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ERM-Northeast

PHASE II INVESTIGATION
NORTON COMPANY LANDFILL
COLONIE, NEW YORK

MARCH 1988

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1.0 EXECUTIVE SUMMARY

The Norton Company owns an inactive 17.8-acre landfill situated north of its manufacturing facility in Town of Colonie, New York. The landfill had been used between 1955 and 1980 to dispose of a variety of waste generated at the plant. The New York State Department of Environmental Conservation (NYSDEC) conducted a Phase I investigation of the landfill in 1984 to evaluate its impact on the environment. This investigation concluded that there was insufficient data available to complete the impact assessment.

ERM-Northeast was retained by the Norton Company to conduct a Phase II investigation to obtain the data needed to complete the impact assessment. ERM-Northeast developed a Work Plan, subsequently approved by the NYSDEC, to guide the investigation. As the investigation proceeded, additional work items were added to the scope of the investigation. The field investigation was conducted between September, 1987 and January, 1988. The investigation was a comprehensive, multimedia evaluation of ground and surface water, soils, fill deposits and stream sediment. It consisted of the following major components:

- a magnetometer survey to locate buried metallic objects;
- excavation of 44 test pits in the landfill area to characterize the fill deposits;
- construction of four monitoring wells within the landfill area to evaluate on-site ground water quality;
- construction of four perimeter monitoring wells to evaluate the potential for off-site impacts, and
- the collection of surface water and sediment samples.

All field activities were conducted following strict quality control procedures under the direct supervision of ERM-Northeast. Representative's of the NYSDEC were also present to observe the investigation.

The field data collected during the investigation was thoroughly reviewed and assessed. These data yielded the following major conclusions:

1. The industrial fill deposits cover an area of approximately 4 acres within the landfill property.

2. The industrial fill deposits consisted of solid materials such as trash and rolls of pressure sensitive tape, iron slag, flyash, construction debris, wire, abrasive material and ceramics.

3. Characterization of the industrial fill deposits revealed the presence of volatile and semivolatile organic compounds and heavy metals.

4. A number of buried metal drums were also encountered during the investigation. The contents of the drums were not verified.

5. Low levels of PCBs were detected in the soils within a discrete area of the landfill site.

6. Ground water was found to occur in the shallow overburden and the deeper bedrock formation. Ground water flow direction is to the east.

7. Concentrations of volatile organic compounds were detected in the shallow monitoring well constructed in the industrial fill deposits. These materials were not detected in the deeper bedrock monitoring wells above drinking water standards.

8. Water quality data from the shallow monitoring wells located along the perimeter of the site have concentration of volatile organics that are approximately one-onethousandth of their on-site levels. Adverse off-site ground water impacts are not expected.

9. Surface water samples indicate minimal impacts from the landfill. Volatile and semi-volatile compounds were detected in on-site pond sediment samples located in close proximity of the industrial fill deposits.

10. The HRS scoring for the site was calculated to be below the threshold level (i.e., 28.5) that qualifies a site as a candidate for inclusion on the National Priority List.

2.0 INTRODUCTION

The Norton Company owns an abandoned 17.8-acre landfill located at the north end of its Watervliet/Colonie, New York plant. In 1984, the New York State Department of Environmental Conservation (NYSDEC) conducted a Phase I investigation of the landfill. This investigation noted that insufficient data were available to complete the assessment of landfill impacts on the environment. In addition, it was not possible to establish a final Hazardous Ranking System (HRS) score for the site.

The HRS is a uniform method of evaluating a site to determine if it is a candidate for the National Priority List (NPL) established under CERCLA. Scoring is on a scale of zero to 100. A score of 28.5 qualifies the site as a candidate for the NPL. The Norton landfill site was given a preliminary score of 14.1 by the NYSDEC.

The NYSDEC requested that Norton Company conduct a Phase II investigation to address the data deficiencies noted during Phase I. This would allow for a more comprehensive assessment of potential landfill impacts and the completion of a final HRS score. The Norton Company retained ERM-Northeast in July, 1987 to prepare a work plan for the Phase II investigation. The Work

Plan was submitted to the NYSDEC and approved in September, 1987. The work plan was appended to a NYSDEC Consent on Order #R4-0454-87-05. A copy of the Phase II Work Plan is included in Appendix A.

The Phase II investigation was initiated in September 1987 and the original scope of field investigative work completed by December, 1987. Based on data collected during the field investigation, the scope of the field investigation was expanded. The additional field work was conducted during January 1988.

2.1 Objectives of the Phase II Investigation

The overall objective of this Phase II investigation is to address data requirements identified by the NYSDEC during their Phase I investigation. The NYSDEC Phase I investigation for the Norton landfill site noted that the data were not adequate to complete the HRS scoring since the extent and magnitude of soil, ground and surface water were not known.

Specifically, the Phase II investigation was designed to meet the following objectives: 1) to determine if soil, ground water and/or surface water has been impacted by the landfill; 2) to characterize the landfill deposits; and 3) to define the hydrogeologic setting, i.e., surface water and ground water route characteristics. It was not the intent of this Phase II investigation to completely delineate the extent of soils, ground water and surface water impacts but rather to determine if soils, surface water and ground water impacts exist at the site and to delineate the potential surface water and ground water contaminate migration routes.

2.2 Report Organization

To meet its objectives, the remainder of this Phase II report is organized as follows:

Section 3.0 - Site History: presents a brief history of landfill operations and a site description.

Section 4.0 - Field Investigation: describes the field program performed during the Phase II investigation.

Section 5.0 - Hydrogeologic Setting: describes the regional and site specific hydrogeologic setting, extent and characteristics of the fill deposits, ground and surface water occurrence and interactions, and public water supply inventory.

Section 6.0 - Soil/Water Quality: describes ground water, surface water and soils quality data collected from the site. A discussion of these data is also presented.

Section 7.0 - HRS Scoring: this section presents and discusses the HRS score developed from data generated during the investigation.

Appendices: the appendices include a copy of the original Phase II Work Plan, test pit descriptions, laboratory analytical reports, geologists drill logs, laboratory quality assurance/quality control reports and HRS scoring work sheets.

3.0 LANDFILL HISTORY

3.1 Site History

The Norton Company Landfill is part of a 22-acre site located directly north of Norton's Coated Abrasive Division Plant in Watervliet/Colonie, New York. The site was used as a landfill between 1955 and 1966 for the purpose of filling the area to prepare it for possible future development. Much of the waste deposited in the landfill was solid materials, such as waste tape rolls and paper. However, quantities of liquid waste in 55-gallon drums were also reported to have been deposited in the landfill. This liquid material was reported to consist of solvents, settling basin sludges and waste phenol/formaldehyde type resins. The solvents included toluene, xylene, ethanol, methyl isobutyl ketone and methyl ethyl ketone. Because of the landfill's age and the extent of excavation at the site, it is unlikely that any of the drums are intact. The landfilling of these wastes stopped in 1966.

From 1966 to 1973, liquid latex was deposited in five surface holding lagoons on the landfill site. The latex sealed the bottom of the lagoons and eventually dried to form hard rubbery material. In addition, flyash from the plant's boiler house was deposited in the landfill during the same period. From 1973 to 1980, the site was used for disposal of only construction waste and flyash. From 1980 to date, the landfill has been inactive.

The amount of waste deposited in the landfill can not be accurately established. The following list summarizes the types of wastes disposed in the landfill.

<u>1955 - 1966</u>

A. Solid - Rolls of waste tape, coated abrasives, paper, and flyash from the boiler house.

B. Liquid - Deposited in drums (quantities unknown).

<u>1. Water Based Resin Cleanup Waste</u>

- o Phenolic Resin
- o Animal Glue
- o Latex
- o Inert Filler (i.e., calcium carbonate)
- o Water

<u>2. Settling Basin Sludge</u>

- o Phenolic Resin
- o Animal Glue

- o Latex
- o Inert Filler
- o Water

3. <u>Solvent Base Resin Cleanup Waste</u>

- o Phenolic Resin
- o Urethane Resin
- o Toluene
- o Xylene
- o Ethanol
- o Methyl Isobutyl Ketone
- o Methyl Ethyl Ketone

<u>1966 - 1973</u>

Dilute latex/water solutions in five evaporation ponds (approximately 8,000 gallons per week).

<u>1966 - 1980</u>

Flyash from the boiler house.

1973 - 1980

Construction debris.

1980 - Current

Site is inactive; no wastes were being deposited in the landfill.

3.2 Site Description

The Norton landfill site covers a total of 22 acres in the shape of a quarter of a circle. The two straight sides of the site are approximately 1,200 feet long and the curved southern side is 1,800 feet long. The northern 3.2 acres of the site consists of marsh area containing two ponds. This area is situated at a lower elevation than the remainder of the site and likely represents undisturbed original grade. Proceeding to the south are the landfill deposits that cover a total of 17.8 acres and extend to within an average of 30 feet of the southern property line. This area is referred to as the landfill deposits in this report. Contained within the landfill deposits is an oblonged shaped area representing the extent of the industrial fill deposits originally mapped in 1965 and confirmed during this investigation. Running along the southern property line is a topographic high that was at one time the bed of a former railroad. The high consists of iron slag that was deposited by the railroad. These deposits are referred to in this report as the iron slag deposits. Much of the fill deposits and the iron slag deposits are wooded.

Located to the north of the landfill site is an electrical substation owned by Niagara Mohawk. On the east side of the property is an active railroad track belonging to Delaware and Hudson Railroad Company.

The entire site is fenced. Access is through lockable gates located at the southeast and northwest corners of the property.

4.0 FIELD INVESTIGATION

The Phase II investigation includes the following four field investigative tasks:

- Task 1 - Soils Investigation;
- Task 2 - Ground Water Investigation;
- Task 3 - Surface Water Investigative Work; and,
- Task 4 - Surveying.

All four tasks were completed as outlined in the original work plan. Based on the results of data generated during the four tasks, the scope of the work was expanded. This section of the report presents a description of the field work completed including the investigation.

4.1 Task 1 - Soils Investigation

The objectives of the soils investigation were to:

- Characterize the physical and chemical composition of the landfill deposits;
- Determine the horizontal and vertical extent of the landfill deposits; and,

- Characterize soil quality along the railroad right-of-way adjacent to the site.

The soils investigation was completed through a number of steps. First, a grid was establish over the area that had been filled. A magnetometer survey was then performed and test pits excavated. Finally, soil samples were then collected from the test pits.

4.1.1 Grid Pattern

The area delineated as landfill deposits was subdivided into equal areas to form a grid. The grid was used to establish a coordinate system to reference observations and provide a method for selecting sampling locations that would yield information representative of the entire area. The grid system divided the landfill into 44 areas approximately 120 foot square. The grid was established in the field and the corners of the individual 44 areas staked. The configuration of the grid is shown on Figure 4-1 (in rear pocket).

4.1.2 Magnetometer Survey

A magnetometer survey of the site was conducted by an ERM-Northeast hydrogeologist from September 2 to September 4, 1987. Gary Johnston, Sanitary Engineer, NYSDEC-Region IV, observed the work. The purpose of the magnetometer survey was to identify locations where buried waste materials may exist, so that locations for excavating the test pits could be targeted.

The survey was conducted using a Dowty RFL Industries, Inc. Model DM22 Differential Magnetometer. The instrument is a portable, multi-range fluxgate magnetometer that was operated in the differential mode. Using the instrument in the differential mode enables ferrous objects such as buried pipes, drums and similar objects to be located due to their disturbance of the earths magnetic field. Magnetic field intensity and/or field differential is indicated by an audible tone generator.

The survey was carried out along north-south lines spaced 20 feet apart proceeding from east to west over the grid area. In addition, the swamp area was surveyed where access permitted. Anomalous readings were flagged for reference for test pit site selection.

4.1.3 Test Pit Excavation and Soil Sampling

The purpose for excavating test pits was to characterize soil conditions over the entire landfill both by visual and textural evaluation and to provide a means for obtaining soils for analyzes to characterize the chemical composition of deposits.

