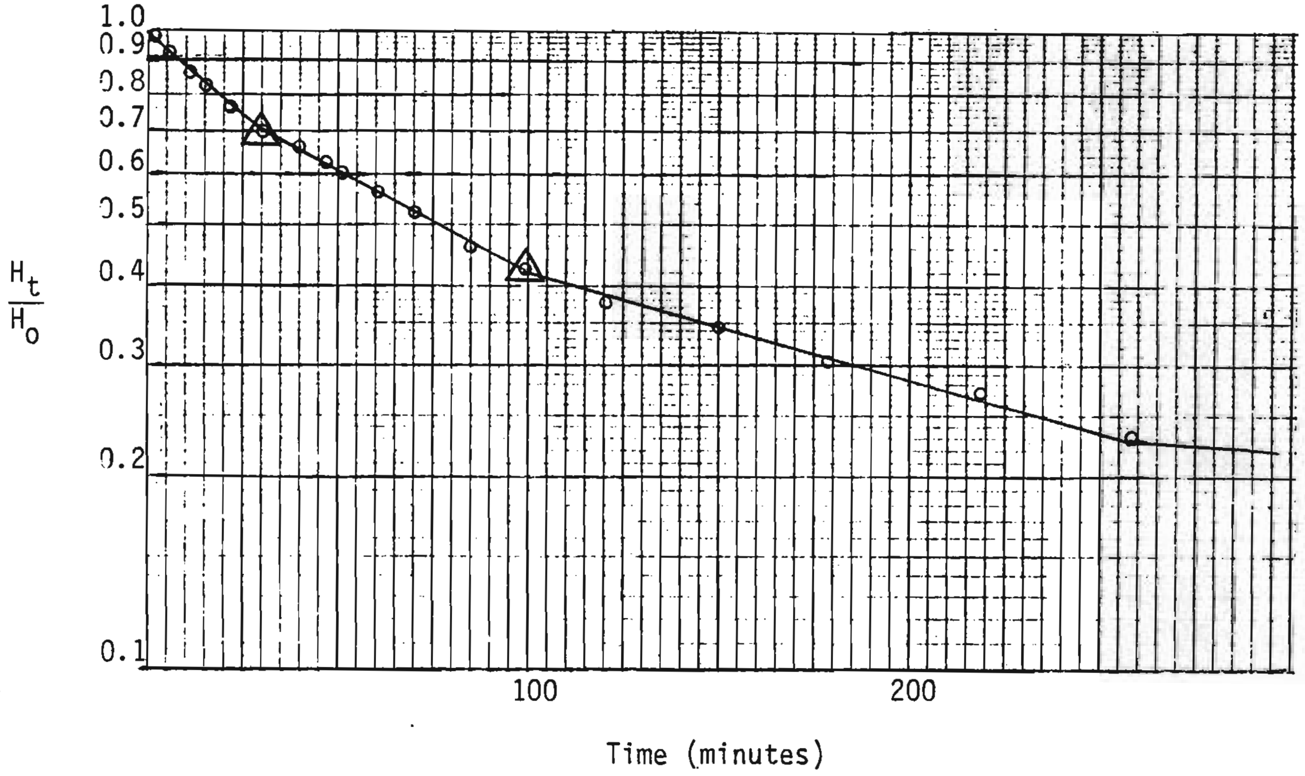
r = .375 cm.

L = 152 cm.

R = 5.08 cm.

H_o = 6.75 ft.

$K = 1.2 \times 10^{-6}$ cm/sec.



GENERAL ELECTRIC COMPANY
KINGSBURY SITE

IN-SITU PERMEABILITY TEST
LOCATION #K-8A

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

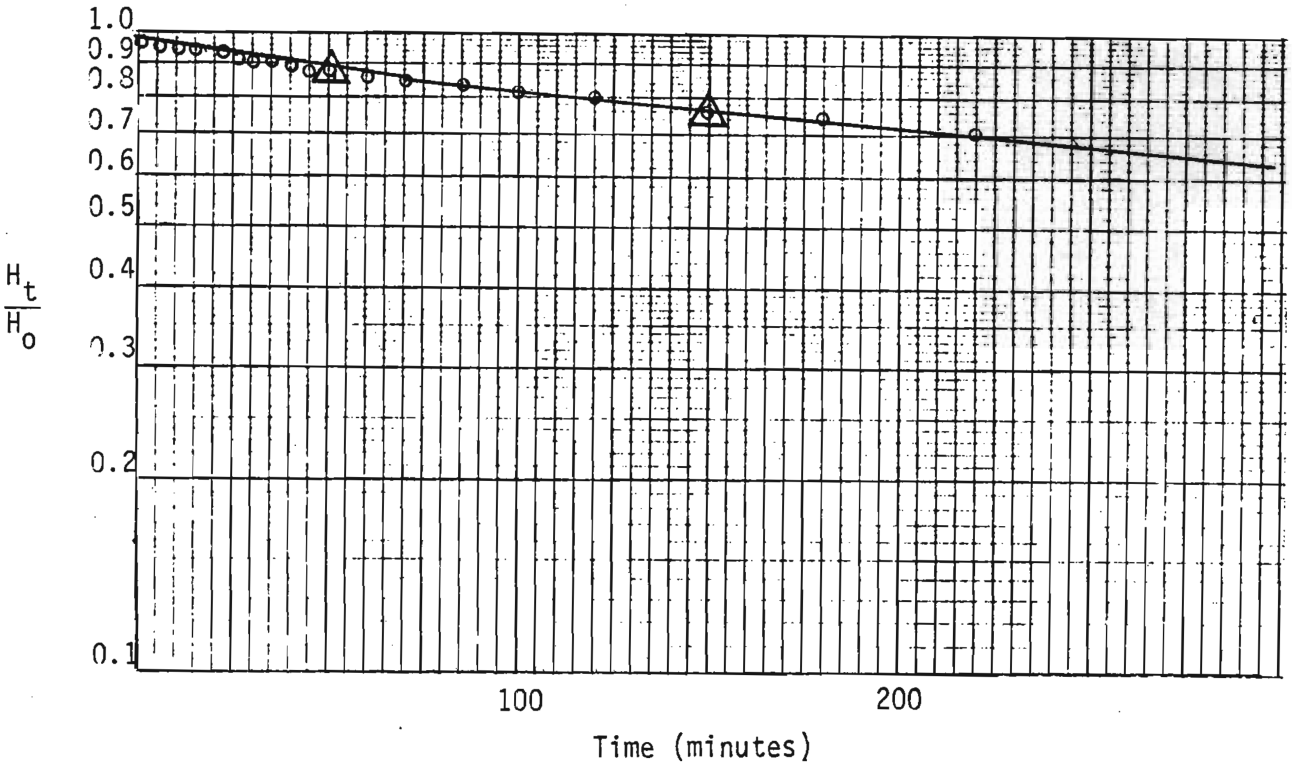
r = .95 cm.

L = 152.5 cm.

R = 11.45 cm.

H_o = 10.17 ft.

