

Town of Hempstead

Department

of

Sanitation

1600 MERRICK ROAD, MERRICK, N.Y. 11566
(516) 378-4210



JAMES H. HEIL, P.E.
Commissioner

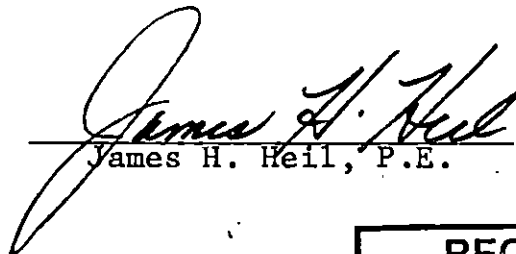
March 1, 1988

To: Distribution List

Re: Inactive Hazardous Waste Disposal Site
Merrick Landfill, Nassau (C)
Index #W1-0931-85-12

In accordance with Section VI of the referenced Order on Consent, the Town herewith submits two (2) copies of the Draft Town of Hempstead Merrick Landfill Field Investigation Report.

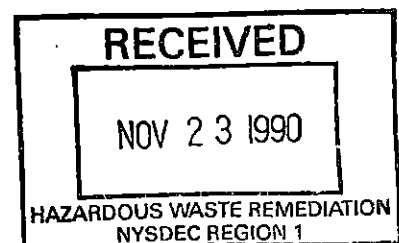
The Town will issue a Final Report upon receipt of comments by the review agencies.


James H. Heil, P.E.

JHH:BJ

Atts:

cc: W. Kenneth Chave, Jr. - Town Attorney
Eugene Ferencik - Deputy Town Attorney



Town of Hempstead

Department
of
Sanitation



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Receiver of Taxes

1600 MERRICK ROAD, MERRICK, N.Y. 11566
(516) 378-4210

JAMES H. HEIL, P.E.
Commissioner

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Distribution List

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50 Wolf Road - Room 209
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202 Mamaroneck Avenue - Room 304
White Plains, New York 10601-5381

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Regional Director, Region I
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New York State Department of Health
Empire State Plaza
Albany, New York 12237

Phase II Investigation

Merrick Landfill Town of Hempstead Nassau County, New York

Prepared for:

**Town of Hempstead
Department of Sanitation**

Velzy ASSOCIATES

Charles R Velzy Associates, Inc.

A wholly owned subsidiary of Roy F. Weston, Inc.
Armonk, New York
Buffalo, New York
Carle Place, Long Island, New York
York, Pennsylvania

Phase II Investigation

Merrick Landfill Town of Hempstead Nassau County, New York

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EXECUTIVE SUMMARY

The Merrick Landfill is located in the Town of Hempstead, Nassau County, New York (Figure 1) in a generally residential and commercial area. The facility operated at the 1600 Merrick Road site from 1950 until 1984. Before this time the site was reportedly used by local residents as an open dump.

The site is an inactive municipal landfill, which was closed in 1984. The total acreage of the site is 82 acres, of which the southern 42 acres comprise the actual landfill, and the northern area is utilized by the Town of Hempstead for administration buildings, roadways, parking areas, an inactive incinerator complex, abandoned ash lagoons, and an active refuse transfer station.

The Phase II Investigation involved the following: collection and review of existing data; installation and sampling of monitoring wells; ash and sediment sampling; preparation of a Hazard Ranking Score (HRS) and documentation for the site; and preparation of a summary report.

Results of boring for well installations confirmed at multiple locations the existence of the "twenty foot clay" layer generally thought to separate the Upper Glacial Aquifer from the aquifer of drinking water concern, the Magothy.

Results of groundwater analyses showed that bay water has intruded beneath the site making that portion of the Upper Glacial Aquifer unsuitable as potable water. The levels of

heavy metals in groundwater sampled from beneath the site were generally low. Mercury, nickel, selenium and vanadium were reported at one or two locations at low, but greater than background, levels.

Eleven organic contaminants were identified but of these only two, chlorobenzene and bis (2-ethylhexyl) phthalate were reported above their Contract Laboratory Program (CLP) detection limits. The contaminant of greatest concentration in groundwater was bis (2-ethylhexyl) phthalate, a plasticizer. Pthlates can be bio-accumulated by aquatic organisms and have been implicated in the reduced reproductive success of these organisms. Groundwater may be a pathway for phthalate movement from landfill to bay.

Soil samples taken from the area of the ash and lagoons for the incinerator show elevated levels of heavy metals. The average concentration of lead, cadmium and total chromium were 414.7, 9.1 and 8.0 parts per million. Analysis of sediments from the creek into which ash lagoons previously discharged shows that some heavy metal enrichment has occurred. Samples from the head of the creek contained mercury at 0.46 ppm and beryllium at 1.0 ppm, but these were below detection levels in sediments taken from the mouth of the creek (Meadow Brook). The head of the tidal creek is upgradient of the landfill.

The Phase I Report (1985) stated that surface leachate had been observed at the site however, no leachate was visible during the Phase II effort. Nevertheless, surface water is considered a contaminant pathway of concern because of the

adjacent Merrick Bay. Groundwater is identified as a contaminant pathway of moderate concern. Air does not appear to be a significant contaminant pathway.

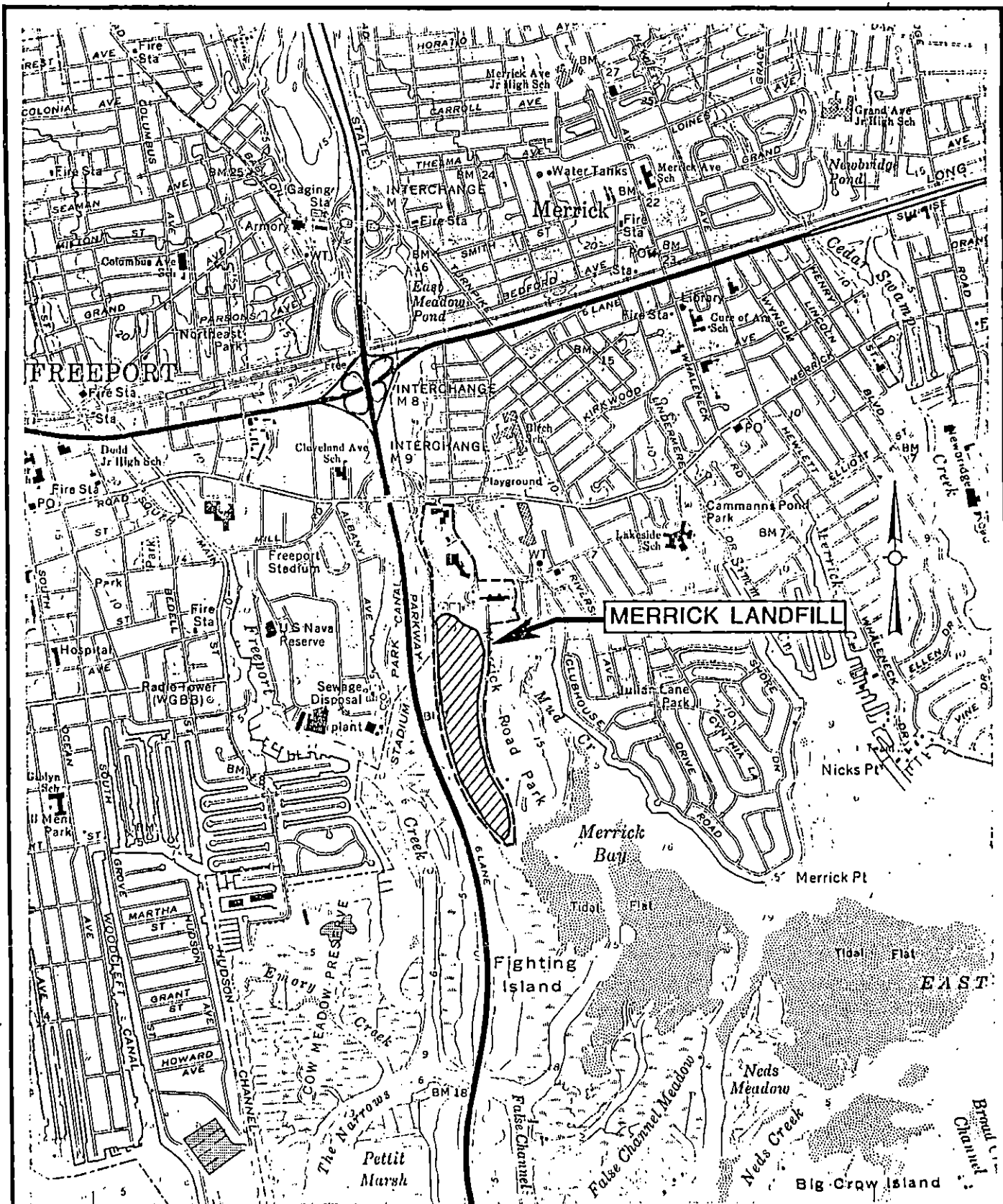
The HRS scores developed for the Merrick Landfill are as follows:

$$S_M = 14.10 \quad (S_{gw} = 18.46 \quad S_{sw} = 15.94 \quad S_a = 0)$$

$$S_{FE} = 0$$

$$S_{DC} = 0$$

These scores are indicative of overall low migration potential. From these HRS scores and the supporting data, it is concluded that the Merrick Landfill is not presently a significant contributor to air, groundwater or surface water contaminant pathways. The levels of contaminants present in groundwaters beneath the landfill are such as would be controlled through the use of normal landfill closure methods.



MAP SOURCE: U.S.G.S. 7.5 MINUTE SERIES FREEPORT, NEW YORK, QUADRANGLE, 1979
 COORDINATES: LAT. $-40^{\circ}38'08''$, LONG. $-73^{\circ}33'47''$ ----- FACILITY BOUNDARIES

**MERRICK LANDFILL
 PHASE II INVESTIGATION**



**FIGURE 1
 SITE LOCATION MAP**
Velzy ASSOCIATES

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SECTION I - INTRODUCTION

The Phase II investigation was initiated at the Merrick Landfill in Nassau County, New York, in response to an Order on Consent to the Town of Hempstead from the New York State Department of Environmental Conservation (DEC) (Order on Consent Index # W1-0931-85-12).

The purpose of the Phase II investigation is to determine whether hazardous wastes are being released from the Merrick Landfill into the groundwater, surface water and air around the site, and if so, whether there is a public health risk or environmental impact.

SECTION 2.0 - SITE HISTORY

The Merrick Landfill encompasses a total area of about 82 acres. The landfill is located on the south shore of Nassau County, and is bounded to the south by Merrick Bay, to the north by administrative buildings and Merrick Road, to the east by Merrick Road Park and Mud Creek, and to the west by a narrow tidal creek. This overall site is comprised of three major use areas including:

o	Town of Hempstead Offices	21.0 acres
o	Incinerator site	18.7 acres
o	Landfill site	42.5 acres
Total Area		82.2 acres

The current landfill area is approximately 3500 feet long, 300 feet wide at the south end, 800 feet wide at the north end, and ranges in height between 0 feet and 125 feet above mean sea level (MSL).

The landfill site is a filled wetland area with elevations ranging from sea level to 125 feet at the top. Side slopes are very steep, exceeding 50% in many areas. The site contains an estimated 3.8 million cubic yards of municipal solid waste. The site perimeter is either fenced or adjacent

to open water. As such, access to the landfill is restricted.

The Merrick Landfill has been in operation since 1950, originally serving as a disposal site for incinerator residue. The incinerator has not been in use since 1980. In more recent years, typical municipal solid waste, i.e., garbage, rubbish, demolition debris, street sweeping and landscaping waste have been received in the landfill. Based upon records available for 1979 through 1981, the incoming percentage of the five waste categories listed above were: garbage 78%, rubbish 14 1/2%, demolition debris (negligible), street sweepings 1 1/2% and landscaping 6%. During this period the landfill was receiving approximately 15,100 tons per month of solid waste. Between July 1983 and its closure in 1984, the landfill received only residential refuse. Refuse disposal into the Merrick Landfill was discontinued in March 1984.

There are no records that indicate that the Merrick Landfill site has ever been used for the disposal of sewage sludge, industrial sludge, hazardous/toxic materials or related materials.

Topographic maps developed from aerial photography have been prepared for the site in the years 1979, 1981 and 1984. Based on these surveys the volume of waste material in the landfill is computed to be about 3,800,000 cubic yards (CY).

The landfill density assumed for compacted refuse in the landfill is 1,000 lb/CY, which includes an allowance for

cover material (20 to 25% by volume) incorporated in the waste. Using this density the final in-place tonnage at the Merrick landfill is approximately 1,900,000 tons.

The Town of Hempstead has an ongoing contract with Browning-Ferris Industries, Inc. (BFI), of Kenmore, New York for hauling approximately 208,000 tons per year of refuse for disposal at a private landfill in Goshen, Orange County, New York. As part of this operation a portion of the Merrick incinerator facility has been converted, by BFI, into a refuse transfer station. A permanent transfer station was constructed at the Merrick site in 1987.

2.1 Land Use and Water Supply

Land use in the vicinity of the landfill includes park land, commercial properties, residential dwellings, and the Meadowbrook Parkway Right-of-Way. The building nearest to the landfill is the new transfer station on the north end of the landfill property. (Figure 3-1). The Town of Hempstead Department of Sanitation Administration Building is about 1,100 feet away.

The area surrounding the landfill utilizes municipal water supply wells for potable drinking water supplies. The nearest municipal wells are the Village of Freeport's and New York Water Service's Well Fields, which are approximately one (1) to two (2) miles north of the landfill. The well nearest to the landfill is a golf course irrigation well at Merrick Road Park, and is about 300 feet east of the

northern part of the landfill. All of these wells draw water from the Magothy Aquifer.

2.2 Sensitive Environments

Two environmentally sensitive areas have been identified adjacent or near the Merrick Landfill. These areas are Merrick Bay and the estuarine wetlands that are found throughout the bay areas south of the landfill.

The surface waters adjacent to the Merrick Landfill (Merrick Bay) have been designated as "Class AA - Special" by DEC. "Class AA - Special" designation applies to the waters which constitute the Interstate Sanitation District. The best usage of these waters are for secondary contact recreation and any other usage except for primary contact recreation and shellfishing for market purposes.

The estuarine wetlands provide the natural habitat for many marine animals and species of migratory bird life. The wetlands provide these forms of wildlife with food, shelter, and protection from predators. The wetlands also provide a water storage area during times of flooding.