Forty-four (44) test pits were excavated from September 10 to September 15, 1987 under the supervision of an ERM-Northeast hydrogeologist. Mr. Gary Johnston, NYSDEC, also observed their work. James H. Maloy Inc., general contractor, Albany, New York, excavated the test pits using a John Deer Model 510 backhoe.

The test pit locations within each gridded area were selected based on anomalous readings found by the magnetometer survey. Locations for test pits in areas not having anomalous readings were selected by visual inspection. Indicators used included: surface depressions, (indication the possible collapse of buried containers);

mounded areas (indicating possible burial of wastes); unvegetated areas with soil discoloration. In the absence of these indicators, test pits were installed in the center of the area. Figure 4-1 shows the location of each test pit.

The test pits extended from the land surface to the ground water surface or until natural materials were encountered. The backhoe bucket and arm was cleaned with a high pressure washer prior to initiation of the project, between each test pit, and upon completion of the project. Fill materials were excavated in stages with clean soils stock piled separately. Backfilling was done in reverse order and graded so that surface runoff would be diverted away from the test pit and the ponding of the water minimized. Plastic sheeting was placed over each test pit (with additional soil covering) to prevent infiltration of surface water.

Each test pit was photographed and fully documented as excavation proceeded. Documentation included physical descriptions of individual layers encountered, total depth, water level, organic vapor analyzer (OVA) response, and the intervals sampled. Appendix B provides a detailed description of each test pit.

A representative soil sample was collected from the wall of each test pit. The sample interval was from the base of the fill deposits (i.e., above the natural materials) to within two feet of the surface. A decontaminated stainless steel trowel attached to a hoe handle was used to obtain an equal amount of fill from each pit. The sample was examined, composited in a stainless steel bowl and then immediately transferred to a one liter amber glass jar provided by EnviroTest Laboratories of Newburgh, New York. Each sample was labeled with the project name, sample location, time and date and then immediately stored in a refrigerated cooler to maintain sample integrity.

In order to characterize the fill deposits, samples from every 7-10 test pits were combined into one composite sample. The rationale for determining which test pits would be composited for a given geographic area changed as the test pit excavation process proceeded. The original rationale assumed that the waste was uniformly spread over the entire 17.8 acres. Therefore, each composite sample would be comprised of an equal number of test pits, representative of an area approximately one fifth of the landfill. This was the rationale for selection of individual samples for composite samples 1 and 2. Subsequently, it became evident that industrial fill material was generally within the area delineated in 1965 as fill deposits. Therefore, the compositing strategy changed to reflect this. Areas located outside the 1965 fill deposits were composited into Samples 4 and 5. Areas located within or in close proximity of the 1965 fill were composited into Sample 3. A summary of the test pit samples comprising each composite sample is presented in Table 4-1 and shown on Figure 4-2.

A total of five composite samples were collected for analyses. These five samples plus one blind duplicate were analyzed for Contract Laboratory Protocol (CLP), Hazardous Substance List (HSL) metals (total), volatile organics, base neutral and acid extractables, pesticides, PCB, phenol, and cyanide. In addition, a library search for 40 (15 volatile organics, 10 acid extractables, 15 base neutrals) of the next highest peaks was conducted. This analytical list is collectively referred to as Hazardous Substance List plus 40 in this report.

TABLE 4-1

SOIL SAMPLE COMPOSITING SUMMARY

Composite Sample No.	Test Pits
SS-1	4, 5, 6, 7, 11, 12, 13, 21
SS-2	1, 2, 3, 8, 9, 10, 16, 17, 18, 28
SS-3	14, 15, 19, 20, 22, 23, 24, 25, 26
SS-4	29, 35, 36, 37, 41, 42, 43, 48, 49
SS-5	27, 30, 31, 32, 33, 38, 39, 44

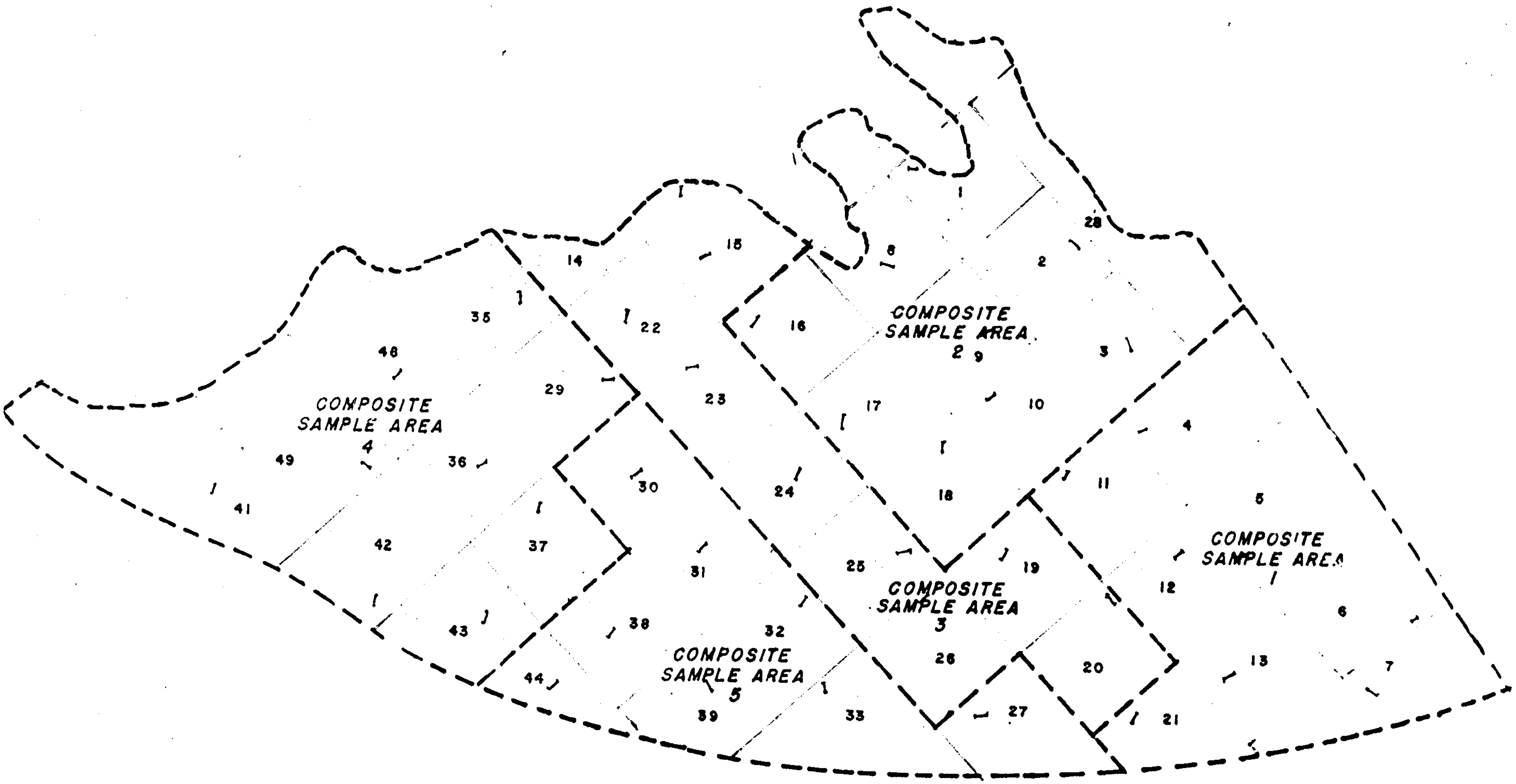

Figure 4-2 Configuration of composite sample locations.

All soil samples and water samples with the exception of one set of waters noted in Section 4.2.3 were analyzed by Envirotest Laboratories, a NYSDEC approved lab. The results are presented in Tables 6-1, 6-2 and 6-3 and discussed in Section 6.0. The analytical data in the tables of this report present only those HSL chemicals and the tentatively identified compounds (TICs) that were detected. The complete HSL and TIC results are included in Appendix C along with a summary of the analytical methods and chain of custody used. The quality assurance, quality control procedures for field work and analytical data is included in the Phase II Work Plan (Appendix A). A quality assurance/ quality control review of the laboratory data packages was conducted by Environmental Standards, Inc. of Valley Forge, PA. The quality assurance/quality control review reports are included in Appendix D.

4.1.4 Railroad and Background Soil Sampling

Three soil samples were collected near the railroad tracks on September 15, 1987. Soil samples RR-1 through RR-3 were collected just west of the Delaware and Hudson Railroad Line and east of the eastern Norton fence line. Sample locations are shown on Figure 4-1. These samples were obtained and analyzed to determine if surface runoff from the railroad has impacted soil and possibly ground water quality at the site. Each sample was obtained with a decontaminated stainless steel bucket auger from a depth of 24 to 36 inches below grade. Samples RR-1 and RR-3 were analyzed for PCB and pesticides. Sample RR-2 was analyzed for the HSL plus 40.

A background soil sample, BG, was obtained just outside the northwest corner of the site on Lansing Lane (Figure 4-1). The purpose of this sample is to provide natural background soil geochemistry to compare with soils analyzed within the Norton site.

The soil sample results are presented in Tables 6-1, 6-2 and 6-3 and discussed in Section 6.0.

4.1.5 Sediment Sampling

As part of the expanded scope of work, the NYSDEC requested that sediment sampling be conducted during the January 1988 field effort. A sediment sample, SED-1, was obtained on January 18, 1988 from the pond located in close proximity to the 1965 fill deposits. The sampling location is shown on Figure 4-1.

The sediment sample was obtained using a decontaminated stainless steel hand bucket auger. The bucket auger was advanced to six inches below grade. The soils obtained from zero to six inches were collected directly into sample bottles provided by EnviroTest Laboratories. The sample was analyzed for HSL plus 40. The results are presented in Table 6-4.

4.2 Task 2 - Ground Water Investigation

The objectives of the ground water investigation are:

- Determine whether ground water has been adversely impacted;
- Identify horizontal and vertical head differences;
- Identify ground water flow boundaries; and,
- Identify vertical and horizontal permeability zones.

The ground water investigation was completed in several steps. First, three temporary monitoring wells were installed to establish ground water flow direction. Four permanent monitoring wells were then installed. Based on the data obtained from these wells an additional four monitoring wells were constructed.

4.2.1 Installation of Temporary Monitoring Wells

Temporary monitoring wells (TMW-A, TMW-B, and TMW-C) were installed to establish ground water flow direction. This data was needed to select locations for the permanent wells that are downgradient of the 1965 fill deposits. The temporary wells were constructed in test pits 6, 2 and 49. The locations of the temporary wells are shown on Figure 4-1. The temporary wells were constructed by installing two inch diameter, 0.020 inch slotted PVC screens into the test pit excavations and then backfilling. Each temporary wells' surface elevation was determined by levelling with a Wild Heerbrugg Engineers Level. A ground water contour map was then drawn and established that ground water flow direction was to the southeast.

4.2.2 Installation of Permanent Monitoring Wells

The Phase II Work Plan included a deep soil boring drilled to the top of the first lacustrine clay layer or top of bedrock, which ever was encountered first. Based on the test pit work it was determined that bedrock was extremely shallow, 0 to 15 feet, therefore a deep boring, as described in the work plan, was not installed. In addition, it appeared that the water encountered in the test pits might have been perched water and therefore, wells screening this material would not be representative of ground water beneath the site. Therefore, with agreement from the NYSDEC the scope of work outlined in the work plan was changed. Instead of installing three overburden wells and one deep well, three deep wells and one shallow well were installed.

The four monitoring well locations were approved by the NYSDEC based on data obtained from the temporary wells. Three monitoring wells, MW-2, MW-3 and MW-4, were installed into bedrock and a shallow well MW-1 was installed in the overburden. Monitoring well MW-4 is the upgradient monitoring well. Well MW-1 is located within the 1965 fill deposits. Wells MW-2 and MW-3 are located downgradient. Locations of the wells are shown on Figure 4-1.

Based on the data obtained from wells MW-1 through MW-4, (i.e., water table elevations and water quality) four additional wells (MW-5, MW-6, MW-7 and MW-8) were installed along the south and eastern border of the site to evaluate ground water quality leaving the site and to refine ground water flow direction.