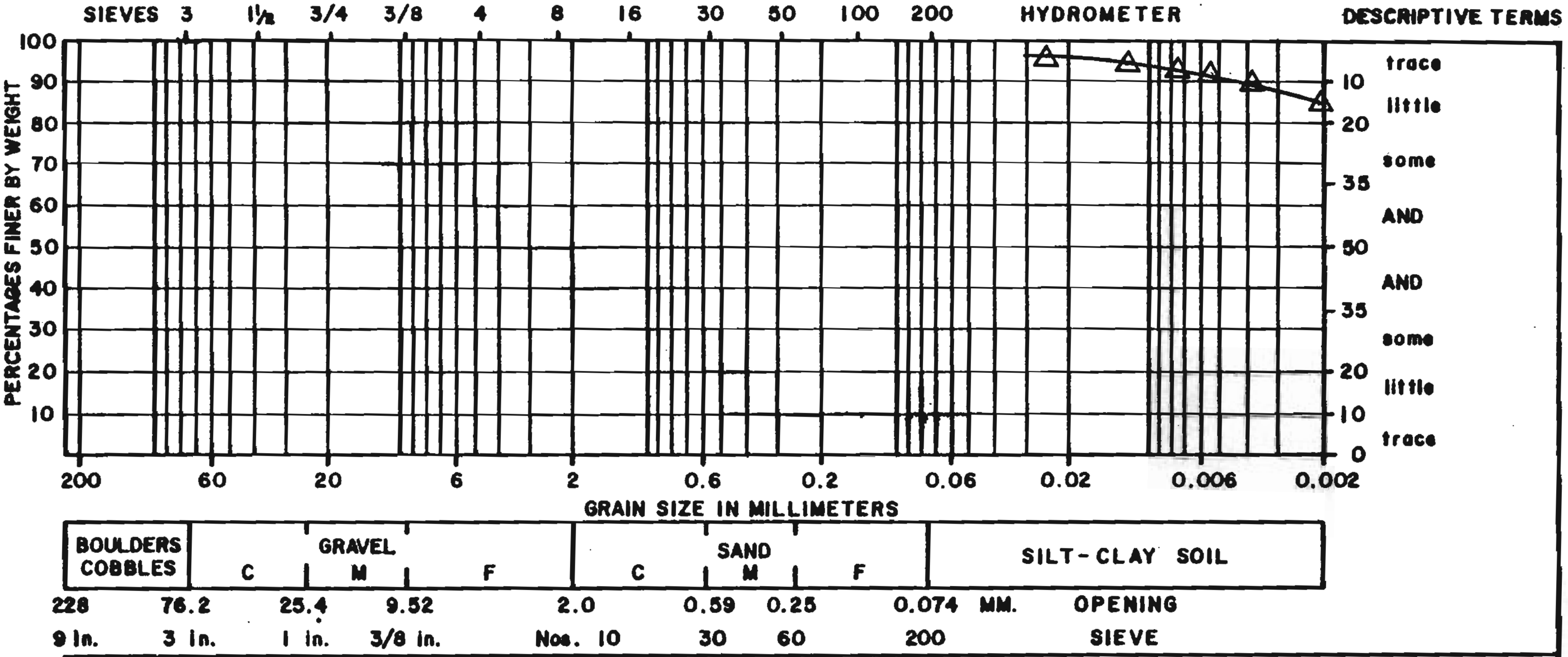
$K = 2.0 \times 10^{-7}$ cm/sec.



APPENDIX G

GEOTECHNICAL SOILS EVALUATION

GRAIN SIZE ANALYSIS
IDENTIFICATION AND DESCRIPTION OF SOILS



parratt wolff inc

FISHER RD., EAST SYRACUSE, N.Y. 13057
TELEPHONE AREA CODE 315/437-1429

General Electric Company - Schenectady, N.Y. △ Hydrometer

Kingsbury-Fort Edward Site

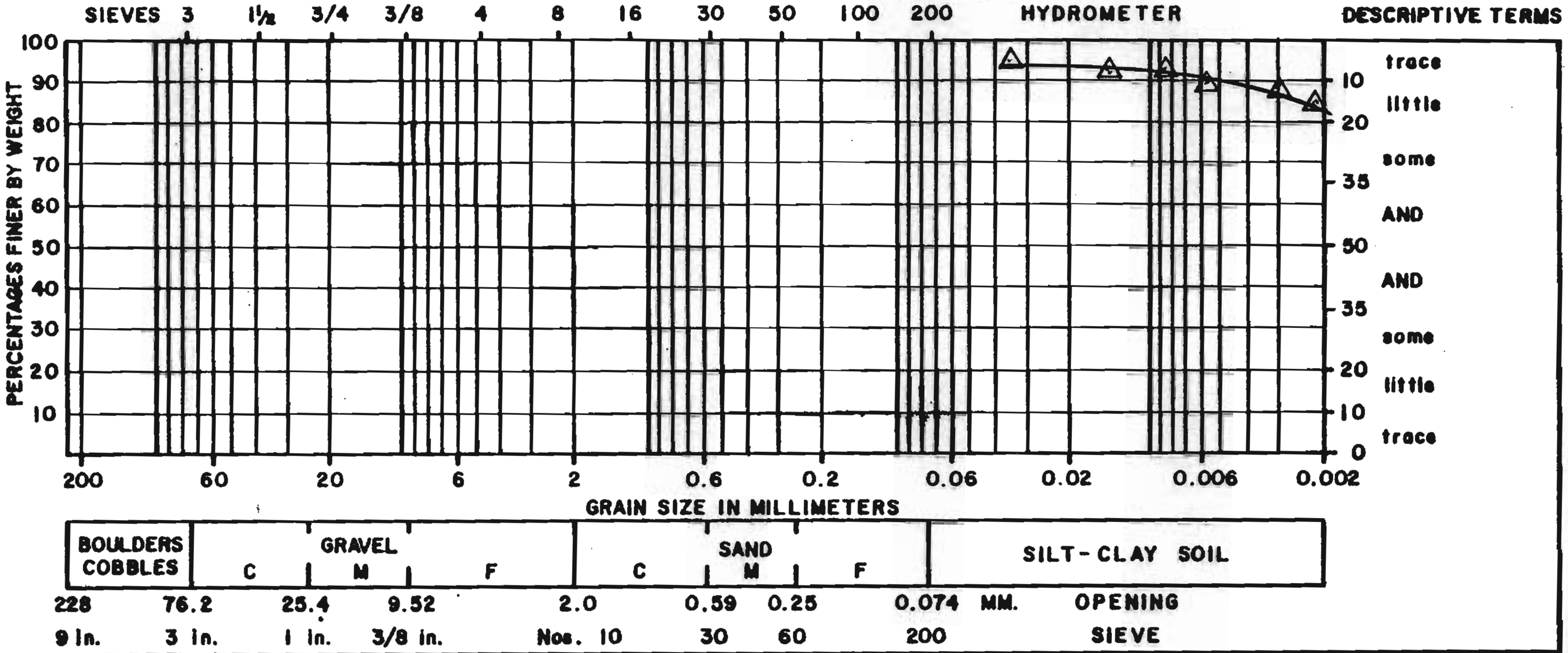
Boring # F2

Sample# 4

Depth 41' - 43'

Classification: Clay, trace silt, trace fine to coarse sand

GRAIN SIZE ANALYSIS
IDENTIFICATION AND DESCRIPTION OF SOILS



General Electric Company - Schenectady, N.Y. △ Hydrometer

Kingsbury-Fort Edward Site

Boring # F5

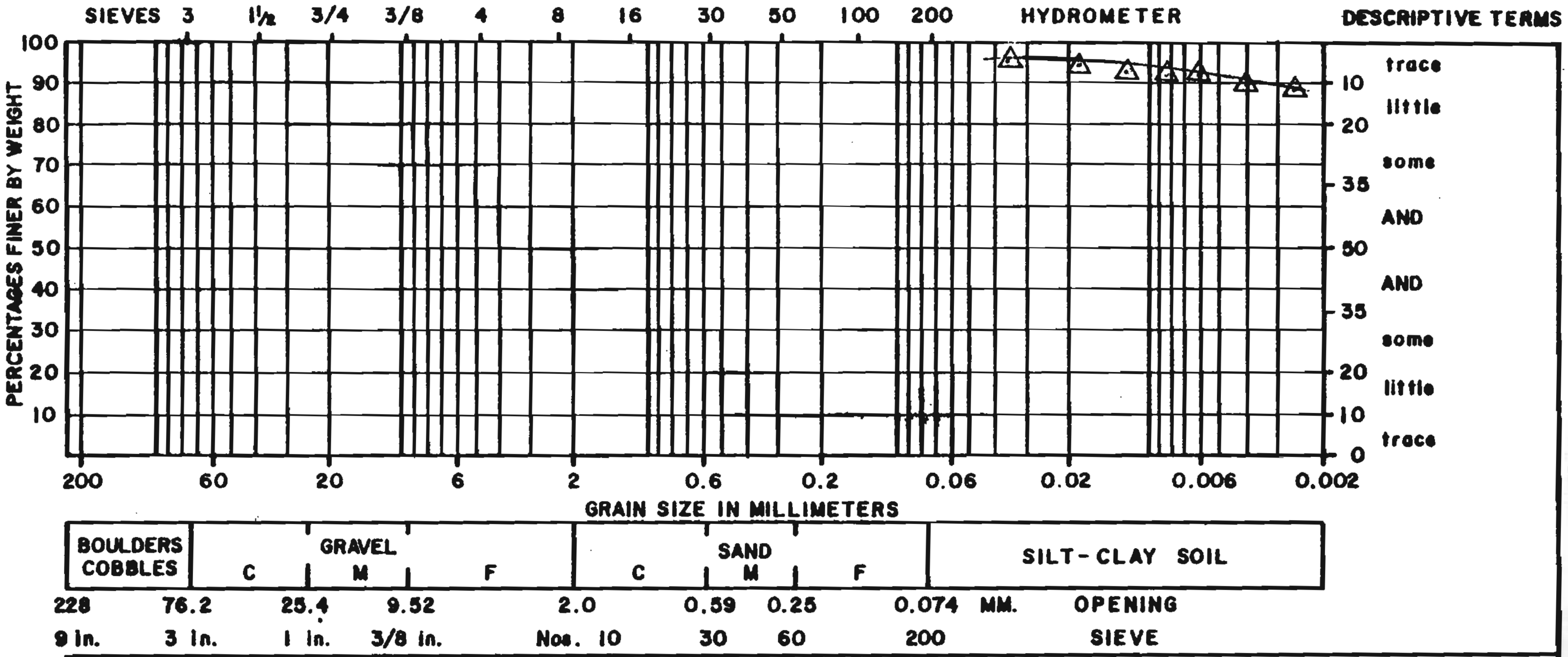
Sample # 5

Depth 8' - 10'

Classification: Clay, trace silt, trace fine to coarse sand

parratt wolff inc
FISHER RD., EAST SYRACUSE, N.Y. 13057
TELEPHONE AREA CODE 315/437-1429

GRAIN SIZE ANALYSIS
IDENTIFICATION AND DESCRIPTION OF SOILS



FISHER RD., EAST SYRACUSE, N.Y. 13057
TELEPHONE AREA CODE 315/437-1429

General Electric Company - Schenectady, N.Y.

