~~NORTH~~
~~HEMPSTEAD, NY~~

GERAGHTY
& MILLER, INC.

Consulting Ground-Water Geologists and Hydrologists

WATER RESEARCH BUILDING
PORT WASHINGTON, NEW YORK 11050

Report to: Town of North Hempstead

EVALUATION OF GROUND-WATER CONDITIONS

LANDFILL L-4

TOWN OF NORTH HEMPSTEAD

February 1977

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Consulting Ground-Water Geologists and Hydrologists
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Geraghty & Miller, Inc. has reviewed the report entitled "Effects of Town of North Hempstead Sanitary Landfill on Wells of the Port Washington Water District," prepared by Henderson and Casey, Consulting Engineers, and dated July 14, 1976. The purpose of this analysis is to comment upon a number of points raised in the report and to present our findings, conclusions and recommendations with regard to the situation. For simplicity, comments concerning the Henderson and Casey report will be made on a page by page basis.

On Page 2 it is stated that Well 2 can only be sampled by bailing and analytical "results should be viewed with suspicion," noting high iron concentrations. In fact, only one sample (5-74) was collected by bailing. Since then, samples have been taken by setting a pump in the screen zone and pumping the well dry (lowering the water level to the pump intake). The well is then allowed to recover before repeating the process. Evacuating the casing is carried out at least four times prior to sampling, in compliance with accepted techniques.[1] The samples are clearly representative of formation water rather than stagnant water standing in the casing, and there is absolutely no reason to question the results.

Careful reading of the Geraghty & Miller, Inc. June 1974 report would have revealed that at the site of Well 2, fill and rubble were found from land surface to a depth of 28 feet. The volume and nature of this material, dumped prior to commencement of the Town's landfill, is not known. However, leachate from that material has clearly affected shallow ground-water quality in that area. In July 1973 (again before the landfill operation had begun), water samples collected from four test borings 30 to 45 feet deep contained iron in concentrations of 100 to 132 mg/l (milligrams per litre), indicating that the iron concentrations found in Well 2 are valid. Furthermore, the well has produced water with anomalously high levels of ammonia, total Kjeldahl nitrogen, TOC, and in March 1975, phenol (see Appendix). These levels cannot be attributed to any source other than leachate from waste material placed some time prior to any Town activity at the site.

Coliform bacteria are mentioned on Pages 2 and 3 of the Henderson and Casey report. These are not considered to be a valid monitoring parameter due to the relatively short distances that they are capable of traveling through soils. They are not included in the ground-water sampling program recommended for the landfill in a letter dated June 21, 1976 from Mr. William Bentley of the New York State DEC to the Town.

On Page 3 it is stated that "groundwater contamination moving laterally might not be evident in the monitoring wells at the site (1, 2, 3 and 4) for a very long period of time," ostensibly because the wells are too deep and clay lenses are found between the well screens and landfill surface. This may be true for Wells 3 and 4, located upgradient for background data, but not for Wells 1 and particularly 2. The latter are located downgradient from the landfill and are screened at shallow depths with the tops of the well screens only about 49 and 9 feet below the water table for Wells 1 and 2, respectively. In addition, there is hydraulic interconnection between the wells as evidenced by the fact that pumping from Well 1 lowers the water level in Well 2. It is most unlikely that leachate, if it were to reach the ground-water system, would not be intercepted by one or both of the wells.

On Page 6 of the Henderson and Casey report, a discussion of how water can enter the landfill is presented. The mechanisms are direct precipitation on the landfill and runoff and groundwater flow into it from surrounding banks. It should be considered desirable to minimize the amount of water reaching the waste so that lesser volumes of leachate are produced and disposed of. Runoff into the fill can be eliminated by means of drainage ditches around the perimeter of the site. Upon completion of each portion of the site, proper covering, grading and planting will greatly reduce infiltration of precipitation. In one study of simulated landfills, which received 46 inches of water (about equal to the average yearly precipitation on Long Island) over an 8.5-month period, leachate produced at two units covered with vegetation totalled only 1.59 and 1.27 inches. [2)]

Ground-water flow into the refuse cannot take place at the North Hempstead landfill because the landfill is above the water table. A very small amount of percolating or perched water could enter it from the surrounding banks but would have no significant effect.

A statement on Page 7 asserts: "Leachate will drain directly to the soil through the banks. The seepage through the higher elevations along the banks to the south, west and north constitute (sic) a major threat to the water supply of the entire peninsula. Contaminated leachate entering at upwards of 100 feet and more (up to elevation $150^{\pm}$ msl) above the normal groundwater elevation ($20^{\pm}$ msl) at the site will be capable of very lengthy lateral travel against and with the normal groundwater flow."

Water infiltrating the landfill will move as unsaturated flow only after the field capacity of the refuse has been reached. In other words, the refuse will absorb and retain water up to a point. Beyond that point, excess water moves downward under the influence of gravity, following the path of least resistance or highest permeability. Since the fill is probably more permeable than the bank surfaces, the percolating water should move downward through the fill until it reaches a zone of saturation at a relatively low elevation - the surface of the leachate contained within the liner (Figure 1). Were it to reach the water table, its movement would then be to the east, the direction of shallow ground-water flow beneath the site. Seepage into the banks at higher elevations is simply not significant because of the unsaturated flow conditions. To state that the seepage (alleged) constitutes a threat to the water supply of the entire 10-square-mile peninsula is irresponsible and in no way based on scientific evidence or even accepted theory.