Monitoring wells MW-1 through MW-4 were installed on September 17 and 18, 1987 and wells MW-5 through MW-8 were installed from January 5 through January 12, 1988. Catoh Environmental Company of Weedsport, New York constructed the wells under the supervision of ERM-Northeast. Gary Johnston, Senior Sanitary Engineer of the NYSDEC, observed the construction procedure.

Monitoring well MW-1 was installed using the hollow stem auger drilling technique. The remaining wells were installed using air rotary drilling techniques. Monitoring well MW-1 was installed and constructed as follows. A borehole was advanced 15 feet to bedrock, using hollow stem augers. Split spoon samples were collected on alternating two foot intervals. Upon completion of the borehole, a two inch diameter, SCH 40, PVC, screw coupled screen and riser pipe was installed. A ten foot long, 0.020 inch slot screen was used. The annular space from the base of the screen to two feet above the top of the screen was gravel packed followed by a cement/bentonite grout that extended to grade. These materials were emplaced while backing the augers up out of the hole to ensure that no voids were left. The well was finished at grade in a locking protective casing.

Monitoring wells MW-2 through MW-8 were installed using air rotary drilling techniques. Wells MW-2, MW-3, MW-4 and MW-5 were advanced into bedrock until fractures yielding water was encountered. Upon completion of the borehole, a screen was set in the bedrock with riser pipe extending across the bedrock overburden contact. The length of the screen and diameter used varied from well to well. A gravel pack was installed from the base of the borehole to two feet above the top of the screen. A bentonite seal was installed on top of the gravel pack followed by tremie grout which extended across the bedrock surface to grade. The wells were finished at grade in locking protective casings.

Monitoring wells MW-6, MW-7 and MW-8 were installed in the overburden deposits using air rotary drilling techniques. The boreholes were advanced to bedrock and then cased with a 6-inch diameter temporary casing. The well was constructed within the casing using the same technique as described for the auger drilling. All eight wells were developed until the discharge ran clear.

Drilling equipment, including all augers, drill rods, bits and accessory tools were cleaned with a high pressure washer between each of the monitoring wells and prior to leaving the site at the end of the job.

A summary of the well construction details are presented in Table 4-2. Geologists logs are presented in Appendix E.

A synoptic set of water levels was obtained from the existing well network on January 18, 1988. This water level data is presented in Table 4-2.

4.2.3 Ground Water Sampling

Water samples were obtained from the monitoring wells using dedicated Watterra pumping systems. A Watterra pump is a positive displacement pump that consists of a delrin foot valve and polyethylene tubing that extends to grade. The tubing is connected at grade to a lever with displaces the foot valve and tube in a vertical direction. The pump was used for evacuating the well and sampling. There is no decontamination required because all components that come in

TABLE 4-2
WELL SPECIFICATIONS
SUMMARY TABLE

MONITORING WELL	Formation Screened	Measuring Point Elevation (MSL)	Ground Elevation (MSL)	Total Depth (feet)	Screen Length (feet)	Screen Interval (MSL)	Well Diameter (inches)	Depth to Bedrock (feet)	Water Level Elevations January 18, 1988	
									DTW	WTE
MW-1	Overburden	46.12	44.1	15.0	10	41.12-31.12	2	15	5.63 *	40.49 *
MW-2	Bedrock	41.88	39.9	76.0	40	5.88--34.12	2	13	5.22	36.66
MW-3	Bedrock	44.56	42.6	115.0	80	9.56--70.44	2	13	8.09	36.47
MW-4	Bedrock	59.93	58.2	61.5	35	33.43--1.57	2	18	9.81	50.12
MW-5	Bedrock	42.71	41.3	25.25	13	30.46-17.46	4	6.5	9.23	33.48
MW-6	Overburden	41.51	39.2	12.0	8	37.51-29.51	4	12	7.65	33.86
MW-7	Overburden	39.18	40.8	12.8	7.5	33.88-26.38	4	12.5	5.84	33.34
MW-8	Overburden	42.99	42.4	14.85	10.0	38.14-28.14	4	15.5	4.75	38.24

* Estimated water level, see text.

contact with the well casing and water are dedicated to the wells.

The first round of water samples were obtained from wells MW-1 through 4 on October 22, 1987 and a second set of water samples was collected from wells MW-2, MW-3, MW-4, MW-5, MW-6, MW-7, and MW-8 on January 18, 1988. Prior to sampling, the wells were evacuated. The number of casing volumes of water obtained from each well varied depending on recharge rates. Wells which recharged quickly had five casing volumes of water removed, whereas others were pumped until dry and therefore, had lesser volumes removed. Wells that pumped dry were sampled as soon as enough water had recharged the well to fill the sample bottles. Water samples were collected directly into the appropriate sampling containers.

Water samples collected during the first round of sampling on October 22, 1987 were analyzed for HSL plus 40. Water samples collected during the second round of water sampling on January 18, 1988 were analyzed for a variety of compounds. Wells MW-5, MW-6, MW-7, and MW-8 were analyzed for HSL plus 40. Wells MW-2, MW-3, and MW-4 were sampled for lead, cadmium, chromium and volatile organic compounds plus 15 to confirm the first round water sample results. In addition, well MW-3 was analyzed for pesticides as confirmation of previous results. Water samples from wells MW-2, MW-3 and MW-4 were split with Adirondack Laboratories and analyzed for lead, cadmium and chromium. The water sample results are presented in Tables 6-6, 6-7, 6-8 and are discussed in Section 6.0.

4.3 Surface Water Investigation

The objective of the surface water investigation was to:

- determine if the landfill has impacted surface water quality; and,
- determine surface water/ground water interactions.

The surface water investigation included delineating the sites drainage system, collection of water level data and surface water sampling.

4.3.1 Delineation of Drainage Pattern and Selection of Surface Water Monitoring Locations

The site's drainage pattern was mapped, as part of the surveying work completed in Task 5, to facilitate the selection of sampling points. Based on the mapping, several surface water sampling and water level locations, shown on Figure 4-1, were selected. SW-2 is a downstream sampling site and SW-3 is located on a pond in close proximity to the suspected waste deposits. SW-1 is a downstream site located at the outfall of a storm water drainage line. SW-4 is an upstream sampling location.

4.3.2 Water Sampling

Surface water samples were collected at the same time the monitoring wells were sampled. The first round of surface water samples were collected on October 22, 1987 and the second round was collected on January 18, 1988.

Water samples were collected by submerging the sampling containers, provided by EnviroTest Laboratories, as far below the surface of the water as possible. The first round surface water samples were analyzed for HSL plus 40.

A second round of surface water sampling was attempted in conjunction with the monitoring well sampling on January 18, 1988 but the water bodies were frozen with the exception of sample location SW-1. A water sample from this location was obtained and analyzed for the HSL plus 40. The surface water analytical results are presented in Tables 6-9, 6-10 and discussed in Section 6.0.

4.4 Task 4 - Surveying

The site was surveyed by C.T. Male Associates, Latham, NY. The survey work included establishing horizontal and ground elevations of staked grid stations, test pits, monitoring wells, soil sample locations, perimeter fence, major topographic breaks, locations of standing water, sanitary and storm sewer lines. A base map was prepared utilizing this data. Figure 4-1 was developed based on C.T. Male's survey worksheet.

5.0 HYDROGEOLOGIC SETTING

5.1 Regional Hydrogeology

The Towns of Watervliet and Colonie are underlain by a thin veneer of unconsolidated deposits situated directly on top of bedrock. The thin veneer of deposits consist of alluvial clays, silts, sands and gravels deposited in association with the Hudson River and its tributaries. In general, these deposits are very thin but may attain thicknesses of 50 feet or more. Where these deposits exist, the topography is generally flat and swampy areas with poor drainage occur.

Artificial fill deposits consisting of iron slag, construction debris, sand and gravel exist in the area surrounding Norton. This material was used as fill on top of the swamp deposits to provide buildable land and as bedding material for the railroads.

Directly underlying the alluvium deposits is the Snake Hill Formation of Ordovician age. The Snake Hill Formation consists primarily of dark-gray to black argillaceous shales with occasional layers of limestone. Owing to the extreme pliability of the shales, the Snake Hill formation has been intricately folded and crumbled. The thickness of the formation is approximately 3,000 feet. The formation is very dense and nearly impervious , and contains recoverable water only in joint , cleavage and bedding planes. Yields average 16 gallons per minute and dry wells are common. Occasional beds of limestone within the Snake Hill formation have been known to yield substantial quantities of water.

5.1.1 Water Supply Inventory

The water supply inventory involved reviewing Albany County Health Department (ACHD) files. According to ACHD, the drinking water supply for the area immediately surrounding the site is derived from two separate sources. Watervliet obtains its water supply from the Watervliet reservoir in the Town of Guilderland located approximately 10 miles to the west. The Town of Colonie obtains its water supply from the Mohawk River and Stoney Creek located in the Town of Clifton Park. The Village of Green Island obtains its water supply from an infiltration gallery located in the middle of the Hudson River on Green Island. This well obtains water from the Hudson River through sediments that underlay the Hudson River. The well are located 1.5 miles the site.

The ACHD does not have any specific information regarding the presence of private supply wells in the area near the landfill. Private wells for lawn watering may exist.

5.2 Site Specific Hydrogeology

5.2.1 Geologic Setting

The surficial deposits that outcrop at the Norton Landfill consist of artificial fill, alluvial silt, clay, sand and shales. Outcrops of these deposits are scattered throughout the site.

The Snake Hill formation underlies the entire site and outcrops in areas 1 and 29 and extends to at least 115 feet below grade as evidenced by boring MW-3. The shale is poorly fractured dark gray, green to black and is consistent in lithology with the Snake Hill formation. There are no apparent limestone layers present. Examination of bedrock outcrops and exposures within test pits indicated that weathering of the bedrock does not extend beyond a couple of feet. It was observed in the test pits that the shale has weathered in place to a clayey material. Figure 5-1 is a