△ Hydrometer

Kingsbury-Fort Edward Site

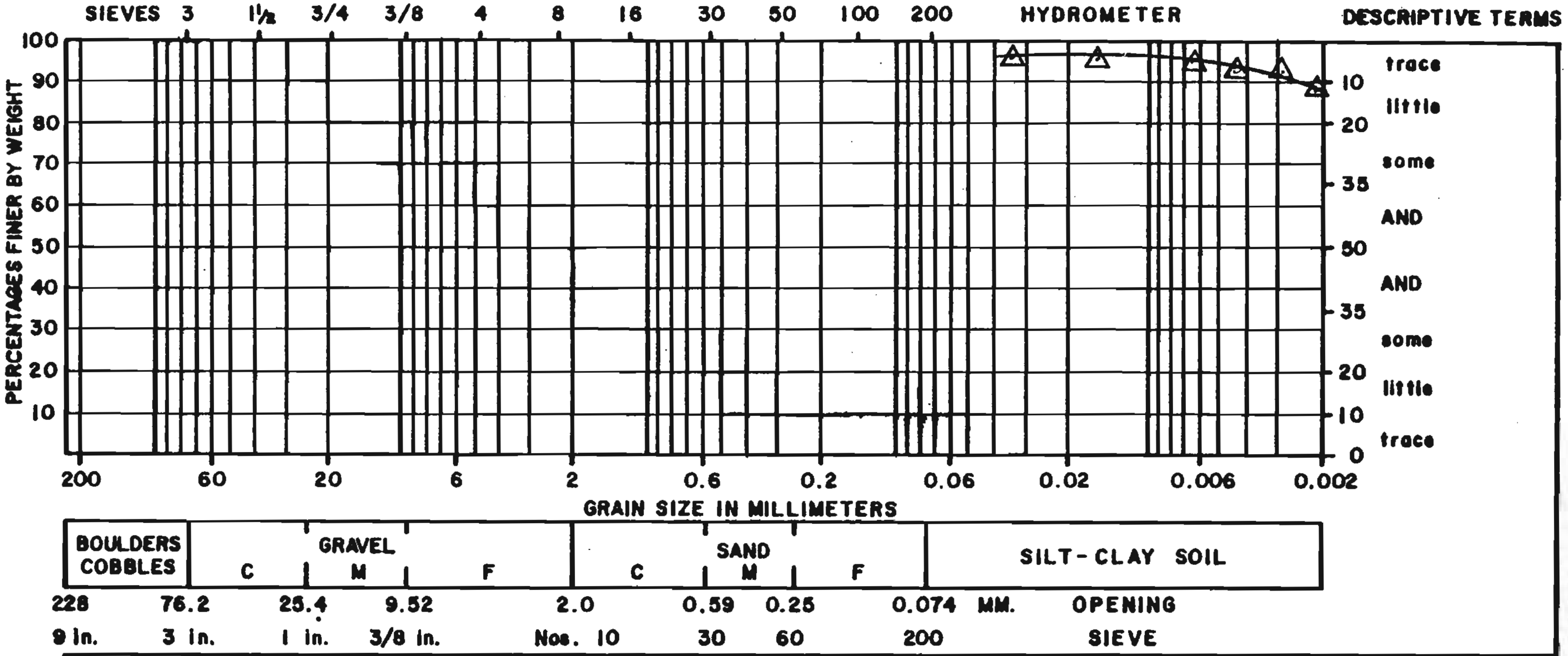
Boring # F6A

Sample # 2

Depth 40' - 41.5'

Classification: Clay, trace silt, trace fine to coarse sand

GRAIN SIZE ANALYSIS
IDENTIFICATION AND DESCRIPTION OF SOILS



General Electric Company - Schenectady, N.Y. △ Hydrometer

Kingsbury-Fort Edward Site

Boring # F5

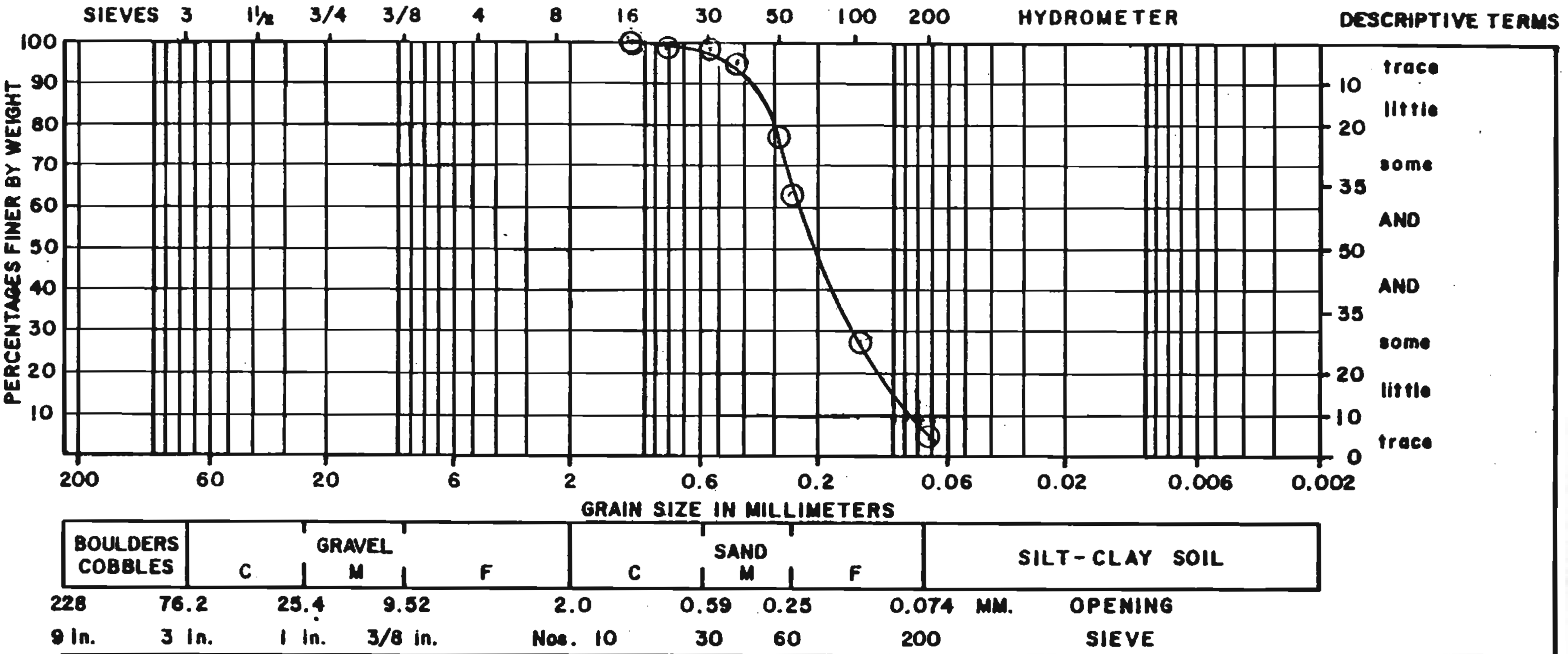
Sample # 10

Depth 35' - 36.5'

Classification: Clay, trace silt, trace fine to coarse sand

parratt wolff inc
FISHER RD., EAST SYRACUSE, N.Y. 13057
TELEPHONE AREA CODE 315/437-1429

GRAIN SIZE ANALYSIS
IDENTIFICATION AND DESCRIPTION OF SOILS



General Electric Company - Schenectady, N.Y.