2.3 Hydrology

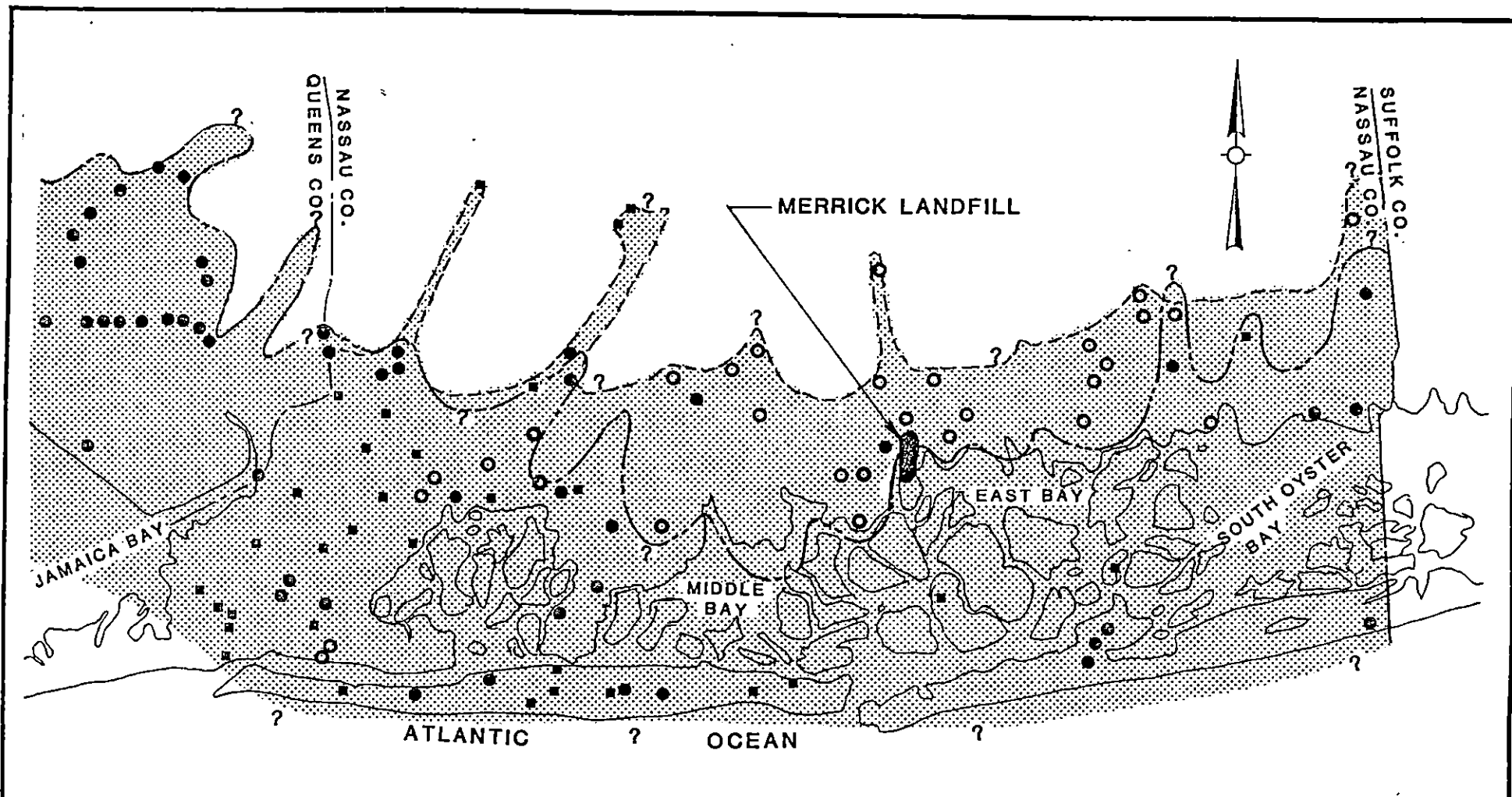
There are three (3) major aquifers underlying the Merrick Landfill area. These are the Upper Glacial Aquifer, the Magothy Aquifer and the Lloyd Aquifer. The Lloyd Aquifer, or more specifically, the Lloyd Sand Member of the Raritan Formation, is approximately 900 feet below land surface in

this area. This aquifer is overlain by an extremely thick and competent clay layer, which is known as the Raritan Clay. The Raritan Clay can be as thick as 300 feet. Because of this confining clay layer, and the fact that no wells are utilizing the aquifer in the area, the Lloyd Aquifer is not an aquifer of concern and will not be discussed in this report.

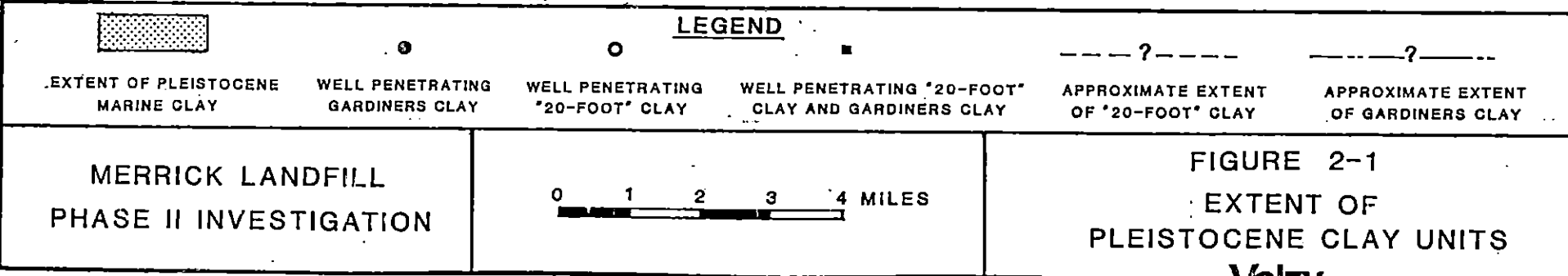
The Upper Glacial Aquifer consists mainly of Pleistocene age glacial outwash materials. Highly permeable outwash deposits of fine to coarse sand and gravel are exposed at the surface and extend to depths between 45 feet and 65 feet. Beneath this outwash a bed of marine clay ("20 foot" clay) forms a barrier between unconfined salty water above confined fresh water below (USGS, 1963).

The Magothy Formation, which underlies these deposits and forms the principal confined freshwater aquifer for the area, contains alternating beds of mixtures of gravel, sand, silt and clay.

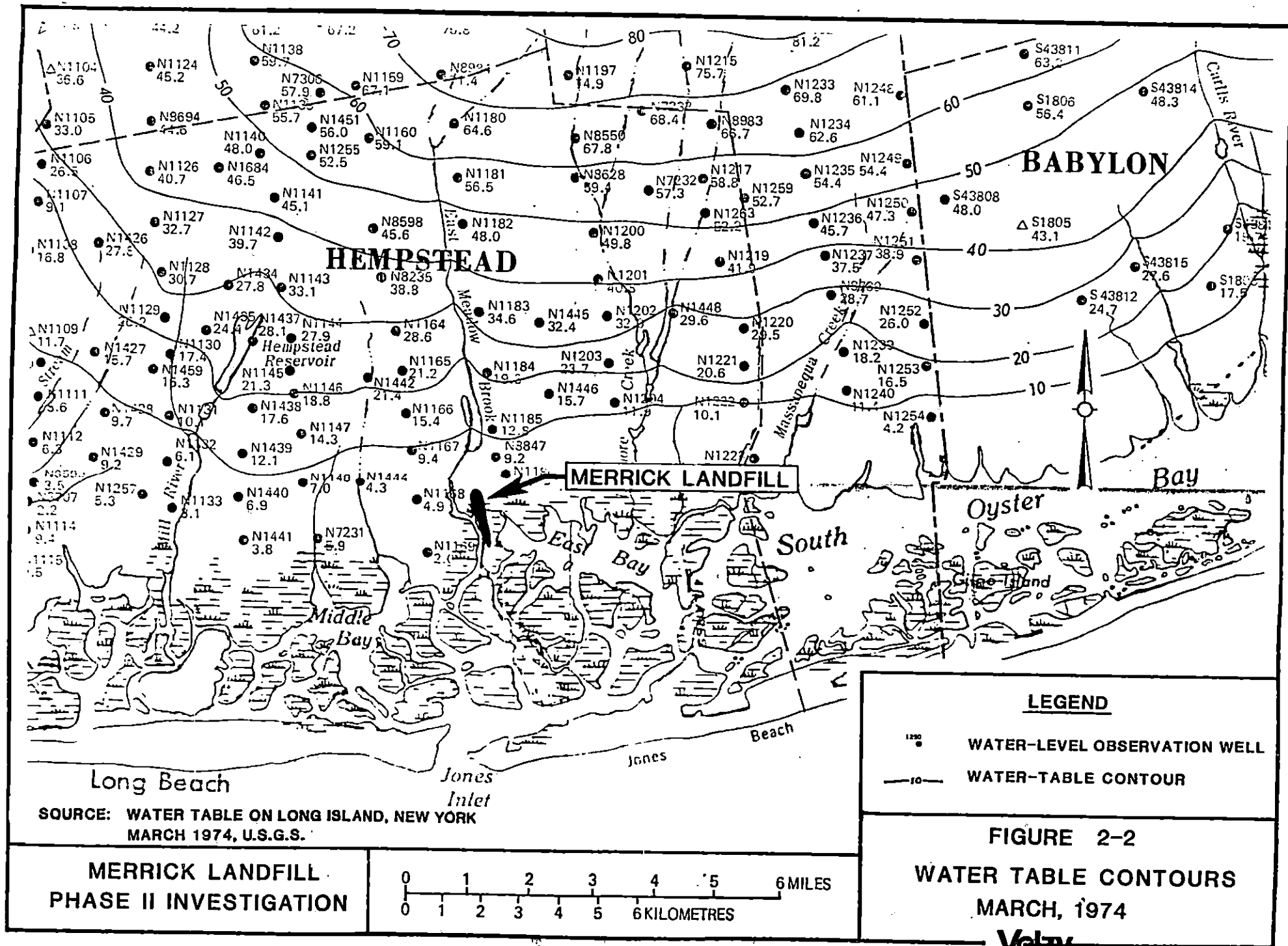
There are about 40 feet of sand and gravel deposits beneath the Merrick Landfill site. The "20 foot" clay is about 18 feet thick below these outwash deposits and acts as a confining bed for the deeper Magothy Formation. This clay also restricts vertical flow between the two aquifers. A second clay unit, the Gardiners clay, may exist beneath the southern half of the site underlying the "20 foot" clay. The extent of the Pleistocene clay units as inferred from well data is presented in Figure 2-1 (USGS).



SOURCE: FIGURE 7, U.S.G.S., 1963 (REDRAWN)



Groundwater flow in the Upper Glacial Aquifer is generally to the south on the southern side of the Long Island groundwater divide, which is located about mid-Island in Nassau County. Water table contours are shown in Figure 2-2. There is a small vertical flow component but the "20 foot" clay retards vertical flow, both up and down. Measured water levels in the shallow and deep wells of paired wells installed and monitored by the USGS show the heads measured in wells completed in the Magothy Formation to be greater than the heads in the unconfined glacial deposits (Geraghty & Miller, 1981). The vertical component of groundwater flow, is therefore, upward, from the Magothy into the Upper Glacial Aquifer.



SECTION 3.0 FIELD INVESTIGATION METHODS

The Merrick Landfill Field Investigation included the following activities: site visits to determine present conditions at the landfill; the placement and installation of fifteen (15) monitoring wells; representative geologic sampling during drilling; sampling and analysis of groundwater samples from each of the monitoring wells; sediment sampling and analysis of sediments at two (2) tidal creek locations adjacent to the landfill; sampling and analysis of ash from the abandoned ash lagoon; and a tidal study.

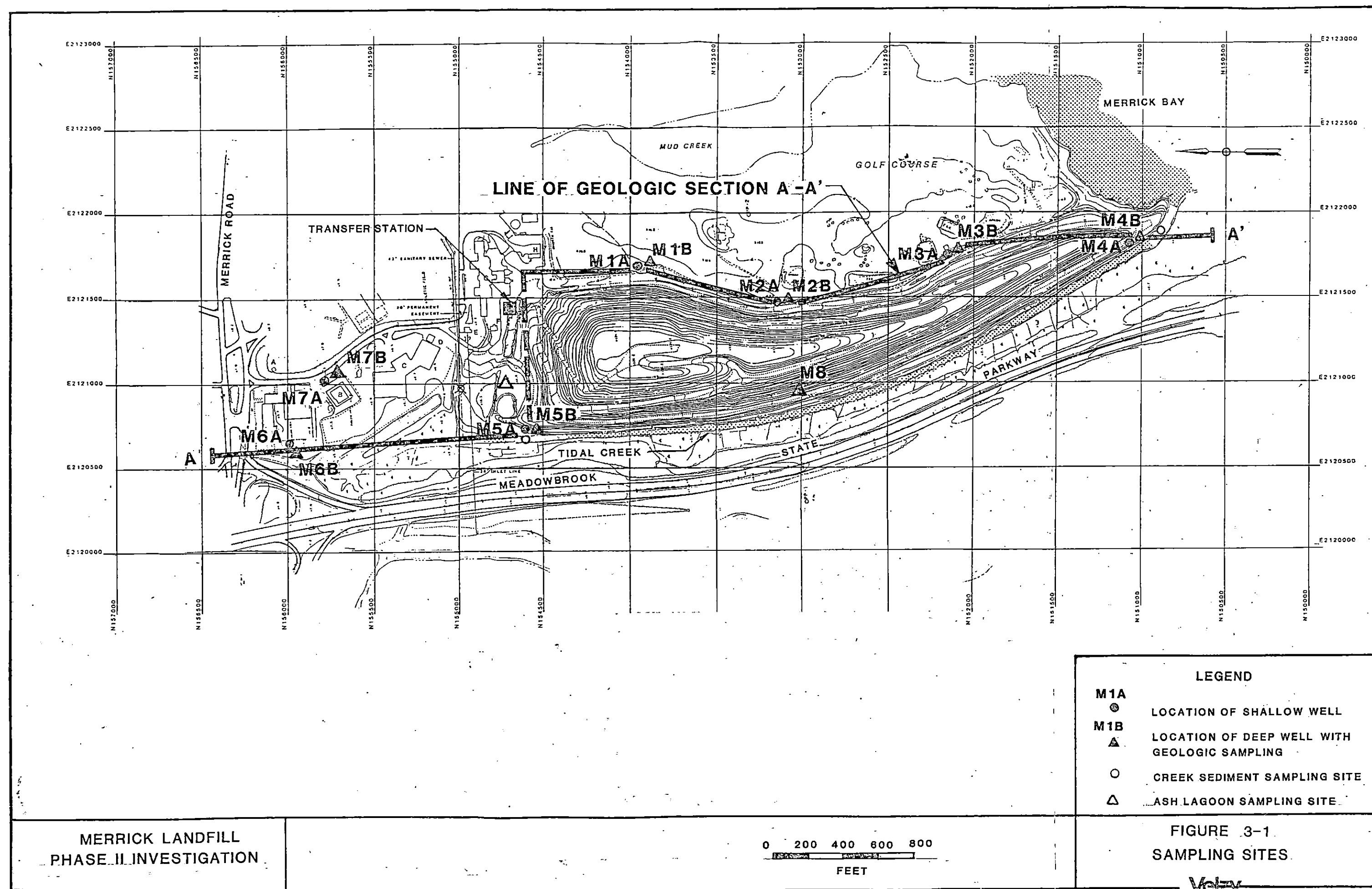
3.1 Geophysical Survey

The Merrick Landfill is located on what was originally a tidal flat, and is adjacent to an estuarine bay and wetland area. The shallow (Upper Glacial) aquifer underlying the landfill is subject to salt water intrusion, with accompanying high total dissolved solids (TDS) levels. These conditions would mimic landfill leachate during a geophysical survey, and would nullify the results of such a survey in identifying contaminant plumes. In addition the landfill contains massive amounts of rubber and discarded solids that might also cause difficulties in data interpretation. As an alternative to geophysical survey, additional monitoring wells were installed to provide representative coverage of the site for groundwater and leachate sampling.

3.2 Monitoring Well Installation

The wells were installed at eight (8) locations on the site for characterization of groundwater conditions (Figure 3-1). These locations were approved by the DEC. Five (5) well clusters (pairs) (M1 through M5) and one (1) single well (M8) were installed around the perimeter of the landfill at downgradient locations, based on the expected radial flow of groundwater away from the landfill. At these locations, drilling was conducted through actual landfilled material. At the direction of the DEC, drilling was not permitted to pass through the confining "20 foot clay" boundary due to the possible creation of a conduit between the Upper Glacial and the Magothy Aquifer. Two (2) well clusters (M6 and M7) were installed at the northern end of the site at upgradient locations. The clusters were screened at two separate depths in the Upper Glacial Aquifer to assess vertical water chemistry profiles and hydraulic gradients.

The shallow downgradient wells ("A" wells), except well M2A, were screened just below the limit of refuse material encountered at these locations. These wells were installed with five (5) foot screens, as compared to the use of ten (10) foot screens at all remaining wells, to maximize the distance between groundwater sampling intervals. Well M2A was screened directly in saturated refuse material to characterize the leachate. Well M8 and the deep upgradient and downgradient wells ("B" wells) were screened directly above the top of the clay unit. Well M7A was screened across the water table and well M6A was screened directly beneath a



shallow, one (1) foot layer of peat located approximately at the water table.

Drilling was accomplished with the use of six (6) inch inner diameter, continuous-flight augers for installation of the wells. Well data is summarized in Table 3-1 and well construction diagrams are presented in Figures 3-2 through 3-6. Wells are constructed of 2-inch diameter PVC casing and 10-slot screens with threaded couples. Backfill of the annulus utilized a gravel pack of the screen zone, a bentonite pellet seal or a graded sand filter bed with a bentonite slurry seal, a bentonite/cement grout, and a concrete surface seal. PVC risers were extended two (2) to three (3) feet above grade to prevent contamination by surface runoff or flooding. Six (6) inch diameter protective steel casings were set into the concrete surface seal and provided with locks immediately following installation. The auger flights, drilling, and all other downhole equipment were steam cleaned between well installations.