In addition, even though seepage into the banks under natural conditions cannot be considered significant, the Town reports that it is taking an added precaution directed toward reducing the potential for moisture from the landfill entering the bank slopes above the PVC liner. This is being accomplished by placement of a clay layer on the slopes. Laboratory permeability test results indicate that the clay material used by the Town should act as an effective barrier against moisture seepage to the soil beyond the banks.

The Henderson and Casey report discusses ground-water contamination in the sand pit area caused by using salt water for past sand and gravel washing and then notes on Page 9 that "it is quite possible that the zone of influence of the three nearby District wells reaches the landfill site." Rather than specu-

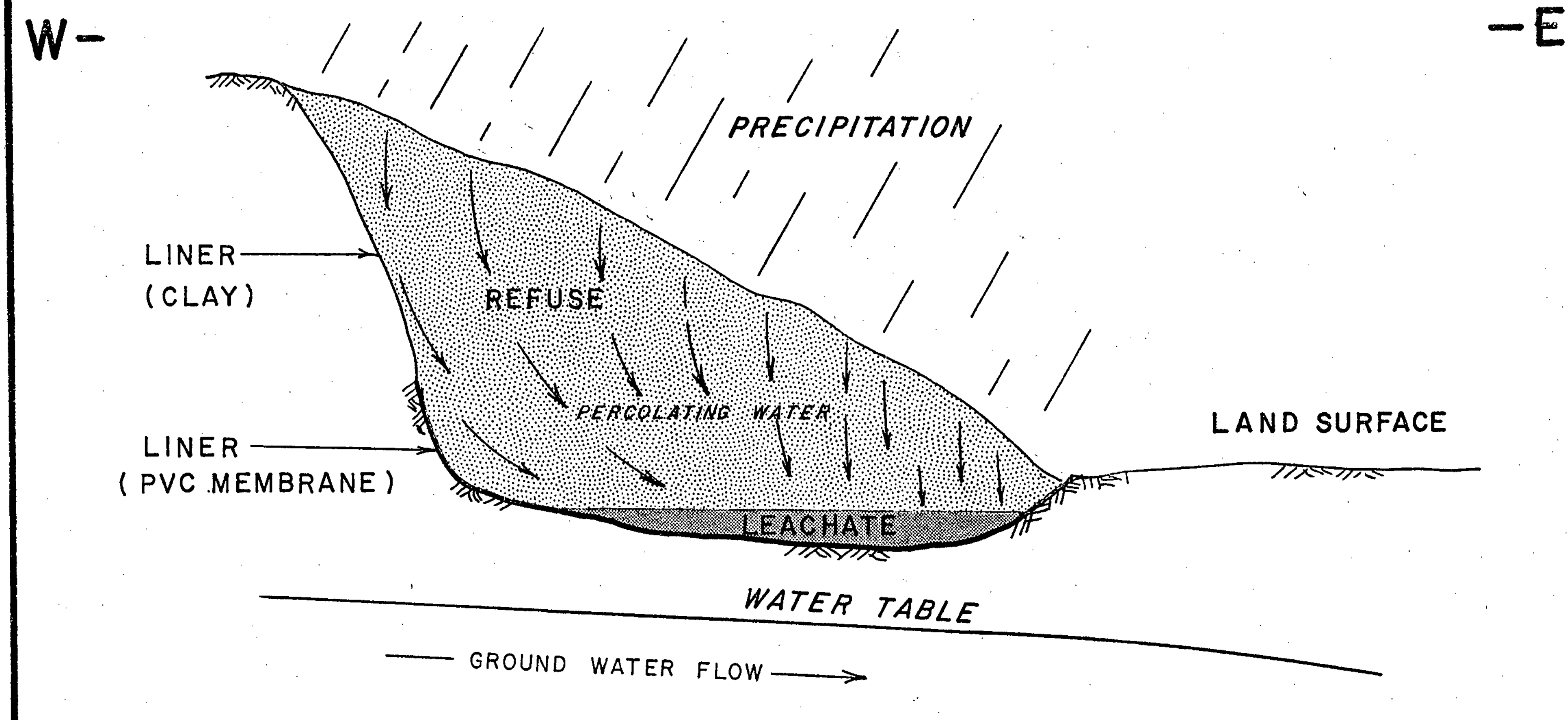

FIGURE 1

ILLUSTRATION OF WATER PERCOLATING LANDFILL
AND REACHING SATURATED ZONE OF LEACHATE IN LINER

TOWN OF NORTH HEMPSTEAD LANDFILL

DRAWING NOT TO SCALE

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late, this possibility should have been investigated. Contamination of ground water from artificial ponds containing salt water pumped from the bay has been known for some time. For example, Swarzenski in his U. S. Geological Survey Water Supply Paper 1657, published in 1963, describes this problem and its impact on aquifers in the area in great detail. 3) In the Geraghty & Miller, Inc. report of June 1974 to the Town on the results of constructing the four monitoring wells, the salt-water contamination problem was pointed out and the following paragraph was included:

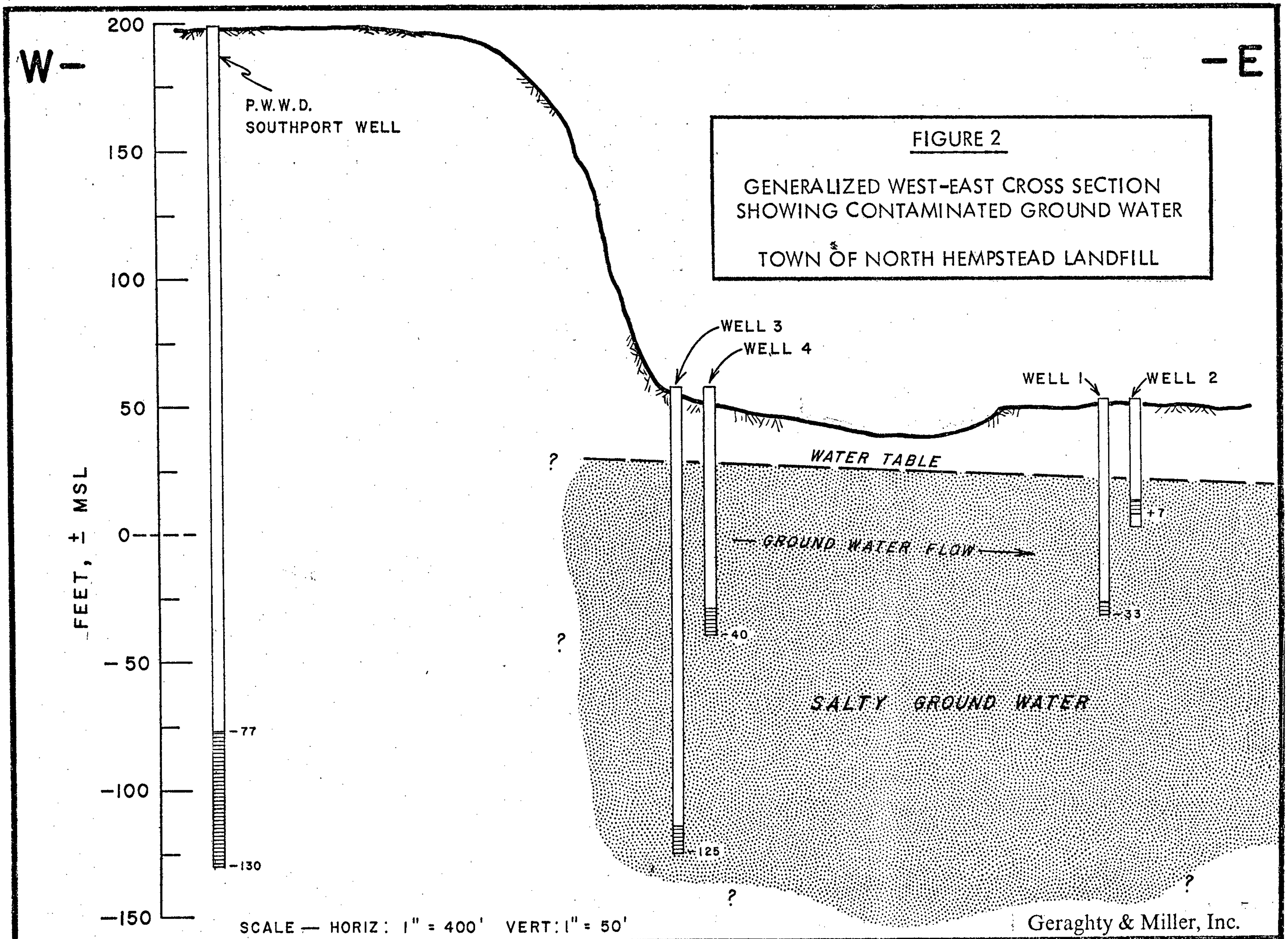
> "A public supply well (N 4223), located off Wakefield Avenue, is operated by the Port Washington Water District. It is possible that this well could be threatened by the contaminated body of water, depending of course, upon hydraulic gradients. It would be advisable to inform the Port Washington Water District of the existing situation. They may wish to conduct pumping tests, utilizing Wells 3 and 4 for observation purposes to determine the direction and rates of ground-water flow."

The District was so informed but to our knowledge never took any action. If no action were taken, a rather disconcerting lack of concern was exhibited, particularly in view of the fact that salt water already in the aquifer is a far more immediate and distinct threat to the District's wells than leachate.

On Page 11 of the Henderson and Casey report, it is stated that "contamination of the landfill operations will eliminate future options for full groundwater exploitation along Hempstead Harbor." This is simply not the case because any ground water that the leachate might reach is already contaminated with salt water (Figure 2). The monitoring wells were installed for the landfill and not to define the vertical and horizontal extent of existing salt-water contamination. However, Well 3 has its screen at a similar elevation to the one in the Southport Well, about 1,500 feet to the west (Figure 2). As noted in the preceding paragraph, the Port Washington Water District could have conducted pumping tests and used this well for observation purposes to determine rate and direction of ground-water flow. Apparently, this was not done.

It is claimed on Page 12 that "it is of particular importance to analyze the leachate at least weekly to get early warning of any toxic material that may be deposited." In fact, there is no justification for such frequent sampling. Any toxic substance deposited in the landfill could take many months or more to show up in the leachate. Furthermore, ground-water flow is laminar and measured in inches per day. Sampling and analysis every three months is quite sufficient for both the leachate and wells. It is important to note that no indication of leachate contamination has been confirmed in the water obtained from the monitoring wells in over two years of sampling.