○ Sieve

Kingsbury-Fort Edward Site

Boring # F7

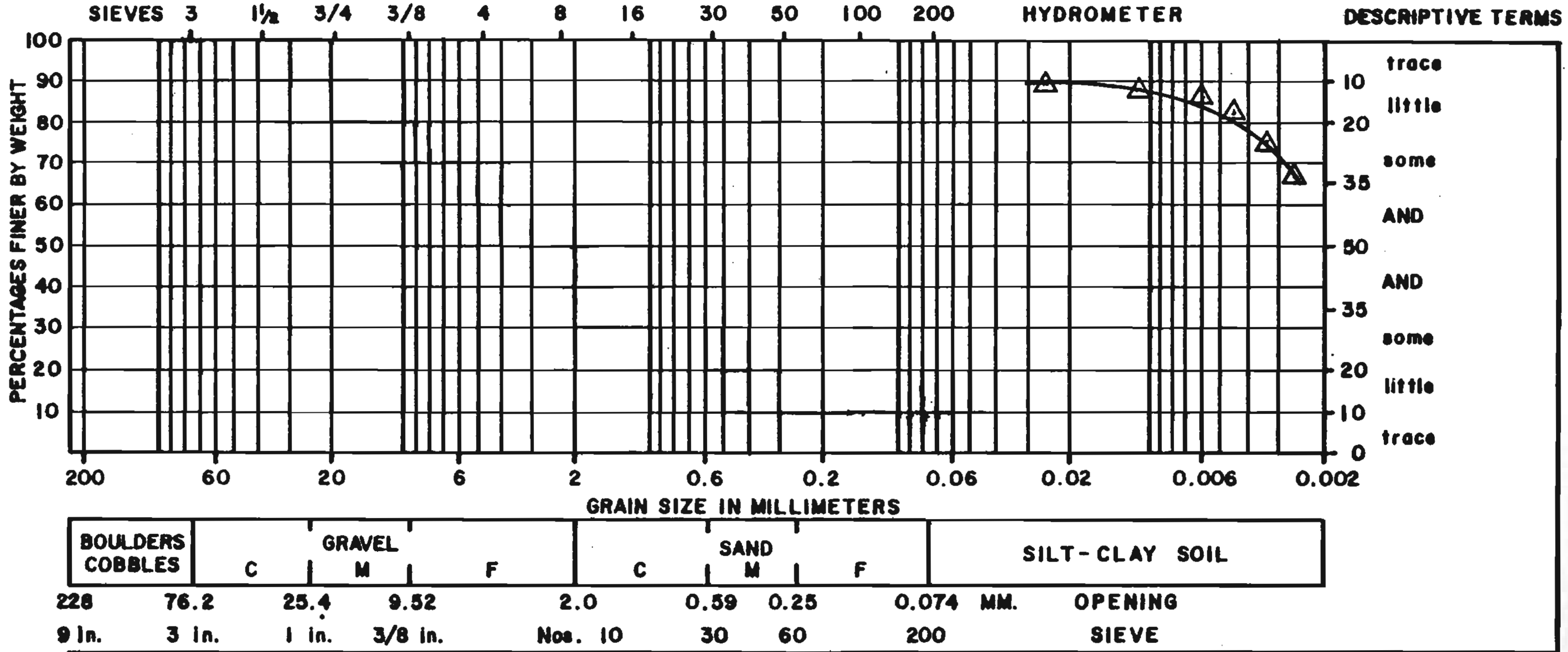
Sample # 6, 7 & 8

Depth 15' - 25'

Classification: Medium to fine sand, trace silt

parratt wolff inc
FISHER RD., EAST SYRACUSE, N.Y. 13057
TELEPHONE AREA CODE 315/437-1429

GRAIN SIZE ANALYSIS
IDENTIFICATION AND DESCRIPTION OF SOILS



General Electric Company - Schenectady, N.Y. △ Hydrometer

Kingsbury-Fort Edward Site

Boring # K8

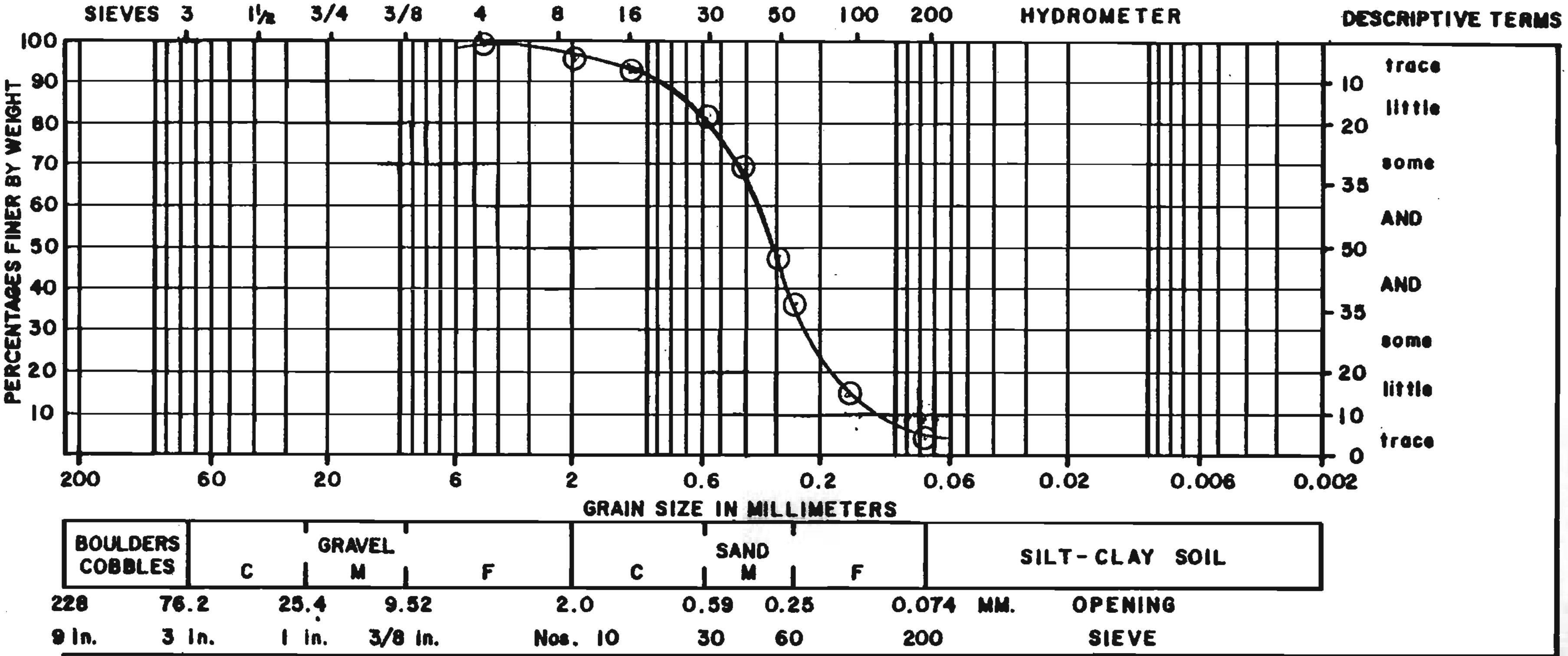
Sample # 4

Depth 6' - 8'

Classification: Clay, little silt, trace fine to coarse sand

parratt wolff inc
FISHER RD., EAST SYRACUSE, N.Y. 13057
TELEPHONE AREA CODE 315/437-1429