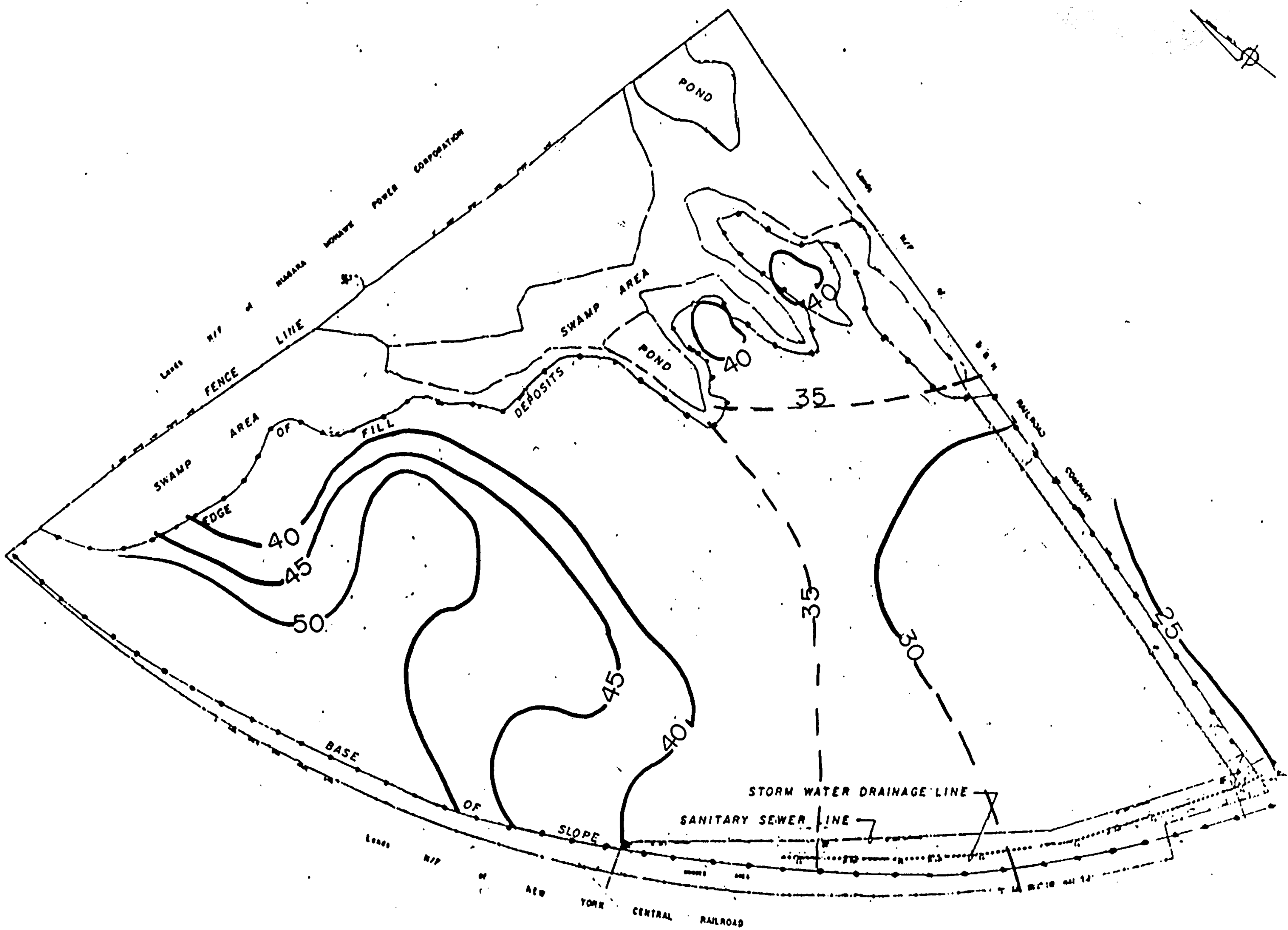

Figure 5-1 Bedrock topography.

topographic map of the bedrock surface based on data obtained from the test pits and well borings. In general the bedrock surface slopes in all directions from a high located near test pit 29 at the west end of the landfill. Test borings for well MW-4 indicates that the bedrock surface drops off to the west.

Alluvial deposits outcrop at the site as swamp deposits at the north end of the site. Prior to placement of the fill, the swamp deposits covered almost the entire property. This was confirmed by the presence of swamp deposits at the base of many of the test pits. The swamp deposits consist of abundant natural organic material and silt. Also interspersed with the swamp deposits are discontinuous clay and sand layers typically encountered directly on top of bedrock. The magnetometer survey of the swamp deposits did not encounter any anomalous readings or evidence of buried waste.

5.2.2 Fill Deposits

The fill deposits at the site can be characterized into three types of fill. These include iron slag, iron slag mixed with demolition debris and iron slag deposits mixed with demolition debris and industrial waste material.

The iron slag deposits comprise the topographic high that borders the southern property line. These materials were deposited by the railroad prior to 1954. This material at one time occupied a larger portion of the southern part of the site. This material was the source of the fill which was spread over the remainder of the site.

The iron slag material mixed with demolition debris was derived from the slag deposits located along the southern property line. The slag material was pushed across the site and mixed with construction debris and flyash. This material consists of iron slag, silty to fine sand, brick fragments, cinders and pieces of metal. This material is fairly heterogeneous.

Industrial waste material was also observed mixed with the slag. This material consists of rolls of pressure sensitive tape, rags, wire, drums, abrasive material and ceramics. Numerous drums were encountered in the test pits, however, most are not intact. Those that were partially intact contain fluid, but it could not be determined if the fluid was ground water or chemicals. Soil staining was evident in association with some of the drums. Based on the test pit work, this material is located in the area designated as 1965 fill material, but also extends slightly to the north. The extent of the industrial waste material is shown on Figure 4-1 and covers approximately 4 acres.

The distribution of three different types of fill material is shown on Figure 5-2. Figures 5-3, 5-4 and 5-5 show the fill deposits in cross section and their relationship to alluvial deposits and bedrock. The thickness of the fill deposits vary in relationship to the bedrock topography and land surface. The fill materials range from zero to 14 feet thick across the site. In the area where the industrial waste material is located, the deposits average 10 to 14 feet thick. Figure 5-6 is a thickness map of the fill deposits.

5.2.3 Ground and Surface Water Occurrence

The water table configuration beneath the landfill site is shown in Figure 4-1. The ground water contours are based on a synoptic set of water levels obtained on January 18, 1988. A summary of the water levels is presented in Table 4-2.

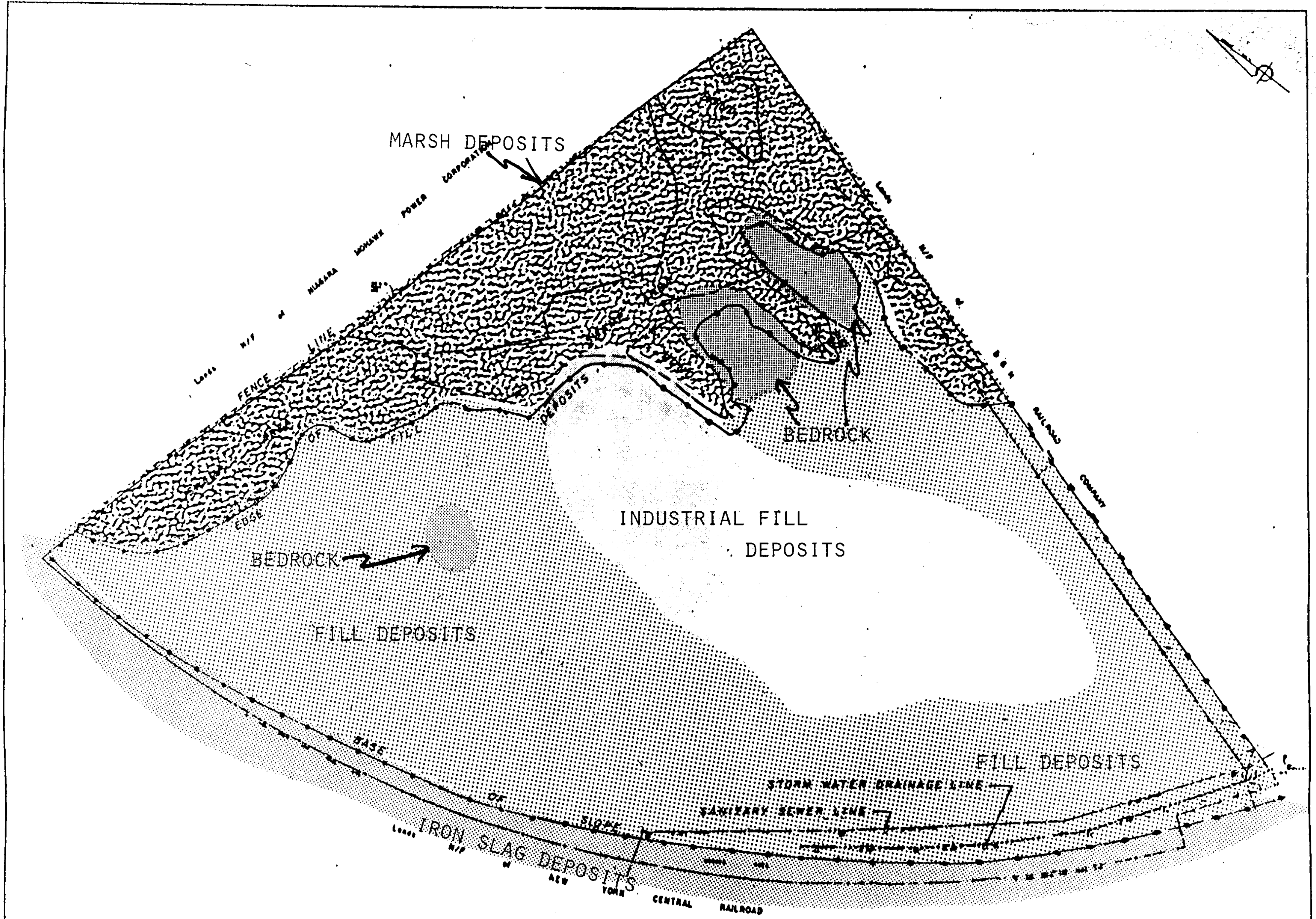

FIGURE 5-2 Extent of surfical deposits.

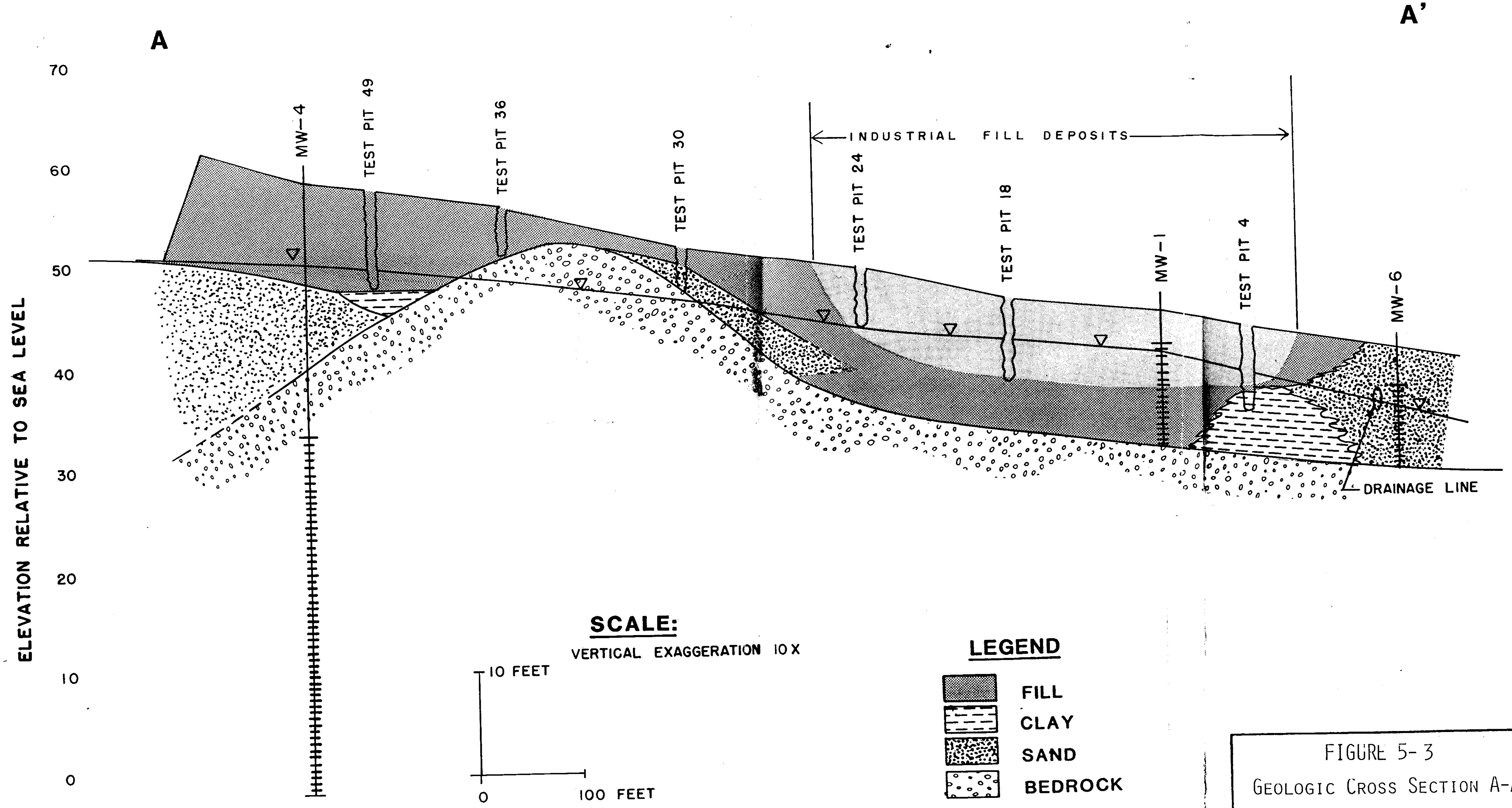

FIGURE 5-3

Geologic Cross Section A-A'