A bentonite pellet seal was used above the gravel pack for wells M2A, M7A, and M6A. Due to the anticipated high levels of chlorides in groundwater, with possible effects on the stability of the bentonite, a graded sand filter bed was installed above the gravel pack in wells screened below the water table. Upon recommendations from DEC, the normal bentonite pellet seal was replaced with a three (3) foot thick bentonite slurry seal, pre-hydrated with fresh water. The bentonite slurry was tremied into place above the sand filter bed, followed by the bentonite/cement grout.

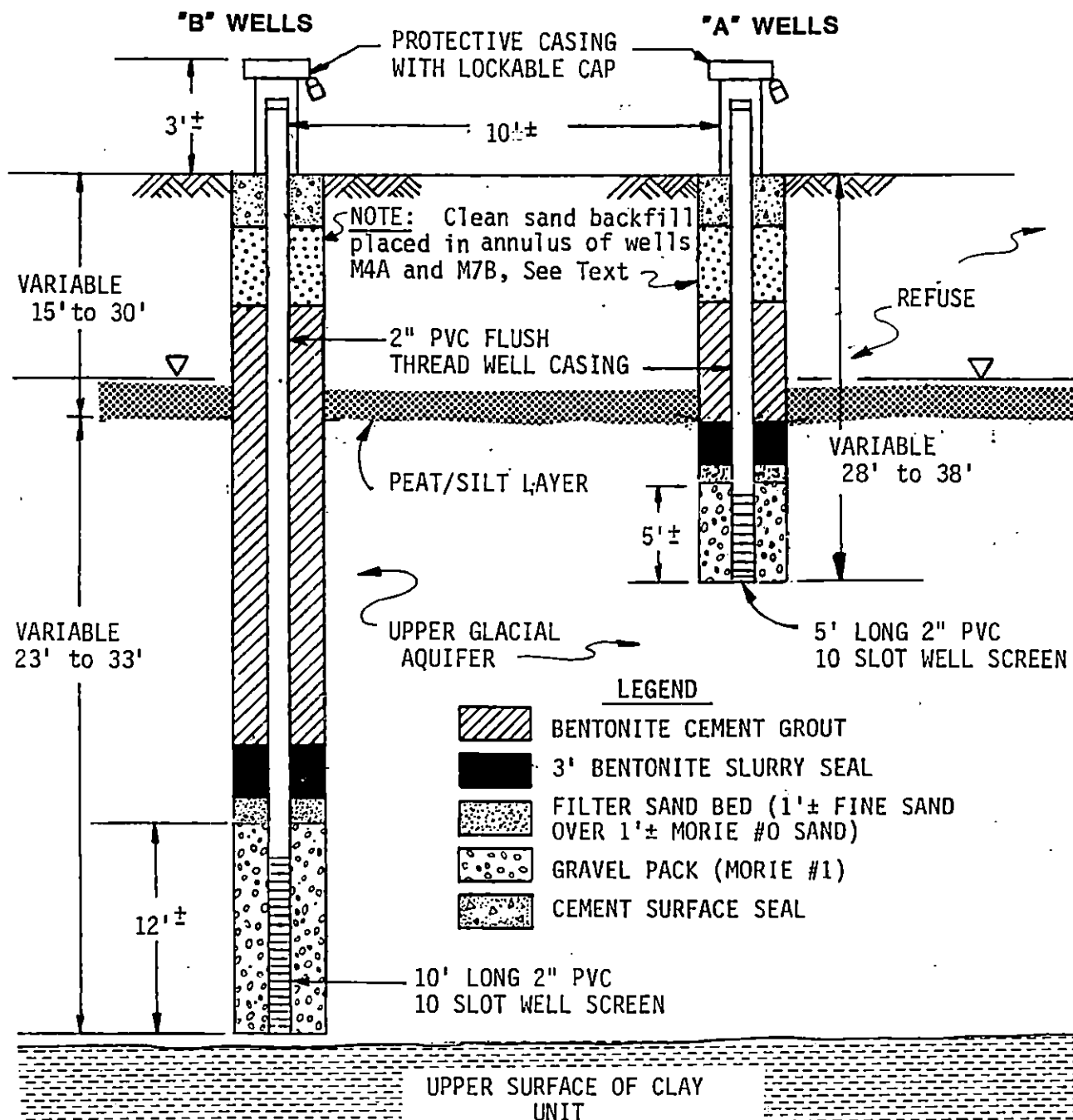
WELL NO.	DATE OF INSTALLATION	APPROX. GRADE ELEV. (MSL)	MEASURING POINT (TOP OF WELL CASING)		DEPTH OF WELL SCREEN		WATER ELEV. (MSL)	DATE OF MEASUREMENT
			ELEV. (MSL)	HEIGHT ABOVE GRADE (FT.)	BGS (FT.)	MSL		
M1A	8-19-87	18.3	19.81	1.5	23-28	- 5 TO -10	1.91	11-13-87
M1B	8-19-87	18.2	20.05	1.9	38-48	-20 TO -30	1.90	11-13-87
M2A	8-17-87	16.6	18.64	2.0	7-17	+ 9 TO - 1	7.23	11-13-87
M2B	8-17-87	16.5	18.62	2.1	35-45	-19 TO -29	1.86	11-13-87
M3A	8-13-87	21.0	22.88	1.9	28-33	- 7 TO -12	1.88	11-13-87
M3B	8-12-87	21.0	22.69	1.7	43-53	-22 TO -32	1.92	11-13-87
M4A	7-30-87	19.5	21.66	2.2	28-33	- 8 TO -13	2.23	11-12-87
M4B	7-30-87	19.7	22.65	3.0	38-48	-18 TO -28	2.19	11-12-87
M5A	8-25-87	23.4	25.73	2.3	33-38	-10 TO -15	2.48	11-12-87
M5B	8-21-87	24.0	26.35	2.4	43-53	-19 TO -29	2.26	11-12-87
M6A	8 -3-87	5.8	8.43	2.6	7-17	- 1 TO -11	1.09	11-16-87
M6B	8 -3-87	5.9	7.90	2.0	28-38	-22 TO -32	1.11	11-16-87
M7A	8-11-87	7.3	9.48	2.2	4-14	+ 4 TO - 6	2.45	11-16-87
M7B	8-10-87	7.5	9.59	2.1	28-38	-20 TO -30	2.40	11-16-87
M8	8-24-87	28.7	30.69	2.0	48-58	-19 TO -29	2.18	11-12-87

NOTES: 1) MSL = MEAN SEA LEVEL; ELEVATIONS ARE REFERENCED TO FEET ABOVE/BELOW MEAN SEA LEVEL DATUM.
2) BGS = BELOW GRADE SURFACE

MERRICK LANDFILL
PHASE II INVESTIGATION

TABLE 3-1
SUMMARY OF WELL DATA

Water



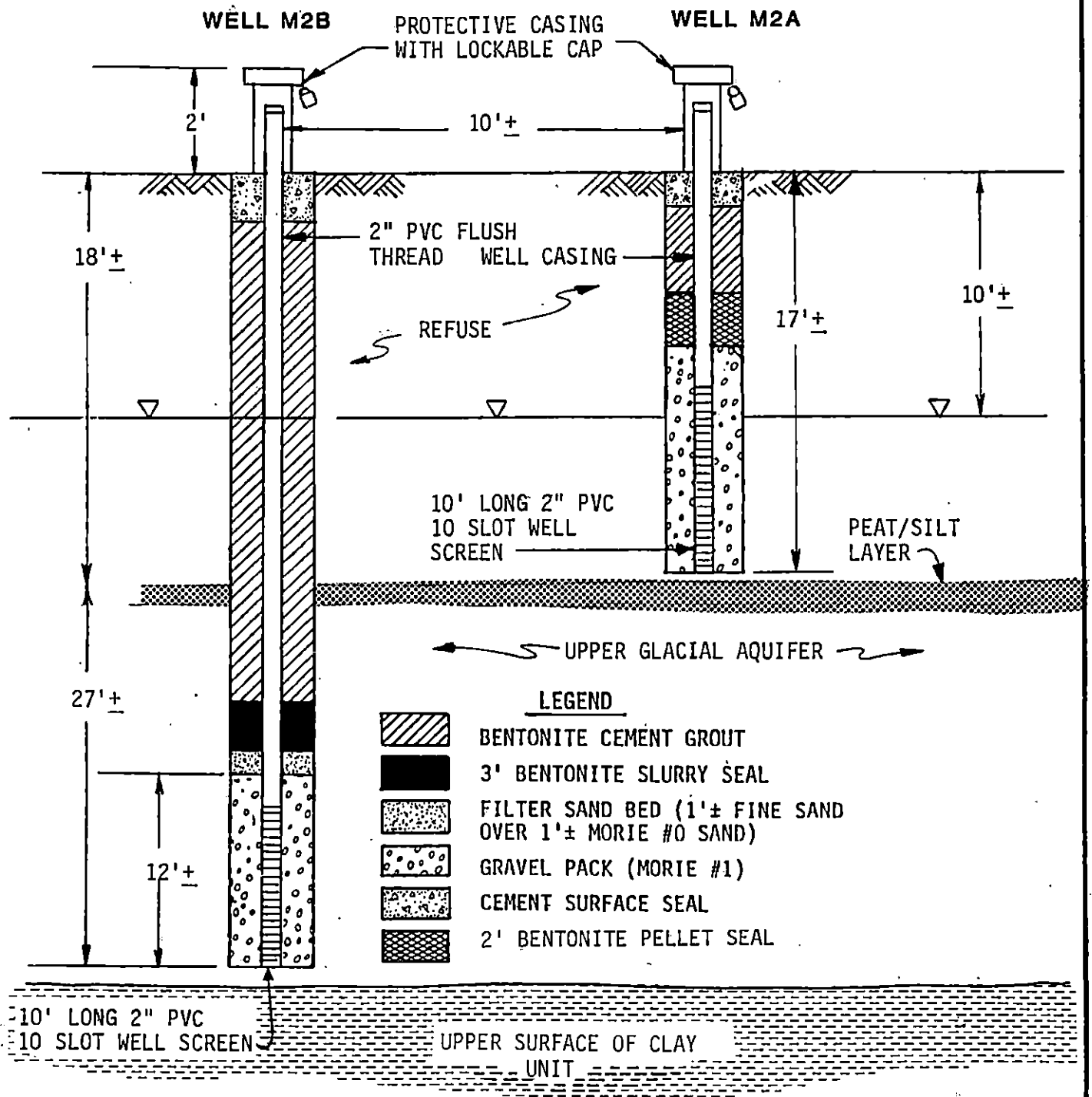
MERRICK LANDFILL
PHASE II INVESTIGATION

NOTE: NOT TO SCALE

FIGURE 3-2
CONSTRUCTION DETAILS
WELL CLUSTERS M1, M3,
M4 AND M5

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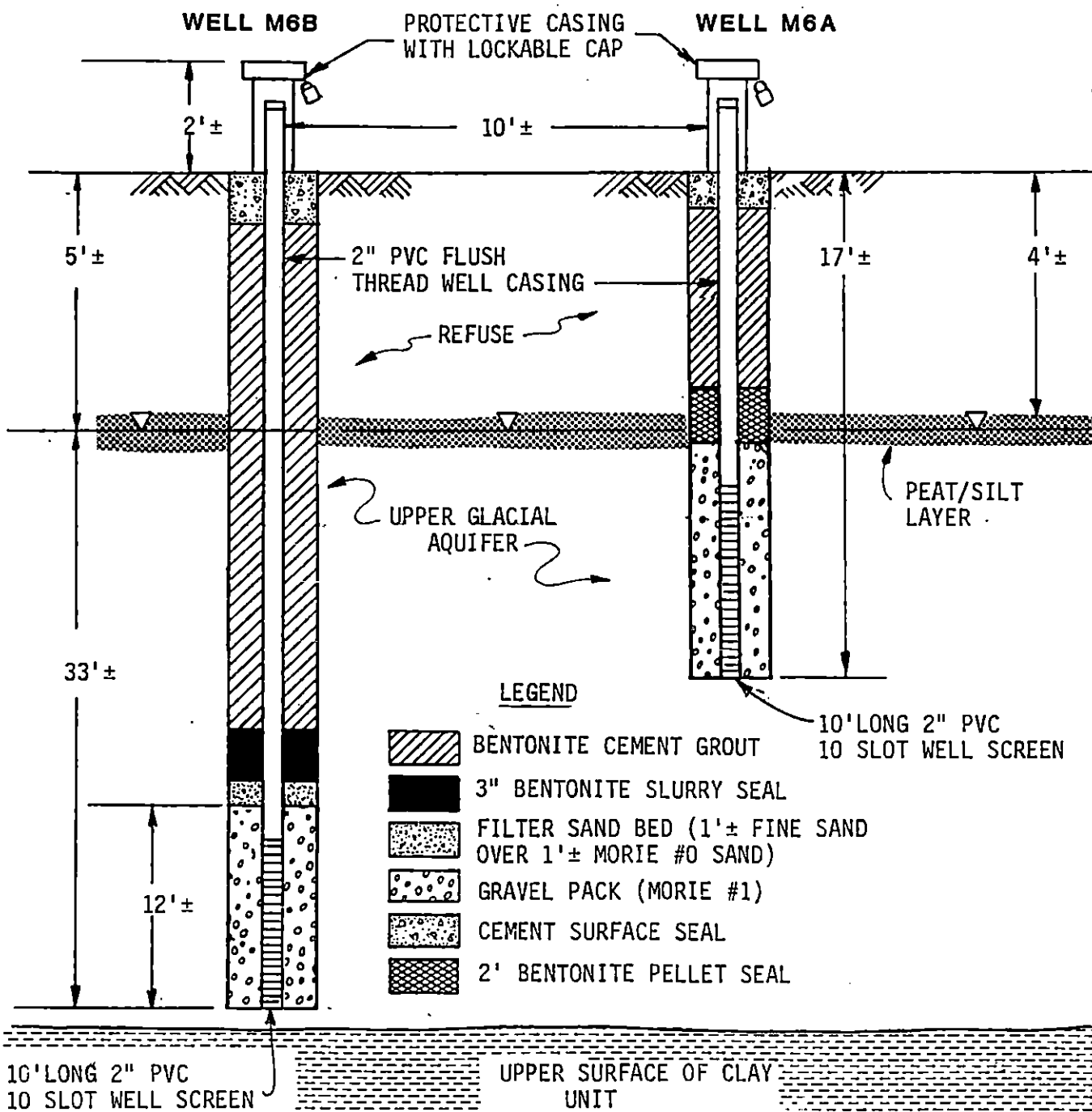
MERRICK LANDFILL
PHASE II INVESTIGATION