GRAIN SIZE ANALYSIS
IDENTIFICATION AND DESCRIPTION OF SOILS



General Electric Company - Schenectady

○ Sieve

Kingsbury-Fort Edward Site

Boring # K9

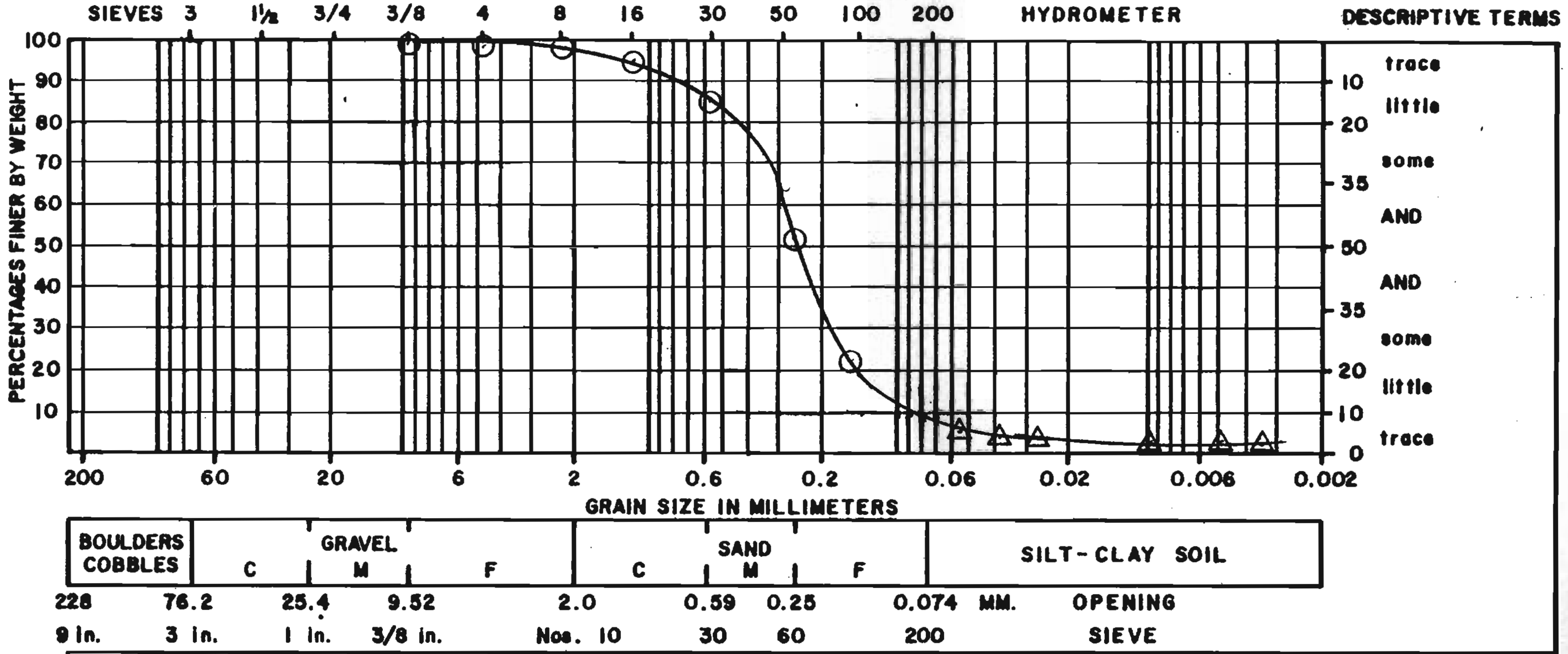
Sample # S8

Depth 20' - 21.5'

Classification: Coarse to fine sand, trace silt

parratt wolff inc
FISHER RD., EAST SYRACUSE, N.Y. 13057
TELEPHONE AREA CODE 315/437-1429

GRAIN SIZE ANALYSIS
IDENTIFICATION AND DESCRIPTION OF SOILS



General Electric Company - Schenectady, N.Y.

○ Sieve

Kingsbury-Fort Edward Site

△ Hydrometer

Boring # K12

Samples 6A & 6B

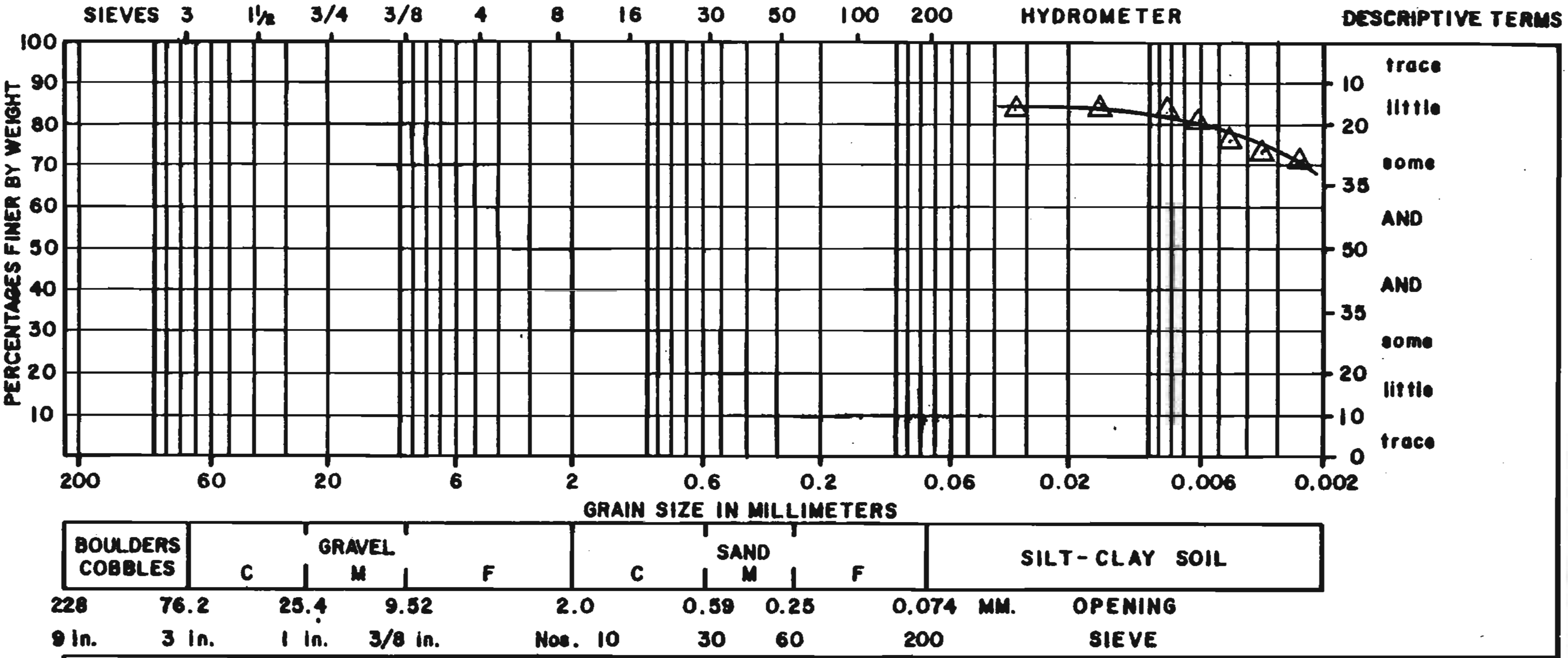
Depth 15' - 16.5'

Classification: Coarse to fine sand, trace silt

parratt wolff inc

FISHER RD., EAST SYRACUSE, N.Y. 13057
TELEPHONE AREA CODE 315/437-1429

GRAIN SIZE ANALYSIS
IDENTIFICATION AND DESCRIPTION OF SOILS



General Electric Company - Schenectady, N.Y.