A number of additional points in the report can be questioned. However, it is felt that the above covers the major items of interest. The following discusses subjects that are


W-
-E
P.W.W.D.
SOUTHPORT WELL
FIGURE 2
GENERALIZED WEST-EAST CROSS SECTION
SHOWING CONTAMINATED GROUND WATER
TOWN OF NORTH HEMPSTEAD LANDFILL
WELL 3
WELL 4
WELL 1
WELL 2
WATER TABLE
GROUND WATER FLOW
SALTY GROUND WATER
FEET, ± MSL
200
150
100
50
0
-50
-100
-150
-77
-130
-125
-40
-33
+7
?
SCALE — HORIZ: 1" = 400' VERT: 1" = 50'
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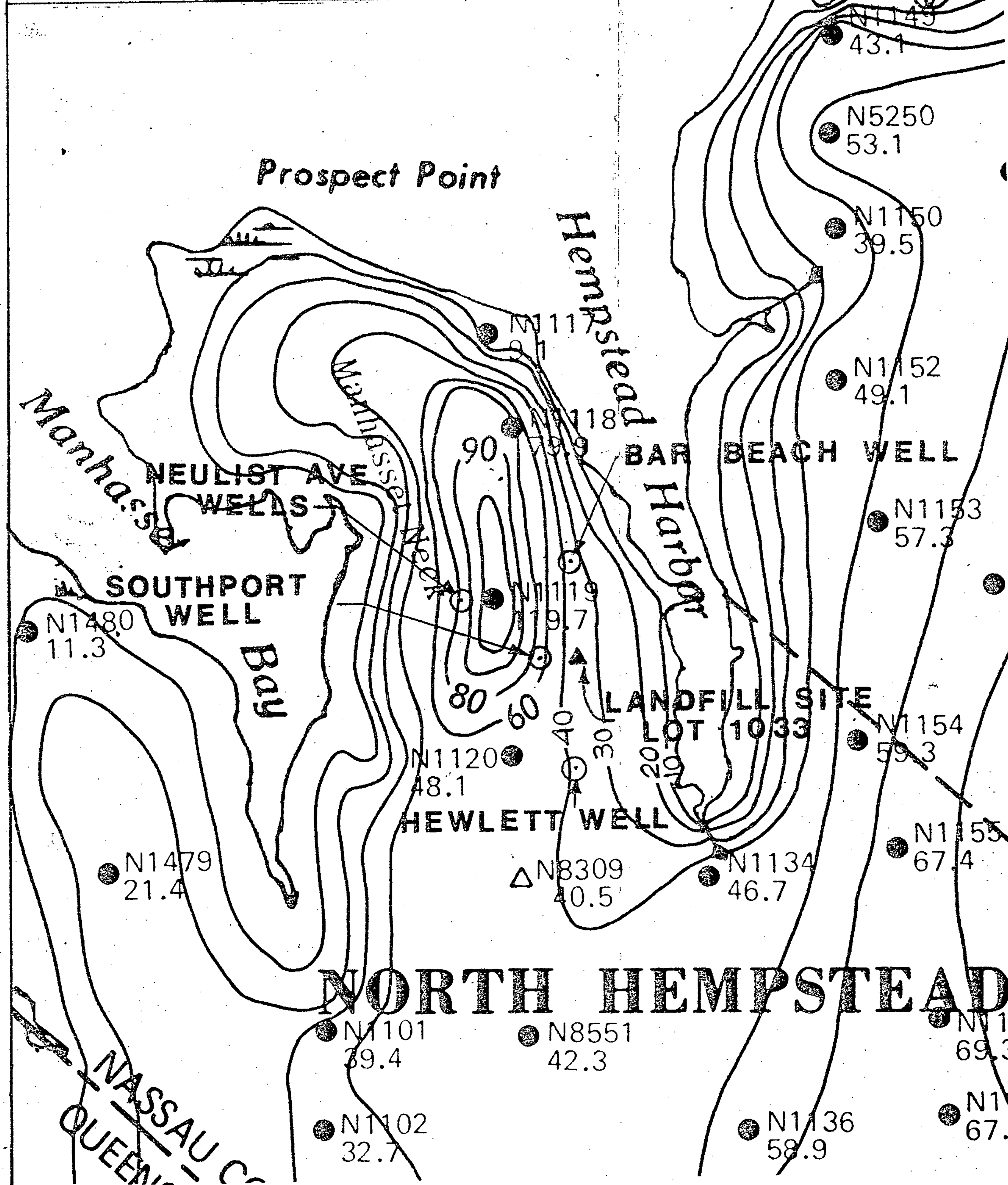
particularly relevant to the situation but which have not been given sufficient emphasis in the Henderson and Casey report. Of primary importance are the facts that the direction of shallow ground-water flow at the site is easterly, toward Hempstead Harbor; that ground water beneath the site and in the area is contaminated with salt water to a depth of at least 125 feet below sea level; and that the nature of the unconsolidated deposits varies significantly, both vertically and horizontally.

Shallow test borings installed at the landfill site in 1973 showed that the water table slopes toward Hempstead Harbor. The same is indicated by Exhibit 3 (copy attached), in the Henderson and Casey report, which is a contour map of the water table in 1974. Because ground water flows at right angles to the contour lines, the flow direction is clearly to the east. The only way the flow patterns could be affected is by pumping, and there are no wells in the vicinity of the landfill that pump significant quantities of water from the water table. Pumpage from greater depths could induce vertical leakage from the water table into underlying artesian zones, but there is no evidence that leakage is great enough to alter flow patterns in the water table. It is not envisioned that any changes will take place in the foreseeable future.