NOTE: NOT TO SCALE

FIGURE 3-3
CONSTRUCTION DETAILS
WELL CLUSTER M2

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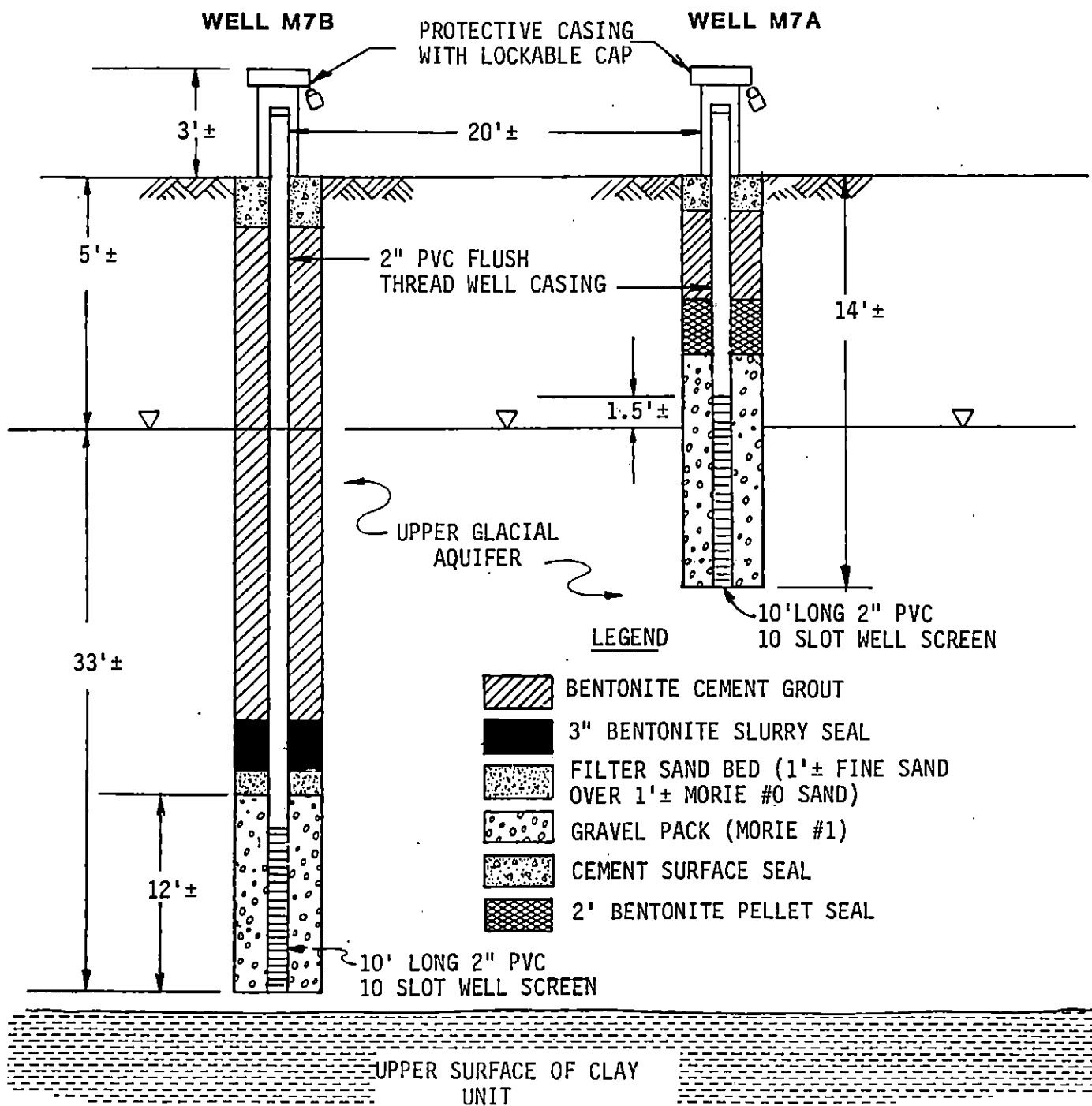


MERRICK LANDFILL
PHASE II INVESTIGATION

NOTE: NOT TO SCALE

FIGURE 3-4
CONSTRUCTION DETAILS
WELL CLUSTER M6

Velzy ASSOCIATES



**MERRICK LANDFILL
PHASE II INVESTIGATION**

NOTE: NOT TO SCALE

**FIGURE 3-5
CONSTRUCTION DETAILS
WELL CLUSTER M7**

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During sealing of the annulus through the refuse at wells M4B and M5A, the bentonite/cement grout drained freely from the auger into porous zones in the refuse. Under a revised procedure the drill team continued to place grout into the well until the level stabilized. Grout levels stabilized within the refuse zone approximately 16 feet and 8 feet below land surface at wells M4B and M5A, respectively. The auger was left in the unfinished well overnight to allow the grout to cure (harden). The following day, the annulus was backfilled with clean, fine sand to about 4 feet below surface grade. A steel outer casing was then set into a concrete surface seal at the top of the well for protection.

Drill cuttings were stored on site at each well location, and covered with plastic sheeting. Upon recommendation from DEC, composite samples were collected from cluster sites M2 and M5 and submitted for EP Toxicity analysis. These sites were considered to represent potential worst cases for leachate-contaminated soil. The results of the analyses were used to determine the proper disposal of drill cuttings generated by the well installation program. Samples were collected from the cuttings pile and delivered to the laboratory by a field team member. The results of these analyses are shown in Appendix H.

During drilling at cluster M7, dark brown, oily-looking coarse sands were encountered at a depth of approximately five (5) feet. A split-spoon sample of this material was obtained during drilling of well M7B boring. A portion of the sample was collected directly into a sample jar with the use of a stainless-steel spatula and delivered to the

laboratory. The sample was analyzed for PCB's and oil and grease. The results of this sample analysis is shown in Appendix H.

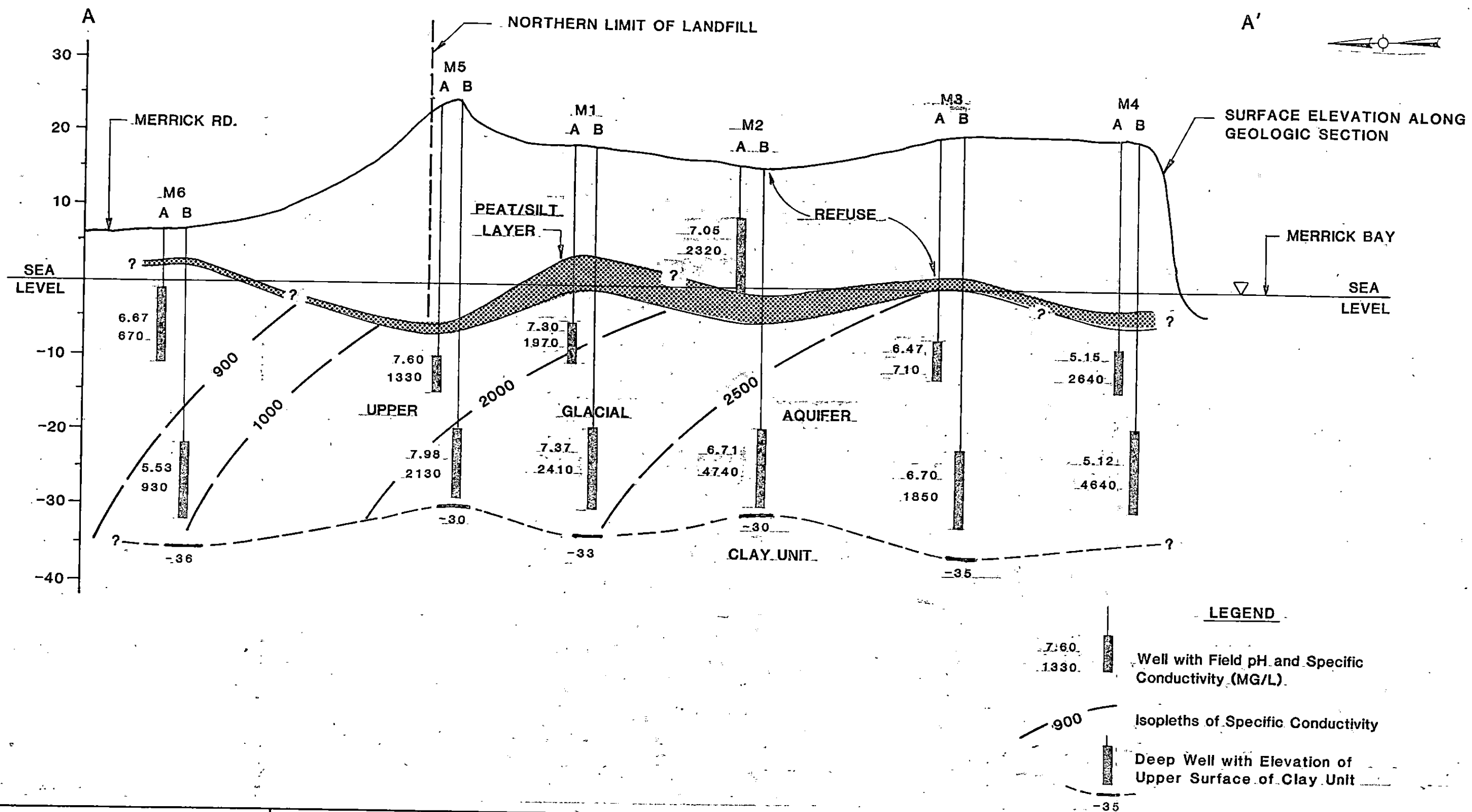
3.3 Geologic Sampling

Representative geologic samples were taken during drilling for well M8 and all of the deep ("B") wells at each cluster. Sampling was initiated near the bottom of the refuse or fill zone to characterize the geologic conditions underlying the site. Samples were obtained at five (5) foot intervals or less via a split spoon sampler. The split spoons were brushed off and rinsed with fresh water between sampling events.

The samples were characterized by saturated, fine to coarse grained sands with trace amounts of fine gravel, and trace amounts of silt, extending from about sea level to a depth of 35 feet. A thin peat and/or silt zone was encountered near the bottom of the refuse zone and overlying the sand. The upper layer of the "20 foot" clay was established at cluster sites M1, M2, M3, M5, M6, M7, and well M8 (Figure 3-7). Sieve analyses for the split-spoon samples are included in Appendix F and geologists logs are included in Appendix G.

3.4 Well Development

Each monitoring well was developed after installation was completed. This resulted in the removal of fine sediments from the screen zone and improved hydraulic communication



MERRICK LANDFILL
PHASE II INVESTIGATION

SCALE: 0 200 400 600 800
FEET

10 FEET
5
0

FIGURE 3-7
GEOLOGIC SECTION A-A'

between well and surrounding formation. All "foreign" water that was introduced into the well during installation was also removed.

Depending upon the individual well, one of two development methods was used. If the well was screened below the water table and the water level was within suction lift (approximately twenty-five (25) feet), a suction fitting was attached to the top of the PVC well riser and connected to a centrifugal pump. If the well was screened across the water table or the water level was below the limits of suction lift then a method employing a draw down tube was used. The draw down tube consisted of one (1) inch PVC piping which was inserted into the water column of the well and connected to a centrifugal pump.

At wells where the water column was within suction lift, a surging effect was created by turning the centrifugal pump on and off approximately three times over a four minute time period. This allowed the water column being drawn into the pump to fall back into the well. This resulted in a momentary flow reversal from the screen into the surrounding formation, thereby loosening and removing fine material from the screen zone. The wells were surged several times during the development period.

At the remaining wells, a surging effect was created by suspending the intake portion of the drawdown tube in the screen zone and frequently turning the pump on and off. This procedure was performed several times during the

development period. The drawdown tubes were steam cleaned between use at each well location.

An average of two hours per well was needed for development purposes. Samples of the water pumped from the well were taken periodically and observed for sediment content, especially before and after a surging interval.

3.5 Groundwater Sampling

Groundwater samples were taken from the fifteen (15) monitoring wells at the landfill. All of these wells were screened in the Upper Glacial Aquifer.

Certain steps were followed prior to sample collection at each well cluster. These steps included calibration and start-up of monitoring and field parameter instruments. Monitoring was done using an HNU photoionization device. At each sampling point field parameters (pH, specific conductivity, and temperature) were measured using a thermometer and a combination pH and conductivity meter.

At each well cluster, well caps from both wells were removed and headspaces were measured using the HNU monitoring instrument. This instrument was also used to check ambient levels of volatile organic compounds during bailing and prior to sampling.

In order to ensure that the sample collected was representative of the groundwater contained in the underlying

formation, approximately five (5) well casing volumes were removed by bailing before the actual sample was collected.

After evacuating each well, the sample was taken. Sampling was accomplished by lowering a dedicated teflon bailer attached to dedicated nylon line into the well casing until the bailer reached the lower portion of the screen zone. The bailer was then raised slowly back to the surface. The sample was decanted into labeled, laboratory supplied glassware. Field parameters were measured and recorded. All samples were placed into sample coolers with cooler packs.

The analytical laboratory for the investigation was NYTEST, located in Port Washington, New York. NYTEST is certified for hazardous waste analyses by the New York State DEC. Sample coolers were sent to the laboratory at the end of each day. Samples were submitted for the full hazardous substance list (HSL) for both organic and inorganic analysis. Sampling data analyses results are presented in Appendices A and B.

3.6 Water Level Measurements

Water levels were measured for all wells prior to sampling of groundwater (Table 3-1). The results of these measurements are summarized below:

- o No consistent vertical component of groundwater flow was measured at cluster sites M1, M3, M4, M5, M6 and M7.

- o No horizontal component to flow was measured between clusters M1, M2, and M3, and between clusters M5, M4, and well M8.
- o The water level measured in well M2A (screened in saturated refuse above the peat zone) was considerably greater than all other wells.
- o A horizontal component to flow was measured between well cluster M7 and M6 towards the tidal creek.

The data suggests that the landfill is located over a very slow moving groundwater flow system. The higher water level in well M2A indicates the presence of mounding of groundwater, at least along the eastern perimeter of the landfill, possibly under perched conditions due to the peat and silt layer. The vertical gradient measured in the wells at cluster M2 indicates that groundwater discharge in this area is downwards through the peat and silt zone into the underlying sands.

An in-depth comparison of horizontal groundwater flow gradients is not possible with the use of this data since the water levels were measured over a three (3) day period under varying tidal conditions. Tidal influences on the water levels in site wells confound the use of this data for determining true groundwater flow gradients. The tidal influence on the groundwater underlying the landfill is discussed in Section 3.10 of this report.

3.7 Sediment Sampling

Sediment samples were collected from two (2) locations in the tidal creek which is located along the western perimeter of the landfill. The sampling points chosen are at the southern and northern ends of the creek (Figure 3-1).

The sediments were collected by excavating a section of the side wall of the creek with a large spade to a maximum depth of eight (8) inches (approximately 3 inches below the water line). The outer portions of this larger sample were then carefully scraped away with teflon coated instruments. The inner, more representative core position was taken for analysis. This procedure prevented possible alteration or contamination of the sample via contact with the spade.

The sediment samples were placed into labeled, laboratory supplied glass sample jars, and the jars were packed, with ice packs, into sample coolers. The coolers were sealed, and delivered to the laboratory by a field team member. The samples were analyzed for the full HSL scan.

3.8 Leachate Seep Survey

The Phase II investigation included surveying the landfill perimeter to identify any leachate seeps that could allow leachate to directly enter the surface water. The survey was conducted on November 23, 1987. Two leachate seeps had been reported previously, along the northern slope and along the eastern perimeter near the southern end of the landfill (Personal Comm., HDCW). The northern slope area has since been filled and is no longer seeping. Both areas appear to

be dry at this time. Because of the steep grade and dense vegetation on the lower slopes of the landfill, the survey was completed along the southern and western sides by boat, provided and operated by the Town of Hempstead Department of Conservation and Waterways. The survey was continued on foot along the eastern portion of the shoreline towards the Town Park and Golf Course. In addition, DEC representatives surveyed about 100 feet along the northern end and about 200 feet along the southern end of the landfill. No leachate seeps were observed during these surveys.

3.9 Ash Lagoon Sampling

Ash lagoons were constructed for the collection of ash produced by the municipal incinerator. These lagoons were filled when the incinerator was closed. Samples were obtained at the abandoned, filled ash lagoon location upon completion of the well installation program. The ash lagoons were located next to what is now the transfer station. (Figure 3-1). Drilling was accomplished with the use of 3-3/8" inside diameter continuous-flight augers. The boring was advanced through approximately eight (8) feet of fill into the ash bed.

Four (4) continuous split spoons were obtained from the ash material from a depth interval of eight (8) to eighteen (18) feet below grade. The upper six (6) inches of the ash bed was characterized by silver, gray, and yellow interbedded layers of coarse grained ash material. The remaining thickness was characterized by wet, dark gray and black ash.

Samples were also obtained from the natural sands below the ash bed with split-spoon samplers from a depth interval of eighteen (18) to twenty-one (21) feet below grade.

All samples were transferred from the split spoons to the sample containers with the use of dedicated teflon-coated spatulas. The split-spoons were steam cleaned between each sampling event. Upon completion of the sampling, the boring was backfilled with drill cuttings and a five (5) foot thick cement surface plug was installed to grade.