NORTON COMPANY LANDFILL
COLONIE, NEW YORK

ERM-Northeast

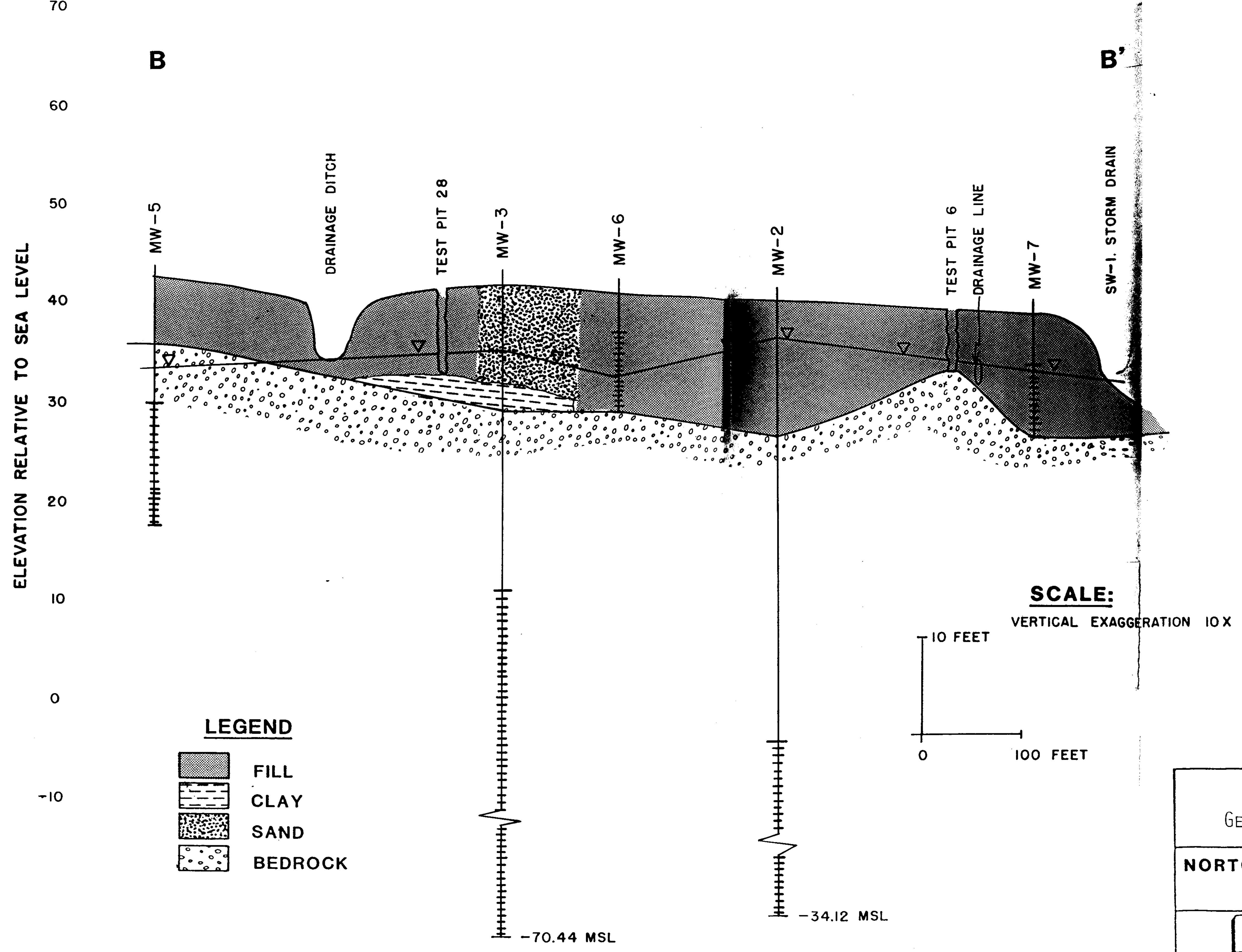

FIGURE 5-4

GEOLOGIC CROSS SECTION B-B'

NORTON COMPANY LANDFILL
COLONIE, NEW YORK

ERM-Northeast

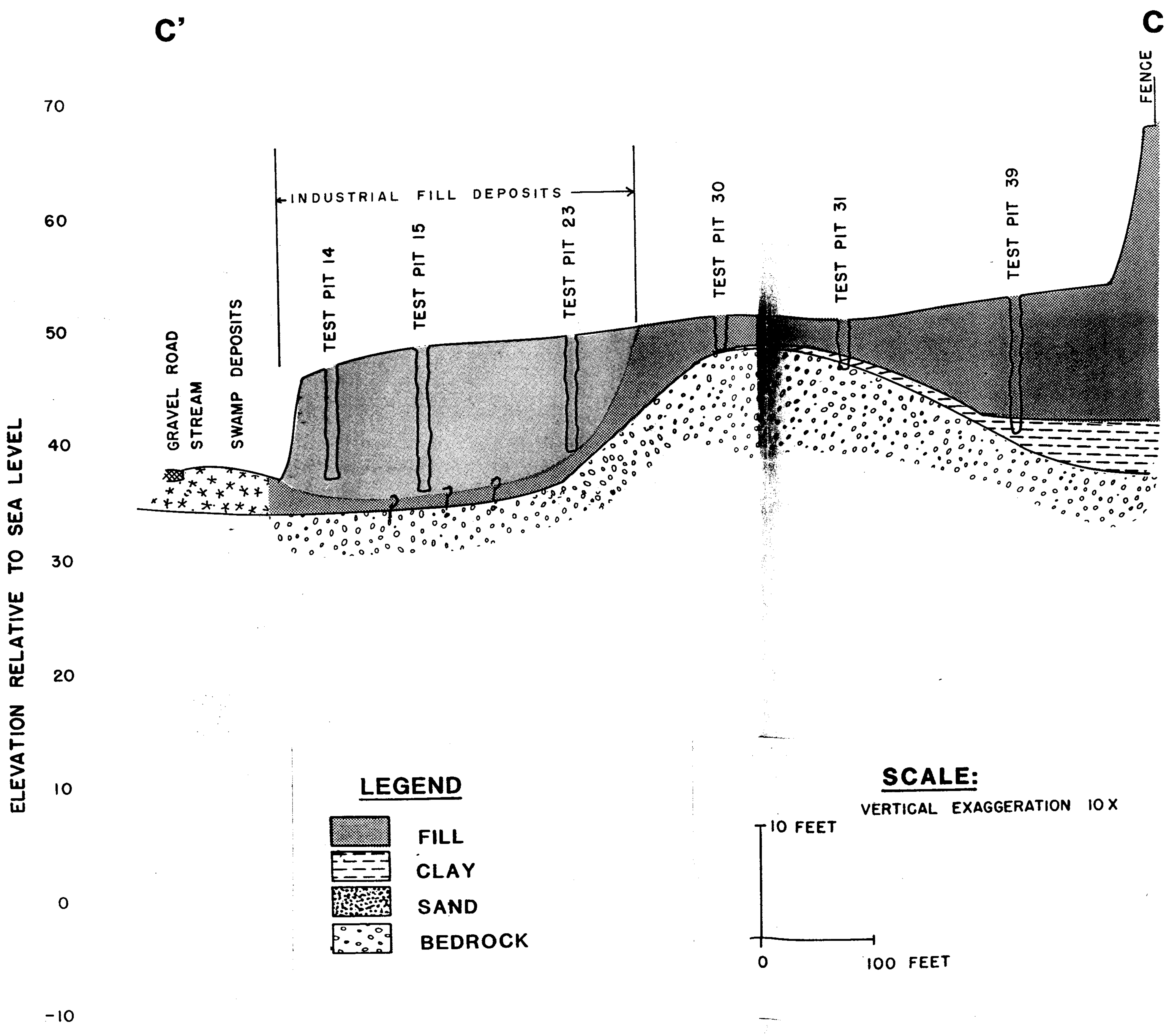

FIGURE 5-5

GEOLOGIC CROSS SECTION C=C'

NORTON COMPANY LANDFILL

COLONIE, NEW YORK

ERM-Northeast

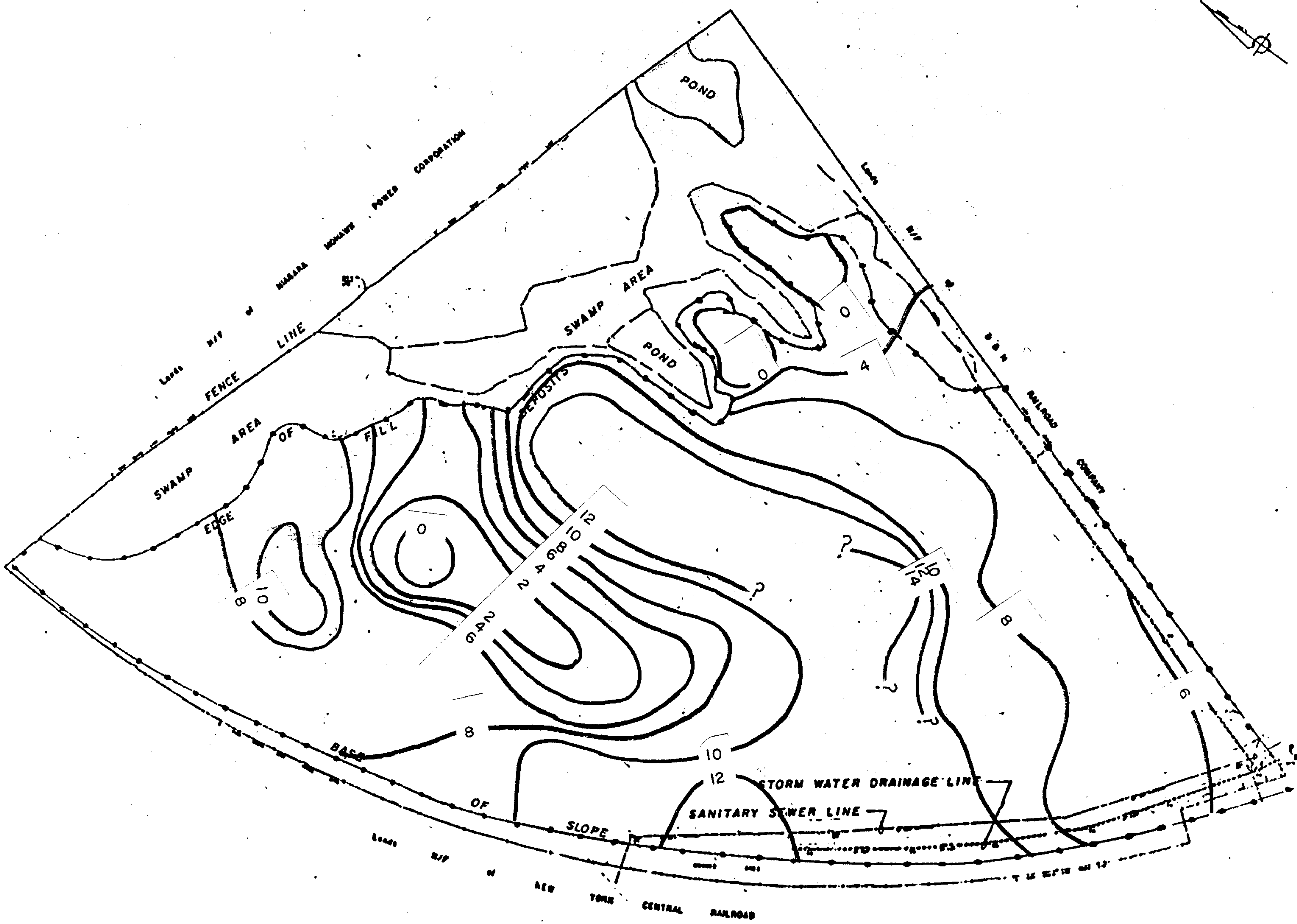

Figure 5-6 Map showing thickness of landfill deposits.