It has been confirmed that ground water beneath the site, to a depth of at least 125 feet below sea level, has been grossly



DEC 20 1976

PORT WASHINGTON WATER DISTRICT TOWN OF NORTH HEMPSTEAD NASSAU COUNTY N.Y.	SANITARY LANDFILL STUDY CONTOUR MAP - WATER TABLE 1974		
	DATE 7-14-76 SCALE 1" = 1 MI.	HENDERSON & CASEY CONSULTING ENGINEERS	EXH. 3

contaminated by past sand and gravel washing operations using salt water. Water samples collected from Wells 3 and 4 have had chloride concentrations as high as 4,100 and 6,600 mg/l, respectively. Such concentrations are from more than 16 to more than 26 times the drinking water limit of 250 mg/l. The Southport Well, located to the west (see Figure 2), reportedly pumps 700 gpm (gallons per minute). Were water with a chloride content of 5,000 mg/l to reach this well and constitute only five percent or 35 gpm of the total pumpage, the well could no longer be used to supply drinking water.

The geology in the sand pit is quite complex. As can be seen from Figure 3, the Southport Well (N 4223) is screened in what appears to be a north-south trending valley of more permeable deposits than are found to the east or west. Under such conditions, the pumping cone of depression created by the well would be elongated to the north and south and not extend a proportional distance to the east or west. This could account for the fact that chlorides in the well water have remained low even though salty water is less than 1,500 feet from the well.

Taking the preceding factors into account, there is no way that the leachate, if it escaped the liner, could reach the Southport Well. To do so, it would have to flow upgradient which is physically impossible. In the very unlikely event that hydraulic gradients were reversed, salt water would reach the

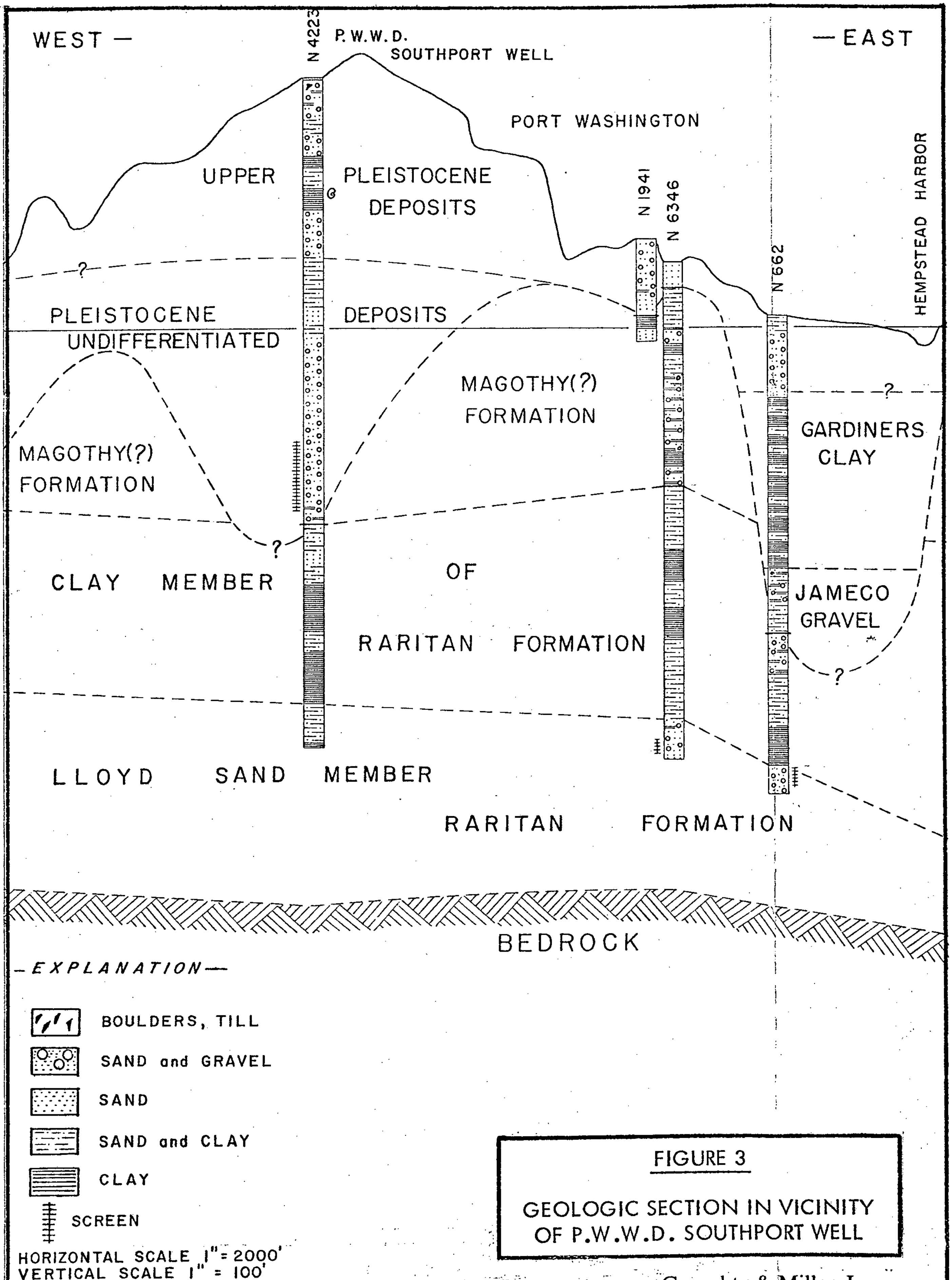


FIGURE 3

GEOLOGIC SECTION IN VICINITY OF P.W.W.D. SOUTHPORT WELL

Geraghty & Miller, Inc.

well long before any leachate did, in accordance with laws governing ground-water flow.