Representative sub-samples of each type of material (ash and natural sands) were composited from the jarred split-spoon samples at the laboratory. The composited samples were analyzed for the HSL metals to characterize the ash and to evaluate whether any leaching has occurred from the ash layer into the underlying sands. The results of these analyses are summarized in Table 4-4, and are shown in Appendix D.

3.10 Tidal Influence Survey

Due to the coastal location of the landfill, and based upon the historical work done by Geraghty and Miller (1981) and the U.S. Geological Survey, an investigation of the potential for tidal influence on landfill groundwater elevations was conducted. Well clusters M5, M6 and M7 were utilized for this study, due to their proximity to the tidal creek. The study was conducted February 3, 1988 and lasted approximately 10 hours. The study was scheduled to coincide with the monthly high tide in order to observe the maximum effect. The water level for each well was measured on an hourly basis, with an electronic water level indicator.

The time and depth to water were recorded and are shown in Table 3-2. Measurements were recorded to the nearest hundredth of a foot and adjusted to mean sea level (margin of error = $\pm$.05 foot.)

Water levels in each well showed a significant variation over the measured time period (maximum and minimum water levels). These are shown graphically in Figures 3-8 through 3-10. The greatest variation was observed in well M6A, which showed a total change of 1.18 feet.

This tidal fluctuation could explain the apparent anomaly of water levels in the monitoring wells at the landfill. If the tidal effect is not known, it can appear to show a localized groundwater flow moving northward, versus the regional southerly flow direction.

PROJECT Merrick Landfill
Tidal Study
 LOCATION Merrick Landfill

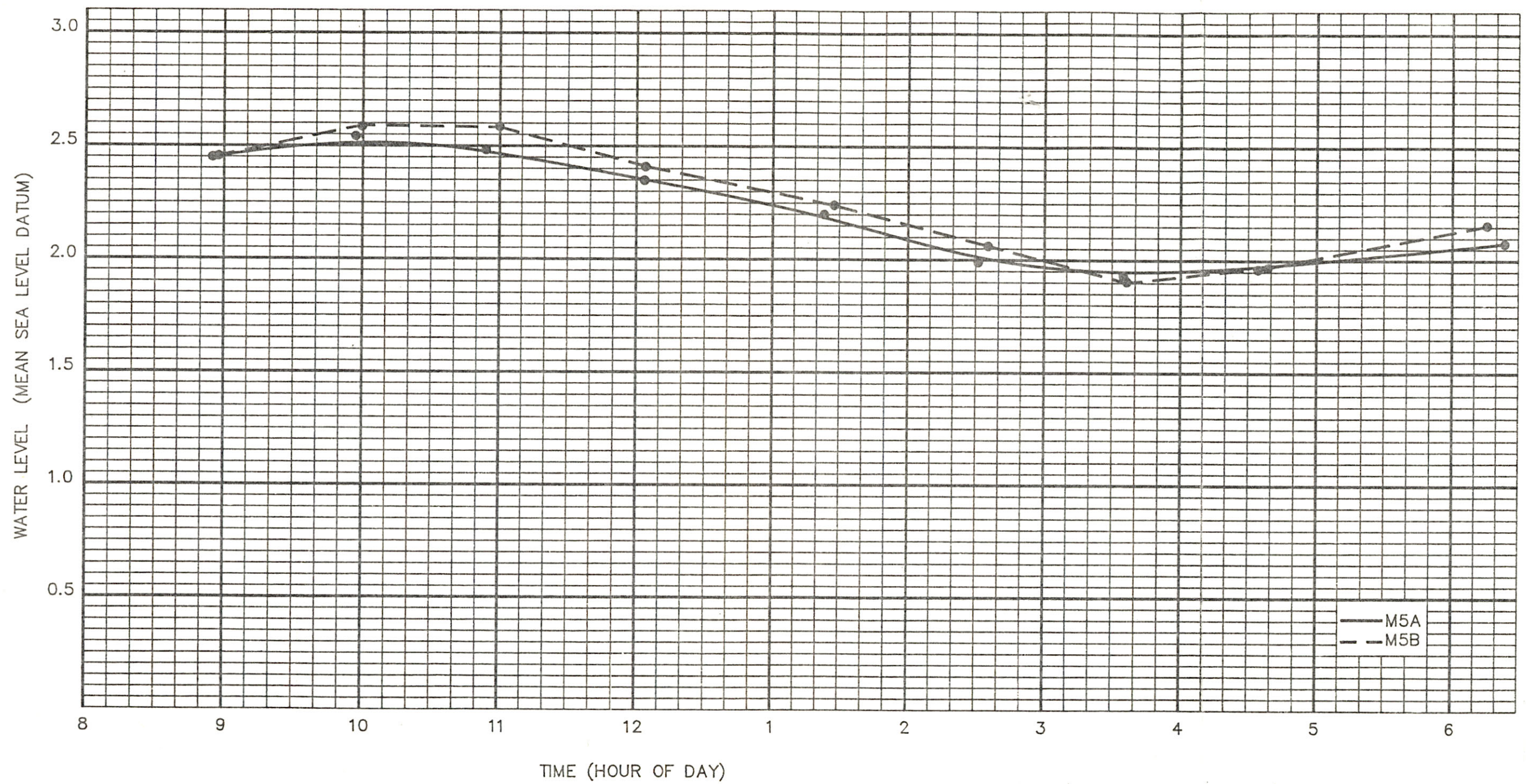
TIDAL DATA RECORD SHEET

DATE: 2/3/88
 J. Nuccio
 RECORDED BY: C. Lehr

TIME AND WATER LEVEL	WELL NO. <u>M6B</u> CASING ELEV. 7.90MSL	WELL NO. <u>M6A</u> CASING ELEV. 8.43MSL	WELL NO. <u>M7A</u> CASING ELEV. 9.48MSL	WELL NO. <u>M7B</u> CASING ELEV. 9.59MSL	WELL NO. <u>M5A</u> CASING ELEV. 25.73MSL	WELL NO. <u>M5B</u> CASING ELEV. 26.35MSL
TIME	8:41 AM	8:43 AM	8:48 AM	8:50 AM	8:55 AM	8:57 AM
WATER LEVEL	3.10	3.12	3.18	3.07	2.45	2.44
TIME	9:45 AM	9:47 AM	9:52 AM	9:54 AM	9:58 AM	10:00 AM
WATER LEVEL	2.96	2.98	3.18	3.07	2.56	2.57
TIME	10:39 AM	10:41 AM	10:44 AM	10:46 AM	10:55 AM	11:00 AM
WATER LEVEL	2.64	2.64	3.12	3.07	2.49	2.57
TIME	11:48 AM	11:51 AM	11:57 AM	11:59 AM	12:01 PM	12:04 PM
WATER LEVEL	2.28	2.27	3.02	2.97	2.35	2.41
TIME	1:15 PM	1:18 PM	1:21 PM	1:23 PM	1:23 PM	1:27 PM
WATER LEVEL	2.06	2.03	2.92	2.88	2.20	2.24
TIME	2:24 PM	2:26 PM	2:28 PM	2:30 PM	2:33 PM	2:35 PM
WATER LEVEL	2.01	1.98	2.90	2.84	1.99	2.06
TIME	3:25 PM	3:27 PM	3:29 PM	3:31 PM	3:35 PM	3:37 PM
WATER LEVEL	1.97	1.94	2.85	2.81	1.87	1.93
TIME	4:25 PM	4:27 PM	4:29 PM	4:32 PM	4:34 PM	4:38 PM
WATER LEVEL	1.97	1.94	2.85	2.78	1.91	1.97
TIME	5:56 PM	5:58 PM	6:03 PM	6:05 PM	6:13 PM	6:15 PM
WATER LEVEL	2.09	2.12	2.88	2.80	2.13	2.16
TIME						
WATER LEVEL						

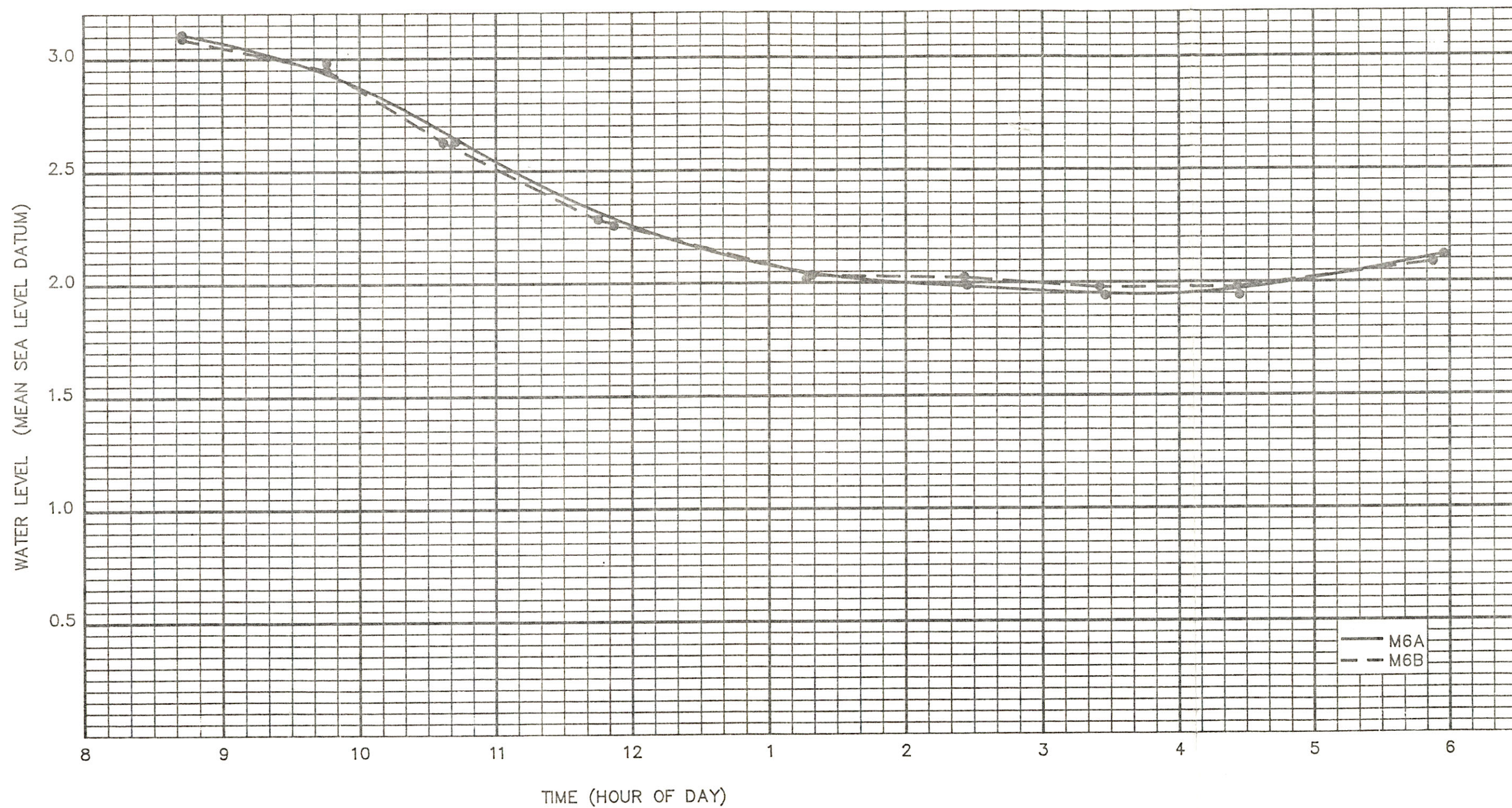
NOTE: WATER LEVEL = CASING ELEVATION MINUS DEPTH TO WATER

TABLE 3-2



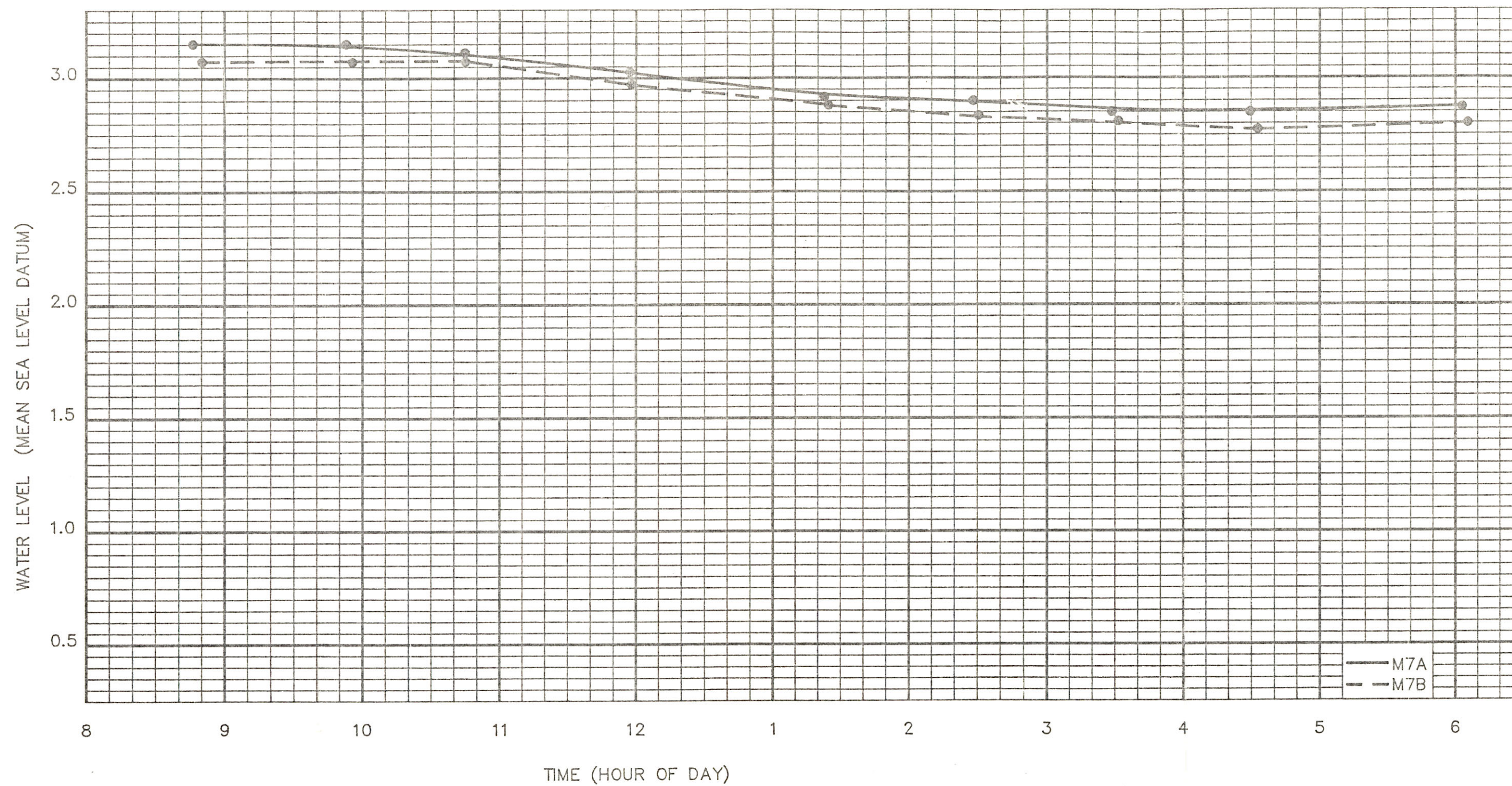
MERRICK LANDFILL
PHASE II INVESTIGATION

FIGURE 3-8
HYDROGRAPHS OF WELL CLUSTER M5
FEBRUARY 3, 1988



MERRICK LANDFILL
PHASE II INVESTIGATION

FIGURE 3-9
HYDROGRAPHS OF WELL CLUSTER M6
FEBRUARY 3, 1988



MERRICK LANDFILL
PHASE II INVESTIGATION

FIGURE 3-10
HYDROGRAPHS OF WELL CLUSTER M7
FEBRUARY 3, 1988

4.0 RESULTS

4.1 Results of Monitoring Well Installations

4.1.1 Monitoring of Volatile Organic Compounds During Drilling

Field monitoring for Volatile Organic Compounds (VOC's) was performed during drilling with the use of an HNU Model PI-101 organic vapor analyzer with an 11.7 eV probe. The 11.7 eV probe was chosen since it does not respond to methane gas. Monitoring was conducted in accordance with the Site Health and Safety Plan to identify VOC's present in the sub-surface material.