△ Hydrometer

Kingsbury-Fort Edward Site

Boring # K13

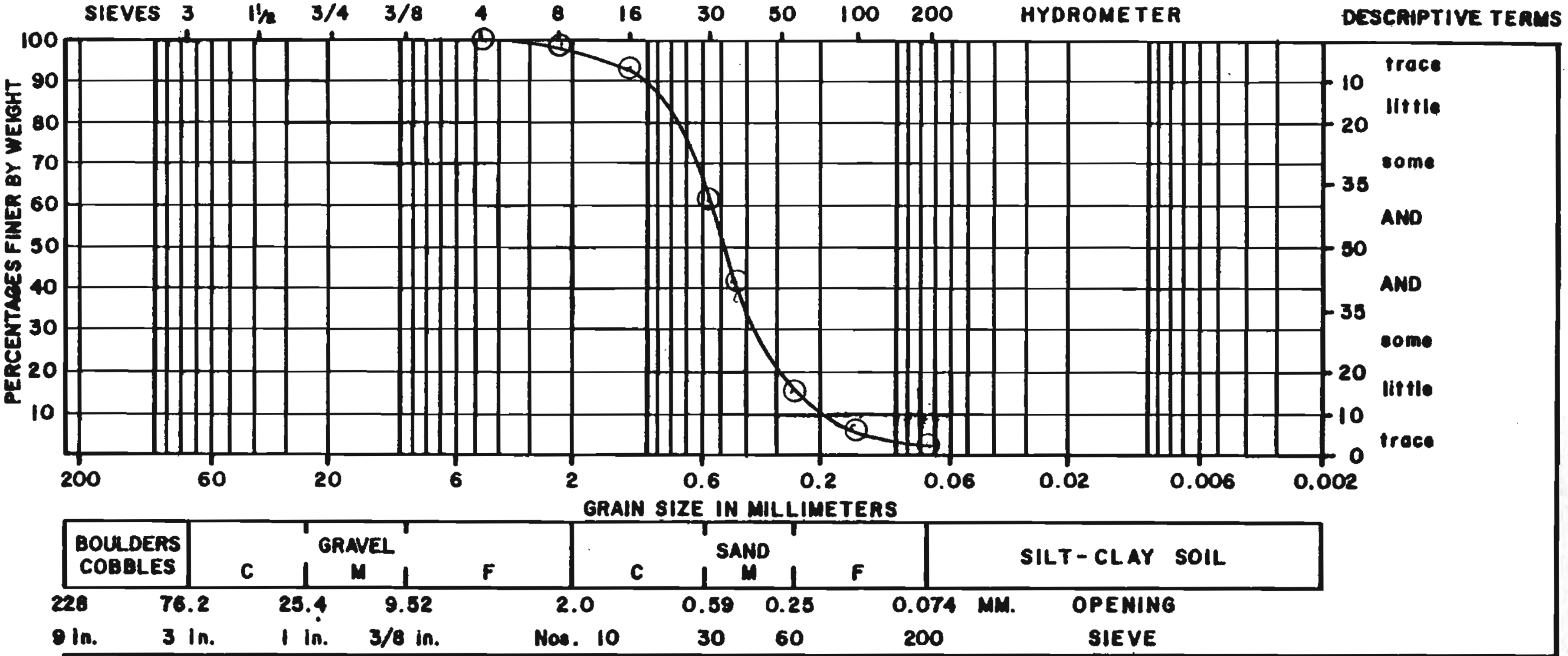
Sample # 7

Depth 30' - 31.5'

Classification: Clay, little fine to coarse sand, trace silt

parratt wolff inc
FISHER RD., EAST SYRACUSE, N.Y. 13057
TELEPHONE AREA CODE 315/437-1429

GRAIN SIZE ANALYSIS
IDENTIFICATION AND DESCRIPTION OF SOILS



○ Sieve

General Electric Company - Schenectady, N.Y.

Kingsbury-Fort Edward Site

Boring # K14

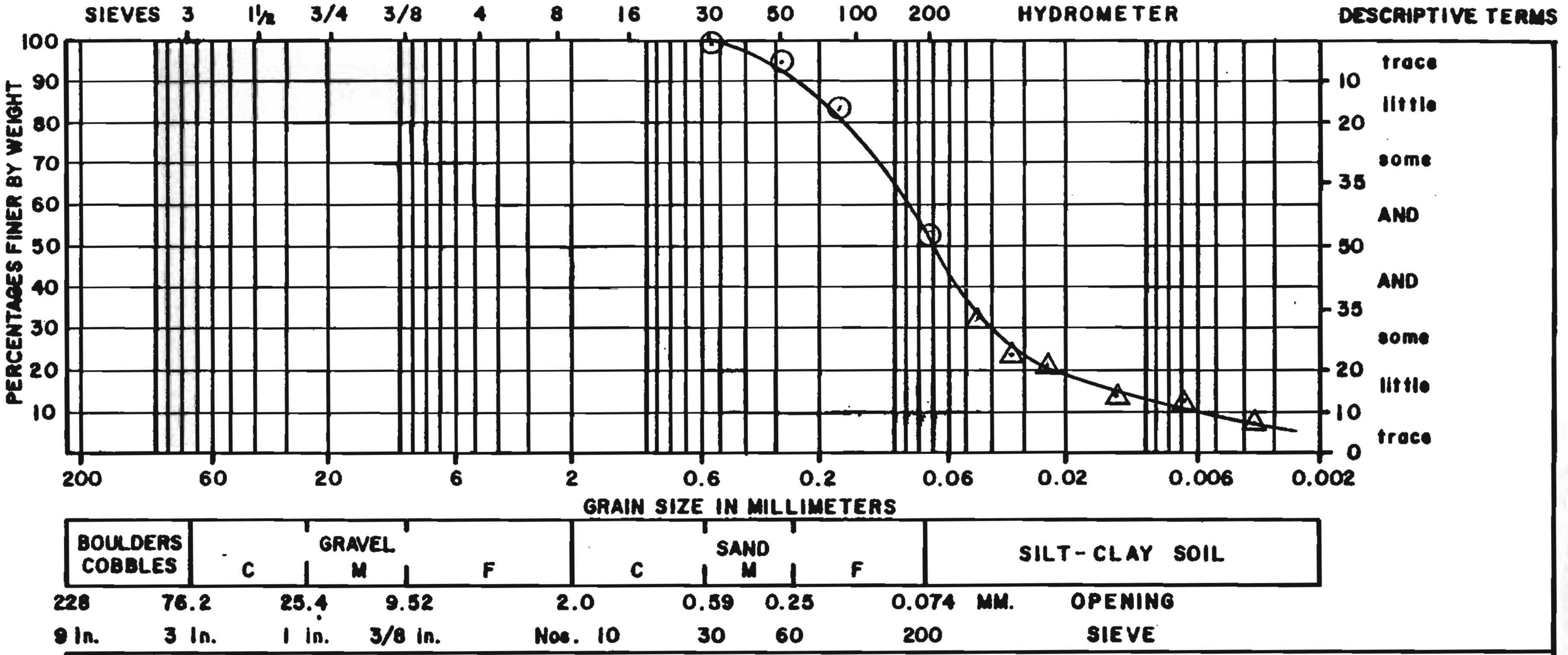
Sample # 6

Depth 15' - 16.5'

Classification: Coarse to fine sand, trace fine gravel, trace silt

parratt wolff inc
FISHER RD., EAST SYRACUSE, N.Y. 13057
TELEPHONE AREA CODE 315/437-1429

GRAIN SIZE ANALYSIS
IDENTIFICATION AND DESCRIPTION OF SOILS



General Electric Company - Schenectady, N.Y.

Kingsbury-Fort Edward Site

Boring # K14

Sample # 10

Depth 35' - 36.5'

Classification: Medium to fine sand, some silt trace clay

○ Sieve

△ Hydrometer

parratt wolff inc
FISHER RD., EAST SYRACUSE, N.Y. 13057
TELEPHONE AREA CODE 315/437-1429

APPENDIX H

CHARACTERISTICS OF LEACHATE AND DOMESTIC WASTE WATERS

TABLE H-1

TYPICAL CHARACTERISTICS OF LEACHATE FROM LAND DISPOSAL OF MUNICIPAL SOLID WASTES

Constituents	Range 1 (mg/l)	Range 2 (mg/l)	Range 3 (mg/l)	Leachate Fresh	Leachate Old
Chloride (Cl)	34-2,800	100-2,400	600-800	742	197
Iron (Fe)	0.2-5,500	200-1,700	210-325	500	1.5
Manganese (Mn)	.06-1,400	---	75-125	49	---
Zinc (Zn)	0-1,000	1-135	10-30	45	0.16
Magnesium (Mg)	16.5-15,600	---	160-250	277	81
Calcium (Ca)	5-4,080	---	900-1,700	2,136	254
Potassium (K)	2.8-3,770	---	295-310	---	---
Sodium (Na)	0-7,700	100-3,800	450-500	---	---
Phosphate (P)	0-154	5-130	---	7.35	4.96
Copper (Cu)	0-9.9	---	0.5	0.5	0.1
Lead (Pb)	0-5.0	---	1.6	---	---
Cadmium (Cd)	---	---	0.4	---	---
Sulfate (SO_4)	1-1,826	25-500	400-650	---	---
Total N	0-1,416	20-500	---	989	7.51
Conductivity (μ mhos)	---	---	6,000-9,000	9,200	1,400
TDS	0-42,276	---	10,000-14,000	12,620	1,144
TSS	6-2,685	---	100-700	327	266
pH	3.7-8.5	4.0-8.5	5.2-6.4	5.2	7.3
Alk as $CaCO_3$	0-20,850	---	800-4,000	---	---
Hardness tot.	0-22,800	200-5,250	3,500-5,000	---	---
BOD_5	9-54,610	---	7,500-10,000	14,950	---
COD	0-89,520	100-51,000	16,000-22,000	22,650	81

NOTES:

1. The above table was compiled by the USEPA and presented in the Procedures Manual for Groundwater Monitoring at Solid Waste Disposal Facilities in August, 1977.

2. Ranges 1, 2, and 3 represent characteristic constituent concentrations obtained from three separate studies conducted in 1973, 1971, and 1975, respectively.