In conclusion, the leachate does not presently and is not anticipated to constitute a threat to the Southport Well or other District wells. Rather, the salt-water contamination problem poses the real threat. Mention has been made of installing additional wells to monitor possible contamination by leachate. Because salt-water encroachment is the only major potential problem, the supply wells themselves can be used for additional monitoring by noting changes in chloride content in the water pumped. A better approach would be for the Water District to install salt-water, outpost monitoring wells between its supply wells and the sand pit area. Additional monitoring wells for leachate, in the vicinity of the landfill, are not necessary.

To be consistent with good management practices, certain actions should be taken at the landfill to minimize leachate generation and to provide for its removal. After field capacity of the refuse is reached, the volume of leachate is proportional to the amount of water entering the refuse. The amount can be lessened by eliminating runoff into the site from surrounding areas by means of drainage ditches. Upon completion of filling operations in one area, the fill can be properly graded, covered and seeded to greatly reduce infiltrating precipitation (discussed previously). Removal of leachate from the site as it is collected would be desirable. Possibly local sewage treatment facilities would be amenable to accepting and treating it. Leachate levels should be monitored and maintained as low as possible. In no case should they exceed the height of the liner edges.

With one exception, no changes in the existing monitoring program are recommended. In order to obtain more data on trace organic chemical compounds, additional analyses should be made during the next round of sampling. These would be carried out on the leachate and water from Wells 1 and 2 and would entail gas chromatograph scans for polychlorinated biphenyls, halogenated pesticides and volatile organics.

Respectfully submitted,

GERAGHTY & MILLER, INC.

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February 25, 1977

References Cited

1. Wehran Engineering Corp. and Geraghty & Miller, Inc., "Procedures Manual for Monitoring Solid Waste Disposal Sites," draft copy prepared for Office of Solid Waste Management Programs, U. S. EPA, 1976, 287 pp.

2. Pohland, F. G., and R. S. Engelbrecht, "Impact of Sanitary Landfills - An Overview of Environmental Factors and Control Alternatives," prepared for American Paper Institute, Feb. 1976, 82 pp.

3. Swarzenski, W. V., "Hydrogeology of Northwestern Nassau and Northeastern Queens Counties, Long Island, New York," U. S. Geological Survey Water-Supply Paper 1657, Washington, 1963, 88 pp.

APPENDIX

Leachate and Monitoring Well Analyses

NORTH HEMPSTEAD LANDFILL MONITORING PROGRAM

Source - WELL 1

Date Sampled (mo./yr.)		5/74	3/75	9/75	5/76	10/76	2/77
Constituent	mg/l as*						
Total Hardness	$CaCO_3$	2,760	2,740	2,300	2,220		
Alkalinity	$CaCO_3$	126	97	84	101		
Conductivity		24,000	10,800	1,450	14,750		
Total Dissolved Solids		14,623	14,420	13,330	13,580	10,700	9,820
Color			- 5	- 5	- 5		
Turbidity			3	3	6		
Sodium	Na	4,360	4,200		3,350		
Potassium	K		165		130		
Calcium	Ca		228		200		
Chloride	Cl	7,825	9,800	1,280	6,200	5,700	5,200
Nitrate	N	2.63	2.40	2.60	3.58		
Nitrite	N	0.231	- 0.001		0.016		
Ammonia	N		0.05		0.05	-0.01	-0.01
Kjeldahl Nitrogen	N		0.07		0.12	0.01	0.03
Iron	Fe	0.25	0.44	0.75	0.82	1.62	1.79
Manganese	Mn	0.04	0.07		0.05	0.11	0.14
Copper	Cu	0.024	0.08		0.05		
Zinc	Zn	0.20	0.37	0.25	0.26	0.28	0.09

*where applicable   - less than

NORTH HEMPSTEAD LANDFILL MONITORING PROGRAM

Source - WELL 1

Date Sampled (mo./yr.)		5/74	3/75	9/75	5/76	10/76	2/77	
Constituent	mg/l as *							
Chromium (Total)	Cr		-0.01		-0.05			
Chromium (Hex.)	Cr^{+6}	-0.01	-0.01		-0.01			
Lead	Pb	-0.1	-0.02		-0.02			
Mercury	Hg		0.042		0.0005			
Arsenic	As		-0.003		-0.003			
Beryllium	Be		0.004		n.d.			
Selenium	Se							
Boron	B				1.33			
Phenol			-0.002		-0.002			
pH		6.2	6.4	6.6	6.3	6.5	6.5	
Sulfate	SO_4	960	922		825			
Phosphate (Total)	P		0.02		0.03			
Phosphate (Ortho)	P		-0.01					
MBAS			0.02		0.44			
COD			107.5	98.8	127.2	115.1	122.0	
TOC					14.3		5	
Total Coliform			-3.0	23.0	-3.0		-3.0	
Fecal Coliform			-3.0	3.6	-3.0		-3.0	