VOC levels were recorded for background conditions, drill cuttings, auger headspace, and geologic split-spoons. Split-spoon samples were screened with the HNu immediately upon opening the samples. Background levels ranged from approximately 0.6 ppm to 2.0 ppm. VOC levels up to 10 ppm were measured during drilling through refuse for wells M3A and B, M2B, M4A, and M5A and B. A level of 4 ppm was measured at well M4A at a depth of ten (10) feet at which time odors of a household sanitizer were detected. A level of 10 ppm was measured at a depth of ten (10) feet at well M5A which corresponded to odors of an enamel-based paint. The drill string was slowly pulled from the boring and blue paint was observed on the auger flights. No VOC's were detected during screening of the split-spoon samples except for one (1) sample taken at well M2B from a depth interval

of twenty (20) to twenty-two (22) feet below grade. Field monitoring was not conducted during drilling for well M1A below a depth of twenty (20) feet due to the malfunctioning of the HNU.

4.1.2 Monitoring of Combustible Gases

An MSA Gascoe Model 62S was used for monitoring of combustible gases during drilling. Gas levels were recorded for measurements taken at open borings, auger flight headspace, and near the edge of the boring. Gas levels ranged from 0 to 70 percent and generally decreased as work progressed at a location. Results of the field monitoring for combustible gases are presented in Table 4-1.

The high level at well M2B (55% gas) was recorded during split-spoon sampling of the peat/silt zone immediately below the limits of refuse. When the sampler was pulled from the sample intervals, the well head began venting odors. Vapors could be seen venting from the auger flight. The field crew withdrew from the area until the gases dissipated. VOC levels were measured up to 6 ppm.

The high levels at well M5B (70% gas) was recorded while the augers were suspended within the refuse zone during grouting. At this site, grout was draining out of the auger flight into a porous zone in the refuse. The grout drained out of the bottom of the augers, allowing landfill gas to vent from the headspace.

TABLE 4-1
SUMMARY OF FIELD MONITORING
FOR COMBUSTIBLE GASES

<u>WELL NUMBER</u>	<u>MAXIMUM GAS LEVELS RECORDED * (PERCENT)</u>	<u>DEPTH (FEET BELOW GRADE)</u>
M1A	---	---
M1B	20	10
M2A	5	10
M2B	55	20
M3A	43	17
M3B	26	15
M4A	---	---
M4B	6	6
M5A	55	20
M5B	70	20
M6A	---	---
M6B	---	---
M7A	---	---
M7B	0	5
M8	34	15

* Field monitoring was performed with an MSA Gascope Model 62-S.

4.1.3 Monitoring of VOC's During Groundwater Sampling

Measurements were recorded for VOC levels before and during bailing for groundwater samples with the HNU organic vapor analyzer. Relatively low VOC levels ranging from approximately 1 ppm to 3 ppm above background were measured within the well head at all wells except wells M1A and B, M4A, and M8. Levels generally remained the same throughout the bailing procedures at most of the wells locations. Background levels were measured before bailing at wells M2B and M5A and B, but rose slightly by the time bailing was completed. The highest level was measured at well M2B and 5 ppm prior to sampling. At no time were VOC levels above background levels measured in the breathing zone of the field team members.

4.2 Groundwater Quality

4.2.1 Water Quality - Inorganic

The groundwater system at the Merrick Landfill is complex, not only because of the presence of the landfill itself, but also because of the adjacent bay. Not only are groundwater gradient perturbed by the bay's tides, but groundwater quality is also apparently influenced by seawater intrusion at the Merrick Landfill.

One suggestion of this seawater intrusion is the finding of greater concentration of major seawater cations (sodium, magnesium, calcium, and potassium) in the deeper of any two

wells at a cluster as shown in Table 4-2. This is particularly apparent for sodium, which, as the principal seawater cation, can be used as an indicator of intrusion. Measurements of baywater salinity made by the Town of Hempstead Department of Conservation and Waterways indicate that surface salinities in adjacent parts Merrick Bay ranged from 25 to 31 parts per thousand (ppt) during the sampling period (fall 1987).

The highest sodium concentration measured in Merrick monitoring wells (1.78 ppt) was found in the deep well at M-4, the most southerly well. Using the constant ratio of seawater ions, this concentration is equivalent to a seawater of about 6 ppt. This compares with measurements of raw leachate salinity of 0.19 to 0.59 ppt also reported by the Department of Conservation and waterways in samples taken between 1984 and 1986.

The presence of seawater beneath the landfill is also suggested by conductivity measurements which show a general pattern of higher conductivity in wells closer to the bay in addition to indicating higher conductivity in deeper wells (Figure 3-1).

The presence of seawater beneath the landfill has important implications for the chemical forms and mobilities of heavy metals which may have been placed in the landfill as part of its normal waste stream of residential/commercial refuse, or from deposition of municipal incinerator ash. The carbonates sulfates, and especially, the sulfides present in the anaerobic seawater found in soils or sediments form highly

TABLE 4-2
MAJOR SEAWATER CATIONS (ug/l)

Well No.	Na	Mg	Ca	K
M1A	584,000	44,200	16,340	69,400
M1B	660,600	57,000	28,120	77,600
M2A	469,200	69,400	109,000	120,900
M2B	1,296,000	93,800	27,740	274,700
M3A	56,930	26,400	96,500	22,900
M3B	56,930	65,400	56,350	22,900
M4A	699,800	133,000	46,210	87,200
M4B	1,781,500	267,000	53,120	85,200
M5A	354,900	55,600	19,570	70,300
M5B	672,400	118,800	38,330	75,200
M6A	43,730	11,200	21,190	4,000
M6B	551,200	105,700	33,780	21,300
M7A	108,200	22,900	36,340	9,650
M7B	172,100	93,900	31,490	4,670
M8	1,169,000	90,000	26,840	459,900

insoluble salts which stabilize or fix heavy metals in a solid mineral form. The precipitation or fixation of these metals results in the immobility of inorganic contaminants in the soils and sediments beneath the landfill. As a result of this effect, groundwater migration is not believed to be a significant contributor of inorganic contaminants to either Merrick Bay or the Upper Glacial Aquifer.

Most of the groundwater beneath the site does not qualify as potable water (Class GA, as defined by NYCRR Article 2, Part 703) due to the elevated chloride and sulfate levels associated with the intruded seawater. Therefore, comparisons with drinking water standards are not further considered in this analysis. Background well waters are clusters M6 and M7 have the lowest apparent amount of seawater influence, and, being upgradient of the landfill, are the most suitable control locations for use in quality comparisons.

In general, as shown in Table 4-3, metals in groundwater were at low concentrations. This is especially notable since the analytical results were for total water metals which includes both dissolved and suspended metals. For most locations, most toxic heavy metals were below detection levels. Lead, manganese and iron were elevated at the upgradient (background) wells when compared with other site wells. Copper and zinc in background well waters were sufficiently elevated to account for all, or most, of that reported from other site wells. The possibility exists that the upgradient, background locations have been degraded by road run-off from the adjacent Merrick Road.

TABLE 4-3
CONCENTRATIONS OF INORGANIC SUBSANCES OF CONCERN
ANALYTE CONCENTRATIONS (ug/l)

Well No.	As	Be	Cd	Cr	Co	Pb	Hg	Ni	Se	Ag	Sn	Zn	Cu
M1A	b	b	b	b	b	[3]F	b	b	b	b	b	30.	[11]A
M1B	[2]F	[4]A	b	b	[13]A	b	b	b	14.	b	b	33.	b
M2A	b	[3]A	b	b	[14]A	b	b	b	[4]F	b	b	88.	[12]A
M2B	b	[3]A	b	b	[10]A	b	b	b	28	b	b	41.	[22]A
M3A	[2]F	b	b	b	b	b	b	b	b	b	b	35.	[19]A
M3B	b	b	b	b	b	b	b	b	b	b	b	35.	[13]A
M4A	b	b	b	b	[10]A	b	b	b	5	b	b	47.	[13]A
M4B	[2]F	[4]A	b	b	b	b	b	b	b	b	b	27.	[16]A
M5A	b	b	b	b	b	b	b	b	b	b	b	108.	32
M5B	[4]F	b	b	b	b	b	b	b	14.	b	b	26.	[13]A
M6A	b	8	b	b	[23]A	13	b	b	b	b	b	53.	37
M6B	b	5	b	b	[13]A	5	b	b	b	b	b	64.	29
M7A	b	[3]A	b	b	[47]A	16	b	b	b	b	b	64.	25
M7B	b	b	b	b	b	6	b	15.	b	b	b	47.	[17]A
M8	[3]F	b	b	b	[23]A	b	.20	57.	17.	b	b	62.	[19]A

A value enclosed in "[]" indicates a result which was greater then or equal to instrument detection limits but less than contract required detection limits. The accompanying letter notation indicates method used with "F" for furnace AA and "A" for flame AA.

b indicates that the compound was analyzed for but not detected.

Several isolated instances of elevated metal concentrations were found. Mercury was reported from M-8 well water at a low concentration of 0.20 parts-per-billion (ppb). Nickel was detected in the same well water at 57 ppb. Vanadium, which is often concentrated in ash, was found at elevated levels in both shallow and deep water samples from well M4 at the southern tip of the landfill.

4.2.2 Water Quality - Organic

No organic contaminants were identified in groundwater samples from upgradient (background) locations. Eleven of the Hazardous Substance List (HSL) organic compounds were identified in groundwater samples taken from downgradient site monitoring wells. These are shown in Table 4-4. The concentrations of nine of these contaminants were below the detection levels required by the United States Environmental Protection Agency Contract Laboratory Program (CLP). Concentrations below the detection level are presented as estimates.

Bis (2 - ethylhexyl) phthalate was measured above the detection level at locations M2 and M3 in the deep wells and had a maximum concentration of 280 parts per billion (ppb). This compound is a non-carcinogen with a moderate toxicity.

For comparative purposes the USEPA Ambient Water Quality Criteria for the Protection of Human Health is 21 ppm (US EPA, 1986) for bis (2-ethylhexyl) phthalate. Phthalates are bio-accumulated by aquatic organisms and have been implicated in reducing reproductive success in these organisms.

TABLE 4-4

HSL ORGANIC COMPOUNDS IN SITE GROUNDWATER

LOCATION	COMPOUNDS	CONCENTRATION ug/l)	
M1B	Tetrachloroethane	4	J
M2A	bis (2-ethylhexyl) phthalate	18	J
M2B	bis (2-ethylhexyl) phthalate	280	J
M3A	benzene	2	J
	chlorobenzene	4	J
M3B	benzene	3	J
	chlorobenzene	4	J
	bis (2-ethylhexyl) phthalate	37	J
M4A	methylene chloride	1	J
	benzene	4	J
	chlorobenzene	18	J
	carbon di-sulfide	3	J
M5A	phenol	4	J
	benzoic acid	4	J
	di-n-butyl phthalate	4	J
M5B	methylene chloride	1	J
	benzoic acid	3	J
	di-n-butyl phthalate	3	J
M8	methylene chloride	1	J
	benzene	2	J
	naphthalene	11	J

J = estimated value, below CLP detection limit.

A criterion of 3 ppb has been recommended for the protection of marine organisms (USEPA Quality Criteria for Water, 1976).

Chlorobenzene was found above CLP detection levels in water from one location, M4A at the southern tip of the landfill, at 18 ppb. Chlorobenzenes have an EPA Ambient Water Quality Criteria for the Protection of Human Health of 488 ppb.

Acute and chronic toxicity to salt water aquatic life occurs at concentrations as low as 160 and 129 ppb of chlorinated benzenes, respectively for the organisms which have been tested (Federal Register, Vol. 45. No. 231, 1980). Its low concentration and infrequent presence in site groundwater would appear to make chlorobenzene an insignificant contaminant to the adjacent marine water assuming it is ultimately discharged to that environment.

4.4 Ash Lagoon and Creek Sediment

Samples were taken at sequential depths at the location of the former ash lagoons utilized for collection of municipal incinerator ash. Analysis of these samples revealed the presence of elevated levels of heavy metals in these samples as shown in Table 4-5. No background soil samples were collected from the Merrick area, mean levels of soil metals in soils from the eastern United States analyzed by the US Geological Survey (1987) are being used as background. On this basis, the heavy metals, copper, lead, manganese, mercury and zinc exceed their estimated mean concentrations in background soils. Maximum concentrations of lead (967 ppm) and zinc (916 ppm) are 57 and 18 times mean background levels

TABLE 4-5

**ASH LAGOON AND CREEK SEDIMENT SAMPLES
RESULTS OF INORGANIC ANALYSIS**

Analytes	Ash Lag on Samples (Analysis results mg/kg)			Creek Sediment Samples (Analysis Results mg/kg)	
	1, 2, 3 AL	4,5AL	6AL	M1 - 1S	M2 - 1S
Aluminum	11900	4680	350	105.0	b
Antimony	b	b	5.0	b	b
Arsenic	5.	5.2	b	b	b
Barium	226	162.	.54	b	b
Beryllium	.007	.600	.700	1.00	b
Cadmium	13.1	13.3	.800	b	b
Calcium	2950.	978	18.	148.0	b
Chromium	21.4	17.7	2.70	b	b
Cobalt	b	b	b	b	b
Copper	128.	102	3.50	b	b
Iron	3682	3535.	2455.	137.8	1.4
Lead	967.	267.8	8.40	b	5.0
Magnesium	1650.	1810.	191.0	34.0	b
Manganese	269	248.	27.3	1.4	b
Mercury	.320	.560	.260	0.46	b
Nickel	15.	11.8	2.80	5.0	b
Potassium	2642.	1145.	86.0	8.1	b
Selenium	.500	b	b	b	b

TABLE 4-5

**ASH LAGOON AND CREEK SEDIMENT SAMPLES
RESULTS OF INORGANIC ANALYSIS (Cont'd)**

Analytes	Ash Lagoon Samples (Analysis results) (mg/kg)			Creek Sediment Samples (Analysis Results mg/kg)	
	1, 2, 3 AL	4,5AL	6AL	M1 - 1S	M2 - 1S
Silver	b	b	b	b	b
Sodium	2255	630.	41.4	18.0	b
Thallium	b	b	b	b	b
Tin	54200	78300	-	b	b
Vanadium	.170	.670	.050	4.0	b
Zinc	916.	753.	8.30	5.0	b

a - data invalidated by laboratory.

b - compound analyzed for but not detected.

respectively. The extent of these ash deposits has been estimated from site plans prepared in 1975 in which three ash lagoons totalling approximately 4,540 square feet are shown. These ponds were reportedly shallow, having a maximum depth of an estimated 4 feet. Assuming that a one foot depth of ash remained in these ponds at the time they were closed and filled, the amount of ash presently in the ash lagoons would be 4,540 cubic feet of material.

It should be noted that these lagoons were designated as fly ash lagoons. The physical character of fly ash is that it is composed of microscopic glassy spheres which are highly resistant to leaching under environmental conditions typical of Long Island.

5.0 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

To insure the accuracy and validity of groundwater samples, the following QA/QC field activities were performed:

- o The drill rig and all down-hole equipment including auger flights, sampler rods, and split-spoon samplers were decontaminated by steam-cleaning between well clusters sites.
- o Split spoon samplers were thoroughly brushed and rinsed in fresh water between sampling events.
- o The combustible gas indicator and HNU were calibrated regularly with a standard gas mixture according to manufacturers instructions.
- o Well screens casing, and filter pack material were inspected for meeting manufacturer's specification adherence (slot size) and for oil, grease, or dirt before installation and backfill.
- o Protective steel casings were installed around each well riser. Padlocks were installed to lock well caps immediately after well installation to prevent tampering.
- o Groundwater sampling was accomplished with the use of new, dedicated teflon bailers and dedicated nylon rope.