The water table is shown sloping to the east. This is consistent with regional flow which is towards the Hudson River to the east. The gradient based on wells MW-1, MW-2, MW-3, MW-5, MW-6, MW-7, and MW-8 at the east end of the site is very consistent, approximately 0.028 ft./ft. The water level obtained from well MW-1 is an estimate. Accurate measurement of the water level in this well was not possible because of the presence of a free phase substance floating on the water. The gradient indicated over the remainder of the site is lower and is based on well MW-4. The gradient between MW-4 and the remaining 7 wells is 0.014 ft./ft.

Comparison of heads in bedrock wells versus overburden wells has not revealed any trends in the data that would indicate that an upward or downward component of flow exists at the site. The overburden material and the bedrock at the site have a fairly low permeability. Several dry wells were installed into bedrock. The bedrock wells that did encounter ground water recharged extremely slowly. The water bearing capacity of the bedrock is controlled by the number and interconnection of fractures joints and bedding planes. Very few of these features were encountered during drilling.

The wells installed into the overburden yielded greater quantities of water than the bedrock wells. In particular, well MW-8 (and to a lesser extent MW-1), yielded significant quantities of water.

Ground water within the overburden materials is under water table conditions. Ground water flow in the overburden materials is probably controlled by the two drainage lines that parallel the south and east site boundaries and the surface water bodies to the north.

The location and configuration of the surface water bodies and drainlines at the site are shown on Figure 4-1.

The drain lines intersect the water table surface and apparently were designed to drain the swamp deposits prior to filling. The backfill material surrounding these pipes may be serving as conduit which intersects ground water flow and diverts it to the southeast corner of the property where it would discharge into the surface water body at that location. Geologic cross sections presented in Figures 5-3 and 5-4 show the relationship of the water table surface to the drain lines and the fill deposits.

Surface water enters the site along the north property line and flows through a main channel that discharges into a pond located at the far northern corner of the property. Flow in the stream originates approximately 500 feet to the north of the property line on Niagara Mohawk property.

The stream is ground water fed. Comparison of water level elevations between ground water in the fill deposits and surface water elevations indicates that ground water flows from the fill deposits into the stream. The streams main channel flows directly to the north pond which discharges to the north.

The pond in close proximity of the industrial fill deposits is dry during many times of the year. Most of the water that enters the pond does so through surface water runoff from the fill deposits or ground water seepage. There are no apparent surface water streams feeding the pond. In general all of the swamp deposits are under water during high runoff events.

6.0 SOIL AND WATER QUALITY

6.1 Soil Quality

The composite soil sample results (Tables 6-1, 6-2 and 6-3) confirm that spent solvents, rolls of tape and flyash have been deposited at the site. Most of these materials are restricted to the area referred to as the industrial fill deposits.

6.1.1 Fill Deposits

Volatiles

The volatile organic compounds identified were primarily toluene and xylene. Total volatile organic compounds ranged between 1.94 ppm and 22.23 ppm in samples SS-1, SS-2 and SS-3. Volatile organics were not detected in samples SS-4, SS-5 or the background sample (BG). The presence of the volatile organic compounds in samples SS-1, SS-2 and SS-3 is consistent with solvent adhesive materials used in the manufacturing of rolls of pressure sensitive tape being deposited in the area delineated as the industrial waste fill deposits.

TABLE 6-1
SUMMARY OF SOIL ANALYTICAL RESULTS
INORGANICS
(ALL CONCENTRATIONS IN PARTS PER MILLION)

Sample Identification	SS-1	SS-2		SS-3	SS-4	SS-5	RR-1	RR-2	RR-3	BG
Aluminum	3500	6710 J	19,030 J	7330	6970	4400	NA	12960	NA	14,340
Arsenic	2.8	1.8	2.4	26	23	3.2	NA	2.4	NA	3.5
Barium	44 B	114 J	351 J	139	119	30 B	NA	118	NA	103
Beryllium ·	1.3	1.3 J	3.3 J	2.0	2.1	1.1	NA	1.5	NA	1.7
Cadmium	0.59 B	0.5 B	2.1 B	1.7 B	1.7 B	0.8 B	NA	1.6 B	NA	1.7 B
Calcium	3390 B	15,900 B	52,600 J	17,140 B	30,100	1930 B	NA	3150 B	NA	2600 B
Chromium	3.8 J	20 J	60 J	25	19	12	NA	23	NA	21
Cobalt	12 B	15 B	26 B	16 B	19 B	12 B	NA	20 B	NA	19 B
Copper	44 B	60 J	175 J	38 B	133	73	NA	33 B	NA	17 B
Lead	79	52 J	264 J	48	160	33	NA	34	NA	25
Iron	35,000	26,300 J	65,300 J	44,230	53,100	27,430	NA	30,180	NA	29,200
Magnesium	938 B	1890 B	4810 J	1320 B	2400 B	1050 B	NA	4545	NA	4270
Manganese	472	371 J	928 J	500	890	364	NA	973	NA	763
Mercury	0.38	0.22	0.19 J	0.20	0.40	0.38	NA	0.18	NA	0.14
Nickel	12 J	52 J	106 J	25	20	13	NA	34	NA	17
Potassium	307 B	489 B	1233 J	500 B	556 B	508 B	NA	721 B	NA	1032
Silver	0.24 J	0.88 J	2.1 J	0.58	1.0	0.45	NA	0.13	NA	0.47
Sodium	160 B	534 B	983 B	355 B	280 B	159 B	NA	128 B	NA	151 B
Vanadium	35	126 J	400 J	92	28	17	NA	24	NA	28
Zinc	150 B	435 B	1400 J	180 B	570	64 B	NA	72 B	NA	64 B

Qualifier Codes

J = Indicates an estimated value. This flag is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed or when the mass spectral data indicated the presence of a compound that meets the identification criteria but the result is < the specified limit but > zero or when a concentration is determined to be an estimate due to a quality control criteria.

B = This result is of questionable qualitative significance since this compound was detected in a blank at a similar concentration.

NA = Not analyzed

Blank = Analyzed for but not detected

TABLE 6-2
SUMMARY OF SOIL ANALYTICAL RESULTS
ORGANICS
(ALL CONCENTRATIONS IN PARTS PER MILLION)

SAMPLE IDENTIFICATION	SS-1	SS-2		SS-3	SS-4	SS-5	RR-1	RR-2	RR-3	BG
Comment			Duplicate							
VOLATILES										
Carbon Disulfide	0.23	0.053 J	0.65 J				NA		NA	
Benzene	0.053	0.11	0.14				NA		NA	
Tetrachloroethane		0.094	0.12				NA		NA	
Toluene	0.93	15.1 J	18.9 J	2.45			NA		NA	
Ethyl benzene	0.098	0.34	0.34				NA		NA	
Total Xylenes	0.63	2.28	2.08	1.1			NA		NA	
SEMI VOLATILES										
Naphthalene	0.23 J	0.25 J	0.41 J	0.44			NA		NA	
2-Methylnaphthalene	0.2 J	0.24 J	0.41 J	0.14 J			NA		NA	
Phenanthrene	0.63		0.24 J	2.2		0.8	NA		NA	
Anthracene				0.56			NA		NA	
Fluoranthene	0.62			7.34	0.37 J	1.33	NA		NA	
Pyrene	0.80			7.43		0.78	NA		NA	
Benzo (a) Anthracene				3.32		0.28 J	NA		NA	
Bis (2-Ethylhexyl) Phthalate	2.18 B						NA		NA	2.350 B
Chrysene	1.01 J			10.74 J	0.26 J	1.92 J	NA		NA	
Benzo (b) Fluoranthene				7.72 J		1.06	NA		NA	
Benzo (k) Fluoranthene	0.25 J					0.54	NA		NA	
Benzo (a) Pyrene	0.38 J			5.93	0.22 J	1.16 J	NA		NA	
Total Phenols	0.0006	0.00055	0.00045	0.0005			NA		NA	
PESTICIDES/PCBS										
Arochlor 1248		0.023	0.056			0.022				
Arochlor 1254					2.1					

Qualifier Codes

J = Indicates an estimated value. This flag is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed or when the mass spectral data indicated the presence of a compound that meets the identification criteria but the result is < the specified limit but > zero or when a concentration is determined to be an estimate due to a quality control criteria.

B = This result is of questionable qualitative significance since this compound was detected in a blank at a similar concentration.

NA = Not analyzed

Blank = Analyzed for but not detected

TABLE 6-3
SUMMARY OF SOIL ANALYTICAL RESULTS
TENTATIVELY IDENTIFIED COMPOUNDS
(ALL CONCENTRATIONS IN PARTS PER MILLION)

Sample Identification	SS-1	SS-2		SS-3	SS-4	SS-5	RR-1	RR-2	RR-3	BG
1-Ethyl-2-Methyl Benzene	0.33 J	0.2 J		3.67 J			NA		NA	
1,3,5-Trimethyl Benzene	0.31 J		0.33 J	1.78 J			NA		NA	
1,2,4-Trimethyl Benzene	0.82 J	0.28 J		4.68 J			NA		NA	
Decane	0.13 J		0.11 J	1.7 J			NA		NA	
1-Ethyl-3-Methylbenzene	0.370 J		0.17 J	1.62 J			NA		NA	
1,8-Dimethylnaphthalene		0.23 J	0.36 J	0.17 J			NA		NA	
2,5-bis (1,1-dimethylpropyl) -2,5-Cyclo-hexadiene-1,4-dione		0.71 J	0.33 J				NA		NA	
2,7,10-Trimethyl dodecane			0.13 J	0.26 J		1.6 J	NA		NA	
1-Hexadecane			0.41 J				NA		NA	
Heptadecane				0.085 J			NA		NA	
11-Tricosene			0.41 J	0.06 J			NA		NA	
Hexadecene	2.08 J			0.17 J			NA		NA	
Heptacosane	2.03 J						NA		NA	
Pentacosane	0.58 J			0.29 J			NA		NA	
Hexatriacontane	1.69 J			0.16 J			NA		NA	
Octacosane	1.19 J						NA		NA	
Benzo (J) Fluoranthene				13.8 J		1.21 J	NA		NA	

Qualifier Codes
J = Indicates an estimated value. This flag is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed or when the mass spectral data indicated the presence of a compound that meets the identification criteria but the result is < the specified limit but > zero or when a concentration is determined to be an estimate due to a quality control criteria.
B = This result is of questionable qualitative significance since this compound was detected in a blank at a similar concentration.
NA = Not analyzed
Blank = Analyzed for but not detected

Semi Volatile and Tentatively Identified Compounds

The distribution of the semivolatiles and the TICs (primarily base neutrals) differs from the volatiles. The semivolatiles and TICs are present in greatest concentrations in samples SS-3, SS-1 and SS-5 samples. The combined total concentration of semivolatiles and TICs in these samples ranged from 74.27 ppm in sample SS-3 to 15.83 ppm in sample SS-1. Minor concentrations of semivolatiles and TICs were also detected in Samples SS-2 and SS-4. Trace concentrations of a base neutral compound of questionable quantitative significant was detected in the background sample (see QA\QC review). The semivolatiles present are all coal tar derivatives that are likely related to the flyash that was spread across the site and mixed with the iron slag. This explains why these compounds are not restricted to the industrial fill deposits.

Inorganics

The inorganic data indicates that concentrations of arsenic, barium, chromium, copper, lead, silver, vanadium and zinc are present in the soils. The background sample contained concentrations of these same heavy metals. The presence of the metals in the background sample is consistent with the sample being obtained from fill deposits similar to those spread across the site. Based on visual examination, these fill deposits also exist on the Niagara Mohawk Property to the north of the site.

The greatest concentrations of heavy metals were detected in Samples SS-2 and SS-3. Samples SS-2 an SS-3 are associated with the industrial fill deposits. SS-4 has metals present at concentrations slightly above background. Samples SS-1 and SS-5 had concentrations similar to the background sample. Based on this data, the concentrations of metals appear to be associated with the industrial fill deposits.