*where applicable - less than n.d. - none detected

NORTH HEMPSTEAD LANDFILL MONITORING PROGRAM

Source - WELL 2

Date Sampled (mo./yr.)		5/74	3/75	9/75	5/76	10/76	2/77	
Constituent	mg/l as*							
Total Hardness	$CaCO_3$	716	1,580	1,840	780			
Alkalinity	$CaCO_3$	688	1,540	1,280	505			
Conductivity		3,400	2,850	3,350				
Total Dissolved Solids		2,208	3,550	4,080	3,420	2,634	2,431	
Color			40	-5	-5			
Turbidity			375	240	79			
Sodium	Na	541	710		660			
Potassium	K		150		100			
Calcium	Ca		184		128			
Chloride	Cl	750	1,050	1,760	1,380	1,160	980	
Nitrate	N	0.20	0.21	1.40	0.13			
Nitrite	N	0.002	-0.001		0.008			
Ammonia	N		9.73		7.70	6.0	5.8	
Kjeldahl Nitrogen	N		9.99		7.78	6.0	9.7	
Iron	Fe	34.8	31.3	73.25	36.70	31.1	27.0	
Manganese	Mn	3.6	7.3			3.76	2.3	
Copper	Cu	0.020	0.04		-0.05			
Zinc	Zn	5.2	13.0	0.30	0.22	0.45	0.16	

*where applicable   - less than

NORTH HEMPSTEAD LANDFILL MONITORING PROGRAM

Source - WELL 2

Date Sampled (mo./yr.)		5/74	3/75	9/75	5/76	10/76	2/77	
Constituent	mg/l as *							
Chromium (Total)	Cr		-0.01		-0.05			
Chromium (Hex.)	Cr^{+6}	-0.01	-0.01					
Lead	Pb	-0.1	0.04		-0.02			
Mercury	Hg		0.064		0.0006			
Arsenic	As		-0.003		-0.003			
Beryllium	Be		0.002		n.d.			
Selenium	Se							
Boron	B				0.67			
Phenol			0.157		-0.002			
pH		6.9	7.1	7.1	6.9	7.0	7.3	
Sulfate	SO_4	130	53		220			
Phosphate (Total)	P		0.02		0.075			
Phosphate (Ortho)	P		0.02					
MBAS			0.26		0.24			
COD			376.3	256.9	112.2	79.4	102.0	
TOC					21.4		33	
Total Coliform			-3.0	23.0	-3.0		-3.0	
Fecal Coliform			-3.0	9.1	-3.0		-3.0	

*where applicable   - less than   n.d. - none detected

NORTH HEMPSTEAD LANDFILL MONITORING PROGRAM

Source - WELL 3

Date Sampled (mo./yr.)		5/74	3/75	9/75	5/76	10/76	2/77	
Constituent	mg/l as*							
Total Hardness	$CaCO_3$	584	1,180	1,720	1,440			
Alkalinity	$CaCO_3$	32	26	27	31			
Conductivity		3,100	4,100	5,130	8,610			
Total Dissolved Solids		1,718	5,000	12,856	8,320	6,928	7,120	
Color			-5	-5	-5			
Turbidity			15	2	8			
Sodium	Na	456	1,200		1,768			
Potassium	K		13.8		25.0			
Calcium	Ca		192		196			
Chloride	Cl	940	2,800	4,100	3,350	3,600	3,600	
Nitrate	N	2.63	3.40	2.70	4.79			
Nitrite	N	0.231	-0.001		0.012			
Ammonia	N		0.13		0.02	0.03	0.04	
Kjeldahl Nitrogen	N		0.26		0.08	0.03	0.15	
Iron	Fe	0.24	2.46	1.19	3.16	3.40	3.10	
Manganese	Mn	0.07	0.11			0.13	0.09	
Copper	Cu	0.015	-0.05		0.13			
Zinc	Zn	0.19	0.19	0.27	0.84	0.26	0.16	

*where applicable - less than

NORTH HEMPSTEAD LANDFILL MONITORING PROGRAM

Source - WELL 3

Date Sampled (mo./yr.)		5/74	3/75	9/75	5/76	10/76	2/77	
Constituent	mg/l as *							
Chromium (Total)	Cr		-0.01		-0.05			
Chromium (Hex.)	Cr^{+6}	-0.01	-0.01		-0.01			
Lead	Pb	-0.1	0.04		-0.02			
Mercury	Hg		0.015		-0.0005			
Arsenic	As		-0.003		-0.003			
Beryllium	Be		0.004		n.d.			
Selenium	Se							
Boron	B				0.17			
Phenol			-0.002		-0.002			
pH		6.0	6.2	6.4	6.2	6.4	6.3	
Sulfate	SO_4	80	320		430			
Phosphate (Total)	P		0.04		0.020			
Phosphate (Ortho)	P		0.01					
MBAS			0.03		0.22			
COD			107.5	71.1	108.5	91.3	83.0	
TOC					12.0		4	
Total Coliform			-3.0	3.6	-3.0		9.1	
Fecal Coliform			-3.0	-3.0	-3.0		-3.0	