APPENDIX I

PREVIOUS LABORATORY ANALYSES BY OTHERS

TABLE I-1

PREVIOUS GROUNDWATER ANALYSIS BY OTHERS (PCBs)

Location of Monitoring Well	Monitoring Well Sampled	Samples Collected By/Sampling Date	PCB (ppb)
Kingsbury	B-23	WEH/December, 1979	56.0
		WEH/April, 1980	< 0.05
		NYSDEC/August, 1980	< 0.05
		NYSDEC/December, 1980	0.53
		* NYSDEC/March, 1981	3.76
		NYSDEC/October, 1981	0.13
Kingsbury	B-24	WEH/December, 1979	3.3
		WEH/April, 1980	2.3
		NYSDEC/August, 1980	0.16
		NYSDEC/December, 1980	< 0.50
		* NYSDEC/March, 1981	3.23
		NYSDEC/October, 1981	0.98
Kingsbury	RFW-1	WES/December, 1977	4.7
		WEH/December, 1979	37.0
		NYSDEC/April, 1980	4.2
		NYSDEC/August, 1980	190.0
		* NYSDEC/March, 1981	9.7
		NYSDEC/July, 1981	3.8
		NYSDEC/October, 1981	2.0
Kingsbury	RFW-2	NYSDEC/December, 1977	482.0
		NYSDEC/January, 1978	290.0
		WEH/December, 1979	24,000.0
Kingsbury	RFW-3	WES/December, 1977	1.6
		WEH/December, 1979	2.2
		WEH/April, 1980	0.17
		NYSDEC/August, 1980	< 0.05
		NYSDEC/December, 1980	< 0.05
		* NYSDEC/March, 1981	0.22
		NYSDEC/October, 1981	0.25
Kingsbury	RFW-4	WES/December, 1977	2.8
		WES/January, 1978	3.5
		WEH/December, 1979	4.87
		NYSDEC/December, 1980	0.37
		* NYSDEC/March, 1981	0.64
		NYSDEC/October, 1981	0.37
Fort Edward	B-20	WEH/December, 1979	< 0.05
		WEH/April, 1980	< 0.05
		NYSDEC/August, 1980	< 0.05
		NYSDEC/October, 1981	0.15

TABLE I-1
PREVIOUS GROUNDWATER ANALYSIS BY OTHERS (PCBs)
(Continued)

Location of Monitoring Well	Monitoring Well Sampled	Samples Collected By/Sampling Date	PCB (ppb)
Fort Edward	B-21	WEH/December, 1979	0.21
		WEH/April, 1980	< 0.05
		NYSDEC/August, 1980	< 0.05
		NYSDEC/December, 1980	0.59
		* NYSDEC/March, 1981	4.75
		NYSDEC/July, 1981	0.24
Fort Edward	B-22	WEH/December, 1979	45.0
		WEH/April, 1980	0.05
		NYSDEC/August, 1980	20.0
		NYSDEC/December, 1980	5.1
		* NYSDEC/March, 1981	36.0
		NYSDEC/July, 1981	0.24
		NYSDEC/October, 1981	0.41
Fort Edward	RFW-5	WES/December, 1977	1.8
Fort Edward	RFW-6	WES/December, 1977	234.0
Fort Edward	RFW-7	WES/December, 1977	31.8
		WEH/December, 1979	0.34
		WEH/April, 1980	0.15
		NYSDEC/August, 1980	< 0.05
		* NYSDEC/March, 1981	14.41
Fort Edward	RFW-8	WES/December, 1977	2.6
		WEH/December, 1980	1.48
		WEH/April, 1980	< 0.05
Fort Edward	U01	DUNN/July, 1980	< 0.05
Fort Edward	D01	DUNN/July, 1980	< 0.05
Fort Edward	D02	DUNN/July, 1980	< 0.05

NOTES:

1. This table was developed from results obtained by Weston Environmental Consultants (WES), Wehran Engineers, P.C., (WEH), New York State Department of Environmental Conservation (NYSDEC), and Dunn Geoscience Corp. (DUNN) during previous engineering studies.

2. "B" notations refer to groundwater wells installed by Wehran Engineers, P.C., for NYSDEC during previous engineering studies.

3. "RFW" notations refer to groundwater wells installed by Weston Environmental Consultants for NYSDEC during previous engineering investigations.

4. Samples collected by NYSDEC, Weston, Wehran, and Dunn Geoscience were analyzed unfiltered unless denoted by an * indicating that the same was filtered prior to analysis.

TABLE I-2

PREVIOUS GROUNDWATER ANALYSES BY OTHERS (SELECT METALS)

Location of Monitoring Well	Monitoring Well Sampled	Sampled By/ Sampling Date	As (ppm)	Be (ppm)	Ag (ppm)	Cd (ppm)	Cr (ppm)	Cu (ppm)	Pb (ppm)	Hg (ppm)	Se (ppm)	Zn (ppm)	Ba (ppm)
Kingsbury	B-23	NYSDEC/March, 1981	3.	---	---	0.005	0.004	0.003	0.03	3.	3.	0.061	0.13
Kingsbury	B-24	NYSDEC/March, 1981	3.	---	---	0.005	0.005	0.012	0.02	3.	3.	0.051	0.1
Kingsbury	RFW-1	NYSDEC/March, 1981	3.	---	---	0.005	0.021	0.014	0.02	3.	3.	0.079	0.1
Kingsbury	RFW-2	NYSDEC/January,1978	0.04	0.02	0.02	0.02	0.10	0.18	0.20	0.0004	0.01	1.0	0.5
Kingsbury	RFW-3	NYSDEC/March, 1981	0.004	---	---	0.005	0.005	0.003	0.02	3.	3.	0.037	0.1
Ft. Edward	U01	DUNN/July, 1980	---	---	---	0.01	0.01	0.01	0.02	0.0015	0.006	0.03	---
Ft. Edward	D01	DUNN/July, 1980	---	---	---	0.01	0.01	0.01	0.02	0.001	0.006	0.03	---
Ft. Edward	D02	DUNN/July, 1980	---	---	---	0.01	0.01	0.01	0.02	0.001	0.006	0.05	---
NYSGW Standards			0.025	---	0.05	0.01	0.05	1.0	0.025	0.002	0.02	5.	1.0

NOTES:

1. This table was generated from results obtained by NYSDEC and Dunn Geoscience Corp. (DUNN) during previous engineering studies. It presents analyses of select priority pollutant metals and barium (Ba).
2. Samples collected by NYSDEC were filtered prior to analysis; those collected by Dunn Geoscience Corp. were not filtered.
3. "B" notations refer to groundwater wells installed by Wehran Engineers, P.C. for NYSDEC during previous engineering investigations.
4. "RFW" notations refer to groundwater wells installed by Weston Environmental Consultants for NYSDEC during previous engineering investigations.
5. "---" means samples not analyzed for the specific parameter.
6. NYSGW Standards - New York State Groundwater Classification Quality Standards and Effluent Standards and/or Limitations

TABLE I -3

PREVIOUS LEACHATE AND SURFACE WATER ANALYSIS BY OTHERS (PCBs)

Site	Sample Location	Sample Type	Description of Sample Location	Sampled By	Sampling Date	PCB Concentration (ppb)
KINGSBURY	013	Surface Water	Outflow of drainage area northerly of Feedertow Rd.	NYSDEC	November, 1975	< 0.25
	053	Surface Water	Diversion ditch at tow of slope 75 ft. southerly of landfill	NYSDEC	November, 1975	25.25
	054	Surface Water	Outlet of diversion ditch into swale area 750 ft. southerly from landfill	NYSDEC	November, 1975	31.25
	055	Surface Water	Southerly most drainage ditch at West end outlet	NYSDEC	November, 1975	25.25
KINGSBURY	L-239*	Leachate	Southerly flow from sand pit N.W. of landfill	WESTON	September, 1977	0.30
	L-265	Leachate	Seep at N.E. corner of landfill	WESTON	September, 1977	15.6
	L-267	Leachate	Stream East of landfill flowing into pond	WESTON	September, 1977	3.1
	L-238	Surface Water	Stagnant pool in sand pit N.W. of landfill	WESTON	September, 1977	2.1
	L-273*	Surface Water	Feedertow Canal - culvert located upgradient	WESTON	September, 1977	2.6
	L-274*	Surface Water	Feedertow Canal - downgradient	WESTON	September, 1977	1.5
KINGSBURY	WS-4	Surface Water	S.E. of landfill	WEHRAN	March, 1980	1.43
	WS-5	Surface Water	South end of swamp area East of landfill	WEHRAN	March, 1980	0.27
	WS-6B	Surface Water	North end of swamp area East of landfill	WEHRAN	March, 1980	<0.05
FORT EDWARD	L-233*	Leachate	Stream South of landfill	WESTON	September, 1977	0.60
	L-234	Leachate	Seep on S.E. side of landfill	WESTON	September, 1977	190.0
FORT EDWARD	WS-7	Surface Water	Above Burgoyne Avenue at Feedertow Canal	WEHRAN	March, 1980	0.36
	WS-8	Surface Water	S.E. toe of Kingsbury Landfill near Feedertow Canal	WEHRAN	March, 1980	0.70
	WS-9	Surface Water	Stream N.E. of landfill flowing into Feedertow Canal	WEHRAN	March, 1980	1.10
	WS-11	Surface Water	Junction of Feedertow and Old Champlain Canal	WEHRAN	March, 1980	0.27
	WS-12	Surface Water	S.E. of landfill	WEHRAN	March, 1980	0.08