PCBs

PCBs were detected in composite Samples SS-2, SS-4 and SS-5. No PCBs were detected in SS-1, SS-3 and the background sample. PCB arochlor 1248 was detected in trace concentrations in Samples SS-2 and SS-5. PCB arochlor 1254 was detected in low concentrations in sample SS-4 (2.1 ppm). This result was problematic because composite soil Sample SS-4 was otherwise uncontaminated and is not associated with the industrial fill deposits. To determine the source area for the arochlor 1254 detected in SS-4, the individual samples that comprised this composite soil sample were analyzed. The soil sample from test pit 36 was found to have a combined total of 16.4 ppm of arochlor 1254 and 1248. Analytically these two arochlors are very similar. The remaining samples had no detectable concentrations of PCBs. Therefore, the PCBs detected in composite sample SS-4 are restricted to test pit 36.

6.1.2 Railroad Samples

The railroad was found not to be a source of soils contamination at the site. Analytical results of soil samples collected along the railroad RR-1 RR-2 and RR-3 did not reveal the presence of any organics. The inorganics detected in the soil samples were the same as background concentrations.

6.1.3 Pond Sediment Samples

Sediments in the pond in close proximity to the industrial fill deposits contained volatile and semivolatile organics, although different from those in the fill deposits

(Table 6-4). The concentrations of compounds detected was significantly less than observed in the industrial waste fill deposits. Volatile organics, including tentatively identified volatiles, totaled 0.18 ppm. The semivolatiles total 1.23 ppm. The only inorganic present in concentrations that exceed the background sample is silver at 3.9 ppm; however, this result is of questionable qualitative significance because it was also present in a blank at similar concentrations.

6.2 Ground Water Quality

In this section, ground water quality data from this site is compared to New York State drinking water standards and guidelines (Table 6-5). The majority of the water samples collected from the monitoring wells met these criteria. The distribution of ground water impacts at the site is consistent with the industrial fill deposits.

Fill Area Wells

Monitoring well MW-1 was installed in the industrial fill deposits. This well contains a free phase substance that has the consistancy of rubber cement. Water obtained from this well

TABLE 6-4
SUMMARY OF SEDIMENT SAMPLE (SED-1)
ANALYTICAL RESULTS
JANUARY 18, 1988
(ALL RESULTS IN PARTS PER MILLION)

Inorganics	
Aluminum	5,070
Barium	45
Calcium	1,940
Chromium	6.7
Copper	16
Iron	12,140
Lead	13
Magnesium	2,020
Manganese	171
Mercury	0.33 B
Nickel	13
Silver	3.9 B
Vandium	52
Zinc	57

Volatile Organics	
2-Hexanone	0.026 S
Acetone	0.096 B

Semi-Volatiles	
Bis (2-ethylhexyl) Phthalate	0.65 B

Tentatively Identified Compounds

Volatiles	
1-propanol	0.058 S

Semi-Volatiles	
1,2,4-Trimethylbenzene	0.25 J
2,6,10-Trimethylpentadecane	0.33 J

J = This result should be considered a quantitative estimate.
S = This result is qualitatively suspect - see quality assurance.
B = This result is of questionable qualitative significance since this constituent was detected in the laboratory blank at similar levels.

TABLE 6-5
NEW YORK STATE DRINKING WATER STANDARDS AND GUIDELINES

Containment Metals	Unit	NYSDOH Part 5	NYSDOH Guidelines
Antimony	mg/l	---	---
Arsenic	mg/l	0.05	---
Barium	mg/l	1	---
Cadmium	mg/l	0.01	---
Chromium (Cr^{+6})	mg/l	0.05	---
Copper	mg/l	1	---
Iron	mg/l	0.03[1]	---
Lead	mg/l	0.05	---
Manganese	mg/l	0.3[1]	---
Mercury	mg/l	0.002	---
Selenium	mg/l	0.01	---
Silver	mg/l	0.5	---
Sodium	mg/l	---	---
Zinc	mg/l	5	---
Non-Metals			
Cyanide	mg/l	---	---
Chloride	mg/l	250	---
Fluoride	mg/l	2.2	---
Nitrate	mg/l	10	---
Sulfate	mg/l	250	---
TDS	mg/l	---	---
Solvents & Degreasers			
Benzene	ug/l	---	5
Toluene	ug/l	---	50/100[2]
Xylene	ug/l	---	50/100[2]
1,1,1 Trichloroethane	ug/l	---	50/100[2]
Trichloroethylene	ug/l	---	50/100[2]
Tetrachloroethylene	ug/l	---	50/100[2]
Carbon Tetrachloride	ug/l	---	50/100[2]

[1] - Combined concentration of Iron and Manganese shall not exceed 0.5 mg/l.

[2] - 50 ug/l individually or 100 ug/l combined total of all compounds so designated in the Guidelines

contained concentrations of volatiles, semi volatiles and heavy metals (Tables 6-6, 6-7 and 6-8). The observed concentrations of these substances in ground water is influenced by sampling interferences due to the presence of the free phase liquid. Therefore, the concentrations of the compounds in the ground water are not an accurate measure of ground water quality at that location. Actual ground water concentrations are likely to be lower than observed.

The concentration of organics in the remaining monitoring wells at the site are very low to nonexistent. First round sample results from the upgradient monitoring well MW-4 (which is screened deep into bedrock) contained low concentrations of two volatile compounds, 4-methyl-2-Penatanone and toluene. Upon resampling, these were not detected. However, a different compound, 2-Hexanone, was found at low concentrations but was flagged as suspect and is probably not present (see QA/QC review). The first round water sample results contained cadmium above the drinking water standard. In subsequent resampling for cadmium it was found present but below drinking water standards as was chromium.

Well MW-2 meets drinking water standards for organics. Methylene chloride was detected in the first round water sample,

TABLE 6-6
SUMMARY OF MONITORING WELL ANALYTICAL RESULTS
INORGANICS
(ALL CONCENTRATIONS IN PARTS PER MILLION)

Monitoring Well Desigation	MW-1	MW-2				MW-3				MW-4				MW-5	MW-6		MW-7	MW-8
Sample Date	10/22/87	10/22/87	1/18/88			10/22/87	1/18/88			10/22/87	1/18/88			1/18/88	1/18/88		1/18/88	1/18/88
Comment	Free Phase Present			Lab Filtered	Adirondack			Lab Filtered	Adirondack			Lab Filtered	Adirondack			Duplicate		
Aluminum	14.130	156.9	NA	NA	NA	13.9	NA	NA	NA	1.885	NA	NA	NA	1.21	11.3	9.21	12.1	4.07
Arsenic			NA	NA	NA		NA	NA	NA		NA	NA	NA		0.035	0.027	0.037	
Barium	0.564	5.195	NA	NA	NA	0.745	NA	NA	NA	0.285	NA	NA	NA	0.402	1.3	1.41	0.638	0.231
Beryllium	0.007	0.024	NA	NA	NA		NA	NA	NA		NA	NA	NA					
Cadmium	0.021 B	0.0218			0.001	0.012 B			0.002	0.019 B			0.002		0.01			
Calcium	127.0	42.4	NA	NA	NA	15.7	NA	NA	NA	67.2	NA	NA	NA	31.9	172.1	179.0	119.5	122.7
Chromium	0.095	0.356	0.013		0.078				0.03			0.013	0.008 B		0.039	0.013		
Cobalt	0.313	0.778	NA	NA	NA	0.113 B	NA	NA	NA	0.035 B	NA	NA	NA		0.052		0.053	
Copper	0.131	0.409	NA	NA	NA	0.059	NA	NA	NA		NA	NA	NA	0.055	0.275	0.222	0.406	0.1
Iron	161.54	379.3	NA	NA	NA	40.3	NA	NA	NA	4.683	NA	NA	NA	2.54	36.9	27.0	36.9	28.5
Lead	0.423	0.665			0.03	0.227 B			0.04	0.03 B					0.23	0.17	0.19	0.17
Magnesium	50.97	82.8	NA	NA	NA	7.55	NA	NA	NA	22.2	NA	NA	NA	10.8	105.2	108.9	35.6	31.9
Manganese	1.305	4.61	NA	NA	NA	0.559	NA	NA	NA	0.602	NA	NA	NA	0.427	9.69	9.06	2.94	2.12
Mercury	0.0009	0.001	NA	NA	NA		NA	NA	NA		NA	NA	NA		0.0007	0.0005	0.0011	0.0007
Nickel	0.098	0.494	NA	NA	NA	0.262	NA	NA	NA		NA	NA	NA		0.136	0.141	0.058	
Potassium	108.2	17.2	NA	NA	NA	7.62	NA	NA	NA	4.261	NA	NA	NA	5.06	5.06	5.32		6.56
Silver		0.01	NA	NA	NA		NA	NA	NA		NA	NA	NA		0.015 B	0.011 B	0.015 B	0.015 B
Sodium	174.5	376.9	NA	NA	NA	480.7	NA	NA	NA	48.066	NA	NA	NA	60.0	127.0	124.7	47.6	19.8
Vanadium	0.06	0.335	NA	NA	NA		NA	NA	NA		NA	NA	NA		0.076	0.069	0.066	
Zinc	54.277	0.845	NA	NA	NA	0.156	NA	NA	NA	0.032	NA	NA	NA	0.065	0.55	0.446	0.246	0.158

Qualifier Codes
B = This result is of questionable qualitative significance since this compound was detected in a blank at a similar concentration.
NA = Not analyzed
Blank = Analyzed for but not detected

TABLE 6-7
SUMMARY OF MONITORING WELL
ANALYTICAL RESULTS ORGANICS
(ALL CONCENTRATIONS IN PARTS PER MILLION)

MONITORING WELL DESIGNATION	MW-1	MW-2			MW-3			MW-4			MW-5	MW-6		MW-7	MW-8
SAMPLE DATE	10/22/87	10/22/87	1/18/88		10/22/87	1/18/88		10/22/87	1/18/88		1/18/88	1/18/88	1/18/88	1/18/88	1/18/88
COMMENT	Free Phase Present			Filtered			Filtered			Filtered			Duplicate		
VOLATILES															
Methylene Chloride	0.083	0.022 B													
Acetone	11.1 J				0.86 J										
Carbon Disulfide	0.049														
2-Butanone	74.1 J														
1,2-Dichloropropane	0.031														
Benzene	3.36 J														
4-Methyl-2-Pentanone	60.6 J							0.014			0.0064 S				
2-Hexanone	0.1								0.012 S		0.015 S				
Toluene	150.0 J							0.046							
Ethyl Benzene	1.24 J														
Total Xylenes	4.54 J														
SEMI VOLATILES															
Phenol	4.25*														
2-Methylphenol	0.054*														
4-Methylphenol	0.14*														
2,4-Dimethylphenol	0.008 J*														
Benzoic Acid	0.035*														
Bis (2-ethyl hexyl) phthalate											0.015 B	0.005 B	0.014 B	0.014 B	0.01 B
Total Phenols	70.0	0.040		NA			NA			NA					

Qualifier Codes
J = Indicates an estimated value.
B = This result is of questionable qualitative significance since this compound was detected in a blank at a similar concentration.
NA = Not analyzed for this compound.
Blank = Analyzed for but not detected
S = This value is qualitatively suspect - see quality assurance review.
* = See quality assurance review

TABLE 6-8
SUMMARY OF MONITORING WELL ANALYTICAL RESULTS
TENTATIVELY IDENTIFIED COMPOUNDS
(ALL CONCENTRATIONS IN PARTS PER MILLION)

Monitoring Well Designation	MW-1	MW-2			MW-3			MW-4			MW-5	MW-6		MW-7	MW-8
Sample Date	10/22/87	10/22/87	1/18/88	1/18/88	10/22/87	1/18/88	1/18/88	10/22/87	1/18/88	1/18/88	1/18/88	1/18/88	1/18/88	1/18/88	1/18/88
Comment	Free Phase Present			Lab Filtered			Lab Filtered			Lab Filtered			Duplicate		
VOLATILES															
Ethanol	1.58 J														
Tetrahydrofuran	1.25 J														
2-Butanol	16.1 J														
Ethylacetate	5.5 J														
Methylcyclohexane	2.2 J														
Butylacetate	0.35 J														
Methylcyclopentane						0.021 JS						0.21 S J	0.094 SJ		0.094 SJ
Unknown RT = 16.91												0.012 J			
Hexane						0.0064 SJ						0.058 JS	0.024 SJ		0.036 SJ
1-Propanol															
SEMI VOLATILES															
A-Dimethylphenol isomer	12.0 J		NA	NA		NA	NA		NA	NA					
3-Ethylphenol	84.0 J		NA	NA		NA	NA		NA	NA					
4-(1,1-Dimethylethyl) phenol	17.0 J		NA	NA		NA	NA		NA	NA					
(1 methylethylidena) Hydrazone -2-Propanone			NA	NA		NA	NA		NA	NA		0.0053 J			0.0089 J

Qualifier Codes
J = Indicates an estimated value
NA = Not analyzed
Blank = Analyzed for but not detected
S = This value is qualitatively suspect - see quality assurance review

but was also present in the lab blank at similar concentrations. Subsequent resampling did not detect concentrations of that compound. Well MW-3 contained acetone at 0.86 ppm in the first sampling round but was not detected in the subsequent sampling. However, two TICs were detected in one of the two samples from well MW-3, however, the results are of questionable quantitative significance. Well MW-3 meets drinking water standards for organics. Well MW-5 meets drinking water standards for organics however, the water sample did contain two compounds of questionable quantitative significance, 4-Methyl-2-pentanone and 2 Hexanone and one semivolatile, bis (2-ethyl hexyl) phthalate that was present in the lab blank.