*where applicable - less than n.d. - none detected

NORTH HEMPSTEAD LANDFILL MONITORING PROGRAM

Source - WELL 4

Date Sampled (mo./yr.)		5/74	3/75	9/75	5/76	10/76	2/77	
Constituent	mg/l as*							
Total Hardness	$CaCO_3$	2,420	1,700	960	700			
Alkalinity	$CaCO_3$	52	23	23	20			
Conductivity		19,500	5,900	6,070	4,930			
Total Dissolved Solids		9,957	5,248	5,060	4,340	2,350	2,200	
Color			-5	-5	-5			
Turbidity			26	9	5			
Sodium	Na	3,008	2,000		891			
Potassium	K		31.5		18.0			
Calcium	Ca		248		112			
Chloride	Cl	5,350	3,300	6,600	1,740	1,260	1,060	
Nitrate	N	3.64	3.75	9.40	4.92			
Nitrite	N	0.264	-0.001		0.082			
Ammonia	N		0.11		0.04	0.05	0.02	
Kjeldahl Nitrogen	N		0.26		0.10	0.05	0.11	
Iron	Fe	0.35	1.90	3.71	0.57	2.01	1.84	
Manganese	Mn	0.32	0.20			0.10	0.06	
Copper	Cu	0.018	-0.05		0.08			
Zinc	Zn	0.19	1.3	0.18	0.16	0.21	0.06	

*where applicable   - less than

NORTH HEMPSTEAD LANDFILL MONITORING PROGRAM

Source - Well 4

Date Sampled (mo./yr.)		5/74	3/75	9/75	5/76	10/76	2/77	
Constituent	mg/l as *							
Chromium (Total)	Cr		-0.01		-0.05			
Chromium (Hex.)	Cr^{+6}	-0.01	-0.01		-0.01			
Lead	Pb	-0.1	-0.02		-0.02			
Mercury	Hg		0.030		-0.0005			
Arsenic	As		-0.003		-0.003			
Beryllium	Be		0.004		n.d.			
Selenium	Se							
Boron	B				0.33			
Phenol			-0.002		0.003			
pH		5.8	6.0	6.5	6.3	6.4	6.4	
Sulfate	SO_4	650	465		260			
Phosphate (Total)	P		0.08		0.015			
Phosphate (Ortho)	P		0.02					
MBAS			-0.02		0.11			
COD			130.6	39.5	123.4	59.5	55.0	
TOC					8.8		2	
Total Coliform			3.6	2,400	-3.0		-3.0	
Fecal Coliform			-3.0	-3.0	-3.0		-3.0	

*where applicable   - less than   n.d. - none detected

NORTH HEMPSTEAD LANDFILL MONITORING PROGRAM

Source - Leachate

Date Sampled (mo./yr.)		3/75	3/75	9/75	5/76	10/76	10/76	2/77
Constituent	mg/l as*	(manhole)	(pond)			(manhole)	(pond)	(manhole)
Total Hardness	$CaCO_3$	1,260	1,640	14,400	5,200			
Alkalinity	$CaCO_3$	580	740	3,100	4,400			
Conductivity								
Total Dissolved Solids		54	5,329	16,600	17,800	10,388	9,804	10,988
Color		35	50	300	400			
Turbidity		525	680	940	96			
Sodium	Na	440	560		1,400			
Potassium	K	210	275		810			
Calcium	Ca	300	336		992			
Chloride	Cl	680	750	5,000	2,120	2,150	2,200	1,960
Nitrate	N	1.13	0.35	2.90	-0.02			
Nitrite	N	-0.005	-0.005		0.26			
Ammonia	N	174.2	128.8		536.0	460.0	460.0	610.0
Kjeldahl Nitrogen	N		137.5		599.8	572.0	520.0	700.0
Iron	Fe	130.0	88.0	430.0	595.0	1,108.0	112.0	300.0
Manganese	Mn	9.4	15.0			25.4	1.79	7.5
Copper	Cu	0.24	0.07		0.12	0.18	0.18	
Zinc	Zn	16.0	4.9	8.75	17.0	6.4	2.4	3.2

*where applicable   - less than

NORTH HEMPSTEAD LANDFILL MONITORING PROGRAM

Source - Leachate

Date Sampled (mo./yr.)		3/75	3/75	9/75	5/76	10/76	10/76	2/77
Constituent	mg/l as *	(manhole)	(pond)			(manhole)	(lagoon)	(manhole)
Chromium (Total)	Cr	-0.01	0.03		0.16	-0.05	-0.05	
Chromium (Hex.)	Cr^{+6}	-0.01	-0.01		0.148			
Lead	Pb	0.04	-0.02		-0.02	-0.08	-0.08	
Mercury	Hg	0.001	0.029		-0.0005	0.0009	-0.0005	
Arsenic	As	-0.003	-0.003		0.020			
Beryllium	Be	0.003	0.003		n.d.			
Selenium	Se				0.55			
Boron	B				9.0			
Phenol					1.2			
pH		5.8	6.2	6.7	6.4	6.9	7.9	6.9
Sulfate	SO_4	382	336		347			
Phosphate (Total)	P	0.13	0.10		0.075			
Phosphate (Ortho)	P	0.13	0.10					
MBAS		0.33	0.45		0.07			
COD		5,837	6,144	18,574	19,100	8,928	9,920	11,400
TOC					5,700			10,000
Total Coliform		430	2,400	-3.0	240.0			2,400.0
Fecal Coliform		-3.0	-3.0		-3.0			150.0

*where applicable   - less than   n.d. - none detected