- o Decontamination procedures consisted of one rinse of Alkonox detergent wash and two fresh water rinses for sampling gloves and measuring tape during groundwater sampling.
- o Plastic sheeting was secured on and around the protective casing during bailing to prevent foreign material from entering the well.
- o VOC levels were measured before and during bailing as a control check on the analytical results and for health and safety purposes.
- o Groundwater samples were transferred to laboratory pre-cleaned sample bottles and stored in a cooler with ice prior to pick-up by laboratory personnel at the end of each day.
- o A two-point calibration was run on the pH and conductivity meter at the beginning of each day.
- o Chain-of-custody procedures were followed with site samples.
- o Laboratory analytical data for site samples was compared with the laboratory's quality assurance data for data validation.
- o An inspection of the sieve analysis procedures was conducted at the drilling contractor's office.

- o Trip blanks were submitted for the VOA analysis for each day of groundwater sampling.
- o Samples of the fresh water used during well installation were collected and submitted for VOA analysis (Sample QA2-1).

SECTION 6
HAZARDOUS RANKING SCORE

Facility name: Merrick Landfill

Location: Nassau County, Hempstead, N.Y.

EPA Region: _____

Person(s) in charge of the facility: _____

Name of Reviewer: _____ Date: _____

General description of the facility:
 (For example: landfill, surface impoundment, pile, container; types of hazardous substances; location of the facility; contamination route of major concern; types of information needed for rating; agency action, etc.)

Landfill: History of municipal refuse disposal,
adjacent to coastal estuary and
associated wetlands. Overlies
the Magothy Aquifer (aquifer of concern).

Scores: $S_M = 14.1$, $(S_{GW} = 18.46, S_{AW} = 15.9, S_D = 0.0)$
 $S_{FE} = 0.0$
 $S_{DC} = 0.0$

FIGURE 1
HRS COVER SHEET

Ground Water Route Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multi- plier	Score	Max. Score	Ref. (Section)
1 Observed Release	0 45	1	0	45	3.1
If observed release is given a score of 45, proceed to line 4 . If observed release is given a score of 0, proceed to line 2 .					
2 Route Characteristics					3.2
Depth to Aquifer of Concern	0 1 2 3 ✓	2	4	6	
Net Precipitation	0 1 2 3 ✓	1	3	3	
Permeability of the Unsaturated Zone	0 1 2 3 ✓	1	2	3	
Physical State	0 1 2 3 ✓	1	3	3	
Total Route Characteristics Score			12	15	
3 Containment	0 1 2 3 ✓	1	1	3	3.3
4 Waste Characteristics					3.4
Toxicity/Persistence	0 3 6 9 12 15 18	1	18	18	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8	1	0	8	
Total Waste Characteristics Score			18	26	
5 Targets					3.5
Ground Water Use	0 1 2 3	3	9	9	
Distance to Nearest Well/Population Served	0 4 6 8 10 12 16 18 20 24 30 32 35 40	1	40	40	
Total Targets Score			49	49	
6 If line 1 is 45, multiply 1 x 4 x 5 If line 1 is 0, multiply 2 x 3 x 4 x 5			10,584	57,330	
7 Divide line 6 by 57,330 and multiply by 100			S _{gw} = 18.46		

FIGURE 2
GROUND WATER ROUTE WORK SHEET

Surface Water Route Work Sheet						
Rating Factor	Assigned Value (Circle One)		Multi-plier	Score	Max. Score	Ref. (Section)
[1] Observed Release	0	45	1	45	45	4.1
If observed release is given a value of 45, proceed to line [4] . If observed release is given a value of 0, proceed to line [2] .						
[2] Route Characteristics						4.2
Facility Slope and Intervening Terrain	0	1	2	3	1	3
1-yr. 24-hr. Rainfall	0	1	2	3	1	3
Distance to Nearest Surface Water	0	1	2	3	2	6
Physical State	0	1	2	3	1	3
Total Route Characteristics Score					15	
[3] Containment	0	1	2	3	1	3
[4] Waste Characteristics						4.4
Toxicity/Persistence	0	3	6	9	12	15
Hazardous Waste Quantity	0	1	2	3	4	5
	6	7	8	9	10	11
	12	13	14	15	16	17
	18	19	20	21	22	23
	24	25	26	27	28	29
	30	31	32	33	34	35
	36	37	38	39	40	41
	42	43	44	45	46	47
	48	49	50	51	52	53
	54	55	56	57	58	59
	60	61	62	63	64	65
	66	67	68	69	70	71
	72	73	74	75	76	77
	78	79	80	81	82	83
	84	85	86	87	88	89
	90	91	92	93	94	95
	96	97	98	99	100	101
	102	103	104	105	106	107
	108	109	110	111	112	113
	114	115	116	117	118	119
	120	121	122	123	124	125
	126	127	128	129	130	131
	132	133	134	135	136	137
	138	139	140	141	142	143
	144	145	146	147	148	149
	150	151	152	153	154	155
	156	157	158	159	160	161
	162	163	164	165	166	167
	168	169	170	171	172	173
	174	175	176	177	178	179
	180	181	182	183	184	185
	186	187	188	189	190	191
	192	193	194	195	196	197
	198	199	200	201	202	203
	204	205	206	207	208	209
	210	211	212	213	214	215
	216	217	218	219	220	221
	222	223	224	225	226	227
	228	229	230	231	232	233
	234	235	236	237	238	239
	240	241	242	243	244	245
	246	247	248	249	250	251
	252	253	254	255	256	257
	258	259	260	261	262	263
	264	265	266	267	268	269
	270	271	272	273	274	275
	276	277	278	279	280	281
	282	283	284	285	286	287
	288	289	290	291	292	293
	294	295	296	297	298	299
	300	301	302	303	304	305
	306	307	308	309	310	311
	312	313	314	315	316	317
	318	319	320	321	322	323
	324	325	326	327	328	329
	330	331	332	333	334	335
	336	337	338	339	340	341
	342	343	344	345	346	347
	348	349	350	351	352	353
	354	355	356	357	358	359
	360	361	362	363	364	365
	366	367	368	369	370	371
	372	373	374	375	376	377
	378	379	380	381	382	383
	384	385	386	387	388	389
	390	391	392	393	394	395
	396	397	398	399	400	401
	402	403	404	405	406	407
	408	409	410	411	412	413
	414	415	416	417	418	419
	420	421	422	423	424	425
	426	427	428	429	430	431
	432	433	434	435	436	437
	438	439	440	441	442	443
	444	445	446	447	448	449
	450	451	452	453	454	455
	456	457	458	459	460	461
	462	463	464	465	466	467
	468	469	470	471	472	473
	474	475	476	477	478	479
	480	481	482	483	484	485
	486	487	488	489	490	491
	492	493	494	495	496	497
	498	499	500	501	502	503
	504	505	506	507	508	509
	510	511	512	513	514	515
	516	517	518	519	520	521
	522	523	524	525	526	527
	528	529	530	531	532	533
	534	535	536	537	538	539
	540	541	542	543	544	545
	546	547	548	549	550	551
	552	553	554	555	556	557
	558	559	560	561	562	563
	564	565	566	567	568	569
	570	571	572	573	574	575
	576	577	578	579	580	581
	582	583	584	585	586	587
	588	589	590	591	592	593
	594	595	596	597	598	599
	600	601	602	603	604	605
	606	607	608	609	610	611
	612	613	614	615	616	617
	618	619	620	621	622	623
	624	625	626	627	628	629
	630	631	632	633	634	635
	636	637	638	639	640	641
	642	643	644	645	646	647
	648	649	650	651	652	653
	654	655	656	657	658	659
	660	661	662	663	664	665
	666	667	668	669	670	671
	672	673	674	675	676	677
	678	679	680	681	682	683
	684	685	686	687	688	689
	690	691	692	693	694	695
	696	697	698	699	700	701
	702	703	704	705	706	707
	708	709	710	711	712	713
	714	715	716	717	718	719
	720	721	722	723	724	725
	726	727	728	729	730	731
	732	733	734	735	736	737
	738	739	740	741	742	743
	744	745	746	747	748	749
	750	751	752	753	754	755
	756	757	758	759	760	761
	762	763	764	765	766	767
	768	769	770	771	772	773
	774	775	776	777	778	779
	780	781	782	783	784	785
	786	787	788	789	790	791
	792	793	794	795	796	797
	798	799	800	801	802	803
	804	805	806	807	808	809
	810	811	812	813	814	815
	816	817	818	819	820	821
	822	823	824	825	826	827
	828	829	830	831	832	833
	834	835	836	837	838	839
	840	841	842	843	844	845
	846	847	848	849	850	851
	852	853	854	855	856	857
	858	859	860	861	862	863
	864	865	866	867	868	869
	870	871	872	873	874	875
	876	877	878	879	880	881
	882	883	884	885	886	887
	888	889	890	891	892	893
	894	895	896	897	898	899
	900	901	902	903	904	905
	906	907	908	909	910	911
	912	913	914	915	916	917
	918	919	920	921	922	923
	924	925	926	927	928	929
	930	931	932	933	934	935
	936	937	938	939	940	941
	942	943	944	945	946	947
	948	949	950	951	952	953
	954	955	956	957	958	959
	960	961	962	963	964	965
	966	967	968	969	970	971
	972	973	974	975	976	977
	978	979	980	981	982	983
	984	985	986	987	988	989
	990	991	992	993	994	995
	996	997	998	999	1000	1001
	1002	1003	1004	1005	1006	1007
	1008	1009	1010	1011	1012	1013
	1014	1015	1016	1017	1018	1019
	1020	1021	1022	1023	1024	1025
	1026	1027	1028	1029	1030	1031
	1032	1033	1034	1035	1036	1037
	1038	1039	1040	1041	1042	1043
	1044	1045	1046	1047	1048	1049
	1050	1051	1052	1053	1054	1055
	1056	1057	1058	1059	1060	1061

Air Route Work Sheet						
Rating Factor	Assigned Value (Circle One)	Multi- plier	Score	Max. Score	Ref. Section	
[1] Observed Release	(0) 45	1	0	45	5.1	
Date and Location:						
Sampling Protocol:						
If line [1] is 0, the $S_a = 0$. Enter on line [5]. If line [1] is 45, then proceed to line [2].						
[2] Waste Characteristics					5.2	
Reactivity and Incompatibility	0 1 2 3	1		3		
Toxicity	0 1 2 3	3		9		
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8	1		8		
Total Waste Characteristics Score				20		
[3] Targets					5.3	
Population Within 4-Mile Radius	0 9 12 15 18 21 24 27 30	1		30		
Distance to Sensitive Environment	0 1 2 3	2		6		
Land Use	0 1 2 3	1		3		
Total Targets Score				39		
[4] Multiply [1] x [2] x [3]				35,100		
[5] Divide line [4] by 35,100 and multiply by 100						
$S_a = 0$						

**FIGURE 9
AIR ROUTE WORK SHEET**

	s	s ²
Groundwater Route Score (S _{gw})	18.46	340.77
Surface Water Route Score (S _{sw})	15.94	254.08
Air Route Score (S _a)	0	0
$S_{gw}^2 + S_{sw}^2 + S_a^2$		594.85
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2}$		24.40
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2} / 1.73 = S_M =$		14.10

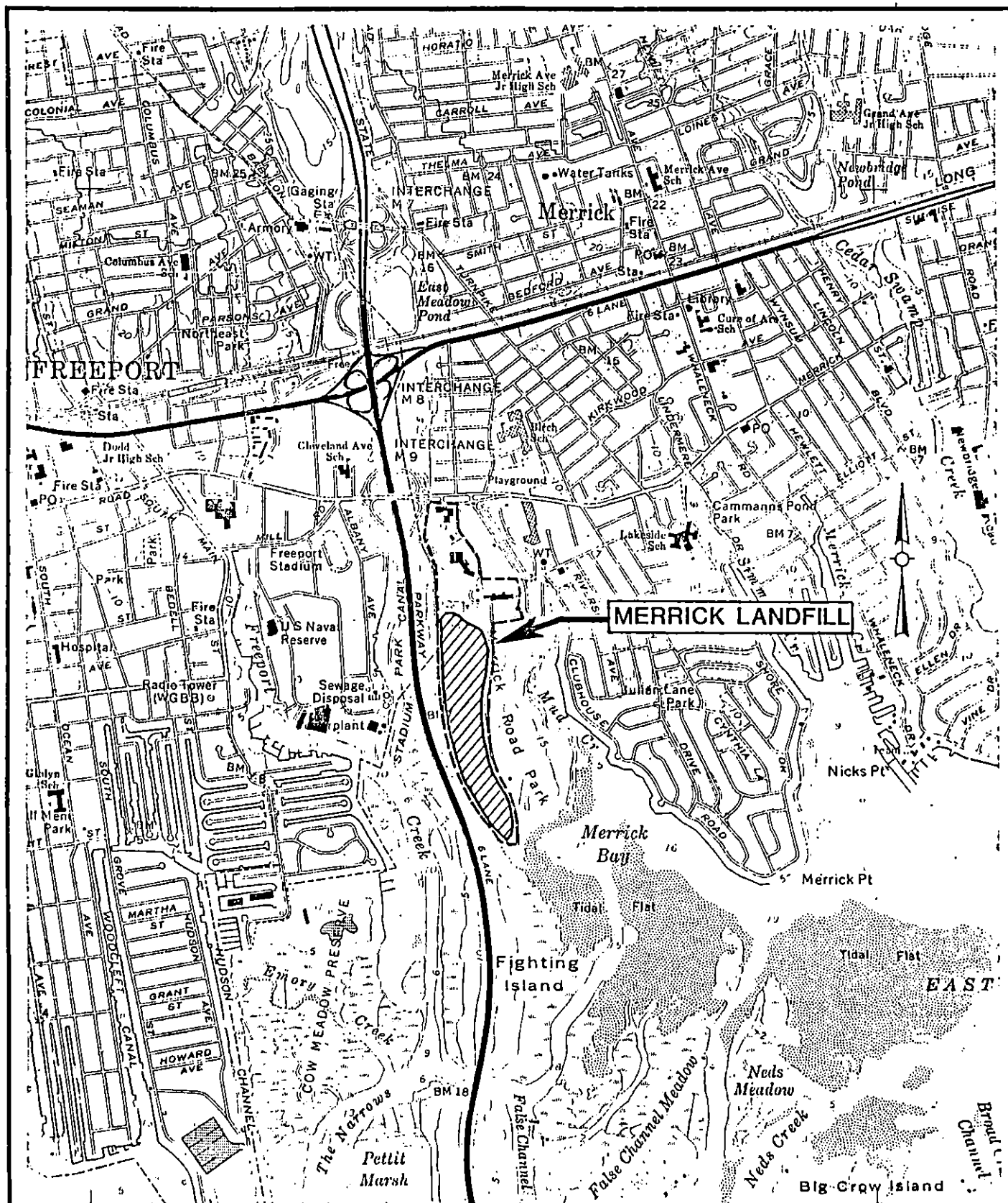
FIGURE 10
WORKSHEET FOR COMPUTING S_M

Direct Contact Work Sheet						
Rating Factor	Assigned Value (Circle One)	Multi- plier	Score	Max. Score	Ref. (Section)	
1 Observed Incident	<u>0</u> 45	1	0	45	8.1	
If line 1 is 45, proceed to line 4 If line 1 is 0, proceed to line 2						
2 Accessibility	<u>0</u> 1 2 3	1	0	3	8.2	
3 Containment	<u>0</u> 15	1	0	15	8.3	
4 Waste Characteristics Toxicity	0 1 2 <u>3</u>	5	15	15	8.4	
5 Targets					8.5	
Population Within a 1-Mile Radius	0 1 2 3 4 <u>5</u>	4	20	20		
Distance to a Critical Habitat	0 1 2 <u>3</u>	4	12	12		
Total Targets Score			32	32		
6 If line 1 is 45, multiply 1 x 4 x 5 If line 1 is 0, multiply 2 x 3 x 4 x 5			0	21,600		
7 Divide line 6 by 21,600 and multiply by 100			SDC = 0			

FIGURE 12
DIRECT CONTACT WORK SHEET

Fire and Explosion Work Sheet									
Rating Factor	Assigned Value (Circle One)					Multi- plier	Score	Max. Score	Ref. (Section)
1 Containment	1	3				1	N/A	3	7.1
2 Waste Characteristics									7.2
Direct Evidence	0	3				1		3	
Ignitability	0	1	2	3		1		3	
Reactivity	0	1	2	3		1		3	
Incompatibility	0	1	2	3		1		3	
Hazardous Waste Quantity	0	1	2	3	4	5	6	7	8
Total Waste Characteristics Score						0		20	
3 Targets									7.3
Distance to Nearest Population	0	1	2	3	4	5	1	5	
Distance to Nearest Building	0	1	2	3			1	3	
Distance to Sensitive Environment	0	1	2	3			1	3	
Land Use	0	1	2	3			1	3	
Population Within 2-Mile Radius	0	1	2	3	4	5	1	5	
Buildings Within 2-Mile Radius	0	1	2	3	4	5	1	5	
Total Targets Score								24	
4 Multiply 1 x 2 x 3								1,440	
5 Divide line 4 by 1,440 and multiply by 100							SFE = 0		

FIGURE 11
FIRE AND EXPLOSION WORK SHEET



MAP SOURCE: U.S.G.S. 7.5 MINUTE SERIES FREEPORT, NEW YORK, QUADRANGLE, 1979
 COORDINATES: LAT. $-40^{\circ}39'08''$, LONG. $-73^{\circ}33'47''$ ----- FACILITY BOUNDARIES

MERRICK LANDFILL PHASE II INVESTIGATION

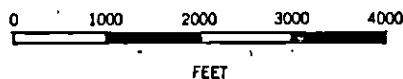


FIGURE 1 SITE LOCATION MAP

Velzy ASSOCIATES

A wholly owned subsidiary of Roy F. Weston, Inc.