The first round of inorganics results from the two downgradient bedrock wells MW-2 and MW-3 indicate that the ground water within the bedrock does not meet drinking water standards for cadmium, lead and chromium. Laboratory error was suspected, so the wells were subsequently resampled and a split sample sent to both the original and a second laboratory. The resampling revealed that chromium is the only heavy metal exceeding (marginally) drinking water standards. Other metals of lesser concern (i.e., iron, manganese and sodium) exceed drinking water standards in well MW-5.

Perimeter Wells

The downgradient perimeter overburden wells MW-6 and MW-8 contain concentrations of one target organic compound and several TICs. Well MW-7 contained only one target organic compound. The target compound, Bis (2-ethyl hexyl) phalate was also present in the lab blank and is therefore probably a laboratory induced result. TICs, particularly methlycyclopentane and hexane, are of questionable qualitative significance. An unknown compound with a RT = 16.91 and (1 methylethylidena) hydrazone-2-Propanone are present in wells MW-6 and MW-8; quantification levels, however, could not be verified.

The three perimeter overburden wells contained barium, cadmium and lead in concentrations that exceed drinking water standards. Lead is present in all three wells above drinking water standards. Cadmium and barium are present at or just above the drinking water standard in well MW-6.

The organic and inorganics results from the perimeter overburden wells indicate that ground water in the overburden may have been minimally impacted by the landfill. The concentration of total organics is approximately three orders of magnitude (i.e., one-onethousandth) of the concentration observed in the industrial fill deposits. The number of organics present is also significantly less. Adverse off-site ground water impacts are not anticipated.

6.3 Surface Water Quality

The upstream surface water sample (SW-4) contained 10 metals at similar or higher concentrations than are present in downstream samples SW-1, SW-2 and SW-3 (Table 6-9). Of these metals cadmium, and lead exceeded drinking water standards. The only heavy metal detected in downstream samples SW-1, SW-2 and SW-3 at higher concentrations than the upgradient sample SW-4 was silver. However, the level of silver detected was within the drinking water standards and was present in the lab blank at similar concentrations. The contamination of heavy metals from the landfill is, therefore, not significant.

Organics results indicate that trace concentrations of volatiles are present in down stream samples SW-1, SW-2 and SW-3 (Table 6-10). In the first round of sampling, SW-1 contained three volatile organics that during subsequent sampling were not present. SW-2 contains toluene below drinking water standards. Water sampled at SW-3 which is located in close proximity of the

TABLE 6-9
SUMMARY OF SURFACE WATER ANALYTICAL RESULTS
INORGANICS
(ALL CONCENTRATIONS IN PARTS PER MILLION)

Surface Water Designation	SW-1		SW-2	SW-3	SW-4	
Sample Date	10/22/87	1/18/88	10/22/87	10/22/87	10/22/87	
Comment						Duplicate
Aluminum	0.153		0.252	0.21	2.2	1.72
Barium	0.08			0.05	0.08	0.08
Cadmium	0.009 B		0.017 B	0.009 B	0.026 B	0.019 B
Calcium	104.0	100.8	53.7	73.0	54.4	57.6
Chromium	0.035			0.029		0.035 J
Cobalt						0.038 B
Copper						
Iron	1.5	1.53 J	0.84	0.13	3.4	2.8
Lead	0.227 B		0.136 B	0.151 B	0.091 B	0.272 B
Magnesium	29.7	32.6	16.2	20.7	22.5	22.5
Manganese	1.1	1.23	0.19	0.23	0.46	0.47
Mercury						0.0002 J
Nickel					0.068	0.049
Potassium	4.0		3.14	4.2	1.4	1.33
Silver		0.015 B				
Sodium	44.5	26.9	24.4	32.0	23.0	25.0
Zinc	0.076	0.037	0.146	0.112	0.131	0.187

Qualifier Codes
J = Indicates an estimated value
B = This result is of questionable qualitative significance since this compound was detected in a blank at a similar concentration.
NA = Not analyzed
Blank = Analyzed for but not detected

TABLE 6-10
SUMMARY OF SURFACE WATER ANALYTICAL RESULTS
ORGANICS
(ALL CONCENTRATIONS IN PARTS PER MILLION)

Surface Water Designation	SW-1		SW-2	SW-3	SW-4	
Sample Date	10/22/87	1/18/88	10/22/87	10/22/87	10/22/87	
Comment						Duplicate
VOLATILES						
Methylene Chloride	0.0082 B					0.0057 B
Acetone				0.051		
2-Butanone				0.35 J		
Trichloroethene	0.0092*					
Benzene						
4-Methyl-2-Pentanone				0.16		
Tetrachloroethene	0.0025 J*					
Toluene			0.0011 B	0.04		
Total Phenol			0.016	0.016		
TENTATIVELY IDENTIFIED						
Bis(2-ethylhexyl)Phthalate		0.019B				0.0057 B

Qualifier Codes
J = Indicates an estimated value
NA = Not analyzed
Blank = Analyzed for but not detected
S = This value is qualitatively suspect - see quality assurance review
* = See quality assurance review

fill deposits had concentrations of the same volatile organics detected in the fill deposits and the sediment of the pond.

Surface water quality in general varies widely with flow and therefore, these results are only preliminary indicators of water quality impact. The presence of heavy metal concentrations in the upstream sample is to be expected because the stream is ground water fed upstream of the site from fill deposits similar to those present at the landfill. The preliminary sampling indicates that surface water impacts due to fill deposits at the site are minimal. Results from locations at the sites downstream boundaries, indicates that surface water leaving the site meets drinking water standards for organics. Both upstream and downstream samples exceed drinking water standards for lead and cadmium. The downstream concentration of these metals was lower than upstream values, suggesting that the contribution from the landfill, if any, is minimal.

7.0 HAZARDOUS RANKING SYSTEM SCORE

The Hazardous Ranking System (HRS) (40 CFR 300 [Appendix A]; 47 FR 31203, July 16, 1982; amended by 48 FR 40669, September 8, 1983) is intended for use in evaluating the relative potential of uncontrolled hazardous substance facilities to cause health or safety problems, or ecological or environmental damage. It is the intent that uniform application of the HRS in each state would permit the EPA to identify those releases of hazardous substances that pose the greatest hazards to humans or the environment. The HRS is a means of applying uniform technical judgement regarding the potential hazards presented by the facility relative to other facilities.

The HRS assigns three scores to a hazardous facility:

- S_m reflects the potential for harm to humans or the environment from migration of hazardous substances away from the facility by routes involving ground water, surface water or air. It is a composite of separate scores for each of the three routes.

- S_{fe} reflects the potential for harm from substances that can explode or cause fires.

- S_{dc} reflects the potential for harm from direct contact with hazardous substances at the facility (i.e., no direct migration required)

The score for each mode (migration, fire and explosion and direct contact) is obtained by considering a set of factors that characterize the potential of the facility to cause harm. Each factor is assigned a numerical value according to prescribed guidelines. This value is then multiplied by a weighting factor to yield the factor score. The factor scores are then combined: scores within a factor category are added; then the total scores for each category are multiplied together to develop a score for ground water, surface water, air, fire and explosion, and direct contact.

In computing S_{fe} or S_{dc}, or an individual migration route score, the product of its factor category is divided by the maximum possible score, and the resulting ratio is then multiplied by 100. The last step puts all scores on a scale of 0 to 100.

S_m is a composite of the scores for the three possible migration routes:

$$S_m = 1/1.73 \sqrt{S_{gw} + S_{sw} + S_a}$$

where:

S_{gw} = Ground water route score
S_{sw} = Surface water route score
S_a = Air route score

The effect of this means of combining the route scores is to emphasize the primary (highest scoring) route in aggregating route scores while giving some additional consideration to the secondary or tertiary routes if they score high. The factor 1/1.73 is used simply for the purpose of reducing S_m scores to a 100-point scale.

The ranking of facilities nationally for remedial action is based primarily on S_m. S_{fe} and S_{dc} may be used to identify facilities requiring emergency attention.

The worksheets used to arrive at the various scores for the Norton landfill are presented in Appendix F.

The hazardous ranking score was determined as follows:

Migration S_m:

Ground Water Route:

1) Observed release: Score = 45 - Analytical data from monitoring wells is a direct evidence of a release;

2) Route Characteristics - N/A;

3) Containment - N/A;

4) Waste Characteristics: Score = 20 - The most persistent and toxic material, scores 18. The quantity of waste disposed of at the site is unknown; however, the number of drums encountered during excavation was greater than 41, but less that 250, therefore score 2.

5) Targets: Score = 3 - The ground water aquifer underlaying site is not used for water supply, but may be usable, score = 1 (3x multiplier). The bedrock aquifer under the site is not tapped by public water supplies within a three mile radius; however, the

overburden deposits are. The Green Island well taps sediments under the Hudson River. It is highly unlikely that these sediments are in hydraulic communication with the overburden deposits at the site. There are two potential discontinuities and/or ground water discharge zones in the overburden aquifer between the site and the Green Island well. The first one is a tributary stream to the Hudson and the second is the Hudson River. In between the tributary stream and the Hudson is a peninsula that may also contain a ground water divide. The ability of a particle of ground water leaving the site to pass under the tributary stream across a ground water divide and then under the Hudson River and into the Green Island well is highly unlikely, the Score = 0.

Surface Water Route S_{SW}

1) Observed Release: Score = 45 - Analytical data from surface water samples is direct evidence of a release.

2) Route Characteristics - N\A.

3) Containment - N\A.

4) Waste characteristics: Score = 20 - Same as ground water.

5) Targets: Score = 8 - Use of surface water is recreation, score 2 (3x multiplier). The distance to sensitive environment which is a fresh water wetland exceeding 5 acres is one mile, score 2.

Air Route S_a

1) Observed Release: Score = 0 - No release observed.

2, 3, 4, 5) N\A.

Fire and Explosion Hazard

Not applicable

Direct Contact

1) Observed Incident: Score = 0 - No such instance.

2) Accessability: Score = 0 - Completely fenced.

3) Containment: Score = 15 - contaminants at surface, score 3 (5x multiplier).

4) Waste Characteristics, Toxicity: Score = 3 - PCBs present.

5) Targets: Score = 16 - Population within one mile radius is greater than 1000 people, score 4 (4x multiplier). No critical habitats within one mile, score = 0.

The NYSDEC ranked the site an S_m score of 14.8. The current score is 7.02. This score is below the 28.5 threshold that would qualify a site as a candidate for the NPL.

The site scored 16.66 direct contact, S_{dc}. This is a low score and as long as access to the site is minimized a problem at the site does not exist.