NOTES:

1. "L" notation designates samples obtained by Weston Environmental Consultants for NYSDEC during previous engineering investigations.
2. "WS" notation designates surface water obtained by Wehran Engineering, P.C., for NYSDEC during previous engineering studies.
3. Appropriate locations of "L" and "WS" sampling designations are shown on the Location Map, Previous Sampling Locations by Others, included in this Appendix.
4. "*" indicates that the sample location does not appear on the location map entitled Previous Sampling Locations by Others found in this Appendix.
5. "---" indicates information not available for that particular parameter.

TABLE I-4

PREVIOUS LEACHATE ANALYSIS BY OTHERS

(FOR SELECT PARAMETERS AT THE KINGSBURY LANDFILL)

Parameter	Concentration	
Total Organic Carbon	49	ppm
True Color	20	platinum-cobalt units
Odor	13	threshold odor number
Sulfate	9.8	ppm
Total Filterable Residue (180°C)	80	ppm
pH	7.0	std. units
Conductance (at 25°C)	1,580	umhos/cm
Total Arsenic	5.5	ppb
Total Barium	0.12	ppm
Total Cadmium	< 0.005	ppm
Total Chromium	0.007	ppm
Total Lead	< 0.02	ppm
Total Mercury	< 3.	ppb
Total Selenium	< 3.	ppb
Total Silver	< 0.003	ppm
Total Iron	46.	ppm
Total Manganese	2.7	ppm
Total Copper	0.008	ppm
Total Zinc	0.011	ppm
Endrin	< 0.03	ppb
Lindane	< 0.02	ppb
Methoxychlor	< 0.2	ppb
Toxaphene	< 0.5	ppb
2,4-D	< 0.2	ppb
2,4,5-TP (Silvex)	0.1	ppb

NOTES:

1. Sample collected by NYSDEC on March 2, 1981 as a grab sample. Location of sample identified as "contaminated water flowing to pond, NE portion of the site".

2. Sample location does not appear on the location map entitled Previous Sampling Locations by Others found in this Appendix due to poor description of sample location.

3. Field parameters of leachate sample indicate the following:

pH	6.0
Temperature	6.7°C
Conductivity	1740 umhos/cm

TABLE I-5

PREVIOUS SOILS ANALYSIS BY OTHERS (PCBs)

Site	Sample Location	Sampled By	Sampling Date	Sample Depth (Ft. Below Grade)	Type of Soil Sampled	PCB Concentration (PPM)
Kingsbury	053	NYSDEC	November, 1975	---	Sediment	7.01
	054	NYSDEC	November, 1975	---	Sediment	1.1
	Test Pit 23	WESTON	September, 1977	---	---	28.0
	Test Pit 24	WESTON	September, 1977	10.	---	4.6
	Test Pit 26	WESTON	September, 1977	---	Sand	40.0
	RFW-2	WESTON	December, 1977	40. - 41.5	Sand	21.11
	RFW-2	WESTON	December, 1977	45. - 46.5	Sand	36.73
	RFW-2	WESTON	December, 1977	50. - 51.5	Sand	263.6
	RFW-2	WESTON	December, 1977	55. - 56.6	Sand	275.3
	RFW-4	WESTON	December, 1977	20.	Clay	0.20
	B-23	WEHRAN	November, 1979	2. - 4.	Sand	1.852
	B-23	WEHRAN	November, 1979	14. - 16.	Sand/Clay	0.273
	B-23	WEHRAN	November, 1979	28. - 30.	Sand/Clay	0.073
	B-24	WEHRAN	November, 1979	2. - 4.	Sand	< 0.01
	B-24	WEHRAN	November, 1979	12. - 14.	Sand/Clay	< 0.05
	PA-41	WEHRAN	November, 1979	1. - 1.5	Sand/Silt	1.495
	PA-41	WEHRAN	November, 1979	3. - 3.5	Silt	5.99
	PA-42	WEHRAN	November, 1979	1. - 1.5	Sand	1.017
	PA-42	WEHRAN	November, 1979	3. - 3.5	Sand	14,760.0
Fort Edward	Test Pit 14	WESTON	September, 1977	6.	Sand	8.6
	Test Pit 17	WESTON	September, 1977	4.5	Clay	7.1
	Test Pit 20	WESTON	September, 1977	6.	---	2.6
	RFW-6	WESTON	December, 1977	21.5- 24.	Sand	2.06
	RFW-6	WESTON	December, 1977	30. - 31.	Sand	---
	RFW-6	WESTON	December, 1977	31. - 32.	Clay	214.4
	B-20	WEHRAN	November, 1979	0 - 2.	Sand	< 0.01
	B-20	WEHRAN	November, 1979	2. - 4.	Sand	< 0.05
	B-20	WEHRAN	November, 1979	12. - 14.	Sand/Clay	< 0.05
	B-21	WEHRAN	November, 1979	0 - 2.	Sand	< 0.05
	B-21	WEHRAN	November, 1979	2. - 4.	Sand	1.86
	B-21	WEHRAN	November, 1979	10. - 12.	Clay	< 0.05
	B-22	WEHRAN	November, 1979	0 - 2.	Sand	< 0.05
	B-22	WEHRAN	November, 1979	2. - 4.	Sand	7.45
	B-22	WEHRAN	November, 1979	4. - 6.	Sand	< 0.05
	B-22	WEHRAN	November, 1979	6. - 6.9	Sand	0.553
	B-22	WEHRAN	November, 1979	18. - 22.	Sand/Clay	170.9
	B-22	WEHRAN	November, 1979	38. - 40.	Clay	0.401
	PA-12	WEHRAN	November, 1979	3. - 3.5	Clay/Silt	< 0.01
	PA-13	WEHRAN	November, 1979	1. - 1.5	Sand/Silt	0.359
	PA-14	WEHRAN	November, 1979	1.3- 1.8	Silt/Sand	0.061

NOTES:

1. "Test Pits" refer to excavations performed by Weston Environmental Consultants for NYSDEC during previous engineering investigations.
2. "RFW" notations refer to monitoring well borings installed by Weston Environmental Consultants for NYSDEC during previous engineering investigations.
3. "B" notations refer to monitoring well borings installed by Wehran Engineering, P.C. for NYSDEC during previous engineering investigations.
4. "PA" notations refer to power auger borings performed by Wehran Engineering, P.C. for NYSDEC during previous engineering investigations.
5. "---" indicates information not available for that particular parameter.
6. Approximate locations of "Test Pits", "B", "RFW" and power auger (PA) borings are shown on the Location Map entitled <u>Previous Sampling Locations by Others</u>, found in this Appendix.

TABLE I-6

PREVIOUS AIR ANALYSIS BY OTHERS

Site	Sample Identification	Sampling Date	PCB's (ug/m^3 as Aroclor 1242)
Kingsbury	A	July 30, 1980	< 0.1
	A*	July 30, 1980	< 0.1
Kingsbury	B	July 30, 1980	< 0.2
	B*		< 0.2
Kingsbury	C	July 30, 1980	< 0.2
	C*	July 30, 1980	< 0.2
Fort Edward	D	July 30, 1980	< 0.1
	D*	July 30, 1980	< 0.1
Fort Edward	E	July 30, 1980	< 0.2
	E*	July 30, 1980	< 0.2
Fort Edward	F	July 30, 1980	< 0.2
	F*	July 30, 1980	< 0.2

NOTES:

1. Air samples presented above were collected by Recra Research, Inc., for NYSDEC during a previous engineering investigation.

2. Approximate locations of air sampling locations are shown on the location map entitled, "Previous sampling locations by others" included in this Appendix.

3. Values for samples identified with a letter only indicate the amount of PCBs found in the first (inlet side) section of the air sample tube. Values for samples identified with an "*" indicate the amount of PCBs found in the second (outlet side) section of the air sample tube.