DOCUMENTATION RECORDS
FOR
HAZARD RANKING SYSTEM

INSTRUCTIONS: As briefly as possible summarize the information you used to assign the score for each factor (e.g., "Waste quantity = 4,230 drums plus 800 cubic yards of sludges"). The source of information should be provided for each entry and should be a bibliographic-type reference. Include the location of the document.

FACILITY NAME: MERRICK LANDFILL

LOCATION: NASSAU COUNTY, HEMPSTEAD, N.Y.

DATE SCORED: February 1988

PERSON SCORING: Peter Acker (Asst. Project Manager)

PRIMARY SOURCE(S) OF INFORMATION (e.g., EPA region, state, FIT, etc.):

NYSDEC Phase II Investigation, conducted by Velzy/Weston for the Town of Hempstead Sanitation department.
Phase I Investigation., USGS., Geraghty & Miller 1981.
Capping closure plan for the Merrick Landfill (1984-Velzy)

FACTORS NOT SCORED DUE TO INSUFFICIENT INFORMATION:

COMMENTS OR QUALIFICATIONS:

GROUND WATER ROUTE

1 OBSERVED RELEASE

Contaminants detected (5 maximum):

Chlorobenzene
Bis-(2-ethyle-hexyl)pthalate
Heavy Metals

Rationale for attributing the contaminants to the facility:

Primary residential area surrounding the site. Contaminants were discovered only in the downgradient monitoring wells, not in the upgradient wells.

* * *

2 ROUTE CHARACTERISTICS

Depth to Aquifer of Concern

Name/description of aquifers(s) of concern:

Magothy Aquifer

Depth(s) from the ground surface to the highest seasonal level of the saturated zone [water table(s)] of the aquifer of concern:

Depth to water table is five(5) feet at upgradient wells (Upper Glacial Aquifer). Depth to Magothy Aquifer (Aquifer of concern) is sixty (60) feet.

Depth from the ground surface to the lowest point of waste disposal/storage:

During the drilling operation a depth of approximately twenty (20) feet was established as the lower limit of the refuse zone.

Net Precipitation

Mean annual or seasonal precipitation (list months for seasonal):

44 inches

Mean annual lake or seasonal evaporation (list months for seasonal):

22 inches

Net precipitation (subtract the above figures):

22 inches

Permeability of Unsaturated Zone

Soil type in unsaturated zone:

Sands and gravels (Charles R. Velzy Associates, Inc. 1984)

Permeability associated with soil type:

Less than 10^{-3} cm/sec.

Physical State

Physical state of substances at time of disposal (or at present time for generated gases):

Solid

(WCCI, 1985)

3 CONTAINMENT

Containment

Method(s) of waste or leachate containment evaluated:

A natural containment layer in the form of a clay lens and a deeper 20 foot clay unit has been documented in the area underlying the site.

Method with highest score:

Landfill- score of 1

4 WASTE CHARACTERISTICS

Toxicity and Persistence

Compound(s) evaluated:

Chlorobenzene

Bis-(2-ethyl-hexyl)phthalate

Compound with highest score:

Bis-(2-ethyl-hexyl)phthalate; score of 18 (user's manual)

Hazardous Waste Quantity

Total quantity of hazardous substances at the facility, excluding those with a containment score of 0 (Give a reasonable estimate even if quantity is above maximum):

Score of zero (0), less than 1 ton/yd³

Basis of estimating and/or computing waste quantity:

The above rating was based upon the analytical results from samples collected at the site showing a low (20%) incidence of occurrence. Also taken into consideration was the lack of any historical evidence or records which document an incidence of hazardous material disposal.

5 TARGETS

Ground Water Use

Use(s) of aquifer(s) of concern within a 3-mile radius of the facility:
The aquifer of concern, the Magothy, is used within a three mile radius of the site as a municipal potable water supply source.

Distance to Nearest Well

Location of nearest well drawing from aquifer of concern or occupied building not served by a public water supply:

Irrigation well for adjacent golf course

Distance to above well or building:

Less than 2,000 feet from site east from site located on adjacent golf course

Population Served by Ground Water Wells Within a 3-Mile Radius

Identified water-supply well(s) drawing from aquifer(s) of concern within a 3-mile radius and populations served by each:

Potable water well field located approximately 1 to 2 miles north of the site.

Computation of land area irrigated by supply well(s) drawing from aquifer(s) of concern within a 3-mile radius, and conversion to population (1.5 people per acre):

Total population served by ground water within a 3-mile radius:

Assigned value is 5, greater than 10,000 people (user's Manual).

SURFACE WATER ROUTE

1 OBSERVED RELEASE

Contaminants detected in surface water at the facility or downhill from it (5 maximum):

Chlorobenzene
Bis-(2-ethyl-hexyl)phthalate
Heavy metals

Rationale for attributing the contaminants to the facility:

Same rationale used for groundwater section.
An incinerator complex was located on the site which operated with an outfall into the bay. This was also taken into account.

2 ROUTE CHARACTERISTICS

Facility Slope and Intervening Terrain

Average slope of facility in percent:

Coastal plain surrounding site has an average slope of approximately 1%-2%. The landfill slopes range from approximately 1%-50%, with an average of $\pm 20\%$.

Name/description of nearest downslope surface water:

Merrick Bay; Saline estuary with densely populated shorelines and ample wetland acreage. Class AA-NYSDEC Special Classification.

Average slope of terrain between facility and above-cited surface water body in percent:

Slopes range from 10%-30%.

Is the facility located either totally or partially in surface water?

Landfill was constructed upon an original tidal flat.

Is the facility completely surrounded by areas of higher elevation?

No surrounding areas of higher elevation.

1-Year 24-Hour Rainfall in Inches

2.7 inches (user's manual)

Distance to Nearest Downslope Surface Water

zero (0) feet. Lower slope is directly adjacent to surface waters of Herrick Bay.

Physical State of Waste

solid/liquid

* * *

3 CONTAINMENT

Containment

Method(s) of waste or leachate containment evaluated:

A natural containment layer exists in the form of a clay lens below the landfill and the documented existence of a 20' clay layer in the area.

Method with highest score:

If section of the HRS worksheet had been scored a value of one (1) would have been assigned.

4. WASTE CHARACTERISTICS

Toxicity and Persistence

Compound(s) evaluated

Same as in surface water observed release section.

Compound with highest score:

Bis-(2-ethyl-hexyl)phthalate
toxicity - 3
persistence - 3 = 18

Hazardous Waste Quantity

Total quantity of hazardous substances at the facility, excluding those with a containment score of 0 (Give a reasonable estimate even if quantity is above maximum):

A score of one (1) was assigned. (1 ton/yd³)

Basis of estimating and/or computing waste quantity:

The above score was assigned based on a higher incidence rate of contaminants in an area more sensitive to surface water contamination (nearer to estuarine waters). Also taken into consideration was the location of an outfall into the bay from an incinerator complex that had operated on the site in the past. ***

5. TARGETS

Surface Water Use

Use(s) of surface water within 3 miles downstream of the hazardous substance:

Surface waters in the site area are used primarily for recreational purposes (fishing, boating, etc.).

Is there tidal influence?

Yes, the site is located on a tidal flat.

Distance to a Sensitive Environment

Distance to 5-acre (minimum) coastal wetland, if 2 miles or less:

Distance is virtually zero with landfill located adjacent to wetland areas.

Distance to 5-acre (minimum) fresh-water wetland, if 1 mile or less:

Coastal wetlands in area: Sensitive environments harboring marine and animal life. No freshwater wetlands within 1 mile radius.

Distance to critical habitat of an endangered species or national wildlife refuge, if 1 mile or less:

Same as above.

Population Served by Surface Water

Location(s) of water-supply intake(s) within 3 miles (free-flowing bodies) or 1 mile (static water bodies) downstream of the hazardous substance and population served by each intake:

zero (0) population

Computation of land area irrigated by above-cited intake(s) and
conversion to population (1.5 people per acre):

Zero (0)

Total population served:

Zero (0)

Name/description of nearest of above water bodies:

Merrick Bay: Saline estuary

Distance to above-cited intakes, measured in stream miles.

N/A

AIR ROUTE

1 OBSERVED RELEASE

Contaminants detected:

No contaminants detected. A methane monitoring program has been undertaken by the Town of Hempstead. No methane concentrations have been recorded since 1986.

Date and location of detection of contaminants

N/A

Methods used to detect the contaminants:

Soil gas probes were installed in critical areas of the site and monitored periodically for methane levels.
HNU used during field operation

Rationale for attributing the contaminants to the site:

N/A

* * *

2 WASTE CHARACTERISTICS

Reactivity and Incompatibility

Most reactive compound:

N/A

Most incompatible pair of compounds:

N/A

Toxicity

Most toxic compound:

N/A

Hazardous Waste Quantity

Total quantity of hazardous waste:

N/A

Basis of estimating and/or computing waste quantity:

N/A

1 TARGETS

Population Within 4-Mile Radius

Circle radius used, give population, and indicate how determined:

0 to 4 mi

0 to 1 mi

0 to 1/2 mi

0 to 1/4 mi

Not calculated/no elevated contaminant levels found

Distance to a Sensitive Environment

Distance to 5-acre (minimum) coastal wetland, if 2 miles or less:

Adjacent to tidal wetlands

Distance to 5-acre (minimum) fresh-water wetland, if 1 mile or less:

N/A

Distance to critical habitat of an endangered species, if 1 mile or less:

N/A No levels of concern have been documented

Land Use

Distance to commercial/industrial area, if 1 mile or less:

Approximately 0.5 miles west of the site.

Distance to national or state park, forest, or wildlife reserve, if 2 miles or less:

No state or national park is located within a 2 mile radius of the site. Jones Beach State Park is located approximately 5 miles south of the site.

Distance to residential area, if 2 miles or less:

Approximately 0.6 miles

Distance to agricultural land in production within past 5 years, if 1 mile or less:

No lands of this type within 1 mile radius of the site

Distance to prime agricultural land in production within past 5 years, if 2 miles or less:

Same as above

Is a historic or landmark site (National Register or Historic Places and National Natural Landmarks) within the view of the site?

None

FIRE AND EXPLOSION

1 CONTAINMENT

Hazardous substances present:

Bis-(2-ethyl-hexyl)phthalate
Chlorobenzene
Heavy Metals
Volatile Organic Compounds (Voc's)
Methane

Type of containment, if applicable:

Cover materials (soils) which were employed during landfilling operations at the site.

* * *

2 WASTE CHARACTERISTICS

Direct Evidence

Type of instrument and measurements:

VOC's measured using HNU's photoionization device.
Methane monitored using an MSA explosimeter.

Ignitability

Compound used:

Chlorobenzene:	Methane:
LEL - 1.3%	LEL - 5%

Reactivity

Most reactive compound:

Chlorobenzene

Incompatibility

Most incompatible pair of compounds:

Chlorobenzene/strong oxidizers

* * *

Hazardous Waste Quantity

Total quantity of hazardous substances at the facility:

Zero (0) value was assigned

Basis of estimating and/or computing waste quantity:

No evidence of release of contaminants from the site in concentrations high enough to pose an increased fire or explosion risk.

3 TARGETS

Distance to Nearest Population

Same as above

Distance to Nearest Building

Same as above.

Distance to Sensitive Environment

Distance to wetlands:

Site is adjacent to tidal wetlands.

Distance to critical habitat:

Same as above

Land Use

Distance to commercial/industrial area, if 1 mile or less:

Approximately 0.5 miles west of the site.

Distance to national or state park, forest, or wildlife reserve, if 2 miles or less:

N/A

Distance to residential area, if 2 miles or less:

Approximately 0.6 miles east of the site.

Distance to agricultural land in production within past 5 years, if 1 mile or less:

N/A

Distance to prime agricultural land in production within past 5 years, if 2 miles or less:

N/A

Is a historic or landmark site (National Register or Historic Places and National Natural Landmarks) within the view of the site?

Insufficient information

Population Within 2-Mile Radius

Not calculated because of lack of evidence showing an increased fire or explosion risk in the site area.

Buildings Within 2-Mile Radius

Same as above.

DIRECT CONTACT

1 OBSERVED INCIDENT

Date, location, and pertinent details of incident:

No reported incident

2 ACCESSIBILITY

Describe type of barrier(s):

Landfill is located within a secure area. Overnight sentry is posted. Perimeter fence and surrounding surface waters preclude unauthorized entry.

3 CONTAINMENT

Type of containment, if applicable:

Containment exists in the form of cover materials.

4 WASTE CHARACTERISTICS

Toxicity

Compounds evaluated:

Same compounds as stated in previous section.

Compound with highest score:

Bis-(2-ethyl-hexyl)phthalate
score of 18 assigned ***

5 TARGETS

Population within one-mile radius

Not calculated because of no reported incidents and secure nature of the site.

Distance to critical habitat (of endangered species)

Site is located directly adjacent to a tidal estuary with considerable wetland acreage.

7.0 CONCLUSIONS

On the basis of the Phase I and Phase II Investigations several conclusions can be drawn about the groundwater system, the extent of the HSL contaminants present and the pathways and receptors potentially impacted by the Merrick Landfill.

It was confirmed that the landfill is underlain by a clay layer which, in the site area, separates the Upper Glacial Aquifer from the drinking water aquifer, the Magothy. Groundwater elevations around the site deviate from those predicted by regional groundwater contours. The groundwater elevations observed are believed to be due to radial flow from the landfill with modifications due to the tidal effects.

It was established that salt water intruding from Merrick Bay is present beneath the site, rendering the groundwater unsuitable for potable use. Only low levels of heavy metals were found in site groundwaters; these levels may reflect, in part, the insolubility of heavy metals in seawater present beneath the site. Organic contaminants were also present at low levels in site groundwaters. Only two HSL organic contaminants were present at concentrations above their CLP detection limits, bis (2 ethylhexyl) phthalate and chlorobenzene. Out of the eleven downgradient site wells, only three show any HSL contaminant levels above CLP detection limits. Overall, groundwaters beneath the site cannot be characterized as contaminated by organic compounds.

The findings of the Hazard Ranking Score method were:

- o The air is not a significant contaminant pathway at the Merrick Landfill.
- o Groundwater is not a pathway of direct human health concern, since the water is non-potable.
- o Groundwater is of moderate environmental concern since it ultimately discharges to the marine environment. However, several physical-chemical processes exist in estuarine waters and sediments which may act to attenuate any contaminant migration.
- o Surface water discharge is a pathway of moderate environmental concern. Surface water discharges were not observed during the Phase II Investigation but may occur from time to time in periods of heavy precipitation.

The Hazard Ranking Score methodology used to rate the hazardousness of a site, gave an overall score of 14.10 out of a possible 100. The HRS of 14.10 indicates that there are no significant contaminant pathways existing at the Merrick Landfill.

8.0 REFERENCES

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